

**TM30N03D**
**N-Channel Enhancement Mosfet**
**General Description**

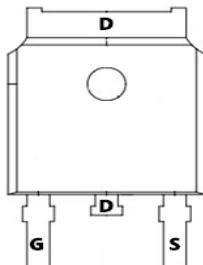
- Low  $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

**Applications**

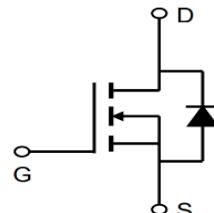
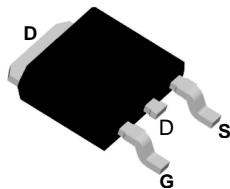
- Load switch
- PWM

**General Features**
 $V_{DS} = 30V$   $I_D = 30A$ 
 $R_{DS(ON)} = 9.5m\Omega$  (Typ.) @  $V_{GS} = 10V$ 

100% UIS Tested

100%  $R_g$  Tested

D:TO-252-3L



Marking: 30N03

**Absolute Maximum Ratings ( $T_c=25^\circ C$  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, $V_{GS} @ 10V^1$	30		A
$I_D @ T_c = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	18		A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	38		A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	28		mJ
$I_{AS}$	Avalanche Current	13.8		A
$P_D @ T_c = 25^\circ C$	Total Power Dissipation <sup>4</sup>	5.5		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>	---	36	°C/W

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}$ , $I_D=250\mu\text{A}$	30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}$ , $V_{GS} = 0\text{V}$ ,	-	-	1.0	$\mu\text{A}$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0\text{V}$ , $V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	1.0	1.5	2.5	V
$R_{DS(\text{on})}$ note3	Static Drain-Source on-Resistance	$V_{GS}=10\text{V}$ , $I_D=5\text{A}$	-	9.5	15	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$ , $I_D=3\text{A}$	-	16	19	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=15\text{V}$ , $V_{GS}=0\text{V}$ , $f=1.0\text{MHz}$	-	490	-	pF
$C_{oss}$	Output Capacitance		-	79	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	61	-	pF
$Q_g$	Total Gate Charge	$V_{DS}=15\text{V}$ , $I_D=5.8\text{A}$ , $V_{GS}=10\text{V}$	-	10	-	nC
$Q_{gs}$	Gate-Source Charge		-	1.7	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	2.5	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=15\text{V}$ , $I_D=3\text{A}$ , $V_{GS}=10\text{V}$ , $R_{REN} = 3\Omega$	-	6	-	ns
$t_r$	Turn-on Rise Time		-	15	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	17	-	ns
$t_f$	Turn-off Fall Time		-	17	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_s$	Maximum Continuous Drain to Source Diode Forward Current	-	-	30	A	
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current	-	-	36	A	
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS}=0\text{V}$ , $I_s=9\text{A}$	-	-	1.2	V
$trr$	Body Diode Reverse Recovery Time	$I_F=5\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$	-	7	-	ns
$Qrr$	Body Diode Reverse Recovery Charge		-	2	-	nC

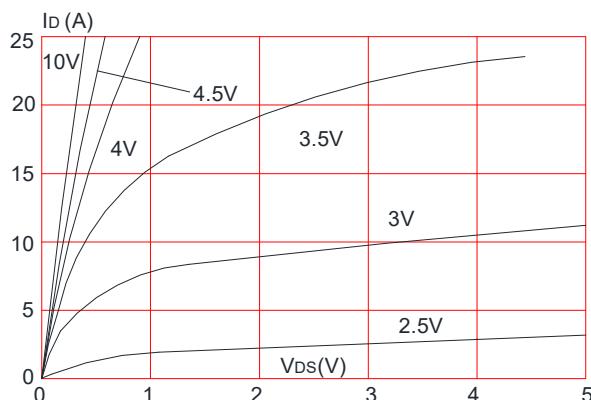
Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

 2. EAS condition :  $T_J=25^\circ\text{C}$ ,  $V_{DD}=15\text{V}$ ,  $V_G=10\text{V}$ ,  $L=0.5\text{mH}$ ,  $R_g=25\Omega$ ,  $I_{AS}=6\text{A}$ 

