

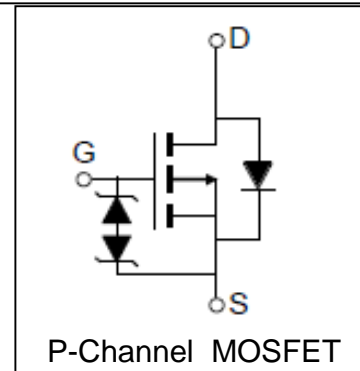
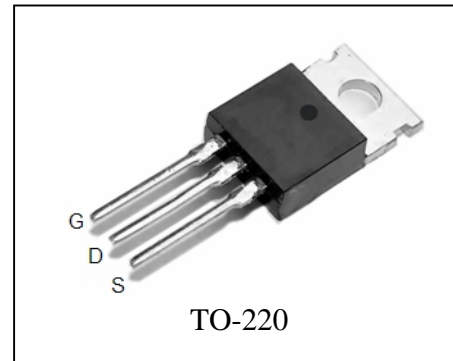
Features

- -100V/-13A,
 $R_{DS(ON)} = 160m$ (tpy.)@ $V_{GS} = -10V$
 $R_{DS(ON)} = 180m$ (tpy.)@ $V_{GS} = -4.5V$
- Super High Dense Cell Design
- ESD protected
- Reliable and Rugged
- 100% avalanche tested
- Lead Free and Green Devices Available
 (RoHS Compliant)

