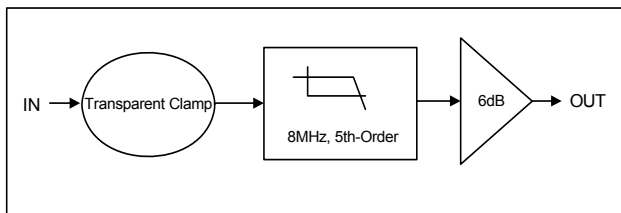


### GENERAL DESCRIPTION

The SGM9113 is a single rail-to-rail 5th-order output reconstruction filter with a -3dB bandwidth of 8MHz and 35V/ $\mu$ s slew rate. Operating from single power supply ranging from 3.0V to 5.5V and sinking an ultra-low 6mA quiescent current, the SGM9113 is ideally suited for low power, battery-operated applications.

The SGM9113 employs an internal level shift circuit that avoids sync-pulse clipping and allows DC-coupled output. It operates over an ambient temperature range of -40°C to +85°C.

### BLOCK DIAGRAM



### FEATURES

- **Excellent Video Performance**
- **5th-Order Reconstruction Filter**
- **Internal Gain: 6dB**
- **Rail-to-Rail Output**
- **Input Voltage Range Includes Ground**
- **Operates from 3.0V to 5.5V Single Power Supply**
- **Low Power**
  - 6mA Typical Supply Current
- **Available in Green SOIC-8 and SC70-5 Packages**
- **-40°C to +85°C Operating Temperature Range**

### APPLICATIONS

Video Amplifiers  
Cable and Satellite Set-Top Boxes  
Communication Devices  
Video on Demand  
Portable and Handheld Products  
Personal Video Recorders  
DVD Players  
HDTV

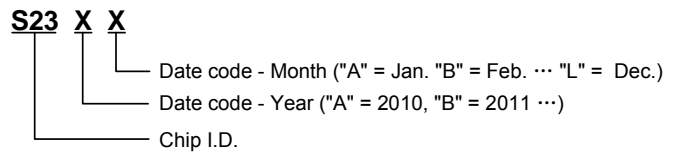
**PACKAGE/ORDERING INFORMATION**

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM9113	SOIC-8	-40°C to +85°C	SGM9113YS8G/TR	SGM9113YS8 XXXXX	Tape and Reel, 2500
	SC70-5	-40°C to +85°C	SGM9113YC5G/TR	S23XX	Tape and Reel, 3000

NOTE: XX = Date Code. 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.

**MARKING INFORMATION**



For example: S23FA (2015, January)

**ABSOLUTE MAXIMUM RATINGS**

Input Voltage Range ..... GND - 0.3V to  $V_{CC} + 0.3V$   
 Supply Voltage,  $V_{CC}$  ..... 6.0V  
 Junction Temperature ..... 150°C  
 Storage Temperature Range ..... -65°C to +150°C  
 Lead Temperature (Soldering, 10s) ..... 260°C  
 ESD Susceptibility  
 HBM ..... 8000V  
 MM ..... 400V  
 CDM ..... 2000V

**RECOMMENDED OPERATING CONDITIONS**

Operating Voltage Range ..... 3.0V to 5.5V  
 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.

