

GENERAL DESCRIPTION

The GS7227 is a high-speed, low-power double-pole/ double-throw (DPDT) analog switch that operates from a single 5.5V power supply.

GS7227 is designed for the switching of high-speed USB 2.0 signals in handset and consumer applications, such as cell phones, digital cameras, and notebooks with hubs or controllers with limited USB I/Os.

The GS7227 has low bit-to-bit skew and high channel-to-channel noise isolation, and is compatible with various standards, such as high-speed USB 2.0 (480 Mbps). Each switch is bidirectional and offers little or no attenuation of the high-speed signals at the outputs. Its bandwidth is wide enough to pass high-speed USB 2.0 differential signals (480 Mb/s) with good signal integrity.

The GS7227 contains special circuitry on the D+/D- pins which allows the device to withstand a VBUS short to D+ or D- when the USB devices are either powered off or powered on.

GS7227 is available in Green UTQFN1.8×1.4-10L and MSOP10 packages. It operates over an ambient temperature range of -40°C to +85°C.

Feature

- R_{ON} is Typically 5Ω at 3.0V
- Voltage Operation: 5.5V
- Fast Switching Times:
 t_{ON} 15ns
 t_{OFF} 20ns
- Crosstalk: -30dB at 250MHz
- Off-Isolation: -35dB at 250MHz
- Rail-to-Rail Input and Output Operation
- Break-Before-Make Switching
- Extended Industrial Temperature Range: -40°C to +85°C
- Available in Green UTQFN1.8×1.4-10L and MSOP10、HFBP1.4x1.8-10 Packages

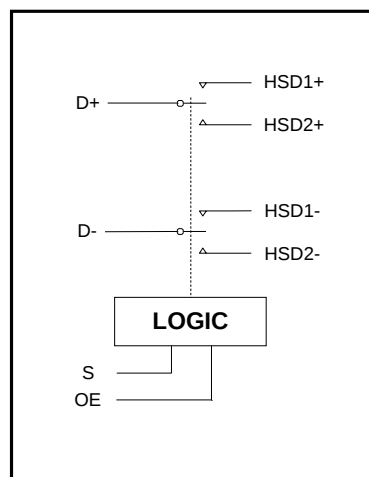
APPLICATIONS

- Route Signals for USB 2.0
- MP3 and Other Personal Media Players
- Digital Cameras and Camcorders
- Portable Instrumentation
- Set-Top Box
- PDAs

ORDERING INFORMATION

Model	PIN-PACKAGE	Ordering Number	Packing Option
GS7227	MOP10	GS7227-MR	3000ea/Reel
	UTQFN1.8×1.4-10L	GS7227-FR	3000ea/Reel
	HFBP1.4×1.8-10	GS7227-HFR	3000ea/Reel

BLOCK DIAGRAM

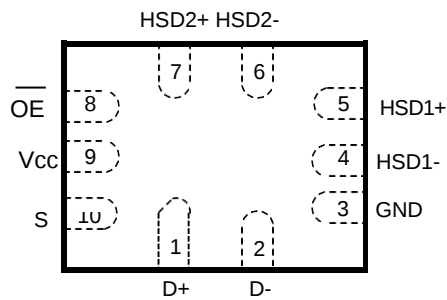
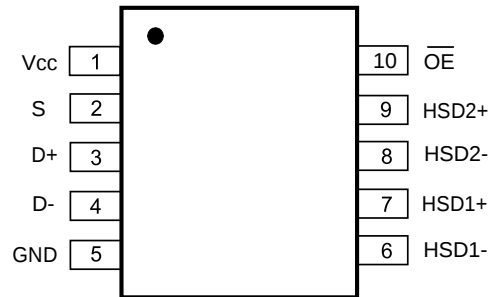


ABSOLUTE MAXIMUM RATINGS

Parameter	Min.	Typ.	Max.	Unit	Note
V _{CC} to GND	-		5.5	V	
Analog, Digital voltage range	-0.3		V _{CC} +0.3	V	
Continuous Current HSDn or Dn	-50		+50	mA	
Peak Current HSDn or Dn	-100		+100	mA	
Operating Temperature Range	-40		+85	°C	
Junction Temperature			+150	°C	
Storage Temperature	-65		+150	°C	
Lead Temperature (soldering, 10s)	—		+260	°C	
ESD Susceptibility			4000V	V	HBM (UTQFN1.8×1.4-10L)
			400V	V	MM (UTQFN1.8×1.4-10L)

