

600V N-Channel MOSFET

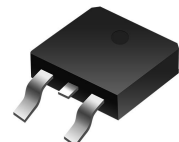
RCD2N60

General Description:

RCD2N60 N-channel Enhanced VDMOSFETs, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-252, which accords with the RoHS standard.

V_{DSS}	600	V
I_D	2	A
P_D ($T_C=25^\circ\text{C}$)	35	W
$R_{DS(ON)}$ Typ	3.9	Ω

TO-252

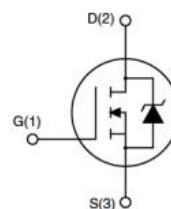


Features:

- Fast Switching
- Low ON Resistance
- Low Gate Charge
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications:

Power switch circuit of adaptor and charger.



Absolute ($T_C=25^\circ\text{C}$ unless otherwise specified) :

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to- Source Voltage	600	V
I_D	Continuous Drain Current	2	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	1.45	A
I_{DM}^{a1}	Pulsed Drain Current	8	A
V_{GS}	Gate-to- Source Voltage	± 30	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	68	mJ
E_{AR}^{a1}	Avalanche Energy , Repetitive	6.4	mJ
I_{AR}^{a1}	Avalanche Current	1.1	A
dv/dt^{a3}	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	35	W
	Derating Factor above 25°C	0.28	W/ $^\circ\text{C}$
$V_{ESD(G-S)}$	Gate source ESD (HBM-C= 100pF, R=1.5k Ω)	3000	V
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150 , - 55 to 150	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	300	$^\circ\text{C}$

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Electrical Characteristics (Tc= 25°C unless otherwise specified) :

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	600	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	$I_D=250\mu A$, Reference 25°C	--	0.6	--	V/°C
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=600V, V_{GS}=0V, T_a=25^\circ C$	--	--	1	μA
		$V_{DS}=520V, V_{GS}=0V, T_a=125^\circ C$	--	--	100	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+30V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-30V$	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain- to- Source On- Resistance	$V_{GS}=10V, I_D=1A$	--	3.9	5.0	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0		4.0	V
Pulse width $t_p \leq 300\mu s, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Trans conductance	$V_{DS}=15V, I_D=2A$		2.6	--	S
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V$ $f=1.0MHz$	--	290		pF
C_{oss}	Output Capacitance		--	31		
C_{rss}	Reverse Transfer Capacitance		--	6		

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn- on Delay Time	$I_D=2A, V_{DD}=325V$ $R_G=9.1\Omega$	--	8	--	ns
t_r	Rise Time		--	6	--	
$t_{d(OFF)}$	Turn- Off Delay Time		--	30	--	
t_f	Fall Time		--	11	--	
Q_g	Total Gate Charge	$I_D=2A, V_{DD}=325V$ $V_{GS}=10V$	--	9		nC
Q_{gs}	Gate to Source Charge		--	1.5		
Q_{gd}	Gate to Drain ("Miller") Charge		--	4		

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Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min .	Typ .	Max .	
I_S	Continuous Source Current (Body Diode)		--	--	2	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	8	A
V_{SD}	Diode Forward Voltage	$I_S=2.0A, V_{GS}=0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=2.0A, T_J = 25^{\circ}C$	--	425	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt=100A/us,$ $V_{GS}=0V$	--	1140	--	nC
Pulse width $t_p \leq 300\mu s, \delta \leq 2\%$						

Symbol	Parameter	Typ .	Units
$R_{\theta JC}$	Junction- to- Case	3.57	$^{\circ}C/ W$
$R_{\theta JA}$	Junction- to- Ambient	62	$^{\circ}C/ W$

^{a1} : Repetitive rating; pulse width limited by maximum junction temperature

^{a2} : $L=10mH, I_D=3.7A$, Start $T_J=25^{\circ}C$

^{a3} : $I_{SD}=2A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}$, Start $T_J=25^{\circ}C$

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Characteristics Curve:

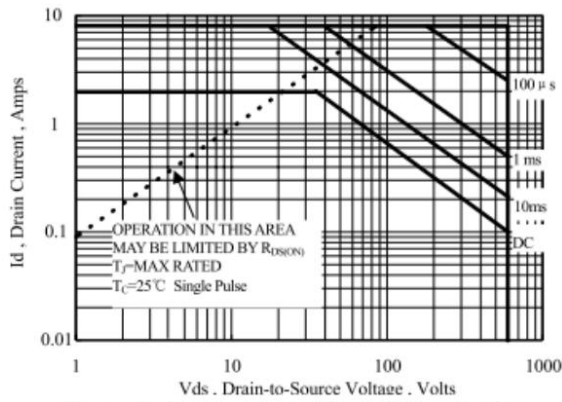


Figure 1 Maximum Forward Bias Safe Operating Area

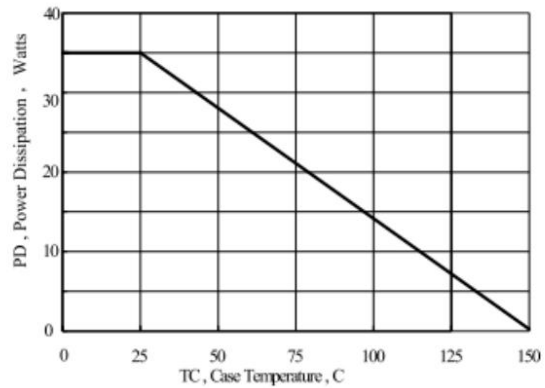


Figure 2 Maximum Power Dissipation vs Case Temperature

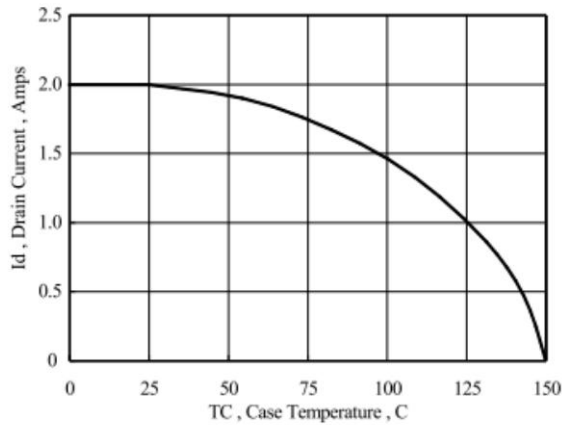


Figure 3 Maximum Continuous Drain Current vs Case Temperature