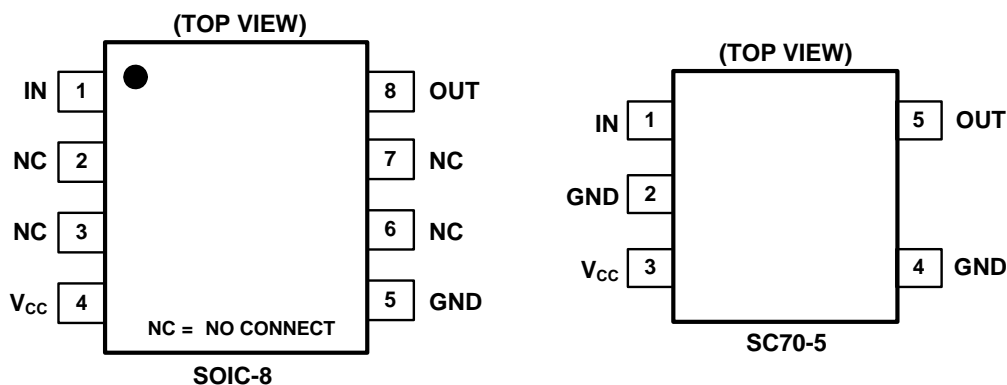
**ESD SENSITIVITY CAUTION**

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 CONFIGURATIONS**



**PIN DESCRIPTION**

PIN		NAME	FUNCTION
SOIC-8	SC70-5		
1	1	IN	Signal Input.
5	2, 4	GND	Ground.
4	3	V <sub>CC</sub>	Power Supply.
8	5	OUT	Signal Output.
2, 3, 6, 7	—	NC	No Connect.

