

GENERAL DESCRIPTION

The MSD2N60 is a N-channel enhancement-mode MOSFET , providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-252 package is universally preferred for all commercial-industrial applications

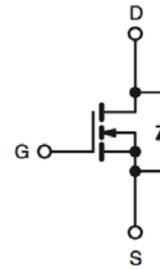
FEATURES

- Originative New Design
- Very Low Intrinsic Capacitances
- Excellent Switching Characteristics
- Unrivalled Gate Charge : 9.5nC (Typ.)
- Extended Safe Operating Area
- Lower RDS(ON) : 4.0 Ω (Typ.) @VGS=10V
- 100% Avalanche Tested

D-PAK(TO-252)



1.Gate 2. Drain 3. Source



RoHS
COMPLIANT

HALOGEN
FREE
Available

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

Symbol	Parameter	Value	Unit
V _{DSS}	Drain-Source Voltage	600	V
I _D	Drain Current -Continuous (T _C =25°C)	2	A
	Drain Current -Continuous (T _C =100°C)	1.3	A
I _{DM}	Drain Current -Pulsed	8.0	A
V _{GS}	Gate-Source Voltage	±30	V
E _{AS}	Single Pulsed Avalanche Energy	120	mJ
E _{AR}	Repetitive Avalanche Energy	5.4	mJ
d _v /d _t	Peak Diode Recovery dv/dt	4.5	V/ns
P _D	Power Dissipation (T _C =25°C)	23	W
	- Derate above 25°C	0.18	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to + 150	°C
T _L	Maximum lead temperature for soldering purposes, case for 5 seconds	1/8" from 300	°C

- Drain current limited by maximum junction temperature

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	2.87	$^{\circ}C/W$
$R_{\theta JA}$	Junction-to-Ambient	—	50.0	

Electrical Characteristics (T_C=25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Type	Max	Units
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On Characteristics

V_{GS}	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	—	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=1.0A$	—	4.0	4.7	Ω

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	600	—	—	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D=250\mu A$, Referenced to 25°C	—	0.6	—	$V/^{\circ}C$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=600V, V_{GS}=0V$	—	—	10	μA
		$V_{DS}=480V, V_C=125^{\circ}C$	—	—	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS}=30V, V_{DS}=0V$	—	—	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS}=-30V, V_{DS}=0V$	—	—	-100	nA

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$	—	320	420	pF
C_{oss}	Output Capacitance		—	35	46	pF
C_{rss}	Reverse Transfer Capacitance		—	4.5	6.0	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Time	$V_{DS}=300V, I_D=2A,$ $R_G=25\Omega$	—	8	30	ns
t_r	Turn-On Rise Time		—	23	60	ns
$t_{d(off)}$	Turn-Off Delay Time		—	25	60	ns
t_f	Turn-Off Fall Time		—	28	70	ns
Q_g	Total Gate Charge	$V_{DS}=480V, I_D=2A,$ $V_{GS}=10V$	—	9.5	13	nC
Q_{gs}	Gate-Source Charge		—	1.6	—	nC
Q_{gd}	Gate-Drain Charge		—	4.0	—	nC



MSD2N60 600V N-Channel MOSFET

Source-Drain Diode Maximum Ratings and Characteristics

I_S	Continuous Source-Drain Diode Forward Current	—	—	2.0	A	
I_{SM}	Pulsed Source-Drain Diode Forward Current	—	—	6.0		
V_{SD}	Source-Drain Diode Forward Voltage	$I_S=2A, V_{GS}=0V$	—	—	1.4	V
t_{rr}	Reverse Recovery Time	$I_S=2 A, V_{GS}= 0V$	—	230	—	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt=100A/\mu s$	—	1.0	—	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS}=2.0A$, $V_{DD}=50V$, $R_G=25\Omega$, Starting $T_J =25^\circ C$
3. $I_{SD}\leq 2.0A$, $di/dt\leq 300A/\mu s$, $V_{DD}\leq BVDSS$, Starting $T_J =25^\circ C$
4. Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

