



N-Channel SGTrench MOSFET, 80V, 175A, 2.8mΩ

General Description

The VAM8004 utilizes the advanced Trench technology and low resistance package to achieve extremely low on-resistance device which makes the system design an efficient and reliable solution for use in a wide variety of applications.

Features

- 85V, 175A, $R_{DS(on)}=2.8m\Omega@V_{GS}=10V$
- High Efficiency
- Improved dv/dt, di/dt capability
- 100% EAS Guaranteed
- Green Device

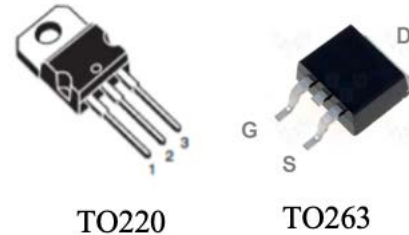
Application

Networking, Load Switch

LED Lighting, Quick Charger

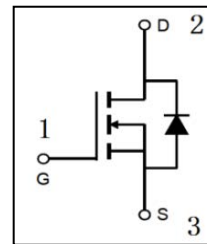
Product Summary

$V_{DS}@T_{j,max}$	85 V
$R_{DS(on)}@V_{GS}=10V$	2.8mΩ
I_D Continuous Current	175A



TO220

TO263



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit	Condition
Drain-Source Voltage	V_{DS}	85	V	
Continuous drain current ⁽¹⁾	I_D	175	A	$T_C=25^\circ C$
		123	A	$T_C=100^\circ C$
Gate-Source Voltage	V_{GS}	± 20	V	Static
Pulsed drain current ⁽²⁾	I_{DM}	440	A	$T_C=25^\circ C$
Single Pulse Avalanche Energy	EAS	180	mJ	
Power dissipation	P_{diss}	192	W	$T_C=25^\circ C$
Storage Temperature Range	T_{STG}	-55 to 175	$^\circ C$	
Operating Junction Temperature Range	T_J	-55 to 175	$^\circ C$	

(1) Limited by $T_{j,max}$.

(2) Pulse width T_P limited by $T_{j,max}$



Thermal characteristics

Symbol	Parameter	Min	Typ	Max	Unit
R _{thJC}	Thermal resistance, junction-case	---	---	0.65	°C/W
R _{thJA}	Thermal resistance, junction-ambient	---	---	62	°C/W
T _{sold}	Soldering temperature	---	---	260	°C

Package and Ordering Information

Device	Package	Marking
VAM8004X	TO263	8004
VAM8004P	TO220	8004



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

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Static Characteristic						
Drain-Source breakdown Voltage	$V_{(BR)DSS}$	85	---	---	V	$V_{GS}=0V, I_D=0.25mA$
Gate Threshold Voltage	$V_{(GS)th}$	1.2	1.8	2.5	V	$V_{DS}=V_{GS}, I_D=0.25mA$
Drain-Source on resistance	$R_{(DS)on}$	---	2.8	3.5	m Ω	$V_{GS}=10V, I_D=20A, T_j=25^\circ\text{C}$
Zero gate voltage drain current	I_{DSS}	---	---	1	μA	$V_{DS}=80V, V_{GS}=0V, T_j=25^\circ\text{C}$
		---	---	100	μA	$V_{DS}=64V, V_{GS}=0V, T_j=25^\circ\text{C}$
Gate-Source leakage current	I_{GSS}	---	---	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Dynamic Characteristic						
Input Capacitance	C_{iss}	---	4150	---	pF	$V_{GS}=0V, V_{DS}=40V, f=1MHz$
Output Capacitance	C_{oss}	---	1200	---	pF	$V_{GS}=0V, V_{DS}=40V, f=1MHz$
Reverse Transfer Capacitance	C_{rss}	---	50	---	pF	$V_{GS}=0V, V_{DS}=40V, f=1MHz$
Turn-on delay time	$T_{d(on)}$	---	24	---	nS	$V_{DD}=40V, V_{GS}=10V, I_D=20A,$ $R_G=6\Omega;$
Rise time	T_r	---	140	---	nS	
Turn-off delay time	$T_{d(off)}$	---	71	---	nS	
Fall time	T_f	---	18	---	nS	
Gate Charge Characteristic						
Gate to source charge	Q_{gs}	---	13.5	---	nC	$V_{DD}=40V, I_D=20A, V_{GS}=10V$
Gate to drain charge	Q_{gd}	---	27	---	nC	
Gate charge total	Q_g	---	80	---	nC	
Reverse diode characteristic						
Diode forward voltage	V_{FD}	---	---	1.5	V	$V_{GS}=0V, I_F=20A, T_j=25^\circ\text{C}$
Reverse Recovery Time	t_{rr}	---	67	---	ns	$V_R=40V, I_F=20A, dI_F/dt=100A/\mu\text{S}$
Reverse Recovery Charge	Q_{rr}	---	105	---	nC	



