SGM9150
4-Channel, Video Filter Driver for SD/HD (1080p)

GENERAL DESCRIPTION

The SGM9150 is a 4-channel, 6th-order output reconstruction filter which can operate from 3.1V to 5.5V single power supply. It is designed to replace passive LC filters and drivers with an integrated device. One channel is Standard Definition (SD) filter while the rest three channels are Definition (HDp) filters.

The device allows DC- or AC-coupled output. SGM9150 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 SGM9150 is available in a Green TSSOP-14 package. It operates over an ambient temperature range of -40℃ to +85℃.

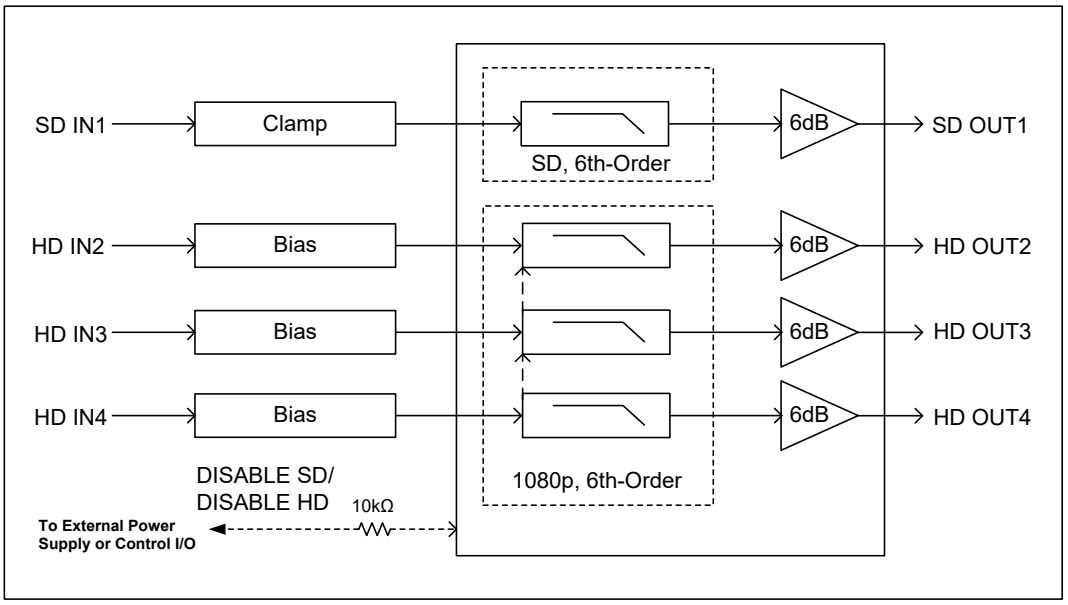
FEATURES

- **Supply Voltage Range: 3.1V to 5.5V**
- **Three Fixed 6th-Order 1080p High Definition Filters**
- **One 6th-Order Standard Definition Filter**
- **Bias Mode Active with AC-Coupled Inputs**
- **Bias Mode Inactive with DC-Coupled Inputs**
- **Clamp Mode on SD Channel Input**
- **Bias Mode on HD Channel Input**
- **AC- or DC-Coupled Outputs**
- **DC-Coupled Outputs Eliminate AC-Coupled Capacitors**
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in a Green TSSOP-14 Package**

APPLICATIONS

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

BLOCK DIAGRAM

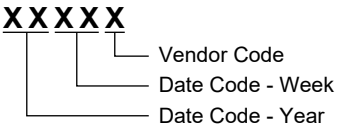


PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM9150	TSSOP-14	-40℃ to +85℃	SGM9150YTS14G/TR	SGM9150 YTS14 XXXXX	Tape and Reel, 3000

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

RECOMMENDED OPERATING CONDITIONS

Operating Voltage Range ..... 3.1V to 5.5V
Operating Temperature Range ..... -40℃ to +85℃

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.

