



**TM80N03D**

**N-Channel Enhancement Mosfet**

**General Description**

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

**Applications**

- Load switch
- PWM

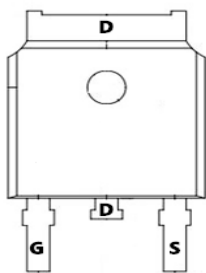
**General Features**

$V_{DS} = 30V$   $I_D = 80A$

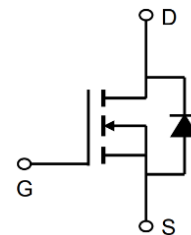
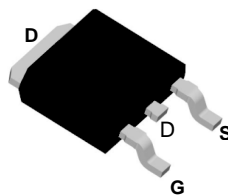
$R_{DS(ON)} = 5.0m\Omega$ (typ.) @  $V_{GS} = 10V$

100% UIS Tested

100%  $R_g$  Tested



D:TO-252-3L



Marking: 80N03

**Absolute Maximum Ratings (TC=25°C unless otherwise noted)**

Symbol	Parameter	Rating		Units
		10s	Steady State	
$V_{DS}$	Drain-Source Voltage	30		V
$V_{GS}$	Gate-Source Voltage	$\pm 20$		V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	80		A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	50		A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	192		A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	306		mJ
$I_{AS}$	Avalanche Current	53.8		
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	82.5		W
$T_{STG}$	Storage Temperature Range	-55 to 175		°C
$T_J$	Operating Junction Temperature Range	-55 to 175		°C

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	0.56	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	---	1.8	°C/W



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## Electrical Characteristics (T<sub>c</sub>=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.5	3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	-	5.0	6.9	mΩ
		V <sub>GS</sub> =5V, I <sub>D</sub> =24A	-	7.0	10	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =24A	20	-	-	S
<b>Dynamic Characteristics</b> (Note4)						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1.0MHz	-	2016	-	PF
Output Capacitance	C <sub>OSS</sub>		-	251	-	PF
Reverse Transfer Capacitance	C <sub>RSS</sub>		-	230	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =10V, I <sub>D</sub> =30A V <sub>GS</sub> =10V, R <sub>GEN</sub> =2.7Ω	-	20	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	15	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	60	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	10	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =30A, V <sub>GS</sub> =10V	-	60.5	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	8.1	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	7.8	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =24A	-	-	1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		-	-	80	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = 80A	-	32	50	nS
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100A/μs (Note3)	-	12	20	nC
Forward Turn-On Time	t <sub>on</sub>	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

### Notes:

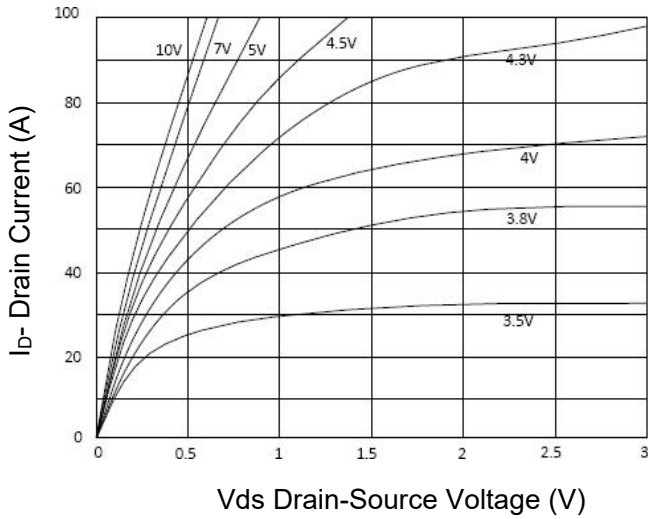
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=15V, V<sub>G</sub>=10V, L=0.5mH, R<sub>g</sub>=25Ω, I<sub>AS</sub>=35A



