



SGM3132 4-Channel 1-Wire Dimming LED Driver with Ultra-Low Dropout Current Source

GENERAL DESCRIPTION

The SGM3132 is a 4-channel ultra-low dropout constant source parallel LED driver. The SGM3132 uses an internal resistor to set the bias current for four LEDs.

The SGM3132 incorporates a single wire interface to program the output current at 16 continuous steps. It has an internal deglitch circuit for filtering the noise of the EN input.

The SGM3132 requires only a 35mV dropout voltage at a 20mA load. The feature makes SGM3132 ideal for battery-operated systems, such as personal digital assistants.

The SGM3132 is available in Green TQFN-3×3-16L, TDFN-2×2-8L and MSOP-8 packages and is specified over an ambient temperature range of -40°C to +85°C.

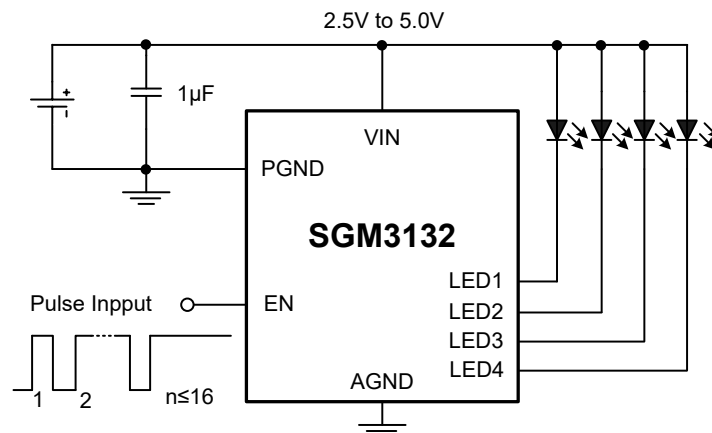
FEATURES

- Ultra-Low Dropout: 35mV/20mA
- Support up to 4 LEDs
- LED Sink Current 20mA
- ±3% LED Current Matching
- Deglitch Circuit
- Thermal Shutdown Protection
- 16-Step Brightness Control
- No EMI and Switch Noise
- Operating Temperature Range: -40°C to +85°C
- Available in Green TQFN-3×3-16L, TDFN-2×2-8L and MSOP-8 Packages

APPLICATIONS

Wireless Handsets
MP3, MP4, and PMP
Cellular Phones
Portable Communication Devices
Digital Cameras, Camcorders
PDAs, Palmtops, and Handy Terminals
Battery-Powered Equipment

TYPICAL APPLICATION



PACKAGE/ORDERING INFORMATION

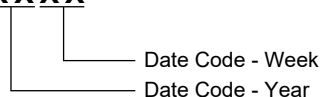
| MODEL | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING | PACKING OPTION |
|---------|---------------------|-----------------------------|------------------|--------------------------|---------------------|
| SGM3132 | TQFN-3×3-16L | -40°C to +85°C | SGM3132YTQ16G/TR | 3132TQ XXXXX | Tape and Reel, 3000 |
| | TDFN-2×2-8L | -40°C to +85°C | SGM3132YDE8G/TR | 3132 XXXX | Tape and Reel, 3000 |
| | MSOP-8 | -40°C to +85°C | SGM3132YMS8G/TR | SGM3132 YMS8 XXXXX | Tape and Reel, 3000 |

MARKING INFORMATION

NOTE: XXXX = Date Code. XXXXX = Date Code and Vendor Code.

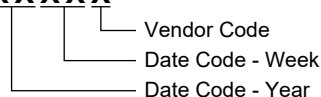
TDFN-2×2-8L

XXXX



TQFN-3×3-16L/ MSOP-8

XXXXX



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.

ABSOLUTE MAXIMUM RATINGS

| | |
|---|-----------------|
| V _{IN} to GND..... | -0.3V to 6V |
| The Other Pins to GND..... | -0.3V to 6V |
| Power Dissipation ⁽¹⁾ , P _D @ T _A = 25°C | |
| TQFN-3×3-16L | 1.47W |
| TDFN-2×2-8L..... | 0.61W |
| MSOP-8 | 0.57W |
| Operating Temperature Range..... | -40°C to +85°C |
| Junction Temperature | +125°C |
| Storage Temperature Range..... | -40°C to +150°C |
| Lead Temperature (Soldering 10s) | +260°C |
| ESD Susceptibility | |
| HBM..... | 4000V |
| MM..... | 400V |

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.

