Dual 4-channel Analog Multiplexer/Demultiplexer

CJ74HC/HCT4052 Logic

1 Introduction

The CJ74HC/HCT4052 is a dual single-pole quad-throw analog switch (2xSP4T)suitable for use in analog or digital 4:1 multiplexer/demultiplexer applications. Each switch features four independent inputs/outputs (nY0, nY1, nY2 and nY3) and a common input/output (nZ). A digital enable input (/E) and two digital select inputs (S0 and S1) are common to both switches. When /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}.

2 Available Packages

PART NUMBER	PACKAGE
CJ74HC4052	SOP16
	SSOP16
	TSSOP16
CJ74HCT4052	SOP16
	SSOP16
	TSSOP16

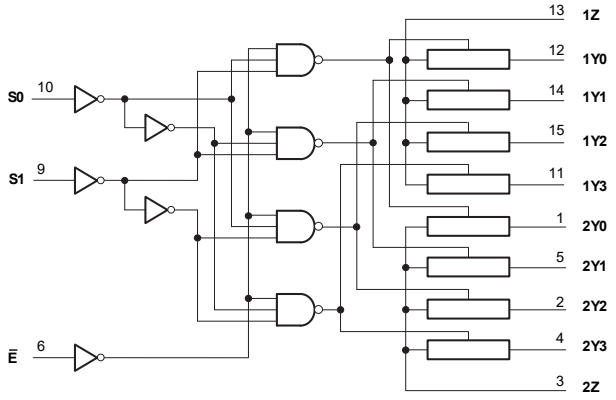
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- Wide analog input voltage range from -4.5V to +4.5V
- Low ON resistance:
  - 80Ω (typical) at V_{CC}-V_{EE}=4.5V
  - 70Ω (typical) at V_{CC}-V_{EE}=6.0V
  - 60Ω (typical) at V_{CC}-V_{EE}=9.0V
- Typical “break before make” built-in
- Input levels:
  - For CJ74HC4052: CMOS level
  - For CJ74HCT4052: TTL level
- Specified from -40°C to +125°C

4 Applications

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



Logic diagram

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74HC4052AEN	SOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74HCT4052AEN	SOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74HC4052SEN	SSOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 2500 Units / Reel	Active
CJ74HCT4052SEN	SSOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 2500 Units / Reel	Active
CJ74HC4052BEN	TSSOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 5000 Units / Reel	Active
CJ74HCT4052BEN	TSSOP16	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 5000 Units / Reel	Active

Note:

ECO PLAN: For the RoHS and Green certification standards of this product, please refer to the official report provided by JSCJ.

MSL: Moisture Sensitivity Level. Determined according to JEDEC industry standard classification.

SORT: Specifically defined as follows:
Active: Recommended for new products;
Customized: Products manufactured to meet the specific needs of customers;
Preview: The device has been released and has not been fully mass produced. The sample may or may not be available;
NoRD: It is not recommended to use the device for new design. The device is only produced for the needs of existing customers;
Obsolete: The device has been discontinued.

6 Pin Configuration and Marking Information

6.1 Pin Configuration

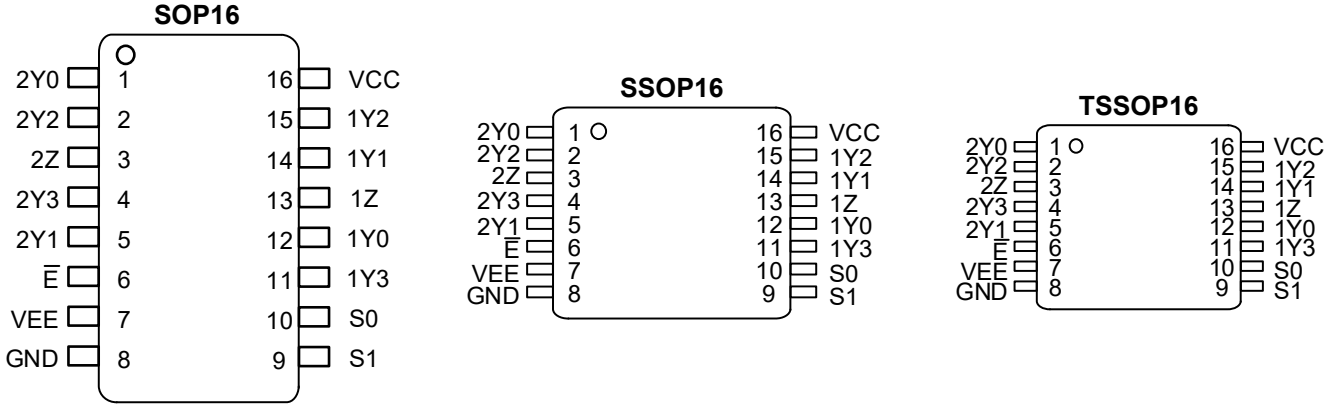


Figure 6-1 Pin configuration

6.2 Pin Function

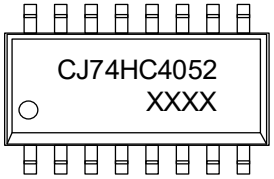
PIN		I/O(1)	DESCRIPTION
No.	NAME		
1	2Y0	I/O	Independent input or output
2	2Y2	I/O	Independent input or output
3	2Z	I/O	Common input or output
4	2Y3	I/O	Independent input or output
5	2Y1	I/O	Independent input or output
6	$\overline{E}$	I	Enable input (active LOW)
7	VEE	P	Negative supply voltage
8	GND	G	Ground supply voltage
9	S1	I	Select logic input
10	S0	I	Select logic input
11	1Y3	I/O	Independent input or output
12	1Y0	I/O	Independent input or output
13	1Z	I/O	Common input or output
14	1Y1	I/O	Independent input or output
15	1Y2	I/O	Independent input or output
16	VCC	P	Positive supply voltage

(1) I-Input, O-Output, P-Power, G-Ground

6.3 Marking Information

6.3.1 CJ74HC4052

SOP16



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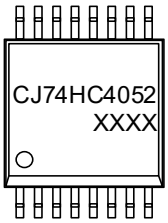

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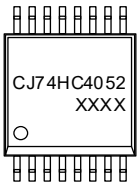

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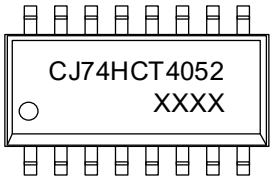
6.3.2 CJ74HCT4052

SOP16



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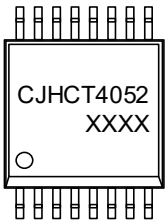

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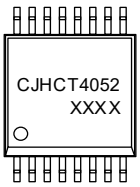

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7 Specifications

7.1 Absolute Maximum Ratings

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CC}	Supply voltage	- (1)	-0.5	+11	V
I_{IK}	Input clamping current	V_I < -0.5 V or V_I > V_{CC} + 0.5 V	-	±20	mA
I_{SK}	Switch clamping current	V_{SW} < -0.5 V or V_{SW} > V_{CC} + 0.5 V	-	±20	mA
I_{SW}	Switch current	-0.5 V < V_{SW} < V_{CC} + 0.5 V	-	±25	mA
I_{EE}	Supply current	-	-	±20	mA
I_{CC}	Supply current	-	-	50	mA
I_{GND}	Ground current	-	-	-50	mA
T_{stg}	Storage temperature	-	-65	+150	°C
P_{tot}	Total power dissipation	-	-	500	mW
P	Power dissipation	Per switch	-	100	mW
T_L	Soldering temperature	10s	-	260	°C

(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 0.4 V. 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}.

