SGM9123
Triple, 8MHz, 3rd-Order SDTV Video Filter Driver

GENERAL DESCRIPTION

The SGM9123 is a rail-to-rail, triple 3rd-order output reconstruction filter which can operate from 2.5V to 5.5V single power supply. Compared with typical passive solutions, triple 3rd-order filters provide better image quality.

The device has a -3dB bandwidth of 9MHz and 44V/μs slew rate. The drivers in SGM9123 can drive DC- or AC-coupled single (150Ω) or dual (75Ω) loads.

The device allows DC-coupled output. An internal level shift circuit avoids synchronous pulse limit. SGM9123 can be DC-coupled or AC-coupled with input video signal to eliminate out-of-band noise, such as the output stage of DAC. Internal clamp and bias circuitry may be used if AC-coupled inputs are required.

The SGM9123 is available in a Green SOIC-8 package.

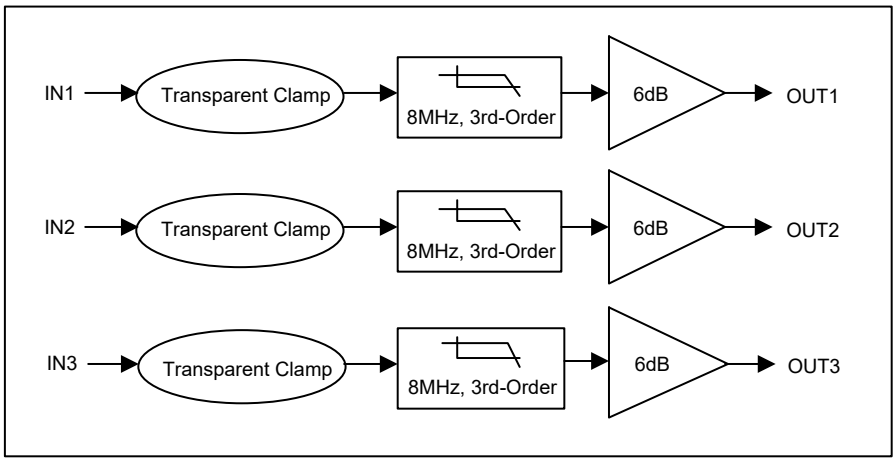
FEATURES

- **Supply Voltage Range: 2.5V to 5.5V**
- **Triple 3rd-Order 8MHz (SD) Filters**
- **Transparent Input Clamping**
- **Internal Gain: 6dB**
- **Drive Dual Video Loads**
- **AC- or DC-Coupled Inputs**
- **AC- or DC-Coupled Outputs**
- **Rail-to-Rail Output**
- **Low Power (2.5mA/Channel)**
- **Quiescent Current: 7.4mA**
- **Available in a Green SOIC-8 Package**

APPLICATIONS

Video Amplifiers
Video Recorders
Video on Demand (VOD)
Cable and Satellite Set-Top Boxes
Portable and Handheld Products
Communication Devices
SDTVs

BLOCK DIAGRAM

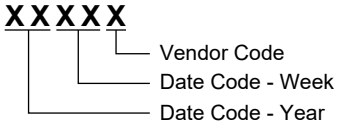


PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM9123	SOIC-8	-40℃ to +125℃	SGM9123XS/TR	SGM9123XS XXXXX	Tape and Reel, 2500

MARKING INFORMATION

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.

Input Voltage Range ..... GND - 0.3V to ($+V_S$) + 0.3V
Supply Voltage, GND to $+V_S$..... 6.5V
Power Dissipation, P_D @ T_A = +25℃
SOIC-8..... 0.8W
Package Thermal Resistance
SOIC-8, θ_{JA}.....128℃/W
Junction Temperature ..... 160℃
Storage Temperature Range..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... 260℃
ESD Susceptibility
HBM..... 8000V
MM..... 400V

RECOMMENDED OPERATING CONDITIONS

Operating Voltage Range.....2.5V to 5.5V
Operating Temperature Range ..... -40℃ to +125℃

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.

