SGM9203
Triple, 6th-Order, Video Filter Driver for SD/PS/HD (1080i)/HD (1080p)

GENERAL DESCRIPTION

The SGM9203 is a triple 6th-order output reconstruction filter which can operate from 3.3V to 5.5V single power supply. It is designed for portable video system, DVD and set-top box applications.

SGM9203 provides two gain options (6dB or 0dB) for different applications. The 6dB gain option is available for 150Ω double terminated video load, the 0dB gain option is available for high impedance. The selectable frequency is 8MHz, 18MHz, 38MHz or 75MHz.

A DC-coupled DAC output or an AC-coupled signal can drive the device.

The SGM9203 is available in a Green TSSOP-14 package. It operates over an ambient temperature range of -40℃ to +85℃.

FEATURES

- **Supply Voltage Range: 3.3V to 5.5V**
- **Triple 6th-Order Video Reconstruction Filters**
- **Output Disable**
- **Supports Component YPbPr or RGB Video**
- **Three Configurable 6th-Order Filters for**
  1080i SD/PS/HD Mode
  1080p HD Mode
- **Selectable Frequency:**
  8MHz, 18MHz, 38MHz, 75MHz
- **6dB or 0dB Gain**
- **Selectable Bias or Clamp Mode on Pr/R, Pb/B Inputs**
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in a Green TSSOP-14 Package**

APPLICATIONS

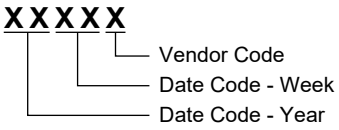
Video Recorders
Video on Demand (VOD)
Cable and Satellite Set-Top Boxes
Portable and Handheld Products
Communication Devices
TVs

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM9203A (6dB Gain)	TSSOP-14	-40℃ to +85℃	SGM9203AYTS14G/TR	SGM9203A YTS14 XXXXX	Tape and Reel, 3000
SGM9203B (0dB Gain)	TSSOP-14	-40℃ to +85℃	SGM9203BYTS14G/TR	SGM9203B 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 5000V
MM 400V

RECOMMENDED OPERATING CONDITIONS

Operating Voltage Range ..... 3.3V 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.

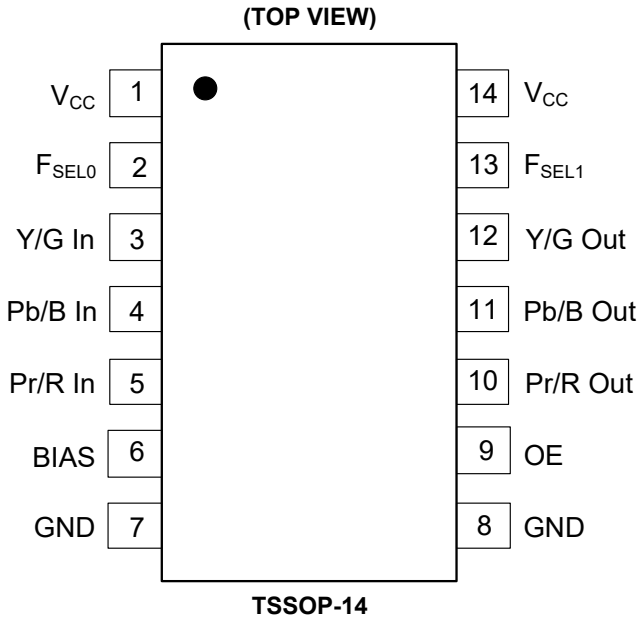
ESD SENSITIVITY CAUTION

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, 14	V_{CC}	Power Supply.
2	F_{SEL0}	Selects Filter Corner Frequency.
3	Y/G In	Selectable Video Input.
4	Pb/B In	Selectable Video Input.
5	Pr/R In	Selectable Video Input.
6	BIAS	Input Bias on Pb/B Pr/R: 0 = Bias, 1 = Clamp.
7, 8	GND	Must be tied to ground. Do not float.
9	OE	Output Disable Control: 0 = Disable, 1 = Enable.
10	Pr/R Out	Filtered SD, PS, HD (1080i), HD (1080p) Video Output.
11	Pb/B Out	Filtered SD, PS, HD (1080i), HD (1080p) Video Output.
12	Y/G Out	Filtered SD, PS, HD (1080i), HD (1080p) Video Output.
13	F_{SEL1}	Selects Filter Corner Frequency.

