



# AiP74HC/HCT4051

## 8-channel Analog

### Multiplexer/Demultiplexer

# Product Specification

**Specification Revision History:**

Version	Date	Description
2019-12-A1	2019-12	New
2021-12-A2	2021-12	Modify Ordering Information
2022-03-A3	2022-03	Modify ambient temperature to $-40^{\circ}\text{C}\sim+105^{\circ}\text{C}$ and add electrical characteristics of $-40^{\circ}\text{C}\sim+105^{\circ}\text{C}$



## 1、 General Description

The AiP74HC/HCT4051 is a single-pole octal-throw analog switch (SP8T) suitable for use in analog or digital 8:1 multiplexer/demultiplexer applications. The switch features three digital select inputs (S0, S1 and S2), eight independent inputs/outputs (Yn), a common input/output (Z) and a digital enable input ( $\bar{E}$ ). When  $\bar{E}$  is HIGH, the switches are turned off. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

### Features:

- Wide analog input voltage range from -5 V to +5 V
- Wide supply voltage range
  - AiP74HC4051: from 3V to 9V
  - AiP74HCT4051: from 4.5V to 5.5V
- Low ON resistance:
  - 80  $\Omega$  (typical) at  $V_{CC} - V_{EE} = 4.5$  V
  - 70  $\Omega$  (typical) at  $V_{CC} - V_{EE} = 6.0$  V
  - 60  $\Omega$  (typical) at  $V_{CC} - V_{EE} = 9.0$  V
- Logic level translation: to enable 5 V logic to communicate with  $\pm 5$  V analog signals
- Typical “break before make” built-in
- Specified from -40°C to +105°C
- Packaging information: DIP16/SOP16/TSSOP16/DHVQFN16

### Applications:

- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating

**Ordering Information:****Tube packing specifications:**

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74HC4051 DA16.TB	DIP16	74HC4051	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HCT4051 DA16.TB	DIP16	74HCT4051	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HC4051 SA16.TB	SOP16(1)	74HC4051	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HC4051 SA16.TB	SOP16(2)	74HC4051	50 PCS/tube	100 tube/box	5000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HCT4051 SA16.TB	SOP16	74HCT4051	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HC4051 TA16.TB	TSSOP16	74HC4051	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP74HCT4051 TA16.TB	TSSOP16	74HCT4051	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

**Reel packing specifications:**

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74HC4051SA16.TR	SOP16	74HC4051	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HCT4051SA16.TR	SOP16	74HCT4051	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HC4051TA16.TR	TSSOP16	74HC4051	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP74HCT4051TA16.TR	TSSOP16	74HCT4051	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP74HC4051QE16.TR	DHVQFN16	HC4051	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 3.5mm×2.5mm Pin spacing: 0.5mm
AiP74HCT4051QE16.TR	DHVQFN16	HCT4051	3000 PCS/reel	3000 PCS/box	Dimensions of plastic enclosure: 3.5mm×2.5mm Pin spacing: 0.5mm

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.



## 2、Block Diagram And Pin Description

### 2.1、Block Diagram

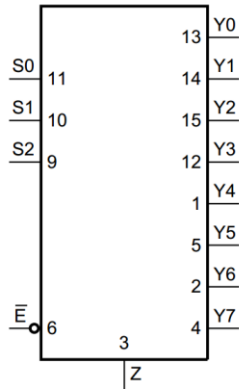


Figure 1. Logic symbol

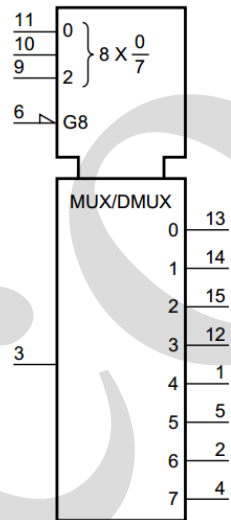


Figure 2. IEC logic symbol

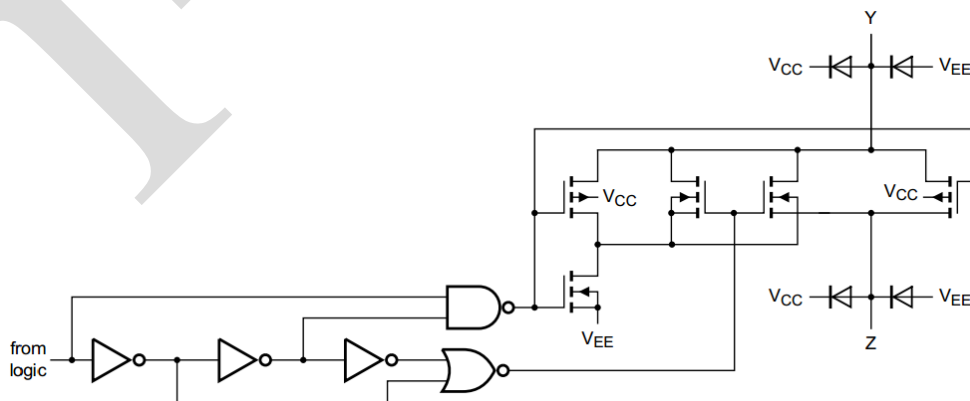


Figure 3. Schematic diagram (one switch)

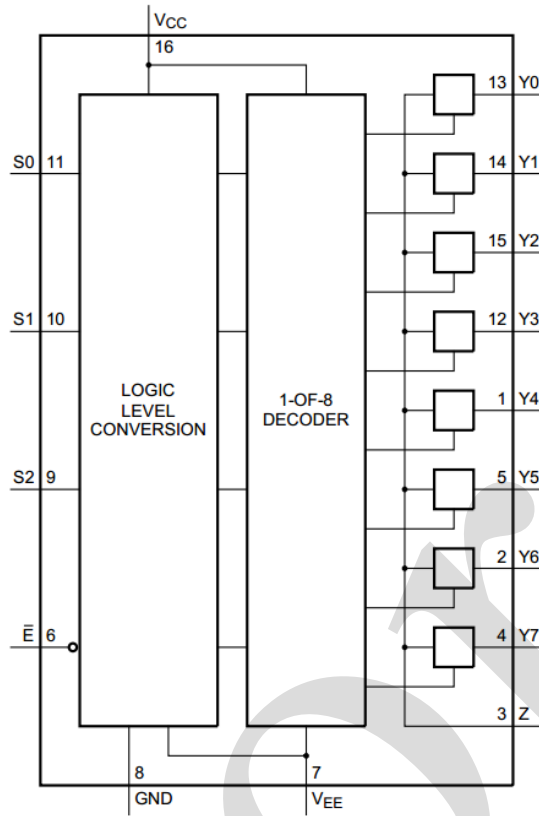
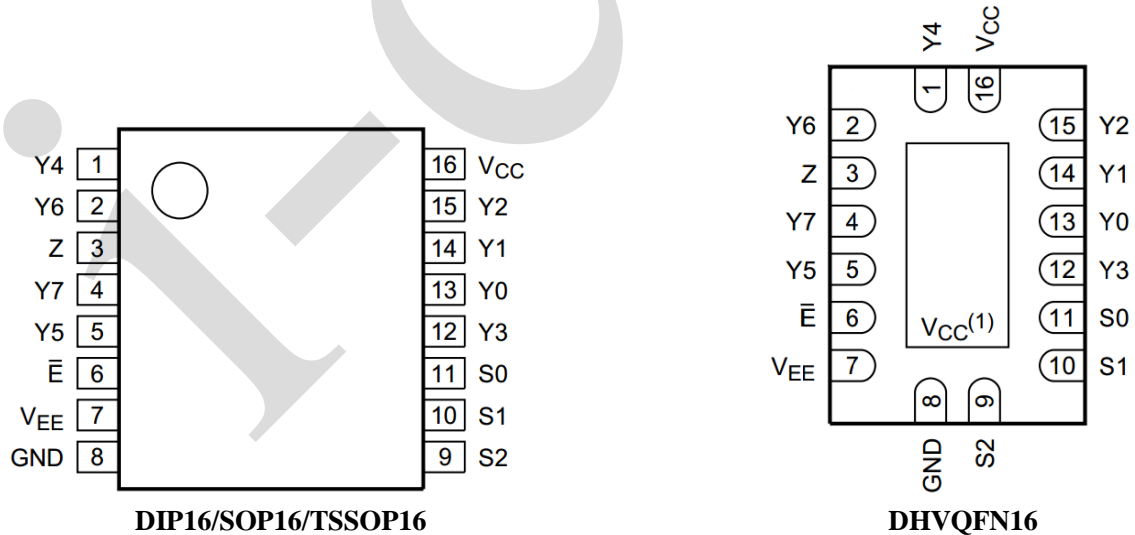


Figure 4. Functional diagram

## 2.2、Pin Configurations



Note:

(1) This is not a supply pin. The substrate is attached to this pad using conductive die attach material. There is no electrical or mechanical requirement to solder this pad. However, if it is soldered, the solder land should remain floating or be connected to V<sub>CC</sub>.



## 2.3、Pin Description

Pin No.	Pin Name	Description
1	Y4	independent input or output
2	Y6	independent input or output
3	Z	common output or input
4	Y7	independent input or output
5	Y5	independent input or output
6	$\bar{E}$	enable input (active LOW)
7	V <sub>EE</sub>	supply voltage
8	GND	ground supply voltage
9	S2	select input
10	S1	select input
11	S0	select input
12	Y3	independent input or output
13	Y0	independent input or output
14	Y1	independent input or output
15	Y2	independent input or output
16	V <sub>CC</sub>	supply voltage

## 2.4、Function Table

Input				Channel ON
$\bar{E}$	S2	S1	S0	
L	L	L	L	Y0 to Z
L	L	L	H	Y1 to Z
L	L	H	L	Y2 to Z
L	L	H	H	Y3 to Z
L	H	L	L	Y4 to Z
L	H	L	H	Y5 to Z
L	H	H	L	Y6 to Z
L	H	H	H	Y7 to Z
H	X	X	X	switches off

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care.



