

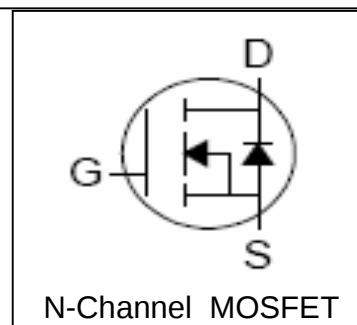
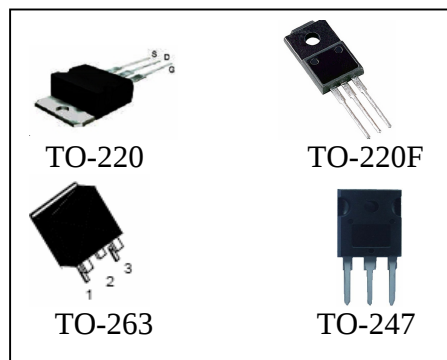
Features

- 150V/120A
 $R_{DS(ON)}=15m\Omega(Typ.) @ V_{GS}=10V$
- Avalanche Rated
- Reliable and Rugged
- Lead Free and Green Devices Available

Applications

- Automotive applications and a wide variety of other applications
- High Efficiency Synchronous in SMPS
- High Speed Power Switching

Pin Description



Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T _A =25°C Unless Otherwise Noted)				
V _{DSS}	Drain-Source Voltage		150	V
V _{GSS}	Gate-Source Voltage		±25	
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	120	A
Mounted on Large Heat Sink				
I _{DP}	300μs Pulsed Drain Current Tested	T _C =25°C	400 ^①	A
I _D	Continue Drain Current	T _C =25°C	120 ^②	
		T _C =100°C	100	
P _D	Maximum Power Dissipation	T _C =25°C	400	W
		T _C =100°C	220	
R _{θJC}	Thermal Resistance -Junction to Case		0.45	°C/W
R _{θJA}	Thermal Resistance-Junction to Ambient		62.5	
Drain-Source Avalanche Ratings				
E _{AS}	Avalanche Energy ,Single Pulsed		2000	mJ

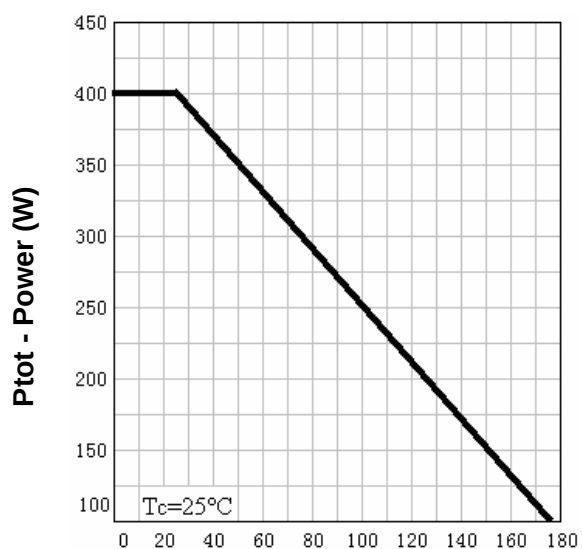
Electrical Characteristics ($T_A=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	RU120N15			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	150			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 150V, V _{GS} =0V			1	μA
		T _J =85°C			30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250μA	2	3	4	V
I _{GSS}	Gate Leakage Current	V _{GS} =±25V, V _{DS} =0V			±100	nA
R _{DS(ON)} ③	Drain-Source On-state Resistance	V _{GS} = 10V, I _{DS} =60A		15	17	mΩ
Diode Characteristics						
V _{SD} ③	Diode Forward Voltage	I _{SD} =60 A, V _{GS} =0V		0.8	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} =60A, dI _{SD} /dt=100A/μs		68		ns
q _{rr}	Reverse Recovery Charge			130		nC
Dynamic Characteristics ④						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz		1.0		Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} = 30V, Frequency=1.0MHz		6600		pF
C _{oss}	Output Capacitance			900		
C _{rss}	Reverse Transfer Capacitance			480		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =35V, R _L =35Ω, I _{DS} = 1A, V _{GEN} = 10V, R _G =6Ω		21	40	ns
t _r	Turn-on Rise Time			40	70	
t _{d(OFF)}	Turn-off Delay Time			110	210	
t _f	Turn-off Fall Time			69	140	
Gate Charge Characteristics ④						
Q _g	Total Gate Charge	V _{DS} =30V, V _{GS} = 10V, I _{DS} =60A		155	220	nC
Q _{gs}	Gate-Source Charge			45		
Q _{gd}	Gate-Drain Charge			48		

