

GENERAL DESCRIPTION

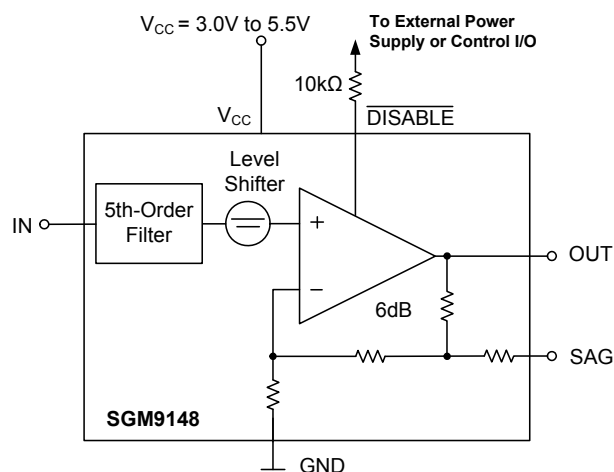
The SGM9148 is a single rail-to-rail 5th-order output reconstruction filter with a -3dB bandwidth of 13MHz and 63V/ μ s slew rate. Operating from single power supply ranging from 3.0V to 5.5V and sinking 5mA quiescent current, the SGM9148 is ideally suited for low power, battery-operated applications.

SGM9148 employs an internal level shift circuit that avoids sync-pulse clipping and allows DC-coupled output. If AC coupling is preferred, the SGM9148 offers a sag-correction feature that significantly reduces the size of the output coupling capacitor.

SGM9148 has a power-down disable feature that reduces the supply current to 0.1 μ A, dramatically reducing power consumption and prolonging battery life.

The SGM9148 is available in Green SOT-23-6 package. It is specified over the -40°C to +85°C temperature range.

BLOCK DIAGRAM



NOTES:

1. A 10k Ω resistor must be serially connected to $\overline{\text{DISABLE}}$ pin.
2. Power supply V_{CC} must be sequenced on first before input video signals.

FEATURES

- Excellent Video Performance
- 5th-Order Reconstruction Filter
- Internal Gain: 6dB
- Rail-to-Rail Output
- SAG Correction Reduces AC Coupling Capacitor Size
- Input Voltage Range Includes Ground
- AC- and DC-Coupled Input
- Single Power Supply: 3.0V to 5.5V
- Low Power
 - 5mA Typical Supply Current
 - 0.1 μ A Supply Current when Disabled
- Available in Green SOT-23-6 Package
- -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 |
|----------|---------------------|-----------------------------|-----------------|-----------------|---------------------|
| SGM9148A | SOT-23-6 | -40°C to +85°C | SGM9148AYN6G/TR | SS6XX | Tape and Reel, 3000 |

NOTE: XX = Date 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

SS6 X X

SS6 X X

└── Date code - Month ("A" = Jan. "B" = Feb. ... "L" = Dec.)
└── Date code - Year ("A" = 2010, "B" = 2011 ...)
└── Chip I.D.

For example: SS6AJ (2010, October)

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{CC} 6V
Input Voltage Range GND - 0.3V to V_{CC} + 0.3V
Storage Temperature Range -65°C to +150°C
Junction Temperature 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.

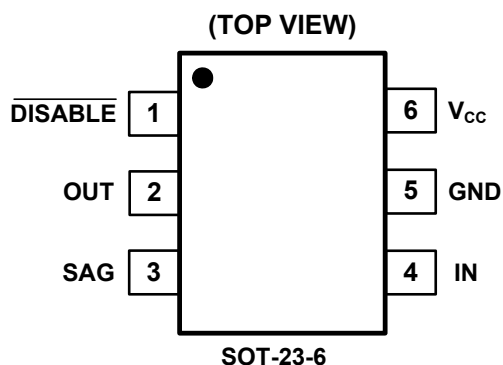
ESD SENSITIVITY CAUTION

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 CONFIGURATION



PIN DESCRIPTION

| PIN | NAME | FUNCTION |
|-----|-----------------------------|-----------------|
| 1 | $\overline{\text{DISABLE}}$ | Shutdown Input. |
| 2 | OUT | Signal Output |
| 3 | SAG | SAG Correction. |
| 4 | IN | Signal Input. |
| 5 | GND | Ground. |
| 6 | V _{CC} | Power Supply. |

