

Features

- On-Resistance: 51Ω (MAX) with ±5V Supplies
84Ω (MAX) with Single +5V Supply
- High Off-Isolation: -70dB ($R_L = 50\Omega$, $f = 1\text{MHz}$)
- Single-Supply Operation: +3.6V ~ +11V
- Dual-Supply Operation: ±1.8V to ±5.5V
- Low On-Resistance Flatness
- Low Off-Leakage Current: 10nA (TYP) at +25°C
- Low On-Leakage Current: 10nA (TYP) at +25°C
- Low Distortion: 0.08% ($R_L = 600\Omega$, $f = 20\text{Hz}$ to 20kHz)
- Rail-to-Rail Input and Output Operation
- TTL/CMOS-Logic Compatible
- -40°C to +85°C Operating Temperature Range
- Available in Green TSSOP-16 & SOP-16 Packages

General Description

The GS4581 is an 8-channel, TTL/CMOS compatible analog multiplexer. It operates from +3.6V to +11V single power supply or ±1.8V to ±5.5V dual power supplies. The GS4581 features high voltage, low on-resistance and low distortion. The high performances make it very suitable for multiple applications, such as cellular phones, audio and video signal routing, etc. TTL/CMOS logic compatibility can be guaranteed when using a single +5V or dual ±5V power supplies because the logic thresholds of all digital inputs are between 0.8V and 2.4V. The GS4581 is available in Green TSSOP-16 & SOP-16 packages. It operates over an ambient temperature range of -40°C to +85°C.

Applications

- Battery-Operated Equipment
- Automotive
- Sample-and-Hold Circuits
- Portable Systems
- Audio and Video Signal Routing
- Cell Phones

