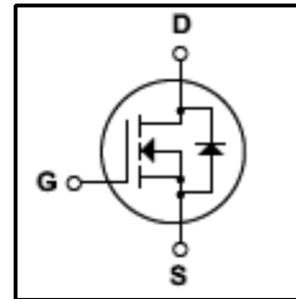
Silicon N-Channel MOSFET

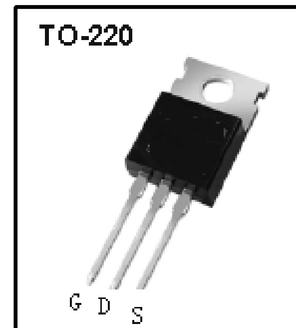


Features

- 12A,650V,$R_{DS(on)}$(Max0.78Ω)@V_{GS}=10V
- Ultra-low Gate Charge(Typical 30nC)
- Fast Switching Capability
- 100% Avalanche Tested
- Maximum Junction Temperature Range(150℃)

General Description

This Power MOSFET is produced using Winsemi's advanced planar stripe, VDMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. This devices is specially well suited for AC-DC switching power supplies, DC-DC power converters, high voltage H-bridge motor drive PMW



Absolute Maximum Ratings

Symbol	Parameter		Value	Units
V_{DSS}	Drain Source Voltage		650	V
I_D	Continuous Drain Current(@Tc=25℃)		12	A
	Continuous Drain Current(@Tc=100℃)			A
I_{DM}	Drain Current Pulsed	(Note1)		A
V_{GS}	Gate to Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	990	mJ
E_{AR}	Repetitive Avalanche Energy	(Note 1)	22	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5	V/ns
P_D	Total Power Dissipation(@Tc=25℃)		178	W
	Derating Factor above 25℃		1.43	W/℃
T_J, T_{stg}	Junction and Storage Temperature		-55~150	℃
T_L	Channel Temperature		300	℃

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
R_{QJC}	Thermal Resistance, Junction-to-Case	-	-	0.70	℃
R_{QCS}	Thermal Resistance, Case-to-Sink	-	-	-	/℃
R_{QJA}	Thermal Resistance, Junction-to-Ambient	-	-	62.5	W℃

/W
W

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Electrical Characteristics (Tc = 25°C)

Characteristics		Symbol	Test Condition	Min	Type	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±30 V, V_{DS} = 0 V	-	-	±100	nA
Gate−source breakdown voltage		$V_{(BR)GSS}$	I_G = ±10 μA, V_{DS} = 0 V	±30	-	-	V
Drain cut−off current		I_{DSS}	V_{DS} = 650 V, V_{GS} = 0 V	-	-	10	μA
			V_{DS} = 480 V, Tc = 125℃	-	-	100	μA
Drain−source breakdown voltage		$V_{(BR)DSS}$	I_D = 250 μA, V_{GS} = 0 V	650	-	-	V
Gate threshold voltage		$V_{GS(th)}$	V_{DS} = 10 V, I_D =250 μA	3	-	4.5	V
Drain−source ON resistance		$R_{DS(ON)}$	V_{GS} = 10 V, I_D = 6A	-	0.64	0.78	Ω
Forward Transconductance		gfs	V_{DS} = 50 V, I_D =6A	-	6.4	-	S
Input capacitance		C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	-	1830	-	pF
Reverse transfer capacitance		C_{rss}		-	155	-	
Output capacitance		C_{oss}		-	2.0	-	
Switching time	Rise time	tr	V_{DD} =325V, I_D = 12A, R_G=25Ω (Note4,5)	-	50	-	ns
	Turn−on time	ton		-	49	-	
	Fall time	tf		-	310	-	
	Turn−off time	toff		-	54	-	
Total gate charge (gate−source plus gate−drain)		Q_g	V_{DD} =520 V, V_{GS} = 10 V, I_D = 12A (Note4,5)	-	51.7	-	nC
Gate−source charge		Q_{gs}		-	9.6	-	
Gate−drain ("miller") Charge		Q_{gd}		-	18.6	-	

Source−Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	I_{DR}	-	-	-	12	A
Pulse drain reverse current	I_{DRP}	-	-	-	48	A
Forward voltage (diode)	V_{DSF}	IDR = 10A, VGS = 0 V	-	-	1.4	V
Reverse recovery time	trr	IDR = 10 A, VGS = 0 V, dIDR / dt = 100 A / μs	-	450	-	ns
Reverse recovery charge	Qrr		-	5.0	-	μC

