



**TM10N06D**

**N-Channel Enhancement Mosfet**

**General Description**

- Low  $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

**Applications**

- Load switch
- PWM

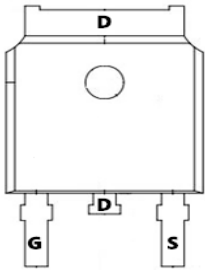
**General Features**

$V_{DS} = 60V$   $I_D = 10 A$

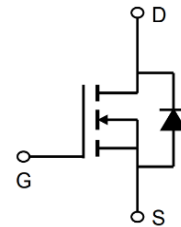
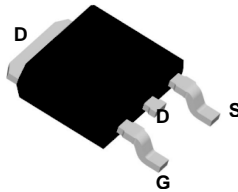
$R_{DS(ON)} = 65 m\Omega$  (typ.) @  $V_{GS} = -10V$

100% UIS Tested

100%  $R_g$  Tested



TO-252-3L



Marking : 10N06

**Absolute Maximum Ratings** ( $T_A=25^\circ C$  unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-source Voltage	$V_{DS}$	60	V
Gate-source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current	$I_D$	$T_A=25^\circ C$	10
		$T_A=100^\circ C$	8
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	18	A
Total Power Dissipation <sup>B</sup>	$P_D$	$T_A=25^\circ C$	1.2
		$T_A=100^\circ C$	0.45
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~+150	$^\circ C$

**Thermal resistance**

Parameter	Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient <sup>C</sup>	$R_{\theta JA}$	85	105	$^\circ C/W$

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**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$	-	-	1	$\mu A$
		$V_{DS}=60V, V_{GS}=0V, T_J=150^\circ C$	-	-	100	
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.9	1.35	2	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=3A$	-	65	82	m $\Omega$
		$V_{GS}=4.5V, I_D=3A$	-	75	92	
Diode Forward Voltage	$V_{SD}$	$I_S=3A, V_{GS}=0V$	-	0.85	1.2	V
Gate resistance	$R_G$	$f=1\text{MHz}, \text{Open drain}$	-	2	-	$\Omega$
Maximum Body-Diode Continuous Current	$I_S$		-	-	10	A
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=30V, V_{GS}=0V, f=1\text{MHz}$	-	500	-	pF
Output Capacitance	$C_{oss}$		-	28	-	
Reverse Transfer Capacitance	$C_{rss}$		-	22	-	
<b>Switching Parameters</b>						
Total Gate Charge	$Q_g$	$V_{GS}=10V, V_{DS}=30V, I_D=3A$	-	10	-	nC
Gate-Source Charge	$Q_{gs}$		-	1.7	-	
Gate-Drain Charge	$Q_{gd}$		-	2.1	-	
Reverse Recovery Charge	$Q_{rr}$	$I_F=3A, di/dt=100A/\mu s$	-	7	-	nC
Reverse Recovery Time	$t_{rr}$		-	33	-	ns
Turn-on Delay Time	$t_{D(on)}$	$V_{GS}=10V, V_{DD}=30V, R_L=20\Omega$ $R_{GEN}=3\Omega$	-	3.6	-	ns
Turn-on Rise Time	$t_r$		-	17.6	-	
Turn-off Delay Time	$t_{D(off)}$		-	13	-	
Turn-off fall Time	$t_f$		-	23	-	

A. Repetitive rating; pulse width limited by max. junction temperature.

B.  $P_d$  is based on max. junction temperature, using junction-case thermal resistance.

C. The value of  $R_{\theta JA}$  is measured with the device mounted on the minimum recommend pad size, in the still air environment with  $T_A=25^\circ\text{C}$ . The maximum allowed junction temperature of  $150^\circ\text{C}$ . The value in any given application depends on the user's specific board design.



