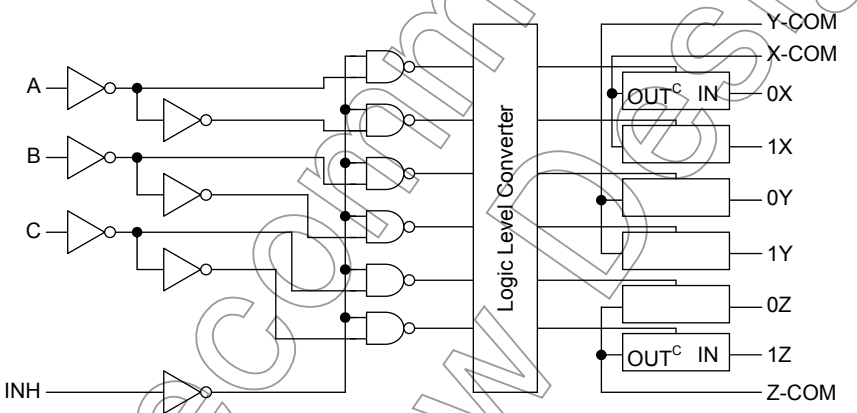
Truth Table

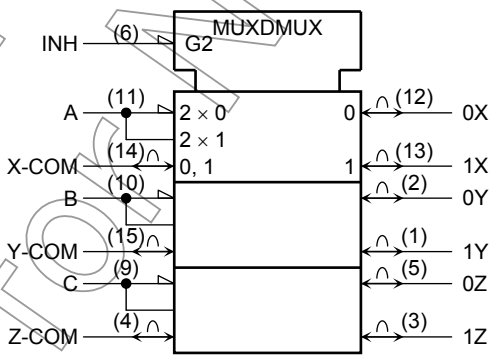
Control Inputs				"ON" Channel
Inhibit	C	B	A	HC4053A
L	L	L	L	0X, 0Y, 0Z
L	L	L	H	1X, 0Y, 0Z
L	L	H	L	0X, 1Y, 0Z
L	L	H	H	1X, 1Y, 0Z
L	H	L	L	0X, 0Y, 1Z
L	H	L	H	1X, 0Y, 1Z
L	H	H	L	0X, 1Y, 1Z
L	H	H	H	1X, 1Y, 1Z
H	X	X	X	NONE

X: Don't care

System Diagram



IEC Logic Symbol



Absolute Maximum Ratings (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	−0.5 to 7	V
Supply voltage range	V_{CC}-V_{EE}	−0.5 to 13	V
Control input voltage	V_{IN}	−0.5 to V_{CC} + 0.5	V
Switch I/O voltage	$V_{I/O}$	V_{EE} − 0.5 to V_{CC} + 0.5	V
Control input diode current	I_{ICK}	±20	mA
I/O diode current	I_{OK}	±20	mA
Switch through current	I_T	±25	mA
DC V_{CC} or ground current	I_{CC}	±50	mA
Power dissipation	P_D	180	mW
Storage temperature	T_{stg}	−65 to 150	°C

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	2 to 6	V
Supply voltage range	V_{EE}	−6 to 0	V
Supply voltage range	V_{CC}-V_{EE}	2 to 12	V
Control input voltage	V_{IN}	0 to V_{CC}	V
Switch I/O voltage	$V_{I/O}$	V_{EE} to V_{CC}	V
Operating temperature	T_{opr}	−40 to 85	°C
Control input rise and fall time	t_r, t_f	0 to 1000 (V_{CC} = 2.0 V) 0 to 500 (V_{CC} = 4.5 V) 0 to 400 (V_{CC} = 6.0 V)	ns

Note: The operating ranges must be maintained to ensure the normal operation of the device.
Unused control inputs must be tied to either VCC or GND.

