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XINBOLE

Product Specification

XBLW SN74HC4053

Triple 2-channel Analog Multiplexer/Demultiplexer

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RoHS

Description

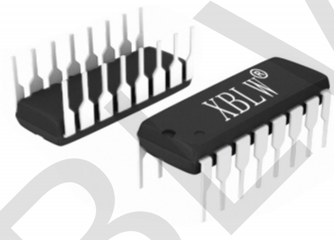
The SN74HC4053 is a triple single-pole double-throw analog switch (3×SPDT) suitable for use in analog or digital 2:1 multiplexer/demultiplexer applications. Each switch features a digital select input (Sn), two independent inputs/outputs (nY0 and nY1) and a common input/output (nZ). A digital enable input ($\bar{E}$) is common to all switches. When $\bar{E}$ is HIGH, the switches areturned off. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC}.

Features

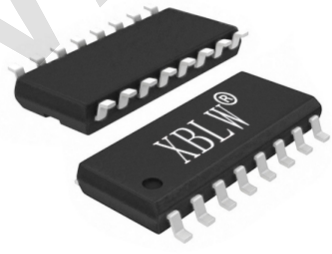
- Wide analog input voltage range from -4.5V to +4.5V
- Low ON resistance:
  – 80 Ω (typical) at V_{CC} - V_{EE} = 4.5 V
  – 70 Ω (typical) at V_{CC} - V_{EE} = 6.0 V
  – 60 Ω (typical) at V_{CC} - V_{EE} = 9.0 V
- Typical "break before make" built-in
- Specified from -40°C to +125°C
- Packaging information: DIP-16/SOP-16/TSSOP-16

Applications

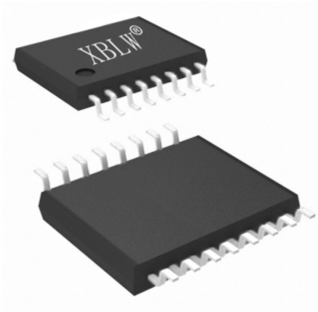
- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating



DIP-16



SOP-16



TSSOP-16

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74HC4053N	DIP-16	74HC4053N	Tube	1000Pcs/Box
XBLW SN74HC4053DTR	SOP-16	74HC4053	Tape	2500Pcs/Reel
XBLW SN74HC4053TDTR	TSSOP-16	74HC4053	Tape	3000Pcs/Reel

Block Diagram

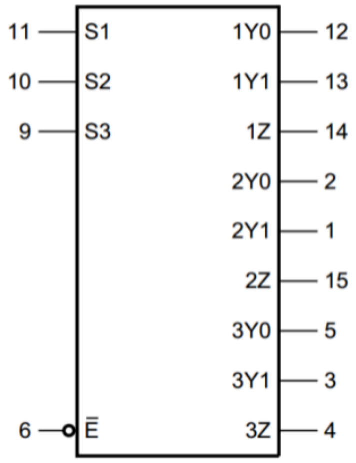


Figure 1. Logic symbol

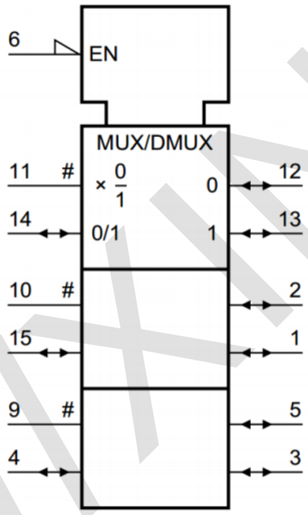


Figure 2. IEC logic symbol

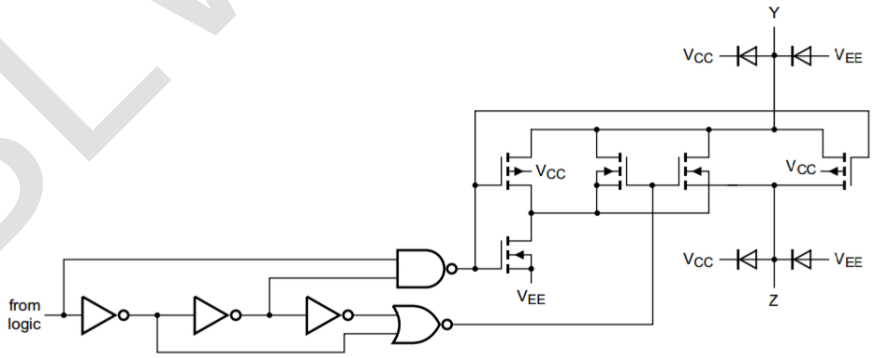


Figure 3. Schematic diagram (one switch)

