



# SGM9126

## 6-Channel, 5th-Order, Standard Definition Video Filter Driver

### PRODUCT DESCRIPTION

The SGM9126 is a low voltage, 6-channel video amplifier with integrated reconstruction filters and input clamps. Specially suited for standard definition video signals, this device is ideal for a wide range of television and set-top box applications.

SGM9126 offers 6dB gain rail-to-rail output driver and 5th-order output reconstruction filter on all six channels. It has 8MHz -3dB bandwidth and 35V/ $\mu$ s slew rate. SGM9126 provides improved image quality compared with passive LC filters and discrete drivers solution. Operating from single power supply ranging from 3.3V to 5.5V and sinking an ultra-low 44mA quiescent current, the SGM9126 is ideally suited for battery powered applications.

SGM9126 can be DC-coupled or AC-coupled with input video signal, such as the output stage of DAC to eliminate out-of-band noise. The output in SGM9126 can be configured as DC- or AC-coupled output.

The SGM9126 is available in Green TSSOP-14 package. It operates over an ambient temperature range of -40°C to +85°C.

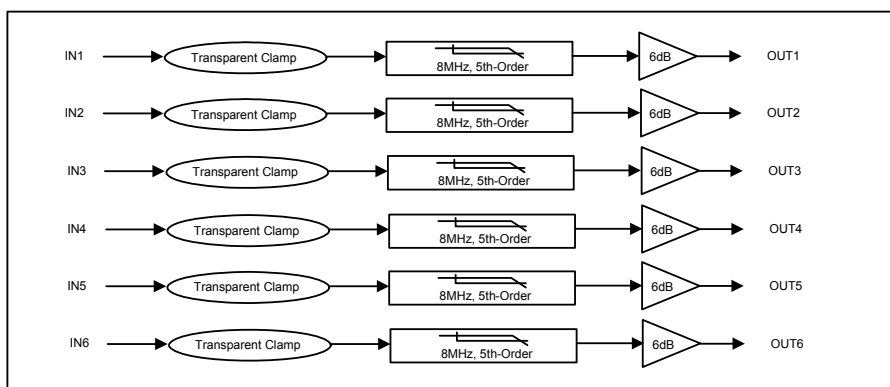
### FEATURES

- 6-Channel 5th-Order 8MHz (SD) Filters
- Transparent Input Clamping
- 6dB Output Driver Gain
- Rail-to-Rail Output
- Input Voltage Range Includes Ground
- AC- or DC-Coupled Inputs
- AC- or DC-Coupled Outputs
- Operates from 3.3V to 5.5V Power Supply
- Low Power (7.5mA/Channel)  
44mA Total Supply Current
- Available in Green TSSOP-14 Package
- -40°C to +85°C Operating Temperature Range

### APPLICATIONS

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

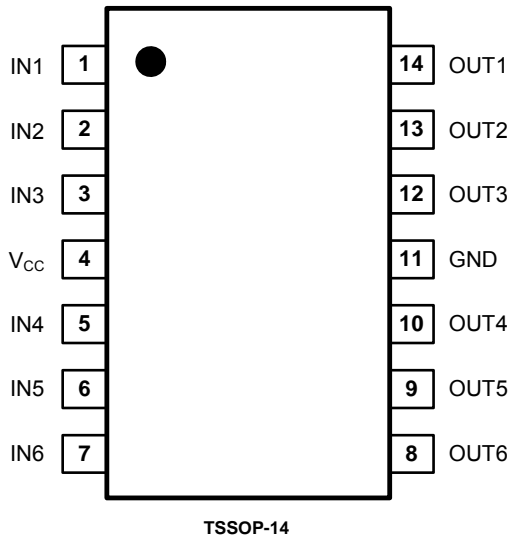
### BLOCK DIAGRAM



**PACKAGE/ORDERING INFORMATION**

ORDER NUMBER	PACKAGE DESCRIPTION	TEMPERATURE RANGE	PACKAGE OPTION	MARKING INFORMATION
SGM9126YTS14G/TR	TSSOP-14	-40°C to +85°C	Tape and Reel, 3000	SGM9126YTS14

