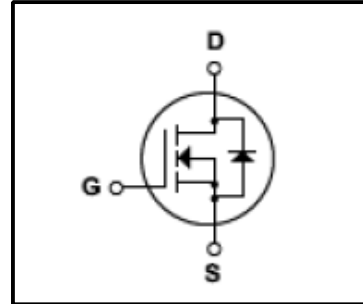## *Silicon N-Channel MOSFET*

Features

- 10A,400V,$R_{DS(on)}$(Max 0.55Ω)@V_{GS}=10V
- Ultra-low Gate Charge(Typical 60nC)
- Fast Switching Capability
- 100%Avalanche Tested
- Maximum Junction Temperature Range(150℃)

General Description

This Power MOSFET is produced using Winsemi's advancedplanar stripe,VDMOS technology. This latest technology has beenespecially designed to minimize on -state resistance,have a highrugged avalanche characteristics. This devices is specially wellsuited for high efficiency switch model power supplies, power factor correction and half bridge and full bridge resonant topology line a electronic lamp ballast.
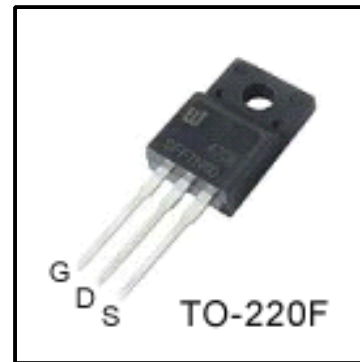
Absolute Maximum Ratings

Symbol	Parameter		Value	Units
V_{DSS}	Drain Source Voltage		400	V
I_D	Continuous Drain Current(@Tc=25℃)		10*	A
	Continuous Drain Current(@Tc=100℃)		6.3*	A
I_{DM}	Drain Current Pulsed	(Note1)	40*	A
V_{GS}	Gate to Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note2)	450	mJ
E_{AR}	Repetitive Avalanche Energy	(Note1)	13	mJ
dv/dt	Peak Diode Recovery dv /dt	(Note3)	4	V/ ns
P_D	Total Power Dissipation(@Tc=25℃)		44	W
	Derating Factor above 25℃		0.35	W/℃
T_J,T_{stg}	Junction and Storage Temperature		-55~150	℃
T_L	Maximum lead Temperature for soldering purposes		300	℃

*Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
R_{QJC}	Thermal Resistance , Junction -to -Case	-	-	2.86	℃/W
R_{QJA}	Thermal Resistance , Junction-to -Ambient	-	-	62.5	℃/W

Rev.A Nov.2010

Electrical Characteristics(Tc=25℃)

Characteristics		Symbol	Test Condition	Min	Type	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS}=\pm30V,V_{DS}=0V$	-	-	±100	nA
Gate-source breakdown voltage		$V_{(BR)GSS}$	$I_G=\pm10\ \mu A,V_{DS}=0V$	±30	-	-	V
Drain cut -off current		I_{DSS}	$V_{DS}=400V,V_{GS}=0V$	-	-	25	µA
Drain -source breakdown voltage		$V_{(BR)DSS}$	$I_D=250\ \mu A,V_{GS}=0V$	400	-	-	V
Break voltage Temperature Coefficient		$\triangle BV_{DSS}/$ $\triangle T_J$	$I_D=250\mu A$, Referenced to 25℃	-	0.4	-	V/℃
Gate threshold voltage		$V_{GS(th)}$	$V_{DS}=10V,I_D=250\ \mu A$	2	-	4	V
Drain -source ON resistance		$R_{DS(ON)}$	$V_{GS}=10V,I_D=5A$	-	0.48	0.55	Ω
Forward Transconductance		gfs	$V_{DS}=40V,I_D=5A$	-	9.6	-	S
Input capacitance		C_{iss}	$V_{DS}=25V,$	-	1400	1800	pF
Reverse transfer capacitance		C_{rss}	$V_{GS}=0V,$	-	36	46	
Output capacitance		C_{oss}	f=1MHz	-	150	195	
Switching time	Rise time	tr	$V_{DD}=200V,$	-	20	50	ns
	Turn-on time	ton	$I_D=10A,$	-	80	170	
	Fall time	tf	$R_G=25Ω,$	-	125	260	
	Turn-off time	toff	(Note4,5)	-	85	180	
Total gate charge(gate-source plus gate-drain)		Qg	$V_{DD}=320V,$ $V_{GS}=10V,$	-	60	71	nC
Gate-source charge		Qgs	$I_D=10A$	-	7	-	
Gate-drain("miller") Charge		Qgd	(Note4,5)	-	27	-	