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Typical Electrical and Thermal Characteristics Diagrams

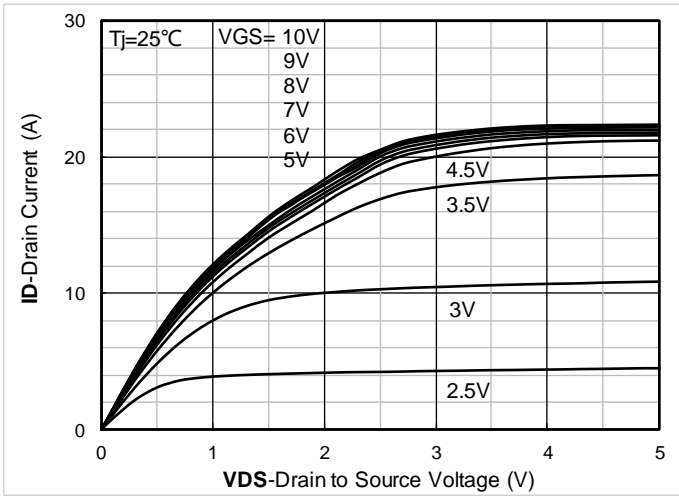


Figure 1. Output Characteristics

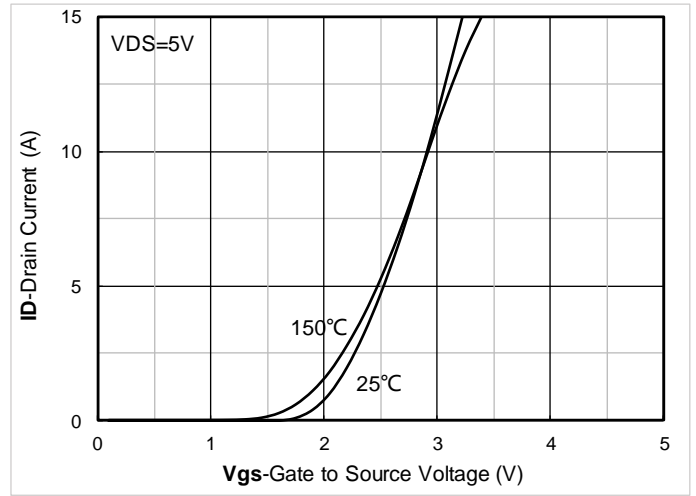


Figure 2. Transfer Characteristics

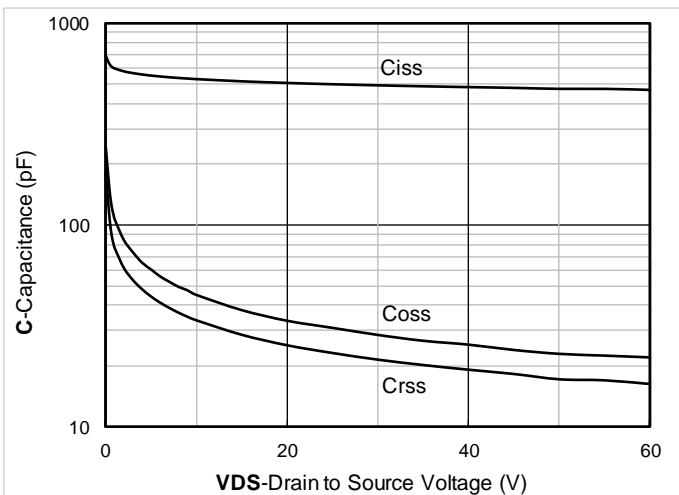


Figure 3. Capacitance Characteristics