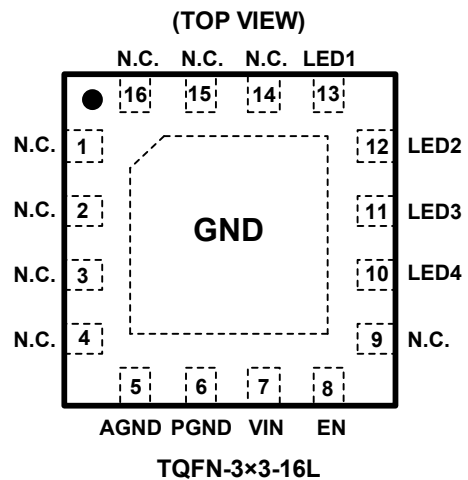
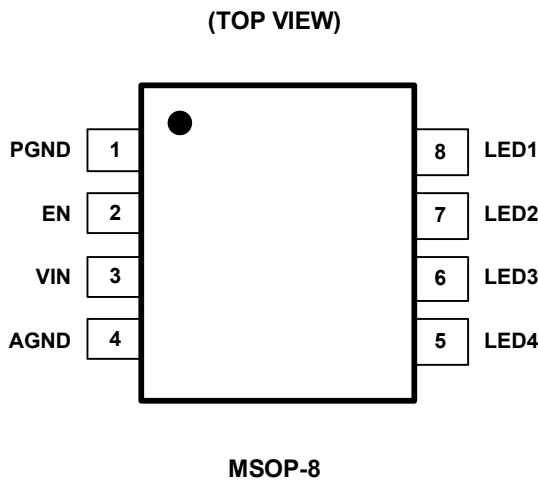
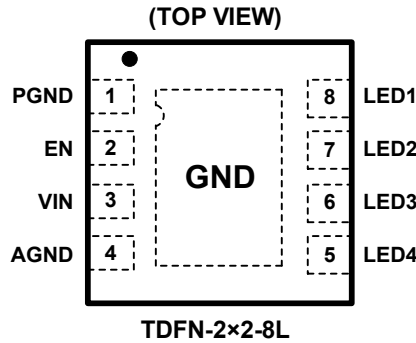
DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

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.

