TMN6010D

N-Channel Enhancement Mosfet

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

Applications
• Load switch
• PWM

General Features

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

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

100% UIS Tested
100% R_g Tested

Green Product
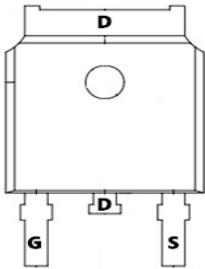
TO-252-3L
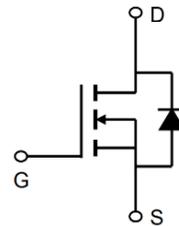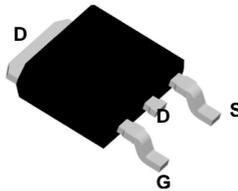
Marking : 10N06

Absolute Maximum Ratings (T_A=25℃ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	60	V
Gate-source Voltage		V_{GS}	±20	V
Drain Current	T_A=25℃	I_D	10	A
	T_A=100℃		8	
Pulsed Drain Current [A]		I_{DM}	18	A
Total Power Dissipation [B]	T_A=25℃	P_D	1.2	W
	T_A=100℃		0.45	
Junction and Storage Temperature Range		T_J , T_{STG}	-55～+150	℃

Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient [C]	Steady-State	$R_{\theta JA}$	85	105	℃/W

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Electrical Characteristics (T$_J$=25℃ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV$_{DSS}$	V$_{GS}$= 0V, I$_D$=250μA	60	-	-	V
Zero Gate Voltage Drain Current	I$_{DSS}$	V$_{DS}$=60V, V$_{GS}$=0V	-	-	1	μA
		V$_{DS}$=60V, V$_{GS}$=0V, Tj=150℃	-	-	100	
Gate-Body Leakage Current	I$_{GSS}$	V$_{GS}$= ±20V, V$_{DS}$=0V	-	-	±100	nA
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$= V$_{GS}$, I$_D$=250μA	0.9	1.35	2	V
Static Drain-Source On-Resistance	R$_{DS(ON)}$	V$_{GS}$=10V, I$_D$=3A	-	65	82	mΩ
		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=1MHz, Open drain	-	2	-	Ω
Maximum Body-Diode Continuous Current	I$_S$		-	-	10	A
Dynamic Parameters						
Input Capacitance	C$_{iss}$	V$_{DS}$=30V, V$_{GS}$=0V, f=1MHz	-	500	-	pF
Output Capacitance	C$_{oss}$		-	28	-	
Reverse Transfer Capacitance	C$_{rss}$		-	22	-	
Switching Parameters						
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/us	-	7	-	nC
Reverse Recovery Time	t$_{rr}$		-	33	-	ns
Turn-on Delay Time	t$_{D(on)}$	V$_{GS}$=10V, V$_{DD}$=30V, R$_L$=20Ω R$_{GEN}$=3Ω	-	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 core, using junction-case thermal resistance.
C. The value of R$_{θJA}$ is measured with the device mounted on the minimum recommend pad size, in the still air environment with T$_A$ =25℃.
The maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design.

