



# SGM7222

## High Speed USB 2.0 (480Mbps) DPDT Analog Switch

### GENERAL DESCRIPTION

The SGM7222 is a DPDT (double-pole/double-throw) analog switch. It operates from a 1.8V to 4.3V single power supply. Each switch of the SGM7222 is bidirectional, which can ensure that the high speed signals have little or no attenuation at the outputs.

The SGM7222 features high speed, low bit-to-bit skew and wide bandwidth. The high performances make it very suitable for multiple applications, such as cellular phones and computer peripherals, etc.

The SGM7222 has a power-off protection. It can prevent accidental signal leakage and ensure system reliability under power-down and over-voltage conditions. In addition, the device is capable of withstanding a  $V_{BUS}$  short to D+ or D- when the device is either powered on or powered off because of the special circuitry on the D+/D- pins.

The SGM7222 is available in Green TQFN-1.8×1.4-10L, MSOP-10 and UTQFN-1.8 × 1.4-10L packages. It operates over an ambient temperature range of -40°C to +85°C.

### APPLICATIONS

Cellular Phones  
Digital Cameras  
Portable Equipment  
Computer Peripherals  
Battery-Powered Systems  
Routes Signals for USB 2.0 Full-Speed

### FEATURES

- **Supply Voltage Range:** 1.8V to 4.3V
- **On-Resistance:** 4.5Ω (TYP) at 3V
- **High Off-Isolation:** -35dB ( $R_L = 50\Omega$ ,  $f = 250\text{MHz}$ )
- **Low Crosstalk:** -41dB ( $R_L = 50\Omega$ ,  $f = 250\text{MHz}$ )
- **Low Bit-to-Bit Skew:** 50ps (TYP)
- **-3dB Bandwidth:** 550MHz
- **Fast Switching Times:**
  - $t_{ON}$ : 10ns (TYP)
  - $t_{OFF}$ : 22ns (TYP)
- **Break-Before-Make Switching**
- **Rail-to-Rail Input and Output Operation**
- **Power-Off and Power-On Protections**
- **-40°C to +85°C Operating Temperature Range**
- **Available in Green MSOP-10, TQFN-1.8×1.4-10L and UTQFN-1.8×1.4-10L Packages**

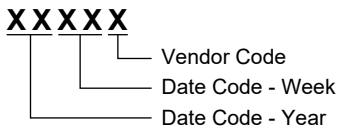
**PACKAGE/ORDERING INFORMATION**

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM7222	MSOP-10	-40°C to +85°C	SGM7222YMS10/TR	SGM7222 YMS10 XXXXX	Tape and Reel, 3000
	TQFN-1.8×1.4-10L	-40°C to +85°C	SGM7222YWQ10/TR	7222	Tape and Reel, 3000
	UTQFN-1.8×1.4-10L	-40°C to +85°C	SGM7222YUWQ10/TR	CAA XXX	Tape and Reel, 3000

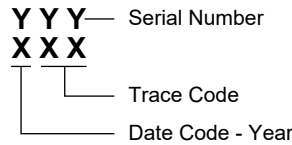
**MARKING INFORMATION**

NOTE: XXX = Date Code and Trace Code. XXXXX = Date Code and Vendor Code.

**MSOP-10**



**UTQFN-1.8×1.4-10L**



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<sub>+</sub> to GND .....0V to 4.6V
- Analog, Digital Voltage Range ..... -0.3V to (V<sub>+</sub>) + 0.3V
- Continuous Current HSDn or Dn ..... ±100mA
- Peak Current HSDn or Dn ..... ±150mA
- Junction Temperature .....+150°C
- Storage Temperature Range ..... -65°C to +150°C
- Lead Temperature (Soldering, 10s) .....+260°C
- ESD Susceptibility
- HBM..... 8000V
- MM..... 400V

**RECOMMENDED OPERATING CONDITIONS**

- 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.