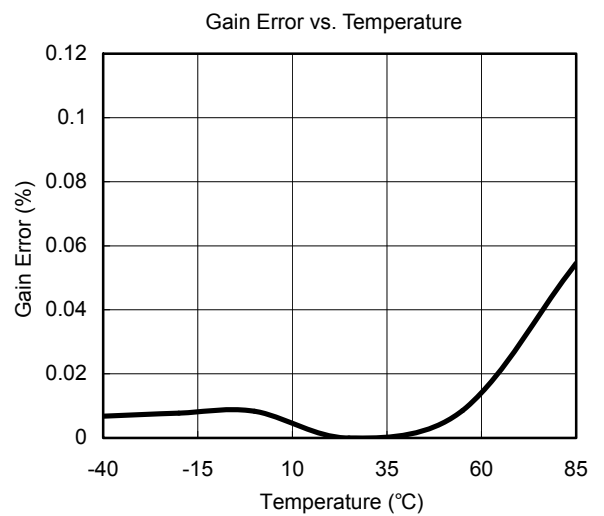
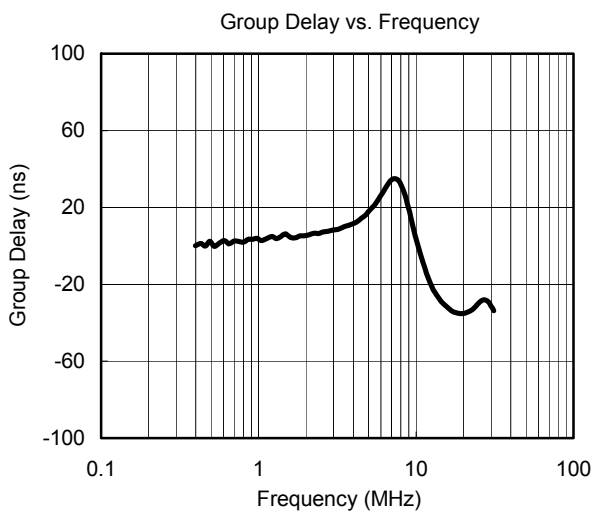
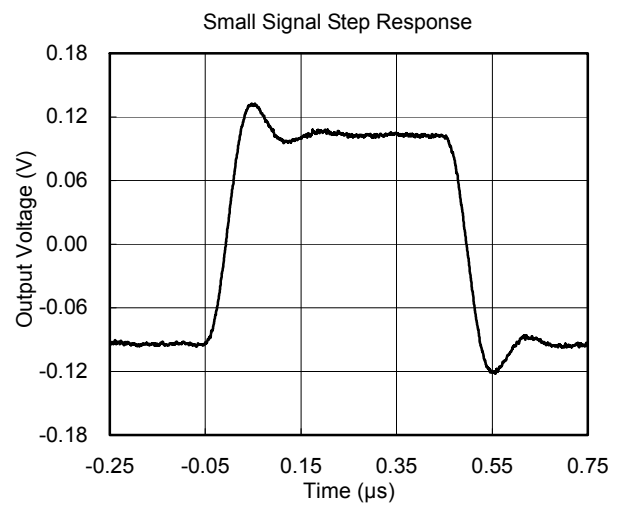
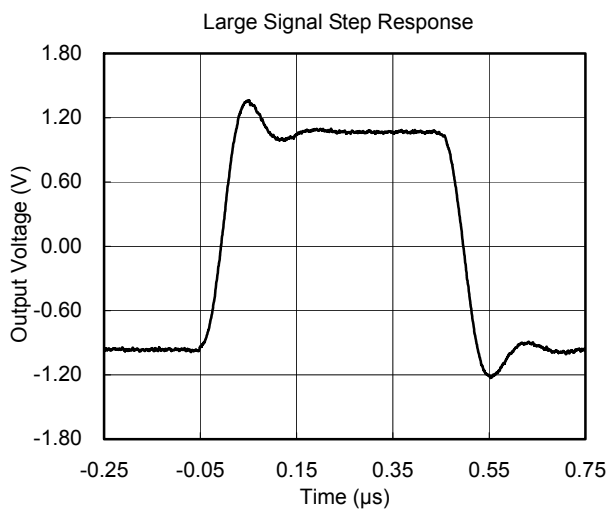
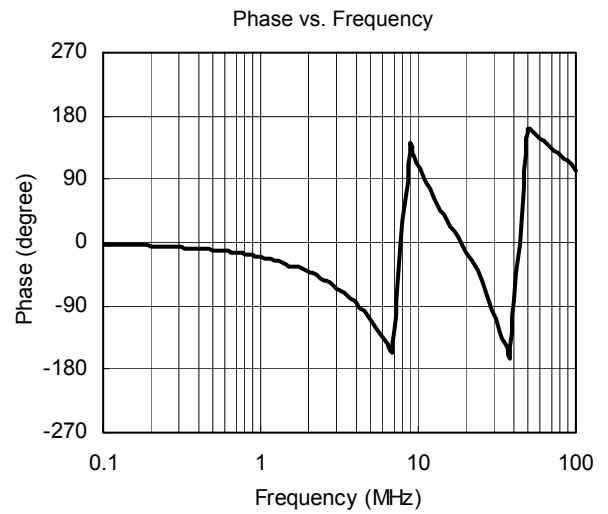
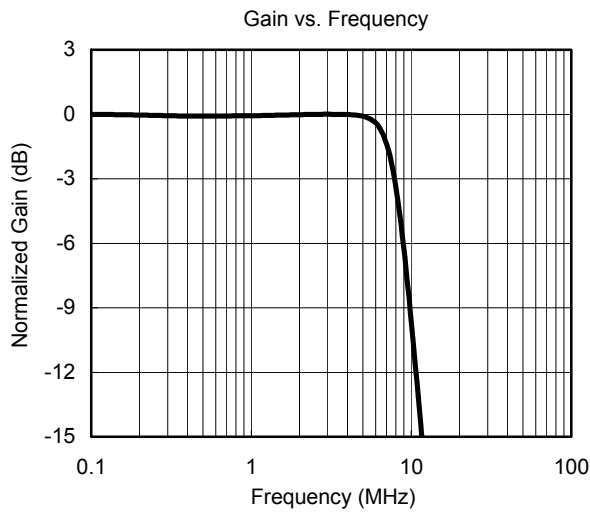
### ELECTRICAL CHARACTERISTICS

(At  $V_{CC} = 5V$ ,  $R_L = 150\Omega$  connected to GND,  $V_{IN} = 1V_{PP}$  and  $C_{IN} = 0.1\mu F$ , output AC-coupled, referenced to 400kHz, unless otherwise noted.)

