SGM8771
High Voltage, High Precision, Single Comparator with Voltage Reference

GENERAL DESCRIPTION

The SGM8771 is a single, high voltage, high precision differential voltage comparator with a 1.225V reference voltage that can operate from a single supply or dual supplies over a wide voltage range. All These features make the SGM8771 suitable for industrial equipment.

For single supply application, the wide voltage range is 2.8V to 36V. Input common mode voltage is 1.5V lower than V_S. Low supply current is independent of the supply voltage. The SGM8771 also has an open-drain output structure and can be connected to other open-drain outputs. Due to the input offset voltage of 2.4mV (MAX), it can be applied as a precision comparator.

The SGM8771 is available in Green TDFN-3×3-8L and SOIC-8 packages. The SGM8771 is specified over the extended -40℃ to +125℃ temperature range.

FEATURES

- **Wide Supply Ranges**
  Single Supply: 2.8V to 36V
  Dual Supplies: ±1.4V to ±18V
- **Open-Drain Output Structure**
- **Low Supply Current: 180μA (TYP) Independent of Supply Voltage**
- **Internal Voltage Reference: 1.225V**
- **Ultra-Low Input Offset Voltage: 2.4mV (MAX)**
- **Ultra-Low Input Bias Current: ±20pA (TYP)**
- **Minimum Input Common Mode Voltage: $-V_S$**
- **Maximum Differential Input Voltage: +36V/-36V**
- **CMOS/TTL-Compatible Output**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green SOIC-8 and TDFN-3×3-8L Packages**

APPLICATIONS

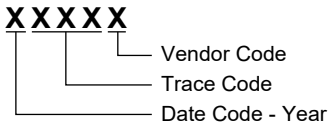
Power System
Battery Monitor
Industrial Control

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8771	SOIC-8	-40℃ to +125℃	SGM8771XS8G/TR	SGM 8771XS8 XXXXX	Tape and Reel, 4000
	TDFN-3×3-8L	-40℃ to +125℃	SGM8771XTDB8G/TR	SGM 8771DB XXXXX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace 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.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_S 40V
Differential Input Voltage, $|V_{ID}|$ 40V
Input Voltage Range ..... -0.3V to $(+V_S)$ + 0.3V
Output Voltage, V_{OUT} ..... -0.3V to $(+V_S)$ + 0.3V
Output Voltage, V_{REF} ..... -0.3V to 5.5V
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 2000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range ..... -40℃ to +125℃
Power Supply Range ..... 2.8V to 36V

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

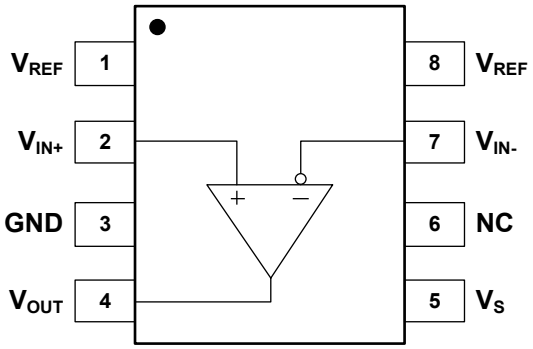
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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.

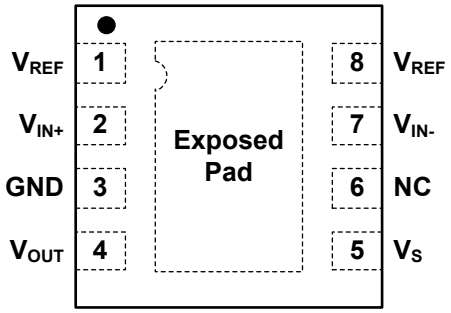
PIN CONFIGURATIONS

(TOP VIEW)



SOIC-8

(TOP VIEW)



TDFN-3×3-8L

PIN DESCRIPTION

PIN	NAME	FUNCTION
1, 8	V_{REF}	Reference Output.
2	V_{IN+}	Non-Inverting Comparator Input.
3	GND	Ground.
4	V_{OUT}	Comparator Output.
5	V_S	Power Supply.
6	NC	No Connection.
7	V_{IN-}	Inverting Comparator Input.
Exposed Pad	Exposed Pad	Exposed Pad (TDFN-3×3-8L Package Only). Exposed pad should be left floating.

