



# SGM330A

## Quad, Wide-Bandwidth SPDT Video Analog Switch

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### GENERAL DESCRIPTION

The SGM330A is a quad, bidirectional, single-pole/double-throw (SPDT), TTL/CMOS compatible video analog switch. It operates from a 2.7V to 5.5V single power supply. The SGM330A features low crosstalk, low on-resistance and fast switching times.

The SGM330A also has the advantages of high current and wide bandwidth (500MHz). The high performances make it very suitable for high frequency applications, such as video editors, audio and video signal routing, etc. In addition, low cost is also one of the important reasons that make the SGM330A a good choice.

The SGM330A is available in Green SOIC-16, TSSOP-16 and SSOP-16 packages. It operates over an ambient temperature range of -40°C to +85°C.

### FEATURES

- **Single Supply Voltage Range: 2.7V to 5.5V**
- **-3dB Bandwidth: 500MHz**
- **Low On-Resistance: 12Ω (TYP)**
- **Low Crosstalk: -60dB (TYP) at 10MHz**
- **Off-Isolation: -58dB at 10MHz**
- **Power Consumption: I<sub>CC</sub> = 0.1μA (TYP)**
- **Rail-to-Rail Input and Output Operation**
- **Fast Switching Times**
- **TTL/CMOS Compatible**
- **-40°C to +85°C Operating Temperature Range**
- **Available in Green SOIC-16, TSSOP-16 and SSOP-16 Packages**

### APPLICATIONS

Digital VCRs  
Video Editors  
Re-Recordable DVD  
Video/TV Game Players  
Computer Peripherals  
Personal Digital Assistants  
Audio and Video Signal Routing  
Battery-Powered Systems

**PACKAGE/ORDERING INFORMATION**

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM330A	SOIC-16	-40°C to +85°C	SGM330A-YS/TR	SGM330A-YS XXXXX	Tape and Reel, 2500
	SSOP-16	-40°C to +85°C	SGM330A-YQS/TR	SGM330A -YQS XXXXX	Tape and Reel, 3000
	TSSOP-16	-40°C to +85°C	SGM330A-YTS/TR	SGM330A -YTS XXXXX	Tape and Reel, 3000

NOTE: XXXXX = Date Code and Vendor Code.

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**

V<sub>+</sub> to GND ..... -0.3V to 6V  
 D<sub>A</sub>, D<sub>B</sub>, D<sub>C</sub>, D<sub>D</sub> to GND ..... -0.3V to 6V  
 DC Input Voltage ..... -0.3V to 6V  
 Package Thermal Resistance @ T<sub>A</sub> = +25°C  
 SOIC-16, θ<sub>JA</sub> ..... 82°C/W  
 TSSOP-16, θ<sub>JA</sub> ..... 100°C/W  
 SSOP-16, θ<sub>JA</sub> ..... 103°C/W  
 Junction Temperature ..... +150°C  
 Storage Temperature Range ..... -65°C to +150°C  
 Lead Temperature (Soldering, 10s) ..... +260°C  
 ESD Susceptibility  
 HBM ..... 8000V  
 MM ..... 400V

**RECOMMENDED OPERATING CONDITIONS**

Operating Temperature Range ..... -40°C to +85°C

**OVERSTRESS CAUTION**

Stresses beyond those listed may cause permanent damage to the device. Functional operation of the device at these or any other conditions beyond those indicated in the operational section of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

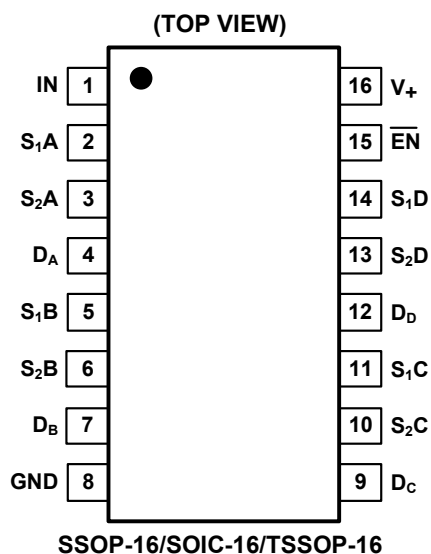
**ESD SENSITIVITY CAUTION**

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. 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 very small parametric changes could cause the device not to meet its published specifications.