**PIN CONFIGURATION (TOP VIEW)**



**PIN DESCRIPTION**

PIN	NAME	FUNCTION
1	IN1	Video Input. Channel 1.
2	IN2	Video Input. Channel 2.
3	IN3	Video Input. Channel 3.
4	V <sub>CC</sub>	Power Supply.
5	IN4	Video Input. Channel 4.
6	IN5	Video Input. Channel 5.
7	IN6	Video Input. Channel 6.
8	OUT6	Filtered Output. Channel 6.
9	OUT5	Filtered Output. Channel 5.
10	OUT4	Filtered Output. Channel 4.
11	GND	Ground.
12	OUT3	Filtered Output. Channel 3.
13	OUT2	Filtered Output. Channel 2.
14	OUT1	Filtered Output. Channel 1.

**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage, GND to V<sub>CC</sub>..... 6V  
 Input Voltage.....GND - 0.3V to V<sub>CC</sub> + 0.3V  
 Storage Temperature Range.....-65°C to +150°C  
 Junction Temperature ..... 150°C  
 Operating Temperature Range..... -40°C to +85°C  
 Lead Temperature Range (Soldering 10 sec)  
 ..... 260°C  
 ESD Susceptibility  
 HBM..... 8000V  
 MM.....400V

NOTE:  
 Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**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.

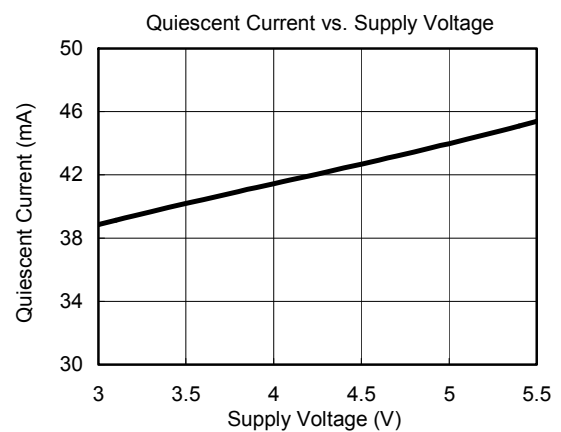
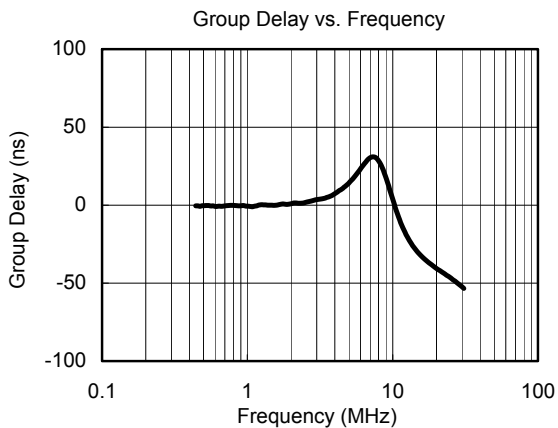
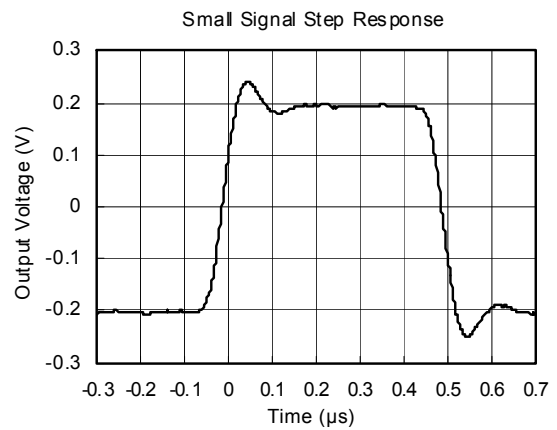
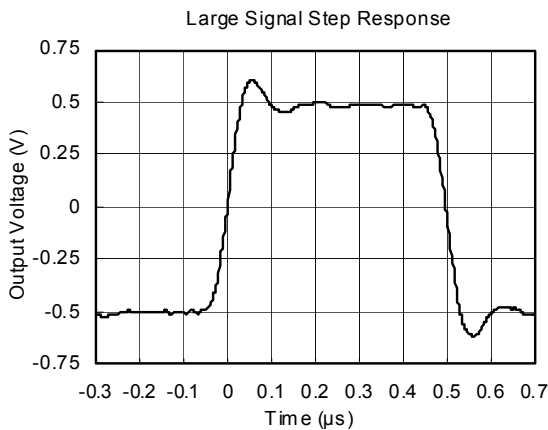
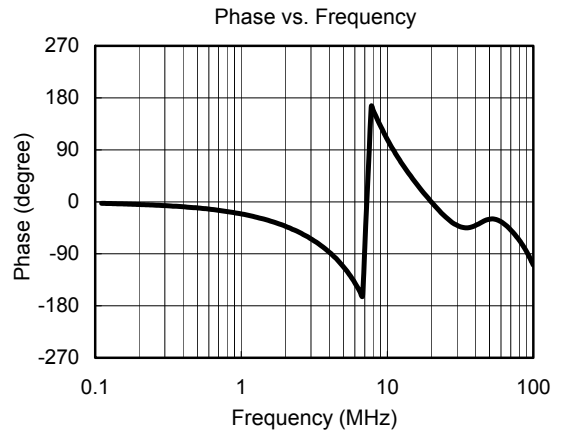
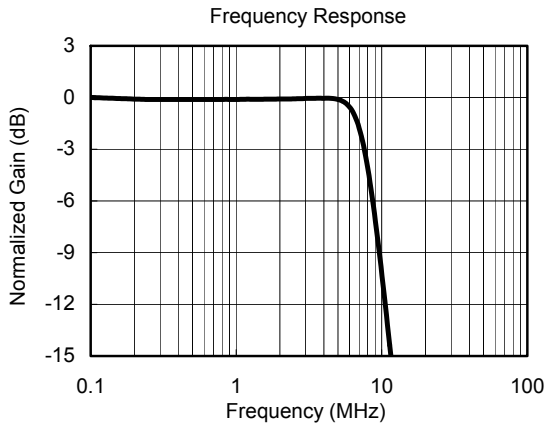
SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the latest datasheet.

