



SGM9111

8MHz Rail-to-Rail Composite Video Driver with 6dB Gain

PRODUCT DESCRIPTION

The SGM9111 is single rail-to-rail 5-pole output reconstruction filter with a -3dB bandwidth of 8MHz and a slew rate of 34.8V/ μ s. Operating from single supplies ranging from 3.0V to 5.5V and sinking an ultra-low 7mA quiescent current, the SGM9111 is ideally suited for low power, battery-operated applications.

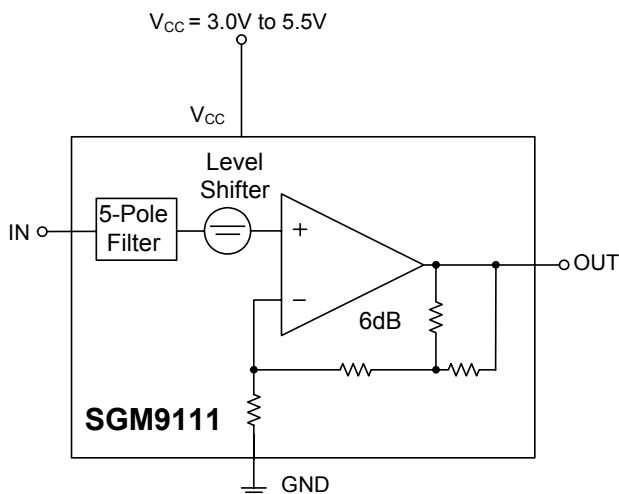
The SGM9111 employs an internal level shift circuit that avoids sync-pulse clipping and allows DC-coupled output. It is specified over the extended -40°C to +85°C temperature range.

It has Green of SOP8 and SC70-5 (SOT-353) packages.

FEATURES

- Low Cost
 - Excellent Video Performance
 - 5-Pole Reconstruction Filter
 - Internal Gain: 6dB
 - Rail-to-Rail Output
 - Input Voltage Range Includes Ground
 - AC-Coupled Input
 - Operates on 3.0V to 5.5V Single-Supplies
 - Low Power
 - 7mA Typical Supply Current
 - Small Packaging
- SGM9111 Available in SOP8 and SC70-5 (SOT-353) packages

BLOCK DIAGRAM



APPLICATIONS

- Video amplifiers
- Cable and Satellite set top boxes
- Communications devices
- Video on demand
- Portable and handheld products
- Personal video recorders
- DVD players
- HDTV

PACKAGE/ORDERING INFORMATION

ORDER NUMBER	PACKAGE DESCRIPTION	TEMPERATURE RANGE	PACKAGE OPTION	MARKING INFORMATION
SGM9111YS/TR	SOP8	-40°C to +85°C	Tape and Reel, 2500	SGM9111YS
SGM9111YC5/TR	SC70-5(SOT-353)	-40°C to +85°C	Tape and Reel, 3000	9111

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{CC} to GND.....6V
 Input Voltage..... GND - 0.3V to (V_{CC}) +0.3V
 Storage Temperature Range -65°C to +150°C
 Junction Temperature.....160°C
 Operating Temperature Range..... -40°C to +85°C
 Lead Temperature Range (Soldering 10 sec) 260°C
 ESD Susceptibility
 HBM..... 6000V
 MM.....400V

NOTES

1. Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

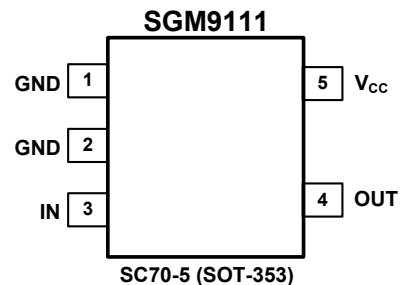
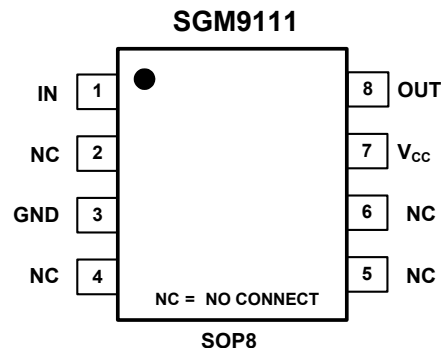
PIN DESCRIPTION

NAME	SOP8 PIN	SC70-5 (SOT-353) PIN	FUNCTION
IN	1	3	Video input
GND	3	1, 2	Ground
V_{CC}	7	5	Power supply
OUT	8	4	Filtered video output
NC	2, 4, 5, 6	—	No connect

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.

