

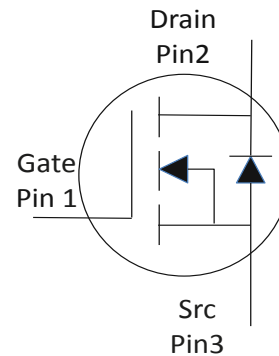


Feature

- ◇ High Speed Power Smooth Switching
- ◇ Enhanced Body diode dv/dt capability
- ◇ Enhanced Avalanche Ruggedness
- ◇ 100% UIS Tested, 100% Rg Tested
- ◇ Lead Free

Application

- ◇ Synchronous Rectification in SMPS
- ◇ Hard Switching and High Speed Circuit
- ◇ Power Tools
- ◇ UPS
- ◇ Motor Control



V_{DS}		250	V
$R_{DS(on),typ}$	TO-263	16.3	m Ω
$R_{DS(on),typ}$	TO-247	15.5	m Ω
$R_{DS(on),typ}$	TO-220	16.6	m Ω
I_D (Silicon Limited)		93	A
I_D (Package Limited)		180	A



Absolute Maximum Ratings at $T_j=25^\circ\text{C}$ (unless otherwise specified)

Parameter	Symbol	Conditions	Value	Unit
Continuous Drain Current (Silicon Limited)	I_D	$T_C=25^\circ\text{C}$	93	A
		$T_C=100^\circ\text{C}$	66	
Drain to Source Voltage	V_{DS}	-	250	V
Gate to Source Voltage	V_{GS}	-	± 20	V
Pulsed Drain Current	I_{DM}	-	290	A
Avalanche Energy, Single Pulse	E_{AS}	$L=0.4\text{mH}, T_C=25^\circ\text{C}$	180	mJ
Power Dissipation	P_D	$T_C=25^\circ\text{C}$	429	W
Operating and Storage Temperature	T_J, T_{stg}	-	-55 to 175	$^\circ\text{C}$

Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Thermal Resistance Junction-Case	$R_{\theta JC}$	0.35	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	60	$^\circ\text{C}/\text{W}$



Electrical Characteristics at $T_J=25^\circ\text{C}$ (unless otherwise specified)

Static Characteristics							
Parameter	Symbol	Conditions	Value			Unit	
			min	typ	max		
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	250	-	-	V	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	3	4		
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS}=0V, V_{DS}=200V, T_J=25^\circ\text{C}$	-	-	1	μA	
		$V_{GS}=0V, V_{DS}=200V, T_J=100^\circ\text{C}$	-	-	100		
Gate to Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA	
Drain to Source on Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	TO-263	-	16.3	21.7	m Ω
			TO-247	-	15.5	21.9	
			TO-220	-	16.6	22	
Transconductance	g_{fs}	$V_{DS}=5V, I_D=20A$	-	70	-	S	
Gate Resistance	R_G	$V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$	-	3.7	-	Ω	
Dynamic Characteristics							
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=100V, f=1\text{MHz}$	-	4950	-	pF	
Output Capacitance	C_{oss}		-	348	-		
Reverse Transfer Capacitance	C_{rss}		-	7	-		
Total Gate Charge	Q_g	$V_{DD}=125V, I_D=20A, V_{GS}=10V$	-	58	-	nC	
Gate to Source Charge	Q_{gs}		-	18	-		
Gate to Drain (Miller) Charge	Q_{gd}		-	6	-		
Turn on Delay Time	$t_{d(on)}$	$V_{DD}=125V, I_D=20A, V_{GS}=10V, R_G=10\Omega,$	-	17	-	ns	
Rise time	t_r		-	22	-		
Turn off Delay Time	$t_{d(off)}$		-	38	-		
Fall Time	t_f		-	11	-		
Reverse Diode Characteristics							
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_F=20A$	-	0.9	-	V	
Reverse Recovery Time	t_{rr}	$V_R=125V, I_F=20A, di_F/dt=100A/\mu s$	-	168	-	ns	
Reverse Recovery Charge	Q_{rr}		-	840	-	nC	



