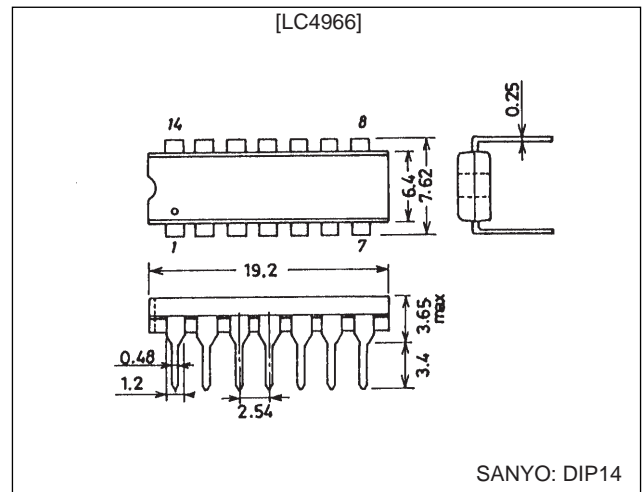


**LC4966****Quad Bilateral Switch****Overview**

The LC4966 is an IC that provides the same functions as the MLC4066B and the MLC4066BH over an expanded usable voltage range. The LC4966 provides four bidirectional switch circuits. These circuits form a low-impedance conducting path between the input and output sides when the corresponding control input (CONT) is set high, and form a high-impedance nonconducting open circuit when the control input is set low.

Package Dimensions

unit: mm

3003A-DIP14**Specifications****Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$, $V_{SS} = 0\text{ V}$**

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---------------------|---|----------------------------------|------------------|
| Maximum supply voltage | $V_{DD\text{ max}}$ | | $V_{SS} - 0.5$ to $V_{SS} + 40$ | V |
| Input voltage | V_{IN} | | $V_{SS} - 0.5$ to $V_{DD} + 0.5$ | V |
| Output voltage | V_{OUT} | | $V_{SS} - 0.5$ to $V_{DD} + 0.5$ | V |
| Input current | I_{IN} | | ± 10 | mA |
| Potential difference between input and output when on | $V_I - V_O$ | | ± 0.5 | V |
| Lead soldering temperature time | T_{sol} | $t = 10\text{ s}$ | 260 | $^\circ\text{C}$ |
| Allowable power dissipation | $Pd\text{ max}$ | $T_a \leq 85^\circ\text{C}$, $I_{IN} = \pm 10\text{ mA}$ | 300 | mW |
| Operating temperature | T_{opr} | | -40 to $+85$ | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | -65 to $+150$ | $^\circ\text{C}$ |

Allowable Operating Ranges at $T_a = -40$ to $+85^\circ\text{C}$

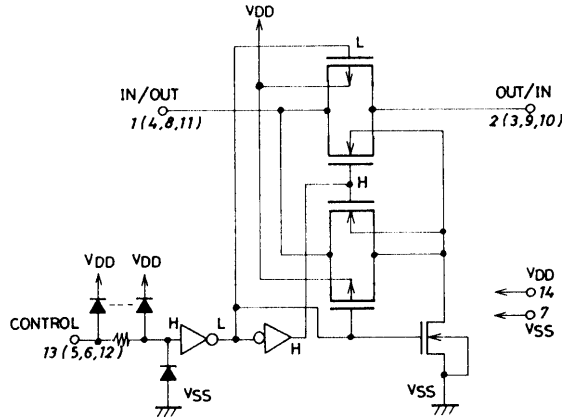
| Parameter | Symbol | Conditions | Ratings | Unit |
|----------------|----------|------------|---------------|------|
| Supply voltage | V_{DD} | | 3 to 37 | V |
| Input voltage | V_{IN} | | 0 to V_{DD} | V |

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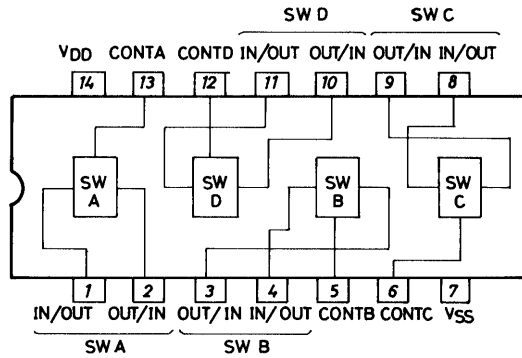
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