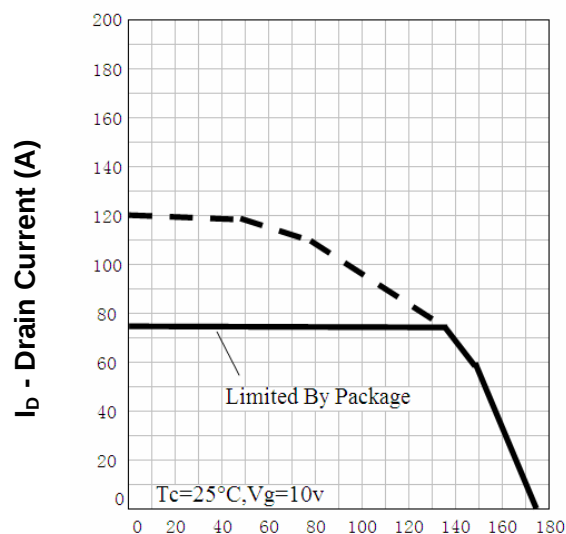
- Notes: ① Pulse width limited by safe operating area.
 ② Current limited by package(Limitation Current is 75A)
 ③ Pulse test ; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 ④ Guaranteed by design, not subject to production testing.

Typical Characteristics

Power Dissipation



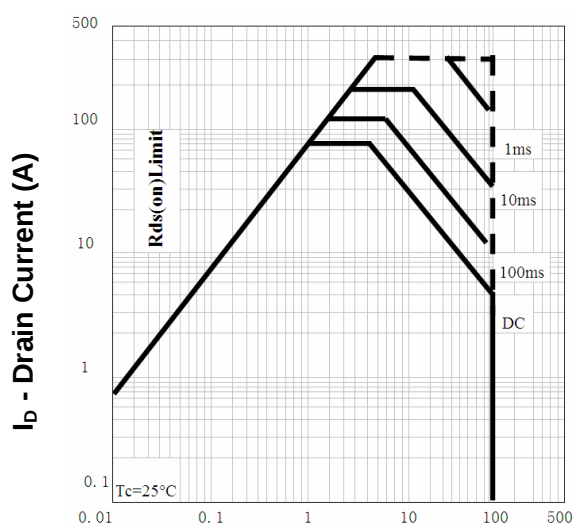
Drain Current



T_j - Junction Temperature ($^{\circ}\text{C}$)

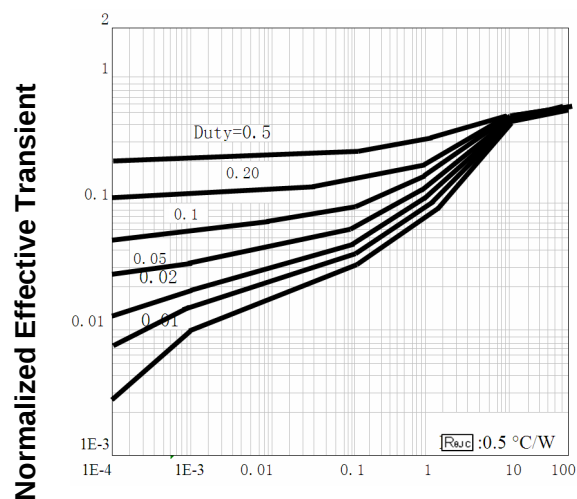
T_j - Junction Temperature ($^{\circ}\text{C}$)

