

GENERAL DESCRIPTION

The SGM8782-2 is a dual, high precision differential voltage comparator optimized for high voltage operation. The device can operate from 2.2V to 36V single supply or from $\pm 1.1V$ to $\pm 18V$ dual power supplies. It consumes low supply current. In addition, it also has low propagation delay, low input offset voltage, and low input bias currents. The SGM8782-2 has an open-drain output structure, which allows the output to be pulled to any voltage rail up to 36V above the negative power supply, regardless of the SGM8782-2 supply voltage.

The SGM8782-2 is available in Green SOIC-8, MSOP-8 and TDFN-2x2-8AL packages. The device is rated over the -40°C to $+125^{\circ}\text{C}$ operating temperature range.

FEATURES

- **Wide Supply Range:**
 - ♦ **Single Supply: 2.2V to 36V**
 - ♦ **Dual Supplies: $\pm 1.1V$ to $\pm 18V$**
- **Rail-to-Rail Input**
- **Low Input Offset Voltage: $\pm 0.4\text{mV}$ (TYP)**
- **Low Propagation Delay: 390ns (TYP)**
- **Low Quiescent Current: 90 μA (TYP)**
- **Open Collector Outputs: Up to 36V above Negative Supply Regardless of Supply Voltage**
- **-40°C to $+125^{\circ}\text{C}$ Operating Temperature Range**
- **Available in Green SOIC-8, MSOP-8 and TDFN-2x2-8AL Packages**

APPLICATIONS

Over-Voltage and Under-Voltage Detectors
Window Comparators
Over-Current Detectors
Zero-Crossing Detectors
System Monitoring for:
Power Supplies
White Goods
Industrial Sensors
Automotive
Medical

TYPICAL APPLICATION

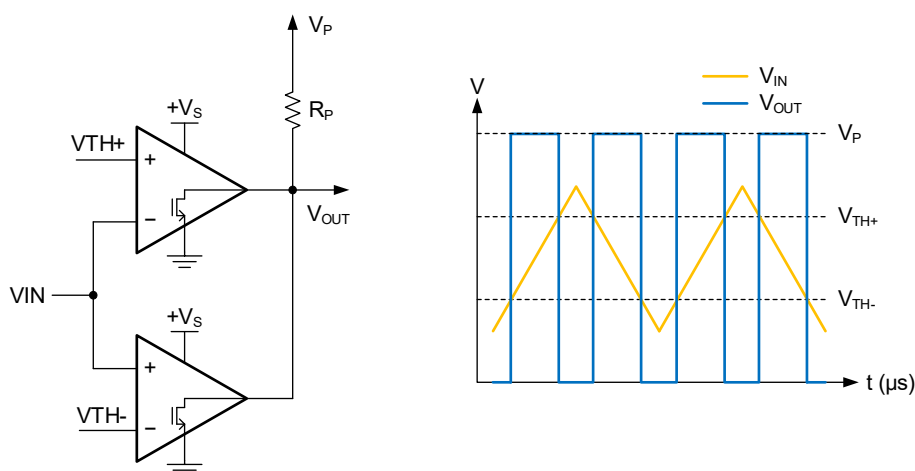


Figure 1. SGM8782-2 as a Window Comparator

PACKAGE/ORDERING INFORMATION

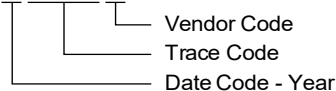
MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8782-2	SOIC-8	-40°C to +125°C	SGM8782-2XS8G/TR	SGM 87822XS8 XXXXX	Tape and Reel, 4000
	MSOP-8	-40°C to +125°C	SGM8782-2XMS8G/TR	SGM2V4 XMS8 XXXXX	Tape and Reel, 4000
	TDFN-2×2-8AL	-40°C to +125°C	SGM8782-2XTDE8G/TR	2V5 XXXX	Tape and Reel, 3000

MARKING INFORMATION

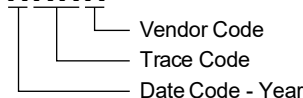
NOTE: XXXXX = Date Code, Trace Code and Vendor Code. XXXX = Date Code, Trace Code and Vendor Code.

SOIC-8 and MSOP-8

XXXXX



TDFN-2×2-8AL

YYY— Serial Number
XXXX

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.....	+40V (±20V)
Signal Input Pins	
Voltage ⁽¹⁾	(-V _S) - 0.5V to (+V _S) + 0.5V
Current ⁽¹⁾	±10mA
Output Short-Circuit ⁽²⁾	Continuous
Package Thermal Resistance	
SOIC-8, θ _{JA}	139.9°C/W
SOIC-8, θ _{JB}	83.8°C/W
SOIC-8, θ _{JC}	80.1°C/W
MSOP-8, θ _{JA}	141.1°C/W
MSOP-8, θ _{JB}	89.1°C/W
MSOP-8, θ _{JC}	58.5°C/W
TDFN-2×2-8AL, θ _{JA}	62°C/W
TDFN-2×2-8AL, θ _{JB}	30.6°C/W
TDFN-2×2-8AL, θ _{JC} (TOP).....	83.4°C/W
TDFN-2×2-8AL, θ _{JC} (BOT).....	10.8°C/W
Junction Temperature.....	+150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s).....	+260°C
ESD Susceptibility ^{(3) (4)}	
HBM.....	±3000V
CDM.....	±1000V

NOTES:

1. A clamping diode is added between the input and negative power supply. So voltage at input pins can be (-V_S) - 0.5V, and current of the input signal should be limited within the range of 10mA.
2. Short-circuit to ground; one comparator per package.
3. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.
4. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage, V _S = (+V _S) - (-V _S).....	2.2V (±1.1V) to 36V (±18V)
Operating Temperature Range.....	-40°C to +125°C

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.

