

Philips Semiconductors/PKM Laser Optics

Compact Disc



Designer's guide - October 1996



Let's make things better.



PHILIPS

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PHILIPS - making Compact Disc better

INNOVATIVE CD SYSTEM SOLUTIONS

PHILIPS is a company that needs little introduction in the world of Compact Disc. As one of the leading inventors of the Compact Disc player, we have been active since the early 80s in developing all its key components. Leading-edge developments in CD mechanisms, loading mechanisms, circuitry, and control software have continuously kept us at the forefront of this new exciting technology. So that today one can hardly think of CD without thinking of PHILIPS, and the two words together have become synonymous with innovation, quality and high-performance.

PHILIPS LASER OPTICS AND PHILIPS SEMICONDUCTORS –

THE PERFECT TEAM

As the innovative arm of PHILIPS responsible for CD sub-assembly and component development, **PHILIPS LASER OPTICS** naturally has a wealth of technological know-how and experience in this area. Whether your interest is in CD Audio, CD-i, Video-CD, CD-ROM, CD-Recordable, games or completely new applications still on the drawing board, you'll find in us the perfect partner to help you develop your ideas to the full and to translate these ideas into working products. A partner, moreover, who can offer you the application support you need to get your innovative products to market in record time.

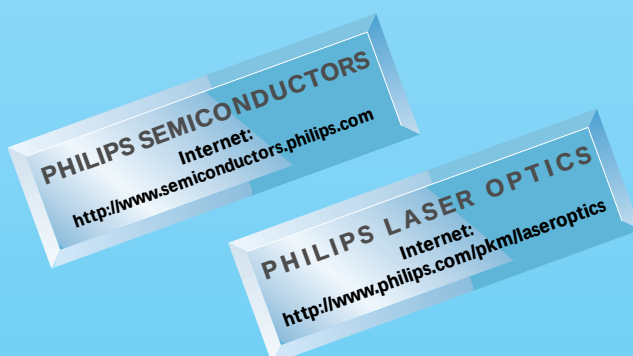
PHILIPS SEMICONDUCTORS is one of the world's largest semiconductor manufacturers with annual sales approaching \$3 billion (1994). The company operates 15 wafer fabrication plants and 8 assembly centres around the world, manufacturing 25 million ICs and discrete semiconductors every day. An innovative total systems approach, embracing both hardware and software, is the foundation on which the company has built an unrivalled reputation as an innovative and reliable supplier of high-quality semiconductors for the consumer electronics market.

In the field of Compact Disc, PHILIPS has consistently led the way in providing ever-higher levels of integration of the various player functions. Specifically, for the CD sector of multimedia, PHILIPS is already sampling products for octal-speed CD ROM drives to meet the astonishing pace at which this sector is advancing.

Together, PHILIPS Laser Optics and PHILIPS Semiconductors is a winning combination that can help you stay competitive in today's markets.

FULL TECHNICAL SUPPORT ON YOUR DOORSTEP

Our worldwide network of sales offices, including offices in Hong Kong, Singapore, Taiwan, Korea, Japan, Brazil, the USA and Europe, means that wherever you operate, you're certain to find one of our representatives nearby. A representative who speaks your language and understands your markets. One, moreover, who can give you full technical support at all levels and provide you with a direct route to our design services. ▶



FUTURE-PROOF DEVELOPMENT

With our broad experience in the whole range of CD-related technologies, we're uniquely placed to support not only your current design projects but also those planned for the future. Together with you, we can formulate a vision of your future market needs and set up a development roadmap with a view to meeting these needs as they arise. For you, of course, this means timely introduction of your products to market, greater competitiveness and continued market success.

CD SYSTEM SOLUTIONS TAILORED TO YOUR NEEDS

To simplify design-in and help you speed up your product creation process, PHILIPS offers a series of CD System Solutions. Each System Solution comprises CD mechanism and loader, key system ICs, software and circuit diagrams, all fully tested and optimized for a specific (reference) application. Each System Solution comes with complete technical documentation and offers a total solution that can be incorporated directly into your product or form the basis for a design evaluation.

Every system is based on a fully-digital concept from optical pick-up, servo and decoding through to the output, providing setmakers high-performance, more features, and a highly reliable adjustment-free system with no ageing effects.

In developing these system solutions, flexibility has been our guiding principle. We can adapt each system concept to meet your specific requirements with regard to interfacing, cost and performance. Enabling you to tailor your products to precisely meet your market needs and keep pace with fast-moving market trends.



Starterkit

STARTER KITS AID DESIGN-IN

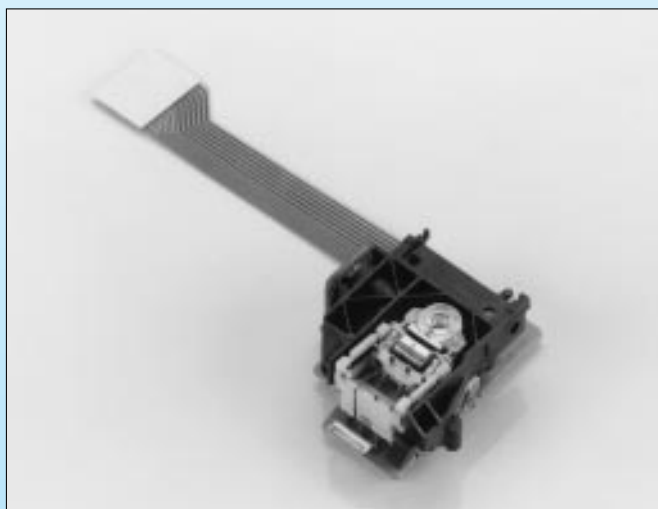
For every CD System Solution, we also offer a Starter Kit – a fully tested, working CD system comprising all the necessary hardware and key components operating according to specification, circuit diagrams and detailed layout documentation for the PC board plus all released software necessary to operate the system.

Since the Starter Kit is guaranteed to meet its specifications, it forms a valuable design-in tool, enabling swift, accurate evaluation for fast design turn-around. It's also valuable as a reference against which to judge the performance of your production models, as a trouble-shooting tool before and after production, and as the basis for your incoming quality control. In all these areas, of course, you can get support from our application-support team.

SUPPORT PRODUCTS

As one of our clients, you can also benefit from the many products that come as a spin-off from our extensive development cycles. The most important of these is software, including our proprietary source codes (called Basic Player Modules). Available subject to licensing agreements, these are designed to offer the highest degree of flexibility for customizing your system to meet specific applications.

Other support products available include test discs, specific measuring equipment and customized measuring tools.



Optical pick-up

ADVANCED CD COMPONENTS AND INTEGRATED CIRCUITS

CD loaders

We offer a broad range of loaders for today's CD applications. These include: tray loaders for audio, games, Video-CD, plus half-height CD-ROM/CD-Recordable loaders. Note, each loader incorporates a CD mechanism from the CDM 12 family (CDM 24 for CD-Recordable).

CD mechanisms

The CDM 12 family of mechanisms are of advanced design, adjustment-free, and provide high-performance with no ageing effects. The family has been developed to suit a wide range of applications. A unique low-mass actuator, with specially developed low-power coils provides fast access in a wide range of equipment from stand-alones to portables. The proprietary Laser Detection and Grating Unit (LDGU) has excellent mechanical and thermal stability under all operating conditions and is highly reliable as it uses few parts. Furthermore, all CDM 12 mechanisms have excellent shock resistance thanks to special suspension components. And, for the highest signal-to-noise ratio, the design of the CDM 12 sledge allows the HF amplifier and laser control circuitry to be mounted on the sledge close to the photodiode detector.

For CD-Recordable applications, there is also the highly-integrated CDM 24 mechanism.

For all these components, advanced fabrication plus economies of scale from mass production guarantee the superior performance and highly competitive prices that have become the hallmark of PHILIPS' CD products.

Integrated circuits

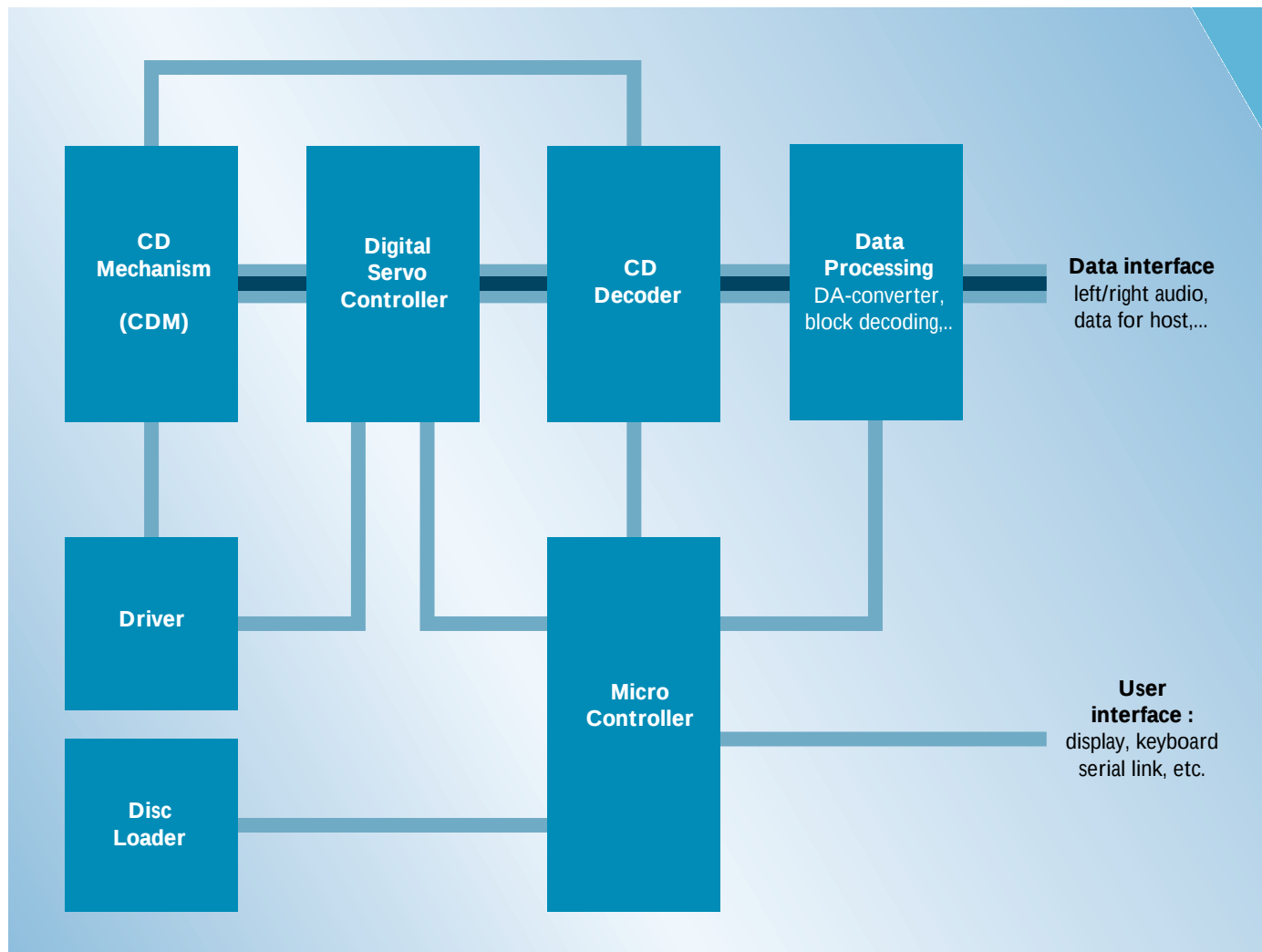
All the CD System Solutions in this guide are characterized by extremely high levels of integration thanks to PHILIPS Semiconductors' high-performance chip sets. These advanced systems-on-silicon solutions require no adjustment, reduce circuitry size, minimize the number of peripheral components, simplify board design and lower assembly costs – cost-saving features with universal appeal. Though many of the ICs used are commodity products, some are custom-designed by PHILIPS Semiconductors to provide the required functionality for a particular CD system. Naturally, this service is also available to customers looking for product differentiation.

TOTAL SUPPORT

The following pages give an overview of the system solutions, integrated circuits, CD mechanisms, loading mechanisms and software available from PHILIPS Laser Optics and PHILIPS Semiconductors. Though impressive, this product range alone cannot fully indicate the support we can offer you. Support that comes from a systems partnership with one of the world's leading innovators in CD technology. Support geared specifically toward helping you solve your problems and develop your products for market. To help you stay competitive today and in the years ahead.

***CD SYSTEM
SOLUTIONS***

The basic CD system



Basic CD system showing the functional blocks in a typical application

CD Mechanism

Consists of a rigid frame housing a motorized turntable that rotates the disc, and a radial mechanism which positions and tracks a single or 3-beam optical pick-up across the disc. The objective lens of the pick-up is moved by a focus coil which focuses a laser light spot onto the information layer of the disc. The laser spots are diffracted by the pits in the information layer to produce returning beams which strike a photodiode assembly.

Data Processing

The data processing section depends on the type of player. In an audio player, it would comprise the digital-to-analog audio conversion circuitry. Other possibilities are:

- MPEG audio/video decoder (Video-CD player)
- Block-decoder with SCSI/IDE interface (CD-ROM drive)
- Block-encoder/decoder with SCSI/IDE interface (CD-Recordable drive)
- Data processor (Games player).

Digital Servo Controller

The photodiode outputs are fed to a servo controller, where they are amplified and selectively summed to produce focus and radial position-error signals. These signals, which represent the actual focus and radial positions, are algorithmically compared with the required position, according to the microcontroller or tracking circuits, and the results used to produce appropriate drive signals for the CD mechanism actuators (tracking and focus). To move the light pen quickly to another part of a disc (e.g. another music track), a motor (termed the sledge motor) is activated.

Driver

The servo driver amplifies the control signals for the various motors. A wide range of digital and analog drivers is available for different applications: stand-alone, single supplied and battery supplied.

Micro-controller

The microcontroller is pre-programmed to provide the processing for the servo system and for the user interface. User commands may be given directly from keys, or via a serial control-bus or remote receiver, according to the application. The microcontroller can also be programmed to drive a range of front-panel display devices.

CD Decoder

The decoder decodes the EFM data signal into serial digital data and sub-code data. After de-interleaving, and descrambling, the integrity of the digital information is tested, and appropriate error-correction or concealment is performed. The resulting data is fed serially as sixteen-bit digital information to the digital-to-analog converter (DAC) or data processing circuit (e.g. for CD-ROM applications). During the decoding process, the decoder monitors the incoming bit-stream rate, maintains it at a constant linear velocity using a phase-locked loop, and produces appropriate drive signals for the disc motor.

Disc Loader

A range of loaders exists to suit a variety of applications. Besides tray and top loaders for stand-alone applications, half-height tray loaders for built-in CD-ROM and CD-Recorder drives are available. All models incorporate a CD mechanism with disc clamping. Discs are normally transported by a motorized disc tray, moulded to accept 12 cm and 8 cm discs. Simple interfacing normally consists of colour-coded wires for the tray motor and detector, and the wire assembly for the CD mechanism.

HIFI

Pre-developed solutions for stand-alone audio sets and stacking systems. Each system features pre-programmed servo and user functions for quick and easy design-in.

HIFI 6000	Total solution featuring optimized digital servo system.
HIFI 6011	As HIFI 6000, but controlled by a user microcontroller via DSA interface.
HIFI 6013	As HIFI 6000, but with improved functions.
HIFI 7000	Advanced HIFI total solution
HIFI 7001	As HIFI 7000, but with microcontroller with on-board LCD driver.
HIFI 7010	As HIFI 7000, but with a 3-disc changer.

PREMIUM

Premium-quality systems providing top performance audio and video, high reliability and easy design-in.

PREMIUM 6000	Pre-developed solution for outstanding performance combined with industrial standards and reliability.
PREMIUM 7050	Pre-developed advanced solution.

MUSIC CENTRE

CCA210	Pre-developed solution incorporating a HIFI 7000 CD system plus 4-waveband stereo radio, and cassette player deck.
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HEADPHONE

These economy, vibration-protected, shock-proof solutions provide a complete range of headphone systems to suit specific personal entertainment environments, while sharing the common features of low power and excellent playability.

HEADPHONE 7000	Headphone solution
HEADPHONE 7001	As HEADPHONE 7000, but with microcontroller with on-board LCD driver.

TV ENTERTAINMENT

A variety of systems for video, audio, karaoke and games applications.

VIDEO 6001	Universal CD-subsystem for video, karaoke and games applications.
VIDEO 6002	As VIDEO 6001 but SMD optimized.
VIDEO 6481	Complete system for video applications with complete MPEG solution.
VIDEO 7000	Complete advanced system for karaoke and video applications with MPEG decoding of audio/video data.
VIDEO 7003	Advanced universal CD-subsystem for video applications.

DATA

A range of pre-developed solutions for CD-ROM drives. All systems are suitable for half-height 5¼" PC drive bays.

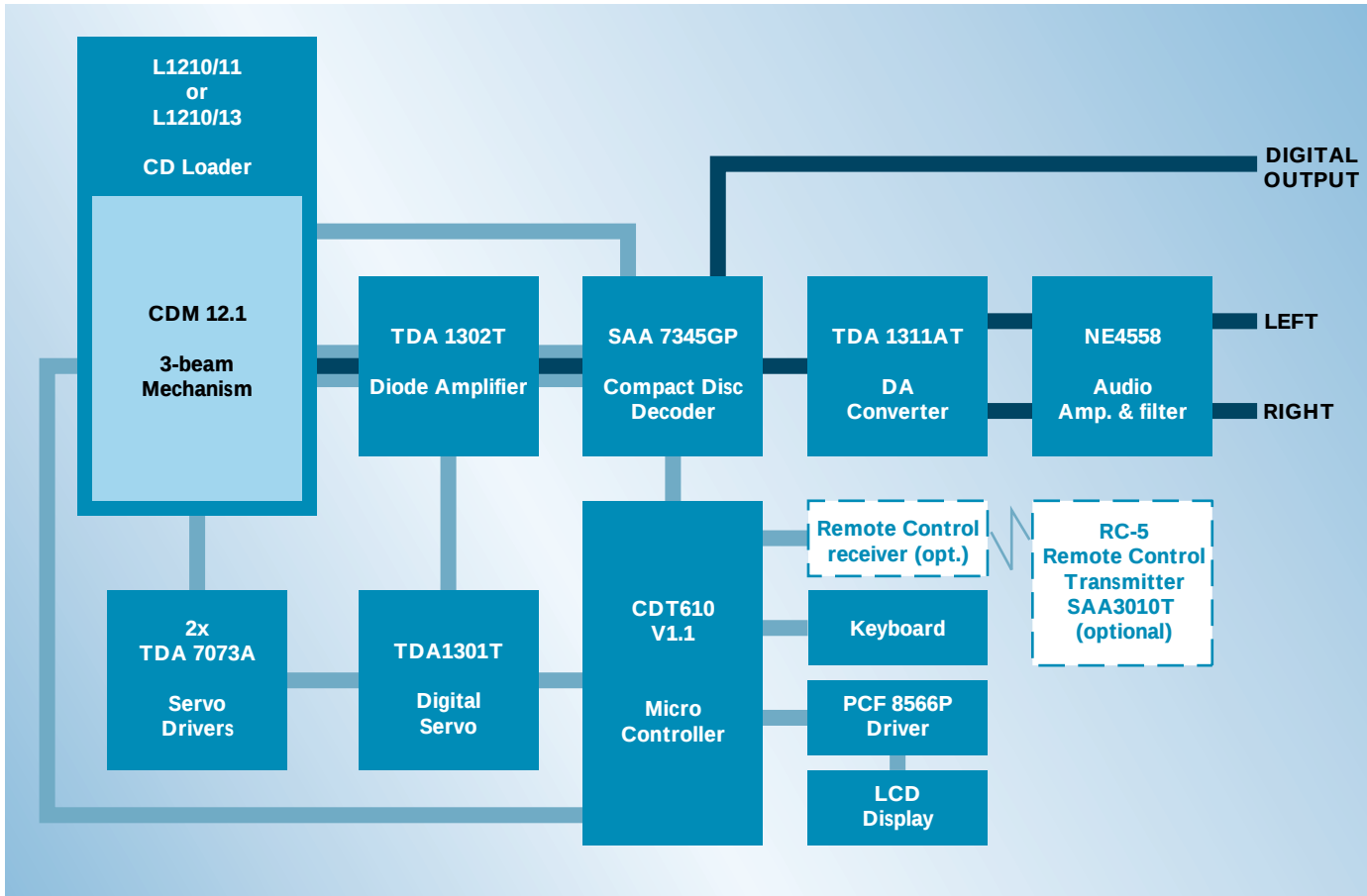
ROM 65100	CD-ROM subsystem; 6x standard data transfer rates.
ROM 65160	CD-ROM system with ROM 65100 and IDE interface; 6x standard data transfer rates.
ROM 65180	CD-ROM system with ROM 65100 and fully integrated SCSI interface; 6x standard data transfer rates.
ROM 65200	CD-ROM subsystem; 8x standard data transfer rates.
ROM 65260	CD-ROM system with ROM 65200 and IDE interface; 8x standard data transfer rates.
ROM 65280	CD-ROM system with ROM 65200 and fully integrated SCSI interface; 8x standard data transfer rates.
ROM 65300	CD-ROM subsystem for high-end applications; 8x standard data transfer rates.
ROM 65360	CD-ROM system for high-end applications with ROM 65300 and IDE interface; 8x standard data transfer rates.
ROM 65380	CD-ROM system for high-end applications with ROM 65300 and fully integrated SCSI interface; 8x standard data transfer rates.
ROA1312/0	CD-ROM subsystem for high-performance applications; 12x standard data transfer rates.
ROA1312/1	CD-ROM system for high-performance applications with ROA1312/0 and IDE interface; 12x standard data transfer rates.
ROA1312/2	CD-ROM system for high-performance applications with ROA1312/0 and fully integrated SCSI interface; 12x standard data transfer rates.
DVD-ROM Prime	DVD ROM system

CD RECORDABLE

A range of high-performance, pre-developed solutions for data and audio recording and playback. Data rates: 2x write; 4x or 6.5x read.

RECORDER E65400	CD-Recordable subsystem featuring fast access, data rates: 2x write; 4x read; suitable for half-height drive bays.
RECORDER D65420	Data subsystem comprising single-chip CD-ROM block-decoder, block-encoder and buffer manager, microcontroller. For use with the E65400 for data-CD-Recorder applications.
RECORDER CDU2600	CD-Recordable subsystem featuring fast access, data rates: 2x write; 6.5x (zoned) read; suitable for half-height drive bays.
RECORDER CDU2620	Data subsystem CDU2600+Chaucer.

Total player solution for stand-alone sets



HIFI 6000 basic system for stand-alone CD players

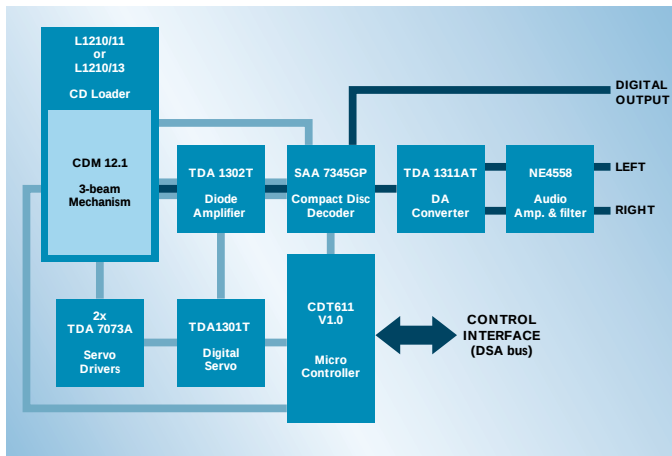
- **Total player solution for stand-alone sets.**
- **L1210/11 or L1210/13 tray-type loader with economy-grade CDM 12.1.**
- **Top loader version available.**
- **Quick design-in thanks to the pre-programmed servo and user functions.**
- **Top performance and playability thanks to the digital servo system.**
- **High-performance digital decoder with high resistance to rotational shock.**

The **HIFI 6000 CD-system** is a complete highly-integrated pre-developed CD-engine for use in stand-alone sets. It includes a mask-programmed micro-controller which provides all the functions of a CD-player including a complete range of user and display functions accessed via a keyboard or infrared remote control.

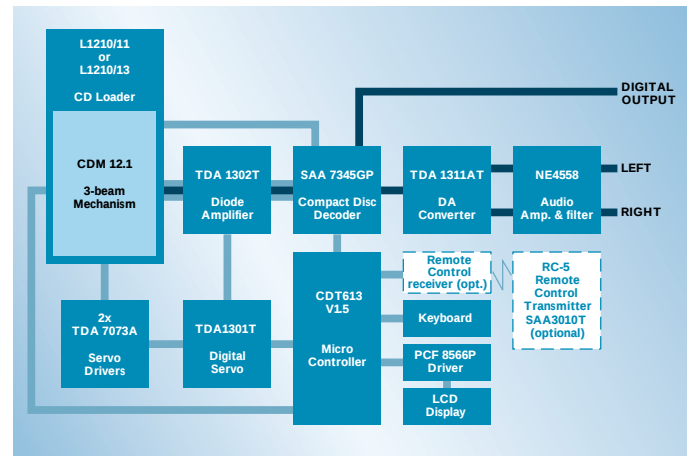
A comprehensive starter kit is available.

The microcontroller controls all the servo and CD-decoder functions plus the input and output user functions: display, keyboard, remote control.

Both the low-height L1210/11 and standard-height L1210/13 loaders include the CDM 12.1 mechanism,



HIFI 6011 basic system for stand-alone audio CD player providing freedom in the design of the user interface



HIFI 6013 basic system for stand-alone audio CD player offering additional features

and use special suspension units to provide the extra damping required for optimal performance against shock and vibration. A top loader version using the CDM 12.1T is an option.

The TDA1302T diode amplifier and laser supply IC buffers the diode signals for the servo control IC. The IC also amplifies and equalizes (option) the HF signal for the CD decoder and controls the power to the laser diode from the CDM 12.1.

The TDA1301T digital servo controller, assures excellent performance owing to advanced features such as enhanced tracking capability and automatic initialization procedures. No external adjustments are necessary.

Power for driving the disc motor, and the focus, radial tracking and sledge actuators is provided by two TDA7073A dual servo power drivers.

The SAA7345 decoder has an embedded 19K SRAM, and uses a unique FIFO overflow concealment technique which provides high resistance to rotational shock. Optimal data detection from the disc is ensured by the

decoder's integrated digital PLL. Communication with the system microcontroller is via a 3-wire interface.

The audio performance depends on which Philips Semiconductors' DAC is used. Shown is a TDA1311A continuous calibration stereo DAC with 16-bit digital input and analog voltage output. This DAC can be replaced by many other types to fulfil individual requirements for cost and performance.

The stereo audio output is provided by a dual general-purpose op-amp.

Derivative systems

The **HIFI 6013 system** is an upgrade of the HIFI 6000 system. It retains all the features of the HIFI 6000 plus:

- Track selection by digit entry.
- Pause/release.
- Blocked-tray protection.
- Both stereo channels 'killed' during digital silence.

The **HIFI 6011 system** is another approach comprising the CD engine of HIFI 6000 but with the CD-system microcontroller controlled by a microcontroller of the customer's own

choice. This allows more freedom in the design of the user interface. In the HIFI 6011 arrangement, the user controller is the master device, communicating with the CD-system microcontroller via the 3-wire DSA (Data, Strobe, Acknowledge) bus.

HIFI 6000 SYSTEM PERFORMANCE (typ. values)	
Disc size	8 and 12 cm.
Formats	CD-DA
Digital output	EBU-standard
Line output	yes

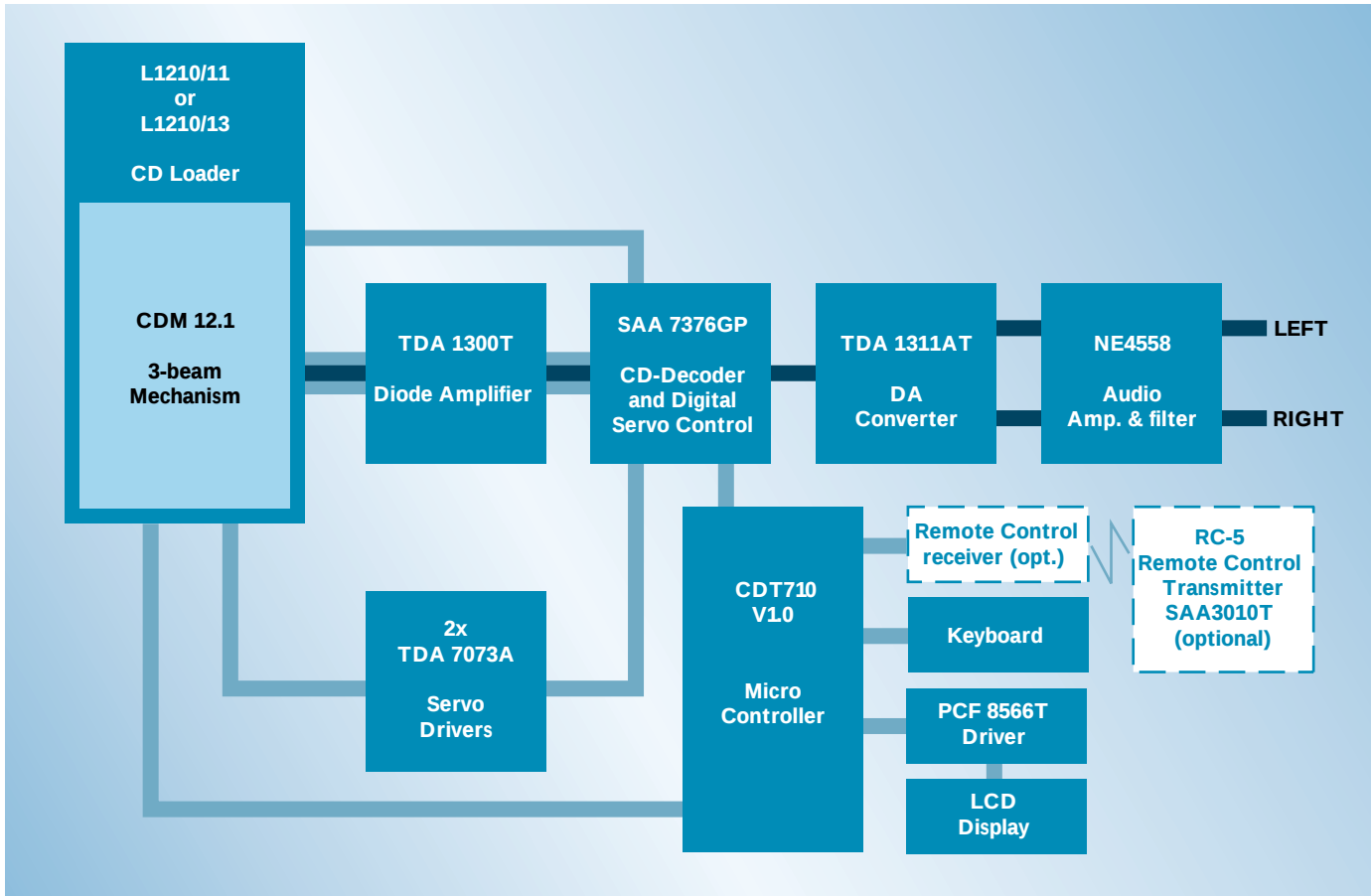
AUDIO PERFORMANCE	
Determined by DA-converter	
T.H.D.	0.04 %
Signal to noise ratio	92 dB
Amplitude (50 kohm)	2 V _{rms}

USER FUNCTION	
Remote / keyboard	scan, open/close, repeat, pause, stop, play, random, previous, next, time, review, program, fast forward, fast reverse

POWER SUPPLY	
Supply Voltage	10 V
Supply current (5 V)	1 A peak, 300mA average

RELIABILITY	
MTBF (25%)	30000 Hr.

Highly-integrated stand-alone player system



HIFI 7000 basic system for stand-alone CD players

- **CD7-system: improved playability and additional features.**
- **One-chip CD-decoder and digital servo controller.**
- **L1210/11 or L1210/13 tray-type loader with economy-class CDM 12.1**
- **Top loader version available.**
- **Quick design-in thanks to the pre-programmed servo and user functions.**
- **Total player solution for stand-alone sets.**

The **HIFI 7000** systems are highly-integrated stand-alone systems for mid-range CD audio players. Each system includes the operating software in a mask-programmed microcontroller. In the HIFI 7001 derivative, the controller has an on-board LCD driver. Both HIFI 7000 and HIFI 7001 are completely pre-developed systems for set manufacturers. Control is via a local keyboard or infrared remote control transmitter.

The system uses the latest semiconductor concept – CD7, Philips' most recent and very-highly-integrated innovation for CD-system solutions. The main feature of a CD7 system such as HIFI 7000 is that it uses a combined CD-decoder and digital servo

controller in one chip, in this case the SAA7376GP. The DAC section is however separate so that the audio performance of the system can be tailored precisely to individual needs.

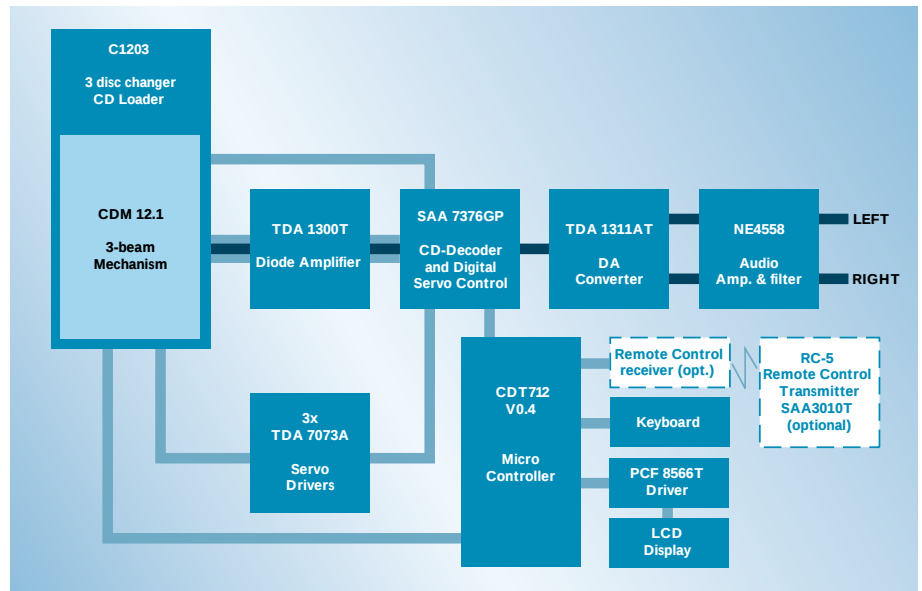
The SAA7376GP decodes and de-interleaves the EFM data and performs full error correction/concealment and digital filtering. It has an embedded 19K SRAM and also controls the speed of the disc motor. The servo control section processes the diode signals to generate servo control signals for the focus and radial tracking actuators and the sledge motor. No external adjustments are necessary.

Power for driving the motors is provided by two TDA7073A dual servo power drivers.

Both the slimline L1210/11 and standard-height L1210/13 loaders include the CDM 12.1 mechanism, and use special suspension units to provide the extra damping required for optimal performance against shock and vibration. A top loader version using the CDM 12.1T is an option.

The TDA1300T diode amplifier and laser supply IC buffers the diode signals for the CD7 decoder. The IC also amplifies and equalizes (option) the HF signal for the decoder and controls the power to the laser diode from the CDM 12.1.

As mentioned, the audio performance depends on which Philips Semiconductors' DAC is used. Shown here is a TDA1311A continuous calibration stereo DAC with 16-bit digital input and analog voltage output. This DAC can be replaced by many other types to fulfil individual requirements for cost and performance.



HIFI 7010 basic system for stand-alone CD-players

The stereo audio output is provided by a dual general-purpose op-amp.

Derivative systems

The **HIFI 7001** is similar to the HIFI 7000 but has a microcontroller with on-board LCD display driver.

The **HIFI 7010** is similar to the HIFI 7000 but has a 3-disc changer (C1203).

HIFI 7000 SYSTEM PERFORMANCE (typ. values)	
Disc size	8 and 12 cm.
Formats	CD-DA
Digital output	EBU-standard
Line output	yes

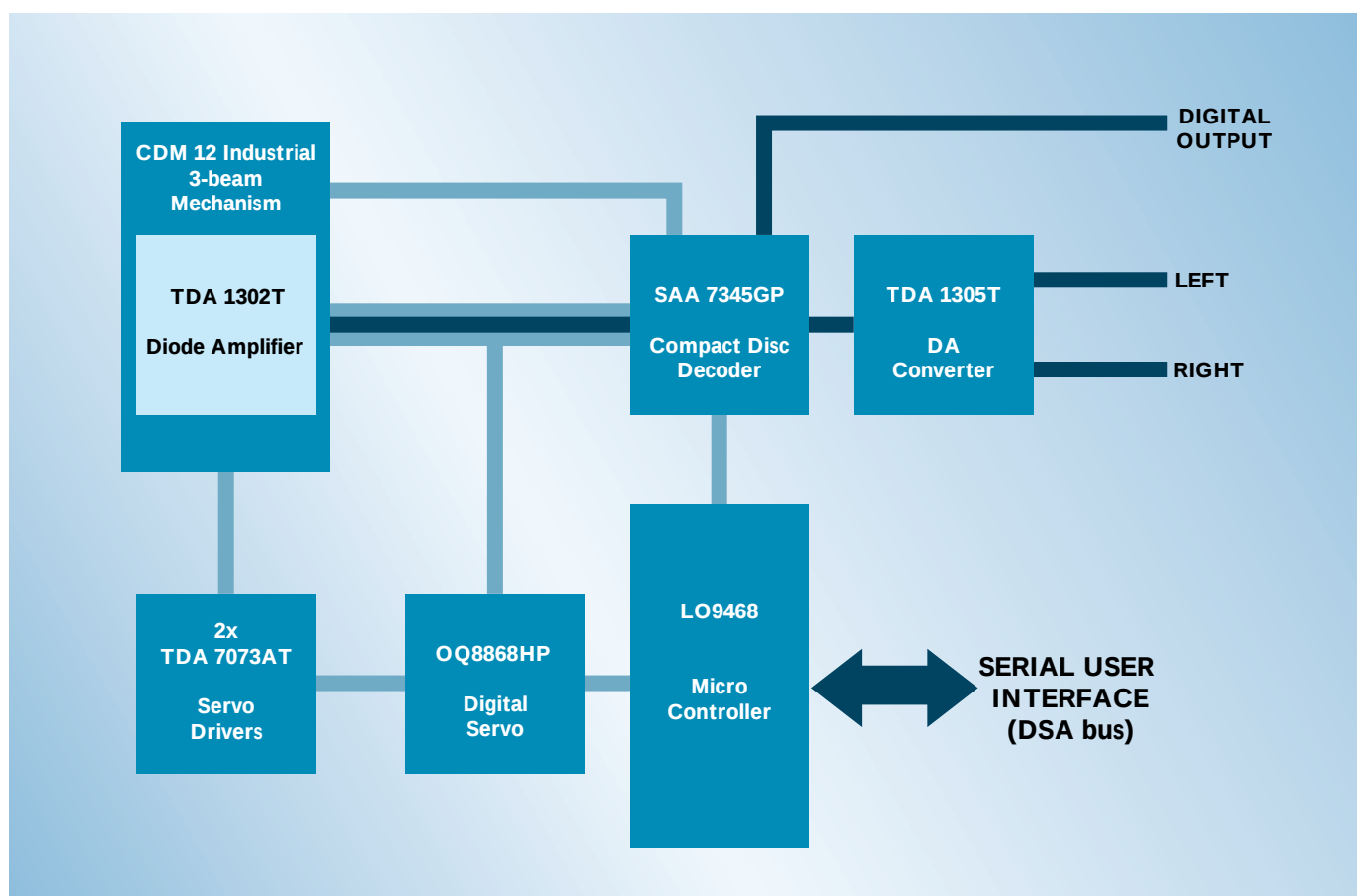
AUDIO PERFORMANCE	
Determined by DA-converter	
THD + noise	0,04 %
Signal to noise ratio	92dB
Amplitude (50k Ω load)	2Vrms

USER FUNCTION	
Remote / keyboard	open/close, play/replay, play by digit, stop/clear, next/prev, search fw/bw, pause, repeat, a-B repeat, random/shuffle, scan, program/review, time formats

POWER SUPPLY	
Supply Voltage	10 V
Requirement supply current	1A peak, 300mA average

RELIABILITY	
MTBF (25%)	30000 Hr.

Outstanding performance and reliability, industrial-standard CDM



PREMIUM 6000 basic subsystem for heavy-duty CD players

- **Pre-developed solution supplied as a completely assembled module, including print-board.**
- **Heavy, industrial-standard CD-mechanism for excellent stability and performance.**
- **Comprehensive serial control interface (DSA).**
- **High-performance digital decoder with high resistance to rotational shock.**
- **Top performance and playability thanks to the digital servo system.**
- **Servo system optimized for minimum operating noise.**

The **PREMIUM 6000** is a complete pre-developed CD-subsystem, combining the benefits of extended performance and easy design-in. The pre-developed system software in the LO9468 microcontroller, for example, reduces design-in time to an absolute minimum.

The subsystem is supplied as an assembled module (MOD JUKEBOX, MOD PRO-AUDIO, see Section 6) to simplify assembly of CD jukeboxes and other professional players.

The CDM 12 concept with the digital servo system, the HF amplifier and laser control system included on the sledge is an extremely robust design, giving extremely high performance.

The microcontroller controls all the servo and CD-decoder functions. Communication with the user micro-processor is provided via a well-defined, customer-friendly 3-wire serial bus, called DSA (Data, Strobe, Acknowledge).

For accurate radial access with minimum jump-noise, the 3-beam CDM 12 INDUSTRIAL mechanism features a sledge motor with high-ratio gearing, controlled by a digital servo system, based on the OQ8868. This unique servo processor has been optimized to provide excellent performance, supported by special features such as enhanced tracking capability and automatic initialization procedures. No external adjustments are necessary.

Special suspension units were developed for the mechanism to provide the extra damping required for optimal performance against shock and vibration (see page 4.10).

The SAA7345 decoder has an embedded 19K SRAM, and uses a unique FIFO overflow concealment technique which provides high resistance to rotational shock. Optimal data detection from the disc is ensured by the decoder's integrated digital PLL. Communication with the system microcontroller is via a 3-wire interface.

Power for driving the disc motor, and the focus, radial tracking and sledge actuators is provided by two TDA7073A(T) dual servo power drivers.

Digital to analog conversion is performed by a TDA1305(T). This IC is a bitstream continuous-calibration stereo DAC with 16-bit digital input, and analog voltage output. The performance of the DAC section can however be enhanced by using another DAC able to fully exploit the superb quality of the digital audio signal produced by this system.

Being fully digital, the complete system has no potentiometers, and no ageing effects.

PREMIUM 6000 SYSTEM PERFORMANCE (typ. values)	
Disc size	8 and 12 cm.
Formats	CD-DA, CD-ROM, CDi, CD ROM XA, CD-Extra, VideoCD, Photo CD, CD-WO(read)
Digital output	EBU-standard
Digital interface	I ² S / EIAJ* Subcode channels Q..W
Line output	yes

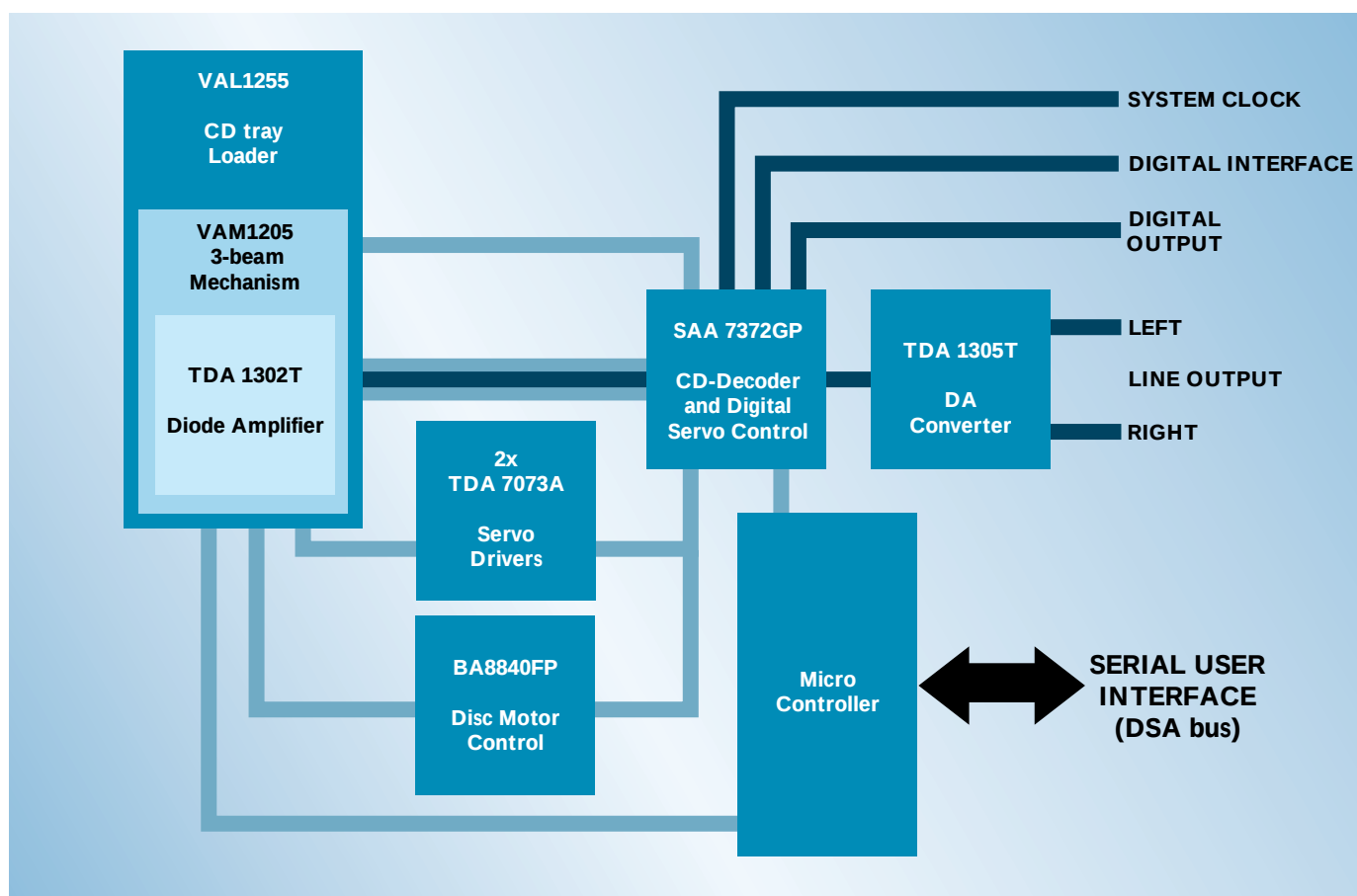
AUDIO PERFORMANCE	
Determined by DA-converter	
Frequency response	20 Hz to 20kHz
T.H.D.	-80 dB
Channel separation	90 dB
Signal to noise ratio	100 dB

POWER SUPPLY	
Supply Voltage	5 V, 9 V
Supply current (5 V)	1 A max.

RELIABILITY	
MTBF (25%)	30000 Hr.

* user programmable format

High-performance audio/video solution



PREMIUM 7050 subsystem

- Suitable for high-end single and double-speed audio and video applications.
- CD7-system: improved playability and additional features.
- One-chip CD-decoder and digital servo controller.
- Comprehensive serial control interface (DSA).
- Servo system optimized for minimum operating noise.

The **PREMIUM 7050** is a complete pre-developed CD-engine for high-end single and double-speed audio and video applications. It combines the benefits of extended performance and easy design-in. The pre-developed system software in the microcontroller reduces design-in time to an absolute minimum.

The VAM 1205 mechanism based on the renowned CDM 12 concept with the digital servo system, the HF amplifier and laser control system included on the sledge is an extremely robust design, giving extremely high performance and long life thanks to the mechanism's brushless disc motor.

The microcontroller controls all the servo and CD-decoder functions. Communication with the user micro-processor is provided via a well-defined, customer-friendly 3-wire serial bus, called DSA (Data, Strobe, Acknowledge).

For accurate radial access with minimum jump-noise, the 3-beam VAM 1205 mechanism features a sledge motor with high-ratio gearing, controlled by a digital servo system. The servo processor has been optimized to provide excellent performance, supported by special features such as enhanced tracking capability and automatic initialization procedures. No external adjustments are necessary.

Special suspension units were developed for the mechanism and loader to provide the extra damping required for optimal performance against shock and vibration.

The system uses the latest semiconductor concept – CD7, Philips' most recent and very-highly-integrated innovation for CD-system solutions. The main feature of a CD7 system such as PREMIUM 7050 is that it uses a combined CD-decoder and digital servo controller in one chip, in this case the double-speed SAA7372GP. CD7 provides improved playability and additional features compared to earlier solutions.

Power for driving the disc drive motor, and the focus, radial tracking and sledge actuators is provided by two TDA7073A(T) dual servo power drivers.

Digital to analog conversion is performed by a TDA1305(T). This IC is a bitstream continuous-calibration stereo DAC with 16-bit digital input, and analog voltage output. The performance of the DAC section can however be enhanced by using another DAC able to fully exploit the superb quality of the digital audio signal produced by this system.

Being fully digital, the complete system has no potentiometers, and no ageing effects.

PREMIUM 7050 SYSTEM PERFORMANCE (typ. values)

Disc size	8 and 12 cm.
Formats	CD-DA, CD-ROM, CDi, CD ROM XA, CD-Extra, VideoCD, Photo CD, CD-WO(read)
Digital output	EBU-standard
Digital interface	I ² S / EIAJ* Subcode channels Q..W
System clock output	16 MHz
Line output	yes

AUDIO PERFORMANCE

Determined by DA-converter

Frequency response	20 Hz to 20kHz
T.H.D.	-80 dB
Channel separation	90 dB
Signal to noise ratio	100 dB

POWER SUPPLY

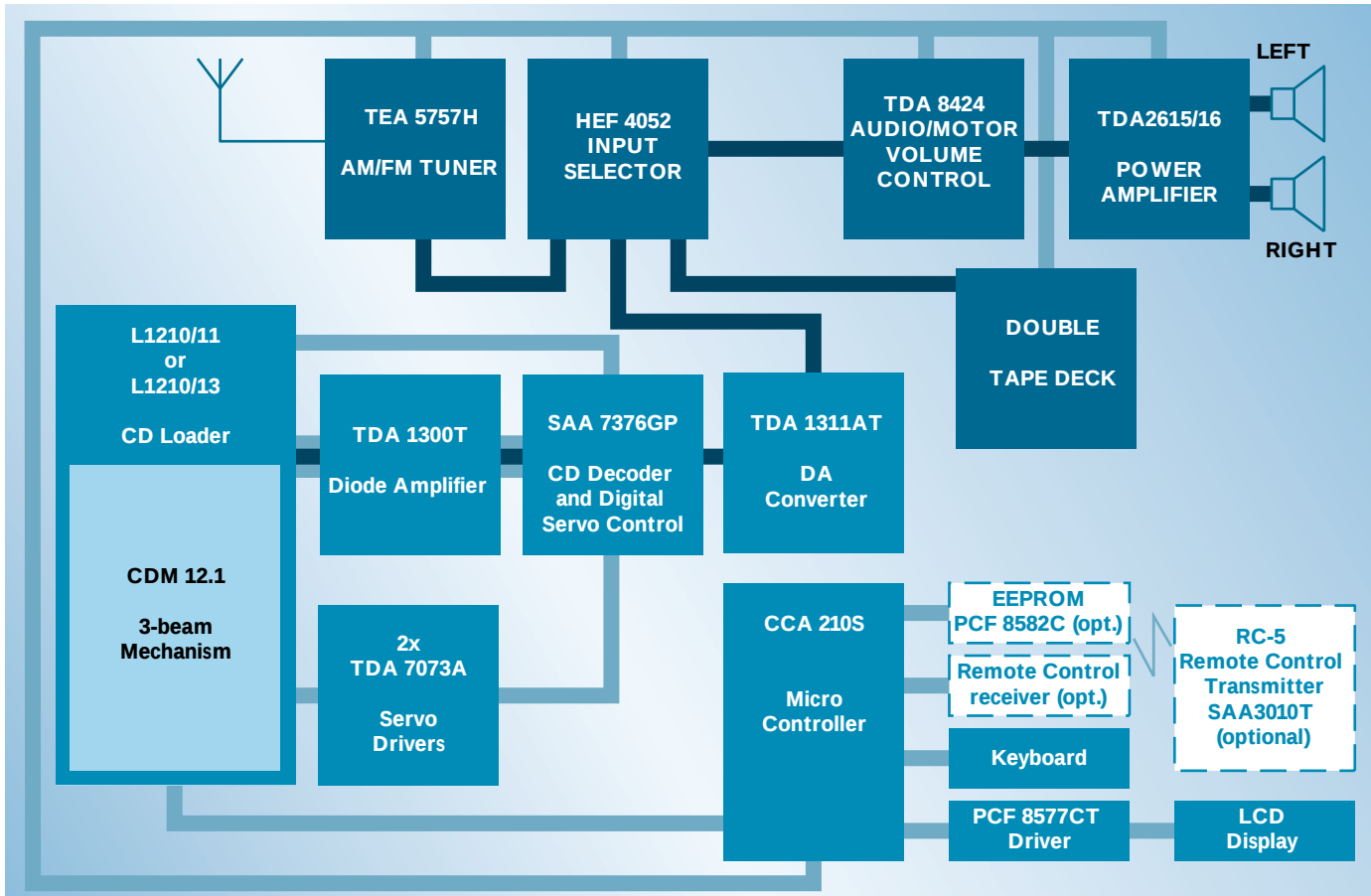
Supply Voltage	5 V, 9 V
Supply current (5 V)	1 A max.