Safe Operation Area



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

Thermal Transient Impedance

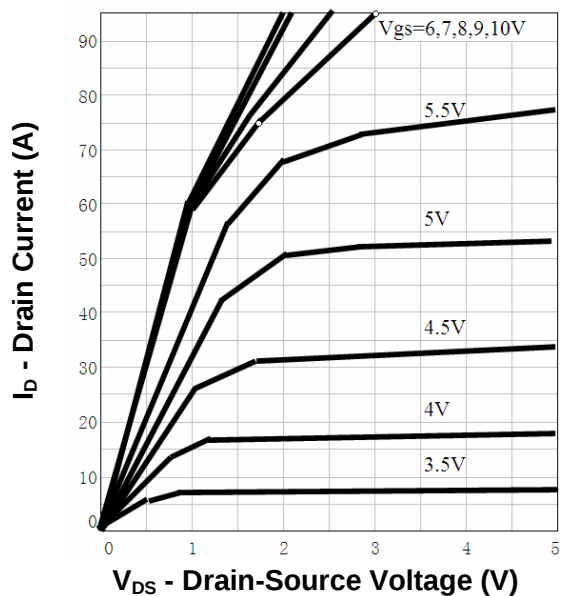


Square Wave Pulse Duration (sec)

Typical Characteristics

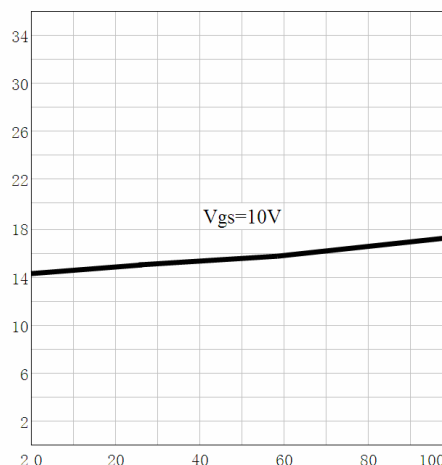
Output Characteristics

Output Characteristics



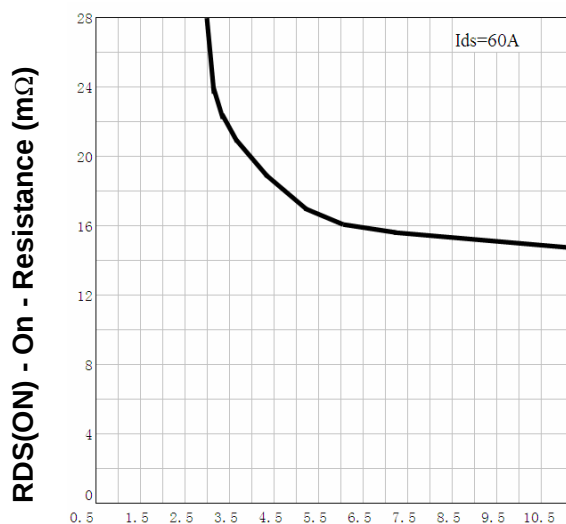
Drain-Source On Resistance

$R_{DS(ON)}$ - On Resistance (m Ω)



I_D - Drain Current (A)

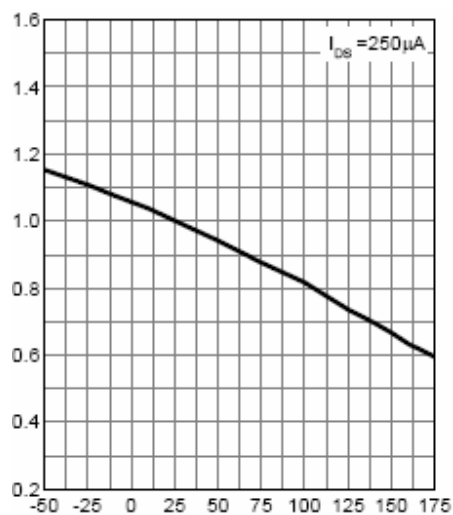
Drain-Source On Resistance



V_{GS} - Gate - Source Voltage (V)