- Characteristic Curves

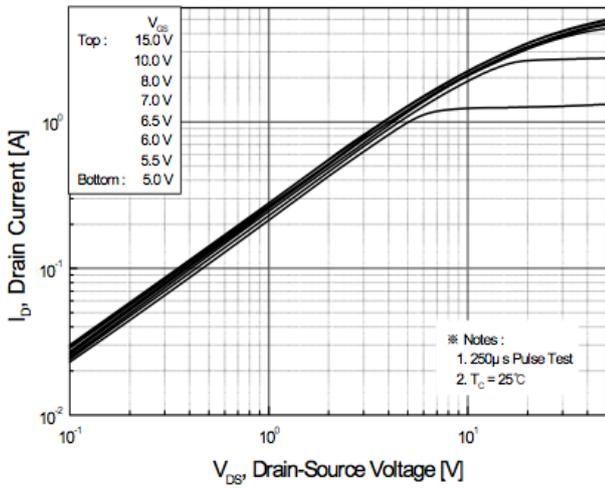


Figure 1. On Region Characteristics

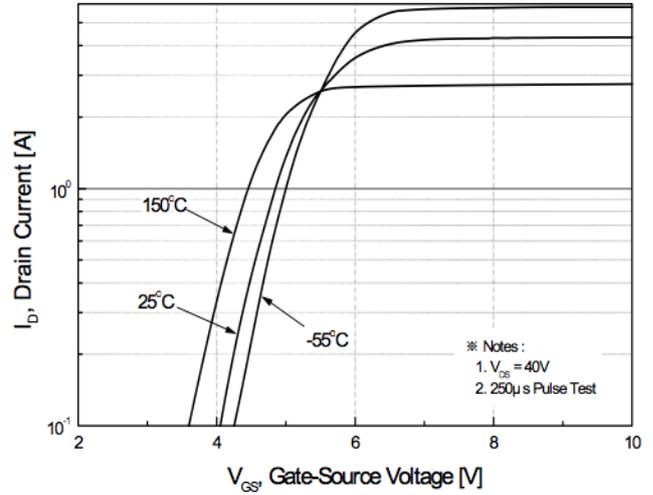


Figure 2. Transfer Characteristics

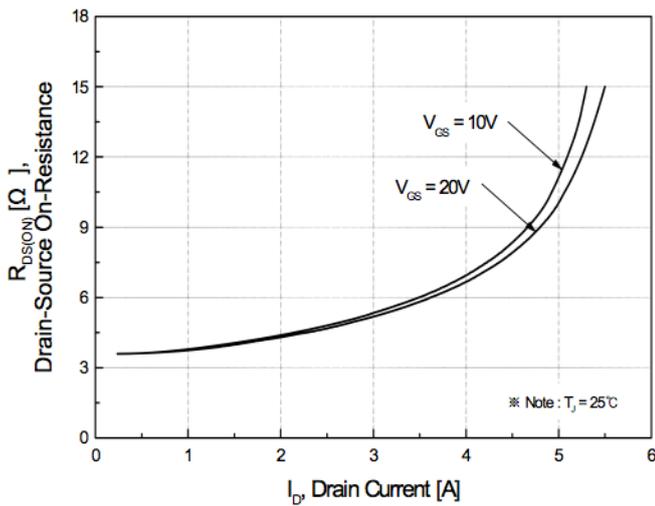


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

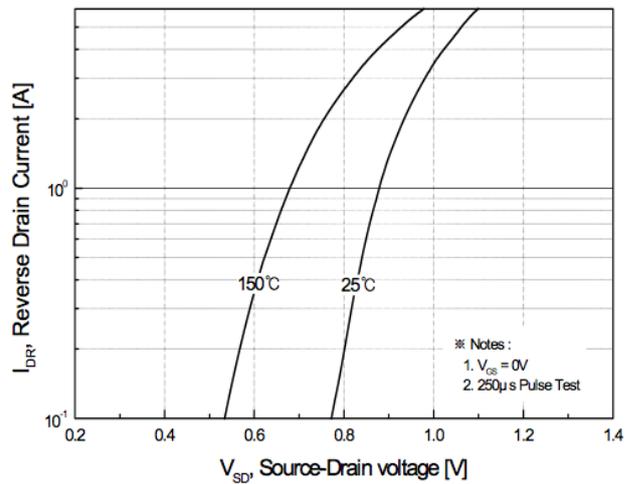