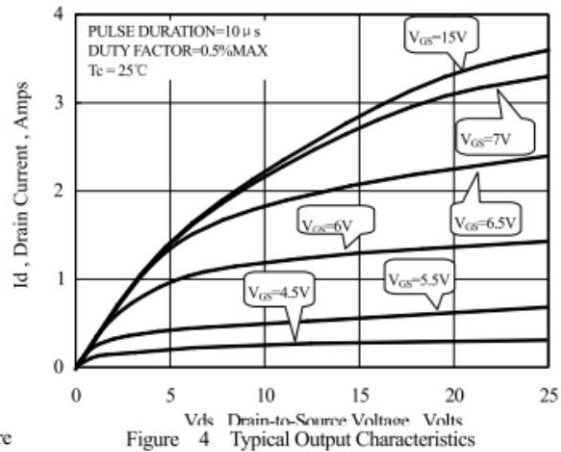


Figure 4 Typical Output Characteristics

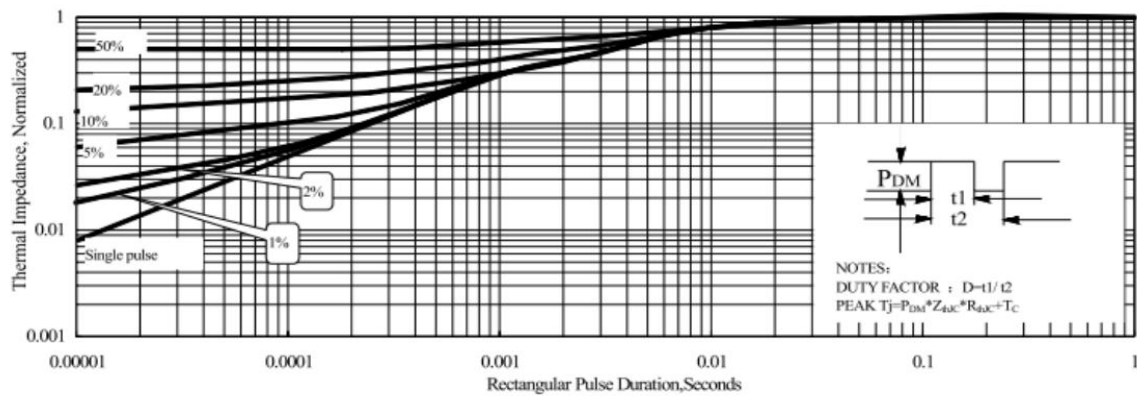
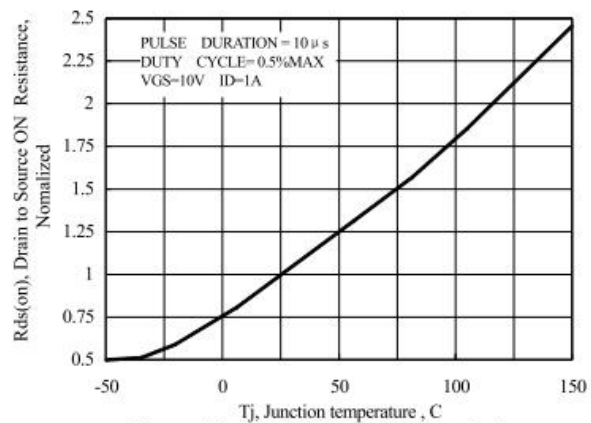
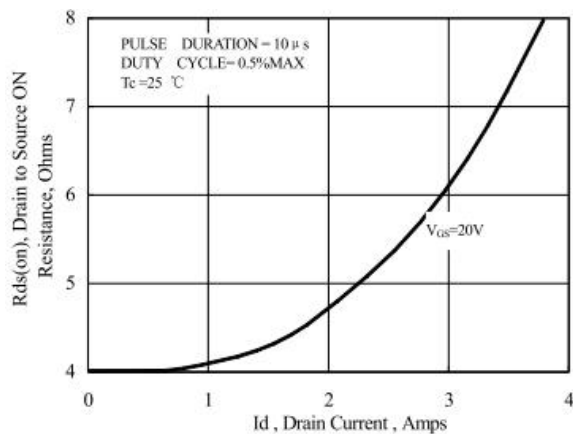
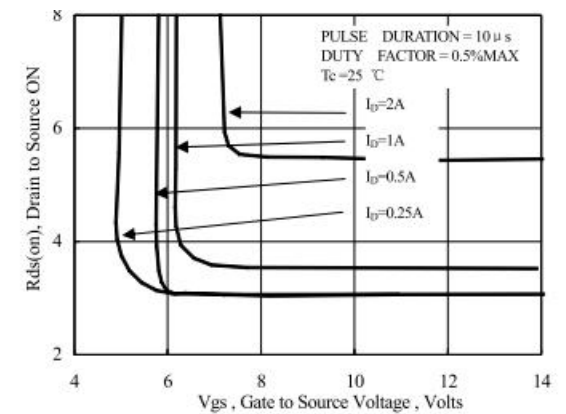
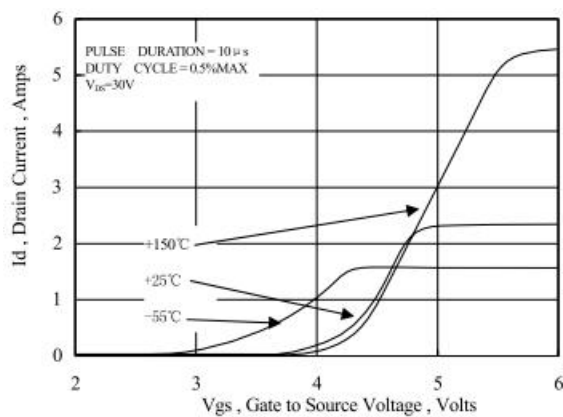
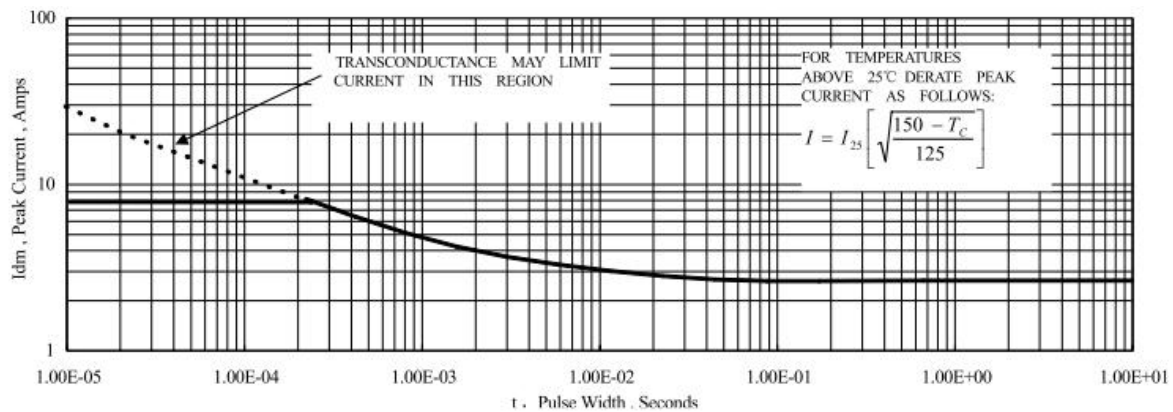


