

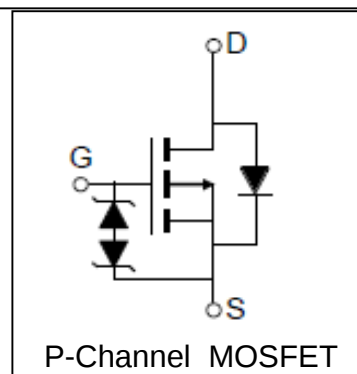
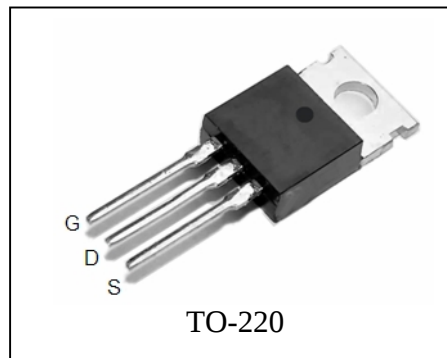
Features

- -100V/-13A,
 $R_{DS(ON)} = 160m\Omega(\text{tpy.}) @ V_{GS} = -10V$
 $R_{DS(ON)} = 180m\Omega(\text{tpy.}) @ V_{GS} = -4.5V$
- 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

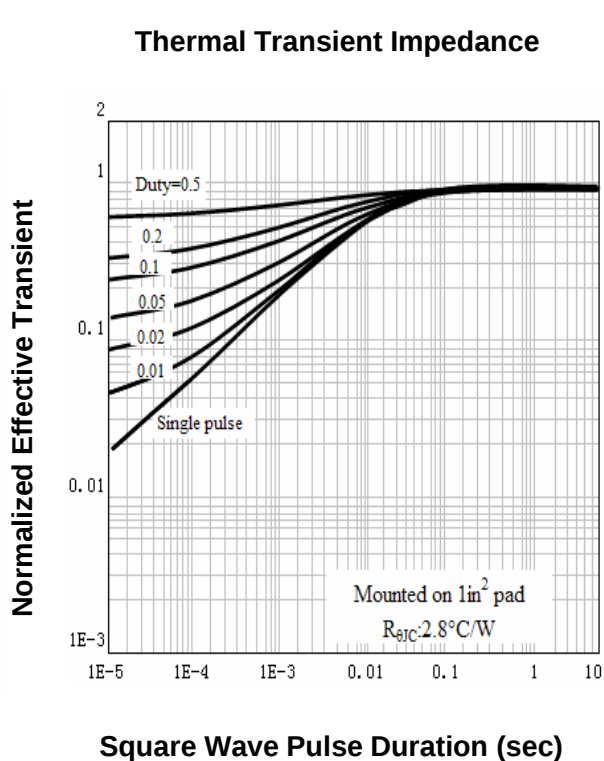
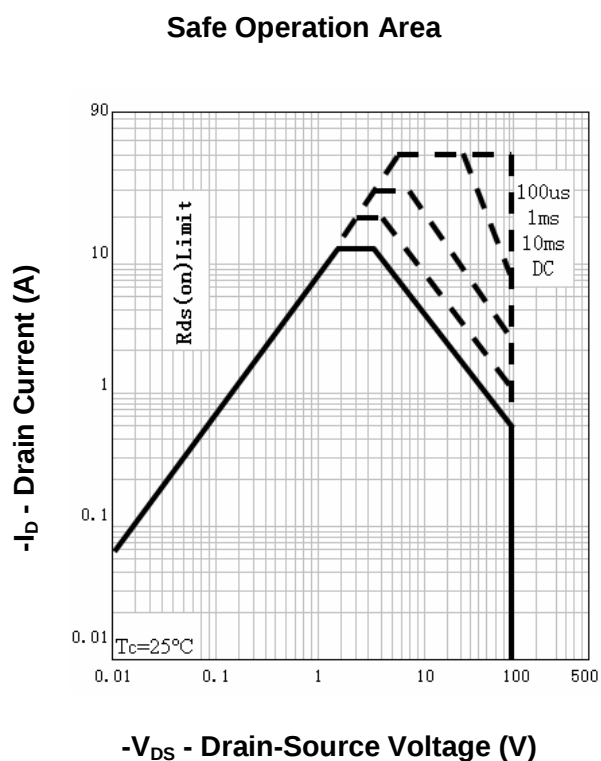
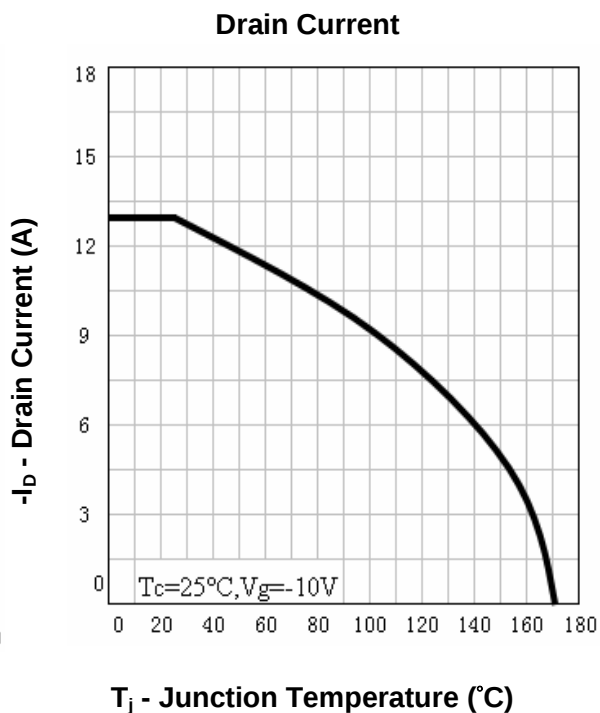
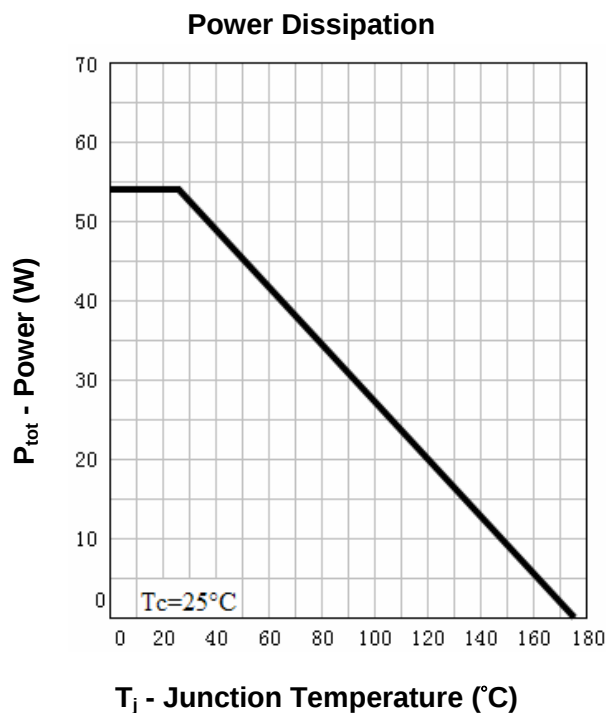
Symbol	Parameter		Rating	Unit
Common Ratings (T _C =25°C Unless Otherwise Noted)				
V _{DSS}	Drain-Source Voltage		-100	V
V _{GSS}	Gate-Source Voltage		±20	
T _J	Maximum Junction Temperature		175	°C
T _{STG}	Storage Temperature Range		-55 to 175	°C
I _S	Diode Continuous Forward Current	T _C =25°C	-13	A
Mounted on Large Heat Sink				
I _{DP}	300μs Pulse Drain Current Tested	T _C =25°C	-52 ^①	A
I _D	Continuous Drain Current(V _{GS} =-10V)	T _C =25°C	-13	A
		T _C =100°C	-9	
P _D	Maximum Power Dissipation	T _C =25°C	54	W
		T _C =100°C	27	
R _{θJC}	Thermal Resistance-Junction to Case		2.8	°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} =-250μA	-100			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -100V, V _{GS} =0V			-1	μA
		T _J =85°C			-30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250μA	-1.5	-2	-2.7	V
I _{GSS}	Gate Leakage Current	V _{GS} =±16V, V _{DS} =0V			±10	μA
R _{DS(ON)} ③	Drain-Source On-state Resistance	V _{GS} = -10V, I _{DS} =-8A		160	200	mΩ
		V _{GS} = -4.5V, I _{DS} =-6A		180	250	mΩ
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/μs		35		ns
Q _{rr}	Reverse Recovery Charge			65		nC
Dynamic Characteristics ④						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz		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 =3.8Ω, I _{DS} =-13A, V _{GEN} =-10V, R _G =6Ω		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		