**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  $220\mu F$ , 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		396	550	mV
		-40°C to +85°C			752	
Input Voltage Clamp ( $V_{CLAMP}$ )	$I_{IN} = -3.5mA$	+25°C	-180	-110		mV
		-40°C to +85°C	-270			
Clamp Charge Current	$V_{IN} = V_{CLAMP} - 100mV$	+25°C	-6.0	-4.75		mA
		-40°C to +85°C	-6.5			
Voltage Gain ( $A_v$ )	$R_L = 150\Omega$	+25°C	5.7	6	6.4	dB
		-40°C to +85°C	5.6		6.5	
<b>OUTPUT CHARACTERISTICS</b>						
Output Voltage High Swing	$V_{IN} = 3V$ , $R_L = 150\Omega$ to GND	+25°C	4.60	4.75		V
		-40°C to +85°C	4.53			
<b>POWER SUPPLY</b>						
Operating Voltage Range		+25°C	3.3		5.5	V
Power Supply Rejection Ratio (PSRR)	$V_{CC} = 3.5V$ to $5.0V$	+25°C	44	51		dB
		-40°C to +85°C	37			
Quiescent Current ( $I_Q$ )	$V_{IN} = 0.5V$	+25°C		44	55	mA
		-40°C to +85°C			63	
<b>AC PERFORMANCE</b>						
-0.1dB Bandwidth	$R_L = 150\Omega$	+25°C		5.7		MHz
-3dB Bandwidth	$R_L = 150\Omega$	+25°C		7.7		MHz
Filter Response (Normalized Gain)	$f_{IN} = 27MHz$	+25°C		44		dB
Slew Rate	2V Output step, 80% to 20%	+25°C		35		V/ $\mu s$
Differential Gain (DG)	PAL DC-coupled	+25°C		0.19		%
	PAL AC-coupled	+25°C		0.27		%
Differential Phase (DP)	PAL DC-coupled	+25°C		1.03		°
	PAL AC-coupled	+25°C		1.19		°
Group Delay Variation (D/DT)	Difference between 400kHz and 6.5MHz	+25°C		30.5		ns
Crosstalk (channel-to-channel)	$f = 1MHz$	+25°C		-66		dB
Fall Time	2V Output step, 80% to 20%	+25°C		34.2		ns
Rise Time	2V Output step, 80% to 20%	+25°C		35.4		ns