ELECTRICAL CHARACTERISTICS

(At T_A = +25℃, V_S = ±1.4V to ±18V, Full = -40℃ to +125℃, unless otherwise specified.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Input Offset Voltage	V_{OS}	V_{CM} = 0V	+25℃		0.6	2.4	mV
			Full			2.8	
Input Bias Current	I_B	V_{CM} = 0V	+25℃		±20	±200	pA
Input Offset Current	I_{OS}	V_{CM} = 0V	+25℃		±20	±200	pA
Maximum Differential Input Voltage	$\|V_{ID}\|$		Full			V_S	V
Maximum Input Difference Bias Current	$\|I_{ID}\|$	V_S = ±18V, V_{ID} = ±18V	+25℃		2.2	4	μA
			Full			5	
Input Common Mode Voltage Range (1)	V_{CM}		Full	$-V_S$		$(+V_S)$ - 1.5V	V
Common Mode Rejection Ratio	CMRR	V_S = ±18V, V_{CM} = $(-V_S)$ to $(+V_S)$ - 1.5V	+25℃	90	116		dB
			Full	87			
Power Supply Rejection Ratio	PSRR	V_S = 2.8V to 36V	+25℃	96	116		dB
			Full	93			
Large-Signal Differential Voltage Amplification	A_{VD}	V_S = 36V, V_{OUT} = 0.1V to 28.8V, R_L = 120kΩ to V_S	+25℃	90	100		dB
			Full	85			
Output Voltage Swing from Rail	V_{OL}	I_{SINK} = 8mA, V_{ID} = -0.2V	+25℃		210	280	mV
			Full			400	
Output Short-Circuit Current	I_{SINK}	V_{OL} = $(-V_S)$ + 1.5V, V_{ID} = -0.2V	+25℃	25	36		mA
High-Level Output Current	I_{OH}	V_{OH} = 2.8V, V_{ID} = 0.2V	+25℃		0.4	0.7	μA
			Full			1	
		V_{OH} = 36V, V_{ID} = 0.2V	+25℃		6	8.5	
			Full			35	
Supply Current	I_S	I_{OUT} = 0mA	+25℃		180	210	μA
			Full			250	
Voltage Reference	V_{REF}	V_S = 2.8V to 36V, I_{REF} = 0 to 5mA	+25℃	1.205	1.225	1.245	V

SWITCHING CHARACTERISTICS

(At T_A = +25℃, V_S = ±2.5V, C_L = 15pF, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Propagation Delay (High to Low)	t_{PHL}	Overdrive = 10mV	+25℃		85		ns
		Overdrive = 100mV	+25℃		50		ns
Fall Time	t_{FALL}	Overdrive = 10mV	+25℃		12		ns
		Overdrive = 100mV	+25℃		12		ns

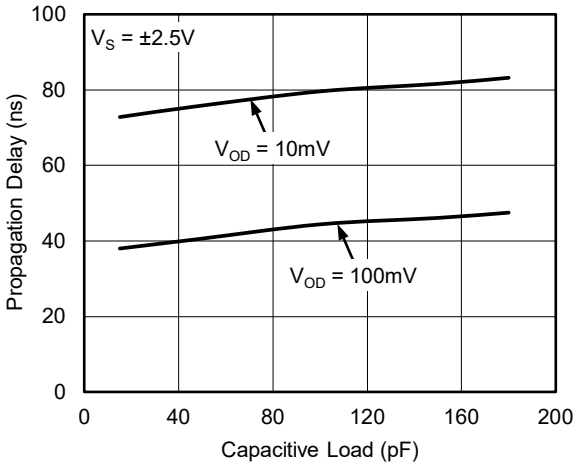
NOTES:

1. The voltage at either input should not be allowed to be lower than $(-V_S)$ - 0.3V. The upper end of the common mode voltage range is $(+V_S)$ - 1.5V, but either input can go up to 36V without damage.