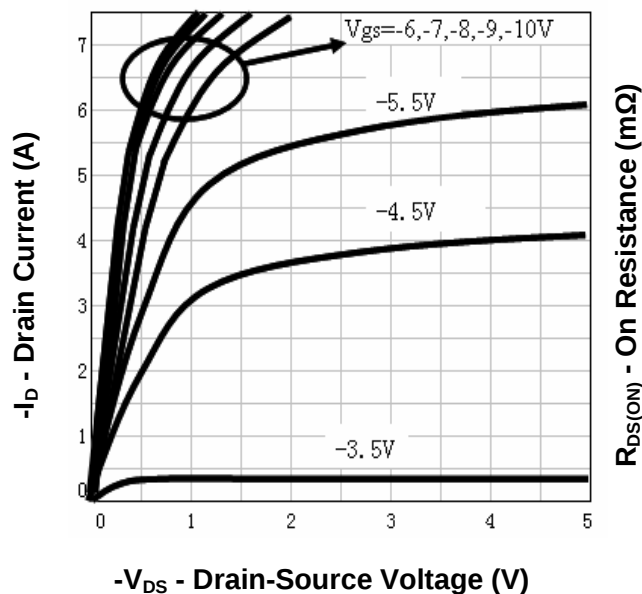
- Notes: ① Pulse width limited by safe operating area.
 ② Limited by T_{Jmax} , $I_{AS}=15A$, $V_{DD}=-48V$, $R_G=50\Omega$, Starting $T_J=25^{\circ}\text{C}$.
 ③ Pulse test; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 ④ Guaranteed by design, not subject to production testing.

