

Features:

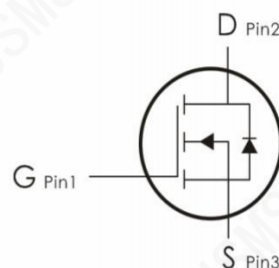
- ☐ Low Intrinsic Capacitances.
- ☐ Excellent Switching Characteristics.
- ☐ Extended Safe Operating Area.
- ☐ Unrivalled Gate Charge :Qg= 41nC (Typ.).
- ☐ BVDSS=60V, I_D=50A
- ☐ R_{DS(on)} : 15mΩ (Max) @V_G=10V
- ☐ 100% Avalanche Tested

Applications:

- ☐ PWM applications.
- ☐ Load Switch.
- ☐ Power management.



TO-220-3L



Device Marking and Package Information

Device	Package	Marking
IRFZ44NPBF	TO-220-3	IRFZ44N

Absolute Maximum Ratings* (T_C=25°C unless otherwise noted)

Symbol	Parameter		Value	Unit
V _{DSS}	Drain-Source Voltage		60	V
I _D	Drain Current	T _C =25°C	50	A
		T _C =100°C	35.4	
V _{GSS}	Gate Threshold Voltage		±25	V
E _{AS}	Single Pulse Avalanche Energy (note1)		490	mJ
I _{AR}	Avalanche Current (note2)		50	A
P _D	Power Dissipation (T _C =25°C)		120	W
T _j	Junction Temperature(MAX)		150	°C
T _{stg}	Storage Temperature		-55~+150	
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		300	

Thermal Characteristics

Symbol	Parameter	Typ.	MAX.	Unit
R _{θJC}	Thermal Resistance, Junction to Case	-	1.24	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	-	62.5	
R _{θCS}	Thermal Resistance, Case to Sink	-	0.5	

Electrical Characteristics $T_c=25^{\circ}\text{C}$ unless other wise noted

Symbol	Parameter	Test Condition	Min.	Typ.	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$, $V_{GS}=0$	60	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Concoffient	$I_D=250\mu\text{A}$, Reference to 25°C	--	0.06	--	$\text{V}/^{\circ}\text{C}$
$IDSS$	Zero Gate Voltage Drain Current	$V_{ds}=60\text{V}$, $V_{gs}=0\text{V}$	--	--	1	μA
		$V_{ds}=48\text{V}$, $T_c=125^{\circ}\text{C}$	--	--	10	μA
$IGSSF$	Gate-body leakage Current, Forward	$V_{gs}=+25\text{V}$, $V_{ds}=0\text{V}$	--	--	100	nA
$IGSSR$	Gate-body leakage Current, Reverse	$V_{gs}=-25\text{V}$, $V_{ds}=0\text{V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Date Threshold Voltage	$I_d=250\mu\text{A}$, $V_{ds}=V_{gs}$	1	1.6	2.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$I_d=25\text{A}$, $V_{gs}=10\text{V}$	--	12	15	m Ω

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS}=25\text{V}$, $V_{GS}=0$, $f=1.0\text{MHz}$	--	2074	--	pF
C_{oss}	Output Capacitance		--	140	--	pF
C_{rss}	Reverse Transfer Capacitance		--	97	--	pF

Switching Characteristics

$T_d(on)$	Turn-On Delay Time	$V_{DD}=250\text{V}$, $I_D=25\text{A}$ $R_G=25\Omega$ (Note 3,4)	--	15	--	nS
T_r	Turn-On Rise Time		--	52	--	nS
$T_d(off)$	Turn-Off Delay Time		--	40	--	nS
T_f	Turn-Off Fall Time		--	35	--	nS
Q_g	Total Gate Charge	$V_{DS}=400\text{V}$, $V_{GS}=10\text{V}$, $I_D=25\text{A}$ (Note 3,4)	--	41	--	nC
Q_{gs}	Gate-Source Charge		--	6.8	--	nC
Q_{gd}	Gate-Drain Charge		--	10	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximun Continuous Drain-Source Diode Forward Current		--	--	50	A
I _{SM}	Maximun Plused Drain-Source DiodeForwad Current		--	--	200	A
V _{SD}	Drain-Source Diode Forward Voltage	Id=25A	--	--	1.2	V
trr	Reverse Recovery Time	I _S =25A,V _{GS} =0V	--	20	--	nS
Qrr	Reverse Recovery Charge	di _F /dt= 100A/ μ s (Note3)	--	75	--	μ C

