



Description

The HSI4946CDYT1GE3 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

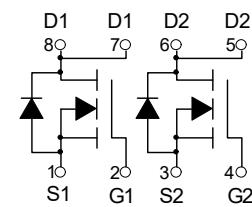


General Features

$$V_{DS} = 60V \quad I_D = 6.5A$$

$$R_{DS(ON)} < 36m\Omega \text{ @ } V_{GS}=10V$$

$$R_{DS(ON)} < 48m\Omega \text{ @ } V_{GS}=4.5V$$



Application

- Battery protection
- Load switch
- Uninterruptible power supply

Dual N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
HSI4946CDYT1GE3	SOP-8(SO-8)	HXY MOSFET	3000

Absolute Maximum Ratings@Tj=25°C(unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_A = 25^\circ C$	Drain Current, $V_{GS} @ 4.5V^3$	6.5	A
$I_D @ T_A = 70^\circ C$	Drain Current, $V_{GS} @ 4.5V^3$	5	A
I_{DM}	Pulsed Drain Current ¹	30	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation	2.1	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
R_{thj-a}	Maximum Thermal Resistance, Junction-ambient ³	60	$^\circ C/W$



Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_{\text{D}}=250\mu\text{A}$	60	69	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$\text{V}_{\text{DS}}=60\text{V}, \text{V}_{\text{GS}}=0\text{V}$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$\text{V}_{\text{GS}}=\pm 20\text{V}, \text{V}_{\text{DS}}=0\text{V}$	-	-	± 100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	$\text{V}_{\text{GS}(\text{th})}$	$\text{V}_{\text{DS}}=\text{V}_{\text{GS}}, \text{I}_{\text{D}}=250\mu\text{A}$	1.0	1.4	2.0	V
Drain-Source On-State Resistance	$\text{R}_{\text{DS}(\text{ON})}$	$\text{V}_{\text{GS}}=10\text{V}, \text{I}_{\text{D}}=6\text{A}$		32	36	$\text{m}\Omega$
		$\text{V}_{\text{GS}}=4.5\text{V}, \text{I}_{\text{D}}=4\text{A}$		34	48	$\text{m}\Omega$
Forward Transconductance	g_{FS}	$\text{V}_{\text{DS}}=5\text{V}, \text{I}_{\text{D}}=6\text{A}$		20	-	S
Dynamic Characteristics ^(Note 4)						
Input Capacitance	C_{iss}	$\text{V}_{\text{DS}}=25\text{V}, \text{V}_{\text{GS}}=0\text{V},$ $\text{F}=1.0\text{MHz}$		1920		PF
Output Capacitance	C_{oss}			155		PF
Reverse Transfer Capacitance	C_{rss}			116		PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	$\text{t}_{\text{d}(\text{on})}$	$\text{V}_{\text{DS}}=30\text{V}, \text{R}_{\text{L}}=4.7\Omega$ $\text{V}_{\text{GS}}=10\text{V}, \text{R}_{\text{GEN}}=3\Omega$	-	8	-	nS
Turn-on Rise Time	t_{r}		-	5	-	nS
Turn-Off Delay Time	$\text{t}_{\text{d}(\text{off})}$		-	29	-	nS
Turn-Off Fall Time	t_{f}		-	6	-	nS
Total Gate Charge	Q_{g}	$\text{V}_{\text{DS}}=30\text{V}, \text{I}_{\text{D}}=6\text{A},$ $\text{V}_{\text{GS}}=10\text{V}$	-	50	-	nC
Gate-Source Charge	Q_{gs}		-	8	-	nC
Gate-Drain Charge	Q_{gd}		-	16	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V_{SD}	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_{\text{S}}=6\text{A}$	-	-	1.2	V
Diode Forward Current ^(Note 2)	I_{S}		-	-	7	A
Reverse Recovery Time	t_{rr}	$\text{T}_{\text{J}} = 25^\circ\text{C}, \text{I}_{\text{F}} = 7\text{A}$ $\text{di}/\text{dt} = 100\text{A}/\mu\text{s}$ ^(Note 3)	-	35	-	nS
Reverse Recovery Charge	Q_{rr}		-	43	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