Applications

- Power Management
- DC/DC Converters

Pin Description



Absolute Maximum Ratings

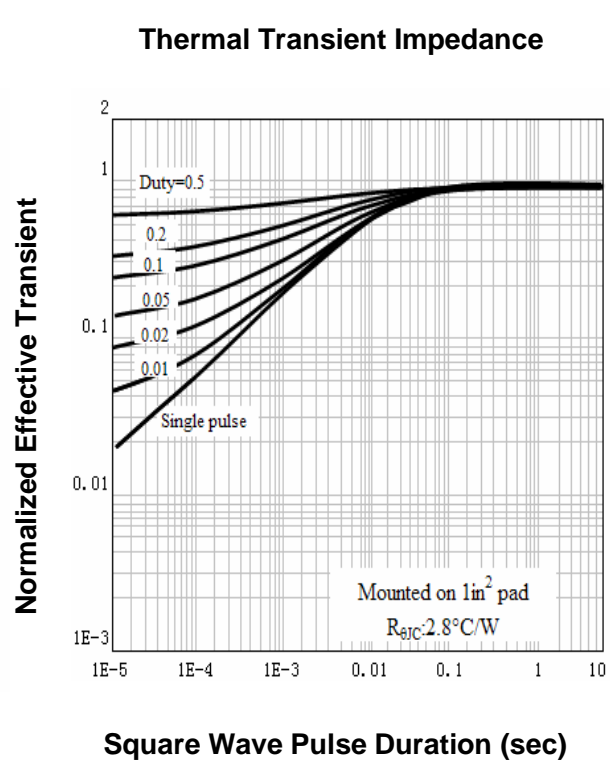
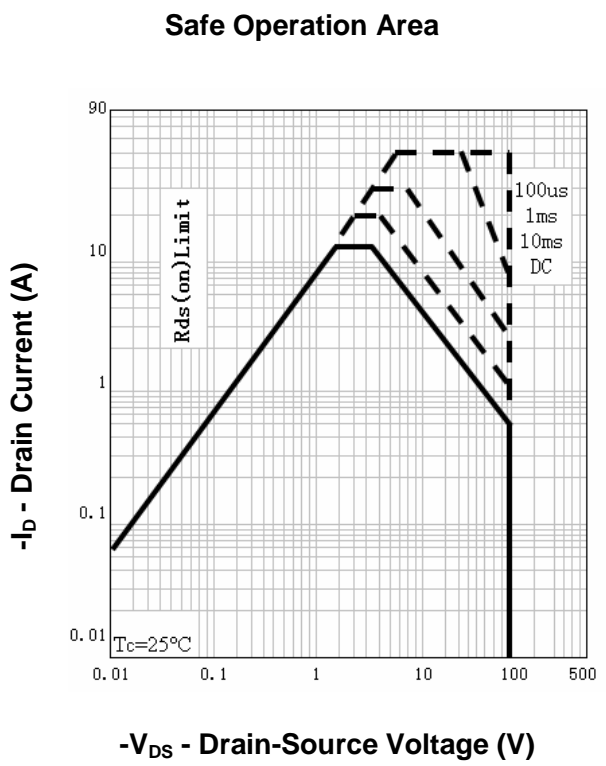
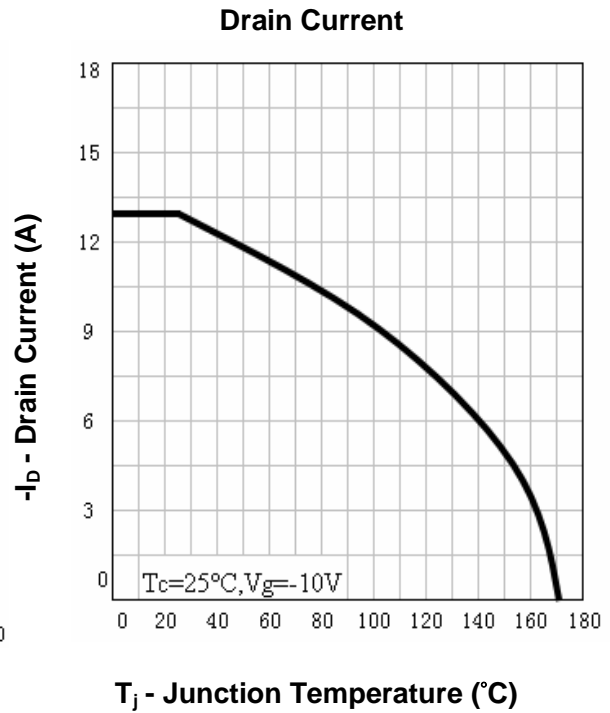
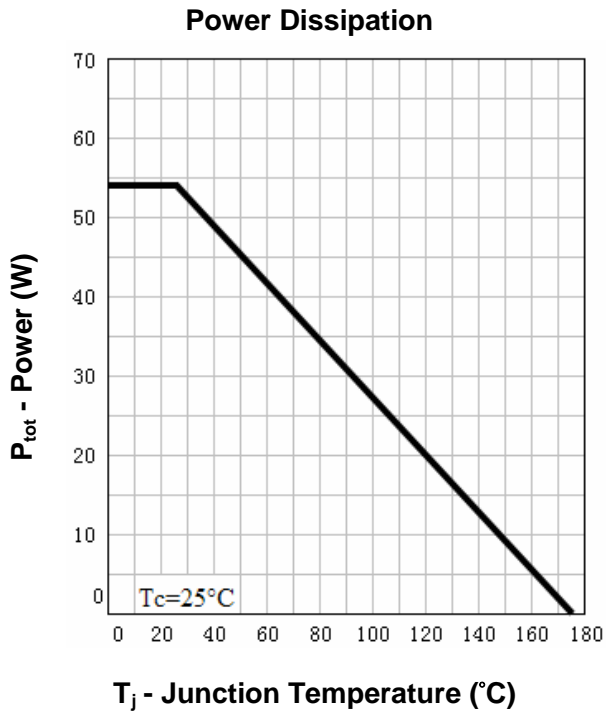
Symbol	Parameter	Rating	Unit	
Common Ratings ($T_C = 25^\circ C$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	-100	V	
V_{GSS}	Gate-Source Voltage	± 20		
T_J	Maximum Junction Temperature	175	$^\circ C$	
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ C$	
I_S	Diode Continuous Forward Current	$T_C = 25^\circ C$ -13	A	
Mounted on Large Heat Sink				
I_{DP}	300 μs Pulse Drain Current Tested	$T_C = 25^\circ C$ -52 ^①	A	
I_D	Continuous Drain Current ($V_{GS} = -10V$)	$T_C = 25^\circ C$	-13	A
		$T_C = 100^\circ C$	-9	
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$	54	W
		$T_C = 100^\circ C$	27	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.8	$^\circ C/W$	
Drain-Source Avalanche Ratings				
E_{AS} ^②	Avalanche Energy, Single Pulsed	56	mJ	