Note: Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Pin Description


UTQFN1.8x1.4-10L/HFBP1.4x1.8-10

MSOP10
Table 1 Pin Description

PIN		NAME	FUNCTION
UTQFN1.8x1.4-10L/HFBP1.4x1.8-10	MSOP10		
9	1	V _{CC}	Power Supply
3	5	GND	Ground
10	2	S	Select Input
8	10	OE	Output Enable
5	7	HSD1+	Multiplexed Source Inputs
4	6	HSD1-	Multiplexed Source Inputs
7	9	HSD2+	Multiplexed Source Inputs
6	8	HSD2-	Multiplexed Source Inputs
1	3	D+	USB Data Bus
2	4	D-	USB Data Bus

Table 2 Function table

OE	S	HSD1+, HSD1-	HSD2+, HSD2-
0	0	ON	OFF
0	1	OFF	ON
1	×	OFF	OFF

Note: Switches Shown For Logic "0" Input.

ELECTRICAL CHARACTERISTICS

($V_{CC} = +3.3V$, $T_A = +25^{\circ}C$, unless otherwise noted.)

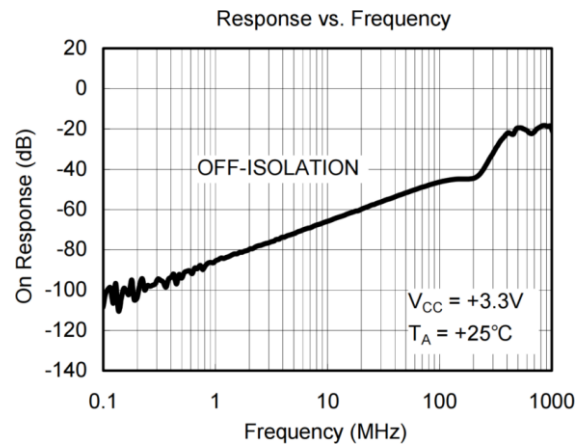
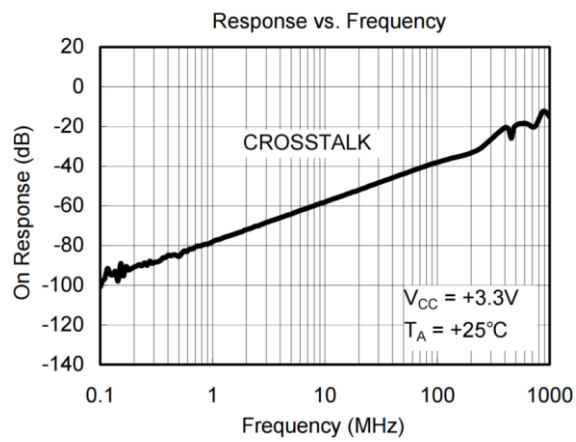
Parameter	Symbol	Note/Test Condition	Values			Unit
			Min.	Typ.	Max.	
ANALOG SWITCH						
Analog I/O Voltage (HSD1+, HSD1-, HSD2+, HSD2-)	V_{IS}		0		V_{CC}	V
On-Resistance	R_{ON}	V_{CC} =3.0V, V_{IS} =0V to 0.4V, I_D =8mA, Test Circuit 1		5	9	Ω
On-Resistance Match Between Channels	ΔR_{ON}	V_{CC} =3.0V, V_{IS} =0V to 0.4V, I_D =8mA, Test Circuit 1		0.3	0.8	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	V_{CC} =3.0V, V_{IS} =0V to 1.0V, I_D =8mA, Test Circuit 1		1	2	Ω
Power Off Leakage Current (D+, D-)	I_{OFF}	V_{CC} =0V, V_D =0V to 3.6V, V_S , V_{OE} =0V or 3.6V			1	μA
Increase in I_{CC} per Control Voltage	I_{CCT}	V_{CC} =3.6V, V_S , V_{OE} =2.6V			5	μA
Source Off Leakage Current	$I_{HSD2(OFF)}$ $I_{HSD1(OFF)}$	V_{CC} =3.6V, V_{IS} =3.3V/0.3V, V_D =0.3V/3.3V			1	μA
Channel On Leakage Current	$I_{HSD2(ON)}$ $I_{HSD1(ON)}$	V_{CC} =3.6V, V_{IS} =3.3V/0.3V, V_D =0.3V/3.3V or floating			1	μA
DIGITAL INPUTS						
Input High Voltage	V_{IH}		1.6			V
Input Low Voltage	V_{IL}				0.5	V
Input Leakage Current	I_{IN}	V_{CC} =3.0V, V_S , V_{OE} =0V or V_{CC}			1	μA
DYNAMIC CHARACTERISTICS						
Turn-On Time	t_{0N}	V_{IS} =0.8V, R_L =50 Ω , C_L =10pF, Test Circuit 2			15	ns
Turn-Off Time	t_{OFF}				20	ns
Break-Before-Make Time Delay	t_D	V_{IS} =0.8V, R_L =50 Ω , C_L =10pF, Test Circuit 3			3.5	ns
Propagation Delay	t_{PD}	R_L =50 Ω , C_L =10pF			0.5	ns
Off Isolation	O_{ISO}	Signal = 0dBm, R_L = 50 Ω , f =250MHz, Test Circuit 4			-35	dB