ELECTRICAL CHARACTERISTICS

(V_{CC} = 5V, Full = -40℃ to +85℃, at R_L = 150Ω connected to GND, V_{IN} = $1V_{PP}$, all outputs AC-coupled with 220μF, unless otherwise noted.)

PARAMETER		CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Operating Voltage Range (V_{CC})			+25℃	3.3		5.5	V
Power Supply Rejection Ratio (PSRR)		V_{CC} = 3.5V to 5.0V	+25℃	50	61		dB
			Full	46			
Quiescent Current (I_Q)		No load	+25℃		40	51	mA
			Full			57	
Voltage Gain (A_V)	6dB	R_L = 150Ω	+25℃	5.93	6.15	6.36	dB
			Full	5.9		6.4	
Output Voltage High Swing	6dB	V_{IN} = 3V, R_L = 150Ω to GND	+25℃	4.73	4.79		V
			Full	4.7			
Supply Current when Disabled		OE = 0V, No load	+25℃		19	23	mA
			Full			26.4	
Digital Input Low (V_{IL})		F_{SEL0}, F_{SEL1}, OE	+25℃			0.4	V
Digital Input High (V_{IH})		F_{SEL0}, F_{SEL1}, OE	+25℃	1.2			V

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 5V, T_A = +25℃, at R_L = 150Ω connected to GND, R_{source} = 37.5Ω, V_{IN} = $1V_{PP}$, all inputs AC-coupled with 0.1μF, all outputs AC-coupled with 220μF into 150Ω, referenced to 400kHz, 6dB; unless otherwise noted.)

PARAMETER		CONDITIONS	MIN	TYP	MAX	UNITS
AC Performance (Standard Definition Mode)						
-0.1dB Bandwidth		R_L = 150Ω		5.4		MHz
-1dB Bandwidth		R_L = 150Ω		7		MHz
-3dB Bandwidth		R_L = 150Ω		8.5		MHz
Filter Response (Normalized Gain)		f_{IN} = 27MHz		-43		dB
Slew Rate		2V Output step, 80% to 20%		40		V/μs
Differential Gain (DG)		PAL DC-coupled		0.32		%
		PAL AC-coupled		0.83		
Differential Phase (DP)		PAL DC-coupled		1.60		°
		PAL AC-coupled		1.78		
Group Delay Variation (D/DT)		Clamp and Bias, Difference between 400kHz and 6.5MHz		22		ns
Crosstalk (channel-to-channel)		f = 1MHz		-72		dB
Output Distortion (THD)	6dB	V_{OUT} = $1.4V_{PP}$, 3.58MHz		0.8		%
	0dB			1.16		

ELECTRICAL CHARACTERISTICS (continued)

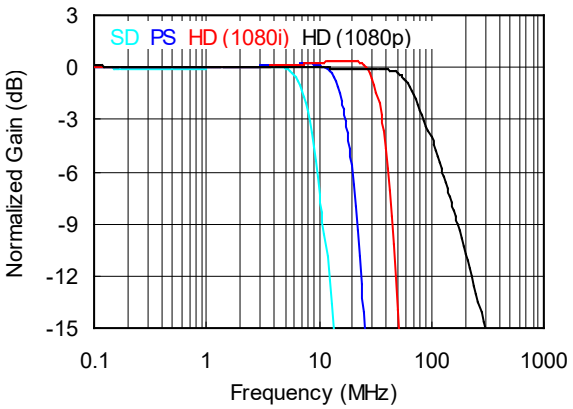
(T_A = +25℃, V_{CC} = 5V, at R_L = 150Ω connected to GND, R_{source} = 37.5Ω, V_{IN} = 1V_{PP}, all inputs AC-coupled with 0.1μF, all outputs AC-coupled with 220μF into 150Ω, referenced to 400kHz, 6dB; unless otherwise noted.)