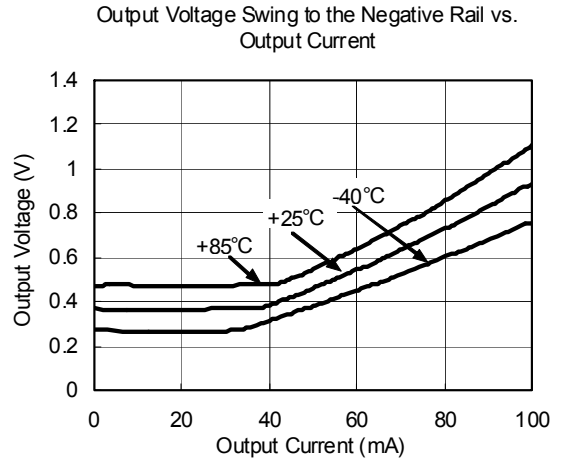
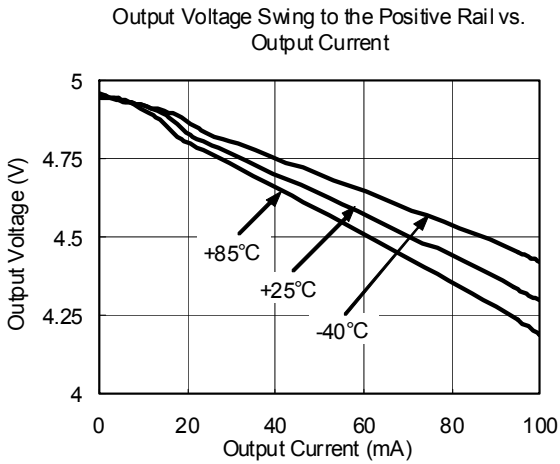
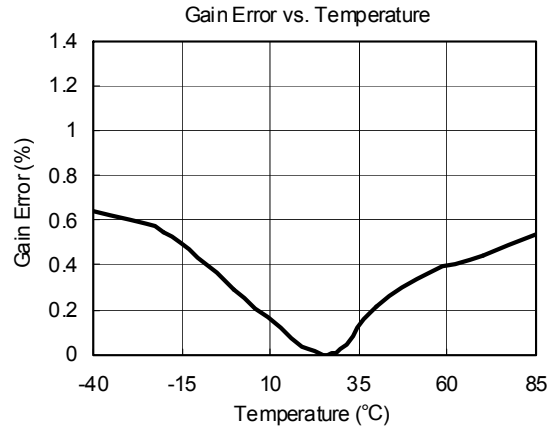
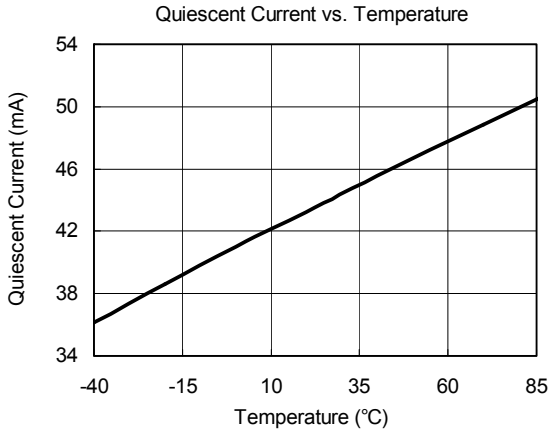
TYPICAL PERFORMANCE CHARACTERISTICS

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



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.