PIN CONFIGURATIONS (Top View)



ELECTRICAL CHARACTERISTICS: $V_{CC} = 5.0V$

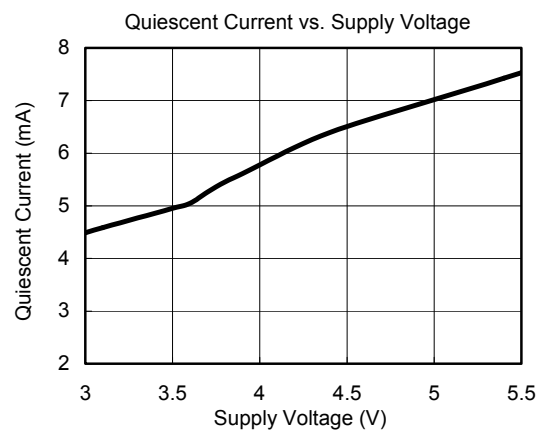
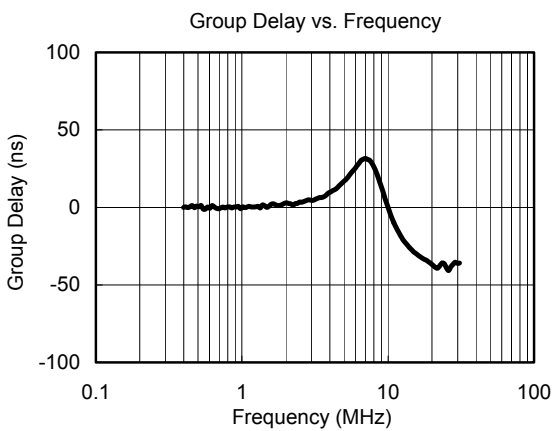
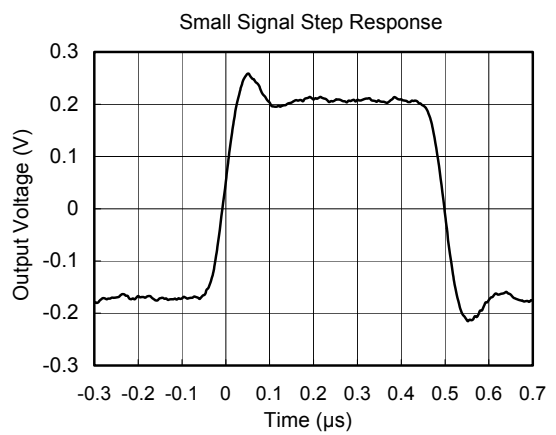
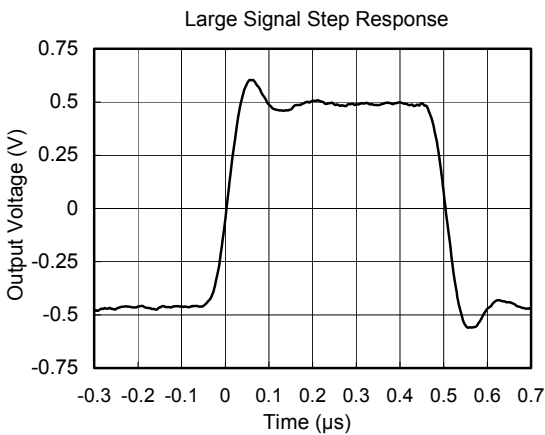
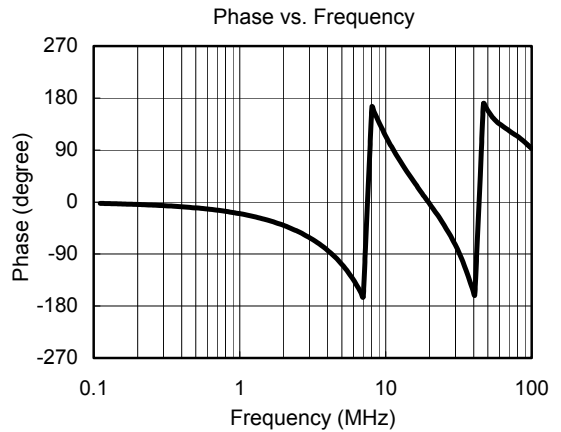
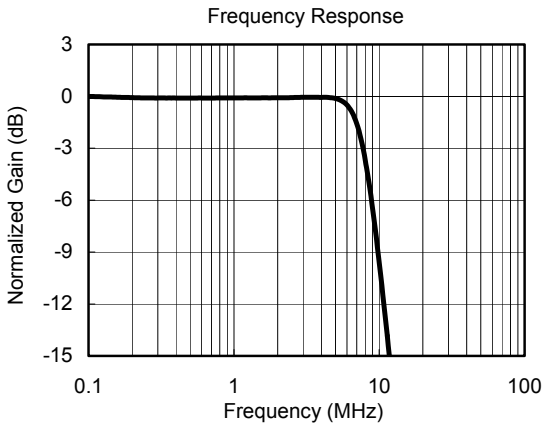
(At $R_L = 150\Omega$ connected to GND, $V_{IN} = 1V_{PP}$, and $C_{IN} = 0.1\mu F$, all outputs AC coupled with $220\mu F$, referenced to 400kHz, unless otherwise noted.)