## 3、Electrical Parameter

### 3.1、Absolute Maximum Ratings

(Voltages are referenced to  $V_{SS}=0V$  (ground), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	$V_{CC}$	- <sup>[1]</sup>	-0.5	+11	V
input clamping current	$I_{IK}$	$V_I < -0.5 V$ or $V_I > V_{CC} + 0.5 V$	-	$\pm 20$	mA
switch clamping current	$I_{SK}$	$V_{SW} < -0.5 V$ or $V_{SW} > V_{CC} + 0.5 V$	-	$\pm 20$	mA
switch current	$I_{SW}$	$-0.5 V < V_{SW} < V_{CC} + 0.5 V$	-	$\pm 25$	mA
supply current	$I_{EE}$	-	-	$\pm 20$	mA
supply current	$I_{CC}$	-	-	50	mA
ground current	$I_{GND}$	-	-	-50	mA
storage temperature	$T_{stg}$	-	-65	+150	°C
total power dissipation	$P_{tot}$	- <sup>[2]</sup>	-	500	mW
power dissipation	P	per switch	-	100	mW
Soldering temperature	$T_L$	10s	DIP	245	°C
			SOP	250	°C
			DHVQFN	250	°C

Note:

[1] To avoid drawing  $V_{CC}$  current out of terminal Z, when switch current flows into terminals  $Y_n$ , the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no  $V_{CC}$  current will flow out of terminals  $Y_n$ , and in this case there is no limit for the voltage drop across the switch, but the voltages at  $Y_n$  and Z may not exceed  $V_{CC}$  or  $V_{EE}$ .

[2] For DIP16 packages: above 70°C the value of  $P_{tot}$  derates linearly with 12mW/K.

For SOP16 packages: above 70°C the value of  $P_{tot}$  derates linearly with 8mW/K.

For (T)SSOP16 packages: above 60°C the value of  $P_{tot}$  derates linearly with 5.5mW/K.

For DHVQFN16 packages: above 60°C the value of  $P_{tot}$  derates linearly with 4.5mW/K.





## 3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>AiP74HC4051</b>						
supply voltage	$V_{CC}$	$V_{CC} - GND$	3.0	5.0	9.0	V
		$V_{CC} - V_{EE}$	3.0	5.0	9.0	V
input voltage	$V_I$	-	0	-	$V_{CC}$	V
switch voltage	$V_{SW}$	-	$V_{EE}$	-	$V_{CC}$	V
ambient temperature	$T_{amb}$	in free air	-40	-	+105	°C
input transition rise and fall rate	$\Delta t/\Delta V$	$V_{CC} = 4.5\text{ V}$	-	1.67	139	ns/V
		$V_{CC} = 6.0\text{ V}$	-	-	83	ns/V
		$V_{CC} = 9.0\text{ V}$	-	-	31	ns/V
<b>AiP74HCT4051</b>						
supply voltage	$V_{CC}$	$V_{CC} - GND$	4.5	5.0	5.5	V
		$V_{CC} - V_{EE}$	3.0	5.0	9.0	V
input voltage	$V_I$	-	0	-	$V_{CC}$	V
switch voltage	$V_{SW}$	-	$V_{EE}$	-	$V_{CC}$	V
ambient temperature	$T_{amb}$	in free air	-40	-	+105	°C
input transition rise and fall rate	$\Delta t/\Delta V$	$V_{CC} = 4.5\text{ V}$	-	1.67	139	ns/V
		$V_{CC} = 6.0\text{ V}$	-	-	-	ns/V
		$V_{CC} = 9.0\text{ V}$	-	-	-	ns/V

## 3.3、Electrical Characteristics

### 3.3.1、DC Characteristics 1

( $T_{amb}=25^{\circ}\text{C}$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
ON resistance (peak)	$R_{ON(peak)}$	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$ $V_{is} = V_{CC} \text{ to } V_{EE};$ $I_{SW} = 1000\text{ uA}$	-	100	180	$\Omega$
		$V_{CC} = 6.0\text{ V};$ $V_{EE} = 0\text{ V}$	-	90	160	$\Omega$
		$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	70	130	$\Omega$
ON resistance (rail)	$R_{ON(rail)}$	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$ $V_{is} = V_{EE};$ $I_{SW} = 1000\text{ uA}$	-	80	140	$\Omega$
		$V_{CC} = 6.0\text{ V};$ $V_{EE} = 0\text{ V}$	-	70	120	$\Omega$
		$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	60	105	$\Omega$
		$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$ $V_{is} = V_{CC};$ $I_{SW} = 1000\text{ uA}$	-	90	160	$\Omega$
		$V_{CC} = 6.0\text{ V};$ $V_{EE} = 0\text{ V}$	-	80	140	$\Omega$



			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	65	120	$\Omega$
ON resistance mismatch between channels	$\Delta R_{ON}$	$V_{is} = V_{CC}$ to $V_{EE}$	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	9	-	$\Omega$
			$V_{CC} = 6.0\text{ V};$ $V_{EE} = 0\text{ V}$	-	8	-	$\Omega$
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	6	-	$\Omega$
<b>AiP74HC4051</b>							
HIGH-level input voltage	$V_{IH}$		$V_{CC} = 4.5\text{ V}$	3.15	2.4	-	V
			$V_{CC} = 6.0\text{ V}$	4.2	3.2	-	V
			$V_{CC} = 9.0\text{ V}$	6.3	4.7	-	V
LOW-level input voltage	$V_{IL}$		$V_{CC} = 4.5\text{ V}$	-	2.1	1.35	V
			$V_{CC} = 6.0\text{ V}$	-	2.8	1.8	V
			$V_{CC} = 9.0\text{ V}$	-	4.3	2.7	V
input leakage current	$I_I$	$V_{EE} = 0\text{ V};$ $V_I = V_{CC}$ or GND	$V_{CC} = 6.0\text{ V}$	-	-	$\pm 0.1$	$\mu\text{A}$
			$V_{CC} = 9.0\text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
OFF-state leakage current	$I_{S(OFF)}$	$V_{CC} = 9.0\text{ V};$ $V_{EE} = 0\text{ V};$ $V_I = V_{IH}$ or $V_{IL};$ $ V_{SW}  = V_{CC} - V_{EE};$ see Figure 7	per channel	-	-	$\pm 0.1$	$\mu\text{A}$
			all channels	-	-	$\pm 0.4$	$\mu\text{A}$
ON-state leakage current	$I_{S(ON)}$	$V_I = V_{IH}$ or $V_{IL};$ $ V_{SW}  = V_{CC} - V_{EE}; V_{CC} = 9.0\text{ V};$ $V_{EE} = 0\text{ V};$ see Figure 8		-	-	$\pm 0.4$	$\mu\text{A}$
supply current	$I_{CC}$	$V_{EE} = 0\text{ V};$ $V_I = V_{CC}$ or GND; $V_{is} = V_{EE}$ or $V_{CC};$ $V_{os} = V_{CC}$ or $V_{EE}$	$V_{CC} = 6.0\text{ V}$	-	-	8.0	$\mu\text{A}$
			$V_{CC} = 9.0\text{ V}$	-	-	16.0	$\mu\text{A}$
input capacitance	$C_I$	-		-	3.5	-	pF
switch capacitance	$C_{SW}$	independent pins Yn		-	5	-	pF
		common pins Z		-	25	-	pF
<b>AiP74HCT4051</b>							
HIGH-level input voltage	$V_{IH}$	$V_{CC} = 4.5\text{ V}$ to $5.5\text{ V}$		2.0	1.6	-	V
LOW-level input voltage	$V_{IL}$	$V_{CC} = 4.5\text{ V}$ to $5.5\text{ V}$		-	1.2	0.8	V
input leakage current	$I_I$	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{ V}; V_{EE} = 0\text{ V}$		-	-	$\pm 0.1$	$\mu\text{A}$



OFF-state leakage current	$I_{S(OFF)}$	$V_{CC}=9.0\text{ V};$ $V_{EE}=0\text{ V};$ $V_I=V_{IH}\text{ or }V_{IL};$ $ V_{SW} =V_{CC}-V_{EE};$ see Figure 7	per channel	-	-	$\pm 0.1$	$\mu\text{A}$
			all channels	-	-	$\pm 0.4$	$\mu\text{A}$
ON-state leakage current	$I_{S(ON)}$	$V_{CC}=9.0\text{ V}; V_{EE}=0\text{ V};$ $V_I=V_{IH}\text{ or }V_{IL};  V_{SW} =V_{CC}-V_{EE};$ see Figure 8	-	-	$\pm 0.4$	$\mu\text{A}$	
supply current	$I_{CC}$	$V_I=V_{CC}\text{ or GND};$ $V_{is}=V_{EE}\text{ or }V_{CC};$ $V_{os}=V_{CC}\text{ or }V_{EE};$	$V_{CC}=5.5\text{ V};$ $V_{EE}=0\text{ V}$	-	-	8.0	$\mu\text{A}$
			$V_{CC}=4.5\text{ V};$ $V_{EE}=-4.5\text{ V}$	-	-	16.0	$\mu\text{A}$
additional supply current	$\Delta I_{CC}$	per input; $V_I=V_{CC}-2.1\text{ V};$ other inputs at $V_{CC}\text{ or GND};$ $V_{CC}=4.5\text{ V to }5.5\text{ V}; V_{EE}=0\text{ V}$	-	50	180	$\mu\text{A}$	
input capacitance	$C_I$	-	-	3.5	-	$\text{pF}$	
switch capacitance	$C_{SW}$	independent pins Yn	-	5	-	$\text{pF}$	
		common pins Z	-	25	-	$\text{pF}$	

Note:

[1]  $V_I=V_{IH}\text{ or }V_{IL};$  for test circuit see Figure 5.

[2]  $V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

[3]  $V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.