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

Symbol	Parameter	Test Condition	RU1HL13R			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=-250\mu A$	-100			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-100V, V_{GS}=0V$ $T_J=85^{\circ}\text{C}$			-1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.5	-2	-2.7	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 16V, V_{DS}=0V$			± 10	μA
$R_{DS(ON)}^{(3)}$	Drain-Source On-state Resistance	$V_{GS}=-10V, I_{DS}=-8A$		160	200	$m\Omega$
		$V_{GS}=-4.5V, I_{DS}=-6A$		180	250	$m\Omega$
Diode Characteristics						
$V_{SD}^{(3)}$	Diode Forward Voltage	$I_{SD}=-1A, V_{GS}=0V$			-1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=-13A, dI_{SD}/dt=100A/\mu s$		35		ns
Q_{rr}	Reverse Recovery Charge			65		nC
Dynamic Characteristics ⁽⁴⁾						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		10		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=-25V,$ Frequency=1.0MHz		1089		pF
C_{oss}	Output Capacitance			616		
C_{rss}	Reverse Transfer Capacitance			191		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-50V, R_L=3.8\Omega,$ $I_{DS}=-13A, V_{GEN}=-10V,$ $R_G=6\Omega$		13		ns
t_r	Turn-on Rise Time			16		
$t_{d(OFF)}$	Turn-off Delay Time			31		
t_f	Turn-off Fall Time			18		
Gate Charge Characteristics ⁽⁴⁾						
Q_g	Total Gate Charge	$V_{DS}=-80V, V_{GS}=-10V,$ $I_{DS}=-13A$		28		nC
Q_{gs}	Gate-Source Charge			9		
Q_{gd}	Gate-Drain Charge			10		

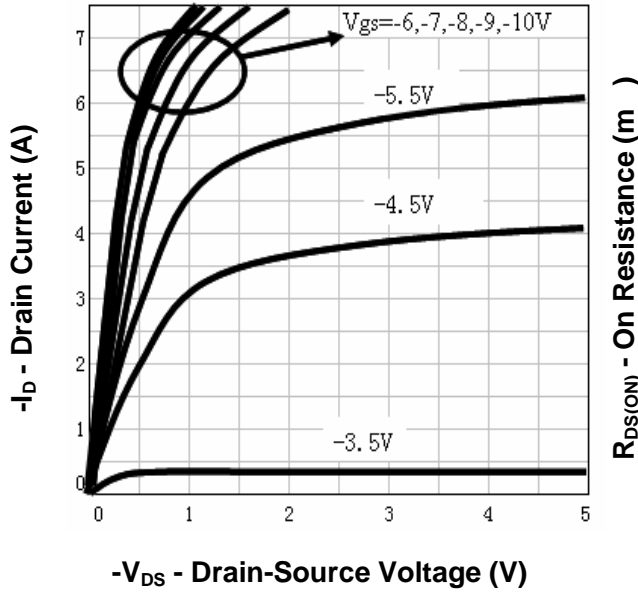
- Notes: ① Pulse width limited by safe operating area.
 ② Limited by $T_{Jmax}, I_{AS}=15A, V_{DD}=-48V, R_G=50\Omega$, Starting $T_J=25^{\circ}\text{C}$.
 ③ Pulse test; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 ④ Guaranteed by design, not subject to production testing.