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
INPUT CHARACTERISTICS						
Output Level Shift Voltage (V_{OLS})	$V_{IN} = 0V$, no load	+25°C		352	480	mV
		-40°C to +85°C			604	
Input Voltage Clamp (V_{CLAMP})	$I_{IN} = -3.5mA$	+25°C	-180	-109		mV
		-40°C to +85°C	-263			
Clamp Charge Current	$V_{IN} = V_{CLAMP} - 100mV$	+25°C	-6.0	-4.8		mA
		-40°C to +85°C	-6.3			
Clamp Discharge Current	$V_{IN} = 500mV$	+25°C		1.8	3.0	μA
		-40°C to +85°C			3.2	
Voltage Gain (A_v)	$R_L = 150\Omega$	+25°C	5.6	6	6.4	dB
		-40°C to +85°C	5.5		6.5	
OUTPUT CHARACTERISTICS						
Output Voltage High Swing	$V_{IN} = 3.0V$, $R_L = 150\Omega$ to GND	+25°C	4.6	4.78		V
		-40°C to +85°C	4.5			
Output Short-Circuit Current (I_{SC})	$V_{IN} = 0.5V$, Out short to GND through 10Ω	+25°C	90	120		mA
		-40°C to +85°C	80			
	$V_{IN} = 1.5V$, Out short to V_{CC} through 10Ω	+25°C		-124	-100	mA
		-40°C to +85°C			-88	
POWER SUPPLY						
Operating Voltage Range			3.0		5.5	V
Power Supply Rejection Ratio (PSRR)	$V_{CC} = 3.5V$ to $5.0V$	+25°C	45	51		dB
		-40°C to +85°C	42			
Quiescent Current (I_Q)	$V_{IN} = 0.5V$	+25°C		7.0	9.5	mA
		-40°C to +85°C			10.1	
DYNAMIC PERFORMANCE						
-0.1dB Bandwidth				5.56		MHz
-3dB Bandwidth				7.76		MHz
Filter Response (Normalized Gain)	$f_{IN} = 27MHz$			42.4		dB
Slew Rate	2V Output Step, 80% to 20%			34.8		V/ μs
Differential Gain Error (DG)	PAL DC coupled			0.53		%
	PAL AC coupled			0.47		%
Differential Phase Error (DP)	PAL DC coupled			1.30		°
	PAL AC coupled			1.47		°
Group Delay Variation (D/DT)	Difference between 400kHz and 6.5MHz			30.3		ns
Fall Time	2V Output Step, 80% to 20%			34.5		ns
Rise Time	2V Output Step, 80% to 20%			35.7		ns

Specifications subject to change without notice.