- *Notes
- 1, $L=9.3\text{mH}$, $I_{AS}=50\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$
 - 2, Repetitive Rating : Pulse width limited by maximum junction temperature
 - 3, Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
 - 4, Essentially Independent of Operating Temperature

Typical Characteristics

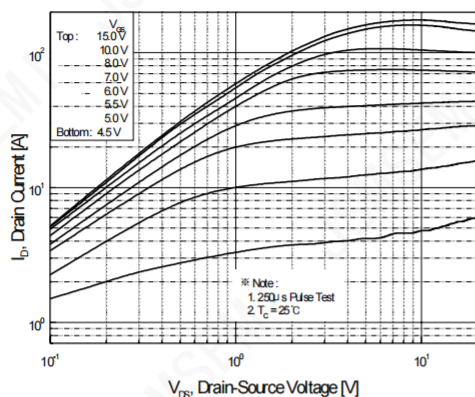


Figure 1. On-Region Characteristics

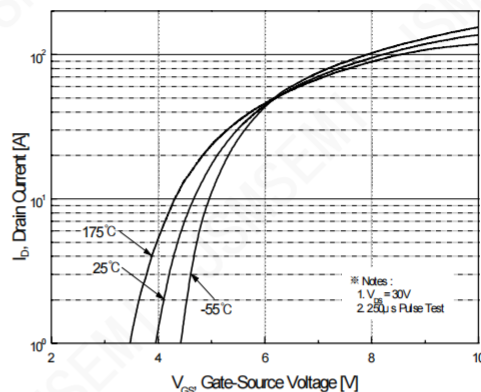


Figure 2. Transfer Characteristics

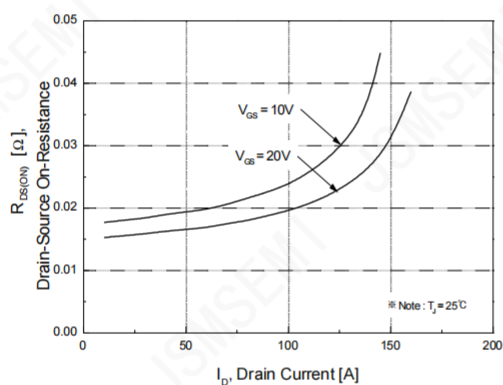