Source-Drain Ratings and Characteristics(Ta=25℃)

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	I_{DR}	-	-	-	10	A
Pulse drain reverse current	I_{DRP}	-	-	-	40	A
Forward voltage(diode)	V_{DSF}	$I_{DR}=10A,V_{GS}=0V$	-	1.4	1.5	V
Reverse recovery time	trr	$I_{DR}=10A,V_{GS}=0V,$	-	330	-	ns
Reverse recovery charge	Qrr	$dI_{DR}/dt=100\ A\ /\ \mu s$	-	3.57	-	µC

Note 1.Repeativity rating :pulse width limited by junction temperature

2.L=7.9mH $I_{AS}=10A,V_{DD}=50V,R_G=0Ω$,Starting $T_J=25℃$

3.$I_{SD}≤10A,di/dt≤300A/us,V_{DD}<BV_{DSS}$,STARTING $T_J=25℃$

4.Pulse Test:Pulse Width≤300us,Duty Cycle≤2%

5. Essentially independent of operating temperature.

This transistor is an electrostatic sensitive device

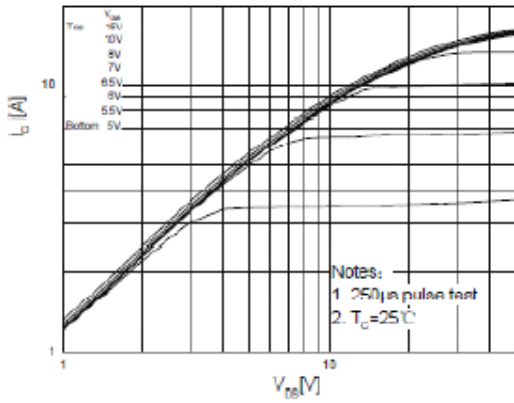Please handle with caution

Steady, keep you advance
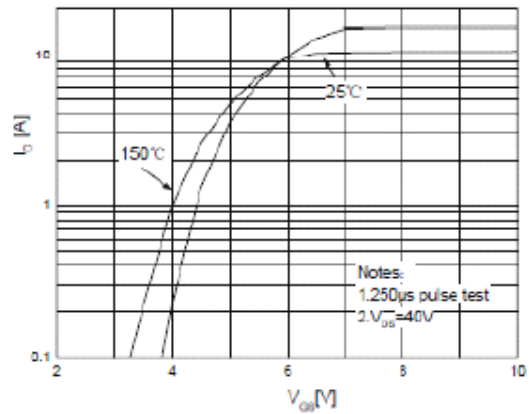
Fig.1 On-State Characteristics
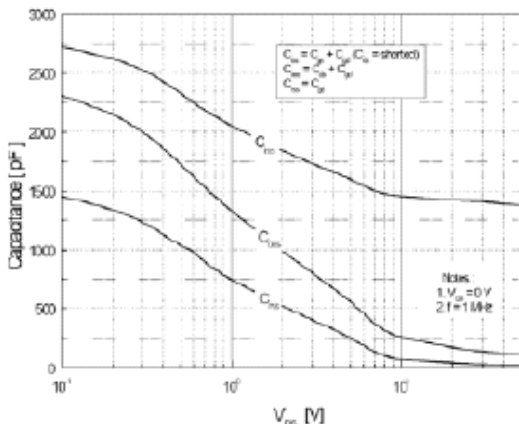

