

GENERAL DESCRIPTION

The SGM4062 is designed for front-end protection of Li-Ion battery charger.

The SGM4062 works like a linear regulator, and constantly monitors the input voltage and battery voltage to maintain an output voltage of 5.1V, and the input voltages reach the input over-voltage threshold ($V_{OV} = 6.8V$).

The SGM4062 has temperature monitoring function. When the temperature exceeds 145°C, the device will switch off. The SGM4062 provides a fault status indication when it is controlled by the processor.

The SGM4062 is available in Green TDFN-2×2-8L and MSOP-8 (Exposed Pad) packages and is rated over the -40°C to +85°C temperature range.

FEATURES

- Input Over-Voltage Protection
- Battery Over-Voltage Protection
- Up to 18V Input Voltage
- Up to 1.5A Load Current Capability
- Soft-Start and Soft-Stop Function
 - ◆ Prevent Inrush Currents and Voltage Spikes
- Thermal Shutdown Protection
- Enable Function
- Fault Status Indication
- Available in Green MSOP-8 (Exposed Pad) and TDFN-2×2-8L Packages

APPLICATIONS

Portable Internet Devices and Accessory
 Mobile Phones and PDAs
 Handheld Equipment
 MP3 Players

TYPICAL APPLICATION

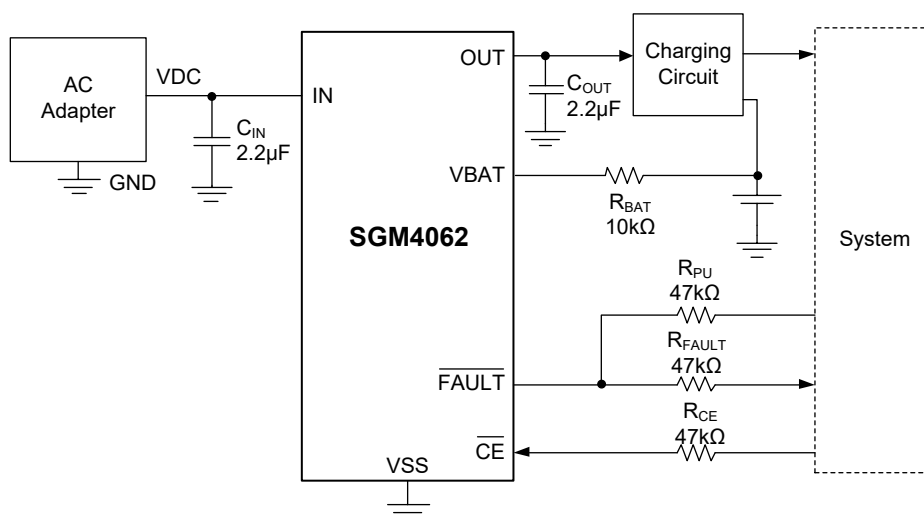


Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM4062	TDFN-2×2-8L	-40°C to +85°C	SGM4062YDE8G/TR	4062 XXXX	Tape and Reel, 3000
	MSOP-8 (Exposed Pad)	-40°C to +85°C	SGM4062YPMS8G/TR	SGM4062 YPMS8 XXXXX	Tape and Reel, 3000

NOTE: XXXX = Date Code. 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.

ABSOLUTE MAXIMUM RATINGS

Voltage Range (with Respect to VSS)

IN	-0.3V to 28V
OUT	-0.3V to MIN ($V_{IN} + 0.3V$, 6V)
\overline{FAULT} , \overline{CE} , VBAT	-0.3V to 6V
Output Source Current (OUT Pin).....	2A
Output Sink Current (\overline{FAULT} Pin).....	15mA
Package Thermal Resistance	
TDFN-2×2-8L, θ_{JA}	75°C/W
MSOP-8 (Exposed Pad), θ_{JA}	140°C/W
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s).....	+260°C
ESD Susceptibility	
HBM (SGM4062YPMS8G)	3000V
HBM (SGM4062YDE8G)	4000V
MM.....	200V

RECOMMENDED OPERATING CONDITIONS

IN Voltage Range, V_I	3.3V to 18V
Current, OUT Pin, I_O	1.5A (MAX)
Operating Temperature Range	-40°C to +85°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.