## APPLICATION INFORMATION

### Functional Description

SGM9126 operates from a single 3.3V to 5.5V supply. In application, SGM9126 is a fully integrated solution for filtering and buffering SDTV signals in front of video decoder or behind video encoder. For example, SGM9126 can replace six passive LC filters and six amplifier drivers 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. SGM9126 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 75 $\Omega$  load. The AC- or DC-coupled input buffer eliminates sync crush, droop, and field tilt. The output of SGM9126 also can be DC-coupled or AC-coupled.

### Input Considerations

Besides AC coupling, the SGM9126 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 SGM9126 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 SGM9126 is driven by an unknown external source or a SCART switch which has its own clamping circuit, AC coupling is needed.

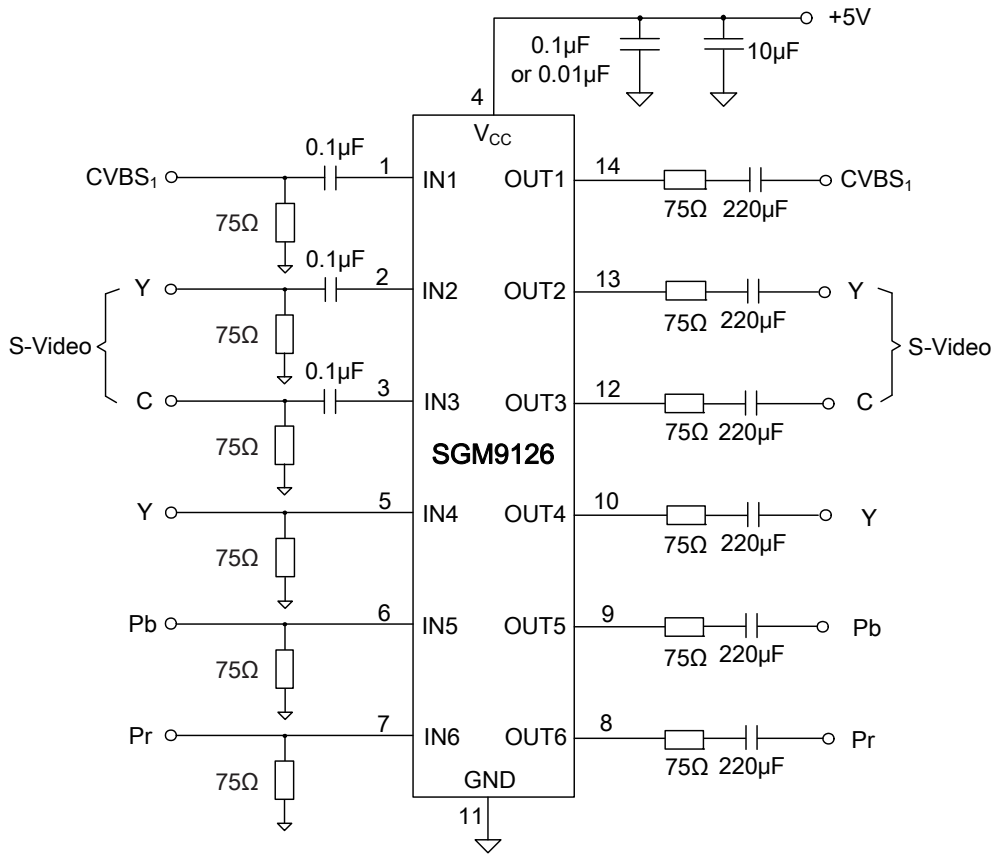
### Output Considerations

The SGM9126 outputs can be DC-coupled or AC-coupled. When input is 0V, the SGM9126 output voltage is 396mV typically. In DC coupling design, one 75 $\Omega$  resistor is used to connect