Equivalent Circuit

(1/4 LC4966)



Pin Assignment and Equivalent Circuit Block Diagram



Electrical Characteristics at $T_a = 25 \pm 2^\circ\text{C}$, $V_{SS} = 0\text{ V}$

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|----------------------------------|----------|--|------|-----|-----|------|
| Input high-level control voltage | V_{IH} | $V_{DD} = 5\text{ V}$, for a current between input and output $> 10\ \mu\text{A}$ | 3.5 | | | V |
| | | $V_{DD} = 10\text{ V}$, for a current between input and output $> 10\ \mu\text{A}$ | 8.0 | | | V |
| | | $V_{DD} = 15\text{ V}$, for a current between input and output $> 10\ \mu\text{A}$ | 12.5 | | | V |
| | | $V_{DD} = 20\text{ V}$, for a current between input and output $> 10\ \mu\text{A}$ | 17.0 | | | V |
| | | $V_{DD} = 30\text{ V}$, for a current between input and output $> 10\ \mu\text{A}$ | 27.0 | | | V |
| | | $V_{DD} = 37\text{ V}$, for a current between input and output $> 10\ \mu\text{A}$ | 34.0 | | | V |
| Input low-level control voltage | V_{IL} | $V_{DD} = 5\text{ V}$, for a current between input and output $< 10\ \mu\text{A}$ | | | 1.0 | V |
| | | $V_{DD} = 10\text{ V}$, for a current between input and output $< 10\ \mu\text{A}$ | | | 2.0 | V |
| | | $V_{DD} = 15\text{ V}$, for a current between input and output $< 10\ \mu\text{A}$ | | | 2.5 | V |
| | | $V_{DD} = 20\text{ V}$, for a current between input and output $< 10\ \mu\text{A}$ | | | 2.5 | V |
| | | $V_{DD} = 30\text{ V}$, for a current between input and output $< 10\ \mu\text{A}$ | | | 3.0 | V |
| | | $V_{DD} = 37\text{ V}$, for a current between input and output $< 10\ \mu\text{A}$ | | | 3.0 | V |

Continued on next page.

LC4966

Continued from preceding page.