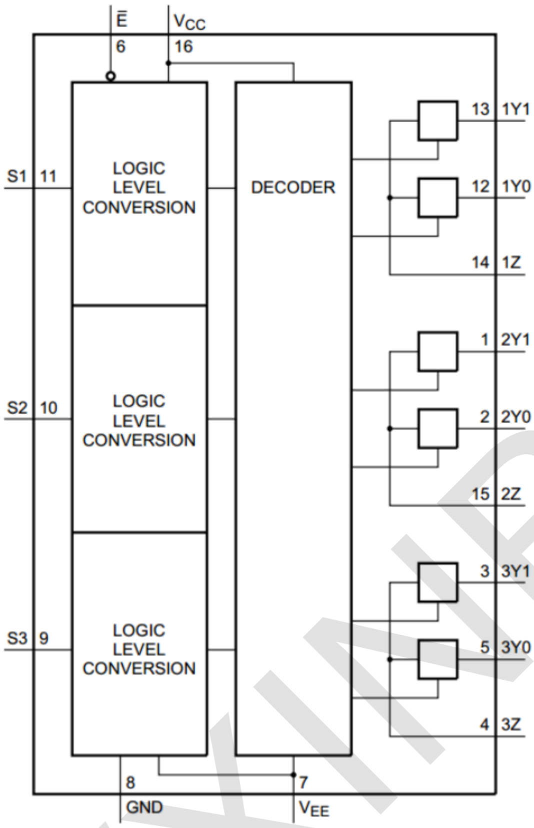
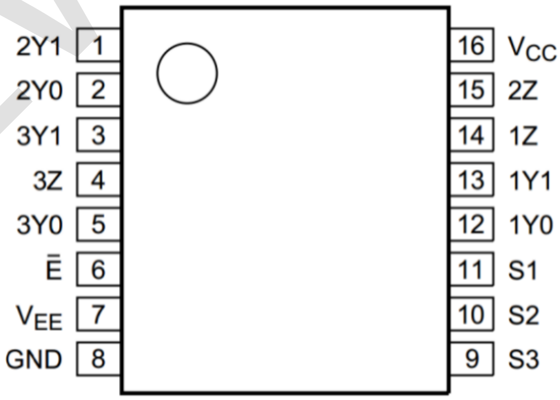


Figure 4. Functional diagram

Pin Configurations



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	$\bar{E}$	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

Function Table

Input		Channel ON
$\bar{E}$	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.

Electrical Parameter

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}	-		-	500	mW
power dissipation	P	per switch		-	100	mW
Soldering temperature	T_L	10s	DIP	245		℃
			SOP/TSSOP	260		℃

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}.

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
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	-	+125	℃
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

Electrical Characteristics

DC Characteristics 1

(T_{amb}=25°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_{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; V_{EE} = -4.5 V	-	65	120	Ω
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
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	-	-	±1.0	uA
			V_{CC} = 9.0 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_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	-	-	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

Note:

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

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

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

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; V_{EE} = 0 V	-	-	175	Ω
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	150	Ω

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

Note:

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

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

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

DC Characteristics 3

(T_{amb} = -40°C~125°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 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
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_{CC} = 6.0 V	-	-	160.0	uA
			V_{CC} = 9.0 V	-	-	320.0	uA

Note:

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

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

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

AC Characteristics 1

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
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-offtime	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

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} isused 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 nYnor nZ terminal, whichever is assigned as an input.

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

AC Characteristics 2

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
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} = 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= ∞ Ω; 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= ∞ Ω; 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-offtime	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
		Sn to V_{os}; R_L = 1 kΩ; see Figure 10[3]	V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-	36	ns
			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

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 anYnor nZ terminal, whichever is assigned as an input.

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

AC Characteristics 3

(T_{amb}= -40℃~+125℃; GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF; unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
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-offtime	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

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 anYnor nZ terminal, whichever is assigned as an input.

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

AC Characteristics 4

(T_{amb}= 25°C; 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; 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).