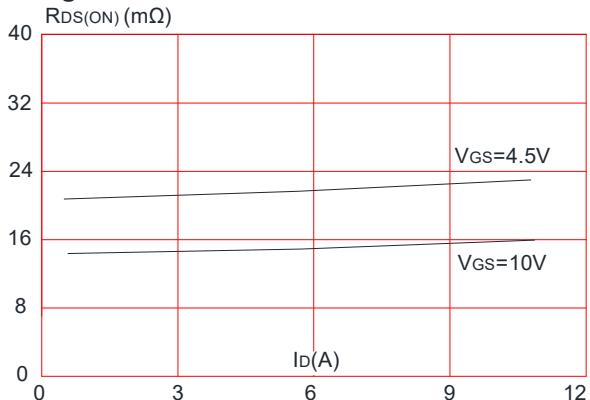
 3. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$

## Typical Performance Characteristics

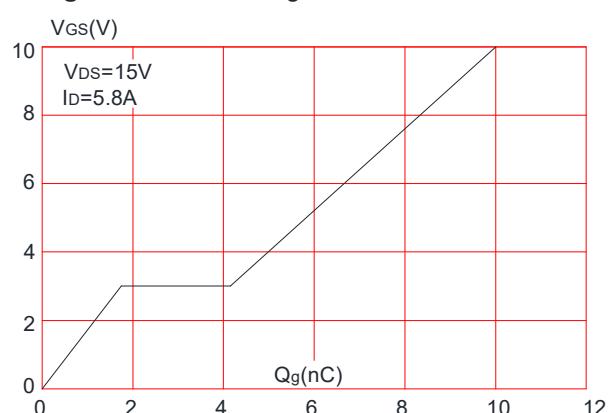
**Figure 1:** Output Characteristics



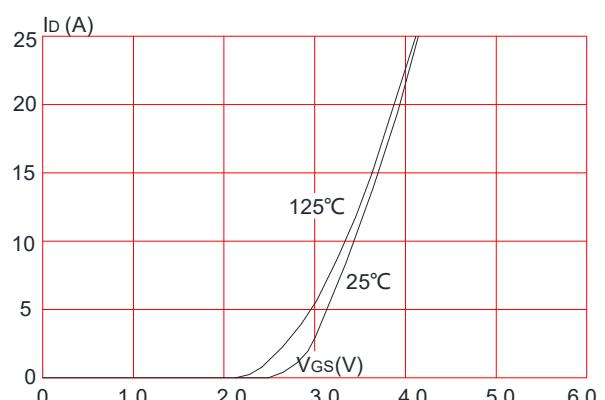
**Figure 3:** On-resistance vs. Drain Current



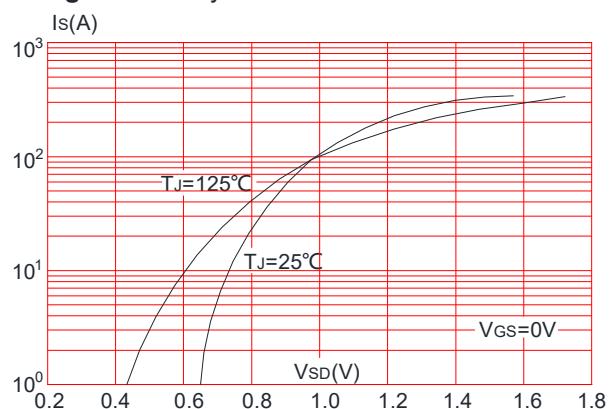
**Figure 5:** Gate Charge Characteristics



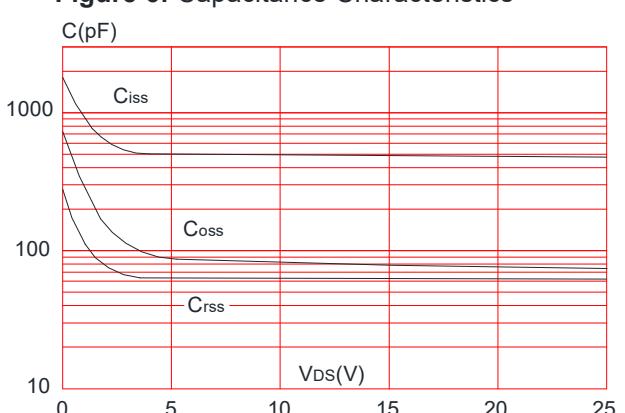
**Figure 2:** Typical Transfer Characteristics