Pin Configuration

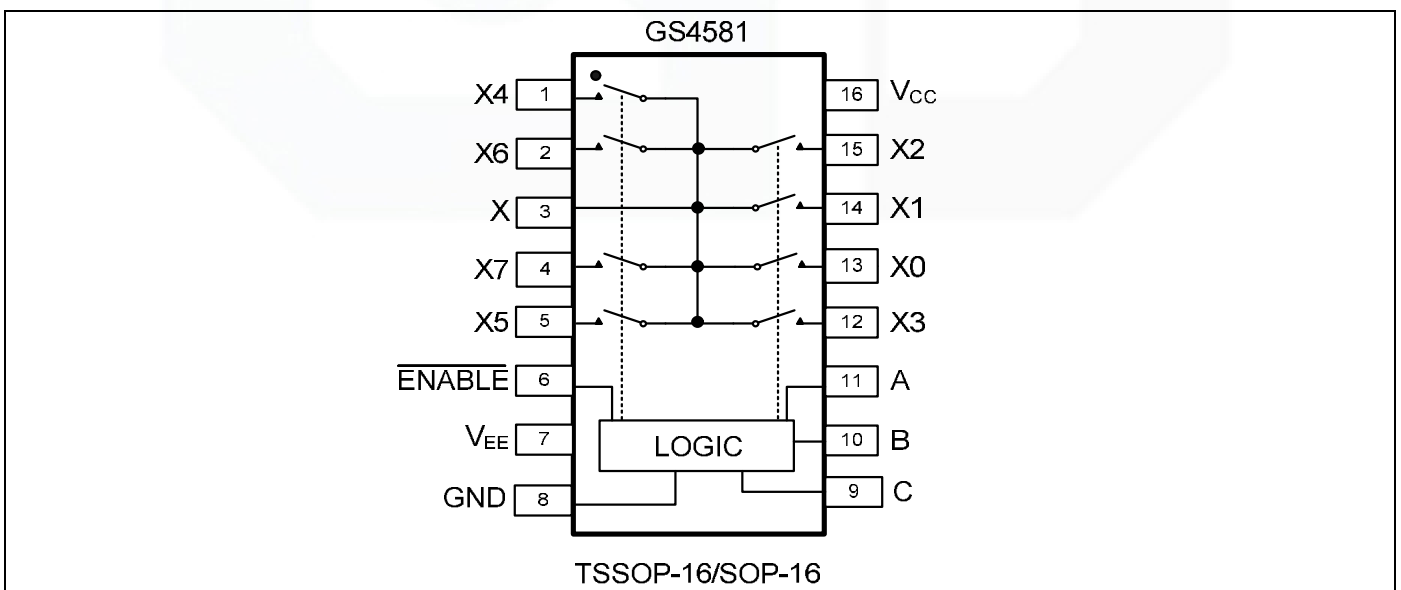


Figure 1. Pin Assignment Diagram

Absolute Maximum Ratings

Condition	Min	Max
Power Supply Voltage (V_{EE} to V_{CC})	-0.3V	+13.2V
Power Supply Voltage (V_{EE} to GND)	-0.3V	+6V
Voltage into Any Terminal ⁽¹⁾	$V_{EE}-0.3V$	$V_{CC}+0.3V$
Continuous Current into Any Terminal	±20mA	
Peak Current, X_{-} (pulsed at 1ms, 10% duty cycle)	±40mA	
Operating Temperature Range	-40°C	+85°C
Junction Temperature	+150°C	
Storage Temperature Range	-65°C	+150°C
Lead Temperature (soldering, 10sec)	+260°C	
Package Thermal Resistance ($T_A=+25^{\circ}C$)		
Tssop-16, θ_{JA}	190°C/W	
ESD Susceptibility		
HBM	2000V	
CDM	2000V	
Latch up	350mA	

Note1: Voltages exceeding V_{CC} or V_{EE} on any signal terminal are clamped by internal diodes. Limit forward-diode current to maximum current rating.

Package/Ordering Information

Model	Channel	Order Number	Package Description	Package Option	Marking Information
GS4581	Eight	GS4581-TR	TSSOP-16	Tape and Reel,3000	GS4581
		GS4581-SR	SOP-16	Tape and Reel,2500	GS4581

Function Table

ENABLE INPUT	SELECT INPUTS			ON SWITCHES
	C	B	A	
H	X	X	X	All Switches Open
L	L	L	L	X-X0
L	L	L	H	X-X1
L	L	H	L	X-X2
L	L	H	H	X-X3
L	H	L	L	X-X4
L	H	L	H	X-X5
L	H	H	L	X-X6
L	H	H	H	X-X7

X= Don't care

Electrical Characteristics(Dual Supplies)

 (At VCC=+4.5V to +5.5V, VEE=-4.5V to-5.5V,and T_A = +25°C, unless otherwise noted.)

Parameter	Symbol	Conditions	GS4581			
			TYP	MIN	MAX	UNIT
ANALOG SWITCH						
Analog Signal Range	V _X , V _{X-}			VEE	VCC	V
On-Resistance	R _{ON}	VCC = 4.5V, VEE = -4.5V I _X = 1mA	36		51	Ω
On-Resistance Match Between Channels	ΔR _{ON}	VCC = 4.5V, VEE = -4.5V I _X = 1mA	3		11	
On-Resistance Flatness	R _{FLAT(ON)}	VCC = 4.5V, VEE = -4.5V I _X = 1mA	15		25	
X Off Leakage Current	I _{X(OFF)}	VCC = 5.5V, VEE = -4.5V, V _{X-} = -4.5V, 4.5V, V _X = 4.5V, -4.5V			10	nA
X On Leakage Current	I _{X(ON)}	VCC = 5.5V, V _X = -4.5V, 4.5V			10	
DIGITAL INPUTS						
Input High Voltage	V _{AH} , V _{BH} , V _{CH} , V _{ENABLEH}	VCC= 5V		2.4		V
Input Low Voltage	V _{AL} , V _{BL} , V _{CL} , V _{ENABLEL}	VCC = 5V			0.8	
Input Leakage Current	I _A , I _B , I _C , I _{ENABLE}	VCC = 5.5V, V _A , V _B , V _C , V _{ENABLE} = 0V or 5.5V			10	nA
Dynamic Characteristics						
Address Transition Time	t _{TRANS}	V _{X-} =-3V/3V, R _L =300Ω, C _L =35pF, Test Circuit 1	100			ns
Turn-on Time	t _{ON}	V _X =3V, R _L =300Ω, C _L =35pF, Test Circuit 2	80			
Turn-off Time	t _{OFF}	V _X =3V, R _L =300Ω, C _L =35pF, Test Circuit 2	70			
BBM Time Delay	t _D	V _X =3V, R _L =300Ω, C _L =35pF, Test Circuit 3	40			
-3dB Bandwidth	BW	R _L =50Ω	90			MHz
Charge Injection	Q	R _S =0Ω, C=1nF, V _S =2.5V, Test Circuit 4	2			pC
Power Supply						
Power Supply Range	VCC, VEE			±1.8	±5.5	V