PIN CONFIGURATIONS



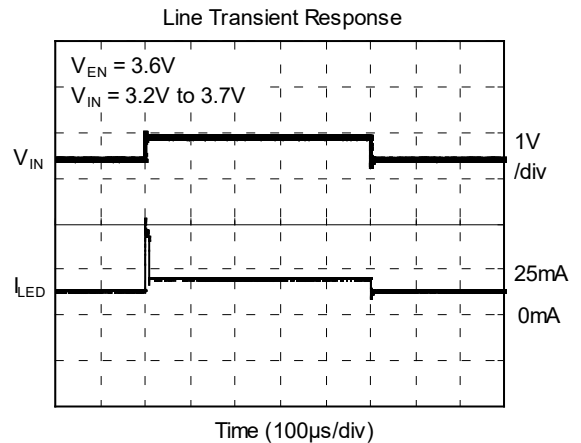
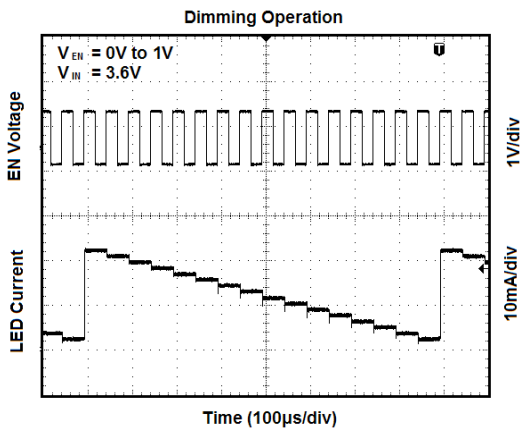
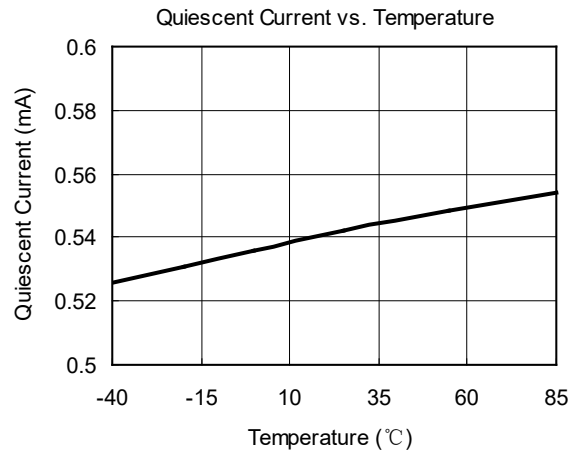
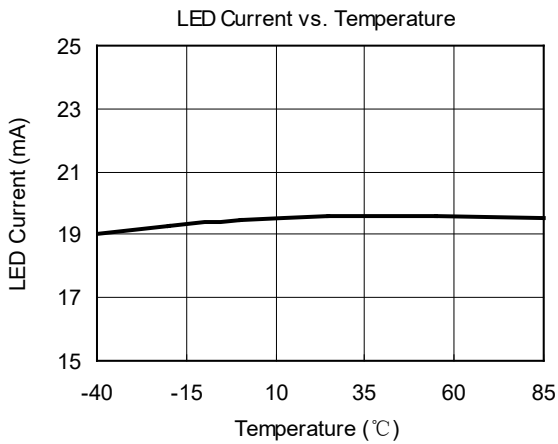
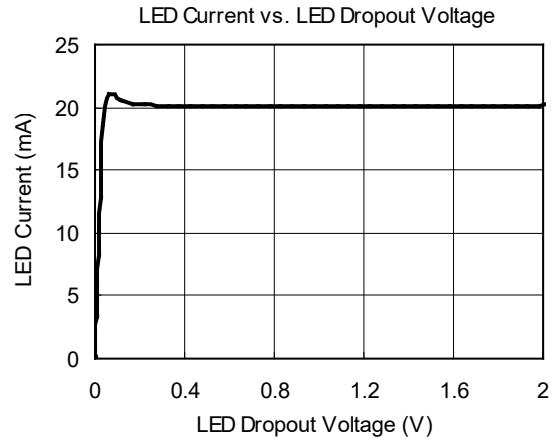
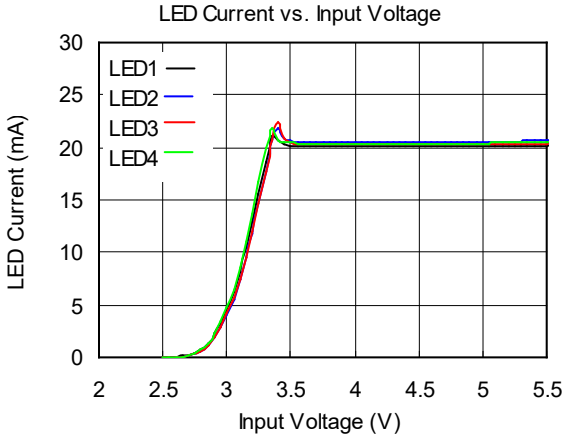
PIN DESCRIPTION

| PIN NUMBER | | | PIN NAME | PIN FUNCTION |
|---------------------|-------------|--------|----------|--|
| TQFN-3x3-16L | TDFN-2x2-8L | MSOP-8 | | |
| 5 | 4 | 4 | AGND | Analog Ground. |
| 6 | 1 | 1 | PGND | Power Ground. |
| 7 | 3 | 3 | VIN | Power Input Voltage. |
| 8 | 2 | 2 | EN | Enable Input. (Active High), and connects to GPIO pin of MCU. |
| 10 | 5 | 5 | LED4 | Current Sink for LED4, connected to cathode of external White LED. |
| 11 | 6 | 6 | LED3 | Current Sink for LED3, connected to cathode of external White LED. |
| 12 | 7 | 7 | LED2 | Current Sink for LED2, connected to cathode of external White LED. |
| 13 | 8 | 8 | LED1 | Current Sink for LED1, connected to cathode of external White LED. |
| 1,2,3,4, 9,14,15,16 | — | — | N.C. | No Internal Connection. |
| Exposed Pad | Exposed Pad | — | GND | Exposed pad should be soldered to PCB board and connected to GND. |

