



SGM4511X/SGM4512X

Quad SPST CMOS Analog Switches

GENERAL DESCRIPTION

The SGM4511X and SGM4512X are low cost, CMOS monolithic, quad single-pole/single-throw (SPST) analog switches. They operate from +4.5V to +40V single power supply or $\pm 4.5\text{V}$ to $\pm 20\text{V}$ dual power supplies.

The SGM4511X and SGM4512X are designed with improved charge injection compensation to minimize switching transients. Also, both of them have improved continuous current rating of 30mA. In ON conditions, both devices can provide true bidirectional performance. In OFF condition, both devices can block the signal to the supply level. These high performances make them very suitable for general purpose switching applications for industrial automation instrument communication systems, portable equipment and etc.

The SGM4511X and SGM4512X are available in Green SOIC-16 and TSSOP-16 packages. They operate over an ambient temperature range of -40°C to $+125^{\circ}\text{C}$.

FEATURES

- **Single Supply Voltage Range:** +4.5V to +40V
- **Dual-Supply Voltage Range:** $\pm 4.5\text{V}$ to $\pm 20\text{V}$
- **1.8V Control Logic**
- **Low On-Resistance:** 23Ω (TYP)
- **Fast Switching Time at $V_{CC} = 15\text{V}$ and $V_{EE} = -15\text{V}$:**
 $t_{ON} = 40\text{ns}$
 $t_{OFF} = 120\text{ns}$
- **Low Charge Injection:**
 18pC at $V_{CC} = 15\text{V}$ and $V_{EE} = -15\text{V}$
- **Simple Logic Interface**
- **Minimum Transients**
- **-40°C to $+125^{\circ}\text{C}$ Operating Temperature Range**
- **Available in Green SOIC-16 and TSSOP-16 Packages**

APPLICATIONS

Computer Peripheral Equipment
Disk Drives
Industrial Automation Instruments
Test Equipment
Sampling Hold Circuits
Communications Systems
Portable Equipment

PACKAGE/ORDERING INFORMATION

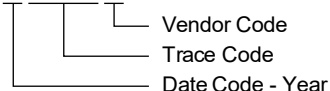
MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM4511X	SOIC-16	-40°C to +125°C	SGM4511XS16G/TR	SGM4511XS16 XXXXXX	Tape and Reel, 2500
	TSSOP-16	-40°C to +125°C	SGM4511XTS16G/TR	SGM4511 XTS16 XXXXXX	Tape and Reel, 4000
SGM4512X	SOIC-16	-40°C to +125°C	SGM4512XS16G/TR	SGM4512XS16 XXXXXX	Tape and Reel, 2500
	TSSOP-16	-40°C to +125°C	SGM4512XTS16G/TR	SGM4512 XTS16 XXXXXX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.

SOIC-16/TSSOP-16

XXXXX



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

Voltages Referenced to V_{EE}

V_{CC}	44V
GND	25V
Digital Inputs ⁽¹⁾ , V_S , V_D ($V_{EE} - 0.3V$) to ($V_{CC} + 0.3V$) or 30mA, whichever occurs first	
Current (Any Terminal)	30mA
Peak Current, S_x or D_x (Pulsed at 1ms, 10% Duty Cycle Max.)	100mA
Storage Temperature Range	-65°C to +150°C
Junction Temperature	150°C
Lead Temperature (Soldering, 10s)	260°C
ESD Susceptibility	
HBM	±4000V
CDM	±1000V

NOTE:

1. Internal diodes will clamp any signals on S_x , D_x , or IN_x that exceed V_{CC} or V_{EE} . Limit the current through the forward diode to the maximum ratings.

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range -40°C to +125°C

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

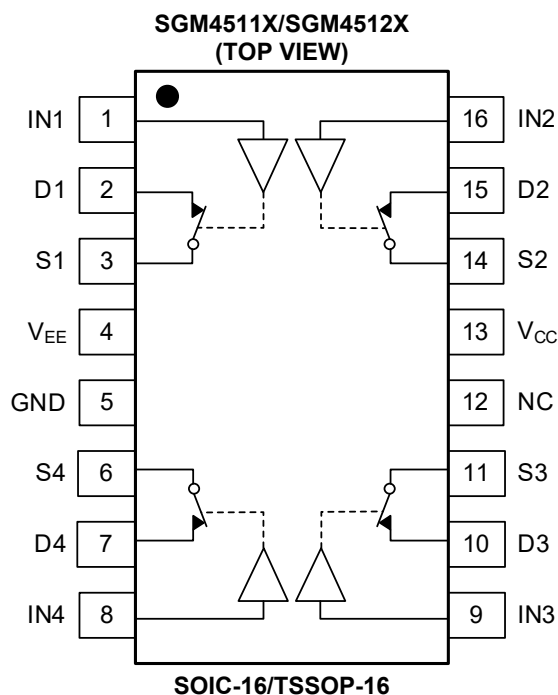
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATIONS



PIN DESCRIPTION

PIN	NAME	FUNCTION
SOIC-16/TSSOP-16		
3, 14, 11, 6	S1, S2, S3, S4	Source Pins. Signal input or output path.
2, 15, 10, 7	D1, D2, D3, D4	Drain Pins. Signal input or output path.
1, 16, 9, 8	IN1, IN2, IN3, IN4	Digital Control Pins to Connect the S Pins to the D Pins.
13	V _{CC}	Positive Supply Voltage Input Pin.
5	GND	Ground.
4	V _{EE}	Negative Supply Voltage Input Pin. Connect to GND for single-supply operation.
12	NC	No Connection.

NOTE:

Any signal input terminal can be used as an output terminal, and any signal output terminal can also be used as an input terminal. Signal transmission in both directions is equally well.

FUNCTIONAL BLOCK DIAGRAM

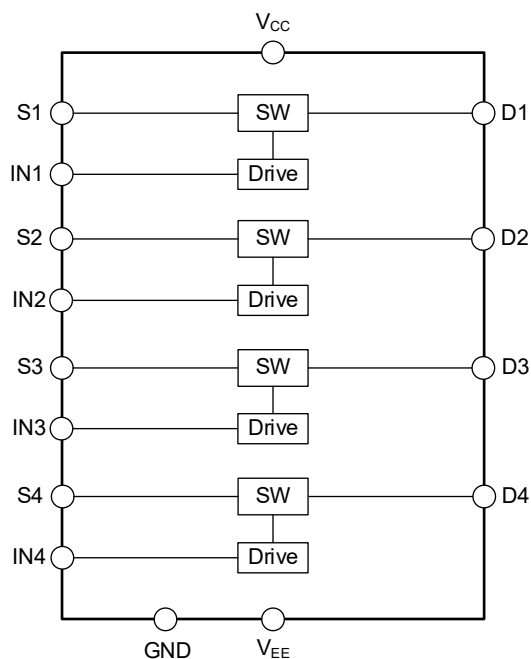


Figure 1. Block Diagram

FUNCTION TABLE

LOGIC	SGM4511X	SGM4512X
0	ON	OFF
1	OFF	ON

NOTES:

1. Logic "0" $\leq 0.3V$.
2. Logic "1" $\geq 1.6V$.

ELECTRICAL CHARACTERISTICS ($V_{CC} = 15V$)