Fig 1. Typical Output Characteristics

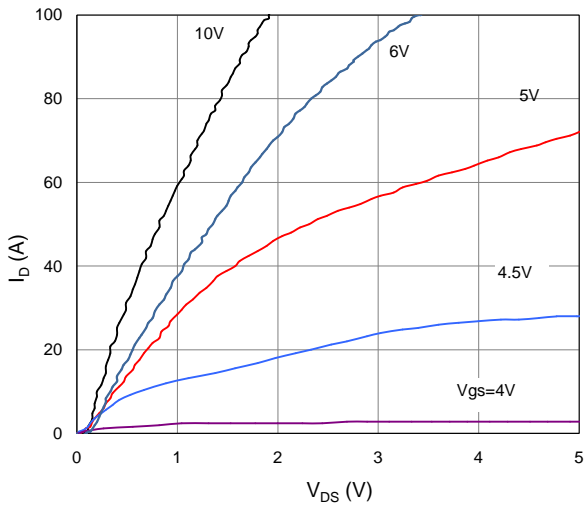


Figure 2. On-Resistance vs. Gate-Source Voltage

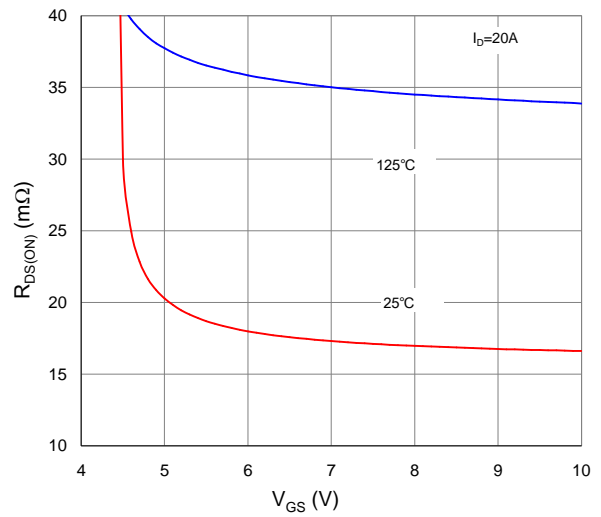


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

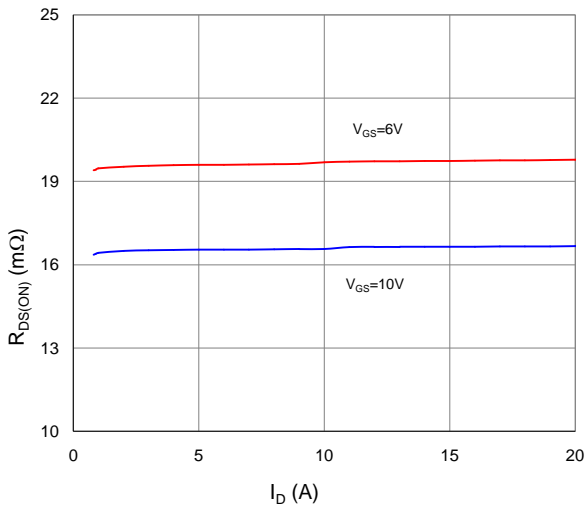


Figure 4. Normalized On-Resistance vs. Junction Temperature