## Typical Electrical and Thermal Characteristics Diagrams
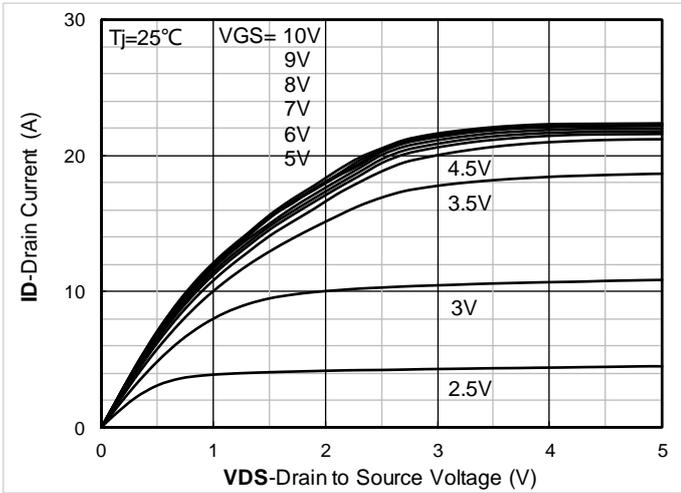
Figure 1. Output Characteristics
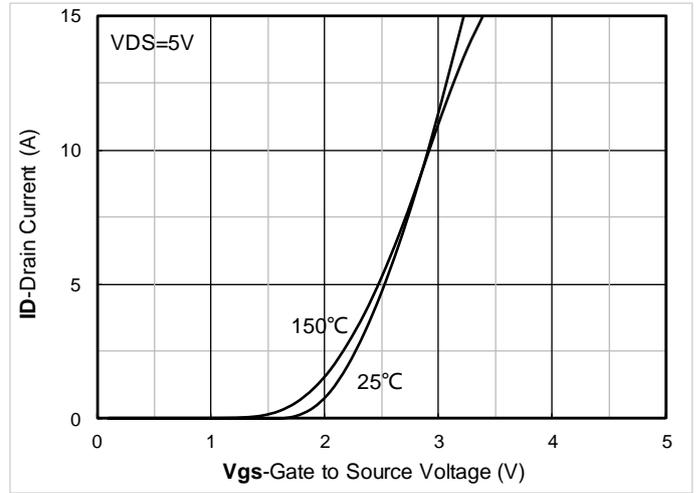
Figure 2. Transfer Characteristics
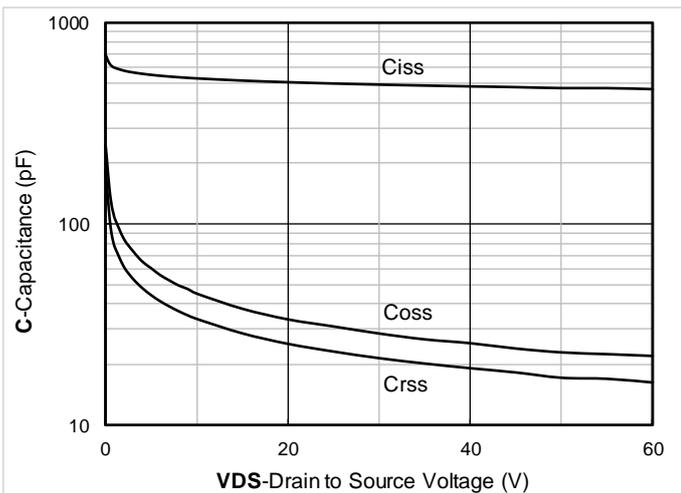