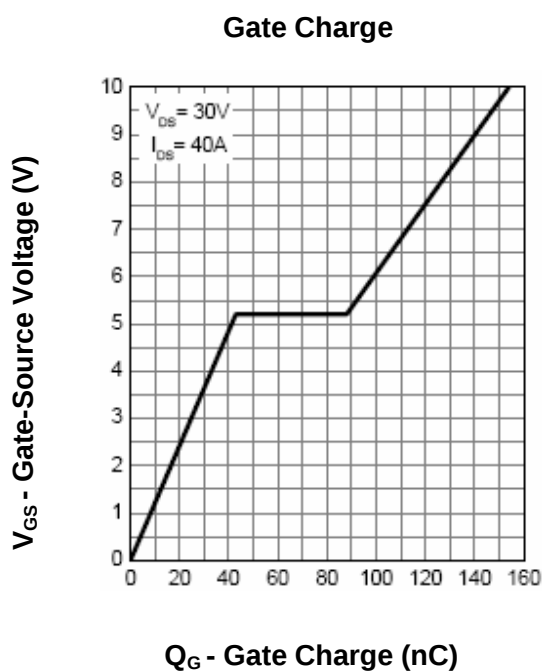
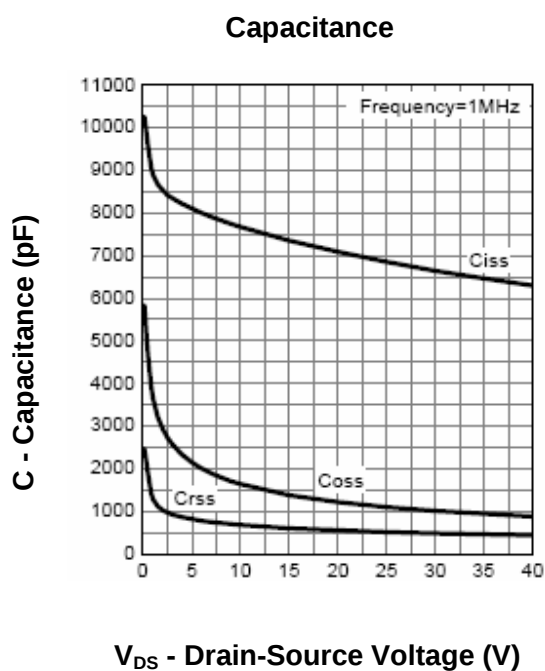
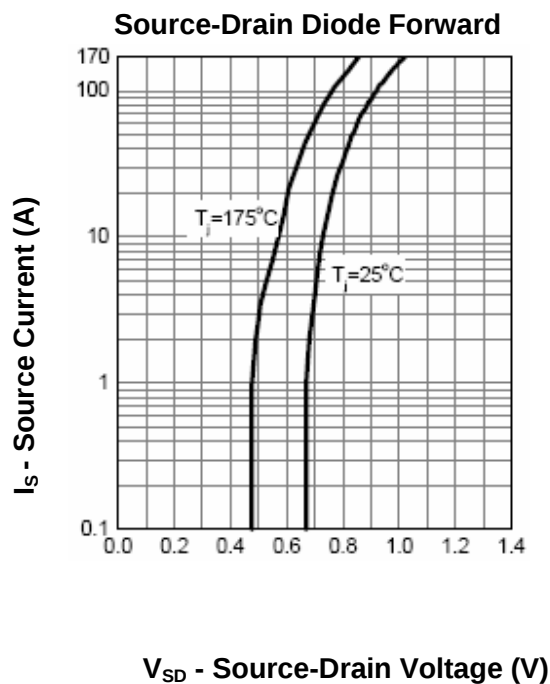
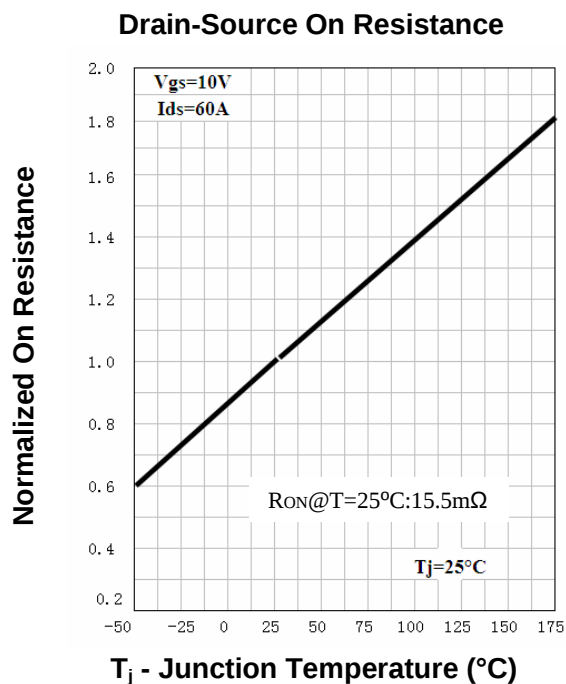
Gate Threshold Voltage