Fig.2 Transfer characteristics

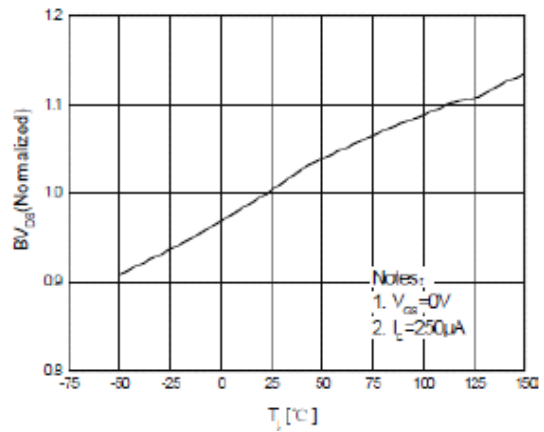Fig.3 Capacitance Variation vs
Drain Voltage
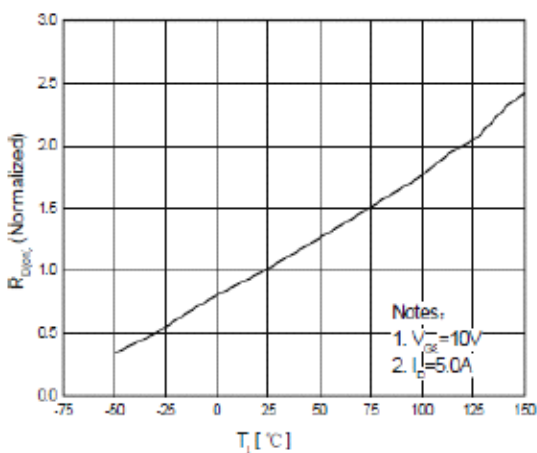

Fig.4 Breakdown voltage Variation
vs Temperature
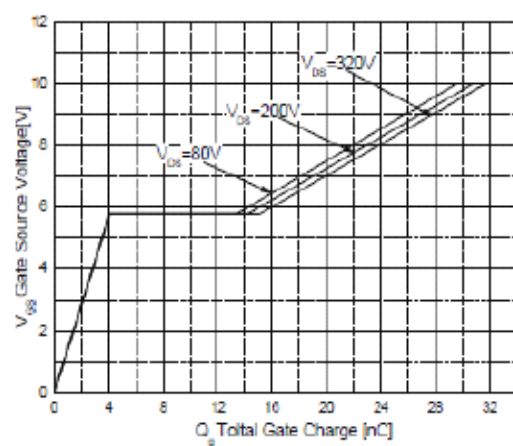

Fig.5 On-Resistance Variation vs
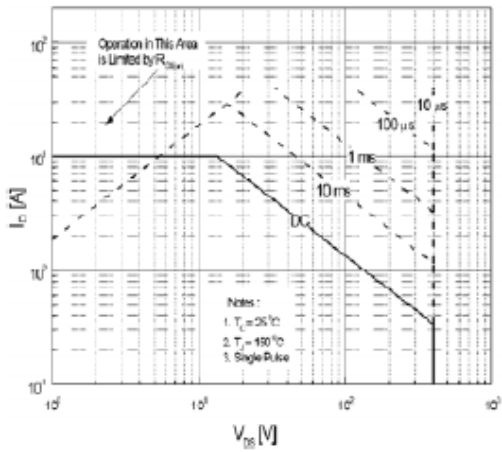Junction Temperature