Figure 3. Capacitance Characteristics
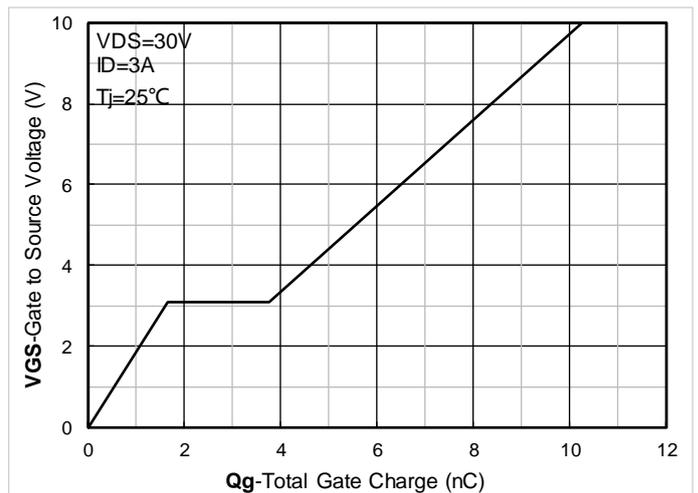
Figure 4. Gate Charge
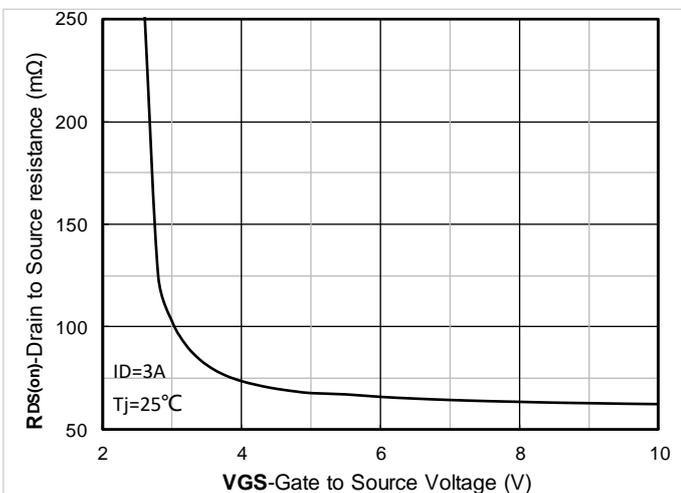
Figure 5. On-Resistance vs Gate to Source Voltage
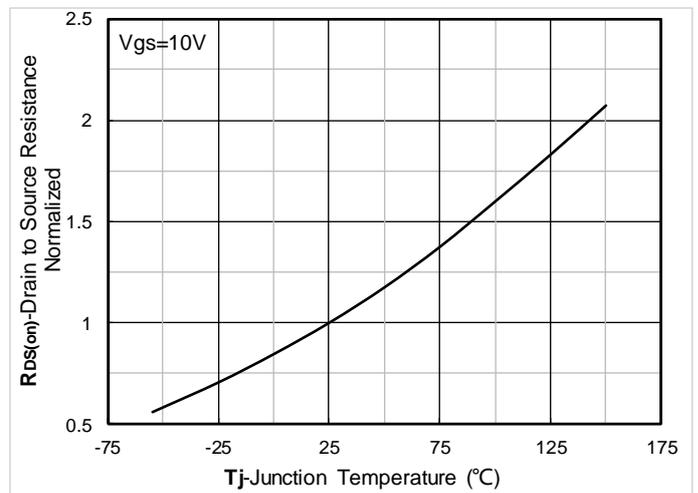
Figure 6. Normalized On-Resistance