Typical Characteristics

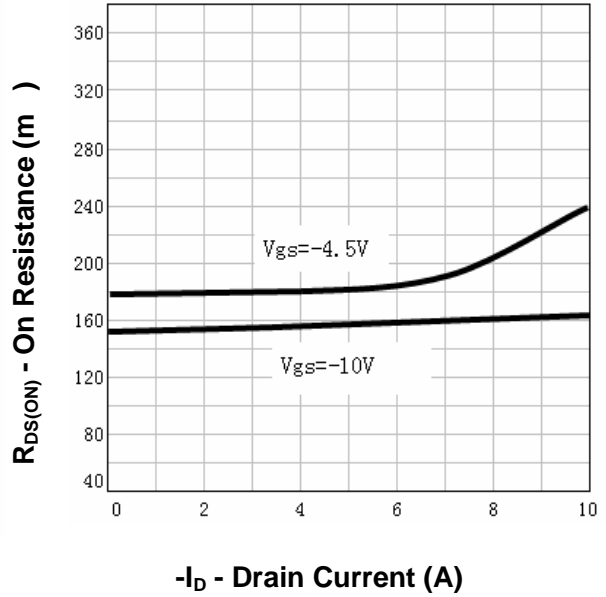


Typical Characteristics

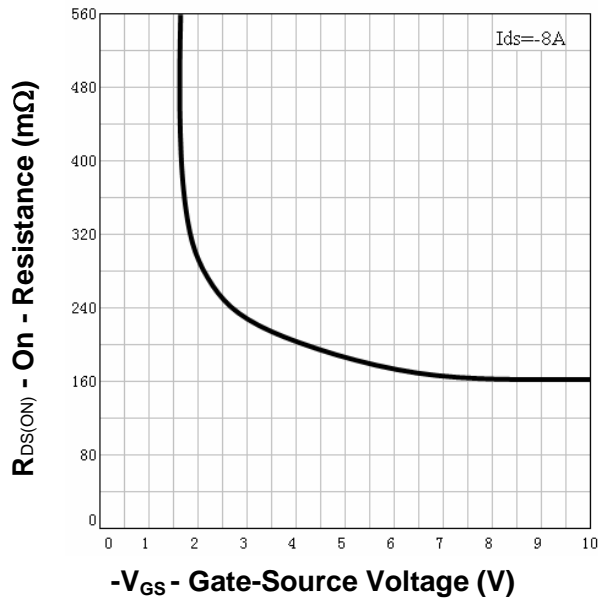
Output Characteristics



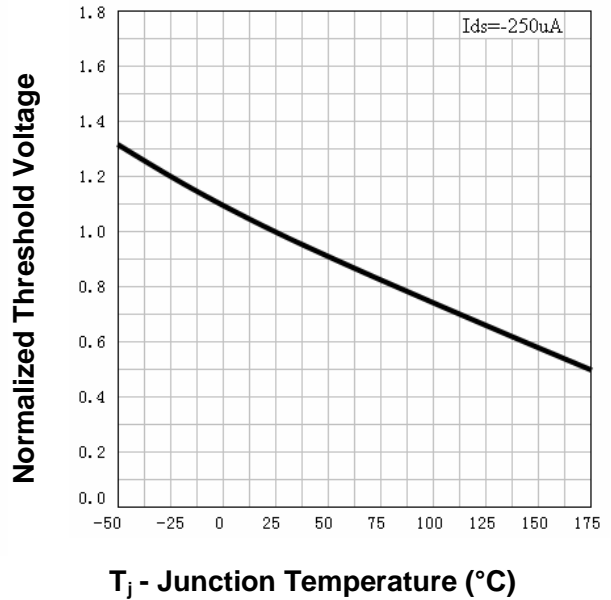
Drain-Source On Resistance



Drain-Source On Resistance

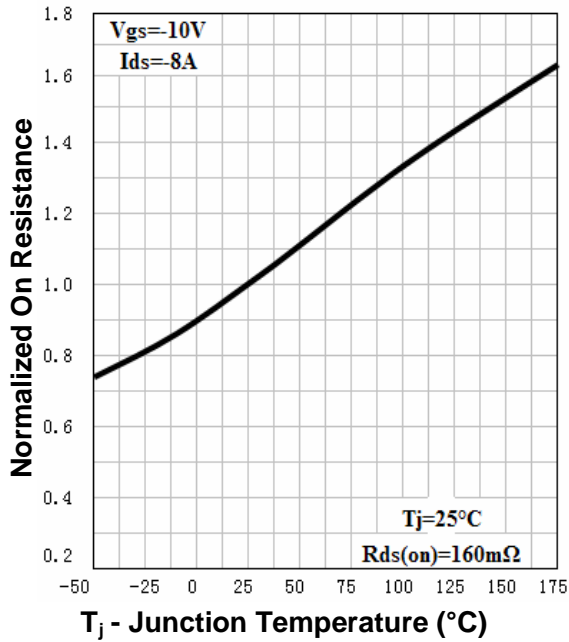


Gate Threshold Voltage

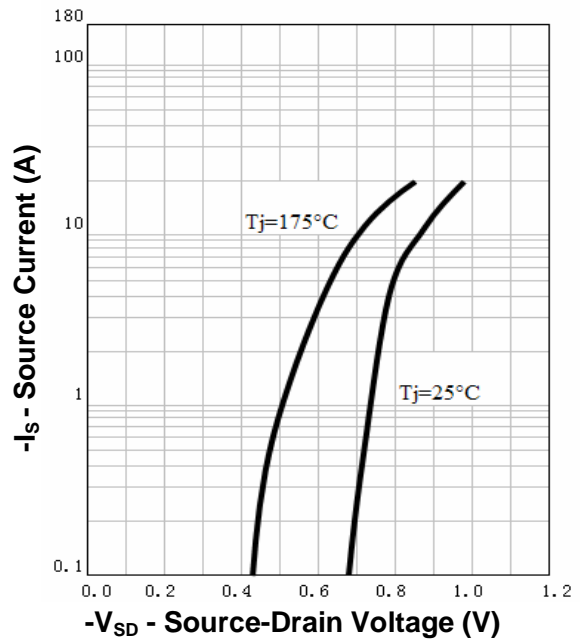


Typical Characteristics

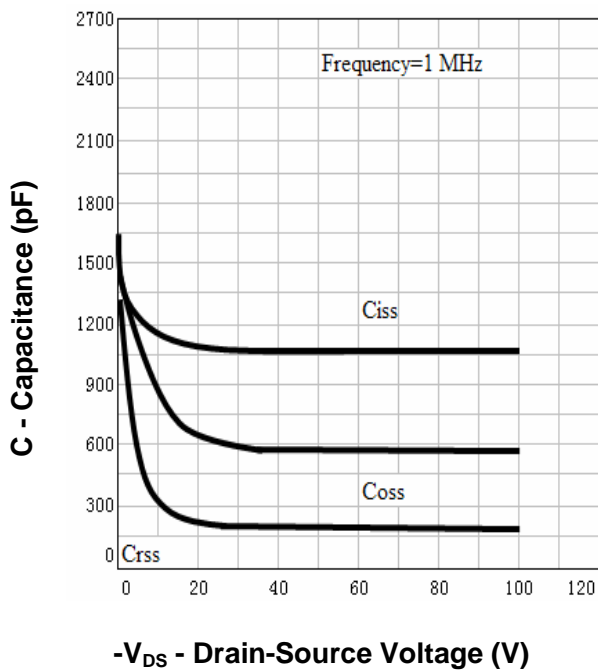
Drain-Source On Resistance



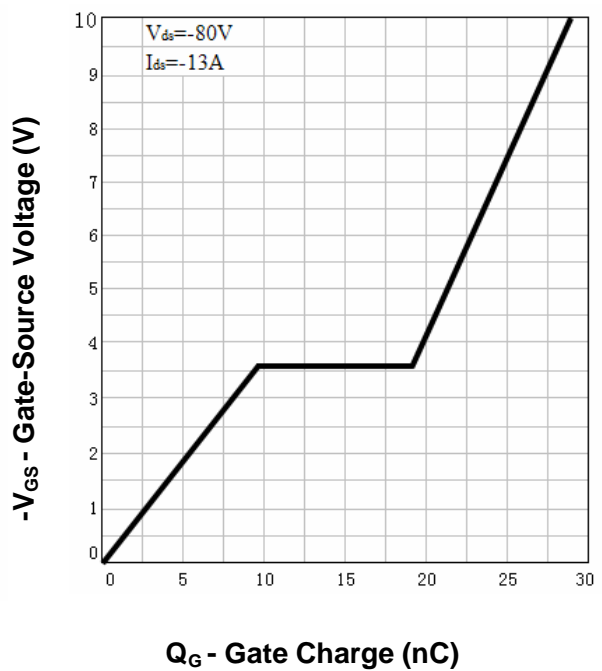
Source-Drain Diode Forward



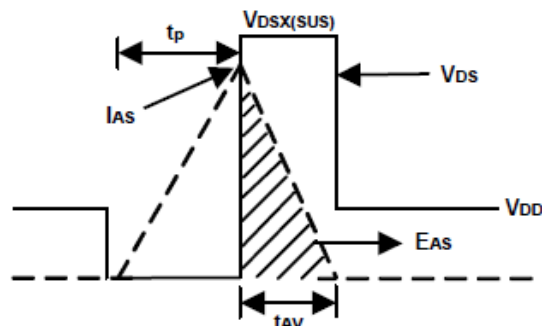
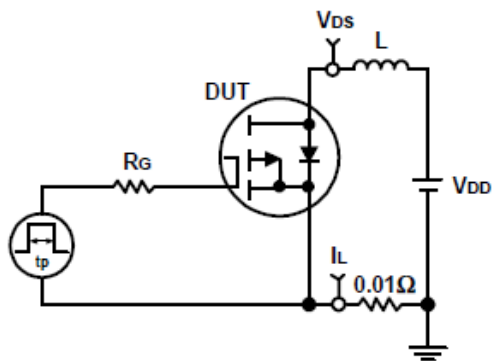