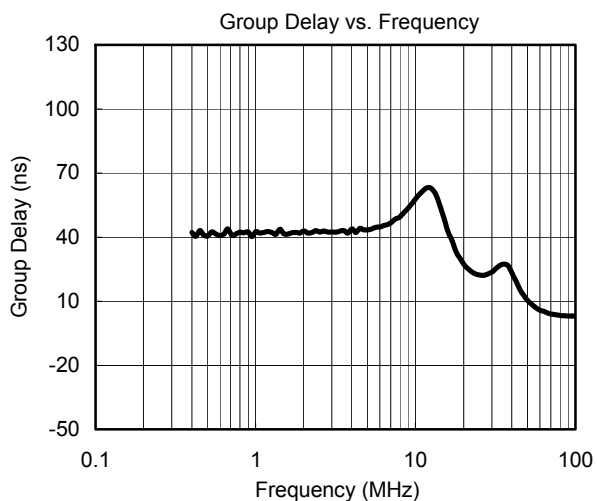
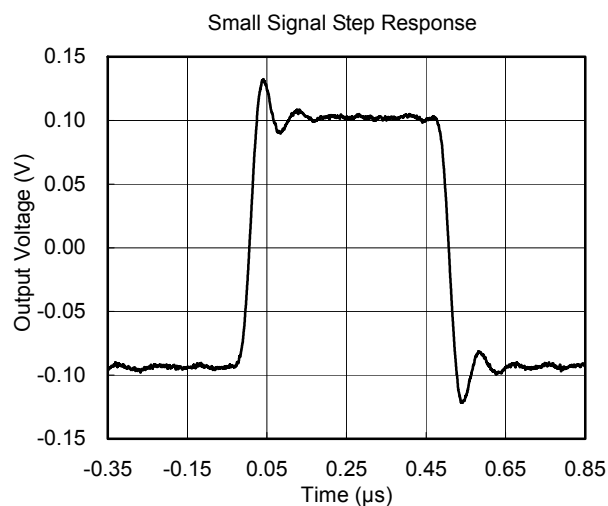
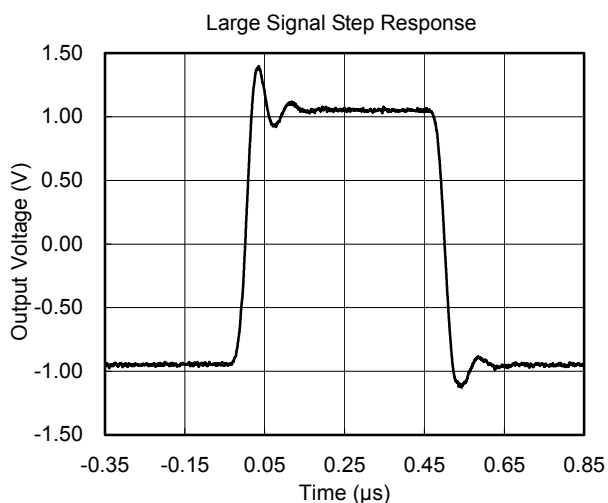
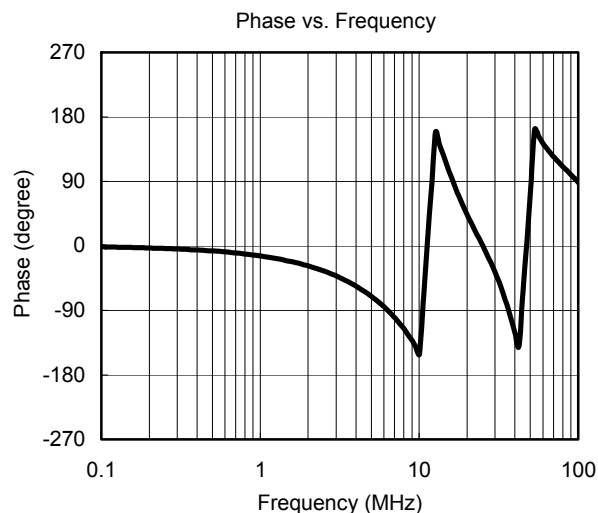
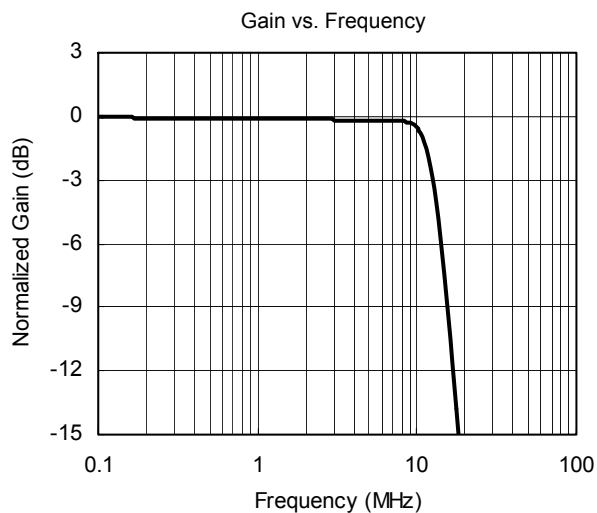
ELECTRICAL CHARACTERISTICS