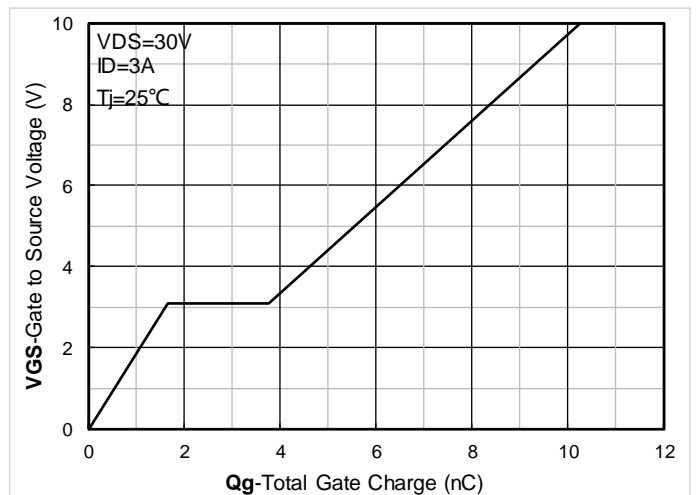


Figure 4. Gate Charge

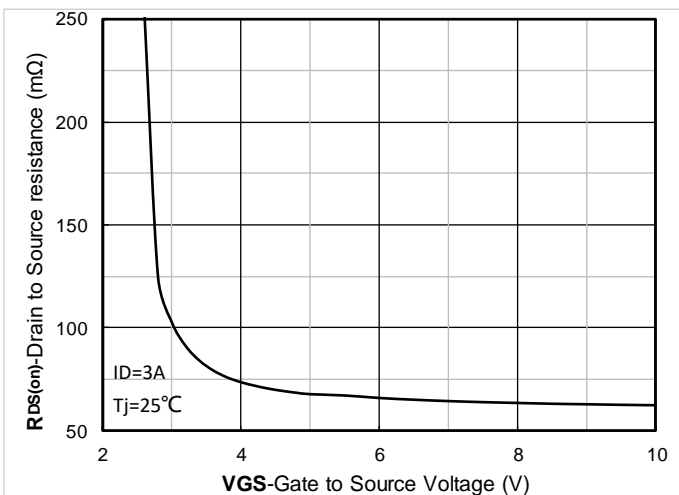


Figure 5. On-Resistance vs Gate to Source Voltage

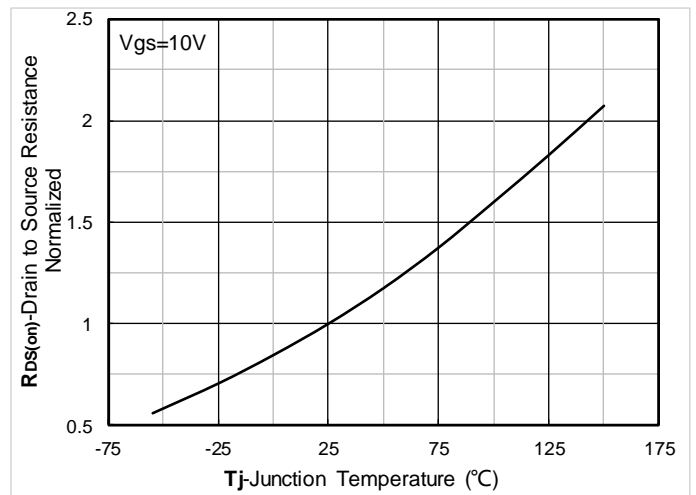


Figure 6. Normalized On-Resistance



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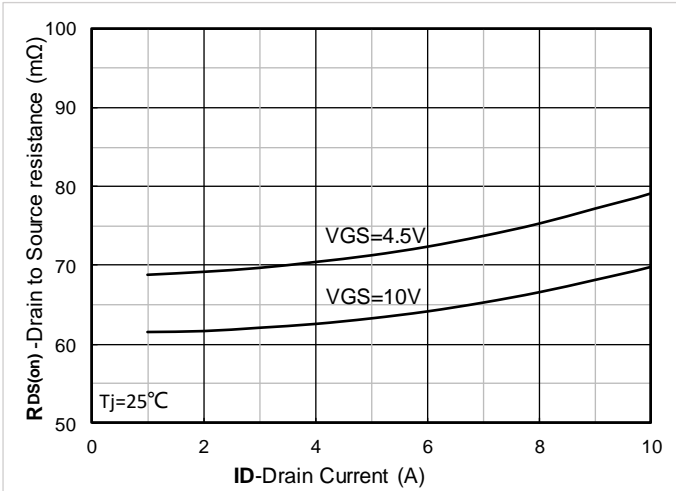