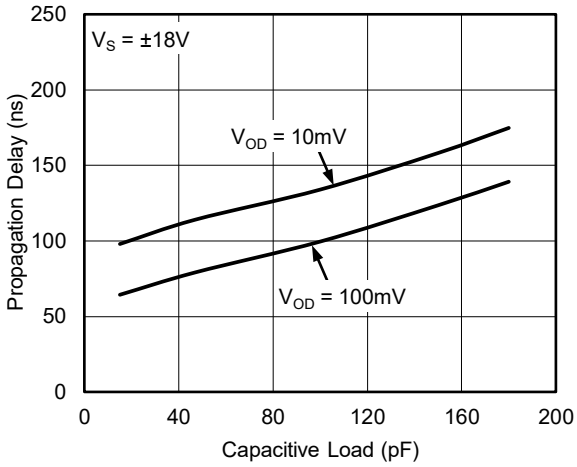
TYPICAL PERFORMANCE CHARACTERISTICS

At T_A = +25℃, V_S = ±18V and C_L = 15pF, unless otherwise noted.

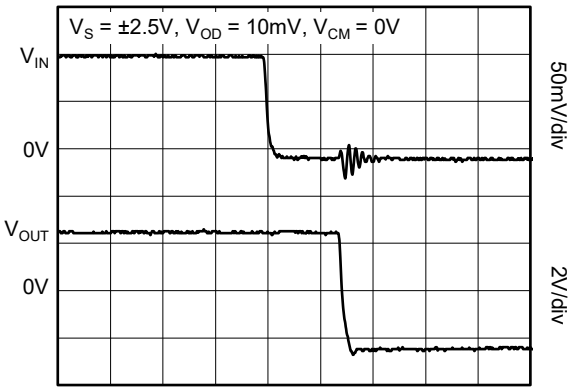
Propagation Delay vs. Capacitive Load



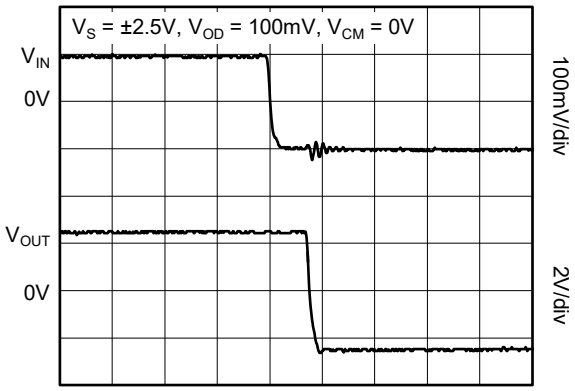
Propagation Delay vs. Capacitive Load



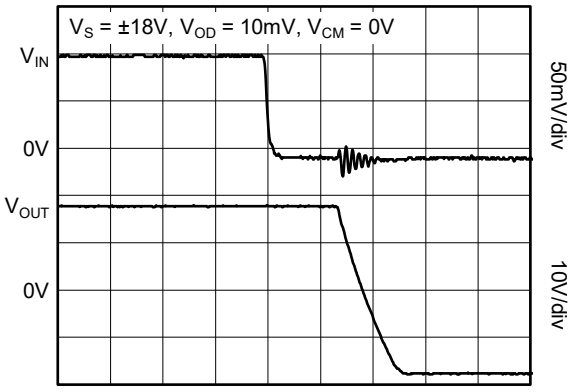
Propagation Delay (H-L)



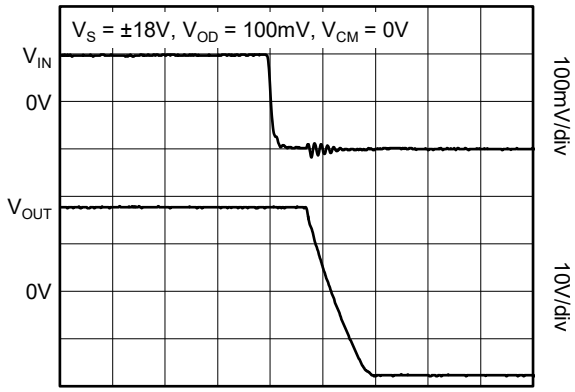
Propagation Delay (H-L)



Propagation Delay (H-L)



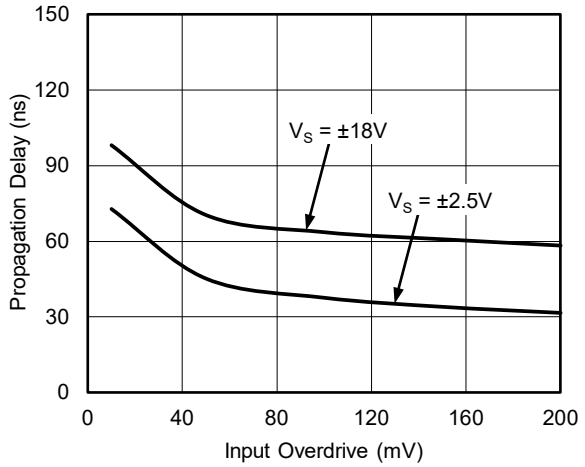
Propagation Delay (H-L)