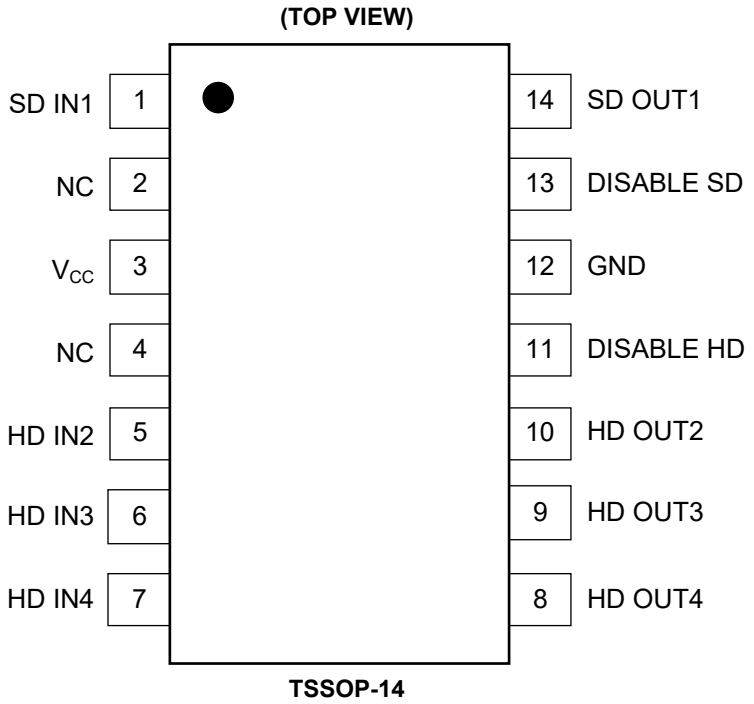
ESD SENSITIVITY CAUTION

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	SD IN1	SD Video Input.
2, 4	NC	No Connect.
3	V_{CC}	Power Supply.
5	HD IN2	HD Video Input.
6	HD IN3	HD Video Input.
7	HD IN4	HD Video Input.
8	HD OUT4	Filtered HD Video Output.
9	HD OUT3	Filtered HD Video Output.
10	HD OUT2	Filtered HD Video Output.
11	DISABLE HD	Disable Standard Full High-Definition Channel. Logic “high” disables the HD channel and logic “low” enables the HD channel. This pin defaults to logic low if left open.
12	GND	Ground.
13	DISABLE SD	Disable Standard Definition Channel. Logic “high” disables the SD channel and logic “low” enables the SD channel. This pin defaults to logic low if left open.
14	SD OUT1	Filtered SD Video Output.

ELECTRICAL CHARACTERISTICS

(T_A = +25℃, V_{IN} = 1V_{PP}, V_{CC} = 5V, R_{SOURCE} = 37.5Ω; all inputs are AC-coupled with 0.1μF; all outputs are AC-coupled with 220μF into 150Ω, referenced to 400kHz, unless otherwise noted.)