Figure 7.  $R_{DS(on)}$  VS Drain Current

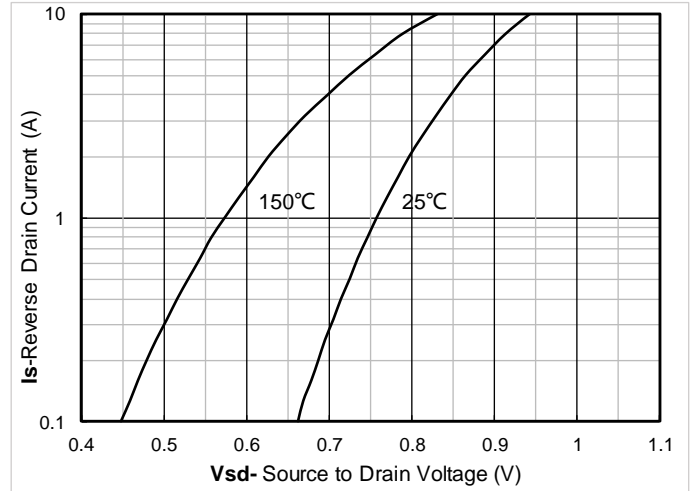


Figure 8. Forward characteristics of reverse diode

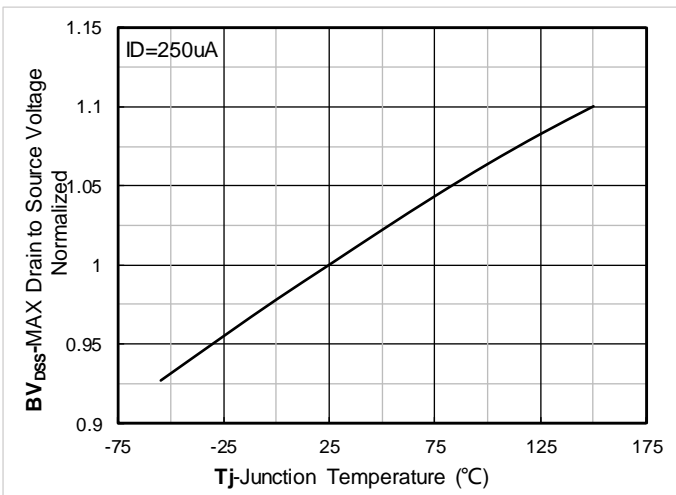


Figure 9. Normalized breakdown voltage

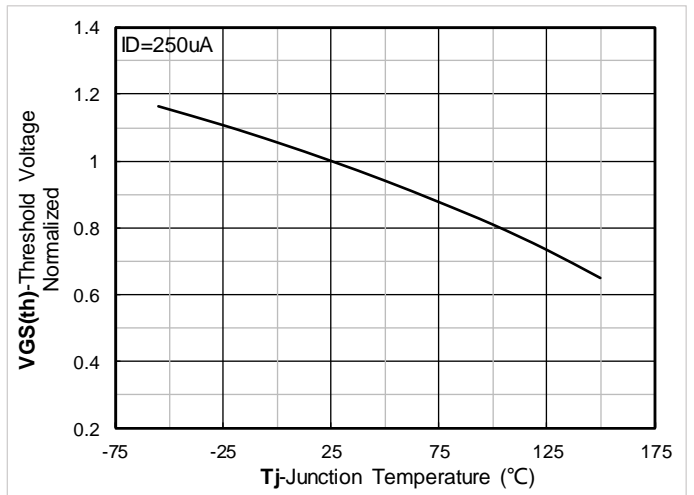