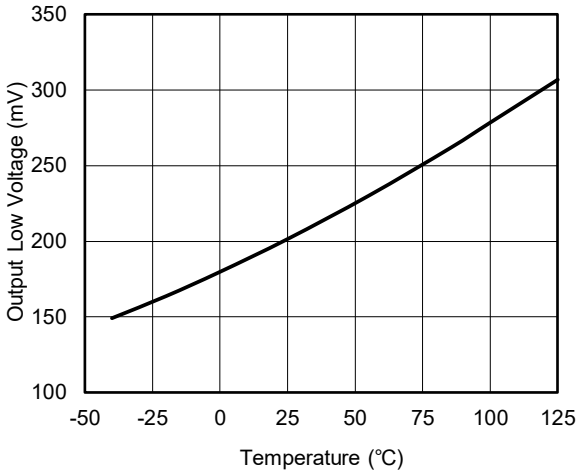
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At T_A = +25℃, V_S = ±18V and C_L = 15pF, unless otherwise noted.

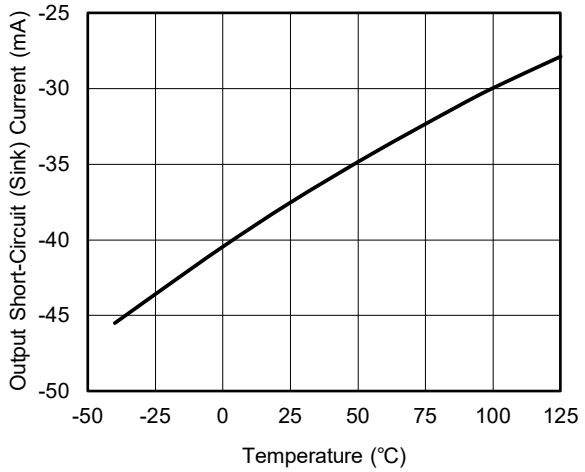
Propagation Delay (H-L) vs. Input Overdrive



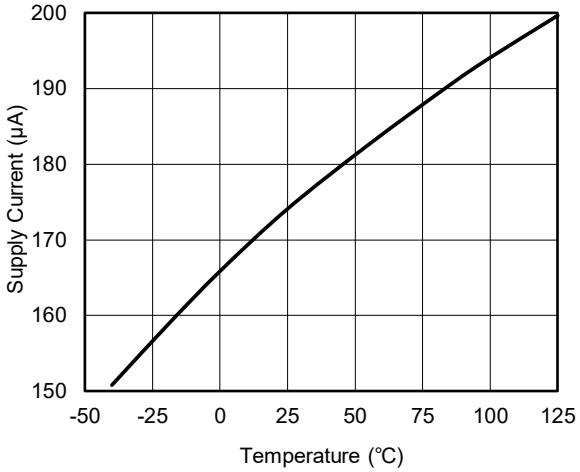
Output Low Voltage vs. Temperature



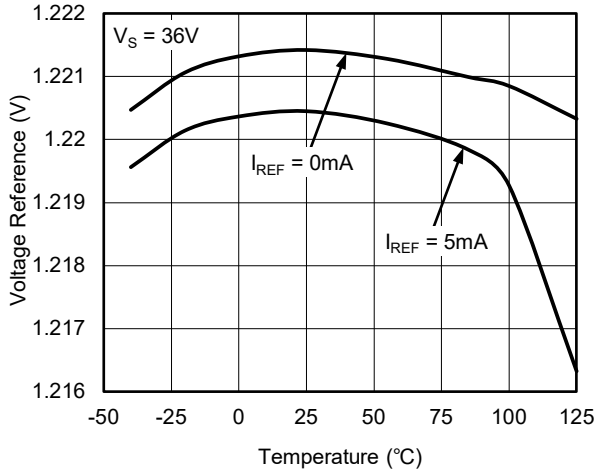
Output Short-Circuit (Sink) Current vs. Temperature