| Parameter | Symbol | Conditions | min | typ | max | Unit | | |
|----------------------------------|-----------|--|-----|---|-----------|---------------|-----|----------|
| On resistance | R_{ON} | $V_{DD} = 5\text{ V}, V_{IN} = 5\text{ V}, I = \pm 1\text{ mA}$ | | 110 | 220 | Ω | | |
| | | $V_{DD} = 5\text{ V}, V_{IN} = 2.5\text{ V}, I = \pm 1\text{ mA}$ | | 90 | 180 | Ω | | |
| | | $V_{DD} = 5\text{ V}, V_{IN} = 0.25\text{ V}, I = \pm 1\text{ mA}$ | | 110 | 220 | Ω | | |
| | | | | $V_{DD} = 10\text{ V}, V_{IN} = 10\text{ V}, I = \pm 3\text{ mA}$ | | 70 | 140 | Ω |
| | | | | $V_{DD} = 10\text{ V}, V_{IN} = 5\text{ V}, I = \pm 3\text{ mA}$ | | 50 | 100 | Ω |
| | | | | $V_{DD} = 10\text{ V}, V_{IN} = 0.25\text{ V}, I = \pm 3\text{ mA}$ | | 70 | 140 | Ω |
| | | | | $V_{DD} = 15\text{ V}, V_{IN} = 15\text{ V}, I = \pm 3\text{ mA}$ | | 60 | 120 | Ω |
| | | | | $V_{DD} = 15\text{ V}, V_{IN} = 7.5\text{ V}, I = \pm 3\text{ mA}$ | | 40 | 80 | Ω |
| | | | | $V_{DD} = 15\text{ V}, V_{IN} = 0.25\text{ V}, I = \pm 3\text{ mA}$ | | 60 | 120 | Ω |
| | | | | $V_{DD} = 20\text{ V}, V_{IN} = 20\text{ V}, I = \pm 3\text{ mA}$ | | 60 | 120 | Ω |
| | | | | $V_{DD} = 20\text{ V}, V_{IN} = 10\text{ V}, I = \pm 3\text{ mA}$ | | 40 | 80 | Ω |
| | | | | $V_{DD} = 20\text{ V}, V_{IN} = 0.25\text{ V}, I = \pm 3\text{ mA}$ | | 60 | 120 | Ω |
| | | | | $V_{DD} = 30\text{ V}, V_{IN} = 30\text{ V}, I = \pm 3\text{ mA}$ | | 50 | 100 | Ω |
| | | | | $V_{DD} = 30\text{ V}, V_{IN} = 15\text{ V}, I = \pm 3\text{ mA}$ | | 35 | 70 | Ω |
| | | | | $V_{DD} = 30\text{ V}, V_{IN} = 0.25\text{ V}, I = \pm 3\text{ mA}$ | | 50 | 100 | Ω |
| | | | | $V_{DD} = 37\text{ V}, V_{IN} = 37\text{ V}, I = \pm 3\text{ mA}$ | | 45 | 90 | Ω |
| | | | | $V_{DD} = 37\text{ V}, V_{IN} = 19\text{ V}, I = \pm 3\text{ mA}$ | | 30 | 60 | Ω |
| | | | | $V_{DD} = 37\text{ V}, V_{IN} = 0.25\text{ V}, I = \pm 3\text{ mA}$ | | 45 | 90 | Ω |
| | | | | $V_{DD} = +5\text{ V}, V_{IN} = -5\text{ V}, V_{IN} = 5\text{ V}, I = \pm 3\text{ mA}$ | | 70 | 140 | Ω |
| | | | | $V_{DD} = +5\text{ V}, V_{SS} = -5\text{ V}, V_{IN} = \pm 0.25\text{ V}, I = \pm 3\text{ mA}$ | | 50 | 100 | Ω |
| | | | | $V_{DD} = +5\text{ V}, V_{SS} = -5\text{ V}, V_{IN} = -5\text{ V}, I = \pm 3\text{ mA}$ | | 70 | 140 | Ω |
| | | | | $V_{DD} = +7.5\text{ V}, V_{SS} = -7.5\text{ V}, V_{IN} = 5\text{ V}, I = \pm 3\text{ mA}$ | | 60 | 120 | Ω |
