

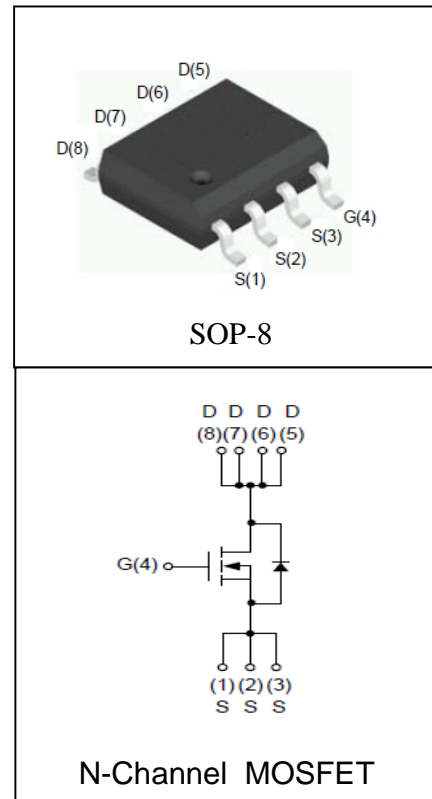
Features

- 20V/13A,
 $R_{DS(ON)} = 13m\Omega$ (Typ.) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 16m\Omega$ (Typ.) @ $V_{GS} = 4.5V$
 $R_{DS(ON)} = 22m\Omega$ (Typ.) @ $V_{GS} = 2.5V$
- Super High Dense Cell Design
- Low On-Resistance
- Reliable and Rugged
- Lead Free and Green Available