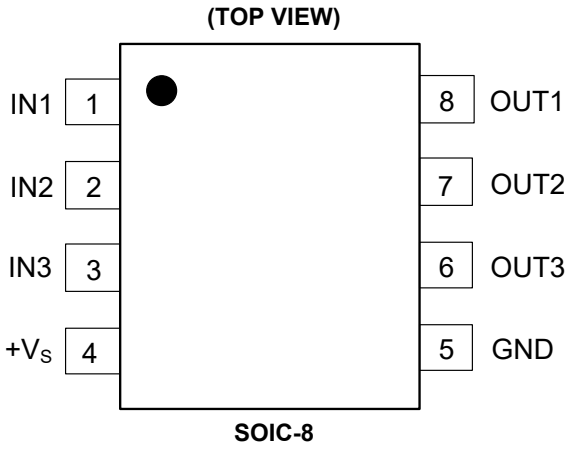
ESD SENSITIVITY CAUTION

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 CONFIGURATION



PIN DESCRIPTION

PIN	NAME	FUNCTION
1	IN1	Video Input for Channel 1.
2	IN2	Video Input for Channel 2.
3	IN3	Video Input for Channel 3.
4	$+V_S$	Power Supply.
5	GND	Ground.
6	OUT3	Filtered Output for Channel 3.
7	OUT2	Filtered Output for Channel 2.
8	OUT1	Filtered Output for Channel 1.

ELECTRICAL CHARACTERISTICS

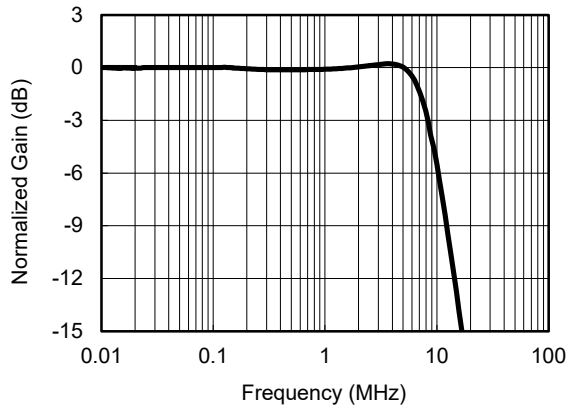
(At V_S = +5.0V, R_L = 150Ω connected to GND, V_{IN} = 1V_{PP} and C_{IN} = 0.1μF, all outputs AC-coupled with 220μF, unless otherwise noted.)

PARAMETER	CONDITIONS	SGM9123					
		TYP	MIN/MAX OVER TEMPERATURE				
		+25℃	+25℃	0℃ to +70℃	-40℃ to +85℃	UNITS	MIN/ MAX
Input Characteristics							
Output Level Shift Voltage (V_{OLS})	V_{IN} = 0V, no load	258	419	423	440	mV	MAX
Input Voltage Clamp (V_{CLAMP})	I_{IN} = -1mA	-13	-27	-27.6	-28.7	mV	MIN
Clamp Charge Current	V_{IN} = V_{CLAMP} - 100mV	-5.6	-8.2	-8.23	-8.24	mA	MIN
Voltage Gain (A_V)	R_L = 150Ω	2.0	1.89	1.88	1.87	V/V	MIN
			2.07	2.08	2.09	V/V	MAX
Output Characteristics							
Output Voltage High Swing	V_{IN} = 3V, R_L = 150Ω to GND	4.42	4.15	4.13	4.12	V	MIN
Output Short-Circuit Current (I_{SC})	V_{IN} = 3V, to GND through 10Ω	110	68	65	63	mA	MIN
	V_{IN} = 100mV, out shorted to VDD through 10Ω	162	102	92	90	mA	MIN
Power Supply							
Operating Voltage Range			2.5	2.7	2.7	V	MIN
			5.5	5.5	5.5	V	MAX
Power Supply Rejection Ratio (PSRR)	V_S = 2.7V to 5.5V	66	51	48	46	dB	MIN
Quiescent Current (I_Q)	V_{IN} = 500mV	7.4	9.5	10.5	10.7	mA	MAX
Dynamic Performance							
±0.1dB Bandwidth	R_L = 150Ω	5.4				MHz	TYP
-3dB Bandwidth	R_L = 150Ω	8.0				MHz	TYP
Filter Response Normalized Gain	f_{IN} = 4.5MHz	+0.2				dB	TYP
	f_{IN} = 27MHz	-25				dB	TYP
Slew Rate	20% to 80%, V_{IN} = 1V Step	44				V/μs	TYP
Differential Gain (DG)	NTSC & PAL DC-coupled	0.2				%	TYP
	NTSC & PAL AC-coupled	0.52				%	TYP
Differential Phase (DP)	NTSC & PAL DC-coupled	0.4				°	TYP
	NTSC & PAL AC-coupled	1.0				°	TYP
Group Delay Variation (D/DT)	Difference between 400kHz and 6.5MHz	17.5				ns	TYP
Crosstalk (channel-to-channel)	at 1MHz	-64				dB	TYP
Fall Time	2.0V_{STEP}, 80% to 20%	36				ns	TYP
Rise Time	2.0V_{STEP}, 80% to 20%	38				ns	TYP