| | | | | $V_{DD} = +7.5\text{ V}, V_{SS} = -7.5\text{ V}, V_{IN} = \pm 0.25\text{ V}, I = \pm 3\text{ mA}$ | | 40 | 80 | Ω |
| | | | | $V_{DD} = +7.5\text{ V}, V_{SS} = -7.5\text{ V}, V_{IN} = -5\text{ V}, I = \pm 3\text{ mA}$ | | 60 | 120 | Ω |
| | | | | $V_{DD} = +10\text{ V}, V_{SS} = -10\text{ V}, V_{IN} = 10\text{ V}, I = \pm 3\text{ mA}$ | | 60 | 120 | Ω |
| | | | | $V_{DD} = +10\text{ V}, V_{SS} = -10\text{ V}, V_{IN} = \pm 0.25\text{ V}, I = \pm 3\text{ mA}$ | | 40 | 80 | Ω |
| | | | | $V_{DD} = +10\text{ V}, V_{SS} = -10\text{ V}, V_{IN} = -10\text{ V}, I = \pm 3\text{ mA}$ | | 60 | 120 | Ω |
| | | | | $V_{DD} = +15\text{ V}, V_{SS} = -15\text{ V}, V_{IN} = 15\text{ V}, I = \pm 3\text{ mA}$ | | 50 | 100 | Ω |
| | | | | $V_{DD} = +15\text{ V}, V_{SS} = -15\text{ V}, V_{IN} = \pm 0.25\text{ V}, I = \pm 3\text{ mA}$ | | 35 | 70 | Ω |
| | | | | $V_{DD} = +15\text{ V}, V_{SS} = -15\text{ V}, V_{IN} = -15\text{ V}, I = \pm 3\text{ mA}$ | | 50 | 100 | Ω |
| | | | | $V_{DD} = +18.5\text{ V}, V_{SS} = -18.5\text{ V}, V_{IN} = 18.5\text{ V}, I = \pm 3\text{ mA}$ | | 45 | 90 | Ω |
| | | | | $V_{DD} = +18.5\text{ V}, V_{SS} = -18.5\text{ V}, V_{IN} = \pm 0.25\text{ V}, I = \pm 3\text{ mA}$ | | 30 | 60 | Ω |
| | | | | $V_{DD} = +18.5\text{ V}, V_{SS} = -18.5\text{ V}, V_{IN} = -18.5\text{ V}, I = \pm 3\text{ mA}$ | | 45 | 90 | Ω |
| Input off leakage current | I_{OFF} | $V_{DD} = 37\text{ V}, V_{IN} = 37\text{ V}, V_{OUT} = 0\text{ V}$ | | ± 1 | ± 500 | nA | | |
| | | $V_{DD} = 37\text{ V}, V_{IN} = 0\text{ V}, V_{OUT} = 37\text{ V}$ | | ± 1 | ± 500 | nA | | |
| Quiescent current drain | I_{DD} | $V_{DD} = 5\text{ V}$ | | 0.001 | 1 | μA | | |
| | | $V_{DD} = 10\text{ V}$ | | 0.001 | 2 | μA | | |
| | | $V_{DD} = 15\text{ V}$ | | 0.002 | 4 | μA | | |
| | | $V_{DD} = 20\text{ V}$ | | 0.004 | 8 | μA | | |
| | | $V_{DD} = 25\text{ V}$ | | 0.01 | 20 | μA | | |
| | | $V_{DD} = 30\text{ V}$ | | 0.02 | 40 | μA | | |
| | | $V_{DD} = 35\text{ V}$ | | 0.04 | 80 | μA | | |
| | | $V_{DD} = 37\text{ V}$ | | 0.1 | 160 | μA | | |
| Input high-level control current | I_{IH} | $V_{DD} = 37\text{ V}, V_{IN} = 37\text{ V}$ | | 10^{-4} | 3 | μA | | |
| Input low-level control current | I_{IL} | $V_{DD} = 37\text{ V}, V_{IN} = 0\text{ V}$ | | -10^{-4} | 3 | μA | | |
| Input capacitance | C_{IN} | Control inputs | | 5 | 7.5 | pF | | |
| | | Switch input and outputs | | 10 | | pF | | |