7.2 Recommended Operating Conditions

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
CJ74HC4052						
V_{CC}	Supply voltage	V_{CC}-GND	3.0	5.0	9.0	V
		V_{CC}-V_{EE}	3.0	5.0	9.0	V
V_I	Input voltage	-	0	-	V_{CC}	V
V_{SW}	Switch voltage	-	V_{EE}	-	V_{CC}	V
T_{amb}	Ambient temperature	In free air	-40	-	+125	°C
Δt/ΔV	Input transition rise and fall rate	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
CJ74HCT4052						
V_{CC}	Supply voltage	V_{CC}-GND	4.5	5.0	5.5	V
		V_{CC}-V_{EE}	3.0	5.0	9.0	V
V_I	Input voltage	-	0	-	V_{CC}	V
V_{SW}	Switch voltage	-	V_{EE}	-	V_{CC}	V
T_{amb}	Ambient temperature	In free air	-40	-	+125	°C
Δt/ΔV	Input transition rise and fall rate	V_{CC}=4.5 V	-	1.67	139	ns/V
		V_{CC}=6.0 V	-	-	-	ns/V
		V_{CC}=9.0 V	-	-	-	ns/V

7.3 ESD Ratings

SYMBOL	ESD RATINGS		VALUE	UNIT
$V_{ESD-HBM}$	Electrostatic discharge	Human body model (HBM)(1)	±1500	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

7.4 Electrical Characteristics

7.4.1 DC Characteristics 1

T_{amb}=-40°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
$R_{ON(peak)}$	ON resistance (peak)	V_{is}=V_{CC} to V_{EE}; I_{SW}=1000 uA	V_{CC}=4.5V; V_{EE}=0V	-	100	225	Ω
			V_C =6.0V; V_{EE}=0V	-	90	200	Ω
			V_{CC}=4.5V; V_{EE}=-4.5V	-	70	165	Ω
$R_{ON(rail)}$	ON resistance (rail)	V_{is}=V_{EE}; I_{SW}=1000 uA	V_{CC}=4.5V; V_{EE}=0V	-	80	175	Ω
			V_{CC}=6.0V; V_{EE}=0V	-	70	150	Ω
			V_{CC}=4.5V; V_{EE}=-4.5V	-	60	130	Ω
		V_{is}=V_{CC}; I_{SW}=1000 uA	V_{CC}=4.5V; V_{EE}=0V	-	90	200	Ω
			V_{CC}=6.0V; V_{EE}=0V	-	80	175	Ω
			V_{CC}=4.5V; V_{EE}=-4.5V	-	65	150	Ω
ΔR_{ON}	ON resistance mismatch between channels	V_{is}=V_{CC} to V_{EE}	V_{CC}=4.5V; V_{EE}=0V	-	9	-	Ω
			V_{CC}=6.0V; V_{EE}=0V	-	8	-	Ω
			V_{CC}=4.5V; V_{EE}=-4.5V	-	6	-	Ω
CJ74HC4052							
V_{IH}	HIGH-level input voltage	V_{CC}=4.5V		3.15	-	-	V
		V_{CC}=6.0V		4.2	-	-	V
		V_{CC}=9.0V		6.3	-	-	V
V_{IL}	LOW-level input voltage	V_{CC}=4.5V		-	-	1.35	V
		V_{CC}=6.0V		-	-	1.8	V
		V_{CC}=9.0V		-	-	2.7	V
I_I	Input leakage current	V_{EE}=0V; V_I=V_{CC} or GND	V_{CC}=6.0V	-	-	±1.0	uA
			V_{CC}=9.0V	-	-	±2.0	uA
$I_{S(OFF)}$	OFF-state leakage current	V_{CC}=9.0V; V_{EE}=0V; V_I=V_{IH} or V_{IL}; $\|V_{SW}\|$=V_{CC} - V_{EE}; See Figure 8-7	Per channel	-	-	±1.0	uA
			All channels	-	-	±2.0	uA
$I_{S(ON)}$	ON-state leakage current	V_I=V_{IH} or V_{IL}; $\|V_{SW}\|$=V_{CC}- V_{EE}; V_{CC}=9.0V; V_{EE}=0V; See Figure 8-8		-	-	±2.0	uA
I_{CC}	Supply current	V_{EE}=0V; V_I=V_{CC} or GND; V_{is}=V_{EE} or V_{CC}; V_{os}=V_{CC} or V_{EE}	V_{CC}=6.0V	-	-	80.0	uA
			V_{CC}=9.0V	-	-	160.0	uA
C_I	Input capacitance	-		-	3.5	-	pF
C_{SW}	Switch capacitance	Independent pins nYn		-	5	-	pF

		Common pins nZ		-	12	-	pF
CJ74HCT4052							
V_{IH}	HIGH-level input voltage	V_{CC} =4.5V to 5.5V		2.0	-	-	V
V_{IL}	LOW-level input voltage	V_{CC} =4.5V to 5.5V		-	-	0.8	V
I_I	Input leakage current	V_I = V_{CC} or GND; V_{CC} =5.5V; V_{EE} =0V		-	-	±1.0	uA
$I_{S(OFF)}$	OFF-state leakage current	V_{CC}=9.0V; V_{EE}=0V; V_I=V_{IH} or V_{IL}; |V_{SW}|=V_{CC} - V_{EE}; See Figure 8-7	Per channel	-	-	±1.0	uA
			All channels	-	-	±2.0	uA
$I_{S(ON)}$	ON-state leakage current	V_I=V_{IH} or V_{IL}; |V_{SW}|=V_{CC}- V_{EE}; V_{CC}=9.0V; V_{EE}=0V; See Figure 8-8		-	-	±2.0	uA
I_{CC}	Supply current	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	-	-	80.0	uA
			V_{CC} = 4.5V; V_{EE} = -4.5V	-	-	160.0	uA
ΔI_{CC}	Additional supply current	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		-	45	202.5	uA
C_I	Input capacitance	-		-	3.5	-	pF
C_{SW}	Switch capacitance	Independent pins nYn		-	5	-	pF
		Common pins nZ		-	12	-	pF

Note：

(1) All typical values are measured at T_{amb}= 25°C.

(2) V_I= V_{IH} or V_{IL}; for test circuit see Figure 8-5.

(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.