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
DC Electrical Characteristics						
Operating Voltage Range (V_{CC})			3.1	5	5.5	V
Quiescent Current (I_Q)	V_{CC} = 5.0V, no load	SD channel		9.5	12.8	mA
		All		77	98	
Output Level Shift Voltage (V_{OLS})	V_{IN} = 0V, no load	SD channel		410	600	mV
		HD channels		550	700	
Voltage Gain (A_V)	R_L = 150Ω		5.8	6.1	6.35	dB
Output Voltage High Swing	V_{IN} = 3V, R_L = 150Ω to GND			4.8		V
Shutdown Current				2	15	μA
Video Input Voltage Range	Referenced to GND if DC-coupled			1.4		V_{PP}
Power Supply Rejection Ratio (PSRR)	DC (All channels)			50		dB
V_{IH}	Disable		2.4			V
V_{IL}	Enable				0.8	V
Standard Definition Mode Electrical Characteristics						
-0.1dB Bandwidth	SD channel			6.4		MHz
-1dB Bandwidth	SD channel			7.6		MHz
-3dB Bandwidth	SD channel			8.5		MHz
Filter Response (Normalized Gain)	SD channel, f_{IN} = 400kHz to 27MHz			50		dB
Slew Rate	2V output step, 80% to 20%			34		V/μs
Differential Gain (DG)	AC-AC coupled, PAL			0.5		%
	AC-DC coupled, PAL			0.4		
Differential Phase (DP)	AC-AC coupled, PAL			1.0		deg
	AC-DC coupled, PAL			1.0		
Group Delay Variation (D/DT)	Difference between 400kHz and 6.5MHz			35		ns
Crosstalk (channel-to-channel)	V_{OUT} = 1.4V_{PP}, f = 1MHz			-63		dB
Signal-to-Noise Ratio (SNR)	100kHz to 5MHz			-66		dB
Fall Time	2V output step, 80% to 20%			34		ns
Rise Time	2V output step, 80% to 20%			34		ns
Chroma Luma Gain (CLG_{SD})	f = 3.58MHz (Referenced to SD_{IN} at 400kHz)			102		%
Chroma Luma Delay (CLD_{SD})	f = 3.58MHz (Referenced to SD_{IN} at 400kHz)			9		ns
Enable Time (t_{ON})				1.4		μs
Disable Time (t_{OFF})				28		ns

ELECTRICAL CHARACTERISTICS (continued)

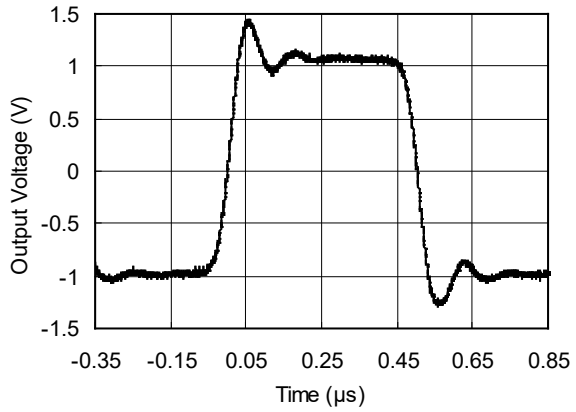
(T_A = +25℃, V_{IN} = 1V_{PP}, V_{CC} = 5V, R_{SOURCE} = 37.5Ω; all inputs are AC-coupled with 0.1μF; all outputs are AC-coupled with 220μF into 150Ω, referenced to 400kHz, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
1080p High Definition Mode Electrical Characteristics					
-0.1dB Bandwidth	R_L = 150Ω		78		MHz
-1dB Bandwidth	R_L = 150Ω		86		MHz
-3dB Bandwidth	R_L = 150Ω		98		MHz
Filter Response (Normalized Gain)	f_{IN} = 400kHz to 148MHz		21		dB
Slew Rate	2V output step, 80% to 20%		340		V/μs
Group Delay Variation (D/DT)	Difference between 400kHz and 70MHz		5.3		ns
Crosstalk (channel-to-channel)	V_{OUT} = 1.4V_{PP}, f = 1MHz		-64		dB
Fall Time	2V output step, 80% to 20%		3.3		ns
Rise Time	2V output step, 80% to 20%		3.6		ns
Enable Time (t_{ON})			1.7		μs
Disable Time (t_{OFF})			29		ns

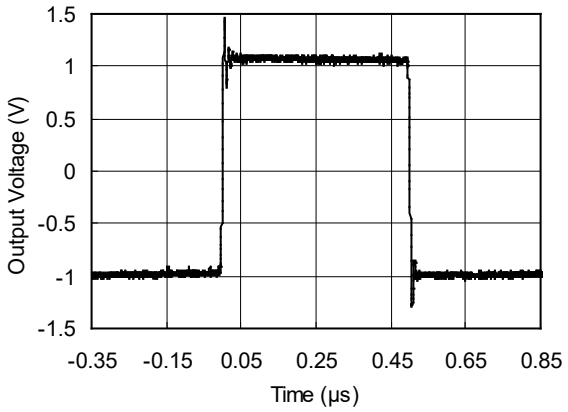
TYPICAL PERFORMANCE CHARACTERISTICS

T_A = +25℃, V_{IN} = 1V_{PP}, V_{CC} = 5.0V, R_{SOURCE} = 37.5Ω; all inputs are AC-coupled with 0.1μF; all outputs are AC-coupled with 220μF into 150Ω, referenced to 400kHz, unless otherwise noted.