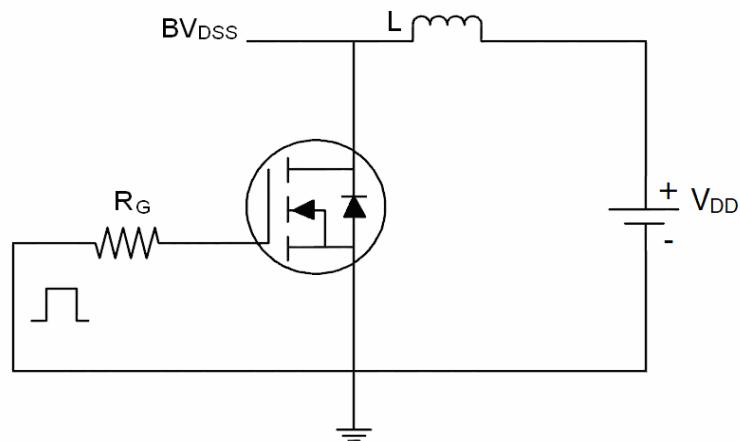
Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

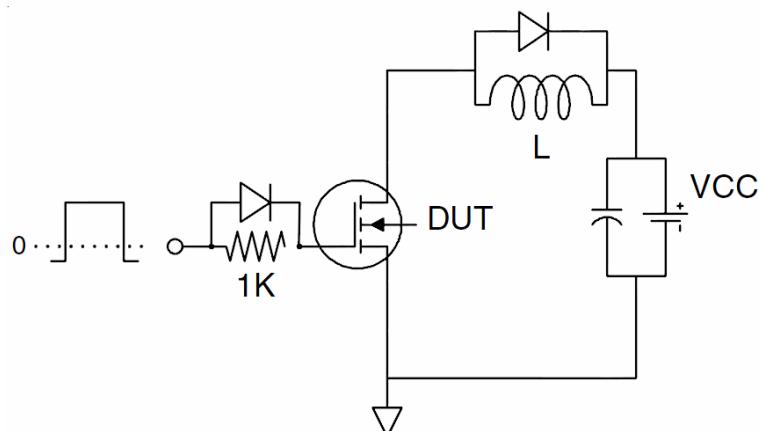


Test Circuit

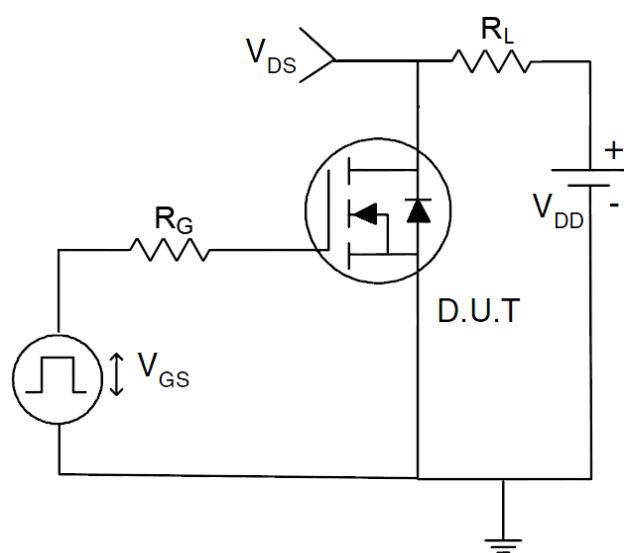
1) E_{AS} test Circuits



2) Gate charge test Circuit



3) Switch Time Test Circuit





Typical Electrical and Thermal Characteristics (Curves)