PARAMETER		CONDITIONS	MIN	TYP	MAX	UNITS
AC Performance (Progressive Scan Mode)						
-0.1dB Bandwidth		R_L = 150Ω		12		MHz
-1dB Bandwidth		R_L = 150Ω		15		MHz
-3dB Bandwidth		R_L = 150Ω		18		MHz
Filter Response (Normalized Gain)		f_{IN} = 54MHz		-53		dB
Slew Rate		2V Output step, 80% to 20%		78		V/μs
Group Delay Variation (D/DT)		Clamp and Bias, Difference between 400kHz and 13MHz		13.5		ns
Crosstalk (channel-to-channel)		f = 1MHz		-72		dB
Output Distortion (THD)	6dB	V_{OUT} = 1.4V_{PP}, 7MHz		1.2		%
	0dB			1.54		
AC Performance (High Definition 1080i Mode)						
-0.1dB Bandwidth		R_L = 150Ω		30		MHz
-1dB Bandwidth		R_L = 150Ω		33		MHz
-3dB Bandwidth		R_L = 150Ω		38		MHz
Filter Response (Normalized Gain)		f_{IN} = 74.25MHz		-36		dB
Slew Rate		2V Output step, 80% to 20%		155		V/μs
Group Delay Variation (D/DT)		Clamp and Bias, Difference between 400kHz and 26.5MHz		9.5		ns
Crosstalk (channel-to-channel)		f = 1MHz		-74		dB
		f = 30MHz		-54		
Output Distortion (THD)	6dB	V_{OUT} = 1.4V_{PP}, 22MHz, R_L = 150Ω		1.82		%
	0dB	V_{OUT} = 0.7V_{PP}, 12MHz, R_L = 10kΩ		0.86		
AC Performance (High Definition 1080p Mode)						
-0.1dB Bandwidth		R_L = 150Ω		40		MHz
-1dB Bandwidth		R_L = 150Ω		67		MHz
-3dB Bandwidth		R_L = 150Ω		89		MHz
Slew Rate		2V Output step, 80% to 20%		311		V/μs
Crosstalk (channel-to-channel)		f = 1MHz		-75		dB
		f = 30MHz		-53		
Output Distortion (THD)	6dB	V_{OUT} = 1.4V_{PP}, 22MHz		1.2		%
	0dB	V_{OUT} = 0.7V_{PP}, 22MHz, R_L = 10kΩ		1		

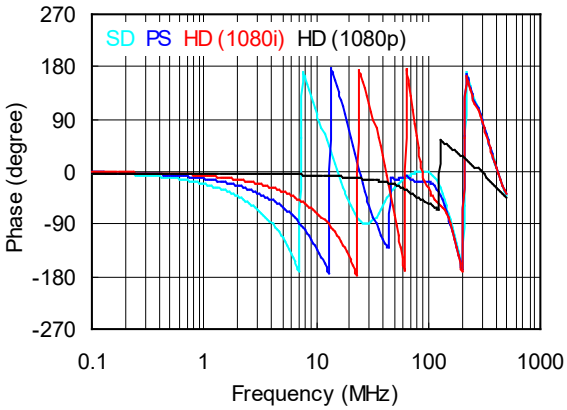
TYPICAL PERFORMANCE CHARACTERISTICS

At V_{CC} = 5V, T_A = +25℃, R_L = 150Ω, all outputs AC-coupled with 220μF, unless otherwise noted.

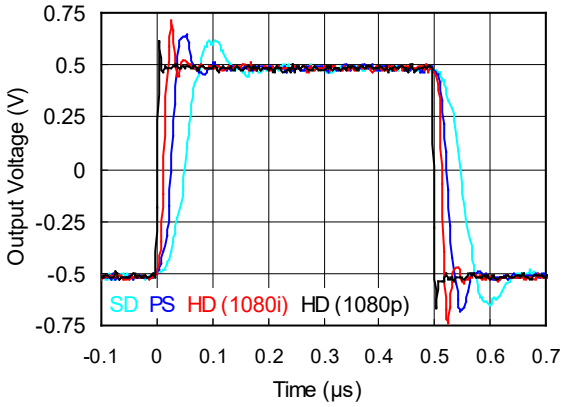
Frequency Response (6dB)