RELIABILITY

MTBF (25%)	30000 Hr.
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* user programmable format

Music-centre solution



CCA 210 music-centre system incorporating a HIFI 7000 CD system

- **Single microcontroller system for:**
 - CD system such as HIFI 7000
 - digitally-tuned four-band radio system
 - single/double cassette tape deck
 - electronically-controlled audio
 - clock/timer/sleep function.
- **Suitable for a wide range of battery and mains-fed equipment (fixed and portable).**

The **CCA210** is a computer-controlled music-centre system for battery and mains-fed portables, micro and mini audio systems. It comprises an FM, MW, LW and SW stereo radio (based on a self-tuned radio circuit) combined with a cassette tape deck and a CD player. The entire system is controlled by a single pre-programmed CMOS microcontroller (CCA210S).

The CD part of the music centre is the same as the stand-alone CD player system HIFI 7000 described on page 2-7, but with the microcontroller, LCD driver and display panel replaced by dedicated parts for the music-centre application. The CD player uses the CDM 12.1 mechanism and L1210 motorized tray loader, and provides full CD control including a service mode.

Besides the HIFI 7000, the other key elements of the music-centre are:

TEA5757(H): AM/FM receiver including synthesizer and stereo decoder. Next/previous station searching is fast due to the analog solution, and does not require an IF-counter for stop detection.

HEF4052: input source selector (radio/CD/tape/aux).

TDA8424: I2C-bus controlled hi-fi audio processor for home audio systems. It includes volume, balance bass, treble and mute control (optional).

TDA2615/16(Q): 2 x 10/20W (maximum output power) hi-fi audio amplifier with mute.

PCF8577C(T): I²C-bus controlled LCD driver providing 32 segment drive lines and 2 backplane select lines (64 segments total.)

RC-5 remote control receiver/amplifier (optional).

SAA3010T or PCF84C122: RC-5 remote control transmitter (optional).

Main features of the CCA210:

CD functions

- Tray Open/Close
- Play/Pause
- Stop/Clear (program)
- Next/Previous track (Direct track access via keyboard)
- Search Forward/Reverse (fast and 'slow' search; audio muted during fast search, and attenuated during 'slow' search)
- Repeat (track and disc); A-B repeat (user-defined repeat)
- Random and scan play
- Program/Review (up to 15 tracks)
- 4 disc-time display formats (elapsed, remaining)
- Double audio kill circuit selection

Tuning

- 4 bands: FM, MW, LW and SW
- Search up/down tuning with wrap-around. Actual searching is done by the TEA5757 IC and the found frequency is read by the microcontroller
- Manual up/down tuning
- 10 presets for FM; 5 presets for MW, LW and SW (or FM-LOW in E. Europe); 3 for the Japanese TV band
- Preset scan pausing for 10 s on every station before selecting the next preset in the band
- AST (Automatic Store Tuning) searches for and stores the 10

strongest FM, or 5 strongest FM, MW or SW) transmitters

- Last band and station frequency saved at power off (in standby mode)

Sound control

- Volume up/down control by a motor-driven potentiometer
- Volume, balance, bass and treble control by I²C-bus controlled audio processor or by potentiometers
- Audio select key to select the audio function (bass, treble, balance and volume) to be controlled; control via the audio up/down keys
- 4 stereo source inputs: radio, CD, tape and auxiliary
- Mute output to mute the power amplifiers (via pin or I²C-bus controlled audio processor)
- Last sound settings saved at power off (standby mode).

Clock functions

- 12 hr/24 hr clock display function, also in standby mode (optional)
- Switch on/off timer functions (optional)
- Sleep timer function (90 min. - off - 90 min. in 10 min. intervals).

Display

- 32x2-segment LCD
- Icons: INTRO, REPEAT, RANDOM, SLEEP, TIMER ON/OFF, MEMORY, TRACK, FM, MW, LW, MHz, kHz, CH, AM/PM (clock), STEREO, '5'(5/50kHz FM-L band only)
- Two 7-segment digits for CD TRACK or PRESET
- Four 7-segment digits for frequency and time.

Control

- 36 local keys
- RC-5 remote control (option).

Tape deck

- Key to select tape mode
- Automatic detection of play mode;

pressing the play key switches the system to tape mode

- Interfaces with a mechanically-controlled deck
- CD synchro record mode. In CD mode, the CD starts playing when the tape deck's record key is pressed.

Auxiliary input

- Key to select auxiliary mode.

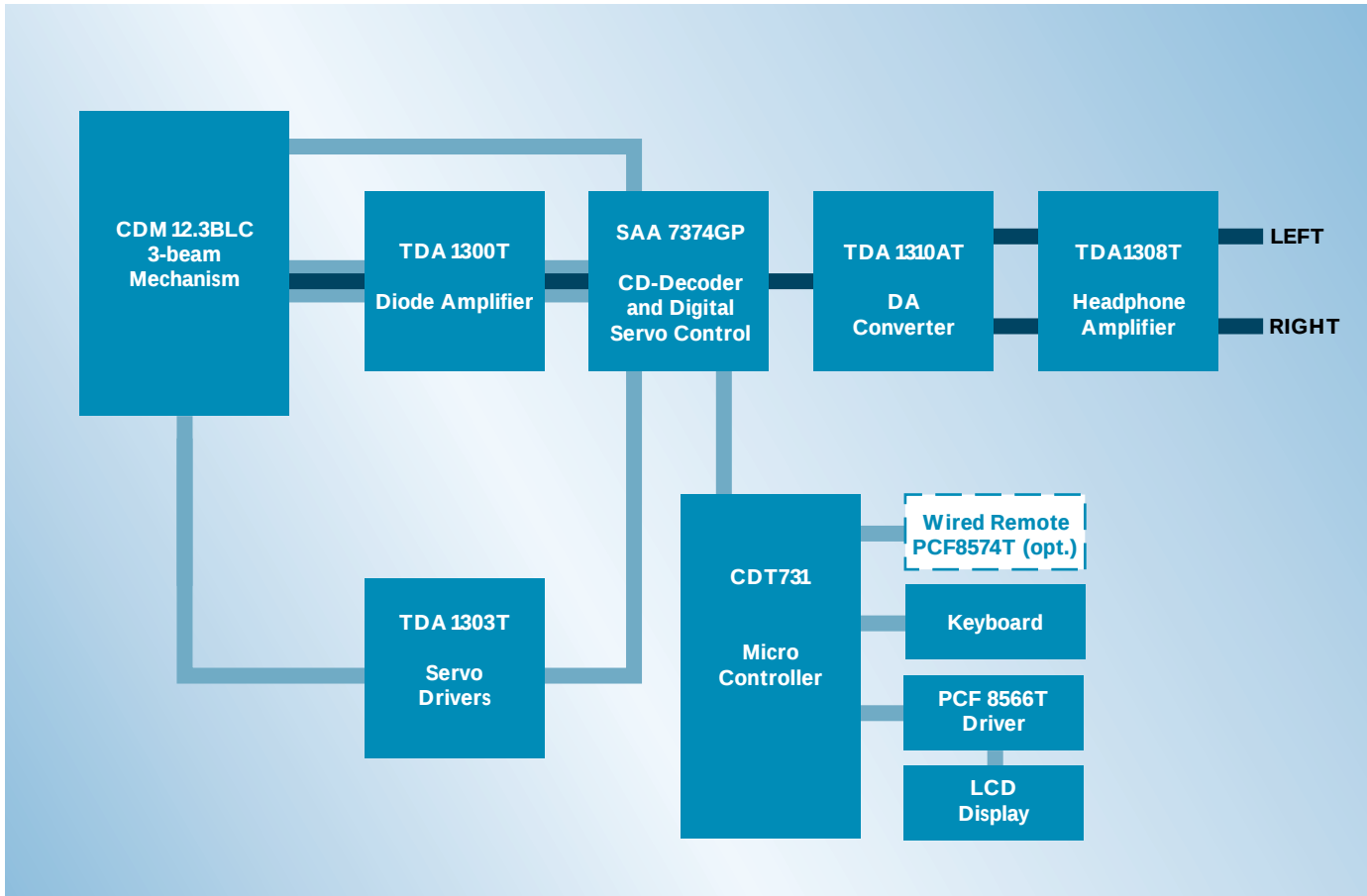
Switching on/off

- Momentary on/off switch
- Continuous mains power supply allows preset data and clock functions to be saved (in RAM) when there is no non-volatile memory (NVM)
- Recall of last mode (radio/CD/tape/aux.). In radio mode, last band, preset and frequency, analog sound settings when switching on from standby
- Clock functions displayed during standby
- First time power-on detection enables preset defaults, analog sound and clock settings
- Output to allow the power supply to be controlled by the timer functions.

Other options

- 256-byte NVM (PCF8582C-2P/T) to store:
 - 10 frequency presets for each band
 - Last selected band, preset number and frequency
- Audio controls: volume, balance, bass and treble
- Selected source: radio, CD, tape and auxiliary
- Switch-on/off timer status and switch-on/off time
- 4 band-switching diodes allow 16 options to suit geographical area and desired bands
- Top loader for CD system

Economical solution for CD headphone stereo players



HEADPHONE 7000 system for mid-range portable CD players

- **CD7-system: improved playability and additional features.**
- **One-chip CD decoder and digital servo controller.**
- **Compact, low-power CD-mechanism CDM 12.3BLC.**
- **Features a unique ball-clamping turntable. No external disc clamping parts are needed.**
- **Low-power, low-voltage – up to 5 hours playing time.**
- **Total player solution for personal, portable systems.**

The **HEADPHONE 7000** is a highly-integrated CD system performing all the functions of a mid-range portable CD player, including software. HEADPHONE 7000 is a low-voltage, low-power consumption system providing long playing time. Fully pre-developed, this system can be used with a customers' own design of case.

The system uses the latest semiconductor concept – CD-7, Philips' most recent and very-highly-integrated innovation for CD-system solutions. The HEADPHONE 7000 system uses a combined CD-decoder and digital servo controller in one chip, the SAA7376GP. This IC decodes and de-interleaves the EFM data and performs full error correction/concealment and

digital filtering. It has an embedded 19K SRAM and also controls the speed of the disc drive motor. The servo control section processes the diode signals to generate servo control signals for the focus and radial tracking actuators and the sledge motor.

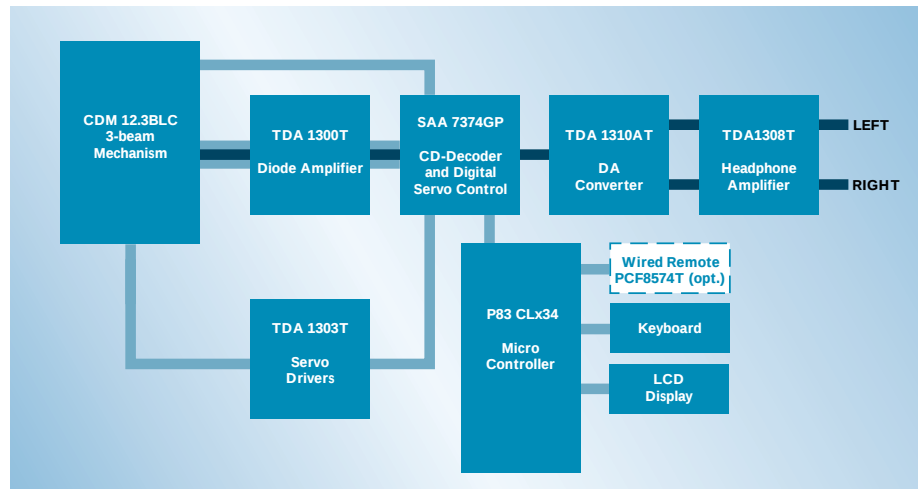
Power for driving the focus and radial actuators and sledge motor is provided by the TDA1303T triple digital servo driver.

The lightweight, compact 3-beam mechanism is just 14.4 mm high which allows for slimline designs. The unique ball-clamping turntable provides optimal ease of design-in. No external mechanical parts are needed for clamping a disc.

The TDA1300T diode amplifier and laser supply circuit buffers the diode signals for the CD7 decoder. The IC also amplifies and equalizes (option) the HF signal for the decoder and controls the power to the laser diode from the CDM 12.3BLC.

The audio performance is not directly related to the CD system but depends on which Philips Semiconductors' DAC is used. Shown here is a TDA1310AT continuous calibration stereo DAC with 16-bit digital input and analog voltage output. The stereo audio output is provided by a headphone amplifier circuit: TDA1308T.

Control and display is from a user interface via a local keyboard and display. If desired, all the local keyboard functions can be operated from a wired remote unit via the I2C bus by using the I/O expander IC PCF8574T.



HEADPHONE 7001 system for mid-range portable CD players

The system's mask-programmed micro-controller is a low-voltage circuit designed for low-power applications.

Derivative systems

The **HEADPHONE 7001** is similar to the HEADPHONE 7000 but has a microcontroller with on-board LCD display driver.

HEADPHONE 7000 SYSTEM PERFORMANCE (typ. values)

Disc size	8 and 12 cm.
Formats	CD-DA

AUDIO PERFORMANCE

Determined by DA-converter

THD + noise	0,05 %
Signal to noise ratio	92dB

USER FUNCTION

Remote / keyboard	play/pause, stop/clear, next/prev, search fw/bw, store, hold/resume, mobile/standalone
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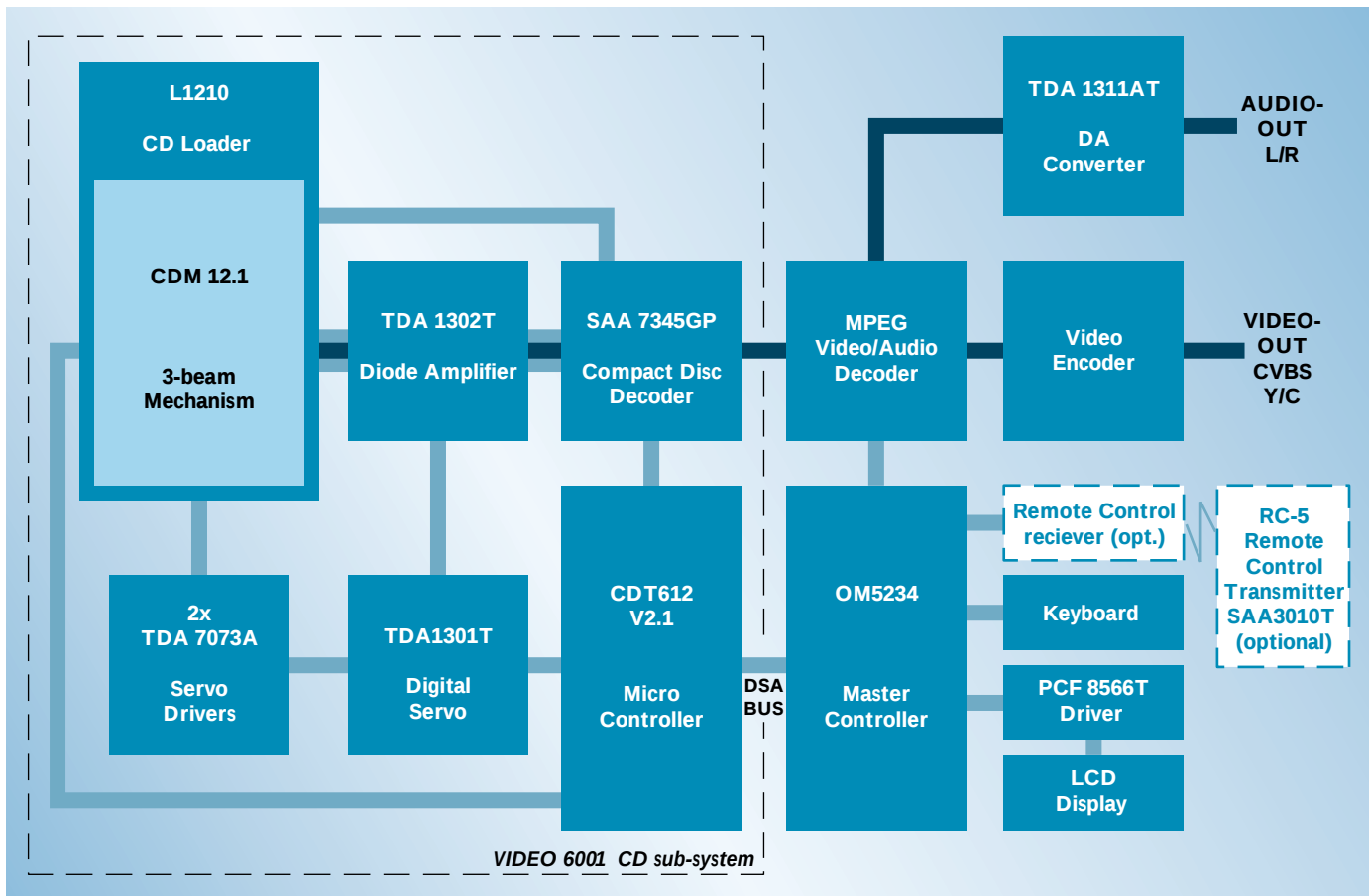
POWER SUPPLY

Battery	3.3 V
Adaptor	3.5 V

RELIABILITY

MTBF (25%)	30000 Hr.
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The versatile Full Motion Video solution



VIDEO 6481 Video CD player including MPEG1 decoding

- The basic CD-subsystem for video applications as well as games and karaoke applications.
- Single-speed CDM 12.1 mechanism.
- L1210 tray-type loader; top loader prepared.
- Pre-developed software available.
- Digital servo system, optimized for excellent performance at dual speeds.
- High-performance digital decoder with high resistance to rotational shock.

The **VIDEO 6001** is the basic CD-subsystem for video applications as well as for games and karaoke applications. Noteworthy is the system's outstanding playability.

A pre-programmed mask microcontroller is available to control all the servo and CD-decoder functions. Communication with the user microprocessor is provided through a user-friendly, serial bus called DSA (Data, Strobe, Acknowledge).

A comprehensive starter kit is available.

The system is controlled by a digital servo system based on the TDA1301T. This unique servo processor has been optimized to provide excellent perfor-

mance at dual speeds, supported by special features such as enhanced tracking capability and automatic initialization procedures. No external adjustments are necessary.

The SAA7345 decoder has an embedded 19K SRAM, and uses a unique FIFO overflow concealment technique which provides high resistance to rotational shock. Optimal data detection from the disc is ensured by the decoder's integrated digital PLL.

With the VIDEO 6001 subsystem, customers only have to develop the user part to make a complete Full Motion Video player. So all the features that make a player stand out in the market place are still determined by the customer's own development. The VIDEO 6001 will however facilitate and speed up this process.

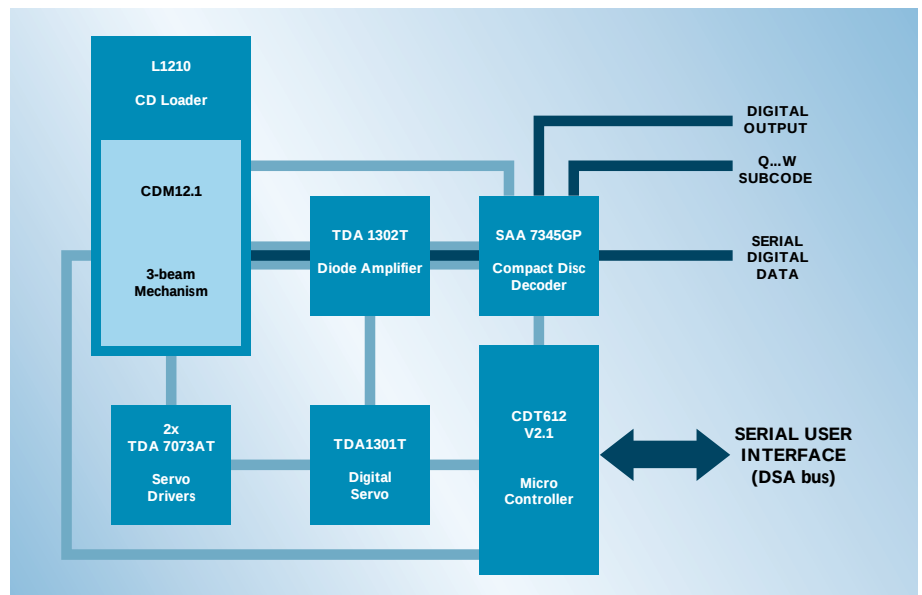
Derivative systems

The **VIDEO 6001** subsystem can be used as a common core in video-CD, games, and karaoke applications. Some of the possibilities are indicated here.

VIDEO 6002 is a video CD-subsystem based on the VIDEO 6001 but optimized for surface-mount components. It caters for single-speed rates and therefore can be used with CDM 12.1 or CDM 12.1T (top loader version).

VIDEO 6481 is a video CD-system based on the VIDEO 6002 subsystem but extended to include an MPEG audio/video decoder, and digital video encoder for Full Motion Video applications. The system is also prepared for karaoke functions.

The system is controlled by a pre-programmed master microcontroller which communicates with the VIDEO 6002's controller via a 3-wire (DSA) bus. A local keyboard, infrared remote control (for all CD functions,



VIDEO 6002 CD subsystem

Video-CD menu selection and OSD controls) and LCD display are provided.

The MPEG decoding is based around a circuit which decodes data streams in accordance with version 2.0 of the Video-CD standard. The circuit requires only a 4 Mbit DRAM to store the encoded/decoded data, play control data and on-screen display data.

A video encoder such as an SAA7185B encodes digital YUV data from the MPEG decoder into a PAL/NTSC (user selectable) CVBS or S-video signal. The composite analog video signal is available at two output pins. If desired, this allows one output to provide baseband composite video, and the other output to drive an RF modulator. Note: the VIDEO 6481 actually uses a CL480VCD and BT851 for MPEG decoding and video encoding.

The audio performance depends on which Philips Semiconductors' DAC is used. Shown here is a TDA1311A continuous calibration stereo DAC with 16-bit digital input and analog voltage output.

VIDEO 6001 SYSTEM PERFORMANCE (typ. values)

Disc size	8 and 12 cm.
Data transfer rate	n=1
Formats	CD-DA, CD-ROM, CDI, CD ROM XA, CD-Extra, VideoCD, Photo CD, CD-WO(read)
Digital output	EBU-standard
Digital interface	I ² S / EIAJ* Subcode channels Q..W
System clock output	16 MHz
Line output	yes

AUDIO PERFORMANCE

Determined by DA-converter

POWER SUPPLY

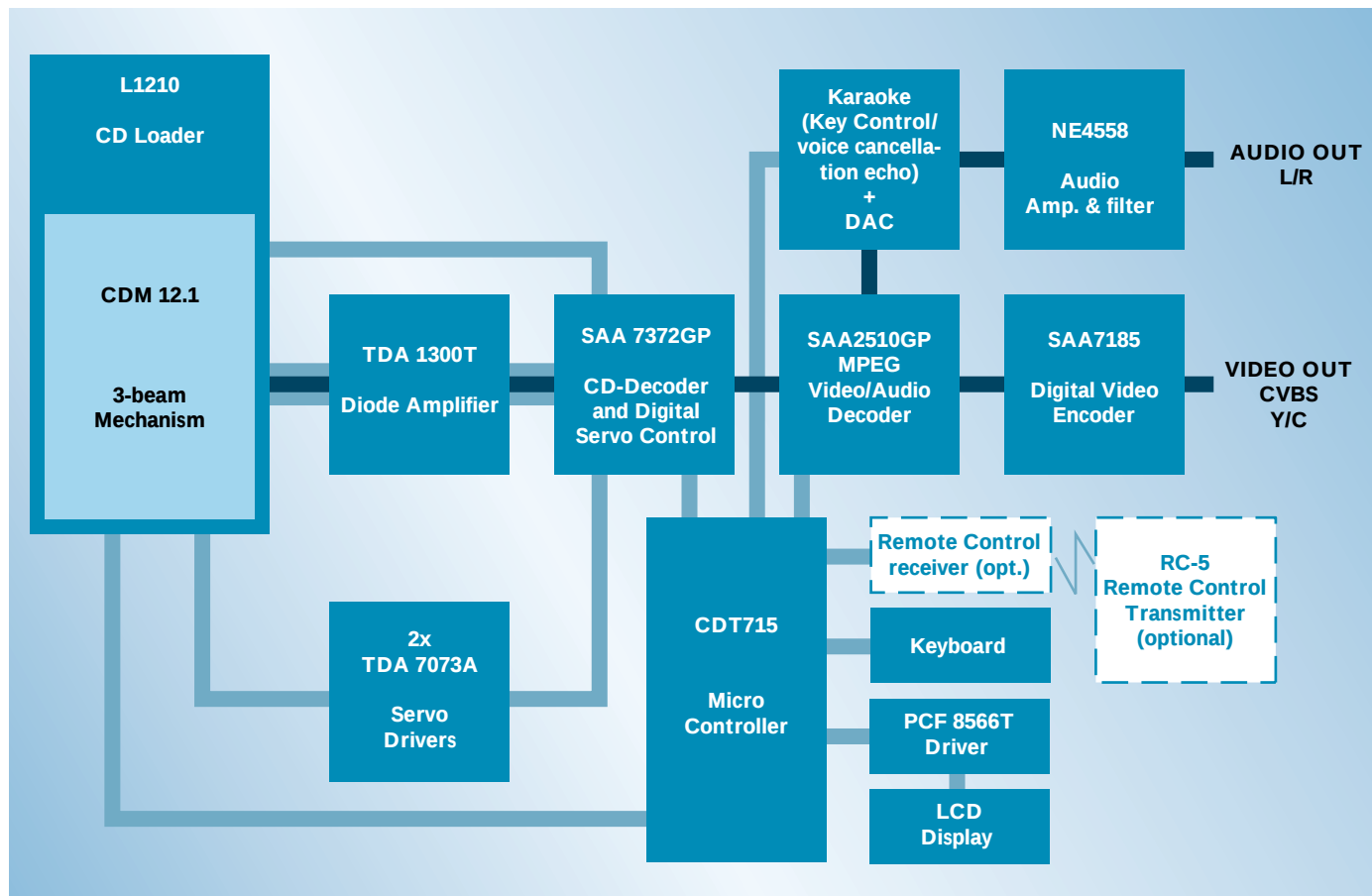
Supply Voltage	5 V, 12 V (5V, 9V VIDEO 6002)
Supply current (5 V)	1 A max.

RELIABILITY

MTBF (25%)	30000 Hr.
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* user programmable format

Complete Full Motion Video system with MPEG decoding



VIDEO 7000 CD-system

- **CD7-system: improved playability and additional features.**
- **One-chip CD-decoder and digital servo controller.**
- **Single-speed CDM 12.1 mechanism.**
- **L1210 tray-type loading mechanism. Top loader prepared.**
- **Pre-developed software available.**
- **MPEG decoding of audio/video data.**
- **Fully implements Video-CD decoding to White Book 2.0 specification.**
- **Implements karaoke key control; voice cancellation; echo functions.**

The **VIDEO 7000** is a complete pre-developed CD-system with MPEG decoding for Full Motion Video applications.

A pre-programmed microcontroller is available. Control is via a local keypad or infrared remote control transmitter.

The system uses the latest semiconductor concept – CD7, Philips' most recent and very-highly-integrated innovation for CD-system solutions. The main feature of a CD7 system such as VIDEO 7000 is that it uses a combined CD-decoder and digital servo controller in one chip, in this case the double-speed SAA7372GP. There is considerable flexibility in the DAC section – designers can choose any DAC

to tailor the audio performance precisely to individual needs.

Another distinguishing feature of this system is the inclusion of a Video-CD MPEG audio/video decoder, and digital video encoder.

The SAA2510GP MPEG decoder decodes data streams in accordance with version 2.0 of the Video-CD standard. The IC requires only 4 Mbit of DRAM to store the encoded/decoded data, play control data and on-screen display data.

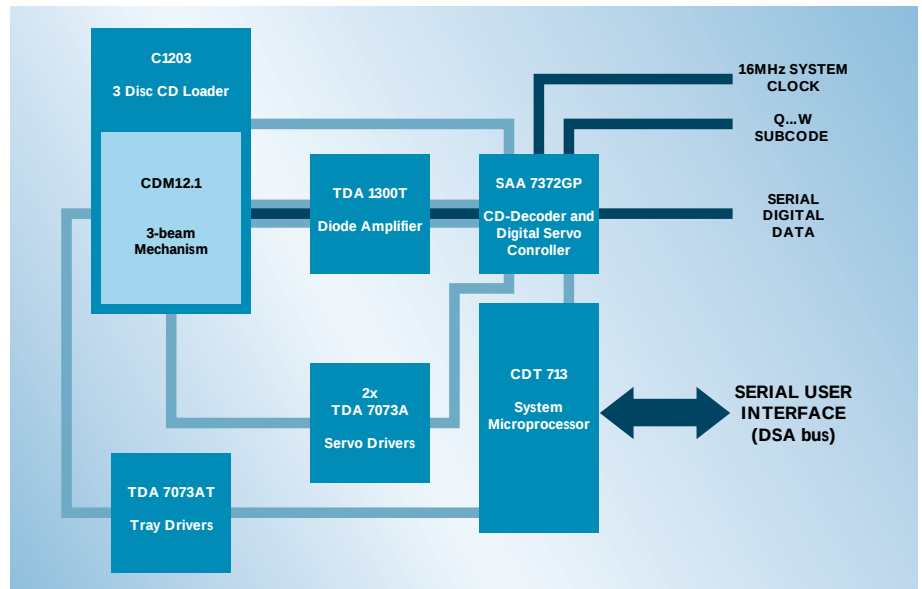
The SAA7185 digital video encoder (DENC2-M) encodes digital YUV video data into PAL or NTSC CVBS or S-video signals. The circuit accepts CCIR-compatible YUV data with 720 active pixels per line in 4:2:2 multiplexed formats such as MPEG decoded data from the SAA2510. It includes a sync clock generator and on-chip DACs.

The VIDEO 7000 also provides karaoke key control; voice cancellation and echo features with integrated digital-to-analog conversion.

A comprehensive starter kit is available.

Derivative systems

VIDEO 7003 is a basic CD-subsystem for Full Motion Video applications. It caters for single and double-speed data rates and has a motorized 3-disc changer. Unlike the full system (VIDEO 7000), it does not include an MPEG decoder. A pre-programmed mask microcontroller CDT713 is available to control all the servo, access and CD-decoder functions. Communication with the user microcontroller is provided via user-friendly DSA (Data, Strobe, Acknowledge) serial interface.



VIDEO 7003 CD subsystem

A comprehensive starter kit is available.

The system is controlled by a digital servo system based on the TDA1300T. This unique servo processor has been optimized to provide excellent performance up to double speed, supported by special features such as enhanced tracking capability and automatic initialization procedures. No external adjustments are necessary.

With the VIDEO 7003 subsystem, customers only have to develop the video board and user part to make a complete Full Motion Video player. So, whilst giving customers complete freedom in providing features that make a player stand out in the marketplace, the VIDEO 7003 facilitates and speeds up the player development.

Features:

- The basic CD-subsystem for Full Motion Video applications.
- Single-speed CDM 12.1 mechanism.
- C1203 3-disc changer or L1210.
- Predeveloped software available.
- Digital servo system optimized

for performance.

- High-performance digital decoder with high resistance to rotational shock.
- Multiple-format serial digital output.

VIDEO 7003 SYSTEM PERFORMANCE (typ. values)

Disc size	8 and 12 cm.
Data transfer rate	n=1
Formats	CD-DA, VideoCD
Digital output	EBU-standard
Digital interface	I ² S / EIA* Subcode channels
Line output	Audio CVBS and Y/C (S-VHS)

AUDIO PERFORMANCE

Determined by DA-converter

POWER SUPPLY

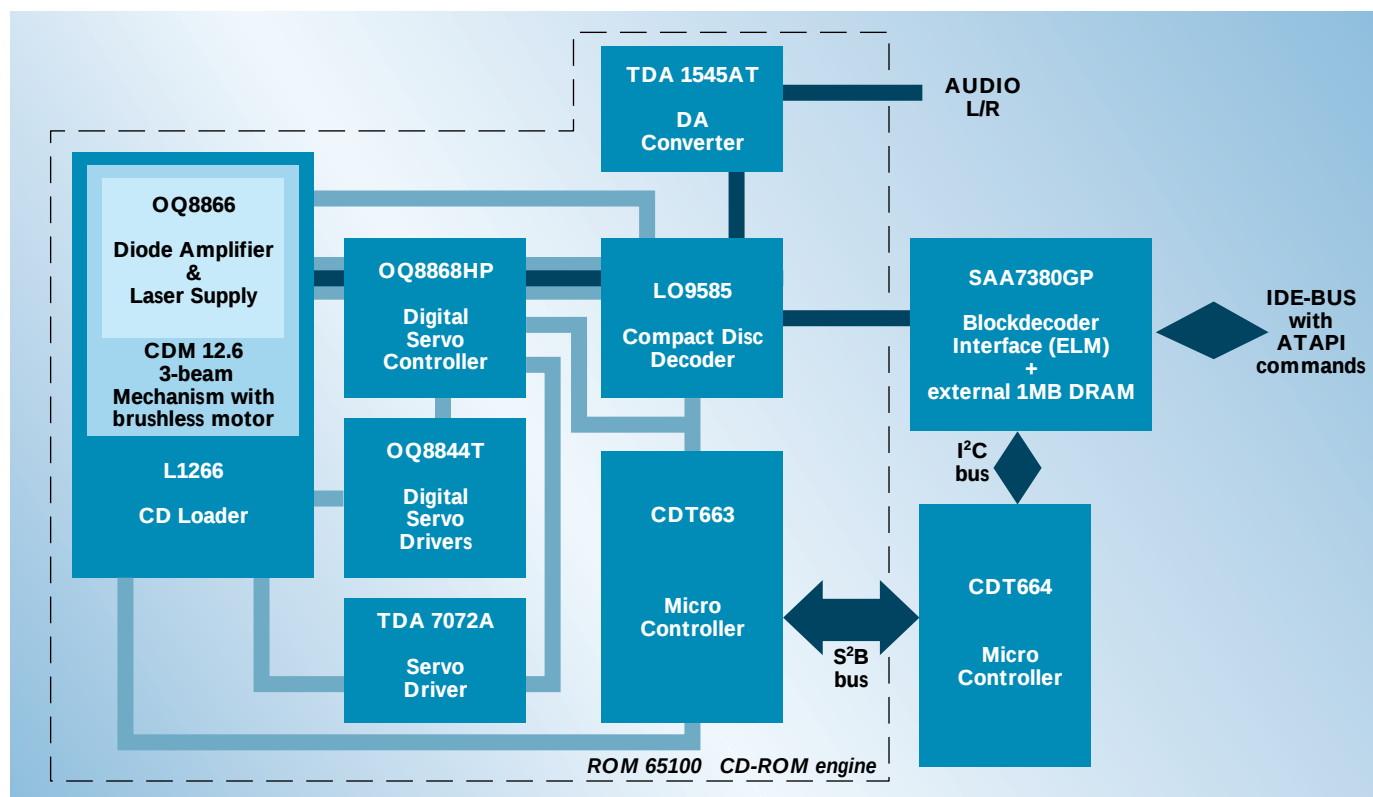
Supply Voltage	10 V (5V, 9V VIDEO 7003)
Supply current (5 V)	1 A peak, 300mA average

RELIABILITY

MTBF (25%)	30000 Hr.
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* user programmable format

6x system for 5¼" half-height CD-ROM applications



ROM 65160: 8x CD-ROM system with IDE interface

- **Complete CD-ROM engine with pre-programmed microcontroller and serial digital data output for further processing.**
- **6x standard data transfer rates (i.e. 900 kbytes/s).**
- **Highly-integrated IDE and SCSI interface solutions.**
- **L1266 tray loader with special suspension and disc clamping for the CDM 12.6 three-beam mechanism.**
- **Fast radial access.**
- **Comprehensive, user-friendly serial control interface (S²B).**

ROM 65100 subsystem

The **ROM 65100** or 'hexaROM' is a complete pre-developed CD-ROM engine for economy 6x applications. Providing benchmark performance in this sector of the market, it incorporates a fast, low-power CD decoder IC (the LO9585 which features unsurpassed error-correction for CD-ROM applications), Philips-patented zoned bit rate techniques, and a high-performance digital servo system. The mechanism used in the ROM 65100 is the

renowned CDM 12.6. This mechanism features a brushless disc motor, which gives the engine its long lifetime and superb reliability even at the high operating speed.

The engine can be extended to provide IDE and SCSI interfacing options based on two new block-decoder circuits. Together, all engine components are optimized for an average sustained data rate of 900 kbytes/s.

A pre-programmed, masked microcontroller is available, offering the user a comprehensive control interface to reduce the design-in cycle. The microcontroller controls all the servo and CD-decoding functions.

The tray-type loader which includes the CD mechanism fits into a 5¼" half-height PC drive bay, and is designed for easy incorporation in a complete CD-ROM drive. In addition, the loader contains special suspension units to provide the extra damping and disc clamping required during operation at 6x standard speed, providing a virtually vibration-free environment.

For fast radial access, the 3-beam CDM 12.6 features a high-speed sledge motor with high-ratio gearing. It is controlled by an adjustment-free digital servo system based on the OQ8868HP.

This unique servo processor has been optimized to provide excellent performance, supported by features such as enhanced tracking capabilities and automatic initialization procedures.

The OQ8866 HF amplifier and laser supply IC is incorporated on the sledge of the CDM 12.6 mechanism. This improves the signal-to-noise ratio because the small diode currents are converted to the HF signal close to the source.

The ROM 65100 has a wide operating temperature range of 5-55 °C.

Easy design-in

A comprehensive starter kit (see p.1.x) of the ROM 65100 is available from Philips Key Modules for CD-ROM drive manufacturers. This contains a robust, fully-tested, working model with circuit diagrams and board layout details, plus all released software necessary to operate the system. Since the starter kit is guaranteed to meet published specifications, it forms a valuable design-in tool and a well-defined reference against which the performance of development and production models can be compared.

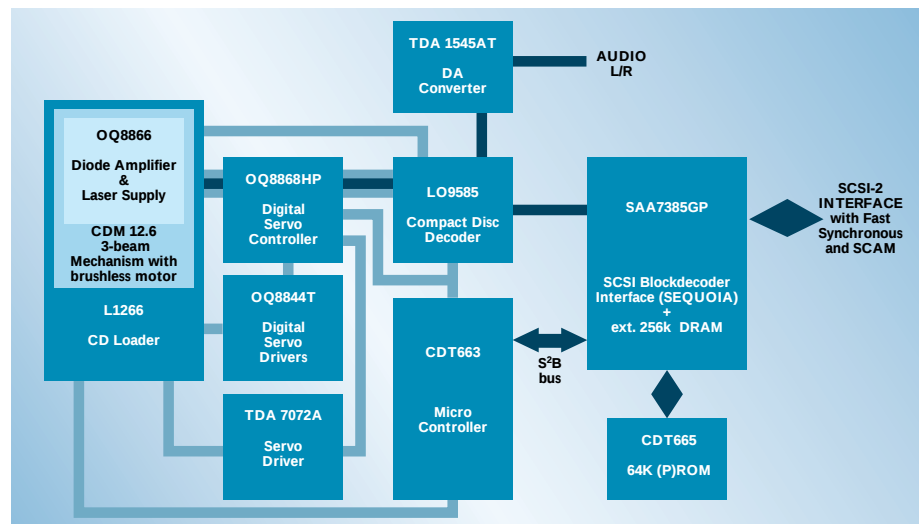
Derivative systems

ROM 65160. This is a complete 6x CD-ROM system based on the ROM 65100 engine, but with an IDE interface. The interface is based on the SAA7380 (ELM) CD-ROM block-decoder IC.

Features:

- Interfaces to IDE-bus without external drivers.
- Compatible with ATA register set and ATAPI command set.

ROM 65180. This is a complete 6x CD-ROM system based on the ROM 65100 engine, but with a SCSI interface. The interface is based on the



ROM 65180: 6x CD-ROM system with SCSI-2 interface

SAA7385 (SEQUOIA) CD-ROM block-decoder IC.

Features:

- Fully-integrated single-IC SCSI-2 interface including 33 MHz 80C32 controller
- 48 mA SCSI drivers
- Fast, synchronous, block-oriented host transfer (10 Mbytes/s)
- Supports SCSI plug-and-play with SCAM
- High data integrity with error flag processing and 3rd layer correction
- Red Book audio pass-through & block-oriented host data transfer
- Supports 1Mbyte cache RAM
- General-purpose I/Os for servo control

Extending system performance

The ROM 65100 and derivative systems are all capable of performance even superior to that indicated here, or as published in the guaranteed starter kit specifications. This is due to an in-built performance margin which CD-ROM drive manufacturers can exploit by careful optimization of their overall system design. This allows a manufacturer to differentiate a particular product, for instance, on data transfer rate. Many outstanding and successful customer products based on ROM 65100 testify the soundness of this

approach. If desired, this dedicated optimization can be a joint-effort with Philips, in which both parties contribute improvements.

ROM65100 SYSTEM PERFORMANCE (typ. values)	
Disc size	8 and 12 cm.
Storage capacity :	
mode 1	553 Mbytes
mode 2	635 Mbytes
Formats	CD-DA, CD ROM mode 1, CD ROM mode 2, CD-ROM XA, Photo CD, Video CD
Access time (1/3 stroke)	235 ms.
Seek time (1/3 stroke)	180 ms.
Digital output	EBU-standard
Sustained transfer rate	900 kbyte/s.

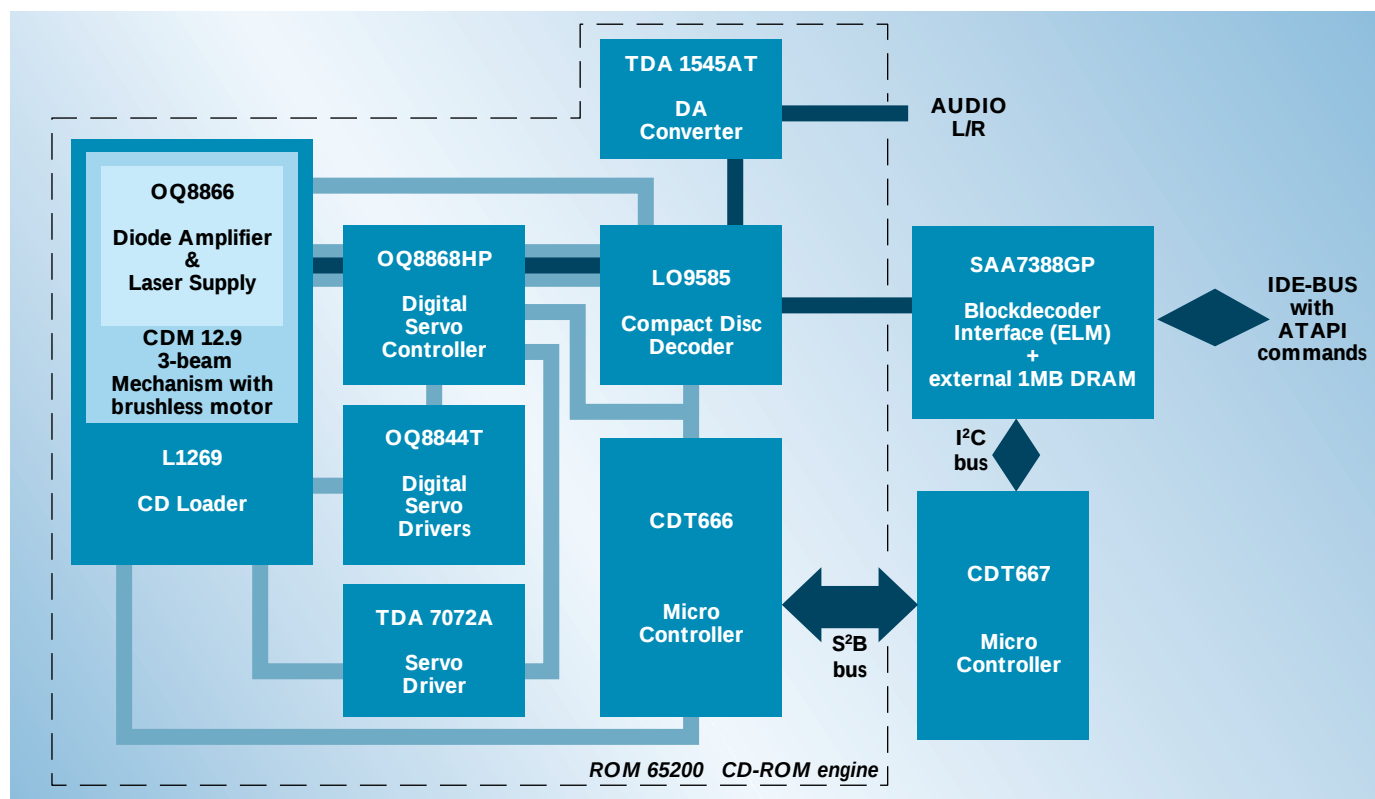
USER INTERFACE	
Type	serial asynchronous bidirectional
No. of lines	TXD (transmit data) RXD (receive data) CPR (control up ready) SUR (servo unit ready)

DATA INTERFACE	
Default	CD-ROM i²s
Audio format	software selectable
R...W subcode	serial format

POWER SUPPLY	
Supply Voltage	5 V, 12 V

RELIABILITY	
MTBF (100%)	50000 Hr.

8x system for 5¼" half-height CD-ROM applications



ROM 65260: 8x CD-ROM system with IDE interface

- **Complete CD-ROM engine with pre-programmed microcontroller, and serial digital data output for further processing.**
- **8x standard data transfer rates.**
- **Highly-integrated IDE and SCSI interface solutions.**
- **L1269 loader incorporating the CDM 12.9 mechanism with improved disc motor for operation at high speeds.**
- **Fast radial access.**
- **Comprehensive, user-friendly serial control interface (S²B).**

ROM 65200 subsystem

The ROM 65200 is a complete pre-developed CD-ROM engine for economy 8x applications. This performance comes from using a fast, low-power CD decoder IC (the LO9585 which features unsurpassed error-correction for CD-ROM applications), Philips-patented zoned bit rate techniques, and a high-performance digital servo system. A new mechanism is employed – the CDM 12.9. This mechanism features a brushless disc motor optimized

for high-speed operation, giving the engine long lifetime and superb reliability even at the high operating speed.

The engine can be extended to provide IDE and SCSI interfacing options based on two new block-decoder circuits. Together, all engine components are optimized for an average sustained data rate of 1150 kbytes/s.

A pre-programmed, masked microcontroller is available, offering the user a

comprehensive control interface to reduce the design-in cycle. The microcontroller controls all the servo and CD-decoding functions.

The tray-type loader which includes the CD mechanism fits into a 5¼" half-height PC drive bay, and is designed for easy incorporation in a complete CD-ROM drive. In addition, the loader contains special suspension units to provide the extra damping and disc clamping required during operation at 8x standard speed, providing a virtually vibration-free environment.

For fast radial access, the 3-beam CDM 12.9 features a high-speed sledge motor with high-ratio gearing. It is controlled by an adjustment-free digital servo system, based on the OQ8868HP. This unique servo processor has been optimized to provide excellent perfor-

mance, supported by special features such as enhanced tracking capabilities and automatic initialization procedures.

The OQ8866 HF amplifier and laser supply IC is incorporated on the sledge of the CDM 12.9 mechanism. This improves the signal-to-noise ratio because the small diode currents are converted to the HF signal close to the source.

The ROM 65200 has a wide operating temperature range of 5-55 °C.

Easy design-in

A comprehensive starter kit (see p.1.x) of the ROM 65200 is available from Philips Key Modules for CD-ROM drive manufacturers. This contains a robust, fully-tested, working model with circuit diagrams and board layout details, plus all released software necessary to operate the system. Since the starter kit is guaranteed to meet published specifications, it forms a valuable design-in tool and a well-defined reference against which the performance of development and production models can be compared.

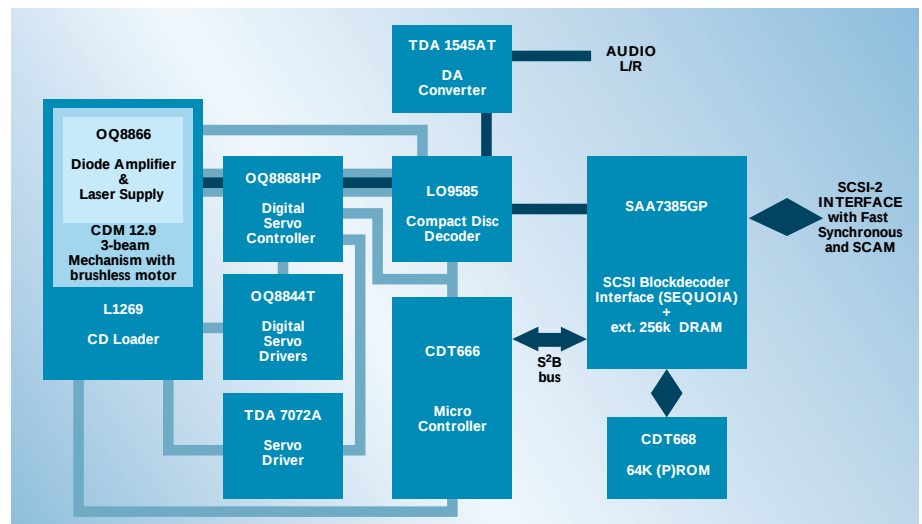
Derivative systems

ROM 65260. This is a complete 8x CD-ROM system based on the ROM 65200 engine, but with an IDE interface. The interface is based on the SAA7388 (ELM) CD-ROM block-decoder IC.

Features:

- Interfaces to IDE-bus without external drivers.
- Compatible with ATA register set and ATAPI command set.

ROM 65280. This is a complete 8x CD-ROM system based on the ROM 65200 engine, but with a SCSI interface. The interface is based on the SAA7387 (SEQUOIA) CD-ROM block-decoder IC.



ROM 65280: 8x CD-ROM system with SCSI-2 interface

Features:

- Fully-integrated single-IC SCSI-2 interface including 33 MHz 80C32 controller
- 48 mA SCSI drivers
- Fast, synchronous, block-oriented host transfer (10 Mbytes/s)
- Supports SCSI plug-and-play with SCAM
- High data integrity with error flag processing and 3rd layer correction
- Red Book audio pass-through & block-oriented host data transfer
- Supports 1Mbyte cache RAM
- General-purpose I/Os for servo control

Extending system performance

The ROM 65200 and derivative systems are all capable of performance even superior to that indicated here, or as published in the guaranteed starter kit specifications. This is due to an in-built performance margin which CD-ROM drive manufacturers can exploit by careful optimization of their overall system design. This allows a manufacturer to differentiate a particular product, for instance, on data transfer rate. Many outstanding and successful customer products based on ROM 65200 testify the soundness of this approach. If desired, this dedicated optimization can be a joint-effort with

Philips, in which both parties contribute improvements.

ROM65200 SYSTEM PERFORMANCE (typ. values)	
Disc size	8 and 12 cm.
Storage capacity :	
mode 1	553 Mbytes
mode 2	635 Mbytes
Formats	CD-DA, CD ROM mode 1, CD ROM mode 2, CD-ROM XA, Photo CD, Video CD
Access time (1/3 stroke)	235 ms.
Seek time (1/3 stroke)	180 ms.
Digital output	EBU-standard
Sustained transfer rate	1150 kbyte/s.