Electrical Characteristic Diagrams

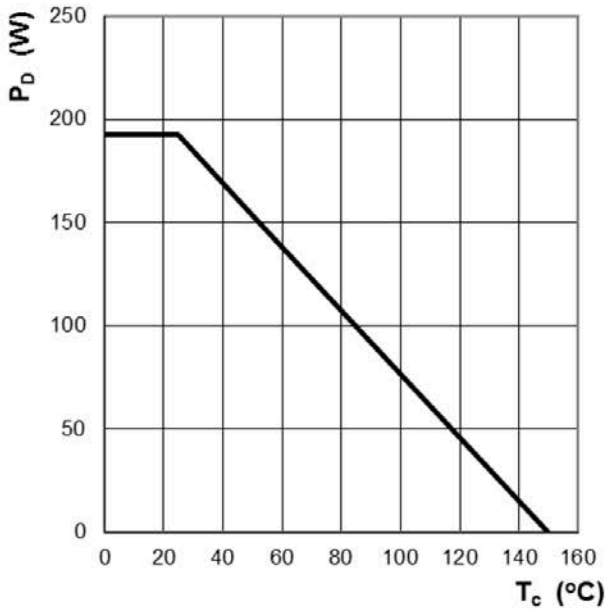


Figure 1: Power Dissipation

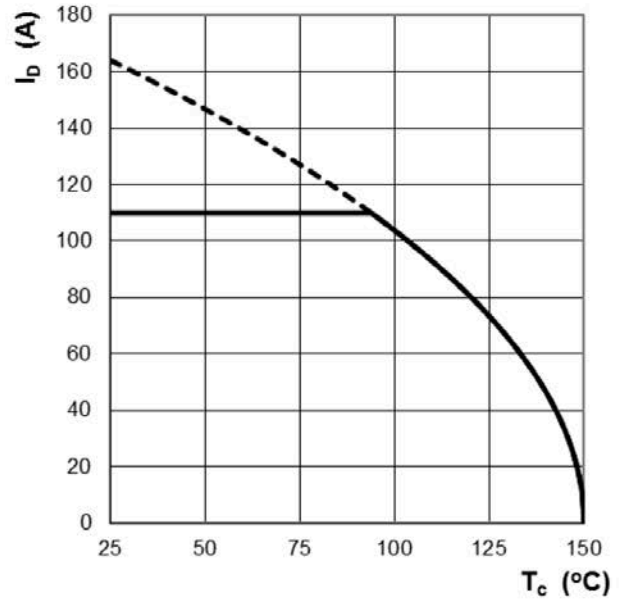


Figure 2: Continuous Drain Current vs. T_c

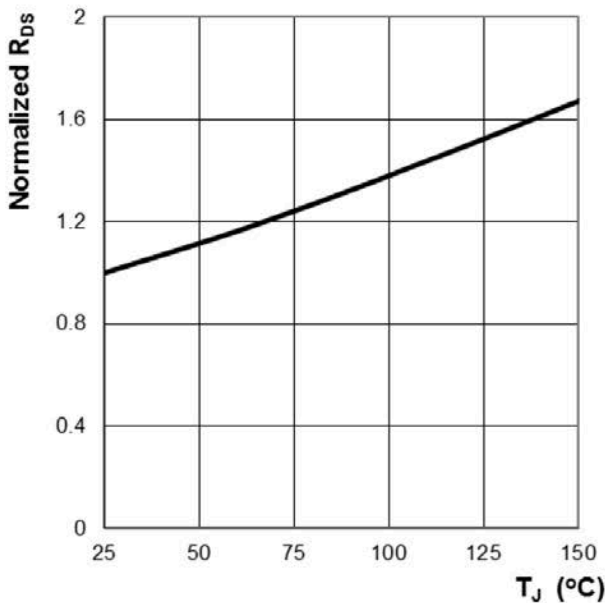