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

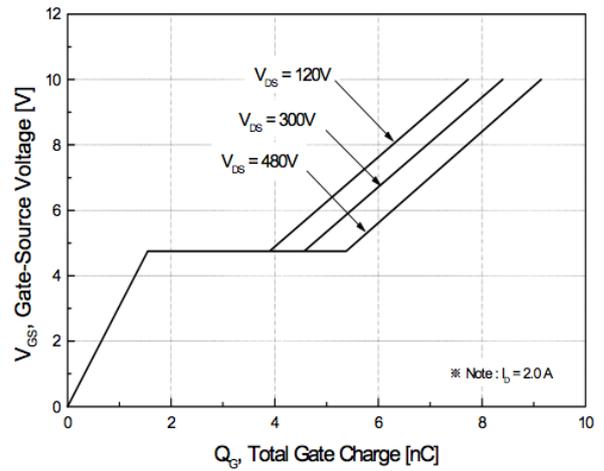
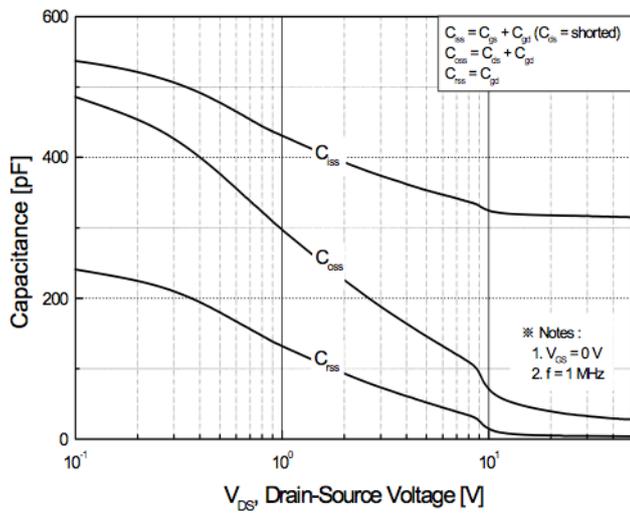


Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

• Characteristic Curves

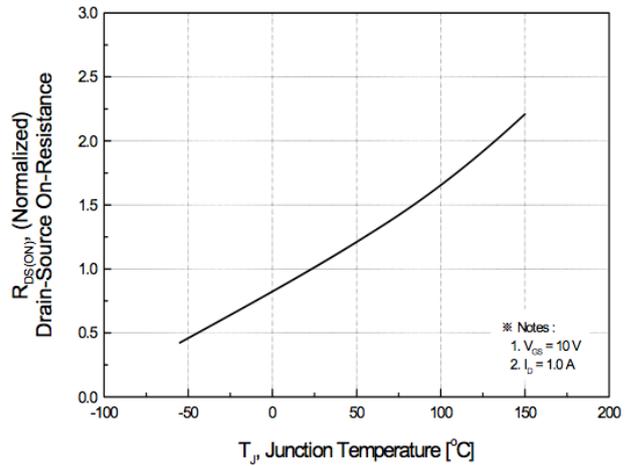
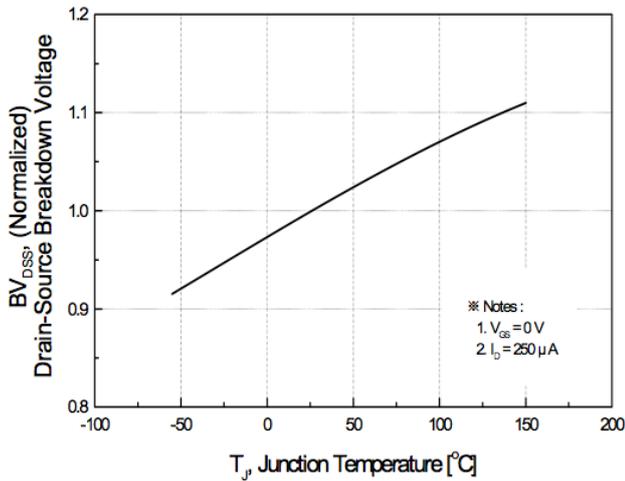