USER INTERFACE	
Type	serial asynchronous bidirectional
No. of lines	TXD (transmit data) RXD (receive data) CPR (control up ready) SUR (servo unit ready)

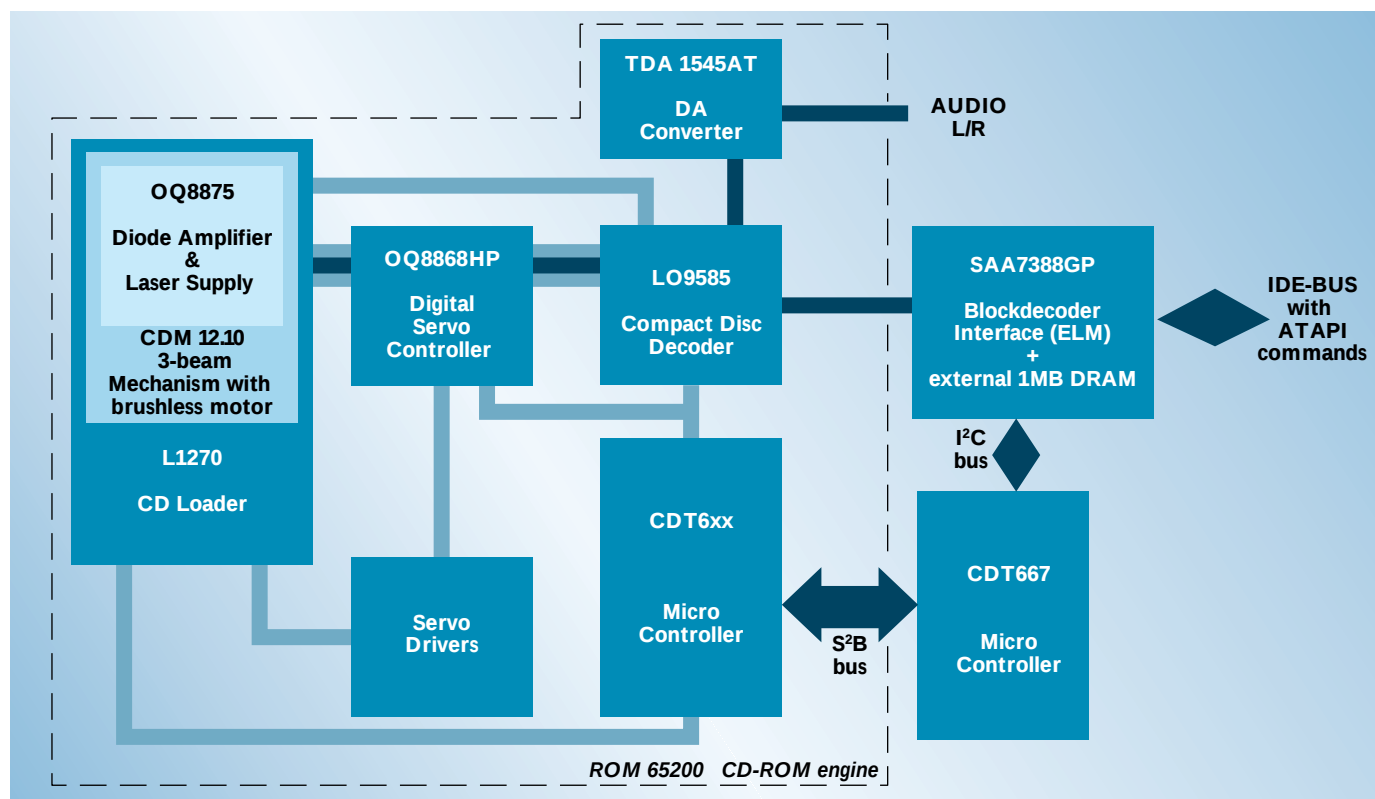
DATA INTERFACE	
Default	CD-ROM I ² S
Audio format	software selectable
R...W subcode	serial format

POWER SUPPLY	
Supply Voltage	5 V, 12 V

RELIABILITY	
MTBF (50%)	60000 Hr. target



8x system for 5¼" half-height high-end CD-ROM applications



ROM 65360: 8x CD-ROM system with IDE interface

- **Complete CD-ROM engine with pre-programmed microcontroller, and serial digital data output for further processing.**
- **True 8x standard data transfer rates.**
- **115 ms seek time; 140 ms access time.**
- **Highly-integrated IDE and SCSI interface solutions.**
- **L1270 loader incorporating the CDM 12.10 mechanism with ultra-high gear ratio sledge drive.**
- **Comprehensive, user-friendly serial control interface (S2B).**

ROM 65300 subsystem

The ROM 65300 is a complete pre-developed CD-ROM engine for flagship 8x applications. This performance comes from using a fast, low-power CD decoder IC (LO9585 which features surpassed error-correction for CD-ROM applications), and an advanced servo system. A new mechanism is employed – the CDM 12.10. This mechanism features a brushless disc motor optimized for high-speed operation, giving the engine long life-

time and superb reliability even at the high operating speed. The sledge transmission has ultra-high-ratio gearing.

The engine can be extended to provide IDE and SCSI interfacing options based on two new block-decoder circuits. Together, all engine components are optimized for an average sustained data rate of 1200 kbytes/s.

A pre-programmed, masked microcontroller is available, offering the user a

comprehensive control interface to reduce the design-in cycle. The microcontroller controls all the servo and CD-decoding functions.

The tray-type loader which includes the CD mechanism fits into a 5¼" half-height PC drive bay, and is designed for easy incorporation in a complete CD-ROM drive. In addition, the loader contains special suspension units to provide the extra damping and disc clamping required during operation at 8x standard speed, providing a virtually vibration-free environment.

For fast radial access, the 3-beam CDM 12.10 features a high-speed sledge motor with ultra-high-ratio gearing. It is controlled by an adjustment-free servo system, based on the OQ8868HP. This unique servo processor which utilises a Fast Track Count

algorithm has been optimized to provide excellent performance, supported by special features such as enhanced tracking capabilities and automatic initialization procedures.

The OQ8866 HF amplifier and laser supply IC is incorporated on the sledge of the CDM 12.10 mechanism. This improves the signal-to-noise ratio because the small diode currents are converted to the HF signal close to the source.

Easy design-in

A comprehensive starter kit of the ROM 65300 is available from Philips Key Modules for CD-ROM drive manufacturers. This contains a robust, fully-tested, working model with circuit diagrams and board layout details, plus all released software necessary to operate the system. Since the starter kit is guaranteed to meet published specifications, it forms a valuable design-in tool and a well-defined reference against which the performance of development and production models can be compared.

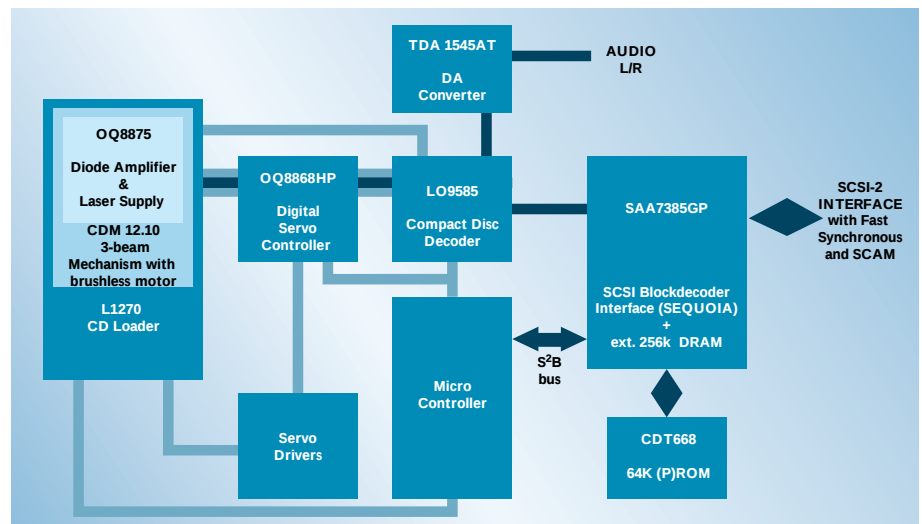
Derivative systems

ROM 65360. This is a complete 8x CD-ROM system based on the ROM 65300 engine, but with an IDE interface. The interface is based on the SAA7388 (ELM) CD-ROM block-decoder IC.

Features:

- Interfaces to IDE-bus without external drivers.
- Compatible with ATA register set and ATAPI command set.

ROM 65380. This is a complete 8x CD-ROM system based on the ROM 65300 engine, but with a SCSI interface. The interface is based on the SAA7387 (SEQUOIA) CD-ROM block-decoder IC.



ROM 65380: 8x CD-ROM system with SCSI-2 interface

Features:

- Fully-integrated single-IC SCSI-2 interface including 33 MHz 80C32 controller
- 48 mA SCSI drivers
- Fast, synchronous, block-oriented host transfer (10 Mbytes/s)
- Supports SCSI plug-and-play with SCAM
- High data integrity with error flag processing and 3rd layer correction
- Red Book audio pass-through & block-oriented host data transfer
- Supports 1Mbyte cache RAM
- General-purpose I/Os for servo control

Extending system performance

The ROM 65300 and derivative systems are all capable of performance even superior to that indicated here, or as published in the guaranteed starter kit specifications. This is due to an in-built performance margin which CD-ROM drive manufacturers can exploit by careful optimization of their overall system design. This allows a manufacturer to differentiate a particular product, for instance, on data transfer rate. Many outstanding and successful customer products based on ROM 65300 testify the soundness of this approach. If desired, this dedicated optimization can be a joint-effort with

Philips, in which both parties contribute improvements.

ROM65300 SYSTEM PERFORMANCE (typ. values)	
Disc size	8 and 12 cm.
Storage capacity :	
mode 1	553 Mbytes
mode 2	635 Mbytes
Formats	CD-DA, CD ROM mode 1, CD ROM mode 2, CD-ROM XA, Photo CD, Video CD
Access time (1/3 stroke)	140 ms.
Seek time (1/3 stroke)	115 ms.
Digital output	EBU-standard
Sustained transfer rate	1200 kbyte/s.

USER INTERFACE	
Type	serial asynchronous bidirectional
No. of lines	TXD (transmit data) RXD (receive data) CPR (control up ready) SUR (servo unit ready)

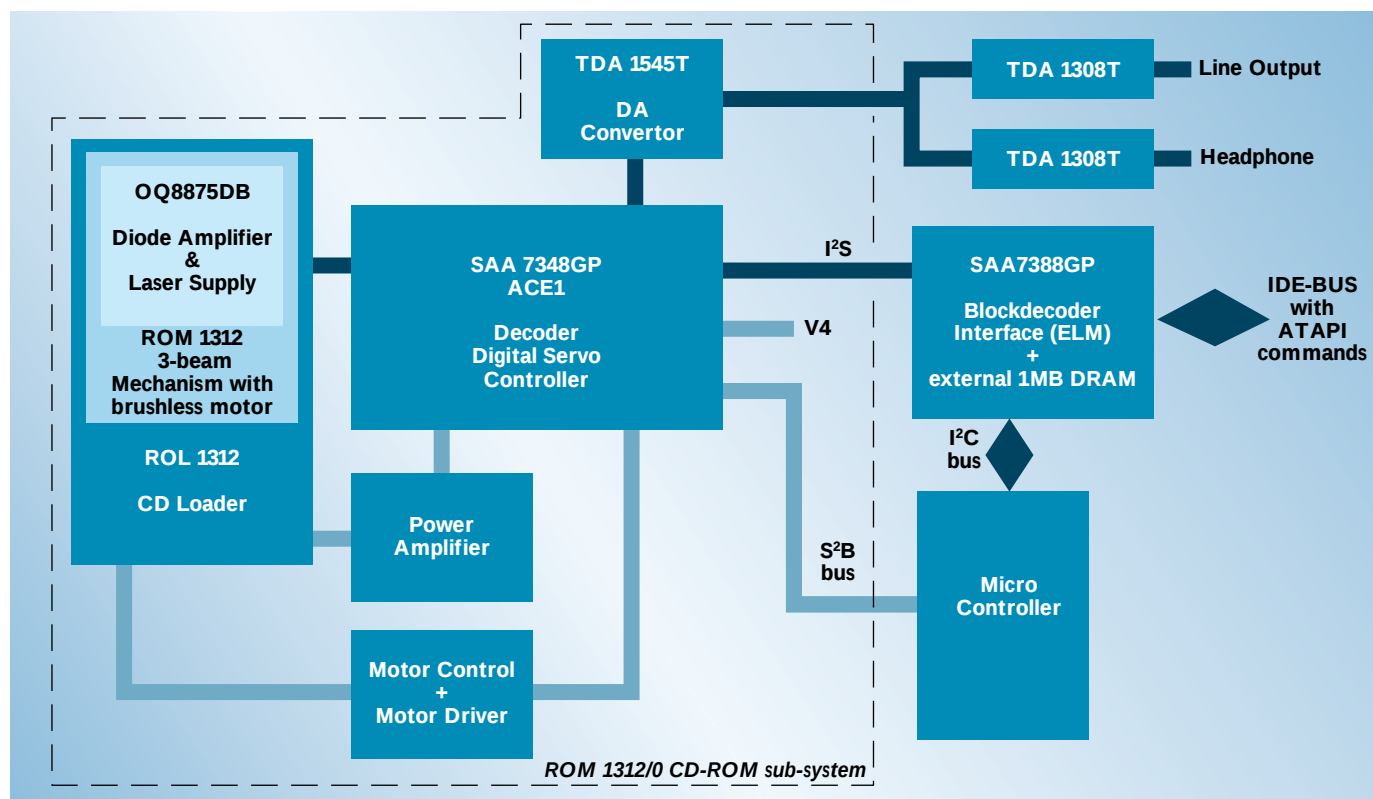
DATA INTERFACE	
Default	CD-ROM I ² S
Audio format	software selectable
R...W subcode	serial format

POWER SUPPLY	
Supply Voltage	5 V, 12 V

RELIABILITY	
MTBF (50%)	60000 Hr. target



12x system for 5¼" half-height high-performance CD-ROM applications



ROA1312/1: 12x CD-ROM system with IDE interface

- **Complete CD-ROM engine with highly integrated IC solution, and serial digital data output for further processing.**
- **True 12x standard data transfer rates.**
- **110 ms seek time; 120-135 ms access time.**
- **Highly-integrated IDE and SCSI interface solutions.**
- **New ROL1312 loader incorporating the ROM1312 mechanism developed to meet future requirements in disc speed and seek time.**
- **Comprehensive, user-friendly serial control interface (S²B).**

The ROA1312/0 is a complete pre-developed CD-ROM engine for high-performance applications. The drive rotation speed is 12x the standard speed with seek times of 110 ms. This superb performance comes from using a highly integrated solution based on the ACE1 circuit (SAA7348). This new IC combines CD decoding, servo processing and microcontroller in one chip. Besides improving performance significantly, this one-chip solution will lower the cost of a complete drive.

The engine can be extended to provide IDE and SCSI interfacing options based on two new block-decoder circuits. Together, all engine components are optimized for an average sustained data rate of 1800 kbytes/s.

A newly designed ROL1312 loader is used. This small tray-type loader, which includes the CD mechanism, fits into a 5¼" half-height PC drive bay, and can be very easily incorporated in a com-

plete CD-ROM drive. Mounted in a suitably designed housing, the loader is dust-tight. In addition, suspension between the loader chassis and its housing provides a virtually vibration-free environment even at very high disc rotation speeds.

For fast radial access, the 3-beam ROM1312 mechanism features a high-speed sledge motor with ultra-high-ratio gearing. ROM1312 includes the diode signal amplifier OQ8875 and a high-speed LDGU. The OQ8875 which also provides the laser supply is on the sledge of the mechanism near to the signal source, which improves the signal-to-noise ratio.

Easy design-in

A comprehensive starter kit of the ROA1312 is available from Philips Key Modules for CD-ROM drive manufacturers. This contains a robust, fully-tested, working model with circuit diagrams and board layout details, plus all released software necessary to operate the system. Since the starter kit is guaranteed to meet published specifications, it forms a valuable design-in tool and a well-defined reference against which the performance of development and production models can be compared.

Derivative systems

ROA1312/1. This is a complete 12x CD-ROM system based on the ROA1312/0 engine with an IDE interface. The interface is based on the SAA7388 (ELM) CD-ROM block-decoder IC.

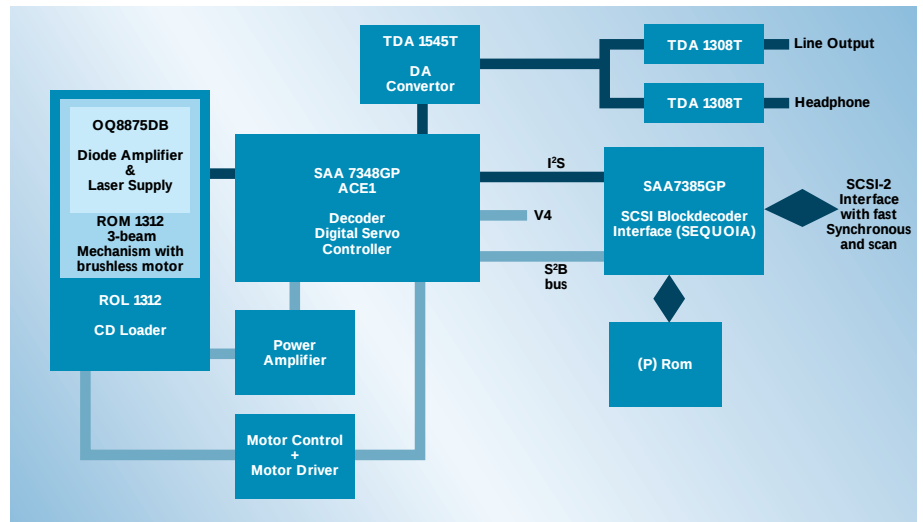
Features:

- Interfaces to IDE-bus without external drivers.
- Compatible with ATA register set and ATAPI command set.

ROA1312/2. This is a complete 12x CD-ROM system based on the ROA1312/0 engine with a SCSI interface. The interface is based on the SAA7385 (SEQUOIA) CD-ROM block-decoder IC.

Features:

- Fully-integrated single-IC SCSI-2 interface including 33 MHz 80C32 controller
- 48 mA SCSI drivers
- Fast, synchronous, block-oriented host transfer (10 Mbytes/s)
- Supports SCSI plug-and-play with SCAM
- High data integrity with error flag processing and 3rd layer correction
- Red Book audio pass-through & block-oriented host data transfer
- Supports 1Mbyte cache RAM
- General-purpose I/Os for servo control



ROA1312/2: 12x CD-ROM system with SCSI-2 interface

Extending system performance

The ROA1312/0 and derivative systems are all capable of performance even superior to that indicated here, or as published in the guaranteed starter kit specifications. This is due to an in-built performance margin which CD-ROM drive manufacturers can exploit by careful optimization of their overall system design. This allows a manufacturer to differentiate a particular product, for instance, on data transfer rate.

Many outstanding and successful customer products based on previous engines testify the soundness of this approach. If desired, this dedicated optimization can be a joint-effort with Philips, in which both parties contribute improvements.

ROA1312 SYSTEM PERFORMANCE (typ. values)	
Disc size	8 and 12 cm.
Storage capacity :	
mode 1	553 Mbytes
mode 2	635 Mbytes
Formats	CD-DA, CD ROM mode 1, CD ROM mode 2, CD-ROM XA, Photo CD, Video CD
Access time (1/3 stroke)	t.b.d
Seek time (1/3 stroke)	110 ms.
Digital output	EBU-standard
Sustained transfer rate	1800 kbyte/s.

USER INTERFACE	
Type	serial asynchronous bidirectional
No. of lines	TXD (transmit data) RXD (receive data) CPR (control up ready) SUR (servo unit ready)

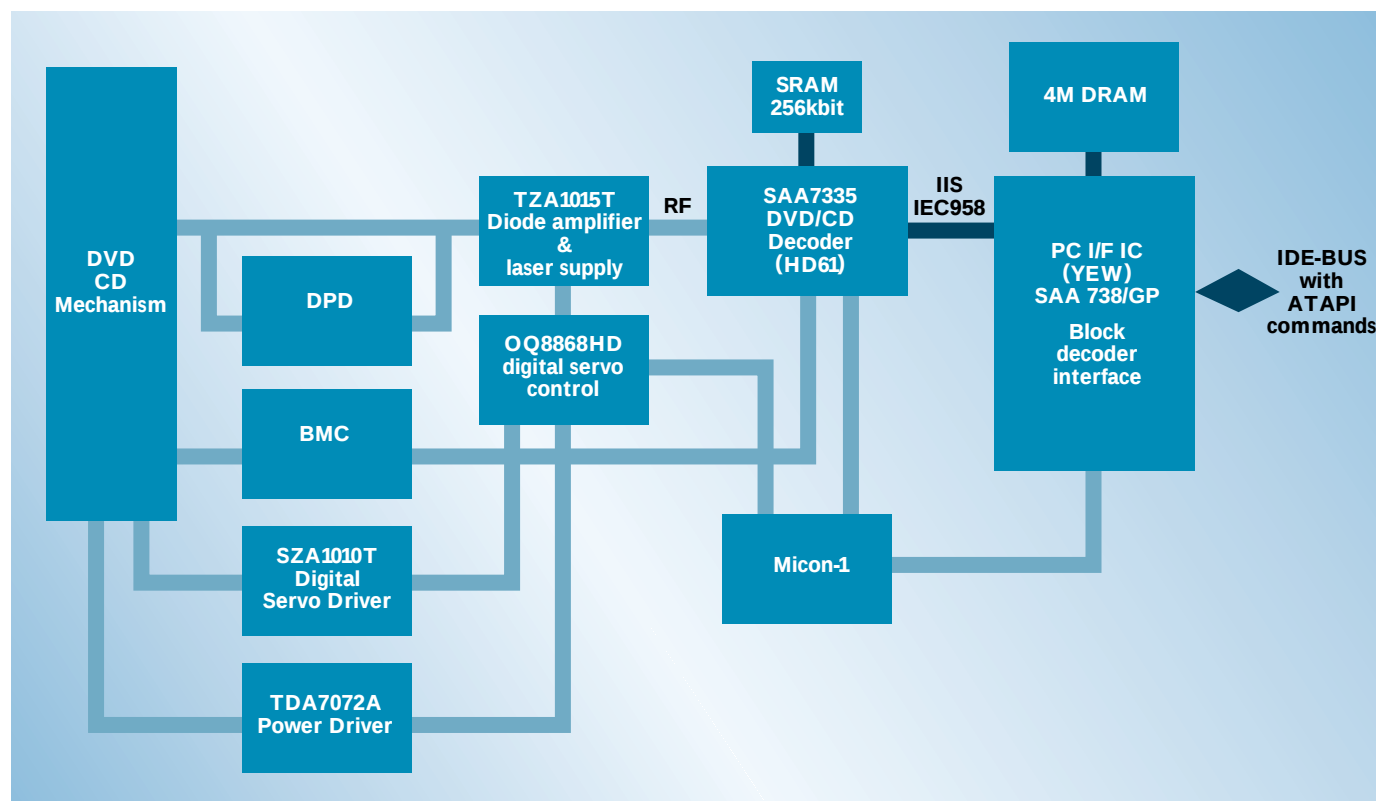
DATA INTERFACE	
Default	CD-ROM I²S
Audio format	software selectable
R...W subcode	serial format

POWER SUPPLY	
Supply Voltage	5 V, 12 V

RELIABILITY	
MTBF (50%)	60000 Hr. target



DVD-ROM SYSTEM WITH HD61, DSIC AND DALAS



PRIME - Philips' DVD-ROM system

■ Complete DVD-ROM engine

■ Two-chip solution for DVD data processing using:

- SAA7335 DVD decoder with integrated ADC and channel equaliser;
- SAA7381 block-decoder with ATAPI host interface

■ Host interface can be connected to standard SCSI drivers

PRIME is Philips' complete pre-developed concept for DVD-ROM systems. It features several ICs developed specially for this new CD medium that enables an unprecedented 4.7 Gbytes to be stored on a single-layer disc. Already, the first ICs at the heart of PRIME are being sampled. Take the SAA7335 decoder IC for instance. Designed for extremely high playback speeds, this IC has an on-chip ADC and channel equaliser, and utilizes dual-pass error correction. The circuit supports several motor speed control options, MPEG-2 decoding, and provides compatibility with CD-i, CD-ROM, and DVD-Video applications.

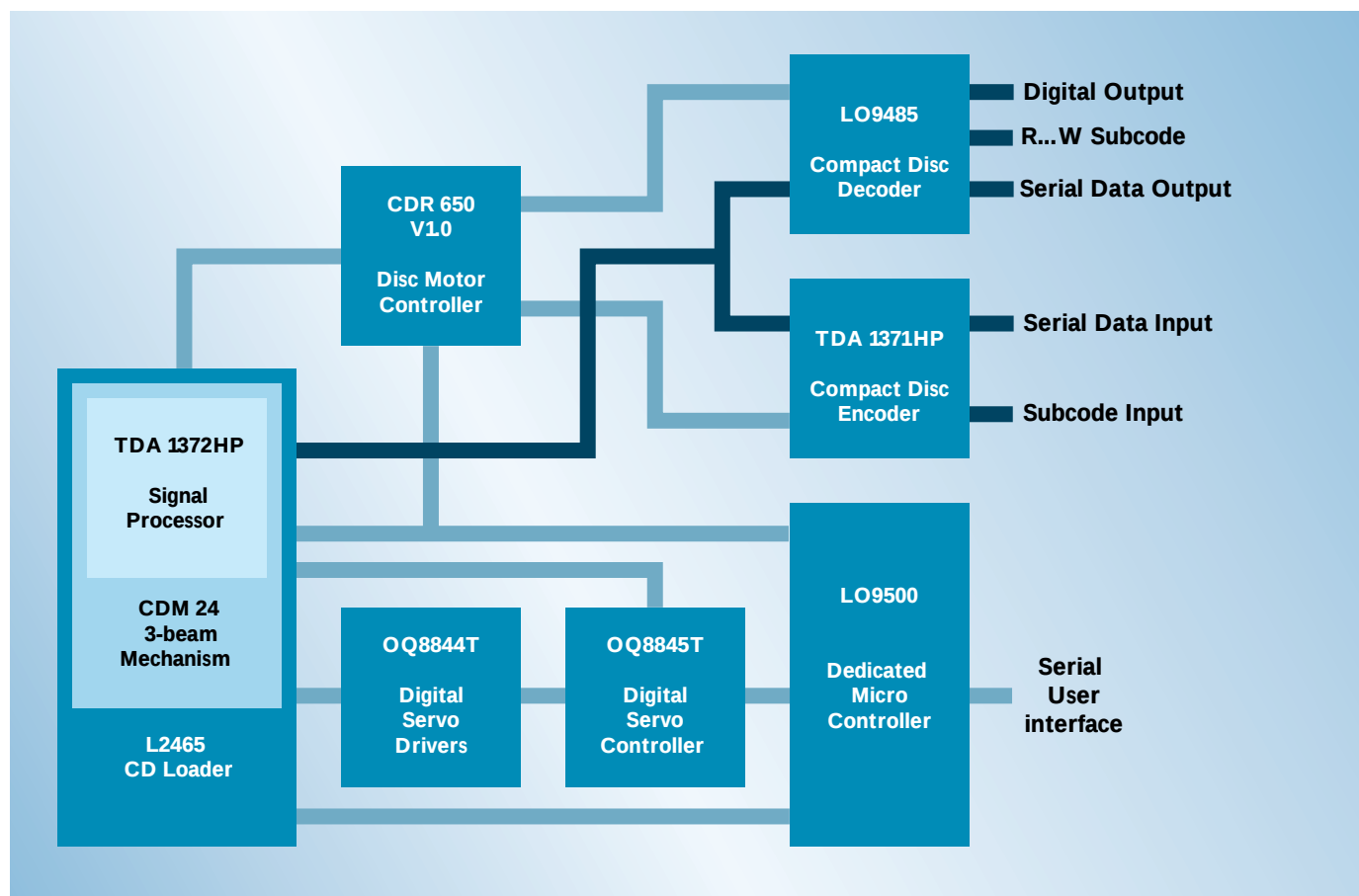
In PRIME, the decoded signals from the SAA7335 are processed by an SAA7381 (nickname: YEW). This new block-decoder and buffer manager IC has an integrated IDE (ATAPI) interface with automatic packet command sequencer and requires no external drivers. The circuit can operate with 0.5 to 16 Mbyte DRAMs.

Together, the SAA7335 and SAA7381 provide a cost-effective two-chip solution for the whole DVD data processing section.

The front-end of PRIME is similar to that used in high-speed CD-ROM systems. A TZA1015 (data amplifier and laser supply IC) interfaces between the CD mechanism and the OQ8868 single-chip digital servo control system and the SAA7335 decoder. An SZA1010 digital servo driver processes and amplifies the signals for the radial tracking and focus actuators, and for the sledge motor. This circuit is optimized for CD-ROM and DVD-ROM applications and has extremely low drive impedances compared with its predecessors. Completing the line-up, a TDA7072A power driver IC is used to drive the disc loader motor.

All in all, PRIME offers an advanced, secure approach to DVD-ROM which can shorten the time needed to get your first DVD-ROM products on the market.

CD-R subsystem for 2x recording and 4x playback



RECORDER E65400 CD-Recorder subsystem

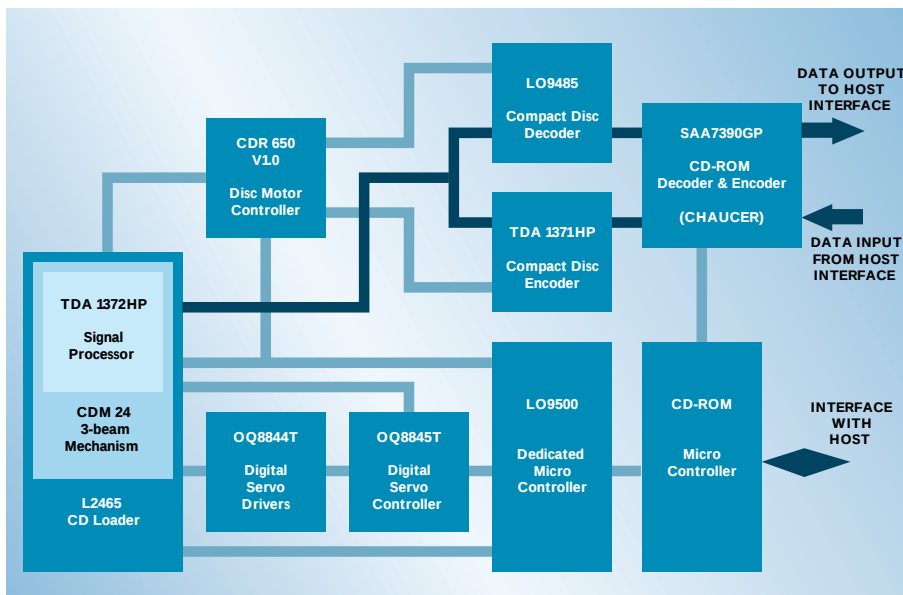
- **L2465 tray-type loader assembly for 5¼" half-height plug-in applications.** (option: Charcoal grey colour).
- **Fast access: 350 ms at 4x.**
- **Incorporates all basic functions of a CD-Recordable application** (audio and data).
- **Up to 2x recording and 4x playback.**
- **Versatile and comprehensive interface.**
- **Highly refined servo and laser control.**

The RECORDER E65400

CD-Recordable subsystem provides all the basic functions of a CD-Recordable application. It incorporates a CD encoder and decoder and a dedicated microcontroller. Recording can be up to double-speed, and playback up to quad-speed with fast access. The system accepts 12 cm and 8 cm discs from all brands, for both playback and recording.

The E65400 uses the CDM 24 mechanism and L2465 loader and is designed so that:

- together with a data-user part (block-decoder, block-encoder, buffer manager and host interface), a 5¼" half-height data CD-Recorder/CD-ROM player can be made.



D65420 Data CD-Recorder system

• together with an audio-user part (DAC, ADC, display and features), an audio CD-Recorder/CD-Player can be made.

The pre-programmed, dedicated microcontroller ensures reliable operation and provides a versatile and user-friendly interface. It handles all servo, calibration and laser control functions during read, write and access operations. It also controls CD-decoding and encoding operations.

Main features of the RECORDER E65400:

- All servo and access functions
- Power calibration functions
- Read and write functions
- CD decoding and encoding functions
- Interfaces with a data or an audio path
- Accepts 8 cm and 12 cm discs.

An E65400 starter kit is available.

Derivative systems

The **D65420** is an extension of the basic E65400 subsystem, forming the basis for a data CD-Recorder. Together with the E65400 and a user part

(buffer manager and host interface), the D65400 can be used to make a 5 1/4"-inch half-height data CD-Recorder drive.

The D65420 is a highly-integrated approach using the SAA7390 IC (nickname: Chaucer). The SAA7390 is a high-performance CD-R, CD-i interface IC with external SCSI or ATAPI options. It includes block-decoder, block-encoder and buffer manager.

Though the CD-Recordable interface module for the E65400 can be adapted to suit a range of interface standards, the first available using the SAA7390 will be a SCSI solution (see figure).

SAA7390 features:

- Fully-integrated CD-ROM block-encoder/decoder
- Third level error corrector
- Third layer ECC syndrome calculation
- Third layer encode/decode and buffer management
- Block-oriented host transfers
- Generic interface with 16.9 Mbyte/s transfer for external SCSI (53CF92) or ATAPI IC

- Designed for 8x read and 6x write speeds
- Supports 256K, 1M or 4M, 70 ns low-cost DRAMs
- Ten-level arbitration logic in buffer manager

E65400/D65420 SYSTEM PERFORMANCE (typ. values)	
Disc size	8 and 12 cm.
Data transfer rate	read (n=1 or 2 or 4) write (n=1 or 2)
CDROM mode 1	n=1 n=2 n=4
176.4, 352.8, 705.6 kb/s, 76.4, 352.8 kb/s	
D65420:	150kbyte/s (D65420) 300kbyte/s (D65420) 600kbyte/s (sustained) (D65420)
Formats	CD-DA, CD ROM mode 1, CD ROM mode 2, CD-i, CD-XA, CD-Bridge, Photo CD,
Video	CD, CDR
Access time read(1/3 stroke n=4)	<350 ms.
Digital output	EBU-standard
Subcode channels	Q,R,S,T,U,V,W

USER INTERFACE	
Type	high speed serial synchronous bidirectional
No. of lines	Data out Data in Clock Acknowledge

DATA INTERFACE	
Default	CD-ROM i ² S
Audio format	software selectable
R...W subcode	serial format

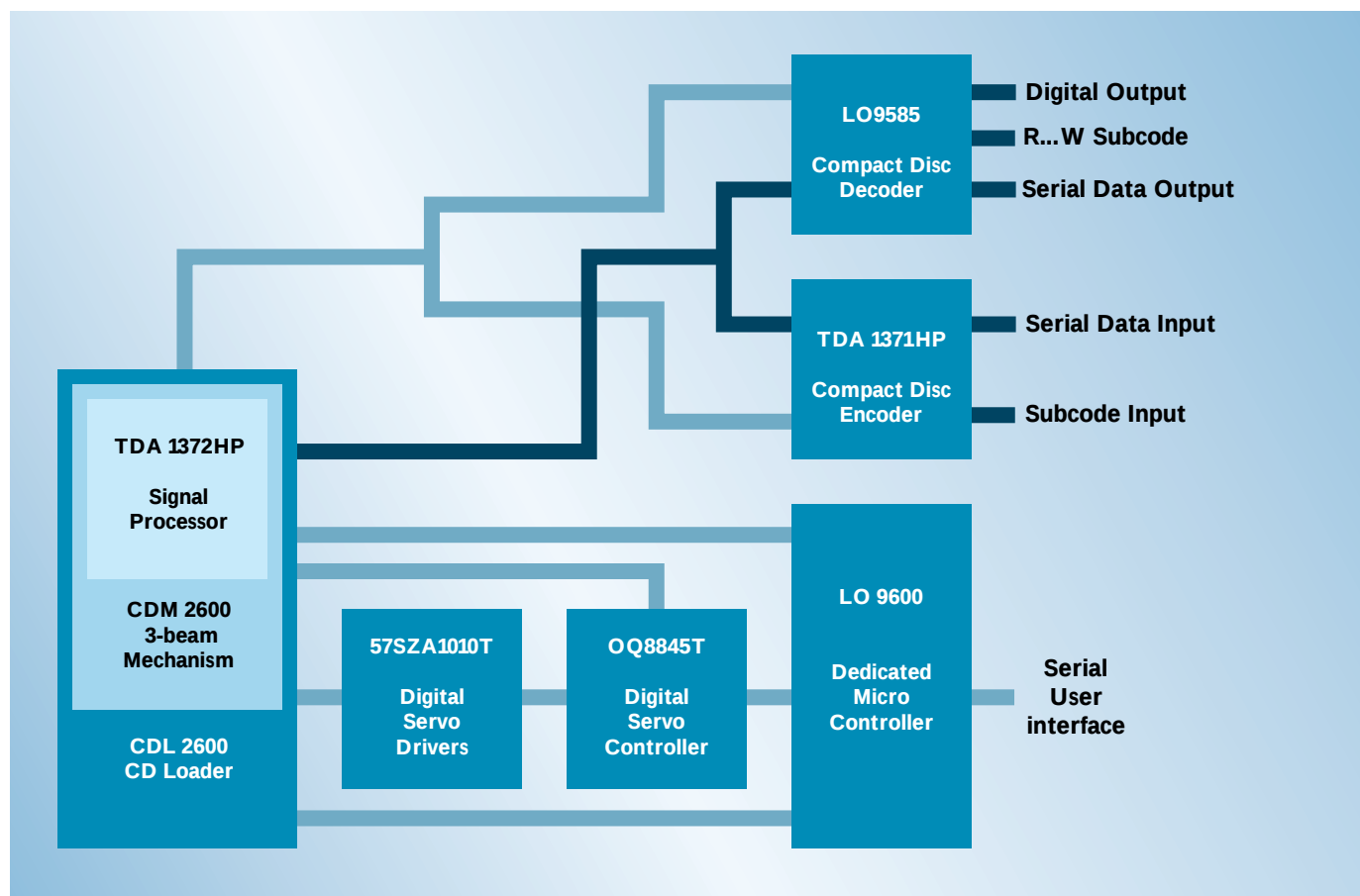
POWER SUPPLY	
Supply Voltage	+5V, +12V
Power consumption (n=4)	4 W

RELIABILITY	
MTBF (50%)	60000 Hr.



RECORDER CDU 2600 SYSTEMS

CD-R subsystem for 2x recording and 6x playback



RECORDER CDU 2600 CD-Recorder subsystem

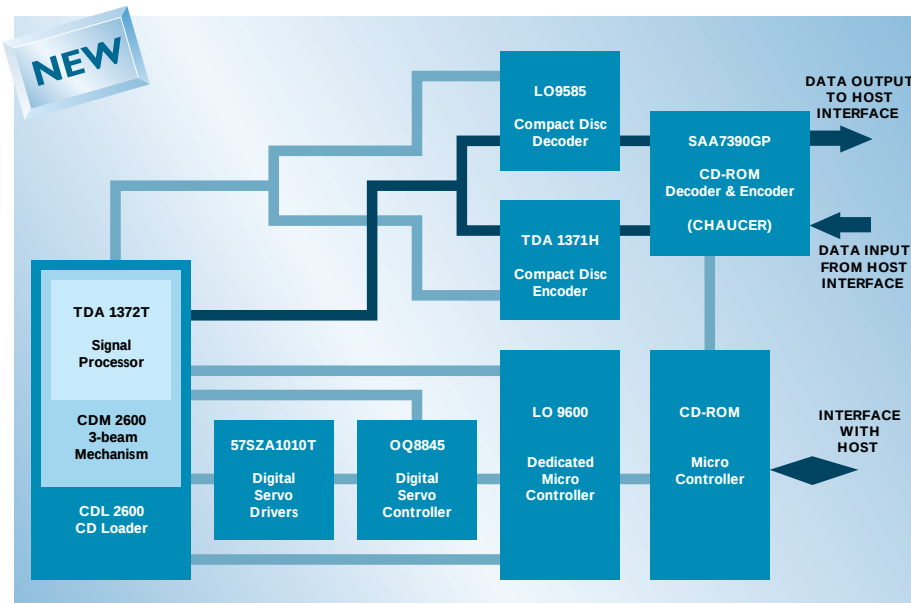
- **CDL 2600 tray-type loader assembly for 5¼" half-height plug-in applications.** (option: Charcoal grey colour).
- **Fast access: <300 ms at 6x (zoned).**
- **Incorporates all basic functions of a CD-Recordable application (audio and data).**
- **Up to 2x recording and up to 6.5x playback.**
- **Versatile and comprehensive interface.**
- **Highly refined servo and laser control.**

The **RECORDER CDU 2600**

CD-Recordable subsystem provides all the basic functions of a CD-Recordable application. It incorporates a CD encoder and decoder and a dedicated microcontroller. Recording can be up to double-speed, and playback up to 6x standard speed with fast access. The high playback speed is achieved using Philips-patented zoned bit rate techniques. The system accepts 12 cm and 8 cm discs from all brands, for both playback and recording.

The CDU 2600 uses the CDM 2600 mechanism and CDL 2600 loader and is designed so that:

- together with a data-user part (block-decoder, block-encoder, buffer manager and host interface), a 5¼" half-



CDU 2620 Data CD-Recorder system

height data CD-Recorder/CD-ROM player can be made.

- together with an audio-user part (DAC, ADC, display and features), an audio CD-Recorder/CD-Player can be made.

The pre-programmed, dedicated microcontroller ensures reliable operation and provides a versatile and user-friendly interface. It handles all servo, calibration and laser control functions during read, write and access operations. It also controls CD-decoding and encoding operations.

Main features of the RECORDER CDU 2600:

- All servo and access functions
- Power calibration functions
- Read and write functions
- CD decoding and encoding functions
- Interfaces with a data or an audio path
- Accepts 8 cm and 12 cm discs.

A CDU 2600 starter kit is available.

Derivative systems

The CDU 2620 is an extension of the basic CDU 2600 subsystem, forming the basis for a data CD-Recorder.

Together with the CDU 2600 and a user part (buffer manager and host interface), the CDU 2620 can be used to make a 5¹/₄"-inch half-height data CD-Recorder drive.

The CDU 2620 is a highly-integrated approach using the SAA7390 IC (nickname: Chaucer). The SAA7390 is a high-performance CD-R, CD-i interface IC with external SCSI or ATAPI options. It includes block-decoder, block-encoder and buffer manager.

Though the CD-Recordable interface module for the CDU 2600 can be adapted to suit a range of interface standards, the first available using the SAA7390 will be a SCSI solution (see figure).

SAA7390 features:

- Fully-integrated CD-ROM block-encoder/decoder
- Third level error corrector
- Third layer ECC syndrome calculation
- Third layer encode/decode and buffer management
- Block-oriented host transfers

- Generic interface with 16.9 Mbyte/s transfer for external SCSI (53CF92) or ATAPI IC
- Designed for 8x read and 6x write speeds
- Supports 256K, 1M or 4M, 70 ns low-cost DRAMs
- Ten-level arbitration logic in buffer manager

CDU 2600 SYSTEM PERFORMANCE (typ. values)	
Disc size	8 and 12 cm.
Data transfer rate	read (n=1 or 2 or 6) write (n=1 or 2)
CDROM mode 2	n=1 176,4 kbyte/s. n=2 352,8 kbyte/s. n= zoned-6 1058,4 kbyte/s. (aug.)
Formats	CD-DA, CD ROM mode 1, CD ROM mode 2, CD-I, CD-XA, CD-Bridge, Photo CD, Video CD
Access time read(1/3 stroke n=6)	<300ms.
Digital output	EBU-standard
Subcode channels	P,Q

USER INTERFACE	
Type	high speed serial synchronous bidirectional
No. of lines	Data out Data in Clock Acknowledge

DATAINTERFACE	
Default	CD-ROM i ² S
Audio format	software selectable
R...W subcode	serial format

POWER SUPPLY	
Supply Voltage	+5V, +12V
Power consumption (n=4)	4 W

RELIABILITY	
MTBF (50%)	60000 Hr.

The ultimate application flexibility...
...available for Philips' customers

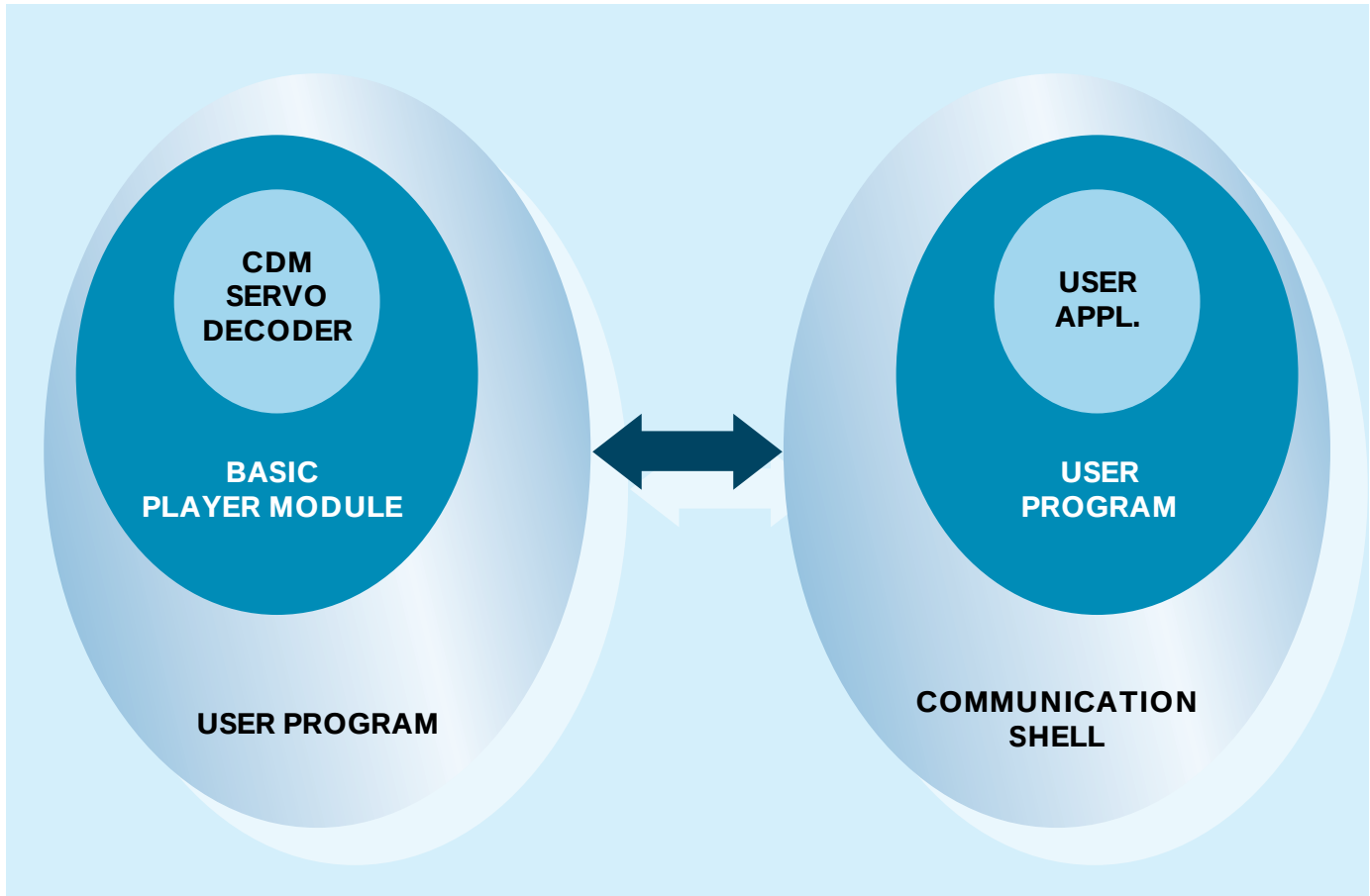


Fig.1 Basic Player Modules – two-microcontroller approach

A Basic Player Module (or BPM) is that part of the firmware that controls the servo and CD-decoding functions. The figures show two possible application options:

- the two-microcontroller approach
- the single-microcontroller approach.

Fig.1 shows the two-microcontroller approach. Around the BPM, a communication shell is written. This takes care of the interface between the BPM and an external (user) microcontroller. Hardware communication lines are used between the two microcontrollers. An example of this can be seen in our VIDEO 6481 application. The protocol used here is the DSA-interface. This set-up allows for maximum flexibility and facilitates significantly upgrades of applications, because the user program is independent of the servo/decoder program.

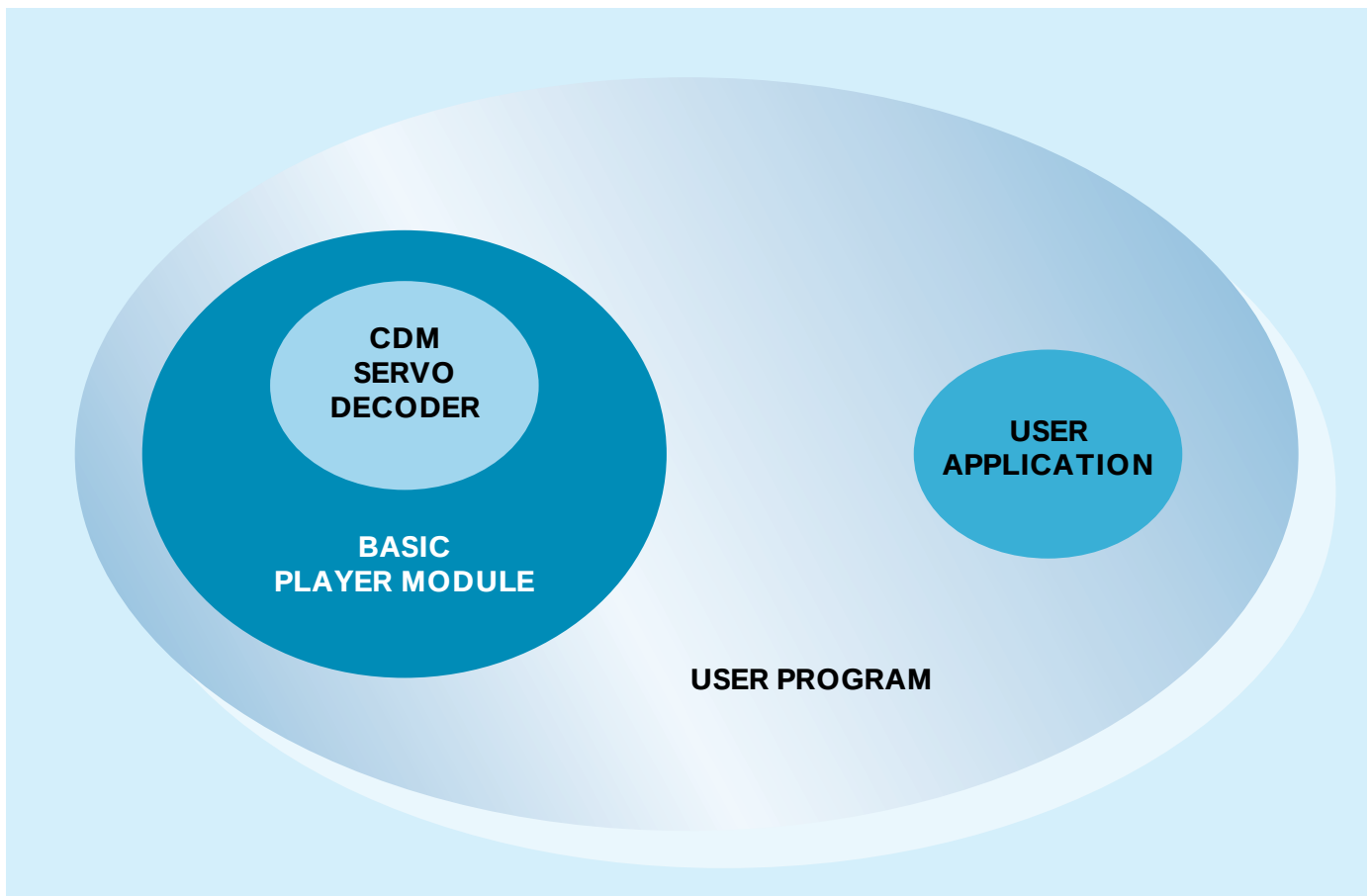


Fig.2 Basic Player Modules – integrated-microcontroller approach

Fig.2 shows a more cost-effective approach – the user program is integrated with the BPM in one micro-processor. Interfacing takes place in software. An example of this approach is our HIFI 6000 system.

By making this firmware available (license agreement is required), our customers can develop in-house the user software for their specific applications. Software support from Philips is available.

Basic Player Modules are not only related to the specific servo/decoder application, but also to the CD-mechanism. All servo related coefficients which have been optimized for the specific applications are embedded in this firmware. Therefore, different BPMs are available. Please contact your local sales-office for more information on Basic Player Module firmware.