(At $V_{CC} = 5V$, $T_A = +25^\circ C$, at $R_L = 150\Omega$ 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 | MIN | TYP | MAX | UNITS |
|---|--|-----|------|-----|-------|
| INPUT CHARACTERISTICS | | | | | |
| Output Level Shift Voltage (V _{OLS}) | V _{IN} = 0V, No load | | 290 | 550 | mV |
| Input Voltage Clamp (V _{CLAMP}) | I _{IN} = - 3.5mA | | -210 | | mV |
| Clamp Charge Current | V _{IN} = V _{CLAMP} - 100mV | | -4.8 | | mA |
| Clamp Discharge Current | V _{IN} = 500mV | | 1.8 | | μA |
| Voltage Gain (A _V) | R _L = 150Ω | 5.6 | 6 | 6.4 | dB |
| OUTPUT CHARACTERISTICS | | | | | |
| Output Voltage High Swing | V _{IN} = 3.0V, R _L = 150Ω to GND | | 4.74 | | V |
| Output Short-Circuit Current (I _{SC}) | V _{IN} = 1.5V, Out shorted to GND through 36Ω | | 91 | | mA |
| | V _{IN} = 0.5V, Out shorted to V _{CC} through 36Ω | | -102 | | |
| POWER SUPPLY | | | | | |
| Operating Voltage Range | | 3 | | 5.5 | V |
| Power Supply Rejection Ratio (PSRR) | V _{CC} = 3.5V to 5.0V | | 50 | | dB |
| Quiescent Current (I _Q) | V _{IN} = 0.5V | | 5 | 8.8 | mA |
| Supply Current when Disabled | DISABLE = 0V | | 0.1 | 18 | μA |
| DYNAMIC PERFORMANCE | | | | | |
| -0.1dB Bandwidth | | | 10 | | MHz |
| -1dB Bandwidth | | | 11.5 | | MHz |
| -3dB Bandwidth | | | 13 | | MHz |
| Filter Response (Normalized Gain) | f _{IN} = 27MHz | | 30 | | dB |
| Slew Rate | 2V Output step, 80% to 20% | | 60 | | V/μs |
| Differential Gain Error (DG) | DC-DC coupled | | 0.65 | | % |
| | AC-AC coupled | | 1.15 | | |
| Differential Phase Error (DP) | DC-DC coupled | | 1 | | ° |
| | AC-AC coupled | | 1.5 | | |
| Group Delay Variation (D/DT) | Difference between 400kHz and 6.5MHz | | 6 | | ns |
| Fall Time | 2V Output step, 80% to 20% | | 20 | | ns |
| Rise Time | 2V Output step, 80% to 20% | | 20 | | ns |
| POWER-DOWN DISABLE | | | | | |
| DISABLE (Logic-Low Threshold) | V _{CC} = 5V | | | 0.4 | V |
| DISABLE (Logic-High Threshold) | V _{CC} = 5V | 1.4 | | | V |

TYPICAL PERFORMANCE CHARACTERISTICS

At $V_{CC} = 5V$, $T_A = +25^\circ C$, at $R_L = 150\Omega$ connected to GND, $V_{IN} = 1V_{PP}$ and $C_{IN} = 0.1\mu F$, output AC-coupled, referenced to 400kHz, unless otherwise noted.



APPLICATION INFORMATION

The SGM9148 low cost, integrated, 5th-order video filter is intended to replace passive LC filters and drivers in low voltage portable video applications.