Figure 3: Normalized $R_{DS(on)}$ vs. T_J

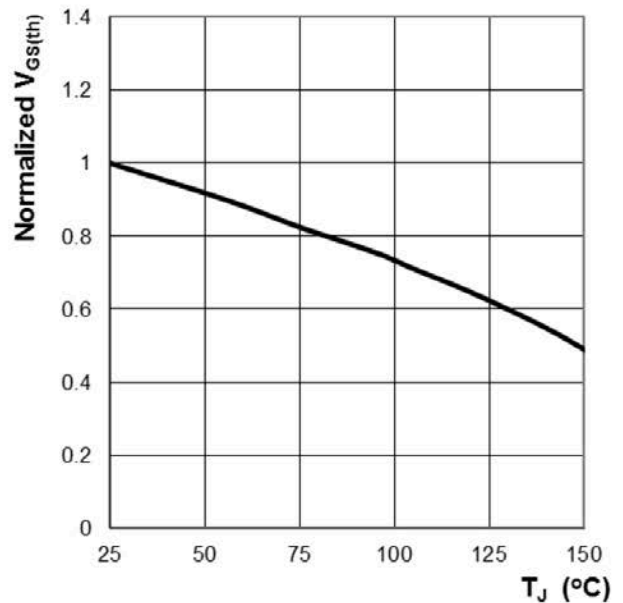


Figure 4: Normalized BV_{DSS} vs. T_J

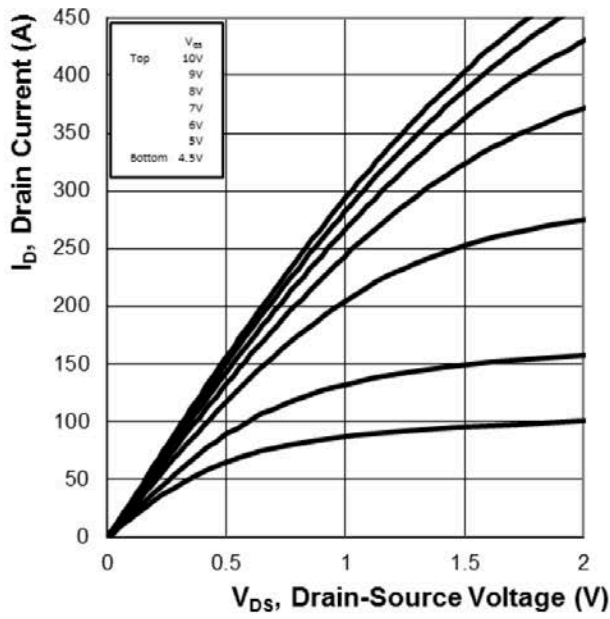


Figure 5: On-Region Characteristics

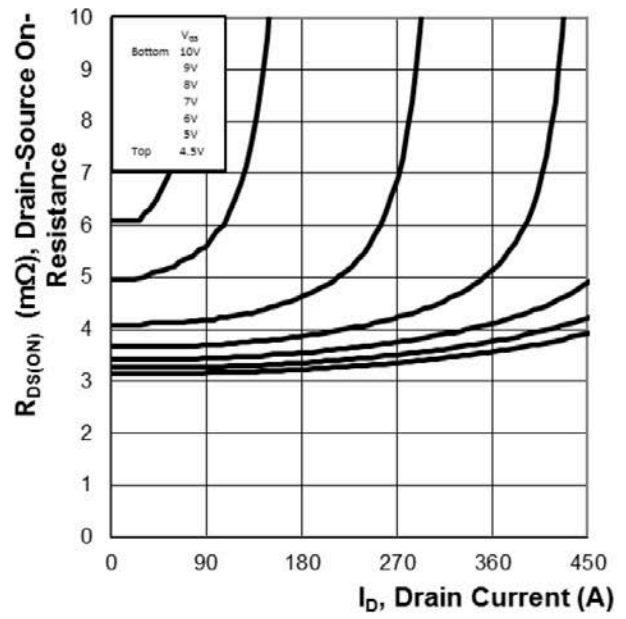