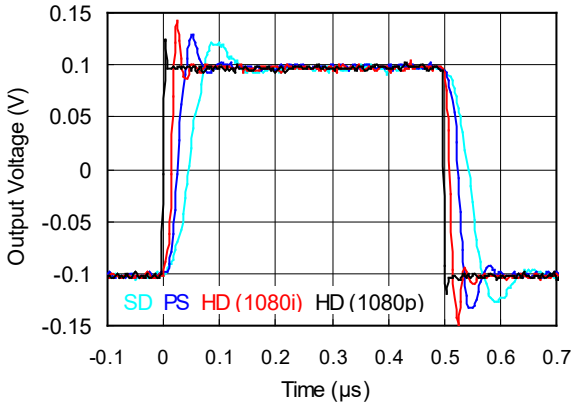
Phase vs. Frequency (6dB)



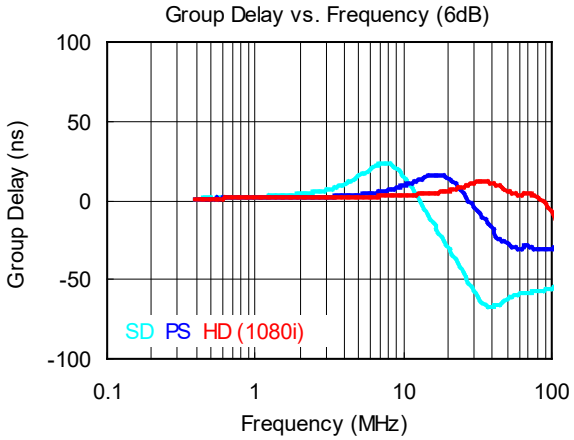
Large Signal Step Response (6dB)



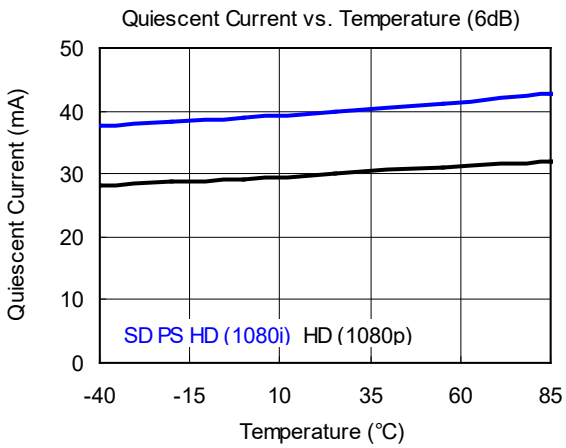
Small Signal Step Response (6dB)



Group Delay vs. Frequency (6dB)



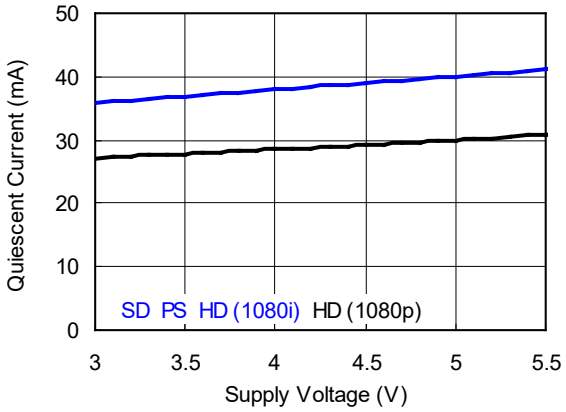
Quiescent Current vs. Temperature (6dB)



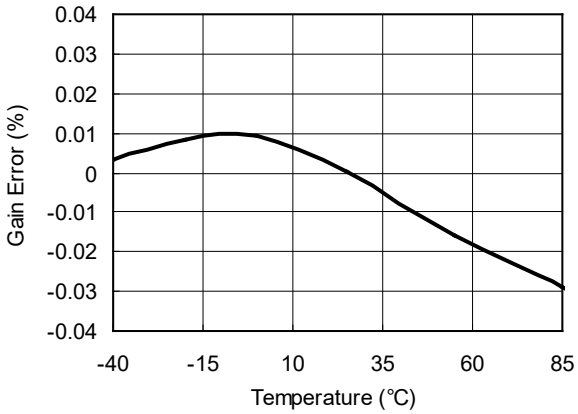
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At V_{CC} = 5V, T_A = +25℃, R_L = 150Ω, all outputs AC-coupled with 220μF, unless otherwise noted.