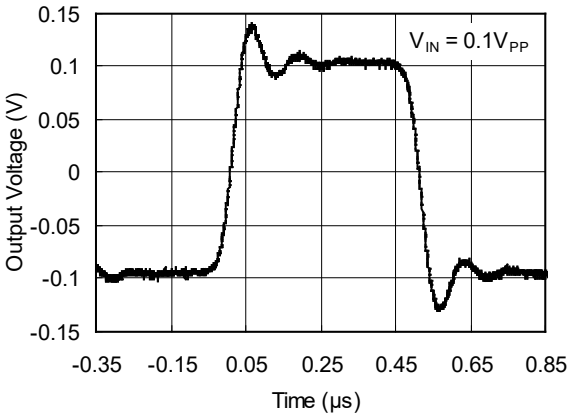
SD Large Signal Step Response



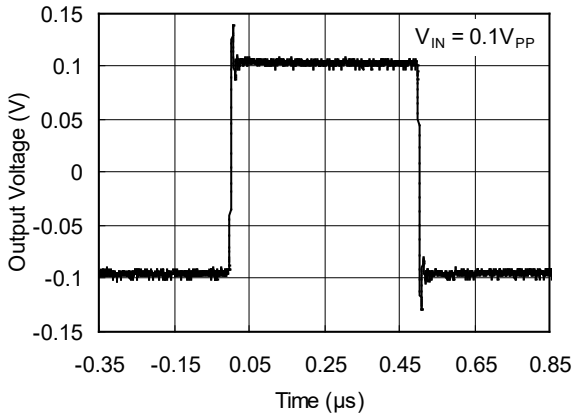
1080p Large Signal Step Response



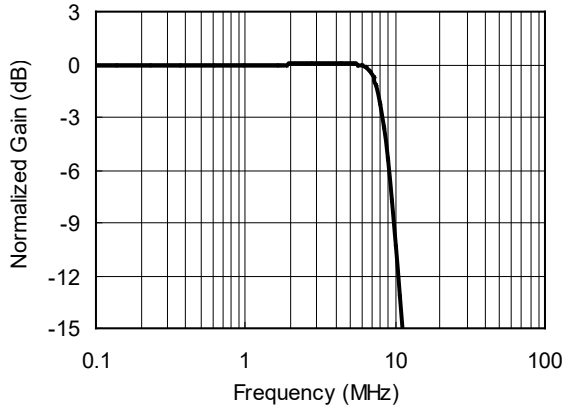
SD Small Signal Step Response



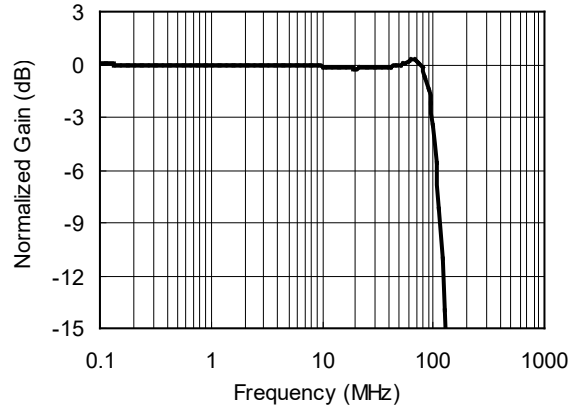
1080p Small Signal Step Response



SD Gain vs. Frequency



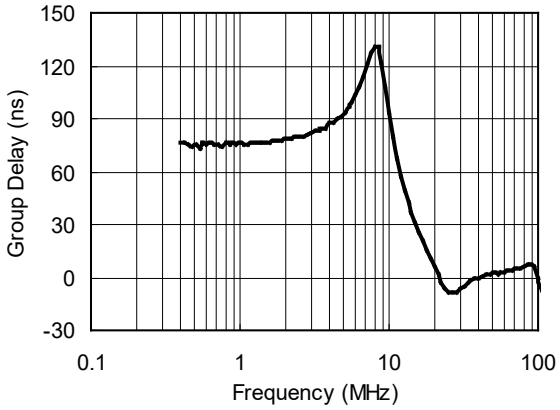
1080p Gain vs. Frequency



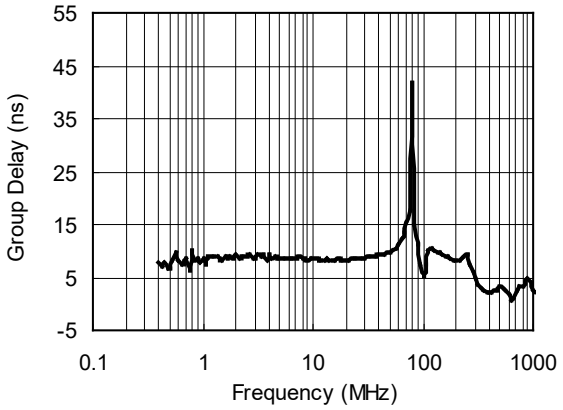