ELECTRICAL CHARACTERISTICS

($V_{CC} = +3.3V$, $T_A = +25^{\circ}C$, unless otherwise noted.)

Parameter	Symbol	Note/Test Condition	Values			Unit
			Min.	Typ.	Max.	
Channel-to-Channel Crosstalk	X_{TALK}	Signal = 0dBm, $R_L = 50\Omega$, $f=250MHz$, Test Circuit 5			-30	dB
-3dB Bandwidth	BW	Signal = 0dBm, $R_L = 50\Omega$, $C_L=5pF$, Test Circuit 6			550	MHz
Channel-to-Channel Skew	t_{SKEW}	$R_L = 50\Omega$, $C_L=10pF$			130	ps
Charge Injection Select Input to Common I/O	Q	$V_G=GND$, $C_L=1.0nF$, $R_G=0\Omega$, $Q=C_{Lx} V_{OUT}$, Test Circuit 7			10	pC
HSD+, HSD-, D+, D- ON Capacitance	C_{ON}	$f=1MHz$			6.5	pF
		$f=250MHz$			7	
POWER REQUIREMENTS						
Power Supply Range	V_{CC}		1.8		4.3	V
Power Supply Current	I_{CC}	$V_{CC} = 3.0V$, V_S , $V_{OE}=0V$ or V_{CC}			1	μA

TYPICAL PERFORMANCE CHARACTERISTICS



TEST CIRCUITS

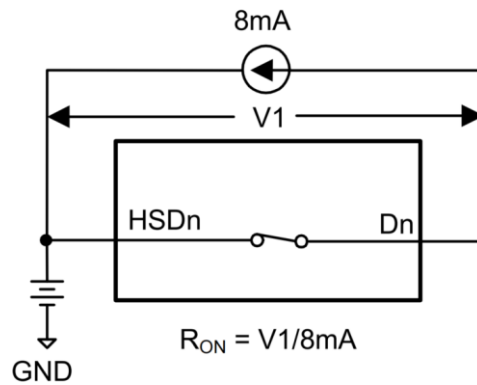


Figure 1 Off Isolation

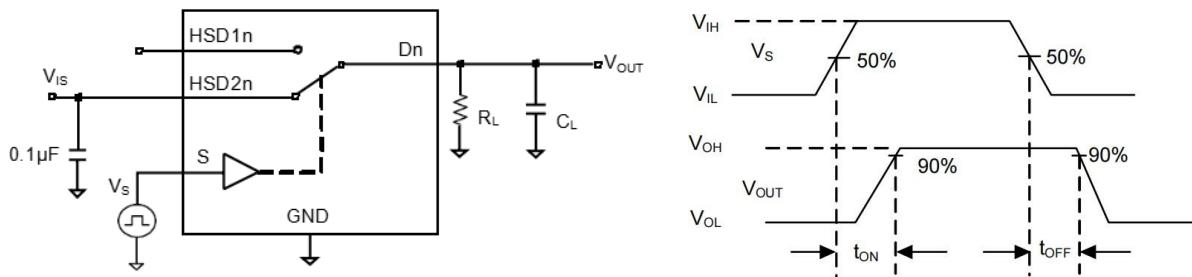


Figure 2 Switching Times (t_{ON}, t_{OFF})