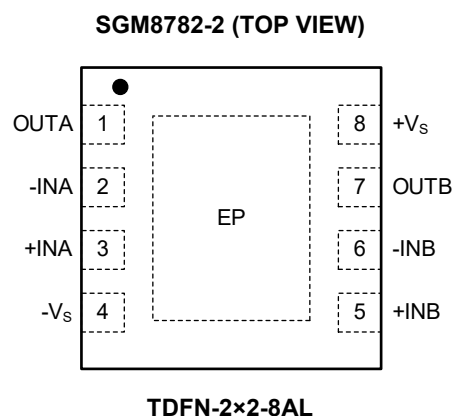
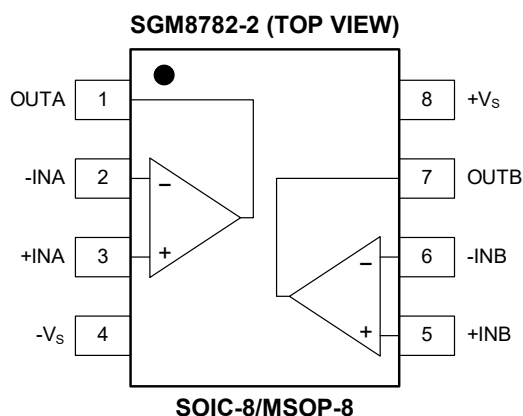
ESD SENSITIVITY CAUTION

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



PIN DESCRIPTION

PIN	NAME	TYPE	FUNCTION
1	OUTA	O	Output. Channel A.
2	-INA	I	Inverting Input. Channel A.
3	+INA	I	Non-Inverting Input. Channel A.
4	-Vs	—	Negative Power Supply.
5	+INB	I	Non-Inverting Input. Channel B.
6	-INB	I	Inverting Input. Channel B.
7	OUTB	O	Output. Channel B.
8	+Vs	—	Positive Power Supply.
Exposed Pad	—	—	Exposed pad can be connected to -Vs or left floating (Only for the TDFN-2x2-8AL Package). Connect it to -Vs plane to maximize thermal performance. Ensure that the exposed pad is exclusively connected to the -Vs pin and not to any other pins.

NOTE: I = input, O = output.

ELECTRICAL CHARACTERISTICS

($V_S = 2.2V$ to $36V$, $C_L = 15pF$, $R_{PULLUP} = 5.1k\Omega$, $V_{CM} = V_S/2$, and $V_S = V_{PULLUP}$, Full = $-40^\circ C$ to $+125^\circ C$, typical values are measured at $T_A = +25^\circ C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Input Offset Voltage							
Input Offset Voltage	V _{OS}		+25°C		±0.4	±2.5	mV
			Full			±3	
Input Offset Voltage Drift	ΔV _{OS} /ΔT		Full		1.7		μV/°C
Power Supply Rejection Ratio	PSRR		+25°C		2.5	13	μV/V
			Full			18	
Input Voltage Range							
Common Mode Voltage Range	V _{CM}		Full	-V _S		+V _S	V
Common Mode Rejection Ratio	CMRR	V _S = 2.2V	+25°C	72	91		dB
			Full	69			
		V _S = 36V	+25°C	95	110		
			Full	92			
Input Bias Current							
Input Bias Current	I _B		+25°C		±0.1	±0.4	nA
			Full			±55	
Input Offset Current	I _{OS}		+25°C		±0.1	±0.4	nA
			Full			±20	
Capacitive Load Drive	C _{LOAD}		See Typical Characteristics				
Output							
Voltage Output Swing from Rail	V _O	I _O ≤ 4mA, input overdrive = 100mV	+25°C		210	280	mV
			Full			380	
Output Short-Circuit Sink Current	I _{SINK}	V _S = 36V	+25°C	15	25		mA
Output Leakage Current	I _{OH}	V _{IN+} > V _{IN-} , V _{OUT} ≤ 36V	+25°C		10	50	nA
			Full			180	
Power Supply							
Specified Voltage Range	V _S		+25°C	2.2		36	V
Quiescent Current	I _Q	I _O = 0A	+25°C		90	120	μA
			Full			130	

SWITCHING CHARACTERISTICS

($V_S = 2.2V$ to $36V$, $C_L = 15pF$, $R_{PULLUP} = 5.1k\Omega$, $V_{CM} = V_S/2$, and $V_S = V_{PULLUP}$, typical values are measured at $T_A = +25^\circ C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Propagation Delay Time, High-to-Low	t_{PHL}	Input overdrive = 100mV		320		ns
Propagation Delay Time, Low-to-High	t_{PLH}	Input overdrive = 100mV		390		ns
Rise Time	t_R	Input overdrive = 100mV		365		ns
Fall Time	t_F	Input overdrive = 100mV		60		ns