### 3.3.2、DC Characteristics 2

( $T_{amb} = -40^{\circ}\text{C} \sim 85^{\circ}\text{C}$ , voltages are reference to GND (ground=0V), unless otherwise specified, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
ON resistance (peak)	$R_{ON(peak)}$	$V_{is}=V_{CC}\text{ to }V_{EE};$ $I_{SW}=1000\text{ }\mu\text{A}$	$V_{CC}=4.5\text{ V};$ $V_{EE}=0\text{ V}$	-	-	225	$\Omega$
			$V_{CC}=6.0\text{ V};$ $V_{EE}=0\text{ V}$	-	-	200	$\Omega$
			$V_{CC}=4.5\text{ V};$ $V_{EE}=-4.5\text{ V}$	-	-	165	$\Omega$
ON resistance (rail)	$R_{ON(rail)}$	$V_{is}=V_{EE};$ $I_{SW}=1000\text{ }\mu\text{A}$	$V_{CC}=4.5\text{ V};$ $V_{EE}=0\text{ V}$	-	-	175	$\Omega$
			$V_{CC}=6.0\text{ V};$ $V_{EE}=0\text{ V}$	-	-	150	$\Omega$
			$V_{CC}=4.5\text{ V};$ $V_{EE}=-4.5\text{ V}$	-	-	130	$\Omega$
		$V_{is}=V_{CC};$ $I_{SW}=1000\text{ }\mu\text{A}$	$V_{CC}=4.5\text{ V};$ $V_{EE}=0\text{ V}$	-	-	200	$\Omega$
			$V_{CC}=6.0\text{ V};$	-	-	175	$\Omega$



			$V_{EE} = 0\text{ V}$				
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	-	150	$\Omega$
<b>AiP74HC4051</b>							
HIGH-level input voltage	$V_{IH}$	$V_{CC} = 4.5\text{ V}$		3.15	-	-	V
		$V_{CC} = 6.0\text{ V}$		4.2	-	-	V
		$V_{CC} = 9.0\text{ V}$		6.3	-	-	V
LOW-level input voltage	$V_{IL}$	$V_{CC} = 4.5\text{ V}$		-	-	1.35	V
		$V_{CC} = 6.0\text{ V}$		-	-	1.8	V
		$V_{CC} = 9.0\text{ V}$		-	-	2.7	V
input leakage current	$I_I$	$V_{EE} = 0\text{ V};$ $V_I = V_{CC}\text{ or GND}$	$V_{CC} = 6.0\text{ V}$	-	-	$\pm 1.0$	$\mu\text{A}$
			$V_{CC} = 9.0\text{ V}$	-	-	$\pm 2.0$	$\mu\text{A}$
OFF-state leakage current	$I_{S(OFF)}$	$V_{CC} = 9.0\text{ V};$ $V_{EE} = 0\text{ V};$ $V_I = V_{IH}\text{ or }V_{IL};$ $ V_{SW}  = V_{CC} - V_{EE};$ see Figure 7	per channel	-	-	$\pm 1.0$	$\mu\text{A}$
			all channels	-	-	$\pm 4.0$	$\mu\text{A}$
ON-state leakage current	$I_{S(ON)}$	$V_I = V_{IH}\text{ or }V_{IL};$ $ V_{SW}  = V_{CC} - V_{EE}; V_{CC} = 9.0\text{ V};$ $V_{EE} = 0\text{ V};$ see Figure 8		-	-	$\pm 4.0$	$\mu\text{A}$
supply current	$I_{CC}$	$V_{EE} = 0\text{ V};$ $V_I = V_{CC}\text{ or GND};$ $V_{is} = V_{EE}\text{ or }V_{CC};$ $V_{os} = V_{CC}\text{ or }V_{EE}$	$V_{CC} = 6.0\text{ V}$	-	-	80.0	$\mu\text{A}$
			$V_{CC} = 9.0\text{ V}$	-	-	160.0	$\mu\text{A}$
<b>AiP74HCT4051</b>							
HIGH-level input voltage	$V_{IH}$	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$		2.0	-	-	V
LOW-level input voltage	$V_{IL}$	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$		-	-	0.8	V
input leakage current	$I_I$	$V_I = V_{CC}\text{ or GND};$ $V_{CC} = 5.5\text{ V}; V_{EE} = 0\text{ V}$		-	-	$\pm 1.0$	$\mu\text{A}$
OFF-state leakage current	$I_{S(OFF)}$	$V_{CC} = 9.0\text{ V};$ $V_{EE} = 0\text{ V};$ $V_I = V_{IH}\text{ or }V_{IL};$ $ V_{SW}  = V_{CC} - V_{EE};$ see Figure 7	per channel	-	-	$\pm 1.0$	$\mu\text{A}$
			all channels	-	-	$\pm 4.0$	$\mu\text{A}$
ON-state leakage current	$I_{S(ON)}$	$V_{CC} = 9.0\text{ V}; V_{EE} = 0\text{ V};$ $V_I = V_{IH}\text{ or }V_{IL};  V_{SW}  = V_{CC} - V_{EE};$ see Figure 8		-	-	$\pm 4.0$	$\mu\text{A}$
supply current	$I_{CC}$	$V_I = V_{CC}\text{ or GND};$ $V_{is} = V_{EE}\text{ or }V_{CC};$	$V_{CC} = 5.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	-	80.0	$\mu\text{A}$



		$V_{os} = V_{CC}$ or $V_{EE}$	$V_{CC} = 4.5V$ ; $V_{EE} = -4.5V$	-	-	160	uA
additional supply current	$\Delta I_{CC}$	per input; $V_I = V_{CC} - 2.1V$ ; other inputs at $V_{CC}$ or GND; $V_{CC} = 4.5 V$ to $5.5 V$ ; $V_{EE} = 0 V$		-	-	225	uA

Note:

[1]  $V_I = V_{IH}$  or  $V_{IL}$ ; for test circuit see Figure 5.

[2]  $V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

[3]  $V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.

### 3.3.3. DC Characteristics 3

( $T_{amb} = -40^{\circ}C \sim 105^{\circ}C$ , voltages are reference to GND (ground=0V), unless otherwise specified, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
ON resistance (peak)	$R_{ON(peak)}$	$V_{is} = V_{CC}$ to $V_{EE}$ ; $I_{SW} = 1000 \mu A$	$V_{CC} = 4.5 V$ ; $V_{EE} = 0 V$	-	-	270	$\Omega$
			$V_{CC} = 6.0 V$ ; $V_{EE} = 0 V$	-	-	240	$\Omega$
			$V_{CC} = 4.5 V$ ; $V_{EE} = -4.5 V$	-	-	195	$\Omega$
ON resistance (rail)	$R_{ON(rail)}$	$V_{is} = V_{EE}$ ; $I_{SW} = 1000 \mu A$	$V_{CC} = 4.5 V$ ; $V_{EE} = 0 V$	-	-	210	$\Omega$
			$V_{CC} = 6.0 V$ ; $V_{EE} = 0 V$	-	-	180	$\Omega$
			$V_{CC} = 4.5 V$ ; $V_{EE} = -4.5 V$	-	-	160	$\Omega$
		$V_{is} = V_{CC}$ ; $I_{SW} = 1000 \mu A$	$V_{CC} = 4.5 V$ ; $V_{EE} = 0 V$	-	-	240	$\Omega$
			$V_{CC} = 6.0 V$ ; $V_{EE} = 0 V$	-	-	210	$\Omega$
			$V_{CC} = 4.5 V$ ; $V_{EE} = -4.5 V$	-	-	180	$\Omega$
<b>AiP74HC4051</b>							
HIGH-level input voltage	$V_{IH}$	$V_{CC} = 4.5 V$	3.15	-	-	V	
		$V_{CC} = 6.0 V$	4.2	-	-	V	
		$V_{CC} = 9.0 V$	6.3	-	-	V	
LOW-level input voltage	$V_{IL}$	$V_{CC} = 4.5 V$	-	-	1.35	V	
		$V_{CC} = 6.0 V$	-	-	1.8	V	
		$V_{CC} = 9.0 V$	-	-	2.7	V	
input leakage current	$I_I$	$V_{EE} = 0 V$ ; $V_I = V_{CC}$ or GND	$V_{CC} = 6.0 V$	-	-	$\pm 1.0$	uA
			$V_{CC} = 9.0 V$	-	-	$\pm 2.0$	uA



OFF-state leakage current	$I_{S(OFF)}$	$V_{CC}=9.0\text{ V};$ $V_{EE}=0\text{ V};$ $V_I=V_{IH}\text{ or }V_{IL};$ $ V_{SW} =V_{CC}-V_{EE};$ see Figure 7	per channel	-	-	$\pm 1.0$	$\mu\text{A}$
			all channels	-	-	$\pm 4.0$	$\mu\text{A}$
ON-state leakage current	$I_{S(ON)}$	$V_I=V_{IH}\text{ or }V_{IL};$ $ V_{SW} =V_{CC}-V_{EE}; V_{CC}=9.0\text{ V};$ $V_{EE}=0\text{ V};$ see Figure 8	-	-	$\pm 4.0$	$\mu\text{A}$	
supply current	$I_{CC}$	$V_{EE}=0\text{ V};$ $V_I=V_{CC}\text{ or GND};$ $V_{is}=V_{EE}\text{ or }V_{CC};$ $V_{os}=V_{CC}\text{ or }V_{EE}$	$V_{CC}=6.0\text{ V}$	-	-	160.0	$\mu\text{A}$
			$V_{CC}=9.0\text{ V}$	-	-	320.0	$\mu\text{A}$
<b>AiP74HCT4051</b>							
HIGH-level input voltage	$V_{IH}$	$V_{CC}=4.5\text{ V to }5.5\text{ V}$	2.0	-	-	V	
LOW-level input voltage	$V_{IL}$	$V_{CC}=4.5\text{ V to }5.5\text{ V}$	-	-	0.8	V	
input leakage current	$I_I$	$V_I=V_{CC}\text{ or GND};$ $V_{CC}=5.5\text{ V}; V_{EE}=0\text{ V}$	-	-	$\pm 1.0$	$\mu\text{A}$	
OFF-state leakage current	$I_{S(OFF)}$	$V_{CC}=9.0\text{ V};$ $V_{EE}=0\text{ V};$ $V_I=V_{IH}\text{ or }V_{IL};$ $ V_{SW} =V_{CC}-V_{EE};$ see Figure 7	per channel	-	-	$\pm 1.0$	$\mu\text{A}$
			all channels	-	-	$\pm 4.0$	$\mu\text{A}$
ON-state leakage current	$I_{S(ON)}$	$V_{CC}=9.0\text{ V}; V_{EE}=0\text{ V};$ $V_I=V_{IH}\text{ or }V_{IL};  V_{SW} =V_{CC}-V_{EE};$ see Figure 8	-	-	$\pm 4.0$	$\mu\text{A}$	
supply current	$I_{CC}$	$V_I=V_{CC}\text{ or GND};$ $V_{is}=V_{EE}\text{ or }V_{CC};$ $V_{os}=V_{CC}\text{ or }V_{EE}$	$V_{CC}=5.5\text{ V};$ $V_{EE}=0\text{ V}$	-	-	160.0	$\mu\text{A}$
			$V_{CC}=4.5\text{ V};$ $V_{EE}=-4.5\text{ V}$	-	-	320.0	$\mu\text{A}$
additional supply current	$\Delta I_{CC}$	per input; $V_I=V_{CC}-2.1\text{ V};$ other inputs at $V_{CC}\text{ or GND};$ $V_{CC}=4.5\text{ V to }5.5\text{ V}; V_{EE}=0\text{ V}$	-	-	245	$\mu\text{A}$	