7.4.2 DC Characteristics 2

T_{amb}=-40°C to +125°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
$R_{ON(peak)}$	ON resistance (peak)	V_{is}=V_{CC} to V_{EE}; I_{SW}=1000 uA	V_{CC}=4.5V; V_{EE}=0V	-	-	270	Ω
			V_C =6.0V; V_{EE}=0V	-	-	240	Ω
			V_{CC}=4.5V; V_{EE}=-4.5V	-	-	195	Ω
$R_{ON(rail)}$	ON resistance (rail)	V_{is}=V_{EE}; I_{SW}=1000 uA	V_{CC}=4.5V; V_{EE}=0V	-	-	210	Ω
			V_{CC}=6.0V; V_{EE}=0V	-	-	180	Ω
			V_{CC}=4.5V; V_{EE}=-4.5V	-	-	160	Ω
		V_{is}=V_{CC}; I_{SW}=1000 uA	V_{CC}=4.5V; V_{EE}=0V	-	-	240	Ω
			V_{CC}=6.0V; V_{EE}=0V	-	-	210	Ω
			V_{CC}=4.5V; V_{EE}=-4.5V	-	-	180	Ω
CJ74HC4052							
V_{IH}	HIGH-level input voltage	V_{CC}=4.5V		3.15	-	-	V
		V_{CC}=6.0V		4.2	-	-	V
		V_{CC}=9.0V		6.3	-	-	V
V_{IL}	LOW-level input voltage	V_{CC}=4.5V		-	-	1.35	V

		V_{CC}=6.0V		-	-	1.8	V
		V_{CC}=9.0V		-	-	2.7	V
I_I	Input leakage current	V_{EE}=0V; V_I=V_{CC} or GND	V_{CC}=6.0V	-	-	±1.0	uA
			V_{CC}=9.0V	-	-	±2.0	uA
$I_{S(OFF)}$	OFF-state leakage current	V_{CC}=9.0V; V_{EE}=0V; V_I=V_{IH} or V_{IL}; $\|V_{SW}\|$=V_{CC} - V_{EE}; See Figure 8-7	Per channel	-	-	±1.0	uA
			All channels	-	-	±2.0	uA
$I_{S(ON)}$	ON-state leakage current	V_I=V_{IH} or V_{IL}; $\|V_{SW}\|$=V_{CC}- V_{EE}; V_{CC}=9.0V; V_{EE}=0V; See Figure 8-8		-	-	±2.0	uA
I_{CC}	Supply current	V_{EE}=0V; V_I=V_{CC} or GND; V_{is}=V_{EE} or V_{CC}; V_{os}=V_{CC} or V_{EE}	V_{CC}=6.0V	-	-	160.0	uA
			V_{CC}=9.0V	-	-	320.0	uA
CJ74HCT4052							
V_{IH}	HIGH-level input voltage	V_{CC} = 4.5 V to 5.5 V		2.0	-	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 4.5 V to 5.5 V		-	-	0.8	V
I_I	Input leakage current	V_I = V_{CC} or GND; V_{CC} = 5.5 V; V_{EE} = 0 V		-	-	±1.0	uA
$I_{S(OFF)}$	OFF-state leakage current	V_{CC}=9.0V; V_{EE}=0V; V_I=V_{IH} or V_{IL}; $\|V_{SW}\|$=V_{CC} - V_{EE}; See Figure 8-7	Per channel	-	-	±1.0	uA
			All channels	-	-	±2.0	uA
$I_{S(ON)}$	ON-state leakage current	V_I=V_{IH} or V_{IL}; $\|V_{SW}\|$=V_{CC}- V_{EE}; V_{CC}=9.0V; V_{EE}=0V; See Figure 8-8		-	-	±2.0	uA
I_{CC}	Supply current	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	-	-	320.0	uA
ΔI_{CC}	Additional supply current	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		-	-	220.5	uA

Note：

(1) All typical values are measured at T_{amb}= 25°C.

(2) V_I= V_{IH} or V_{IL}; for test circuit see Figure 8-5.

(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.

7.4.3 AC Characteristics 1

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

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
CJ74HC4052							
t_{pd}	Propagation delay	V_{is} to V_{os}; R_L=∞ Ω; See Figure 8-9	V_{CC}=4.5V; V_{EE}=0V	-	5	15	ns
			V_{CC}=6.0V; V_{EE}=0V	-	4	13	ns
			V_{CC}=4.5V; V_{EE}=-4.5V	-	4	10	ns
t_{on}	Turn-on time	$\overline{E}$, Sn to V_{os}; R_L=∞ Ω; See Figure 8-10	V_{CC}=4.5V; V_{EE}=0V	-	38	81	ns
			V_{CC}=5.0V; V_{EE}=0V; C_L=15pF	-	28	-	ns
			V_{CC}=6.0V; V_{EE}=0V	-	30	69	ns
			V_{CC}=4.5V; V_{EE}=-4.5V	-	26	58	ns
t_{off}	Turn-off time	$\overline{E}$, Sn to V_{os}; R_L=1kΩ; See Figure 8-10	V_{CC}=4.5V; V_{EE}=0V	-	27	63	ns
			V_{CC}=5.0V; V_{EE}=0V; C_L=15pF	-	21	-	ns
			V_{CC}=6.0V; V_{EE}=0V	-	22	54	ns
			V_{CC}=4.5V; V_{EE}=-4.5V	-	22	48	ns
C_{PD}	Power dissipation capacitance	Per switch; V_I=GND to V_{CC}		-	57	-	pF
CJ74HCT4052							
t_{pd}	Propagation delay	V_{is} to V_{os}; R_L=∞ Ω; See Figure 8-9	V_{CC} = 4.5 V; V_{EE} = 0 V	-	5	15	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	4	10	ns
t_{on}	Turn-on time	$\overline{E}$, Sn to V_{os}; R_L=∞ Ω; See Figure 8-10	V_{CC} = 4.5 V; V_{EE} = 0 V	-	41	88	ns
			V_{CC} = 5.0 V; V_{EE} =0V; C_L=15pF	-	18	-	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	28	60	ns
t_{off}	Turn-off time	$\overline{E}$, Sn to V_{os}; R_L=1kΩ; See Figure 8-10	V_{CC} = 4.5 V; V_{EE} = 0 V	-	26	63	ns
			V_{CC} = 5.0 V; V_{EE} =0V; C_L=15pF	-	13	-	ns
			V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	21	48	ns
C_{PD}	Power dissipation capacitance	Per switch; V_I = GND to V_{CC}-1.5V		-	57	-	pF

Note：

(1) All typical values are measured at T_{amb}= 25°C.

(2) t_{pd} is the same as t_{PHL} and t_{PLH}.

(3) t_{on} is the same as t_{PZH} and t_{PZL}.

(4) t_{off} is the same as t_{PHZ} and t_{PLZ}.

(5) 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.

(6) For test circuit see Figure 8-11.

(7) V_{is} is the input voltage at a nYn or nZ terminal, whichever is assigned as an input.

(8) V_{os} is the output voltage at a nYn or nZ terminal, whichever is assigned as an output.