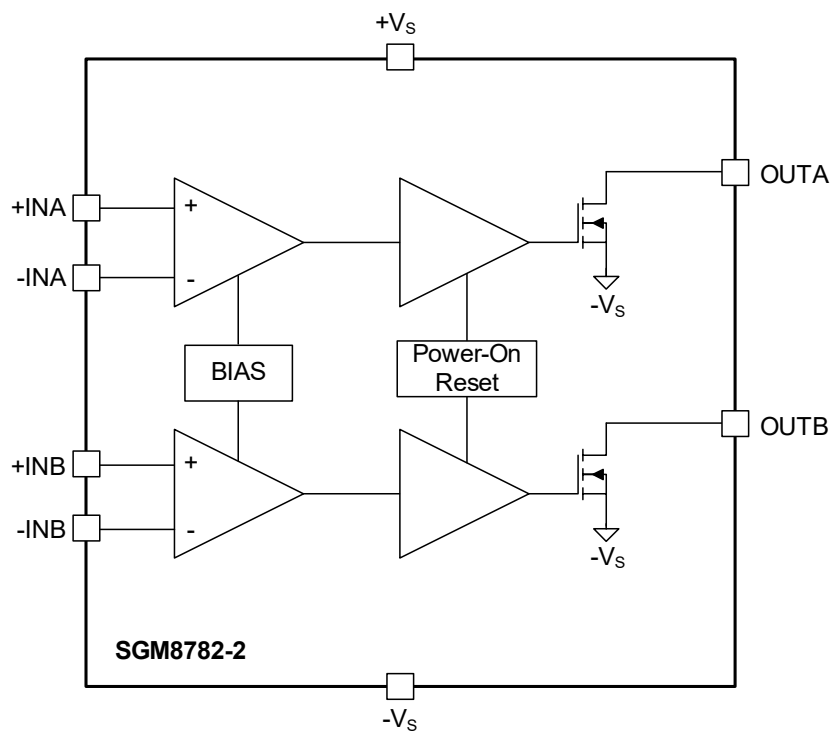
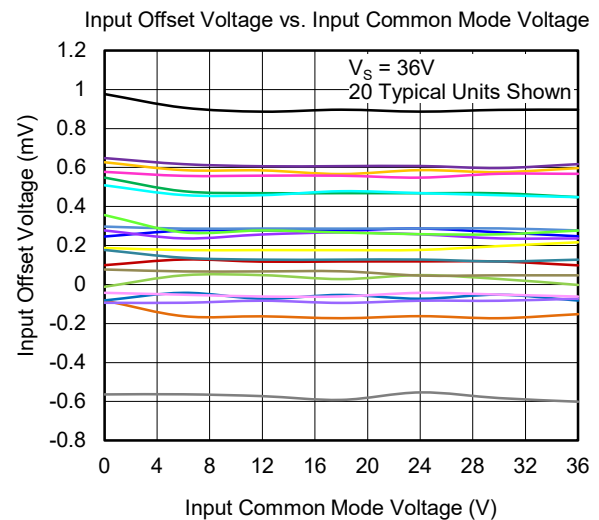
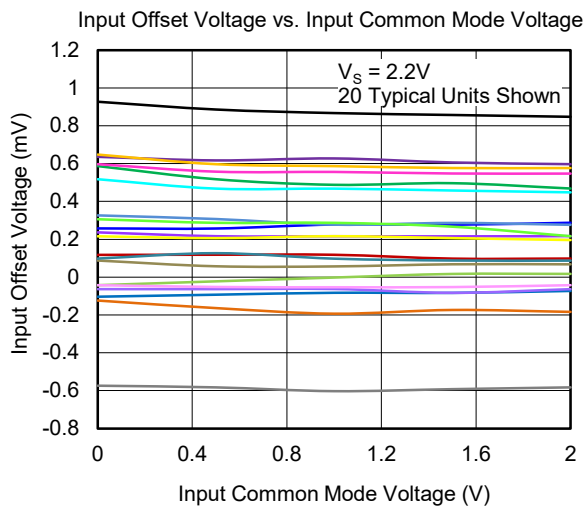
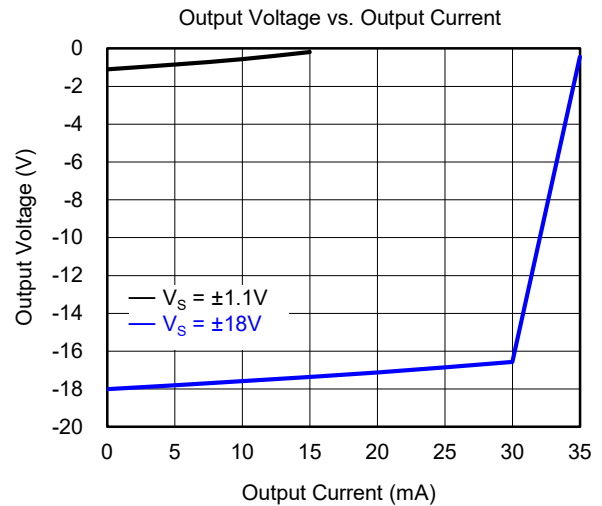
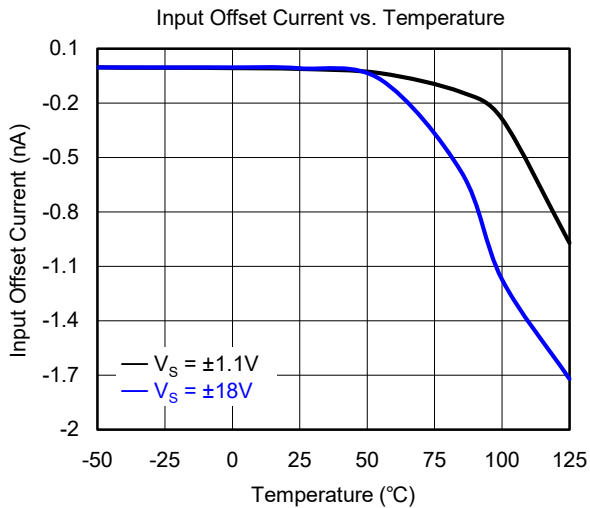
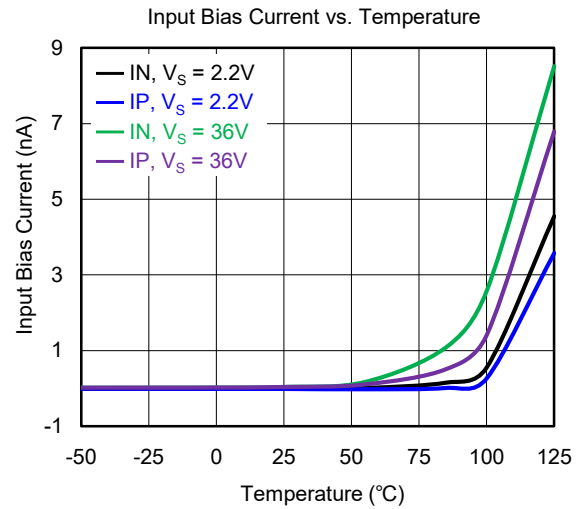
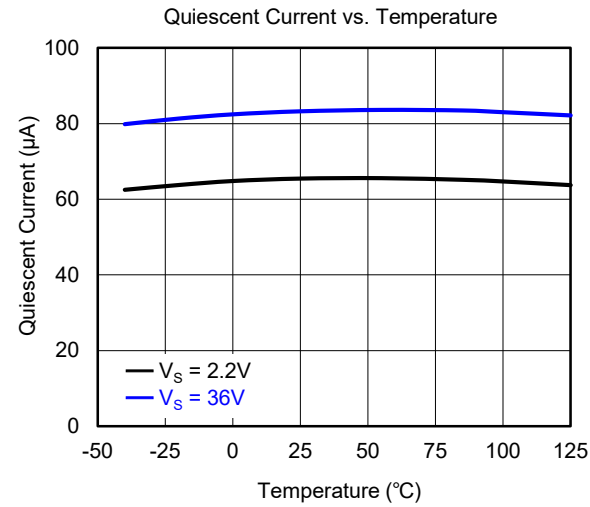
FUNCTIONAL BLOCK DIAGRAM