PARAMETER	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
<b>INPUT CHARACTERISTICS</b>						
Output Level Shift Voltage ( $V_{OLS}$ )	$V_{IN} = 0V$ , No load	+25°C		340	570	mV
		-40°C to +85°C			675	
Input Voltage Clamp ( $V_{CLAMP}$ )	$I_{IN} = -3.5mA$	+25°C	-285	-210		mV
		-40°C to +85°C	-390			
Clamp Charge Current	$V_{IN} = V_{CLAMP} - 100mV$	+25°C	-5.5	-4.8		mA
		-40°C to +85°C	-6.8			
Clamp Discharge Current	$V_{IN} = 500mV$	+25°C		1.9	2.7	$\mu A$
		-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	5.55		6.45	
<b>OUTPUT CHARACTERISTICS</b>						
Output Voltage High Swing	$V_{IN} = 3.0V$ , $R_L = 150\Omega$ to GND	+25°C	4.6	4.79		V
		-40°C to +85°C	4.5			
Output Short-Circuit Current ( $I_{SC}$ )	$V_{IN} = 1.5V$ , Out shorted to GND through 10 $\Omega$	+25°C	80	95		mA
		-40°C to +85°C	77			
	$V_{IN} = 0.5V$ , Out shorted to $V_{CC}$ through 10 $\Omega$	+25°C		-102	-87	mA
		-40°C to +85°C			-78	
<b>POWER SUPPLY</b>						
Operating Voltage Range ( $V_{CC}$ )		+25°C	3.0		5.5	V
Power Supply Rejection Ratio (PSRR)	$V_{CC} = 3.5V$ to 5.0V	+25°C	40	50		dB
		-40°C to +85°C	38			
Quiescent Current ( $I_Q$ )	$V_{IN} = 0.5V$	+25°C		6	9.5	mA
		-40°C to +85°C			11.5	
<b>DYNAMIC PERFORMANCE</b>						
-0.1dB Bandwidth		+25°C		6		MHz
-3dB Bandwidth		+25°C		8		MHz
Filter Response (Normalized Gain)	$f_{IN} = 27MHz$	+25°C		47		dB
Slew Rate	2V Output step, 80% to 20%	+25°C		35		V/ $\mu s$
Differential Gain Error (DG)	PAL DC-coupled	+25°C		0.85		%
	PAL AC-coupled	+25°C		0.85		%
Differential Phase Error (DP)	PAL DC-coupled	+25°C		1		°
	PAL AC-coupled	+25°C		1.4		°
Group Delay Variation (D/DT)	Difference between 400kHz and 6.5MHz	+25°C		28		ns
Fall Time	2V Output step, 80% to 20%	+25°C		34		ns
Rise Time	2V Output step, 80% to 20%	+25°C		33		ns