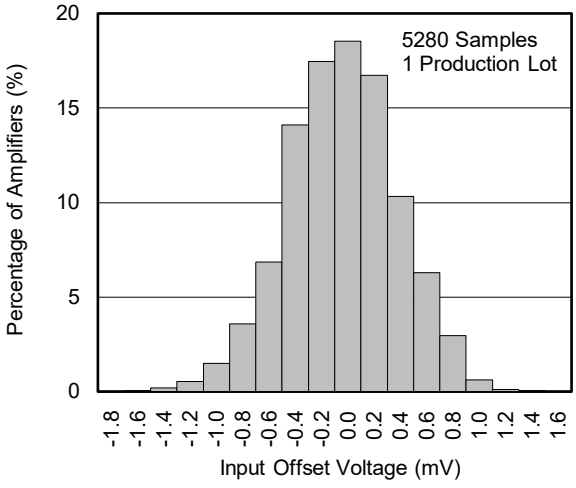
Supply Current vs. Temperature



Voltage Reference vs. Temperature



Input Offset Voltage Production Distribution



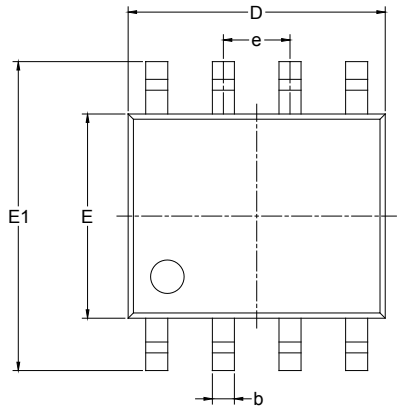
REVISION HISTORY

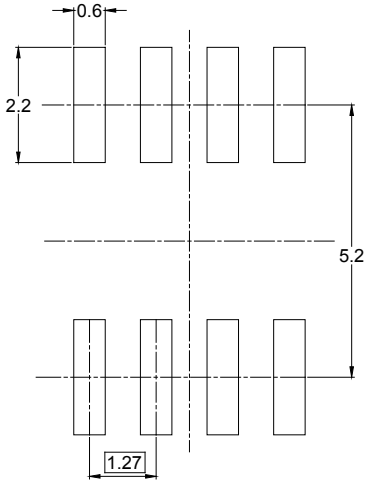
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (DECEMBER 2019) to REV.A	Page
Changed from product preview to production data	All

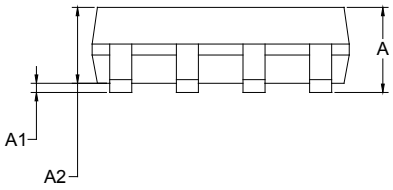
PACKAGE OUTLINE DIMENSIONS

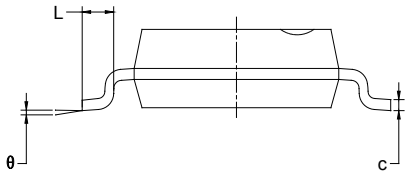
SOIC-8





RECOMMENDED LAND PATTERN (Unit: mm)

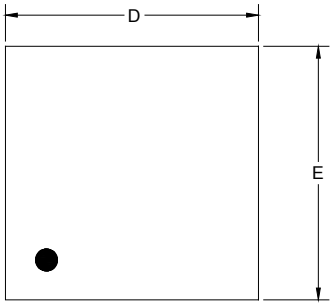




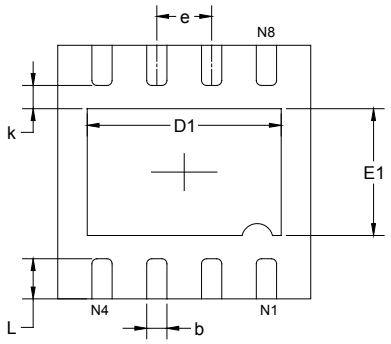
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050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