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition			Ta = 25°C			Ta = −40 to 85°C		Unit
			V_{EE} (V)	V_{CC} (V)	Min	Typ.	Max	Min	Max	
High-level control input voltage	V_{IHC}	—		2.0	1.50	—	—	1.50	—	V
				4.5	3.15	—	—	3.15	—	
				6.0	4.20	—	—	4.20	—	
Low-level control input voltage	V_{ILC}	—		2.0	—	—	0.50	—	0.50	V
				4.5	—	—	1.35	—	1.35	
				6.0	—	—	1.80	—	1.80	
ON resistance	R_{ON}	V_{IN} = V_{ILC} or V_{IHC} $V_{I/O}$ = V_{CC} to V_{EE} $I_{I/O}$ ≤ 2 mA	GND	4.5	—	85	180	—	225	Ω
			−4.5	4.5	—	55	120	—	150	
			−6.0	6.0	—	50	100	—	125	
		V_{IN} = V_{ILC} or V_{IHC} $V_{I/O}$ = V_{CC} or V_{EE} $I_{I/O}$ ≤ 2 mA	GND	2.0	—	150	—	—	—	
			GND	4.5	—	70	150	—	190	
			−4.5	4.5	—	50	100	—	125	
			−6.0	6.0	—	45	80	—	100	
Difference of ON resistance between switches	ΔR_{ON}	V_{IN} = V_{ILC} or V_{IHC} $V_{I/O}$ = V_{CC} to V_{EE} $I_{I/O}$ ≤ 2 mA	GND	4.5	—	10	30	—	35	Ω
			−4.5	4.5	—	5	12	—	15	
			−6.0	6.0	—	5	10	—	12	
Input/output leakage current (switch off)	I_{OFF}	V_{OS} = V_{CC} or GND V_{IS} = GND or V_{CC} V_{IN} = V_{ILC} or V_{IHC}	GND	6.0	—	—	±60	—	±600	nA
			−6.0	6.0	—	—	±100	—	±1000	
Switch input leakage current (switch on)	I_{IZ}	V_{OS} = V_{CC} or GND V_{IN} = V_{ILC} or V_{IHC}	GND	6.0	—	—	±60	—	±600	nA
			−6.0	6.0	—	—	±100	—	±1000	
Control input current	I_{IN}	V_{IN} = V_{CC} or GND	GND	6.0	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND	GND	6.0	—	—	4.0	—	40.0	μA
			−6.0	6.0	—	—	8.0	—	80.0	

AC Characteristics (C_L = 50 pF, input: $t_r = t_f$ = 6 ns, GND = 0 V)

Characteristics	Symbol	Test Condition			Ta = 25°C			Ta = −40 to 85°C		Unit
			V_{EE} (V)	V_{CC} (V)	Min	Typ.	Max	Min	Max	
Phase difference between input and output	$\varphi_{I/O}$		GND	2.0	—	25	60	—	75	ns
			GND	4.5	—	6	12	—	15	
			GND	6.0	—	5	10	—	13	
			−4.5	4.5		4		—	—	
Output enable time	t_{pZL} t_{pZH}	(Note 1)	GND	2.0	—	50	225	—	280	ns
			GND	4.5	—	14	45	—	56	
			GND	6.0	—	12	38	—	48	
			−4.5	4.5		14	—	—	—	
Output disable time	t_{pLZ} t_{pHZ}	(Note 1)	GND	2.0	—	95	225	—	280	ns
			GND	4.5	—	30	45	—	56	
			GND	6.0	—	26	38	—	48	
			−4.5	4.5		26	—	—	—	
Control input capacitance	C_{IN}		—	—	—	5	10	—	10	pF
COMMON terminal capacitance	C_{IS}		−5.0	5.0	—	11	20	—	20	pF
SWITCH terminal capacitance	C_{OS}		−5.0	5.0	—	7	15	—	15	pF
Feedthrough capacitance	C_{IOS}		−5.0	5.0	—	0.75	2	—	2	pF
Power dissipation capacitance	C_{PD}	(Note 2)	GND	5.0	—	67	—	—	—	pF

Note 1: R_L = 1 kΩ

Note 2: C_{PD} is defined as the value of the internal equivalent capacitance of IC which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation:

$$I_{CC\ (opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Analog Switch Characteristics (GND = 0 V, Ta = 25°C) (Note 1)

Characteristics	Symbol	Test Condition		V_{EE} (V)	V_{CC} (V)	Typ.	Unit
Sine wave distortion (T.H.D)		R_L = 10 kΩ, C_L = 50 pF, f_{IN} = 1 kHz	V_{IN} = 4.0 V_{p-p}	−2.25	2.25	0.025	%
			V_{IN} = 8.0 V_{p-p}	−4.5	4.5	0.020	
			V_{IN} = 11.0 V_{p-p}	−6.0	6.0	0.018	
Frequency response (switch on)	f_{max}	Adjust f_{IN} voltage to obtain 0dBm at V_{OS} Increase f_{IN} frequency until dB meter reads −3dB R_L = 50 Ω, C_L = 10 pF f_{IN} = 1 MHz, sine wave	(Note 2)	−2.25	2.25	120	MHz
			(Note 3)			95	
			(Note 2)	−4.5	4.5	190	
			(Note 3)			150	
			(Note 2)	−6.0	6.0	200	
			(Note 3)			190	
Feed through attenuation (switch off)		V_{IN} is centered at (V_{CC} − V_{EE})/2 Adjust input for 0dBm R_L = 600 Ω, C_L = 50 pF f_{IN} = 1 MHz, sine wave		−2.25	2.25	−50	dB
				−4.5	4.5	−50	
				−6.0	6.0	−50	
Crosstalk (control input to signal output)		R_L = 600 Ω, C_L = 50 pF f_{IN} = 1 MHz, square wave (t_r = t_f = 6 ns)		−2.25	2.25	60	mV
				−4.5	4.5	140	
				−6.0	6.0	200	
Crosstalk (between any switches)		Adjust V_{IN} to obtain 0dBm at input R_L = 600 Ω, C_L = 50 pF f_{IN} = 1 MHz, sine wave		−2.25	2.25	−50	dB
				−4.5	4.5	−50	
				−6.0	6.0	−50	