Figure 6: Typ. R_{DS} Variation vs. I_D and V_{GS}

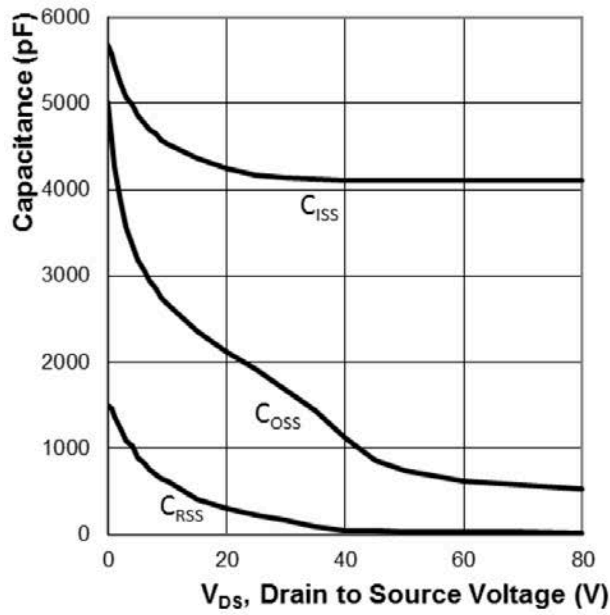


Figure 7: Typ. Capacitance Characteristics

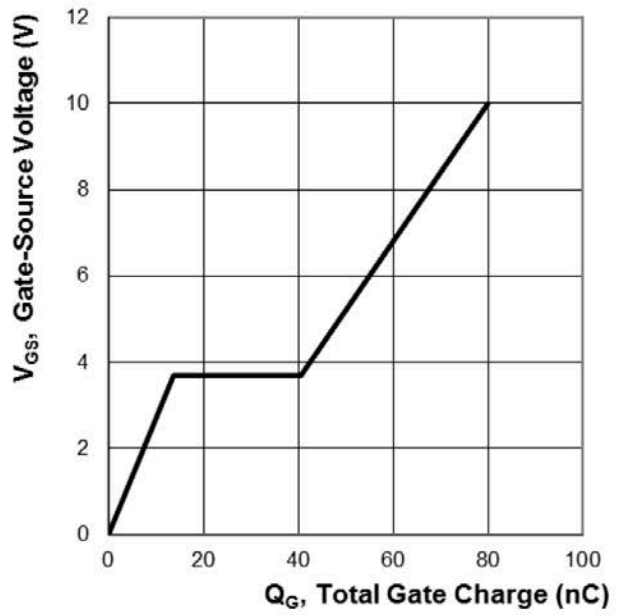


Figure 8: Typ. Gate Charge Characteristics