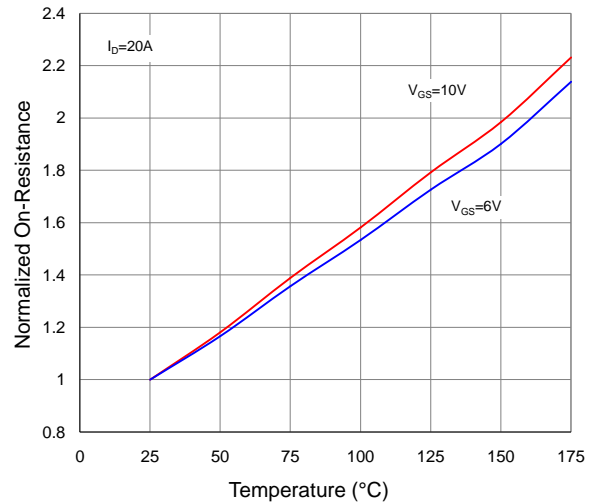


Figure 5. Typical Transfer Characteristics

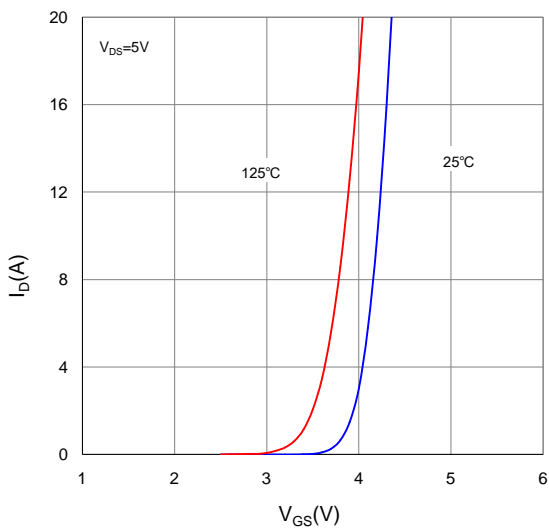


Figure 6. Typical Source-Drain Diode Forward Voltage

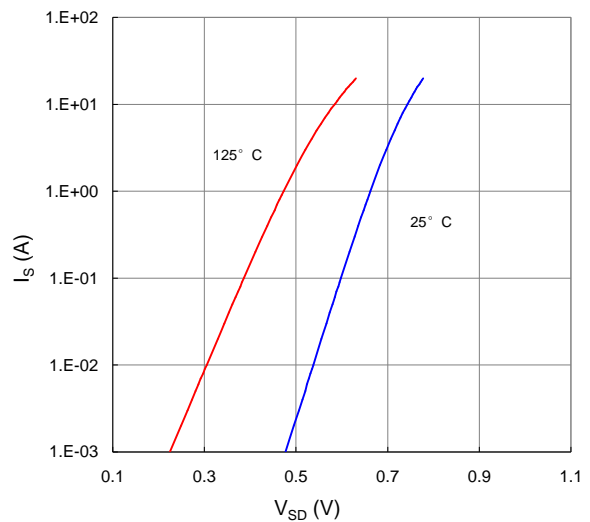




Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

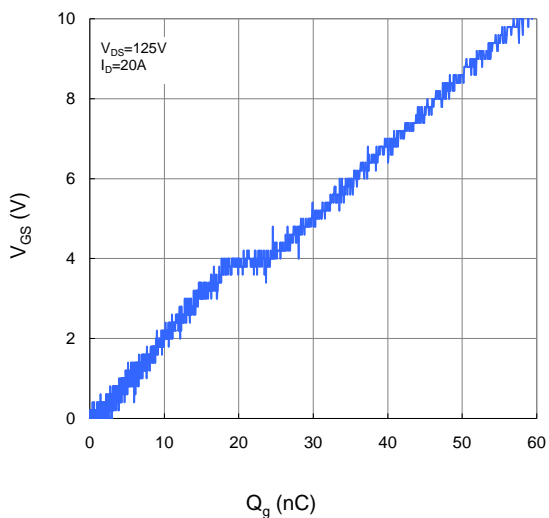


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