Applications

- DC/DC Converters

Pin Description



Absolute Maximum Ratings

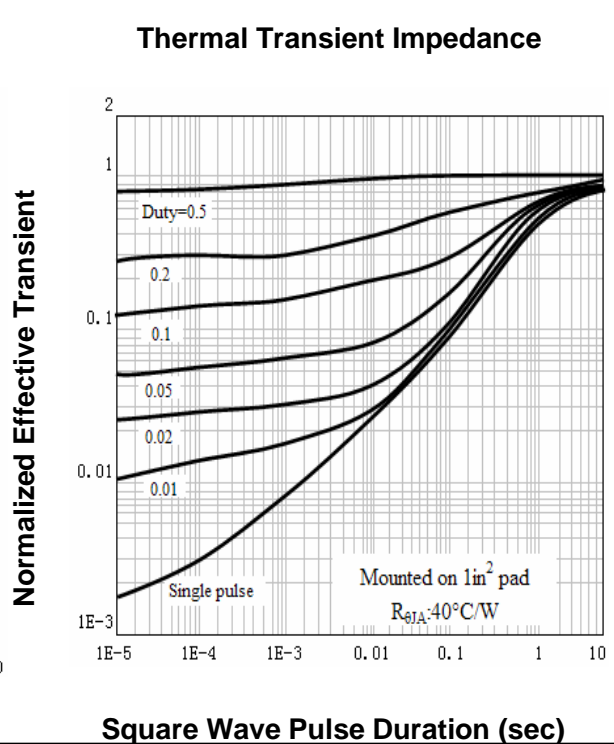
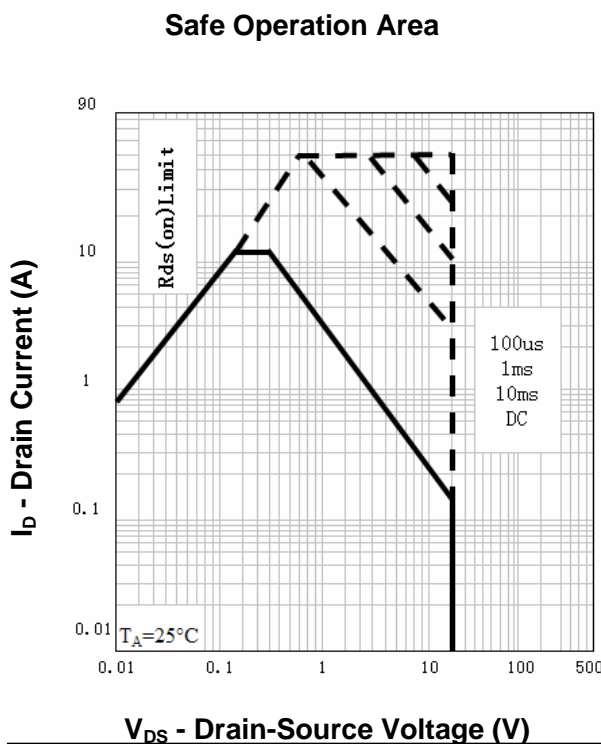
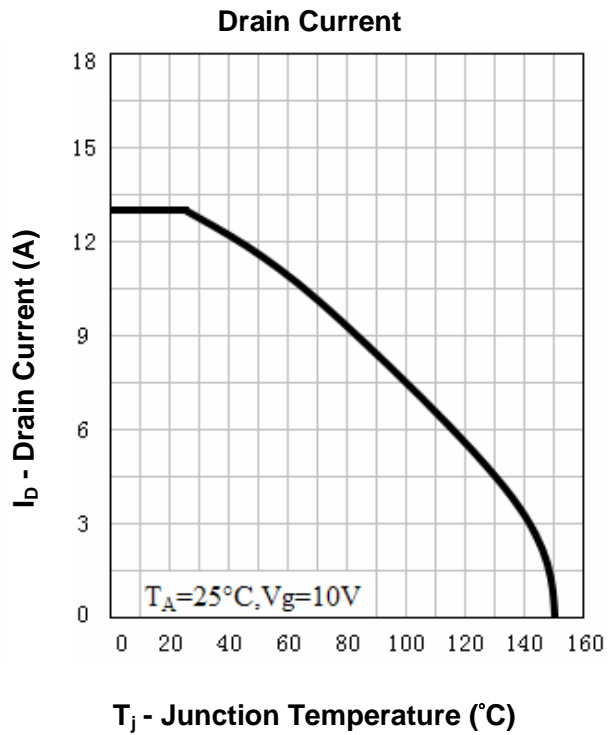
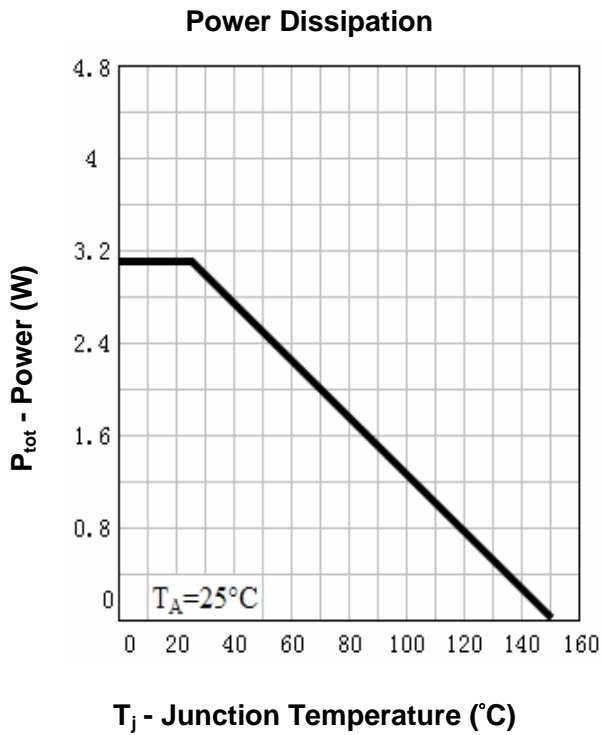
Symbol	Parameter	Rating	Unit
Common Ratings ($T_A = 25^\circ C$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	20	V
V_{GSS}	Gate-Source Voltage	± 12	
T_J	Maximum Junction Temperature	150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
I_S	Diode Continuous Forward Current	$T_A = 25^\circ C$ 4.5	A
Mounted on Large Heat Sink			
I_{DP}	300 μs Pulse Drain Current Tested	$T_A = 25^\circ C$ 50 ^①	A
I_D	Continuous Drain Current	$T_A = 25^\circ C$ 13	A
		$T_A = 70^\circ C$ 10	
P_D	Maximum Power Dissipation	$T_A = 25^\circ C$ 3.1	W
		$T_A = 70^\circ C$ 2	
$R_{\theta JA}$ ^②	Thermal Resistance-Junction to Ambient	40	$^\circ C/W$