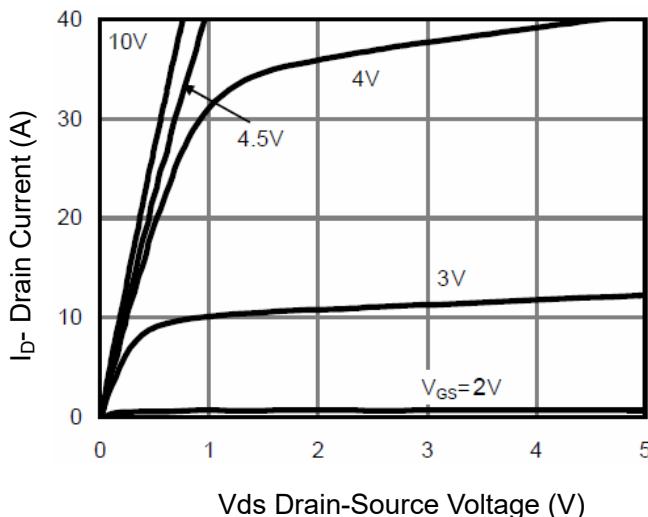


Figure 1 Output Characteristics

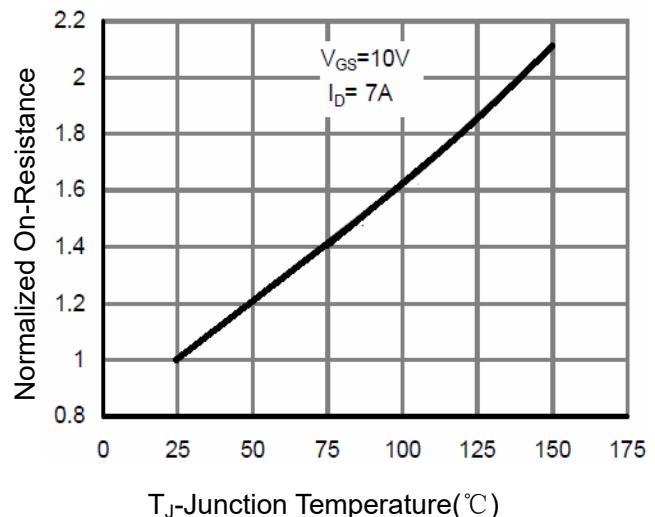


Figure 4 Rdson-Junction Temperature

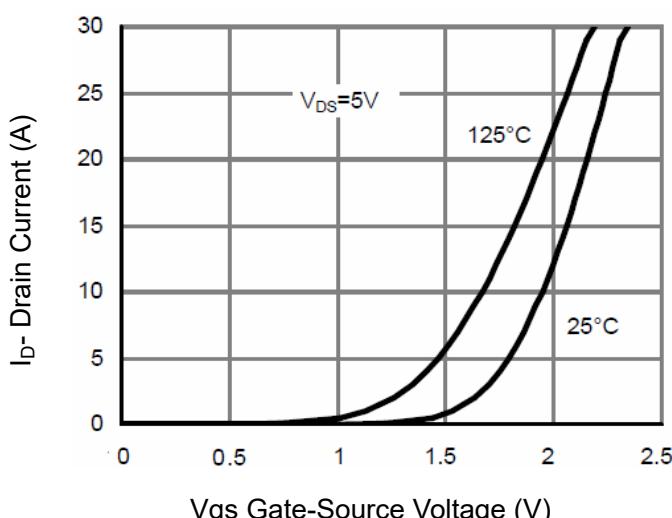


Figure 2 Transfer Characteristics

