AiP74HC/HCT4053
Triple 2-channel Analog
Multiplexer/Demultiplexer

Product Specification

Specification Revision History:

Version	Date	Description
2019-12-A1	2019-12	New
2021-10-A2	2021-10	Modify Ordering Information
2022-02-A3	2022-02	Modify Ordering Information
2022-03-A4	2022-03	Modify ambient temperature to -40℃~+105℃ and add electrical characteristics of -40℃~+105℃

1、General Description

The AiP74HC/HCT4053 is a triple single-pole double-throw analog switch (3×SPDT) suitable for use in analog or digital 2:1 multiplexer/demultiplexer applications. Each switch features a digital select input (Sn), two independent inputs/outputs (nY0 and nY1) and a common input/output (nZ). A digital enable input ($\overline{E}$) is common to all switches. When $\overline{E}$ 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
  AiP74HC4053: from 3V to 9V
  AiP74HCT4053: from 4.5V to 5.5V
- Low ON resistance:
  – 80 Ω (typical) at V_{CC} - V_{EE} = 4.5 V
  – 70 Ω (typical) at V_{CC} - V_{EE} = 6.0 V
  – 60 Ω (typical) at V_{CC} - V_{EE} = 9.0 V
- Logic level translation: to enable 5 V logic to communicate with ±5 V analog signals
- Typical “break before make” built-in
- Specified from -40℃ to +105℃
- Packaging information: DIP16/SOP16/TSSOP16

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
AiP74HC4053DA16.TB	DIP16	74HC4053	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HCT4053DA16.TB	DIP16	74HCT4053	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HC4053SA16.TB	SOP16	74HC4053	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HCT4053SA16.TB	SOP16	74HCT4053	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HC4053TA16.TB	TSSOP16	74HC4053	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP74HCT4053TA16.TB	TSSOP16	74HCT4053	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
AiP74HC4053SA16.TR	SOP16	74HC4053	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
AiP74HCT4053SA16.TR	SOP16	74HCT4053	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
AiP74HC4053TA16.TR	TSSOP16	74HC4053	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm
AiP74HCT4053TA16.TR	TSSOP16	74HCT4053	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm

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

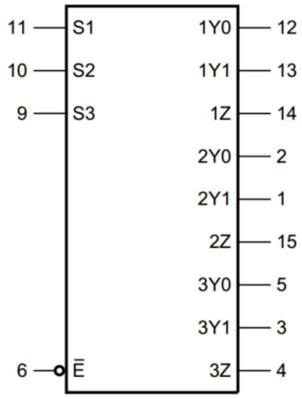


Figure 1. Logic symbol

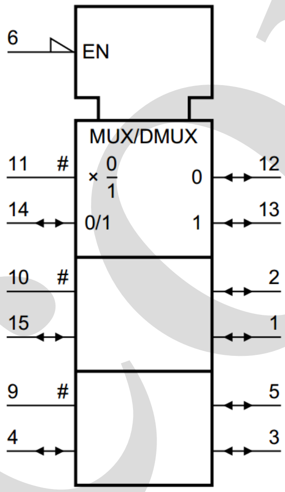


Figure 2. IEC logic symbol

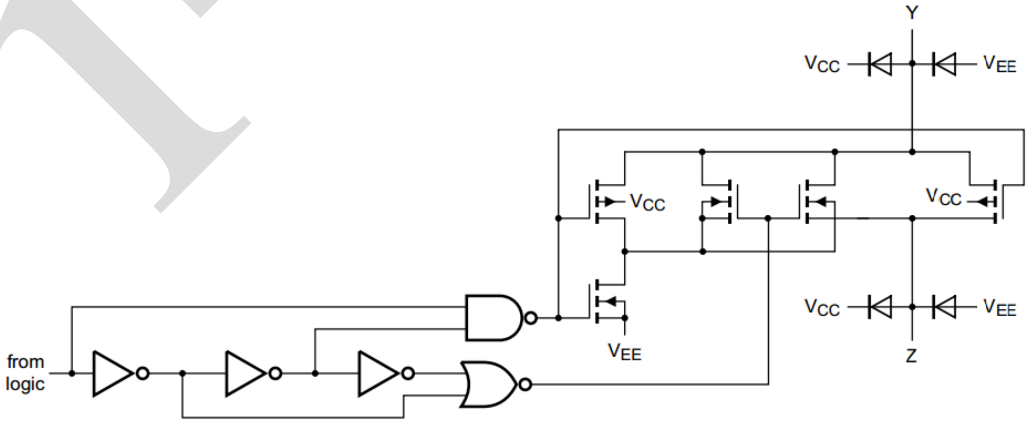


Figure 3. Schematic diagram (one switch)

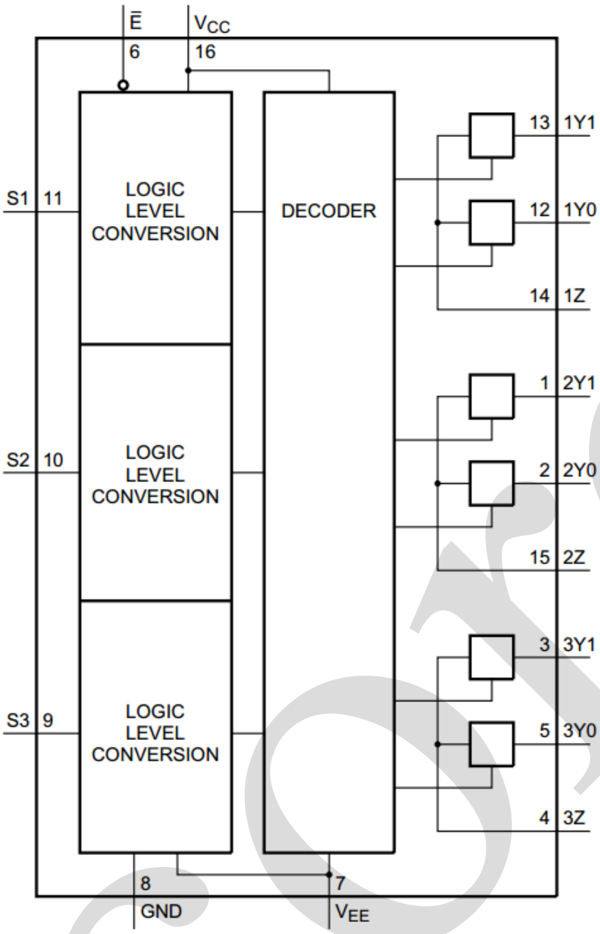
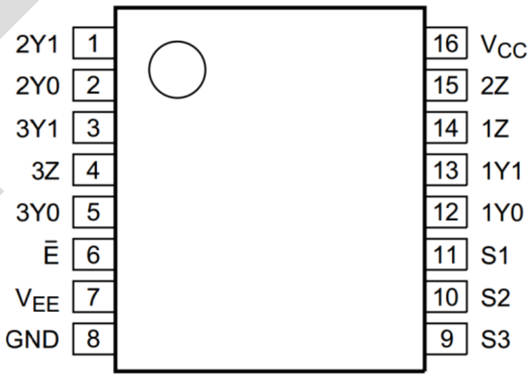