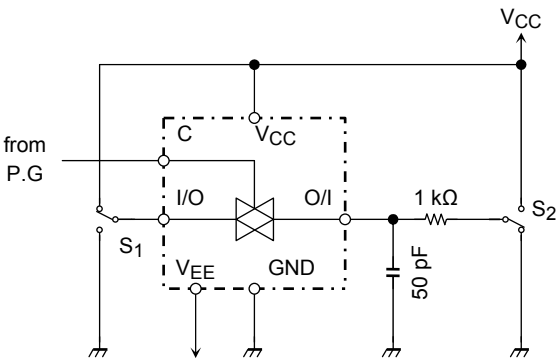
Note 1: These characteristics are determined by design of devices.

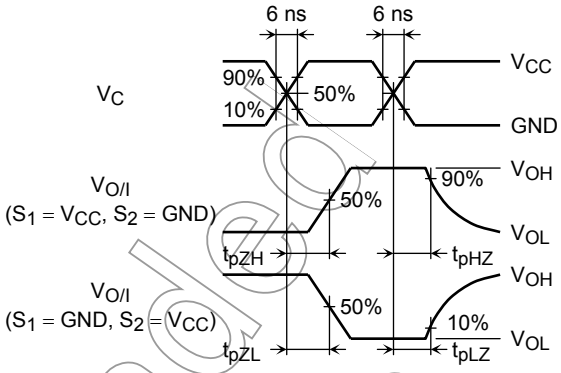
Note 2: Input COMMON terminal, and measured at SWITCH terminal.

Note 3: Input SWITCH terminal, and measured at COMMON terminal.

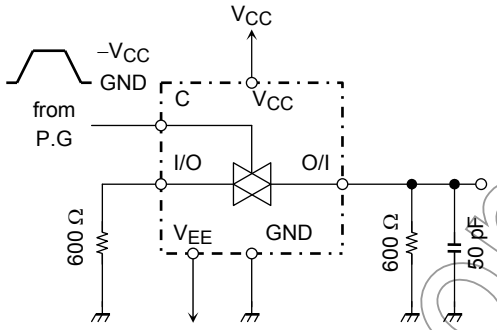
Switching Characteristics Test Circuits

1. t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}

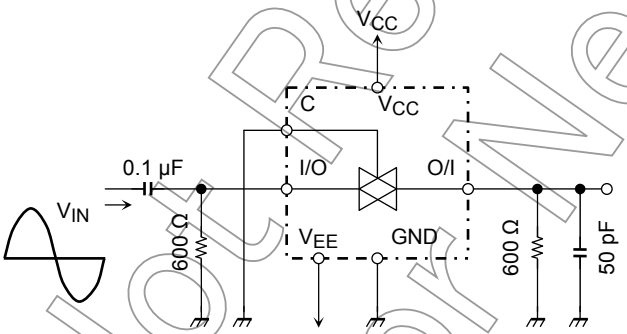




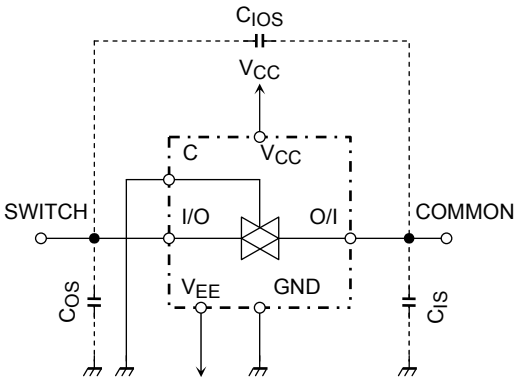
2. Cross Talk (control input-switch output) f_{IN} = 1 MHz duty = 50% $t_r = t_f$ = 6 ns