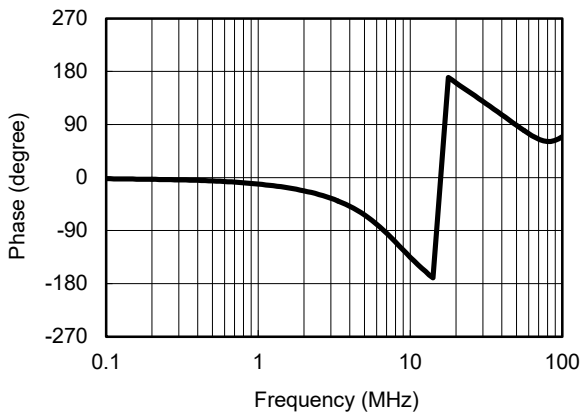
TYPICAL PERFORMANCE CHARACTERISTICS

At V_S = +5.0V, T_A = +25℃, R_L = 150Ω, all outputs AC-coupled with 220μF, unless otherwise noted.

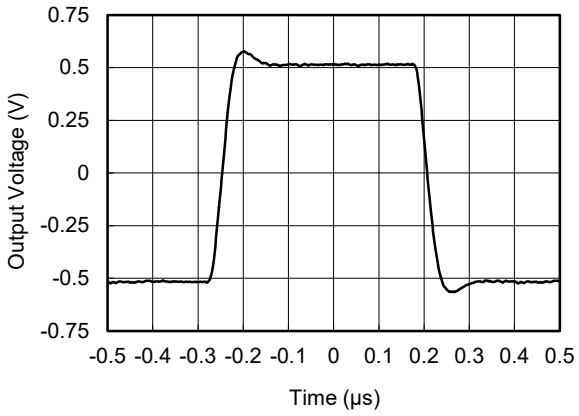
Frequency Response



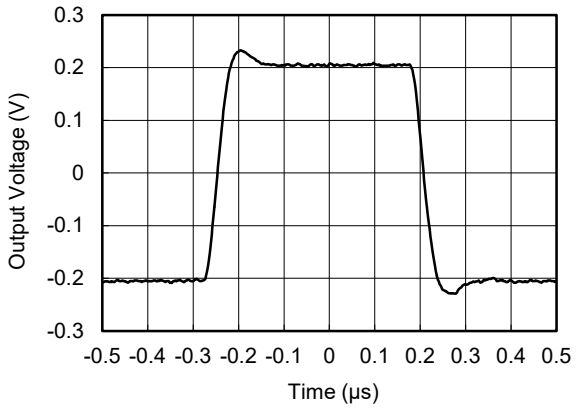
Phase vs. Frequency



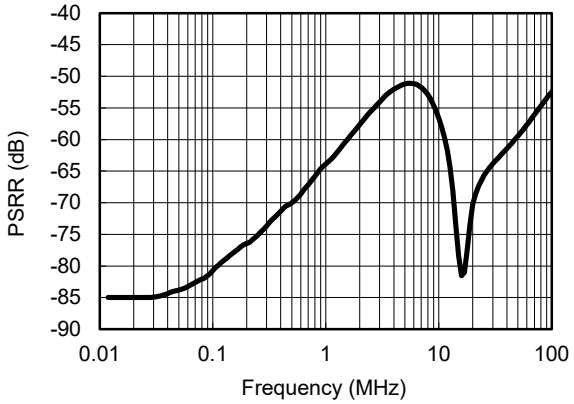
Large Signal Step Response