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

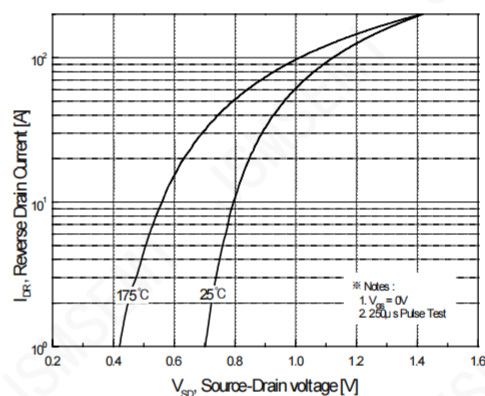


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

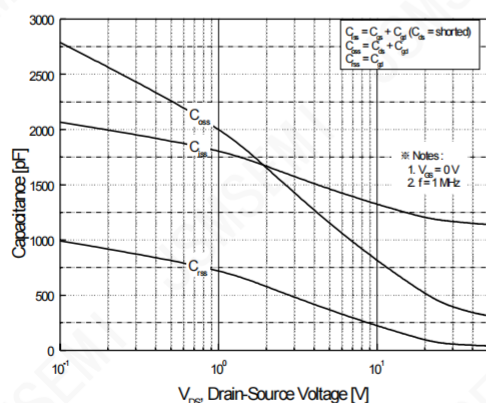


Figure 5. Capacitance Characteristics

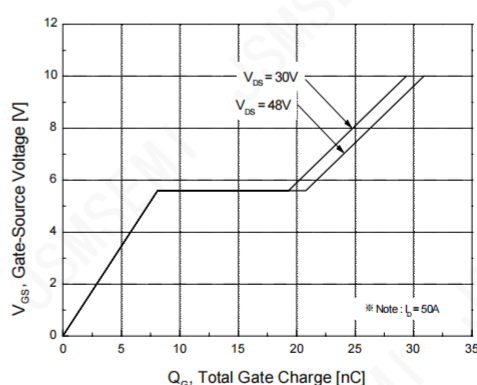


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

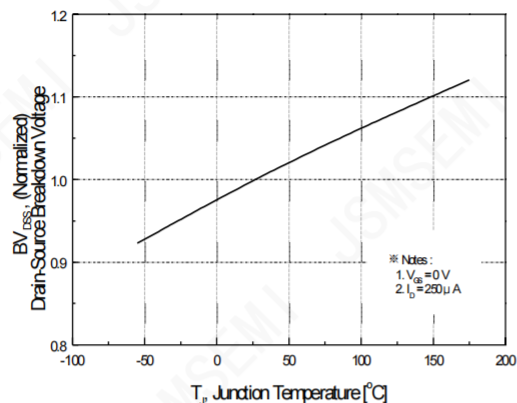


Figure 7. Breakdown Voltage Variation vs. Temperature

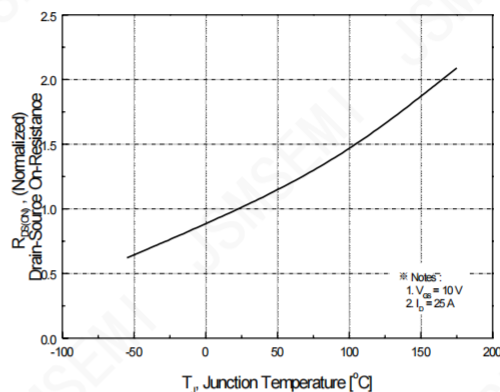