($V_{CC} = 15V$, $V_{EE} = -15V$, $GND = 0V$, $V_{INH} = 1.6V$, $V_{INL} = 0.3V$, Full = $-40^{\circ}C$ to $+125^{\circ}C$. Typical values are at $T_A = +25^{\circ}C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Analog Switch							
Analog Signal Range	V _{ANALOG}		Full	-15		15	V
Drain-Source On-Resistance	R _{DS(ON)}	V _D = ±10V, I _S = 10mA	+25°C		23	30	Ω
			Full			44	
On-Resistance Match	ΔR _{DS(ON)}	V _D = ±10V, I _S = 10mA	+25°C		0.4	1.4	Ω
			Full			1.6	
Source Off Leakage Current	I _{S(OFF)}	V _S = ±10V, V _D = ∓10V	+25°C		0.1	1	μA
Drain Off Leakage Current	I _{D(OFF)}	V _D = ±10V, V _S = ∓10V	+25°C		0.1	1	μA
Drain On Leakage Current	I _{D(ON)}	V _D = ±10V, V _S = ±10V or floating	+25°C		0.1	1.5	μA
Digital Control							
Input Voltage High	V _{INH}	V _{CC} = ±4.5V to ±20V	Full	1.6			V
Input Voltage Low	V _{INL}	V _{CC} = ±4.5V to ±20V	Full			0.3	V
Input Current	I _{INH}	V _{IN} = V _{INH}	+25°C		6	11	μA
			Full			16	
	I _{INL}	V _{IN} = V _{EE} or 0V	+25°C		0.1	1	
			Full			10	
Input Capacitance	C _{IN}	V _{IN} = 0V, f = 1MHz	+25°C		8		pF
Dynamic Characteristics							
Turn-On Time	t _{ON}	V _S = 10V, R _L = 1kΩ, C _L = 35pF, Test Circuit 1	+25°C		40		ns
Turn-Off Time	t _{OFF}		+25°C		120		
-3dB Bandwidth	BW	Signal = 0dBm, R _L = 50Ω, C _L = 5pF	+25°C		300		MHz
Off-Isolation	O _{ISO}	C _L = 15pF, R _L = 50Ω, Signal = 0dBm, f = 100kHz, Test Circuit 2	+25°C		-90		dB
Channel-to-Channel Crosstalk	X _{TALK}	C _L = 15pF, R _L = 50Ω, Signal = 0dBm, f = 100kHz, Test Circuit 3	+25°C		-90		dB
Charge Injection	Q	C _L = 1nF, V _G = 0V, R _G = 0Ω, Test Circuit 4	+25°C		18		pC
Source-Off Capacitance	C _{S(OFF)}	V _S = 0V, f = 1MHz	+25°C		8		pF
Drain-Off Capacitance	C _{D(OFF)}	V _D = 0V, f = 1MHz	+25°C		8		pF
Channel-On Capacitance	C _{D(ON)}	V _D = 0V, f = 1MHz	+25°C		12		pF
Power Supply							
Positive Supply Current	I _{CC}	V _{CC} = 20V, V _{EE} = -20V, V _{IN} = V _{INH} (SGM4511X) or 0V (SGM4512X)	+25°C		200	310	μA
			Full			430	
Negative Supply Current	I _{EE}		+25°C	-125	-65		
			Full	-200			
Positive Supply Current	I _{CC}		+25°C		350	520	
			Full			660	
Negative Supply Current	I _{EE}		+25°C	-330	-200		
			Full	-430			
Power Supply Range for Continuous Operation	V _{OP}		Full	±4.5		±20	V

ELECTRICAL CHARACTERISTICS ($V_{CC} = 12V$)

($V_{CC} = 12V$, $V_{EE} = 0V$, $GND = 0V$, $V_{INH} = 1.6V$, $V_{INL} = 0.3V$, Full = $-40^{\circ}C$ to $+125^{\circ}C$. Typical values are at $T_A = +25^{\circ}C$, unless otherwise noted.)

otherwise noted.)