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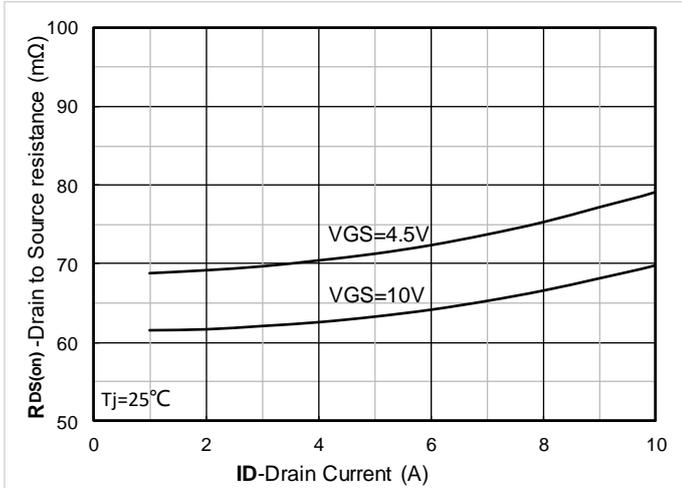
Figure 7. RDS(on) VS Drain Current
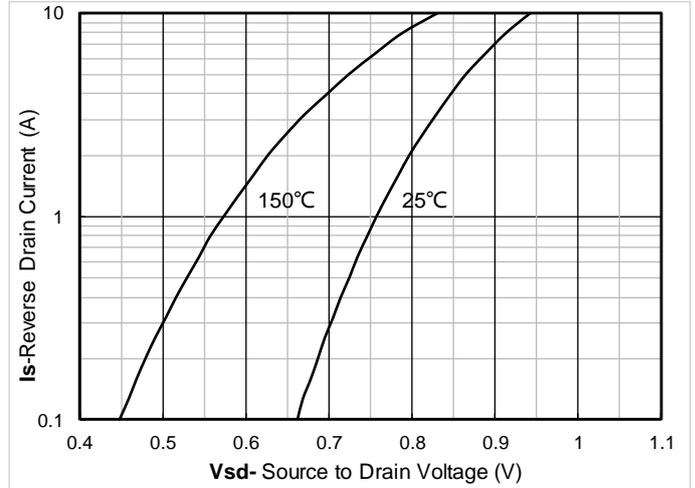
Figure 8. Forward characteristics of reverse diode
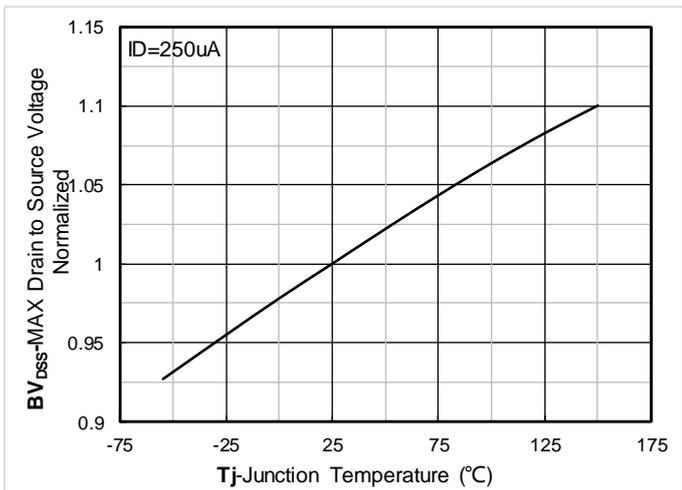