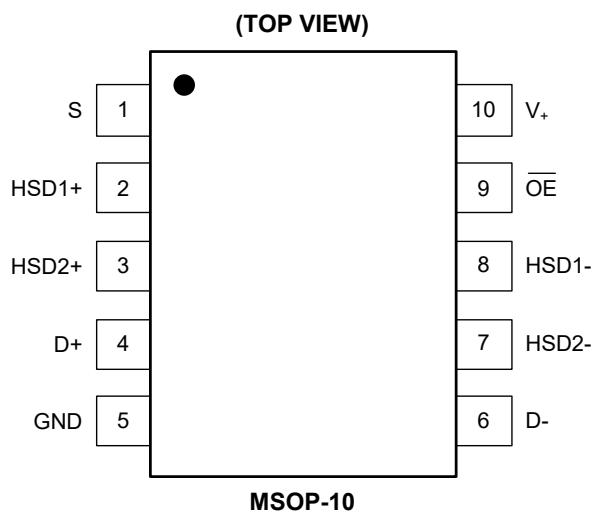
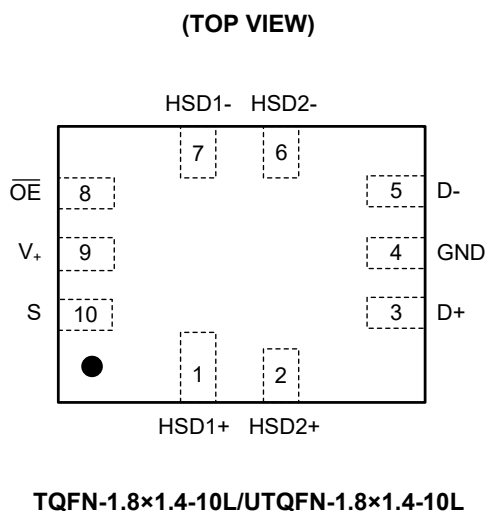
**ESD SENSITIVITY CAUTION**

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
TQFN-1.8x1.4-10L/ UTQFN-1.8x1.4-10L	MSOP-10		
1, 2	2, 3	HSD1+, HSD2+	Data Ports.
3, 5	4, 6	D+, D-	
7, 6	8, 7	HSD1-, HSD2-	
4	5	GND	Ground.
8	9	OE	Enable Control Pin.
9	10	V+	Positive Power Supply.
10	1	S	Select Input Pin.

**FUNCTION TABLE**

OE	S	HSD1+ HSD1-	HSD2+ HSD2-
0	0	ON	OFF
0	1	OFF	ON
1	x	OFF	OFF

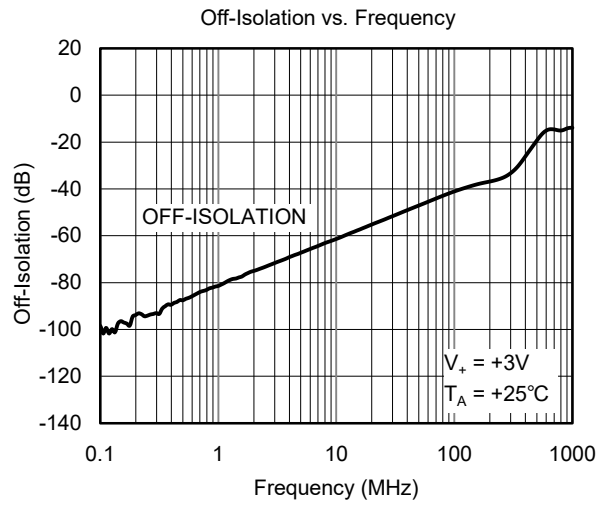
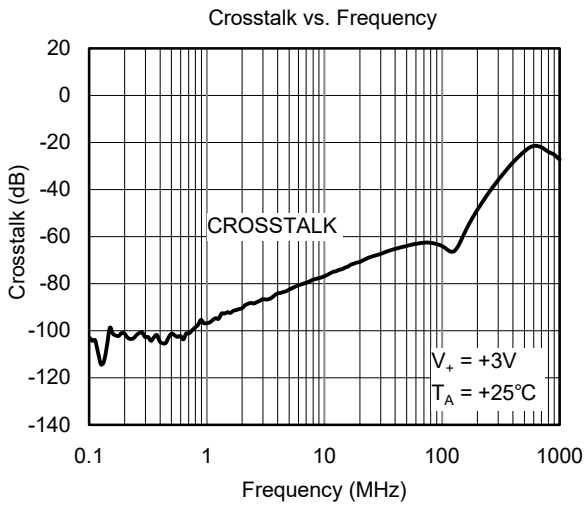
NOTE: Switches shown for logic "0" input.