Electrical Characteristics ($T_A=25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	RU2013H			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=20V, V_{GS}=0V$ $T_J=85^\circ\text{C}$			1	μA
			30			
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	0.5	0.8	1.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}^{(3)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=10A$		13	16	$m\Omega$
		$V_{GS}=4.5V, I_{DS}=8A$		16	20	$m\Omega$
		$V_{GS}=2.5V, I_{DS}=6A$		22	26	$m\Omega$
Diode Characteristics						
$V_{SD}^{(3)}$	Diode Forward Voltage	$I_{SD}=1A, V_{GS}=0V$			1	V
t_{rr}	Reverse Recovery Time	$I_{SD}=10A, di_{SD}/dt=100A/\mu s$		9		ns
Q_{rr}	Reverse Recovery Charge			12		nC
Dynamic Characteristics ⁽⁴⁾						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		1.2		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=10V,$ Frequency=1.0MHz		580		pF
C_{oss}	Output Capacitance			124		
C_{riss}	Reverse Transfer Capacitance			65		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=10V, R_L=1\Omega,$ $I_{DS}=10A, V_{GEN}=10V,$ $R_G=6\Omega$		4		ns
t_r	Turn-on Rise Time			11		
$t_{d(OFF)}$	Turn-off Delay Time			19		
t_f	Turn-off Fall Time			8		
Gate Charge Characteristics ⁽⁴⁾						
Q_g	Total Gate Charge	$V_{DS}=16V, V_{GS}=4.5V,$ $I_{DS}=10A$		9	12	nC
Q_{gs}	Gate-Source Charge			2.1		
Q_{gd}	Gate-Drain Charge			3		

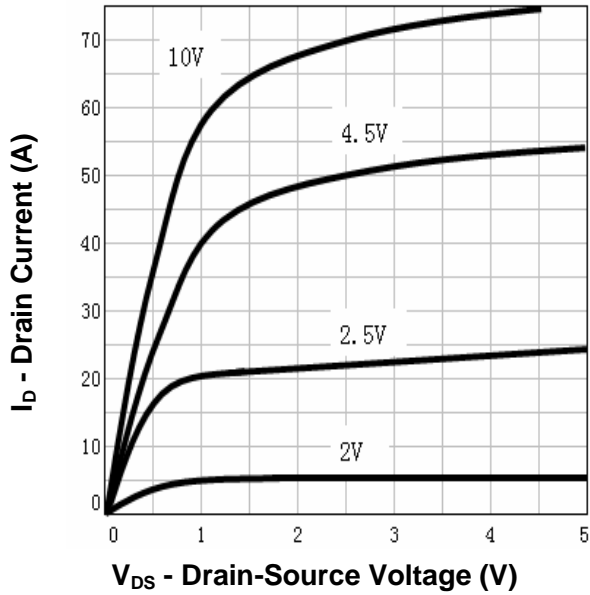
- Notes: ① Pulse width limited by safe operating area.
 ② When mounted on 1 inch square copper board, $t \leq 10\text{sec}$.
 ③ Pulse test ; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 ④ Guaranteed by design, not subject to production testing.