Figure 9. Normalized breakdown voltage
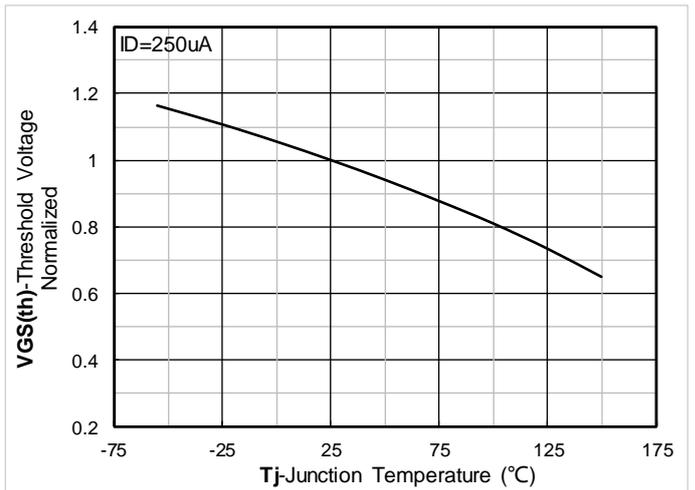
Figure 10. Normalized Threshold voltage
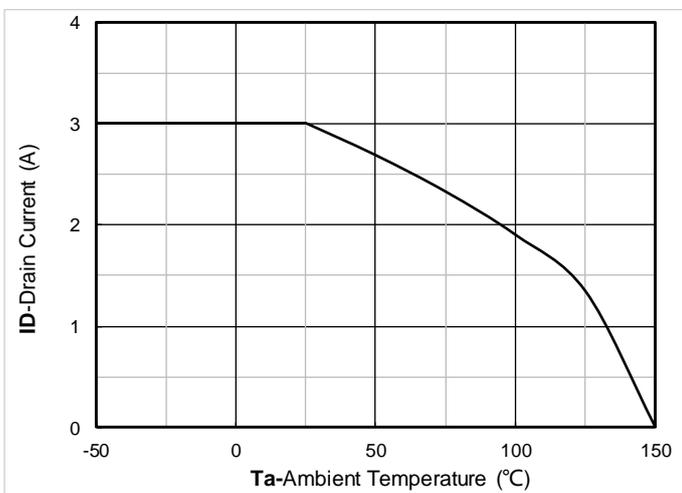
Figure 11. Current dissipation
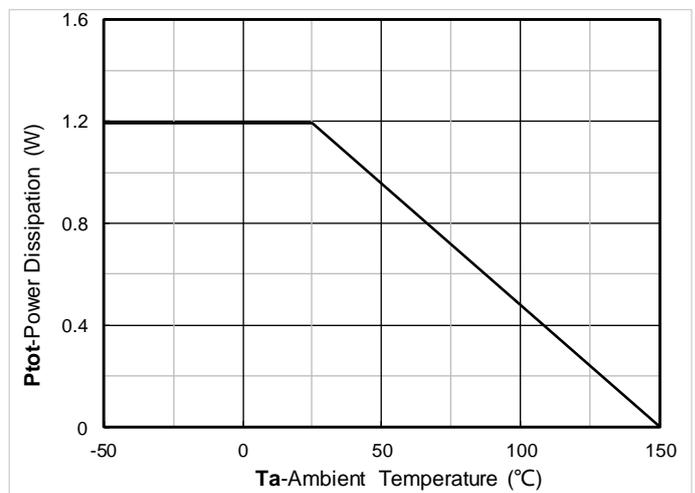
Figure 12. Power dissipation
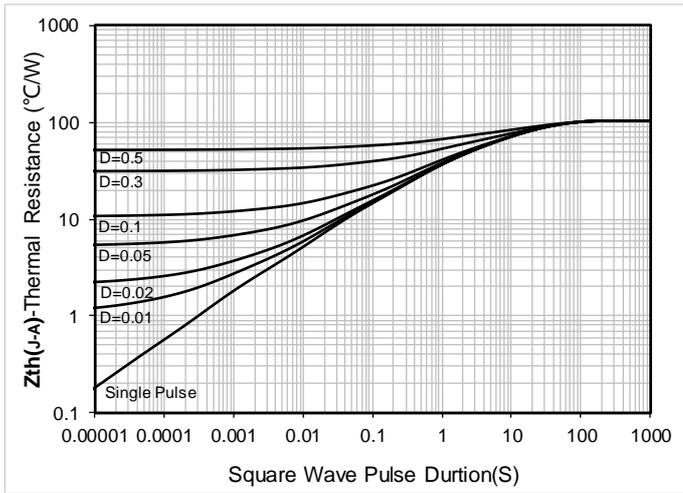
Figure 13. Maximum Transient Thermal Impedance
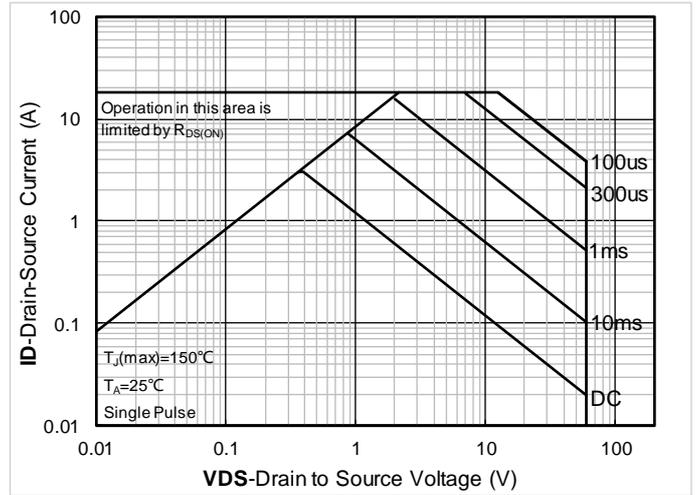
Figure 14. Safe Operation Area