Note:

[1]  $V_I=V_{IH}\text{ or }V_{IL};$  for test circuit see Figure 5.

[2]  $V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

[3]  $V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.



### 3.3.4. AC Characteristics 1

( $T_{amb}=25^{\circ}C$ ,  $GND = 0 V$ ;  $t_r = t_f = 6 ns$ ;  $C_L = 50 pF$ ; unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit				
<b>AiP74HC4051</b>										
propagation delay	$t_{pd}$	$V_{is}$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 9 <sup>[1]</sup>	$V_{CC} = 4.5 V$ ; $V_{EE} = 0 V$	-	5	12	ns			
			$V_{CC} = 6.0 V$ ; $V_{EE} = 0 V$	-	4	10	ns			
			$V_{CC} = 4.5 V$ ; $V_{EE} = -4.5 V$	-	4	8	ns			
turn-on time	$t_{on}$	$\bar{E}$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5 V$ ; $V_{EE} = 0 V$	-	29	69	ns			
			$V_{CC} = 5.0 V$ ; $V_{EE} = 0 V$ ; $C_L = 15 pF$	-	22	-	ns			
			$V_{CC} = 6.0 V$ ; $V_{EE} = 0 V$	-	21	59	ns			
			$V_{CC} = 4.5 V$ ; $V_{EE} = -4.5 V$	-	18	51	ns			
		$Sn$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5 V$ ; $V_{EE} = 0 V$	-	28	69	ns			
			$V_{CC} = 5.0 V$ ; $V_{EE} = 0 V$ ; $C_L = 15 pF$	-	20	-	ns			
			$V_{CC} = 6.0 V$ ; $V_{EE} = 0 V$	-	19	59	ns			
			$V_{CC} = 4.5 V$ ; $V_{EE} = -4.5 V$	-	16	51	ns			
			turn-off time	$t_{off}$	$\bar{E}$ to $V_{os}$ ; $R_L = 1 k\Omega$ ; see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5 V$ ; $V_{EE} = 0 V$	-	31	58	ns
						$V_{CC} = 5.0 V$ ; $V_{EE} = 0 V$ ; $C_L = 15 pF$	-	18	-	ns
$V_{CC} = 6.0 V$ ; $V_{EE} = 0 V$	-	17				49	ns			
$V_{CC} = 4.5 V$ ; $V_{EE} = -4.5 V$	-	18				42	ns			
$Sn$ to $V_{os}$ ; $R_L = 1 k\Omega$ ; see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5 V$ ; $V_{EE} = 0 V$	-	25	58	ns					
	$V_{CC} = 5.0 V$ ; $V_{EE} = 0 V$ ; $C_L = 15 pF$	-	19	-	ns					



			$V_{CC} = 6.0\text{ V};$ $V_{EE} = 0\text{ V}$	-	18	49	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	18	42	ns
power dissipation capacitance	$C_{PD}$	per switch; $V_I = \text{GND to } V_{CC}^{[4]}$		-	25	-	pF
<b>AiP74HCT4051</b>							
propagation delay	$t_{pd}$	$V_{is}$ to $V_{os};$ $R_L = \infty \Omega;$ see Figure 9 <sup>[1]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	5	12	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	4	8	ns
turn-on time	$t_{on}$	$\bar{E}$ to $V_{os};$ $R_L = \infty \Omega;$ see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	26	55	ns
			$V_{CC} = 5.0\text{ V};$ $V_{EE} = 0\text{ V};$ $C_L = 15\text{ pF}$	-	22	-	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	16	39	ns
		$S_n$ to $V_{os};$ $R_L = \infty \Omega;$ see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	28	55	ns
			$V_{CC} = 5.0\text{ V};$ $V_{EE} = 0\text{ V};$ $C_L = 15\text{ pF}$	-	24	-	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	16	39	ns
turn-off time	$t_{off}$	$\bar{E}$ to $V_{os};$ $R_L = 1\text{ k}\Omega;$ see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	19	45	ns
			$V_{CC} = 5.0\text{ V};$ $V_{EE} = 0\text{ V};$ $C_L = 15\text{ pF}$	-	16	-	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	16	32	ns
		$S_n$ to $V_{os};$ $R_L = 1\text{ k}\Omega;$ see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	23	45	ns
			$V_{CC} = 5.0\text{ V};$ $V_{EE} = 0\text{ V};$ $C_L = 15\text{ pF}$	-	20	-	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	16	32	ns
power dissipation capacitance	$C_{PD}$	per switch; $V_I = \text{GND to } V_{CC}-1.5\text{V}^{[4]}$		-	25	-	pF





Note:

- [1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .
- [2]  $t_{on}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .
- [3]  $t_{off}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .
- [4]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in uW).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum \{(C_L + C_{SW}) \times V_{CC}^2 \times f_o\}$  where:  
 $f_i$  = input frequency in MHz;  
 $f_o$  = output frequency in MHz;  
 $N$  = number of inputs switching;  
 $\sum \{(C_L + C_{SW}) \times V_{CC}^2 \times f_o\}$  = sum of outputs;  
 $C_L$  = output load capacitance in pF;  
 $C_{SW}$  = switch capacitance in pF;  
 $V_{CC}$  = supply voltage in V.
- [5] For test circuit see Figure 11.
- [6]  $V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.
- [7]  $V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.

### 3.3.5、AC Characteristics 2

( $T_{amb} = -40^\circ\text{C} \sim +85^\circ\text{C}$ ; GND = 0 V;  $t_r = t_f = 6$  ns;  $C_L = 50$  pF; unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>AiP74HC4051</b>							
propagation delay	$t_{pd}$	$V_{is}$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 9 <sup>[1]</sup>	$V_{CC} = 4.5$ V; $V_{EE} = 0$ V	-	-	15	ns
			$V_{CC} = 6.0$ V; $V_{EE} = 0$ V	-	-	13	ns
			$V_{CC} = 4.5$ V; $V_{EE} = -4.5$ V	-	-	10	ns
turn-on time	$t_{on}$	$\bar{E}$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5$ V; $V_{EE} = 0$ V	-	-	86	ns
			$V_{CC} = 6.0$ V; $V_{EE} = 0$ V	-	-	73	ns
			$V_{CC} = 4.5$ V; $V_{EE} = -4.5$ V	-	-	64	ns
		$S_n$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5$ V; $V_{EE} = 0$ V	-	-	86	ns
			$V_{CC} = 6.0$ V; $V_{EE} = 0$ V	-	-	73	ns
			$V_{CC} = 4.5$ V; $V_{EE} = -4.5$ V	-	-	64	ns
turn-off time	$t_{off}$	$\bar{E}$ to $V_{os}$ ; $R_L = 1$ k $\Omega$ ; see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5$ V; $V_{EE} = 0$ V	-	-	73	ns
			$V_{CC} = 6.0$ V; $V_{EE} = 0$ V	-	-	62	ns



			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	-	53	ns
		Sn to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	-	73	ns
			$V_{CC} = 6.0\text{ V};$ $V_{EE} = 0\text{ V}$	-	-	62	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	-	53	ns
<b>AiP74HCT4051</b>							
propagation delay	$t_{pd}$	$V_{is}$ to $V_{os}$ ; $R_L = \infty\ \Omega$ ; see Figure 9 <sup>[1]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	-	15	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	-	10	ns
turn-on time	$t_{on}$	$\bar{E}$ to $V_{os}$ ; $R_L = \infty\ \Omega$ ; see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	-	69	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	-	49	ns
		Sn to $V_{os}$ ; $R_L = \infty\ \Omega$ ; see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	-	69	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	-	49	ns
turn-off time	$t_{off}$	$\bar{E}$ to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	-	56	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	-	40	ns
		Sn to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5\text{ V};$ $V_{EE} = 0\text{ V}$	-	-	56	ns
			$V_{CC} = 4.5\text{ V};$ $V_{EE} = -4.5\text{ V}$	-	-	40	ns

Note:

[1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .

[2]  $t_{on}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[3]  $t_{off}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

[4] For test circuit see Figure 11.

[5]  $V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

[6]  $V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.