Normalized Threshold Voltage

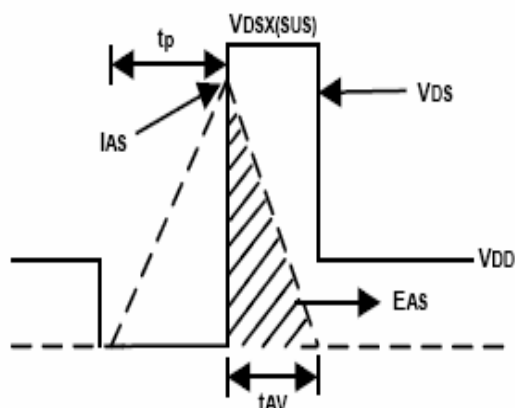
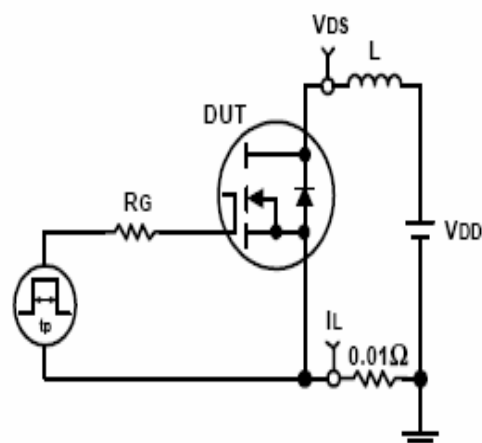


T_J - Junction Temperature (°C)

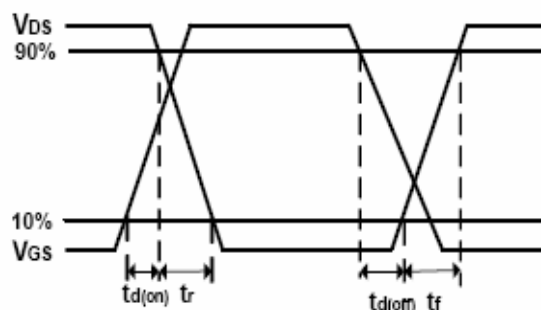
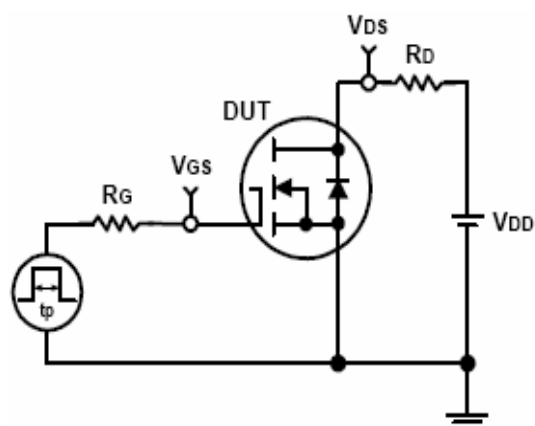
Typical Characteristics



