

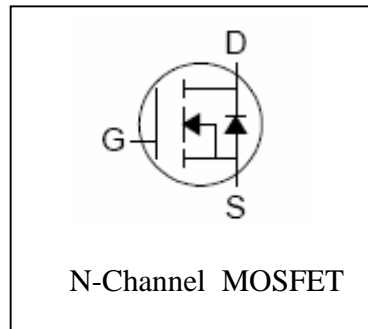
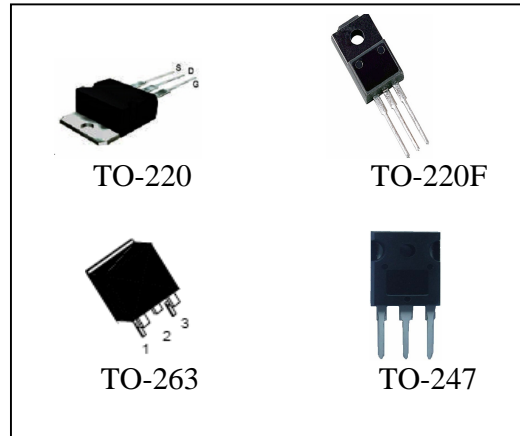
Features

- 60V/100A,
- $R_{DS(ON)} = 7.5m$ (max.) @ $V_{GS} = 10V$ $I_{DS} = 40A$
- Ultra Low On-Resistance
- Exceptional dv/dt capability
- Fast Switching and Fully Avalanche Rated
- 175°C Operating Temperature
- Lead Free and Green Devices Available (RoHS Compliant)