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_A = +25℃, V_{IN} = 1V_{PP}, V_{CC} = 5.0V, R_{SOURCE} = 37.5Ω; all inputs are AC-coupled with 0.1μF; all outputs are AC-coupled with 220μF into 150Ω, referenced to 400kHz, unless otherwise noted.

SD Group Delay vs. Frequency

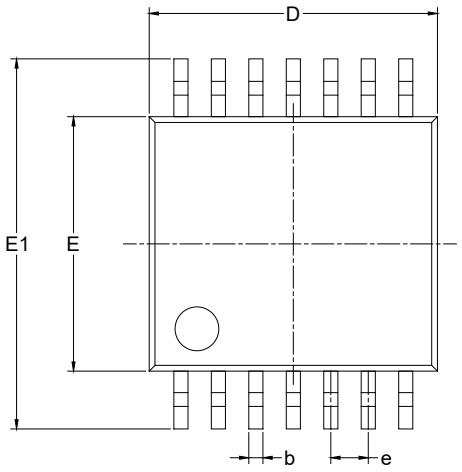


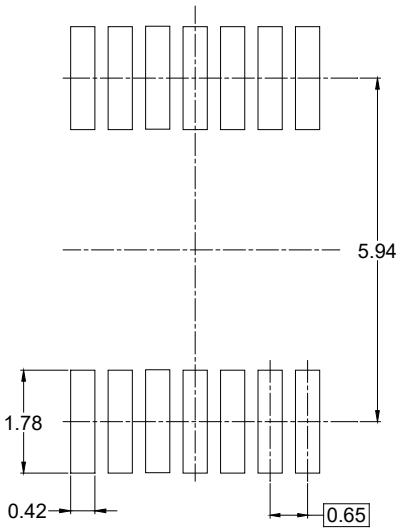
1080p Group Delay vs. Frequency



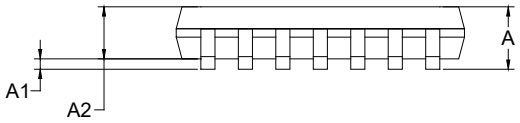
PACKAGE OUTLINE DIMENSIONS

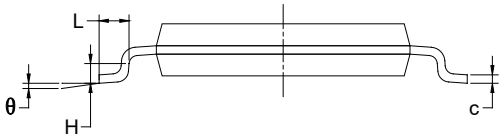
TSSOP-14





RECOMMENDED LAND PATTERN (Unit: mm)