Figure 5 Maximum Effective Thermal Impedance, Junction to Case

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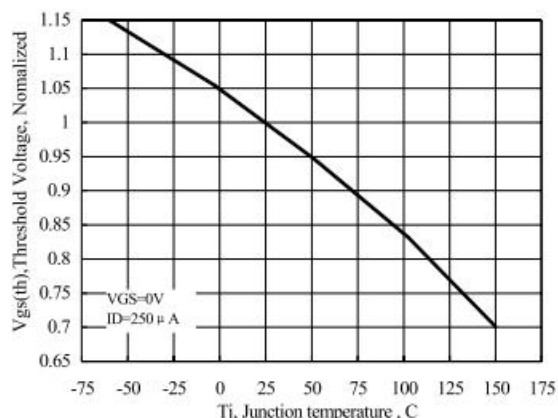


Figure 11 Typical Theshold Voltage vs Junction Temperature

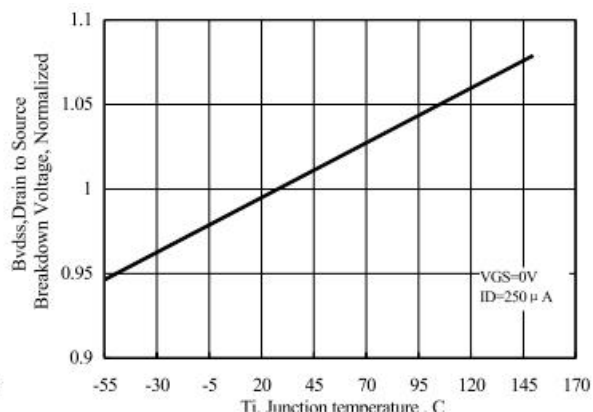


Figure 12 Typical Breakdown Voltage vs Junction Temperature

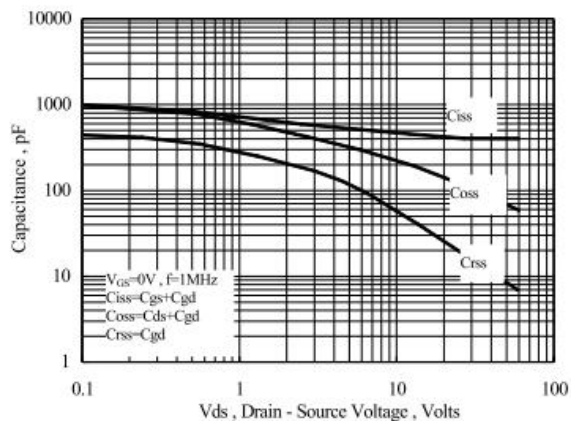


Figure 13 Typical Capacitance vs Drain to Source Voltage

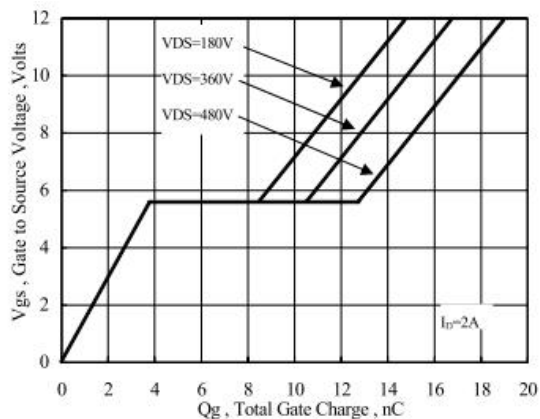


Figure 14 Typical Gate Charge vs Gate to Source Voltage

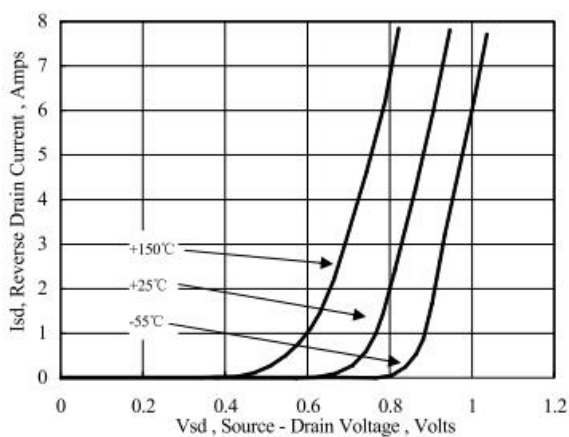


Figure 15 Typical Body Diode Transfer Characteristics

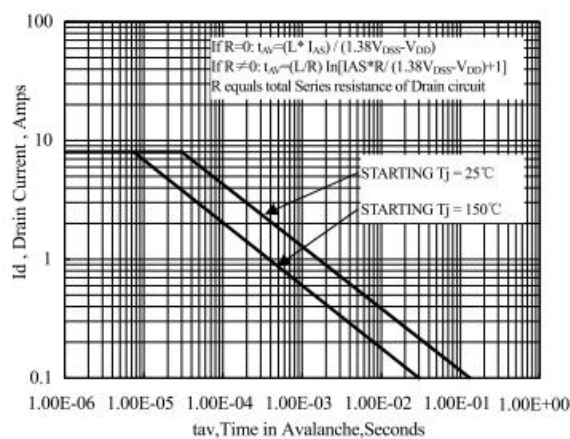


Figure 16 Unclamped Inductive Switching Capability

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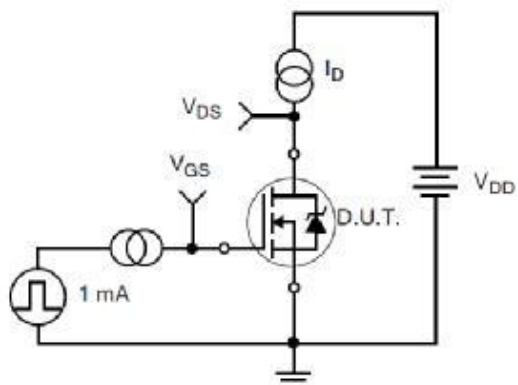