CD-SYSTEM DELIVERABLES

Y= available o=present a=option [o]=choice

DELIVERABLE SYSTEM ICs

application	IC	IC_function	IC_name
	TDAI300T	diode amplifier/laser supply	DALAS
	TDAI302T	diode amplifier/laser supply	DALAS
	TDAI301T	dig. servo processor	DSIC2
	OQ8668HP	dig. servo	DSIC3
	LO9585	CD decoder optical speed	CD65
	LO9585WD	CD decoder disc-speed	HD61
	SAA7335	CD & DVD decoder-DSP	CD6
	SAA7345CP	CD decoder	CD7
	SAA7370CP	CD decoder & servo (N=4)	CD7
	SAA7372CP	CD decoder & servo (N=2, VCD)	CD7
	SAA7374CP	CD decoder & servo low power	CD7
	SAA7376CP	CD decoder & servo (N=1)	CD7
	SAA7348CP	CD decoder & dig. servo & microcontroller	ACE1
	OQ8641T	dig. servo driver	DS2
	BA5934	dig. servo driver	
	SZA1010T	dig. servo driver	DS3
	OQ8645T	dig. servo controller	DSICR
	TDAI303T	dig. servo driver	DSI
	TDA7072A(T)	servo power driver	single BTL
	TDA7073A(T)	servo power driver	dual BTL
	SAA7346H	CD shock absorption	SHOARMA
	TDAI305T	BCC DA converter & filter	
	TDAI306T	BCC DA converter & filter	
	TDAI310A(T)	DA converter	BCDAC
	TDAI311A(T)	DA converter	CCDAC
	TDAI545A(T)	DA converter	CCDAC
	TDAB425	audio processor	dil
	NE4558	audio amp & filtering	
	TDAI308(T)	audio lps amplifier	
	SAA2510CP	Video CD MPEG1 decoder	
	SAA7185	dig. video encoder	
	SAA7380CP	CD ROM decoder/interface (N=6)	ELM
	SAA7381CP	DVD and CD ROM decoder/interface IDE	YEW
	SAA7385CP	CD ROM decoder/interface SCSI (N=12)	SEQUOIA
	SAA7388CP	CD ROM decoder/interface (N=12) IDE	ELM
	SAA7390CP	CD ROM devoder & encoder	CHALCER
	TDAI371H	CD encoder	CDCEP
	OM5232/FB8/...	CCA210 microcontroller	
	OM5232/FB8/541	CDT610 V1.1 microcontroller	QFR-44
	OM5232/FB8/541	CDT610 V1.1 microcontroller	DIL-40
	OM5232/FB8/542	CDT611 V1.0 microcontroller	DIL-40
	OM5234/FB8/556	CDT612 V1.0 microcontroller	QFR-44
	OM5234/FB8/556	CDT612 V1.0 microcontroller	DIL-40
	OM5234/FB8/536	CDT612 V2.1 microcontroller	QFR-44
	OM5234/FB8/536	CDT612 V2.1 microcontroller	DIL-40
	OM5232/FB8/537	CDT613 V1.5 microcontroller	DIL-40
	OM5234/FB8/...	CDT663 microcontroller	
	OM5238/FB8/...	CDT664 microcontroller	
AUDIO			
HIFI 6000		o o	o
HIFI6013		o o	o
HIFI6011		o o	o
HIFI7000		o	o
HIFI7001		o	o
HIFI7010		o	o
PREMIUM 6000		o	o
PREMIUM 7050		o	o
CCA210		o	o
HEADPHONE 7000		o	o
HEADPHONE 7001		o	o
VIDEO			
VIDEO 6001		o o	o
VIDEO 6002		o o	o
VIDEO 6481		o o	o
VIDEO 7000		o	o
VIDEO 7003		o	o
CD-ROM			
ROM 65100		o o	o
ROM 65160		o o	o
ROM 65180		o o	o
ROM 65200		o o	o
ROM 65260		o o	o
ROM 65280		o o	o
ROM 65300		o o	o
ROM 65360		o o	o
ROM 65380		o o	o
ROA1312		o	o
ROA1312/1		o	o
ROA1312/2		o	o
DVD-ROM Prime		o o	o
CD-R			
REC E65400		o	o
REC D65420		o	o
REC CDU 2600		o	o

64k (P)ROM	CDT665 ROM	
OM5238/FBx/...	CDT666 microcontroller	
OM5238/FBx/...	CDT667 microcontroller	
64k (P)ROM	CDT668 ROM	
OM5234/FBx/...	CDT669 microcontroller	
OM5238/FBx/...	ELM interface controller	
64k (P)ROM		
FB3CL834/...	CDT7... microcontroller	
OM5232/FBx/...	CDT710 V1.0 microcontroller	
OM5284/B001	CDT712 V0.4 microcontroller	
OM5284/xxxx	CDT713 Vxx microcontroller	
OM5241/FBx/...	CDT715 microcontroller	
FB3CL781/HFH/...	CDT731 microcontroller	
OM523x	CDT7xx	
FB3CL834/...	CDT73x microcontroller	
LO9468	PREMIUM 6000 Microcontroller	
LO9500	servo processor	
LO9600	CDU2600 microcontroller	
CV4557A28	CDR650 V1.0 motor processor	
PCF8522(T)	non-volatile memory	
PCF8566T	LCD display driver	
PCF8577C(T)	LCD display driver	
PCF8574(T)	wired remote	
SAA3010T	RC5 transmitter/ wired remote	
	RC5 amplifier	

DELIVERABLE SYSTEM Mechanisms

Mechanism	Mech_function	
CDM 12.1	Economic for audio, video and games	incl. TDAI302T
CDM 12.1T	Economic top loading audio, video and games	incl. TDAI302T (DALAS)
CDM 12.38LC	compact audio portable, low power, low voltage	incl. TDAI372 (AEGER)
VAM1205	high-end audio video mechanism	
CDM12 industrial	Professional standards and high reliability	
CDM 24C	double speed write, quad read, CDR	
Loaders	Loader_function	
LI210/11	low height tray, inc. CDM12.1	
LI210/13	standard height tray assembly, inc. CDM12.1	
VAL1255	slimline tray/loader inc. VAM1205	incl. TDAI302T
CI203	3 disc changer inc. CDM12.1	
LI266	half height tray-loader, inc. CDM12.6	incl. OQ8866 (OSDALAS1)
LI269	half height tray-loader, inc. CDM12.9	incl. OQ8866 (OSDALAS1)
LI270	half height tray-loader, inc. CDM12.10	incl. OQ8875 (OSDALAS2)
ROL1312	half height tray-loader, inc. ROM1312	incl. OQ8875 (OSDALAS2)
L2465	half height tray-loader, inc. CDM24	incl. TDAI372 (AEGER)
CDL2600	half height tray-loader, inc. CDM1001	incl. TDAI372 (AEGER)
Modules	Module_function	
MOD JUKEBOX	full assem. funct. unit, inc. CDM12 ind.	
MOD PRO-AUDIO	full assem. funct. unit for prof. audio, grey	
MOD PRO-AUDIO	full assem. funct. unit for prof. audio, black	

application
AUDIO

HIFI 6000	[o]	[o] [o]
HIFI6013	[o]	[o] [o]
HIFI6011	[o]	[o] [o]
HIFI7000	[o]	[o] [o]
HIFI7001	[o]	[o] [o]
HIFI7010		[o]
PREMIUM 6000		[o] [o]
PREMIUM 7050	[o]	[o]
CCA210	[o]	[o] [o]
HEADPHONE 7000	[o]	
HEADPHONE 7001	[o]	

VIDEO

VIDEO 6001	[o]	[o] [o]
VIDEO 6002	[o]	[o] [o]
VIDEO 6481	[o]	[o] [o]
VIDEO 7000	[o]	[o] [o]
VIDEO 7003		[o]

CD-ROM

ROM 65100		[o]
ROM 65160		[o]
ROM 65180		[o]
ROM 65200		[o]
ROM 65260		[o]
ROM 65280		[o]
ROM 65300		[o]
ROM 65360		[o]
ROM 65380		[o]
ROA1312		[o]
ROA1312/1		[o]
ROA1312/2		[o]
DVD-ROM Prime		

CD-R

REC E65400		[o]
REC D65420		[o]
CDU 2600		[o]

***INTEGRATED
CIRCUITS***

INTEGRATED CIRCUITS FOR CD SYSTEMS

Type	Description	Nickname	Package	Page
Pre-programmed microcontrollers				
for stand-alone three-beam CD systems e.g. HIFI 6000				
OM5232/FBP/541	CDT610 V1.1 in DIP40		DIP40	3.7
OM5232/FBB/541	CDT610 V1.1 in QFP44		QFP44	3.7
for three-beam subsystems for CD audio applications e.g. HIFI 6011				
OM5232/FBP/542	CDT611 V1.0 in DIP40		DIP40	3.7
for three-beam subsystems e.g. PREMIUM 6000				
P83C654/FBB/530	LO9468 in QFP44		QFP44	3.7
for CD subsystems used in CD games application GAMES 6001 and karaoke application KARAOKE 6000				
OM5234/FBP/556	CDT612 V1.0 in DIP40		DIP40	3.7
OM5234/FBB/556	CDT612 V1.0 in QFP44		QFP44	3.7
improved CDT612 version for Video-CD application VIDEO 6001				
OM5234/FBP/536	CDT612 V2.1 in DIP40		DIP40	3.7
OM5234/FBB/536	CDT612 V2.1 in QFP44		QFP44	3.7
improved CDT610 with additional direct track selection via digit keys for stand-alone audio systems such as HIFI 6013				
OM5232/FBB/537	CDT730 V1.5 in QFP44		QFP44	3.7
for HIFI 7000, VIDEO 7000 and HEADPHONE 7000 systems				
OM5232/FBB/536	CDT710 V1.0 with/without LCD display driver for stand-alone audio system based upon single chip CD decoder/servo controller SAA7376; used in HIFI 7000 system		QFP44	3.7
OM523x/FBB/...	CDT715 Vx.x for stand-alone Video-CD solution based on single-chip CD decoder/servo controller SAA7372, Video-CD decoder SAA2510 and digital video decoder SAA7185, used in VIDEO 7000 system.		QFP44	3.7
P83CL781HFH/.	CDT730 Vx.x with on-chip LCD display driver for CD-walkman system based on single-chip CD decoder/servo controller SAA737x, used in HEADPHONE 7000 system		QFP44	3.7
variants for HIFI 7010, VIDEO 7003 and VIDEO 7010				
OM5234/FBB/...	CDT712 V0.4 Used in HIFI 7010. Same as CDT710 but with control of 3-disc changer C1203, and FTS features		QFP44	3.7
OM5234/FBB/...	CDT713 Vx.x. Microcontroller for the DSA-bus controlled VIDEO 7003 Video-CD subsystem		QFP44	3.7
OM523x/FBB/...	CDT71x Vx.x. As CDT715 but with control of 3-disc changer C1203 for VIDEO 7010 system		QFP44	3.7
for CD systems in music centres				
OM5234/FBx/...	CCA210 For home and portable audio systems with CD player, electronically-tuned radio and mechanical cassette deck CCA210		DIP40, QFP44	3.7
for the 6x CD-ROM system ROM 65100				
CV3720A	CDT663 V1.0 in PLCC44		PLCC44	3.7
CV3720B	CDT663 V1.0 in QFP44		QFP44	3.7

INTEGRATED CIRCUITS FOR CD SYSTEMS

Type	Description	Nickname	Package	Page
for controlling the ELM block-decoder and DSA-bus; used with CDT663 in the 6x CD-ROM system ROM 65160				
OM5238/FBx/...	CDT664 V1.1		PLCC44, QFP44	3.7
for the 8x CD-ROM system ROM 65200				
-	CDT666			3.7
for controlling the ELM block-decoder and D ^S B-bus; used with CDT666 in the 8x CD-ROM system ROM 65260 + 360				
-	OM5238/FBx/CDT667		PLCC44, QFP44	3.7
for the 8x CD-ROM system ROM 65300				
-	CDT6xx PLEASE SUPPLY TYPE NUMBER			3.7
for controlling the ELM block-decoder and D ^S B-bus; used with CDT6xx in the 8x CD-ROM system ROM 65360				
-	CDT6xx PLEASE SUPPLY TYPE NUMBER			3.7
for CD-Recordable systems				
CV4557-A28	CDR650 V1.0 in PLCC28. Used in the D65420.		PLCC28	3.7
LO9500	microcontroller for the E65400 subsystem		-	3.7
LO9600	microcontroller for the CDU2600 subsystem		-	3.7
Generic microcontrollers				
OM5232/34/38	80C51-based microcontrollers		DIP40, QFP44	3.7
P83CL434/834	80C51-based microcontrollers with on-board LCD driver		DIP42, QFP44	3.7
P83CL781/...	Low-voltage 80C51-based microcontrollers		DIP40, QFP44	3.7
Data amplifier and laser supply circuits (circuits for CD-Recordable and DVD are listed under those headings)				
OQ8866DB	Diode amplifier and laser supply IC for high-speed CD applications	OSDALAS	SSOP24	3.8
OQ8875DB	Diode amplifier and laser supply IC for high-speed CD applications	OSDALAS2	SSOP24	3.8
TDA1302T	Diode amplifier and laser power control	DALAS	SO20	3.9
TDA1300T	Low-voltage data amplifier and laser power control	DALAS2	SO20	3.9
TZA1015T	Diode amplifier and laser supply IC	HDALAS	SO28	3.10
TZA1017T	Diode amplifier and laser supply IC	PALS-AUDIO	TSOP24	3.11
TZA1021T	Diode amplifier and laser supply IC; similar to TZA1017T but for high-speed CD-ROM applications	PALS-ROM	TSOP24	3.12
Servo controllers				
TDA1301T	Digital servo control for 2-stage 3-beam CD mechanism	DSIC2	SO28L	3.13
OQ8868HP	Digital servo control for 2-stage 3-beam CD mechanism	DSICS	QFP44	3.14
Compact Disc decoders				
SAA7345GP/SS	CD decoder with on-chip RAM and digital filter	CD6	QFP44	3.15
SAA7345GP/DS	2x CD decoder with on-chip RAM and digital filter	CD6	QFP44	3.15
SAA7345GP/TT	3x CD decoder with on-chip RAM and digital filter	CD6	QFP44	3.15
SAA7345H/LV	Low-voltage CD decoder with on-chip RAM and digital filter	CD6	TQFP44	3.15
LO9585	10x CD decoder for CD-ROM and CD-i	CD85	TQFP44	3.16
LO9585/WD	12x CD decoder for CD-ROM and CD-i	CD86	TQFP44	3.16
SAA7348GP	16x All CD Engine (ACE) comprising CD decoder, digital servo and microcontroller for data applications	ACE	QFP100	3.17
SAA7370GP	4x single-chip CD decoder and digital servo controller for data applications	CD7	QFP64	3.18

INTEGRATED CIRCUITS FOR CD SYSTEMS

Type	Description	Nickname	Package	Page
SAA7370AGP	Up to 8x single-chip CD decoder and digital servo controller for data applications	CD7	QFP64	3.18
SAA7370BGP	Up to 10x single-chip CD decoder and digital servo controller for data applications	CD7*	QFP64	3.18
SAA7371GP	4x single-chip CD decoder and digital servo controller for automotive applications	CD7	QFP64	3.18
SAA7372GP	2x single-chip CD decoder and digital servo controller for audio/video applications e.g. V-CD	CD7	QFP64	3.18
SAA7373GP	2x single-chip CD decoder and digital servo controller for automotive applications	CD7	QFP64	3.18
SAA7374GP	Low-voltage 2x single-chip CD decoder and digital servo controller for portable applications	CD7	QFP64	3.18
SAA7376GP	Single-speed single-chip CD-decoder and digital servo controller for audio applications	CD7	QFP64	3.18
SAA7377GP	Single-speed single-chip CD decoder and digital servo controller for automotive applications	CD7	QFP6	3.18
CD driver circuits				
TDA7072A(T)	CD single motor-drive circuit in BTL configuration (short circuit protected)		DIP8, SO8	3.19
TDA7073A(T)	CD dual motor-drive circuit in BTL configuration (short circuit protected)		DIP16, SO16L	3.19
TDA8541(T)	CD single motor-drive circuit; similar to TDA7072A(T) but with lower internal voltage drop, disable/enable, and standby mode		DIP8, SO8	3.19
TDA8542(T)	CD dual servo motor-drive circuit; similar to TDA7073A(T) but with lower internal voltage drop, disable/enable, and standby mode		DIP16, SO16L	3.19
TDA1303T	Digital servo driver	DSD1	SO24L	3.20
OQ8844T	Triple digital servo driver	DSD2	SO20	3.21
SZA1010T	Triple digital servo driver with tri-state	DSD3	SO20	3.22
Shock absorption circuits				
SAA7346H	CD shock absorption circuit	SHOARMA	QFP44	3.23
SAA7342GP	CD shock absorption circuit with ADPCM	SHOARMA 2	QFP44	3.24
SAA7343GP	CD shock absorption circuit with ADPCM and DRAM	SHOARMA 3	QFP44	3.24
Digital-to-analog converters (DACs)				
TDA1305(T)	Bitstream/continuous calibration filter-DAC with up-sampling filter		SO28L	3.37
TDA1306T	Bitstream/continuous calibration filter-DAC with up-sampling filter		SO24L	3.37
TDA1310A(T)	Continuous calibration DAC with current output		DIP8, SO8	3.37
TDA1311A(T)	Continuous calibration DAC with voltage output		DIP8, SO8	3.37
TDA1312A(T)	Continuous calibration DAC with voltage output		DIP8, SO8	3.37
TDA1313(T)	Continuous calibration DAC with voltage output		DIP16, SO16	3.37
TDA1314T	Quad sign-magnitude filter DAC with voltage output		SO28L	3.37
TDA1386T	Continuous calibration DAC with up-sampling filter		SO24L	3.37
TDA1387T	Continuous calibration DAC with current output		DIP8, SO8	3.37
TDA1388T(M)	Continuous calibration DAC with DSP for CD-ROM audio		SO28, SSOP28	3.37
TDA1541A	High-performance 16-bit DAC		DIP28	3.37
TDA1541A/R1	High-performance 16-bit DAC		DIP28	3.37
TDA1541A/S1	Single crown 16-bit DAC		DIP28	3.37
TDA1541A/S2	Double crown 16-bit DAC		DIP28	3.37
TDA1543(T)	Economy 16-bit DAC (I2S bus format)		DIP8	3.37
TDA1545A(T)	High-performance continuous calibration DAC with current output		DIP8, SO8	3.37

INTEGRATED CIRCUITS FOR CD SYSTEMS

Type	Description	Nickname	Package	Page
TDA1547	Premium-grade BiMOS bitstream DAC		DIP32SHR	3.37
TDA1548T	Low-voltage bitstream/continuous calibration filter-DAC with DSP features		SO28	3.37
TDA1549(T)	Bitstream continuous calibration DAC		DIP16, SO16	3.37
Analog-to-digital converters (ADCs)				
SAA7360GP	High-performance bitstream ADC		QFP44	3.38
SAA7366T	Economy bitstream ADC		SO24L	3.38
SAA7367T	Economy bitstream ADC		SO16	3.38
Digital-to-analog converters and analog-to-digital converters (ADDAs), and codecs				
TDA1309H	Low-voltage bitstream continuous calibration ADC + DAC		QFP44	3.38
TDA1396H(Z)	Multimedia digital sound circuit (PC audio codec)	BITsound	TQFP128	3.38
Headphone driver				
TDA1308T	Headphone/line-out driver for digital audio		SO8	3.25
Video-CD decoder				
SAA2510GP	Video-CD MPEG audio/video decoder for stand-alone Video-CD applications		QFP100	3.26
Digital Video encoder				
SAA7185B	Digital PAL/NTSC video encoder	DENC2	PLCC68	3.27
CD-ROM block-decoders				
SAA7380GP	10x CD-ROM block-decoder with Atapi interface	ELM	QFP80	3.28
SAA7388GP	16x CD-ROM block-decoder with Atapi interface	ELM	QFP80	3.28
SAA7385GP	16x CD-ROM block-decoder with SCSI-2 interface with SCAM	SEQUOIA	QFP120	3.29
CD encoder				
TDA1371H	CD encoder	CDCEP	QFP44	3.30
CD-Recordable circuits				
CEO27A	CD-ROM block-encoder	CDB2		3.31
SAA7390GP	4x write, 8x read encoder/block-decoder for CD-Recordable	CHAUCER	QFP120	3.32
OQ8845T	Digital servo controller	DSICR	SO28	3.33
TDA1372HP	Preamplifier and error signal generator	AEGER	QFP44	3.34
DVD circuits				
SAA7335GP	DVD decoder	HD61	QFP100	3.35
SAA7381GP	High-speed DVD & CD-ROM block-decoder with Atapi interface	YEW	QFP100	3.36
LCD segment drivers with I2C-bus interface:				
PCF8566(T)	Segment driver (24 drive outputs)		DIP40, VSO40	3.38
PCF8576T	Segment driver (40 drive outputs)		VSO56, FCC	3.38
PCF8577C(T)	Segment driver (32 drive outputs)		VSO40, FCC	3.38

Note:

References to 6x, 8x, and similar indicate the data rate relative to that used in standard CD audio.

* provisional data

The following text summarizes the functions of the ICs at the heart of the CD systems described in Section 2. More data is given in the individual data sheets.

OVERVIEW OF INTEGRATED CIRCUITS

The following text summarizes the functions of the ICs at the heart of the CD systems described in Section 2. More data is given in the individual data sheets.

Photodiode amplifier and laser supply circuits:

TDA1300T & TDA1302T

These two ICs, one of which is a 3 V version, derive adequately filtered currents for radial tracking, focus control, and the HF data signal for the CD decoder. They can be used with a wide range of 3-beam/sledge optics with p- or n-sub lasers, and with single or double Foucault focus error detectors. They have built-in equalizers to permit double or single speed modes of operation that can be changed 'on the fly'. After a single initial adjustment has been made, the ICs maintain the laser output constant, regardless of ageing. The ICs are in SO packages, allowing them to be mounted on the optical pick-up unit extremely close to the photodiode for high signal-to-noise ratio.

OQ8866 & OQ8875

These two ICs are data amplifiers and laser supply circuits for high-speed CD applications. The RF amplifiers can handle data at up to 8x and 12x the standard rate. The laser control circuitry is optimized for n-substrate laser monitor units as used in Philips' CDM mechanisms. Both ICs are in SSOP24 allowing them to be mounted on the optical pick-up unit. Both ICs have current inputs and outputs.

TZA1015

This data amplifier and laser supply circuit forms a universal interface between voltage output CD mechanisms and Philips' current input servo/decoder circuits. The programmable bandwidth of the RF amplifier allows this preamplifier to be used in CD-audio or CD-ROM applications up to 16x. A programmable RF gain and a gain switch to select CD or CD-E/R discs guarantee optimal playability. The universal

laser control circuitry automatically adapts to suit n- or p-substrate laser monitor diodes.

TZA1017

The TZA1017 is a data (current) amplifier and laser supply circuit for audio applications. Its TSOP24 package allows direct mounting on the optical pick-up unit. The IC contains a gain switch for playing CD, CD-R and CD-Rewritable discs. An equalizer for single and double-speed is integrated. The universal laser control circuitry automatically adapts to suit n-sub or p-sub monitor diodes.

TZA1021

The TZA1021 is a data (current) amplifier and laser supply circuit for 12x CD-ROM applications. It has the same functions as the TZA1017 but no equalizer.

Single-chip digital servo control system:

TDA1301T

This highly-integrated 1-chip digital servo control system (DSIC2) minimizes peripheral components, is adjustment-free, and performs all the servo functions, except control of the disc drive motor, in CD players with two-stage three-beam/sledge optics. The system is optimized for low-voltage, low-power applications. The servo characteristics can be adjusted over a wide range via a 3-wire serial interface which allows the system to be tailored, via a microcontroller, to suit a variety of Philips or other CD mechanisms. The functions performed by the IC are:

- Photodiode signal processing
- Focus servo loop
- Radial servo loop
- Sledge motor servo loop.

OQ8868, OQ8845

The OQ8868 (DSICS) is similar to the TDA1301T but is optimized for use in high-speed CD-ROM applications. For CD-Recordable applications, the equivalent circuit is the OQ8845.

Servo power drivers:

TDA1303T

This servo power driver is a low-power, low-voltage IC for CD players with 3-beam 2-stage optics. It includes three class-D amplifiers which receive the PDM signals from the servo control IC and process them for the radial tracking and focus actuators, and the sledge motor. The IC also includes a switched-mode power supply for the laser diode to minimize power losses during the DC to DC conversion. The IC also includes a battery voltage indicator. The gain of the class-D amplifiers is stabilized against supply voltage fluctuations.

OQ8844 and SZA1010

The OQ8844 is similar to the TDA1303T but optimized for CD-ROM applications. The SZA1010 is the successor to the OQ8844 and has lower drive impedances and a tri-state-output selection pin.

TDA7072A(AT), TDA7073(AT)

These two servo power drivers are a single and a dual bridge-tied-load (BTL) power driver respectively. They receive control signals from the servo control and CD decoder ICs and generate power for driving the radial tracking and focus actuators, and the sledge and disc drive motors. Although these ICs are powered from a single 3 V to 18 V supply, the BTL configuration allows them to feed bidirectional direct current to the loads.

Compact disc decoders:

Most systems in this guide use one of two decoding concepts – CD6 and CD7. Both feature single-chip CMOS CD decoder ICs with I2S output, on-chip SRAM and digital filtering. The CD7 decoders, in addition, incorporate the digital servo control function. A new system concept termed ACE has been developed for CD-ROM applications.

CD6 concept:

SAA7345, LO9585, CD85 and CD86
Together with the single-chip digital servo

control IC (DSIC2), a servo power driver, and a CD mechanism, the CD6 decoders provide a complete front-end three-beam decoding system. In addition to the basic signal processing features which are standard for a quality CD decoder (EFM demodulation, subcode processing and error correction/concealment), the CD6 decoders provide control signals for the disc drive motor, achieve higher digital performance and offer a wide range of features.

For CD digital audio and video applications, an SAA7345 circuit (single-, double, or triple-speed version) is available.

For CD-ROM and CD-i applications, there are the LO9585 and LO9585/WD – single-chip decoders with front-end 6-bit ADC with digital equalizer and improved error-correction facilities. The LO9485 can operate at data rates up to 8x those of standard audio CD; the LO9585/WD at rates up to 10x.

CD7 concept: SAA737x

The CD7 decoders are even more highly integrated. They combine the servo control and CD6 decoder functions on a single-chip. There are CD7 decoder versions for up to 10x standard speed operation to suit all CD-audio, CD-ROM and Video-CD applications.

By selecting a stereo audio DAC from our extensive range, it is possible to tailor the performance of CD6- or CD7-based CD-audio players while using the same core system.

The CD7 family of decoders (SAA737x) interfaces directly to a wide range of graphics decoders.

ACE concept: SAA7348

ACE is the new concept for CD-ROM applications. The level of integration is even higher than previous solutions – the servo, decoder and microcontroller are all integrated. And while ACE makes use of

the same techniques and signal processing features of previous solutions, it extends operating speeds to 16x.

CD-ROM block-encoders/decoders: SAA738x, SAA7390

To satisfy the need for ever-faster CD-ROM drives, the SAA738x range of block-decoder buffer managers can handle data rates up to 12x standard speed. They integrate real-time error detection/correction and host data transfer on a single chip. The ICs support both the AT and IDE (ATAPI command set) interfaces and SCSI. They feature a buffer memory interface for SRAM and DRAM memories up to 4 Mbyte. The error corrector can perform a real-time two erasures per block algorithm.

The SAA7390 is a high-performance (8x read, 4x write) block-encoder/decoder with external SCSI or ATAPI interface options.

Video-CD decoder: SAA2510GP

Another recent addition to our range of CD decoders is an IC for MPEG-1 (Moving Picture Expert Group) decoding of audio/video data in consumer Video-CD applications. It decodes data streams in accordance with version 2.0 of the Video-CD standard. The IC requires only 4 Mbit of DRAM to store the encoded/decoded data, play control data and on-screen display (OSD) data.

Video encoder: SAA7185

For Video-CD applications, the digital video encoder SAA7185 (DENC2-M) encodes digital YUV video data into PAL or NTSC CVBS or S-video signals. The circuit accepts CCIR-compatible YUV data with 720 active pixels per line in 4:2:2 multiplexed formats such as MPEG decoded data. It includes a sync clock generator and on-chip DACs.

Shock protection: SAA734x

This family of devices provides electronic shock absorption for portable audio applications. The SAA7343 uses state-of-the-art technology to provide a low-cost solution

in which 3 seconds of audio are stored on-chip in a compressed format. If required, the stored audio continues to provide audio to the system DAC whilst the CD mechanism returns to its last position. The pin-compatible SAA7342 uses external memory to provide even greater shock absorption. The SAA7346 provides the basic shock protection feature without audio compression and is suitable for leader products.

DACs for CD-audio players

An extensive choice of DACs is available from very low-cost types to high-performance continuous calibration and bit-stream types to provide the desired audio performance. See Section 3 for full list and the publication 'Audio data converters and miscellaneous digital audio ICs.' Designer's guide. Aug. 1995, ordering code 9397 750 00151.

Microcontrollers

To control the servo and decoding functions of a CD player, several pre-programmed CMOS microcontrollers (OM52xx, and the low-voltage P83CL781 and P83CL834) are used. These are 8051 derivatives with architectural enhancements that make them suitable for CD systems.

Display drivers: PCF85xx

To simplify the user interface to a CD player, many parameters such as track number, elapsed time, and programming data are displayed. Philips' extensive range of I2C-bus controlled LCD drivers are ideal for driving displays in players.

Interfacing to competitor CD player mechanisms

The CD6 and CD7 concepts are primarily designed for operation with CDM 12.x CD-player mechanisms but have sufficiently flexible architecture to allow interfacing with a wide variety of other 3-beam/sledge mechanisms.

Pre-programmed microcontrollers for CD systems

		OM5232	OM5234	OM5238	P83CL781	P83CL434	P83CL834
ROM capacity	Kbytes	8	16	32	16	4	8
RAM capacity	bytes	256	256	512	256	128	256
Supply voltage	V	4 to 6	4 to 6	4 to 6	1.8 to 12	2 to 5.5	
Supply current (16 MHz):							
operating	mA	26.5	28	35	24 @ 3 V	tbd	
idle (+ sleep)	mA	6	6	6	0.75 @ 3 V	tbd	
power down	μA	50	50	100	<10	tbd	
I/O ports	pins	32	32	32	32	12	
Frequency range	MHz	1.2 to 16	1.2 to 16	1.2 to 16	1.8 to 12	0.7 to 12	
EEPROM/OTP version		✓	✓	✓		✓	
Power-on reset		✓	✓	✓	✓	✓	
Timers		2	2	3	3	2	
Watchdog timer				✓			
LCD driver						22-24 segments	
						1-4 backplanes	
Packages		DIP40,	DIP40,	DIP40,	QFP40, QFP44,	DIP42SHR	
		QFP44,	QFP44,	QFP44,		QFP44,	
		PLCC44,	PLCC44,	PLCC44,			

The servo control and decoding functions of a CD player are controlled via a 3-line interface and by a dedicated pre-programmed CMOS microcontroller (OM5232/34/38, or the low-voltage P83CL781, P83CL434/834). The latter have an on-chip LCD driver.

All types are derivatives of the industry-standard 8051 with architectural enhancements that make them suitable for CD player systems.

Data amplifier and laser supply circuit (OSDALAS: OQ8866, OSDALAS2: OQ8875)

- 5 amplifiers and filters with virtually no offset.
- Data amplifier with wide bandwidth to handle high data rates: up to 8x standard speed (OQ8866); up to 12x standard speed (OQ8875).
- Two built-in equalizers for single and double-speed modes ensure good playability.
- Stabilized laser output power, on/off supply switch and separate power supply connection to increase efficiency.
- Adjustable laser power control loop bandwidth and laser switch-on slope.
- Protection circuit to prevent laser damage due to supply-voltage dip.
- Radial signal for fast track counting.

The OQ8866 is an integrated amplifier and laser supply for three-beam pick-up detectors used in CD mechanisms. It consists of 5 amplifiers and low-pass filters for the focus and radial detector signals. The RF signal is

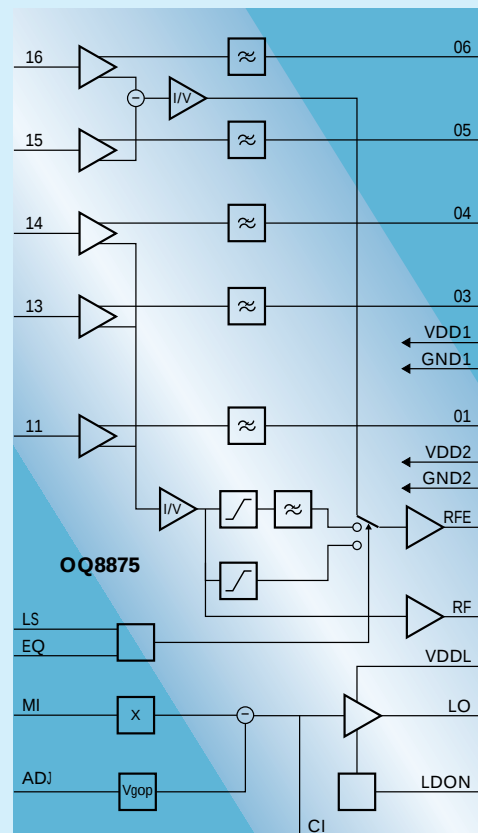
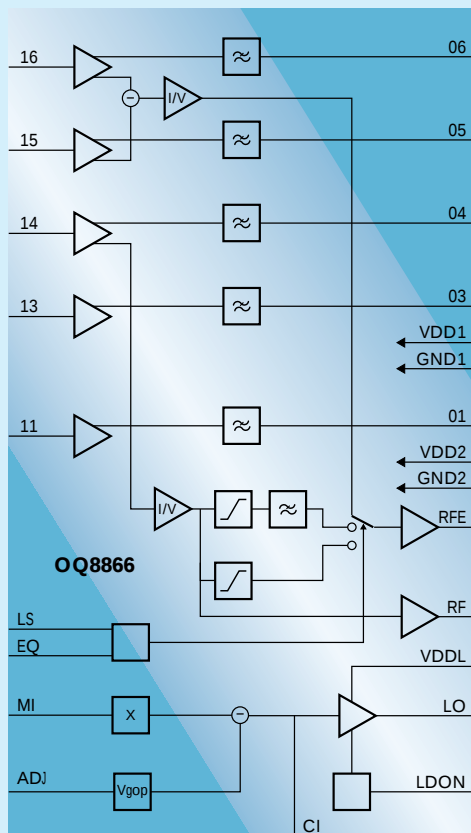
amplified and equalized both for single- and double-speed modes. The RF amplifier can handle data rates up to 8x standard speed. A radial error signal is generated to allow fast-track detection during access. The laser

supply is optimized for n-substrate laser/monitor units used for example in Philips' CDM 12 mechanisms.

The OQ8875 is an improved version of the OQ8866 offering superior RF performance, namely data rates up to 12x standard speed. It also requires fewer external components.

QUICK REFERENCE DATA (typ. values)

Supply voltage	3.4 - 5.5 V
Diode current amplifiers	
Amplification	1.5
Max. offset current	100 nA
Min. 3 dB bandwidth ($I_{in} = 1.67 \mu A$)	50 kHz
RFE amplifier (built-in equalizer)	
Delay ($f_{in} = 0.3 \text{ MHz}$)	198 ns
Flatness delay (double speed)	5 ns
Max. output current of laser supply ($V_{DDL} = 3V$)	100 mA



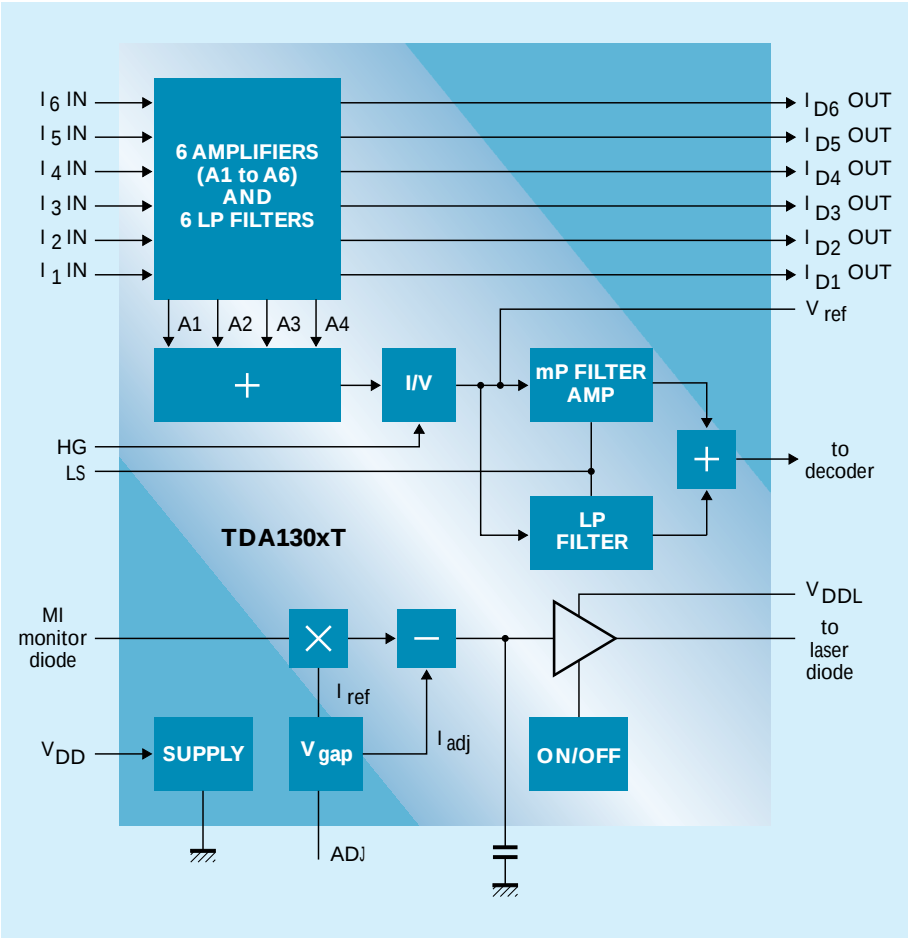
TDA1302T: Data amplifier and laser supply circuit (DALAS)
TDA1300T: Low-voltage circuit (DALAS2)

- Six input buffer amplifiers with low-pass filtering and with virtually no offset.
- HF data amplifier with a high- or low-gain mode.
- Two built-in equalizers for single or double-speed mode, ensuring high performance in both modes.
- Fully automatic laser control including stabilization and on/off switch with separate supply (VDDL) for power reduction.
- Optimized interconnection between the pick-up detector and digital servo processor (e.g. TDA1301T).
- Adjustable laser bandwidth and laser switch-on current slope.
- p-sub laser monitor.
- n-sub laser monitor (TDA1300T only).
- Low power consumption.

The TDA1300T and TDA1302T are data amplifier and laser supply circuits for three-beam pick-up detectors in a wide range of CD mechanisms and read-only optical systems. The devices can be used with diode units with p- or n- (TDA1302T only) sub lasers, and with single or double Foucault focus error detectors. The devices contain 6 amplifiers from which adequately filtered currents for radial tracking and focus control, and the HF data signal for the CD decoder are derived. The circuits have built-in equalizers to permit single or double-speed modes of operation (switched by a control pin).

After a single initial adjustment, the circuit will maintain control over the laser diode current, providing a constant light output with no ageing effects.

The ICs are in a small-outline package to allow them to be mounted close to the laser pick-up on the sledge for maximum signal-to-noise ratio.



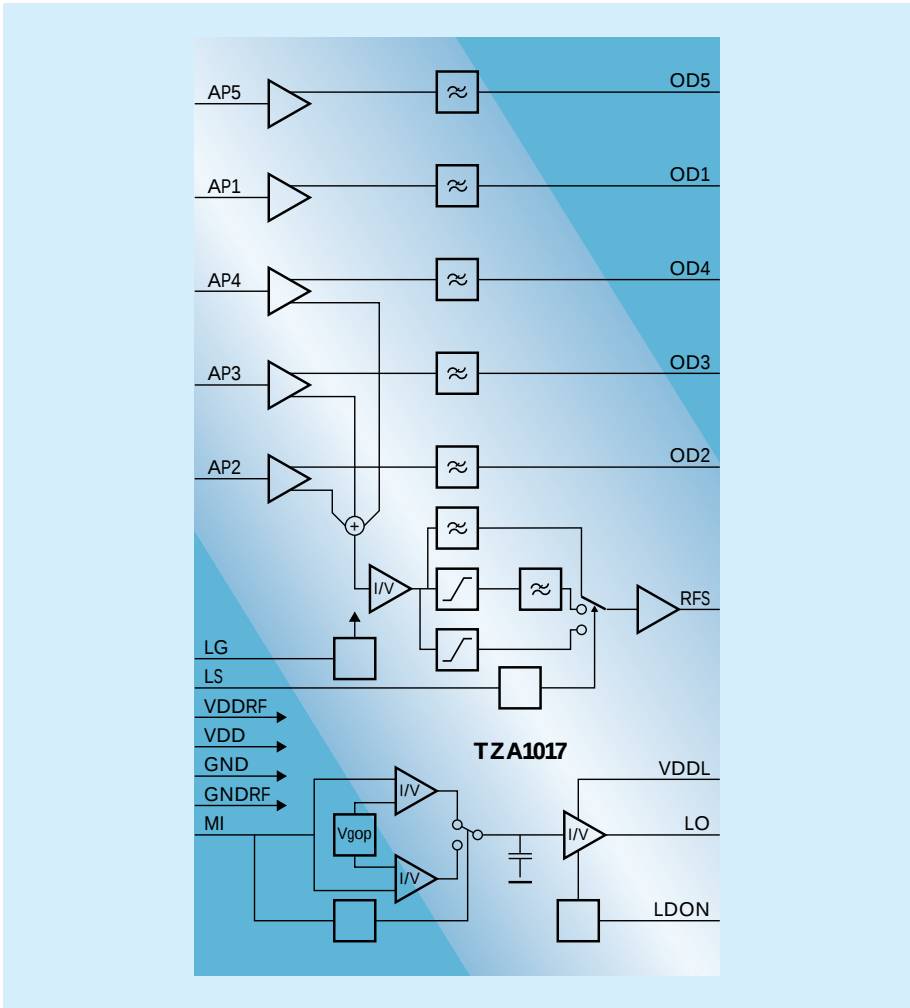
QUICK REFERENCE DATA (typ. values)	
Supply voltage, V _{DD} :	
TDA1300T	3.0 - 5.5 V
TDA1302T	3.4 - 5.5 V
Diode current amplifiers	
Amplification, G _{di}	1.55 dB
Diode output offset current, I _{os(d)}	100 nA max.
-3 dB bandwidth, B	50 kHz min.
RFE amplifier	
Equalization delay, t _{d(eq)}	320 ns
Flatness delay (double-speed), t _{d(f)}	5 ns
Laser supply: output current, I _o	-100 mA max.
Package	SO24L

Preamplifier and laser supply circuit (PALS-AUDIO)

- 5 amplifiers and filters with virtually no offset.
- Gain switch for CD and CD-Rewritable discs.
- Automatic gain switch to avoid data signal limiting at low supply voltages.
- 2 built-in equalizers for single and double-speed modes ensuring good playability.
- No external components needed for laser supply and output power stabilization; separate power-supply connection for greater efficiency.
- Supports both n-sub and p-sub monitor diodes (automatic selection).
- Protection circuit to prevent laser damage due to supply-voltage dip.
- Energy-saving mode (stand-by) controlled externally.
- Small-outline TSOP24 package.

The TZA1017 is an integrated amplifier and laser supply circuit for audio and video applications. The circuit is intended for three-beam pick-up detectors of CD mechanisms using the single Foucault focusing system. It has 5 amplifiers and low-pass filters that process the detector signals for the servo functions. Amplifier gain is selectable to allow playback of CD-R and CD-Rewritable discs.

The TZA1017 incorporates 2 built-in equalizers for single and double-speed modes.

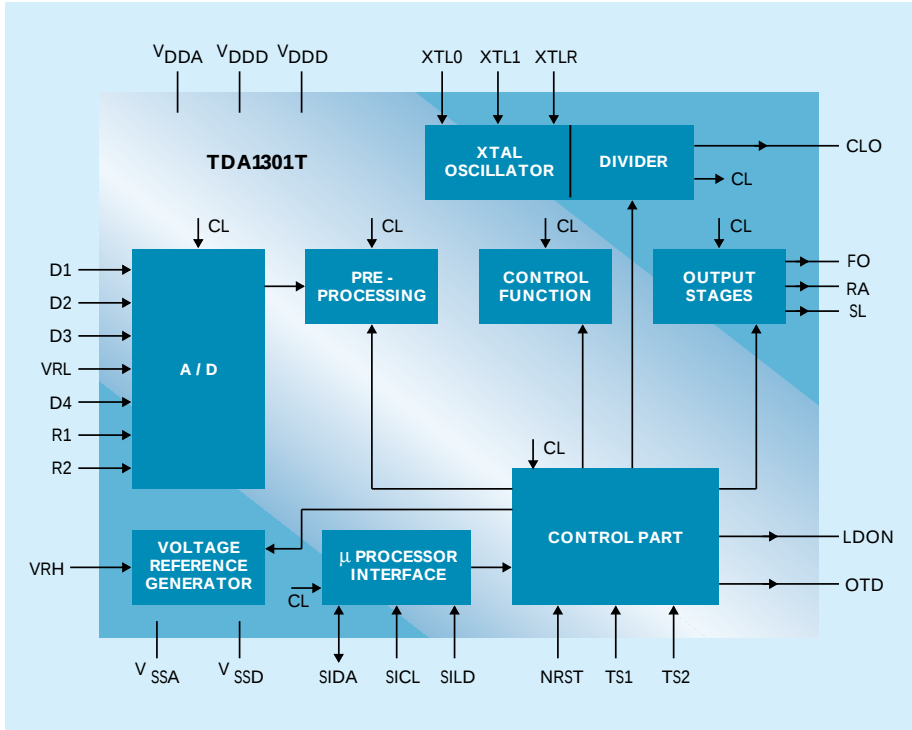


QUICK REFERENCE DATA (typ. values)	
Supply voltage range	2.7 - 5.5 V
LF amplifiers	
Channel matching	3%
-3 dB bandwidth	70 kHz
RF amplifier	
-3 dB bandwidth	4 MHz
Max. flatness delay	5 ns
Laser supply	
Max. output current	-100 mA
Monitor input voltage (P-type monitor)	0.18 V
Monitor input voltage (N-type monitor)	V _{DD} - 0.18 V

Digital servo controller (DSIC2)

- Diode signal preprocessing.
- Focus, radial and sledge-motor servo loop.
- Three-line serial interface via the microcontroller.
- Full digital signal processing.
- Low power consumption, down to 30 mV.
- Low voltage supply, 3 to 5.5 V.
- Integrated analog-to-digital converters and digital servo loop filters.
- Double speed possible.
- Easy application (e.g. no external adjustments required, no component ageing).
- Highly robust and shock resistant.
- Fully-automatic jump procedure for radial servo.
- Automatic focus start-up procedure and built-in FOK (Focus OK).
- Fast radial jump or access procedure.
- Self-operating servo-control without continuous communication via the microcontroller.
- Direct communication to photodiode optics; no external preprocessing.

The TDA1301T is a fully digital servo processor that provides all servo functions except spindle motor control in two-stage, three-spot compact disc systems. The device offers a high degree of integration combined with the low additional cost of external components. The servo characteristics can be adjusted over a wide range via a three-line serial interface. This offers enormous flexibility for meeting the requirements of different CD mechanisms. The circuit is optimized for low-power, low-voltage applications

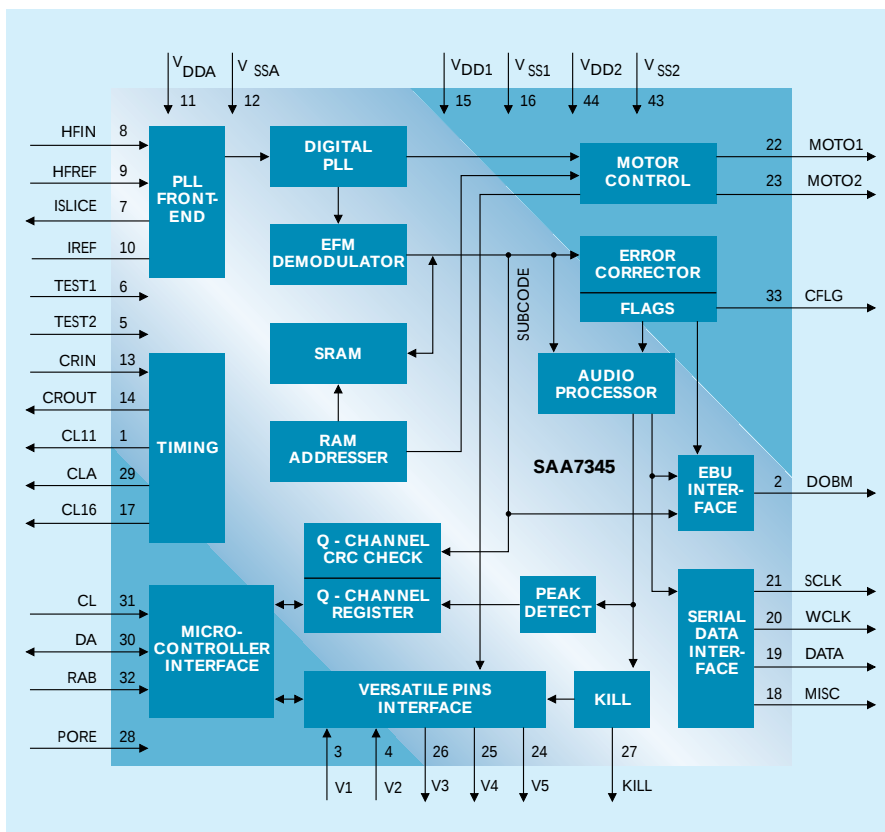


QUICK REFERENCE DATA (typ. values)	
Supply voltage, V_{DD}	3 - 5.5 V
Diode current amplifiers	
Amplification, G_{dn}	155 dB
Diode output offset current, $I_{os(d)}$	100 nA max.
3 dB bandwidth, B	50 kHz min.
RFE amplifier	
Equalization delay, $t_{d(eq)}$	320 ns
Flatness delay (double-speed), $t_{d(f)}$	5 ns
Laser supply	
Output current, I_o	-100 mA max.

CD decoder with on-chip RAM and digital filter

- Integrated data slicer and clock regenerator.
- Digital Phase-Locked Loop (PLL).
- Demodulator and Eight-to-Fourteen Modulation (EFM) decoding.
- Subcoding microcontroller serial interface.
- Integrated programmable motor speed control.
- Error correction and concealment functions.
- Embedded SRAM for de-interleave and FIFO.
- FIFO overflow concealment for rotational shock resistance.
- Digital audio interface (European Broadcasting Union).
- 2 to 4-times oversampling integrated digital filter.
- Audio data peak level detection.
- Versatile audio data serial interface.
- Digital de-emphasis filter.
- Kill interface for Digital-to-Analog Converter (DAC) deactivation during digital silence.
- Compact Disc Read Only Memory (CD-ROM) modes.
- Single-speed version: SAA7345GP/SS.
- Double-speed versions: SAA7345GP/DS
SAA7345H/LV
(low-voltage, 3 V).
- Triple-speed version: SAA7345GP/TT.

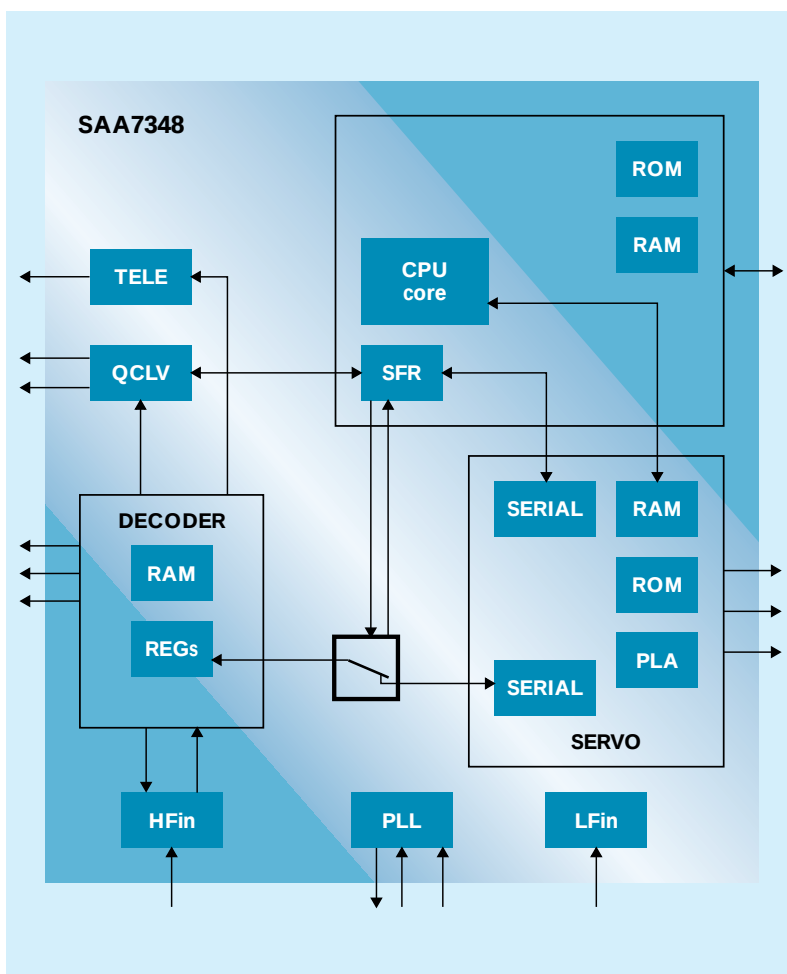
The SAA7345 incorporates the CD signal processing functions of decoding and digital filtering. The device is equipped with on-board SRAM and includes additional features to reduce the processing required in the analog domain. Different speed versions are available.



All Compact Disc Engine (ACE)

- Focus servo loop.
- Radial servo loop.
- Built-in access procedure.
- Sledge motor servo loop with pulsed sledge support.
- High-speed error correction (up to 12x overspeed).
- Full error-correction strategy, $t = 2$ and $e = 4$.
- Lock-to-disc mode.
- Full disc motor control.
- All standard decoder functions implemented digitally on chip.
- FIFO overflow concealment for rotational shock resistance.
- Digital audio interface (EBU), audio and data.
- 2-4 times oversampling integrated digital filter including f_s mode.
- Audio data peak level detection.
- Kill interface for DAC deactivation during digital silence.
- All OQ8868 (DSIC2) digital servo functions.
- Low focus noise.
- Automatic closed-loop gain control available for focus and radial loops.
- On-chip clock multiplier allows the use of 8.4672 MHz crystal.
- S2B serial interface with host controller.
- High-speed servo.
- Integrated engine controller.

The SAA7348 All Compact disc Engine (ACE) incorporates the functionality of a CD decoder (LO9585), a digital servo (OQ8868) and a microprocessor core (8051-based). The ACE chip is primarily for high-speed CD-ROM applications, but its large-scale integration means it can be used in many other CD applications. And these can be developed quickly owing to ACE's internal microprocessor, which can operate with internal or external ROM.