**DISCLAIMER**

SG Micro Corp reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time.

**PIN CONFIGURATION**



**PIN DESCRIPTION**

PIN	NAME	FUNCTION
1	IN	Select Input Pin.
2, 5, 11, 14, 3, 6, 10, 13	S <sub>1</sub> A, S <sub>1</sub> B, S <sub>1</sub> C, S <sub>1</sub> D S <sub>2</sub> A, S <sub>2</sub> B, S <sub>2</sub> C, S <sub>2</sub> D	Source Terminal, I/O.
4, 7, 9, 12	D <sub>A</sub> , D <sub>B</sub> , D <sub>C</sub> , D <sub>D</sub>	Drain Terminal, I/O.
8	GND	Ground.
15	$\overline{\text{EN}}$	Digital Enable Input Pin.
16	V <sub>+</sub>	Positive Power Supply.

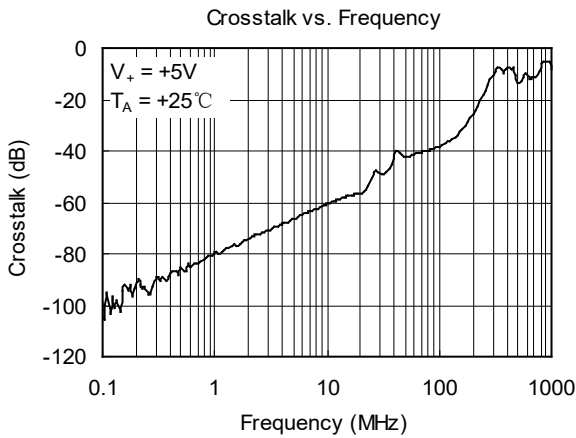
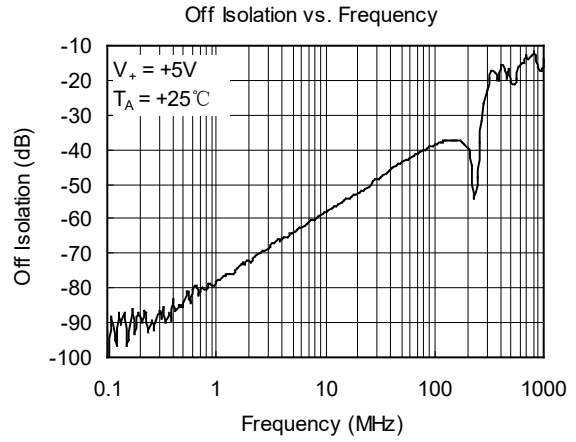
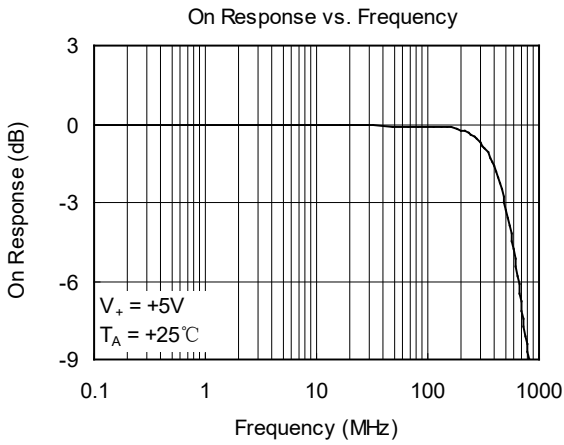
**FUNCTION TABLE**

$\overline{\text{EN}}$	IN	ON SWITCH
0	0	S <sub>1</sub> A, S <sub>1</sub> B, S <sub>1</sub> C, S <sub>1</sub> D
0	1	S <sub>2</sub> A, S <sub>2</sub> B, S <sub>2</sub> C, S <sub>2</sub> D
1	X	Disabled