Applications

- Switching Application Systems

Pin Description



Absolute Maximum Ratings

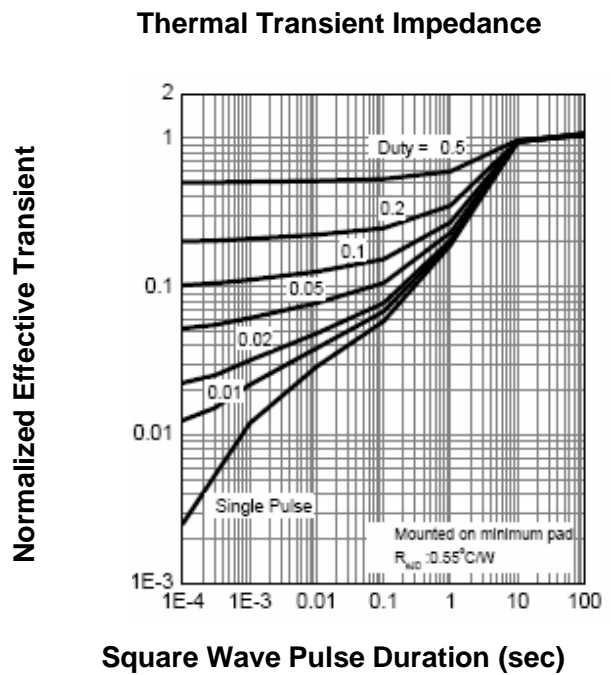
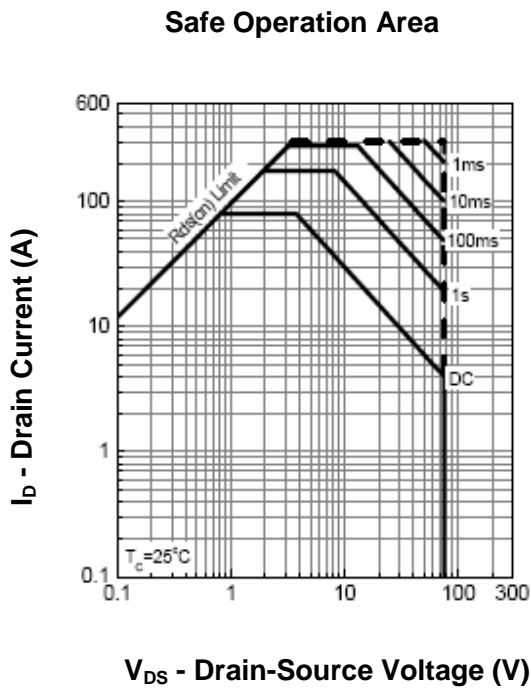
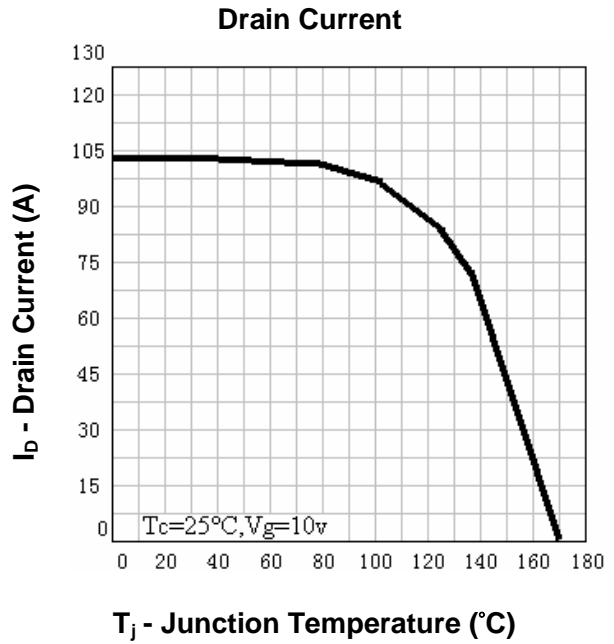
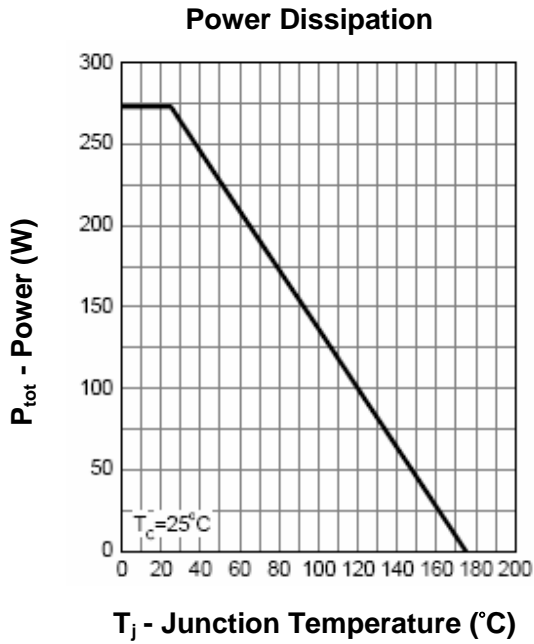
Symbol	Parameter	Rating	Unit
Common Ratings ($T_A = 25^\circ C$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Gate-Source Voltage	± 25	
T_J	Maximum Junction Temperature	175	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ C$
I_S	Diode Continuous Forward Current	$T_C = 25^\circ C$ 100	A
Mounted on Large Heat Sink			
I_{DP}	300 μs Pulse Drain Current Tested	$T_C = 25^\circ C$ 400 ^①	A
I_D	Continuous Drain Current	$T_C = 25^\circ C$ 90	A
		$T_C = 100^\circ C$ 82	
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$ 275	W
		$T_C = 100^\circ C$ 200	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.55	$^\circ C/W$
Drain-Source Avalanche Ratings			
E_{AS}	Avalanche Energy, Single Pulsed	1.2	J

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

Symbol	Parameter	Test Condition	RU3205			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	60			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=60V, V_{GS}=0V$ $T_J=85^{\circ}\text{C}$			1	μA
					30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2	3	4	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}^{(2)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=40A$			7.5	$m\Omega$
Diode Characteristics						
$V_{SD}^{(2)}$	Diode Forward Voltage	$I_{SD}=20A, V_{GS}=0V$		0.83	1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=40A, di_{SD}/dt=100A/\mu s$		50		ns
q_{rr}	Reverse Recovery Charge			110		nC
Dynamic Characteristics ⁽³⁾						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		1.4		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=30V,$ Frequency=1.0MHz		3300		pF
C_{oss}	Output Capacitance			440		
C_{rss}	Reverse Transfer Capacitance			150		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=35V, R_L=35\Omega,$ $I_{DS}=1A, V_{GEN}=10V,$ $R_G=6\Omega$		21	40	ns
t_r	Turn-on Rise Time			12	20	
$t_{d(OFF)}$	Turn-off Delay Time			67	125	
t_f	Turn-off Fall Time			60	115	
Gate Charge Characteristics ⁽³⁾						
Q_g	Total Gate Charge	$V_{DS}=60V, V_{GS}=10V,$ $I_{DS}=80A$		75	105	nC
Q_{gs}	Gate-Source Charge			18		
Q_{gd}	Gate-Drain Charge			25		