Figure 2. Block Diagram

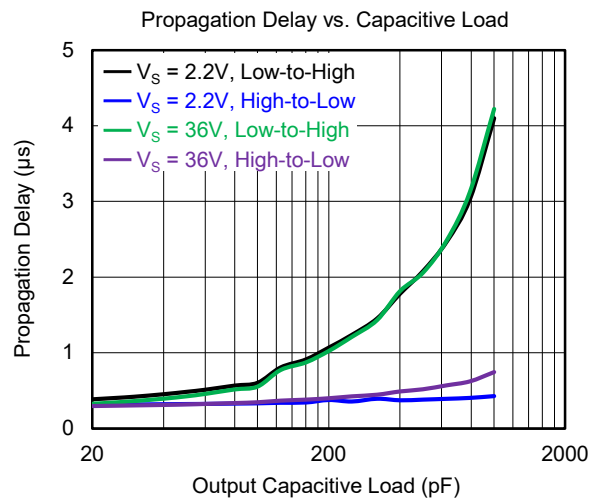
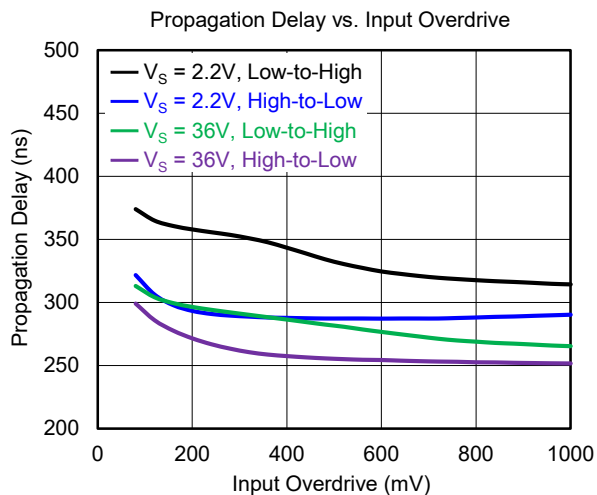
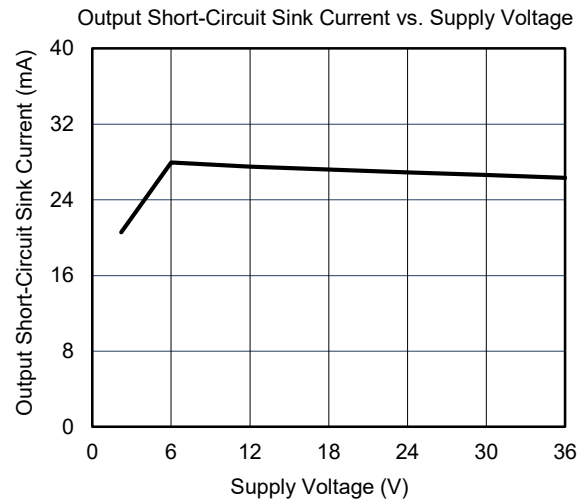
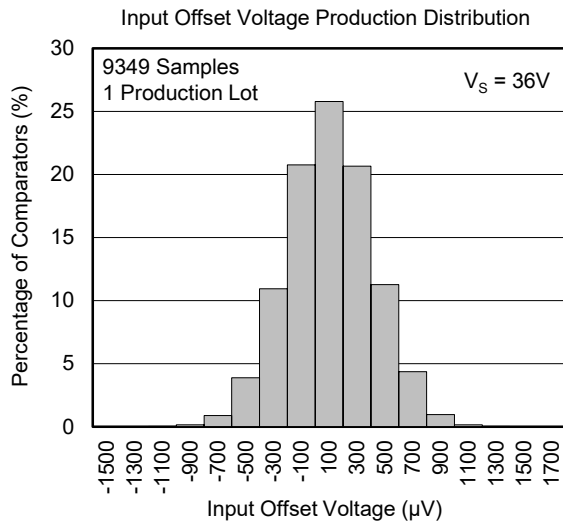
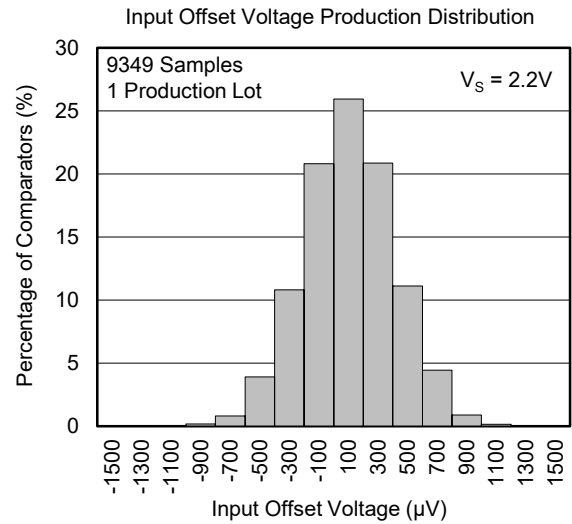
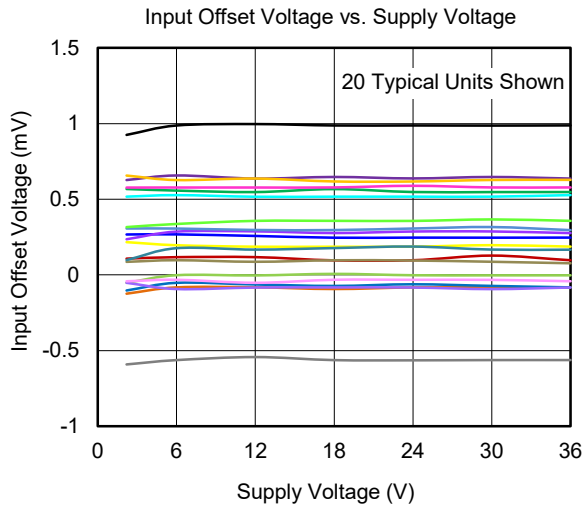
TYPICAL PERFORMANCE CHARACTERISTICS