TYPICAL PERFORMANCE CHARACTERISTICS

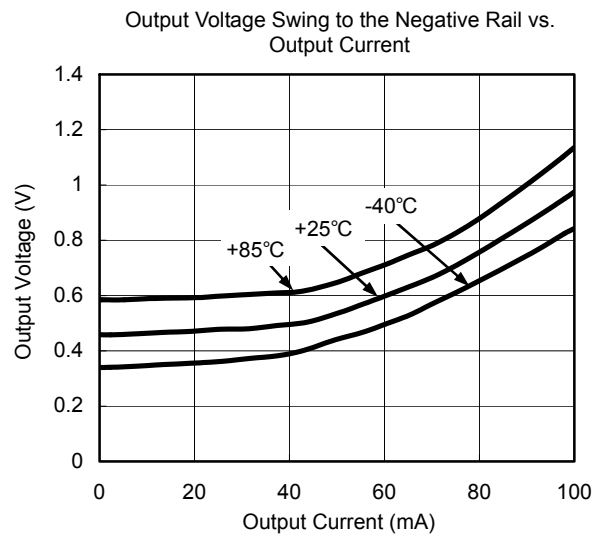
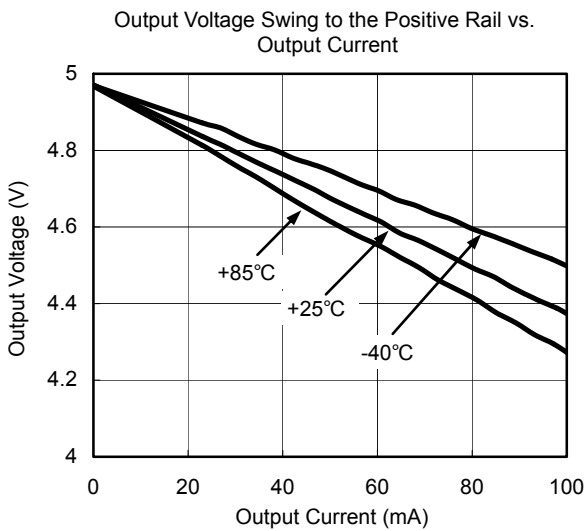
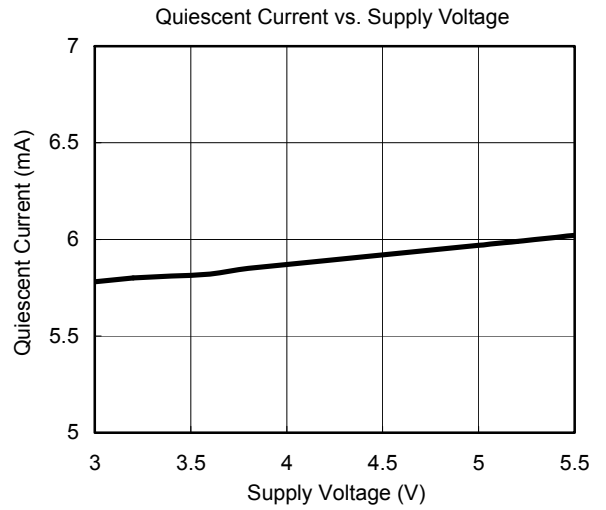
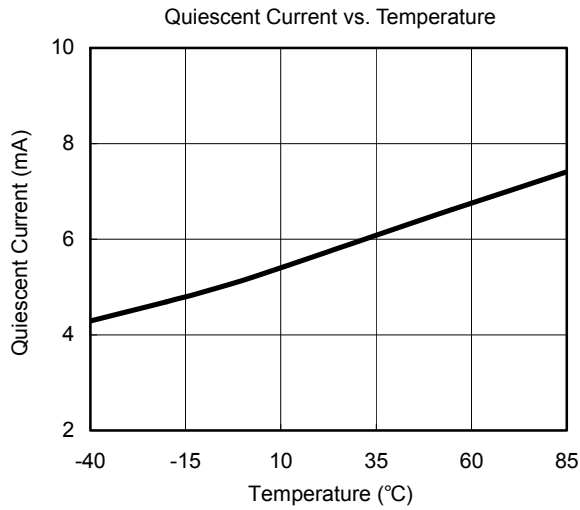
At  $V_{CC} = 5V$ ,  $T_A = +25^\circ C$ ,  $R_L = 150\Omega$ , output AC-coupled, unless otherwise noted.



SGM9113

TYPICAL PERFORMANCE CHARACTERISTICS

At  $V_{CC} = 5V$ ,  $T_A = +25^\circ C$ ,  $R_L = 150\Omega$ , output AC-coupled, unless otherwise noted.