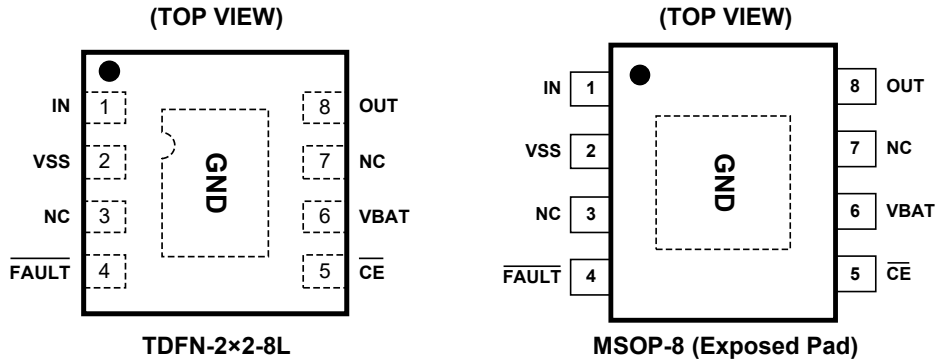
ESD SENSITIVITY CAUTION

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	FUNCTION
1	IN	Power Input Pin. Connect a ceramic capacitor (1μF MIN) between IN and VSS.
2	VSS	Ground Terminal. Connect to the thermal pad and to the ground.
3, 7	NC	No Connection.
4	FAULT	Open-Drain Device Status Output Pin.
5	CE	Active-Low Chip Enable Input Pin.
6	VBAT	Battery Voltage Sense Input Pin. Connect a 10kΩ resistor to pack positive terminal.
8	OUT	Output Terminal to the Charging System. Connect a ceramic capacitor (2.2μF MIN) between OUT and VSS.
Exposed Pad	GND	Exposed Pad. The exposed pad is electrically connected to VSS internally. The exposed pad must be connected to the same potential as the VSS pin on the printed circuit board. Do not use the thermal pad as the primary ground input for the device. VSS pin must be connected to ground at all times.

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, \overline{CE} = LOW, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
INPUT						
Under-Voltage Lockout, Input Power Detected Threshold	UVLO	V _{IN} = 0V to 3V	2.5	2.65	2.8	V
Hysteresis on UVLO	V _{hys(UVLO)}	V _{IN} = 3V to 0V		225		mV
Deglitch Time, Input Power Detected Status	t _{DGL(PGOOD)}	Time measured from V _{IN} = 0V to 5V, 1μs rise-time		9		ms
Operating Current	I _{DD}	V _{IN} = 5V, no load on OUT pin		185	260	μA
Standby Current	I _{STDBY}	\overline{CE} = HIGH, V _{IN} = 5.5V		0.5	2	μA
INPUT-TO-OUTPUT CHARACTERISTICS						
Q1 Off-State Leakage Current	I _{OFF}	\overline{CE} = HIGH, V _{IN} = 5.5V			5	μA
Dropout Voltage IN to OUT	V _{DO}	V _{IN} = 5V, I _{OUT} = 0.5A		120	170	mV
INPUT OVER-VOLTAGE PROTECTION						
Output Voltage	V _{O(REG)}	V _{IN} = 5.5 to V _{OVP} - V _{hys(OVP)} , no load on OUT pin	4.9	5.1	5.3	V
Input Over-Voltage Protection Threshold	V _{OVP}		6.35	6.8	7.05	V
Hysteresis on OVP	V _{hys(OVP)}		50	120	280	mV
Input Over-Voltage Protection Propagation Delay ⁽¹⁾	t _{PD(OVP)}	V _{IN} = 6V to 9V		200		ns
Recovery Time from Input Over-Voltage Condition	t _{REC(OVP)}	Time measured from V _{IN} = 9V to 6V, 1μs fall-time		9		ms
BATTERY OVER-VOLTAGE PROTECTION						
Battery Over-Voltage Protection Threshold	BV _{OVP}	V _{OVP} - V _{hys(OVP)} > V _{IN} > 4.5V	4.275	4.35	4.41	V
Hysteresis on BV _{OVP}	V _{hys(BVovp)}	V _{OVP} - V _{hys(OVP)} > V _{IN} > 4.5V	190	255	320	mV
Input Bias Current on VBAT Pin	I _{VBAT}			20	180	nA
Deglitch Time, Battery Over-Voltage Detected	t _{DGL(BVovp)}	V _{IN} > 4.5V, time measured from V _{VBAT} rising from 4.1V to 4.5V to \overline{FAULT} going low		180		μs
THERMAL PROTECTION						
Thermal Shutdown Temperature	T _{J(OFF)}			145		°C
Thermal Shutdown Hysteresis	T _{J(OFF-HYS)}			15		°C
LOGIC LEVELS ON \overline{CE}						
Logic LOW Input Voltage	V _{IL}				0.4	V
Logic HIGH Input Voltage	V _{IH}		1.4			V
Input LOW Current	I _{IL}			0.3	1.5	μA
Input HIGH Current	I _{IH}	V _{CE} = 1.8V		9	15	μA
LOGIC LEVELS ON \overline{FAULT}						
Output LOW Voltage	V _{OL}	I _{SINK} = 5mA		0.14	0.3	V
Off-State Leakage Current, HI-Z	I _{IKg}	V _{FAULT} = 5V		0.01	25	μA