$T_A = +25^\circ\text{C}$, $V_S = +5\text{V}$, $R_{\text{PULLUP}} = 5.1\text{k}\Omega$, and input overdrive = 100mV, unless otherwise noted.



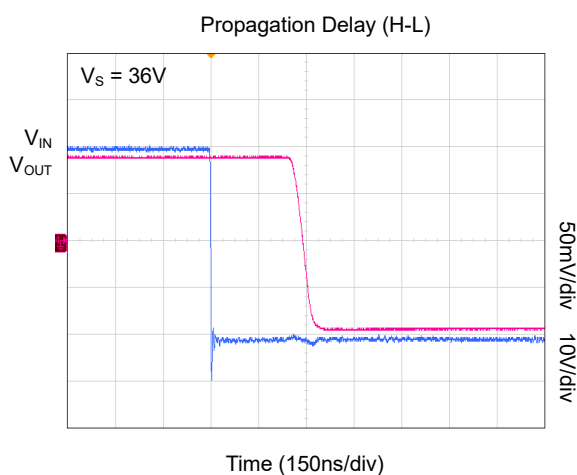
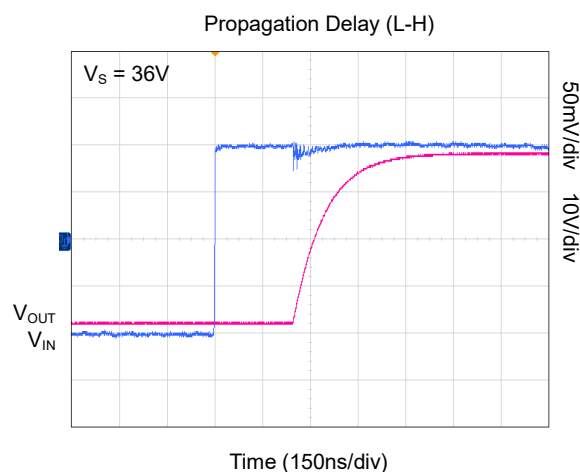
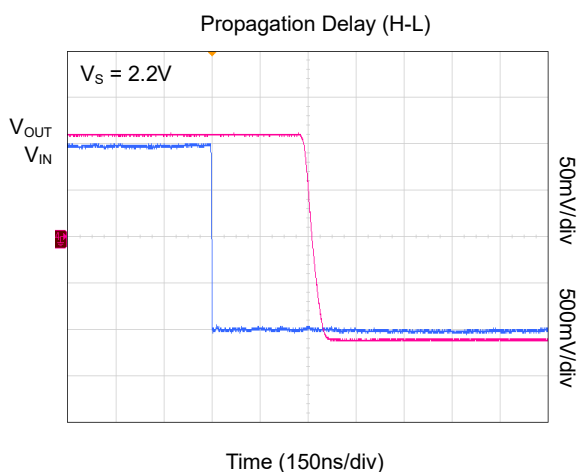
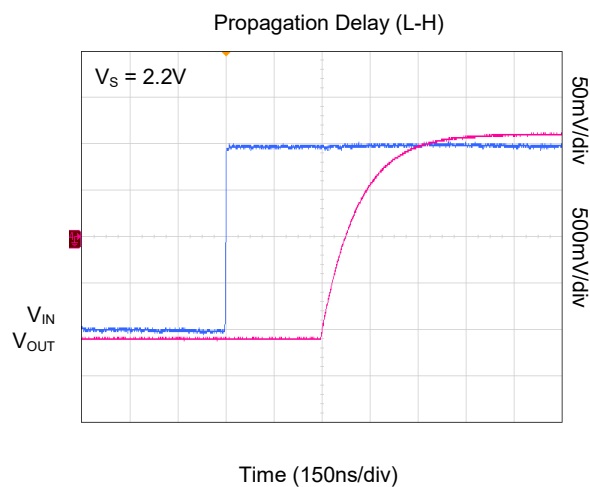
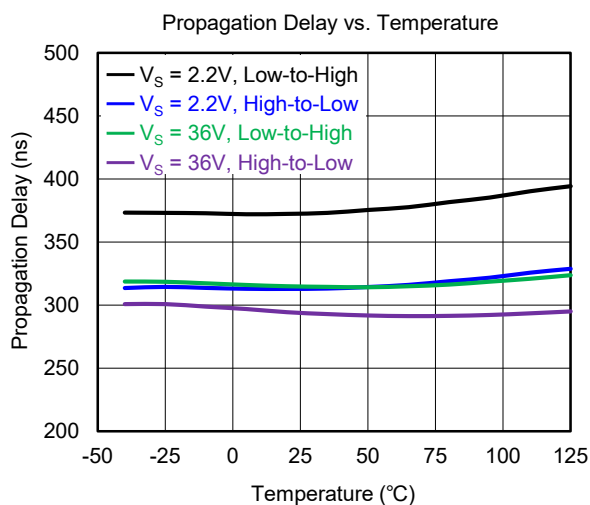
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_A = +25^\circ\text{C}$, $V_S = +5\text{V}$, $R_{\text{PULLUP}} = 5.1\text{k}\Omega$, and input overdrive = 100mV, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_A = +25^\circ\text{C}$, $V_S = +5\text{V}$, $R_{\text{PULLUP}} = 5.1\text{k}\Omega$, and input overdrive = 100mV, unless otherwise noted.