Note 1.Repeativity rating :pulse width limited by junction temperature
2.L=14mH,I_{AS}=12A,V_{DD}=95V,R_G=25Ω,Starting T_J=25℃
3.I_{SD}≤10A,di/dt≤200A/us, V_{DD}<BV_{DSS},STARTING TJ=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

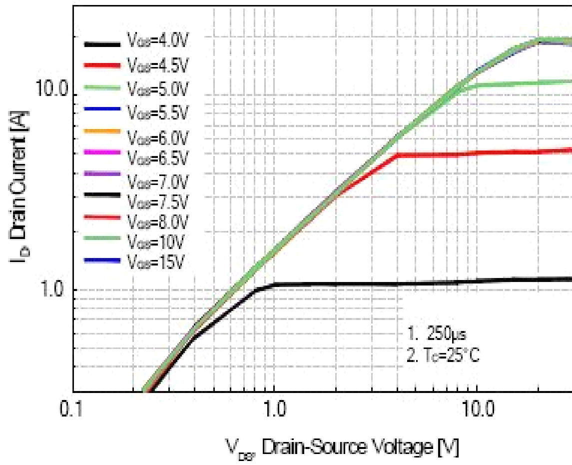

Fig. 1 On-State Characteristics

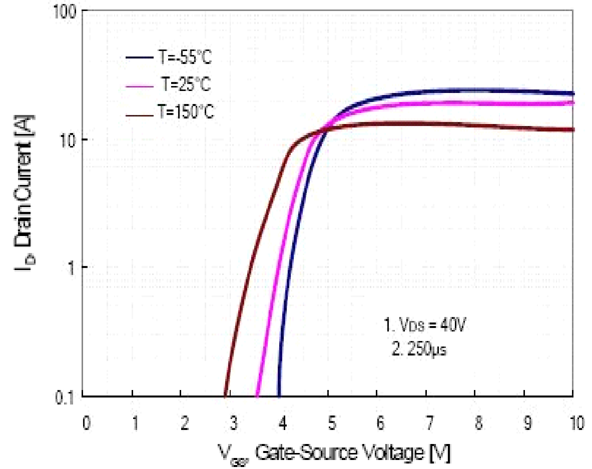