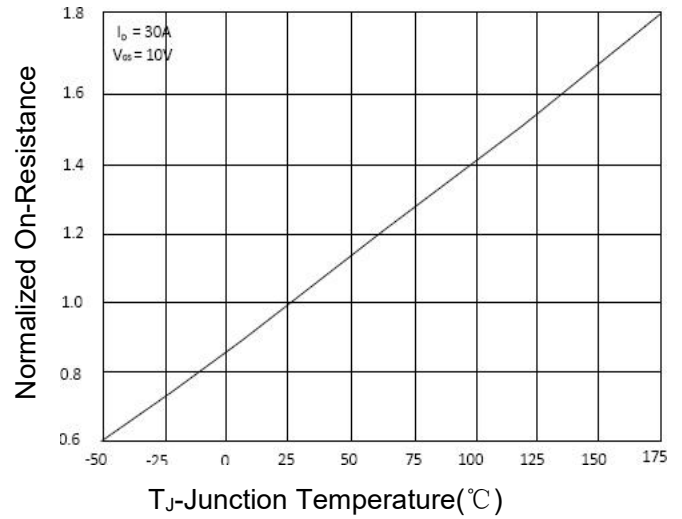
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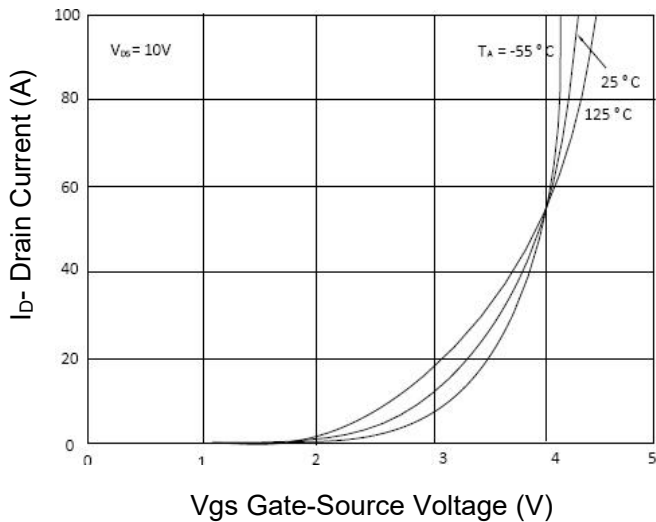
Typical Performance Characteristics



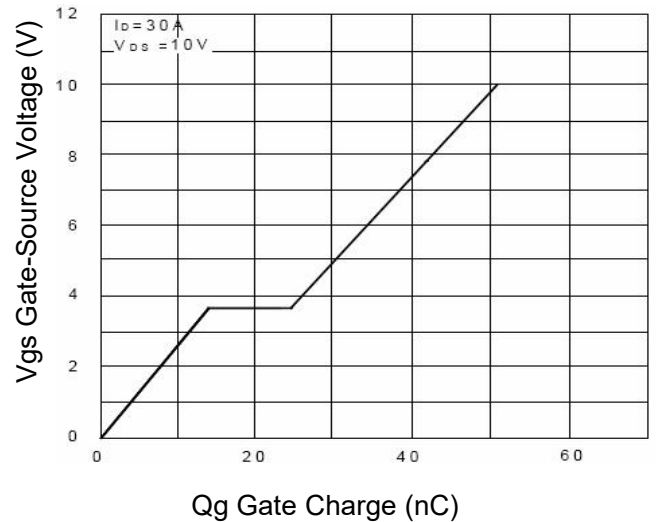
Vds Drain-Source Voltage (V)  
**Figure 1 Output Characteristics**



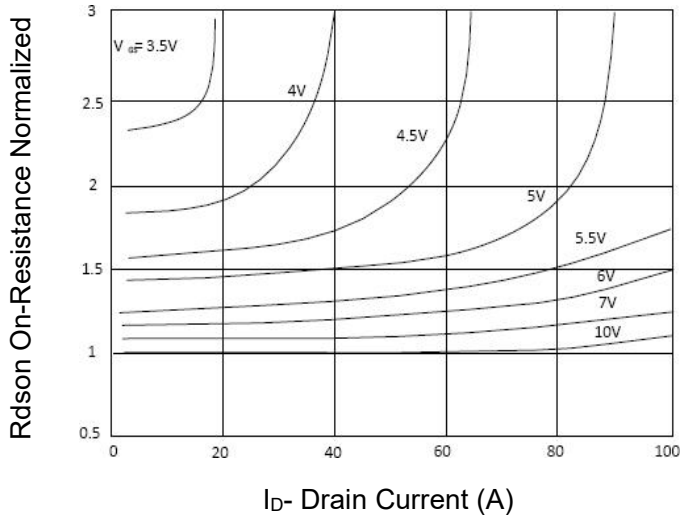
Tj-Junction Temperature(°C)  
**Figure 4 Rdson-Junction Temperature**