## ELECTRICAL CHARACTERISTICS

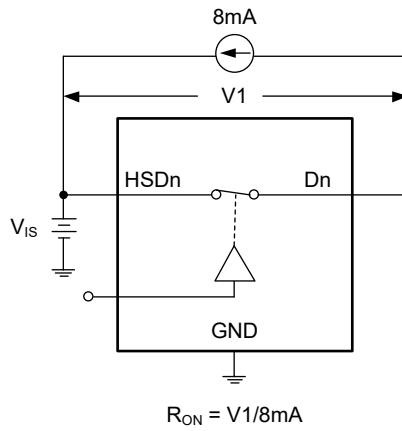
( $V_+ = 1.8V$  to  $4.3V$ ,  $GND = 0V$ ,  $V_{IH} = 1.6V$ ,  $V_{IL} = 0.5V$ , Full =  $-40^\circ C$  to  $+85^\circ C$ . Typical values are at  $V_+ = 3.3V$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
<b>Analog Switch</b>							
Analog I/O Voltage (HSD1+, HSD1-, HSD2+, HSD2-)	$V_{IS}$		Full	0		$V_+$	V
On-Resistance	$R_{ON}$	$V_+ = 3V$ , $V_{IS} = 0V$ to $0.4V$ , $I_D = 8mA$ , Test Circuit 1	+25°C		4.5	8.5	$\Omega$
			Full			9	
On-Resistance Match Between Channels	$\Delta R_{ON}$	$V_+ = 3V$ , $V_{IS} = 0V$ to $0.4V$ , $I_D = 8mA$ , Test Circuit 1	+25°C		0.15	0.6	$\Omega$
			Full			1.6	
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_+ = 3V$ , $V_{IS} = 0V$ to $1V$ , $I_D = 8mA$ , Test Circuit 1	+25°C		1.5	2.0	$\Omega$
			Full			2.6	
Power Off Leakage Current (D+, D-)	$I_{OFF}$	$V_+ = 0V$ , $V_D = 0V$ to $3.6V$ , $V_S$ , $V_{OE} = 0V$ or $3.6V$	Full			1	$\mu A$
Increase in $I_+$ per Control Voltage	$I_{CCT}$	$V_+ = 3.6V$ , $V_S$ or $V_{OE} = 2.6V$	Full			5	$\mu A$
Source Off Leakage Current	$I_{HSD2(OFF)}$ , $I_{HSD1(OFF)}$	$V_+ = 3.6V$ , $V_{IS} = 3.3V/0.3V$ , $V_D = 0.3V/3.3V$	Full			1	$\mu A$
Channel On Leakage Current	$I_{HSD2(ON)}$ , $I_{HSD1(ON)}$	$V_+ = 3.6V$ , $V_{IS} = 3.3V/0.3V$ , $V_D = 3.3V/0.3V$ or floating	Full			1	$\mu A$
<b>Digital Inputs</b>							
Input High Voltage	$V_{IH}$		Full	1.6			V
Input Low Voltage	$V_{IL}$		Full			0.5	V
Input Leakage Current	$I_{IN}$	$V_+ = 3V$ , $V_S$ , $V_{OE} = 0V$ or $V_+$	Full			1	$\mu A$
<b>Dynamic Characteristics</b>							
Turn-On Time	$t_{ON}$	$V_{IS} = 0.8V$ , $R_L = 50\Omega$ , $C_L = 10pF$ , Test Circuit 2	+25°C		10		ns
Turn-Off Time	$t_{OFF}$		+25°C		22		ns
Break-Before-Make Time Delay	$t_D$	$V_{IS} = 0.8V$ , $R_L = 50\Omega$ , $C_L = 10pF$ , Test Circuit 3	+25°C		4		ns
Propagation Delay	$t_{PD}$	$R_L = 50\Omega$ , $C_L = 10pF$	+25°C		0.3		ns
Off Isolation	$O_{ISO}$	Signal = 0dBm, $R_L = 50\Omega$ , $f = 250MHz$ , Test Circuit 4	+25°C		-35		dB
Channel-to-Channel Crosstalk	$X_{TALK}$	Signal = 0dBm, $R_L = 50\Omega$ , $f = 250MHz$ , Test Circuit 5	+25°C		-41		dB
-3dB Bandwidth	BW	Signal = 0dBm, $R_L = 50\Omega$ , $C_L = 5pF$ , Test Circuit 6	+25°C		550		MHz
Channel-to-Channel Skew	$t_{SKEW}$	$R_L = 50\Omega$ , $C_L = 10pF$	+25°C		0.05		ns
Charge Injection Select Input to Common I/O	Q	$V_S = GND$ , $C_L = 1nF$ , $R_S = 0\Omega$ , $Q = C_L \times V_{OUT}$ , Test Circuit 7	+25°C		11		pC
HSD+, HSD-, D+, D- On Capacitance	$C_{ON}$		+25°C		6.5		pF
<b>Power Requirements</b>							
Power Supply Range	$V_+$		Full	1.8		4.3	V
Power Supply Current	$I_+$	$V_+ = 3V$ , $V_S$ , $V_{OE} = 0V$ or $V_+$	Full			1	$\mu A$