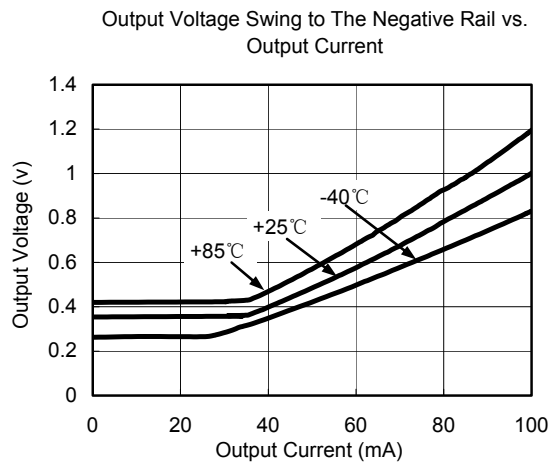
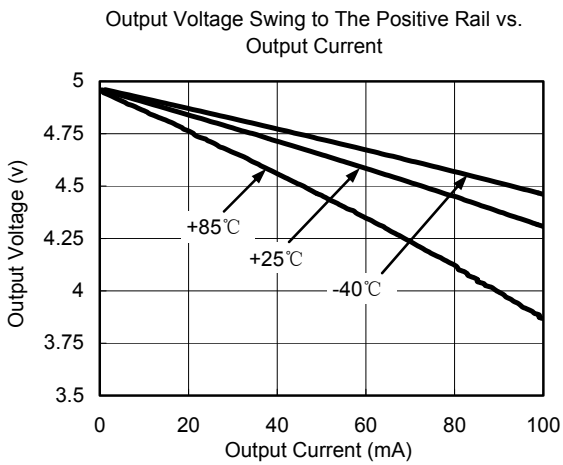
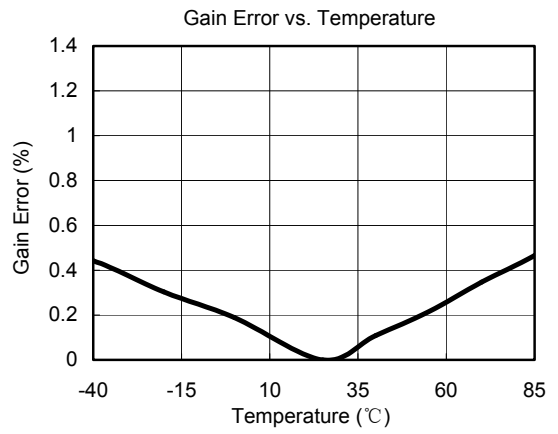
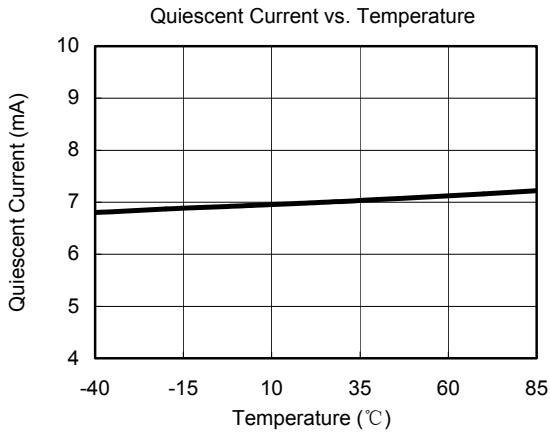
TYPICAL PERFORMANCE CHARACTERISTICS

At $V_{CC} = 5V$, $T_A = +25^{\circ}C$, $R_L = 150\Omega$, all outputs AC coupled with $220\mu F$, unless otherwise noted.