Figure 4. Functional diagram

2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	2Y1	independent input or output
2	2Y0	independent input or output
3	3Y1	independent input or output
4	3Z	common output or input
5	3Y0	independent input or output
6	$\overline{E}$	enable input (active LOW)
7	V_{EE}	supply voltage
8	GND	ground supply voltage
9	S3	select input
10	S2	select input
11	S1	select input
12	1Y0	independent input or output
13	1Y1	independent input or output
14	1Z	common output or input
15	2Z	common output or input
16	V_{CC}	supply voltage

2.4、Function Table

Input		Channel ON
$\overline{E}$	**Sn**	
L	L	nY0 to nZ
L	H	nY1 to nZ
H	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 GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Max.	Unit
supply voltage	V_{CC}	- [1]		-0.5	+11.0	V
input clamping current	I_{IK}	V_I < -0.5 V or V_I > V_{CC} + 0.5 V		-	±20	mA
switch clamping current	I_{SK}	V_{SW} < -0.5 V or V_{SW} > V_{CC} + 0.5 V		-	±20	mA
switch current	I_{SW}	-0.5 V < V_{SW} < V_{CC} + 0.5 V		-	±25	mA
supply current	I_{EE}	-		-	±20	mA
supply current	I_{CC}	-		-	50	mA
ground current	I_{GND}	-		-	-50	mA
storage temperature	T_{stg}	-		-65	+150	℃
total power dissipation	P_{tot}	- [2]		-	500	mW
power dissipation	P	per switch		-	100	mW
Soldering temperature	T_L	10s	DIP	245		℃
			SOP	250		℃

Note:

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

[2] For DIP16 packages: above 70℃ the value of P_{tot} derates linearly with 12mW/K.
For SOP16 packages: above 70℃ the value of P_{tot} derates linearly with 8mW/K.
For (T)SSOP16 packages: above 60℃ the value of P_{tot} derates linearly with 5.5mW/K.

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
AiP74HC4053						
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	℃
input transition rise and fall rate	Δt/ΔV	V_{CC} = 4.5 V	-	1.67	139	ns/V
		V_{CC} = 6.0 V	-	-	83	ns/V
		V_{CC} = 9.0 V	-	-	31	ns/V
AiP74HCT4053						
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	℃
input transition rise and fall rate	Δt/ΔV	V_{CC} = 4.5 V	-	1.67	139	ns/V
		V_{CC} = 6.0 V	-	-	-	ns/V
		V_{CC} = 9.0 V	-	-	-	ns/V

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

(T_{amb}=25℃, voltages are referenced to GND (ground=0V), 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 uA	V_{CC} = 4.5 V; V_{EE} = 0 V	-	100	180	Ω
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	90	160	Ω
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	70	130	Ω
ON resistance (rail)	$R_{ON(rail)}$	V_{is} = V_{EE}; I_{SW} = 1000 uA	V_{CC} = 4.5 V; V_{EE} = 0 V	-	80	140	Ω
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	70	120	Ω
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	60	105	Ω
		V_{is} = V_{CC}; I_{SW} = 1000 uA	V_{CC} = 4.5 V; V_{EE} = 0 V	-	90	160	Ω
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	80	140	Ω
			V_{CC} = 4.5 V;	-	65	120	Ω

			V_{EE} = -4.5 V				
ON resistance mismatch between channels	ΔR_{ON}	V_{is} = V_{CC} to V_{EE}	V_{CC} = 4.5 V; V_{EE} = 0 V	-	9	-	Ω
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	8	-	Ω
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	6	-	Ω
AiP74HC4053							
HIGH-level input voltage	V_{IH}	V_{CC} = 4.5 V		3.15	2.4	-	V
		V_{CC} = 6.0 V		4.2	3.2	-	V
		V_{CC} = 9.0 V		6.3	4.7	-	V
LOW-level input voltage	V_{IL}	V_{CC} = 4.5 V		-	2.1	1.35	V
		V_{CC} = 6.0 V		-	2.8	1.8	V
		V_{CC} = 9.0 V		-	4.3	2.7	V
input leakage current	I_I	V_{EE} = 0 V; V_I = V_{CC} or GND	V_{CC} = 6.0 V	-	-	±0.1	uA
			V_{CC} = 9.0 V	-	-	±0.2	uA
OFF-state leakage current	$I_{S(OFF)}$	V_{CC}= 9.0 V; V_{EE}= 0 V; V_I= V_{IH} or V_{IL}; $\lvert V_{SW}\rvert$ = V_{CC} - V_{EE}; see Figure 7	per channel	-	-	±0.1	uA
			all channels	-	-	±0.1	uA
ON-state leakage current	$I_{S(ON)}$	V_I= V_{IH} or V_{IL}; $\lvert V_{SW}\rvert$ = V_{CC}-V_{EE};V_{CC}= 9.0 V; V_{EE}= 0 V; see Figure 8		-	-	±0.1	uA
supply current	I_{CC}	V_{EE} = 0 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 V	-	-	8.0	uA
			V_{CC} = 9.0 V	-	-	16.0	uA
input capacitance	C_I	-		-	3.5	-	pF
switch capacitance	C_{SW}	independent pins nYn		-	5	-	pF
		common pins nZ		-	8	-	pF
AiP74HCT4053							
HIGH-level input voltage	V_{IH}	V_{CC} = 4.5 V to 5.5 V		2.0	1.6	-	V
LOW-level input voltage	V_{IL}	V_{CC} = 4.5 V to 5.5 V		-	1.2	0.8	V
input leakage current	I_I	V_I = V_{CC} or GND; V_{CC} = 5.5 V; V_{EE}= 0 V		-	-	±0.1	uA

OFF-state leakage current	$I_{S(OFF)}$	V_{CC}= 9.0 V; V_{EE}= 0 V; V_I= V_{IH} or V_{IL}; $\lvert V_{SW}\rvert = V_{CC} - V_{EE}$; see Figure 7	per channel	-	-	±0.1	uA
			all channels	-	-	±0.1	uA
ON-state leakage current	$I_{S(ON)}$	V_{CC}= 9.0 V; V_{EE}= 0 V; V_I= V_{IH} or V_{IL}; $\lvert V_{SW}\rvert = V_{CC}-V_{EE}$; see Figure 8		-	-	±0.1	uA
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $V_{is} = V_{EE}$ or V_{CC}; $V_{os} = V_{CC}$ or V_{EE};	V_{CC} = 5.5V; V_{EE} = 0 V	-	-	8.0	uA
			V_{CC} = 4.5V; V_{EE} = -4.5V	-	-	16.0	uA
additional supply current	ΔI_{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		-	50	180	uA
input capacitance	C_I	-		-	3.5	-	pF
switch capacitance	C_{SW}	independent pins nYn		-	5	-	pF
		common pins nZ		-	8	-	pF