### 3.3.6、 AC Characteristics 3

( $T_{amb} = -40^{\circ}\text{C} \sim +105^{\circ}\text{C}$ ;  $\text{GND} = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>AiP74HC4051</b>							
propagation delay	$t_{pd}$	$V_{is}$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 9 <sup>[1]</sup>	$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	18	ns
			$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	15	ns
			$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	12	ns
turn-on time	$t_{on}$	$\bar{E}$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	104	ns
			$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	88	ns
			$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	77	ns
		$\text{Sn}$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	104	ns
			$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	88	ns
			$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	77	ns
turn-off time	$t_{off}$	$\bar{E}$ to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	87	ns
			$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	74	ns
			$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	72	ns
		$\text{Sn}$ to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	87	ns
			$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	74	ns
			$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	72	ns
<b>AiP74HCT4051</b>							
propagation delay	$t_{pd}$	$V_{is}$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 9 <sup>[1]</sup>	$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	18	ns
			$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	12	ns
turn-on time	$t_{on}$	$\bar{E}$ to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	-	83	ns
			$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	-	59	ns



		Sn to $V_{os}$ ; $R_L = \infty \Omega$ ; see Figure 10 <sup>[2]</sup>	$V_{CC} = 4.5 \text{ V}$ ; $V_{EE} = 0 \text{ V}$	-	-	83	ns
			$V_{CC} = 4.5 \text{ V}$ ; $V_{EE} = -4.5 \text{ V}$	-	-	59	ns
turn-off time	$t_{off}$	$\bar{E}$ to $V_{os}$ ; $R_L = 1 \text{ k}\Omega$ ; see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5 \text{ V}$ ; $V_{EE} = 0 \text{ V}$	-	-	68	ns
			$V_{CC} = 4.5 \text{ V}$ ; $V_{EE} = -4.5 \text{ V}$	-	-	48	ns
		Sn to $V_{os}$ ; $R_L = 1 \text{ k}\Omega$ ; see Figure 10 <sup>[3]</sup>	$V_{CC} = 4.5 \text{ V}$ ; $V_{EE} = 0 \text{ V}$	-	-	68	ns
			$V_{CC} = 4.5 \text{ V}$ ; $V_{EE} = -4.5 \text{ V}$	-	-	48	ns

Note:

[1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .

[2]  $t_{on}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[3]  $t_{off}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

[4] For test circuit see Figure 11.

[5]  $V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

[6]  $V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.

### 3.3.7、AC Characteristics 4

( $T_{amb} = 25^\circ\text{C}$ ;  $GND = 0\text{V}$ ;  $C_L = 50\text{pF}$ ; recommended conditions and typical values.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit		
sine-wave distortion	$d_{sin}$	$f_i = 1 \text{ kHz}$ ; $R_L = 10 \text{ k}\Omega$ ; see Figure 12	$V_{is} = 4.0 \text{ V (p-p)}$ ; $V_{CC} = 2.25 \text{ V}$ ; $V_{EE} = -2.25 \text{ V}$	-	0.04	-	%	
			$V_{is} = 8.0 \text{ V (p-p)}$ ; $V_{CC} = 4.5 \text{ V}$ ; $V_{EE} = -4.5 \text{ V}$	-	0.02	-	%	
		$f_i = 10 \text{ kHz}$ ; $R_L = 10 \text{ k}\Omega$ ; see Figure 12	$V_{is} = 4.0 \text{ V (p-p)}$ ; $V_{CC} = 2.25 \text{ V}$ ; $V_{EE} = -2.25 \text{ V}$	-	0.12	-	%	
			$V_{is} = 8.0 \text{ V (p-p)}$ ; $V_{CC} = 4.5 \text{ V}$ ; $V_{EE} = -4.5 \text{ V}$	-	0.06	-	%	
isolation (OFF-state)	$\alpha_{iso}$	$R_L = 600 \Omega$ ; $f_i = 1 \text{ MHz}$ ; see Figure 13	$V_{CC} = 2.25 \text{ V}$ ; <sup>[1]</sup> $V_{EE} = -2.25 \text{ V}$	-	-50	-	dB	
			$V_{CC} = 4.5 \text{ V}$ ; <sup>[1]</sup> $V_{EE} = -4.5 \text{ V}$	-	-50	-	dB	
crosstalk voltage	$V_{ct}$	peak-to-peak value; between control and		$V_{CC} = 4.5 \text{ V}$ ; $V_{EE} = 0 \text{ V}$	-	110	-	mV



		any switch; $R_L = 600 \Omega$ ; $f_i = 1\text{MHz}$ ; $\bar{E}$ or Sn square wave between $V_{CC}$ and GND; $t_r = t_f = 6\text{ns}$ ; see Figure 14	$V_{CC} = 4.5\text{V}$ ; $V_{EE} = -4.5\text{V}$	-	220	-	mV
-3dB frequency response	$f_{(-3\text{dB})}$	$R_L = 50 \Omega$ ; see Figure 15	$V_{CC} = 2.25\text{V}$ ; <sup>[2]</sup> $V_{EE} = -2.25\text{V}$	-	170	-	MHz
			$V_{CC} = 4.5\text{V}$ ; <sup>[2]</sup> $V_{EE} = -4.5\text{V}$	-	180	-	MHz

Note:

[1] Adjust input voltage  $V_{is}$  to 0 dBm level (0 dBm = 1 mW into 600  $\Omega$ ).

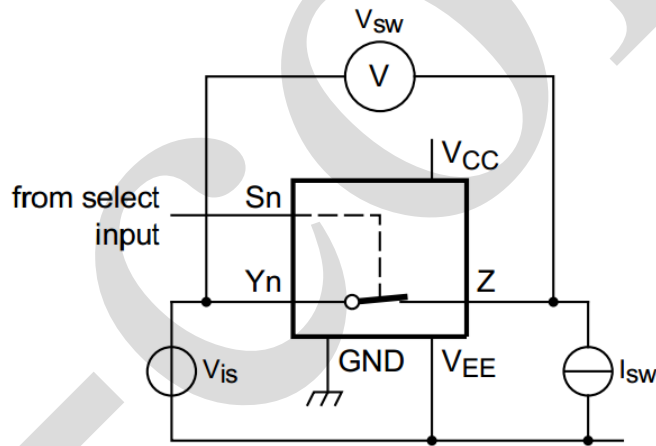
[2] Adjust input voltage  $V_{is}$  to 0 dBm level at  $V_{os}$  for 1 MHz (0 dBm = 1 mW into 50  $\Omega$ ).

[3]  $V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

[4]  $V_{os}$  is the output voltage at a Yn or Z terminal, whichever is assigned as an output.

## 4、 Testing Circuit

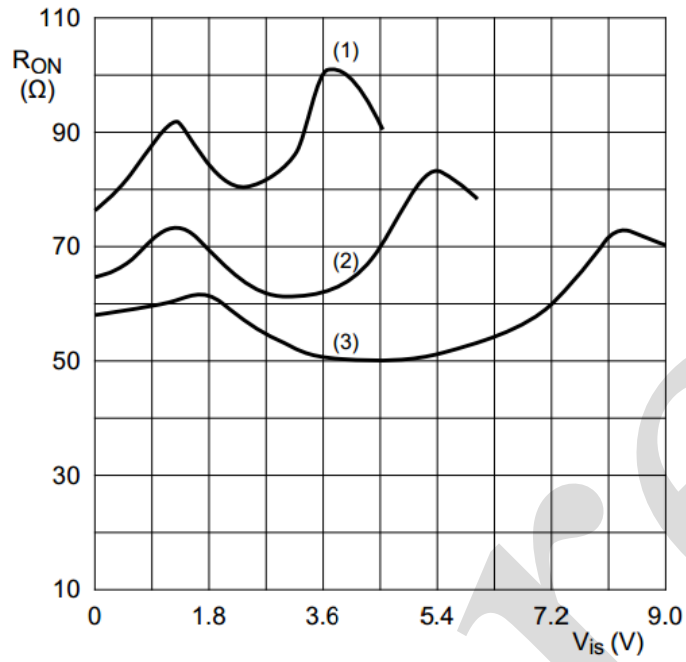
### 4.1、 DC Testing Circuit 1



$$V_{is} = 0\text{V to } (V_{CC} - V_{EE})$$

$$R_{ON} = V_{SW} / I_{SW}$$

Figure 5. Test circuit for measuring  $R_{ON}$



$V_{is} = 0V \text{ to } (V_{CC} - V_{EE})$

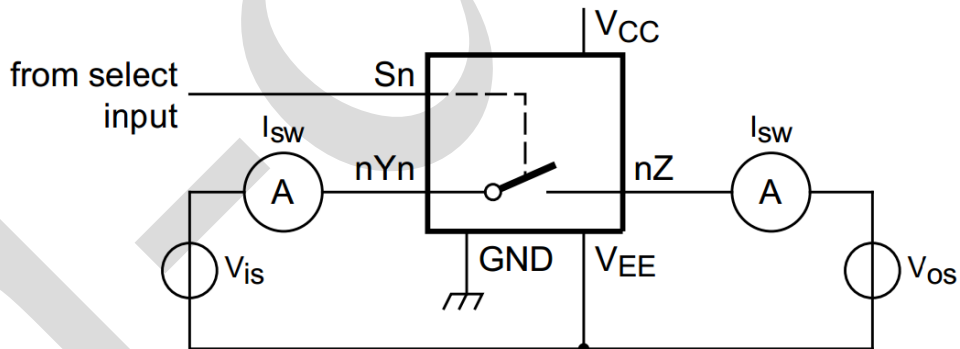
(1)  $V_{CC} = 4.5V$

(2)  $V_{CC} = 6V$

(3)  $V_{CC} = 9V$

Figure 6. Typical  $R_{ON}$  as a function of input voltage  $V_{is}$

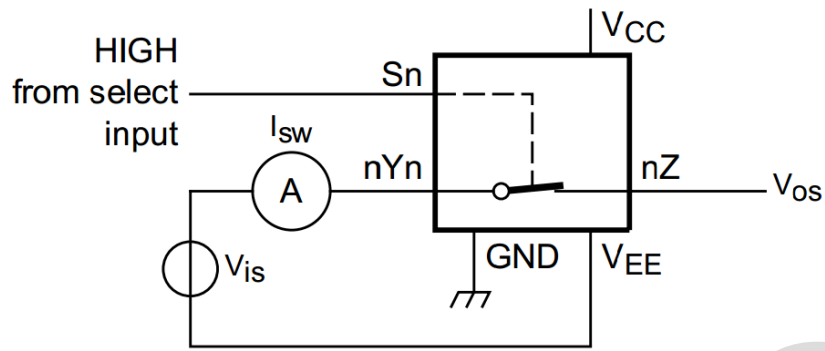
#### 4.2、DC Testing Circuit 2



$V_{is} = V_{CC}$  and  $V_{os} = V_{EE}$ .