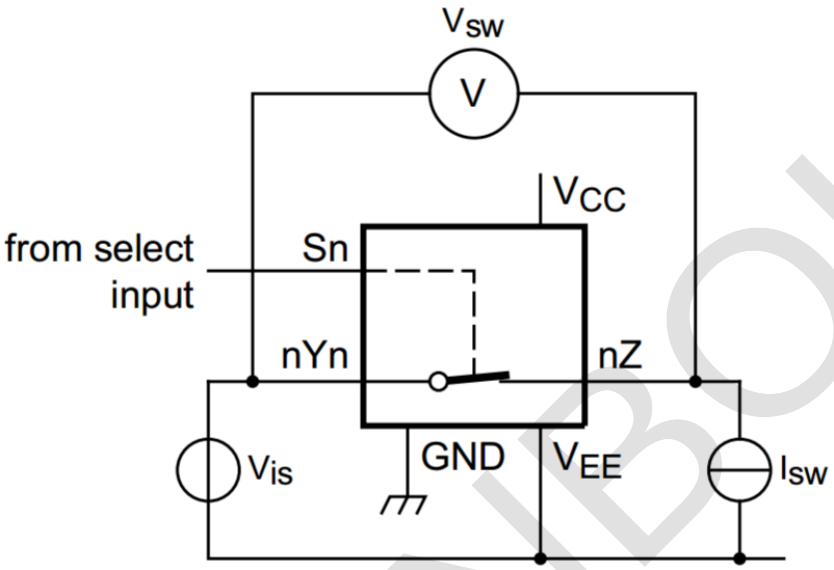
[2] Adjust input voltage V_{is} to 0 dBm level at V_{os} for 1 MHz (0 dBm = 1 mW into 50 Ω).

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

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

Testing Circuit

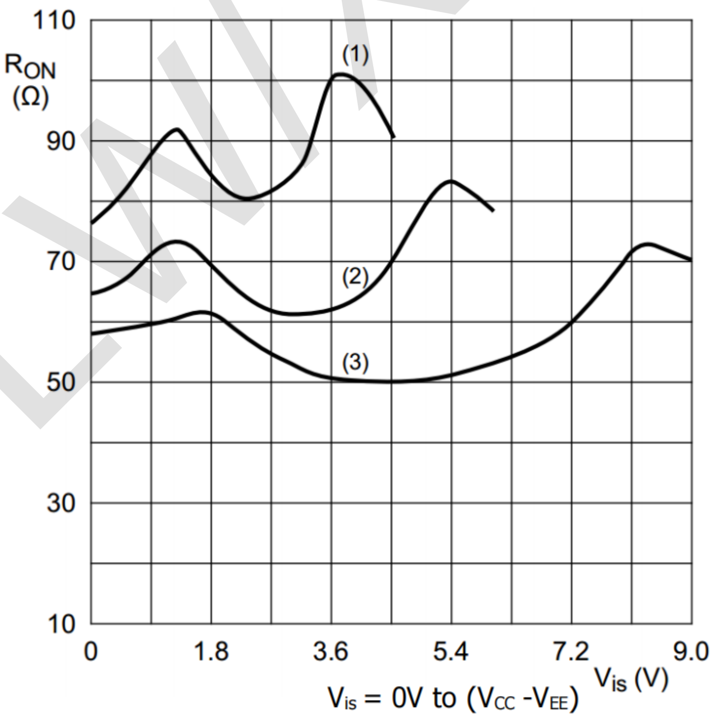
DC Testing Circuit 1



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})