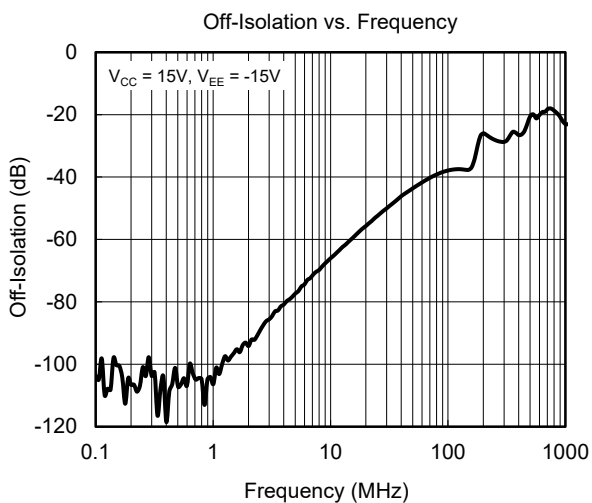
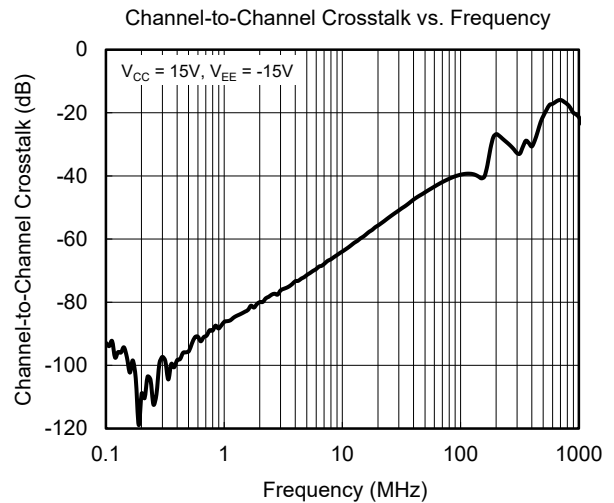
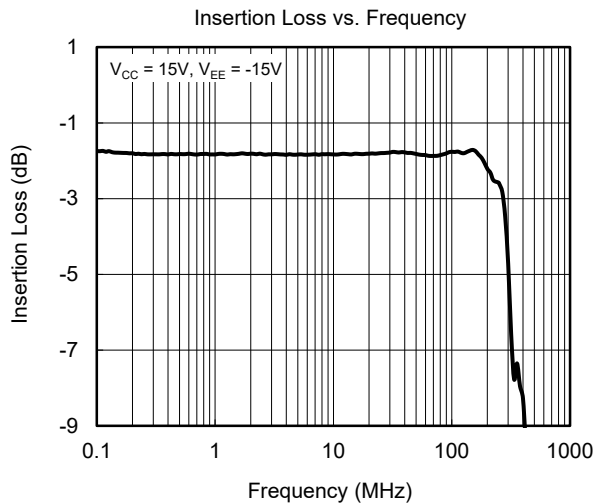
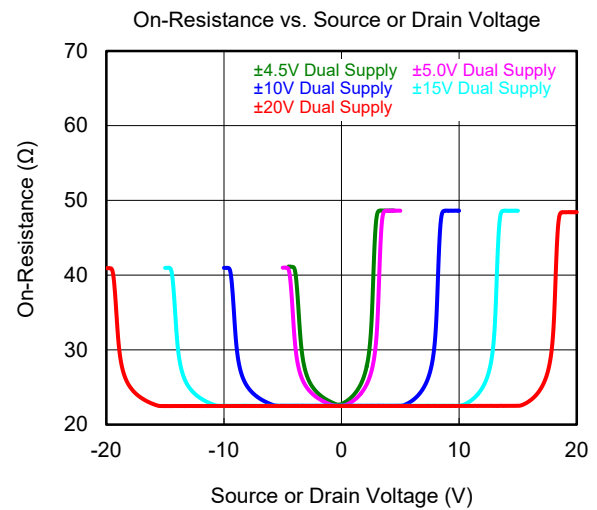
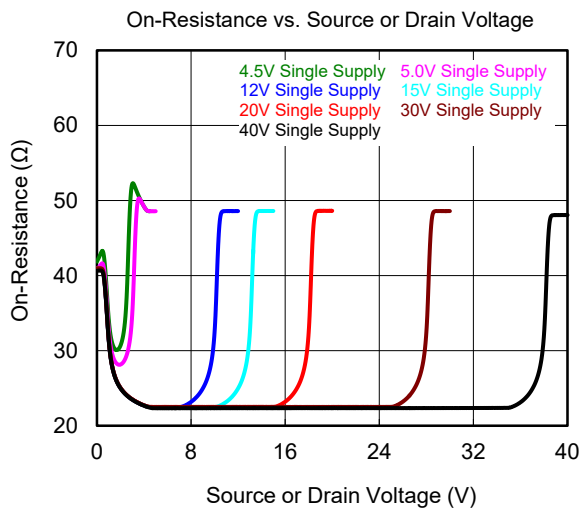
PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Analog Switch							
Analog Signal Range	V _{ANALOG}		Full	0		12	V
Drain-Source On-Resistance	R _{DS(ON)}	V _D = 5V or 7V, I _S = 10mA	+25°C		23	30	Ω
			Full			44	
On-Resistance Match	ΔR _{DS(ON)}		+25°C		0.4	1.4	
			Full			1.6	
Dynamic Characteristics							
Turn-On Time	t _{ON}	V _S = 8V, R _L = 1kΩ, C _L = 35pF	+25°C		45		ns
Turn-Off Time	t _{OFF}		+25°C		240		
Charge Injection	Q	C _L = 1nF, V _G = 6V, R _G = 0Ω	+25°C		10		pC

ELECTRICAL CHARACTERISTICS ($V_{CC} = 40V$)