PACKAGE OUTLINE DIMENSIONS

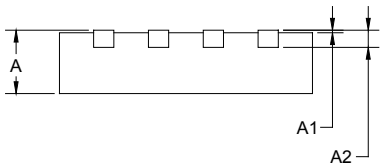
TDFN-3×3-8L



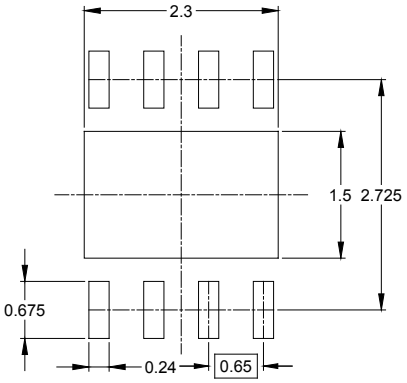
TOP VIEW



BOTTOM VIEW



SIDE VIEW

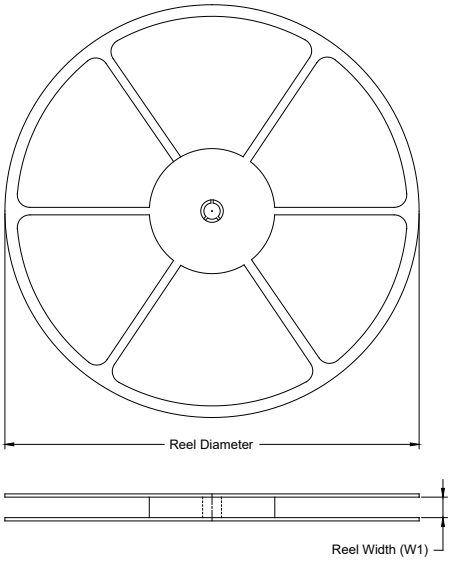


RECOMMENDED LAND PATTERN (Unit: mm)

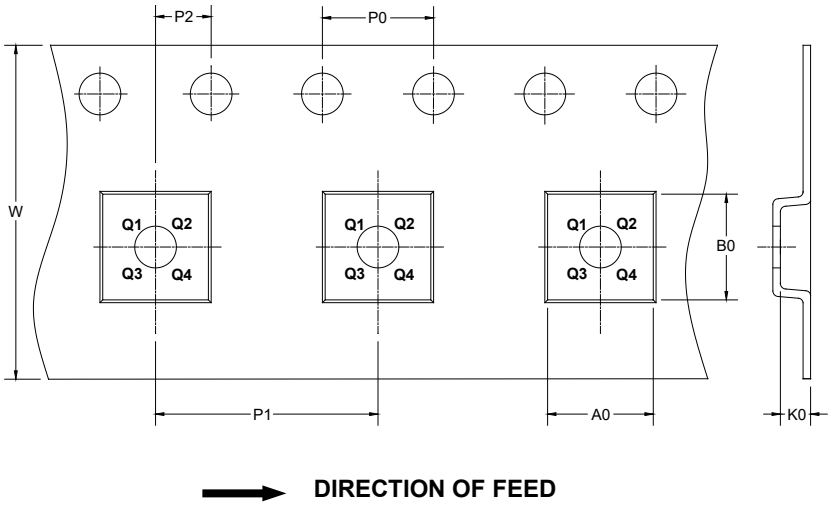
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.900	3.100	0.114	0.122
D1	2.200	2.400	0.087	0.094
E	2.900	3.100	0.114	0.122
E1	1.400	1.600	0.055	0.063
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.650 TYP		0.026 TYP	
L	0.375	0.575	0.015	0.023

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

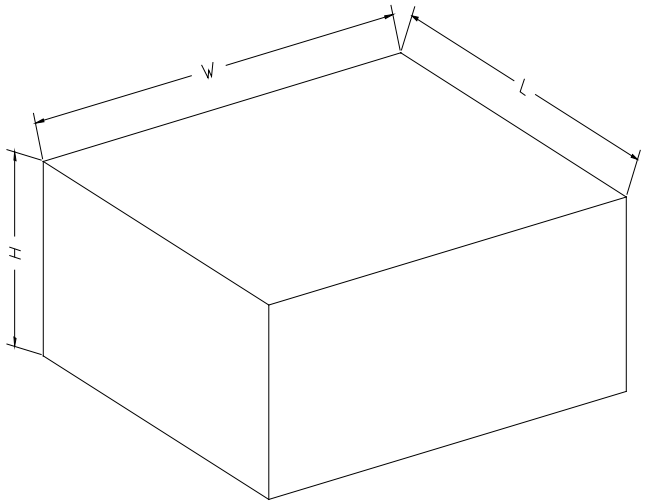
NOTE: The picture is only for reference. Please make the object as the standard.

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
SOIC-8	13″	12.4	6.40	5.40	2.10	4.0	8.0	2.0	12.0	Q1
TDFN-3×3-8L	13″	12.4	3.35	3.35	1.13	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