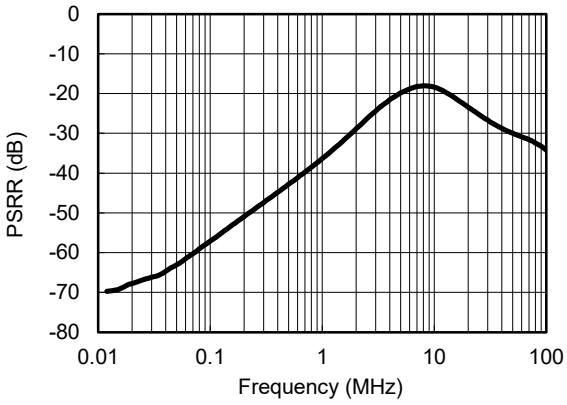
Small Signal Step Response



PSRR vs. Frequency (with Bypass Caps)



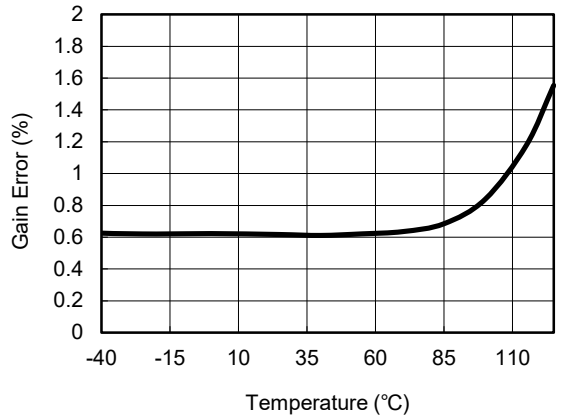
PSRR vs. Frequency (without Bypass Caps)



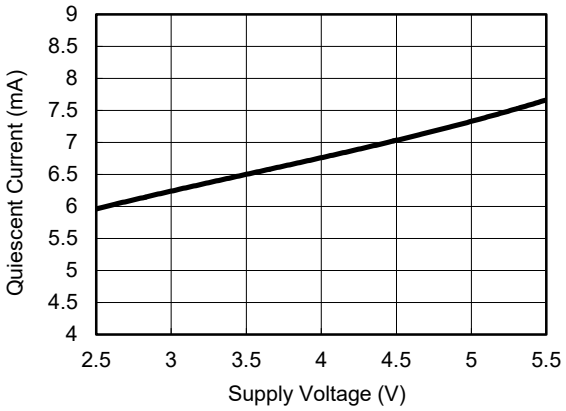
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At V_S = +5.0V, T_A = +25℃, R_L = 150Ω, all outputs AC-coupled with 220μF, unless otherwise noted.