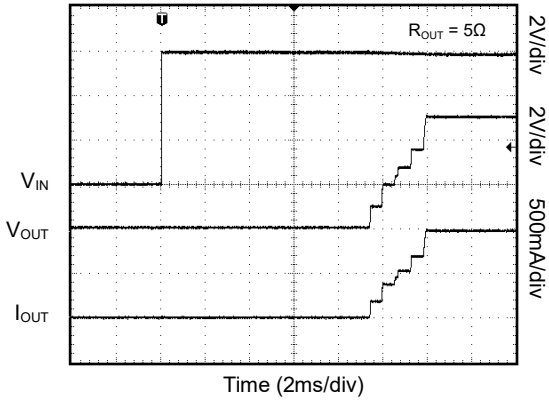
NOTE:

1. Not tested. Specified by design.

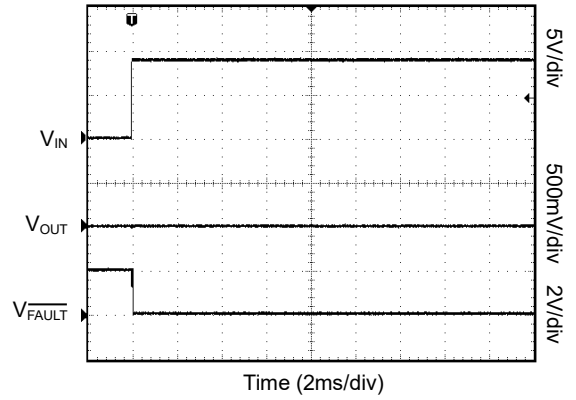
TYPICAL PERFORMANCE CHARACTERISTICS

T_A = +25°C, C_{IN} = C_{OUT} = 2.2µF, unless otherwise noted.