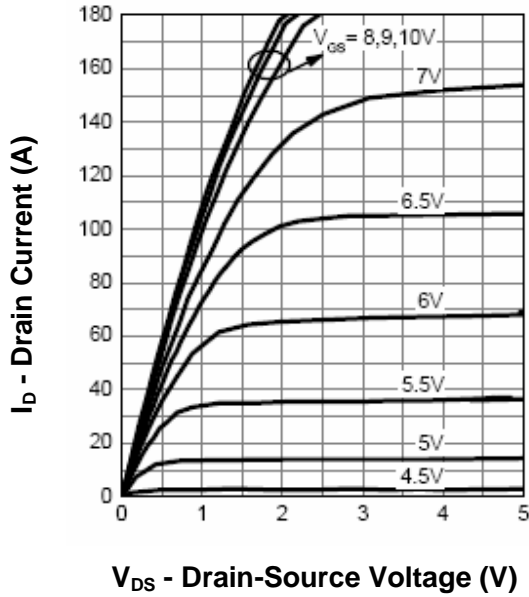
- Notes: ① Current limited by Safe operating area.
 ② Pulse test ; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 ③ Guaranteed by design, not subject to production testing.

Typical Characteristics

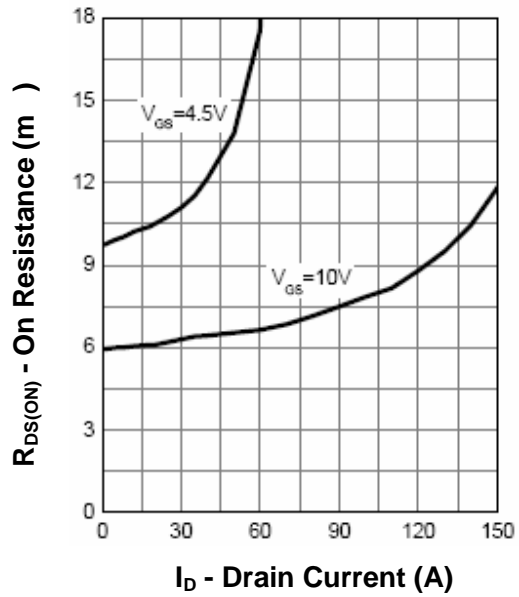


Typical Characteristics

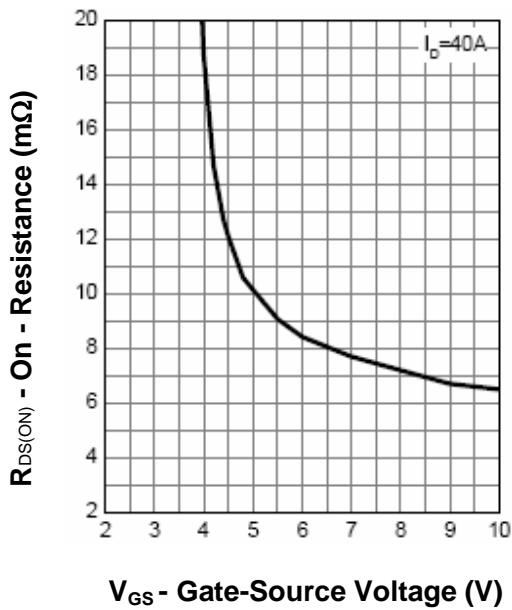
Output Characteristics



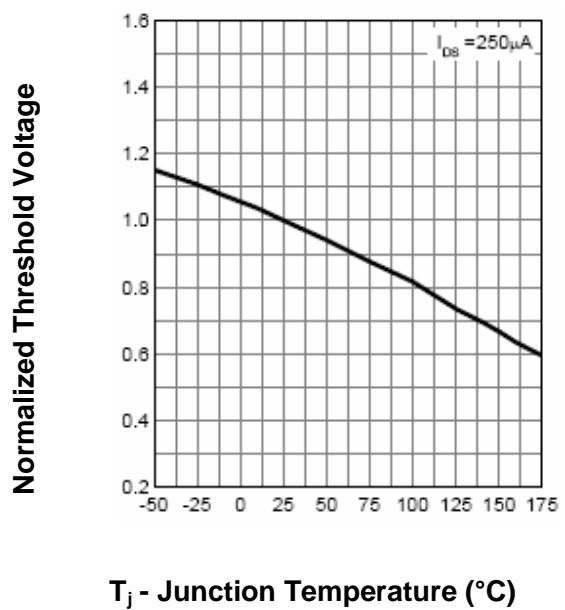