Note:

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

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

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

3.3.2、DC Characteristics 2

(T_{amb} = -40℃~85℃, 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 uA	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	225	Ω
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	200	Ω
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	165	Ω
ON resistance (rail)	$R_{ON(rail)}$	$V_{is} = V_{EE}$; I_{SW} = 1000 uA	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	175	Ω
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	150	Ω
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	130	Ω
		$V_{is} = V_{CC}$; I_{SW} = 1000 uA	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	200	Ω
			V_{CC} = 6.0 V;	-	-	175	Ω

			V_{EE} = 0 V				
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	150	Ω
AiP74HC4053							
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	-	-	±1.0	uA
			V_{CC} = 9.0 V	-	-	±2.0	uA
OFF-state leakage current	$I_{S(OFF)}$	V_{CC}= 9.0 V; V_{EE}= 0 V; V_I= V_{IH} or V_{IL}; $\|V_{SW}\|$ = V_{CC} - V_{EE}; see Figure 7	per channel	-	-	±1.0	uA
			all channels	-	-	±1.0	uA
ON-state leakage current	$I_{S(ON)}$	V_I= V_{IH} or V_{IL}; $\|V_{SW}\|$ = V_{CC}-V_{EE};V_{CC}= 9.0 V; V_{EE}= 0 V; see Figure 8		-	-	±1.0	uA
supply current	I_{CC}	V_{EE} = 0 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 V	-	-	80.0	uA
			V_{CC} = 9.0 V	-	-	160.0	uA
AiP74HCT4053							
HIGH-level input voltage	V_{IH}	V_{CC} = 4.5 V to 5.5 V		2.0	-	-	V
LOW-level input voltage	V_{IL}	V_{CC} = 4.5 V to 5.5 V		-	-	0.8	V
input leakage current	I_I	V_I = V_{CC} or GND; V_{CC} = 5.5 V; V_{EE} = 0 V		-	-	±1.0	uA
OFF-state leakage current	$I_{S(OFF)}$	V_{CC}= 9.0 V; V_{EE}= 0 V; V_I= V_{IH} or V_{IL}; $\|V_{SW}\|$ = V_{CC} - V_{EE}; see Figure 7	per channel	-	-	±1.0	uA
			all channels	-	-	±1.0	uA
ON-state leakage current	$I_{S(ON)}$	V_{CC}= 9.0 V; V_{EE}= 0 V; V_I= V_{IH} or V_{IL}; $\|V_{SW}\|$ = V_{CC}-V_{EE}; see Figure 8		-	-	±1.0	uA
supply current	I_{CC}	V_I = V_{CC} or GND; V_{is} = V_{EE} or V_{CC};	V_{CC} = 5.5V; V_{EE} = 0 V	-	-	80.0	uA

		V_{os} = V_{CC} or V_{EE}	V_{CC} = 4.5V; V_{EE} = -4.5V	-	-	160	uA
additional supply current	ΔI_{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 nYn or nZ terminal, whichever is assigned as an input.

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

3.3.3、DC Characteristics 3

(T_{amb} = -40℃~105℃, 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 uA	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	270	Ω
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	240	Ω
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	195	Ω
ON resistance (rail)	$R_{ON(rail)}$	V_{is} = V_{EE}; I_{SW} = 1000 uA	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	210	Ω
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	180	Ω
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	160	Ω
		V_{is} = V_{CC}; I_{SW} = 1000 uA	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	240	Ω
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	210	Ω
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	180	Ω
AiP74HC4053							
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	-	-	±1.0	uA
			V_{CC} = 9.0 V	-	-	±2.0	uA

OFF-state leakage current	$I_{S(OFF)}$	V_{CC}= 9.0 V; V_{EE}= 0 V; V_I= V_{IH} or V_{IL}; $\lvert V_{SW}\rvert$ = V_{CC} - V_{EE}; see Figure 7	per channel	-	-	±1.0	uA
			all channels	-	-	±1.0	uA
ON-state leakage current	$I_{S(ON)}$	V_I= V_{IH} or V_{IL}; $\lvert V_{SW}\rvert$ = V_{CC}-V_{EE};V_{CC}= 9.0 V; V_{EE}= 0 V; see Figure 8		-	-	±1.0	uA
supply current	I_{CC}	V_{EE} = 0 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 V	-	-	160.0	uA
			V_{CC} = 9.0 V	-	-	320.0	uA
AiP74HCT4053							
HIGH-level input voltage	V_{IH}	V_{CC} = 4.5 V to 5.5 V		2.0	-	-	V
LOW-level input voltage	V_{IL}	V_{CC} = 4.5 V to 5.5 V		-	-	0.8	V
input leakage current	I_I	V_I = V_{CC} or GND; V_{CC} = 5.5 V; V_{EE} = 0 V		-	-	±1.0	uA
OFF-state leakage current	$I_{S(OFF)}$	V_{CC}= 9.0 V; V_{EE}= 0 V; V_I= V_{IH} or V_{IL}; $\lvert V_{SW}\rvert$ = V_{CC} - V_{EE}; see Figure 7	per channel	-	-	±1.0	uA
			all channels	-	-	±1.0	uA
ON-state leakage current	$I_{S(ON)}$	V_{CC}= 9.0 V; V_{EE}= 0 V; V_I= V_{IH} or V_{IL}; $\lvert V_{SW}\rvert$ = V_{CC}-V_{EE}; see Figure 8		-	-	±1.0	uA
supply current	I_{CC}	V_I = V_{CC} or GND; V_{is} = V_{EE} or V_{CC}; V_{os} = V_{CC} or V_{EE}	V_{CC} = 5.5V; V_{EE} = 0 V	-	-	160.0	uA
			V_{CC} = 4.5V; V_{EE} = -4.5V	-	-	320	uA
additional supply current	ΔI_{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		-	-	245	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 nYn or nZ terminal, whichever is assigned as an input.

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

3.3.4、AC Characteristics 1

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74HC4053							
propagation delay	t_{pd}	V_{is} to V_{os}; $R_L = \infty\ \Omega$; see Figure 9[1]	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}	$\overline{E}$ to V_{os}; $R_L = \infty\ \Omega$; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	20	44	ns
			V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	-	17	-	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	16	37	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	15	31	ns
		Sn to V_{os}; $R_L = \infty\ \Omega$; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	25	44	ns
			V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	-	21	-	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	20	37	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	15	31	ns
turn-off time	t_{off}	$\overline{E}$ to V_{os}; R_L= 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	21	42	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	36	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	15	29	ns
		Sn to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	20	42	ns
			V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	-	17	-	ns

			V_{CC} = 6.0 V; V_{EE} = 0 V	-	16	36	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	15	29	ns
power dissipation capacitance	C_{PD}	per switch; V_I = GND to V_{CC}[4]		-	36	-	pF
AiP74HCT4053							
propagation delay	t_{pd}	V_{is} to V_{os}; $R_L = \infty\ \Omega$; see Figure 9[1]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	5	12	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	4	8	ns
turn-on time	t_{on}	$\overline{E}$ to V_{os}; $R_L = \infty\ \Omega$; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	27	48	ns
			V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	-	23	-	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	16	34	ns
		Sn to V_{os}; $R_L = \infty\ \Omega$; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	25	48	ns
			V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	-	21	-	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	16	34	ns
turn-off time	t_{off}	$\overline{E}$ to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	24	44	ns
			V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	-	20	-	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	15	31	ns
		Sn to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	22	44	ns
			V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	-	19	-	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	15	31	ns
power dissipation capacitance	C_{PD}	per switch; V_I = GND to V_{CC}-1.5V[4]		-	36	-	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).