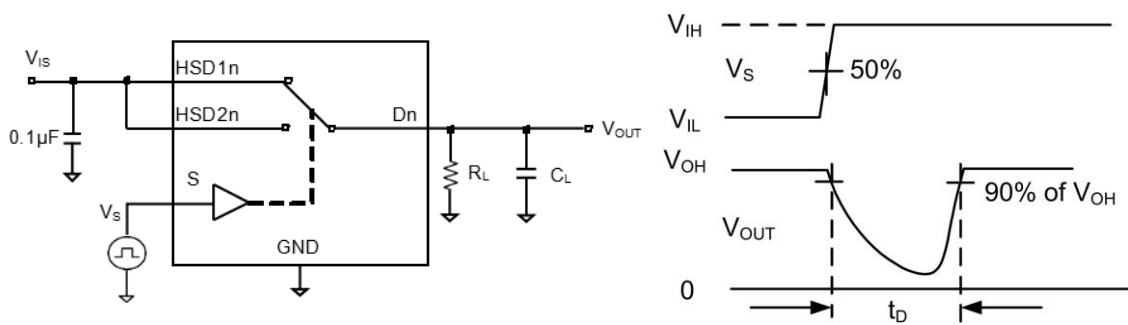


Figure 3 Break-Before-Make Time (t_D)

TEST CIRCUITS (Cont.)

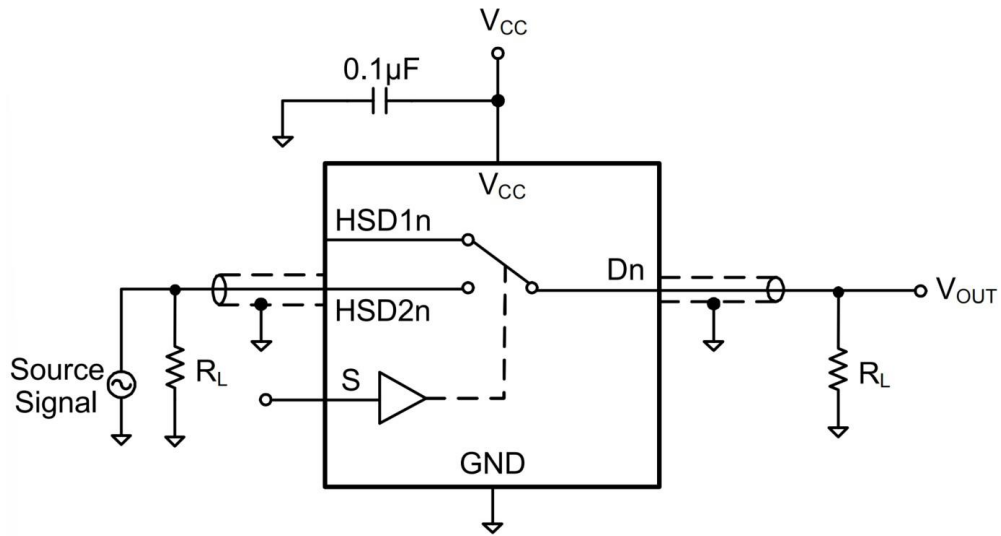
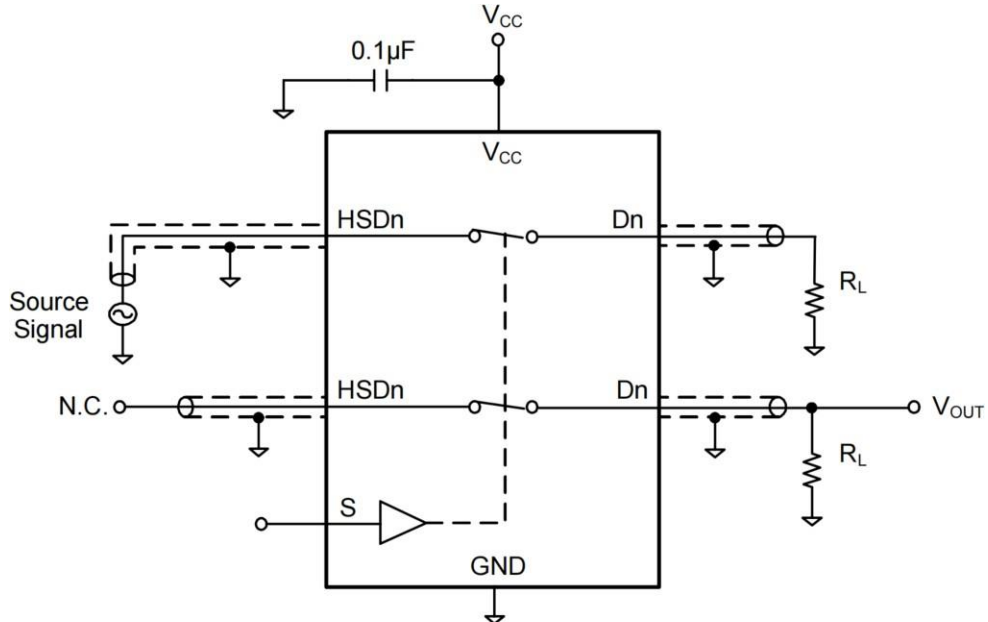