Digital servo processor and Compact Disc decoder (CD7)

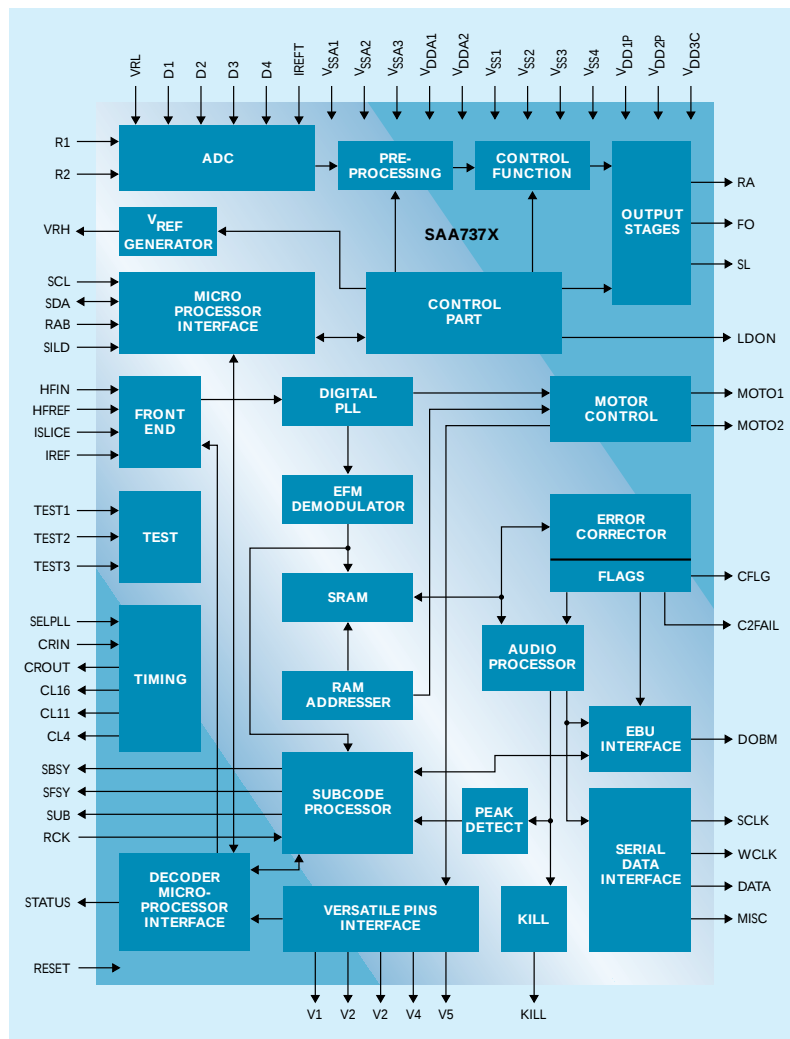
■ Types for all applications:

	Peak data rate	Low-voltage	Automotive	CD-ROM mode	Lock-to-disc
SAA7370	4x			✓	✓
SAA7370A	8x			✓	✓
SAA7370B	10x			✓	✓
SAA7371	4x		✓	✓	✓
SAA7372	2x			✓	✓
SAA7373	2x		✓		✓
SAA7374	2x	✓		✓	✓
SAA7376	1x				
SAA7377	1x		✓		

- Full error correction strategy; $t = 2$ and $e = 4$.
- Full CD-graphics interface.
- All standard decoder functions implemented digitally.
- FIFO overflow concealment for rotational shock resistance.
- Digital audio interface (EBU), audio and data (SAA7377 for audio only).
- 2x and 4x oversampling digital filter.
- Audio data peak level detection.
- Kill interface for DAC deactivation during digital silence.
- All TDA1301T digital servo functions, plus extra hi-level functions.
- Low focus noise (10 dB better than TDA1301T).
- Automatic closed loop gain control available for focus and radial loops.
- Pulsed sledge support.

The SAA737x family are a series of highly-integrated circuits that combine the functions of a CD decoder IC and digital servo IC in a single chip. The decoder part is based on the SAA7345 CD6 decoder with an improved error-correction strategy. The servo part is based on the TDA1301T (DSIC2) with several improvements and additional features incorporated.

Standard speed and overspeed types are available as are low-voltage types for portable applications (SAA7374: 3.0-5.5 V), and types with an extended temperature range (-40 °C to +85 °C) for automotive applications.



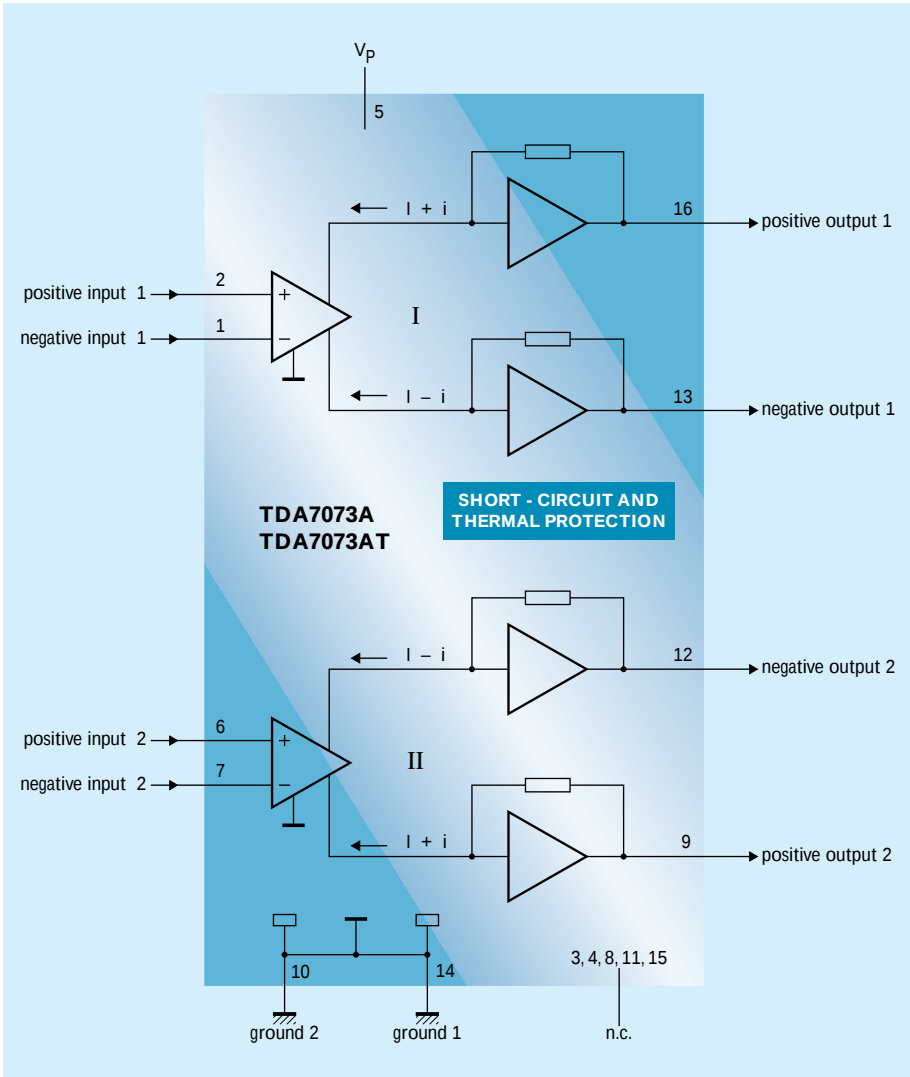
CD motor-drive circuit in BTL configuration

- No external components.
- Very high slew rate.
- Single power supply.
- Short-circuit proof.
- High output current (0.6 A).
- Wide supply voltage range.
- Low output offset voltage.
- Suitable for handling PWM signals up to 176 kHz.
- ESD protected on all pins.

The TDA7072A and TDA7073A are respectively single- and dual-power driver circuits in a BTL configuration, for use as power drivers for servo systems with a single supply. They are specially designed for compact disc players and are capable of driving focus, tracking, sledge functions and spindle motors.

They have a built-in MCL protection circuit activated when the difference in current between the output terminal of each amplifier exceeds 100 mA (typically 300 mA). This level of 100 mA allows for headphone applications (single-ended).

Two new circuits, TDA8541 and TDA8542, which are similar to the TDA702A and TDA7073A respectively, feature lower internal voltage drop, disable/enable, and stand-by mode.



QUICK REFERENCE DATA (typ. values)	
Positive supply voltage, V_P	5.0 V
Internal voltage gain, G_V	33.5 dB
Total quiescent current, I_P ($\& RL = \infty$)	4 mA*
Slew rate, SR	12
Max output current, I_O	0.6 A
Input bias current, I_{bias}	100 nA
Cut-off frequency, f_{∞} (-3 dB)	1.5 MHz

* 8 mA for the TDA7073A

Digital servo driver

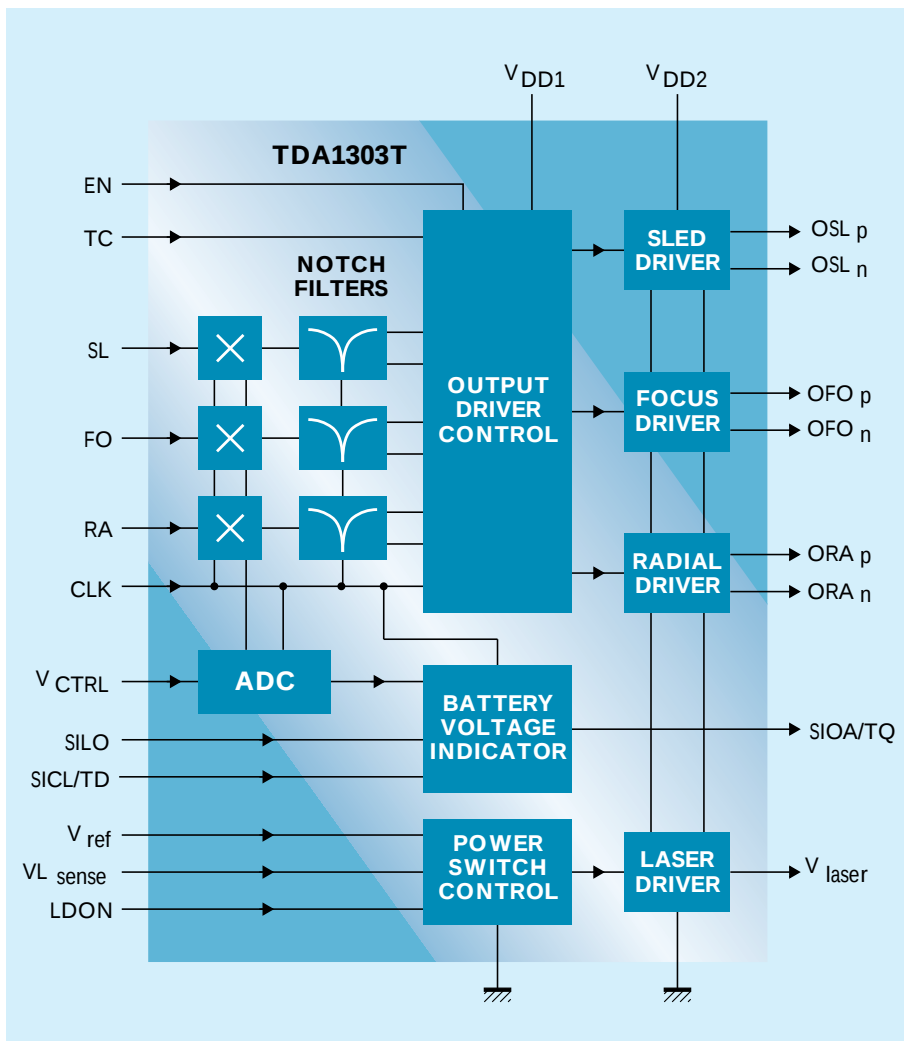
- Optimized for low voltage and low power applications.
- Suppression of idle switching.
- Optimized for the most commonly used CD mechanisms.
- Total output resistance $< 4 \Omega$.
- Continuous gain control to compensate for battery voltage variations.
- Battery voltage indication.
- Switched-Mode Power Supply for DC/DC down-conversion for laser supply voltage.
- Single supply voltage rail.
- Full digital signal processing.

The TDA1303T provides identical output driver functions for the motor/actuator for focus, radial and sledge control, and features a Switched-Mode Power Supply (SMPS) for the laser diode and a battery voltage indicator output.

The circuit contains 3 class D amplifiers for processing pulse duration modulation (PDM) signals for focus, radial and sledge control of servo mechanisms.

The gain of the class D amplifiers is continuously adapted to compensate for fluctuating battery voltage by means of an analog-to-digital converter (ADC) which continuously monitors battery voltage.

The laser supply voltage is produced by an SMPS to minimize power loss in the DC/DC down-conversion.



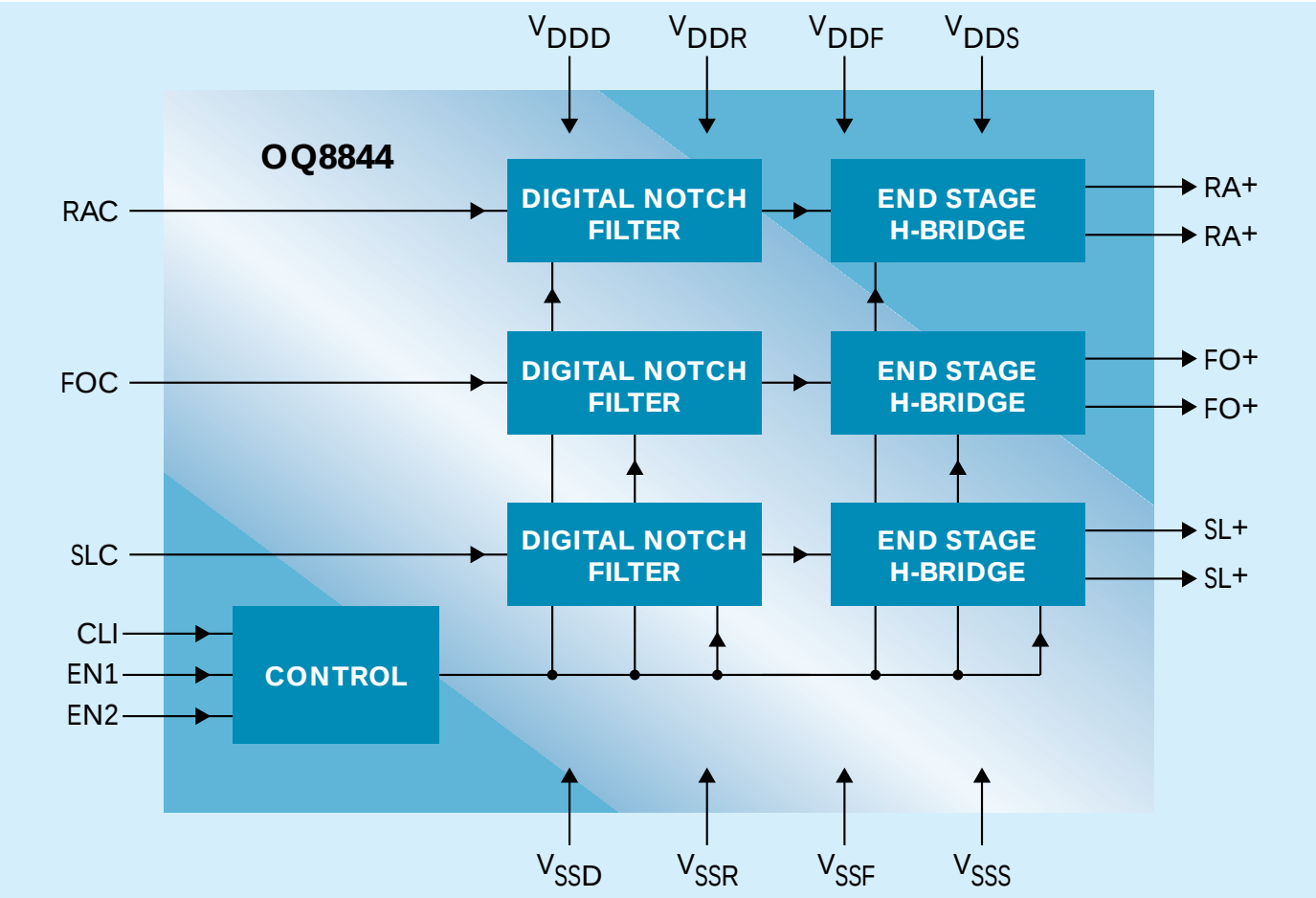
QUICK REFERENCE DATA (typ. values)	
Digital stabilized supply voltage, V_{DD1}	5.0 V
Digital unstabilized supply voltage, V_{DD2}	5.0 V
Analog supply voltage, V_{DDA}	5.0 V
Digital stabilized supply current, I_{DD1}	1 mA
Digital unstabilized supply current, I_{DD2}	0.75 mA
Analog stabilized supply current, I_{DDA}	1 mA
Max. output current per stage, I_o	300 mA
Max. output resistance, R_o	4 Ω
Laser SMPS sense input voltage, V_{IS}	2.5 V
Laser SMPS sense input current, I_{IS}	
Input clock frequency, f_{clk}	4.2336 MHz
Total power dissipation, P_{tot}	12.5 mW
Operating ambient temperature range	-40 to +85 $^{\circ}\text{C}$

Triple digital servo driver (DSD2)

- 1-bit class-D focus actuator driver (4 Ω max.).
- 1-bit class-D tracking actuator driver (4.5 Ω max.).
- 1-bit class-D sledge actuator driver (3 Ω max.).
- Supply voltage: 5 V only.
- Separate power supply pins for all drivers.
- Higher efficiency than conventional drivers.
- Built-in digital notch filters.
- Enable input for focus/tracking driver.
- Enable input for sledge driver.
- Differential output for the drivers.
- Small package SOT163A (SO20).

The digital servo driver OQ8844 contains three 1-bit class-D power drivers specially designed for digital servo applications. The main benefits of this principle are higher efficiency and higher integration level. In a digital servo application, the OQ8844 makes a major contribution to realising a true ‘fully-digital servo loop’.

QUICK REFERENCE DATA (typ. values)	
Supply voltage, digital part	5 V
Supply voltage, focus	5 V
Supply voltage, tracking	5 V
Supply voltage, sledge	5 V
Max. supply current, focus	250 mA
Max. supply current, tracking	250 mA
Max. supply current, sledge	560 mA
Max. input clock frequency	5 MHz



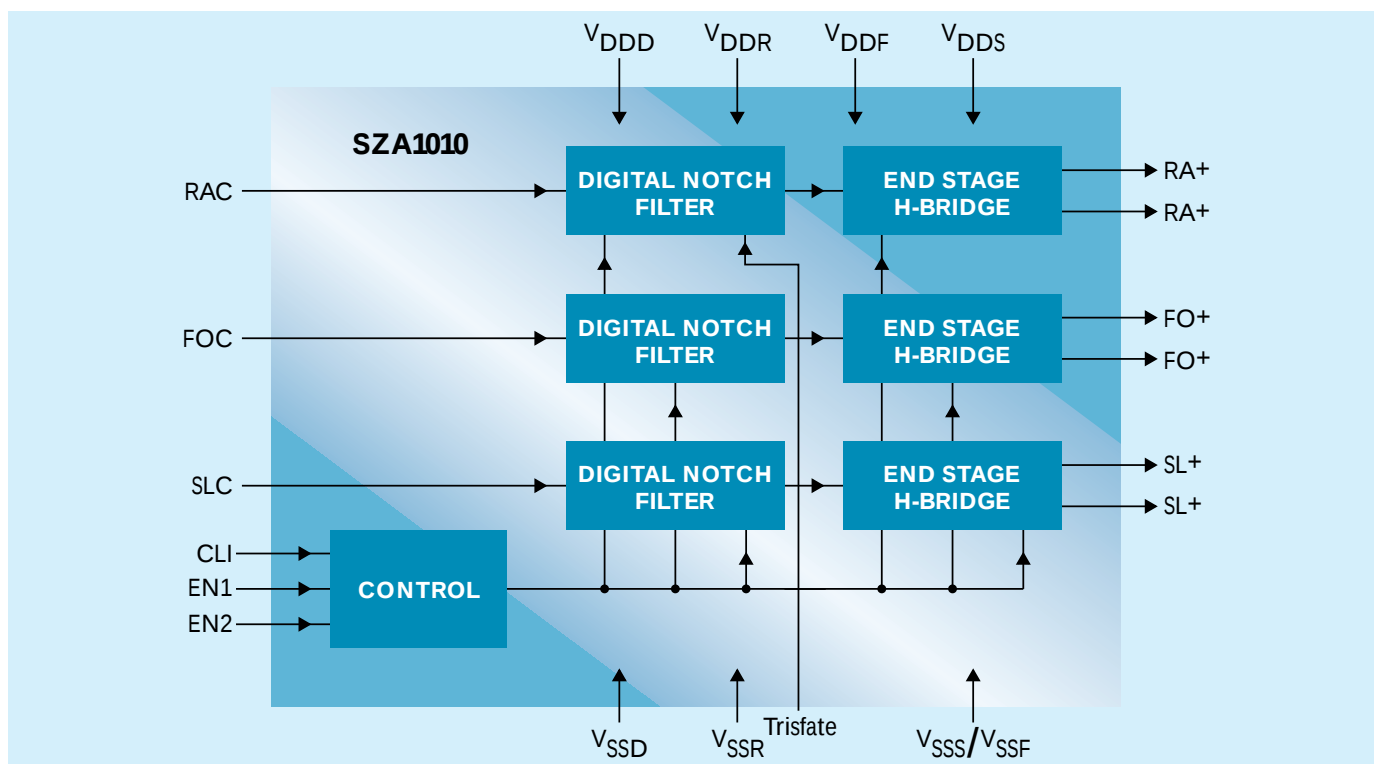
Triple digital servo driver (DSD3)

- 1-bit class-D focus actuator driver ($4\ \Omega$).
- 1-bit class-D tracking actuator driver ($4\ \Omega$).
- 1-bit class-D sledge actuator driver ($2\ \Omega$).
- Supply voltage: 5 V only.
- Separate power supply pins for all drivers.
- Higher efficiency than conventional drivers.
- Built-in digital notch filters.
- Enable input for focus/tracking driver.
- Enable input for sledge driver.
- Differential output for the drivers.
- Small package SOT163A (SO20).
- Tri-state input for radial drives.

The SZA1010 is the successor to the digital servo driver OQ8844 and offers additional features such as a radial tri-state selection pin for the radial output drive and the ability to handle clock frequencies up to 10 MHz. It contains three 1-bit class-D power drivers specially designed for digital servo applications. The main benefits of this principle are higher efficiency and higher integration level. In a digital servo application, the SZA1010 makes a major contribution to realising a true 'fully-digital servo loop'.

QUICK REFERENCE DATA
(typ. values)

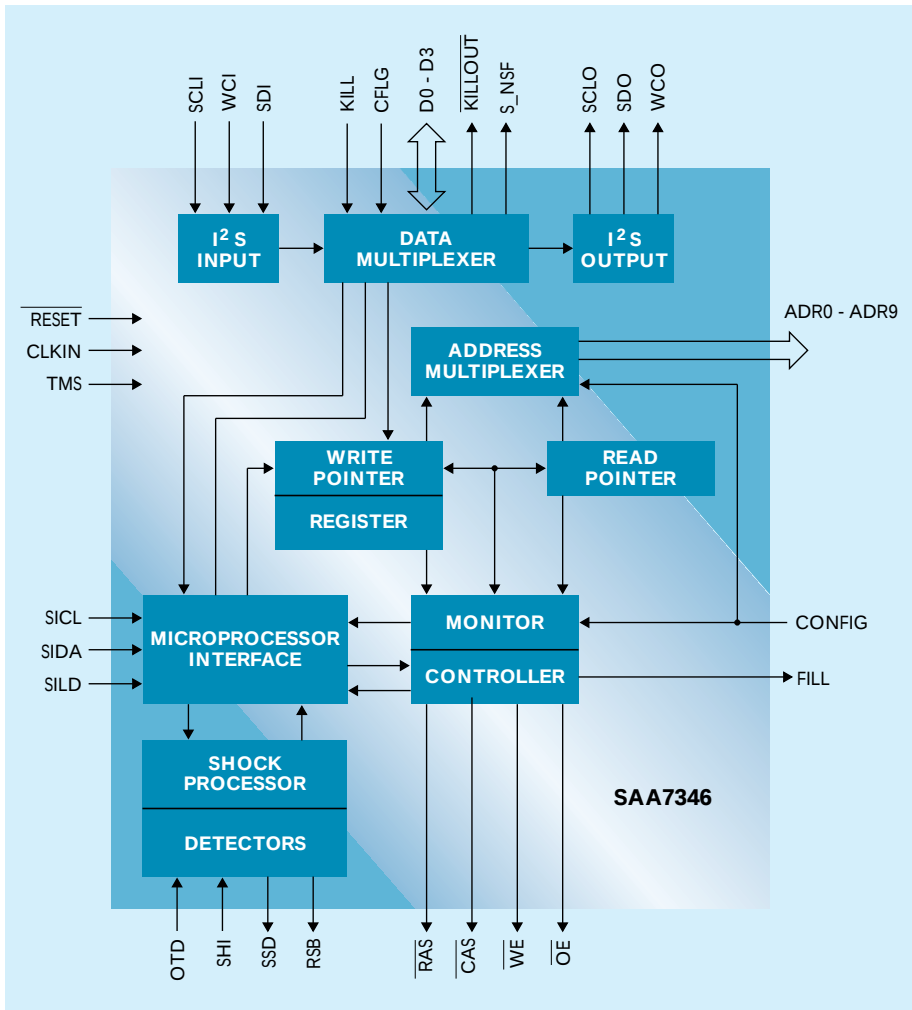
Supply voltage, digital part	4.5 - 5 V
Supply voltage, focus	4.5 - 5 V
Supply voltage, tracking	4.5 - 5.5 V
Supply voltage, sledge	4.5 - 5.5 V
Max. supply current, focus	250 mA
Max. supply current, tracking	250 mA
Max. supply current, sledge	560 mA
Max. input clock frequency	10 MHz



Shock-absorbing RAM addresser

- Absorbs linear and rotational shocks.
- Absorbs multiple shocks per second.
- Interfaces directly with CD decoders SAA7345, SAA737x, LO9585 and SAA7348.
- Multi-speed I²S-bus input with single-speed I²S output.
- Controls 1 or 4 MBit of external DRAM.
- Easy serial interface for communication with common microcontrollers.
- By-pass/power-down mode.
- Kill interface for DAC deactivation.
- Can be used for: 'sampling' part of a disc, reducing access pauses between jumps, delivering a programmable delay and generating a fixed audio rate from Constant Angular Velocity (CAV) discs.

The SAA7346H can be used to improve the shock resistance of a CD player. It operates with a 1 MBit or 4 Mbit DRAM, functioning as a customized DRAM controller with serial I/O and on-board shock detectors. Audio data is continuously stored in the DRAM and during shocks the data can be 'played' to maintain an uninterrupted output.

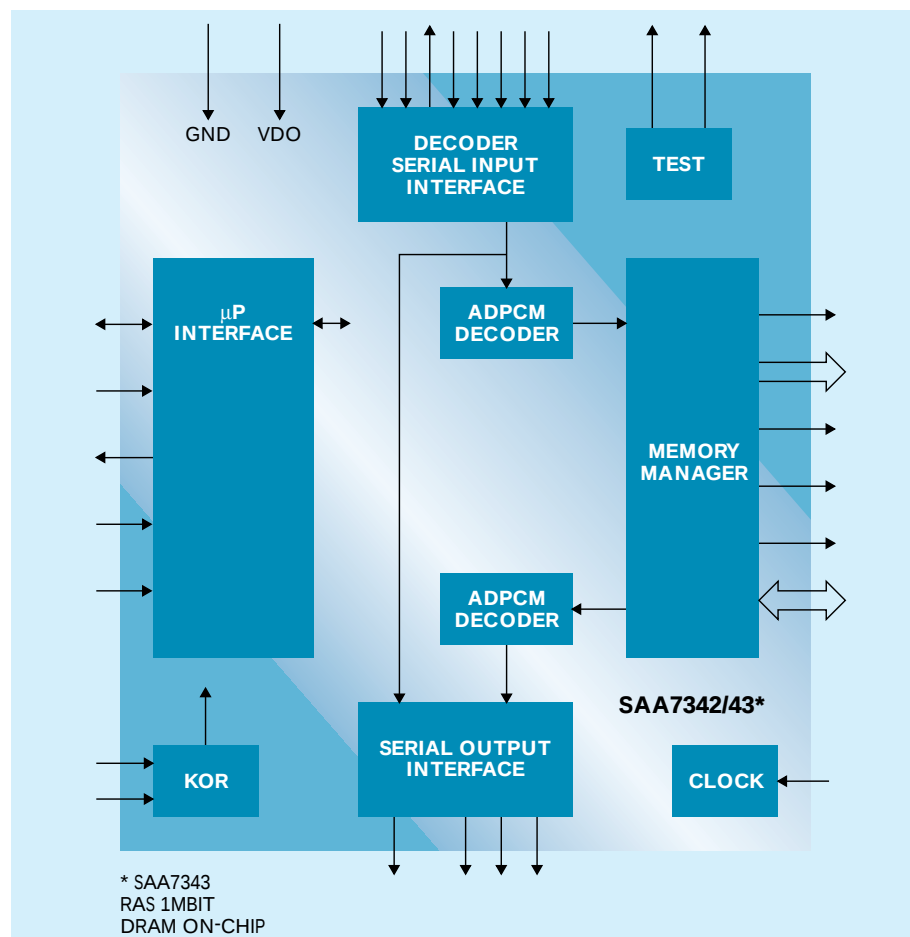


QUICK REFERENCE DATA (typ. values)	
Supply voltage, V _{DD}	5.0 V
Supply current, I _{DD}	12 mA
Clock frequency, f _{clk}	16.9344 MHz
I ² L input word clock frequency, f _{i(clk)}	88.2 kHz
Operating ambient temperature range	-40 to + 85 °C

Shock-absorbing RAM addresser (SHOARMA2: SAA7342, SHOARMA3: SAA7343)

- Operates with 1, 4 and 16-Mbit external DRAM (SAA7342); integrated 1 Mbit DRAM (SAA7343).
- Selectable ADPCM compression and decompression to 5-bit, 4-bit, 3-bit, and off mode.
- Enhanced performance to repetitive shocks.
- Auto-connection by data comparison and (optional) subcode synchronization.
- I2C control bus.
- Interfaces directly with Philips and Japanese decoders.
- Soft mute and volume control.
- Silence detection.
- Acoustic level protection.
- Automatic prediction of ADPCM compression algorithm to suit the music content.
- SAA7342 and SAA7343 are pin and software-compatible.

The SAA7342 and SAA7343 provide optimal shock protection for portable CD applications. The devices offer significant improvements over earlier solutions - firstly by incorporating user-selectable ADPCM compression of 3, 4 or 5 bits which greatly increases the storage efficiency of the DRAM, allowing longer electronic shock absorption times, and secondly by incorporating an innovative future-fill technique for improved tolerance to repetitive mechanical shocks. The SAA7343 differs from the SAA7342 by incorporating a 1 Mbit DRAM, making it extremely cost-effective for low-end players.

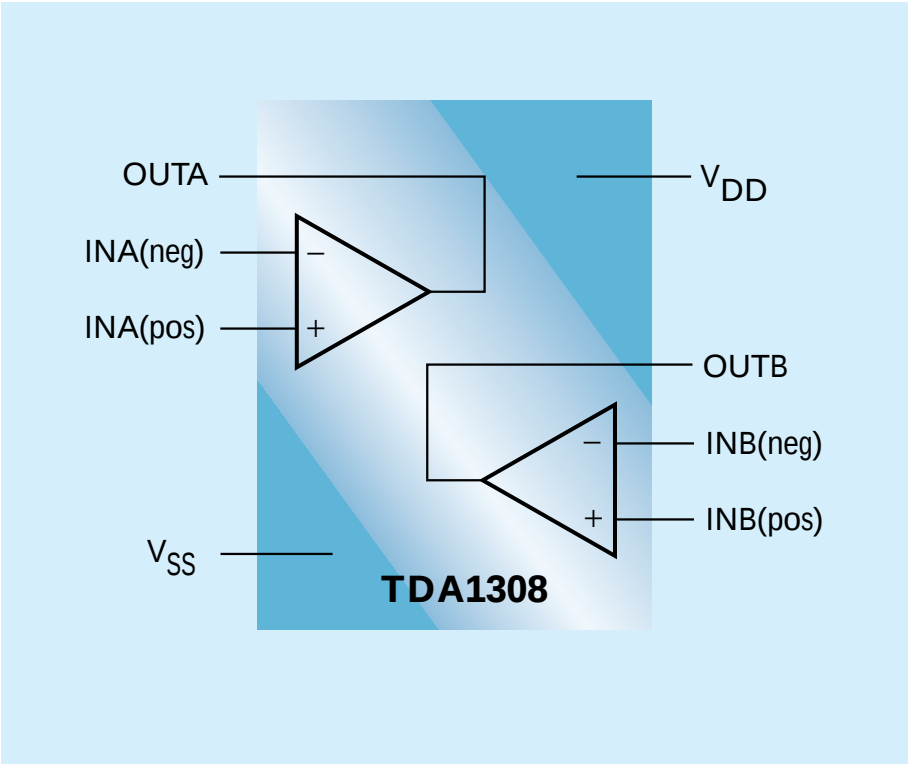


QUICK REFERENCE DATA (typ. values)	
Supply voltage	3.0 V
Clock frequency	16.9344 MHz
Operating ambient temperature range	0 to +70 °C
Package	QFP44

Class-AB stereo headphone driver

- Wide operating temperature range.
- No switch ON/OFF clicks.
- Excellent power supply ripple rejection.
- Low power consumption.
- Short-circuit resistance.
- High S/N ratio, high slew rate, low distortion.
- Large output voltage swing.

The TDA1308T is an integrated class-AB stereo headphone driver developed primarily for portable digital audio applications.



QUICK REFERENCE DATA	
(typ. values)	
Supply voltage, V _{DD} : single dual	5.0 V 2.5 V
Negative supply voltage, V _{SS}	-2.5 V
Supply current (no load), I _{DD}	3 mA
Total power dissipation, P _{Tot}	15 mW
Max output power, P _O (THD < 1%)	60 mW
Signal-to-noise (S/N) ratio	110 dB
THD plus S/N ratio	0.03%
Channel separation, γ _{CS}	70 dB
Power supply ripple rejection, PSRR	90 dB*
Operating ambient temperature range	-40 to +85 °C

* f_i = 100 Hz, V_{ripple(p-p)} = 100 mV

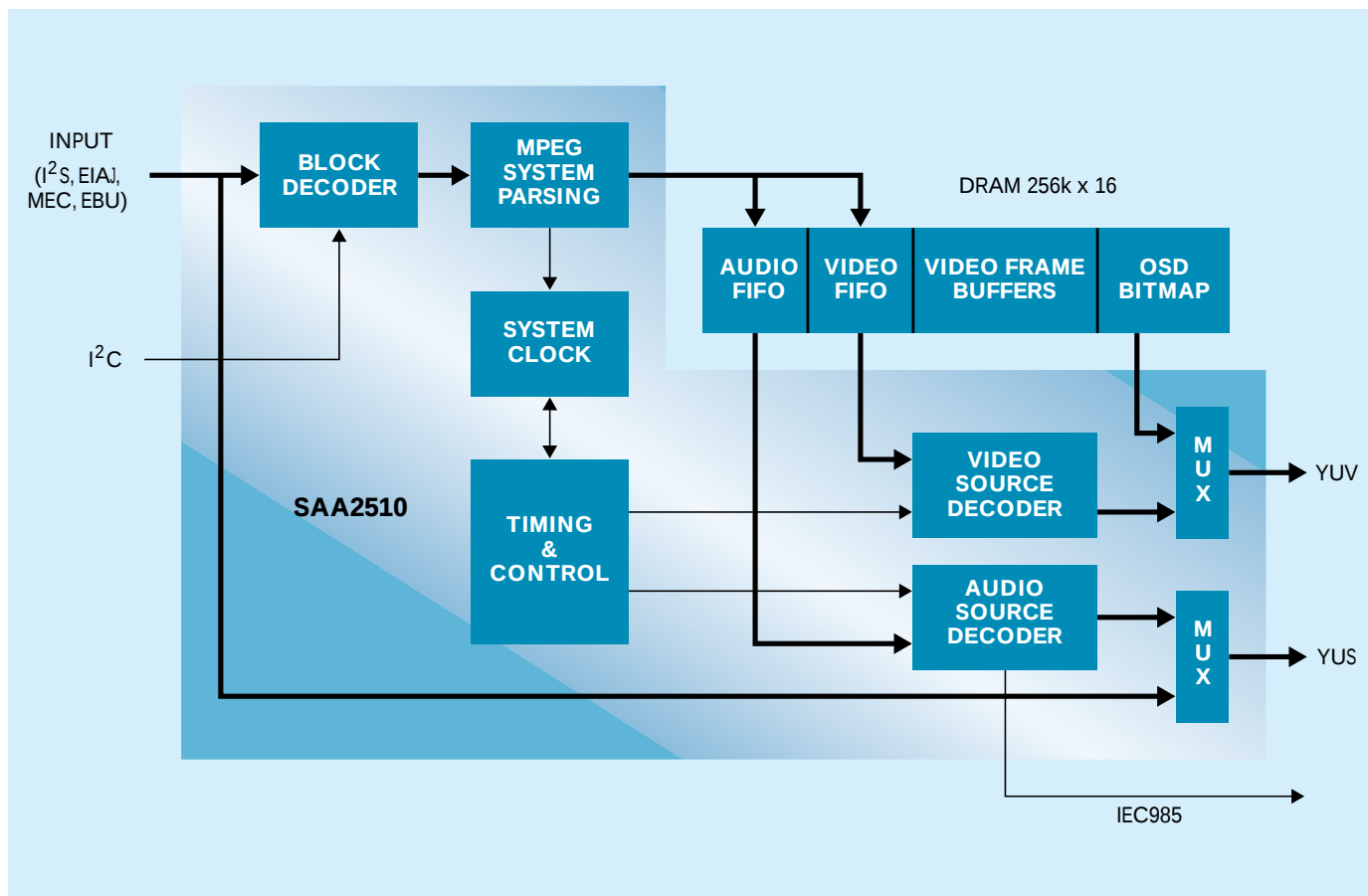
Video-CD MPEG audio/video decoder

- MPEG decoding of audio/video data.
- Integrated OSD and block decoder.
- Supports I²S, EIAJ, MEC and EBU input formats.
- Flexible video output: YUV 4:2:2 format, DMSD-bus compatible.
- Audio output at 44.1 kHz (16, 18 or 20 bits per sample; I²S, EIAJ, MEC and EBU formats).
- IEC958 digital audio output (with loop-through).
- Play control sector buffering.
- Supports high-resolution still-picture playback.
- I²C-bus interface for microcontroller.
- Selectable internal video timing generator.
- Internally-generated 90 kHz MPEG clock.
- Requires only 4 Mbit DRAM.

The SAA2510 is for MPEG (Moving Picture Expert Group) decoding of audio/video data in consumer video-CD applications. It decodes data streams in accordance with version 2.0 of the video-CD standard. The IC requires only 4 Mbit of DRAM to store the encoded/decoded data, play control data and on-screen display (OSD) data.

QUICK REFERENCE DATA (typ. values)

Supply voltage	3.3 V, 5 V
Operating temp. range	0-70 °C



Digital PAL/NTSC video encoder

- CMOS 5 V device.
- Digital PAL/NTSC encoder.
- System pixel frequency 13.5 MHz.
- Accepts MPEG decoded data on YUV input port.
- Input data format Cb,Y, Cr etc. or Y and Cb, Cr on 16 lines.
- Three DACs for CVBS, Y and C operating at 27 MHz with 10-bit resolution.
- CVBS, Y and C output simultaneously.
- I²C-bus control port.
- Encoder can be master or slave.
- Programmable horizontal and vertical input synchronization phase.
- Programmable horizontal sync output phase.
- Internal test pattern generator.
- Overlay with Look-Up Tables (LUTs) 8 x 3 bytes.
- Controlled rise/fall times of output syncs and blanking.
- Down-mode of DACs.
- PLCC68 package.

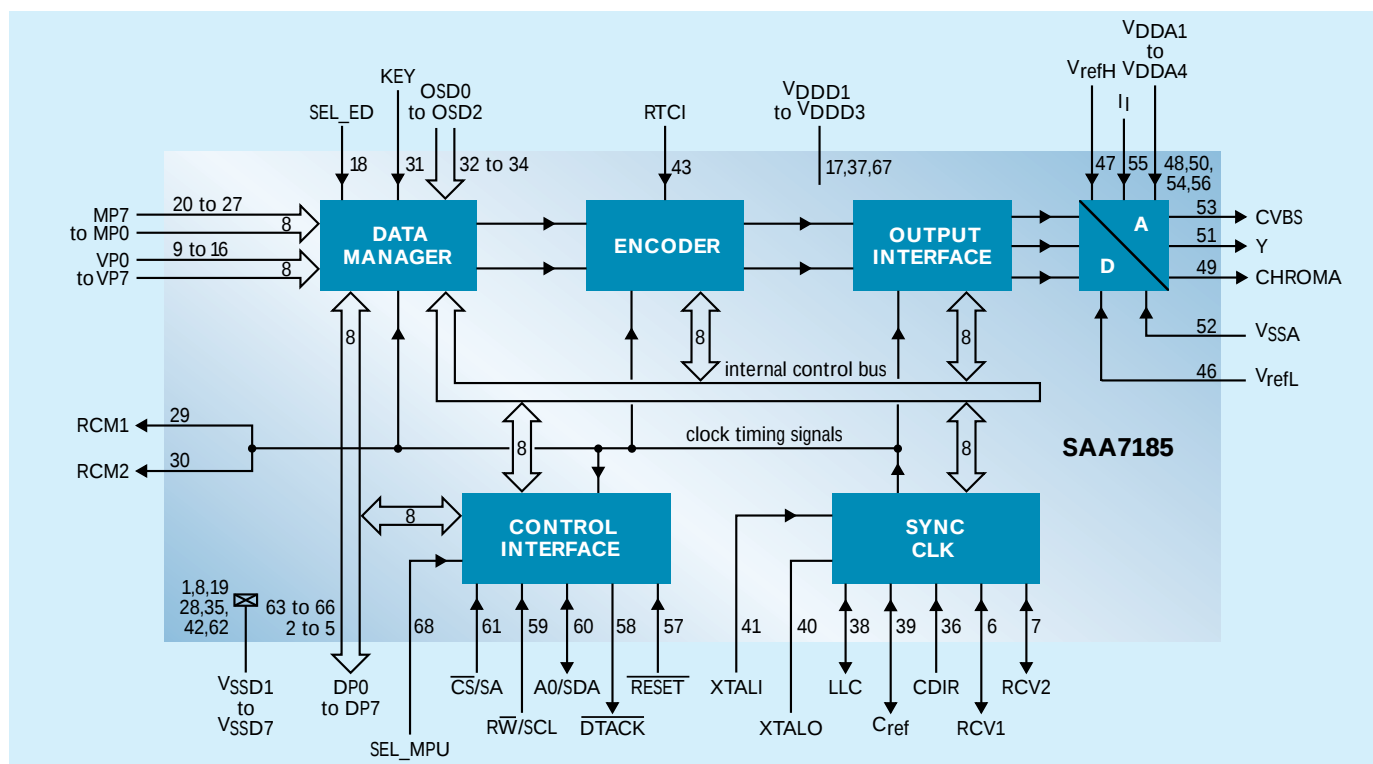
The SAA7185 encodes digital YUV video data to an NTSC, PAL, CVBS or S-Video signal.

The circuit accepts CCIR-compatible YUV video data with 720 active pixels per line in 4:2:2 multiplexed formats, for example, MPEG decoded data. It includes a sync/clock generator and on-chip digital-to-analog converters (DACs).

The circuit is compatible with the DIG-TV2 family.

QUICK REFERENCE DATA
(typ. values)

Analog supply voltage, V_{DDA}	5.0 V
Digital supply voltage, V_{DDD}	5.0 V
Analog supply current, I_{DDA}	50 mA
Digital supply current, I_{DDD}	140 mA
Input signal voltage levels, V_i	TTL
Analog output signal voltage, $V_{O(p-p)}$	2 V
Minimum load resistance, R_L	80 Ω
Operating ambient temperature range	0-70 $^{\circ}\text{C}$



CD-ROM block-decoders with ATAPI interface (ELM)

- Real-time third-level error corrector.
- ATAPI interface.
- 8x decoding (SAA7380) in ROM 65100 12x decoding (SAA7388).
- Supports Q-W subcode de-interleaving and correction.
- Supports up to 2 Mbyte DRAM.

The SAA7380 and SAA7388 circuits (nickname: ELM) are CD-ROM block decoders with on-chip ATAPI interface (no external bus drivers are needed).

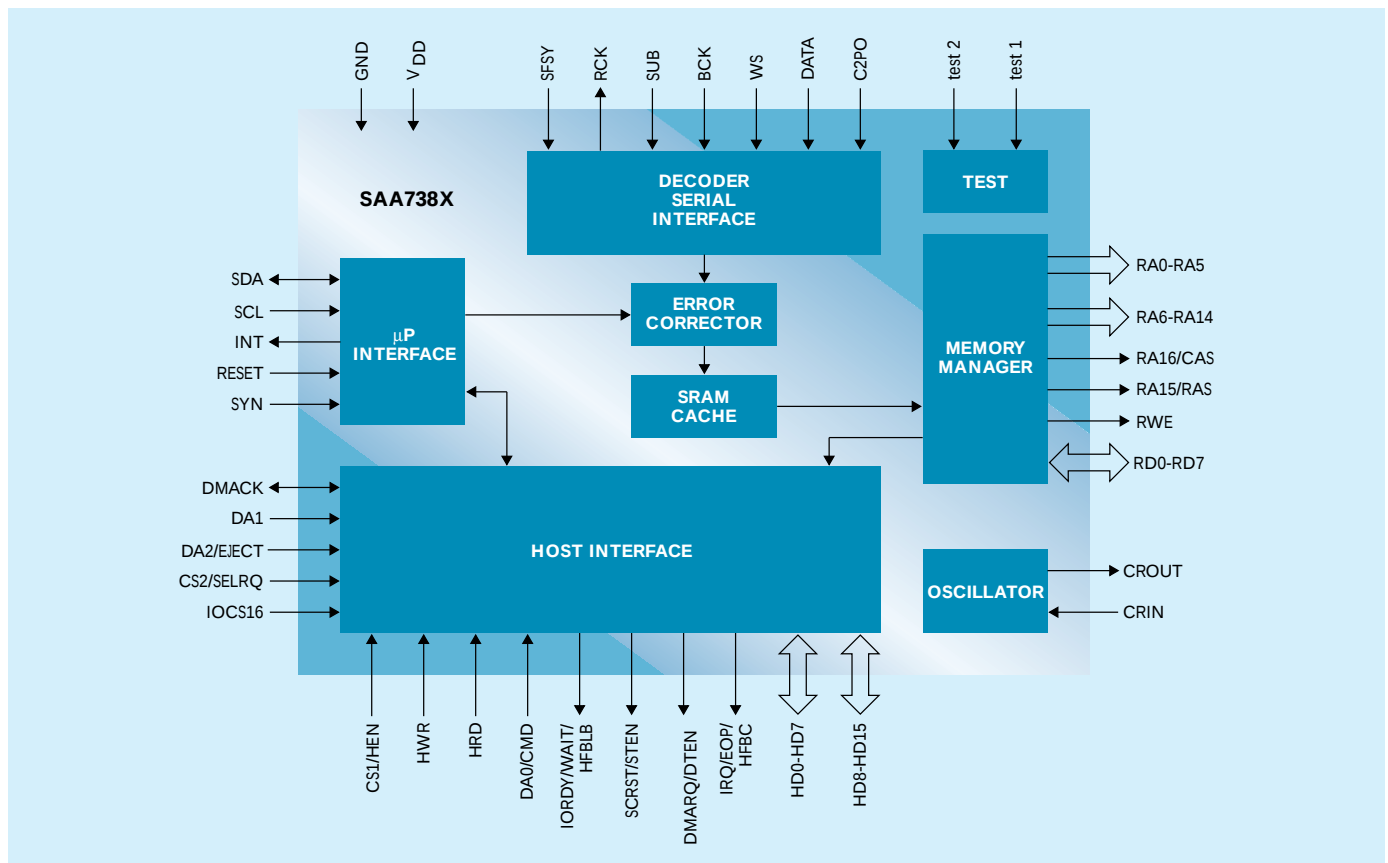
The SAA7380 supports data rates higher than eight-times standard speed to match the data rates supplied by engines such as the ROM 65300.

The SAA7388 supports rates higher than twelve-times standard speed for next-generation ROM engines like ROA 1312 (see page 2.27)

Both types support the ATAPI command set.

QUICK REFERENCE DATA (typ. values)

Supply voltage	5 V (3 V)
Operating temperature range	0-70 °C



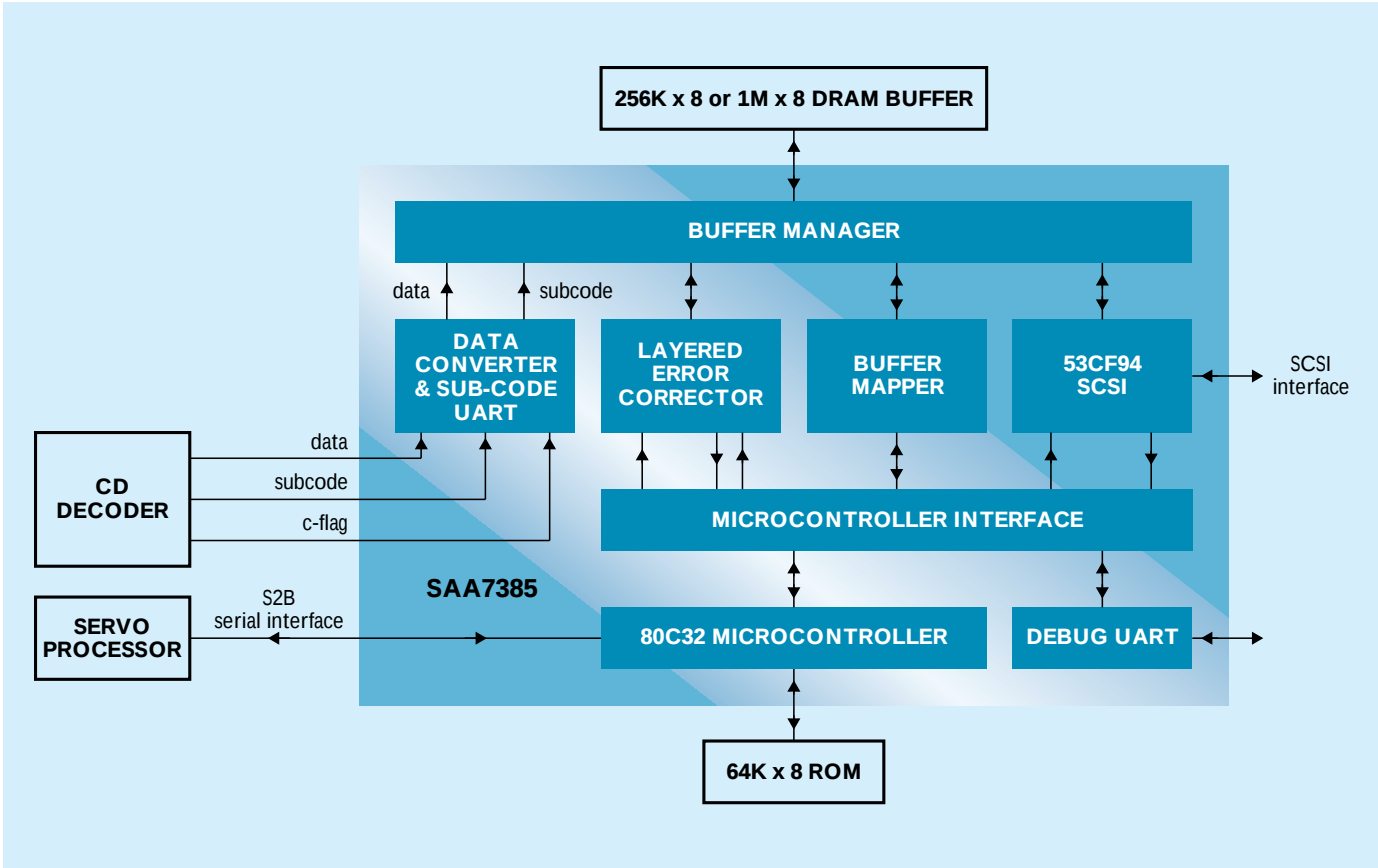
CD-ROM block-decoder (SEQUOIA) with SCSI interface

- 12x decoding.
- Third-level error corrector.
- Fully integrated fast synchronous SCSI-2 interface including '8051' microcontroller.
- 48 mA SCSI drivers.
- Block-oriented host data transfer (10 Mbytes/s).
- Supports SCSI plug-and-play with SCAM.
- High data integrity with error flag processing and 3rd layer correction.
- Red book audio pass-through & block-oriented host data transfer.
- Supports 1 Mbyte cache RAM.
- General-purpose I/Os for servo control.

The SAA7385 (nickname: SEQUOIA) is a CD-ROM block decoder with a SCSI interface.