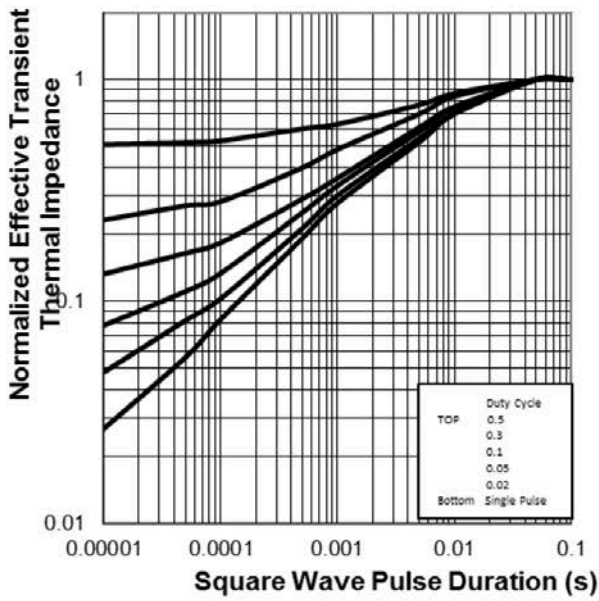


Figure 9: Normalized Thermal Transient Impedance, Junction-to-Case

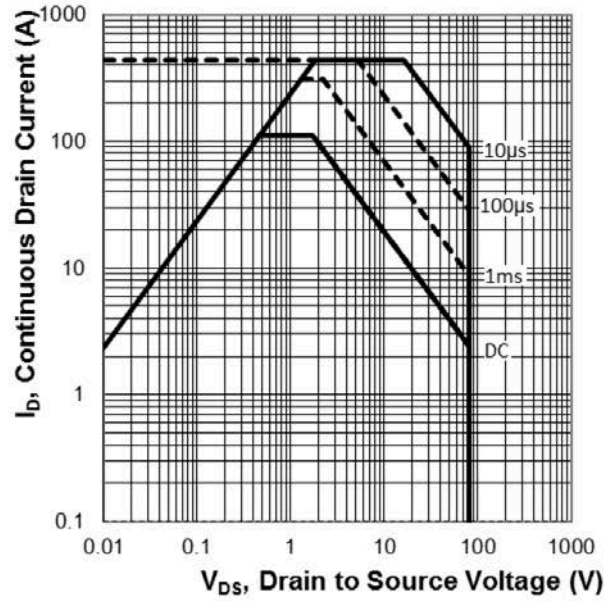


Figure 10: Maximum Safe Operation Area

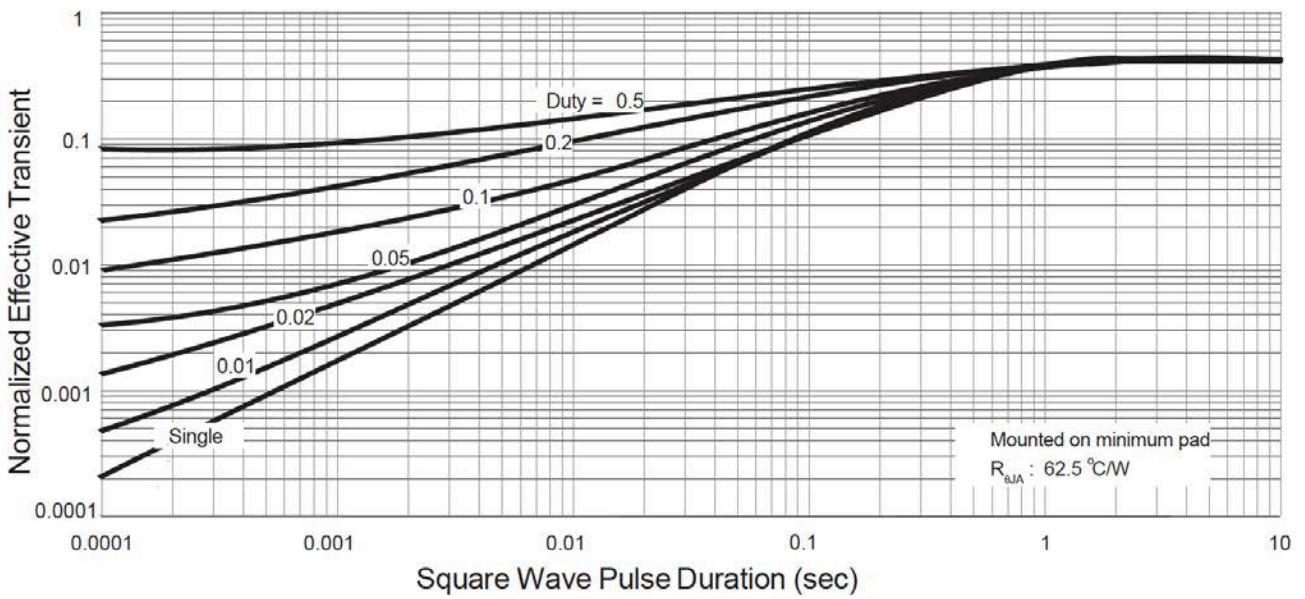