TYPICAL APPLICATION CIRCUITS

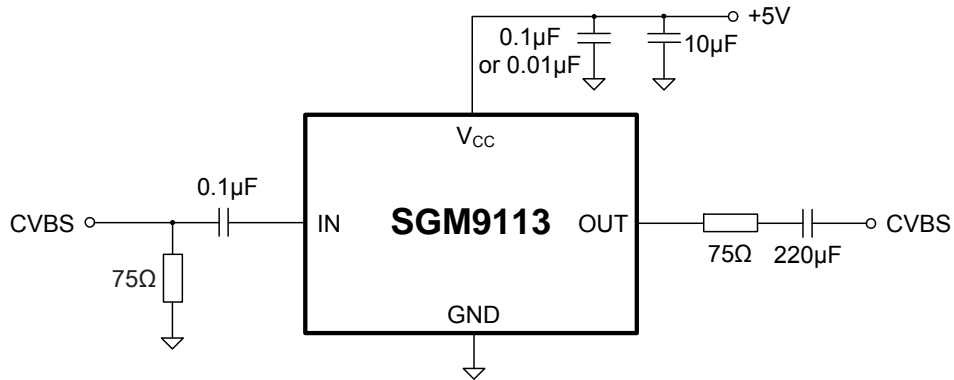


Figure 1. AC Coupling Application Schematic

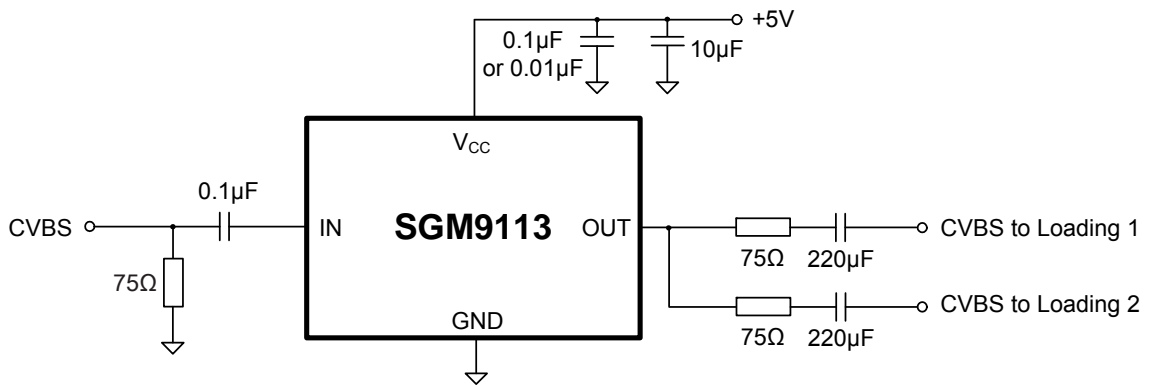


Figure 2. Two Loading Output AC Coupling Application Schematic

NOTE:

1. Power supply V<sub>CC</sub> must be sequenced on first before input video signals.

## APPLICATION INFORMATION

### Functional Description

SGM9113 operates from a single 3.0V to 5.5V supply. In application, SGM9113 is a fully integrated solution for filtering and buffering SDTV signals in front of video decoder or behind video encoder. For example, SGM9113 can replace a passive LC filter and an amplifier driver at CVBS side in set-top box and DVD player. This solution can help reduce PCB size and production cost, and it also improves video signal performance comparing with traditional design using discrete components. SGM9113 features a DC-coupled input buffer, a 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 SGM9113 also can be DC-coupled or AC-coupled.

### Input Considerations

Besides AC coupling, the SGM9113 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, and SGM9113 can be directly connected to the output of a single-supply, current-output DAC without any external bias network. In applications where DAC's output level exceeds the range from 0V to 1.4V, or SGM9113 is driven by an unknown external source or a SCART switch which has its own clamping circuit, AC coupling is needed.

### Output Considerations

The SGM9113 outputs can be DC-coupled or AC-coupled. When input is 0V, the SGM9113 output voltage is 340mV typically. In DC coupling design, one 75Ω resistor is used to connect SGM9113's output pin with external load directly, and this serial back-termination resistor is used to match the impedance of the transmission line between SGM9113 and external load to cancel the signal reflection. The SGM9113 outputs can sink and source current allowing the device to be AC-coupled with external load. In AC coupling, at least 220μF capacitor will be used in order to eliminate field tilt.

The 85mA output current driving capability of the SGM9113 is designed to drive two video lines simultaneously - essentially a 75Ω load, while keeping the output dynamic range as wide as possible.