The SGM9148 input must be AC-coupled because the input capacitor stores the clamp voltage. It needs a typical value of $0.1\mu\text{F}$ for the input clamp to meet the Line Droop specification. The SGM9148 output can drive an AC- or DC-coupled doubly terminated coax (150Ω) load (see Figure 1). DC coupling the output removes the need for an expensive and large output coupling capacitor (see Figure 2). If an AC-coupled output is needed, the SAG correction circuit can be used to reduce the AC output coupling capacitor value.

Offering SAG correction, fixed gain of 6dB, and a 5th-order low pass filter in a tiny space saving package makes the SGM9148 well suited for space sensitive applications such as digital cameras, cellular phones and other portable devices.

Enable/Shutdown

The SGM9148 has a shutdown feature that disables the output and reduces the quiescent current to $0.1\mu\text{A}$. This feature is particularly useful in portable applications, such as video cameras, hand-held gaming devices and cellular phones, where video filtering and driving capability are required.

Internal Sync Clamp

The typical embedded video DAC operates from a ground referenced single supply. This becomes an issue because the lower level of the sync pulse output may be at a 0V reference level to some positive level. The problem is that presenting a 0V input to most single supply driven amplifiers will saturate the output stage of the amplifier, resulting in a clipped sync tip and degrading the video image. A larger positive reference may offset the input above its positive range.

The SGM9148 features an internal sync clamp and offset function to level shift the entire video signal to the best level before it reaches the input of the amplifier stage. These features are also helpful to avoid saturation of the output stage of the amplifier by setting the signal closer to the optimal voltage range.

The typical application of the SGM9148 is shown in Figure 1. The AC-coupled video sync signal is pulled negative by a current source at the input of the comparator amplifier. When the sync tip goes below the comparator threshold, it clamps sync tip to near ground level. The network triggers on the sync tip of video signal.

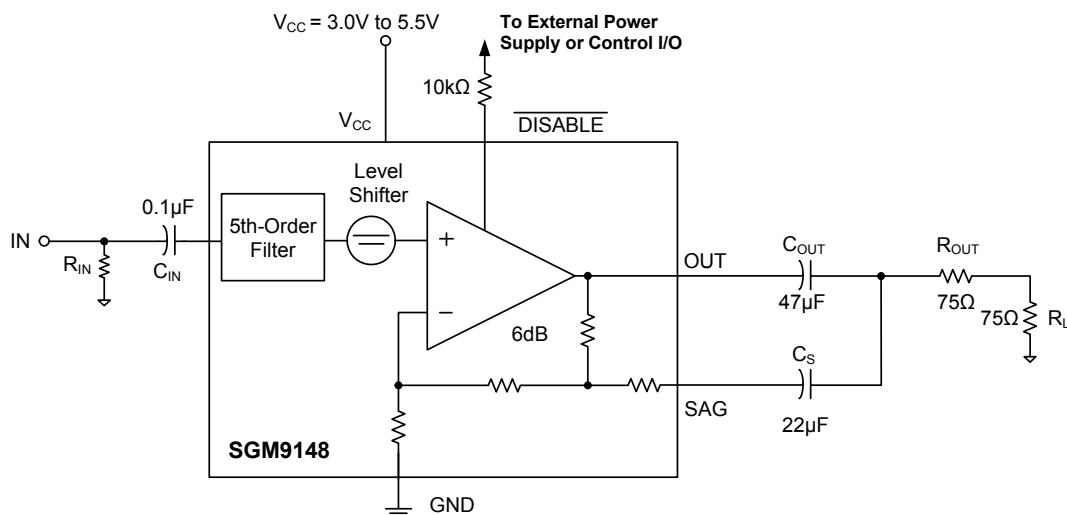


Figure 1. AC-Coupled Input/AC-Coupled Output

APPLICATION INFORMATION

SAG Correction

The SGM9148 can use the SAG configuration if an AC-coupled output video signal is needed. SAG correction refers to the low-frequency compensation for the high pass filter formed by the 150Ω load and the output capacitor. In video applications, the cutoff frequency must be low enough to pass the vertical sync interval to avoid field tilt. This cutoff frequency should be less than 5Hz, and the coupling capacitor must be very large in normal configuration, typically 220μF. In SAG configuration, the SGM9148 removes the need for large coupling capacitors, and instead only requires one 22μF and one 47μF capacitors (Figure 1) to achieve the same performance as the large capacitor.