Electrical Characteristics (Single Supply at +5V)

(At VCC=+4.5V to +5.5V, VEE=0V, and TA = +25°C, unless otherwise noted.)

Parameter	Symbol	Conditions	GS4581			
			TYP	MIN	MAX	UNIT
ANALOG SWITCH						
Analog Signal Range	V_X, V_{X-}			VEE	VCC	V
On-Resistance	R_{ON}	VCC = 4.5V, $I_X = 1mA$	62		80	Ω
On-Resistance Match Between Channels	ΔR_{ON}	VCC = 4.5V, $I_X = 1mA$	3		11	
X Off Leakage Current	$I_{X(OFF)}$	VCC = 5.5V, $V_{X-} = 1.0V, 4.5V,$ $V_X = 4.5V, 1.0V$			10	nA
X On Leakage Current	$I_{X(ON)}$	VCC = 5.5V, $V_X = 4.5V, 1.0V$			10	
DIGITAL INPUTS						
Input High Voltage	$V_{AH}, V_{BH}, V_{CH}, V_{ENABLEH}$	VCC = 5V		2.4		V
Input Low Voltage	$V_{AL}, V_{BL}, V_{CL}, V_{ENABLEL}$	VCC = 5V			0.8	
Input Leakage Current	$I_A, I_B, I_C, I_{ENABLE}$	VCC = 5.5V, $V_A, V_B, V_C, V_{ENABLE} = 0V$ or 5.5V			10	nA
Dynamic Characteristics						
Address Transition Time	t_{TRANS}	$V_{X-} = 3V/0V, R_L = 300\Omega, C_L = 35pF,$ Test Circuit 1	100			ns
Turn-on Time	t_{ON}	$V_{X-} = 3V, R_L = 300\Omega, C_L = 35pF,$ Test Circuit 2	80			
Turn-off Time	t_{OFF}	$V_{X-} = 3V, R_L = 300\Omega, C_L = 35pF,$ Test Circuit 2	70			
BBM Time Delay	t_D	$V_{X-} = 3V, R_L = 300\Omega, C_L = 35pF,$ Test Circuit 3	40			
-3dB Bandwidth	BW	$R_L = 50\Omega$	90			MHz
Charge Injection	Q	$R_S = 0\Omega, C = 1nF, V_S = 2.5V,$ Test Circuit 4	2			pC

Electrical Characteristics (Single Supply at +3.6V)

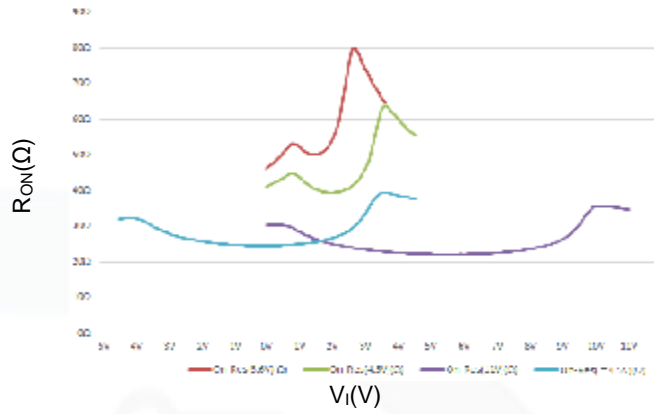
(At VCC=3.5V, VEE=0V, and TA = +25°C, unless otherwise noted.)