Figure 17. Gate Charge Test Circuit

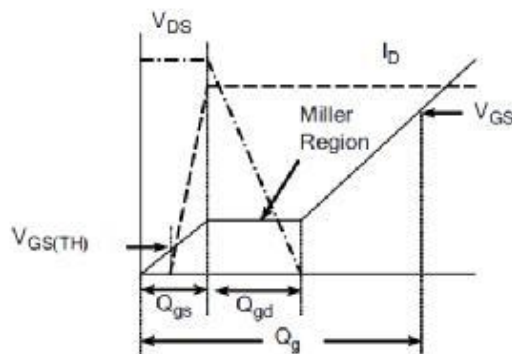


Figure 18. Gate Charge Waveform

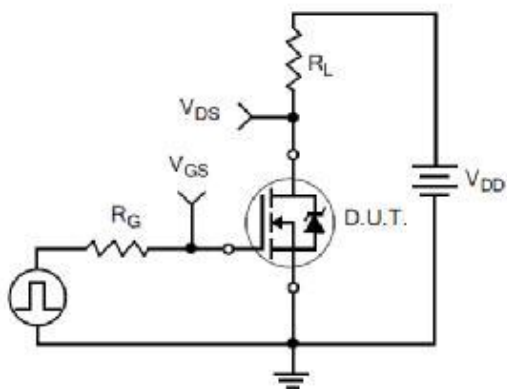


Figure 19. Resistive Switching Test Circuit

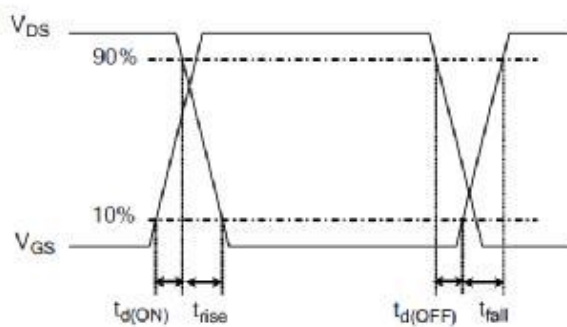


Figure 20. Resistive Switching Waveforms

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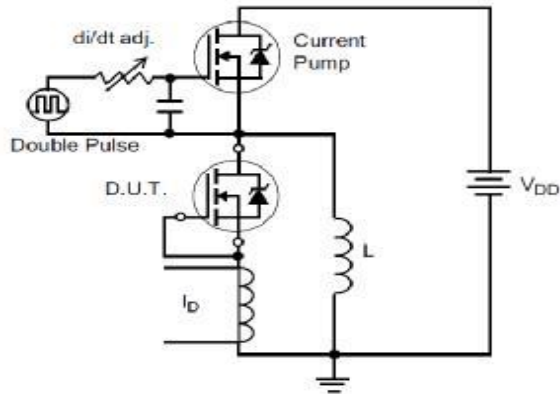


Figure 21. Diode Reverse Recovery Test Circuit