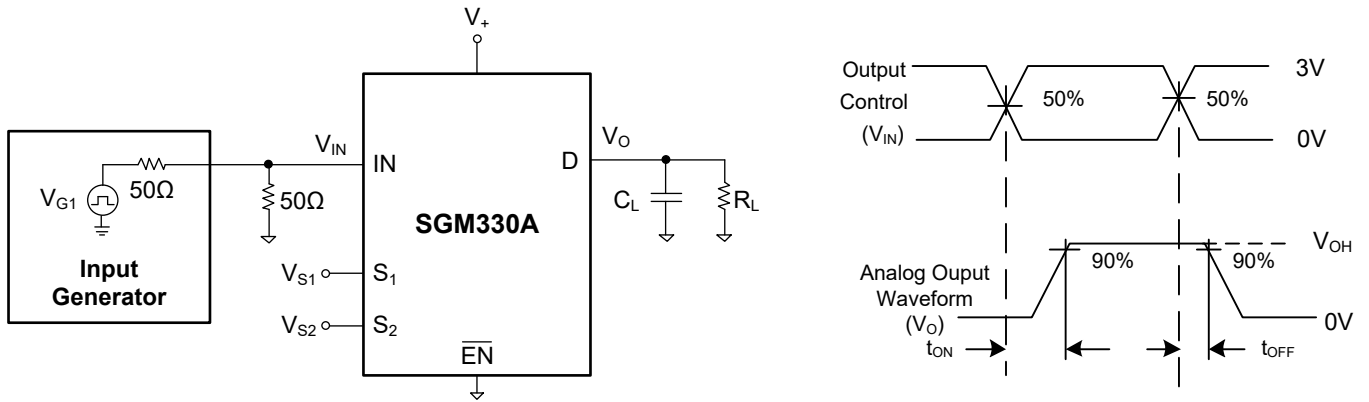
**ELECTRICAL CHARACTERISTICS**(At  $V_+ = +5V$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage	$V_{IN}$		0		$V_+$	V
<b>DC CHARACTERISTICS</b>						
On-Resistance	$R_{ON}$	$0V \leq V_{S1}$ or $V_{S2} \leq V_+$ , $I_D = 13mA$		12	18	$\Omega$
Input High Voltage	$V_{IH}$		2			V
Input Low Voltage	$V_{IL}$				0.6	V
Input High Current	$I_{IH}$	$V_+ = 5.5V$ , $V_{IN}$ and $V_{EN} = V_+$			$\pm 1$	$\mu A$
Input Low Current	$I_{IL}$	$V_+ = 5.5V$ , $V_{IN}$ and $V_{EN} = 0V$			$\pm 1$	$\mu A$
Analog Output Leakage Current	$I_O$	$V_+ = 5.5V$ , $V_{S1}$ or $V_{S2} = 3.3V/0.3V$ , $V_D = 0.3V/3.3V$			$\pm 1$	$\mu A$
Clamp Diode Voltage	$V_{IK}$	$I_{IN} = -18mA$		-1		V
<b>DYNAMIC CHARACTERISTICS</b>						
Turn-On Time	$t_{ON}$	$R_L = 75\Omega$ , $C_L = 20pF$ , See Figure 1		25		ns
Turn-Off Time	$t_{OFF}$	$R_L = 75\Omega$ , $C_L = 20pF$ , See Figure 1		13		ns
Off Isolation	$O_{IRR}$	$R_L = 150\Omega$ , $f = 10MHz$ , See Figure 5		-58		dB
Channel-to-Channel Crosstalk	$X_{TALK}$	$R_{IN} = 10\Omega$ , $R_L = 150\Omega$ , $f = 10MHz$ , See Figure 4		-60		dB
-3dB Bandwidth	BW	$R_L = 150\Omega$ , See Figure 3		500		MHz
Input/Enable Capacitance	$C_{IN}$	$f = 1MHz$		4		pF
Switch OFF Capacitance	$C_{OFF}$	$f = 1MHz$		4		pF
Switch ON Capacitance	$C_{ON}$	$f = 1MHz$		8		pF
Differential Gain	$D_G$	$R_L = 150\Omega$ , $f = 3.58MHz$ , See Figure 2		0.5		%
Differential Phase	$D_P$	$R_L = 150\Omega$ , $f = 3.58MHz$ , See Figure 2		0.03		$^\circ$
<b>POWER REQUIREMENTS</b>						
Power Supply Range	$V_+$		2.7		5.5	V
Power Supply Current	$I_{CC}$	$V_+ = +5.5V$ , $V_{IN}$ and $V_{EN} = 5V/0V$		0.1	20	$\mu A$
Supply Current per Input @ TTL HIGH	$\Delta I_{CC}$	$V_+ = +5.5V$ , $V_{IN}$ or $V_{EN} = 3.4V$			300	$\mu A$