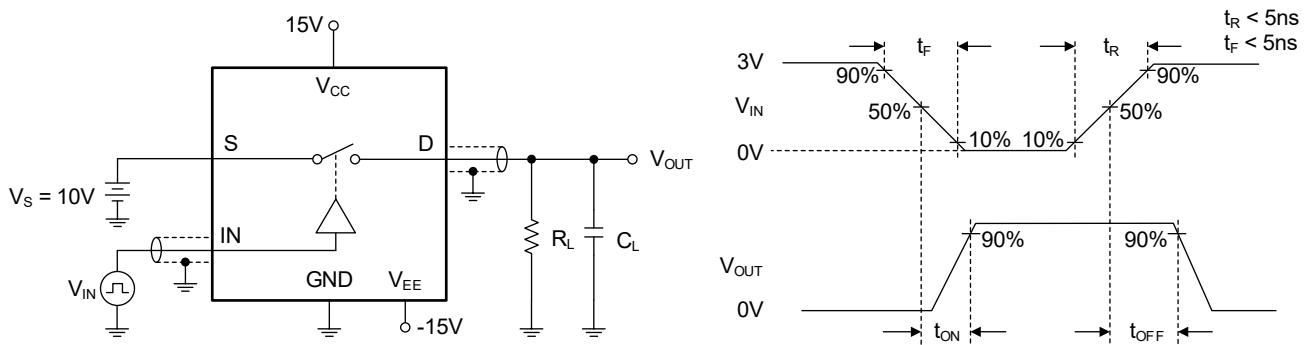
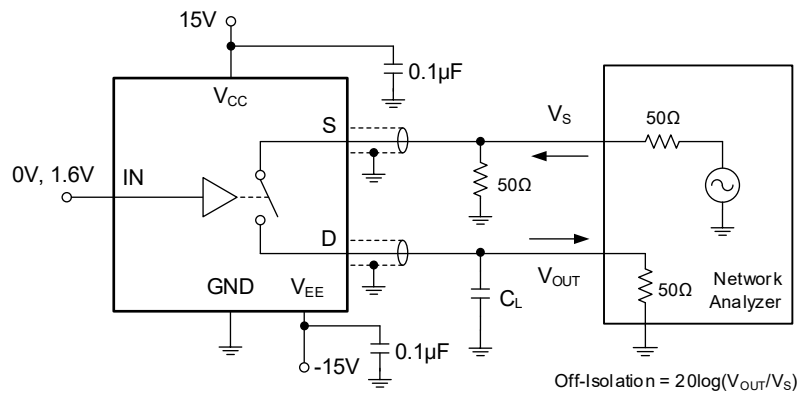
($V_{CC} = 40V$, $V_{EE} = 0V$, $GND = 0V$, $V_{INH} = 1.6V$, $V_{INL} = 0.3V$, Full = $-40^{\circ}C$ to $+125^{\circ}C$. Typical values are at $T_A = +25^{\circ}C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Analog Switch							
Analog Signal Range	V_{ANALOG}		Full	0		40	V
Drain-Source On-Resistance	$R_{DS(ON)}$	$V_D = 5V$ or $35V$, $I_S = 10mA$	$+25^{\circ}C$		23	30	Ω
			Full			44	
On-Resistance Match	$\Delta R_{DS(ON)}$		$+25^{\circ}C$		0.4	1.4	
			Full			1.6	