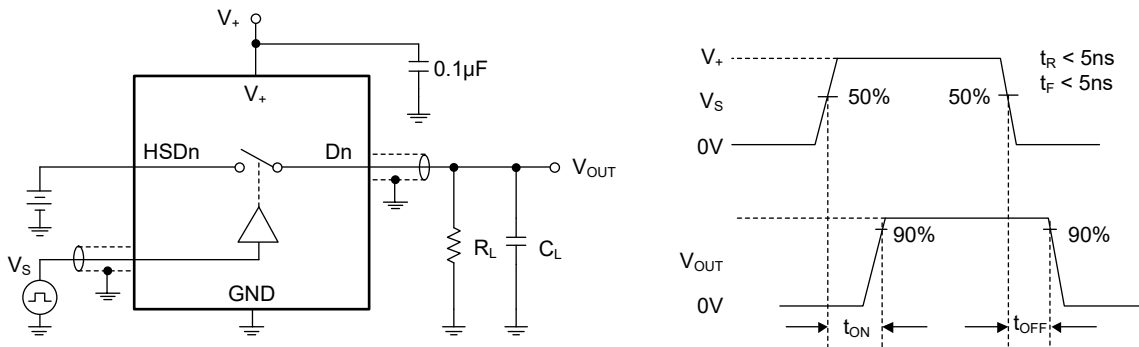
TYPICAL PERFORMANCE CHARACTERISTICS



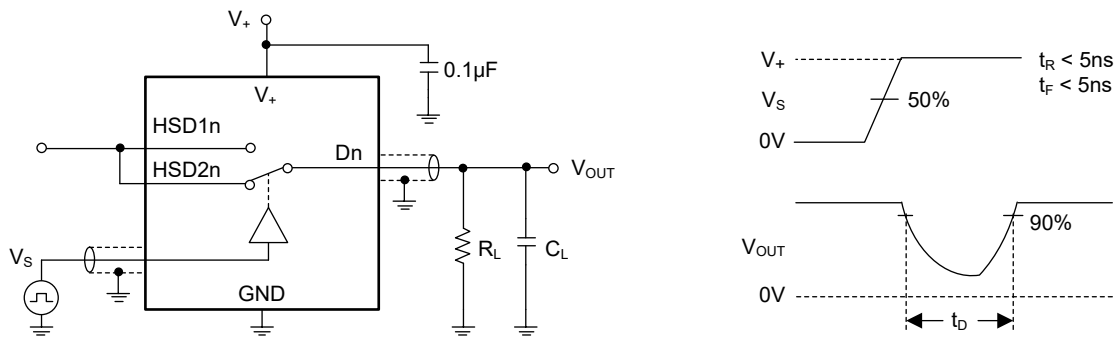
TEST CIRCUITS



Test Circuit 1. On-Resistance

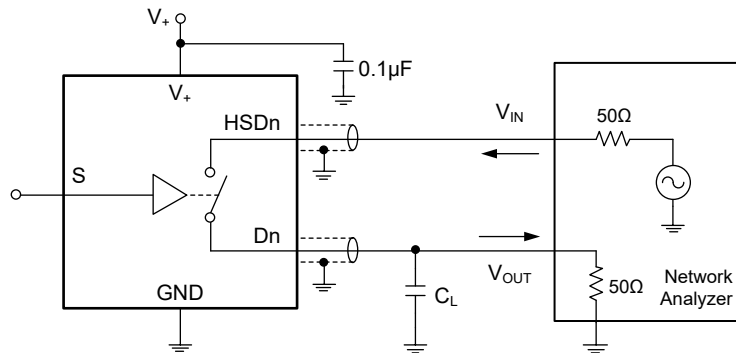


Test Circuit 2. Switching Times ( $t_{ON}$ ,  $t_{OFF}$ )