TYPICAL PERFORMANCE CHARACTERISTICS



TEST CIRCUITS



Test	V <sub>+</sub>	R <sub>L</sub>	C <sub>L</sub>	V <sub>S1</sub>	V <sub>S2</sub>
t <sub>ON</sub>	5V±0.5V	75Ω	20pF	GND	3V
	5V±0.5V	75Ω	20pF	3V	GND
t <sub>OFF</sub>	5V±0.5V	75Ω	20pF	GND	3V
	5V±0.5V	75Ω	20pF	3V	GND

Figure 1. Test Circuit for Voltage Waveform and Switch Time

TEST CIRCUITS (continued)

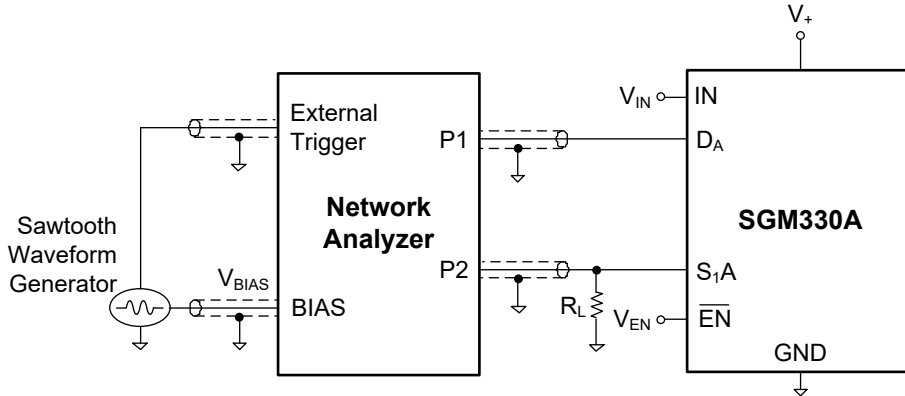


Figure 2. Test Circuit for Differential Gain/Phase Measurement

Differential gain and phase are measured at the output of the ON channel. For example, when  $V_{IN} = 0V$ ,  $V_{EN} = 0V$ , and  $D_A$  is the input, the output is measured at  $S_{1A}$ .

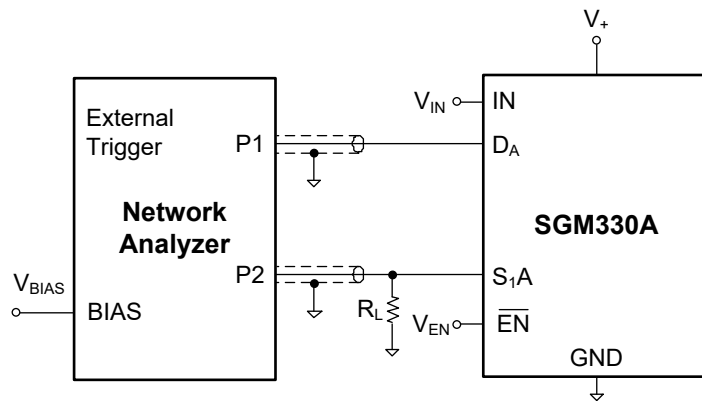


Figure 3. Test Circuit for Frequency Response (BW)

Frequency response is measured at the output of the ON channel. For example, when  $V_{IN} = 0V$ ,  $V_{EN} = 0V$ , and  $D_A$  is the input, the output is measured at  $S_{1A}$ . All unused analog I/O ports are left open.

Table 1. Network Analyzer (HP8753ES) Setup

Average	RBW	$V_{BIAS}$	ST	P1
4	3Hz	$1/2 V_+$	2s	0dBm

TEST CIRCUITS (continued)