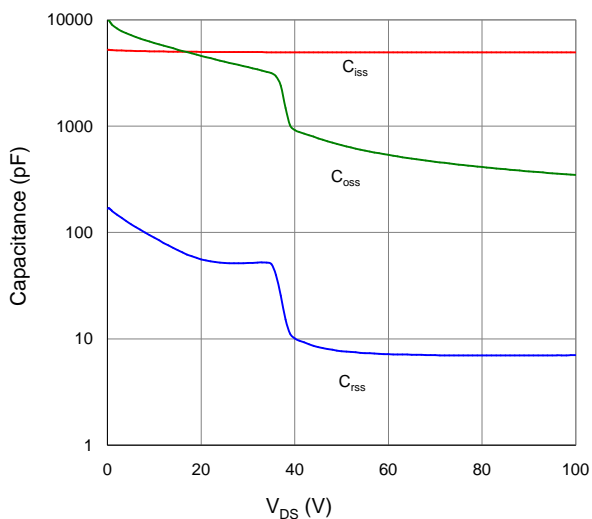


Figure 9. Maximum Safe Operating Area

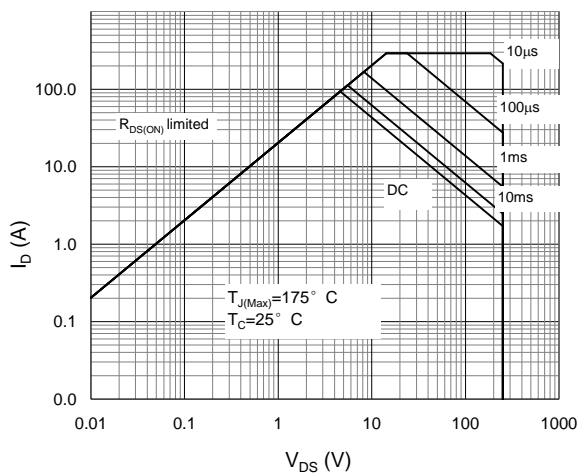


Figure 10. Maximum Drain Current vs. Case Temperature

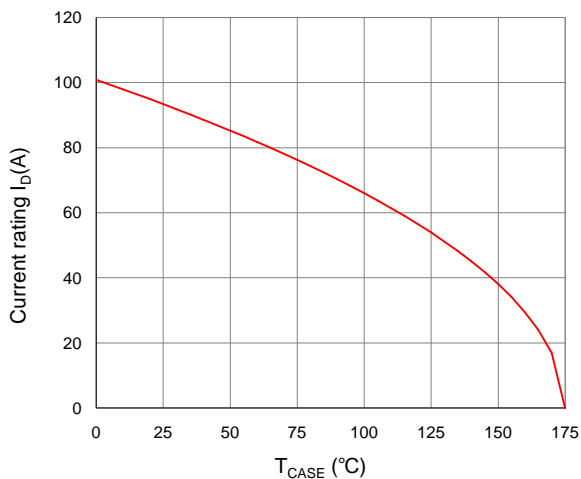
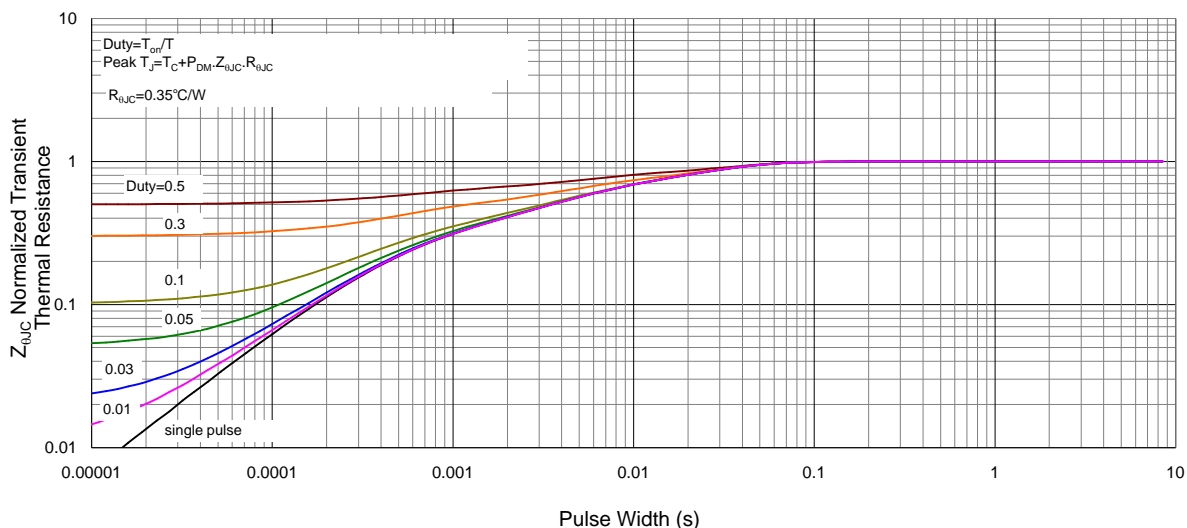
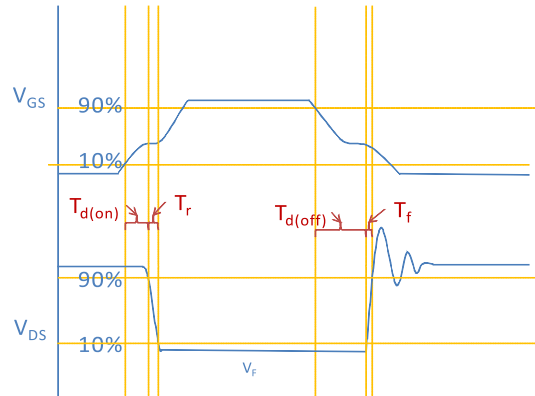
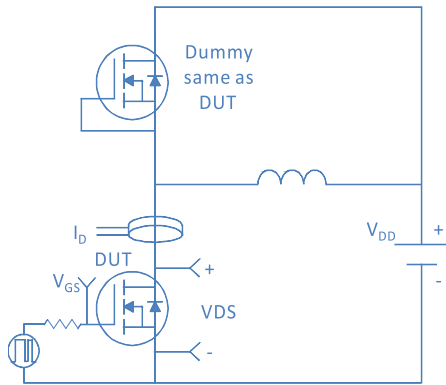