Figure 8. On-Resistance Variation vs. Temperature

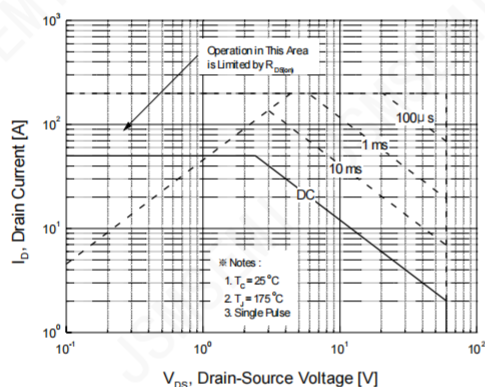


Figure 9. Maximum Safe Operating Area

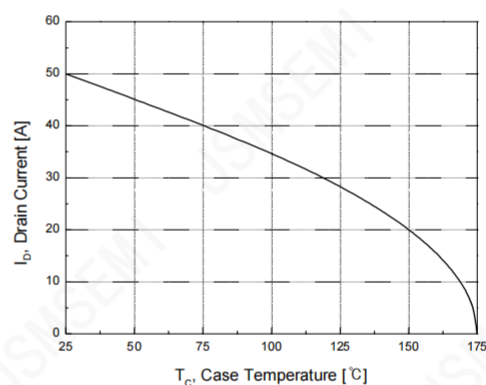


Figure 10. Maximum Drain Current vs. Case Temperature

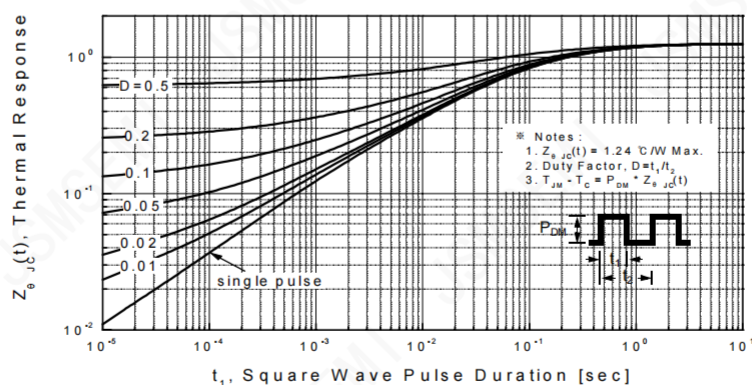
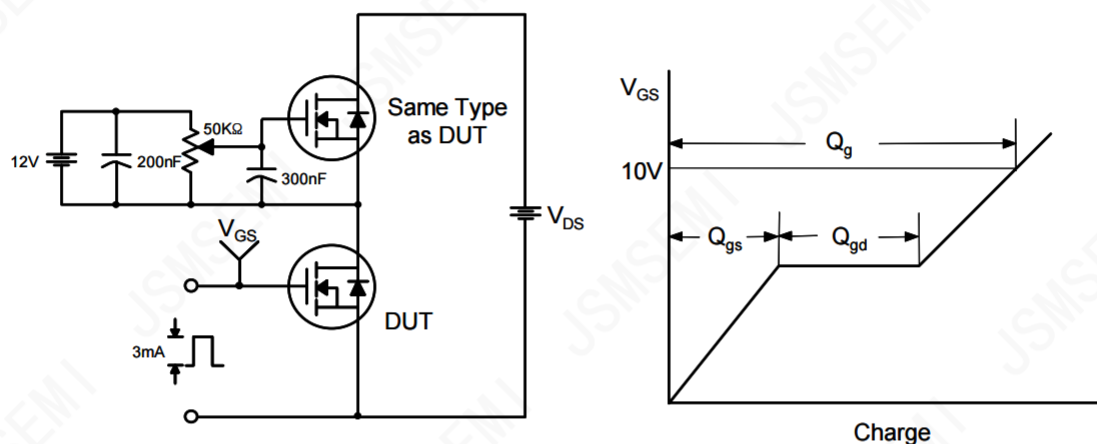


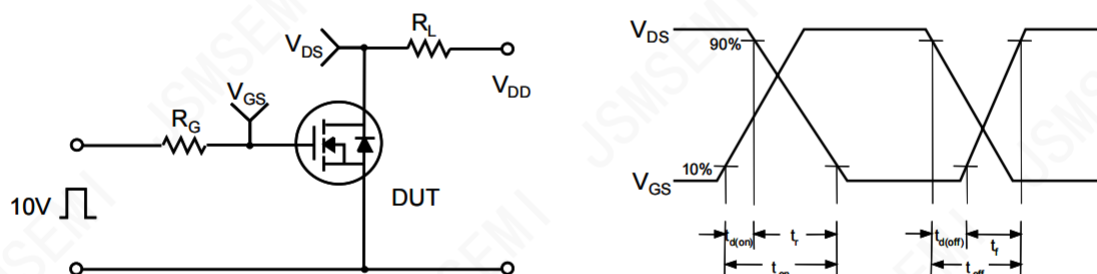
Figure 11. Transient Thermal Response Curve

Typical Characteristics (Continued)

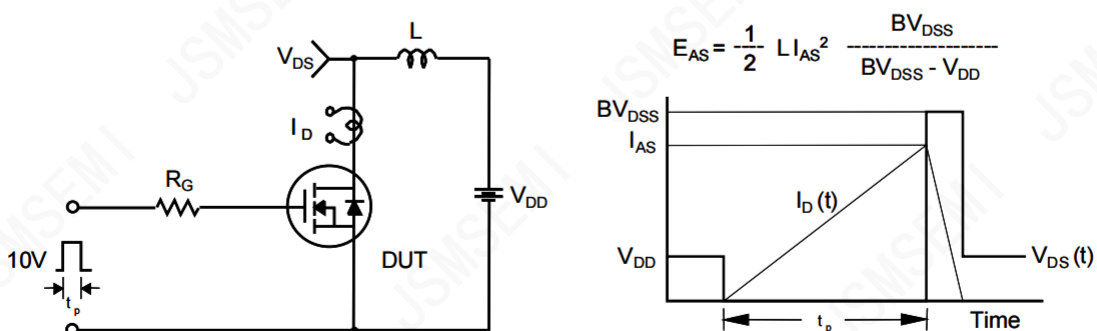
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