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Applications Information

Functional Description

SGM9111 operates from a single 3.0V to 5.5V supply. In application, SGM9111 is a fully integrated solution for filtering and buffering SDTV signals in front of video decoder or behind video encoder. For example, SGM9111 can replace a passive LC filter and an amplifier driver at CVBS side in set-top box and DVD player, this solution can help you save PCB size and production cost, it also improves video signal performance comparing with traditional design using discrete components. SGM9111 features a DC-coupled input buffer, 5-pole low-pass filter to eliminate out-of-band noise of video encoder, and a gain of +6dB in the output amplifier to drive 75Ω load. The AC or DC-coupled input buffer eliminates sync crush, droop, and field tilt. The output of SGM9111 also can be DC-coupled or AC-coupled.

Input Considerations

Besides AC coupling, the SGM9111 inputs also can be DC-coupled. In DC coupling application, No input coupling capacitors are needed because the amplitude of input video signal from DAC includes ground and extends up to 1.4V, then SGM9111 can be directly connected to the output of a single-supply, current-output DAC without any external bias network. Some time, if DAC's output level exceeds the range of 0V to 1.4V, or SGM9111 is driven by an unknown external source or a SCART switch which has its own clamping circuit, AC coupling is needed in such applications.

Output Considerations

The SGM9111 outputs can be DC-coupled or AC-coupled. When 0V is input, the SGM9111 output voltage is 340mV typically. In DC coupling design, one 75Ω resistor is used to connect SGM9111's output pin with external load directly, this serial back-termination resistor is used to match the impedance of the transmission line between SGM9111 and external load to cancel the signal reflection. The SGM9111 outputs can sink and source current allowing the device to be AC-coupled with external load, in AC coupling, 220μF at least capacitor will be used in order to eliminate field tilt.

Power-Supply Bypassing and Layout

Correct power supply bypassing is very important for optimizing video performance in design. One 0.1μF and one 10μF capacitors are always used to Bypass V_{CC} pin of SGM9111, please place these two capacitors as close to the SGM9111 output pin as possible, a large ground plane is also needed to ensure optimum performance. The input and output termination resistors should be placed as close to the related pin of SGM9111 as possible to avoid performance degradation. The PCB traces at the output side should have 75Ω characteristic impedance in order to match the 75Ω characteristic impedance cable connecting external load. In design, please keep the board trace at the inputs and outputs of the SGM9111 as short as possible to minimize the parasitic stray capacitance and noise pickup.

Typical Application Diagram

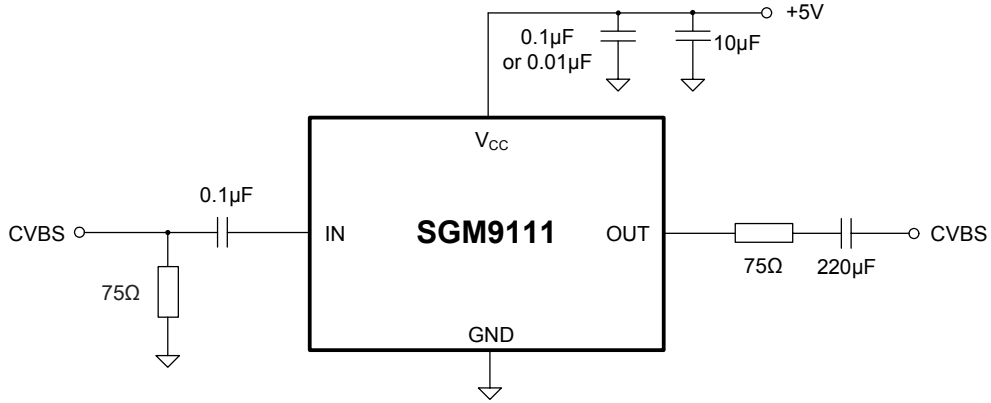
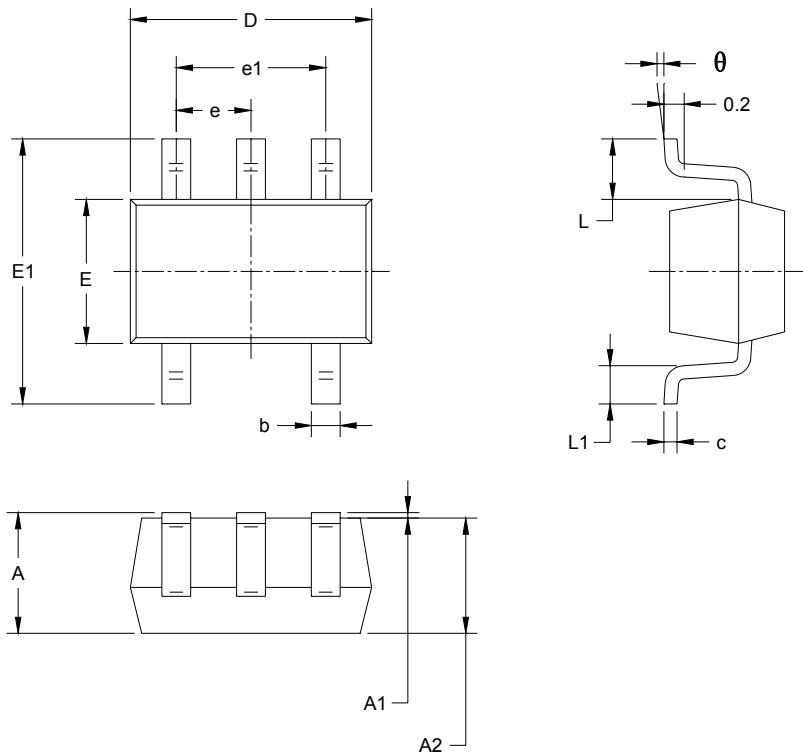