$V_{is} = V_{EE}$  and  $V_{os} = V_{CC}$ .

Figure 7. Test circuit for measuring OFF-state current



$V_{is} = V_{CC}$  and  $V_{os} = \text{open-circuit}$ .

$V_{is} = V_{EE}$  and  $V_{os} = \text{open-circuit}$ .

Figure 8. Test circuit for measuring ON-state current

### 4.3. AC Testing Waveforms

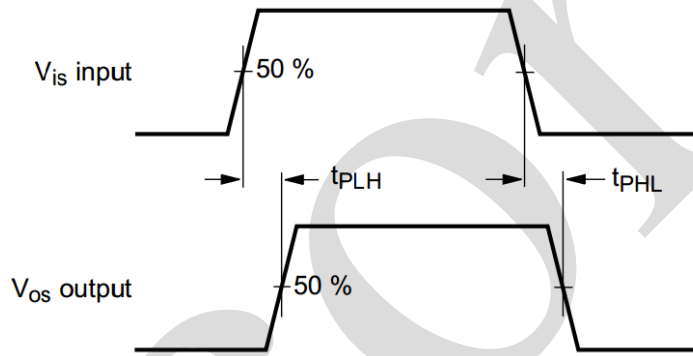
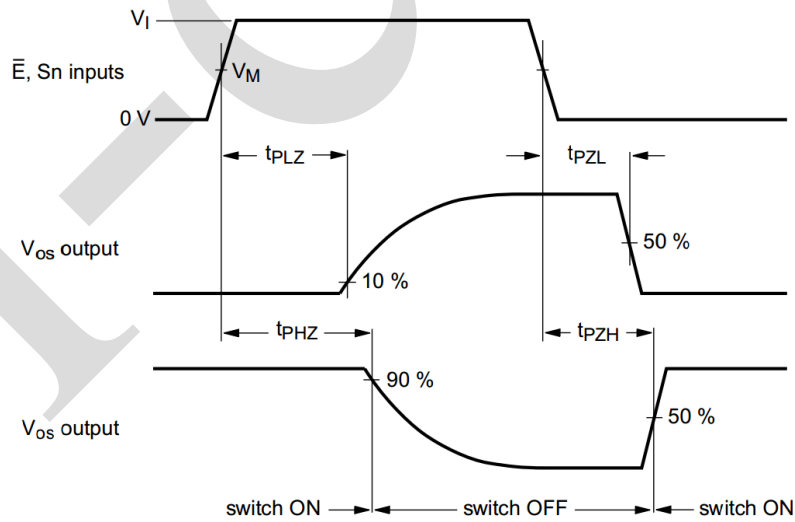


Figure 9. Input ( $V_{is}$ ) to output ( $V_{os}$ ) propagation delays



For AiP74HC4051:  $V_M = 0.5 \times V_{CC}$ .

For AiP74HCT4051:  $V_M = 1.3 \text{ V}$ .

Figure 10. Turn-on and turn-off times



4.4、AC Testing Circuit 1

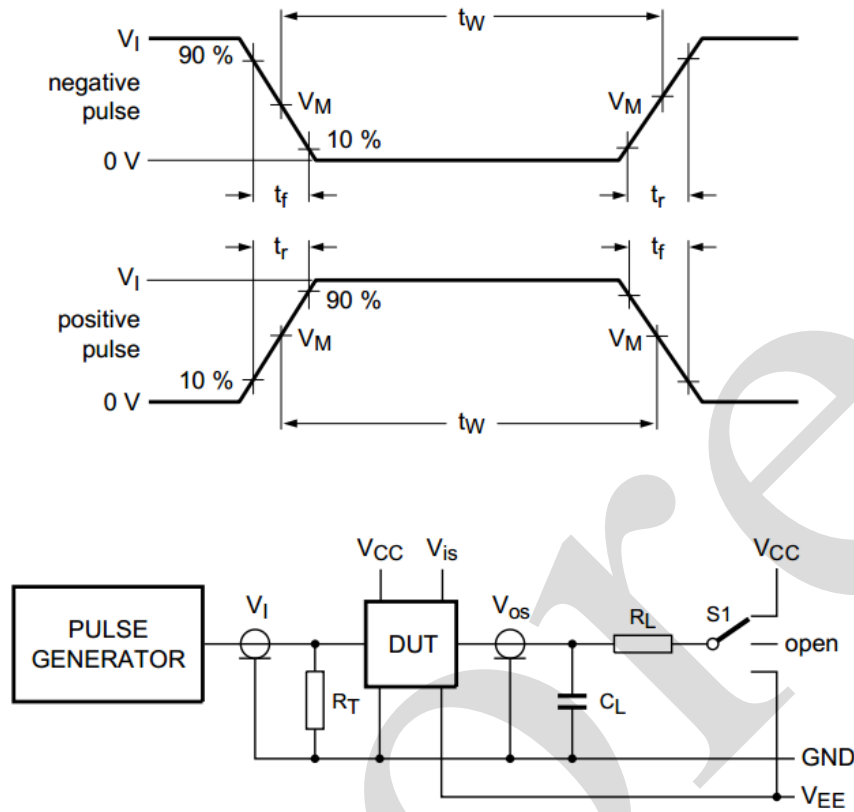


Figure 11. Test circuit for measuring switching times

Definitions for test circuit:

$R_T$  = termination resistance should be equal to the output impedance  $Z_O$  of the pulse generator.

$C_L$  = load capacitance including jig and probe capacitance.

$R_L$  = load resistance.

S1 = Test selection switch.

4.5、Test Data

Test	Input				Load		S1 position
	$V_I$	$V_{is}$	$t_r, t_f$		$C_L$	$R_L$	
			at $f_{max}$	other <sup>[1]</sup>			
$t_{PHL}, t_{PLH}$	[2]	pulse	< 2ns	6ns	50pF	1kΩ	open
$t_{PZH}, t_{PHZ}$	[2]	$V_{CC}$	< 2ns	6ns	50pF	1kΩ	$V_{EE}$
$t_{PZL}, t_{PLZ}$	[2]	$V_{EE}$	< 2ns	6ns	50pF	1kΩ	$V_{CC}$

Note:

[1]  $t_r = t_f = 6$  ns; when measuring  $f_{max}$ , there is no constraint to  $t_r$  and  $t_f$  with 50 % duty factor.

[2]  $V_I$  values:

For AiP74HC4051:  $V_I = V_{CC}$ .

For AiP74HCT4051:  $V_I = 3V$ .





4.6、 AC Testing Circuit 2

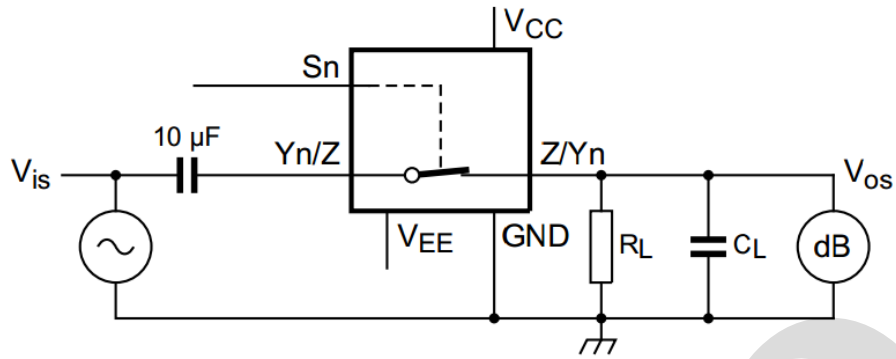
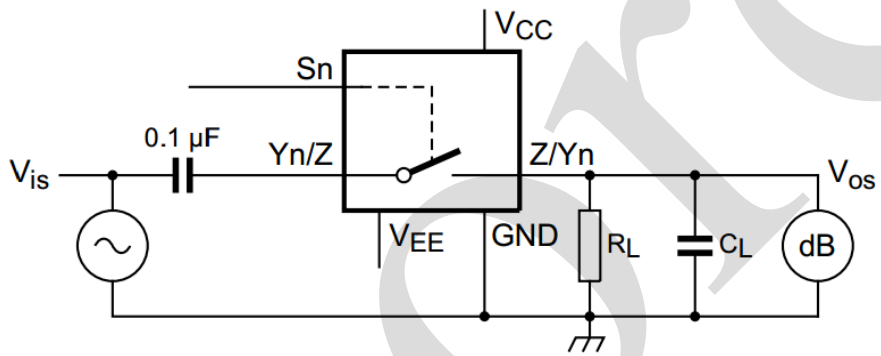
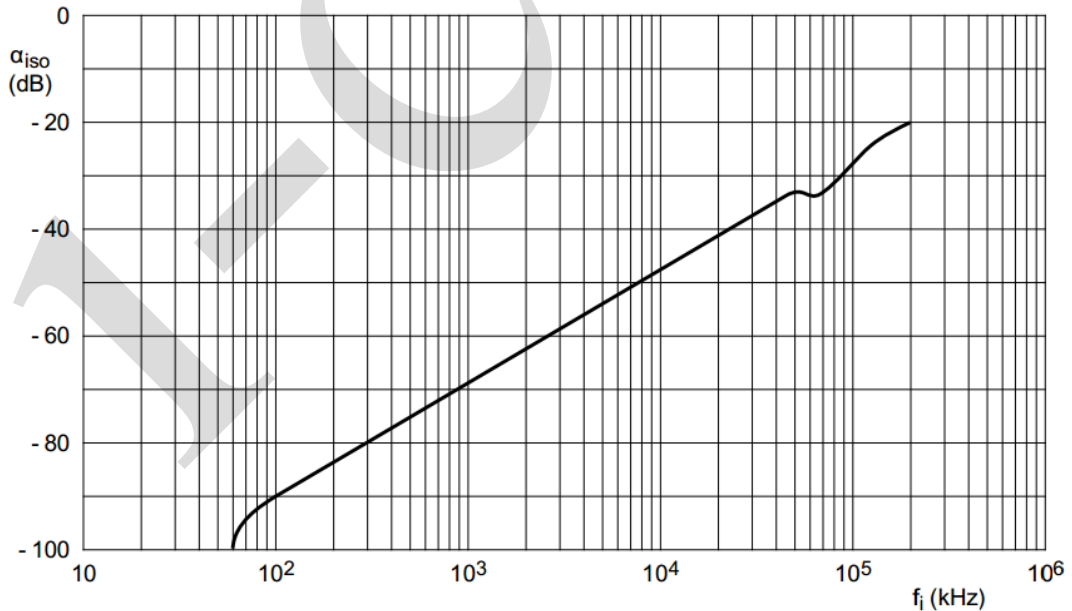