**Figure 4:** Body Diode Characteristics



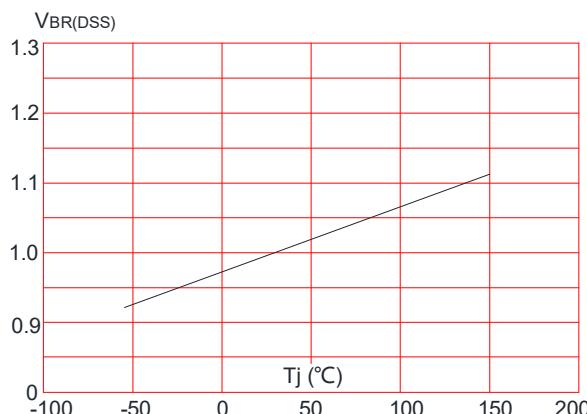
**Figure 6:** Capacitance Characteristics



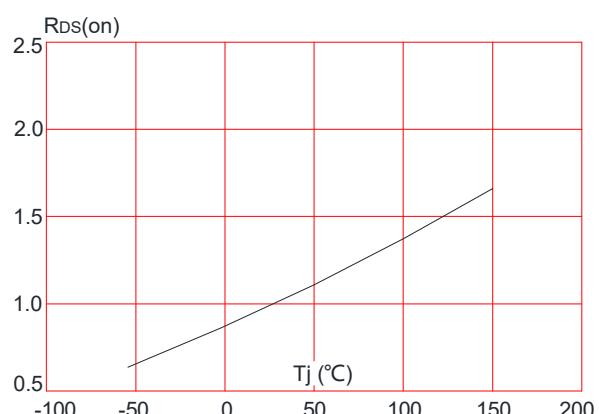
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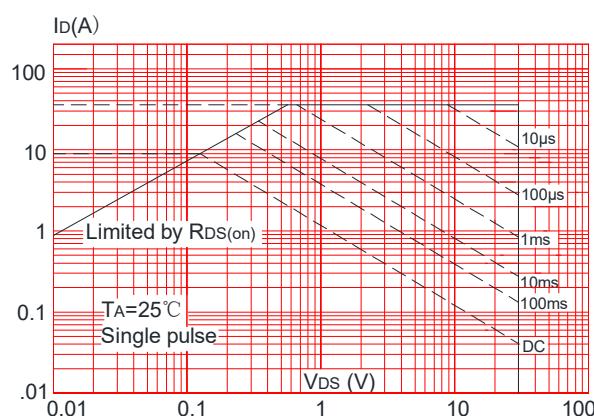
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



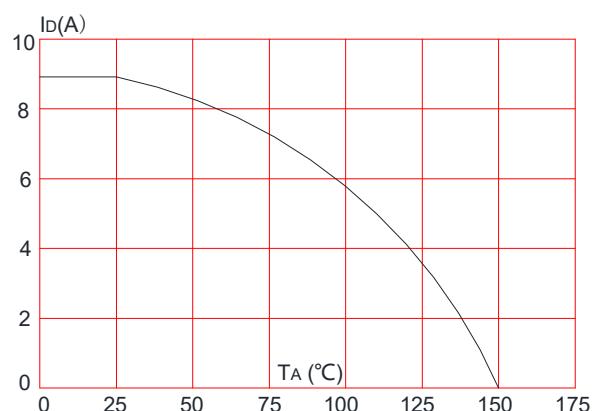
**Figure 8:** Normalized on Resistance vs. Junction Temperature



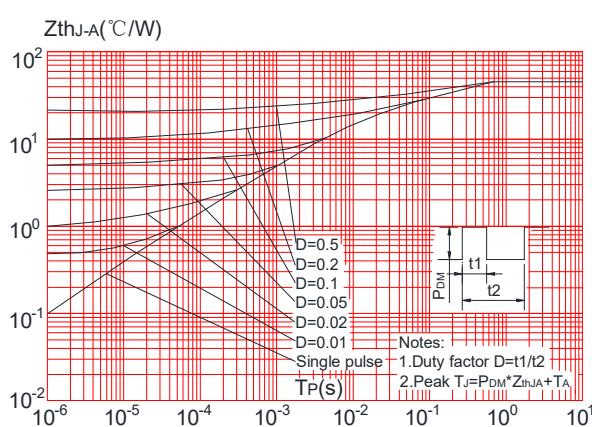
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature



**Figure 11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



## Test Circuit

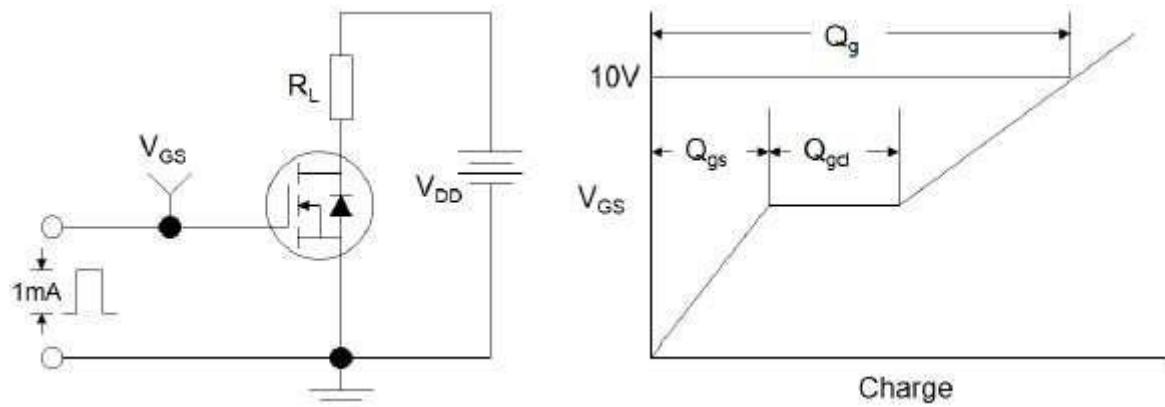


Figure1:Gate Charge Test Circuit & Waveform

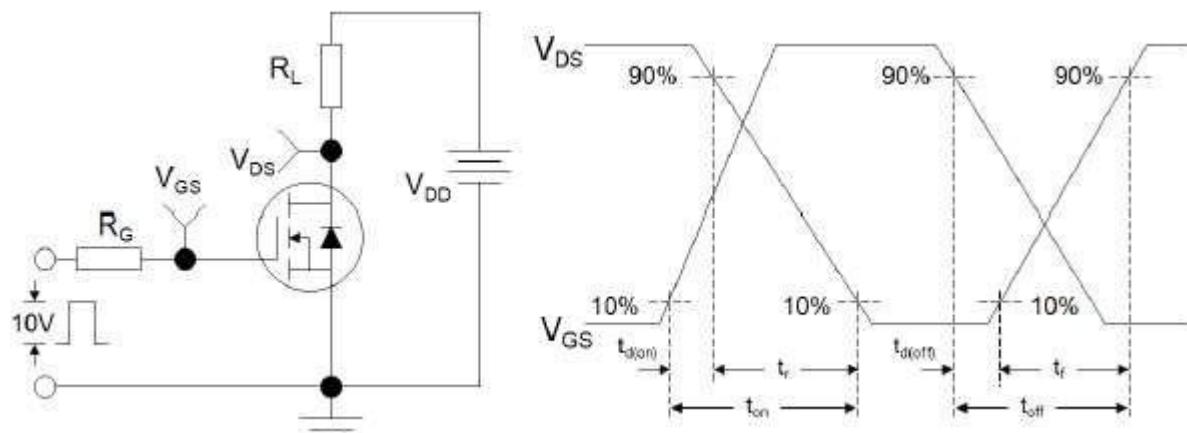