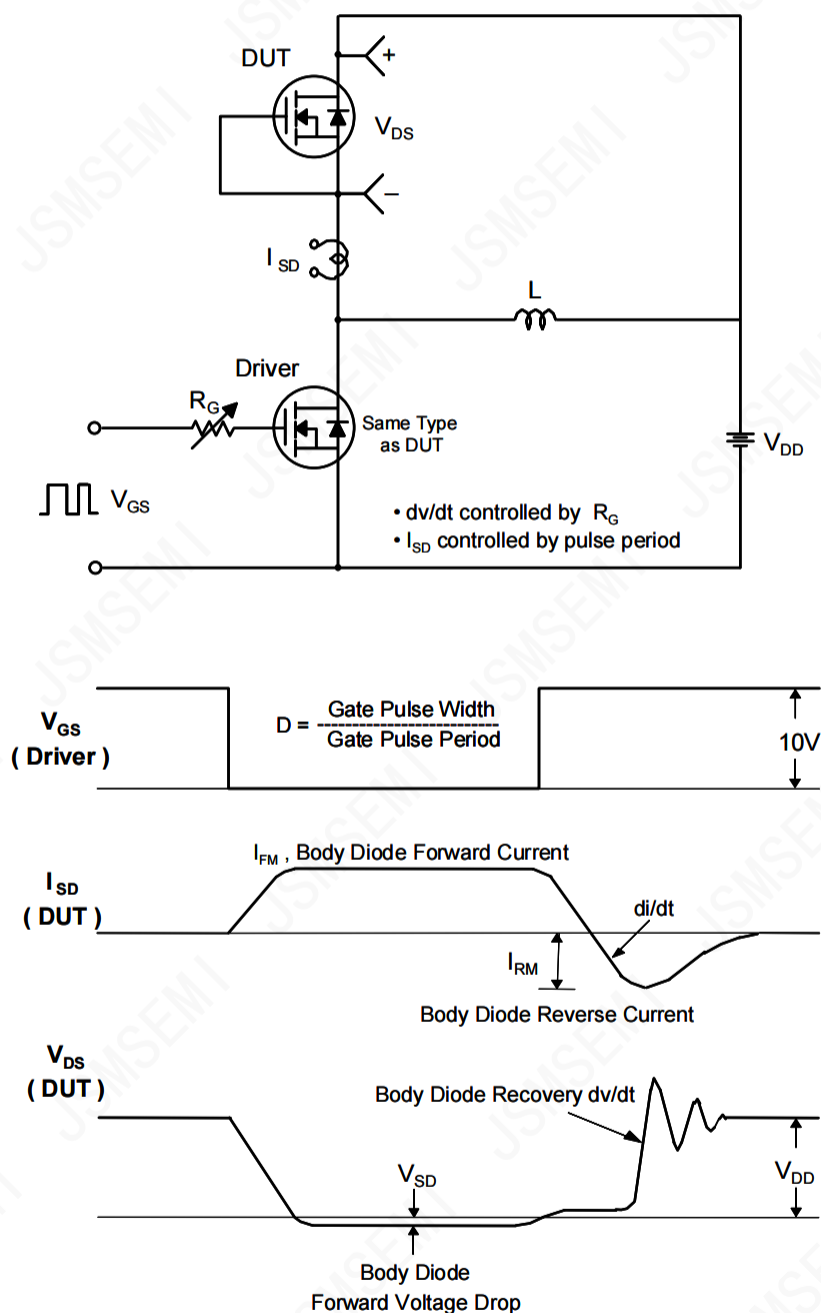


Unclamped Inductive Switching Test Circuit & Waveforms



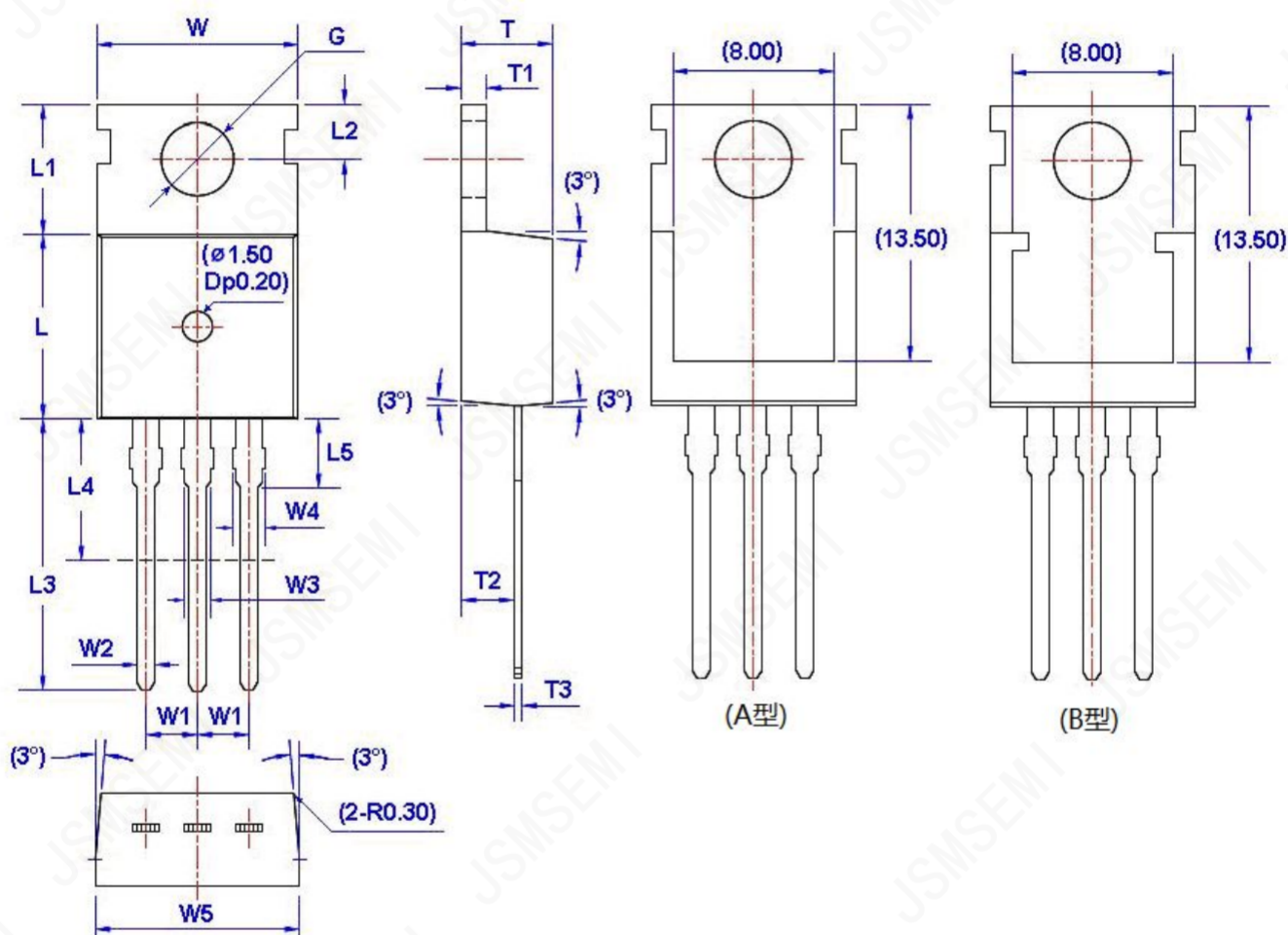
Typical Characteristics (Continued)

Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO-220AB

Unit: mm



Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.66	10.28	W5	9.80	10.20	L4**	6.20	6.60	T3	0.45	0.60
W1	2.54 (TYP)		L	9.00	9.40	L5	2.79	3.30	G(Φ)	3.50	3.70
W2	0.70	0.95	L1	6.40	6.80	T	4.30	4.70			
W3	1.17	1.37	L2	2.70	2.90	T1	1.15	1.40			
W4*	1.32	1.72	L3	12.70	14.27	T2	2.20	2.60			