Fig 7 Normalized Maximum Transient Thermal Impedance

Parameter Test Circuits

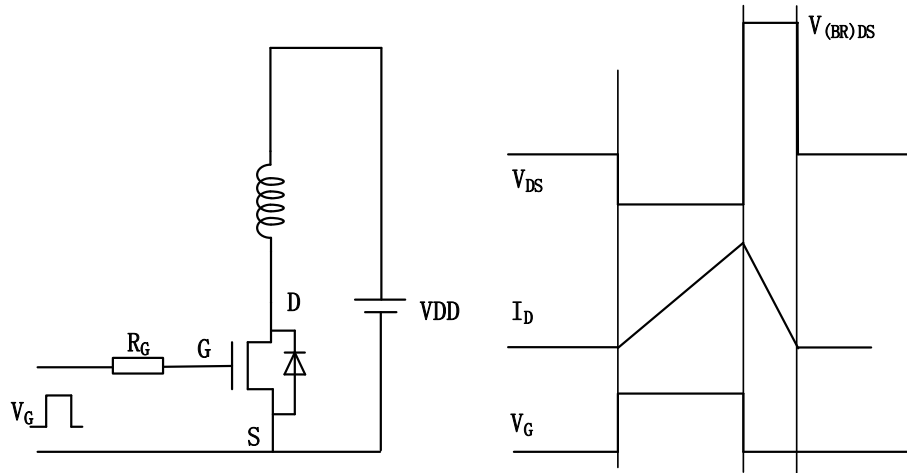


Figure 10 Unclamped Inductive Switching (UIS) Test circuit and waveforms

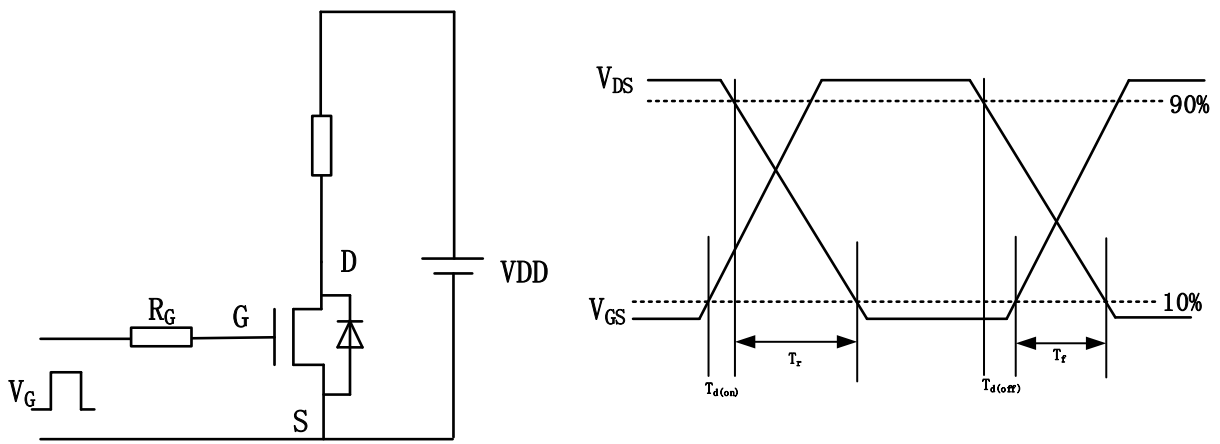