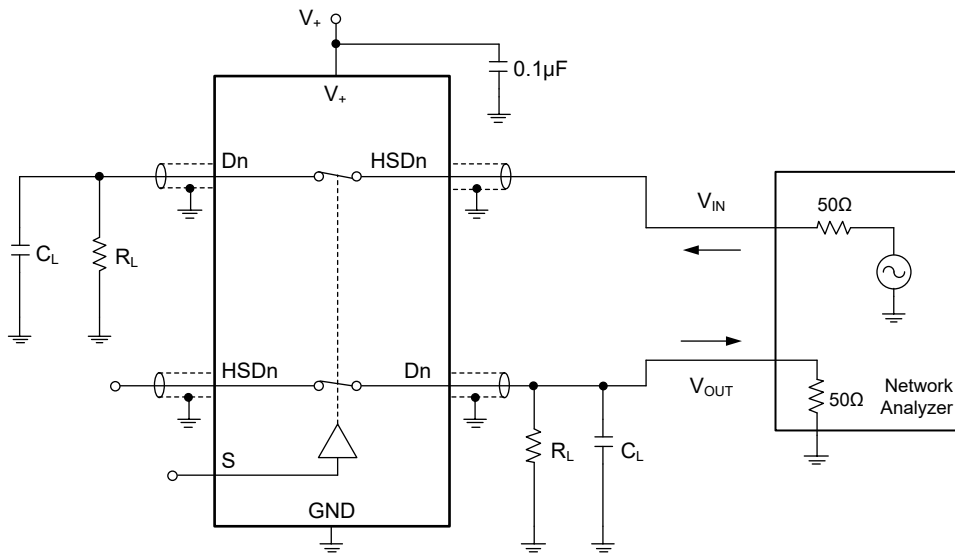


Test Circuit 3. Break-Before-Make Time ( $t_D$ )

TEST CIRCUITS (continued)



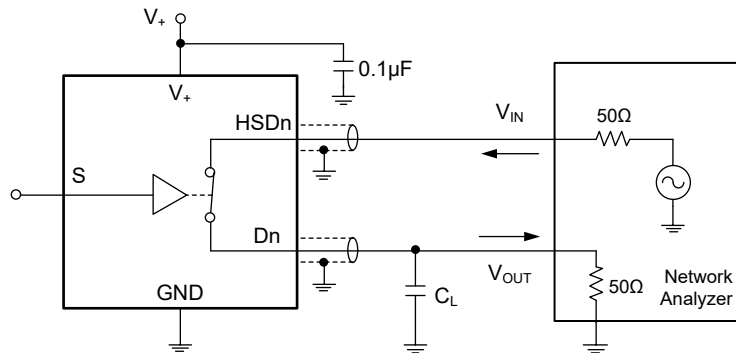
Test Circuit 4. Off Isolation



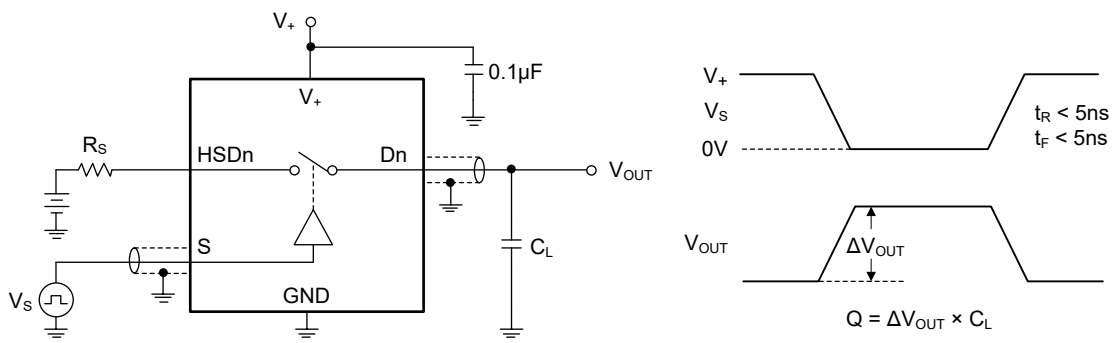
$$\text{Channel-to-Channel Crosstalk} = -20 \log (V_{\text{HSDn}}/V_{\text{OUT}})$$

Test Circuit 5. Channel-to-Channel Crosstalk

TEST CIRCUITS (continued)



Test Circuit 6. -3dB Bandwidth



Test Circuit 7. Charge Injection (Q)