Figure 10. Normalized Threshold voltage

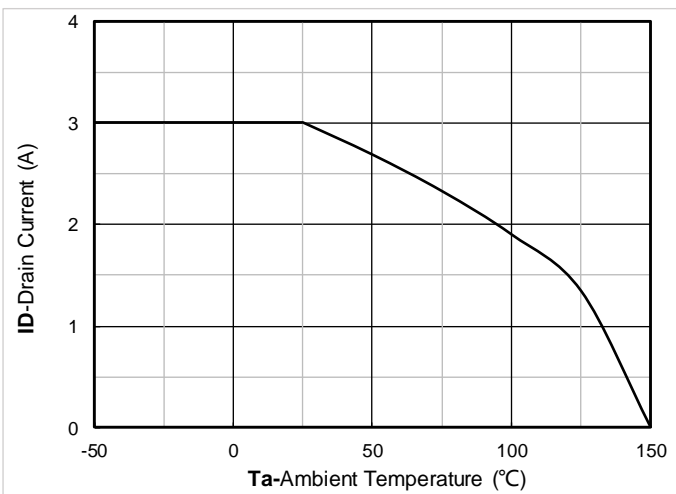


Figure 11. Current dissipation

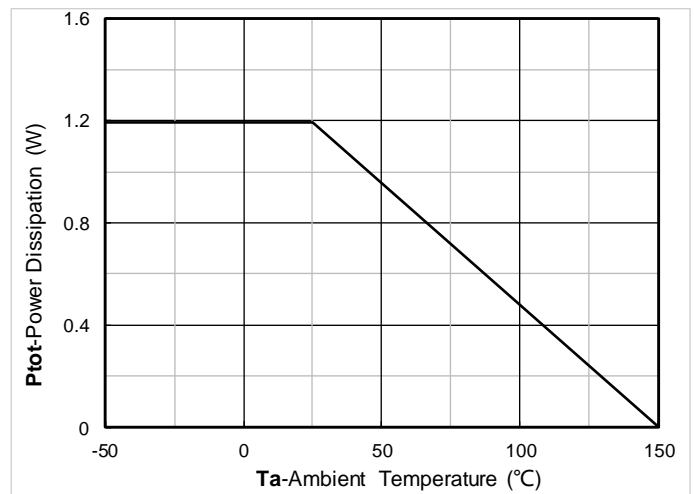


Figure 12. Power dissipation



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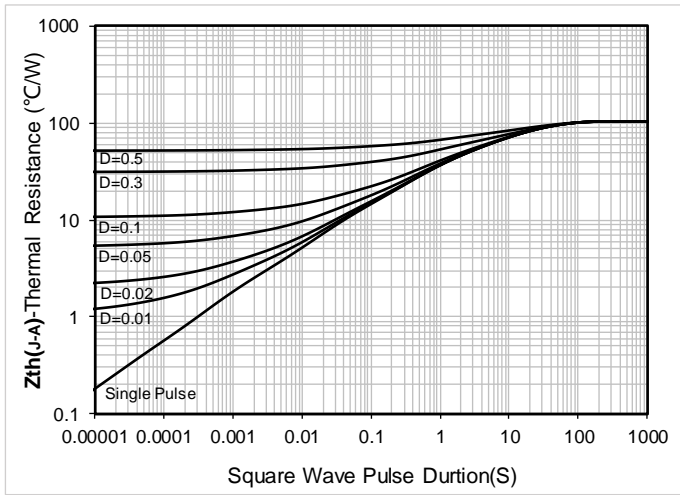