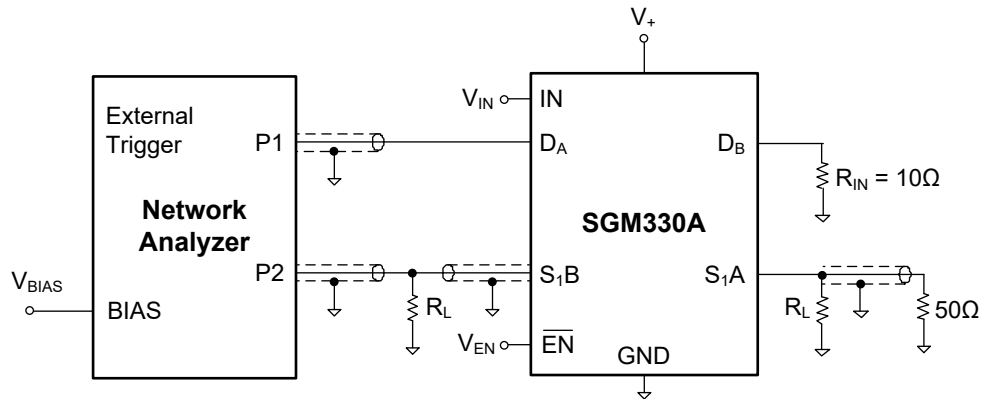


Figure 4. Test Circuit for Crosstalk ( $X_{TALK}$ )

Crosstalk is measured at the output of the nonadjacent ON channel. For example, when  $V_{IN} = 0V$ ,  $V_{EN} = 0V$ , and  $D_A$  is the input, the output is measured at  $S_{1B}$ .

Table 2. Network Analyzer (HP8753ES) Setup

Average	RBW	$V_{BIAS}$	ST	P1
4	3kHz	1/2 $V_+$	2s	0dBm

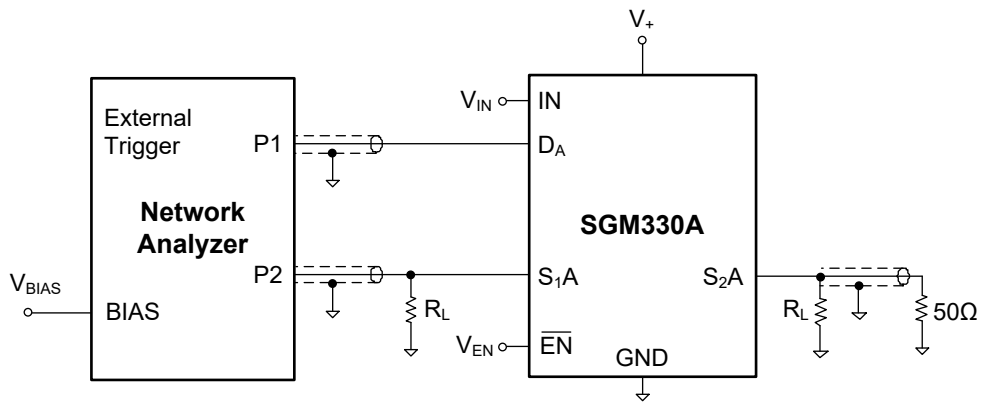


Figure 5. Test Circuit for Off Isolation ( $O_{IRR}$ )

Off isolation is measured at the output of the OFF channel. For example, when  $V_{IN} = V_+$ ,  $V_{EN} = 0V$ , and  $D_A$  is the input, the output is measured at  $S_{1A}$ . All unused analog input (D) ports are left open.

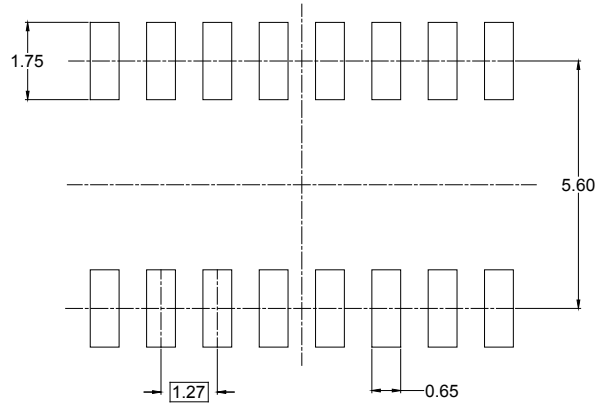
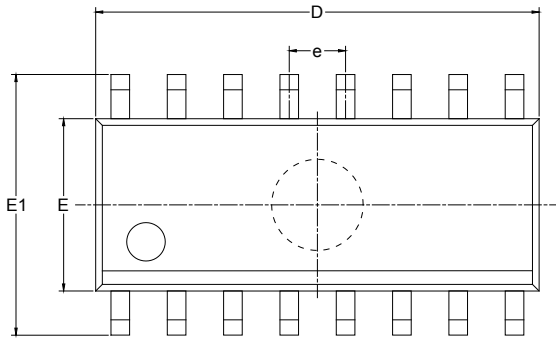
Table 3. Network Analyzer (HP8753ES) Setup