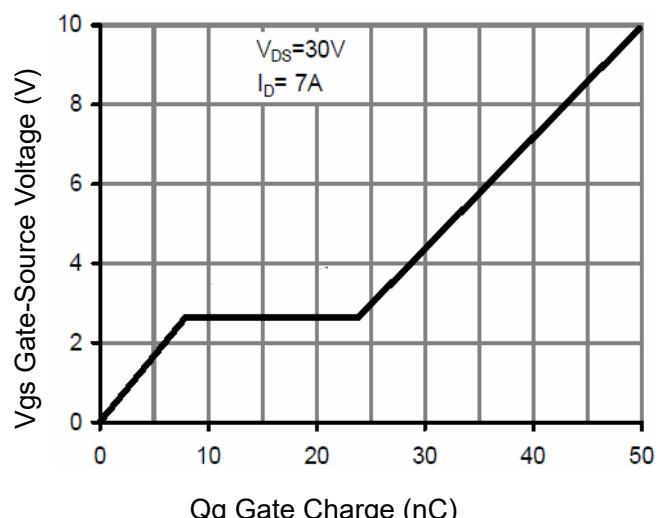


Figure 5 Gate Charge

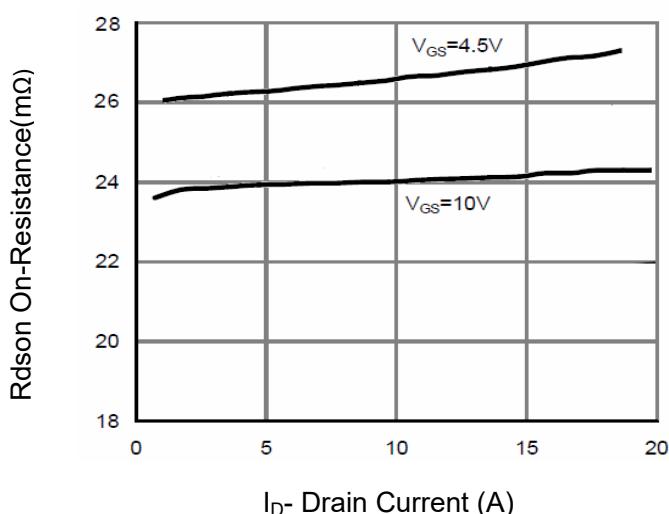


Figure 3 Rdson-Drain Current

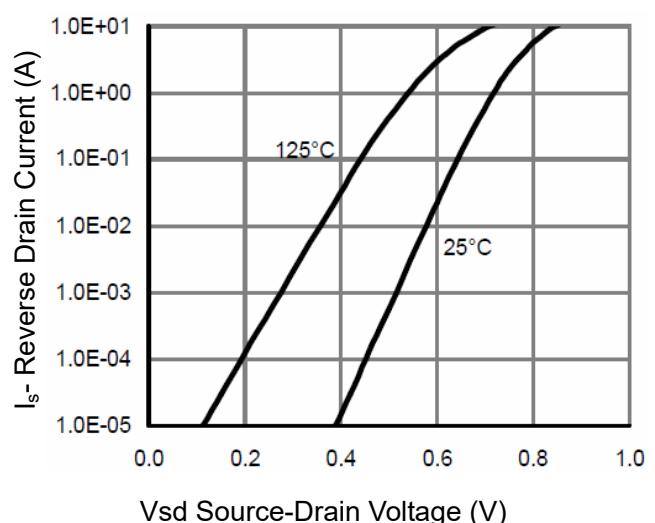
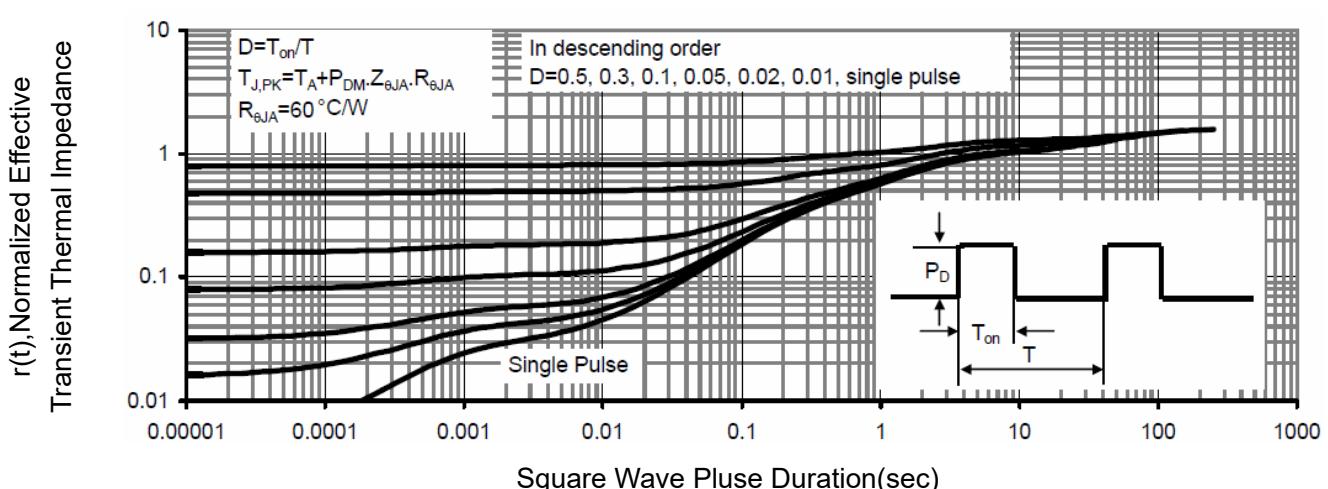
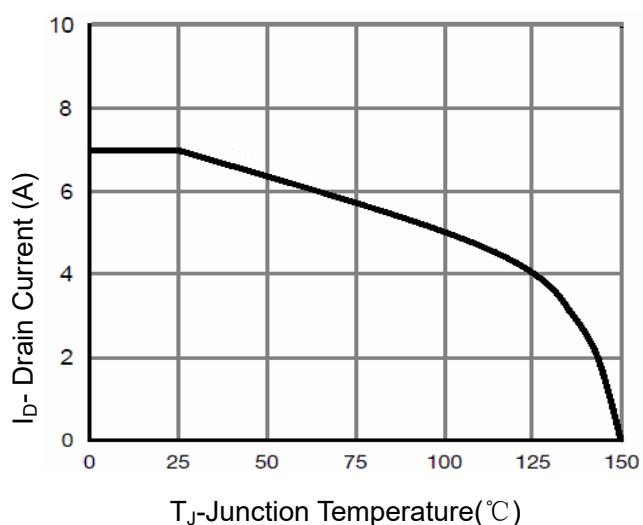