Fig.2 Transfer Current Characteristics

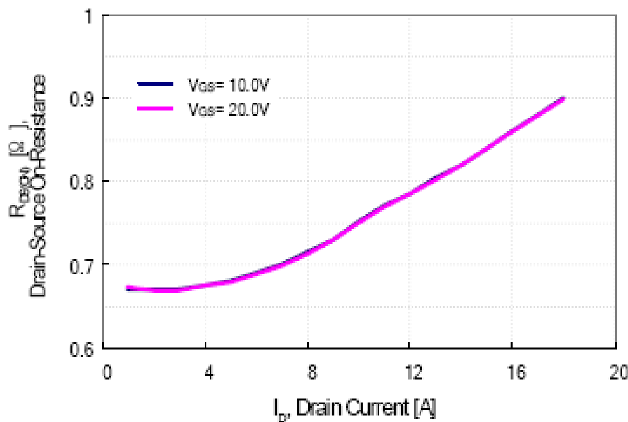

Fig.3 On-Resistance Variation vs Drain Current

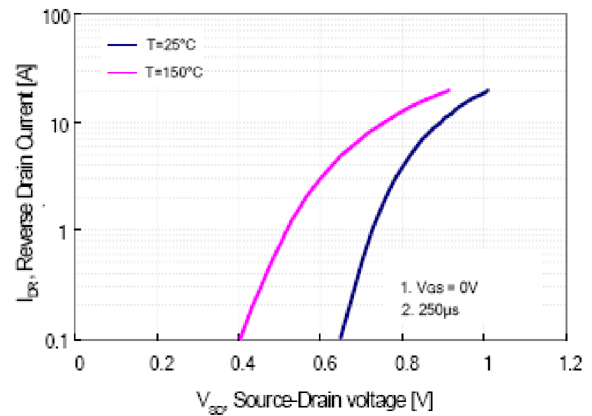

Fig.4 Body Diode Forward Voltage Variation with Source Current And Temperature

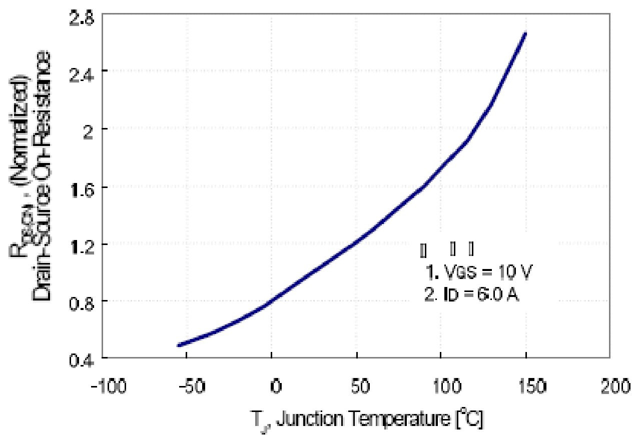

Fig.5 On-Resistance Variation vs Junction Temperature