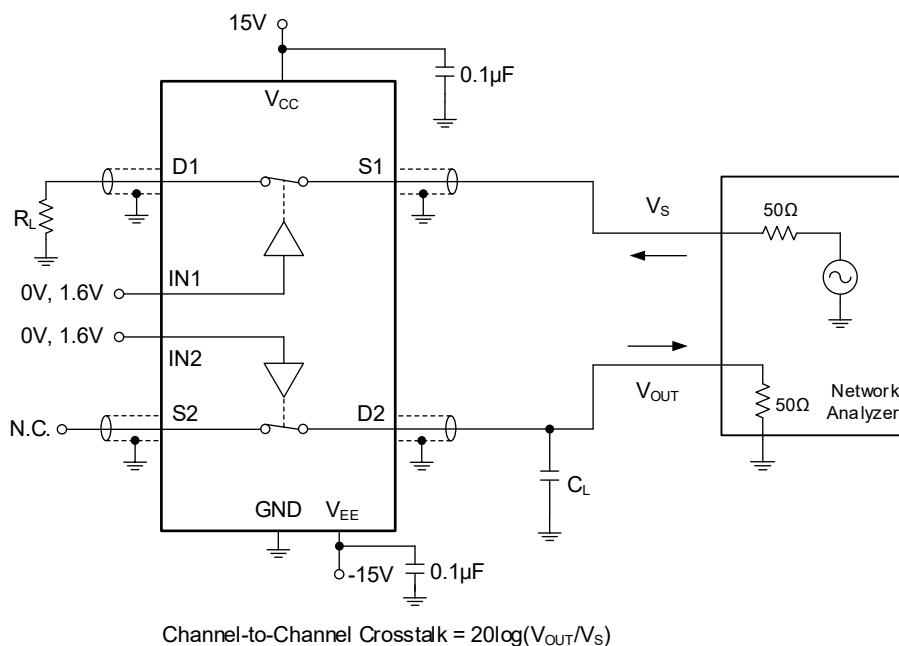
TYPICAL PERFORMANCE CHARACTERISTICS



TEST CIRCUITS

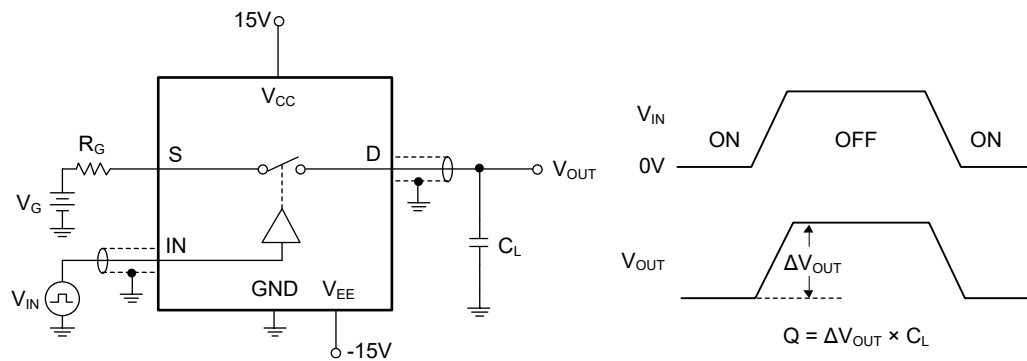
Test Circuit 1. Switching Times (t_{ON} , t_{OFF})

Test Circuit 2. Off-Isolation



Test Circuit 3. Channel-to-Channel Crosstalk

TEST CIRCUITS (continued)



Test Circuit 4. Charge Injection

REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

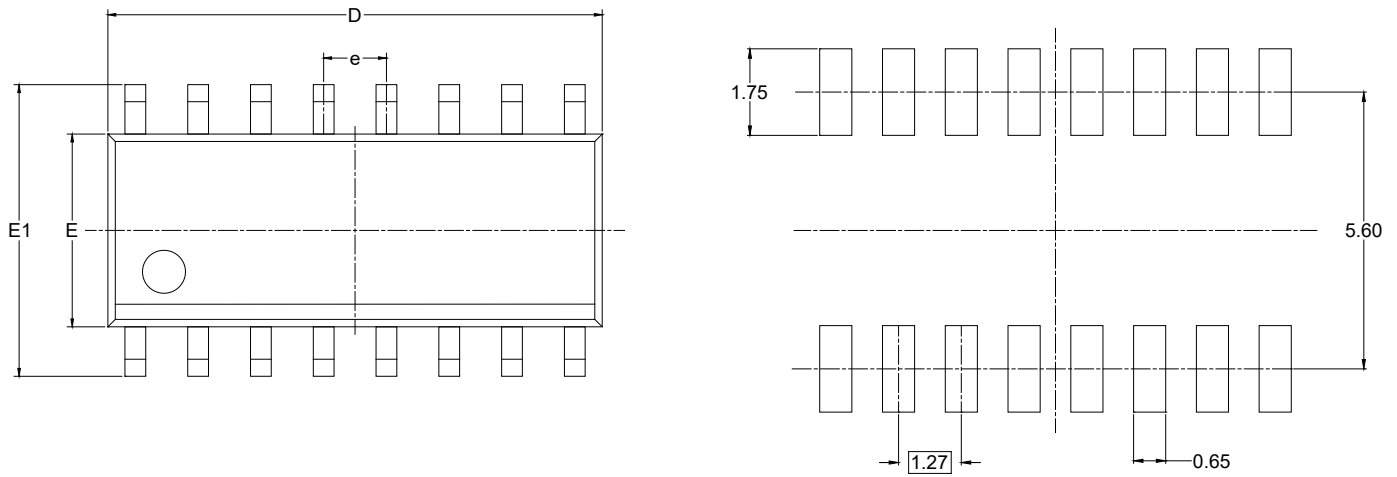
Changes from Original to REV.A (OCTOBER 2026)