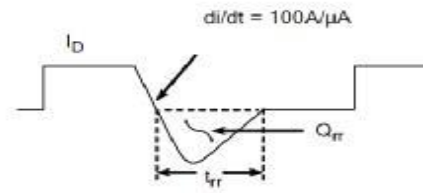


Figure 22. Diode Reverse Recovery Waveform

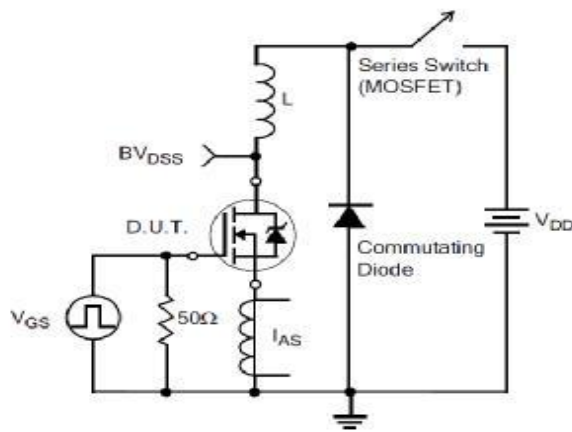


Figure 23. Unclamped Inductive Switching Test Circuit

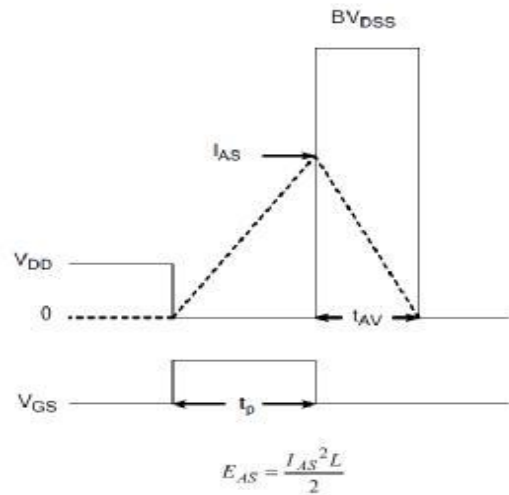
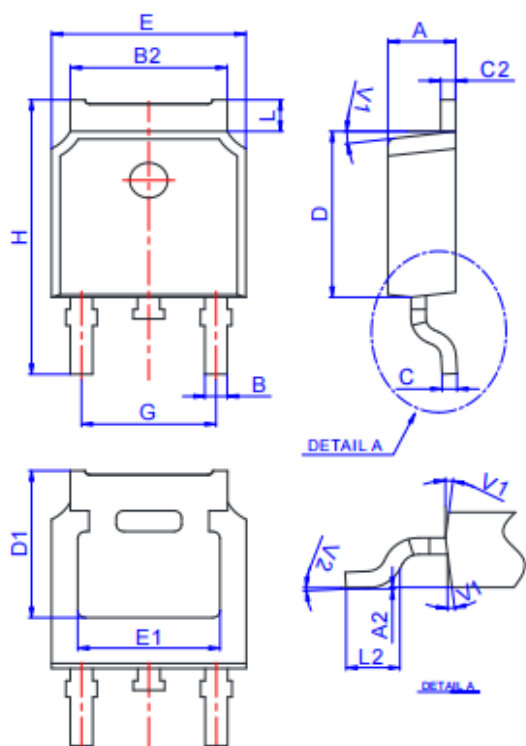


Figure 24. Unclamped Inductive Switching Waveforms

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TO-252 Package outline



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°