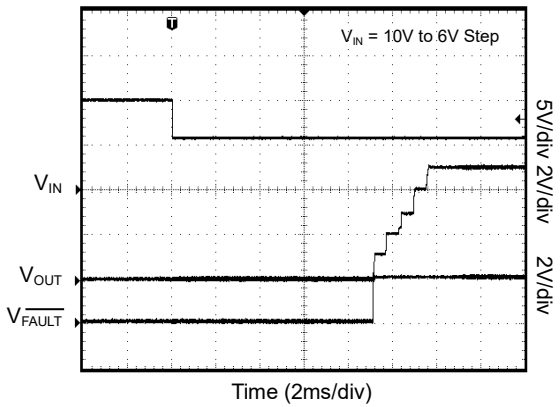
Normal Power-On Showing Soft-Start



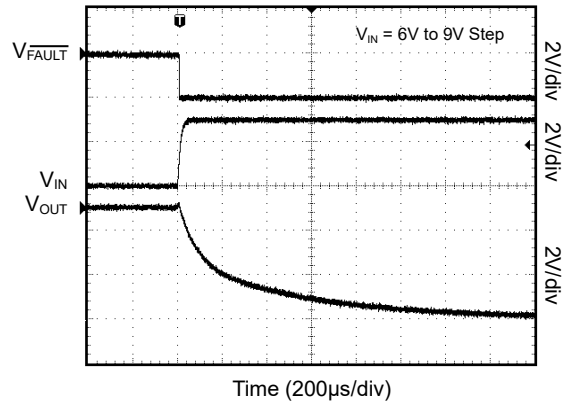
OVP at Power-On



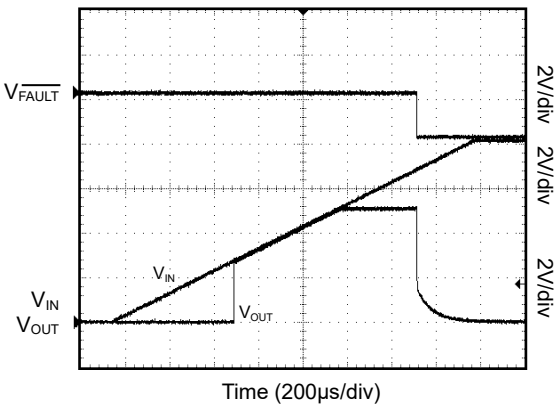
Recovery from OVP



OVP Response for Input Step

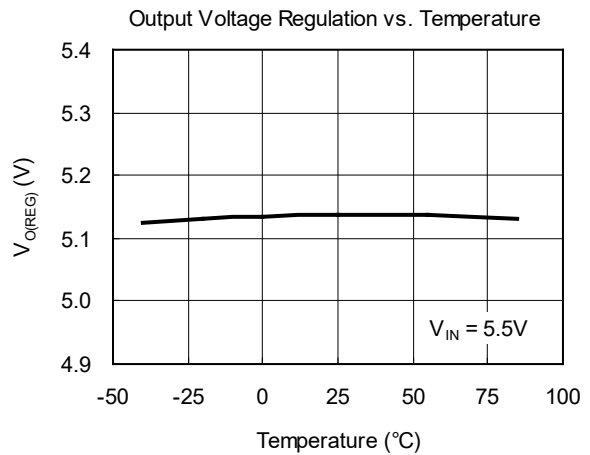
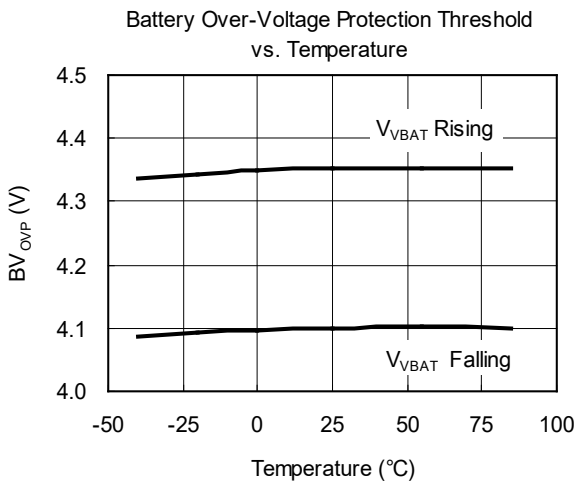
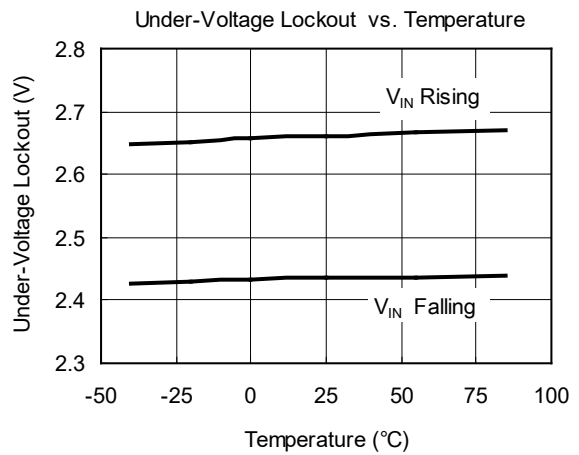
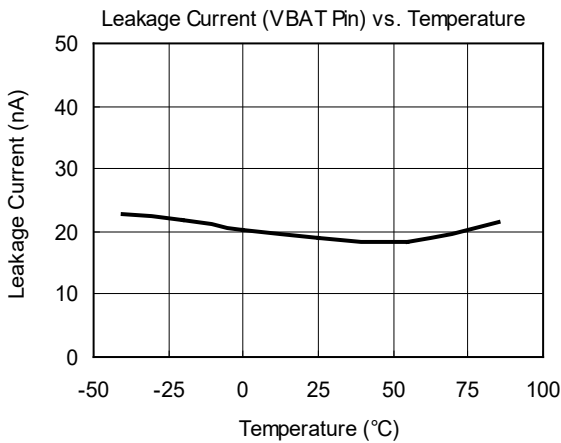
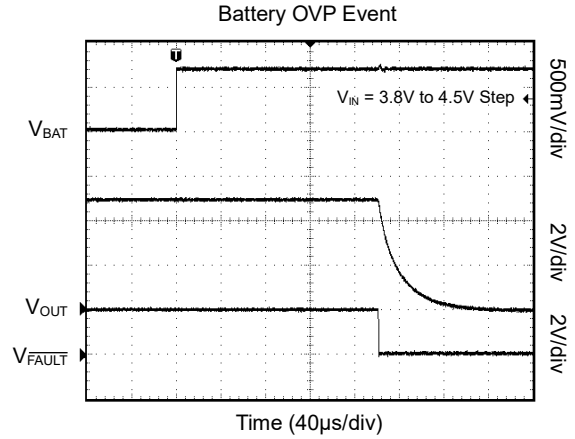
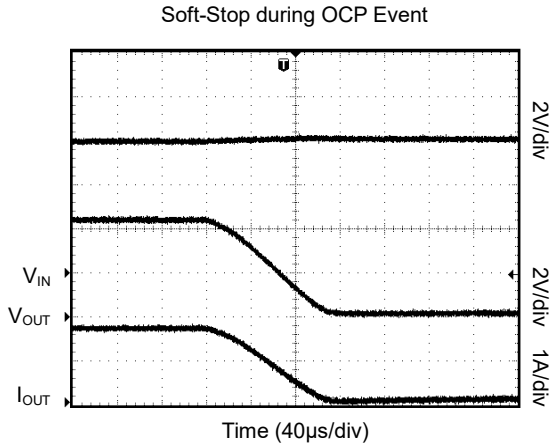