SGM9126's output pin with external load directly, and this serial back-termination resistor is used to match the impedance of the transmission line between SGM9126 and external load to cancel the signal reflection. The SGM9126 outputs can sink and source current allowing the device to be AC-coupled with external load. In AC coupling, at least 220 $\mu$ F 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 0.1 $\mu$ F and one 10 $\mu$ F capacitors are always used to bypass  $V_{CC}$  pin of SGM9126. Place these two capacitors as close to the SGM9126 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 SGM9126 as possible to avoid performance degradation. The PCB traces at the output side should have 75 $\Omega$  characteristic impedance in order to match the 75 $\Omega$  characteristic impedance of the cable connecting external load. In design, keep the board trace at the inputs and outputs of the SGM9126 as short as possible to minimize the parasitic stray capacitance and noise pickup.

TYPICAL APPLICATION DIAGRAM

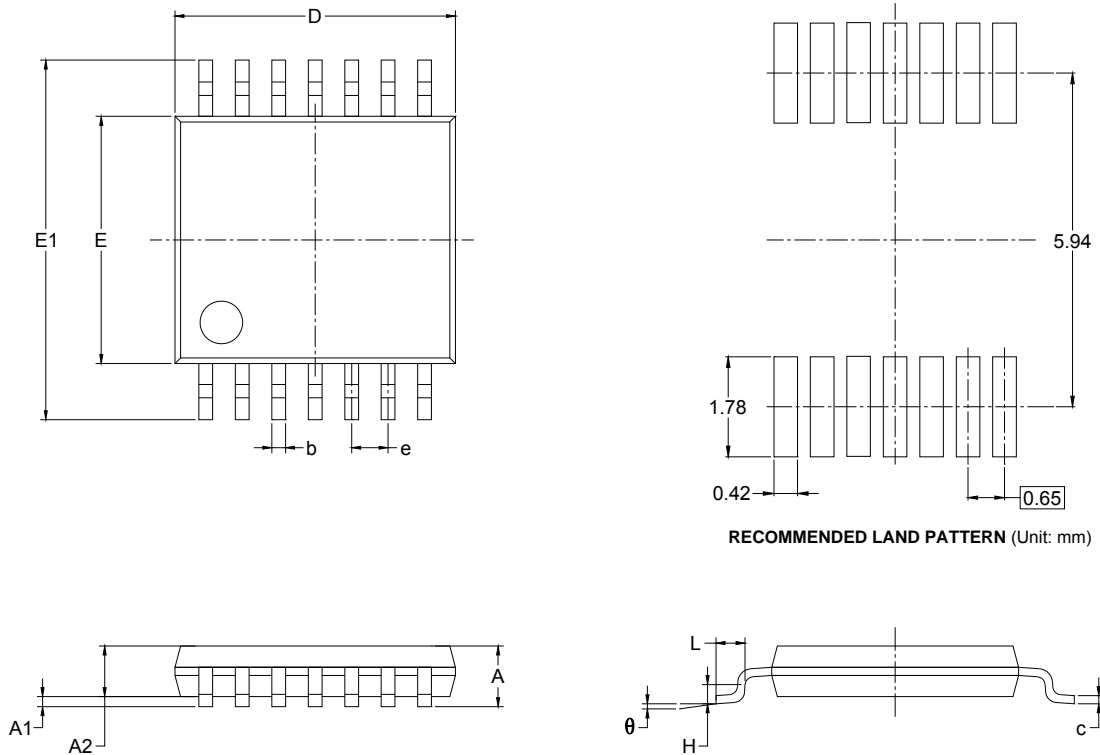


NOTE:  
 1. Power supply  $V_{CC}$  must be sequenced on first before input video signals.