Parameter	Symbol	Conditions	GS4581			
			TYP	MIN	MAX	UNIT
ANALOG SWITCH						
Analog Signal Range	V_X, V_{X-}			VEE	VCC	V
On-Resistance	R_{ON}	VCC = 4.5V, $I_X = 1mA$	80		110	Ω
X Off Leakage Current	$I_{X(OFF)}$	VCC = 5.5V, $V_{X-} = 1.0V, 4.5V,$ $V_X = 4.5V, 1.0V$			10	nA
X On Leakage Current	$I_{X(ON)}$	VCC = 5.5V, $V_X = 4.5V, 1.0V$			10	
DIGITAL INPUTS						
Input High Voltage	$V_{AH}, V_{BH}, V_{CH}, V_{ENABLEH}$	VCC = 5V		2.4		V
Input Low Voltage	$V_{AL}, V_{BL}, V_{CL}, V_{ENABLEL}$	VCC = 5V			0.5	
Input Leakage Current	$I_A, I_B, I_C, I_{ENABLE}$	VCC = 5.5V, $V_A, V_B, V_C, V_{ENABLE} = 0V$ or 5.5V			10	nA
Dynamic Characteristics						
Address Transition Time	t_{TRANS}	$V_{X-} = 3V/0V, R_L = 300\Omega, C_L = 35pF,$ Test Circuit 1	160			ns
Turn-on Time	t_{ON}	$V_{X-} = 3V, R_L = 300\Omega, C_L = 35pF,$ Test Circuit 2	130			
Turn-off Time	t_{OFF}	$V_X = 3V, R_L = 300\Omega, C_L = 35pF,$ Test Circuit 2	90			
BBM Time Delay	t_D	$V_{X-} = 3V, R_L = 300\Omega, C_L = 35pF,$ Test Circuit 3	60			
-3dB Bandwidth	BW	$R_L = 50\Omega$	90			MHz
Charge Injection	Q	$R_S = 0\Omega, C = 1nF, V_S = 2.5V,$ Test Circuit 4	1			pC

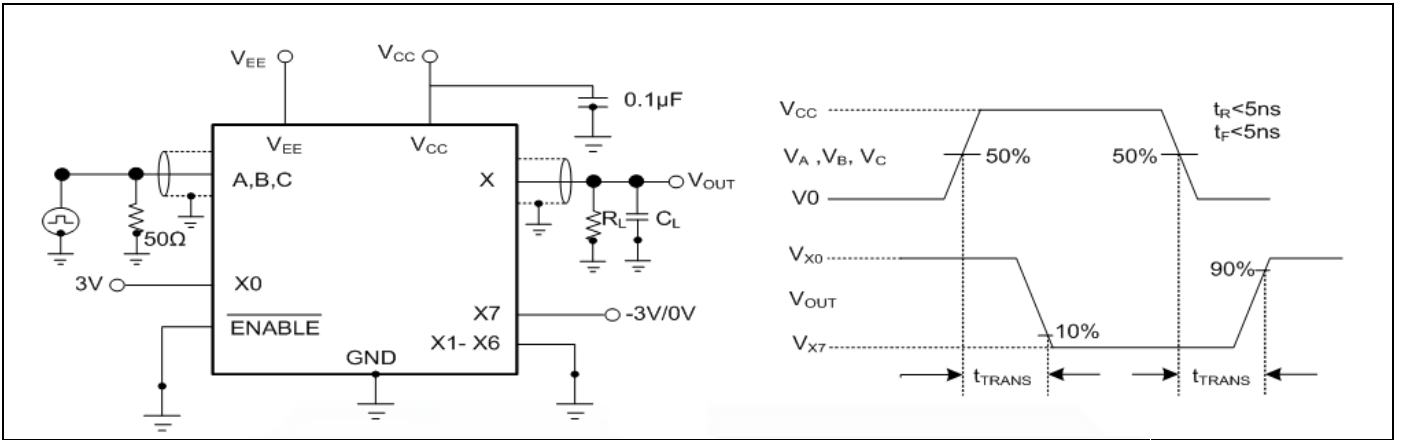
Typical Performance characteristics

At $T_A=+25^{\circ}\text{C}$, and $V_S=+5\text{V}$, unless otherwise noted.