Drain-Source On Resistance



Drain-Source On Resistance

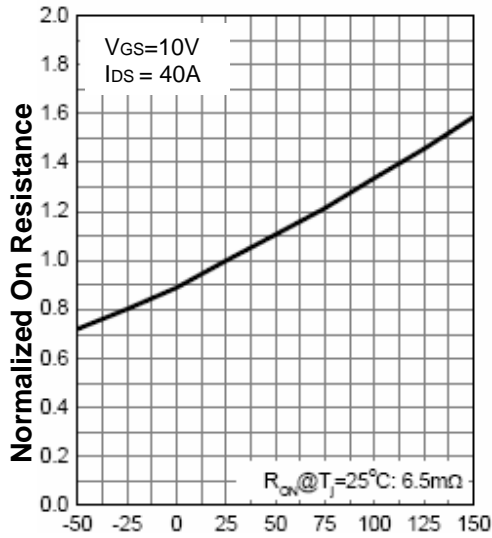


Gate Threshold Voltage



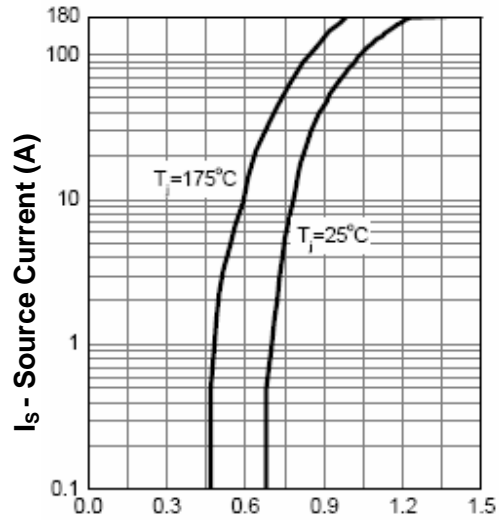
Typical Characteristics

Drain-Source On Resistance



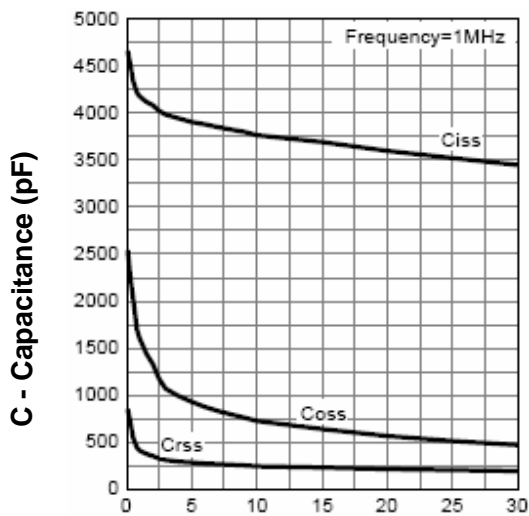
T_J - Junction Temperature (°C)

Source-Drain Diode Forward



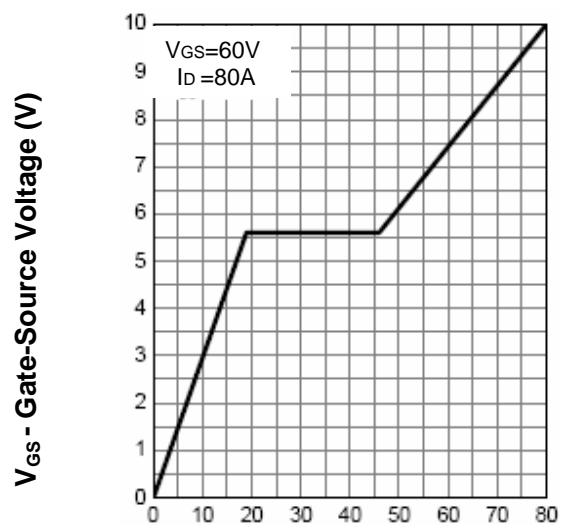
V_{SD} - Source-Drain Voltage (V)