Layout and Power-Supply Bypassing

The SGM9148 operates from single 3.0V to 5.5V supply. Bypass the supply with a 0.1μF capacitor as close to the pin as possible. It is recommended to use micro-strip and strip line techniques to obtain full bandwidth. To ensure that the PC board does not degrade the device's performance, design it for a frequency greater than 1GHz. Pay careful attention to inputs and outputs to avoid large parasitic capacitance. Whether or not you use a constant-impedance board, observe the following design guidelines:

- Do not use IC sockets; they increase parasitic capacitance and inductance.
- Do not use wire-wrap boards; they are too inductive.
- Use surface-mount instead of through-hole components for better, high-frequency performance.
- Use a PC board with at least two layers; it should be as free from voids as possible.
- Keep signal lines as short and as straight as possible. Do not make 90° turns; round all corners.

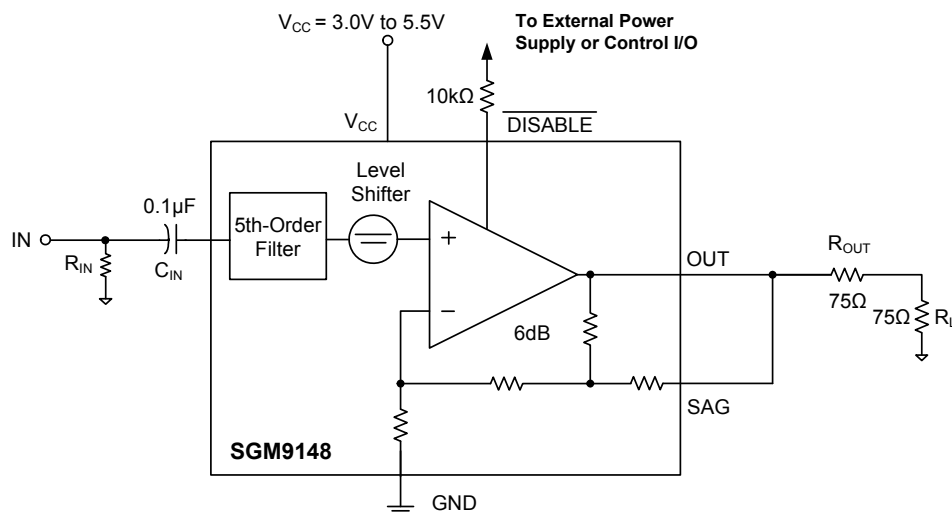
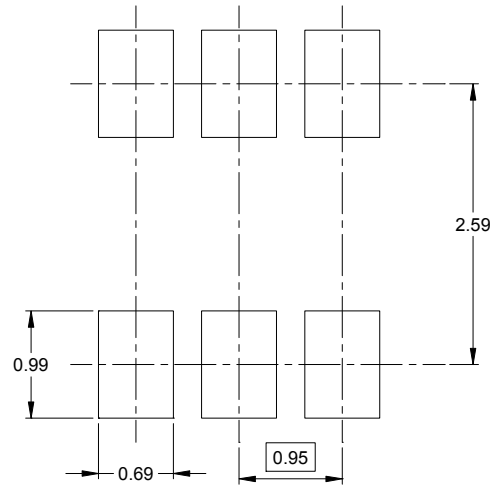
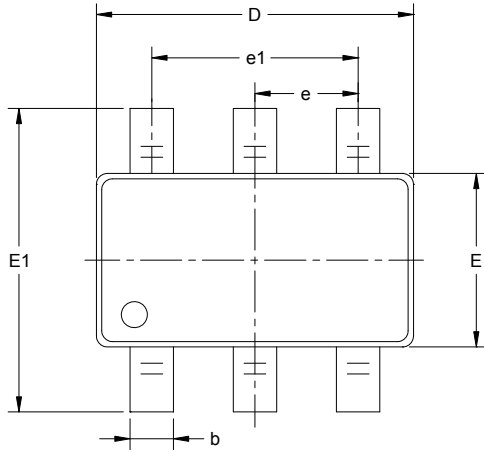


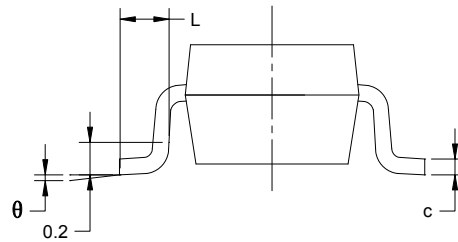
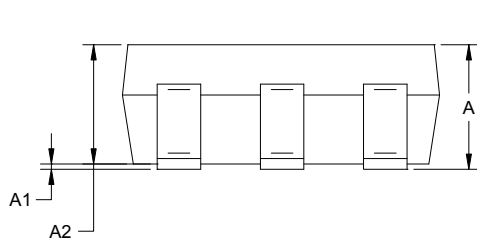
Figure 2. AC-Coupled Input/DC-Coupled Output