$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma\{(C_L + C_{SW}) \times V_{CC}^2 \times f_O\}$ where:

f_i = input frequency in MHz;

f_O = output frequency in MHz;

N = number of inputs switching;

$\Sigma\{(C_L + C_{SW}) \times V_{CC}^2 \times f_O\}$ = 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 nYn or nZ terminal, whichever is assigned as an input.

[7] V_{os} is the output voltage at a nYn or nZ terminal, whichever is assigned as an output.

3.3.5、AC Characteristics 2

(T_{amb}= -40℃~+85℃; GND = 0 V; $t_r = t_f$ = 6 ns; C_L = 50 pF; unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74HC4053							
propagation delay	t_{pd}	V_{is} to V_{os}; $R_L = \infty\ \Omega$; see Figure 9[1]	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}	$\overline{E}$ to V_{os}; $R_L = \infty\ \Omega$; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	55	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	47	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	39	ns
		Sn to V_{os}; $R_L = \infty\ \Omega$; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	55	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	47	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	39	ns
turn-off time	t_{off}	$\overline{E}$ to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	53	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	45	ns

			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	36	ns
		Sn to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	53	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	45	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	36	ns
AiP74HCT4053							
propagation delay	t_{pd}	V_{is} to V_{os}; R_L = ∞ Ω; see Figure 9[1]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	15	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	10	ns
turn-on time	t_{on}	$\overline{E}$ to V_{os}; R_L = ∞ Ω; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	60	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	43	ns
		Sn to V_{os}; R_L = ∞ Ω; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	60	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	43	ns
turn-off time	t_{off}	$\overline{E}$ to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	55	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	39	ns
		Sn to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	55	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	39	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 nYn or nZ terminal, whichever is assigned as an input.

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

3.3.6、AC Characteristics 3

(T_{amb}= -40℃~+105℃; GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF; unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
AiP74HC4053							
propagation delay	t_{pd}	V_{is} to V_{os}; R_L= ∞ Ω; see Figure 9[1]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	18	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	15	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	12	ns
turn-on time	t_{on}	$\overline{E}$ to V_{os}; R_L= ∞ Ω; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	66	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	56	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	47	ns
		Sn to V_{os}; R_L= ∞ Ω; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	66	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	56	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	47	ns
turn-off time	t_{off}	$\overline{E}$ to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	63	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	54	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	44	ns
		Sn to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	63	ns
			V_{CC} = 6.0 V; V_{EE} = 0 V	-	-	54	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	44	ns
AiP74HCT4053							
propagation delay	t_{pd}	V_{is} to V_{os}; R_L = ∞ Ω; see Figure 9[1]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	18	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	12	ns
turn-on time	t_{on}	$\overline{E}$ to V_{os}; R_L = ∞ Ω; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	72	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	51	ns

		Sn to V_{os}; $R_L = \infty\ \Omega$; see Figure 10[2]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	72	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	51	ns
turn-off time	t_{off}	$\overline{E}$ to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	66	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	47	ns
		Sn to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = 0 V	-	-	66	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	47	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 nYn or nZ terminal, whichever is assigned as an input.

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

3.3.7、AC Characteristics 4

(T_{amb}= 25℃; GND = 0V; C_L=50pF; recommended conditions and typical values.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
sine-wave distortion	d_{sin}	f_i = 1 kHz; R_L = 10 kΩ; see Figure 12	V_{is} = 4.0 V (p-p); V_{CC} = 2.25 V; V_{EE} = -2.25 V	-	0.04	-	%
			V_{is} = 8.0 V (p-p); V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	0.02	-	%
		f_i = 10 kHz; R_L = 10 kΩ; see Figure 12	V_{is} = 4.0 V (p-p); V_{CC} = 2.25 V; V_{EE} = -2.25 V	-	0.12	-	%
			V_{is} = 8.0 V (p-p); V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	0.06	-	%
isolation (OFF-state)	α_{iso}	R_L= 600 Ω; f_i= 1 MHz; see Figure 13	V_{CC} = 2.25 V; V_{EE} = -2.25 V [1]	-	-50	-	dB
			V_{CC} = 4.5 V; V_{EE} = -4.5 V [1]	-	-50	-	dB
crosstalk	Xtalk	between two switches/multiplexers; R_L= 600 Ω;f_i= 1 MHz; see Figure 14	V_{CC} = 2.25 V; V_{EE} = -2.25 V [1]	-	-60	-	dB
			V_{CC} = 4.5 V; V_{EE} = -4.5 V [1]	-	-60	-	dB

crosstalk voltage	V_{ct}	peak-to-peak value; between control and any switch; R_L= 600 Ω; f_i= 1MHz; $\overline{E}$ or Sn square wave between V_{CC} and GND; t_r= t_f= 6 ns; see Figure 15	V_{CC} = 4.5 V; V_{EE} = 0 V	-	110	-	mV
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	220	-	mV
-3dB frequency response	$f_{(-3dB)}$	R_L = 50 Ω; see Figure 16	V_{CC} = 2.25 V; V_{EE} = -2.25 V [2]	-	160	-	MHz
			V_{CC} = 4.5 V; V_{EE} = -4.5 V [2]	-	170	-	MHz

Note：

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

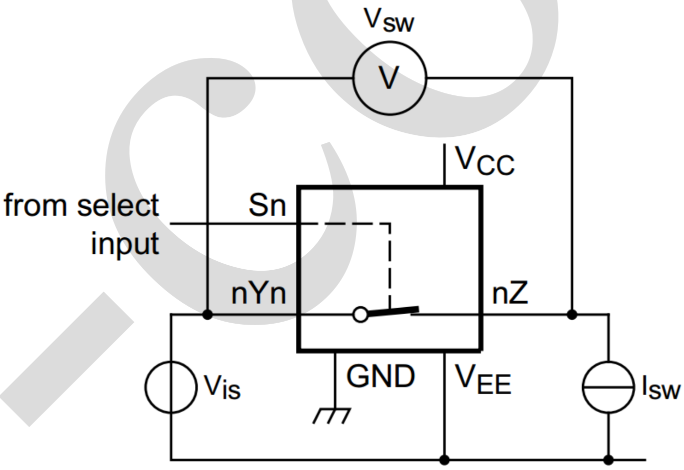
[2] Adjust input voltage V_{is} to 0 dBm level at V_{os} for 1 MHz (0 dBm = 1 mW into 50 Ω).