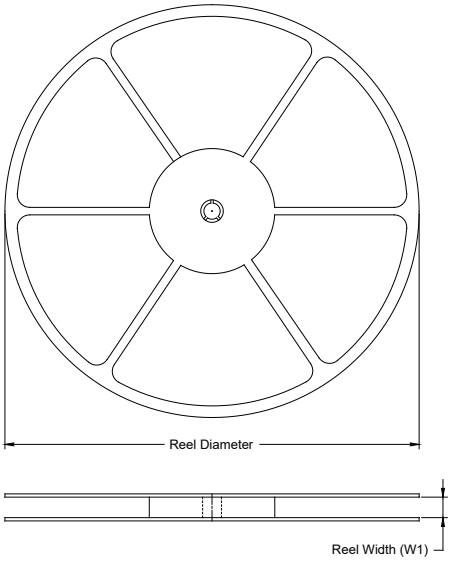


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.100		0.043
A1	0.050	0.150	0.002	0.006
A2	0.800	1.000	0.031	0.039
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.900	5.100	0.193	0.201
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650 BSC		0.026 BSC	
L	0.500	0.700	0.02	0.028
H	0.25 TYP		0.01 TYP	
θ	1°	7°	1°	7°

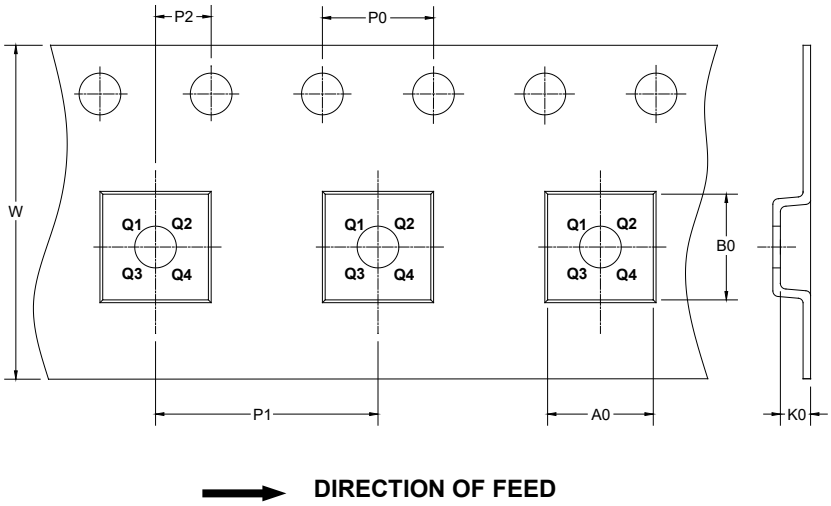
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

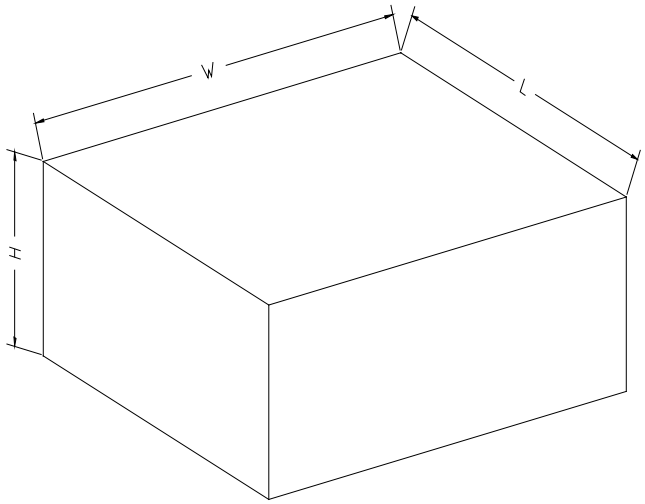
NOTE: The picture is only for reference. Please make the object as the standard.

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	5.60	1.20	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