Figure 1. AC Coupling Application Schematic

PACKAGE OUTLINE DIMENSIONS

TSSOP-14



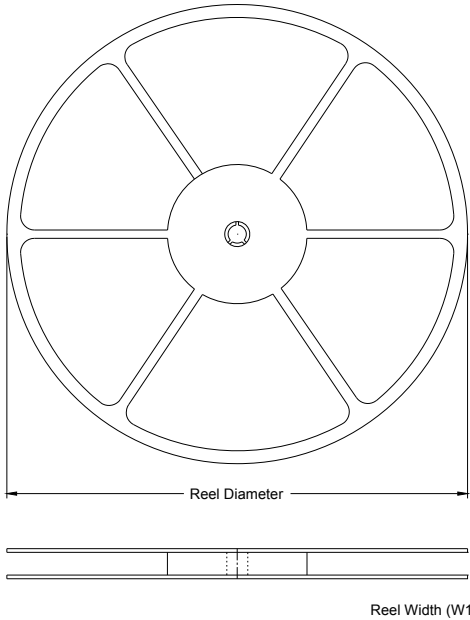
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.100		0.043
A1	0.050	0.150	0.002	0.006
A2	0.800	1.000	0.031	0.039
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.900	5.100	0.193	0.201
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
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°

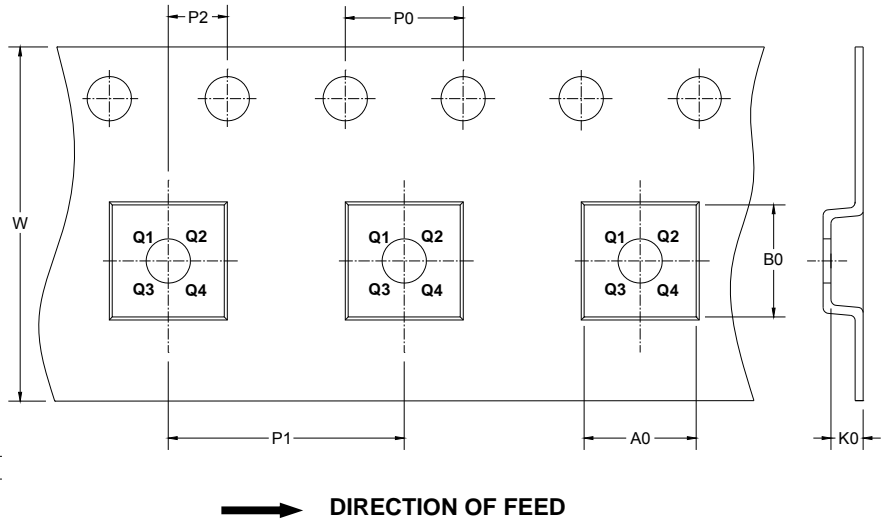


TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS

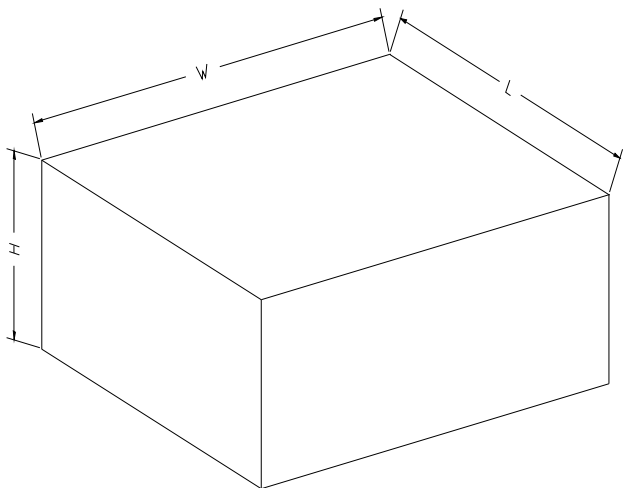


NOTE: The picture is only for reference. Please make the object as the standard.

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
TSSOP-14	13"	12.4	6.95	5.6	1.2	4.0	8.0	2.0	12.0	Q1

**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