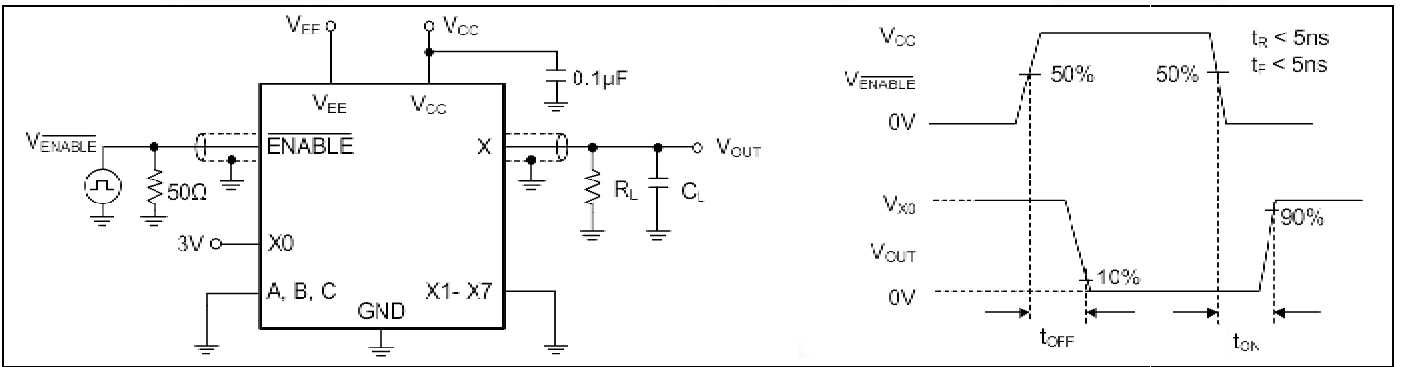
Typical R_{ON} vs Input Voltage (V_I)



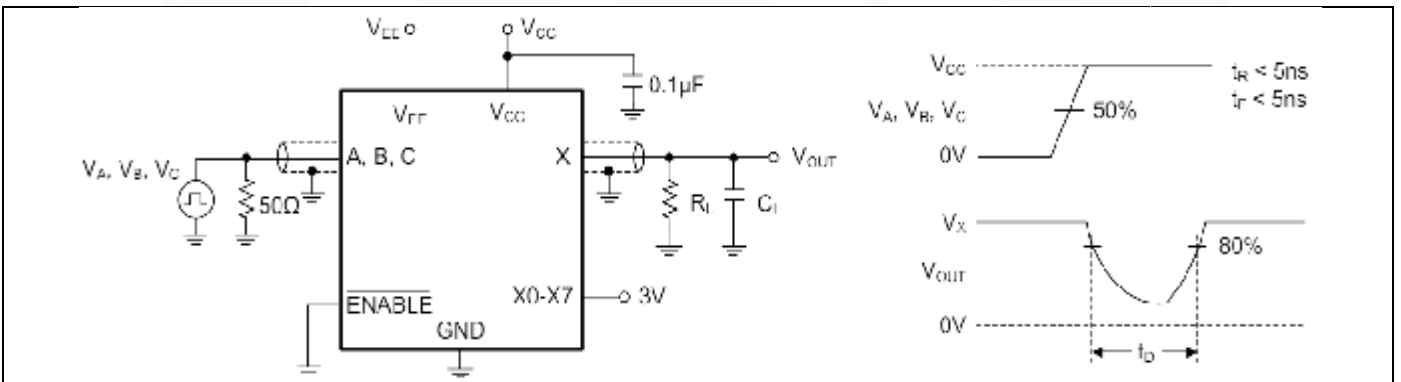
Parameter Measurement Information



Test Circuit 1. Address Transition Times(t_{TRANS})