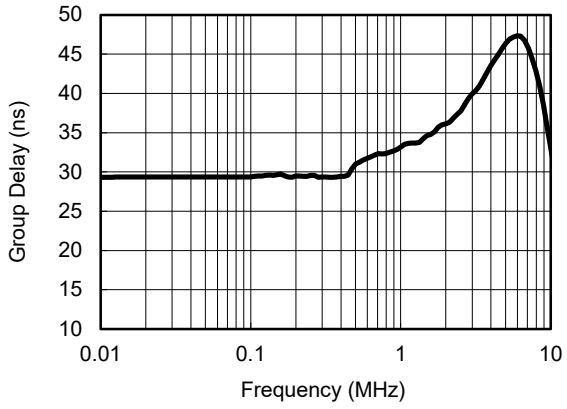
Gain Error vs. Temperature



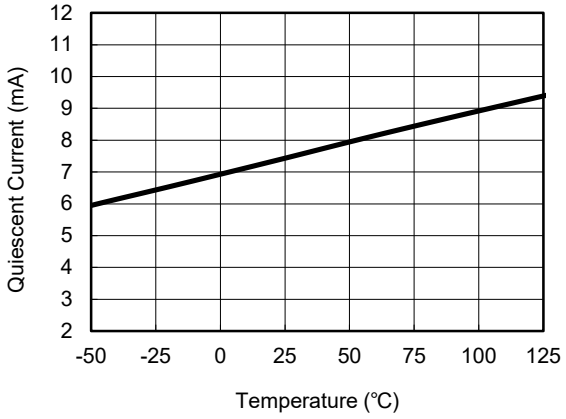
Quiescent Current vs. Supply Voltage



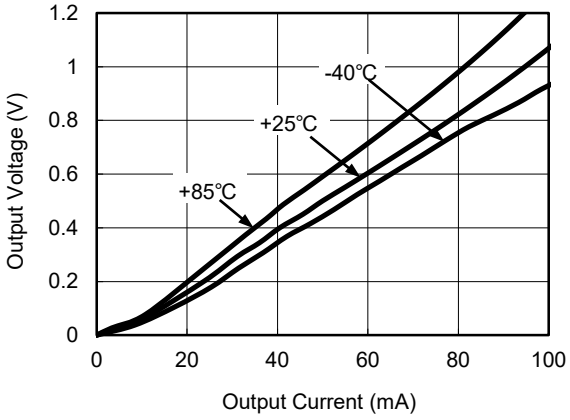
Group Delay vs. Frequency



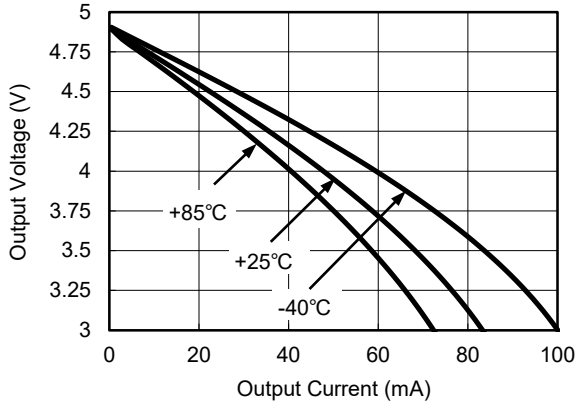
Quiescent Current vs. Temperature



Output Voltage Swing to the Negative Rail vs. Output Current

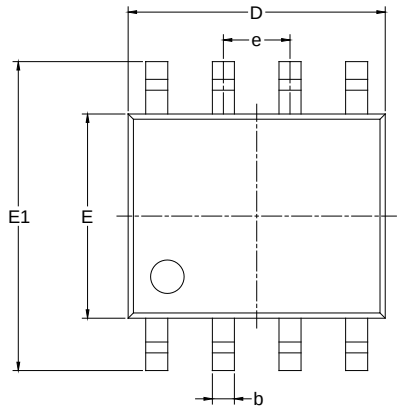


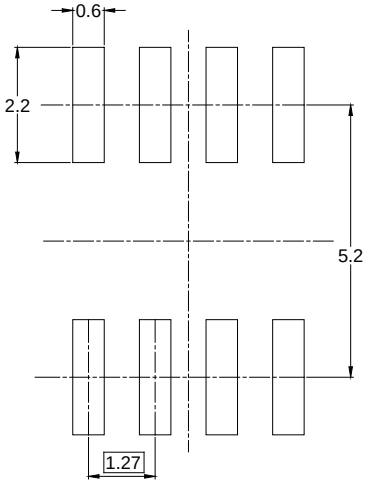
Output Voltage Swing to the Positive Rail vs. Output Current