Figure 13. Maximum Transient Thermal Impedance

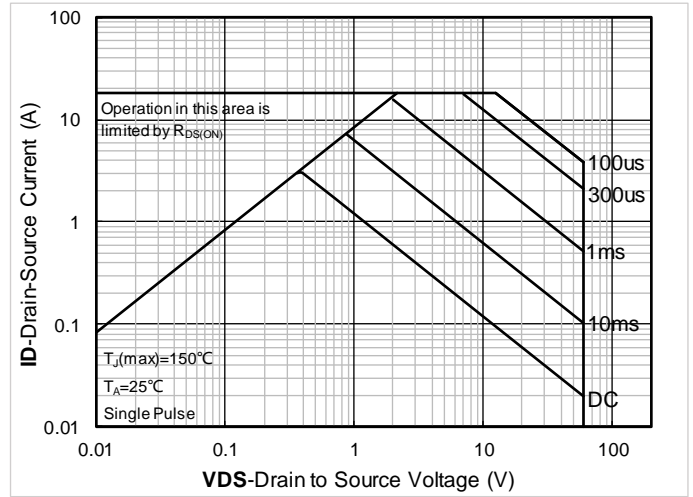


Figure 14. Safe Operation Area

## Test Circuits & Waveforms

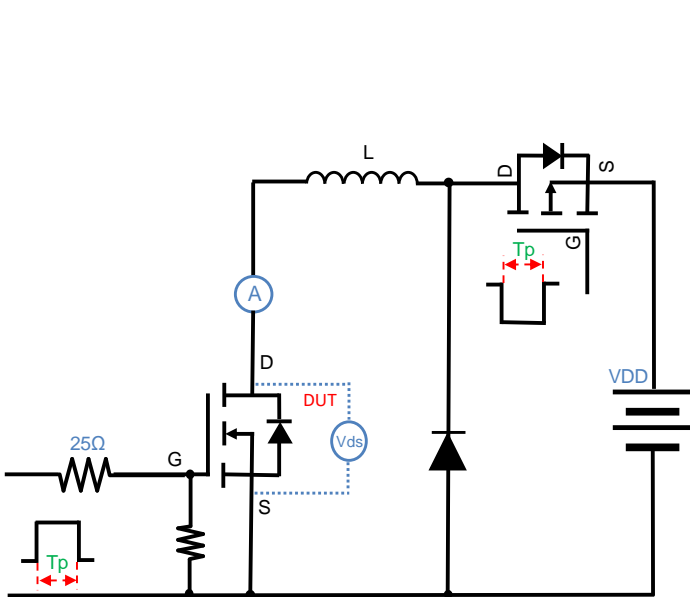
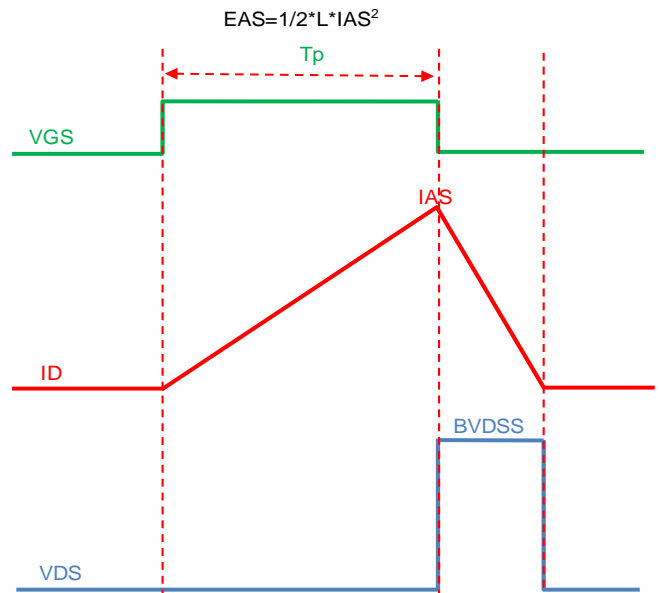