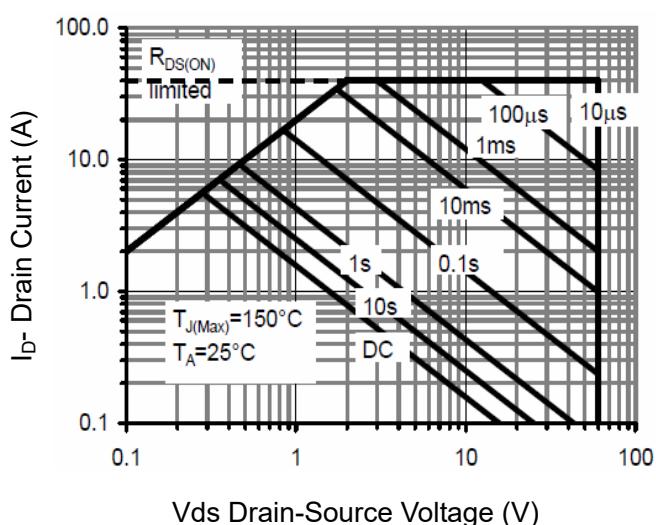
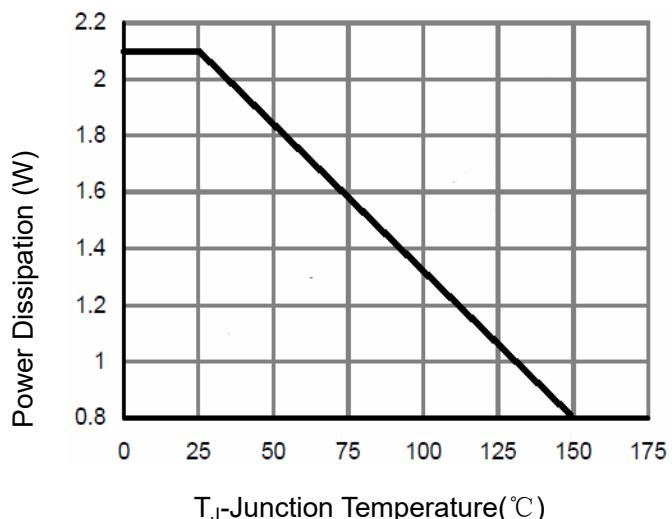
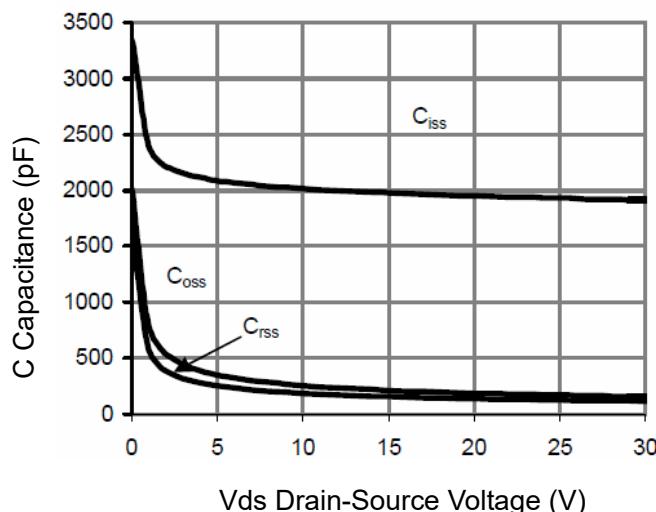
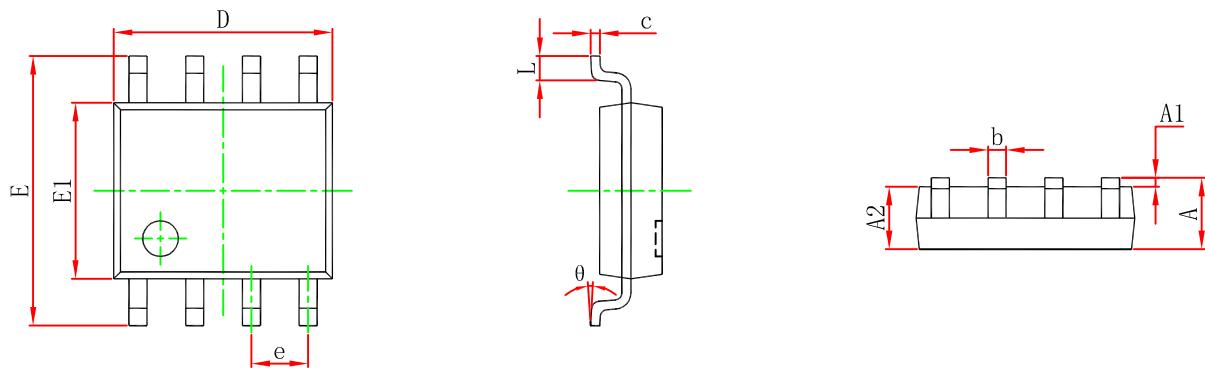


Figure 6 Source-Drain Diode Forward

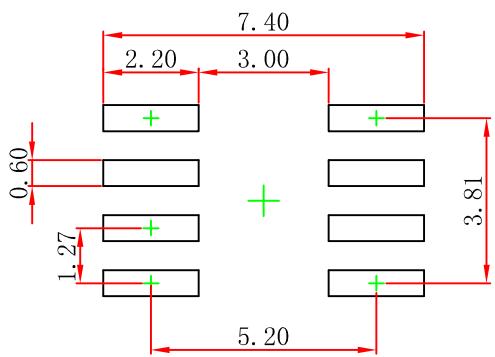




SOP-8(SO-8) Package Outline Dimensions



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	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ± 0.05 mm.
3. The pad layout is for reference purposes only.



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