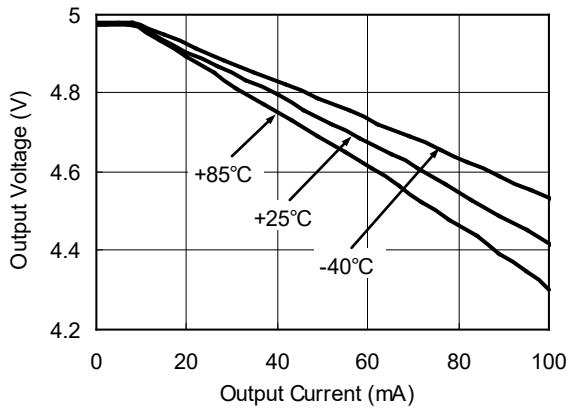
Quiescent Current vs. Supply Voltage (6dB)



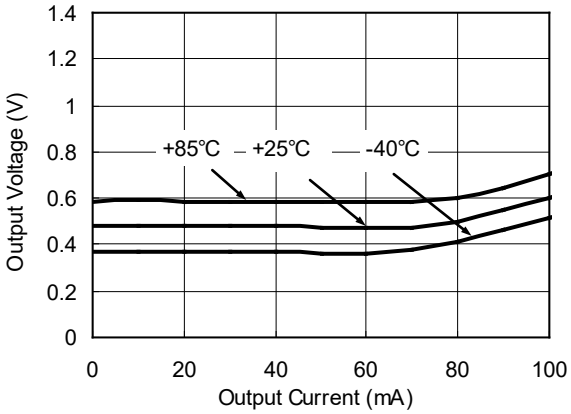
Gain Error vs. Temperature (6dB)



Output Voltage Swing to the Positive Rail vs. Output Current (6dB)

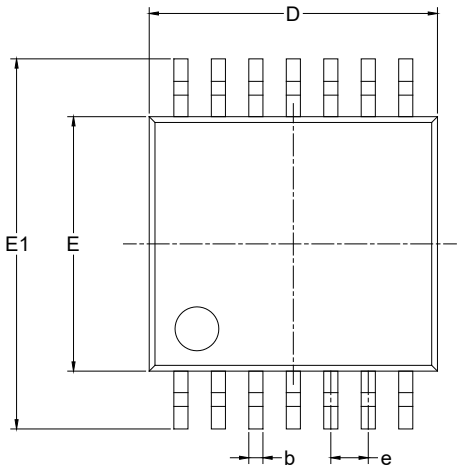


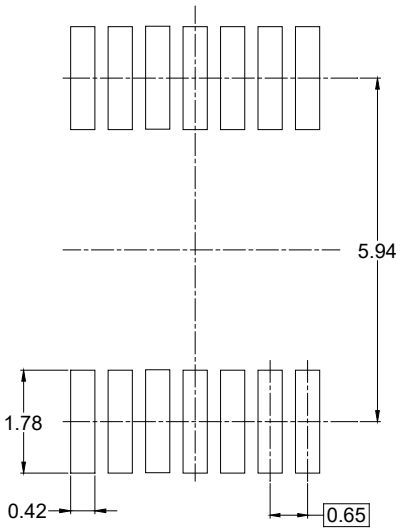
Output Voltage Swing to the Negative Rail vs. Output Current (6dB)