Figure 4 ff Isolation



$$\text{Channel To Channel Crosstalk} = -20 \times \log \frac{V_{\text{HSDn}}}{V_{\text{OUT}}}$$

Figure 5 Channel-to-Channel Crosstalk

TEST CIRCUITS (Cont.)

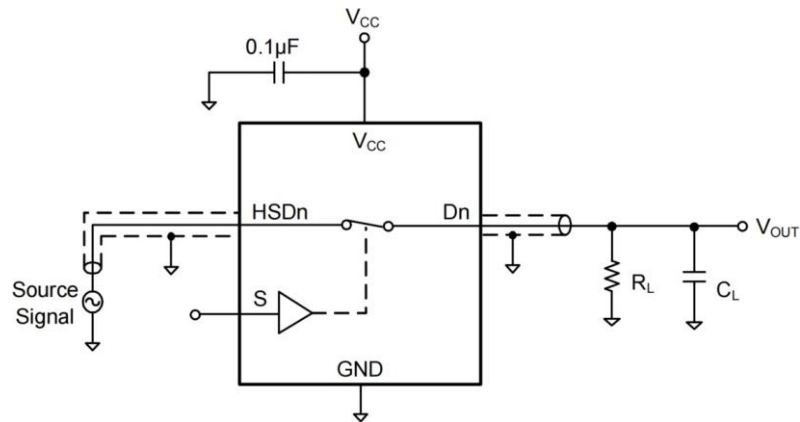


Figure 6 -3dB Bandwidth

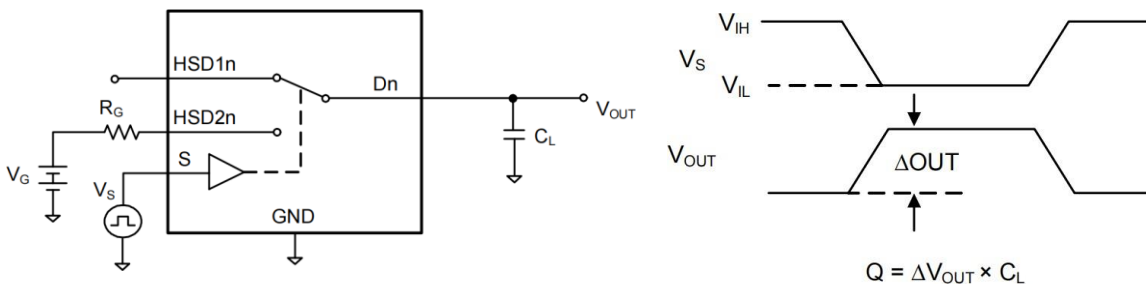
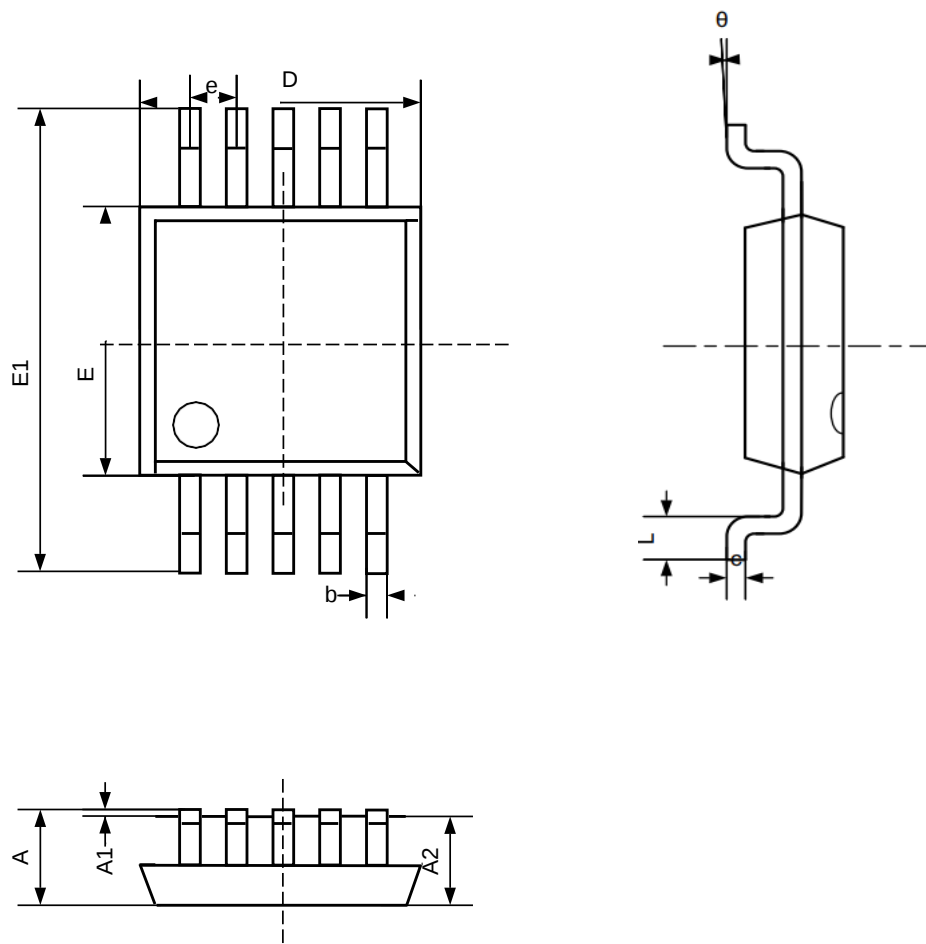


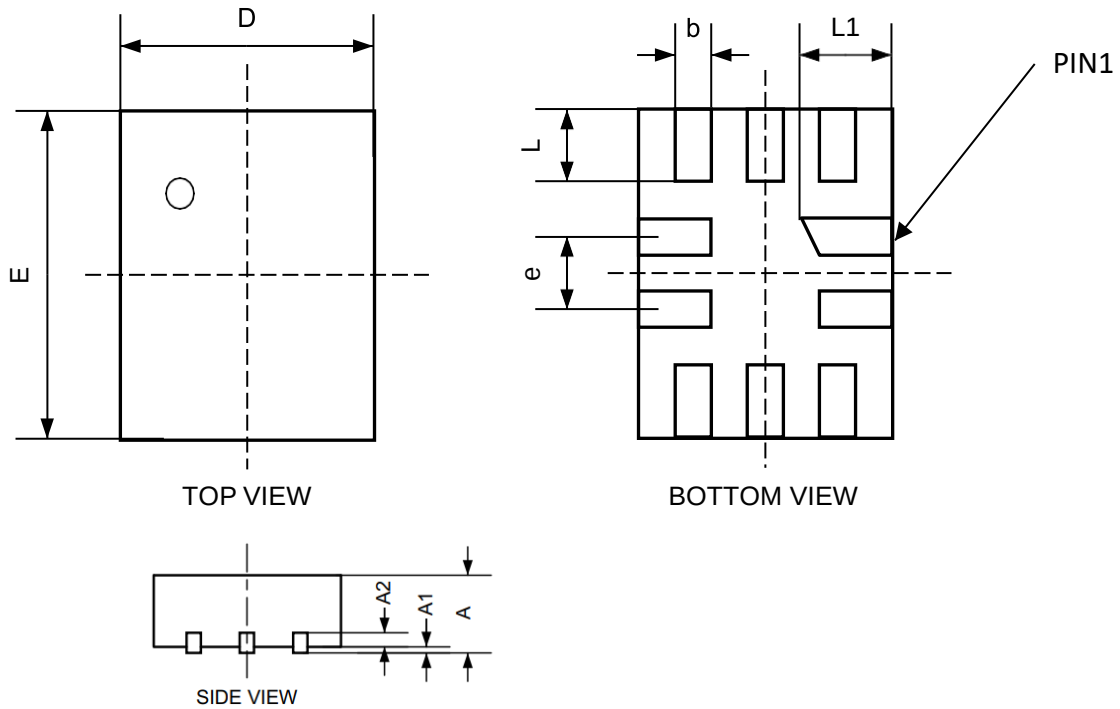
Figure 7 Charge Injection (Q)