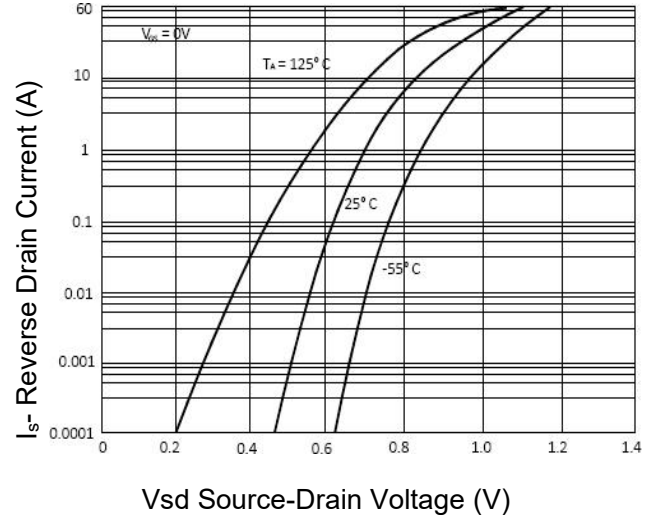
Vgs Gate-Source Voltage (V)  
**Figure 2 Transfer Characteristics**



Qg Gate Charge (nC)  
**Figure 5 Gate Charge**



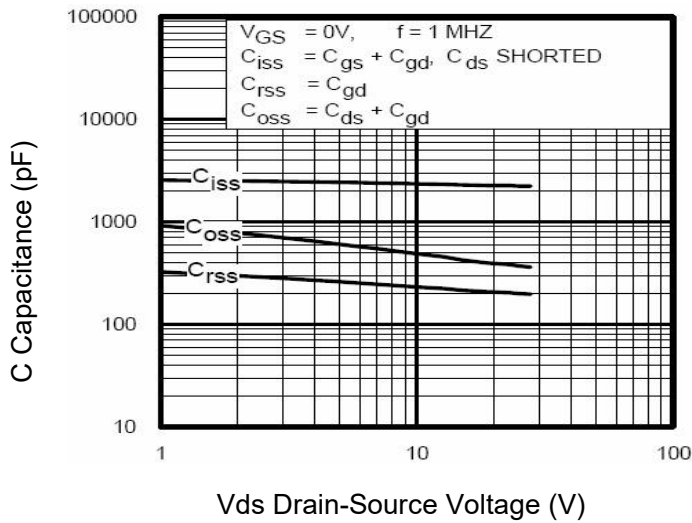
Id- Drain Current (A)  
**Figure 3 Rdson- Drain Current**



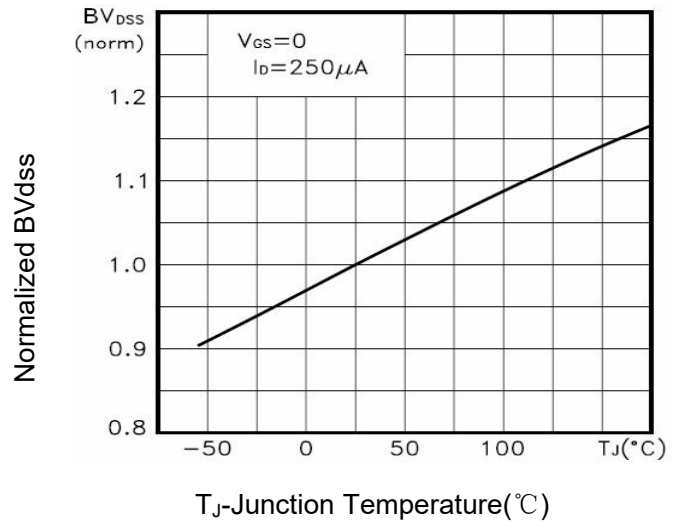
Vsd Source-Drain Voltage (V)  
**Figure 6 Source- Drain Diode Forward**