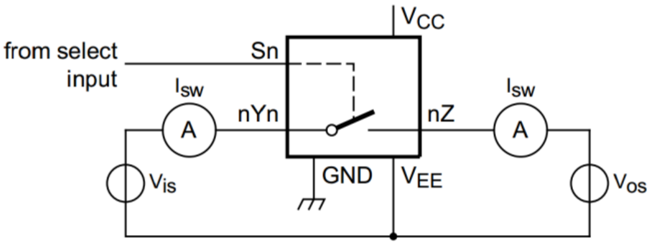
(1)V_{CC} = 4.5V

(2)V_{CC} = 6V

(3)V_{CC} = 9V

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

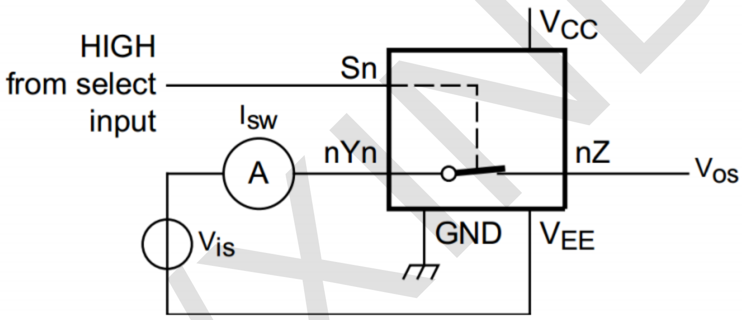
DC Testing Circuit 2



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

AC Testing Waveforms

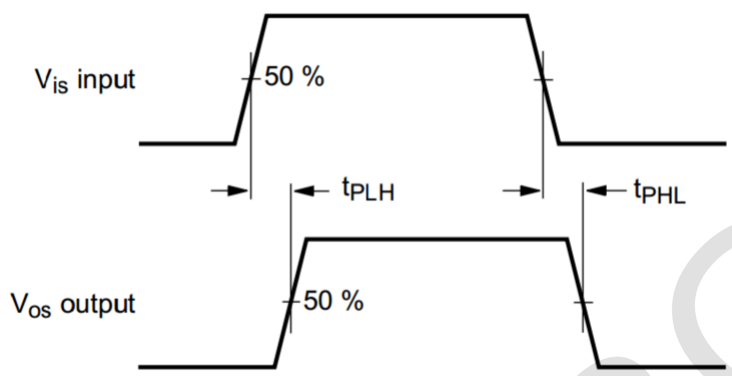
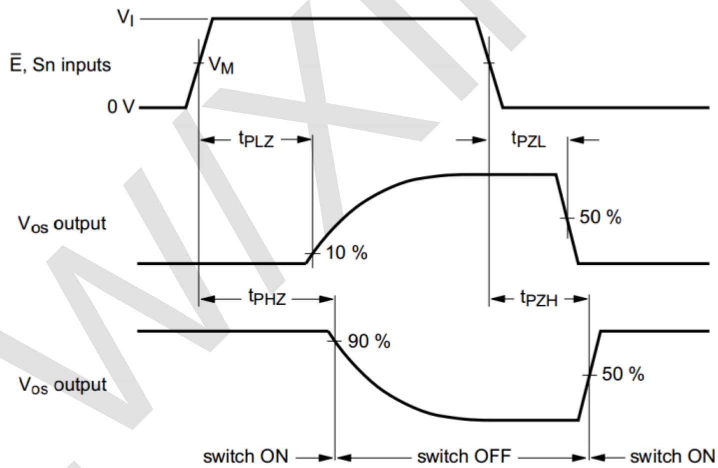


Figure 9. Input (V_{is}) to output (V_{os}) propagation delays



$V_M = 0.5 \times V_{CC}$.

Figure 10. Turn-on and turn-off times

AC Testing Circuit 1

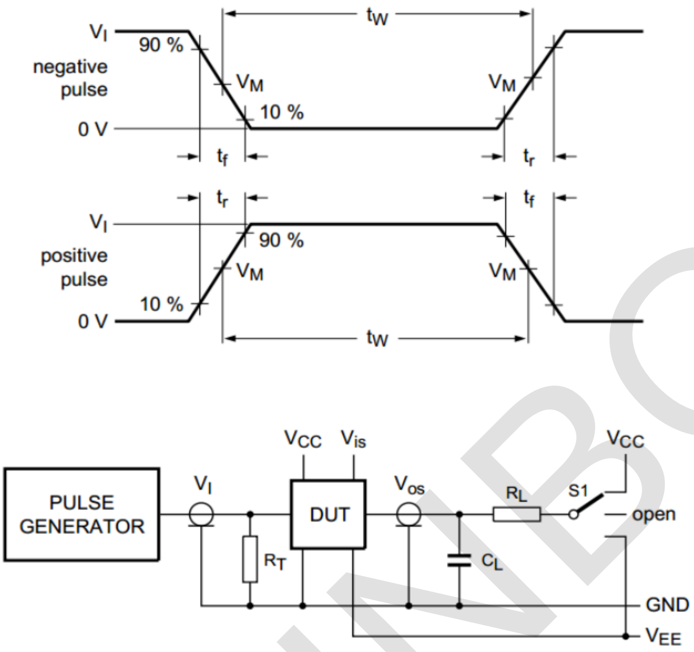


Figure 11. Test circuit for measuring switching times

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.

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: $V_I = V_{CC}$.

AC Testing Circuit 2

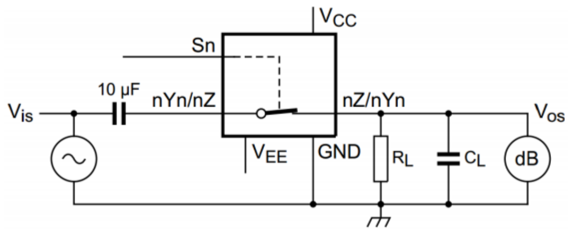
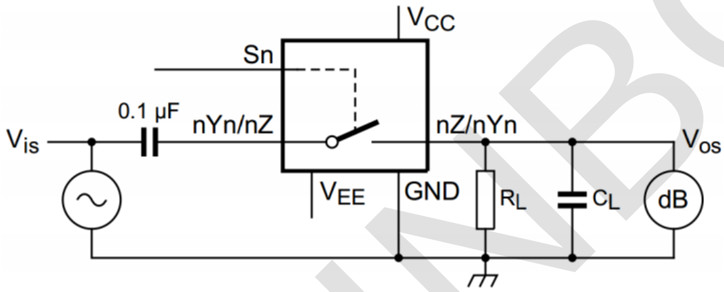
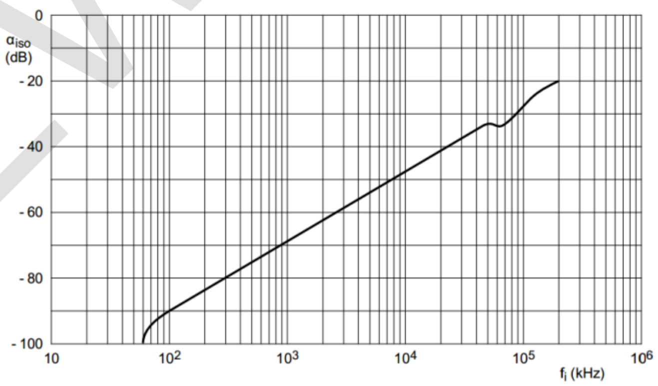