Capacitance



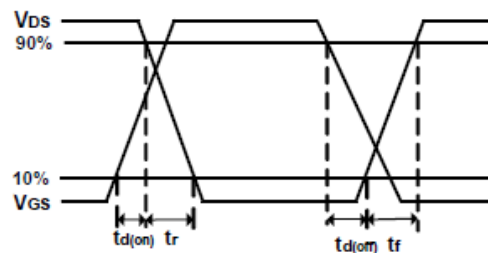
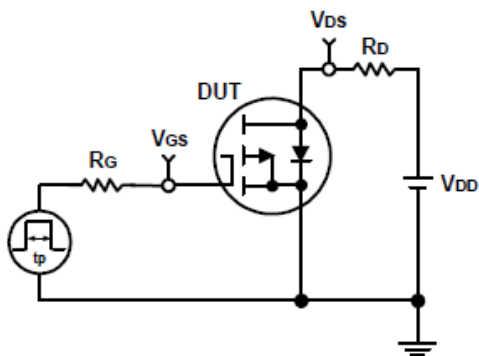
Gate Charge



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



Ordering and Marking Information

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RU1HL13R	RU1HL13R	TO-220	Tube	50	-	-

Package Information
TO-220FB-3L


SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185	$\phi p1$	1.40	1.50	1.60	0.055	0.059	0.063
A1	1.27	1.30	1.33	0.050	0.051	0.052	e	2.54BSC			0.1BSC		
A2	2.35	2.40	2.50	0.093	0.094	0.098	e1	5.08BSC			0.2BSC		
b	0.77	-	0.90	0.030	-	0.035	H1	6.40	6.50	6.60	0.252	0.256	0.260
b2	1.23	-	1.36	0.048	-	0.054	L	12.75	-	13.17	0.502	-	0.519
C	0.48	0.50	0.52	0.019	0.020	0.021	L1	-	-	3.95	-	-	0.156
D	15.40	15.60	15.80	0.606	0.614	0.622	L2	2.50REF.			0.098REF.		
D1	9.00	9.10	9.20	0.354	0.358	0.362	ϕp	3.57	3.60	3.63	0.141	0.142	0.143
DEP	0.05	0.10	0.20	0.002	0.004	0.008	Q	2.73	2.80	2.87	0.107	0.110	0.113
E	9.70	9.90	10.10	0.382	0.389	0.398	$\theta 1$	5°	7°	9°	5°	7°	9°
E1	-	8.70	-	-	0.343	-	$\theta 2$	1°	3°	5°	1°	3°	5°
E2	9.80	10.00	10.20	0.386	0.394	0.401							

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

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