Page

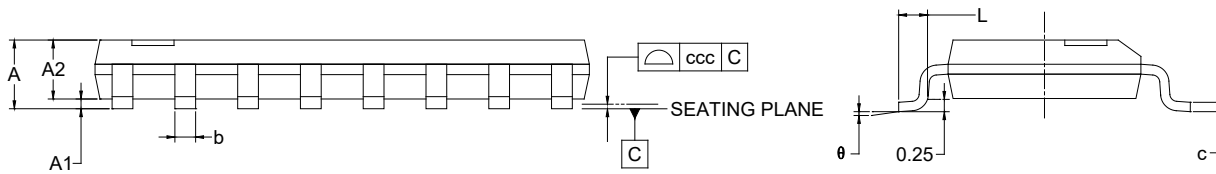
Changed from product preview to production data All

PACKAGE INFORMATION

PACKAGE OUTLINE DIMENSIONS SOIC-16



RECOMMENDED LAND PATTERN (Unit: mm)



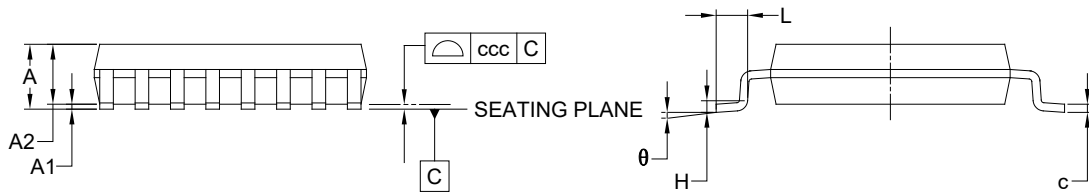
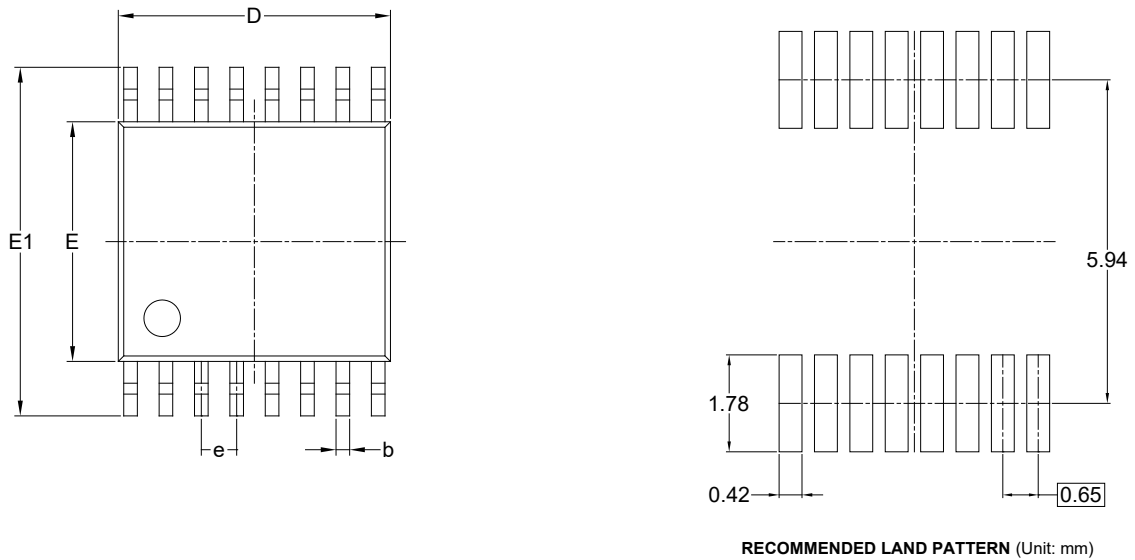
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.750
A1	0.100	-	0.250
A2	1.250	-	1.550
b	0.310	-	0.510
c	0.100	-	0.250
D	9.800	-	10.200
E	3.800	-	4.000
E1	5.800	-	6.200
e	1.270 BSC		
L	0.400	-	1.270
θ	0°	-	8°
ccc	0.100		

NOTES:

1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MS-012.