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

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

4、Testing Circuit

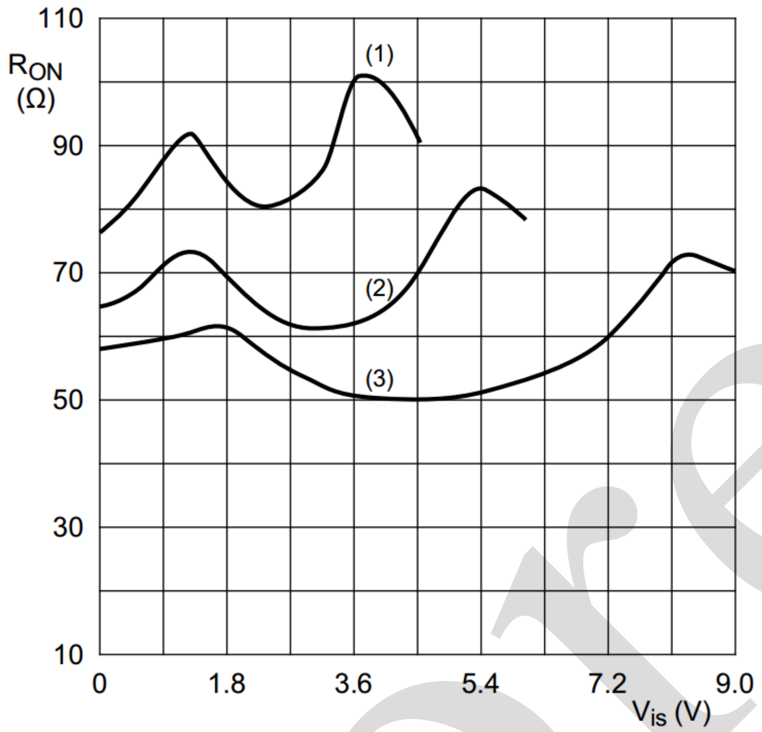
4.1、DC Testing Circuit 1



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

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

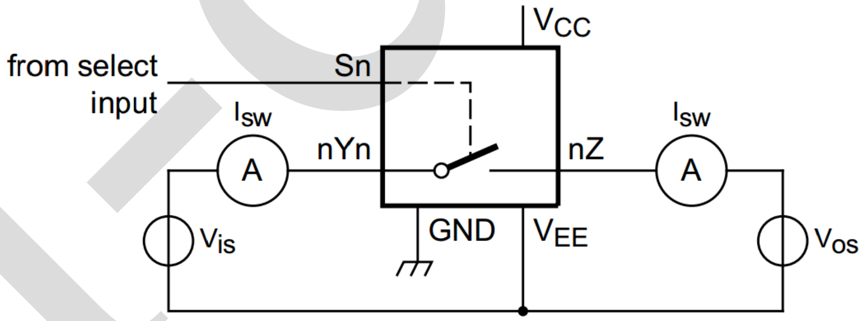
Figure 5. Test circuit for measuring R_{ON}



V_{is} = 0V to (V_{CC} - V_{EE})
(1)V_{CC} = 4.5V
(2)V_{CC} = 6V
(3)V_{CC} = 9V

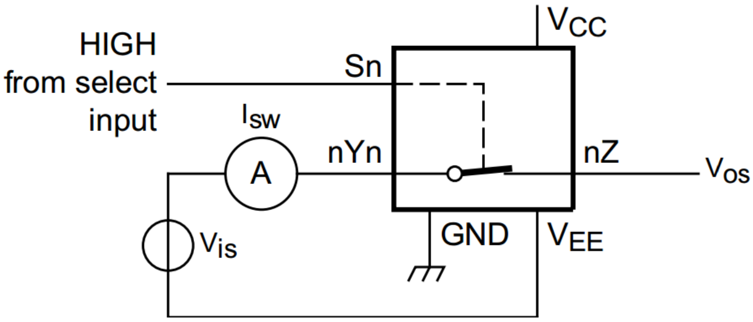
Figure 6. Typical R_{ON} as a function of input voltage V_{is}

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}= open-circuit.

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

Figure 8. Test circuit for measuring ON-state current

4.3、AC Testing Waveforms

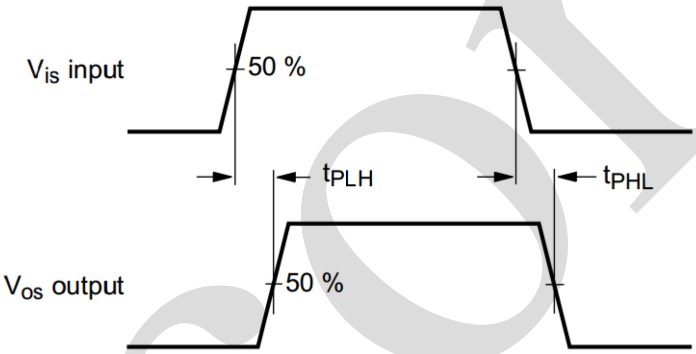
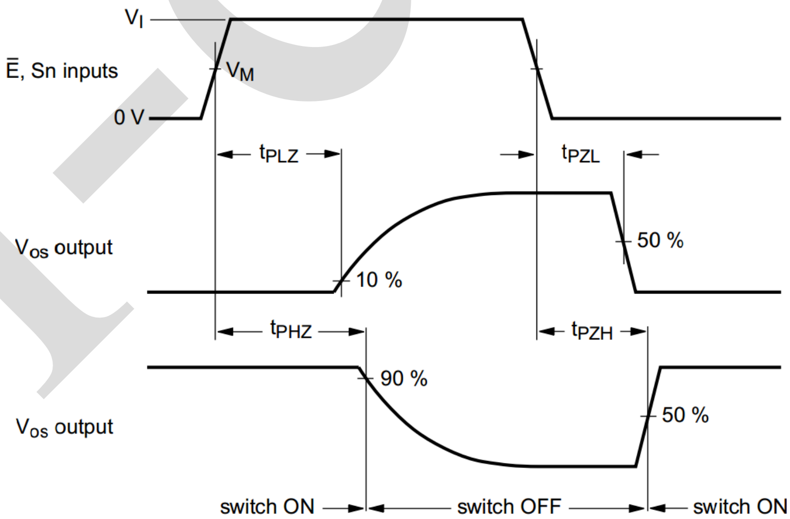


Figure 9. Input (V_{is}) to output (V_{os}) propagation delays

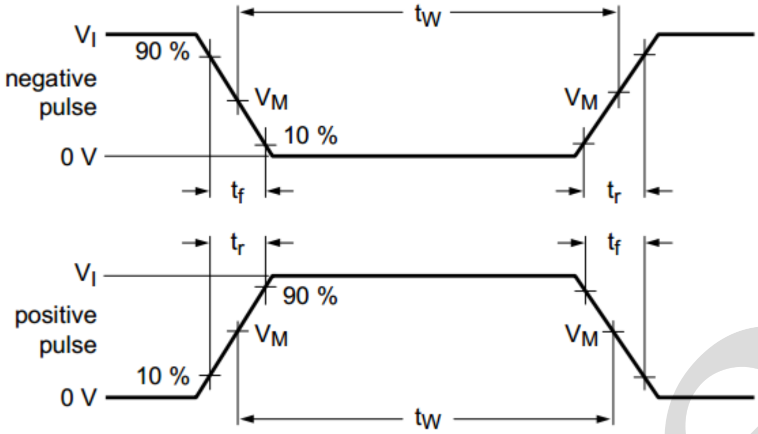


For AiP74HC4053: $V_M = 0.5 \times V_{CC}$.