Figure 12. Test circuit for measuring sine-wave distortion



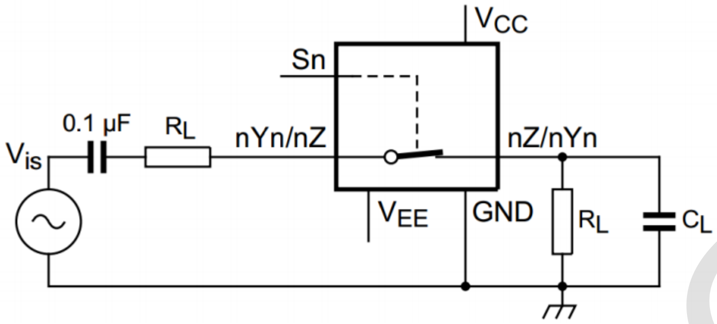
V_{CC} = 4.5 V; GND = 0 V; V_{EE} = -4.5 V; R_L = 600 Ω; R_S = 1 kΩ.

a.Test circuit



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

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



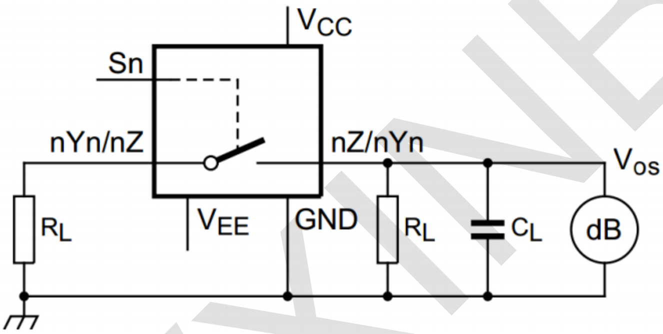


Figure 14. Test circuit for measuring crosstalk between control input and any switch

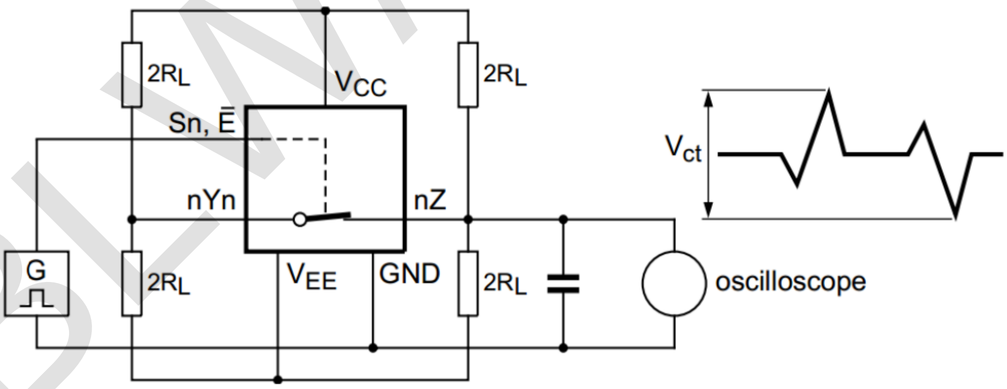
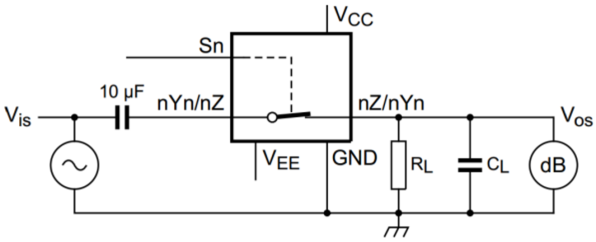
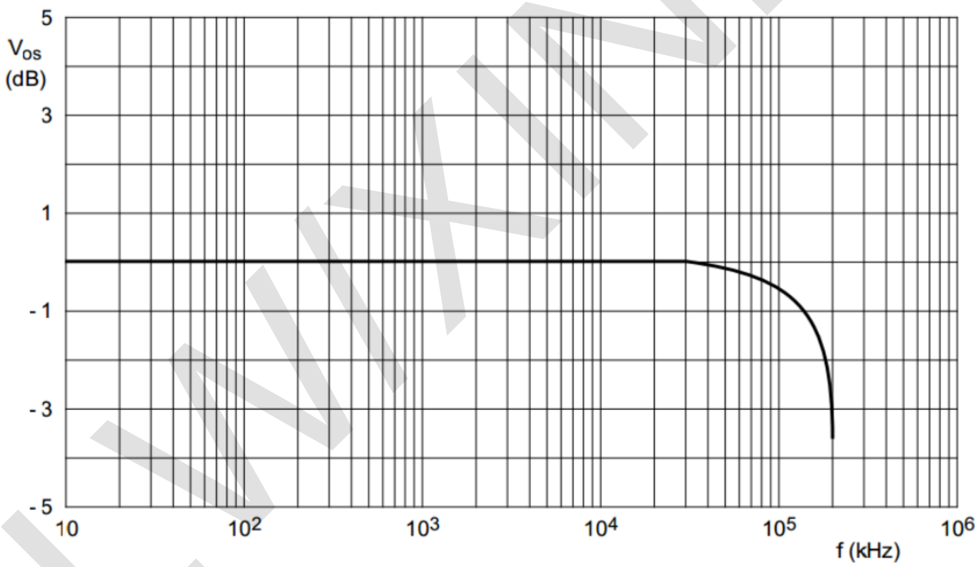