Test Circuits & Waveforms

$$EAS = 1/2*L*IAS^2$$
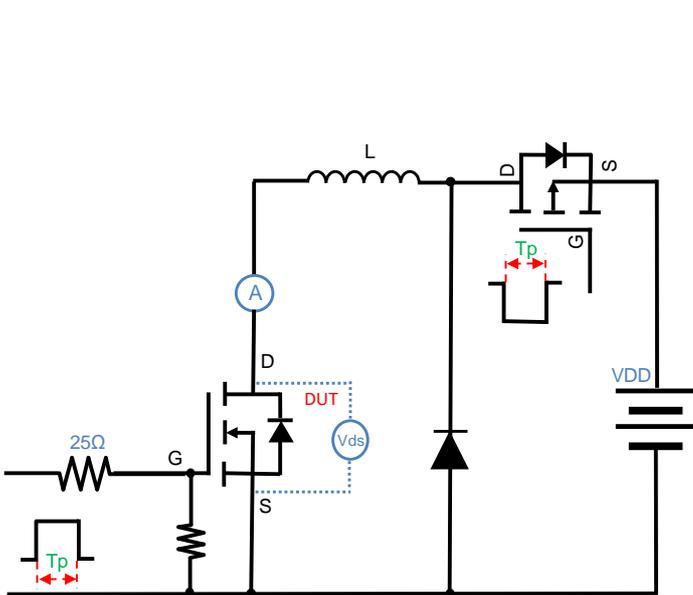

Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform
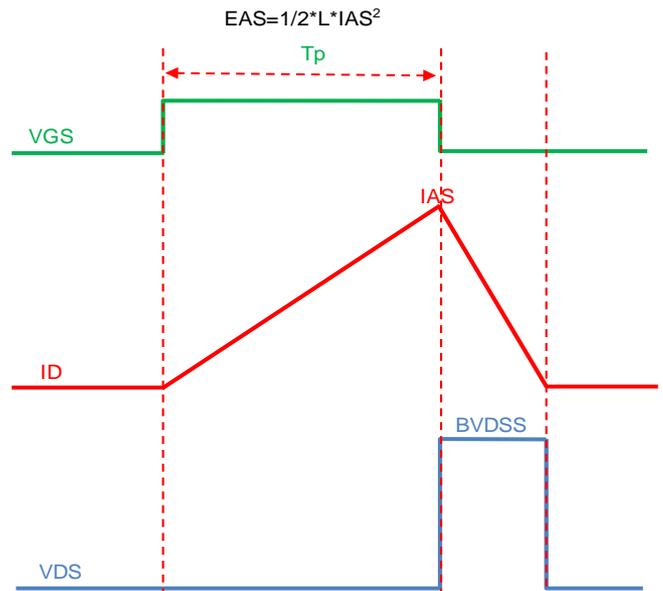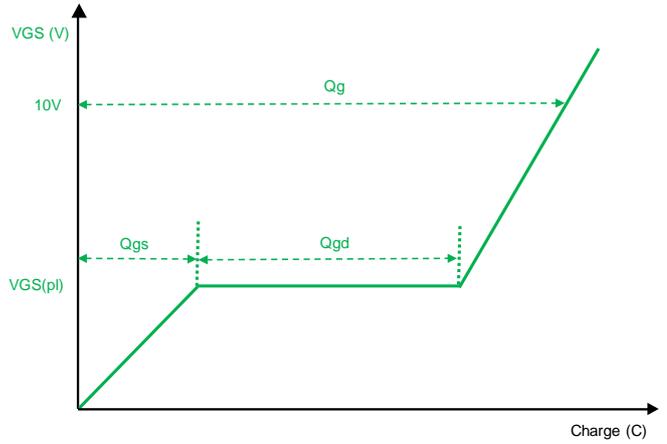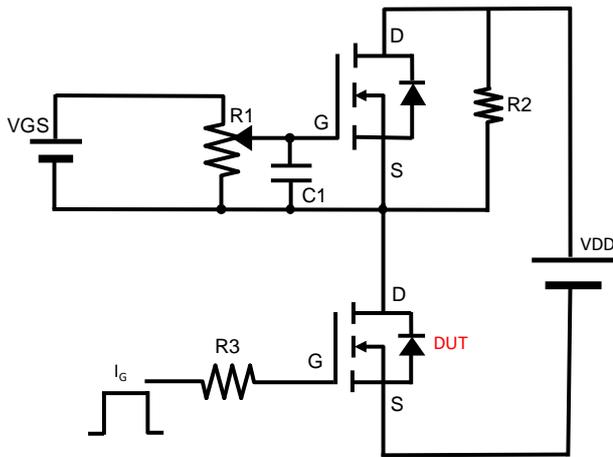