Figure 12. Test circuit for measuring sine-wave distortion



$V_{CC} = 4.5 \text{ V}; \text{GND} = 0 \text{ V}; V_{EE} = -4.5 \text{ V}; R_L = 600 \Omega; R_S = 1 \text{ k}\Omega.$

a. Test circuit



b. Isolation (OFF-state) as a function of frequency

Figure 13. Test circuit for measuring isolation (OFF-state)

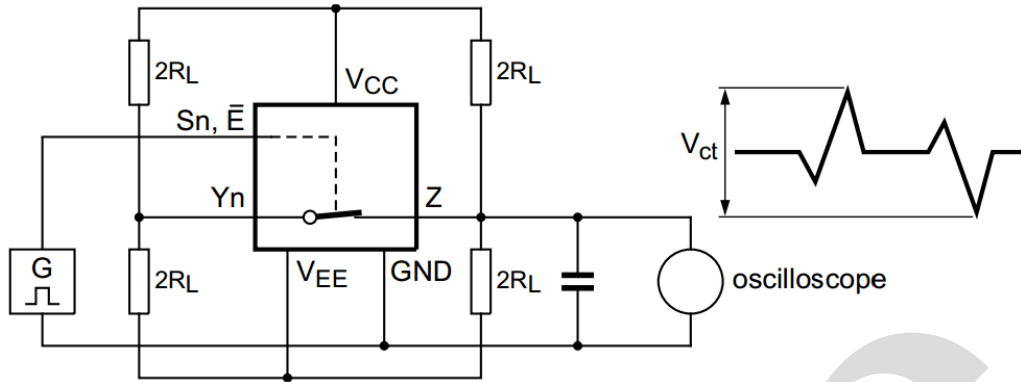
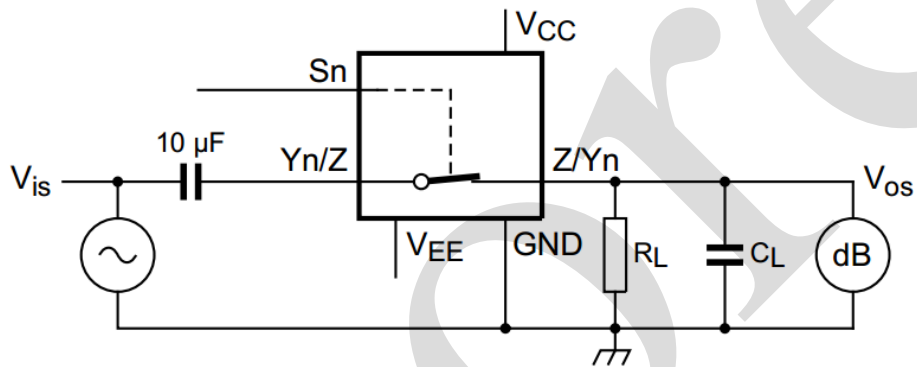
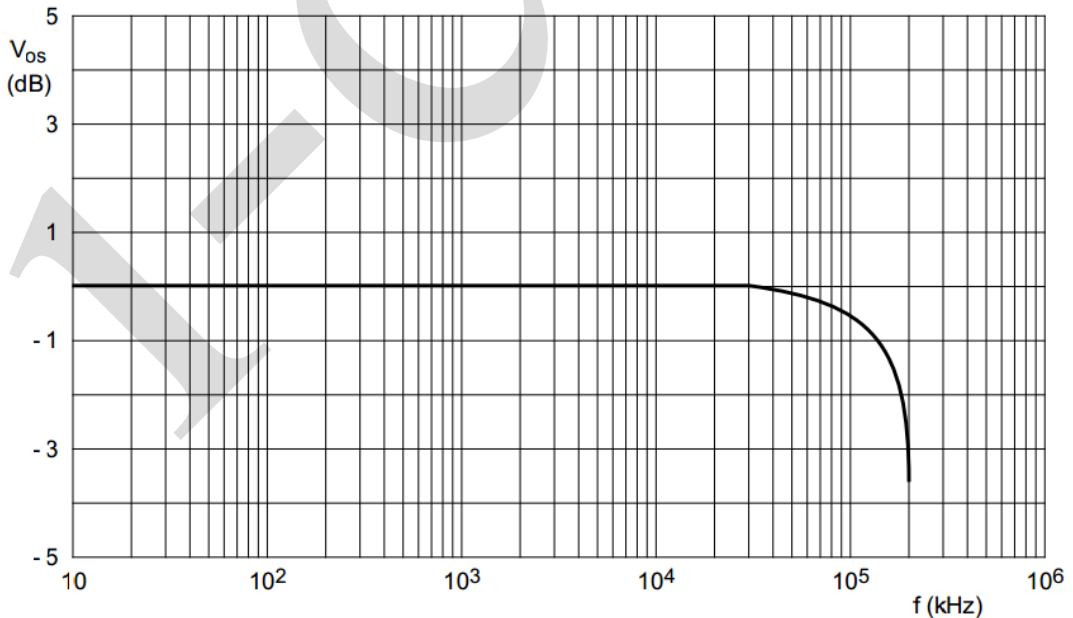


Figure 14. Test circuit for measuring crosstalk between control input and any switch



$V_{CC} = 4.5 \text{ V}; GND = 0 \text{ V}; V_{EE} = -4.5 \text{ V}; R_L = 50 \Omega; R_S = 1 \text{ k}\Omega$