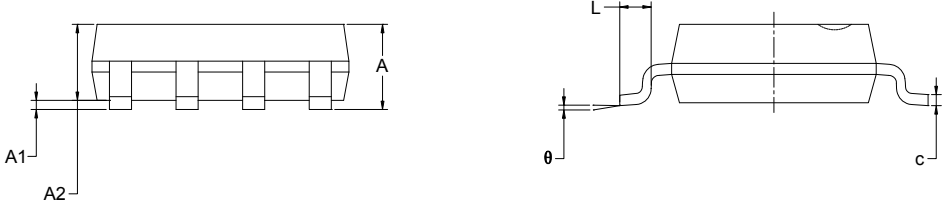
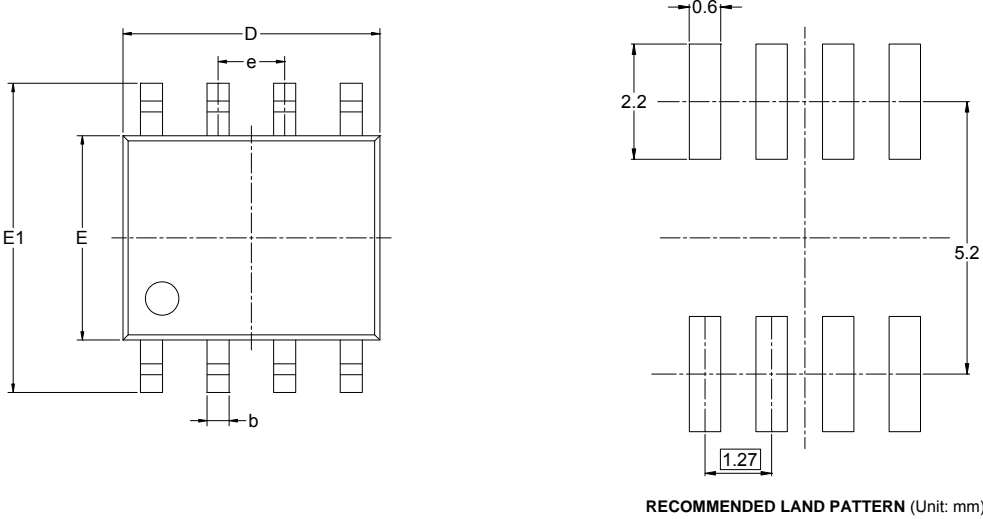
### Power-Supply Bypassing and Layout

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<sub>CC</sub> pin of SGM9113. Place these two capacitors as close to the SGM9113 supply 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 pins of SGM9113 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 of the cable connecting external load. In design, keep the board trace at the inputs and outputs of the SGM9113 as short as possible to minimize the parasitic stray capacitance and noise pickup.



PACKAGE OUTLINE DIMENSIONS

SOIC-8

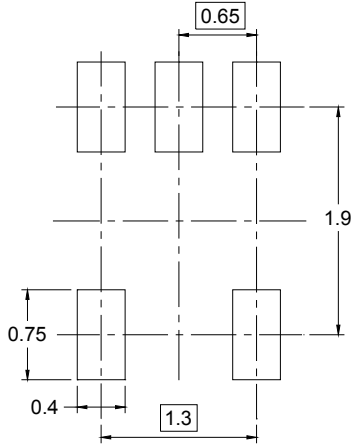
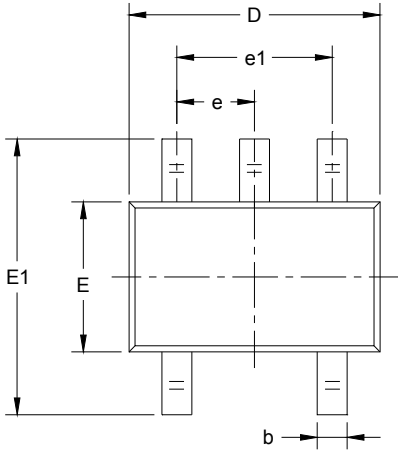


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

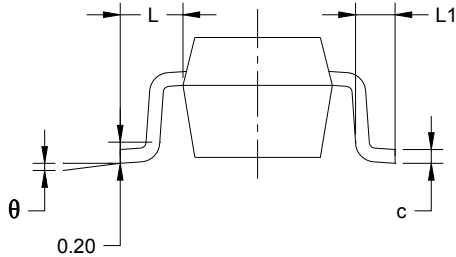
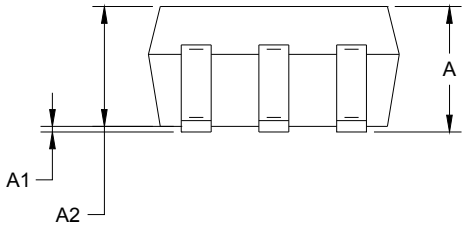
# PACKAGE INFORMATION