Figure B. Gate Charge Test Circuit & Waveform
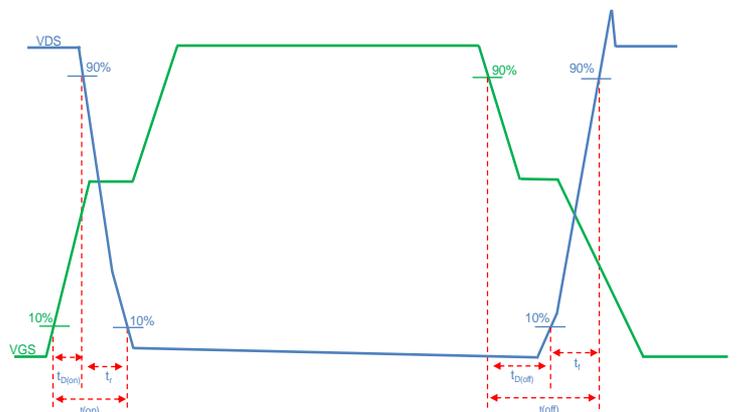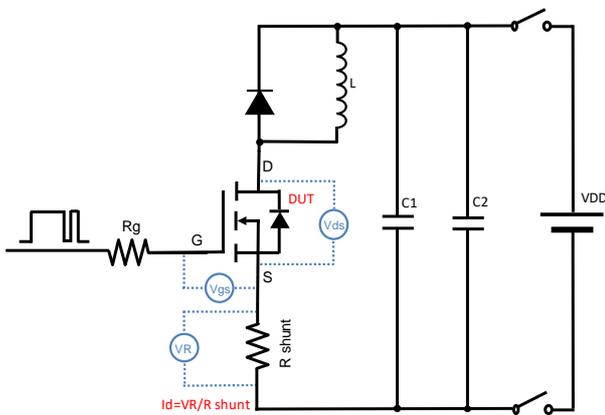
Figure C. Resistive Switching Test Circuit & Waveform
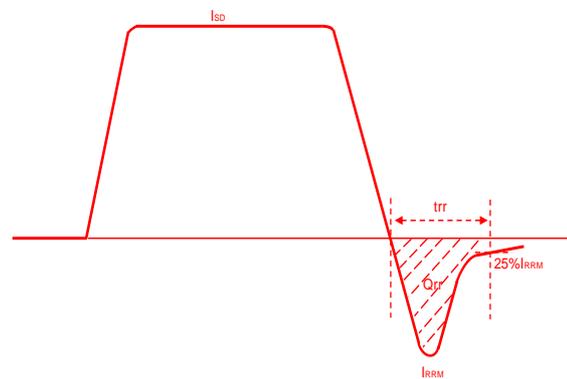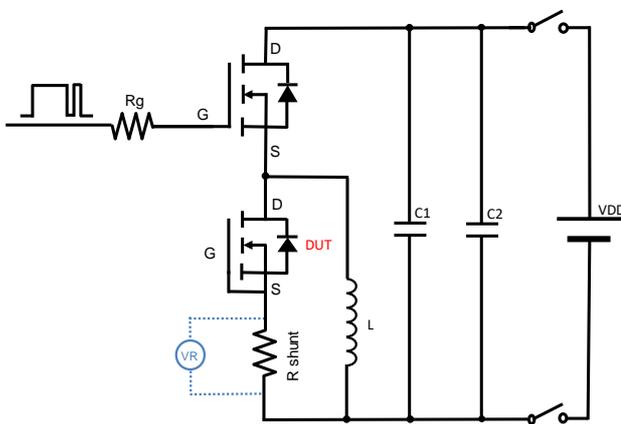
Figure D. Diode Recovery Test Circuit & Waveform