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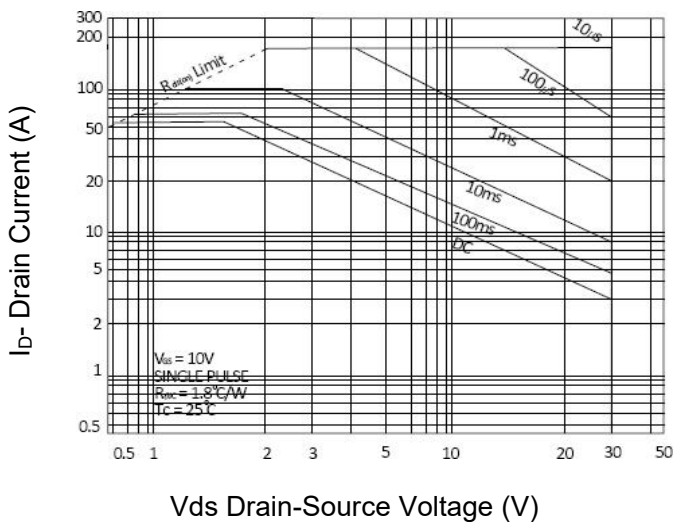
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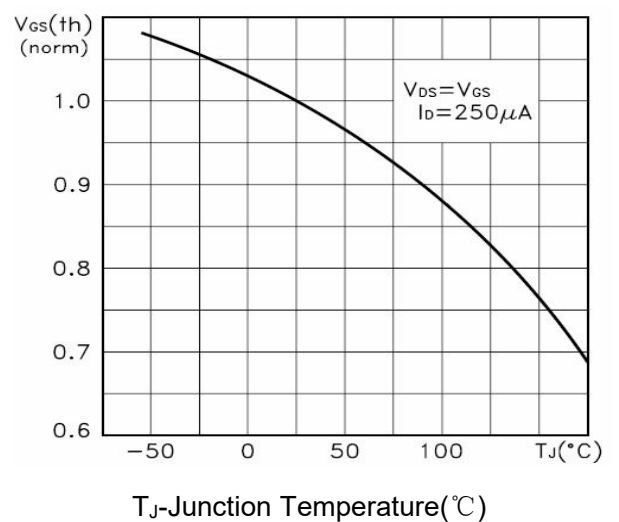
Vds Drain-Source Voltage (V)  
**Figure 7 Capacitance vs Vds**



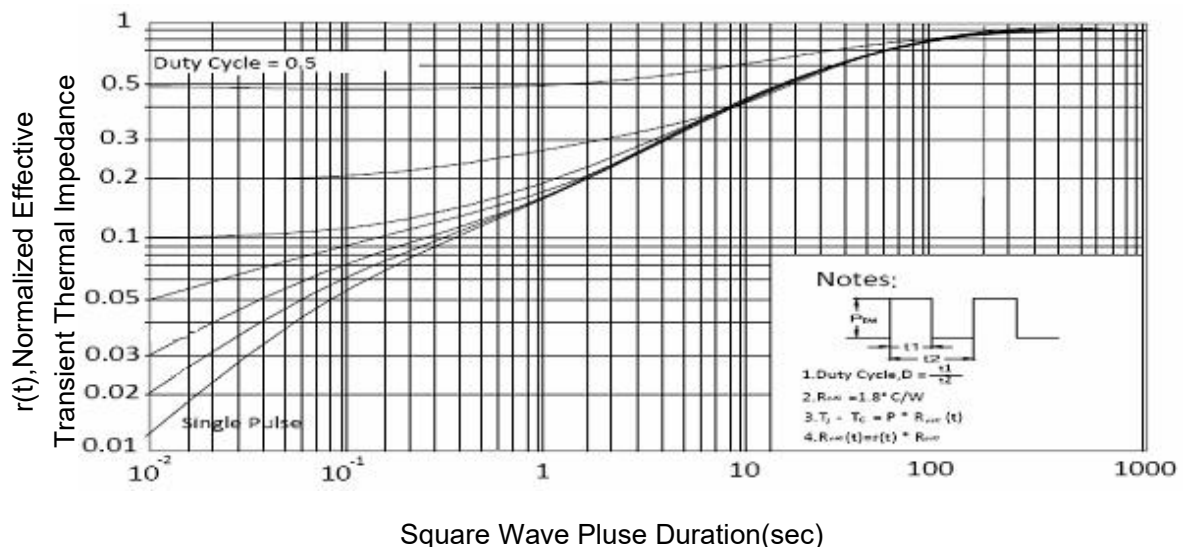
T<sub>J</sub>-Junction Temperature( $^{\circ}C$ )  
**Figure 9  $BV_{DSS}$  vs Junction Temperature**