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



Ordering and Marking Information

RU120N15

Package (Available)

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

Operating Temperature Range

C : -55 to 175 °C

Assembly Material

G : Green & Lead Free Device

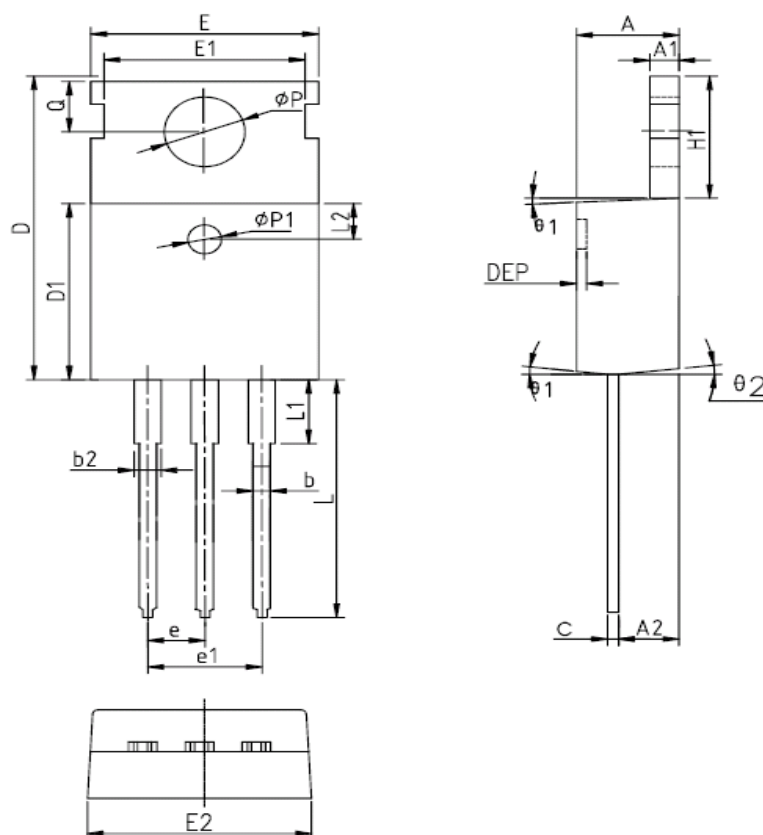
Packaging

T : TUBE

TR : Tape & Reel

Package Information

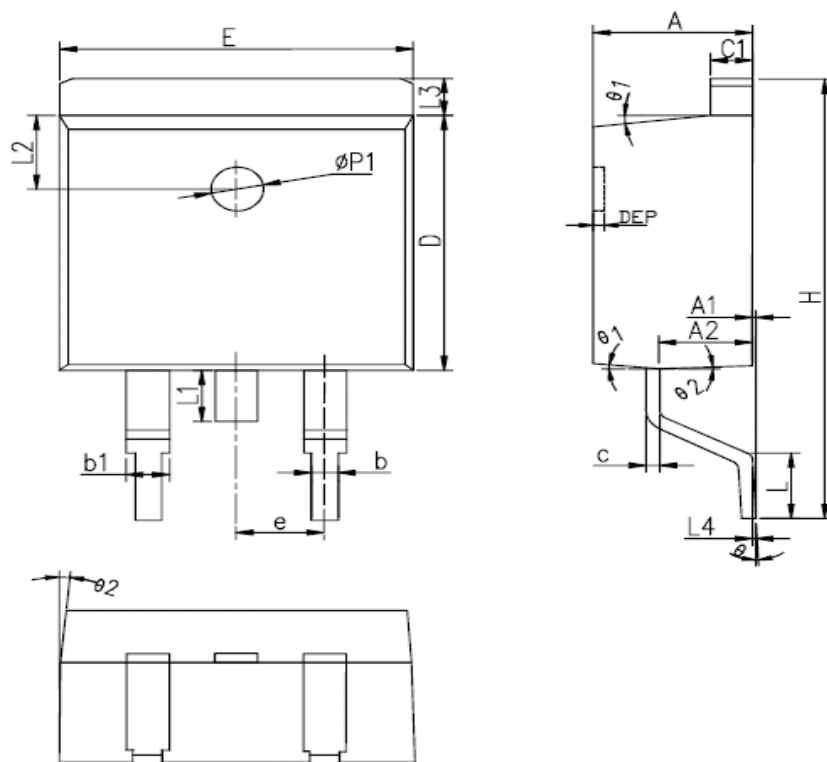