DETAILED DESCRIPTION

The SGM8782-2 is a dual, rail-to-rail input comparator. The device is optimized for low voltage operation from 2.2V to 36V single supply, consuming only 90 μ A quiescent current per comparator. The open-drain output makes it suitable for level shifting and wire-OR applications.

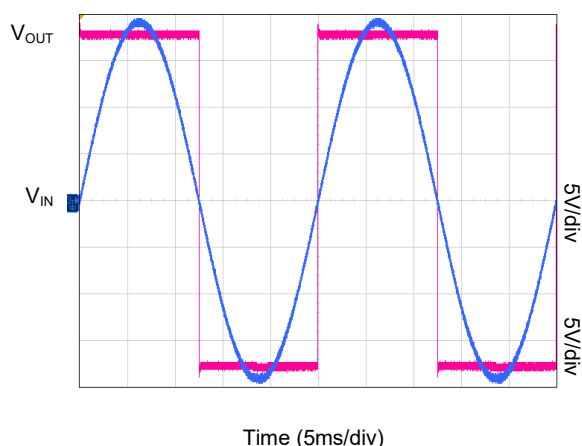


Figure 3. No Phase Inversion-Comparator Response to Input Voltage (Propagation Delay Included)

Comparator Inputs

The SGM8782-2 is a rail-to-rail input comparator whose input common mode range includes both supply rails. It is designed to prevent phase inversion even when the input voltage exceeds the supply, as demonstrated in Figure 3. Using a stable reference is important when setting the transition point for the SGM8782-2. The reference provides a 3V reference voltage, as shown in Figure 4.

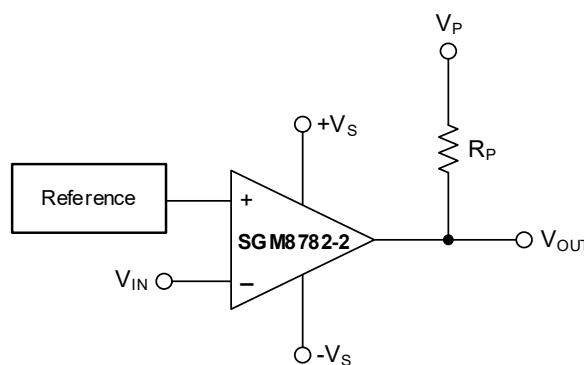


Figure 4. Reference Voltage for the SGM8782-2

APPLICATION INFORMATION

Typical Application

Adding External Hysteresis

The effect of significant input noise is an issue that has to be taken into consideration for applications with slow moving or noisy input signals. Figure 5 illustrates the SGM8782-2 inverting circuit with the external hysteresis. To meet output accuracy, $R_F > 100R_P$.

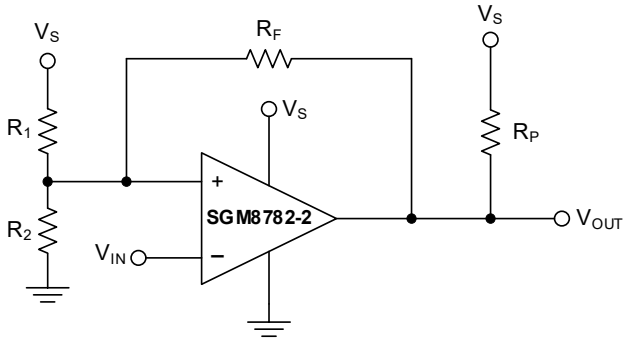


Figure 5. Inverting Configuration with Hysteresis of SGM8782-2

When the comparator output is high:

$$V_H = V_S \times R_2 / (R_2 + R_F \parallel R_1) \quad (1)$$

When the comparator output is low:

$$V_L = V_S \times (R_2 \parallel R_F) / (R_1 + R_F \parallel R_2) \quad (2)$$

$$V_{HYS} = V_H - V_L \quad (3)$$

Power Supply Bypassing

A clean and stable power supply is very important in comparator circuit design to minimize noise, glitch and temporary fluctuation. The power supply is one of the important sources of noise to the comparator through VCC pin. Power supply bypassing is an effective method to clear up the noise at power supply. The low impedance path to ground of decoupling capacitor will bypass the noise to GND. In applications, a 0.1μF to 1μF ceramic capacitor is always used, and this ceramic capacitor should be placed as close as possible to VCC pin.