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

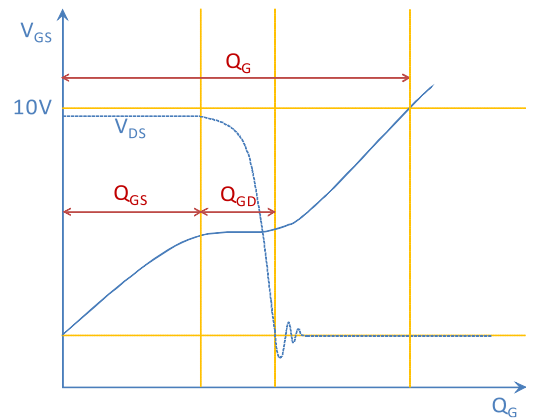
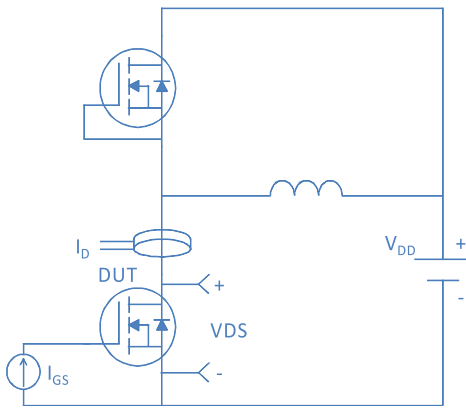




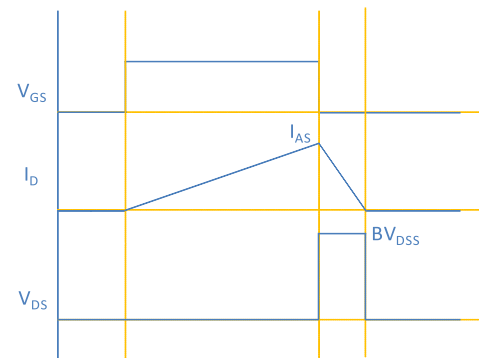
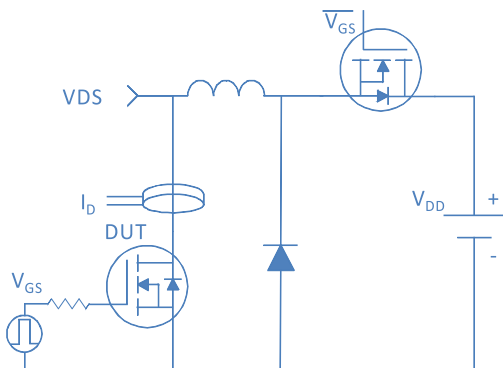
Inductive switching Test



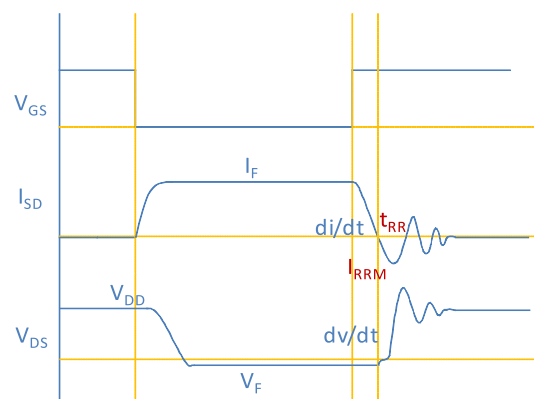
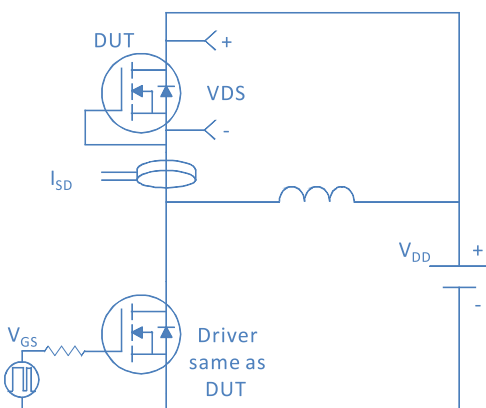
Gate Charge Test