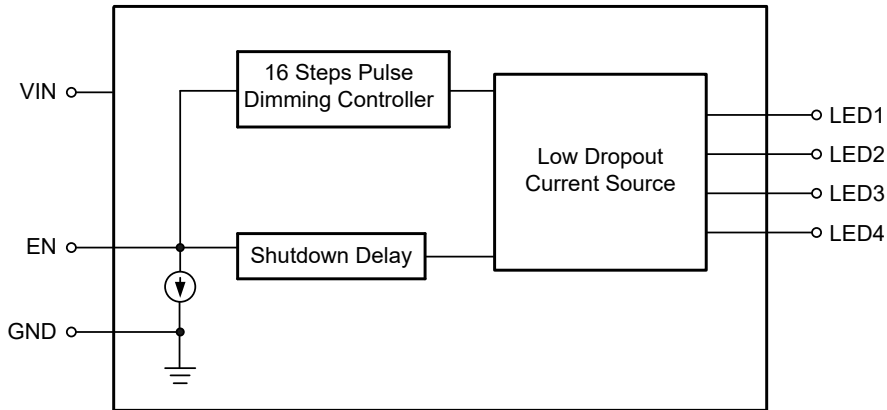
ELECTRICAL CHARACTERISTICS(V_{IN} = 3.6V, C_{IN} = 1μF, T_A = +25°C, unless otherwise noted.)

| PARAMETER | | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|--------------------------------|--------------------|----------------------|---|-----|------|-----|-------|
| Operation Voltage Range | | V _{IN} | | 2.5 | | 5.0 | V |
| EN Pull Low Current | | | V _{EN} = 1.8V | | 0.01 | | μA |
| Quiescent Power Supply Current | | I _Q | V _{IN} = 5.0V, LED OFF | | 0.55 | | mA |
| Shutdown Current | | I _{SHDN} | V _{EN} = 0V, V _{IN} = 5.0V | | 0.1 | 5 | μA |
| I _{LEDx} Accuracy | | I _{LED-ERR} | | -10 | | +10 | % |
| LED Current Deviation Matching | | D _{LED} | | -3 | | +3 | % |
| LED Dropout Voltage | | V _{LED} | I _{LEDx} = 20mA, V _{LED} @ I _{LEDx} = 90% × I _{LED} | | 35 | | mV |
| EN Low Time for Shutdown | | T _{SHDN} | | | 1.6 | | ms |
| EN Low Time for Dimming | | T _{LO} | | 0.5 | | 500 | μs |
| EN High Time for Dimming | | T _{HI} | | 0.5 | | | μs |
| EN Threshold | Logic-High Voltage | V _{IH} | V _{EN} > V _{IH} for Enable IH | 1.2 | | | V |
| | Logic-Low Voltage | V _{IL} | V _{EN} < V _{IL} for Disable IL | | | 0.5 | V |
| Thermal Shutdown Temperature | | | | | 150 | | °C |
| Hysteresis Temperature | | | | | 10 | | °C |

TYPICAL PERFORMANCE CHARACTERISTICS



FUNCTIONAL BLOCK DIAGRAM



APPLICATION INFORMATION

LED Connection

The SGM3132 supports up to 4 white LEDs. The four LEDs are connected from VIN to TQFN-3x3-16L package's pin 10, 11, 12 and 13 respectively. For TDFN-2x2-8L and MSOP-8 packages, Cathode of white LEDs are connected to pin 5, 6, 7 and 8 respectively.

Brightness Control

The SGM3132 implements a pulse dimming method to control the brightness of white LEDs. Users can easily configure the LED current from 1.25mA to 20mA by a serial pulse. The dimming of white LEDs' current can be achieved by applying a pulse signal to the EN pin. There are totally 16 steps of current that could be set by users. The detail operation of brightness dimming is showed in the Figure 1.