Capacitance



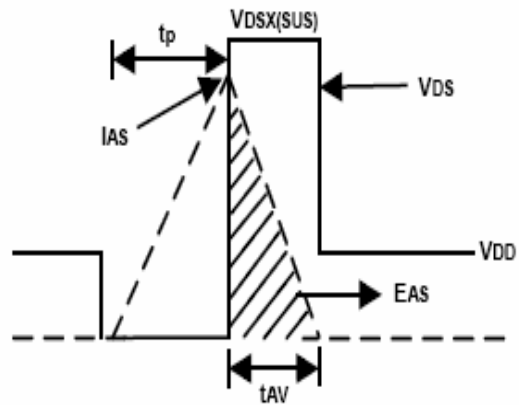
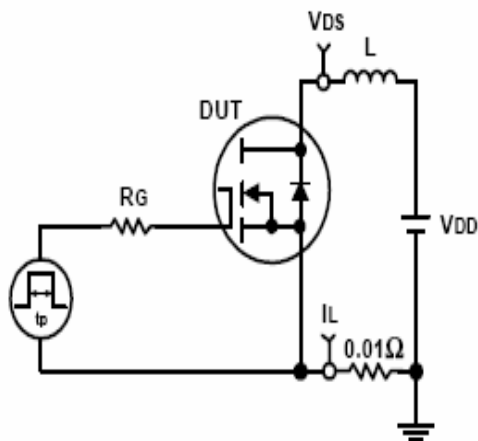
V_{DS} - Drain-Source Voltage (V)

Gate Charge

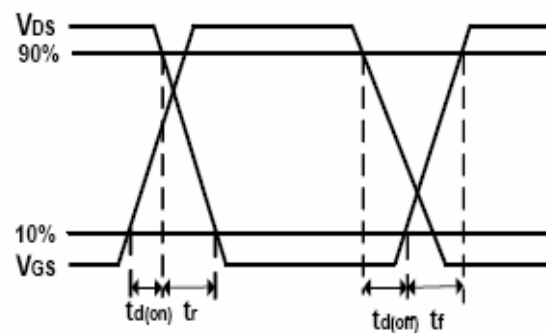
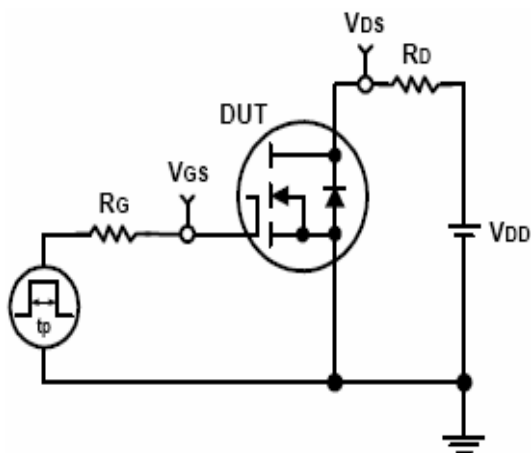


Q_G - Gate Charge (nC)

Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



Ordering and Marking Information**RU3205****Package (Available)**

R : TO-220; S: TO-263; P: TO-220F; Q:TO-247

Operating Temperature Range

C : -55 to 175 °C

Assembly Material

G : Green & Lead Free Device

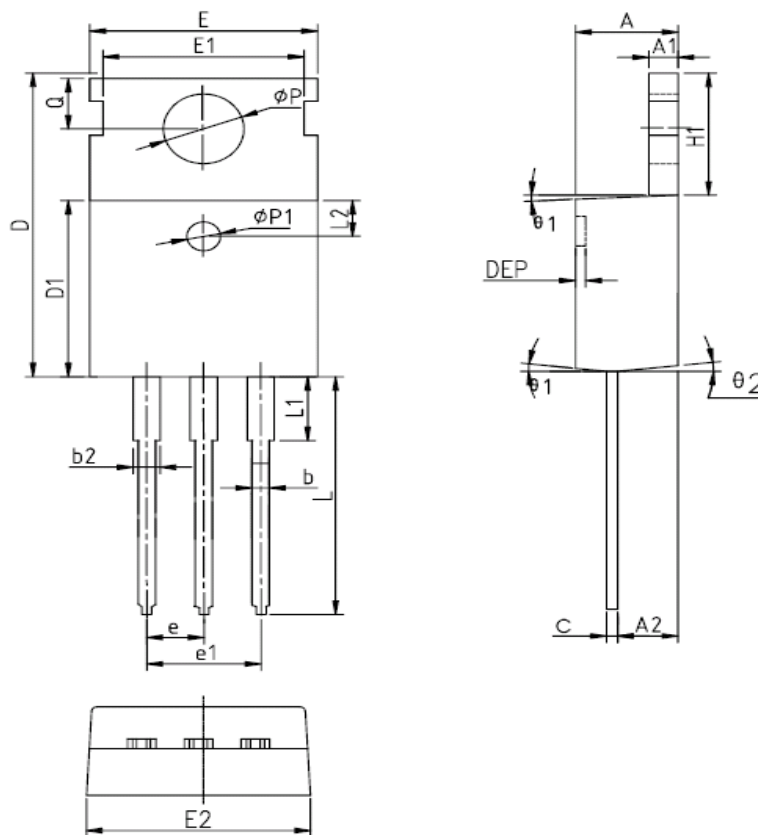
Packaging

T : TUBE

TR : Tape & Reel

Package Information

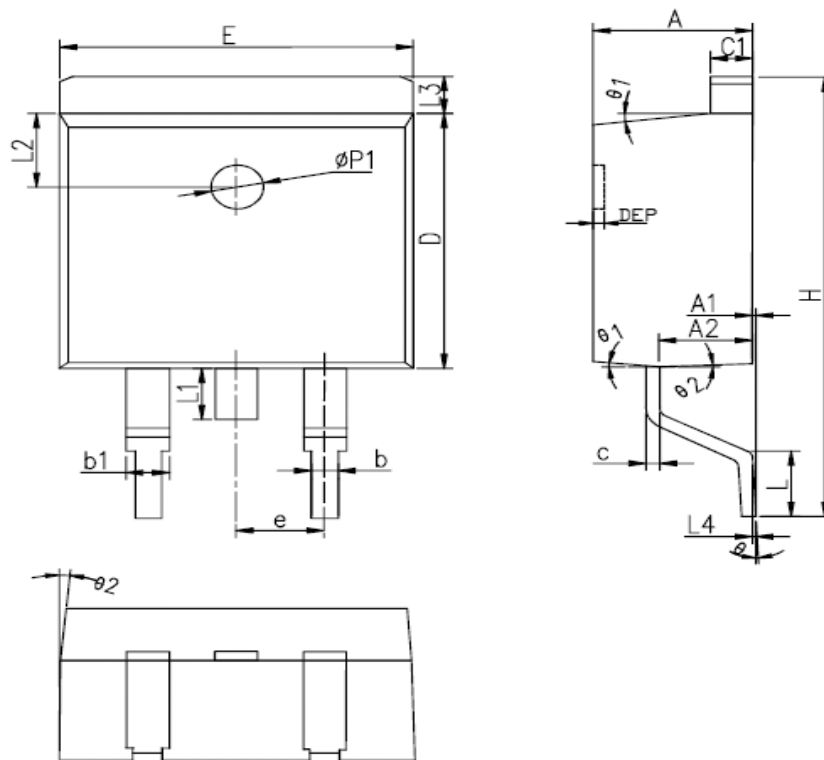
TO-220FB-3L



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

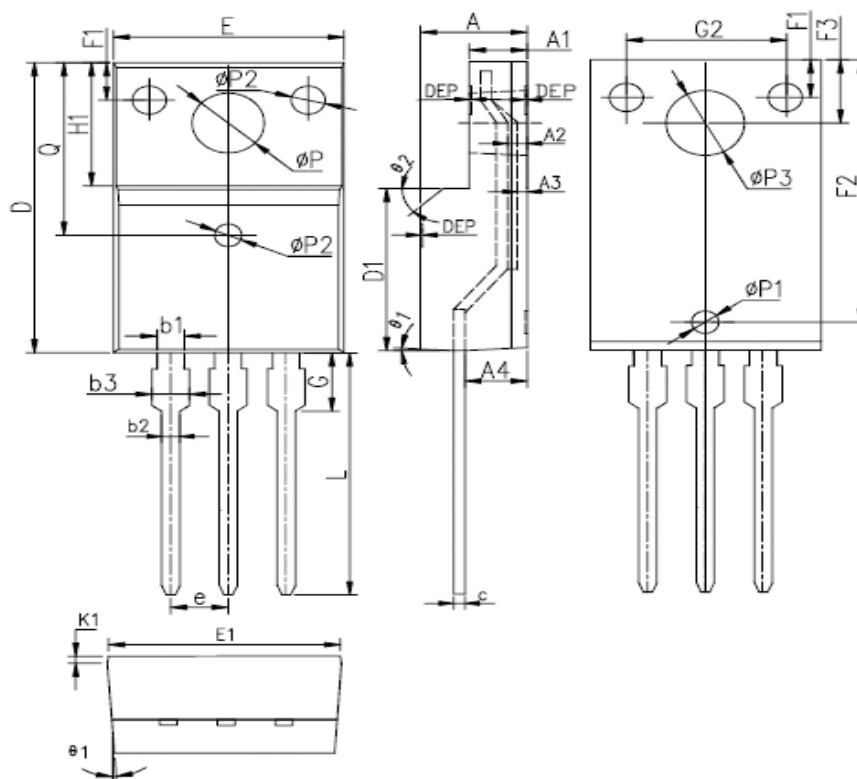
TO-263-2L



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	L	2.00	2.30	2.60	0.079	0.090	0.102