Typical Characteristics

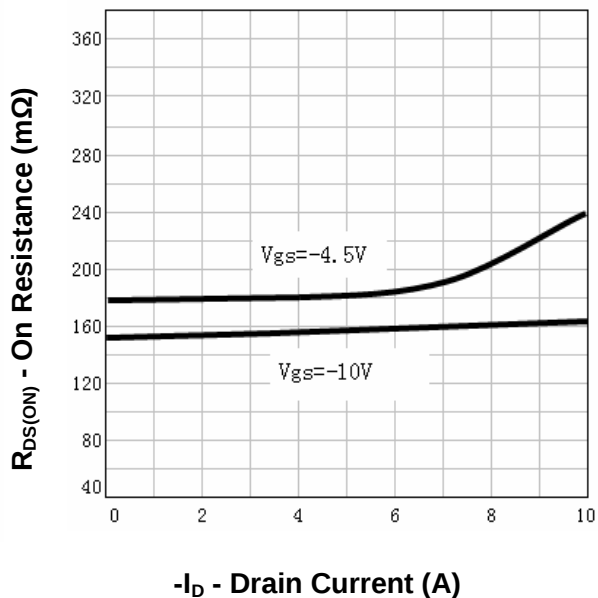


Typical Characteristics

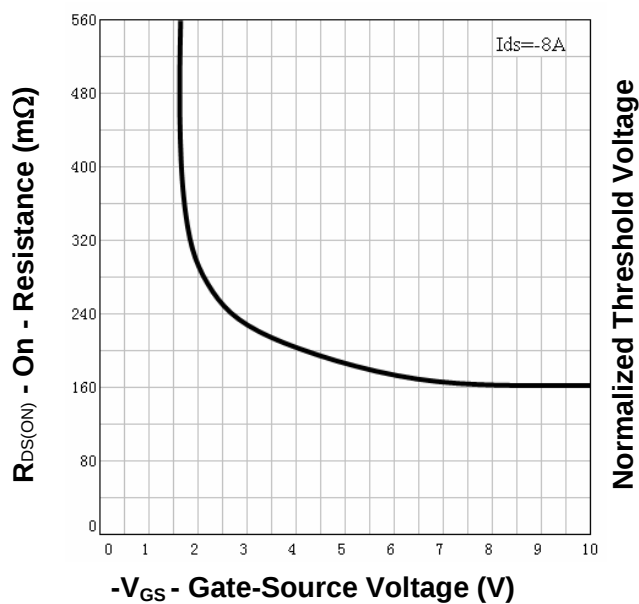
Output Characteristics



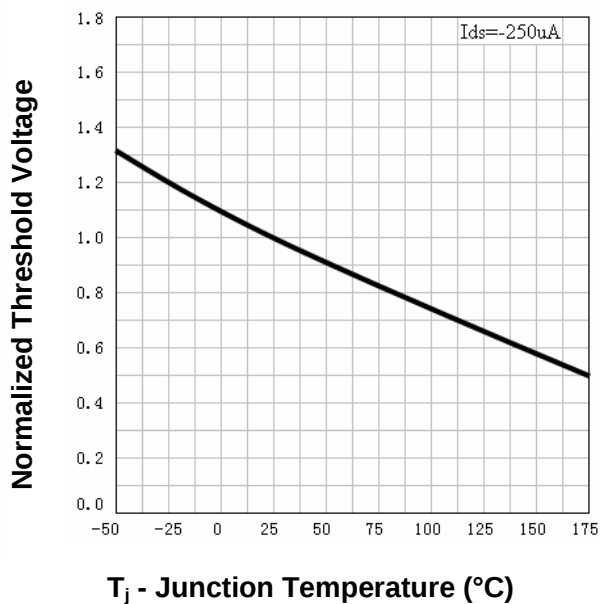
Drain-Source On Resistance



Drain-Source On Resistance

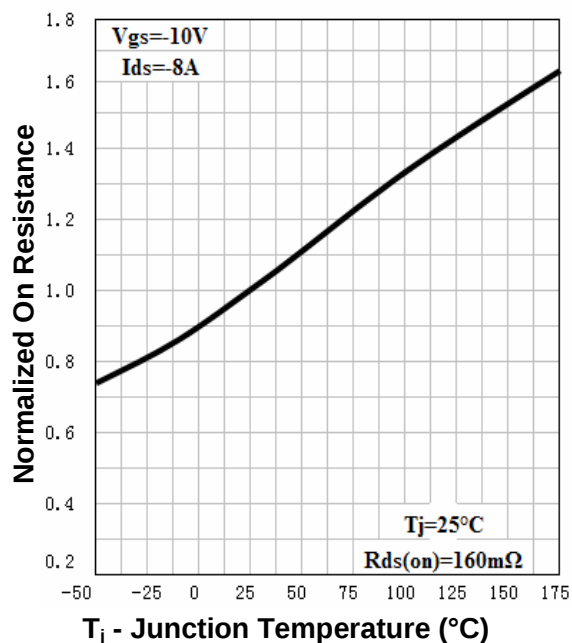


Gate Threshold Voltage

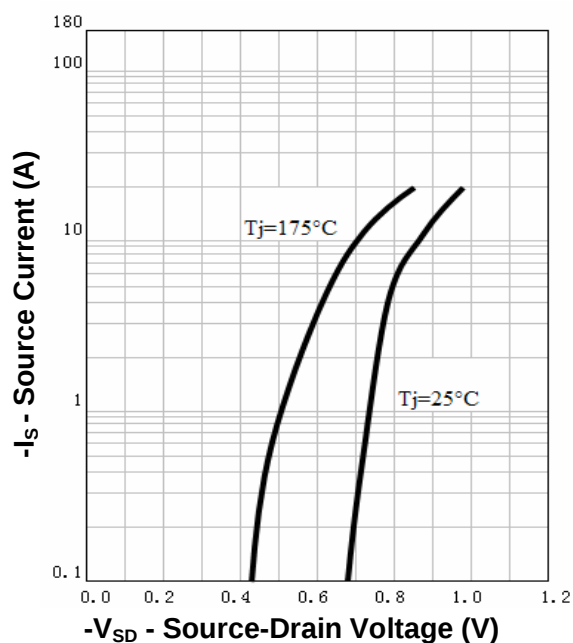