Fig.6 Gate Charge Characteristics

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Fig.7 Maximum Safe Operation Area
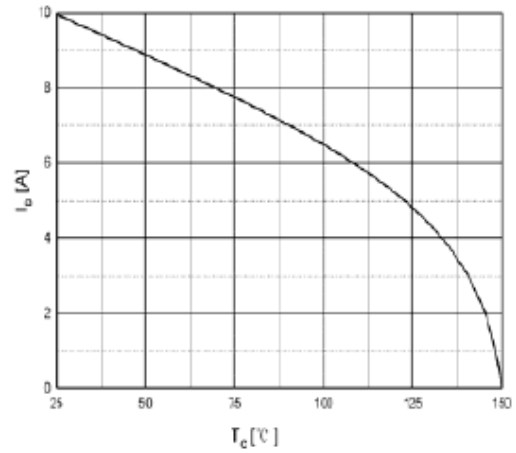
Fig.8 Maximum Drain Current vs Case Temperature
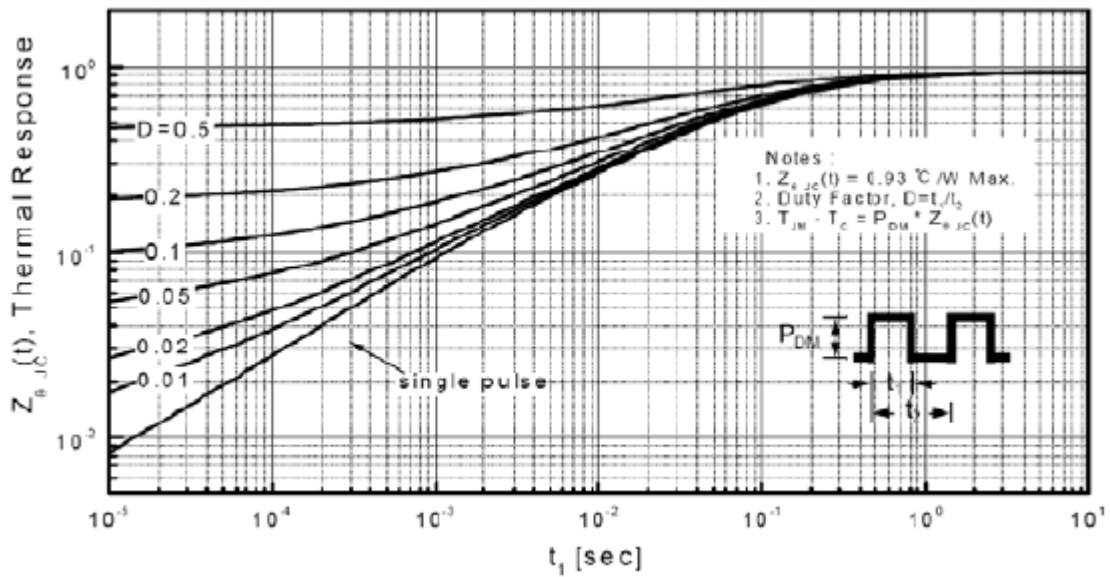
Fig.9 Transient Thermal Response curve