Typical Characteristics

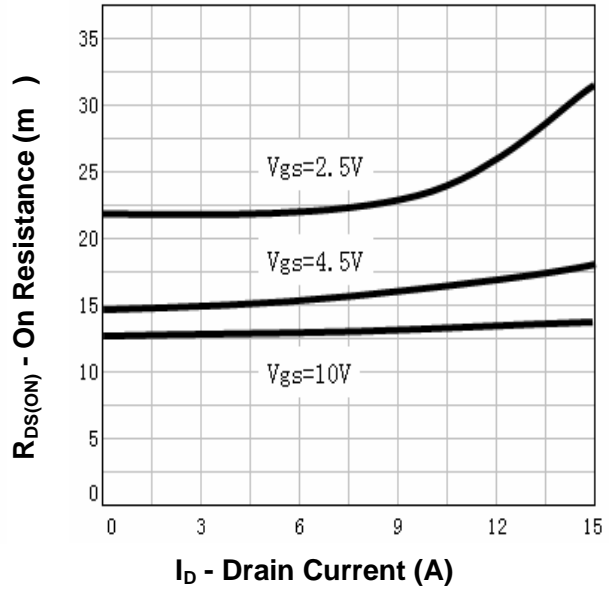


Typical Characteristics

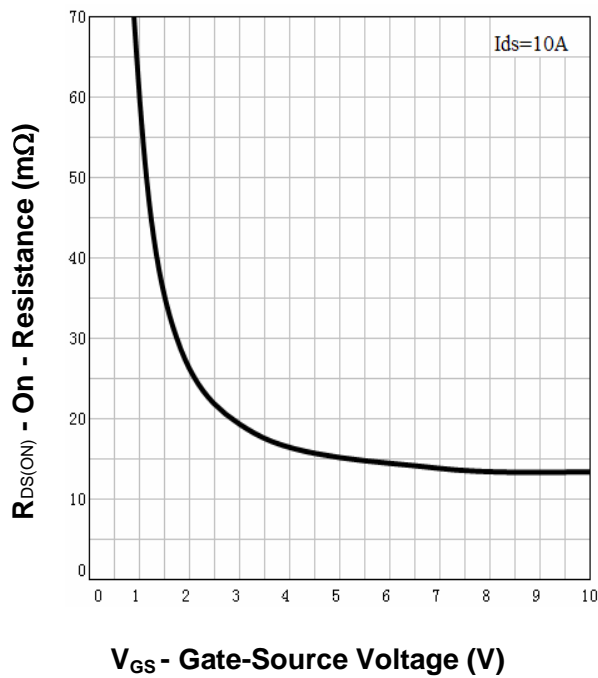
Output Characteristics



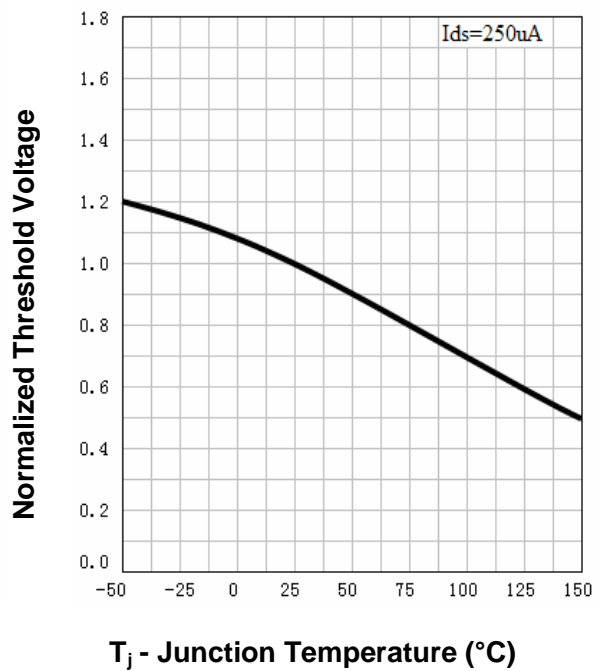
Drain-Source On Resistance



Drain-Source On Resistance

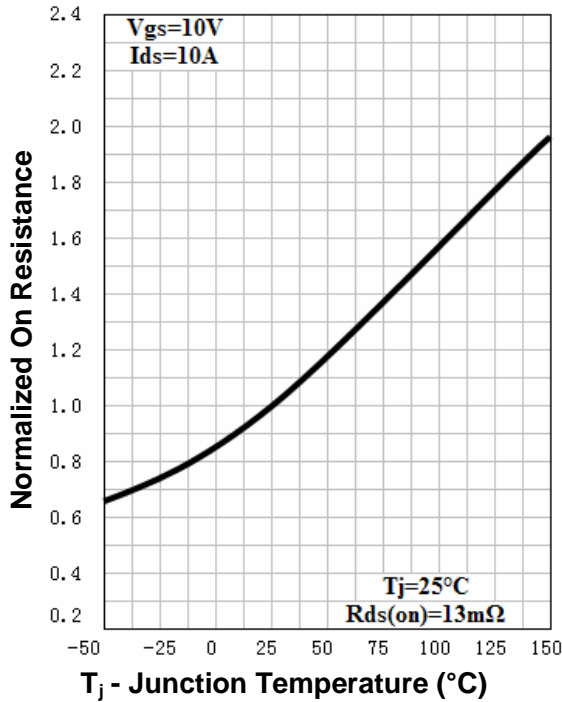


Gate Threshold Voltage

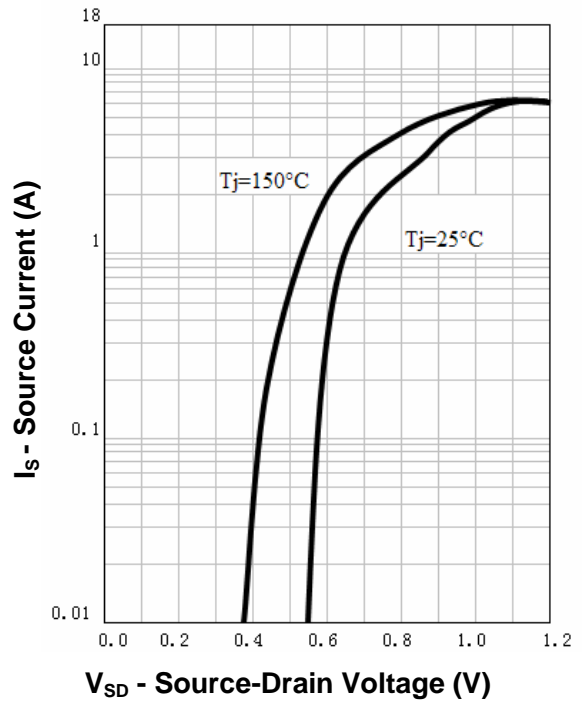