The SAA7385 supports data rates up to twelve-times standard speed for next-generation ROM engines like ROA 1312 (see page 2.27)

QUICK REFERENCE DATA (typ. values)	
Supply voltage	5 V
Operating temperature range	0-70 °C



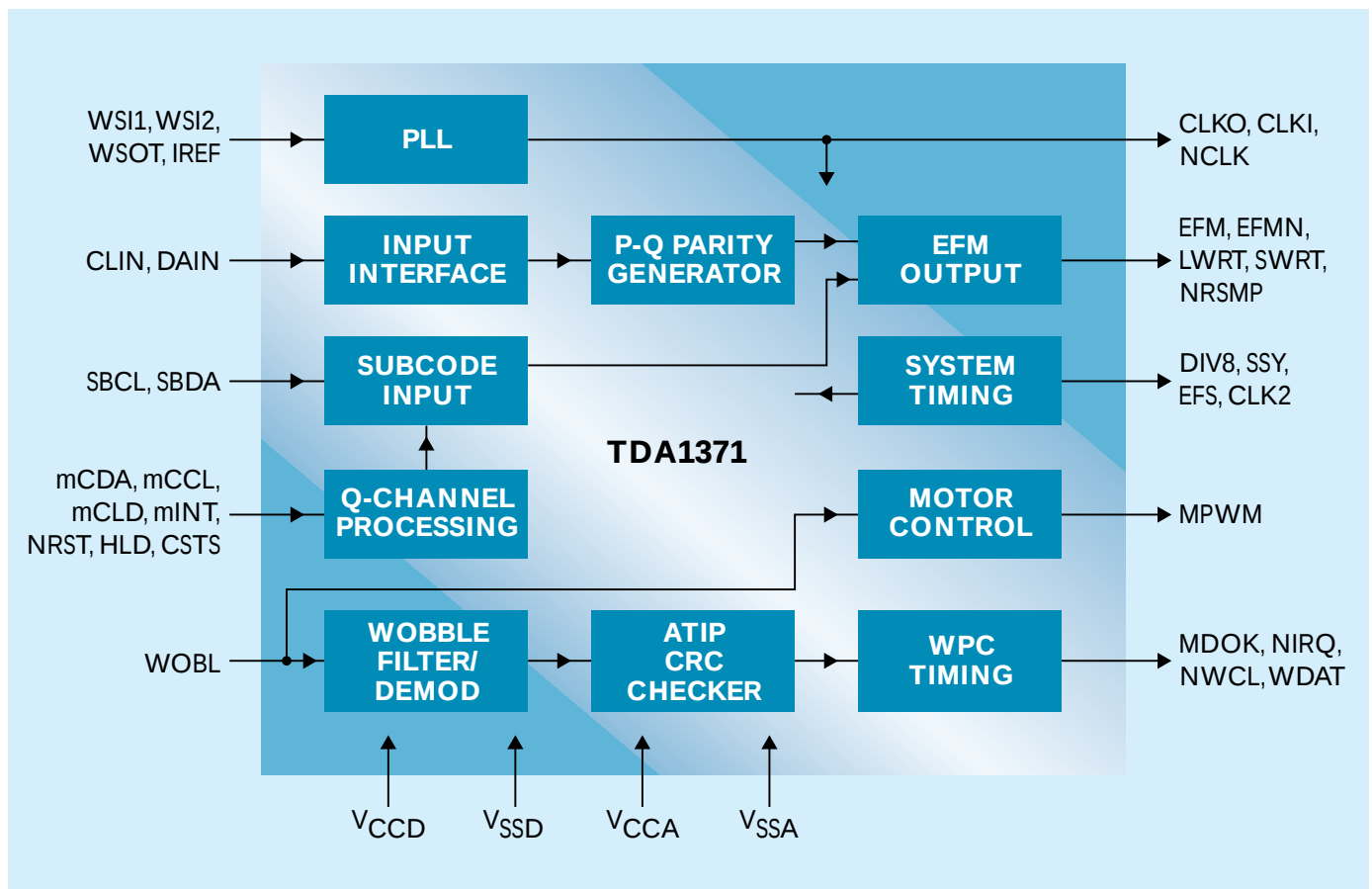
Compact Disc CIRC-EFM encoder (CDCEP)

- Internal RAM for C1, C2 parity calculation.
- Programmable input format.
- Internal system clock regeneration.
- ATIP demodulation.
- ATIP cyclic redundancy check.
- Motor error signal output.
- ATIP/subcode synchronisation.
- Suitable for at least n=2.
- Serial microprocessor interface.
- P and Q subcode channels generator.
- R,...,W subcode channels serial input.
- Laser write signals.

The TDA1371 is a modified and functionally extended follow-up of the first generation Compact Disc Encoder. A wobble processor is embedded. The main function is to convert serial, digital input data to EFM-format, according the RED BOOK specification, and to decode the ATIP-information from the CDR-disc.

QUICK REFERENCE DATA
(typ. values)

Supply voltage - digital part	5 V
Supply voltage - analog part	5 V
Supply current - digital part	14 mA
Supply current - analog part	2 mA
Power dissipation (n=1)	80 mW
Power dissipation (n=2)	160 mW

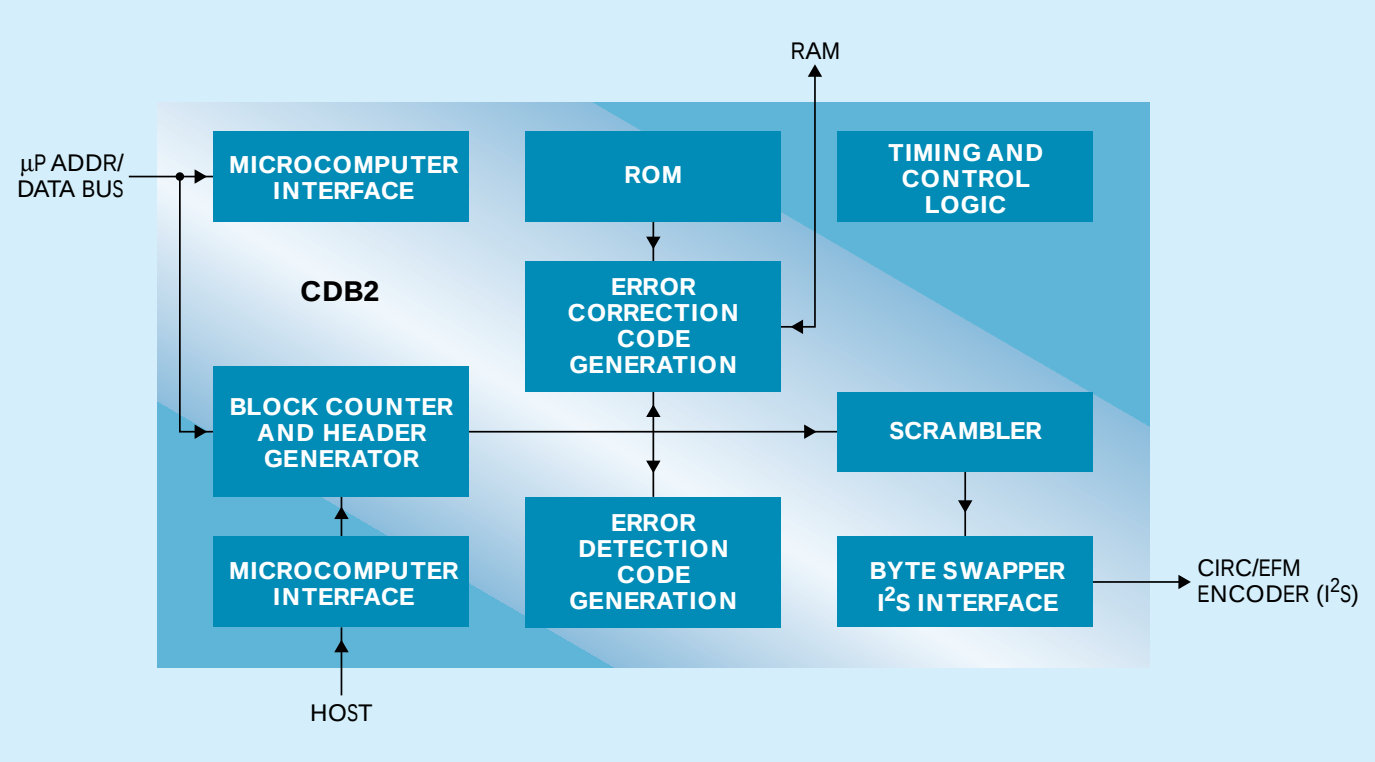


Compact Disc Block Encoder

- Embedded real-time parity encoding.
- Performs all CD-ROM/XA mode 0,1 and 2 functions.
- Performs all CDI form 1 and 2 functions.
- Automatic sync and header generation.
- Fully programmable via an easy microprocessor interface.
- Easy host-interface via request/acknowledge handshaking.
- Low power CMOS.
- Optional automatic calculation of EDC in CDI, form 2.
- Single 5 V power supply.
- Max. speed up to n=5.
- Features ‘Philips’ standard interface format, I²S.
- ‘Bypass’ possibility. Host data is directly fed to the output.

The CDB2 is designed to be a part of the encoding data path of a CD-Recordable system. All the data acquisitions and manipulations, conforming the CD-ROM/CDI rules are embedded in this chip: reformatting data into CD-ROM blocks, providing each block with the necessary parity bytes, giving the decoding part the possibility of a third layer error correction. Data is scrambled, swapped and formatted into I2S format.

QUICK REFERENCE DATA (typ. values)	
Supply voltage	5 V
Maximum clock frequency	22 MHz
Input voltage	5 V
Output voltage	5 V



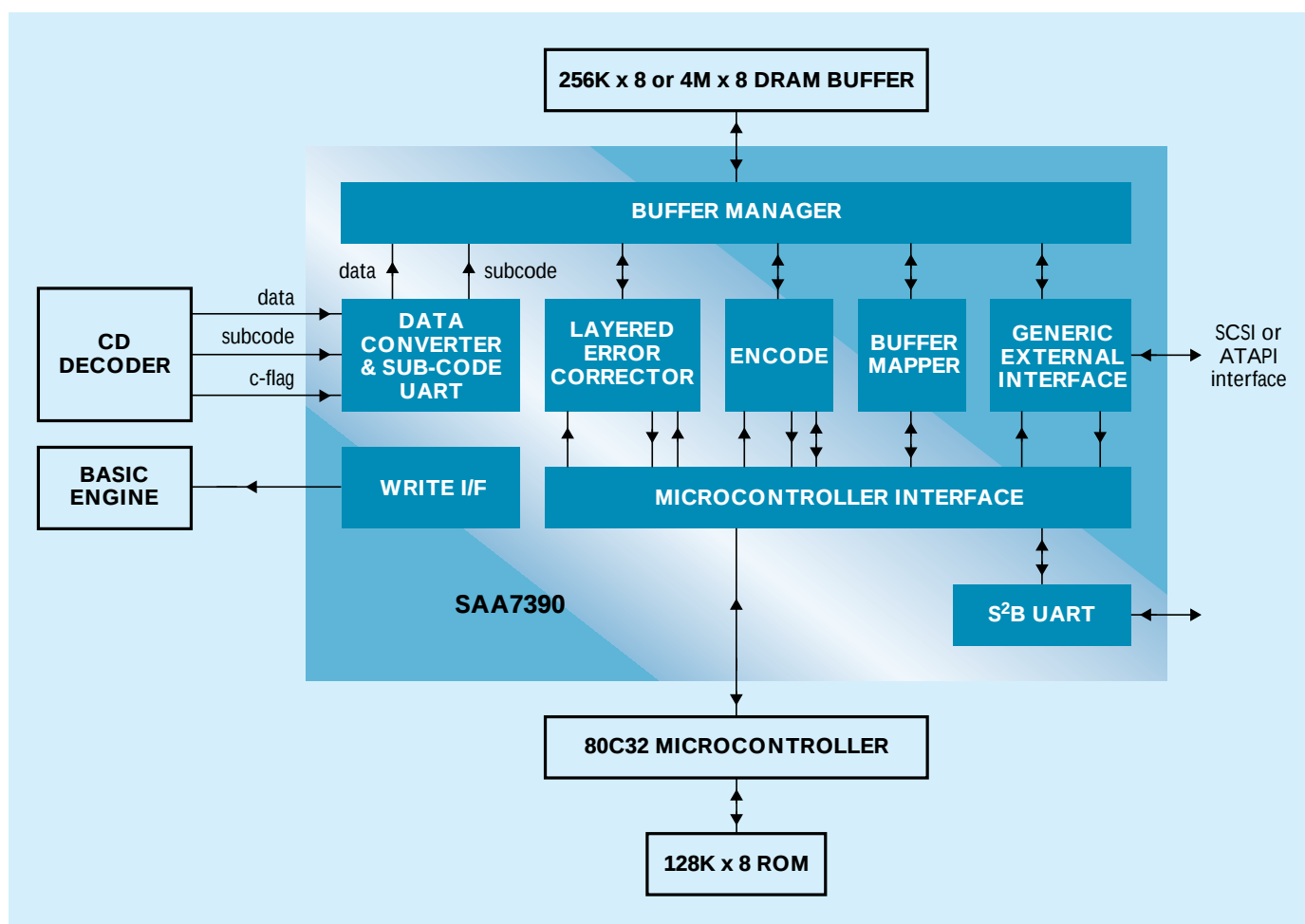
High-speed CD-Recordable block decoder/encoder (CHAUCER)

- Third-level error corrector.
- Third layer ECC syndrome calculation.
- Third layer encode/decode and buffer management.
- Block-oriented host transfers.
- Generic interface with 16.9 Mbyte/s transfer for external SCSI (53CF92) or ATAPI IC.
- Designed for 8x read and 4x write speeds.
- Supports 256K, 1M or 4M, 70 ns low-cost DRAMs.
- Ten-level arbitration logic in buffer manager.

The SAA7390 (nickname: CHAUCER) is a highly integrated CD-ROM block decoder and encoder. It supports data rates during reading of up to eight times standard speed, and during writing of up to four times standard speed.

QUICK REFERENCE DATA (typ. values)

Supply voltage	5 V
Operating temperature range	0-70 °C

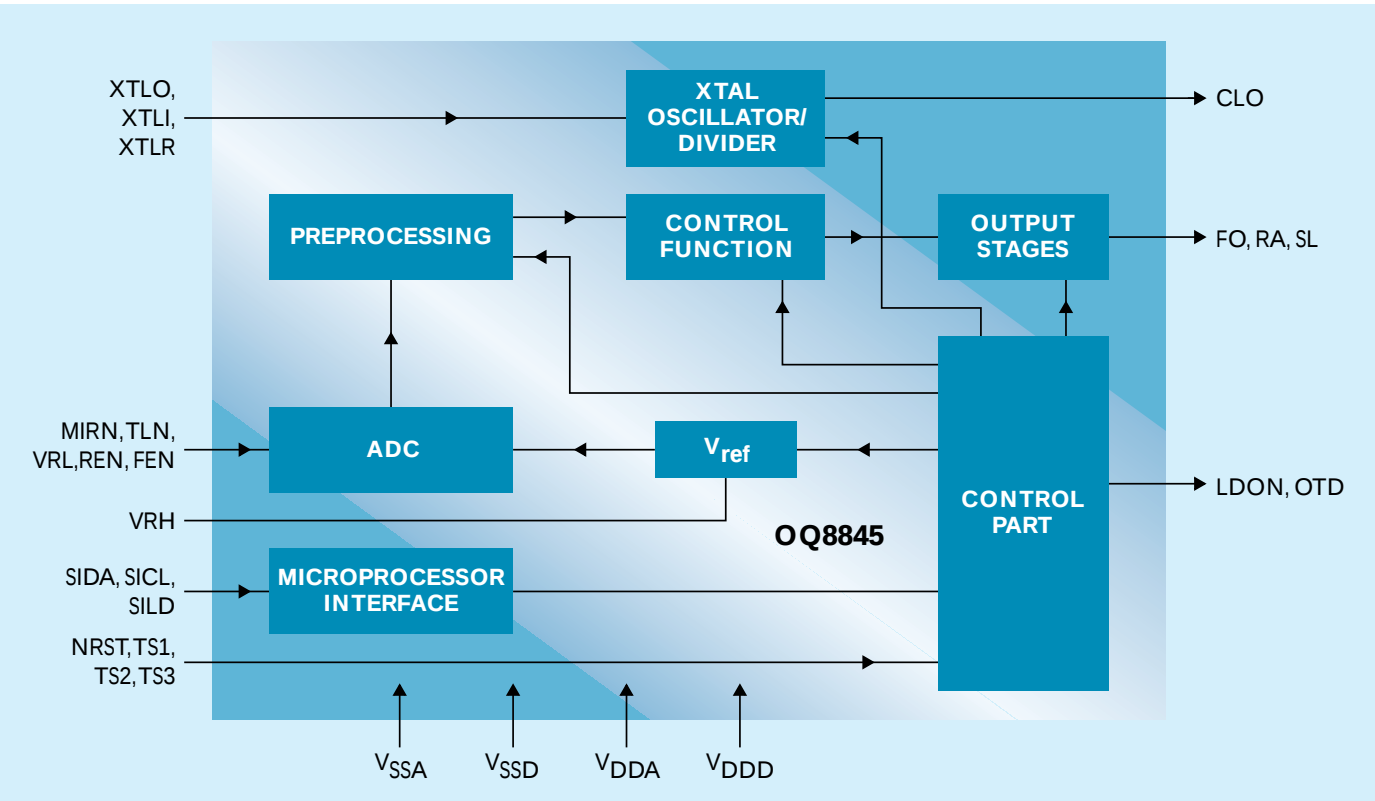


DSICR

- Focus, radial and sledge servo loop.
- Built-in access procedure.
- Supply voltage 5 V only.
- Sophisticated track-loss detection mechanism.
- Automatic focus start-up procedure and in-lock indication (incl. fast focus restart).
- Automatic electrical offset compensation for focus error.
- Automatic offset control for track-loss.
- Extended radial error signal.
- Flexible system oscillator.
- Automatic jump procedure for radial servo.
- Automatic offset and gain control for radial error.
- Defect and shock detector.

The OQ8845 provides all servo functions (except disc motor) for two-stage CD, CD-Recordable and CD-Rewritable systems. It offers a high degree of integration, combined with low additional cost of external components. The servo characteristics are widely adjustable through a three-wire serial interface which offers a high degree of flexibility, enabling the controller to be used in a wide range of CD-mechanisms.

QUICK REFERENCE DATA (typ. values)	
Supply voltage - digital part	5 V
Supply voltage - analog part	5 V
Supply current - digital part	10 mA
Max. quiescent current	10 µA
Max. supply current - analog part	4 mA
Max. input current - FEN, REN, TLN	15.8 µA
Max. input current - MIRN	24.3 µA
Power dissipation	95 mW
Max. clock freq. (internal)	8.5 MHz



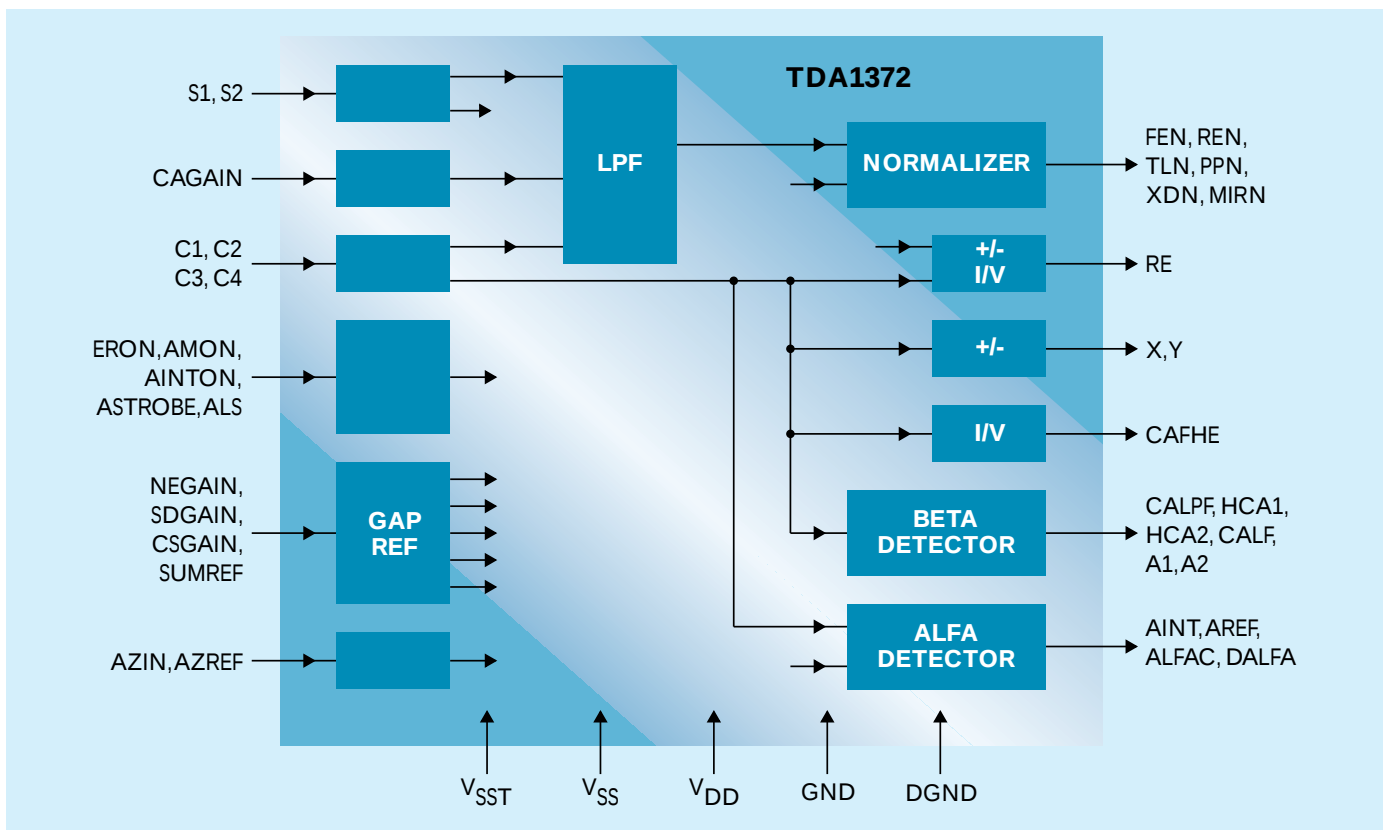
Pre-amplifier and error signal generator for CD-Recordable

- Offset-free pre-amplifiers.
- Normalized error signal, independent of the detected light level.
- Completely integrated filters for normalized error signals.
- Drop-out concealment.
- Spot position signals.
- Detector for optimum laser power calibration.
- Detector for optimum laser power control.
- On-chip band gap reference for temperature independent transfer functions.
- HF-amplifier.
- Signal for fast track counting.

The TDA 1372 is a preamplifier and error-signal generator intended for 3-spot, push-pull tracking systems. Error signals to focus the laser spot on the disc and to control the position of the spots across the tracks are generated independently of the intensity of light falling on the detectors. The data signal is detected and amplified. Signals to determine the optimum laser power and to control the laser power during writing data are also generated.

QUICK REFERENCE DATA
(typ. values)

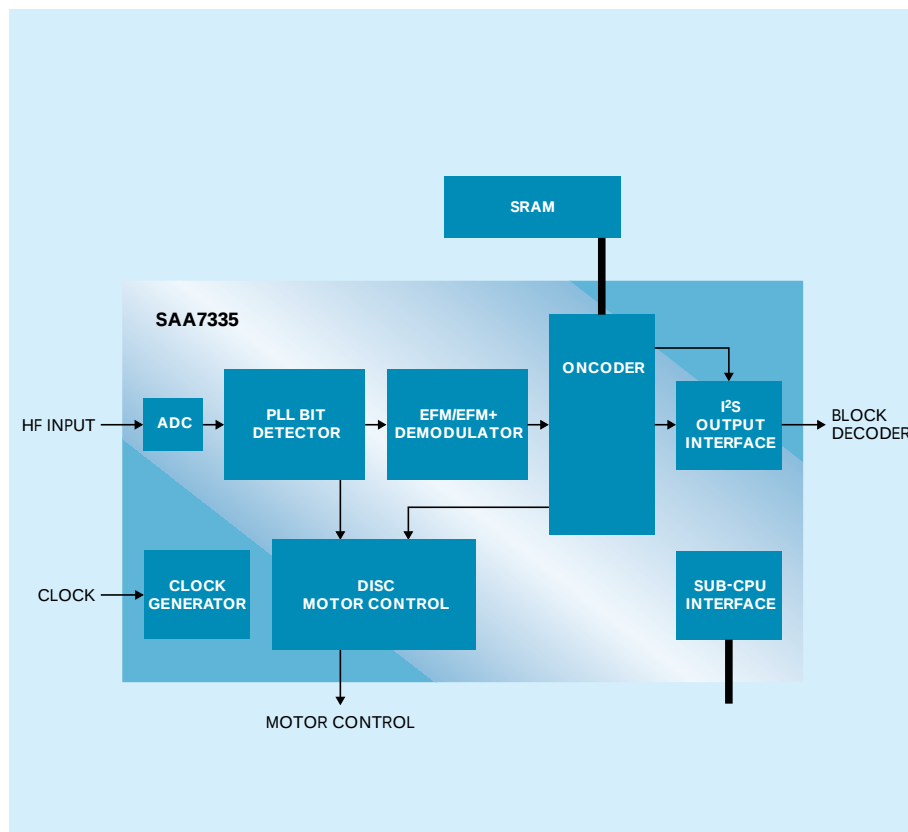
Supply voltage, V_{DD}	5 V
Supply voltage, V_{SS}	5 V
Detector input current range	100 μ A
Min. bandwidth normalized error signals	40 kHz
Min. HF-amplifier bandwidth	4 MHz



DVD decoder for DVD-ROM and DVD-Video

- Compatible with CD-i, CD-ROM, MPEG-Video, DVD-ROM and DVD-Video applications.
- Designed for very high playback speeds.
- Matched filtering, dual-pass error correction (C1-C2-C1-C2), for CD-ROM.
- Overspeed audio playback function included (up to 3 kbyte buffer).
- Parallel or serial control interface.
- Lock-to-disc playback, CAV, pseudo-CLV and CLV motor control loops.
- Interface to 32 kbyte SRAM for DVD error correction and de-interleaving.
- Subcode/header processing for DVD and CD formats.

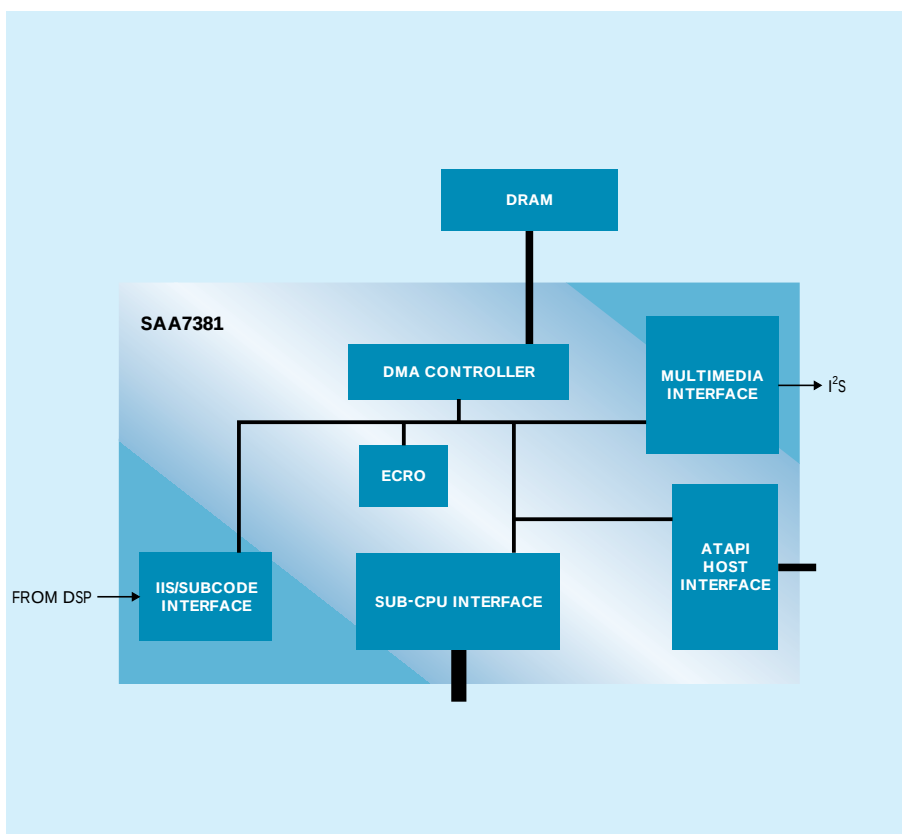
The SAA7335 is a high-end decoding device compatible with both CD and DVD systems. It requires an external 32 kbyte SRAM memory for DVD de-interleaving operations.



Block decoder/host interface

- **CD-ROM with full real-time error correction at up to 16x data rates.**
- **Supports Constant Angular Velocity (CAV), Quasi-Constant Linear velocity (CLV), and standard CLV modes.**
- **CD-ROM (Mode 1), CD-i (Form 1 and Form 2), CD-ROM XA, and DVD-ROM formats supported.**
- **ATAPI interface supports:**
 Packet command reception sequencer
 Block data transfer sequence.
- **Real-time error detection and correction in hardware.**
- **Powerful internal DMA controller allows automatic block size determination.**
- **Operates with up to 16 Mbyte DRAM**
 Hyperpage DRAM up to 33M words/s burst
 Fast Page DRAM up to 17.5M words/s burst.
- **Subcode buffering and de-interleaving supported in hardware with hardware Q-channel CRC check.**
- **Device registers are memory mapped for faster direct access to the chip.**

The SAA7381 is a block decoder and buffer manager designed for use in high-speed CD-ROM functions and DVD applications. Real-time error detection and correction, and ATAPI functions are all integrated in the device.



DACS

Survey of stereo audio DACs (ranked by typical THD + N at 0 dB performance per category)

Type	Description	Over-sampling ($\times f_s$)	Data input format	Typ. THD + N at 0 dB dB(%)	Typ. THD + N at -60 dB dB(%) ⁴⁾	Typ. signal-to-noise ratio (dB) ⁴⁾	Typ. output voltage (or current) V (mA)	Supply voltage (V)	Power dissipation (mW)	Package
Bitstream DAC										
TDA1547 ¹⁾	top-grade BiMOS bitstream DAC	24	1-bit, 192f _s	-101(0.0009)	-51(0.02)	113	1.0	5 ±10%	800	DIP32S
Bitstream/continuous calibration DACs										
TDA1549(T) ⁵⁾	bitstream/CC DAC	24	"S", 4f _s , 18-bit	-90(0.003)	-50(0.32)	110	1.5	3.4 to 5.5	35	DIP16, SO16
16-bit DACs										
TDA1541A/S2 ³⁾	double crown 16-bit DAC	1	I ² S, up to 8f _s	-95(0.002)	-47(0.4)	112	(4.0)	5 ±10%	700	DIP28
TDA1541A/S1 ³⁾	single crown 16-bit DAC	1	I ² S, up to 8f _s	-95(0.001)	-47(0.4)	112	(4.0)	5 ±10%	700	DIP28
TDA1541A ³⁾	high-performance 16-bit DAC	1	I ² S, up to 8f _s	-95(0.0018)	-42(0.79)	112	(4.0)	5 ±10%	700	DIP28
TDA1541A/R1 ³⁾	high-performance 16-bit DAC	1	I ² S, up to 8f _s	-95(0.001)	-43(0.79)	112	(4.0)	5 ±10%	700	DIP28
TDA1543(T)	economy 16-bit DAC	1	I ² S, up to 4f _s	-75(0.018)	-33(2.2)	96	(2.3)	3 to 8	250	DIP8, SO16
Continuous calibration DACs										
TDA1313(T) ⁵⁾	continuous calibration DAC with voltage output	1	"S", up to 8f _s	-88(0.004)	-38(1.3)	98	4.2	3 to 5.5	30	DIP16, SO16
TDA1545A(AT)	continuous calibration DAC with current output	1	"S", up to 4f _s	-88(0.004)	-35(1.7)	101	(1.0)	3 to 5.5	6	DIP8, SO8
TDA1387T	continuous calibration DAC with current output	1	I ² S, up to 4f _s	-88(0.004)	-35(1.7)	98	(1.0)	3 to 5.52	8	DIP8, SO8
TDA1312A(AT) ⁵⁾	continuous calibration DAC with voltage output	1	"S", up to 8f _s	-68(0.04)	-33(2)	92	2.0	4 to 5.5	8	DIP8, SO8
TDA1311A(AT) ⁵⁾	continuous calibration DAC with voltage output	1	"S", up to 4f _s	-68(0.04)	-33(2.2)	92	2.0	4 to 5.5	8	DIP8, SO8
TDA1310A(AT)	continuous calibration DAC with current output	1	"S", up to 4f _s	-65(0.05)	-33(2.2)	95	(1.0)	3 to 5.5	6	DIP8, SO8

Survey of stereo audio filter-DACs (ranked by typical THD + N at 0 dB performance per category)

Bitstream/continuous calibration filter-DACs										
TDA1305T(AT) ²⁾⁶⁾	bitstream/CC filter-DAC	96	I ² S, "S", 1f _s , up to 20-bit	-90(0.003)	-46(0.5)	108	1.5	3.4 to 5.5	70	SO28
TDA1388T(M) ²⁾	bitstream/CC filter-DAC for CD-ROM audio	64	I ² S, "S", 1f _s , up to 20-bit	-85(0.005)	-35(1.7)	95	1.0	5 ± 10%	110	SO28, SSOP28
TDA1548T ²⁾	low-voltage bitstream/CC filter-DAC + DSP features	96	I ² S, "S", 1f _s , up to 20-bit	-85(0.005)	-35(1.8)	95	0.7	2.7 to 4	50	SO28
Continuous calibration filter-DACs										
TDA1306T2 ⁵⁾	CC filter-DAC	4	I ² S, "S", 1f _s , up to 20-bit	-70(0.032)	-42(0.8)	108	1.1	5 ± 10%	85	SO24
TDA1386T ²⁾	CC filter-DAC	4	I ² S, "S", 1f _s , up to 20-bit	-70(0.032)	-42(0.8)	108	2.0	5 ± 10%	50	SO24
Quadruple sign-magnitude filter-DAC										
TDA1314T ⁵⁾	quad sign-magnitude filter-DAC with voltage output	4	2 xc I ² S, 1f _s , 18-bit with sign	-70(0.03)	-42(0.8)	110	2.0	5 ±5%	85	SO28

Notes: ¹⁾ measured with SAA7350 and 20-bit input; ²⁾ includes digital filter; ³⁾ high sound quality: dynamic element matching (DEM); ⁴⁾ A-weighting; ⁵⁾ includes I/V converter.

Survey of stereo audio ADCs (ranked by typical THD + N at 0 dB performance per category)

Type	Description	Oversampling ($\times f_s$)	Data input format	Typ. THD + N at 0 dB dB(%)	Typ. signal-to- noise ratio (dB) ⁴⁾	Supply voltage (V)	Power dissipation (mW)
SAA7366T	economy bitstream ADC	128	data output format: I ² S + one pseudo I ² S	-88(0.004)	95	5 $\pm$ 10%	350
SAA7367T	economy bitstream ADC	128	data output format: I ² S + one pseudo I ² S	-88(0.004)	95	5 $\pm$ 10%	tbF
SAA7360GP	high-performance bitstream ADC	128	data output format: I ² S + two pseudo I ² S	-90(0.003)	102	5 $\pm$ 10%	410

Notes: ¹⁾ measured with SAA7350 and 20-bit input; ²⁾ includes digital filter; ³⁾ high sound quality: dynamic element matching (DEM); ⁴⁾ A-weighting; ⁵⁾ includes I/V converter.

Survey of stereo audio ADCs + DACs

Type	Description	Over- sampling ($\times f_s$)	Data input format	Typ. THD + N at 0 dB dB(%)	Typ. THD + N at -60 dB dB(%) ⁴⁾	Typ. signal- to-noise ratio (dB) ⁴⁾	Typ. output voltage (or current) V (mA)	Supply voltage (V)	Power dissipation (mW)	Package
TDA1309H	low-voltage bitstream/CC ADC + DAC	ADC	I ² S, "S", 16-bit, 18-bit output	-85(0.005)	-35(1.7)	95		2.7 to 4.0	72	QFP44SL
TDA1396H*	bitstream PC codec	DAC	I ² S, "S", 16-bit, 18-bit input analog and digital	-90(0.003)	-44(0.6)	104	0.5	3 or 5	84	TQFP128

Notes: ¹⁾ measured with SAA7350 and 20-bit input; ²⁾ includes digital filter; ³⁾ high sound quality: dynamic element matching (DEM);

* Digital PC codec with Plug & Play ISA interface.

DISPLAY DRIVERS

LCD segment drivers with I²C-bus interface

Type number	PCF8566(T)	PCF8576T	PCF8576C	PCF8577C(T)
Segment drive outputs	24	40	40	32
Multiplex rate	1:1, 1:2, 1:3, 1:4	1:1, 1:2, 1:3, 1:4	1:1, 1:2, 1:3, 1:4	1:1, 1:2
Segments driven per IC	96	40	40	32
Max. ICs per system	16	16	16	8
Max. segments driven per system	1536	2560	2560	512
Supply voltage	2 to 6 V	2 to 9 V	2 to 6 V	2.5 to 9 V
Max. supply current:				
operating at 5 V	90 μ A	180 μ A	120 μ A	250 μ A
power saving mode	40 μ A	60 μ A	60 μ A	
Display data RAM	24 x 4 bits	40 x 4 bits	40 x 4 bits	
Blinking modes	0.5, 1, 2 Hz	0.5, 1, 2 Hz	0.5, 1, 2 Hz	
Package	DIP40, VSO40	VSO56	VSO56, LQFP64	DIL40, VSO40

***COMPACT DISC
MECHANISMS***

OVERVIEW OF CD MECHANISMS

For audio, video and games applications

CDM 12.1

Economy mechanism for audio, video and games applications.
Lightweight 3-beam LDGU with holographic pick up, providing excellent thermal stability.
Low-profile frame.
Unique low-mass actuator for fast, accurate focusing and radial tracking.
Reliable, long-life, DC motors.

CDM 12.1T

For top loaders; includes ornamental plate.

CDM 12.3BLC

Compact low-power low-voltage mechanism for audio portable applications.
Overall height only 14.3 mm.
Lightweight 3-beam LDGU with holographic pick up, providing excellent thermal stability.
Unique low-mass actuator for fast, accurate focusing and radial tracking, low power consumption and high shock resistance.
Ball-clamping turntable.

VAM 1205

High-performance mechanism for audio and video applications.
Lightweight 3-beam LDGU with holographic pick up, providing excellent thermal stability.
Unique low-mass actuator for fast, accurate focusing and radial tracking.
Integrated diode pre-amplifier for high signal-to-noise ratio.
Brushless disc motor for long life.

CDM 12 INDUSTRIAL

Professional standards and high reliability for industrial applications.
Lightweight 3-beam LDGU with holographic pick up, providing excellent thermal stability.
Heavy die-cast frame, for minimum relative pick-up mass.
Unique low-mass actuator for fast, accurate focusing and radial tracking.
Integrated diode pre-amplifier for high signal-to-noise ratio and high data integrity.

For CD-ROM applications

CDM 12.6

Economy mechanism.
Data transfer rates (up to 6x).
Integrated diode pre-amplifier for high signal-to-noise ratio and high data integrity at high data transfer rates.
Brushless disc motor.

CDM 12.9

Data transfer rates (up to 8x).
Integrated diode pre-amplifier for high signal-to-noise ratio and high data integrity at high data transfer rates.
Brushless disc motor, optimised for high-speed operation, and providing long life.

CDM 12.10

Fast access and high data transfer rates (8x and higher).
High-speed sledge motor and ultra-high-ratio gearing for fast radial access.
Integrated diode pre-amplifier for high signal-to-noise ratio and high data integrity at high data transfer rates.
Brushless disc motor, optimised for high-speed operation, and providing long life.

ROM 1312/0

Low-power loader for high-performance CD-ROM applications (12x and higher).
Fast access (110 ms seek).
Suitable for 5¼", half-height mounting in computers.
Compact size.
Can be used upright (with 12 cm discs only).
Suspension between loader chassis and housing for a virtually vibration-free environment.
Pre-set mounting positions up to ±15°.

For CD-Recordable applications

CDM 24C (CDM 2001)

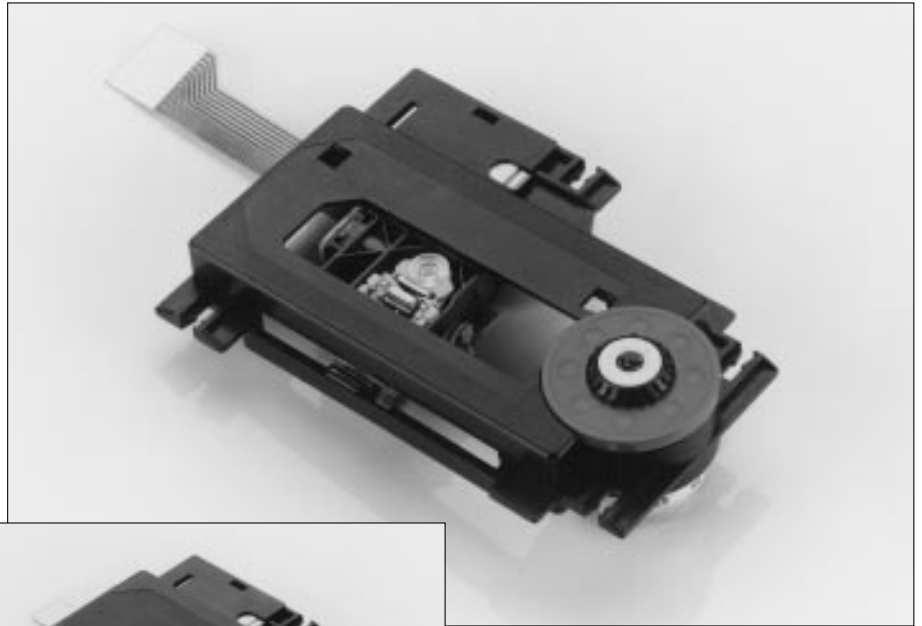
Three-beam push-pull light-pen with high-intensity laser for recording in the organic-dye layer of CD-Recordable discs.
Selected high-speed sledge motors and higher gear ratios for fast radial access.
Integrated signal processor for high signal-to-noise ratio and high data integrity at 4x data transfer rates.
Brushless disc motor.

*Note: Stated speeds are only indications set by the application not by the mechanism.
All mechanisms can operate at speeds higher than those stated.*

* LDGU: Laser Detector Grating Unit

Economic mechanism for audio, video and games applications

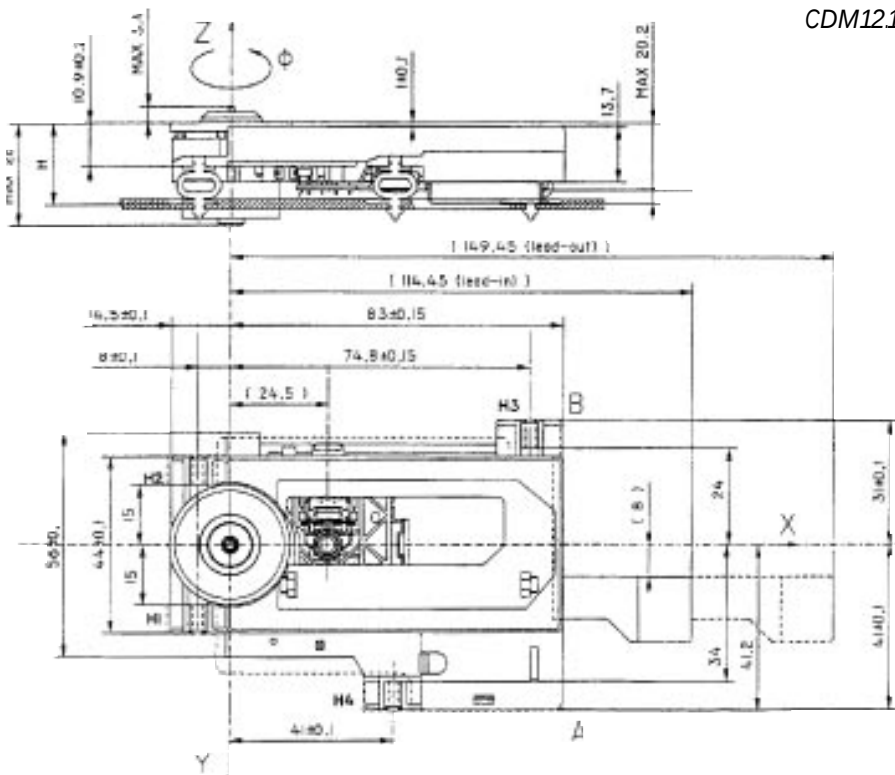
- Lightweight 3-beam LDGU with holographic pick-up, providing excellent thermal stability.
- Low-profile frame.
- Unique low-mass actuator for fast, accurate focusing and radial tracking.
- Reliable long-life DC motors.
- Top-loading version with ornamental plate available (CDM 12.1T).



CDM12.1



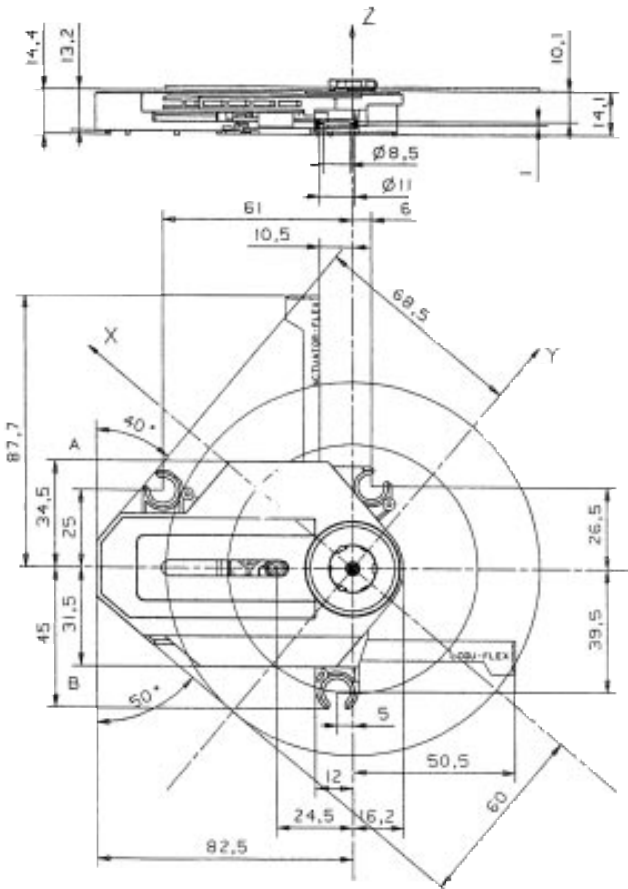
CDM12.1T



CDM 12.1(T) TECHNICAL DATA (typ. values)	
Disc motor	RF310T-11400
Sledge motor	PPN 13
Mech. sledge speed	13 mm/s (3.5V)
Moving mass actuator	0.56 gr
Focus error detection	Single Foucault
Focus resonance freq.	30 Hz
Focus AC-sensitivity	0.28 N/A
Focus DC-sensitivity	0.8 mm/V
Focus resistance	18 Ω
Radial error detection	3-beam
Tracking resonance freq.	49 Hz
Tracking AC-sensitivity	0.32 N/A
Tracking DC-sensitivity	0.35 mm/V
Tracking resistance	18 Ω
Wavelength	780 nm
Power intens. (obj. lens)	max. 0.5 mW
Numerical aperture	0.45
Lifetime	5000 Hr (B10)
MTBF (100%)	27000 Hr
Operational temp. range	5 to 55 °C
Storage temperature	-25 to 55 °C
Storage exposure	70 °C (48Hr)
Allowed impact	max. 100 g (6 ms.)
Vibration (2g/0.15mm)	10-150 Hz

Compact mechanism for audio portable applications

- Unique ball-clamping turntable. No additional clamping parts required.
- Low-profile frame; overall height only 14.4 mm.
- Unique low-mass actuator for fast, accurate focusing and radial tracking, low power consumption and high shock resistance.
- Operates in any position.
- Low power and low voltage (laser, actuators and motors) for extended battery life.



CDM 12.3BLC TECHNICAL DATA (typ. values)	
Disc motor	RF410CH-12250
Sledge motor	FF030PK-08250
Mech. sledge speed (3.5V)	13 mm/s
Moving mass actuator	0.56 gr
Focus error detection	Single Foucault
Focus resonance freq.	30 Hz
Focus AC-sensitivity	0.16 N/A
Focus DC-sensitivity	118 mm/V
Focus resistance	7.1 Ω
Radial error detection	3-beam
Tracking resonance freq.	49 Hz
Tracking AC-sensitivity	0.25 N/A
Tracking DC-sensitivity	0.24 mm/V
Tracking resistance	18 Ω
Wavelength	780 nm
Power intensity (obj. lens)	max. 0.5 mW
Numerical aperture	0.45
Lifetime	2000 Hr (B10)
MTBF (25%)	30000 Hr
Operational temp. range	-10 to 55 °C
Storage temperature range	-25 to 55 °C
Storage exposure	70 °C (48Hr)
Allowed impact	max. 100 g (6 ms.)
Vibration (3g/0.2mm)	10-150 Hz

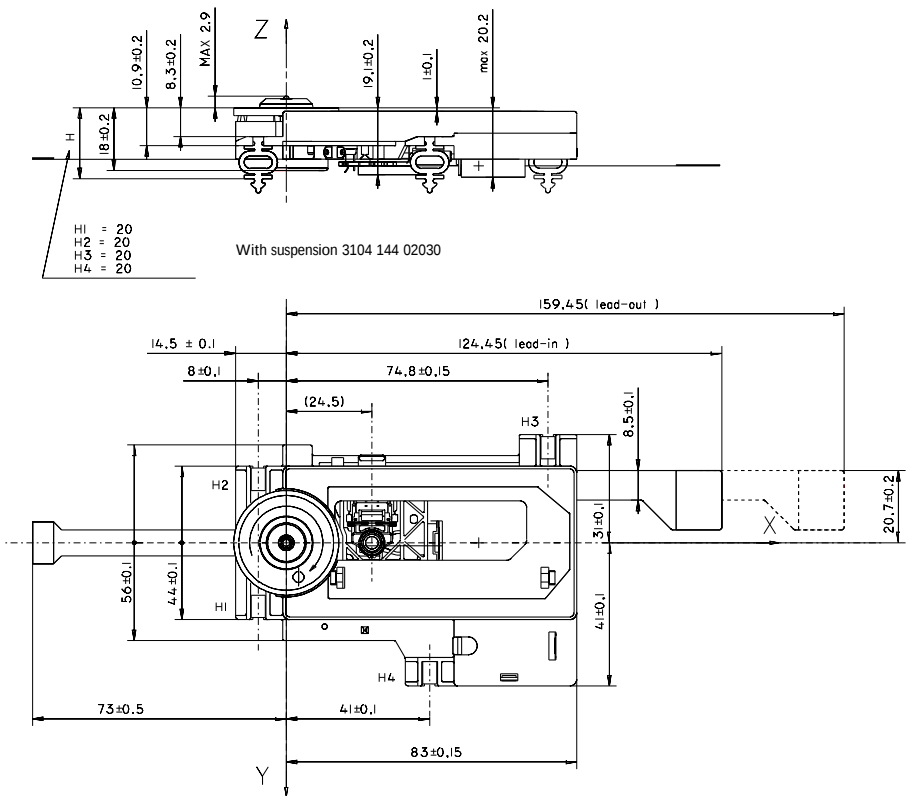
High-performance for audio and video applications

- Lightweight 3-beam LDGU with holographic pick-up, providing excellent thermal stability.
- Unique low-mass actuator for fast, accurate focusing and radial tracking.
- Integrated diode pre-amplifier for high signal-to-noise ratio.
- Brushless disc motor for long life.
- Suitable for single and double-speed applications.



VAM 1205

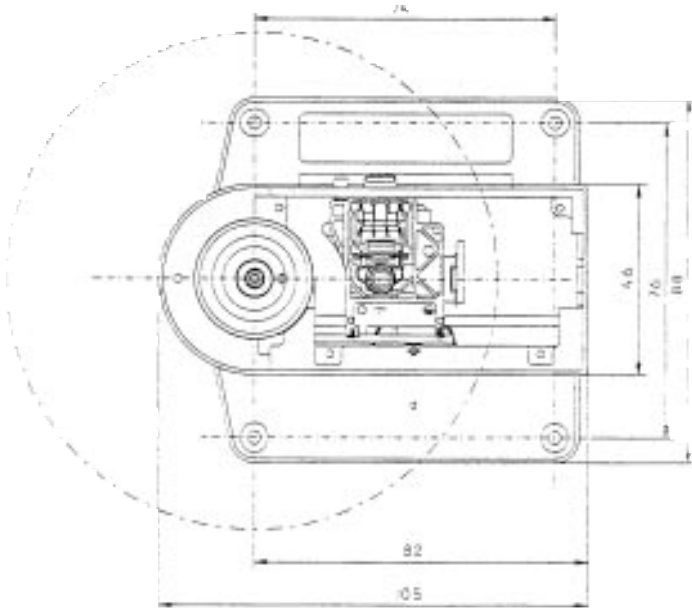
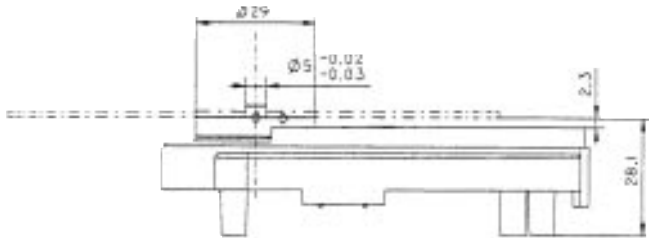
4



VAM 1205 TECHNICAL DATA (typ. values)	
Disc motor	CDS8C50T20-2
Sledge motor	FF-030PK
Moving mass actuator	.56 gr
Focus error detection	Single Foucault
Focus resonance freq.	30 Hz
Focus AC-sensitivity	0.25 N/A
Focus DC-sensitivity	0.65 mm/V
Focus resistance	18 Ω
Radial error detection	3-beam
Tracking resonance freq.	49 Hz
Tracking AC-sensitivity	0.25 N/A
Tracking DC-sensitivity	0.27 mm/V
Tracking resistance	18 Ω
Wavelength	780 nm
Power intensity (obj. lens)	max. 0.5 mW
Numerical aperture	0.45
Lifetime	8,000 Hr (B10)
MTBF (25%)	30,000 Hr
Operational temp. range	5 to 55 °C
Storage temperature	-25 to 55 °C
Storage exposure	70 °C
Allowed impact	max. 100g (6 ms.)