7.4.4 AC Characteristics 2

T_{amb}=-40°C to +125°C, GND=0V; $t_r = t_f$ = 6ns; C_L=50pF; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
CJ74HC4052							
t_{pd}	Propagation delay	V_{is} to V_{os}; R_L=∞ Ω; See Figure 8-9	V_{CC}=4.5V; V_{EE}=0V	-	-	18	ns
			V_{CC}=6.0V; V_{EE}=0V	-	-	15	ns
			V_{CC}=4.5V; V_{EE}=-4.5V	-	-	12	ns
t_{on}	Turn-on time	$\overline{E}$, Sn to V_{os}; R_L=∞ Ω; See Figure 8-10	V_{CC}=4.5V; V_{EE}=0V	-	-	98	ns
			V_{CC}=6.0V; V_{EE}=0V	-	-	83	ns
			V_{CC}=4.5V; V_{EE}=-4.5V	-	-	69	ns
t_{off}	Turn-off time	$\overline{E}$, Sn to V_{os}; R_L=1kΩ; See Figure 8-10	V_{CC}=4.5V; V_{EE}=0V	-	-	75	ns
			V_{CC}=6.0V; V_{EE}=0V	-	-	64	ns
			V_{CC}=4.5V; V_{EE}=-4.5V	-	-	57	ns
CJ74HCT4052							
t_{pd}	Propagation delay	V_{is} to V_{os}; R_L=∞ Ω; See Figure 8-9	V_{CC}=4.5V; V_{EE}=0V	-	-	18	ns
			V_{CC}=4.5V; V_{EE}=-4.5V	-	-	12	ns
t_{on}	Turn-on time	$\overline{E}$, Sn to V_{os}; R_L=1kΩ; See Figure 8-10	V_{CC} =4.5V; V_{EE} =0V	-	-	105	ns
			V_{CC}=4.5V; V_{EE}=-4.5V	-	-	72	ns
t_{off}	Turn-off time	$\overline{E}$, Sn to V_{os}; R_L=1kΩ; See Figure 8-10	V_{CC} =4.5V; V_{EE} =0V	-	-	75	ns
			V_{CC}=4.5V; V_{EE}=-4.5V	-	-	57	ns

Note：

(1) All typical values are measured at T_{amb}= 25°C.

(2) t_{pd} is the same as t_{PHL} and t_{PLH}.

(3) t_{on} is the same as t_{PZH} and t_{PZL}.

(4) t_{off} is the same as t_{PHZ} and t_{PLZ}.

(5) For test circuit see Figure 8-11.

(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.

7.4.5 AC Characteristics 3

T_{amb}=25°C, GND=0V; C_L=50 pF; recommended conditions and typical values.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
d_{sin}	Sine-wave distortion	f_i=1 kHz; R_L=10 kΩ; See Figure 8-12	V_{is}=4.0V (p-p); V_{CC}=2.25V; V_{EE}=-2.25V	-	0.04	-	%
			V_{is}=8.0V (p-p); V_{CC}=4.5V; V_{EE}=-4.5V	-	0.02	-	%
		f_i=10 kHz; R_L=10 kΩ; See Figure 8-12	V_{is}=4.0V (p-p); V_{CC}=2.25V; V_{EE}=-2.25V	-	0.12	-	%
			V_{is}=8.0V (p-p); V_{CC}=4.5V; V_{EE}=-4.5V	-	0.06	-	%
α_{iso}	Isolation (OFF-state)	R_L= 600 Ω; f_i= 1 MHz; See Figure 8-13	V_{CC}=2.25V;V_{EE}=-2.25V	-	-50	-	dB
			V_{CC}=4.5V;V_{EE}=-4.5V	-	-50	-	dB
Xtalk	Crosstalk	Between two switches/multiplexers; R_L=600 Ω; f_i=1 MHz; See Figure 8-14	V_{CC}=2.25V;V_{EE}=-2.25V	-	-60	-	dB
			V_{CC}=4.5V;V_{EE}=-4.5V	-	-60	-	dB
V_{ct}	Crosstalk voltage	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 8-15	V_{CC}=4.5V; V_{EE}=0V	-	110	-	mV
			V_{CC}=4.5V;V_{EE}=-4.5V	-	220	-	mV
$f_{(-3dB)}$	-3dB frequency response	R_L=50 Ω; See Figure 8-16	V_{CC}=2.25V;V_{EE}=-2.25V	-	170	-	MHz
			V_{CC}=4.5V;V_{EE}=-4.5V	-	180	-	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.

8 Detailed Description

8.1 Overview

The CJ74HC/HCT4052 is a dual single-pole quad-throw analog switch (2xSP4T)suitable for use in analog or digital 4:1 multiplexer/demultiplexer applications. Each switch features four independent inputs/outputs (nY0, nY1, nY2 and nY3) and a common input/output (nZ). A digital enable input (/E) and two digital select inputs (S0 and S1) are common to both switches. When /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}.

8.2 Functional Block Diagram

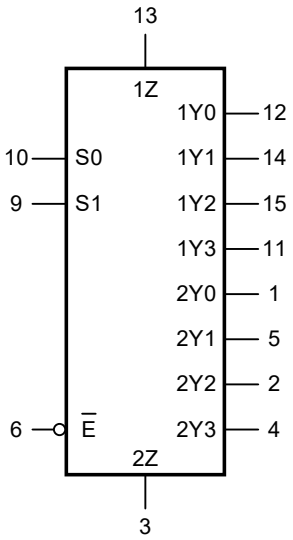


Figure 8-1 Logic symbol

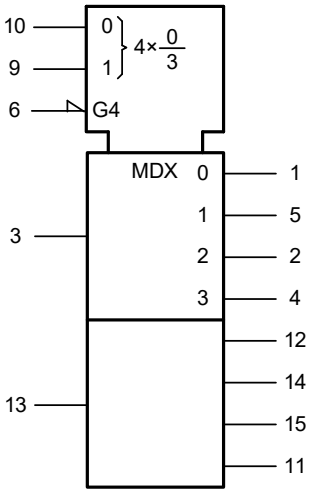


Figure 8-2 IEC logic symbol

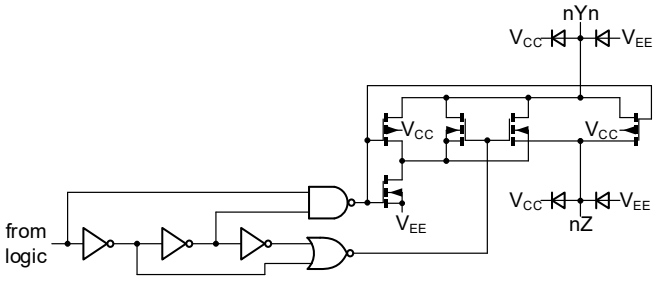


Figure 8-3 Schematic diagram (one switch)