LC4966

Switching Characteristics at $T_a = 25 \pm 2^\circ\text{C}$

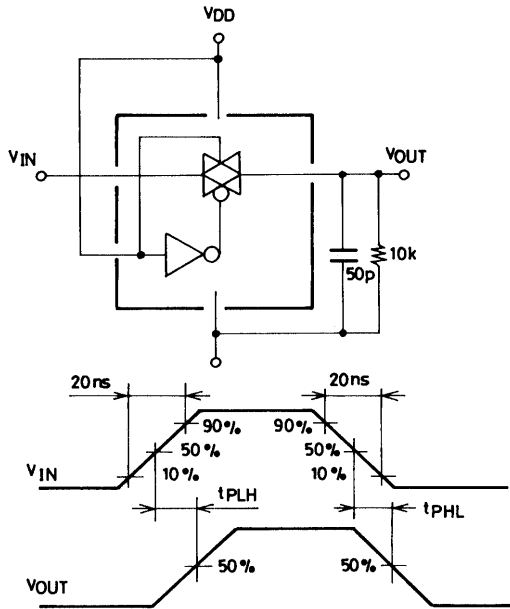
| Parameter | Symbol | Conditions | min | typ | max | Unit |
|-------------------------------------|-----------------------|--|-----|-------|-----|------|
| Transmission time (IN to OUT) | t_{PLH}, t_{PHL} | $V_{DD} = 5\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 15 | 45 | ns |
| | | $V_{DD} = 10\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 10 | 30 | ns |
| | | $V_{DD} = 15\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 8 | 25 | ns |
| | | $V_{DD} = 20\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 8 | 25 | ns |
| | | $V_{DD} = 25\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 8 | 25 | ns |
| | | $V_{DD} = 30\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 7 | 25 | ns |
| | | $V_{DD} = 35\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 7 | 25 | ns |
| | | $V_{DD} = 37\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 7 | 25 | ns |
| Transmission time (control → OUT) | t_{PLH}, t_{PHL} | $V_{DD} = 5\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 100 | 200 | ns |
| | | $V_{DD} = 10\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 40 | 70 | ns |
| | | $V_{DD} = 15\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 35 | 60 | ns |
| | | $V_{DD} = 20\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 35 | 60 | ns |
| | | $V_{DD} = 25\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 35 | 60 | ns |
| | | $V_{DD} = 30\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 35 | 60 | ns |
| | | $V_{DD} = 35\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 35 | 60 | ns |
| | | $V_{DD} = 37\text{ V}, R_L = 10\text{ k}\Omega, C_L = 50\text{ pF}$ | | 35 | 60 | ns |
| Maximum control input frequency | $f_{\text{max}}(c)$ | $V_{DD} = 5\text{ V}, C_L = 15\text{ pF}$ | | 1.0 | | MHz |
| | | $V_{DD} = 10\text{ V}, C_L = 15\text{ pF}$ | | 1.0 | | MHz |
| | | $V_{DD} = 20\text{ V}, C_L = 15\text{ pF}$ | | 1.0 | | MHz |
| | | $V_{DD} = 30\text{ V}, C_L = 15\text{ pF}$ | | 1.0 | | MHz |
| | | $V_{DD} = 37\text{ V}, C_L = 15\text{ pF}$ | | 1.0 | | MHz |
| Maximum transmission frequency | $f_{\text{max}}(I-O)$ | $V_{DD} = +5\text{ V}, V_{SS} = -5\text{ V}, R_L = 10\text{ k}\Omega, C_L = 15\text{ pF}^{*1}$ | | 35 | | MHz |
| | | $V_{DD} = +10\text{ V}, V_{SS} = -10\text{ V}$ | | 40 | | MHz |
| | | $V_{DD} = +15\text{ V}, V_{SS} = -15\text{ V}$ | | 50 | | MHz |
| | | $V_{DD} = +18.5\text{ V}, V_{SS} = -18.5\text{ V}$ | | 50 | | MHz |
| Sine wave total harmonic distortion | | $V_{DD} = +5\text{ V}, V_{SS} = -5\text{ V}, R_L = 10\text{ k}\Omega, f = 1\text{ kHz}^{*2}$ | | 0.010 | | % |
| | | $V_{DD} = +10\text{ V}, V_{SS} = -10\text{ V}$ | | 0.005 | | % |
| | | $V_{DD} = +15\text{ V}, V_{SS} = -15\text{ V}$ | | 0.005 | | % |
| | | $V_{DD} = +18.5\text{ V}, V_{SS} = -18.5\text{ V}$ | | 0.005 | | % |
| Feedthrough (switch off state) | | $V_{DD} = +5\text{ V}, V_{SS} = -5\text{ V}, R_L = 10\text{ k}\Omega^{*3}$ | | 1 | | MHz |
| | | $V_{DD} = +10\text{ V}, V_{SS} = -10\text{ V}$ | | 1 | | MHz |
| | | $V_{DD} = +15\text{ V}, V_{SS} = -15\text{ V}$ | | 1 | | MHz |
| | | $V_{DD} = +18.5\text{ V}, V_{SS} = -18.5\text{ V}$ | | 1 | | MHz |

- Note
1. V_{is} is a $\pm 2.5\text{ Vp-p}$ sine wave; $f_{\text{max}} = 20\log(V_{os}/V_{is})$ = the -3 dB frequency.
 2. V_{is} is a $\pm 2.5\text{ Vp-p}$ sine wave.
 3. V_{is} is a $\pm 2.5\text{ Vp-p}$ sine wave. Frequency (feedthrough): $20\log(V_{os}/V_{is}) = -50\text{ dB}$

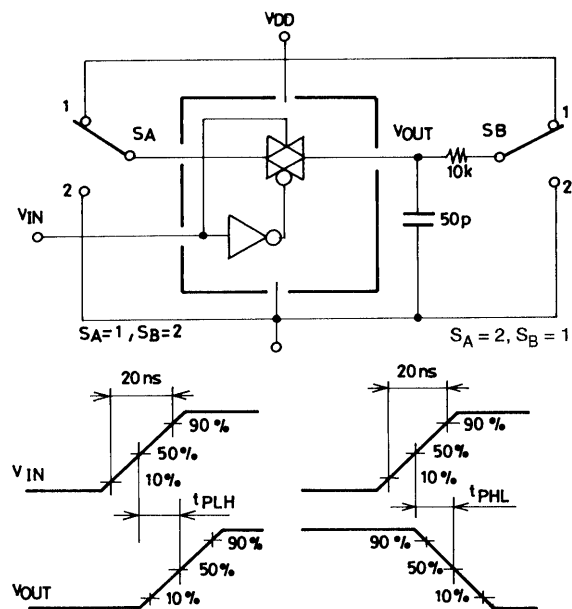
Test Circuits and Waveforms

Unit (resistance: Ω, capacitance: F)