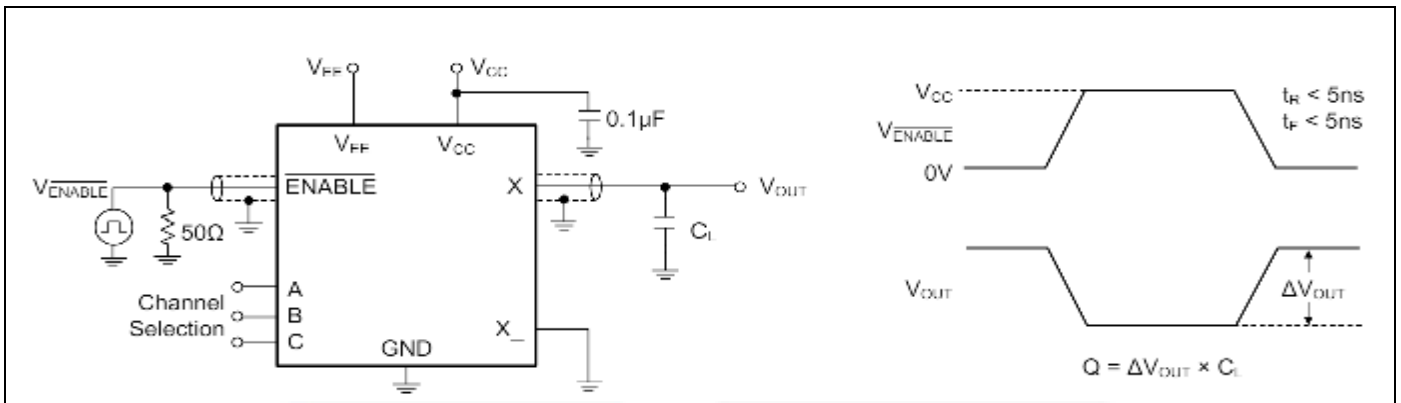


Test Circuit 2. Switching Times

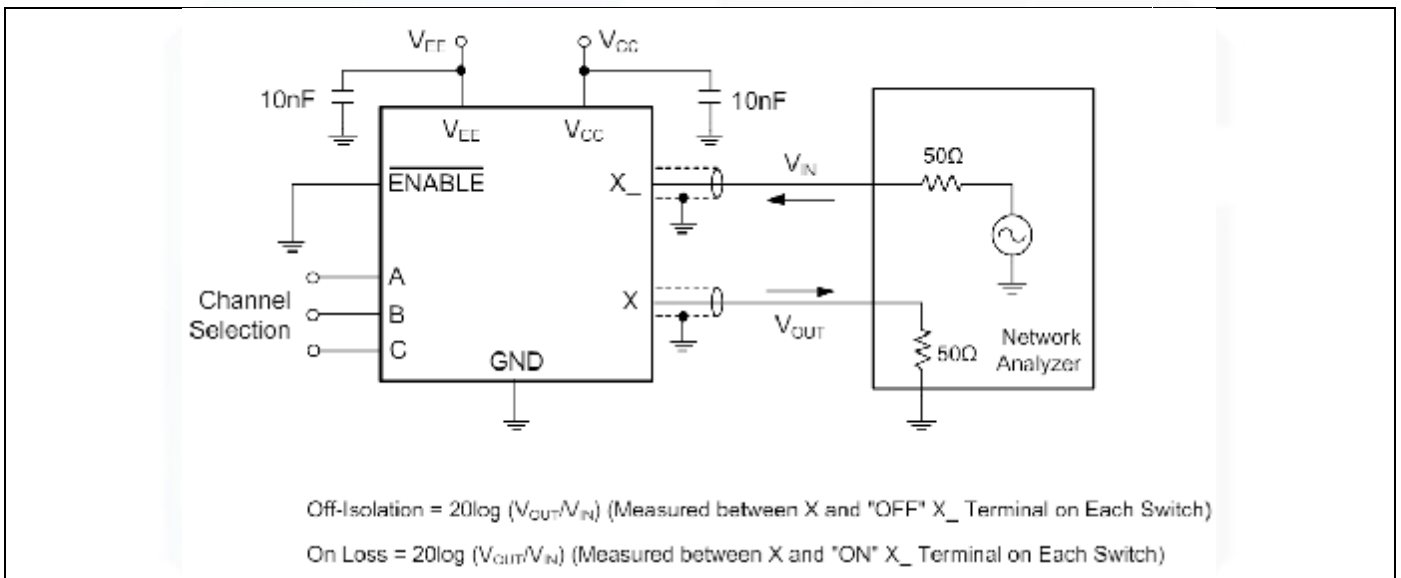


Test Circuit 3. Break-Before-Make Time Delay

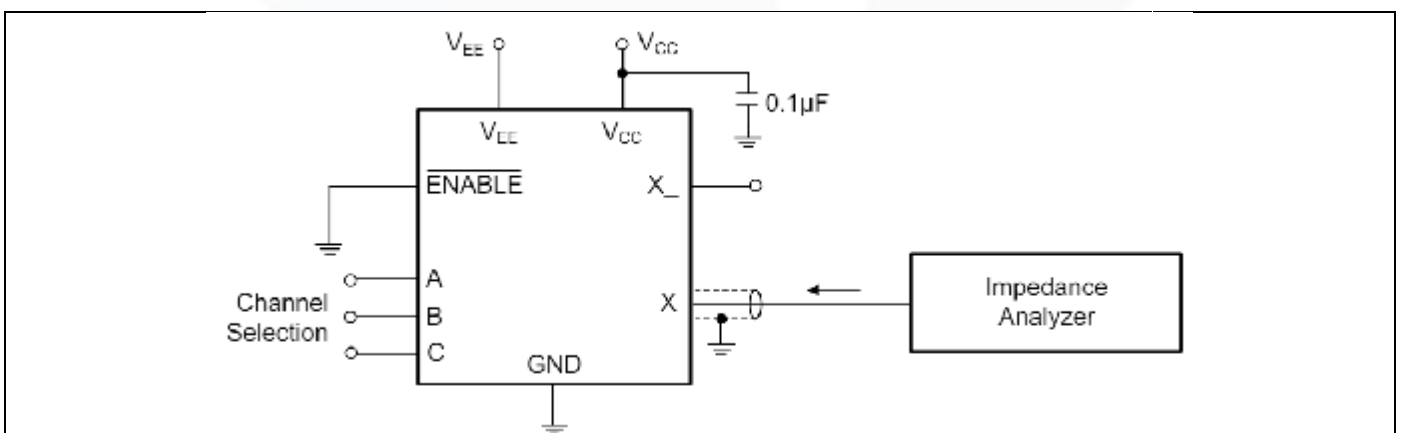
Parameter Measurement Information



Test Circuit 4. Output Signal Skew