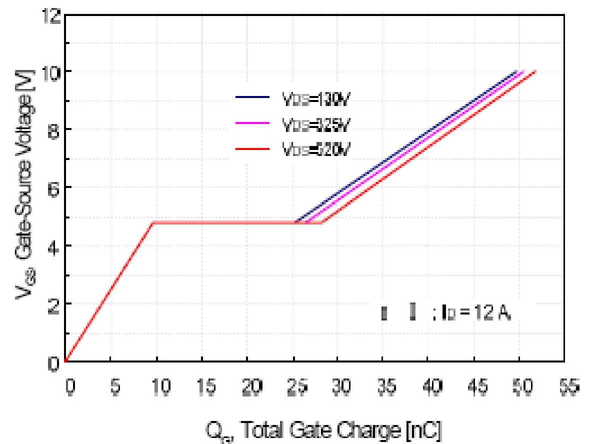

Fig.6 Gate Charge Characteristics

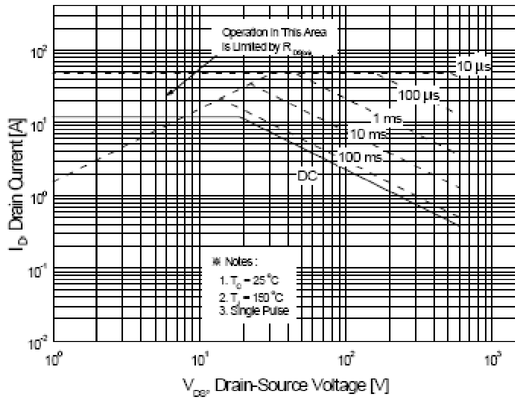

Fig.7 Maximum Safe Operation Area

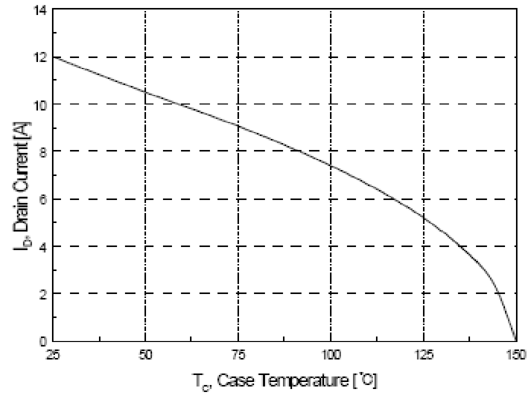

Fig.8 Maximum Drain Current vs Case Temperature

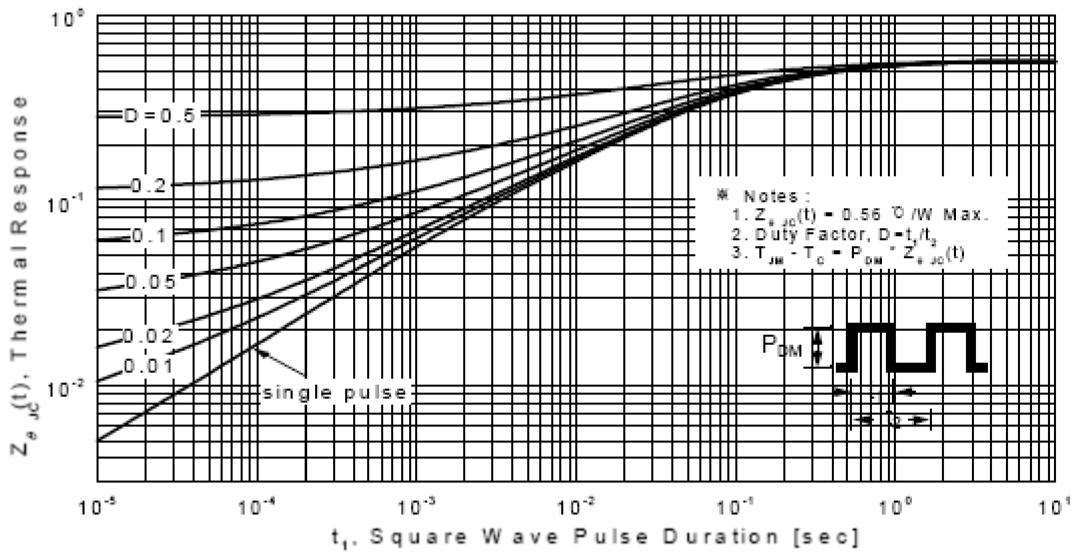

Fig.9 Transient Thermal Response Curve

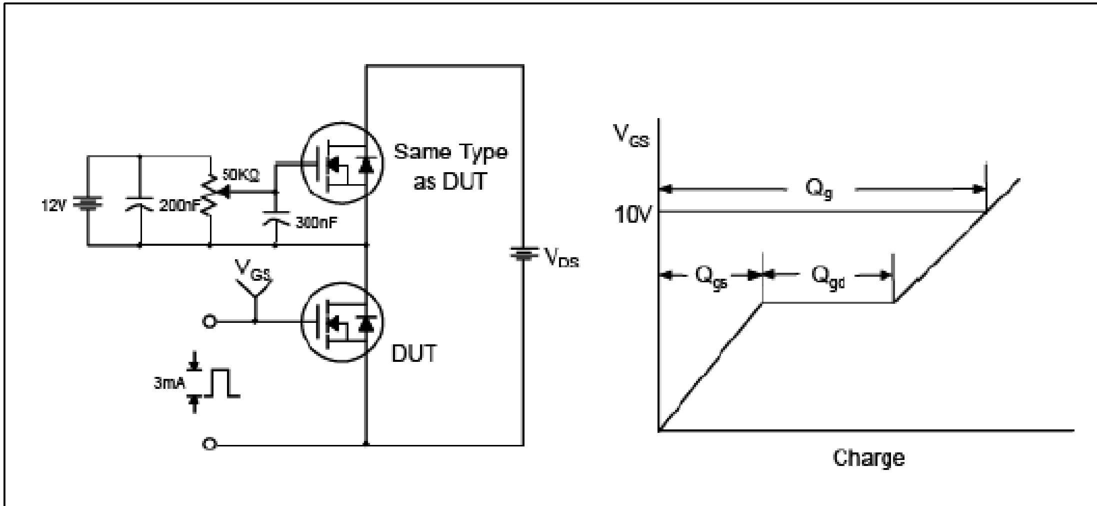