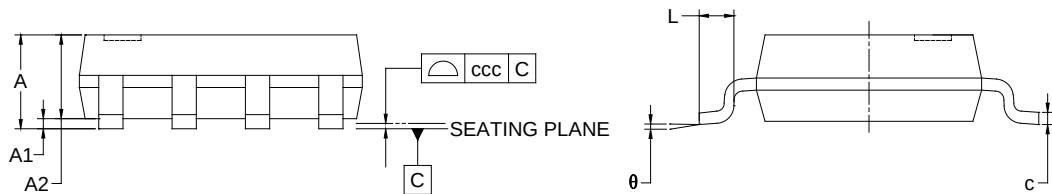
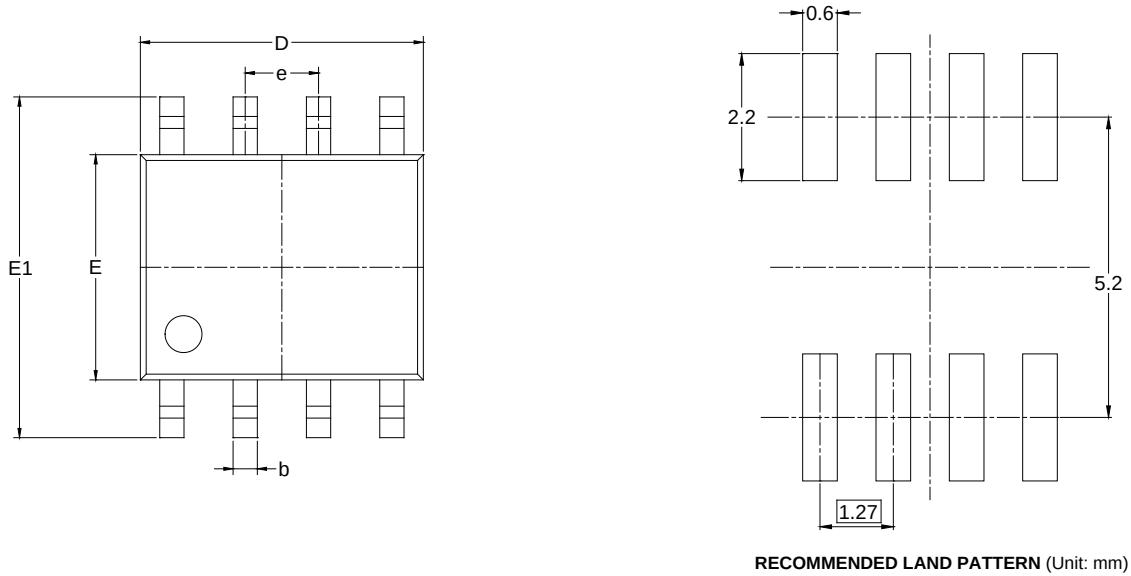
REVISION HISTORY

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

Changes from Original to REV.A (OCTOBER 2026)	Page
Changed from product preview to production data.....	All

PACKAGE OUTLINE DIMENSIONS

SOIC-8



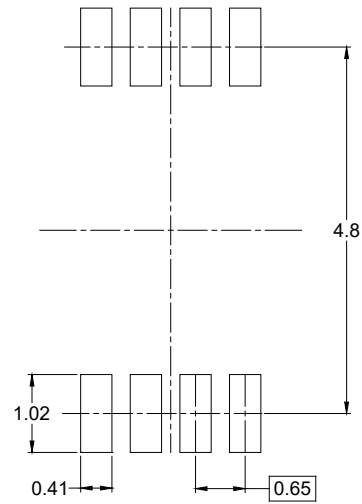
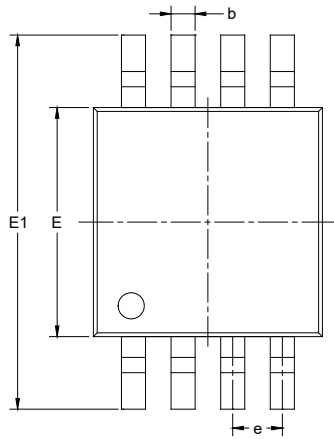
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	1.350	-	1.750
A1	0.100	-	0.250
A2	1.350	-	1.550
b	0.330	-	0.510
c	0.170	-	0.250
D	4.700	-	5.100
E	3.800	-	4.000
E1	5.800	-	6.200
e	1.270 BSC		
L	0.400	-	1.270
θ	0°	-	8°
ccc	0.100		

NOTES:

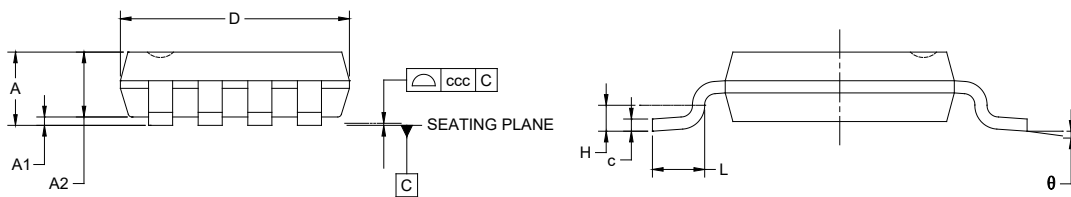
1. This drawing is subject to change without notice.
2. This dimension does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.15mm per side.
3. Reference JEDEC MS-012.

PACKAGE OUTLINE DIMENSIONS

MSOP-8



RECOMMENDED LAND PATTERN (Unit: mm)