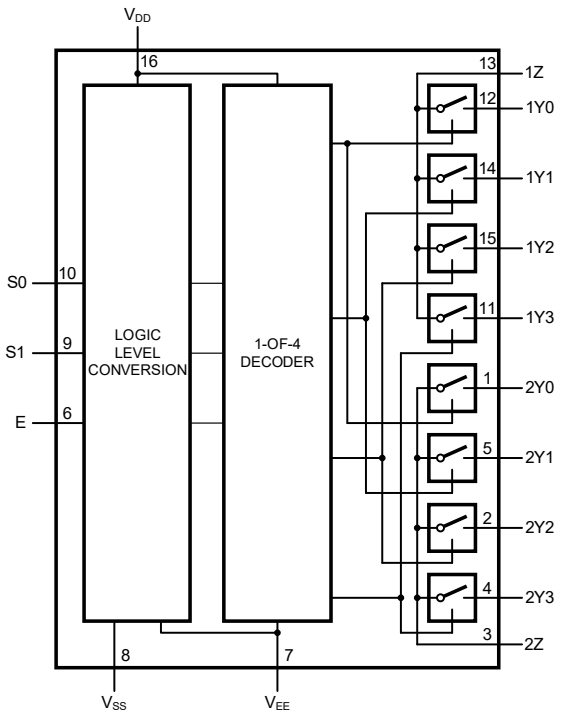


Figure 8-4 Functional diagram

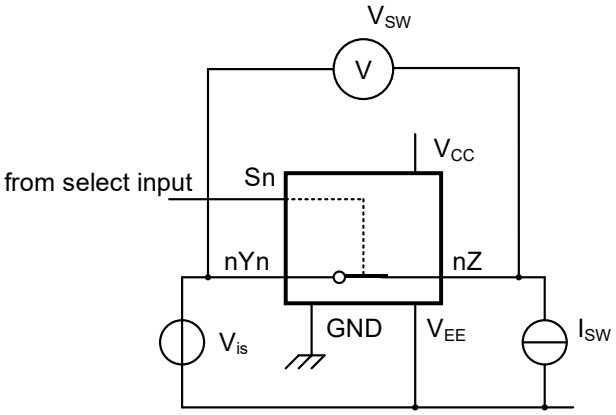
8.3 Function Table(1)

INPUT			CHANNEL ON
$\overline{E}$	S1	S0	
L	L	L	nY0 and nZ
L	L	H	nY1 and nZ
L	H	L	nY2 and nZ
L	H	H	nY3 and nZ
H	X	X	None

(1) H=HIGH voltage level; L=LOW voltage level; X=don't care.

8.4 Testing Circuit

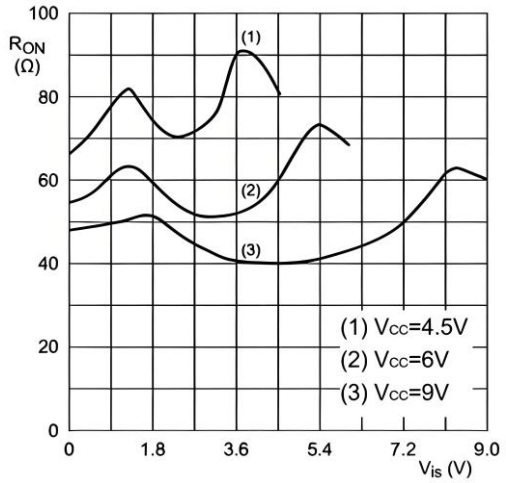
8.4.1 DC Testing Circuit 1



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

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

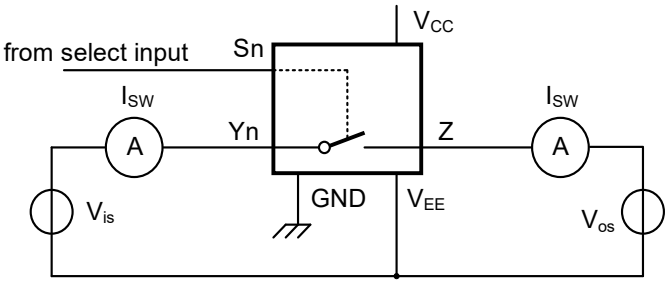
Figure 8-5 Test circuit for measuring R_{ON}



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

Figure 8-6 Typical R_{ON} as a function of input voltage V_{is}

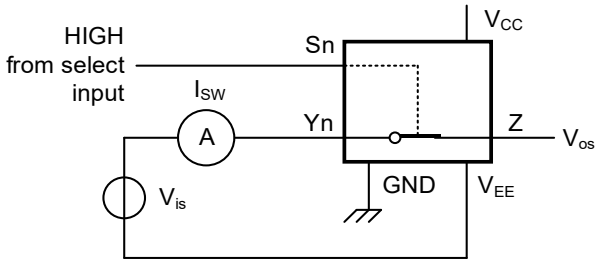
8.4.2 DC Testing Circuit 2



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

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

Figure 8-7 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 8-8 Test circuit for measuring ON-state current

8.4.3 AC Testing Waveforms

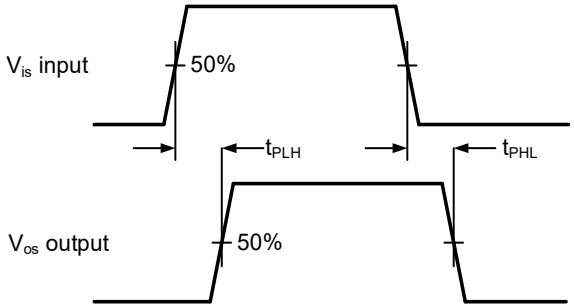
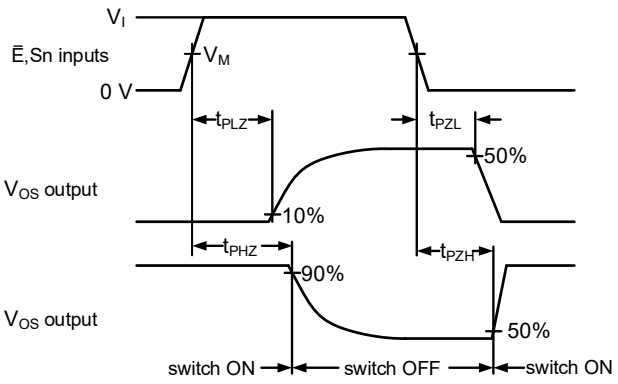


Figure 8-9 Input (V_{is}) to output (V_{os}) propagation delays



For CJ74HC4052: V_M=0.5xV_{CC}
For CJ74HCT4052: V_M=1.3V

Figure 8-10 Turn-on and turn-off times

8.4.4 AC Testing Circuit 1

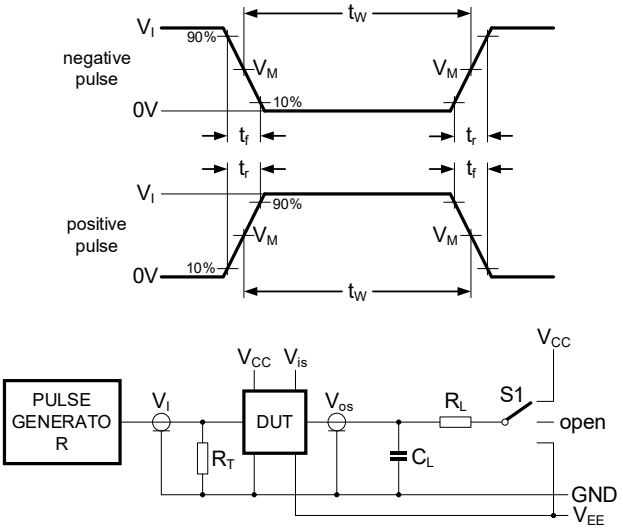


Figure 8-11 Test circuit for measuring switching times

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.