Slow Input Ramp into OVP Event



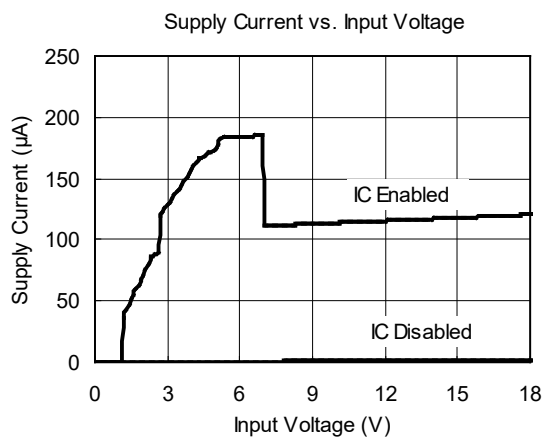
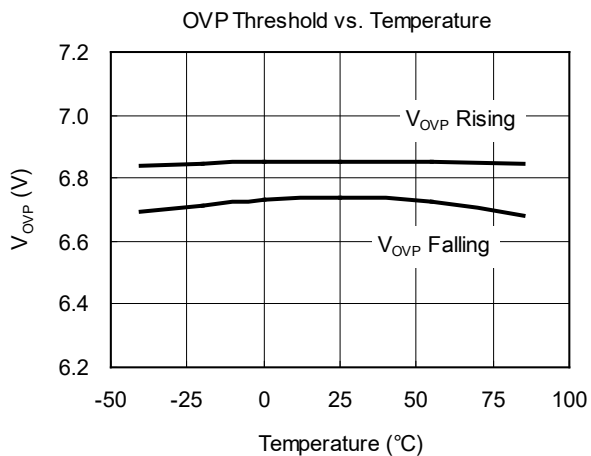
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_A = +25°C, C_{IN} = C_{OUT} = 2.2µF, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_A = +25°C, C_{IN} = C_{OUT} = 2.2μF, unless otherwise noted.