Vds Drain-Source Voltage (V)  
**Figure 8 Safe Operation Area**



T<sub>J</sub>-Junction Temperature( $^{\circ}C$ )  
**Figure 10  $V_{GS(th)}$  vs Junction Temperature**



Square Wave Pulse Duration(sec)  
**Figure 11 Normalized Maximum Transient Thermal Impedance**

TM80N03D

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Test Circuit

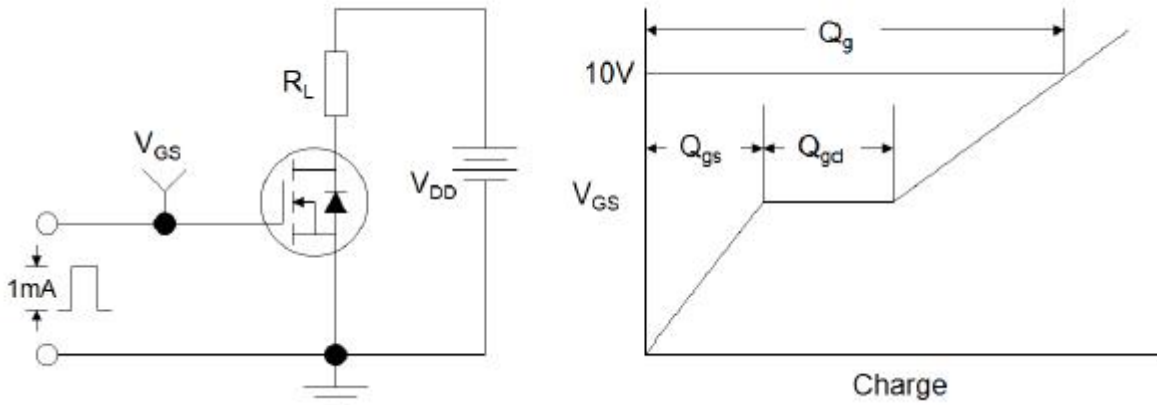