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform





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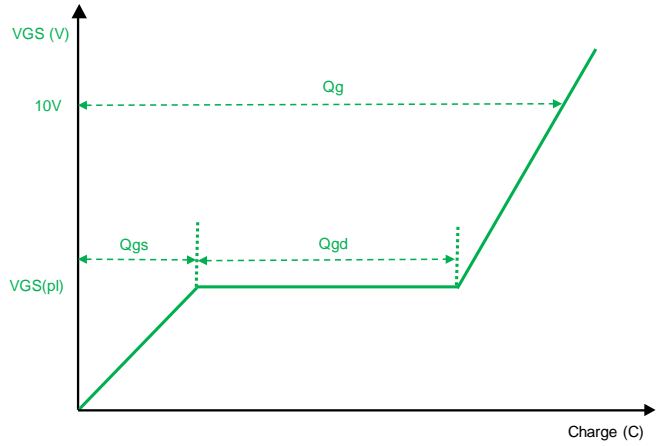
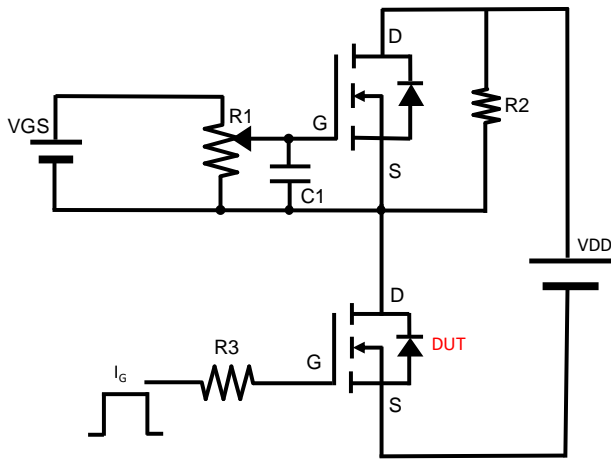


Figure B. Gate Charge Test Circuit & Waveform

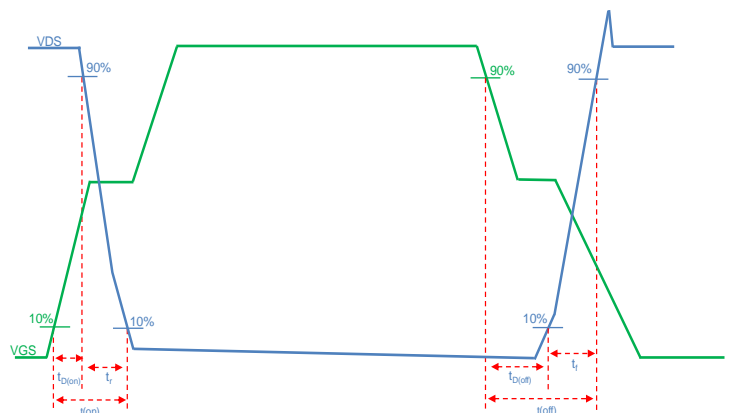
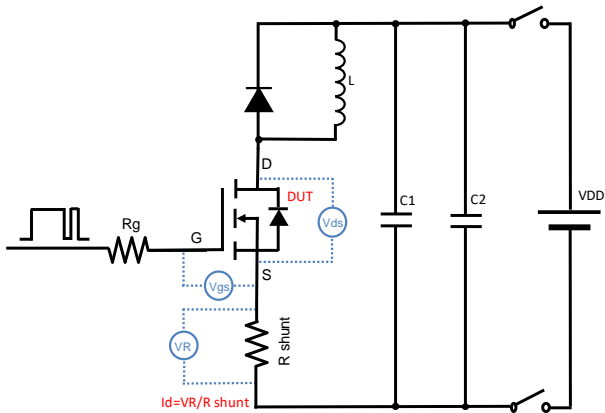