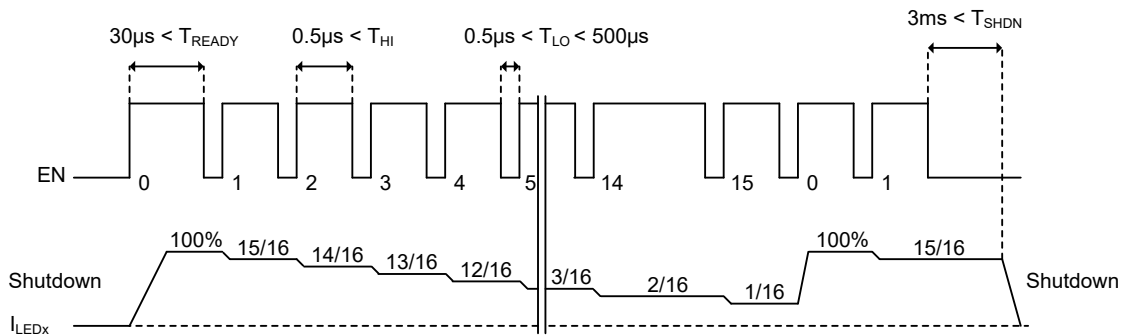


Figure 1. Brightness Control by Pulse Dimming

REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

| JANUARY 2013 – REV.A.1 to REV.A.2 | Page |
|---|-------------|
| Added Recommended Land Pattern section | 8, 9, 10 |
| Added Tape and Reel Information section | 11, 12 |

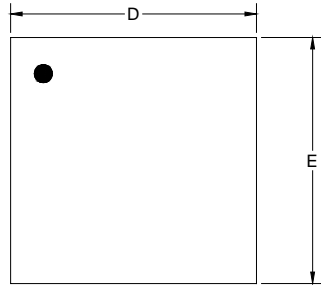
| MAY 2011 – REV.A to REV.A.1 | Page |
|------------------------------------|-------------|
| Changed Package Description | All |

| Changes from Original (MARCH 2010) to REV.A | Page |
|--|-------------|
| Changed from product preview to production data..... | All |

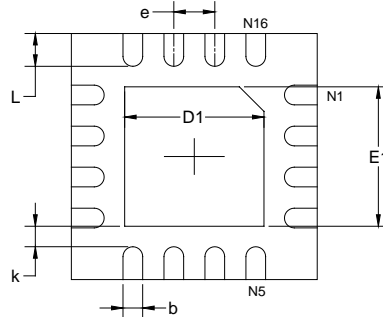
PACKAGE INFORMATION

PACKAGE OUTLINE DIMENSIONS

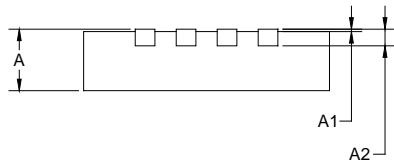
TQFN-3x3-16L



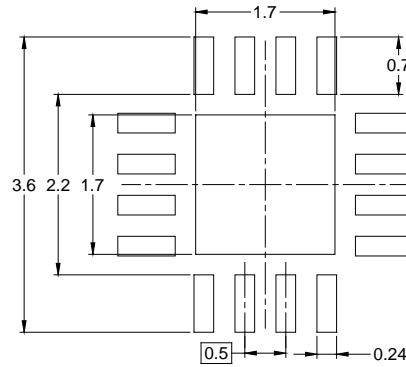
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