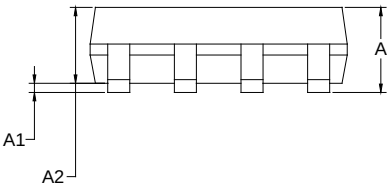
PACKAGE OUTLINE DIMENSIONS

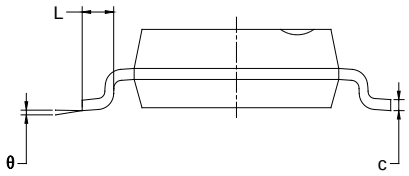
SOIC-8





RECOMMENDED LAND PATTERN (Unit: mm)



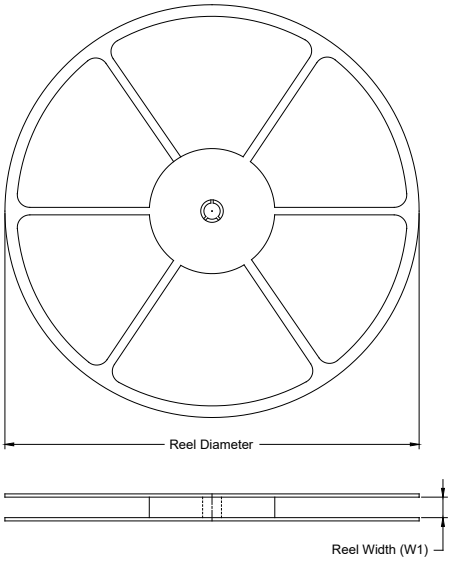


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050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

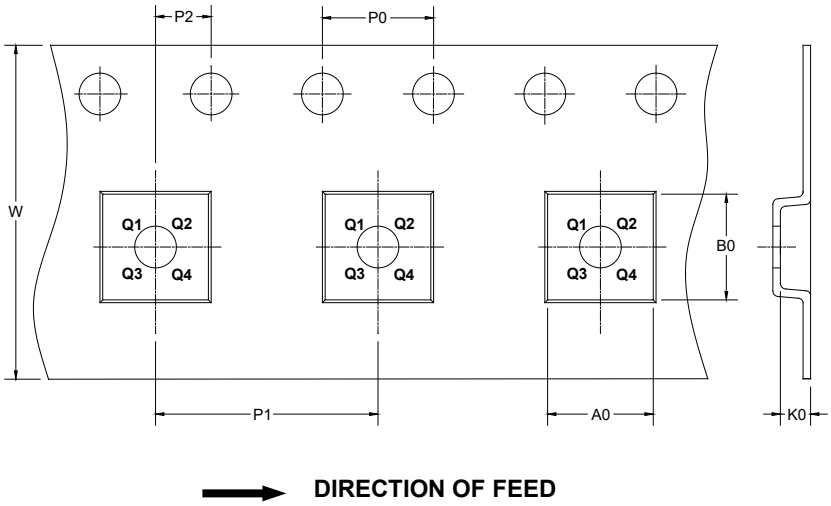
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



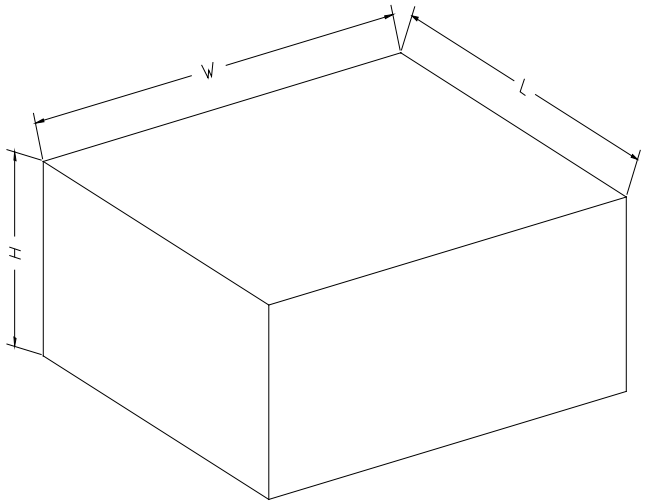
NOTE: The picture is only for reference. Please make the object as the standard.

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	6.40	5.40	2.10	4.0	8.0	2.0	12.0	Q1

DD0001

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