Figure 7. Breakdown Voltage Variation vs. Temperature

Figure 8. On-Resistance Variation vs. Temperature

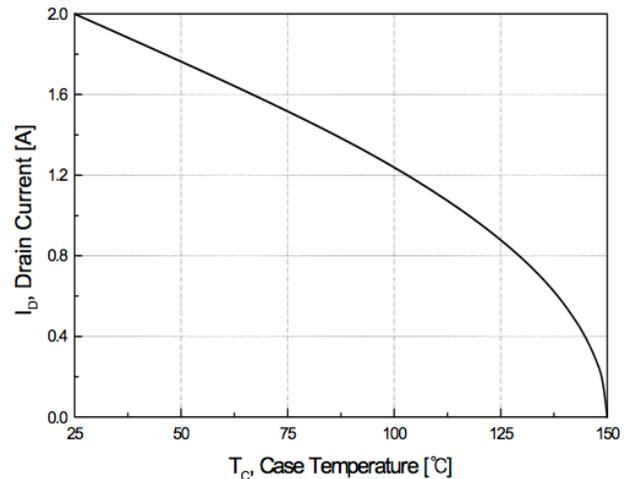
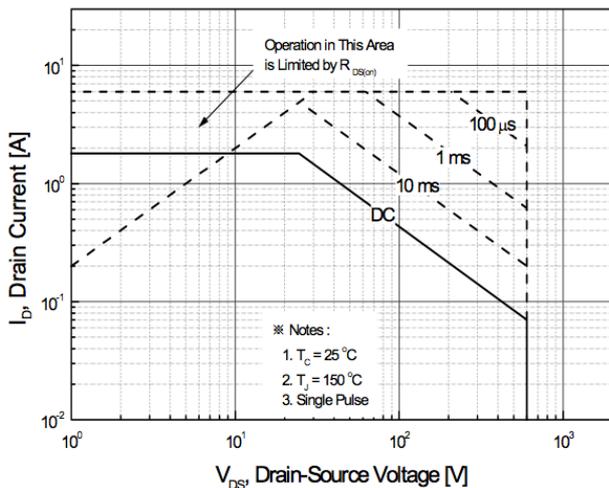


Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

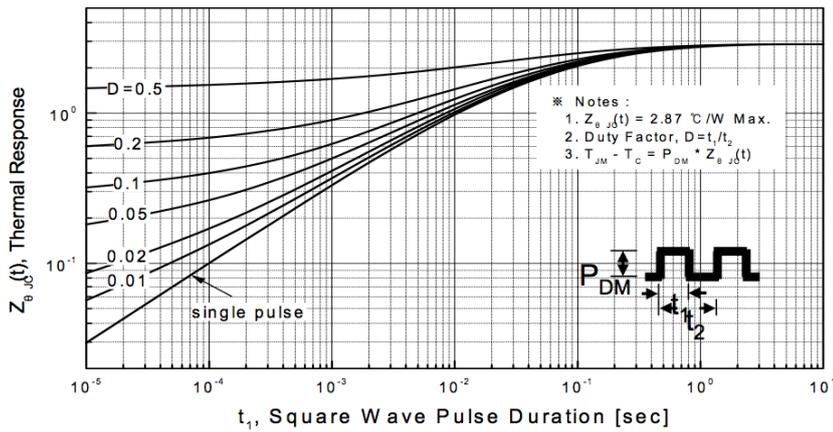


Figure 11. Transient Thermal Response Curve

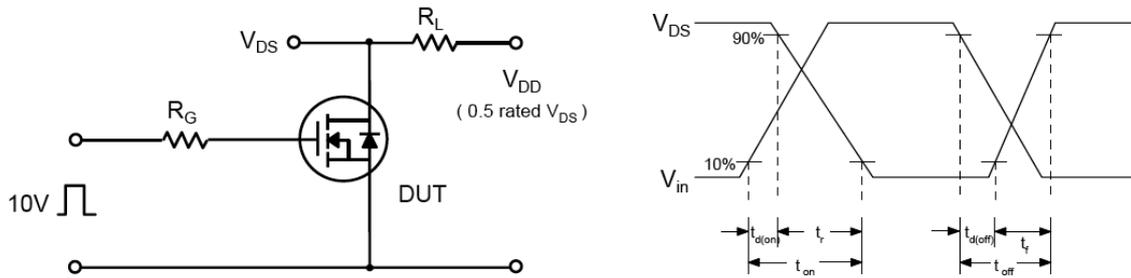


Fig 12. Resistive Switching Test Circuit & Waveforms

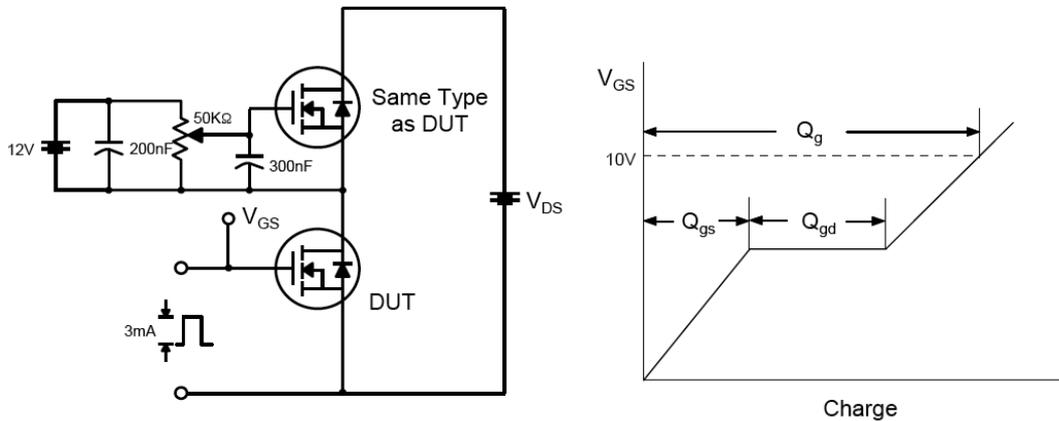
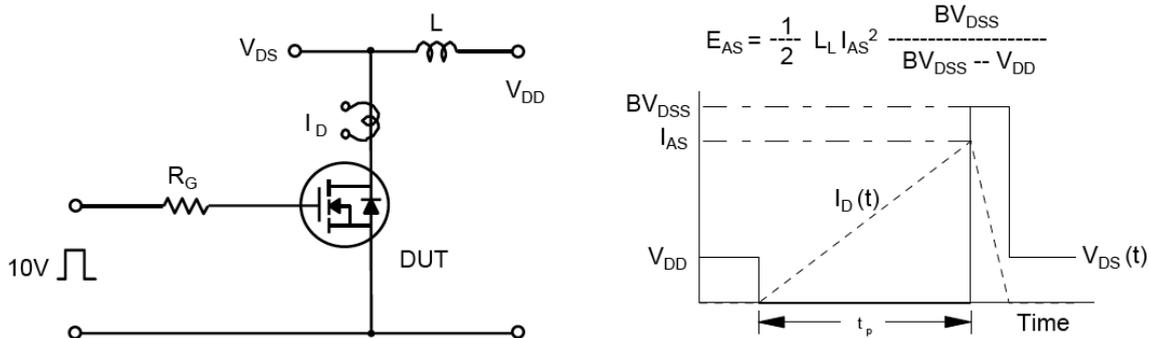