Figure 2: Resistive Switching Test Circuit & Waveforms

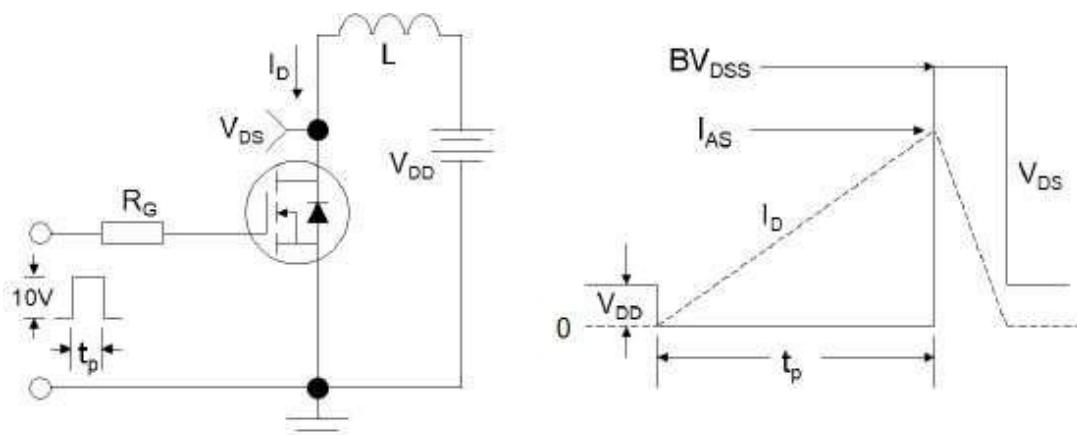
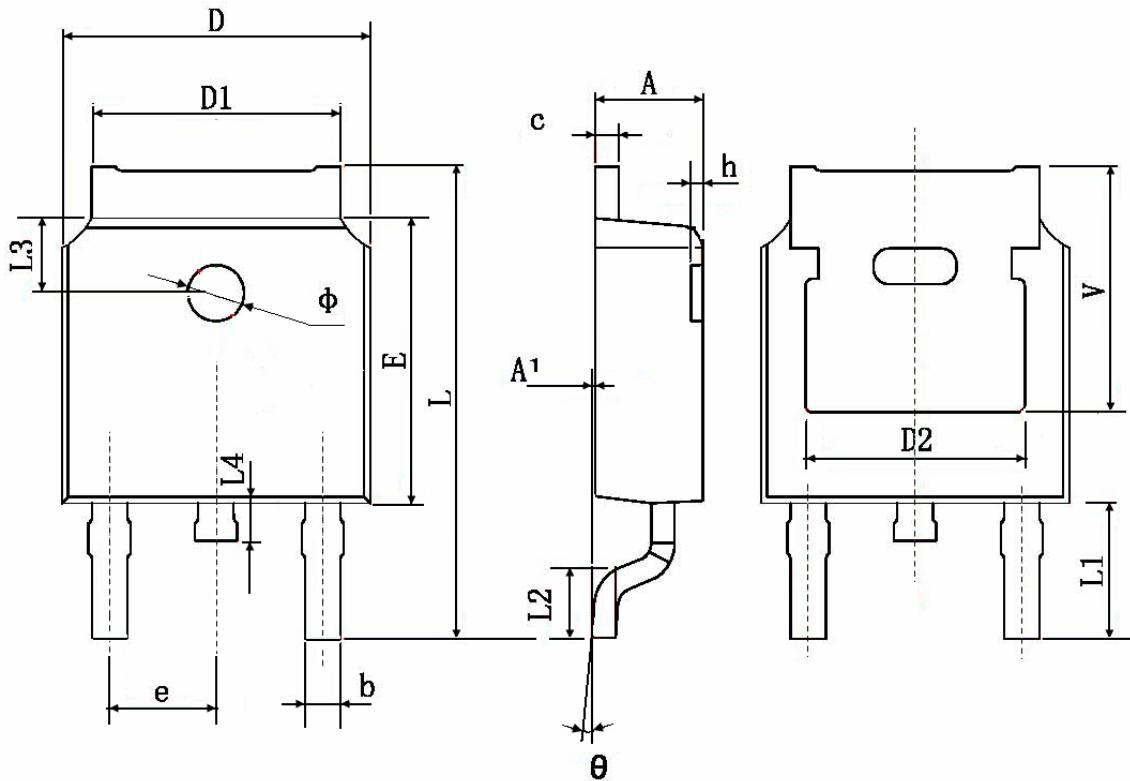


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

## 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.	