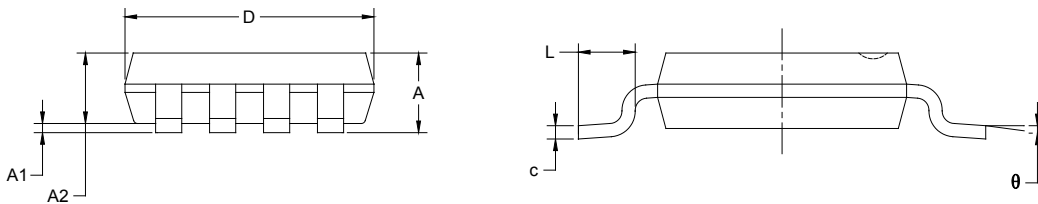
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.700 | 0.800 | 0.028 | 0.031 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| A2 | 0.203 REF | | 0.008 REF | |
| D | 2.900 | 3.100 | 0.114 | 0.122 |
| D1 | 1.600 | 1.800 | 0.063 | 0.071 |
| E | 2.900 | 3.100 | 0.114 | 0.122 |
| E1 | 1.600 | 1.800 | 0.063 | 0.071 |
| k | 0.200 MIN | | 0.008 MIN | |
| b | 0.180 | 0.300 | 0.007 | 0.012 |
| e | 0.500 TYP | | 0.020 TYP | |
| L | 0.300 | 0.500 | 0.012 | 0.020 |

PACKAGE OUTLINE DIMENSIONS

MSOP-8



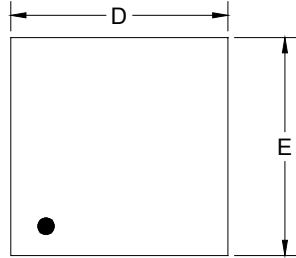
RECOMMENDED LAND PATTERN (Unit: mm)



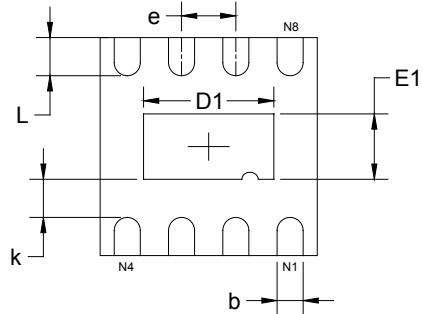
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.820 | 1.100 | 0.032 | 0.043 |
| A1 | 0.020 | 0.150 | 0.001 | 0.006 |
| A2 | 0.750 | 0.950 | 0.030 | 0.037 |
| b | 0.250 | 0.380 | 0.010 | 0.015 |
| c | 0.090 | 0.230 | 0.004 | 0.009 |
| D | 2.900 | 3.100 | 0.114 | 0.122 |
| E | 2.900 | 3.100 | 0.114 | 0.122 |
| E1 | 4.750 | 5.050 | 0.187 | 0.199 |
| e | 0.650 BSC | | 0.026 BSC | |
| L | 0.400 | 0.800 | 0.016 | 0.031 |
| θ | 0° | 6° | 0° | 6° |

PACKAGE OUTLINE DIMENSIONS

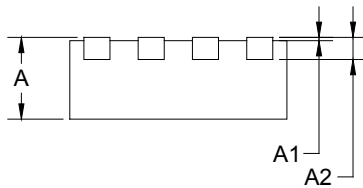
TDFN-2x2-8L



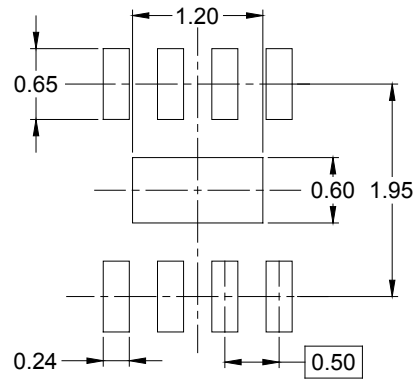
TOP VIEW



BOTTOM VIEW



SIDE VIEW



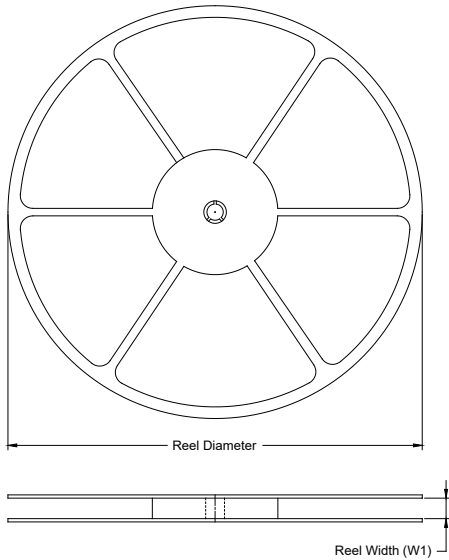
RECOMMENDED LAND PATTERN (Unit: mm)