Fig 13. Gate Charge Test Circuit & Waveform



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Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

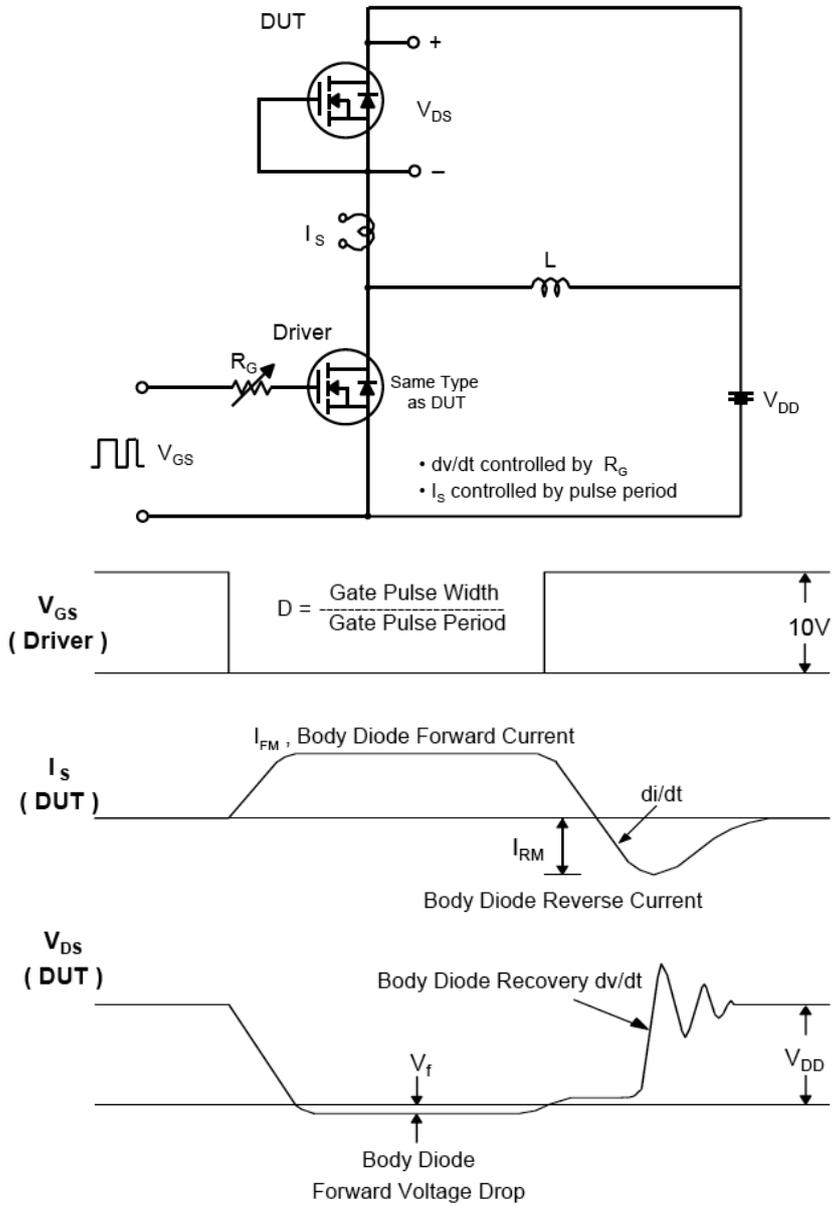


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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