Average	RBW	$V_{BIAS}$	ST	P1
4	3kHz	1/2 $V_+$	2s	0dBm

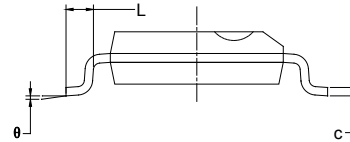
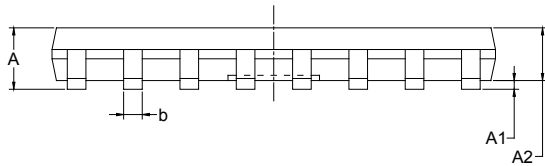


PACKAGE OUTLINE DIMENSIONS

SOIC-16



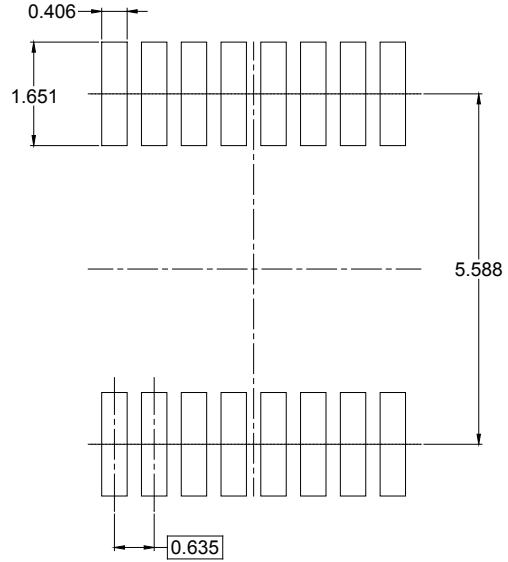
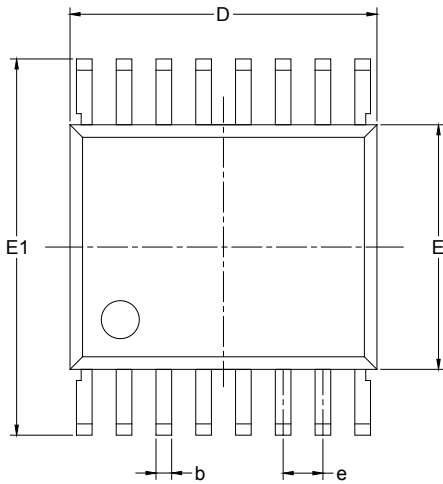
RECOMMENDED LAND PATTERN (Unit: mm)



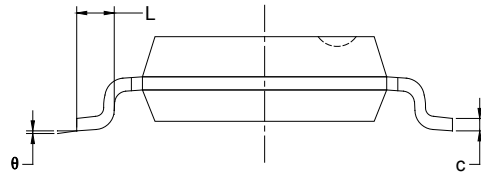
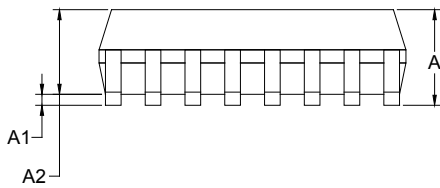
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	9.800	10.200	0.386	0.402
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