Typical Characteristics

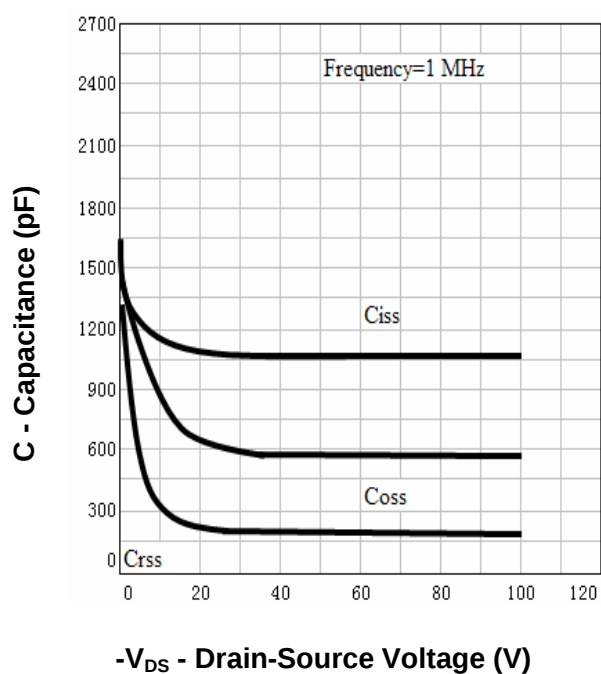
Drain-Source On Resistance



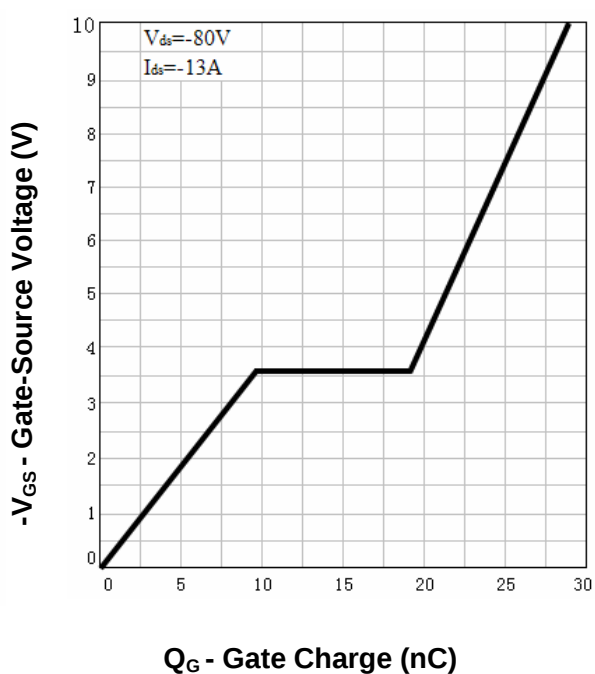
Source-Drain Diode Forward



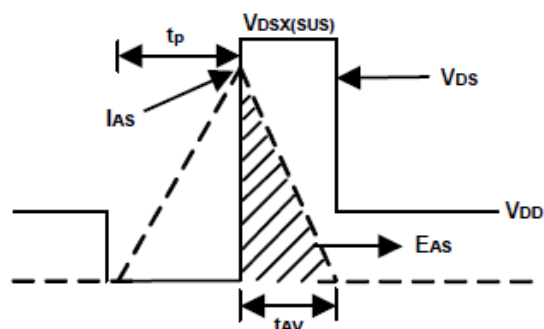
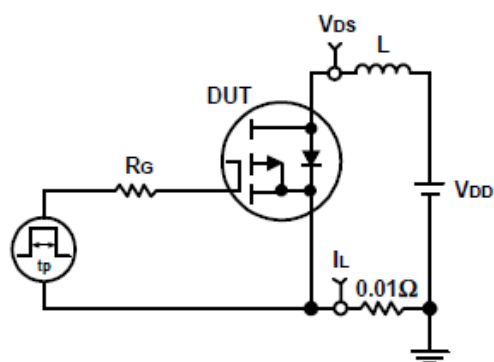
Capacitance



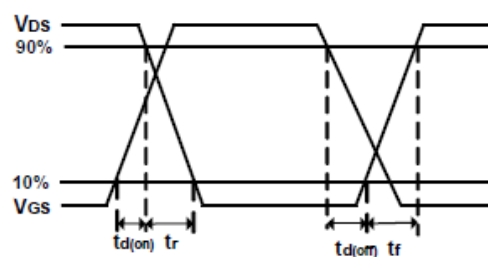
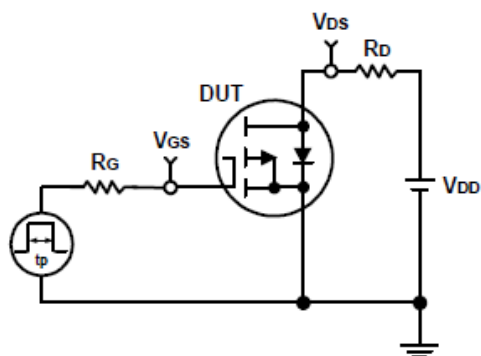