For AiP74HCT4053: V_M = 1.3 V.

Figure 10. Turn-on and turn-off times

4.4、AC Testing Circuit 1



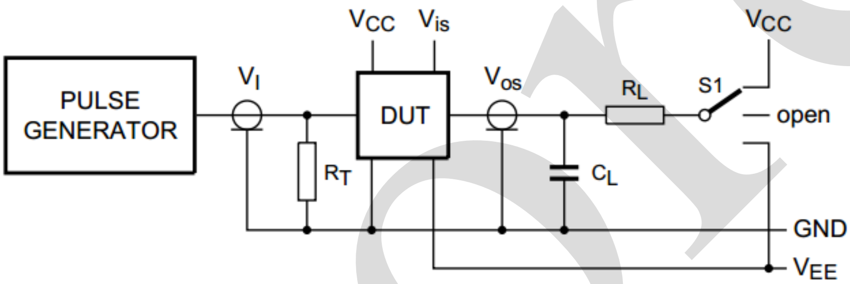


Figure 11. Test circuit for measuring switching times

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[1]			
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 AiP74HC4053: $V_I = V_{CC}$.

For AiP74HCT4053: V_I = 3V.

4.6、AC Testing Circuit 2

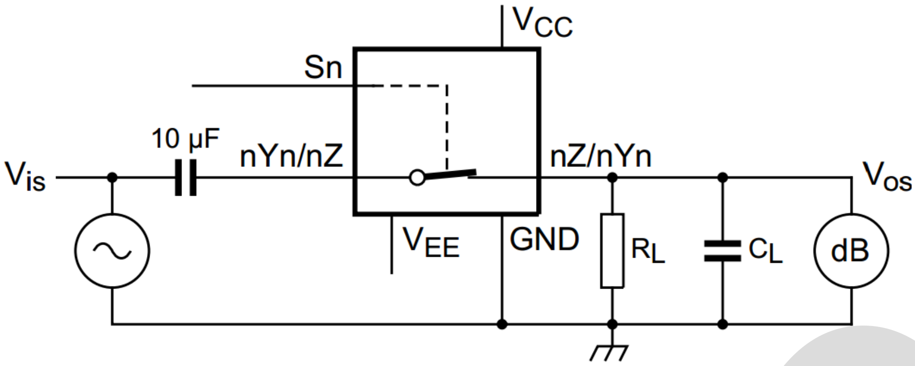
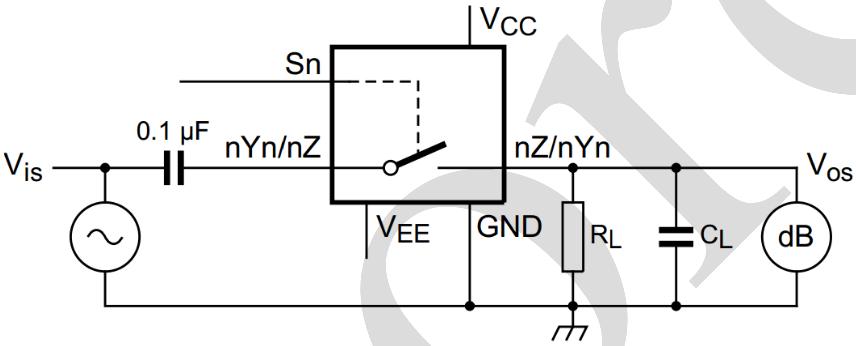
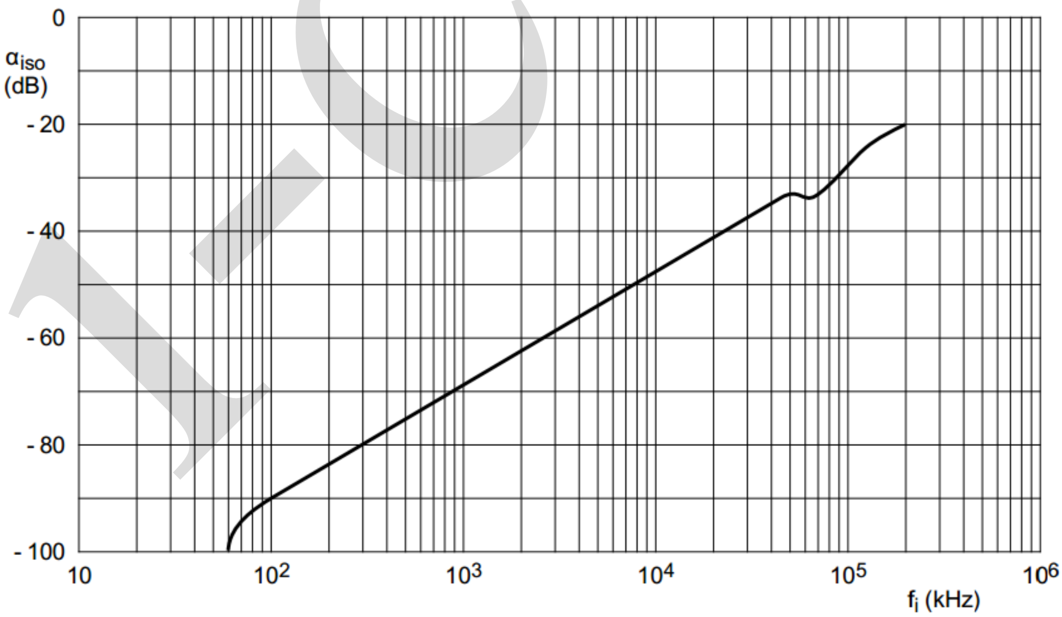