8.4.5 AC Testing Circuit 2

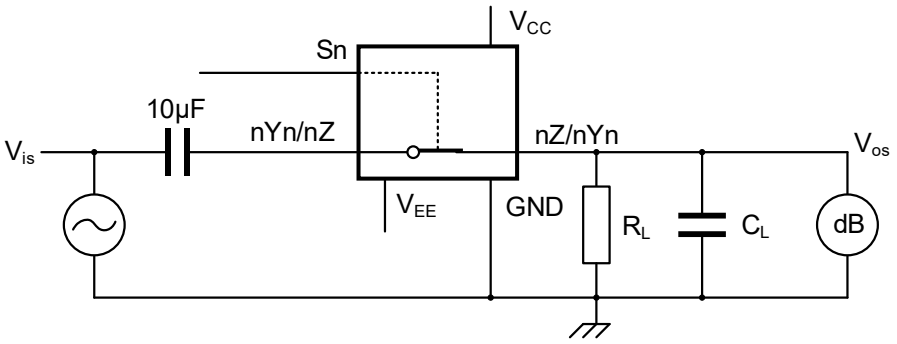
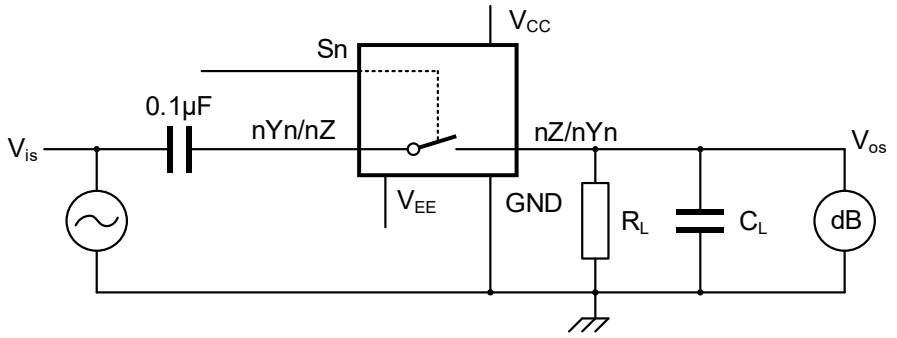
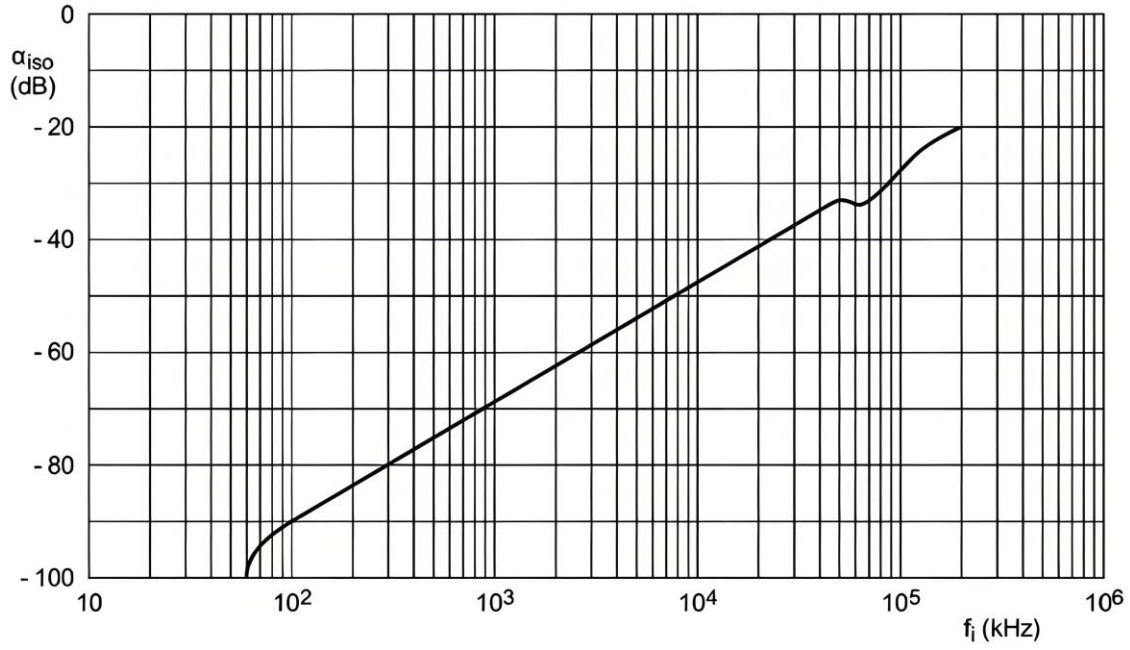


Figure 8-12 Test circuit for measuring sine-wave distortion



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 8-13 Test circuit for measuring isolation (OFF-state)

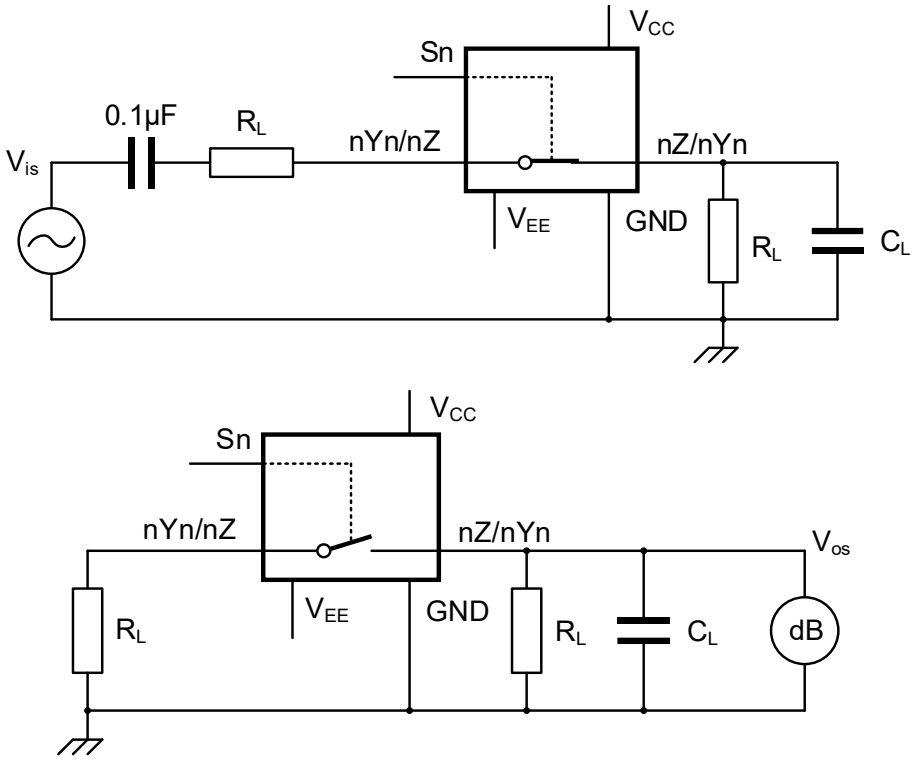


Figure 8-14 Test circuits for measuring crosstalk between any two switches/multiplexers