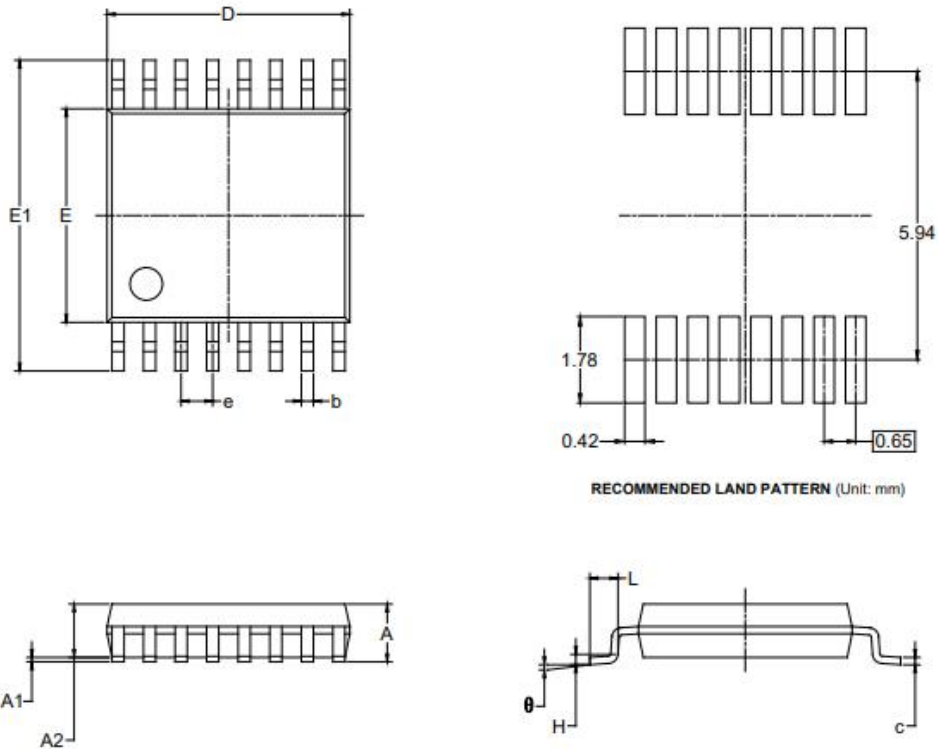
Test Circuit 5. Off Isolation



Test Circuit 6. -3dB Bandwidth

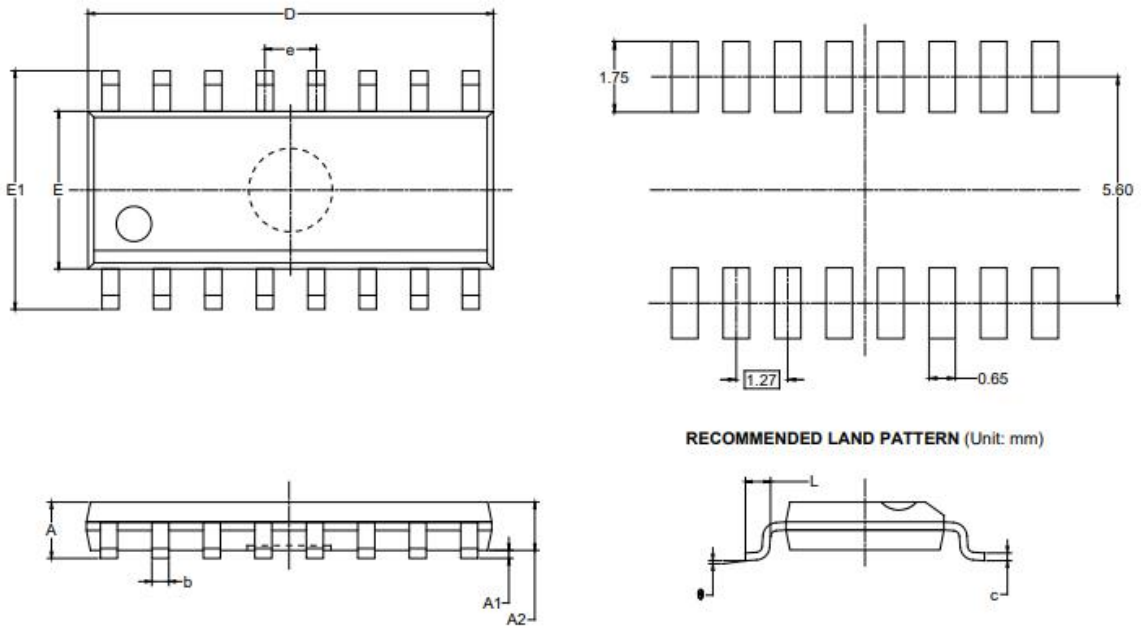
Package Information

TSSOP-16



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.860	5.100	0.191	0.201
E	4.300	4.500	0.169	0.177
E1	6.200	6.600	0.244	0.260
e	0.650 BSC		0.026 BSC	
L	0.500	0.700	0.02	0.028
H	0.25 TYP		0.01 TYP	
θ	1°	7°	1°	7°

SOP-16



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	0.006	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	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°