PACKAGE OUTLINE DIMENSIONS

SOT-23-6



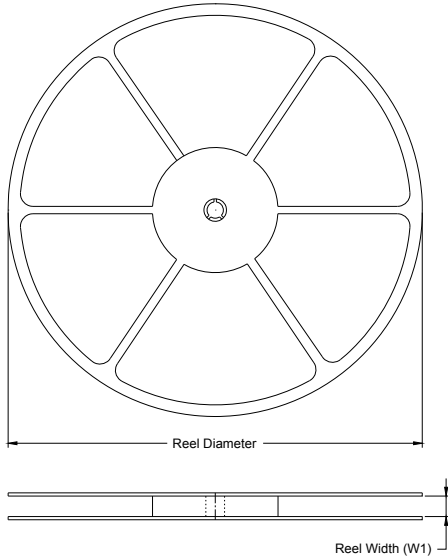
RECOMMENDED LAND PATTERN (Unit: mm)



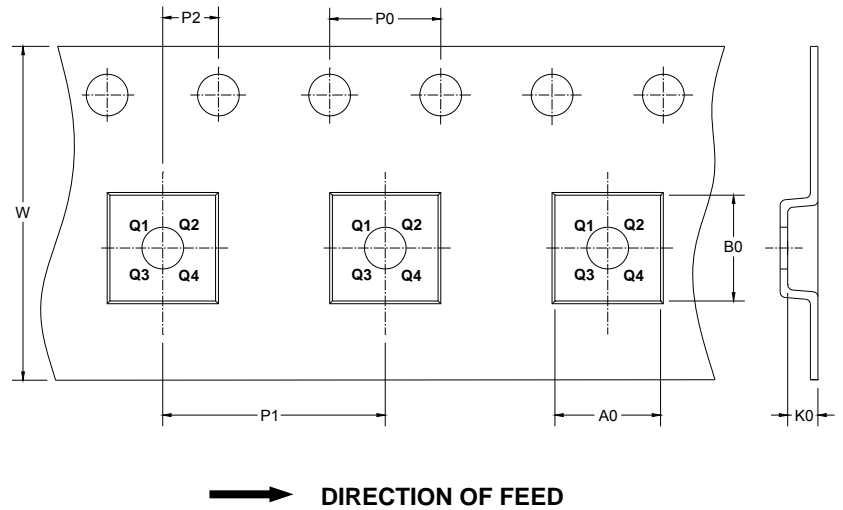
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950 BSC | | 0.037 BSC | |
| e1 | 1.900 BSC | | 0.075 BSC | |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| θ | 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.

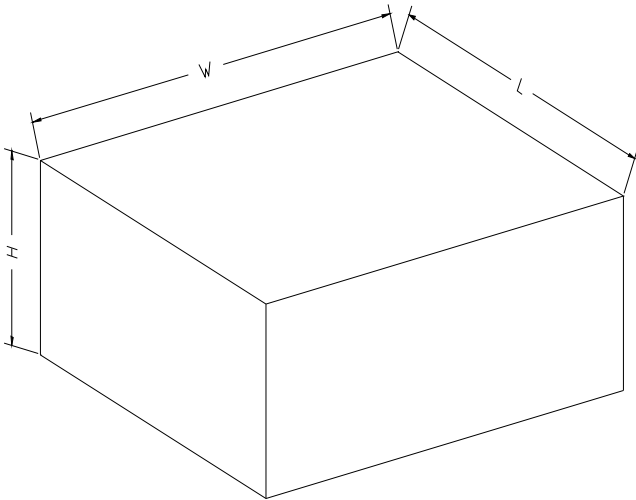
KEY PARAMETER LIST OF TAPE AND REEL

| Package Type | Reel Diameter | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P0 (mm) | P1 (mm) | P2 (mm) | W (mm) | Pin1 Quadrant |
|--------------|---------------|--------------------|---------|---------|---------|---------|---------|---------|--------|---------------|
| SOT-23-6 | 7" | 9.5 | 3.17 | 3.23 | 1.37 | 4.0 | 4.0 | 2.0 | 8.0 | Q3 |

DD0001

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 |

DD0002