Professional standards and high reliability

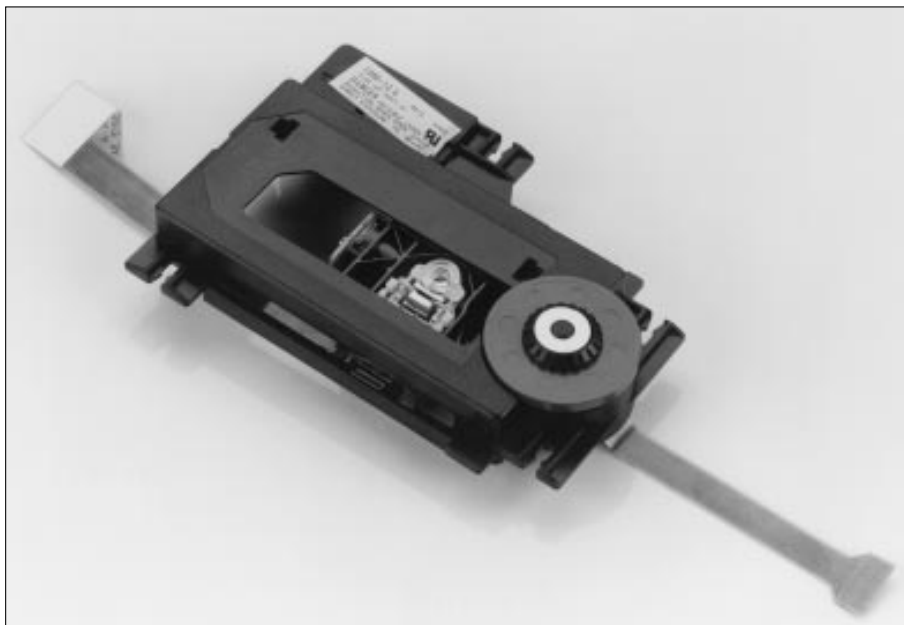
- Lightweight 3-beam LDGU with holographic pick up, providing excellent thermal stability.
- Heavy die-cast frame for high performance.
- Integrated diode pre-amplifier for high signal-to-noise ratio.
- Unique low-mass actuator for fast, accurate focusing and radial tracking, low power consumption and high shock resistance.



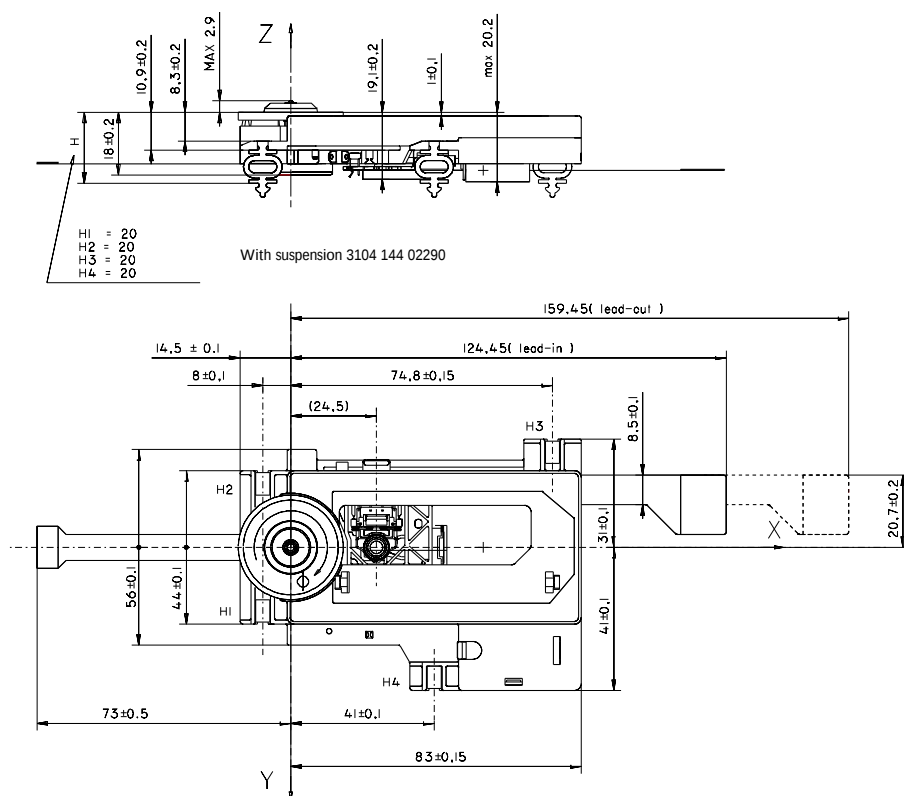
CDM 12 INDUSTRIAL TECHNICAL DATA (typ. values)	
Disc motor	RF300CH-11400
Sledge motor	FF030PK-08250
Mech. sledge speed	0.05 m/s (3.5V)
Moving mass actuator	0.56 gr
Focus error detection	Single Foucault
Focus resonance freq.	30 Hz
Focus AC-sensitivity	0.25 N/A
Focus DC-sensitivity	0.65 mm/V
Focus resistance	18 Ω
Radial error detection	3-beam
Tracking resonance freq.	49 Hz
Tracking AC-sensitivity	0.25 N/A
Tracking DC-sensitivity	0.24 mm/V
Tracking resistance	18 Ω
Wavelength	780 nm
Power intensity (obj. lens)	max. 0.5 mW
Numerical aperture	0.45
Lifetime	7500 Hr (B10)
MTBF (25%)	30000 Hr
Operational temp. range	5 to 55 °C
Storage temperature	-25 to 55 °C
Storage exposure	70 °C (48Hr)
Allowed impact	max. 100 g (6 ms.)
Vibration (3g/0.2mm)	10-150 Hz

For CD ROM applications at 6x

- Small size, suitable for half-height mounting in computer applications.
- 6x standard data transfer rates.
- Extended reliability due to brushless disc motor.
- Unique low-mass actuator for fast, accurate focusing and radial tracking.
- Integrated diode pre-amplifier for maximum signal-to-noise ratio.



4

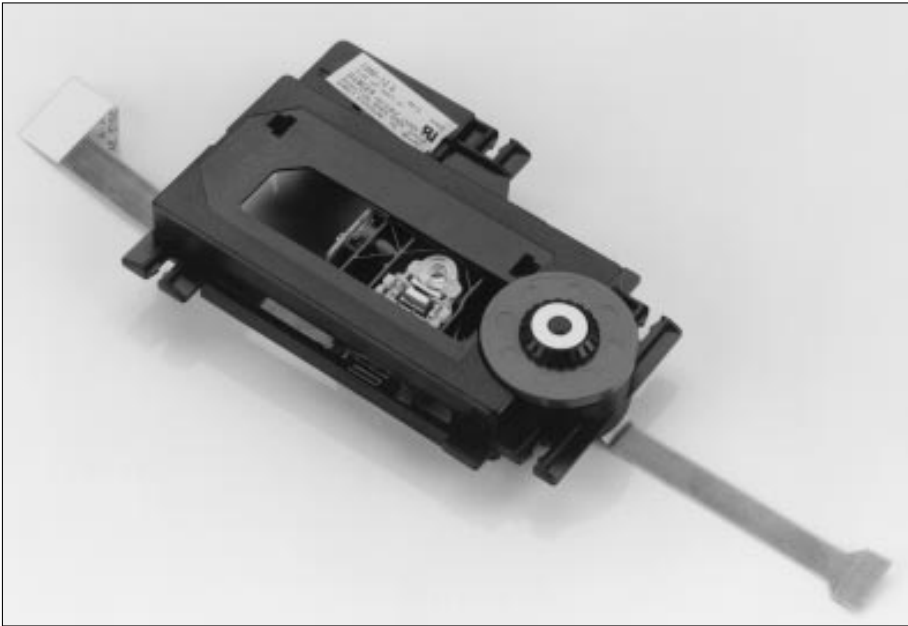


CDM 12.6 TECHNICAL DATA
(typ. values)

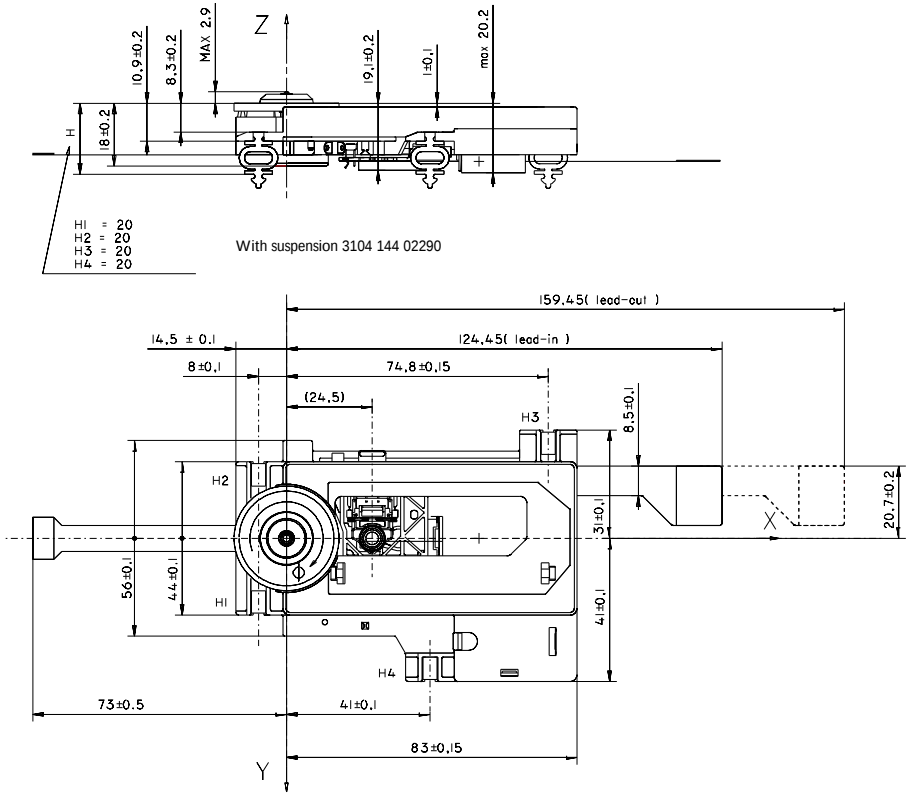
Disc motor	Brushless
Sledge motor	FF030PK-08250
Mech. sledge speed (6.5V)	0.1 m/s
Moving mass actuator	0.56 gr
Focus error detection	Single Foucault
Focus resonance freq.	30 Hz
Focus AC-sensitivity	0.25 N/A
Focus DC-sensitivity	0.65 mm/V
Focus resistance	18 Ω
Radial error detection	3-beam
Tracking resonance freq.	49 Hz
Tracking AC-sensitivity	0.25 N/A
Tracking DC-sensitivity	0.24 mm/V
Tracking resistance	18 Ω
Wavelength	780 nm
Power intensity (obj. lens)	max. 0.5 mW
Numerical aperture	0.45
Lifetime	5000 Hr (B10)
MTBF (100%)	30000 Hr
Operational temp. range	5 to 55 $^{\circ}\text{C}$
Storage temperature	-25 to 55 $^{\circ}\text{C}$
Storage exposure	70 $^{\circ}\text{C}$ (48Hr)
Allowed impact	max. 100 g (6 ms.)

For CD ROM applications at 8x

- Small size, suitable for half-height mounting in computer applications.
- 8x data transfer rates
- Extended reliability due to brushless disc motor for high speeds.
- Unique low-mass actuator for fast, accurate focusing and radial tracking.
- Integrated diode pre-amplifier for maximum signal-to-noise ratio.

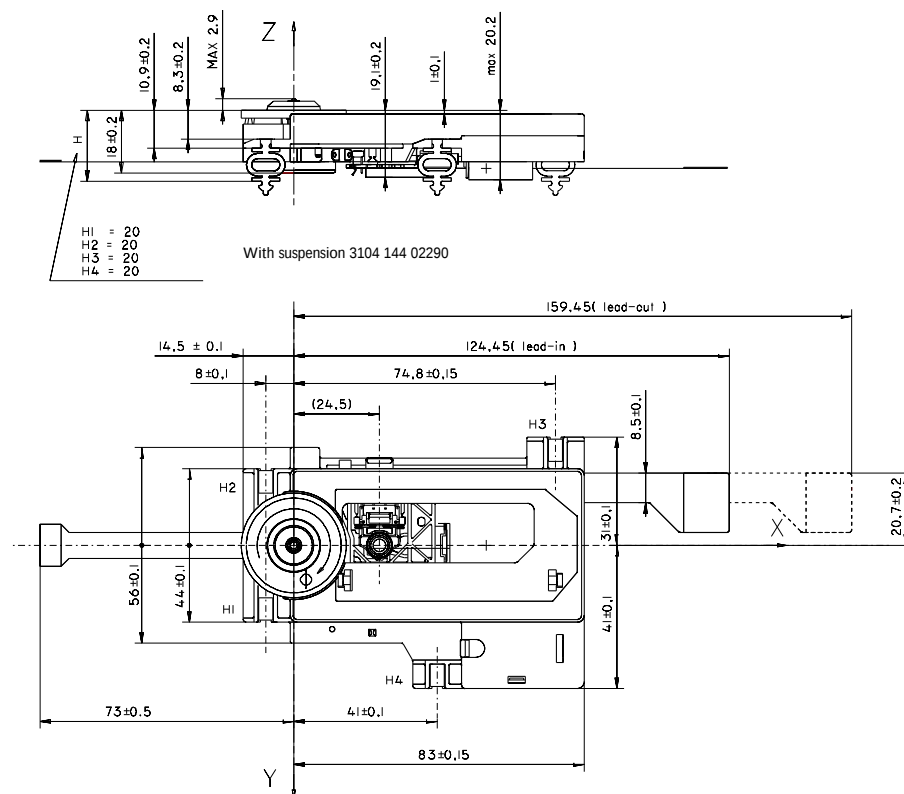
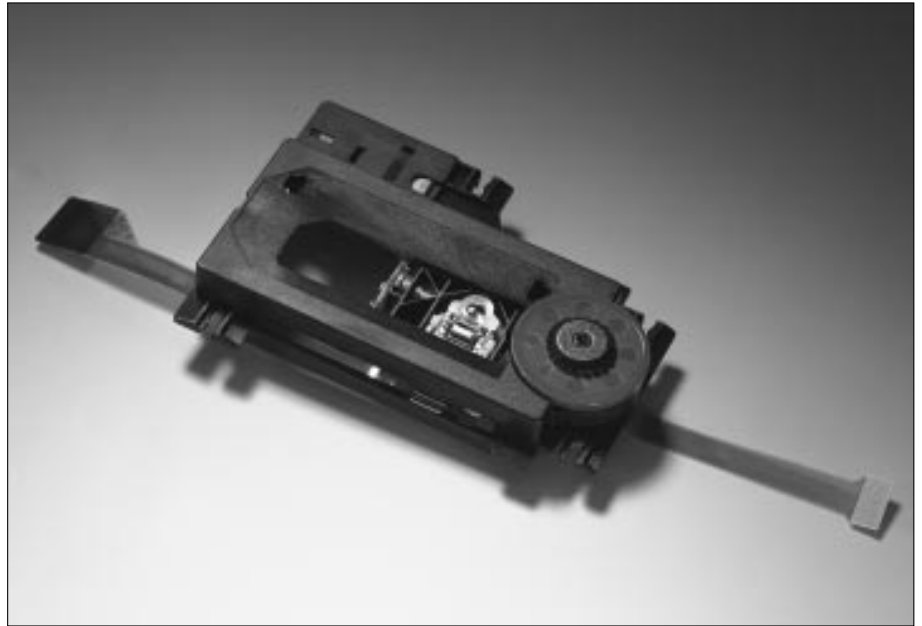


CDM 12.9 TECHNICAL DATA (typ. values)	
Disc motor	Brushless
Sledge motor	FF030PK-08250
Mech. sledge speed (6.5V)	0.1 m/s
Moving mass actuator	0.56 gr
Focus error detection	Single Foucault
Focus resonance freq.	30 Hz
Focus AC-sensitivity	0.25 N/A
Focus DC-sensitivity	0.65 mm/V
Focus resistance	18 Ω
Radial error detection	3-beam
Tracking resonance freq.	49 Hz
Tracking AC-sensitivity	0.25 N/A
Tracking DC-sensitivity	0.24 mm/V
Tracking resistance	18 Ω
Wavelength	780 nm
Power intensity (obj. lens)	max. 0.5 mW
Numerical aperture	0.45
Lifetime	5000 Hr (B10)
MTBF (100%)	30000 Hr
Operational temp. range	5 to 55 °C
Storage temperature	-25 to 55 °C
Storage exposure	70 °C (48Hr)
Allowed impact	max. 100 g (6 ms.)



For fast access in high-end CD ROM applications (8x and higher)

- Small size, suitable for half-height mounting in computer applications.
- Fast radial access due to high-speed sledge motor and ultra-high gear ratios. (Seek time 115 ms.)
- 8x data transfer rates
- Extended reliability due to brushless disc motor for high speeds.
- Unique low-mass actuator for fast, accurate focusing and radial tracking.
- Integrated diode pre-amplifier for maximum signal-to-noise ratio.

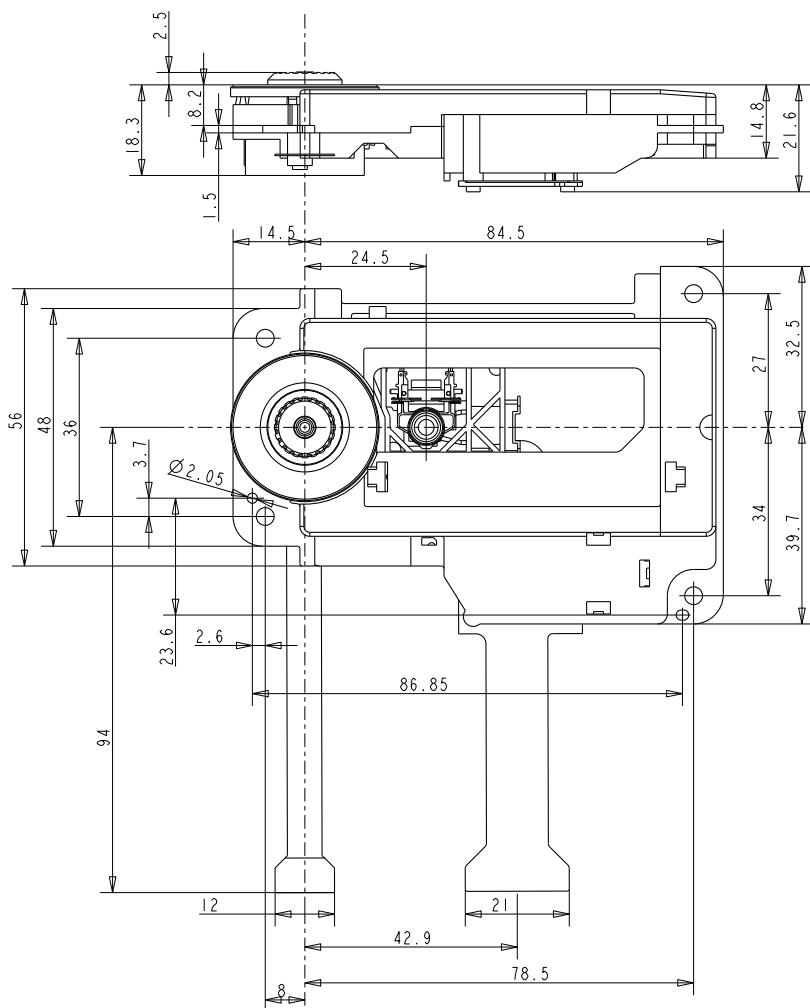


CDM 12.10 TECHNICAL DATA (typ. values)	
Disc motor	Brushless
Sledge motor	FF030PK-08250
Mech. sledge speed (6.5V)	t.b.f.
Moving mass actuator	0.56 gr
Focus error detection	Single Foucault
Focus resonance freq.	30 Hz
Focus AC-sensitivity	0.25 N/A
Focus DC-sensitivity	0.65 mm/V
Focus resistance	18 Ω
Radial error detection	3-beam
Tracking resonance freq.	49 Hz
Tracking AC-sensitivity	0.25 N/A
Tracking DC-sensitivity	0.24 mm/V
Tracking resistance	18 Ω
Wavelength	780 nm
Power intensity (obj. lens)	max. 0.68 mW
Numerical aperture	0.45
Lifetime	5000 Hr (B10)
MTBF (100%)	30000 Hr
Operational temp. range	5 to 55 °C
Storage temperature	-25 to 55 °C
Storage exposure	70 °C (48Hr)
Allowed impact	max. 100 g (6 ms.)



For fast access in high-performance CD ROM applications (12x and higher)

- Small size, suitable for half-height mounting in computer applications.
- Fast radial access due to high-speed sledge motor and ultra-high gear ratios. (Seek time 110 ms.)
- 12x data transfer rates.
- Extended reliability due to brushless disc motor for high speeds.
- Unique low-mass actuator for fast, accurate focusing and radial tracking.
- Integrated diode pre-amplifier for maximum signal-to-noise ratio.

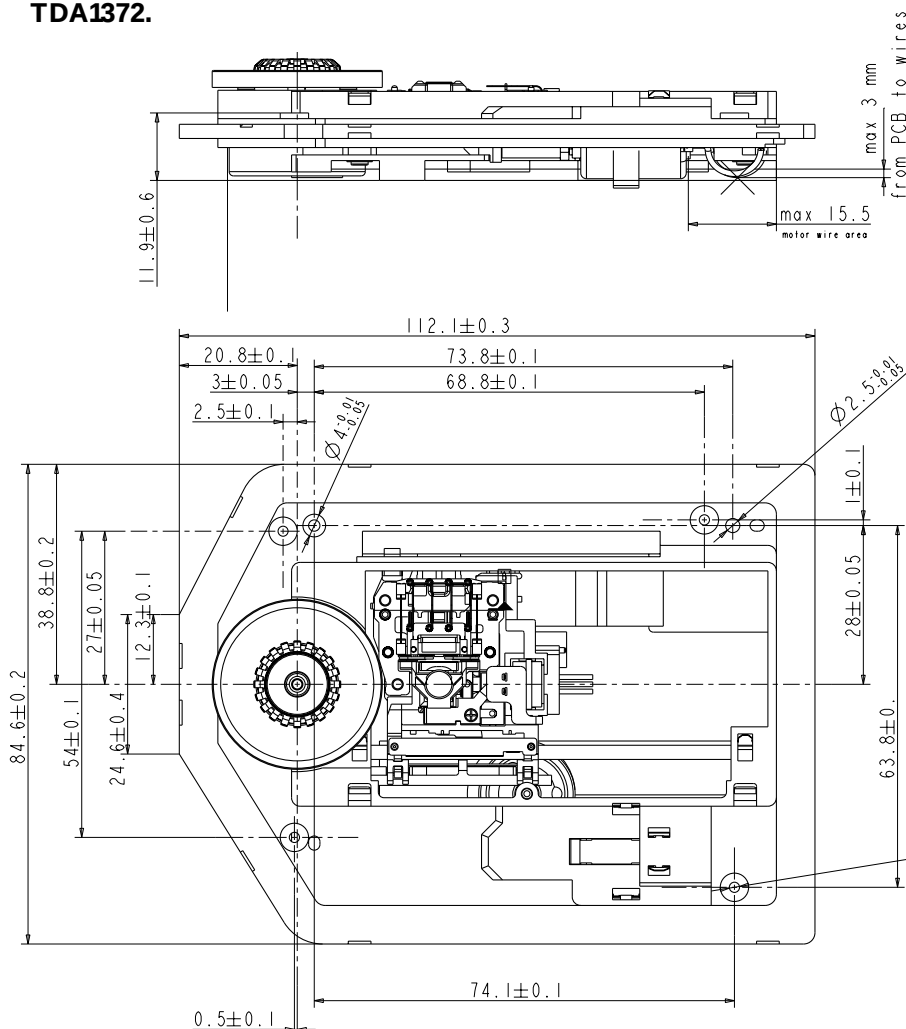
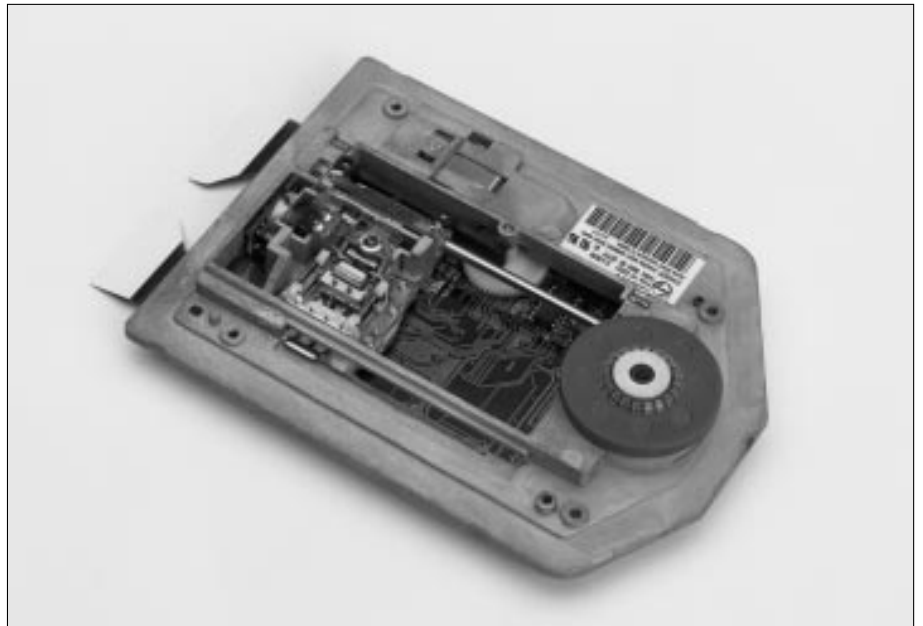


ROM 1312 TECHNICAL DATA
(typ. values)

Disc motor	Brushless
Sledge motor	FF030PK-08250
Mech. sledge speed (6.5V)	t.b.f.
Moving mass actuator	0.56 gr
Focus error detection	Single Foucault
Focus resonance freq.	30 Hz
Focus AC-sensitivity	0.25 N/A
Focus DC-sensitivity	0.65 mm/V
Focus resistance	18 Ω
Radial error detection	3-beam
Tracking resonance freq.	49 Hz
Tracking AC-sensitivity	0.25 N/A
Tracking DC-sensitivity	0.24 mm/V
Tracking resistance	18 Ω
Wavelength	780 nm
Power intensity (obj. lens)	max. 0.68 mW
Numerical aperture	0.45
Lifetime	5000 Hr (B10)
MTBF (100%)	30000 Hr
Operational temp. range	5 to 55 °C
Storage temperature	-25 to 55 °C
Storage exposure	70 °C (48Hr)
Allowed impact	max. 100 g (6 ms.)

2x recording, 4x playback for recording applications

- Small size for caddy-based half-height mounting in CD-R applications.
- Fast radial access due to high-speed sledge motor and higher gear ratios.
- 4x standard data transfer rate (playback) and extended reliability due to brushless disc motor.
- Unique low-mass actuator for fast, accurate focusing and radial tracking.
- Integrated signal processor TDA1372.



CDM 24C TECHNICAL DATA (typ. values)

Disc motor	Brushless
Sledge motor	FF030PK
Moving mass actuator	0.6 gr
Focus error detection	astigmatic
Focus resonance freq.	50 Hz
Focus AC-sensitivity	0.28 N/A
Focus DC-sensitivity	0.33 mm/V
Focus resistance	18 Ω
Radial error detection	diff. push-pull
Tracking resonance freq.	68 Hz
Tracking AC-sensitivity	0.27 N/A
Tracking DC-sensitivity	0.1 mm/V
Tracking resistance	18 Ω
Wavelength	780 nm
Numerical aperture	0.5
Lifetime	5000 Hr (B10)
MTBF (50%)	60000 Hr
Operational temp. range	5 to 55 $^{\circ}\text{C}$
Storage temperature	-25 to 55 $^{\circ}\text{C}$
Storage exposure	70 $^{\circ}\text{C}$ (48Hr)
Allowed impact	t.b.f.

ACCESSORIES

For easy, fast and reliable design-in



ACCESSORIES CD-Mechanisms									
			CDM 121(T)	CDM 12.3 BLC	CDM 12 industrial	CDM 12.6	CDM 12.9	CDM 12.10	CDM 24C
ITEM	q't/ CDM	DESCRIPTION	page 4.2	page 4.3	page 4.5	page 4.6	page 4.7	page 4.8	page 4.9
SUS121N1	4	Suspension grommet for single speed	●						
CL121	1	Clamping device	●						
SPR123	6	Suspension spring for single and double speed		●					
DAM123	3	Suspension damper for single and double speed		●					
CL12IND	1	Clamping device			●				
3ORNPLATE	1	Ornamental plate	●	●	●	●	●	●	●
3ADHSTRIP	1	Adhesive strip (to be used for fixation of ornamental strip)	●	●	●	●	●	●	●
EP12IND	1	Extension plate			●				
3CF12IND	1	Cover frame			●				
DAM12IND	4	Suspension damper			●				
KT12INDJB	1,4,4	Jukebox KIT including: clamping device, suspension springs & grommet			●				
SUS126	4	Suspension grommet				●	●	●	

***LOADER ASSEMBLIES
AND DISC CHANGERS***

OVERVIEW OF CD-LOADERS

For audio, video and games applications

L1210/11

Low-height tray-loader complete with CDM 12.1 for general audio, video and games applications.

L1210/13

Standard-height tray-loader complete with CDM 12.1 for general audio, video and games applications.

VAL 1255

5¹/₄", half-height tray-loader assembly complete with VAM 1205. A loader with damping, suspension and clamping suitable for high-performance audio and video applications.

C1203

Three-disc changer complete with CDM 12.1.

For CD-ROM applications

L1266/01 and L1266/02

5¹/₄", half-height tray-loader, complete with CDM 12.6. An economy loader with damping, suspension and clamping for 8x operation.
Tray colour: /01 computer white/02 charcoal.

L1269/01 and L1269/02

5¹/₄", half-height tray-loader, complete with CDM 12.9. An economy loader with damping, suspension and clamping for 8x operation.
Tray colour: /01 computer white/02 charcoal.

L1270/01 and L1270/02

5¹/₄", half-height tray-loader, complete with CDM 12.10. A low-power loader with damping, suspension and clamping designed for high-speed operation (at least 8x) and fast access (115 ms seek).
Tray colour: /01 computer white/02 charcoal.

ROL1312/1 and ROL1312/2

5¹/₄", half-height tray-loader, complete with ROM1312. A low-power loader with damping, suspension and clamping designed for high-speed operation (at least 12x) and fast access (110 ms seek).
Tray colour: /01 computer white/02 charcoal.

For CD-Recordable applications

L2465/01 and L2465/02

5¹/₄", half-height tray-loader assembly complete with CDM 24. Includes damping, suspension and clamping, optimized for operation at 4x standard speed.
Tray colour: /01 computer white/02 charcoal.

CDL 2600/01, CDL 2600/03 and CDL 2600/02

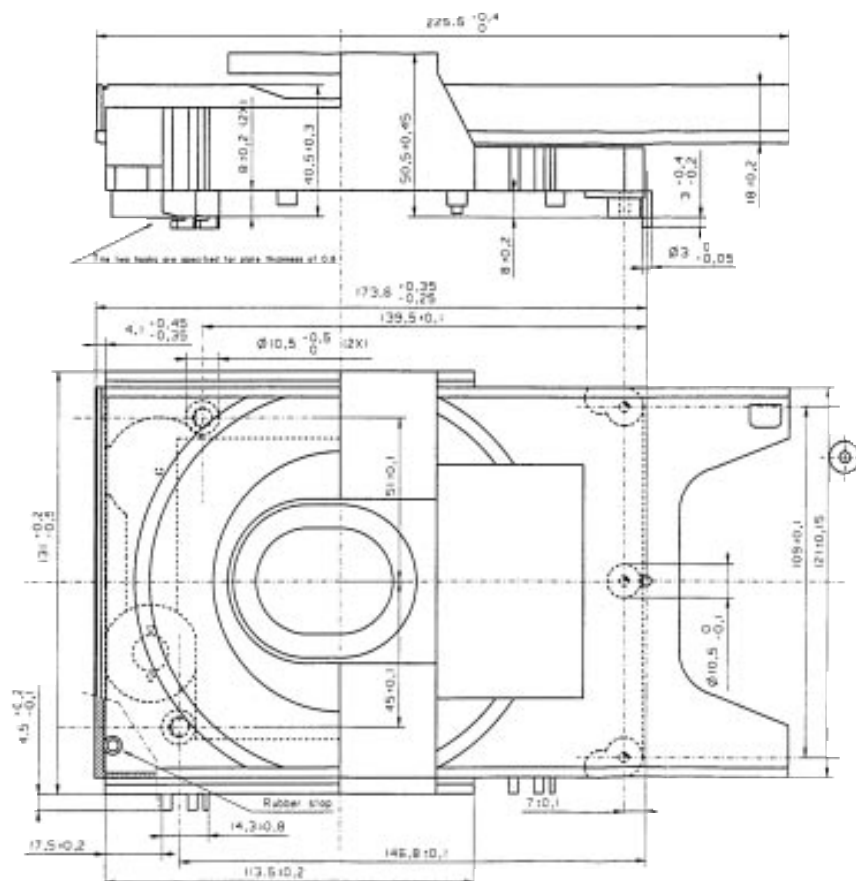
5¹/₄", half-height tray-loader assembly complete with mechanism. Includes damping, suspension and clamping, optimized for operation at 6x standard speed.
Tray colour: /01 computer white/03 computer white with barcode reader/02 charcoal.

Note: Stated speeds are only indications set by the application not by the mechanism.

All mechanisms can operate at speeds higher than those stated.

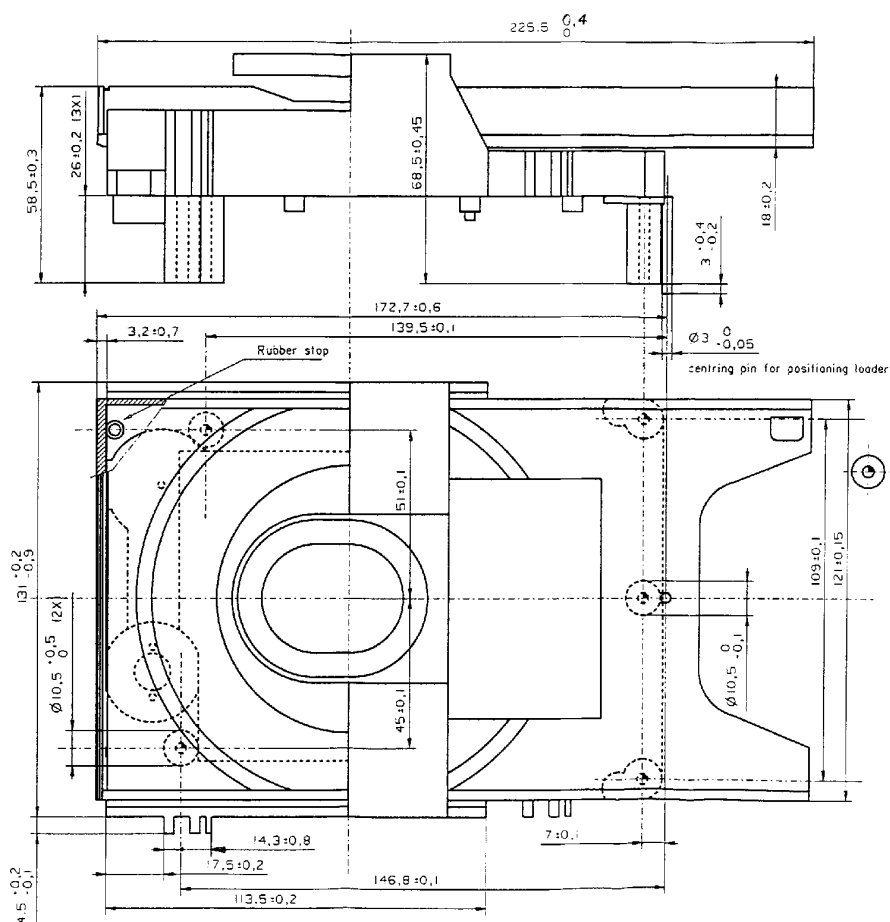
Low-height tray loader assembly incorporating CDM 121

- Designed for general audio and video applications.
- Meets UL-flammability and safety standards.
- Includes suspension, damping and clamping parts.
- Fully wired, with simple interface.



TECHNICAL DATA (typ. values)	
Tray motor	RF310TA-11400
Load time (3.5 V)	1.7 s
Eject time (3.5V)	1.7 s
Push tray stroke	3.5 mm
Push tray force	max. 5 N
Max. current switch	1 A
Max. voltage switch	15 V
Lifetime (no. of cycles)	20000
Operational temp. range	5 to 55 °C
Storage temp. range	-25 to 55 °C
Storage exposure	70 °C (48 Hr)
Allowed impact	max. 60 g (6 ms.)
Working position	horizontal
Loading noise	max. 73 dBA

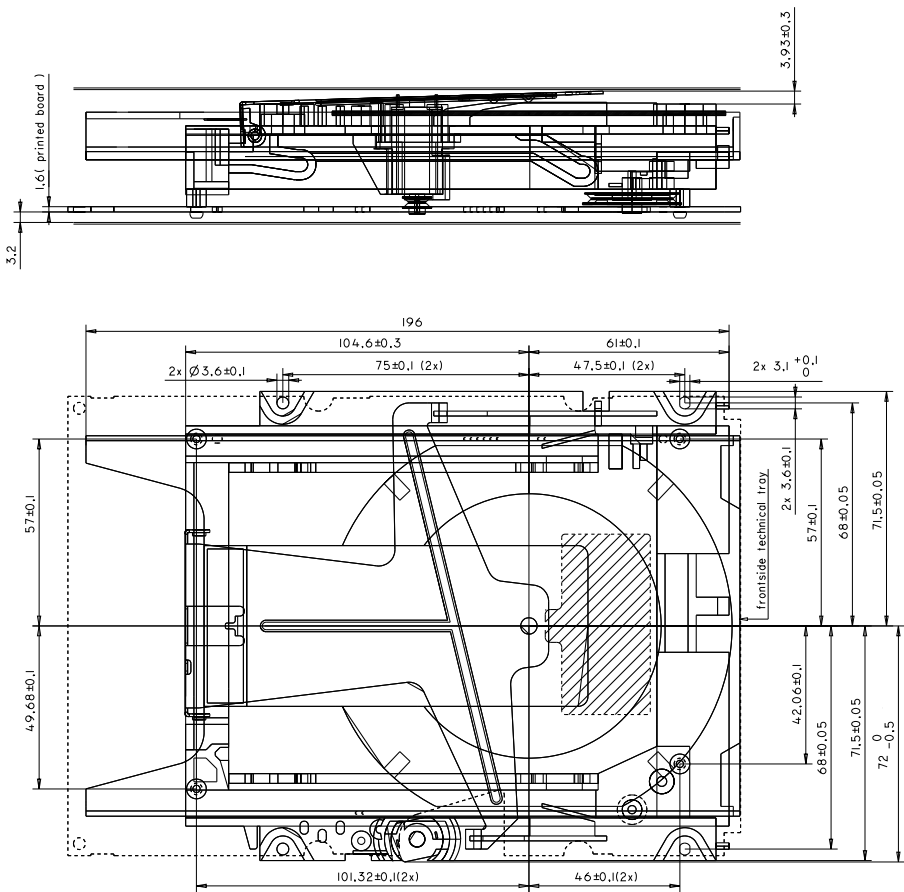
- **Designed for general audio and video applications.**
- **Meets UL-flammability and safety standards.**
- **Includes suspension, damping and clamping parts.**
- **Fully wired, with simple interface.**



TECHNICAL DATA (typ. values)	
Tray motor	RF310TA-11400
Load time (3.5 V)	1.7 s
Eject time (3.5V)	1.7 s
Push tray stroke	3.5 mm
Push tray force	max. 5 N
Max. current switch	1 A
Max. voltage switch	15 V
Lifetime (no. of cycles)	20000
Operational temp. range	5 to 55 °C
Storage temp. range	-25 to 55 °C
Storage exposure	70 °C (48 Hr)
Allowed impact	max. 60 g (6 ms.)
Working position	horizontal
Loading noise	max. 73 dBA

Slimline tray-loader assembly incorporating VAM 1205

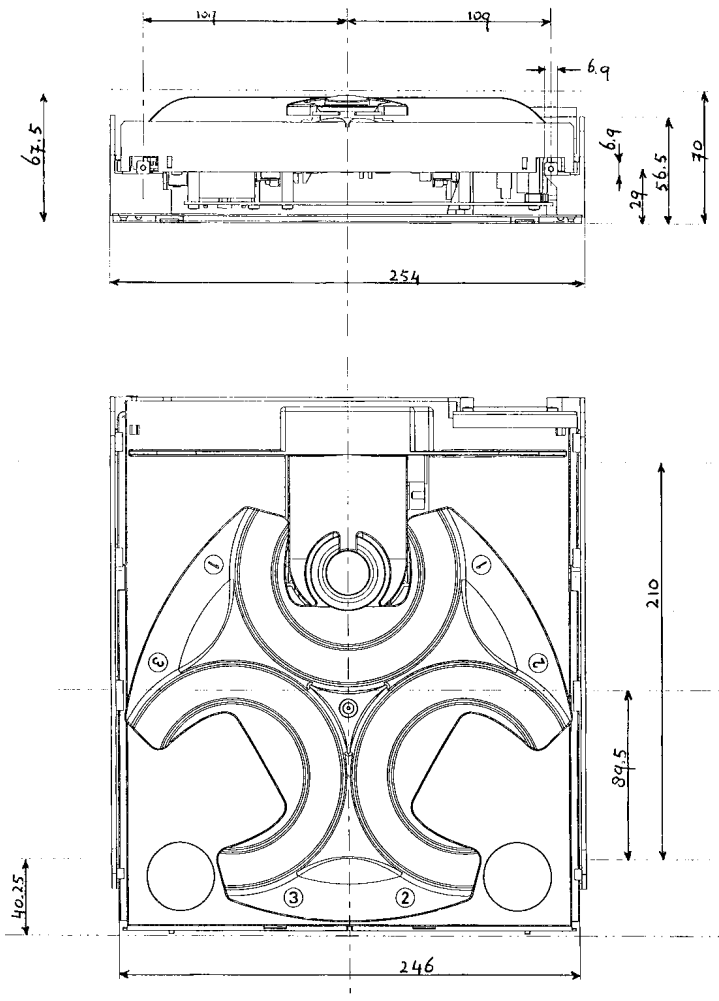
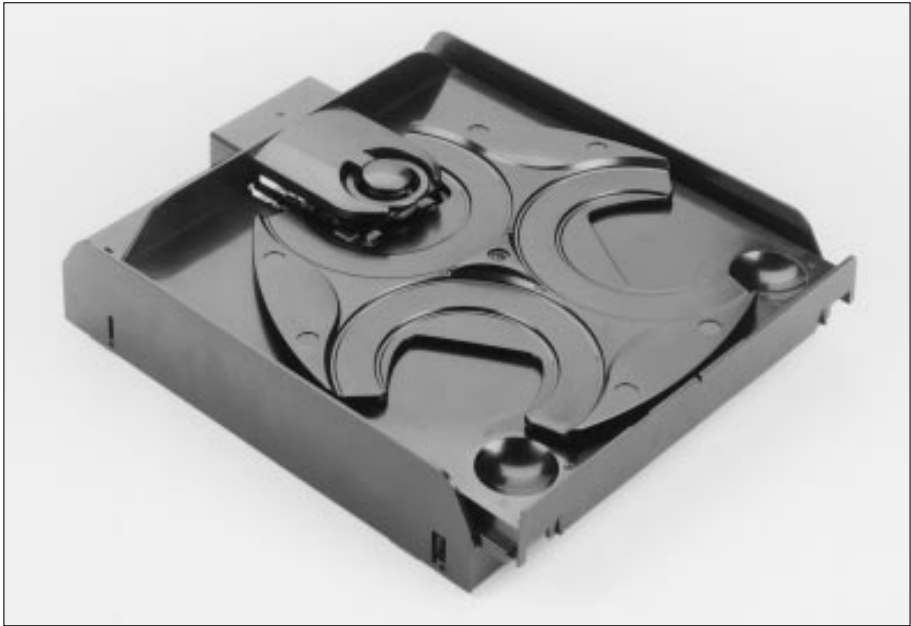
- Designed for high-performance audio and video applications.
- Meets UL-flammability and safety standards.
- Fully wired, with simple interface.
- Suitable for slimline designs.
- Special suspension, damping and clamping parts for high-performance applications.



TECHNICAL DATA (typ. values)	
Tray motor	PPN13
Load time (4.3V)	1.3 s
Eject time (4.3V)	1.3 s
Push tray stroke	3.5 mm
Push tray force	max. 5N
Max. current switch	1 A
Max. voltage switch	15 V
Lifetime (no. of cycles)	20,000
Operational temp. range	5 to 55 °C
Storage temp. range	-25 to 55 °C
Storage exposure	70 °C (48 Hr)
Allowed impact	max. 50 g. (6ms.)
Working position	horizontal
Loading noise	max. 73 dBA

Three-disc changer incorporating CDM 12.1

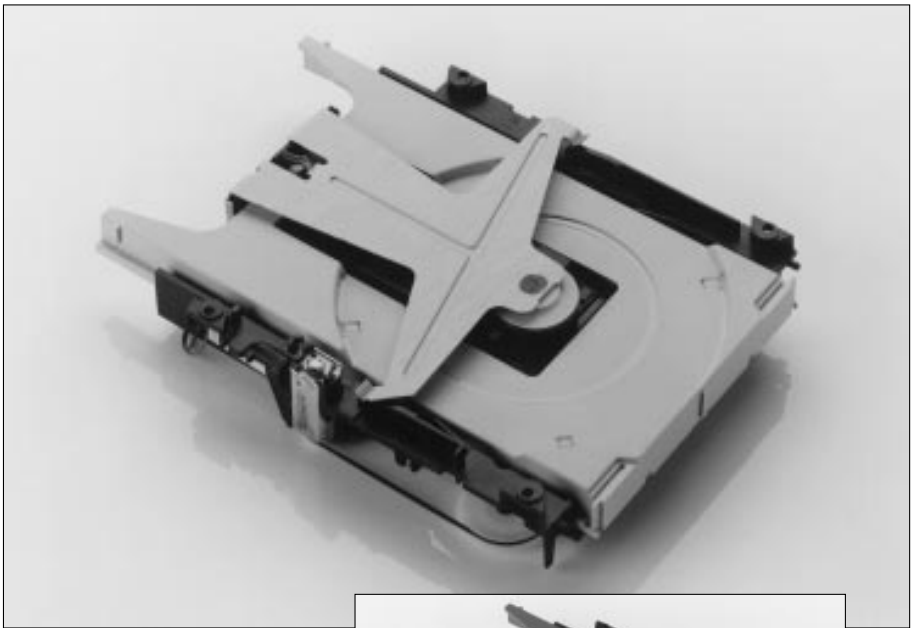
- Carousel can change discs in two directions.
- Two discs in the carousel can be changed while playing a third disc.
- Dimensions: 252 x 70 x 284 mm (w x h x d).



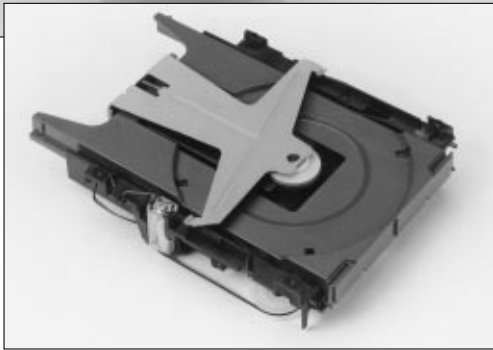
TECHNICAL DATA (typ. values)	
Tray motor	RF500TB-12560
Carrousel motor	mabuchi
Load/eject time	ca. 1.5 s
Disc change time	ca. 2.5 s
Dimensions: width height depth	252 mm 70 mm 284 mm
Lifetime (no. of cycles) disc changes	60000
Operational temp. range	5 to 55 °C
Storage temp. range	-25 to 55 °C
Working position	horizontal

Half-height tray-loader assembly incorporating CDM 12.6

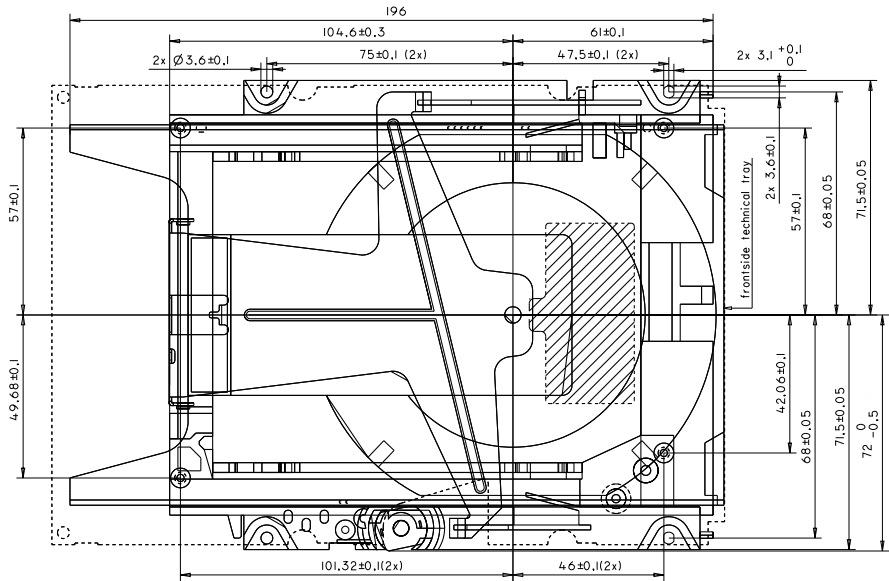
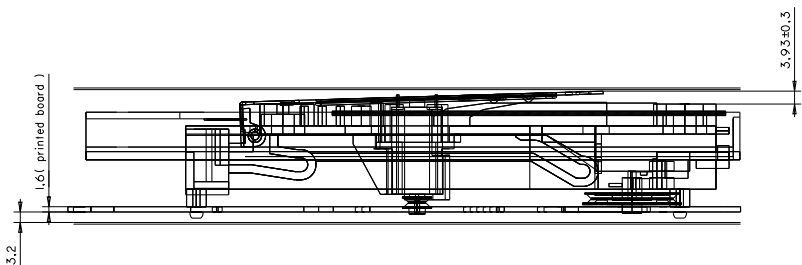
- Economy loader for CD-ROM applications.
- Suitable for 5¼", half-height mounting in computers.
- Special suspension and clamping for 6x operation.
- UL prepared.