SSOP-16



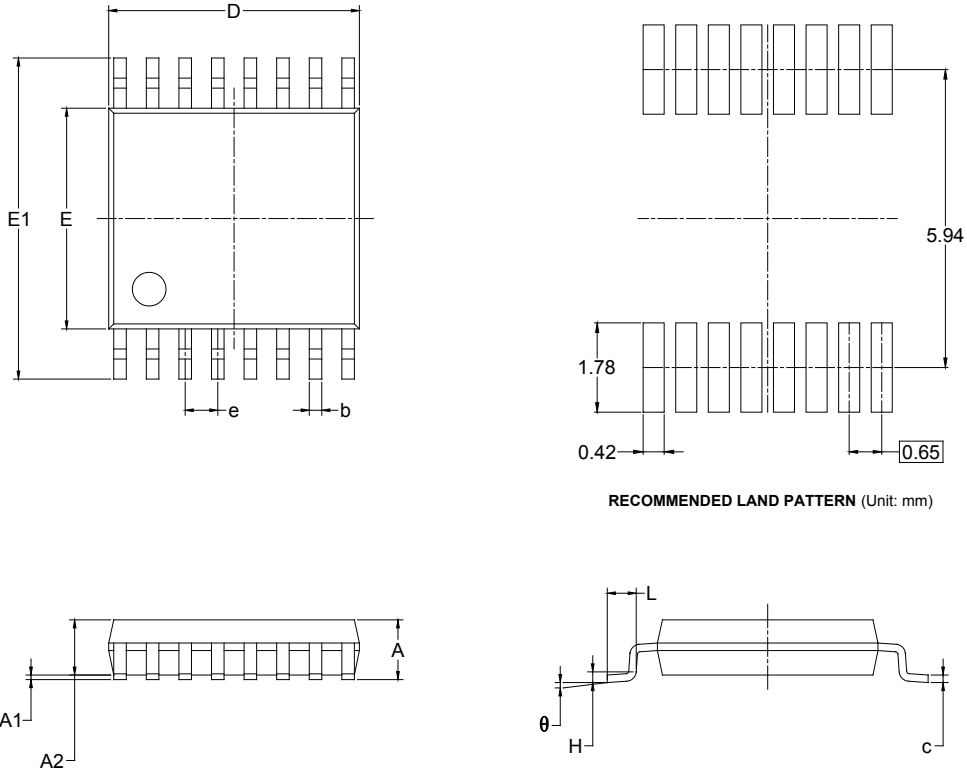
RECOMMENDED LAND PATTERN (Unit: mm)



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	0.200	0.300	0.008	0.012
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	0.635 BSC		0.025 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

TSSOP-16

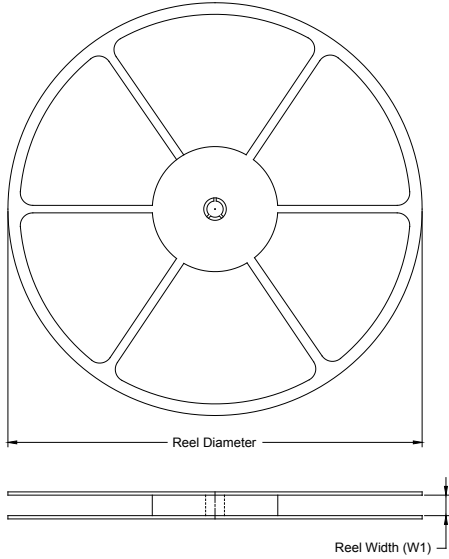


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.860	5.100	0.191	0.201
E	4.300	4.500	0.169	0.177
E1	6.200	6.600	0.244	0.260
e	0.650 BSC		0.026 BSC	
L	0.500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

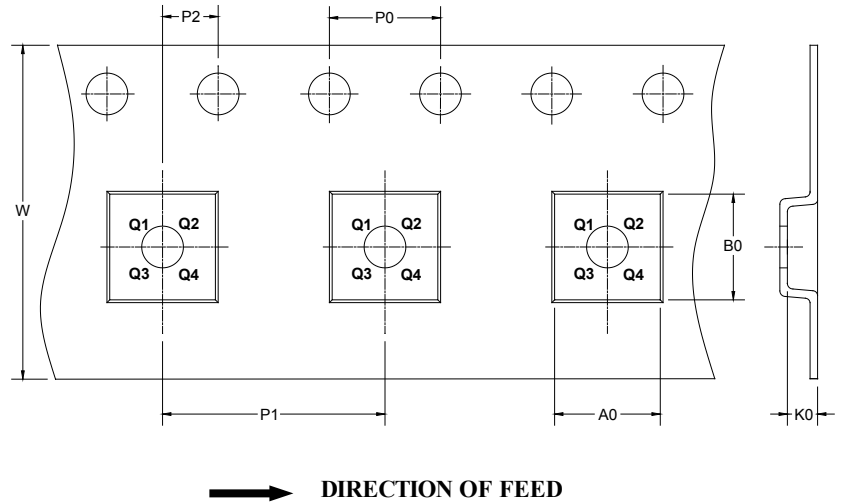
# PACKAGE INFORMATION

## 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	6.50	10.30	2.10	4.0	8.0	2.0	16.0	Q1
SSOP-16	13"	12.4	6.40	5.40	2.10	4.0	8.0	2.0	12.0	Q1
TSSOP-16	13"	12.4	6.90	5.60	1.20	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