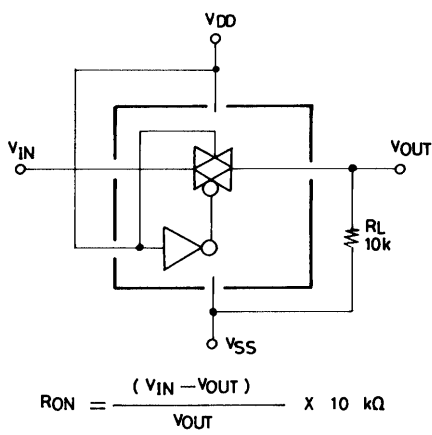
1. t_{PLH} , t_{PHL} (IN-OUT) Test Circuit



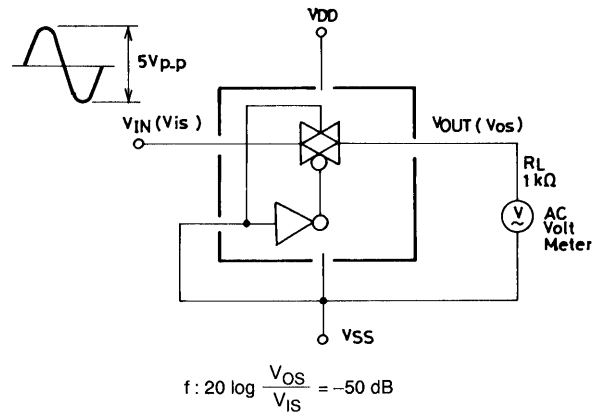
2. t_{PLH} , t_{PHL} (Control-OUT) Test Circuit



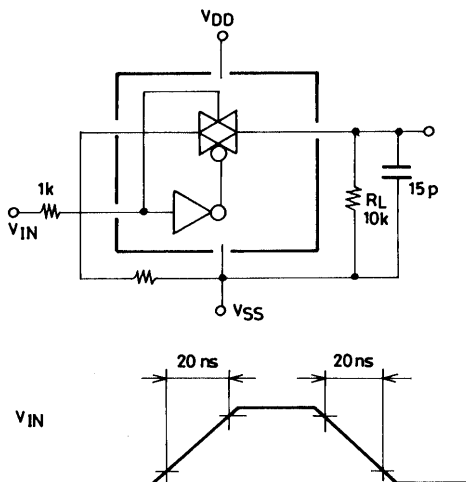
3. R_{ON} Test Circuit



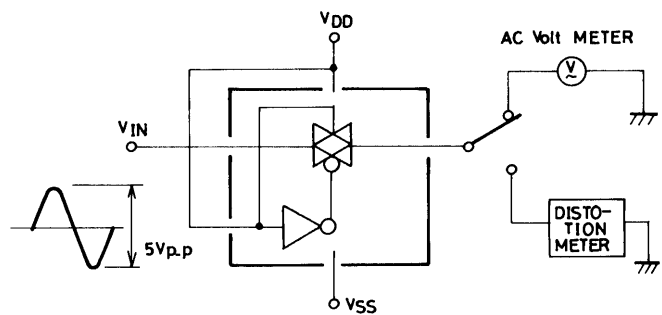
4. Feedthrough Test Circuit

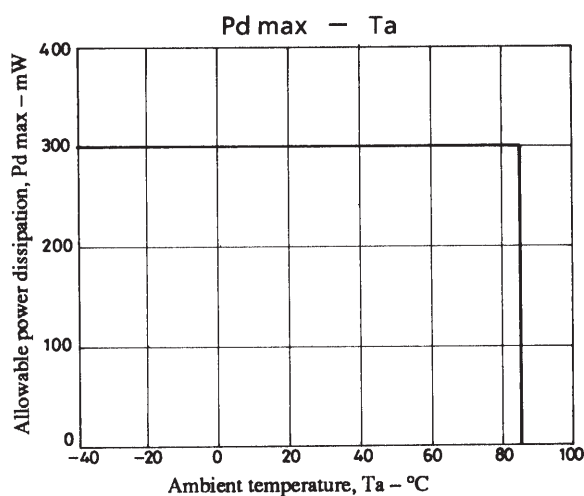


5. Crosstalk



6. Frequency Response (f_{max}) and Total Harmonic Distortion





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