Typical Characteristics

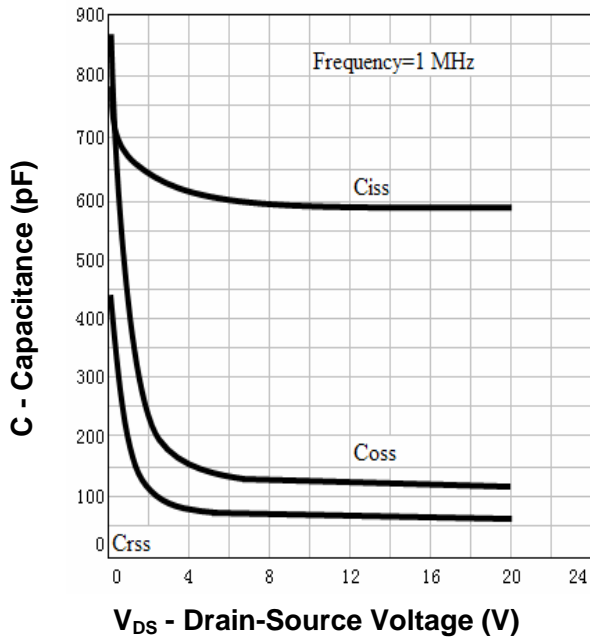
Drain-Source On Resistance



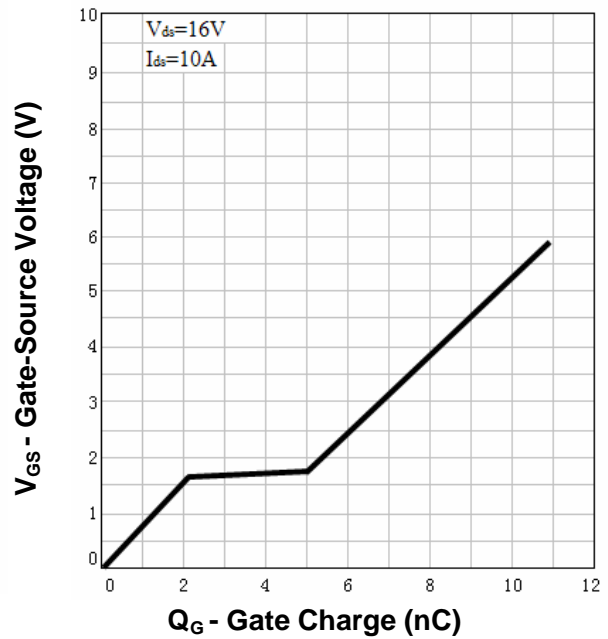
Source-Drain Diode Forward



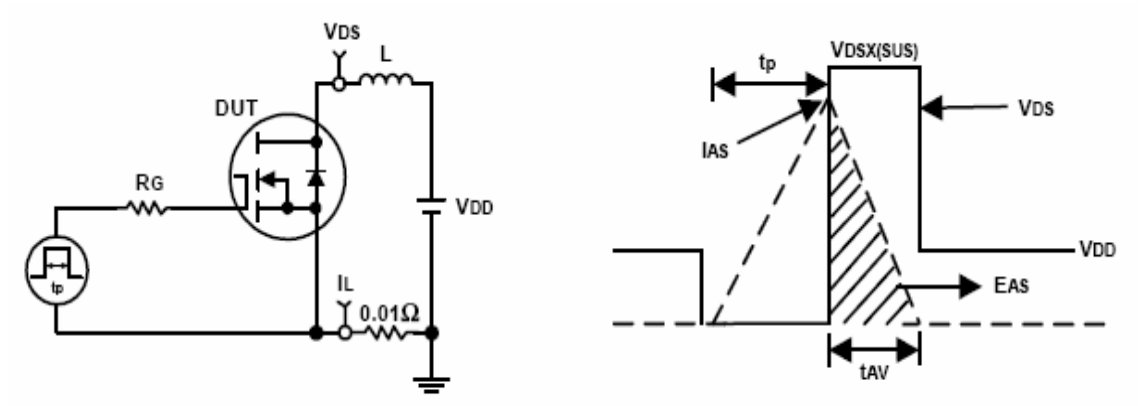
Capacitance



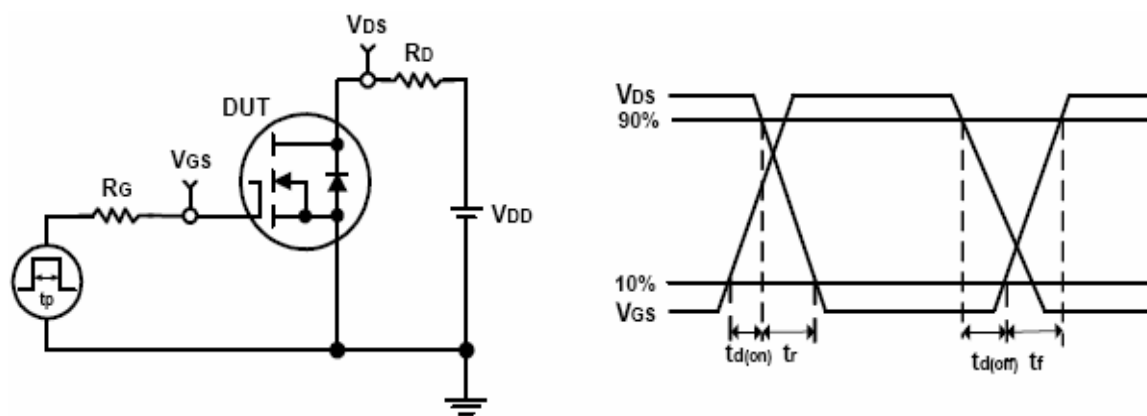
Gate Charge



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



Ordering and Marking Information**RU2013****Package (Available)**