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.700 | 0.800 | 0.028 | 0.031 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| A2 | 0.203 REF | | 0.008 REF | |
| D | 1.900 | 2.100 | 0.075 | 0.083 |
| D1 | 1.100 | 1.300 | 0.043 | 0.051 |
| E | 1.900 | 2.100 | 0.075 | 0.083 |
| E1 | 0.500 | 0.700 | 0.020 | 0.028 |
| k | 0.200 MIN | | 0.008 MIN | |
| b | 0.180 | 0.300 | 0.007 | 0.012 |
| e | 0.500 TYP | | 0.020 TYP | |
| L | 0.250 | 0.450 | 0.010 | 0.018 |

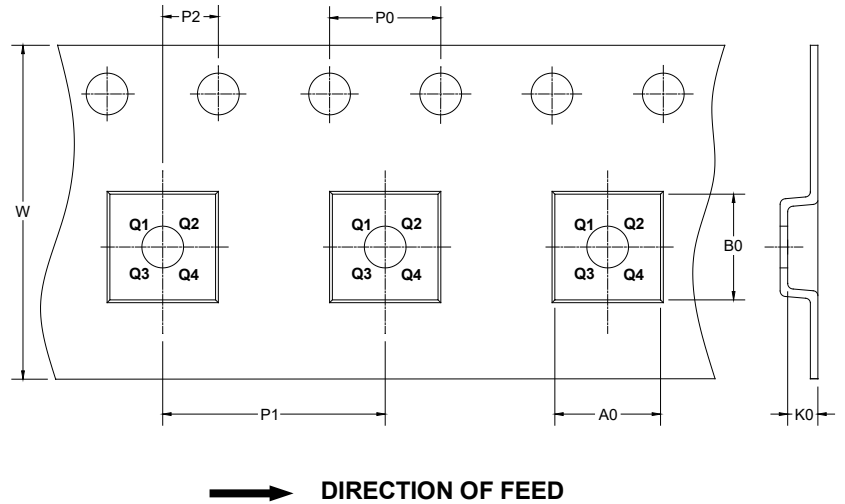
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

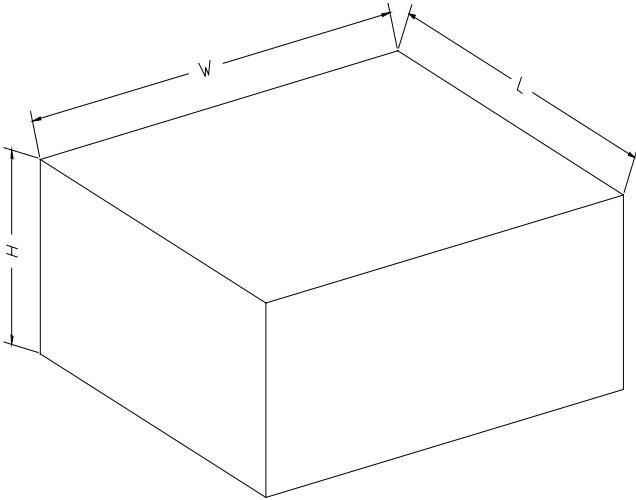
KEY PARAMETER LIST OF TAPE AND REEL

| Package Type | Reel Diameter | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P0 (mm) | P1 (mm) | P2 (mm) | W (mm) | Pin1 Quadrant |
|--------------|---------------|--------------------|---------|---------|---------|---------|---------|---------|--------|---------------|
| TQFN-3×3-16L | 13" | 12.4 | 3.35 | 3.35 | 1.13 | 4.0 | 8.0 | 2.0 | 12.0 | Q1 |
| MSOP-8 | 13" | 12.4 | 5.20 | 3.30 | 1.50 | 4.0 | 8.0 | 2.0 | 12.0 | Q1 |
| TDFN-2×2-8L | 7" | 9.5 | 2.30 | 2.30 | 1.10 | 4.0 | 4.0 | 2.0 | 8.0 | Q1 |

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 |
| 13" | 386 | 280 | 370 | 5 |

DD0002