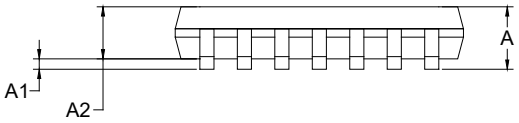
PACKAGE OUTLINE DIMENSIONS

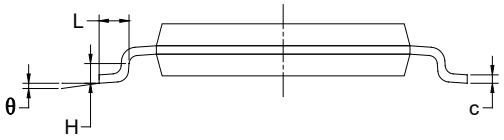
TSSOP-14





RECOMMENDED LAND PATTERN (Unit: mm)



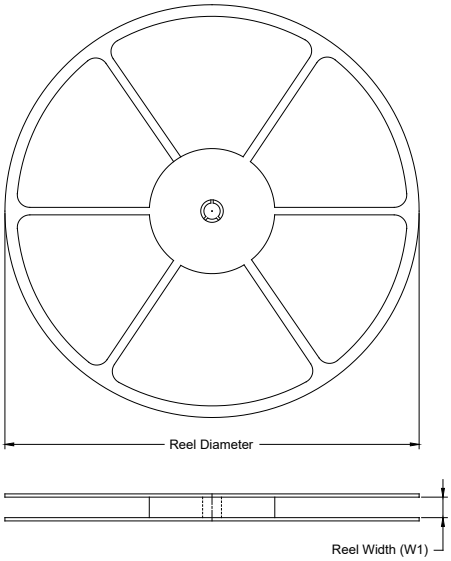


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.100		0.043
A1	0.050	0.150	0.002	0.006
A2	0.800	1.000	0.031	0.039
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.900	5.100	0.193	0.201
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650 BSC		0.026 BSC	
L	0.500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

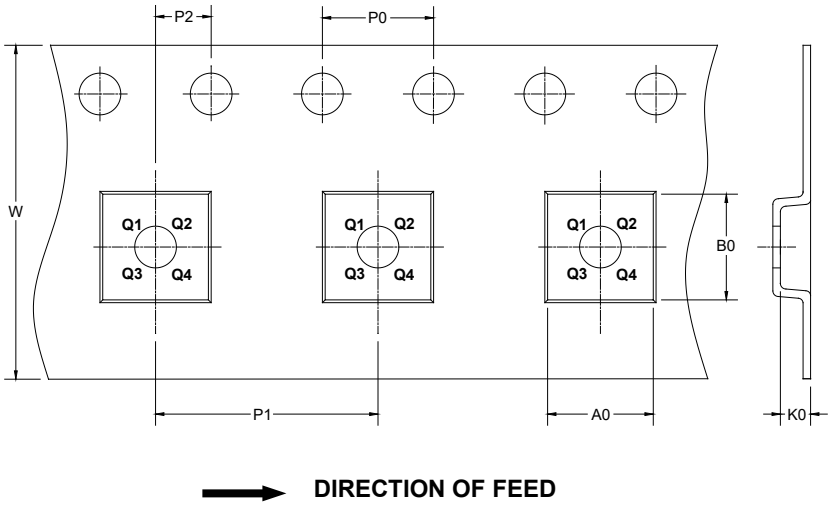
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



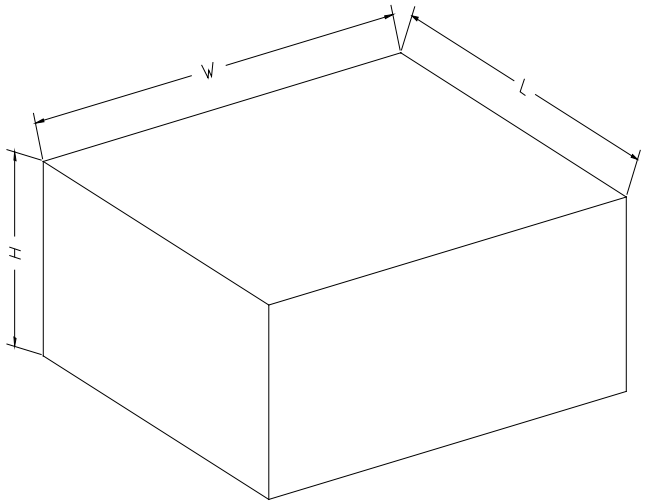
NOTE: The picture is only for reference. Please make the object as the standard.

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