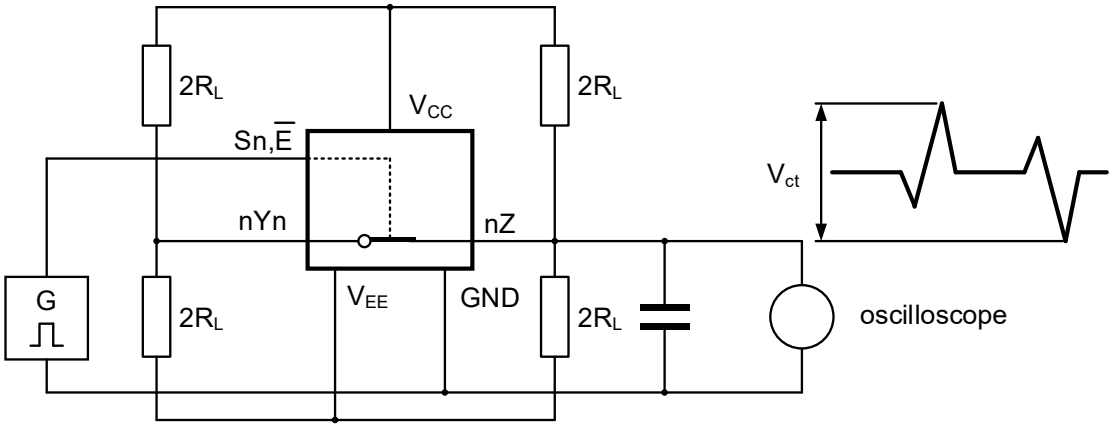
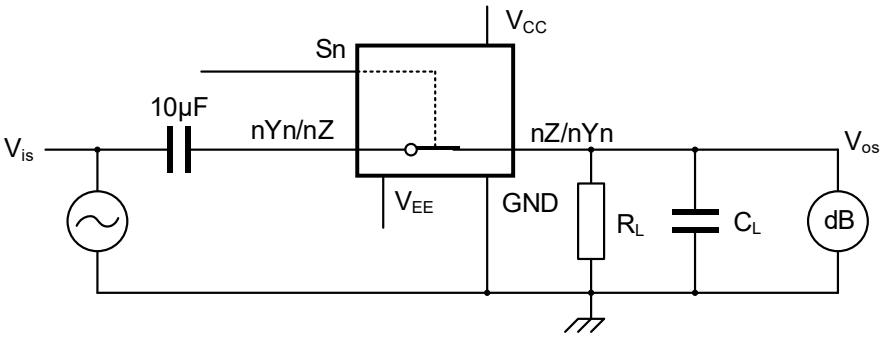
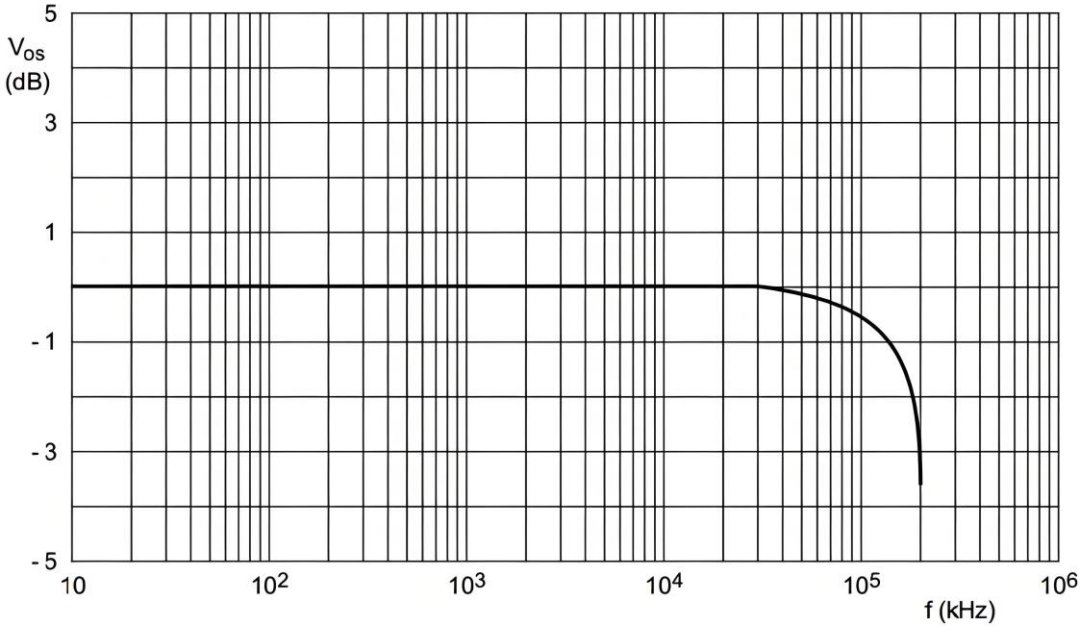


Figure 8-15 Test circuit for measuring crosstalk between control input and any switch



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 8-16 Test circuit for frequency response

8.4.6 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}

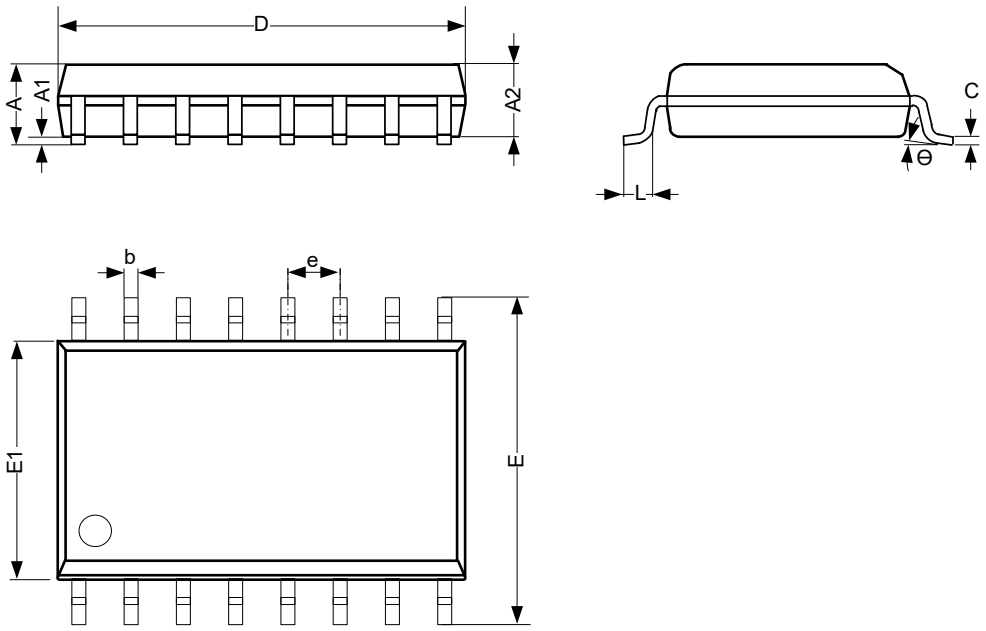
(1) t_r = t_f= 6 ns; when measuring f_{max}, there is no constraint to t_r and t_f with 50 % duty factor.