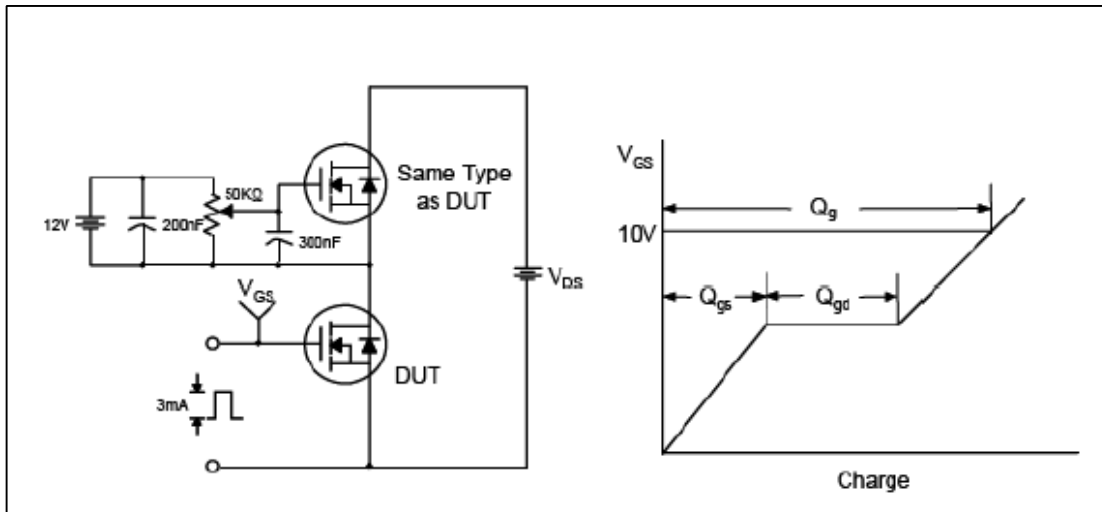*Steady, keep you advance*

Fig.10 Gate Test circuit & Waveform
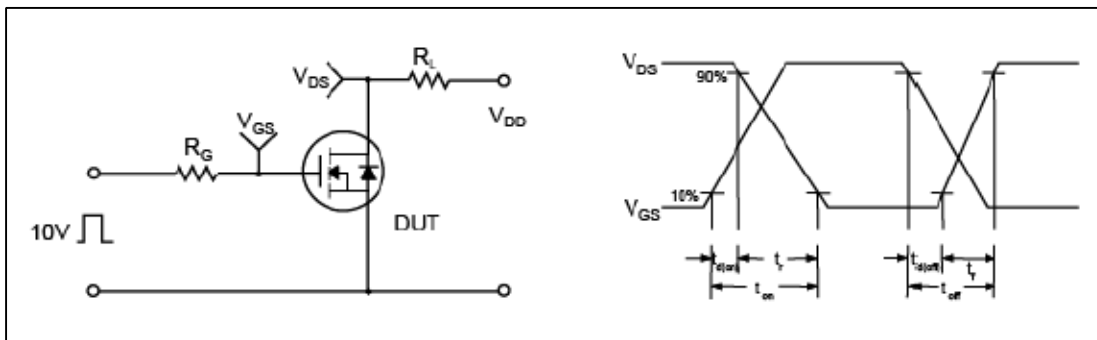
Fig.11 Resistive Switching Test Circuit & Waveform

$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$
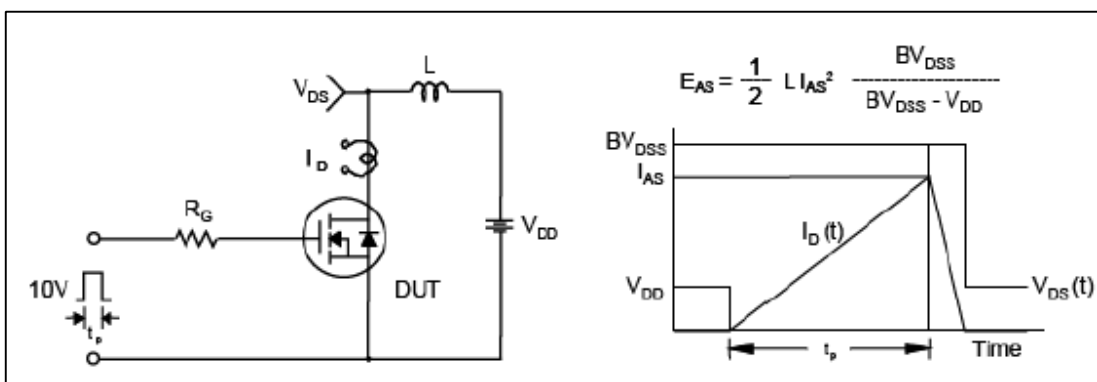
Fig.12 Uncamped Inductive Switching Test Circuit & Waveform