Figure 1. AC Coupling Application Schematic

PACKAGE OUTLINE DIMENSIONS

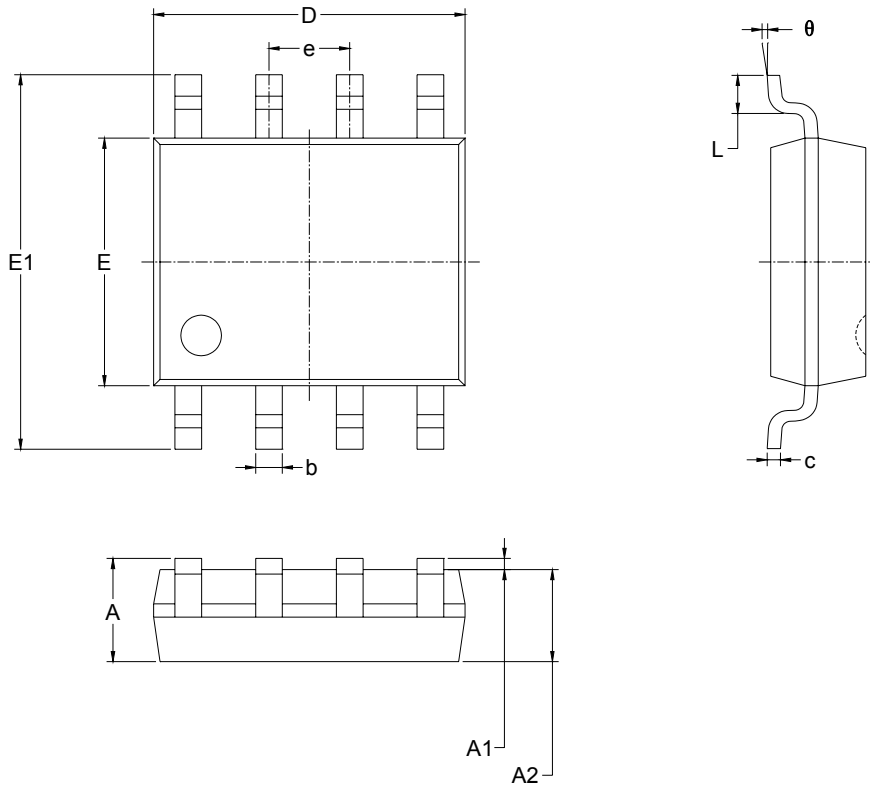
SC70-5 (SOT-353)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

SOP8



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	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	1.270 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
theta	0°	8°	0°	8°

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