Package Outline (MSOP10)



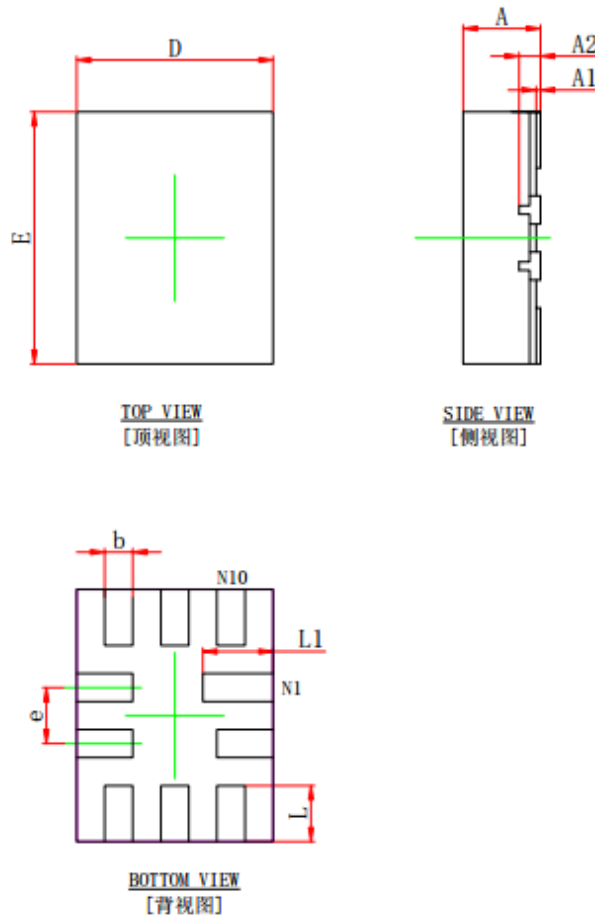
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.180	0.280	0.007	0.011
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.500 BSC		0.020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

Package Outline (UTQFN1.8×1.4-10L)



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.500	0.600	0.020	0.024
A1	0.000	0.050	0.000	0.002
A2	0.152	0.152	0.006	0.006
b	0.150	0.250	0.006	0.010
D	1.350	1.450	0.053	0.057
E	1.750	1.850	0.069	0.073
e	0.400 TYP		0.016 TYP	
L	0.350	0.450	0.014	0.018
L2	0.450	0.550	0.015	0.002

Package Outline (HFBP1.4×1.8-10)



		SYMBOL	MIN.	NOM.	MAX.
TOTAL THICKNESS		A	0.500	0.550	0.600
STAND OFF		A1	0	--	0.050
LF THICKNESS		A2	0152REF.		
LEAD WIDTH		b	0.150	0.200	0.250
BODY SIZE	X	D	1.324	1.400	1.476
	Y	E	1.724	1.800	1.876
LEAD PITCH		e	0.400BSC.		
LEAD LENGTH	L		0.350	0.400	0.450
	L1		0.450	0.500	0.550