Steady, keep you advance
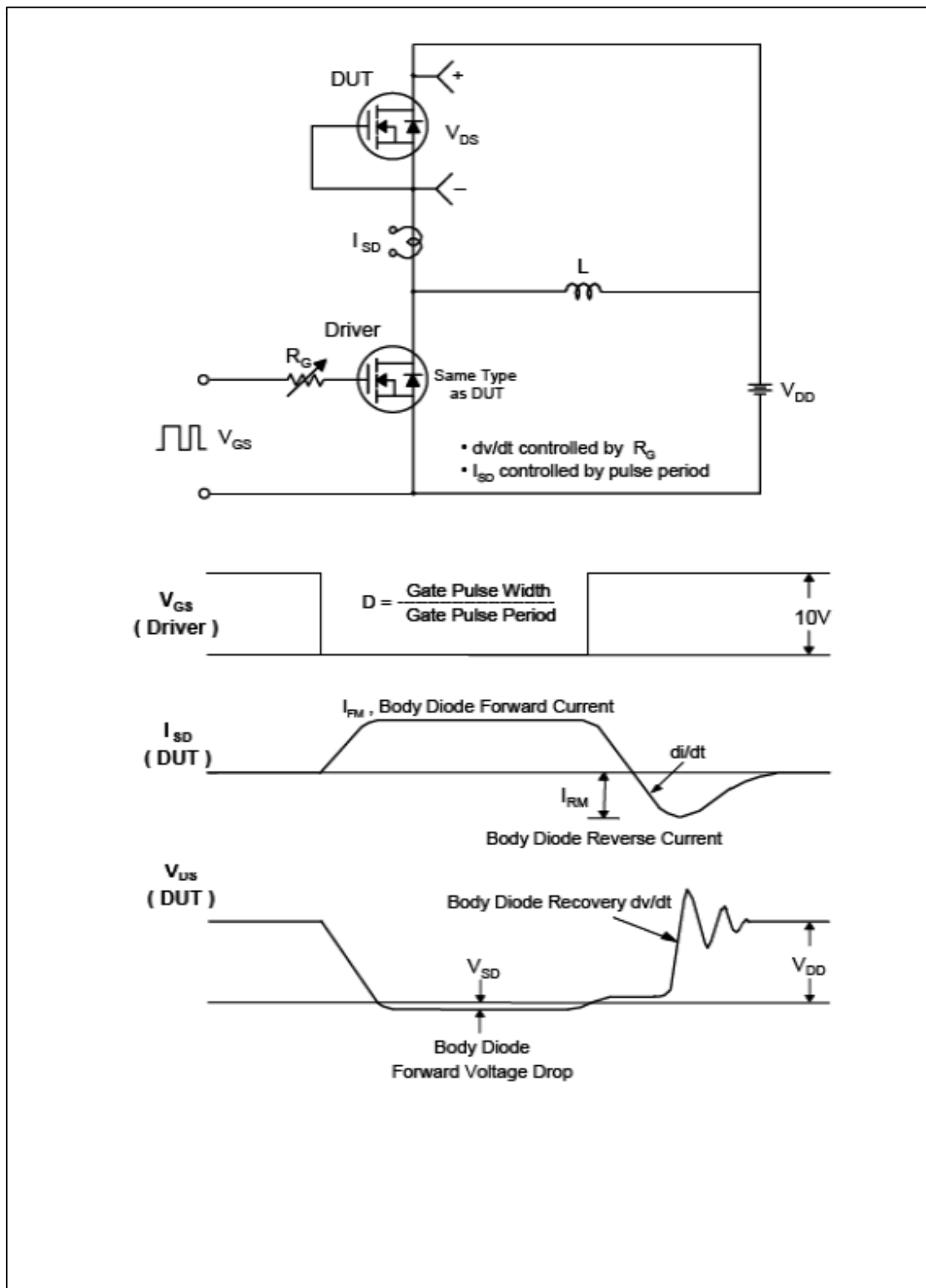
Fig.13 Peak Diode Recovery dv/dt Test Circuit & Waveform

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TO-220F   Package Dimension

Unit:mm

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