## PACKAGE OUTLINE DIMENSIONS

### SC70-5



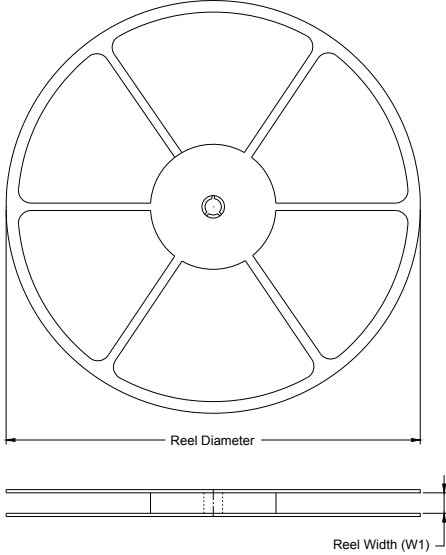
RECOMMENDED LAND PATTERN (Unit: mm)



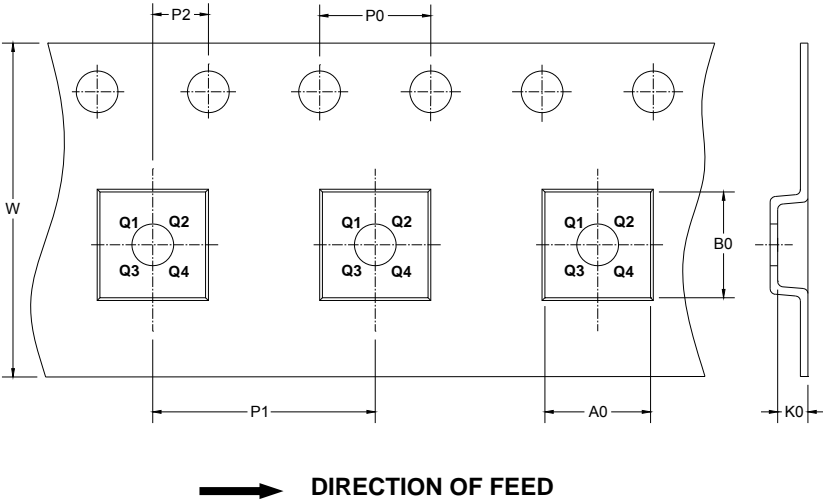
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
$\theta$	0°	8°	0°	8°

**TAPE AND REEL INFORMATION**

**REEL DIMENSIONS**



**TAPE DIMENSIONS**



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

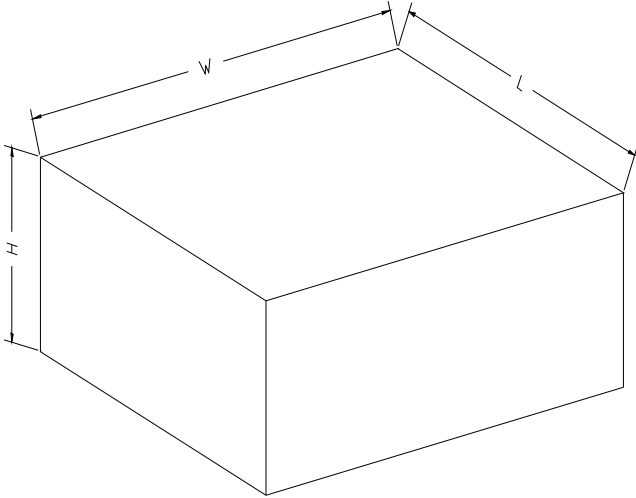
**KEY PARAMETER LIST OF TAPE AND REEL**

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-8	13"	12.4	6.4	5.4	2.1	4.0	8.0	2.0	12.0	Q1
SC70-5	7"	9.5	2.25	2.55	1.20	4.0	4.0	2.0	8.0	Q3

000001

# 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
7" (Option)	368	227	224	8
7"	442	410	224	18
13"	386	280	370	5

DD0002