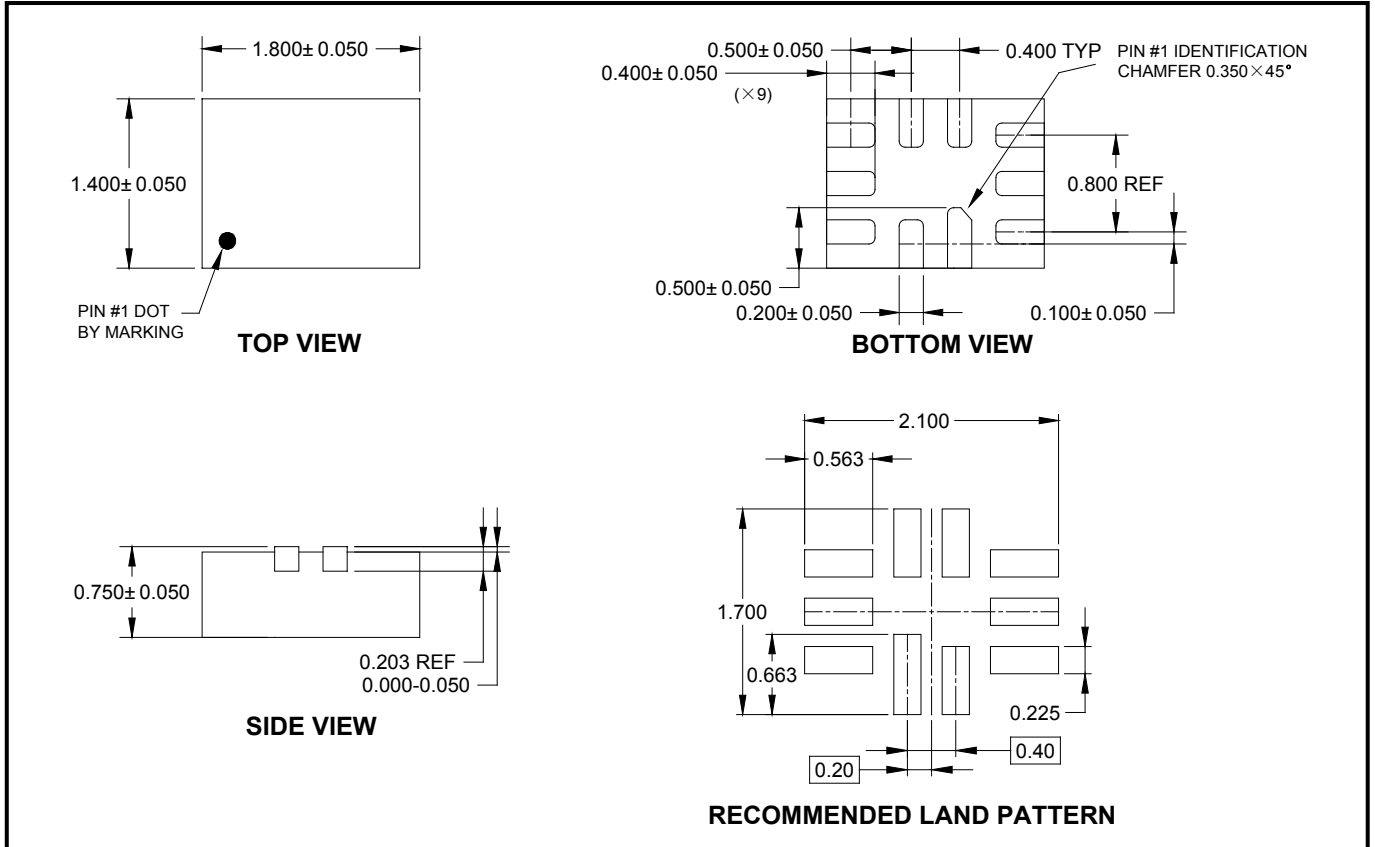
**REVISION HISTORY**

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

	Page
<b>JUNE 2021 – REV.B.3 to REV.B.4</b>	
Updated Package Outline Dimensions section .....	13
<b>APRIL 2019 – REV.B.2 to REV.B.3</b>	
Updated Package/Ordering Information section .....	2
<b>MAY 2014 – REV.B.1 to REV.B.2</b>	
Updated Absolute Maximum Ratings section .....	2
<b>JANUARY 2013 – REV.B to REV.B.1</b>	
Added Recommended Land Pattern section .....	12, 13, 14
Added Tape and Reel Information section .....	15, 16
<b>MAY 2011 – REV.A.3 to REV.B</b>	
Updated package option .....	All
<b>MARCH 2011 – REV.A.2 to REV.A.3</b>	
Updated Package Outline Dimensions section .....	12, 13, 14
<b>FEBRUARY 2010 – REV.A.1 to REV.A.2</b>	
Updated Test Circuits section .....	6, 8
<b>SEPTEMBER 2009– REV.A to REV.A.1</b>	
Added new package .....	All
Updated Absolute Maximum Ratings section .....	2
<b>Changes from Original (DECEMBER 2008) to REV.A</b>	
Changed from product preview to production data .....	All