Figure C. Resistive Switching Test Circuit & Waveform

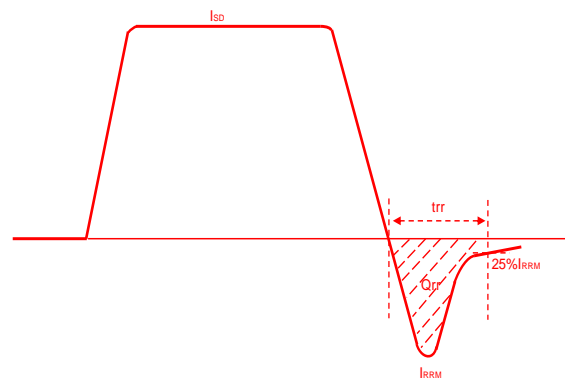
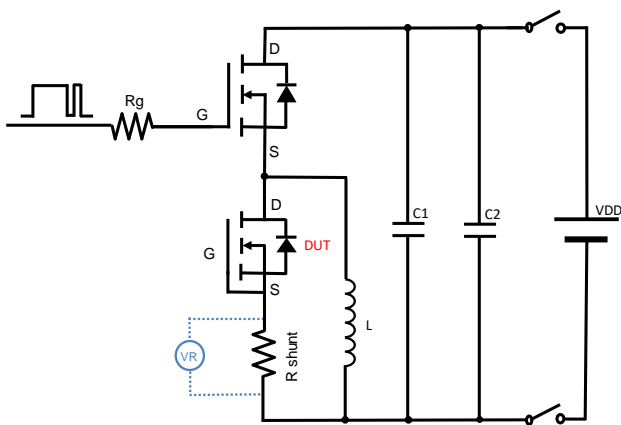
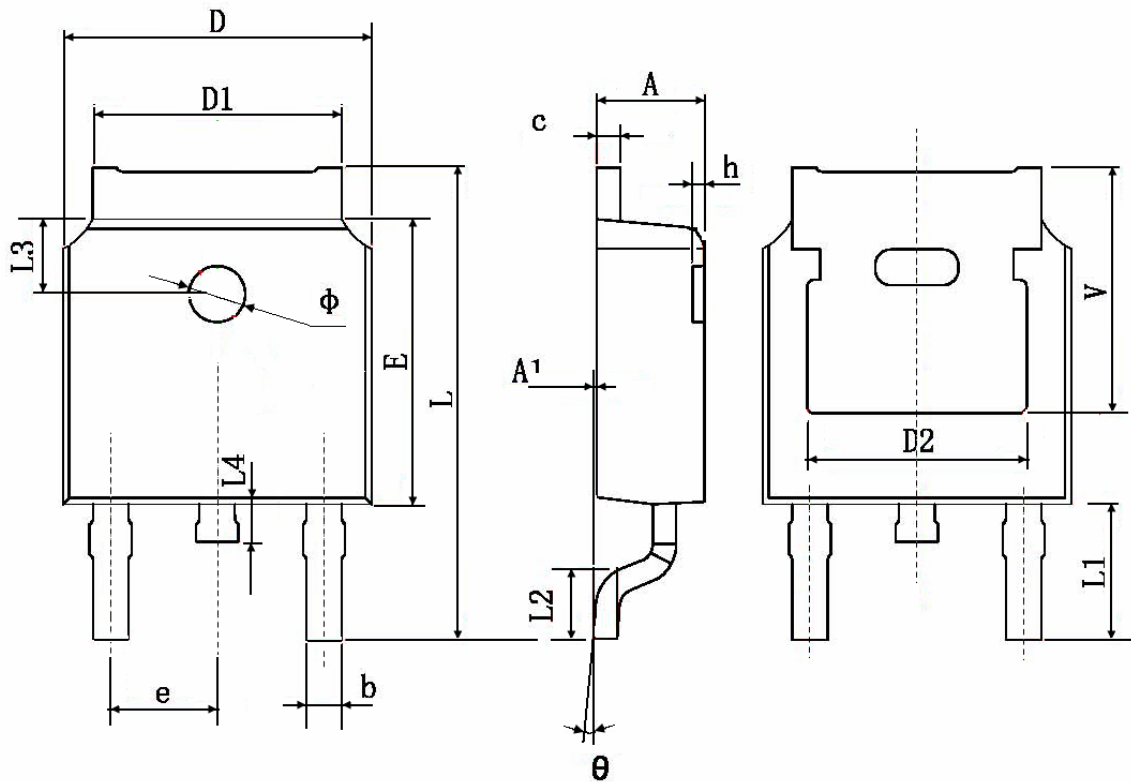


Figure D. Diode Recovery Test Circuit & Waveform

**Package Information:TO-252-3L**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
phi	1.100	1.300	0.043	0.051
theta	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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