Fig.10 Gate Test circuit & Waveform

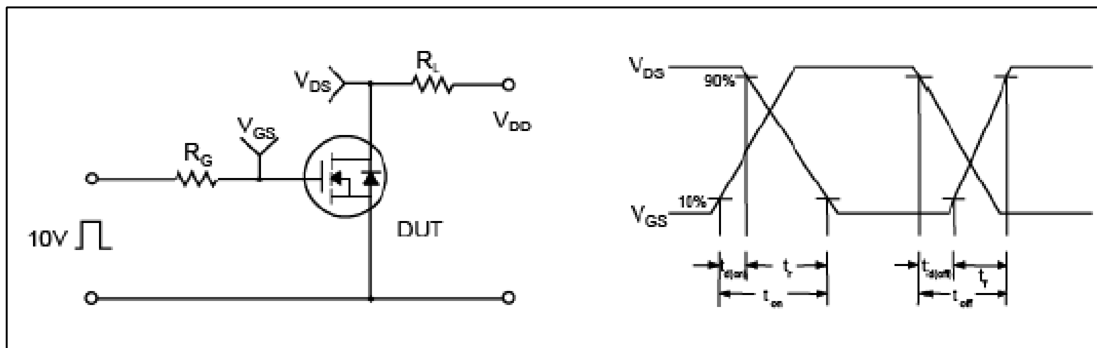

Fig.11 Resistive Switching Test Circuit & Waveform

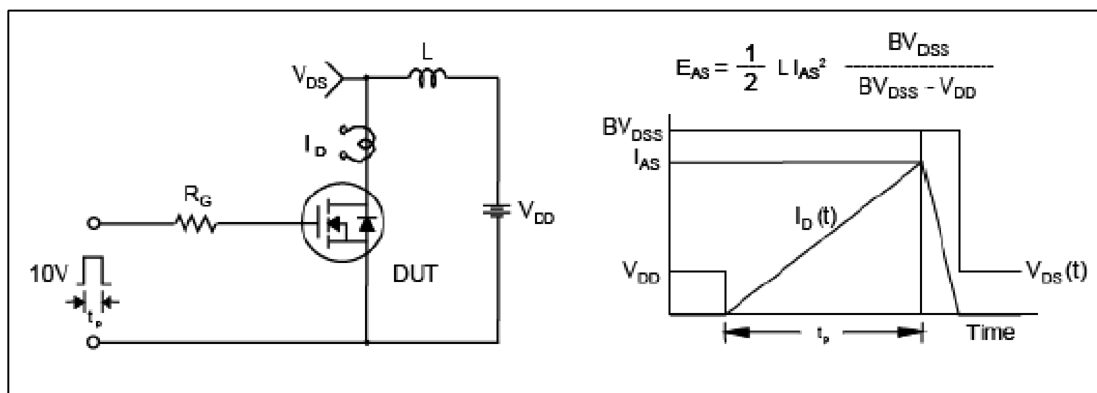

Fig.12 Uncamped Inductive Switching Test Circuit & Waveform

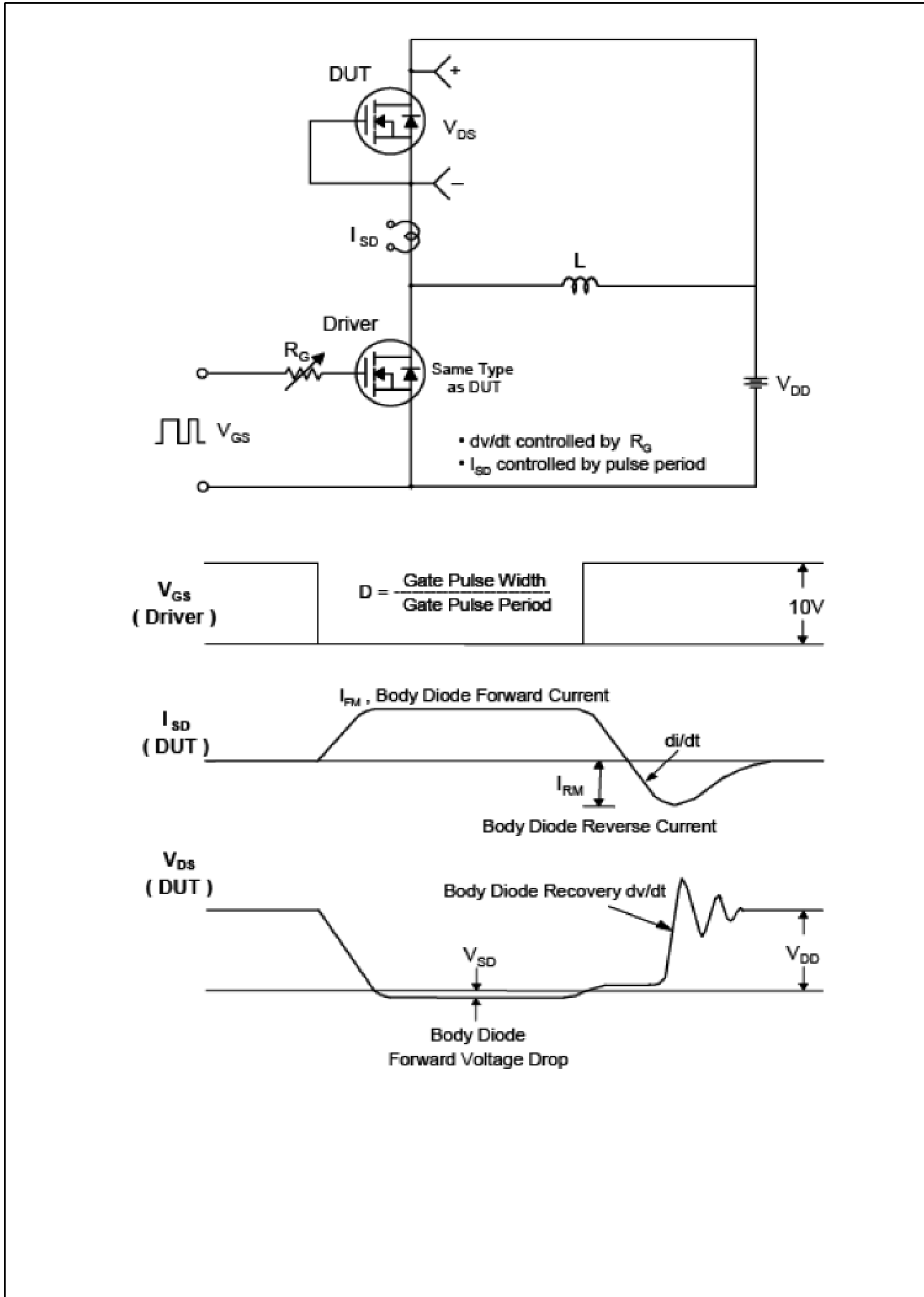

Fig.13 Peak Diode Recovery dv/dt Test Circuit & Waveform

TO-220 Package Dimension