H : SOP-8

Operating Temperature Range

C : -55 to 150 °C

Assembly Material

G : Green & Lead Free

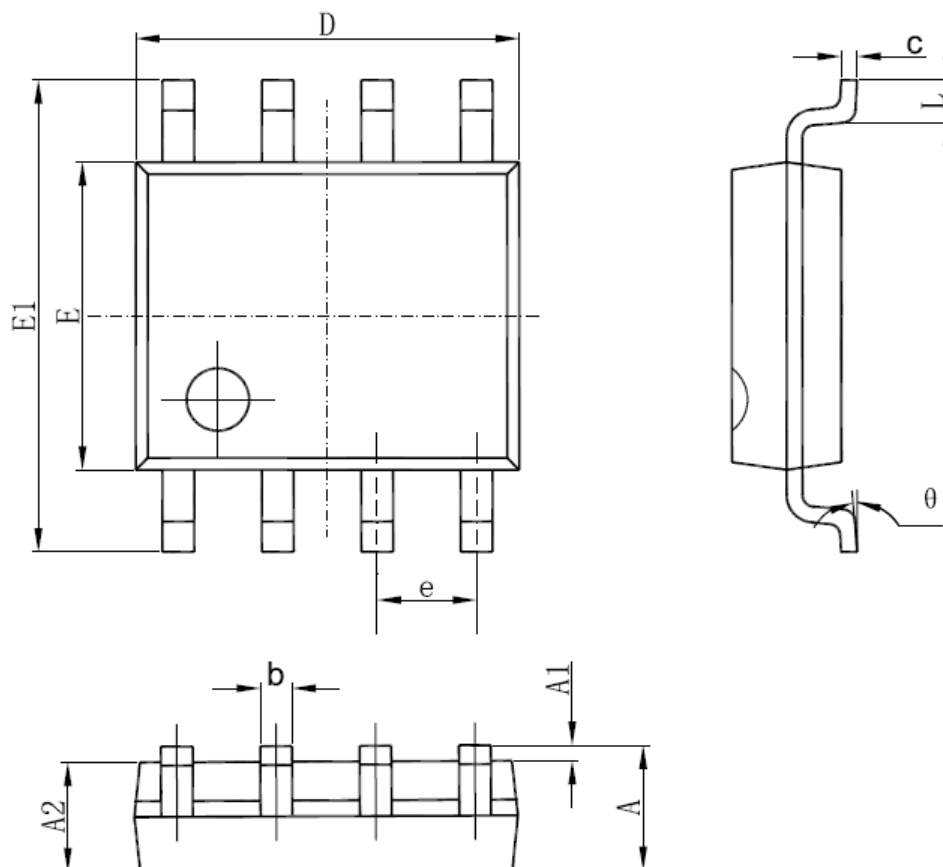
Packaging

T : TUBE

TR : Tape & Reel

Package Information

SOP-8



SYMBOL	MM		INCH		SYMBOL	MM		INCH	
	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069	E	3.800	4.000	0.150	0.157
A1	0.100	0.250	0.004	0.010	E1	5.800	6.200	0.228	0.244
A2	1.350	1.550	0.053	0.061	e	1.270 (BSC)		0.050 (BSC)	
b	0.330	0.510	0.013	0.020	L	0.400	1.270	0.016	0.050
c	0.170	0.250	0.006	0.010	θ	0°	8°	0°	8°
D	4.700	5.100	0.185	0.200					

ALL DIMENSIONS REFER TO JEDEC STANDARD
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS

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