Uclamped Inductive Switching (UIS) Test

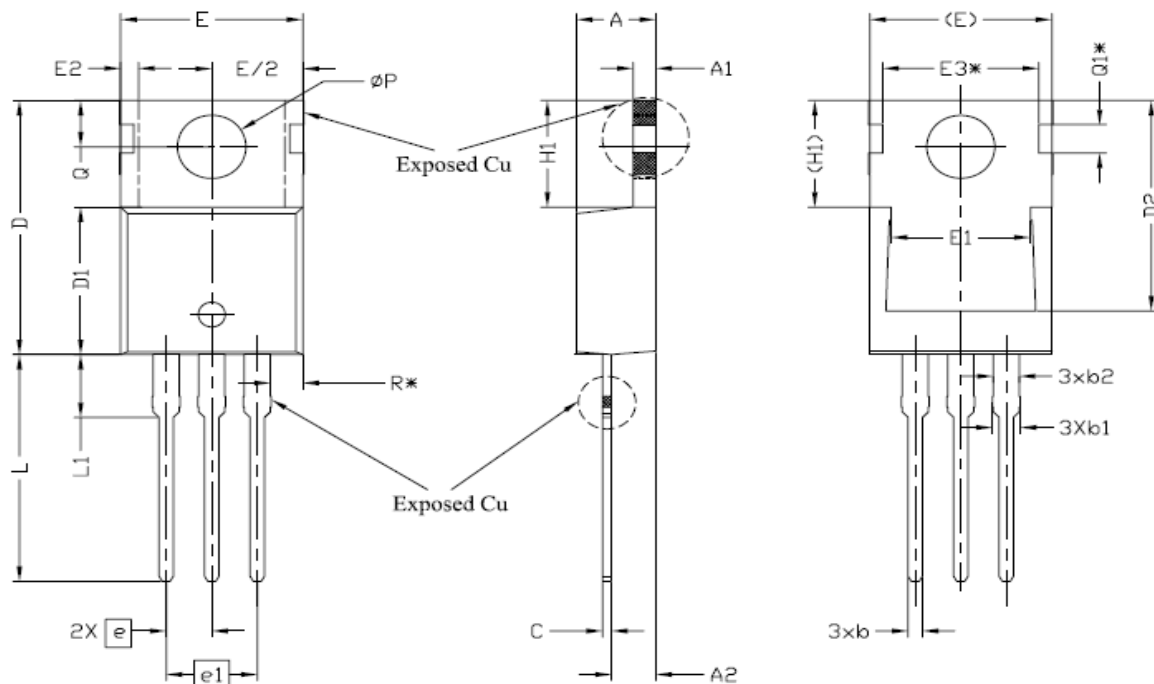


Diode Recovery Test





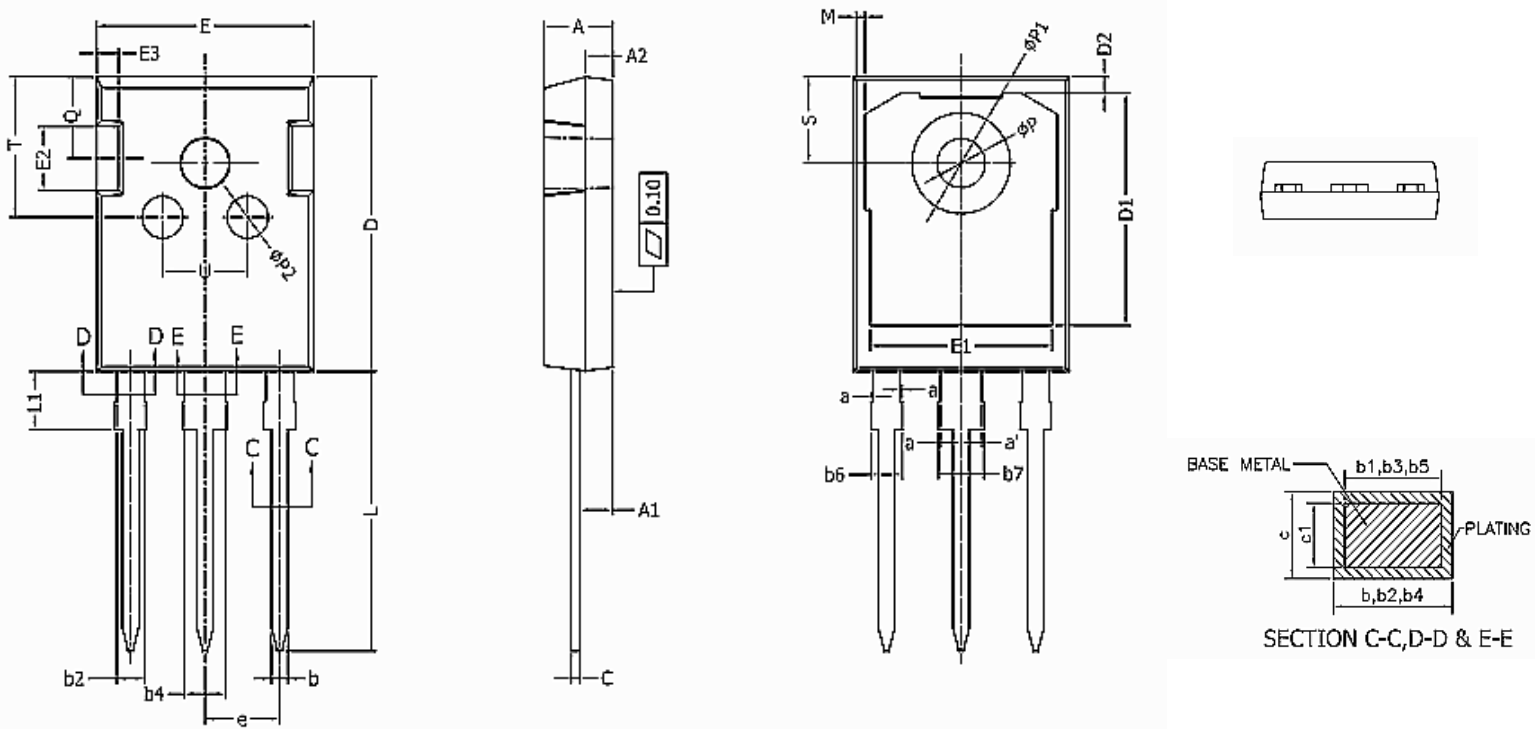
TO-220, 3 leads



SYMBOL	DIMENSIONS			NOTES
	MIN.	NOM.	MAX.	
A	4,24	4,44	4,64	
A1	1,15	1,27	1,40	
A2	2,30	2,48	2,70	
b	0,70	0,80	0,90	
b1	1,20	1,55	1,75	
b2	1,20	1,45	1,70	
c	0,40	0,50	0,60	
D	14,70	15,37	16,00	4
D1	8,82	8,92	9,02	
D2	12,63	12,73	12,83	5
E	9,96	10,16	10,36	4,5
E1	6,86	7,77	8,89	5
E2	-	-	0,76	6
E3*	8,70REF.			
e	2,54BSC			
e1	5,08BSC			
H1	6,30	6,45	6,60	5,6
L	13,47	13,72	13,97	
L1	3,60	3,80	4,00	
ϕP	3,75	3,84	3,93	
Q	2,60	2,80	3,00	
Q1*	1,73REF.			
R*	1,82REF.			



Outlines TO-247 Package



SYMBOL	MIN	NOM	MAX
A	4.9	5	5.1
A1	2.31	2.41	2.51
A2	1.9	2	2.1
a	0	---	0.15
a'	0	---	0.15
b	1.16	---	1.26
b1	1.15	1.2	1.22
b2	1.96	---	2.06
b3	1.95	2	2.02
b4	2.96	---	3.06
b5	2.96	3	3.02
b6	---	---	2.25
b7	---	---	3.25
c	0.59	---	0.66
c1	0.58	0.6	0.62
D	20.9	21	21.1
D1	16.25	16.55	16.85

SYMBOL	MIN	NOM	MAX
D2	1.05	1.17	1.35
E	15.7	15.8	15.9
E1	13.1	13.3	13.5
E2	4.4	4.5	4.6
E3	2.4	2.5	2.6
e	5.436 BSC		
L	19.8	19.92	20.1
L1	---	---	4.3
M	0.35	---	0.95
P	3.4	3.5	3.6
P1	7	---	7.4
P2	2.4	2.5	2.6
Q	5.6	---	6
S	6.05	6.15	6.25
T	9.8	---	10.2
U	6	---	6.4



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