REVISION HISTORY

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

JANUARY 2016 – REV.A.1 to REV.A.2

Added Functional Block Diagram section..... 8

DECEMBER 2013 – REV.A to REV.A.1

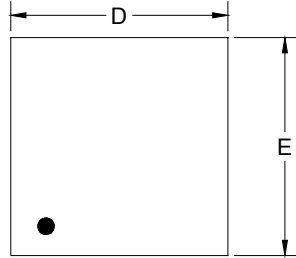
Added MSOP-8 (Exposed Pad) package..... All

Changes from Original (OCTOBER 2012) to REV.A

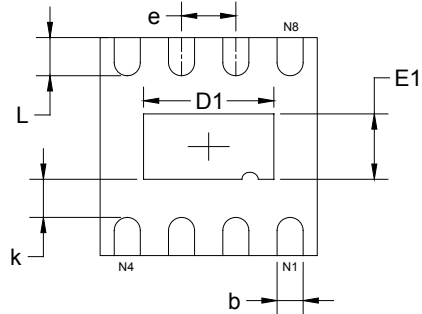
Changed from product preview to production data..... All

PACKAGE OUTLINE DIMENSIONS

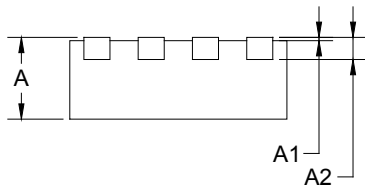
TDFN-2x2-8L



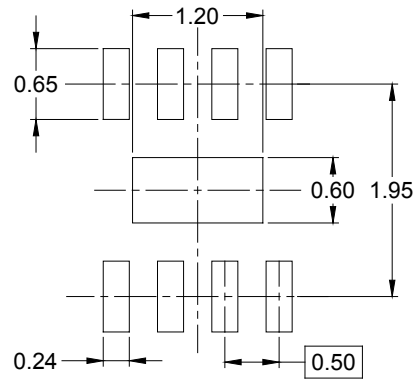
TOP VIEW



BOTTOM VIEW



SIDE VIEW

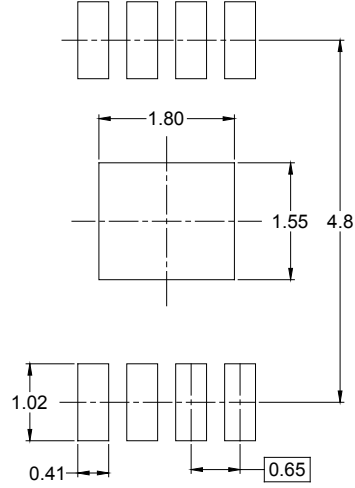
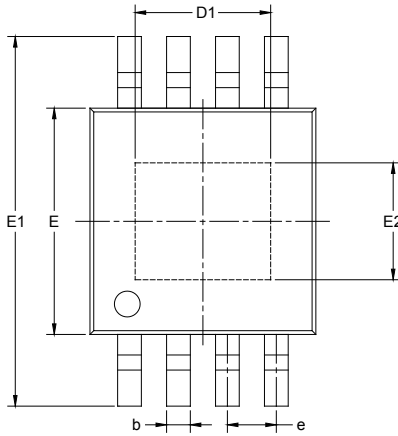


RECOMMENDED LAND PATTERN (Unit: mm)

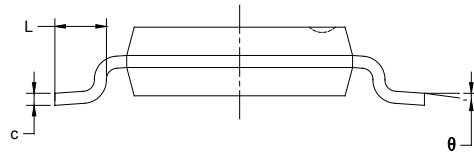
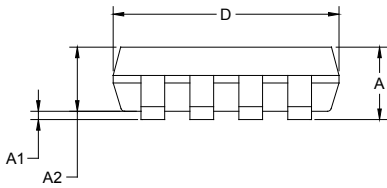
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	1.900	2.100	0.075	0.083
D1	1.100	1.300	0.043	0.051
E	1.900	2.100	0.075	0.083
E1	0.500	0.700	0.020	0.028
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007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

PACKAGE OUTLINE DIMENSIONS

MSOP-8 (Exposed Pad)



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
D1	1.700	1.900	0.067	0.075
e	0.65 BSC		0.026 BSC	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
E2	1.450	1.650	0.057	0.065
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

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
TDFN-2x2-8L	7"	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q1
MSOP-8 (Exposed Pad)	13"	12.4	5.20	3.30	1.50	4.0	8.0	2.0	12.0	Q1

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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