Figure1:Gate Charge Test Circuit & Waveform

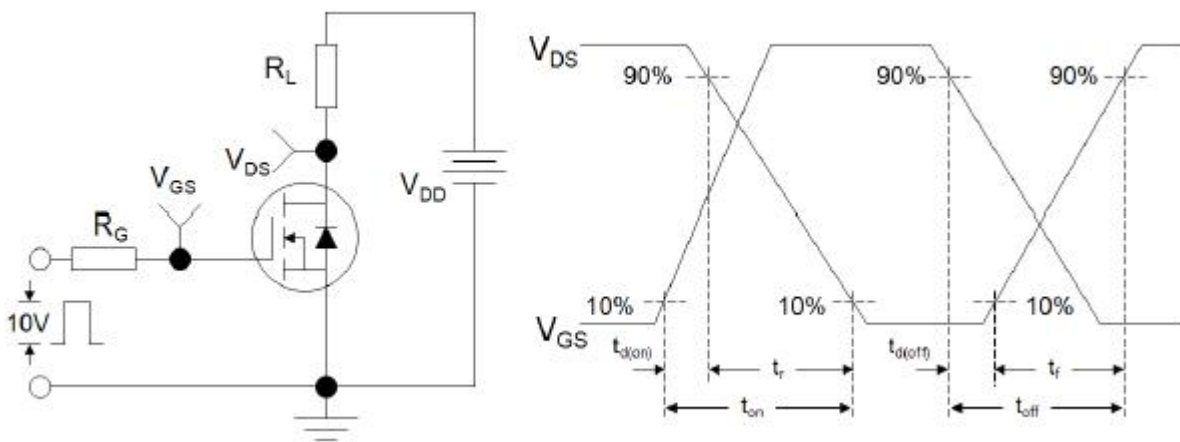


Figure 2: Resistive Switching Test Circuit & Waveforms

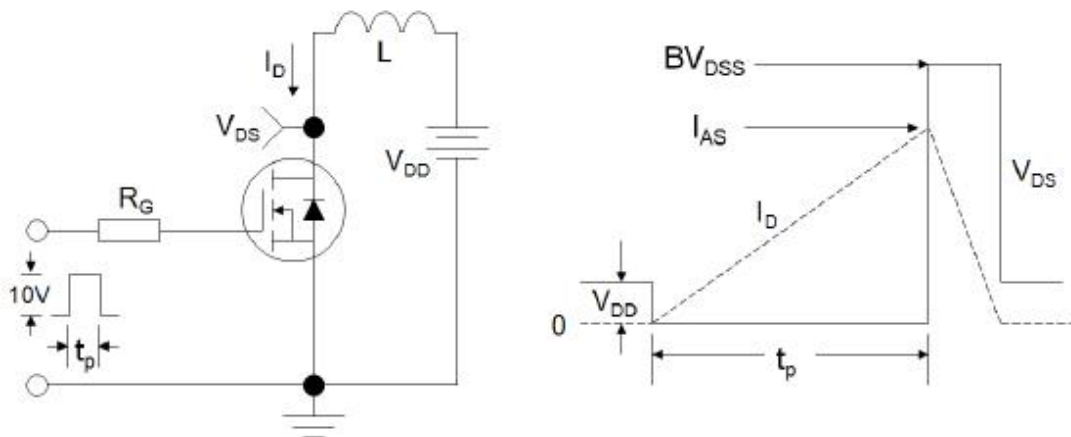
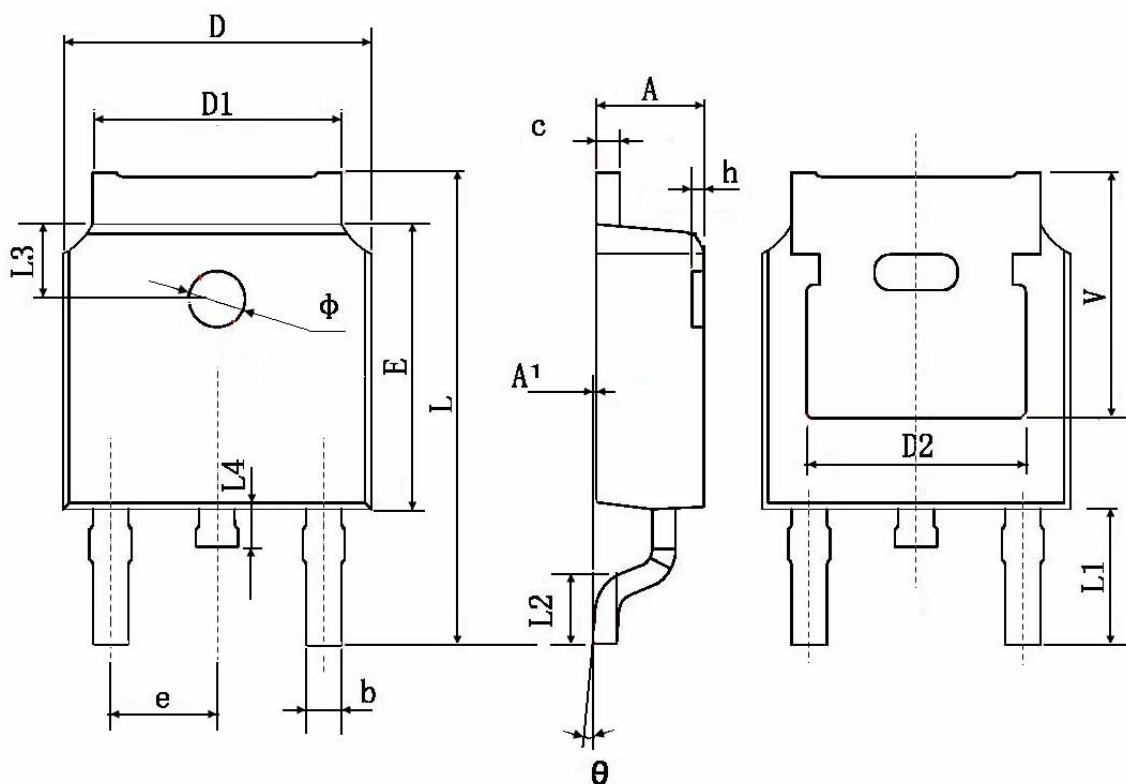


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

## 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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