Figure 15. Test circuit for measuring crosstalk between control input and any switch



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

a.Test circuit



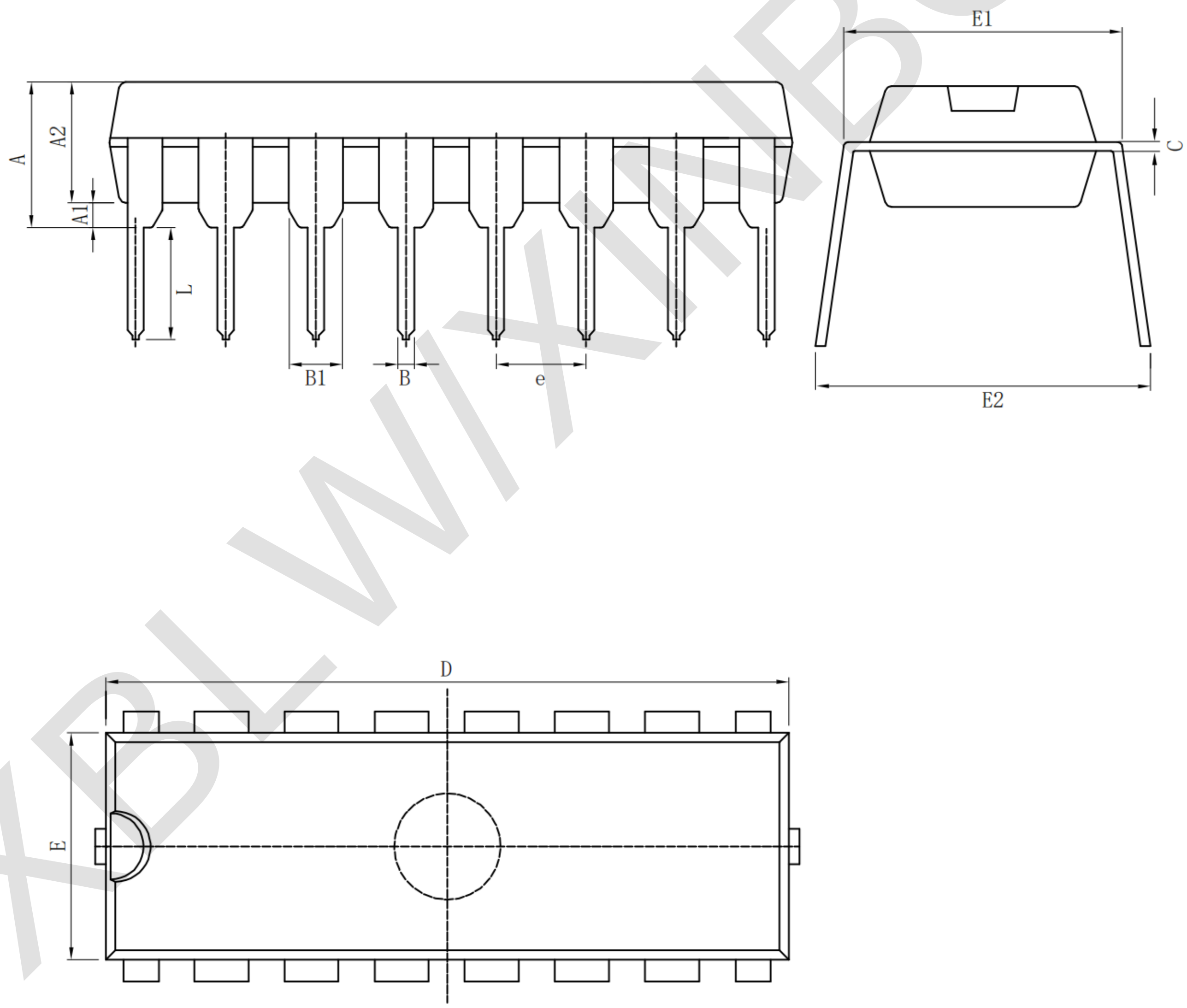
b. Typical frequency response

Figure 16. Test circuit for frequency response

Package Information

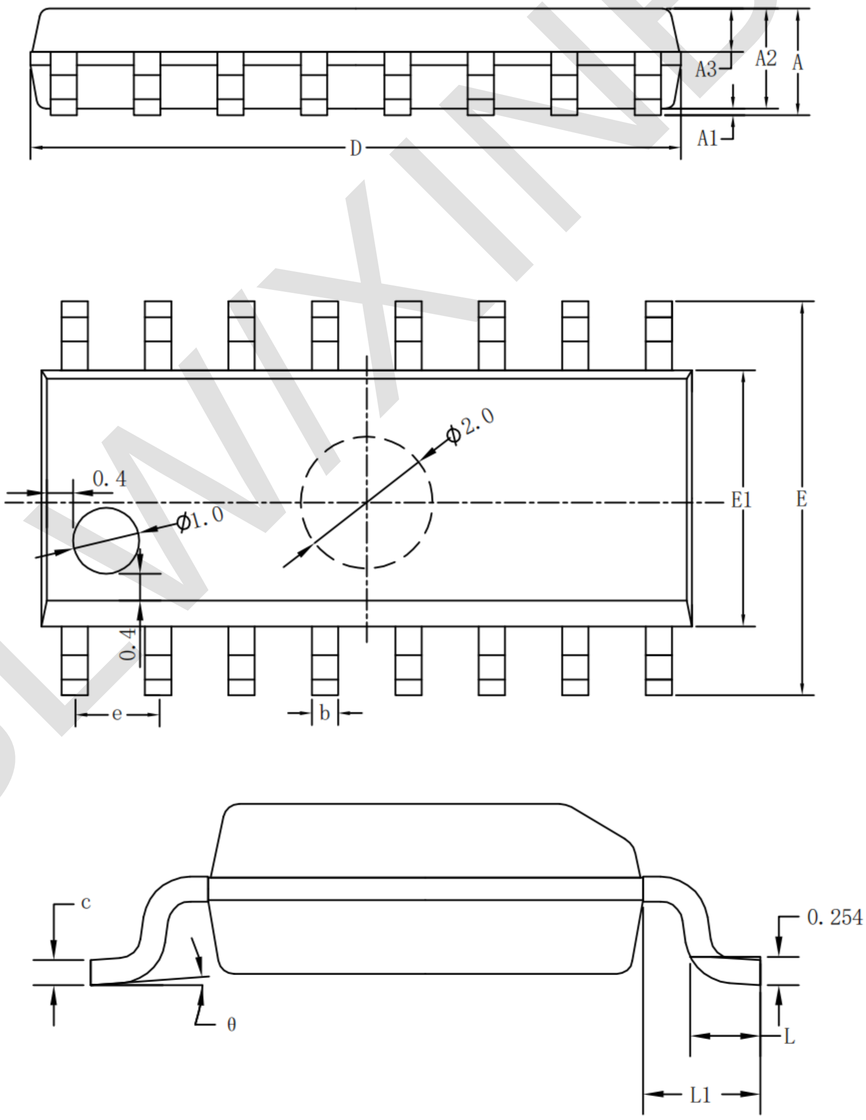
· DIP-16

Symbol \ Size	Dimensions In Millimeters		Symbol \ Size	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	3.710	4.310	A	0.146	0.170
A1	0.510		A1	0.020	
A2	3.200	3.600	A2	0.126	0.142
B	0.380	0.570	B	0.015	0.022
B1	1.524(BSC)		B1	0.060(BSC)	
C	0.204	0.360	C	0.008	0.014
D	18.80	19.20	D	0.740	0.756
E	6.200	6.600	E	0.244	0.260
E1	7.320	7.920	E1	0.288	0.312
e	2.540(BSC)		e	0.100(BSC)	
L	3.000	3.600	L	0.118	0.142
E2	8.400	9.000	E2	0.331	0.354