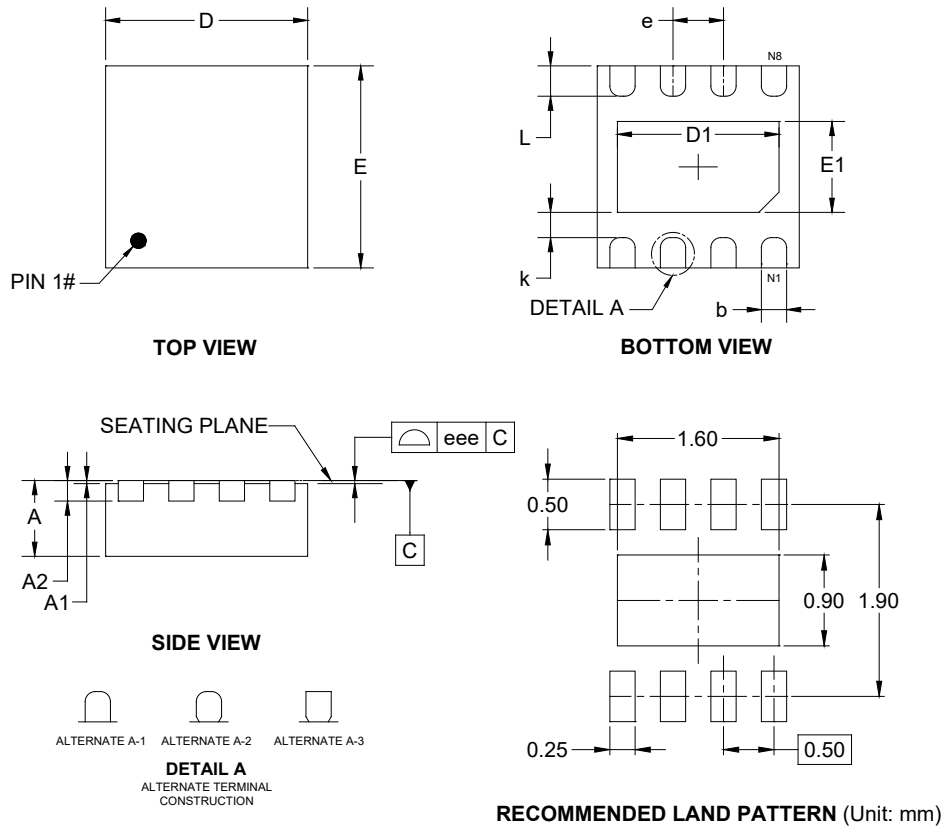
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.100
A1	0.000	-	0.150
A2	0.750	-	0.950
b	0.220	-	0.380
c	0.080	-	0.230
D	2.800	-	3.200
E	2.800	-	3.200
E1	4.650	-	5.150
e	0.650 BSC		
L	0.400	-	0.800
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

NOTES:

1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-187.

PACKAGE OUTLINE DIMENSIONS

TDFN-2×2-8AL



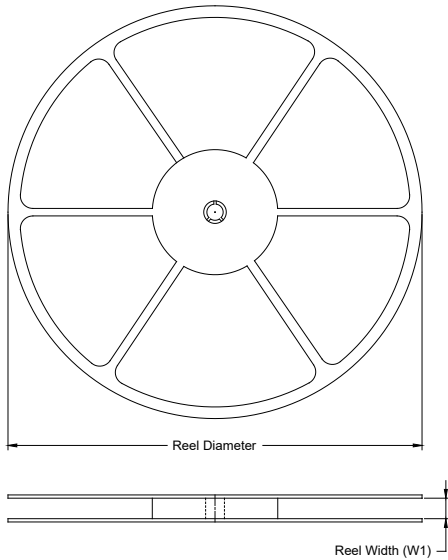
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.700	-	0.800
A1	0.000	-	0.050
A2	0.203 REF		
b	0.200	-	0.300
D	1.900	-	2.100
D1	1.450	-	1.700
E	1.900	-	2.100
E1	0.750	-	1.000
k	0.200	-	-
e	0.500 BSC		
L	0.200	-	0.400
eee	0.080		

NOTE: This drawing is subject to change without notice.

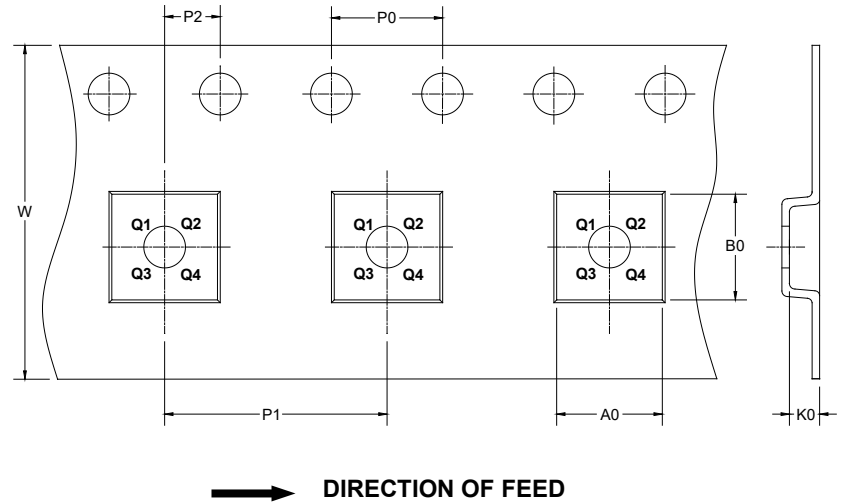
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

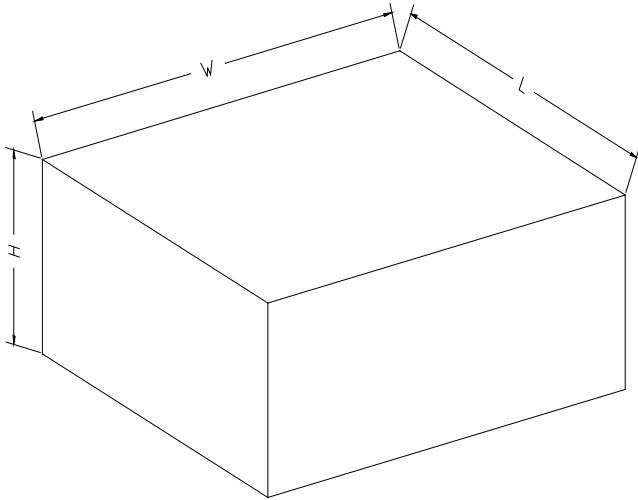
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOIC-8	13"	12.4	6.40	5.40	2.10	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-2×2-8AL	7"	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q2

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