L1266/01: computer white



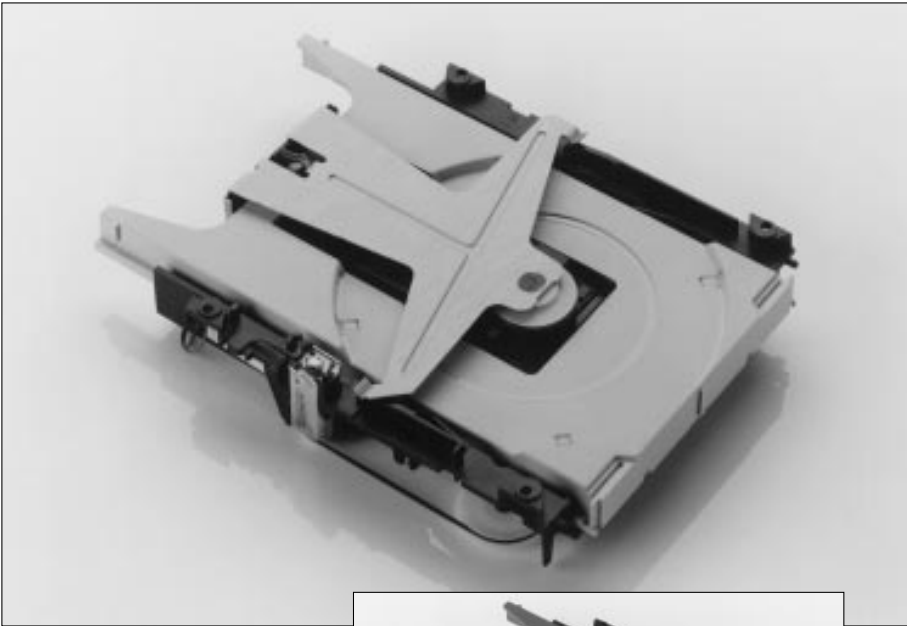
L1266/02: charcoal



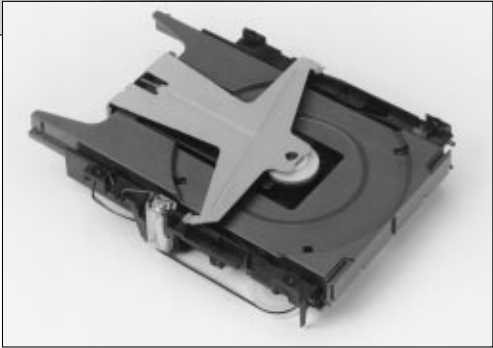
TECHNICAL DATA (typ. values)	
Tray motor	PPN13
Load time (3.5V)	1.7 s
Eject time (3.5V)	1.7 s
Push tray stroke	3.5 mm
Push tray force	max. 5 N
Max. current switch	1 A
Max. voltage switch	15 V
Lifetime (no. of cycles)	20000
Operational temp. range	5 to 55 °C
Storage temp. range	-25 to 55 °C
Storage exposure	70 °C (48 Hr)
Allowed impact	max. 50 g (6 ms.)
Working position	horizontal
Loading noise	max. 73 dBA

Half-height tray-loader assembly incorporating CDM 12.9

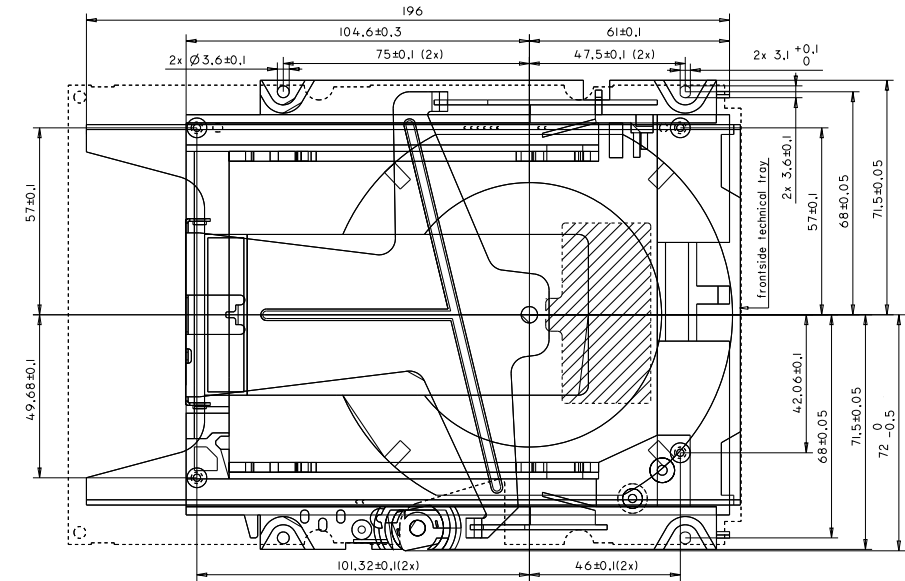
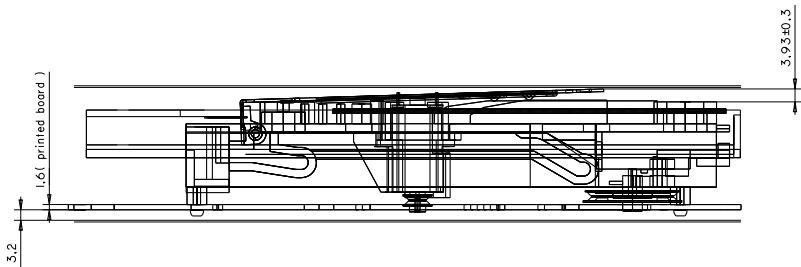
- Economy loader for CD-ROM applications.
- Suitable for 5¼", half-height mounting in computers.
- Special suspension and clamping for 8x operation.



L1269/01: computer white



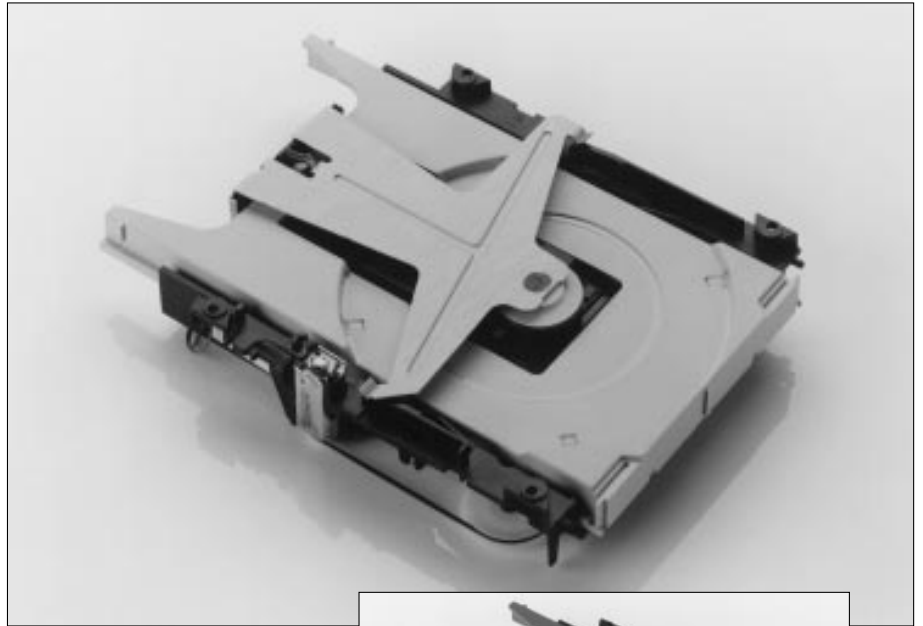
L1269/02: charcoal



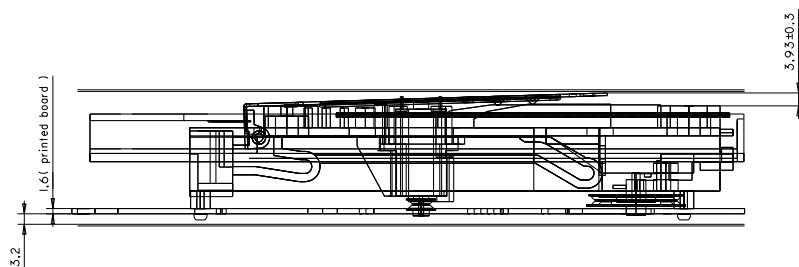
TECHNICAL DATA (typ. values)	
Tray motor	PPN13
Load time (3.5 V)	1.7 s
Eject time (3.5V)	1.7 s
Push tray stroke	3.5 mm
Push tray force	max. 5 N
Max. current switch	1 A
Max. voltage switch	15 V
Lifetime (no. of cycles)	20000
Operational temp. range	5 to 55 °C
Storage temp. range	-25 to 55 °C
Storage exposure	70 °C (48 Hr)
Allowed impact	max. 50 g (6 ms.)
Working position	horizontal
Loading noise	max. 73 dBA

Half-height tray-loader assembly incorporating CDM 12.10

- Low-power loader for high-end CD-ROM applications.
- Suitable for 5¼", half-height mounting in computers.
- Special suspension and clamping for operation at 8x and higher.
- Fast access (115 ms seek).

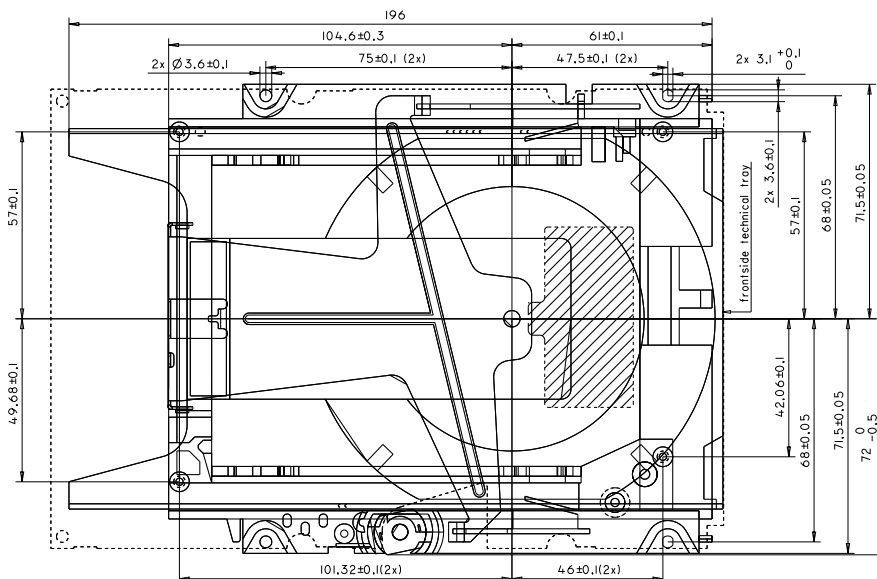


L1270/01: computer white



L1270/02: charcoal

5



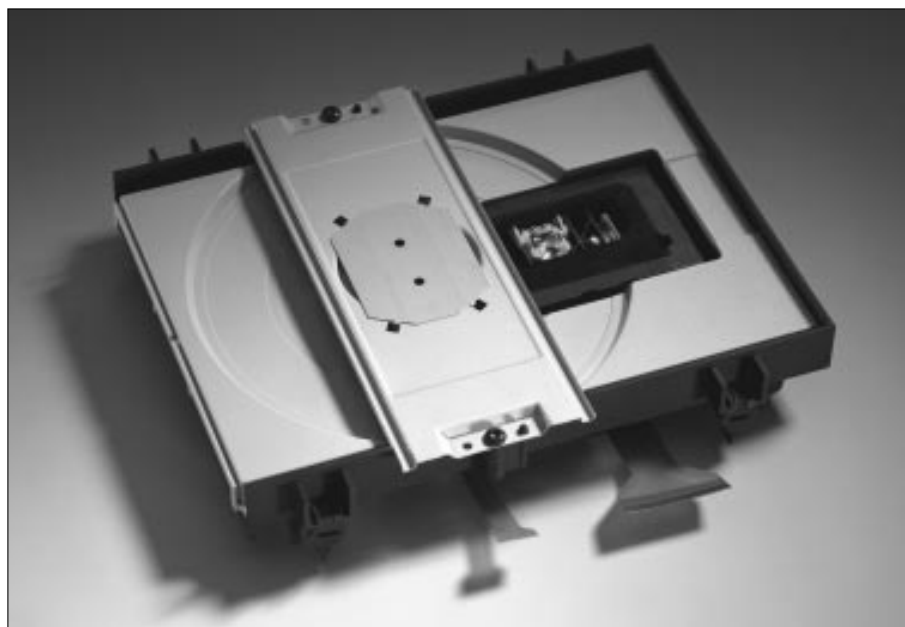
TECHNICAL DATA (typ. values)

Tray motor	PPN13
Load time (3.5V)	1.7 s
Eject time (3.5V)	1.7 s
Push tray stroke	3.5 mm
Push tray force	max. 5 N
Max. current switch	1 A
Max. voltage switch	15 V
Lifetime (no. of cycles)	20000
Operational temp. range	5 to 55 °C
Storage temp. range	-25 to 55 °C
Storage exposure	70 °C (48 Hr)
Allowed impact	max. 50 g (6 ms.)
Working position	horizontal
Loading noise	max. 73 dBA



Half-height tray-loader assembly incorporating ROM 1312

- Low-power loader for high-performance CD-ROM applications (12x and higher).
- Fast access (110 ms seek).
- Suitable for 5¼", half-height mounting in computers.
- Compact size.
- Dust-tight.
- Can be used upright (with 12 cm discs only).
- Suspension between loader chassis and housing for a virtually vibration-free environment.
- Locked tray with emergency eject.
- Pre-set mounting positions up to $\pm 15^\circ$.

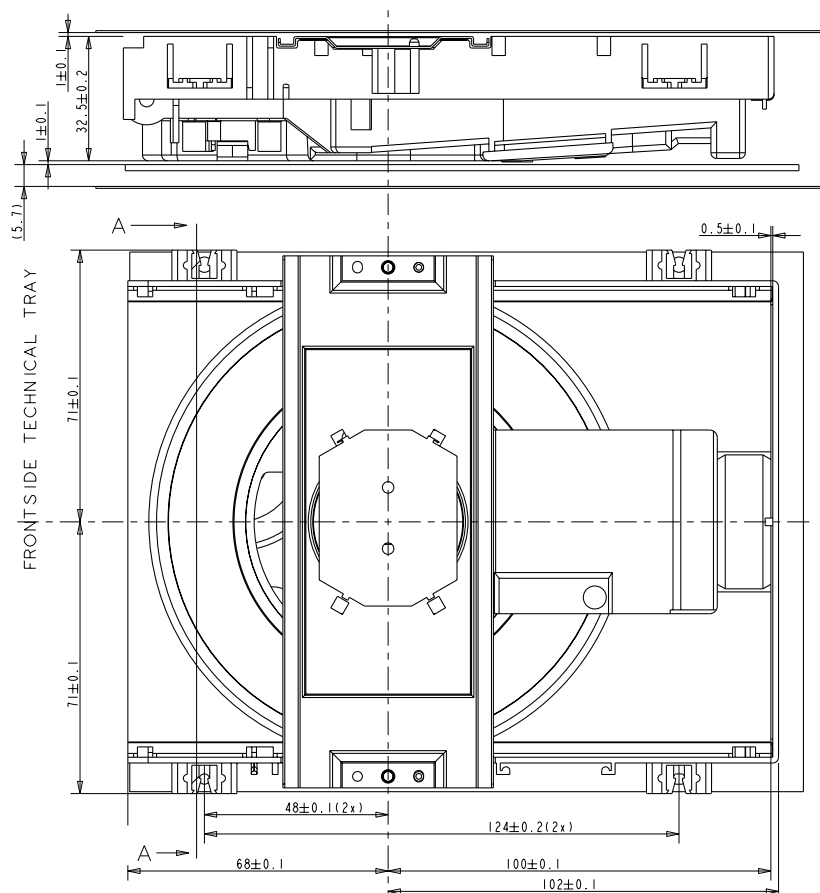


ROL1312/1: computer white

ROL1312/2: charcoal

Accessories:

- 4 suspension grommets.
- Spring for vertical mounting.



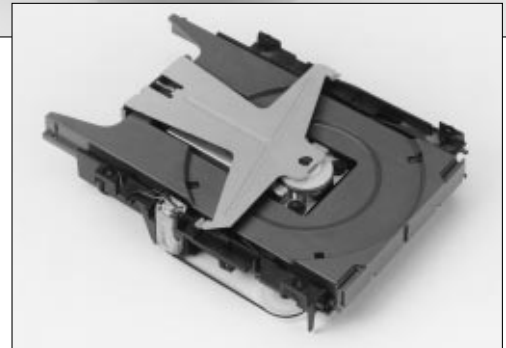
TECHNICAL DATA (typ. values)	
Tray motor	PPN13
Load time (3.5 V)	1.7 s
Eject time (3.5V)	1.7 s
Push tray stroke	3.5 mm
Push tray force	max. 5 N
Max. current switch	1 A
Max. voltage switch	15 V
Lifetime (no. of cycles)	20000
Operational temp. range	5 to 55 °C
Storage temp. range	-25 to 55 °C
Storage exposure	70 °C (48 Hr)
Allowed impact	max. 50 g (6 ms.)
Working position	horizontal
Loading noise	max. 73 dBA

Half-height tray-loader assembly incorporating CDM 24

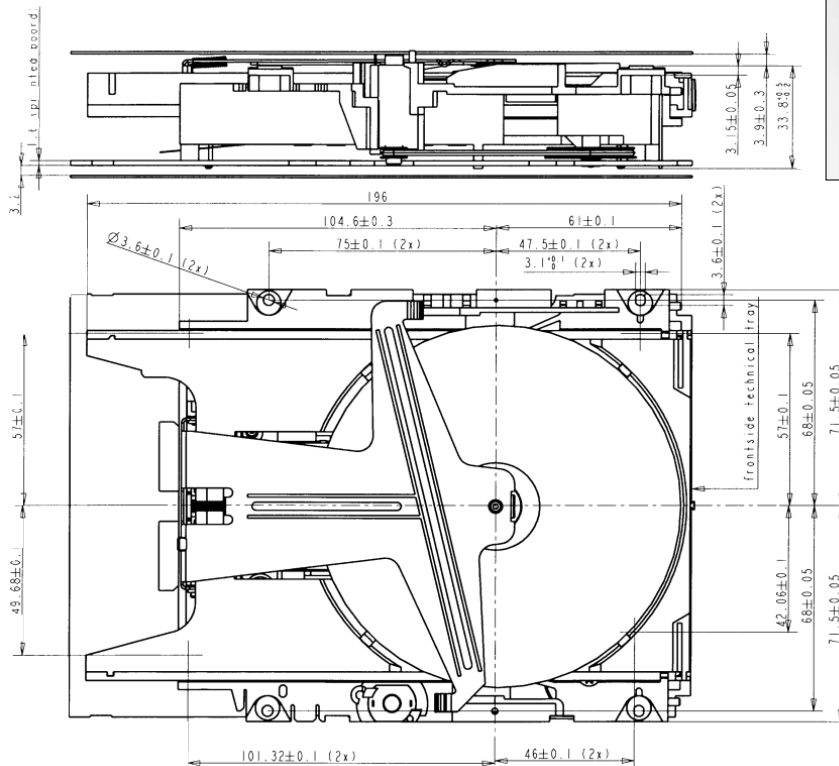
- Suitable for 5¼", half-height mounting in CD-Recordable computer applications.
- Fully wired, with simple interface.
- Special suspension and clamping for quad-speed CDM 24.
- Meets UL-flammability and safety standards.



L2465/01: computer white



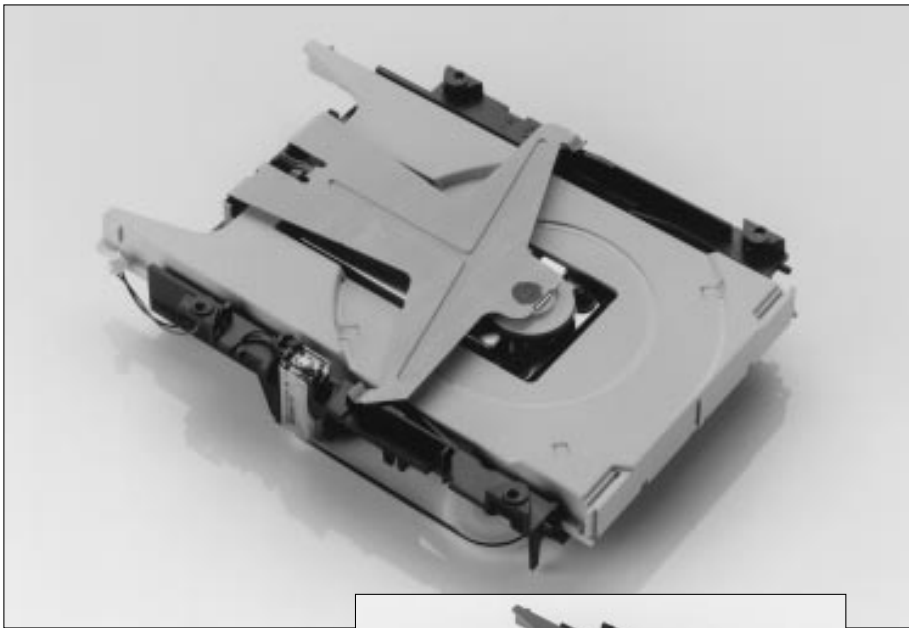
L2465/02: charcoal



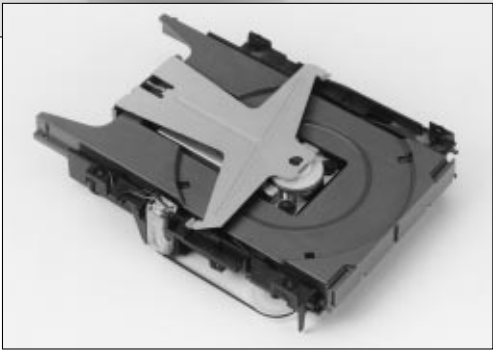
TECHNICAL DATA (typ. values)	
Tray motor	PPN13
Load time (3.5 V)	1.7 s
Eject time (3.5 V)	1.7 s
Push tray stroke	3.5 mm
Push tray force	max. 5 N
Max. current switch	1 A
Max. voltage switch	15 V
Lifetime (no. of cycles)	20000
Operational temp. range	5 to 55 °C
Storage temp. range	-25 to 55 °C
Storage exposure	70 °C (48 Hr)
Allowed impact	max. 50 g (6 ms.)
Working position	horizontal
Loading noise	max. 73 dBA

Half-height tray-loader assembly with 6x mechanism

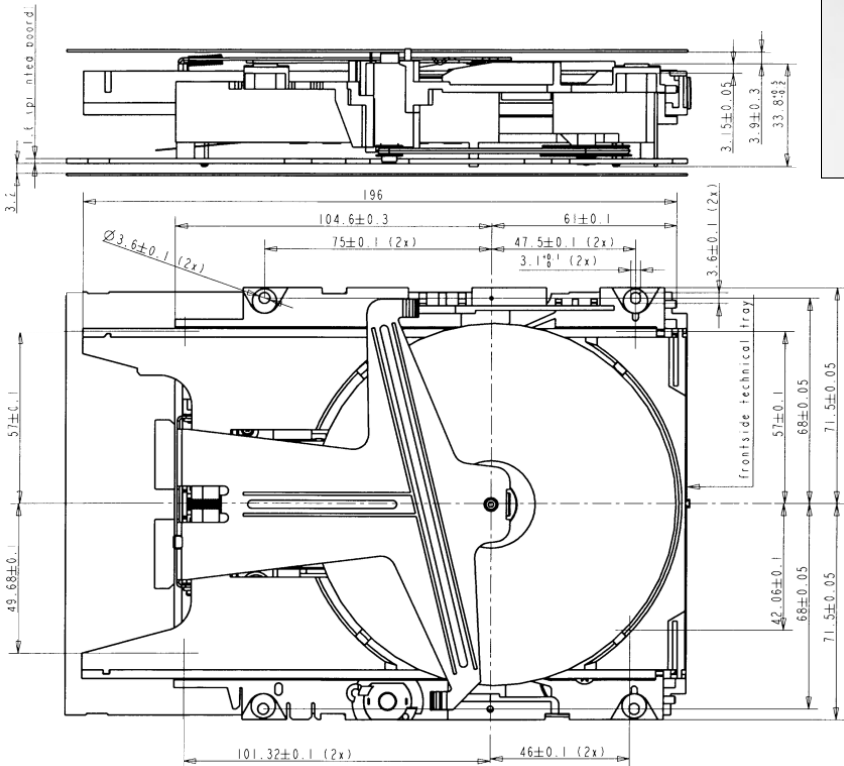
- Suitable for 5¼", half-height mounting in CD-Recordable computer applications.
- Fully wired, with simple interface.
- Special suspension and clamping for 6x operation.
- Meets UL-flammability and safety standards.
- CDL 2600/03 includes barcode reader.



CDL 2600/01: computer white



CDL 2600/02: charcoal



TECHNICAL DATA (typ. values)	
Tray motor	PPN13
Load time (3.5 V)	1.7 s
Eject time (3.5 V)	1.7 s
Push tray stroke	3.5 mm
Push tray force	max. 5 N
Max. current switch	1 A
Max. voltage switch	15 V
Lifetime (no. of cycles)	20000
Operational temp. range	5 to 55 °C
Storage temp. range	-25 to 55 °C
Storage exposure	70 °C (48 Hr)
Allowed impact	max. 50 g (6 ms.)
Working position	horizontal
Loading noise	max. 73 dBA

***MODULES
AND DRIVES***

OVERVIEW OF CD MODULES AND DRIVES

MOD JUKEBOX

Complete, assembled plug-and-play unit, based on the PREMIUM 6000 system. The standard application for jukeboxes.

MOD PRO-AUDIO

Complete, assembled plug-and-play unit, based on the PREMIUM 6000 system, for top-performance audio applications.

CDD2000

Complete 5¹/₄" half-height RC-Recordable drive. 4x standard reading speed, 2x standard writing speed. Internal drive with SCSI-2 interface.

CDD2600

Complete 5¹/₄" half-height RC-Recordable drive. 6.5x standard reading speed, 2x standard writing speed. Internal drive with SCSI-2 interface.

Fully assembled functional unit incorporating CDM 12 INDUSTRIAL



- Complete PREMIUM 6000 system on a print-board, assembled with the CDM 12 INDUSTRIAL.
- With extension plate and print-board.
- Special, heavy-duty suspension.
- UL prepared.
- Designed for jukebox applications.

MOD JUKEBOX TECHNICAL DATA (typ. values)	
ACCESSORIES	MOD JUKEBOX
Extension plate	Yes
Turntable cap	Yes
Cover frame	Yes
Ornamental plate	Yes
Suspension	Yes

The solution for professional audio applications



- Complete PREMIUM 6000 system on a print-board, assembled with the CDM 12 INDUSTRIAL.
- With ornamental plate.
- Specially developed for top performance and professional audio applications.
- UL prepared.

MOD PRO AUDIO TECHNICAL DATA (typ. values)	
ACCESSORIES	MOD PRO-AUDIO
Extension plate	No
Turntable cap	Yes
Cover frame	Yes
Ornamental plate	Yes
Suspension	No

**CD-Recordable drive:
4x read, 2x write**



- Records CD-ROM (XA) CD-Bridge Multi-Session CD-i and CD-Audio discs.
- Conforms to Write-Once CD format (Orange Book, part II).
- Supports Track-At-Once, Disc-At-Once and Incremental Packet Writing modes.
- Double-speed recording and up to quad-speed reading.
- Motorized tray loading for easy operation.
- SCSI-2 interface.
- Leading-edge optical technology for data security and integrity.
- Industry-standard 5¼" profile for building into PCs and workstations.
- Incremental Packet Writing acc. Orange Book for data archiving applications.

CDD2000 TECHNICAL DATA (typ. values)	
CD-formats supported	CD-DA, CD-ROM (XA), CD-Bridge, Multi-session, CD-i, Video-CD
Write methods	Track at once, Incremental packet writing, multi-session
Capacity: mode 1 (63min media) mode 2 (63 min. media) mode 2 (74 min. media)	550 Mb 630 Mb 740 Mb
Average access time	max access time 390 ms. 750 ms.
Interface	SCSI II
Transfer rate: mode 2 (quad speed) mode 2 (double speed) mode 2 (single speed)	705.6 kb/s 352.6 kb/s 176.4 kb/s
Dimensions (HxWxD)	41.4x146x106 mm
Data buffer	1 Mb
Disc loading	tray

CD-Recordable drive: 6.5x read, 2x write



- **NEW:** up to 6.5x standard reading speed.
- **NEW:** improved SCSI performance.
- **NEW:** Also WIN95 and WIN NT Plug and Play CD-ROM compatible
- Records CD-ROM (XA) CD-Bridge Multi-Session CD-i and CD-Audio discs.
- Conforms to Write-Once CD format (Orange Book, part II).
- Supports Track-At-Once, Disc-At-Once and Incremental Packet Writing modes.
- Double-speed recording and up to 6.5x speed reading.
- Motorized tray loading for easy operation.
- SCSI-2 interface.
- Leading-edge optical technology for data security and integrity.
- Industry-standard 5¼" profile for building into PCs and workstations.
- Incremental Packet Writing acc. Orange Book for data archiving applications.
- FIRST 2 x 6 (write x read) recorder in the industry
- Operates under all major operating systems
- Fast SCSI data transfer rate and fast access time
- Disc-at-Once and Incremental Packet Writing conforming to the Orange Book for data archiving applications
- Fourth generation with high integration levels providing highest quality and reliability standards

CDD2600 TECHNICAL DATA (typ. values)

Performance	
CD-formats supported	CD-DA, CD-ROM (XA), CD-Bridge Multi-Session, CD-I, Video-CD, CD-UDF
Write methods	Track-at-Once, Disc-at-Once, Incremental Packet Writing, Multi-Session
Capacity:	
mode 1 (63 min. media)	550 Mbytes
mode 2 (63 min. media)	630 Mbytes
mode 2 (74 min. media)	740 Mbytes
Average access time (1)	290 msec
Max. access time (1)	550 msec
Transfer rate:	
mode 2 (zoned 6 speed)	1146 kB/sec (read-only, outer diameter)
mode 2 (double speed)	352.6 kB/sec (reading or writing)
mode 2 (single speed)	176.4 kB/sec (reading or writing)
Interface	SCSI-II
Form factor	5.25" half-height built-in2
Data integrity from drive	10-16
Data buffer (internal cache)	1 MB
Disc loading	Tray (motorized)
MTBF	120.000 hours (duty 20%)
Dimensions:	
height	41.5 mm
width	146 mm
depth	206 mm
Environmental:	
Operating temperature	+5 to 40 Co
Non operating temperature	-25 to +55 Co
Certification	FCC compliance: Class B UL, cUL, CEBC, CE certification

(1) After spin up, excluding latency and overhead at six speed reading
(2) The CDD2600 is also available as an external drive

***SUPPORT
TOOLS***

Available for development and testing purposes...

To facilitate the development and production of players using Philips' mechanisms and CD systems, various tools are necessary. Often, these are not available 'off-the-shelf' but have to be developed specially. At Philips, we make these tools available to customers on request for their own engineering purposes. Available are pre-programmed microcontrollers with test loops for various applications, boards to measure signals from CD mechanisms, and a measuring circuit for digital servo loops, to name but a few.

Player development and training tools are available from Philips Semiconductors and are described later in this section. Test discs, see below, are available from Philips Laser Optics. The Video-CD test discs fully comply with the standards specified in the White and Red books, and form an essential tool in development and in production for testing players intended to play Video-CDs. All the Video-CD test discs include a fully functional CD-i application program, FMV sequences, and normal and high-resolution PAL and NTSC stills.

SBC442



BURN-IN TEST DISC

- Used for burn-in tests, maintenance and repair.
- Total playing time: 65' 00".
- Contents: Continuous 1 kHz reference tone.

SBC429



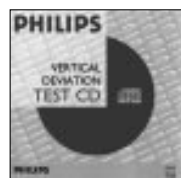
AUDIO SIGNALS DISC 1

- This disc contains audio signals useful in measuring the performance of a player. The quality is of the highest standard; all signals have been computer-generated, computer-assembled and digitally recorded according to the IEC908 Compact Disc Digital Audio System.
- Contains 99 tracks. Full information is supplied with the disc.
- Caution, before starting the disc: a number of audio signals have been recorded at maximum level (0 dB).



ECCENTRICITY TEST DISC 150µm

- Purpose: checks loading mechanism and radial focusing unit.
- Contents: 24 CD-Audio tracks (identical to SBC444).
- Skew: 0.4°.



VERTICAL DEVIATION TEST DISC 0.4°

- Purpose: checks loading mechanism and radial focusing unit.
- Contents: 24 CD-Audio tracks (identical to SBC444).
- Skew: 0.4°.

SBC444



PLAYABILITY REFERENCE TEST DISC

- Reference test disc for playability measurements.
- Contains 24 tracks standard CD-Audio.
- Pauses are variable down to 0 seconds.
- Track 14 is recorded without pre-emphasis.
- Track 15 is recorded with pre-emphasis.

SBC444A



PLAYABILITY TEST DISC

- Purpose: adjustment/checking. The disc is not within specification concerning local defects. It is not assumed that the player is able to replay each track on the disc.
- Contains 24 tracks standard CD-Audio (identical to SBC444).
- Contains the following defects:
 - Interruption in information layer: 0.4-0.5-0.6-0.7-0.8-0.9-1 mm.
 - Black dot area read-out side: 300-500-600-800 µm.
 - Simulated fingerprint.



PSD TEST DISC

- Tool for testing the PSD (Play Sequence Descriptor) interpreter.
- Exhaustive PSD test cases including: play lists, selection and extended selection lists, end list.
- Video A/V sequences: PAL; still video sequences: PAL & NTSC; audio sequences: MPEG-1 Layer II, bit rate 224 kbits/s.
- INFO.VCD file structure test.
- Error conditions for evaluating error-correcting ability.



A/V TEST DISC

- Development tool for testing MPEG-1 A/V decoders and DAC stages.
- Contains samples of MPEG-1 encoded data including: Video (PAL & NTSC): FMV, normal and high-resolution stills. Audio: MPEG-1 (several modes).
- CDDA directory.
- Response tests, e.g. when switching from PAL to NTSC.



PRODUCTION TEST DISC

- For production line inspection of Video-CD players.
- Contains:
 - Video sequences: PAL and NTSC stills/video acc. to Video-CD 2.0.
 - Audio sequences: CDDA, channel tests, DolbyTM Surround Audio.
- Audio and button functionality, and aspect ratio distortion test.
- Continuous test cycles for reliability checks, accelerated lifetime tests and burn-in cycles.

CD player development/training tools

CD servo software module for CD6 systems

This software module supports customers with a ready-made software interface to a full single-speed CD player using Philips' CD6 decoder SAA7345, 1-chip digital servo processor TDA1301T and three-beam CD player mechanism CDM 12.1. The module is written in the PL/M-51 language for 8051-series microcontrollers (code size less than 2 K). It performs all the communication with the ICs and provides all the low-level servo functions such as turn servos on/off, monitor servo performance and perform jumps. The module provides:

- Radial control
- Focus control
- Spindle motor control
- Access to disc area
- Sledge position control
- Audio control (mute, attenuate etc.)
- Sub-code reading.

Full error recovery is incorporated and service mode functions are included. The module can be used with a wide variety of CD applications requiring only the addition of a user interface.

Requirements for using this software module are:

- A 12 MHz 8051-series microcontroller
- A PL/M-51 compiler for the microcontroller
- Five output lines and one I/O for controlling the CD decoder SAA7345 (CD6) and digital servo processor TDA1301T (DSIC2)
- The main program should have an interrupt routine

which is called at least every 8 ms to decrement the servo timer

- The home switch of the CDM 12.1 CD player mechanism must be read through versatile input pin V2 (pin 4) of the SAA7345 CD decoder (CD6)
- The main loop should be as shown in Fig.1.

The relationship between the CD servo software module and other modules is shown in Fig.2.

Other important features of the servo software module are:

- Easy to use
- Accesses all functions via a few interface routines such as:
 - Init_servos() - initialize SAA7345 decoder (CD6) and TDA1301T servo processor (DSIC2)
 - Servo_start() - start all servos
 - Servo_stop() - stop all servos
 - CD6_read_subcode() - read sub-code from SAA7345 decoder (CD6)
- A servo() routine call in the main program loop performs all the servo functions, monitors the status of the servos and takes corrective action if necessary. All actions are transparent to the main program
- The customer provides the software to to:
 - drive the servo module
 - control the user interfaces (keypad, display, etc.)
 - control player features (PLAY, PAUSE, etc.)
 - process subcode information.

A software module for use with the SAA737x (CD7) decoder is under development.

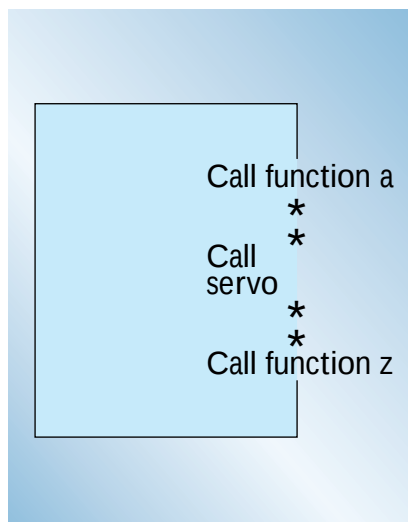


Fig.1 Main loop

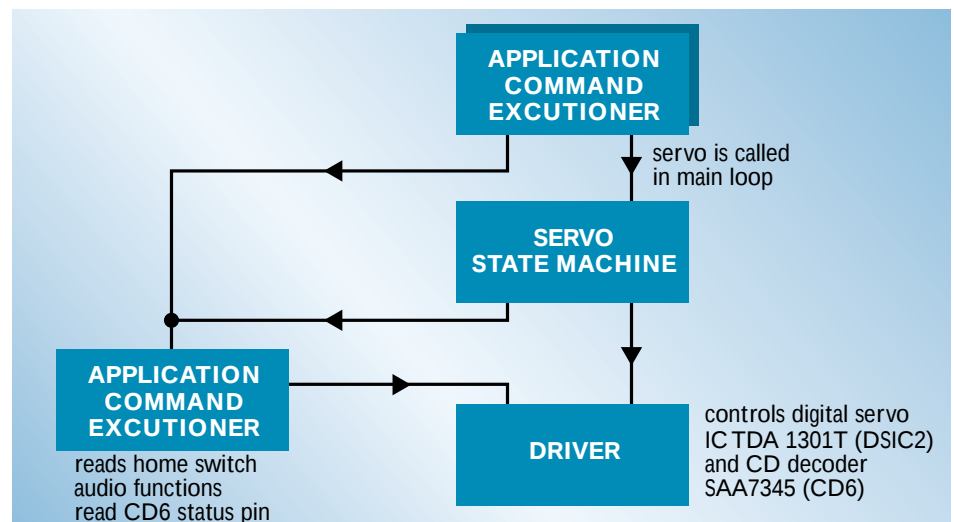


Fig.2 Architecture of the servo software module showing the relationship to other modules

CD player training tool

The CD player training tool shown in Fig.3 is intended for use as a training aid, for system development or for CD mechanism characterization. It is not intended to be an example of CD system robustness. The speed of the software is not a priority, nor does the software incorporate corrective actions.

Important features of the CD player training tool are:

- Operates with an IBM-compatible PC with MS-DOS or a mainframe terminal
- Connection to a PC or mainframe terminal via a Centronics parallel port (printer port)
- Various three-beam CD mechanisms can be connected
- Mechanism-related and storable/retrievable data files provide mechanism-independence.

The main advantages of using this tool are:

- Requires no system development prior to study
- Allows immediate start of study/evaluation/development activities
- All parameters are easy to access
- Has a direct relationship with CD Application Notes
- Enhances language independence
- The software can be used to control a CD player application which uses at least a 1-chip digital servo processor TDA1301T (DSIC2) and a CD decoder SAA7345 (CD6).

The system consists of a complete three-beam CD player (less microcontroller and power supply), a Centronics parallel interface, and a CD player software package on a floppy diskette. It allows an IBM-compatible PC with an MS-DOS operating system and a mouse to exercise the basic CD microcontroller functions and a number of special evaluation functions.

The hardware of the training tool consists of:

- A mechanism PCB for connection to a Philips CDM 12 or CDM 12.1 mechanism or a Sanyo DV90V1 or Sony KSM210 (two types) mechanism via a flexible connector. The PCB contains two TDA7073 dual BTL servo power drivers and a TDA1302T photodiode amplifier and laser supply IC.
- A decoder PCB with an SAA7345 CD decoder (CD6), a TDA1301T 1-chip digital servo processor (DSIC2), a TDA1545AT continuous calibration stereo DAC, and a TDA1308 stereo audio amplifier for driving an audio amplifier or headphone. There is also an AES/EBU signal output and facilities for connecting an external DAC, a Centronics interface and a power supply
- Centronics parallel interface for connecting between the decoder PCB and a computer.

The training tool software allows the CD player hardware to be controlled at three levels:

- A HIGH level as a complete CD player with basic functions
- A MEDIUM servo system oriented level which is very useful for activities such as characterizing a CD mechanism
- A LOW level extended programmable parameter level which allows the individual parameters of programmable ICs to be changed.

Other important features of the training tool software are:

- Easy mouse manipulation
- Pull-down menus
- Pop-up windows that can be opened, shifted, tiled and closed
- Multiple windows on the screen at the same time give a complete overview
- On-screen messages
- Program maintains internal IC settings
- One-to-one relationship between the software and the various device specifications and Application Notes.

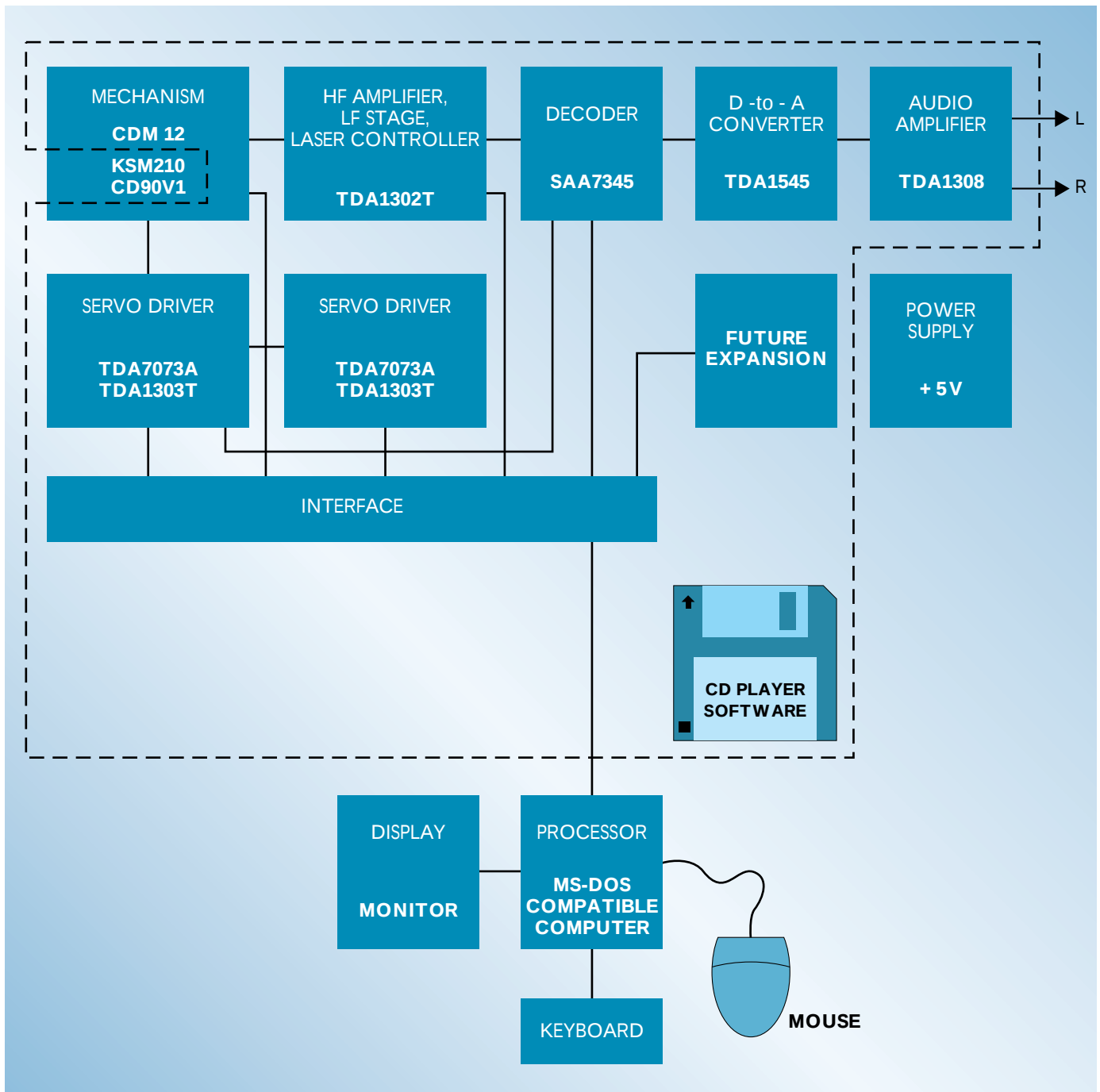


Fig.3 Full digital compact disc player training tool

CD7-DS compact disc player development system

The CD7-DS system shown in Fig.4 is a complete skeleton 3-beam CD player consisting of the following two modules:

- A 3-beam mechanism plus loader (CDM12.1 + L1210) with the main system PCB mounted on the underside. The main system PCB contains a 1-chip fully-digital servo controller/CD decoder IC SAA737x (CD7), a diode amplifier and laser supply IC TDA1302 (DALAS), two dual servo power driver ICs TDA7073A, a continuous-calibration DAC TDA1545A (CCDAC), a stereo audio amplifier IC TDA1308 used as a line amplifier, and a stereo audio amplifier IC TDA1308 used as a headphone amplifier with volume control
- A PCB (microcontroller module) containing the system microcontroller (P87C528) and an RS232 interface for testing the system via a computer. The microcontroller module also incorporates a normal user interface consisting of a keypad and a liquid crystal display driven by a PCF8566 LCD driver IC.

The main features of the CD7-DS system are:

- Uses single-chip fully-digital servo controller/CD decoder IC SAA737x (CD7)
- Operates with three-beam optics
- Allows use of single/double Foucault and astigmatic focus optics
- Fast jump (access) time
- Communication with the CD7 decoder is via the I2C-bus or the DSIC-CD6 bus
- Can operate with various DACs from our comprehensive range
- Implements the following functions via the system microcontroller:
 - reset at power on
 - idle state
 - read Table Of Contents (TOC)
 - play
 - stop
 - next/previous track
 - fast forward/reverse
 - pause

- Single-speed and double-speed operation
- Digital audio (DOBM) interface
- Optimized for mechanical shock immunity
- CD-Graphics interface signals available
- Can maintain CD operation with the microcontroller disconnected
- Minimum number of adjustments
- Few peripheral components
- Versatile output lines of the CD decoder (V4 and V5) are used to drive the tray loader.

Modes of operation

The system software has two modes of operation – the test mode and the normal mode.

The test mode is based on a menu structure known as the CD ‘test harness’ which gives the user access to all the features of the system hardware and software via the RS232 serial interface. This requires a ‘dumb’ terminal (e.g. VT100) or a PC running a communications program in connect mode. The test menus are constructed by the CD7-DS microcontroller writing messages to the computer which displays them on the screen so that the user can make a selection by pressing a key on the computer keyboard.

In the normal mode, the system behaves like a normal CD player. The ‘test harness’ is inactive, and all the CD functions are available from the keypad/display on the microcontroller module. If only normal CD operation is required, there is no need to connect a cable to the RS232 connector on the microcontroller module.

Documentation

‘Full digital compact disc player training tool user guide (version 2.0).’ Ordering code: NBA/AN9404

‘Servo module design description for compact disc applications.’ Ordering code: SAU/AN93005

‘CD7-DS Compact Disc Development System (Version 1.0).’ Ordering code: SAU/AN95024.

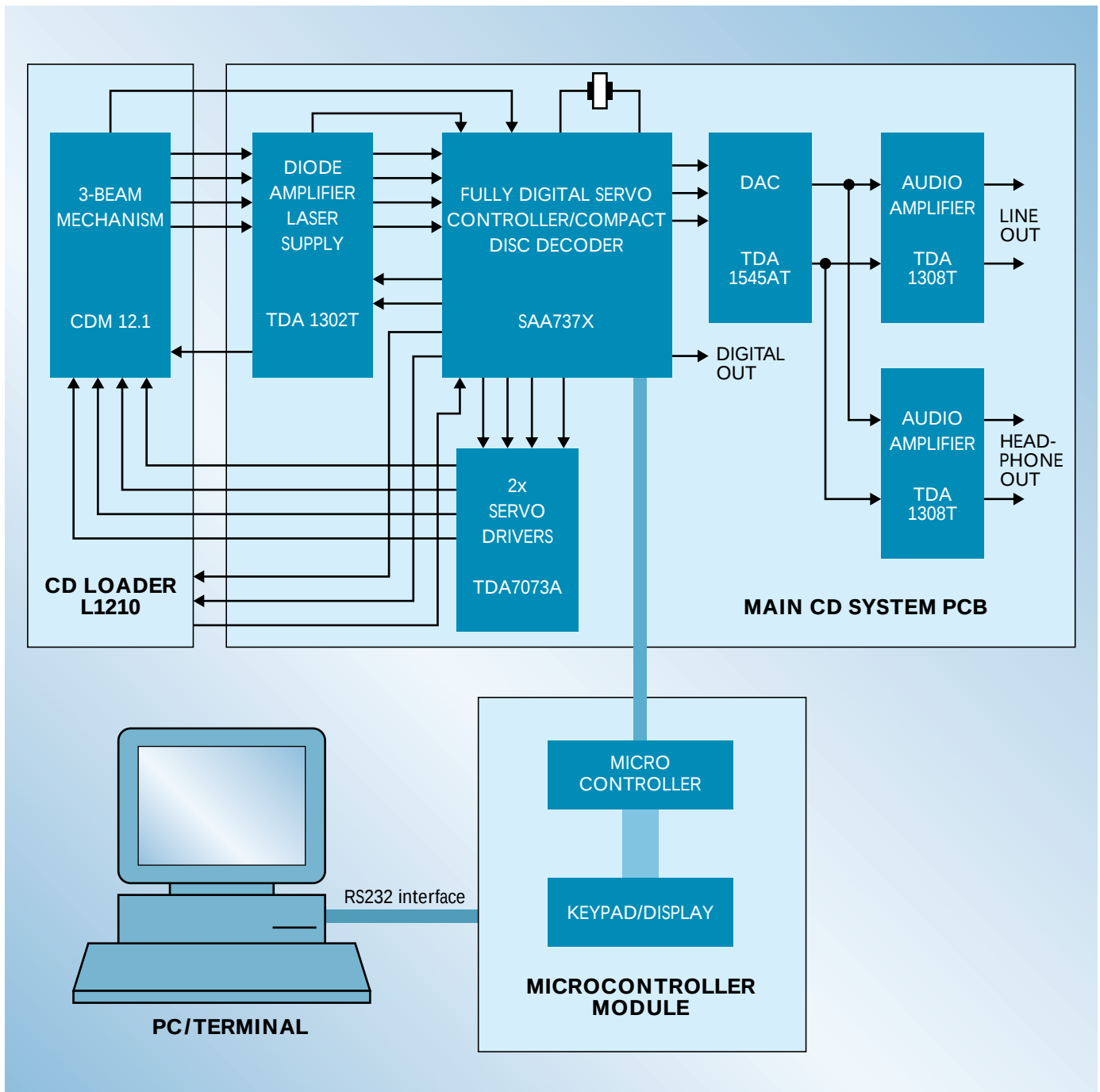


Fig.4 CD7-DS compact disc player development system

DOCUMENTATION

DOCUMENTATION

Title	Ordering code
DATA HANDBOOKS	
Data handbook IC01: Semiconductors for Radio and Audio Systems 1996	9397 750 01121
PORTABLE/PERSONAL/HOME RADIO/AUDIO SYSTEMS CCAxxx AND CPRxxx	
Outline Specification CCA210S, μ C for a CD, Digital Tuned Radio and Cassette Recorder System (Version 1.0)	AN96017
User manual CCA210S, CD, Digital Tuned Radio and Cassette Recorder System (Version 1.0)	ERA/UMAN96001.0
I²S BUS	
I ² S bus specification	9398 332 10011
DSA bus	
Interface bus Description, September 1993	*
COMPACT DISC SYSTEMS	
Outline Specification for the CDT610 Compact Disc Player System (Version 1.3)	SAU/AN93025
User Manual for the CDT610 Compact Disc Player System (Version 1.1)	SAU/AN93027
Specification of CDT610 Software	SAU/AN93018
Outline Specification for the CDT611 Compact Disc Player System (Version 1.0)	SAU/AN92021
User Manual for CDT611 Compact Disc Player System (Version 1)	SAU/AN93006
Outline Specification for the CDT613 Compact Disc Player System (Version 1.1)	AN94034
User's manual CDT613 Compact Disc Player System (Version 1.0)	AN94038
Outline Specification for the HIFI7000 Compact Disc Player System (Version 1.2)	AN95109
The HIFI7000 Compact Disc Audio System (Version 1.0) User's manual	SAU/UM95018
Outline Specification for the HIFI7010 3-Disc CD-audio System (Version 1.0)	AN96011
The HIFI7010 3-Disc Changer CD-audio System (Version 1.0) User's manual	SAU/UM96010
Outline Specification for the CDT715 Video Compact Disc Player System (Version 1.0)	SSW95006
Outline Specification for the CDT731 Compact Disc Player System (Version 1.0)	AN95022
CD7-DS Compact Disc Development System (Version 1.0)	AN94024
Premium 6000, Application Specification, June 95	*
Games 6001, Outline Specification, June 93	*
Video 6002, Application Specification, March 95	*
ROM 65000, Application Specification, March 95	*
ROM 65000, Interface Description, March 95	*
D65400 Recorder, Application Specification, V1.0, September 1995	*
E65400, Application Specification, September 1995	*

Title	Ordering code
COMPACT DISC CIRCUITS	
<i>Servo interface and control</i>	
TDA1300 Digital Amplifier and Laser Supply	NBA/AN9503
TDA1301 Digital Servo IC for controlling 2 stage 3 beam servo mechanisms	NBA/AN9401
TDA1302 Printed Circuit Board description	NBA/AN9302
OQ8866 (OS DALAS) Product Specification, May 95	*
OQ8868 (DSICS) Product Specification, April 95	*
LO9465 Preliminary Specification	*
LO9465 User Manual	*
LO9585 Preliminary Specification	*
<i>CD driver circuits</i>	
TDA1303 Digital Servo Driver for driving CD-mechanism motor/actuators	NBA/AN9304
TDA7072A(T)-TDA7073A(T) Power Drivers for Servo Systems	ERA/AN9209
OQ8844 (DSD2) Device specification, May 1993	*
<i>CD-ROM</i>	
How to use ELM in an ATAPI CD-ROM system (Version 2.0)	SAU/UM96013
SAA7385: highly integrated 8 speed CD-ROM single-chip controller with internal microcontroller	9397 750 00455
CDR650 Preliminary Specification, August 1995	*
CDT660 Product Specification, June 1995	*
<i>CD Recordable</i>	
SAA7390: high performance CD-Recordable/Erasable controller supports both SCSI & ATAPI solutions	9397 750 00456
CE027A (CDB2) Device Specification, January 1994	*
GLG30738 (CDBD) Device Description	*
OQ8845 (DSICR) Preliminary Specification, March 1993	*
TDA1371 Preliminary Specification, August 1994	*
TDA1372 (AEGER) Preliminary Specification, March 1993	*
<i>Converters/miscellaneous</i>	
Audio data converters and miscellaneous digital audio ICs. Designer's guide. August 1995	9397 750 00151
CD MECHANISMS AND LOADERS	
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