Figure 12. Test circuit for measuring sine-wave distortion



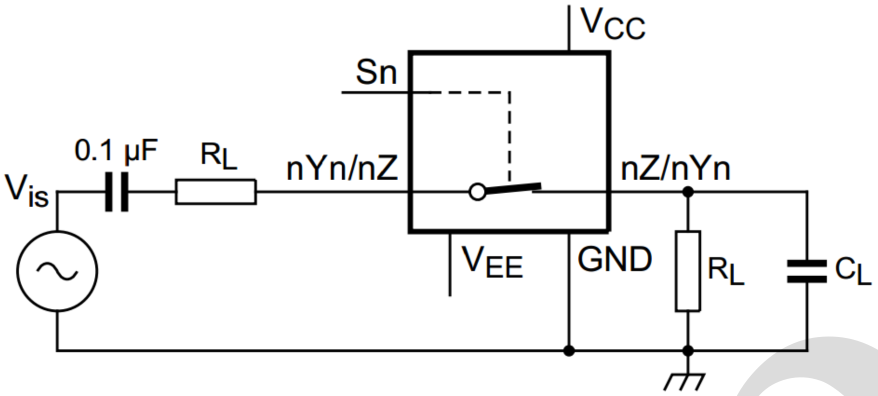
V_{CC} = 4.5 V; GND = 0 V; V_{EE} = -4.5 V; R_L = 600 Ω; R_S = 1 kΩ.

a. Test circuit



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

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



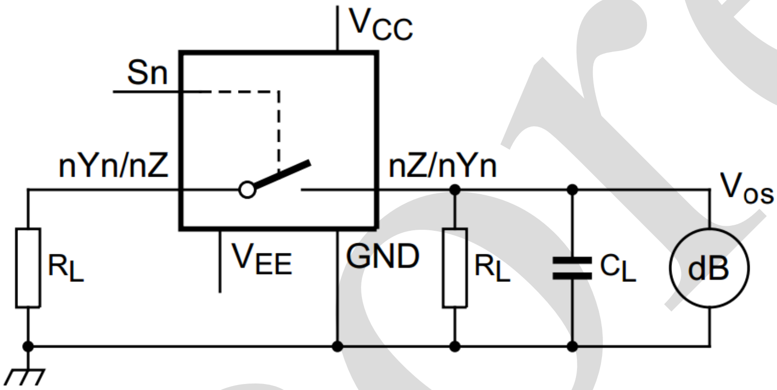


Figure 14. Test circuit for measuring crosstalk between control input and any switch

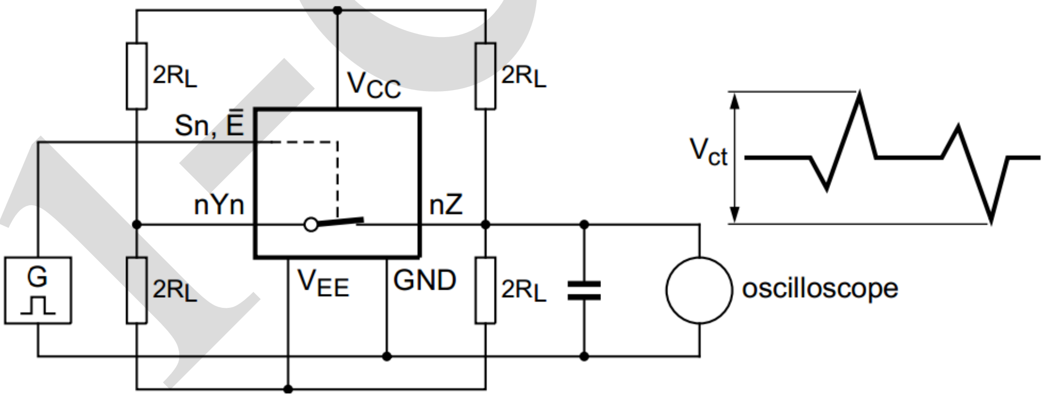
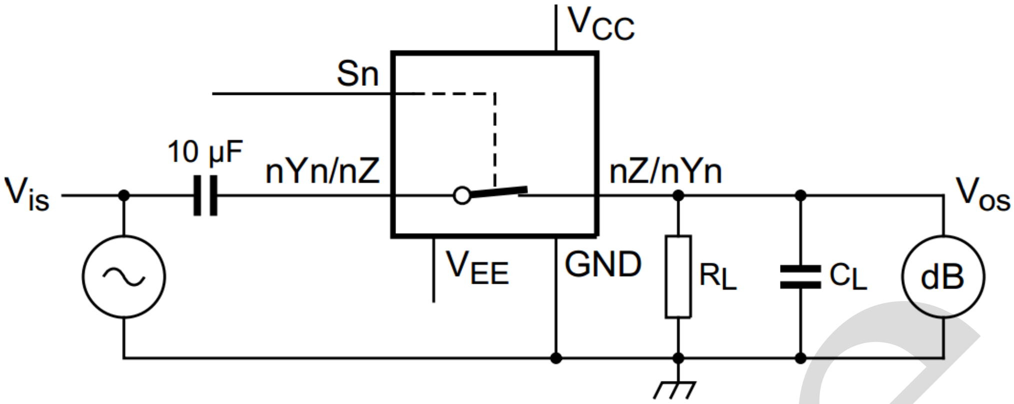
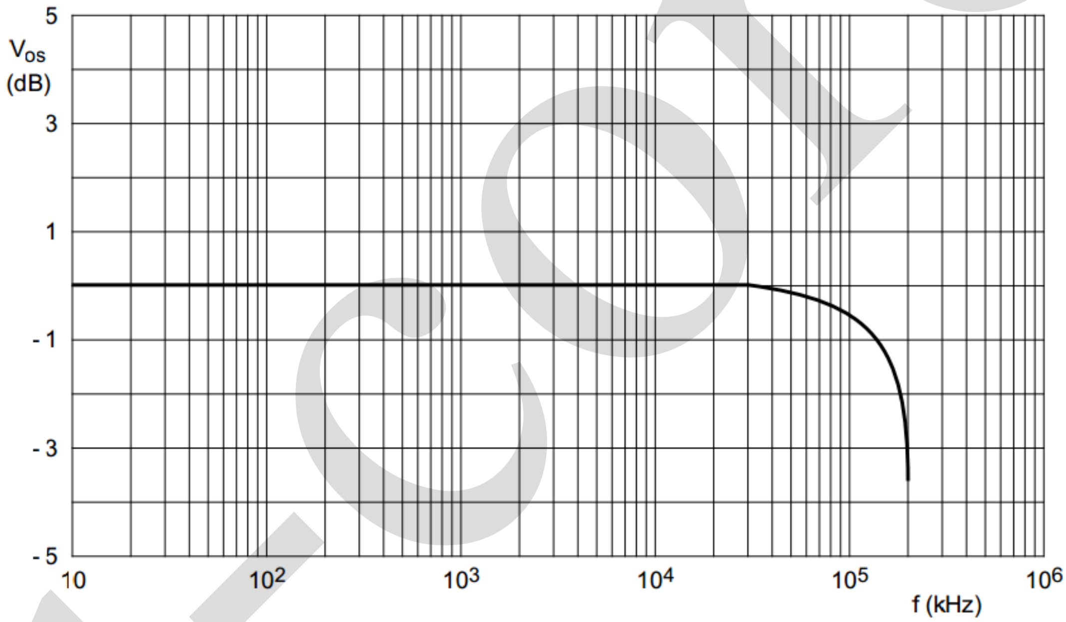


Figure 15. Test circuit for measuring crosstalk between control input and any switch