TO-220FB-3L



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	Øp1	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	Øp	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

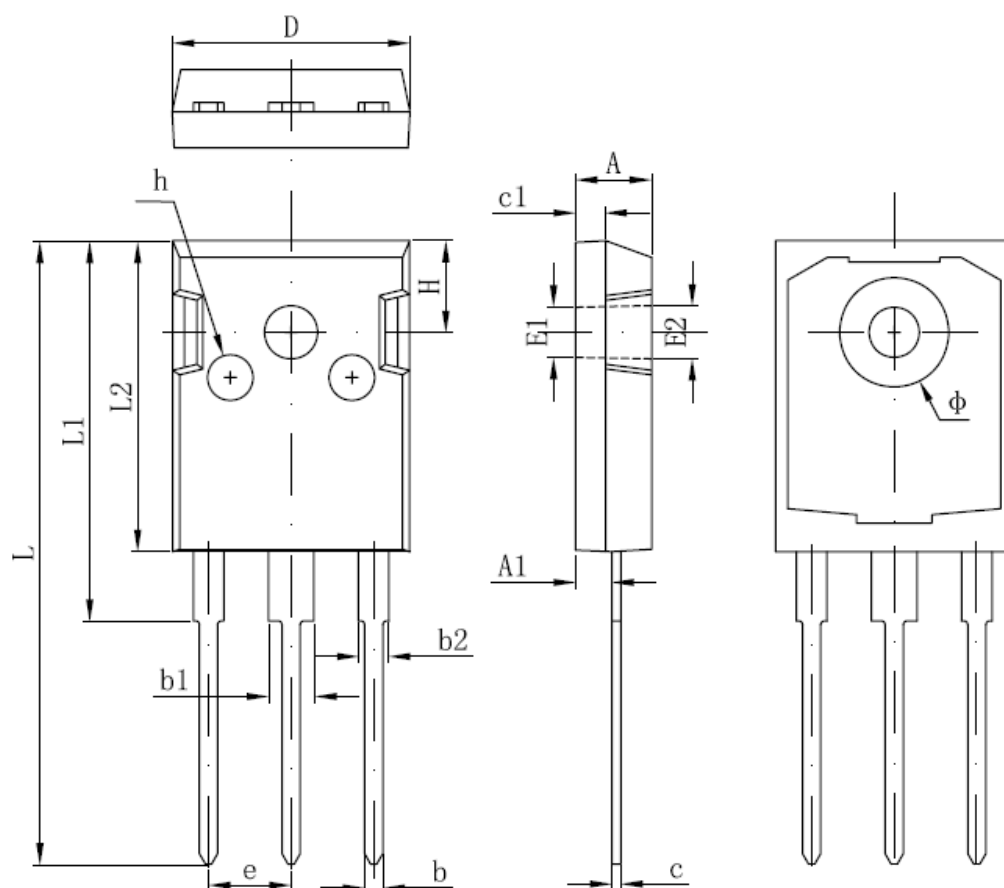
TO-263-2L



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-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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