A1	0	0.10	0.25	0	0.004	0.010	L3	1.17	1.27	1.40	0.046	0.050	0.055
A2	2.59	2.69	2.79	0.102	0.106	0.110	L1	-	-	1.70	-	-	0.067
b	0.77	-	0.90	0.030	-	0.035	L4	0.25BSC			0.01BSC		
b1	1.23	-	1.36	0.048	-	0.052	L2	2.50REF.			0.098REF.		
c	0.34	-	0.47	0.013	-	0.019	θ	0°	-	8°	0°	-	8°
C1	1.22	-	1.32	0.048	-	0.052	θ 1	5°	7°	9°	5°	7°	9°
D	8.60	8.70	8.80	0.338	0.343	0.346	θ 2	1°	3°	5°	1°	3°	5°
E	10.00	10.16	10.26	0.394	0.4	0.404	DEP	0.05	0.10	0.20	0.002	0.004	0.008
e	2.54BSC			0.1BSC			Øp1	1.40	1.50	1.60	0.055	0.059	0.063
H	14.70	15.10	15.50	0.579	0.594	0.610							

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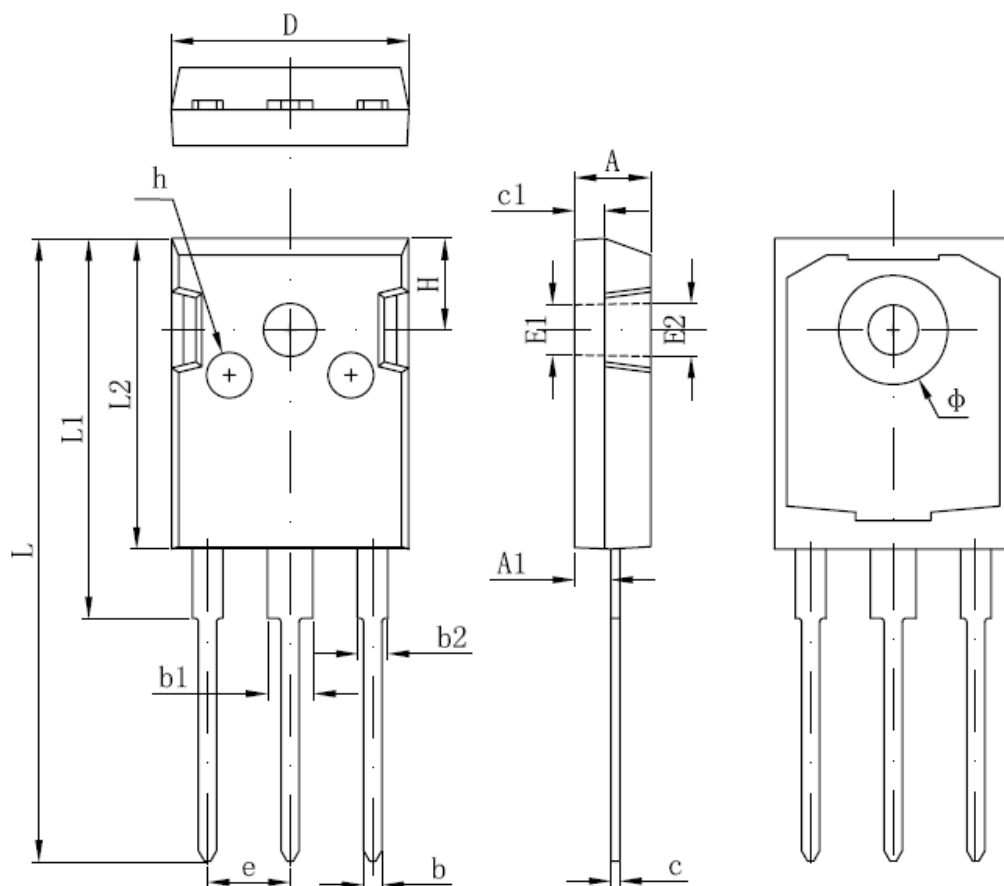
TO-220F-3L



SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
E	9.96	10.16	10.36	0.392	0.400	0.408	Øp3	-	3.450	-	-	0.136	-
A	4.50	4.70	4.90	0.177	0.185	0.193	θ 1	5°	7°	9°	5°	7°	9°
A1	2.34	2.54	2.74	0.092	0.100	0.108	θ 2	-	45°	-	-	45°	-
A2	0.95	1.05	1.15	0.037	0.041	0.045	DEP	0.05	0.10	0.15	0.002	0.004	0.006
A3	0.42	0.52	0.62	0.017	0.020	0.024	F1	1.90	2.00	2.10	0.075	0.079	0.083
A4	2.65	2.75	2.85	0.104	0.108	0.112	F2	13.61	13.81	14.01	0.536	0.544	0.552
c	-	0.50	-	-	0.020	-	F3	3.20	3.30	3.40	0.126	0.130	0.134
D	15.67	15.87	16.07	0.617	0.625	0.633	G	3.25	3.45	3.65	0.128	0.136	0.144
Q	8.80	9.00	9.20	0.346	0.354	0.362	G1	5.90	6.00	6.10	0.232	0.236	0.240
H1	6.48	6.68	6.88	0.255	0.263	0.271	G2	6.90	7.00	7.10	0.272	0.276	0.280
e	2.54BSC			0.1BSC			b1	1.17	1.20	1.24	0.046	0.047	0.048
Øp	-	3.183	-	-	0.125	-	b2	0.77	0.8	0.85	0.030	0.031	0.033
L	12.78	12.98	13.18	0.503	0.511	0.519	b3	1.10	1.30	1.50	0.043	0.051	0.059
D1	8.99	9.19	9.39	0.354	0.362	0.370	E1	9.8	10.00	10.20	0.386	0.394	0.412
Øp1	1.40	1.50	1.60	0.055	0.059	0.063	K1	0.75	0.8	0.85	0.030	0.031	0.033
Øp2	1.15	1.20	1.25	0.045	0.047	0.049							

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TO-247



SYMBOL	MM		INCH		SYMBOL	MM		INCH	
	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
A	4.850	5.150	0,191	0.200	E2	3.600 REF		0.142 REF	
A1	2.200	2.600	0.087	0.102	L	40.900	41.300	1.610	1.626
B	1.000	1.400	0.039	0.055	L1	24.800	25.100	0.976	0.988
b1	2.800	3.200	0.110	0.126	L2	20.300	20.600	0.799	0.811
b2	1.800	2.200	0.071	0.087	Φ	7.100	7.300	0.280	0.287
c	0.500	0.700	0.020	0.028	e	5.450 TYP		0.215 TYP	
c1	1.900	2.100	0.075	0.083	H	5.980 REF.		0.235 REF.	
D	15.450	15.750	0.608	0.620	h	0.000	0.300	0.000	0.012
E1	3.500 REF.		0.138 REF.						

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