Figure 11 Resistive Switching time Test circuit and waveforms

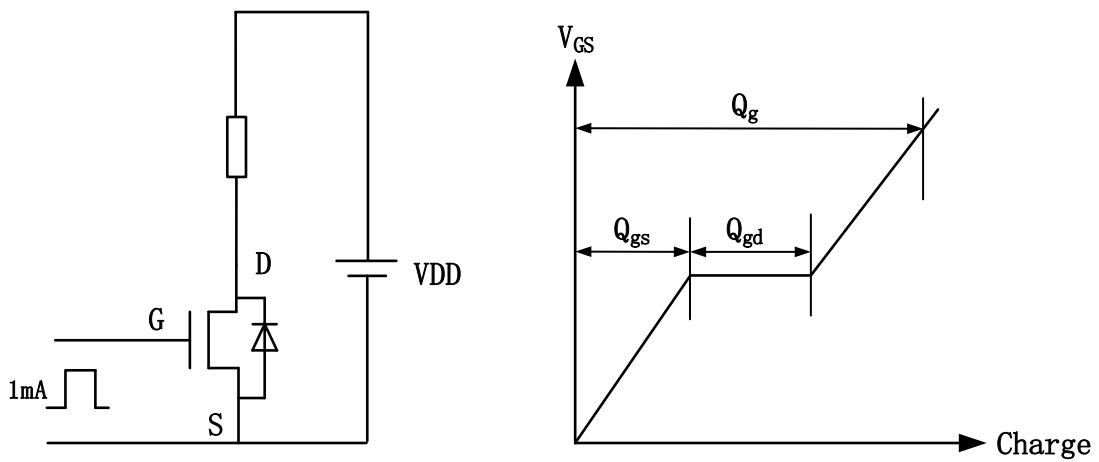
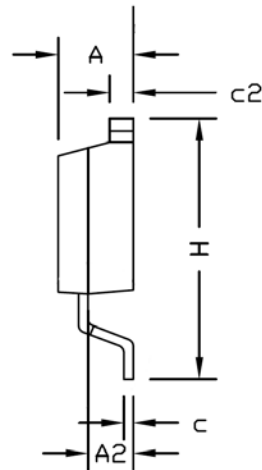
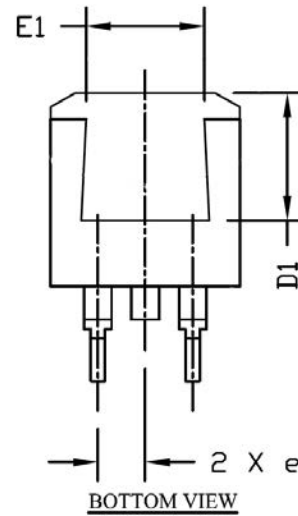
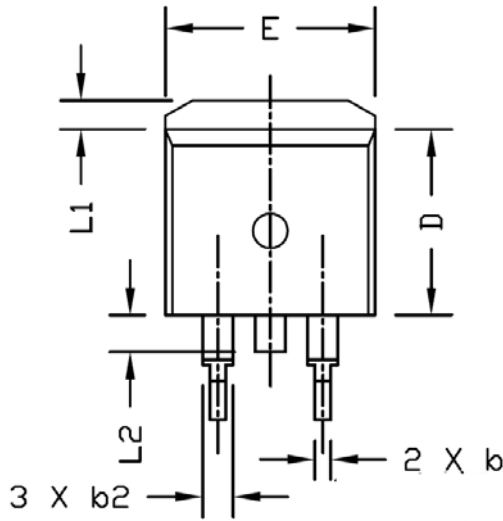
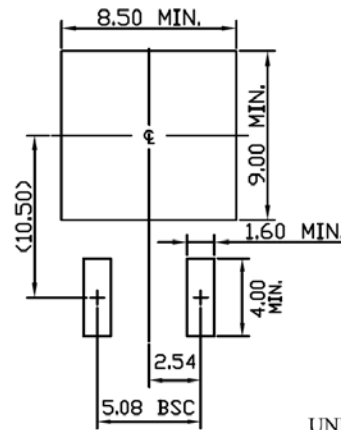