PACKAGE OUTLINE DIMENSIONS

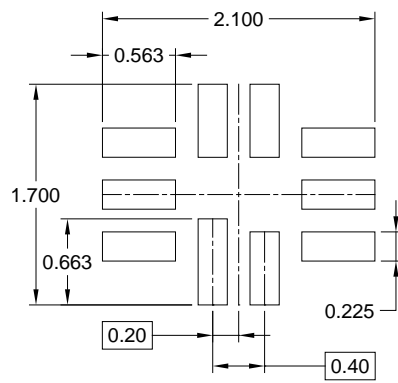
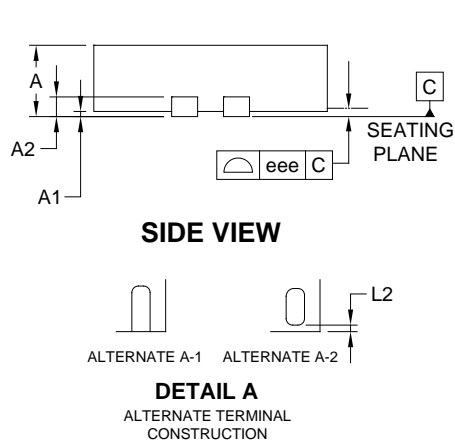
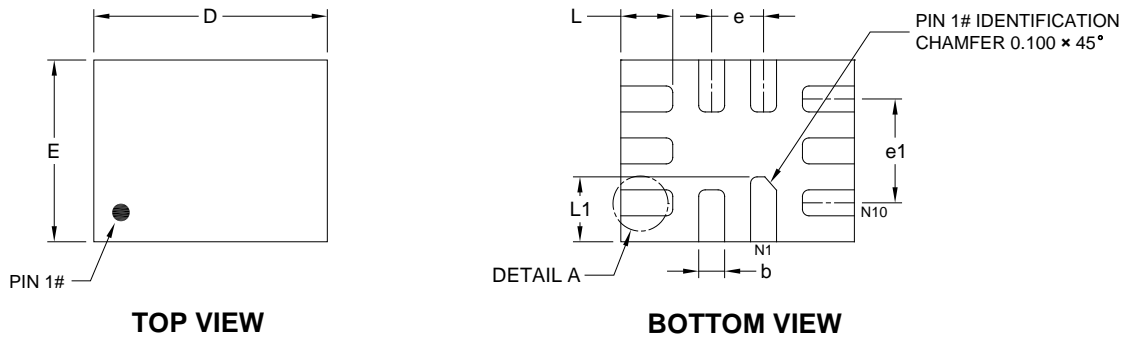
TQFN-1.8×1.4-10L



NOTE: All linear dimensions are in millimeters.

PACKAGE OUTLINE DIMENSIONS

UTQFN-1.8x1.4-10L



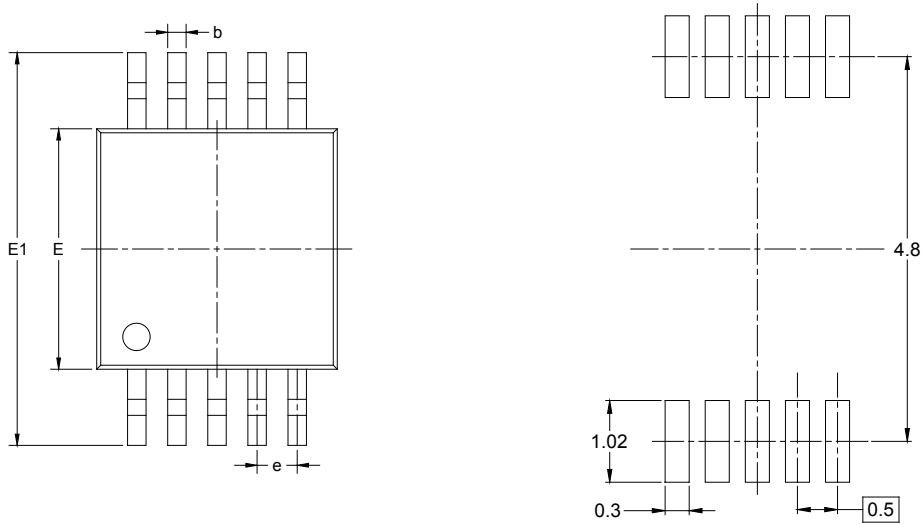
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.450	-	0.600
A1	0.000	-	0.050
A2	0.152 REF		
b	0.150	0.200	0.250
D	1.750	1.800	1.850
E	1.350	1.400	1.450
e	0.400 TYP		
e1	0.800 REF		
L	0.350	0.400	0.450
L1	0.450	0.500	0.550
L2	0.000	-	0.100
eee	-	0.080	-