PACKAGE OUTLINE DIMENSIONS

TSSOP-16



Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.200
A1	0.050	-	0.150
A2	0.800	-	1.050
b	0.190	-	0.300
c	0.090	-	0.200
D	4.860	-	5.100
E	4.300	-	4.500
E1	6.200	-	6.600
e	0.650 BSC		
L	0.450	-	0.750
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

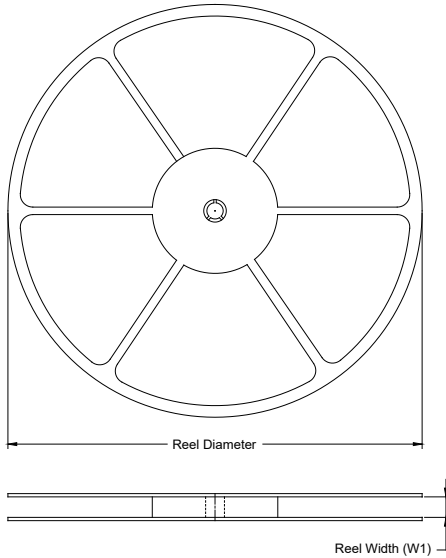
NOTES:

1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-153.

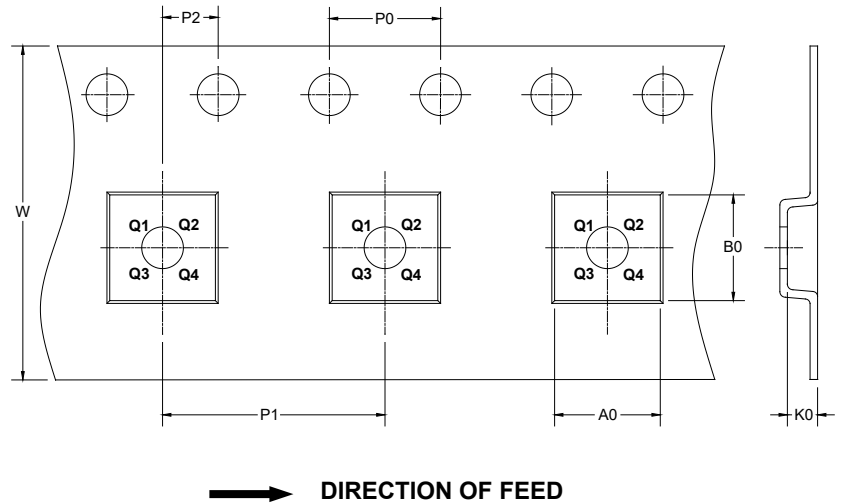
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

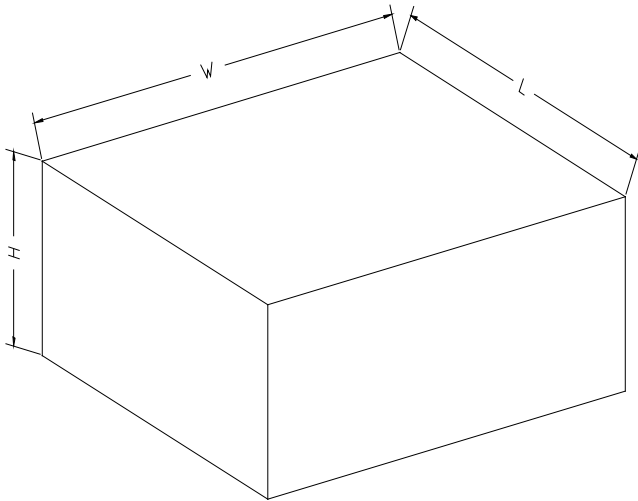
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOIC-16	13"	16.4	6.70	10.40	2.10	4.0	8.0	2.0	16.0	Q1
TSSOP-16	13"	12.4	6.80	5.40	1.50	4.0	8.0	2.0	12.0	Q1

DD0001

PACKAGE INFORMATION

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
13"	386	280	370	5

DD0002