Gate Charge



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms

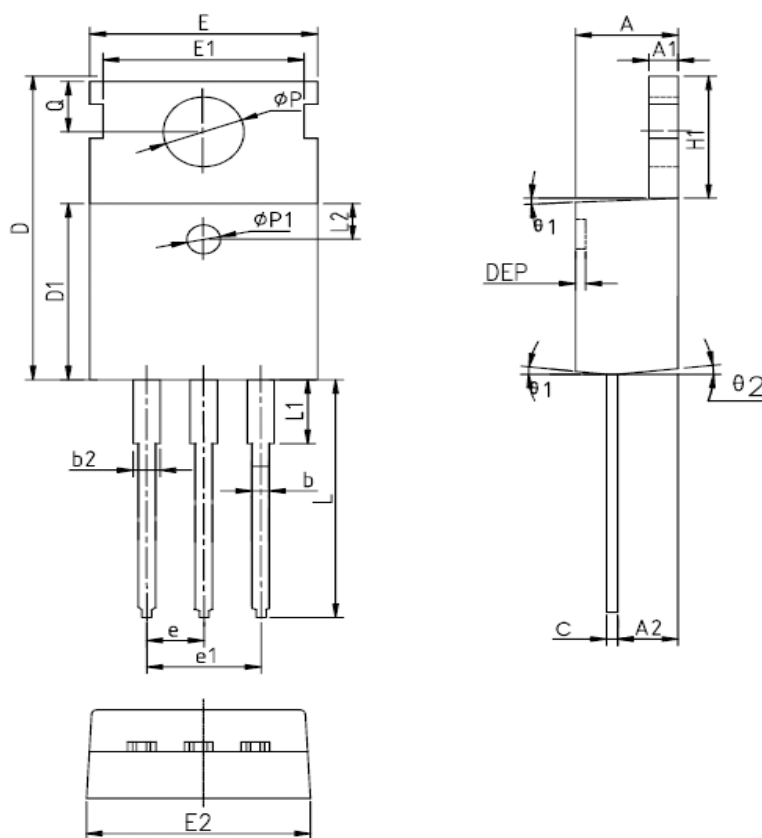


Ordering and Marking Information

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	θ_1	5°	7°	9°	5°	7°	9°
E1	-	8.70	-	-	0.343	-	θ_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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