(2) V_I values:
For CJ74HC4052: V_I = V_{CC}.
For CJ74HCT4052: V_I = 3V.

9 Mechanical Information

9.1 SOP16 Mechanical Information

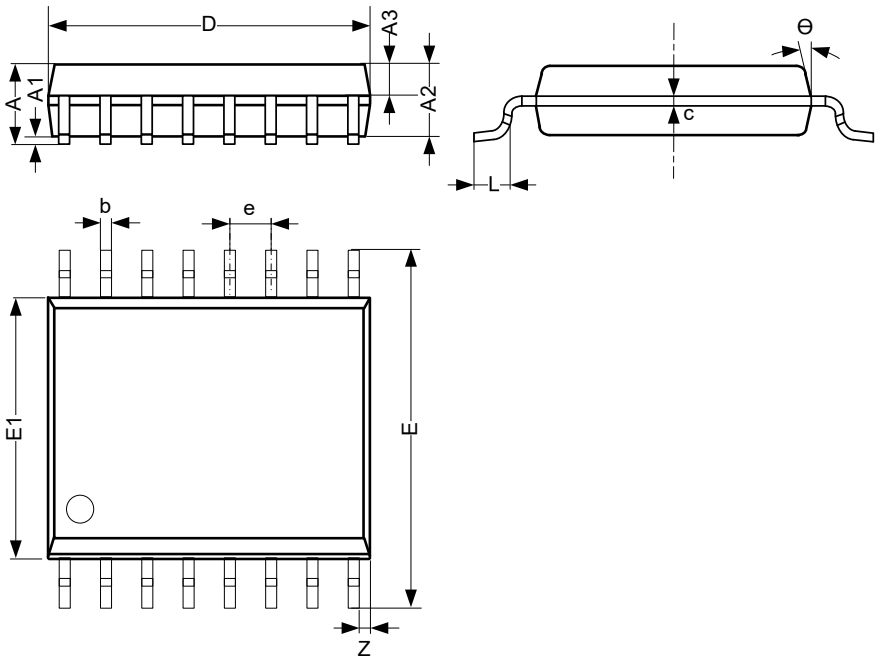
9.1.1 SOP16 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.35	-	1.80
A1	0.10	-	0.25
A2	1.25	-	1.55
b	0.33	-	0.51
c	0.19	-	0.25
D	9.50	-	10.10
E	5.80	-	6.30
E1	3.70	-	4.10
e	1.27 BSC		
L	0.35	-	0.89
θ	0°	-	8°
Unit: mm			

9.2 SSOP16 Mechanical Information

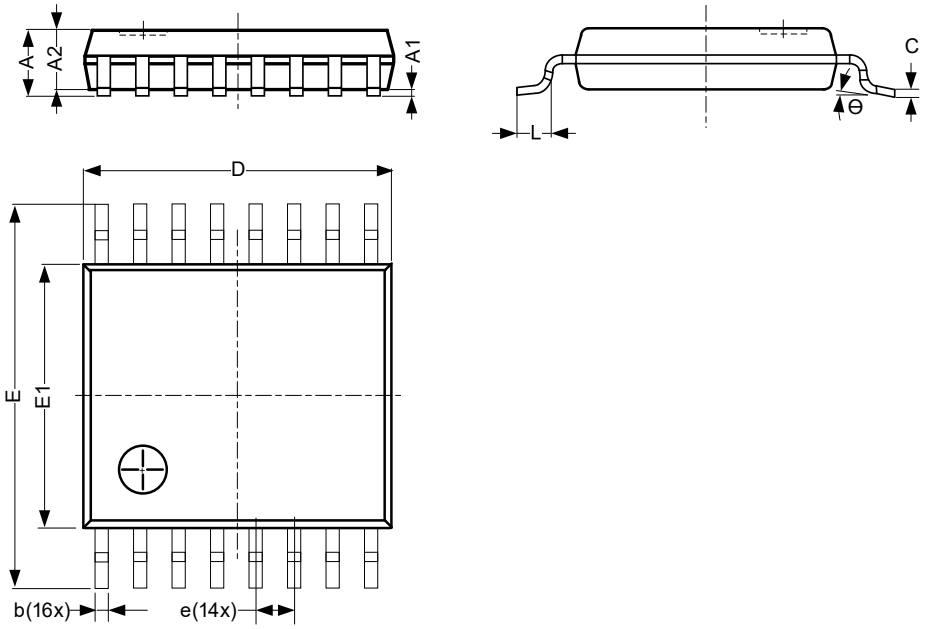
9.2.1 SSOP16 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.75	-	1.95
A1	0.05	-	0.15
A2	1.70	-	1.80
A3	-	0.80	-
b	-	0.30	-
c	-	0.15	-
D	6.15	-	6.25
E	7.65	-	7.95
E1	5.25	-	5.35
e	0.65 BSC		
L	0.60	-	0.80
Z	-	0.675	-
Θ	0°	-	8°
Unit: mm			

9.3 TSSOP16 Mechanical Information

9.3.1 TSSOP16 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	-	-	1.20
A1	0.05	-	0.15
A2	0.80	-	1.05
b	0.19	-	0.30
c	0.09	-	0.20
D	4.90	-	5.10
E	6.20	-	6.60
E1	4.30	-	4.50
e	0.65 BSC		
L	0.45	-	0.75
θ	0°	-	8°
Unit: mm			

10 Notes and Revision History

10.1 Associated Product Family and Others

To view other products of the same type or IC products of other types, click the official website of JSCJ -- ***https:www.jscj-elec.com*** for more details.

10.2 Notes

Electrostatic Discharge Caution

This IC may be damaged by ESD. Relevant personnel shall comply with correct installation and use specifications to avoid ESD damage to the IC. If appropriate measures are not taken to prevent ESD damage, the hazards caused by ESD include but are not limited to degradation of integrated circuit performance or complete damage of integrated circuit. For some precision integrated circuits, a very small parameter change may cause the whole device to be inconsistent with its published specifications.

10.3 Revision History

July, 2025: rev - 1.1, Added 74HCT4052 and change marking information.

DISCLAIMER

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