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Package Information:TO-252-3L
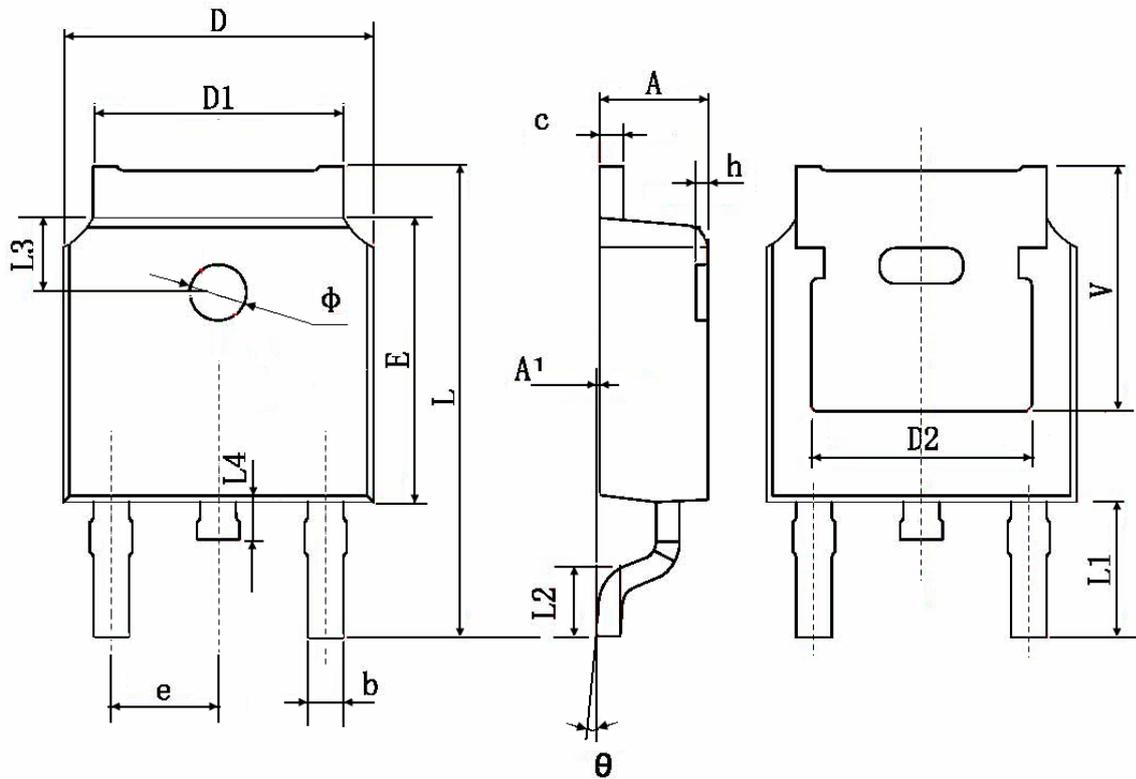
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	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
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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