Figure 12 Gate charge Test circuit and waveforms

Package Information : TO-263



RECOMMENDED LAND PATTERN

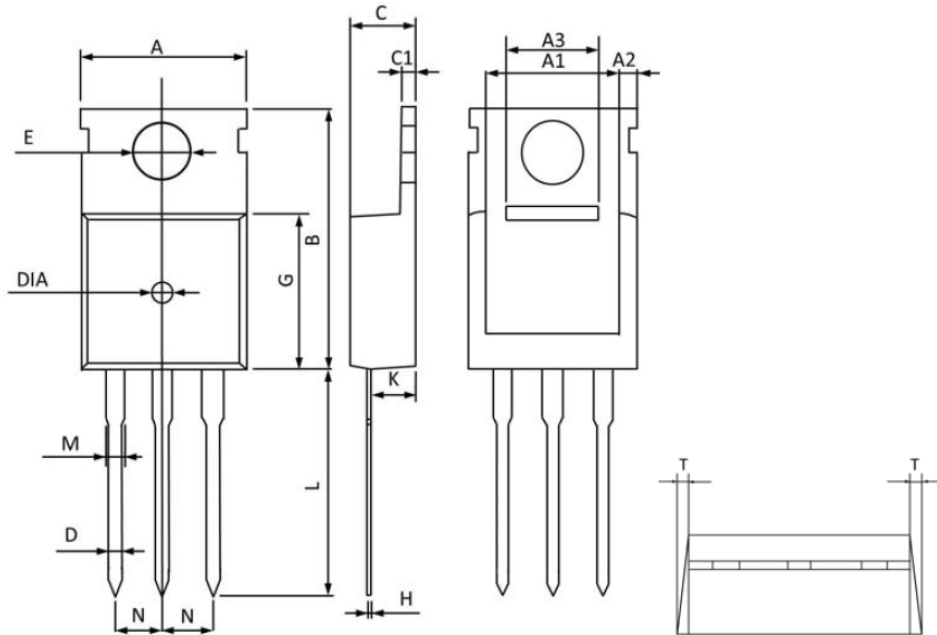


UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.064	4.45	4.826	0.160	0.175	0.190
A1	0.00	---	0.254	0.000	---	0.010
A2	2.20	2.67	2.90	0.087	0.105	0.114
b	0.508	0.81	0.991	0.020	0.032	0.039
b2	1.143	1.27	1.778	0.045	0.050	0.070
c	0.381	0.50	0.737	0.015	0.020	0.029
c2	1.143	1.27	1.651	0.045	0.050	0.065
D	8.382	9.14	9.652	0.330	0.360	0.380
D1	6.858	8.00	8.37	0.270	0.315	0.330
e	2.54 BSC			0.100 BSC.		
E	9.652	10.03	10.668	0.380	0.395	0.420
E1	6.223	8.00	8.37	0.245	0.315	0.330
H	14.605	15.24	15.875	0.575	0.600	0.625
L	1.778	2.54	2.794	0.070	0.100	0.110
L1	1.02	1.27	1.676	0.040	0.050	0.066
L2	1.27	1.52	1.778	0.50	0.60	0.070
L3	0.25 BSC			0.010 BSC.		



Package Information : TO-220



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.300	9.700	0.406	0.382
A1	8.840	8.440	0.348	0.332
A2	1.250	1.050	0.049	0.041
A3	5.300	5.100	0.209	0.201
B	16.200	15.400	0.638	0.606
C	4.680	4.280	0.184	0.169
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	3.800	3.400	0.150	0.134
G	9.300	8.700	0.366	0.343
H	0.600	0.400	0.024	0.016
K	2.700	2.100	0.106	0.083
L	13.600	12.800	0.535	0.504
M	1.500	1.100	0.059	0.043
N	2.590	2.490	0.102	0.098
T	W0.35		W0.014	
DIA	Φ1.5 TYP.	deep0.2 TYP.	Φ0.059 TYP.	deep0.008 TYP.