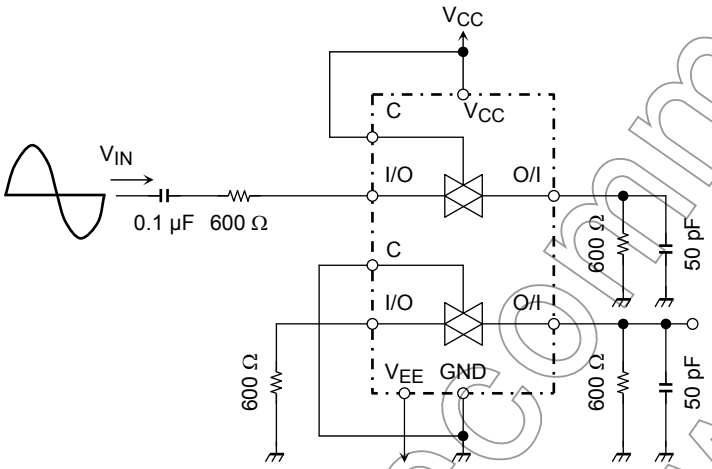
3. Feedthrough Attenuation



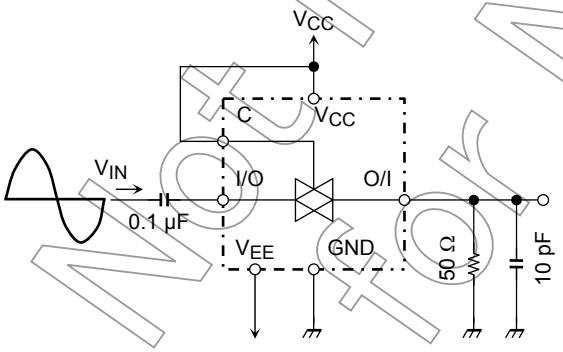
4. C_{IOS}, C_{IS}, C_{OS}



5. Cross Talk (between any two switches)

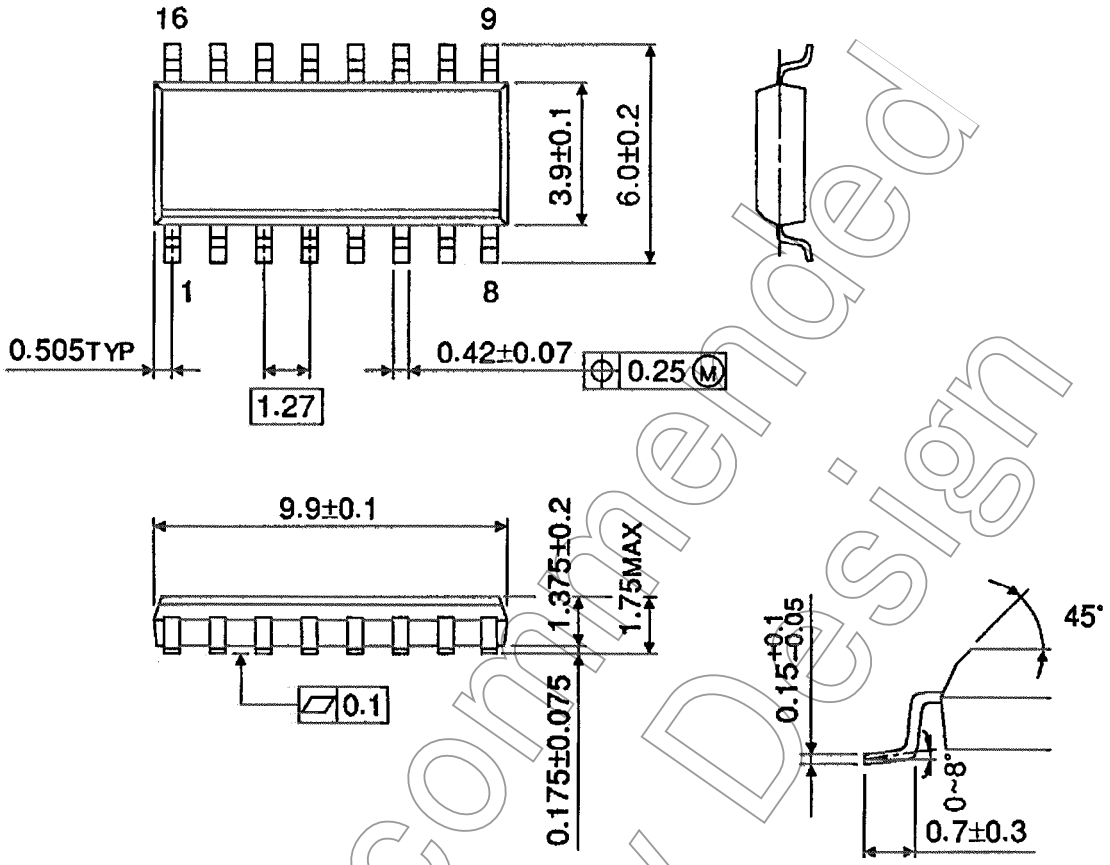


6. Frequency Response (switch on)



Package Dimensions (Note)

SOL16-P-150-1.27 Unit : mm



Note: This package is not available in Japan.

Weight: 0.13 g (typ.)

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