a. Test circuit



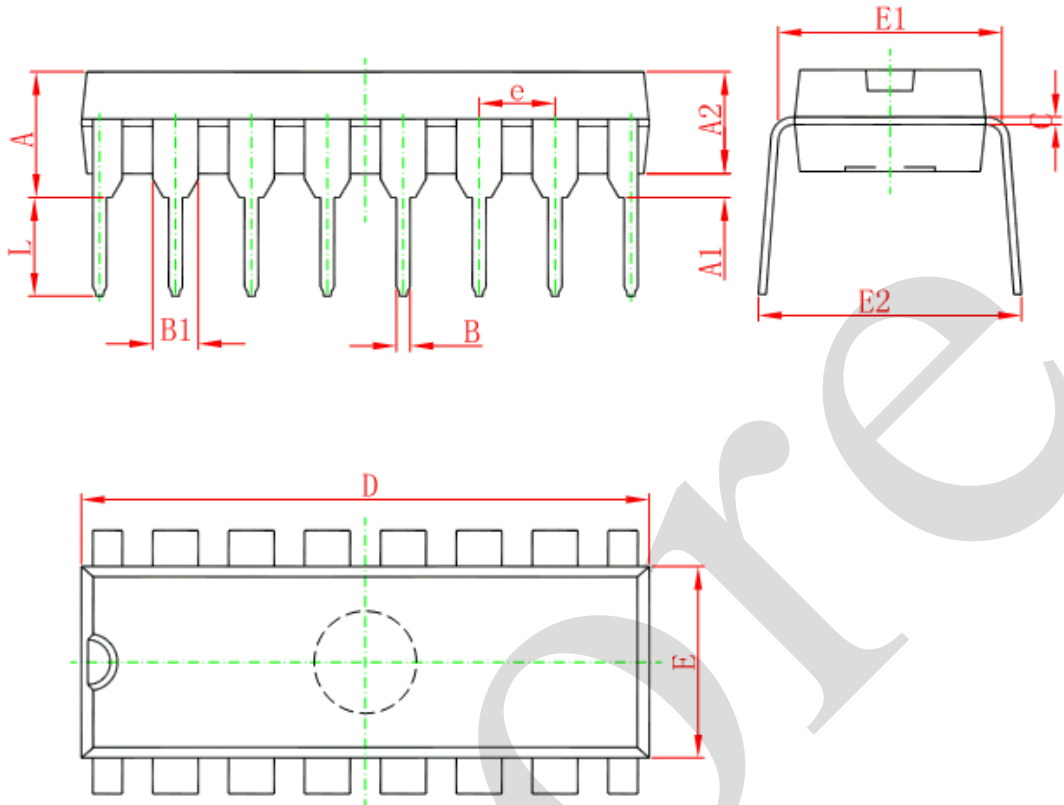
b. Typical frequency response

Figure 15. Test circuit for frequency response



## 5、Package Information

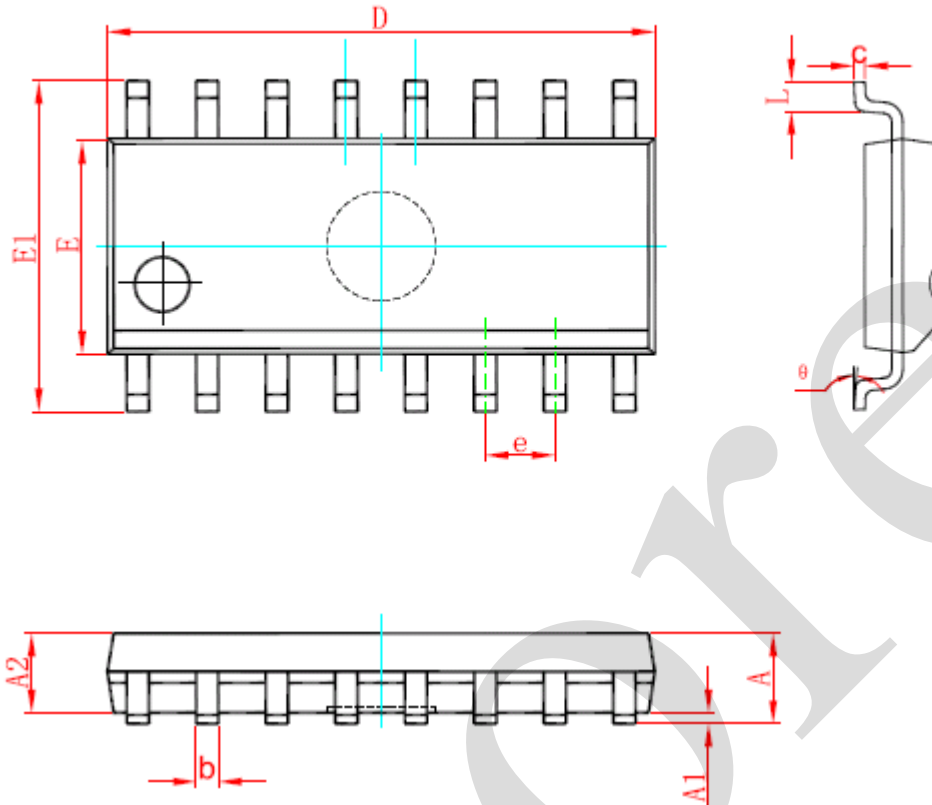
### 5.1、DIP16



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524 (BSC)		0.060 (BSC)	
C	0.204	0.360	0.008	0.014
D	18.800	19.200	0.740	0.756
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540 (BSC)		0.100 (BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354



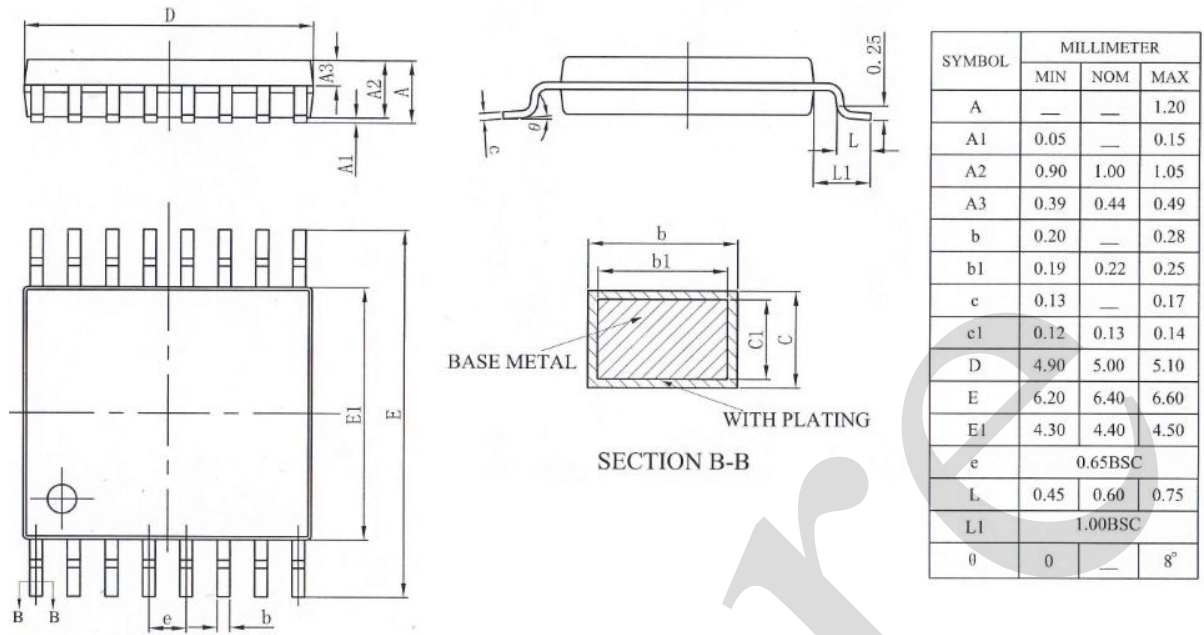
## 5.2、SOP16



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	9.800	10.200	0.386	0.402
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

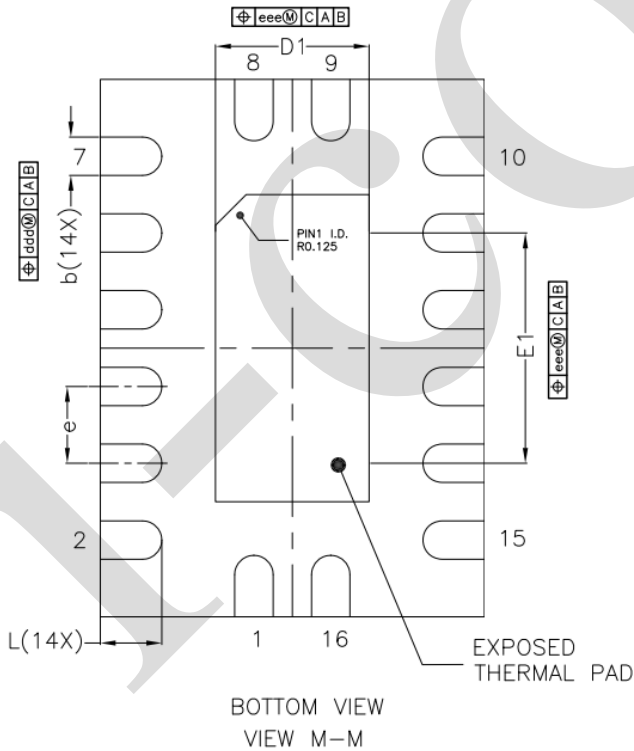
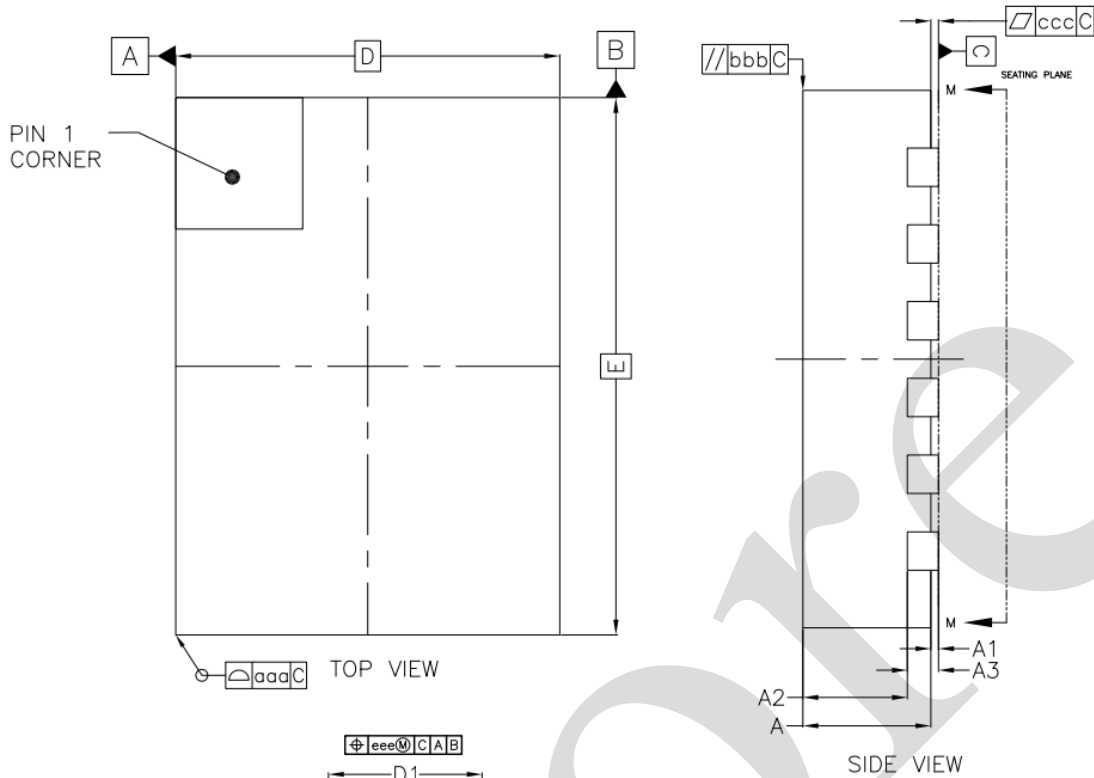


## 5.3、TSSOP16





## 5.4. DHVQFN16



DESCRIPTION	SYMBOL	MILLIMETER			
		MIN	NOM	MAX	
TOTAL THICKNESS	A	0.80	0.85	1.00	
STAND OFF	A1	0.00	--	0.05	
MOLD THICKNESS	A2	0.60	0.65	0.70	
L/F THICKNESS	A3	0.203 REF			
BODY SIZE	X	D	2.40	2.50	2.60
	Y	E	3.40	3.50	3.60
LEAD PITCH	e	0.50 BSC			
LEAD WIDTH	b	0.18	0.25	0.30	
LEAD LENGTH	L	0.30	0.40	0.50	
EP SIZE	D1	0.85	1.00	1.15	
	E1	1.85	2.00	2.15	
Tolerance of form and position					
PKG EDGE TOLERANCE	aaa	0.1			
MOLD FLATNESS	bbb	0.1			
COPLANARITY	ccc	0.05			
LEAD OFFSET	ddd	0.1			
EXPOSED PAD OFFSET	eee	0.1			

NOTES  
 1.0 COPLANARITY APPLIES TO LEADS, CORNER LEADS AND DIE ATTACH PAD.



## 6、 Statements And Notes

### 6.1、 The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

### 6.2、 Notion

Recommended carefully reading this information before the use of this product;

The information in this document are subject to change without notice;

This information is using to the reference only, the company is not responsible for any loss;

The company is not responsible for the any infringement of the third party patents or other rights of the responsibility.