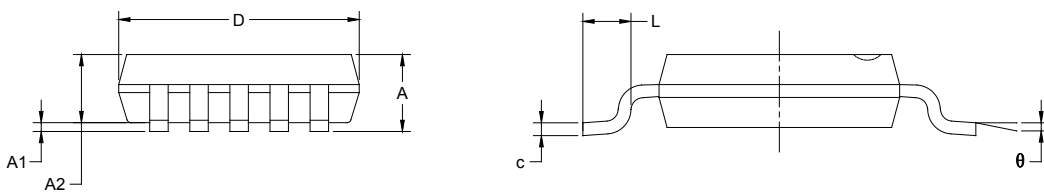
NOTE: This drawing is subject to change without notice.

## PACKAGE OUTLINE DIMENSIONS

### MSOP-10



RECOMMENDED LAND PATTERN (Unit: mm)

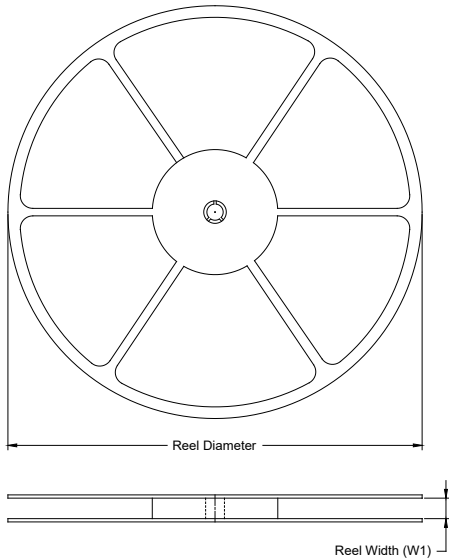


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.180	0.280	0.007	0.011
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.500 BSC		0.020 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

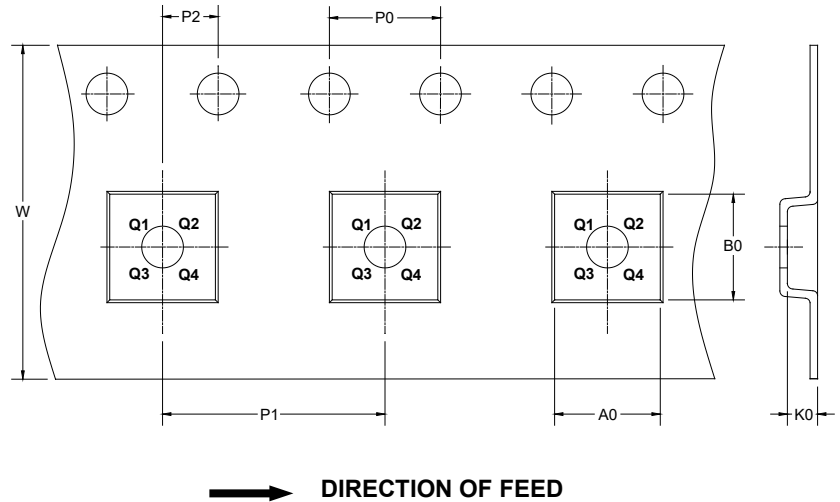
# PACKAGE INFORMATION

## 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-1.8×1.4-10L	7"	9.0	1.75	2.10	1.00	4.0	4.0	2.0	8.0	Q1
UTQFN-1.8×1.4-10L	7"	9.0	1.75	2.10	0.70	4.0	4.0	2.0	8.0	Q1
MSOP-10	13"	12.4	5.20	3.30	1.20	4.0	8.0	2.0	12.0	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

单击下面可查看定价，库存，交付和生命周期等信息

[>>SGMICRO\(圣邦微电子\)](#)