V_{CC} = 4.5 V; GND = 0 V; V_{EE} = -4.5 V; R_L = 50 Ω; R_S = 1 kΩ

a. Test circuit

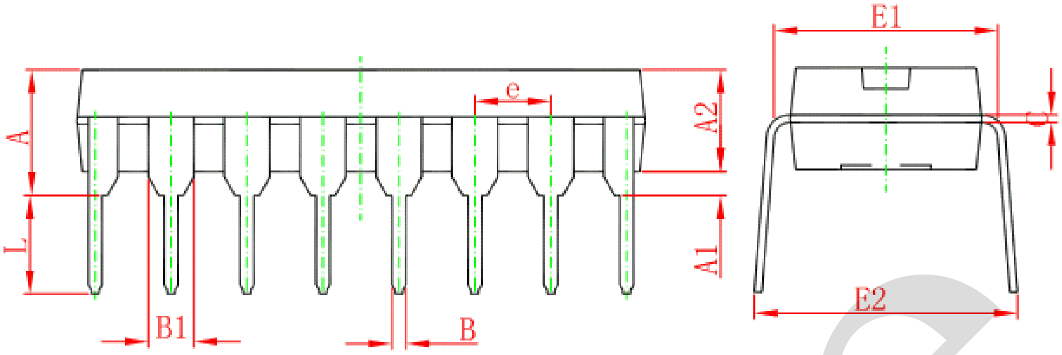


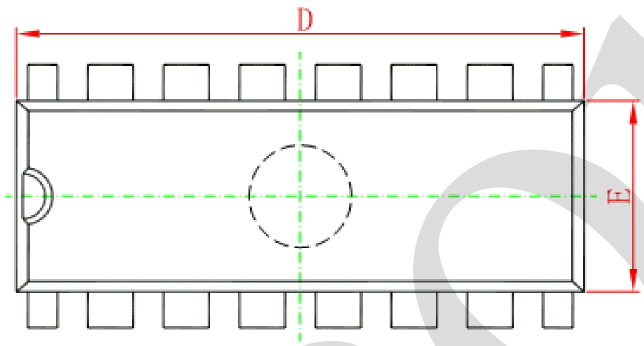
b. Typical frequency response

Figure 16. Test circuit for frequency response

5、Package Information

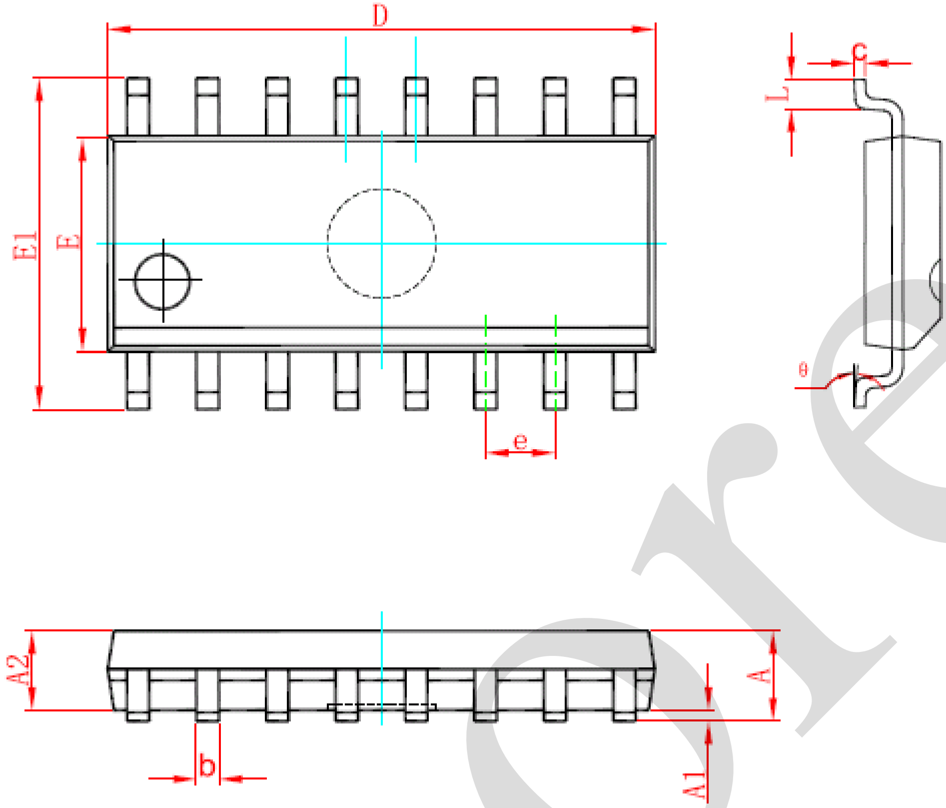
5.1、DIP16





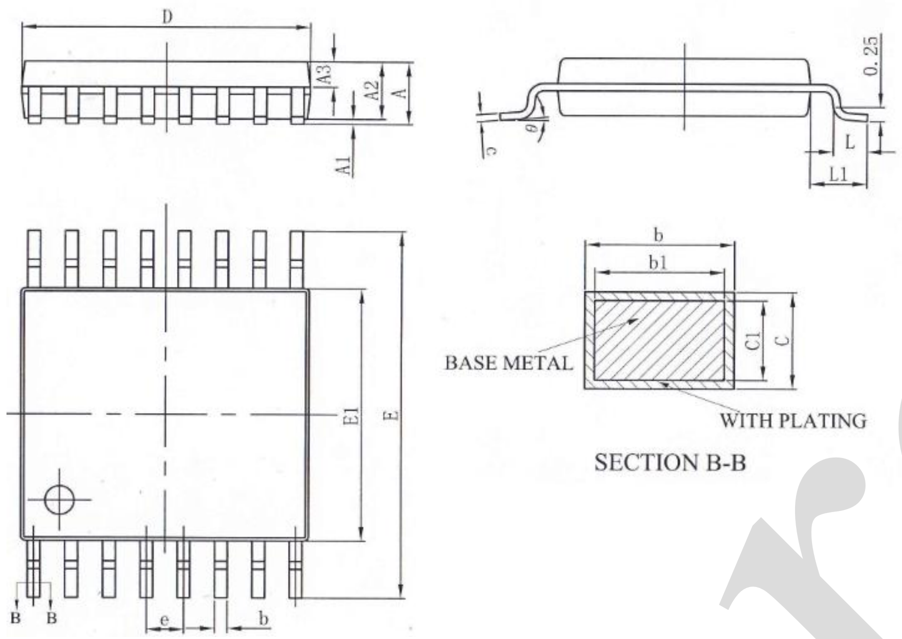
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	18.800	19.200	0.740	0.756
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312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



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.20
A1	0.05	—	0.15
A2	0.90	1.00	1.05
A3	0.39	0.44	0.49
b	0.20	—	0.28
b1	0.19	0.22	0.25
c	0.13	—	0.17
c1	0.12	0.13	0.14
D	4.90	5.00	5.10
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00BSC		
θ	0	—	8°

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.