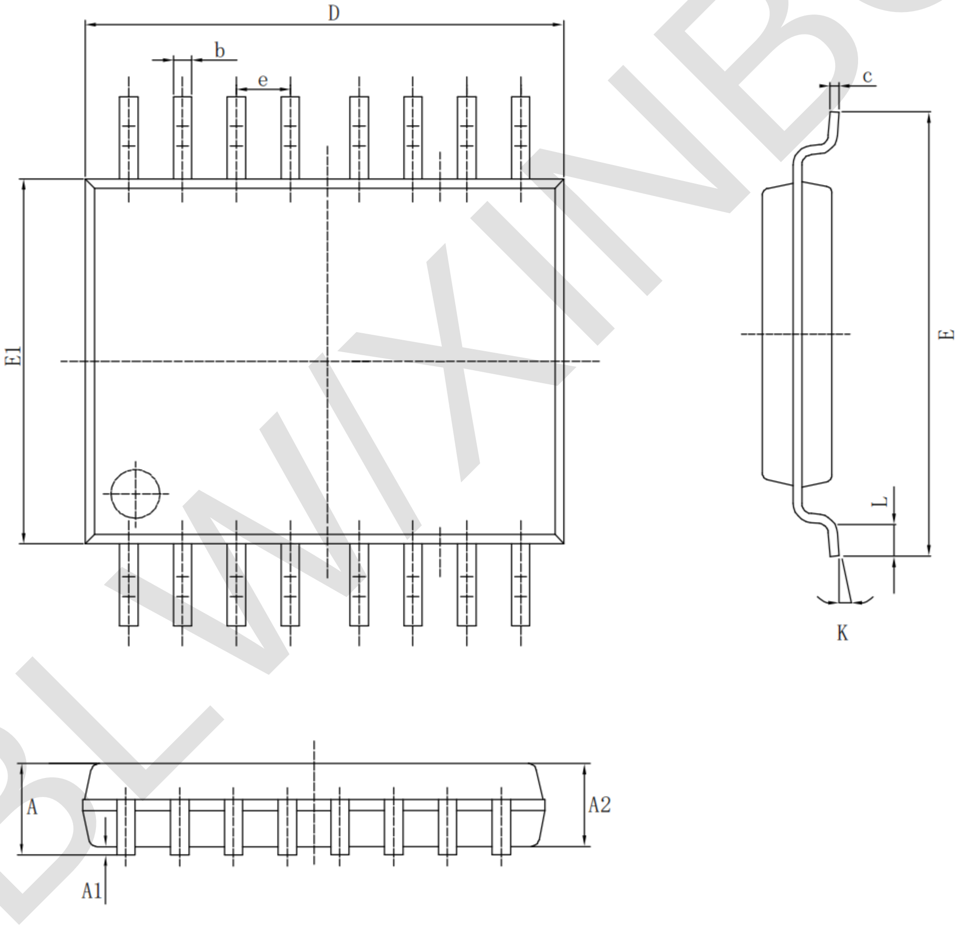
· SOP-16

Symbol \ Size	Dimensions In Millimeters			Symbol \ Size	Dimensions In Inches		
	Min(mm)	Nom(mm)	Max(mm)		Min(in)	Nom(in)	Max(in)
A	1.500	1.600	1.700	A	0.059	0.063	0.067
A1	0.100	0.150	0.250	A1	0.004	0.006	0.010
A2	1.400	1.450	1.500	A2	0.055	0.057	0.059
A3	0.600	0.650	0.700	A3	0.024	0.026	0.028
b	0.300	0.400	0.500	b	0.012	0.016	0.020
c	0.150	0.200	0.250	c	0.006	0.008	0.010
D	9.800	9.900	10.00	D	0.386	0.390	0.394
E	5.800	6.000	6.200	E	0.228	0.236	0.244
E1	3.850	3.900	3.950	E1	0.152	0.154	0.156
e	1.27(BSC)			e	0.050(BSC)		
L	0.500	0.600	0.700	L	0.020	0.024	0.028
L1	1.05(BSC)			L1	0.041(BSC)		
θ	0°	4°	8°	θ	0°	4°	8°



· TSSOP-16

Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A		1.200	A		0.047
A1	0.050	0.150	A1	0.002	0.006
A2	0.800	1.050	A2	0.031	0.041
b	0.190	0.300	b	0.007	0.012
c	0.090	0.200	c	0.004	0.0089
D	4.900	5.100	D	0.193	0.201
E	6.200	6.600	E	0.244	0.260
E1	4.300	4.480	E1	0.169	0.176
e	0.65(BSC)		e	0.0256(BSC)	
K	0°	8°	K	0°	8°
L	0.450	0.750	L	0.018	0.030



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