

## Description

### JMT N-channel Enhancement Mode Power MOSFET

#### Features

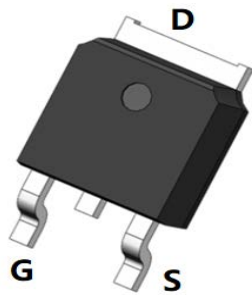
- 20V, 90A
- $R_{DS(ON)} < 3.6m\Omega @ V_{GS} = 4.5V$
- $R_{DS(ON)} < 4.9m\Omega @ V_{GS} = 2.5V$
- Lead free and Green Device Available
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead Free

#### Applications

- Load Switch
- PWM Application
- Power Management



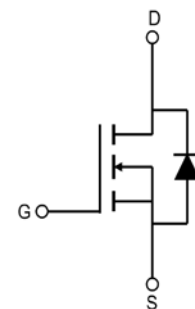
*100% UIS TESTED!*  
*100% ΔVds TESTED!*



TO-252-3L Top



Marking and Pin Assignment



Schematic Diagram

### Package Marking and Ordering Information

Device Marking	Device	Outline	Package	Reel Size	Reel(pcs)	Per Carton (pcs)
JMTK90N02A	JMTK90N02A	TAPING	TO-252-3L	13"	2500	25000

### Absolute Maximum Ratings (@ $T_C = 25^\circ C$ unless otherwise specified)

Symbol	Parameter	Value	Units
$V_{DS}$	Drain-to-Source Voltage	20	V
$V_{GS}$	Gate-to-Source Voltage	±12	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ C$	90
		$T_C = 100^\circ C$	57
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	360	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>note2</sup>	156	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ C$	54
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>(2)</sup>	32	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case <sup>(3)</sup>	2.32	°C/W
$T_J, T_{STG}$	Junction & Storage Temperature Range	-55 to 150	°C



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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	20	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V	-	-	1.0	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±12V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	0.5	0.8	1.0	V
R <sub>DS(ON)</sub>	Static Drain-Source ON-Resistance <sup>(4)</sup>	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 30A	-	2.8	3.6	mΩ
		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 20A	-	3.8	4.9	mΩ
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 10V, f = 1MHz	-	3476	-	pF
C <sub>oss</sub>	Output Capacitance		-	528	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	464	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 0 to 8V V <sub>DS</sub> = 10V, I <sub>D</sub> = 30A	-	65	-	nC
Q <sub>gs</sub>	Gate Source Charge		-	8	-	nC
Q <sub>gd</sub>	Gate Drain("Miller") Charge		-	12	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 10V I <sub>D</sub> = 30A, R <sub>GEN</sub> = 3Ω	-	8	-	ns
t <sub>r</sub>	Turn-On Rise Time		-	19	-	ns
t <sub>d(off)</sub>	Turn-Off DelayTime		-	73	-	ns
t <sub>f</sub>	Turn-Off Fall Time		-	80	-	ns
<b>Drain-Source Diode Characteristics and Max Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	90	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	360	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 30A	-	-	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 20A, di/dt = 100A/μs	-	16	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	5.6	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2. E<sub>AS</sub> condition: Starting T<sub>J</sub> = 25°C, V<sub>DD</sub> = 10V, V<sub>G</sub> = 10V, R<sub>G</sub> = 25Ω, L = 0.5mH, I<sub>AS</sub> = 25A .
  3. R<sub>θJA</sub> is measured with the device mounted on a 1inch<sup>2</sup> pad of 2oz copper FR4 PCB
  4. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%.

## Typical Performance Characteristics

Figure 1: Output Characteristics

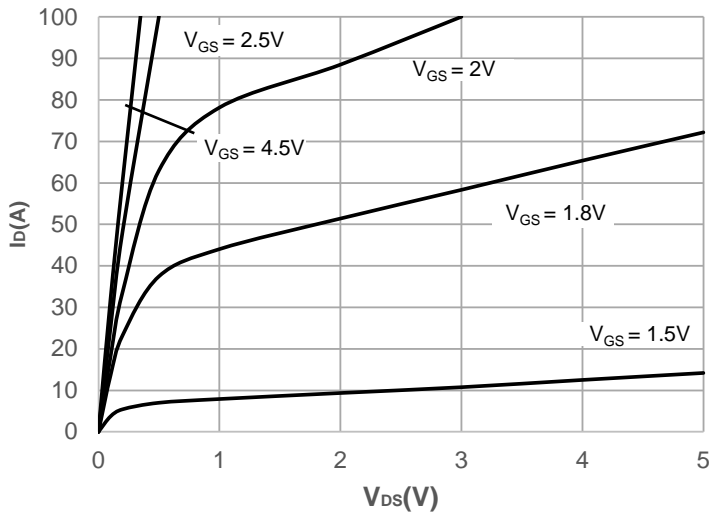


Figure 2: Typical Transfer Characteristics

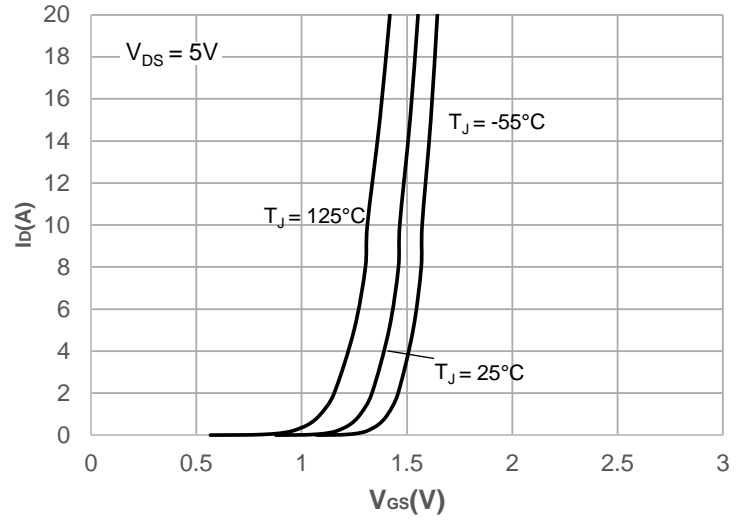


Figure 3: On-resistance vs. Drain Current

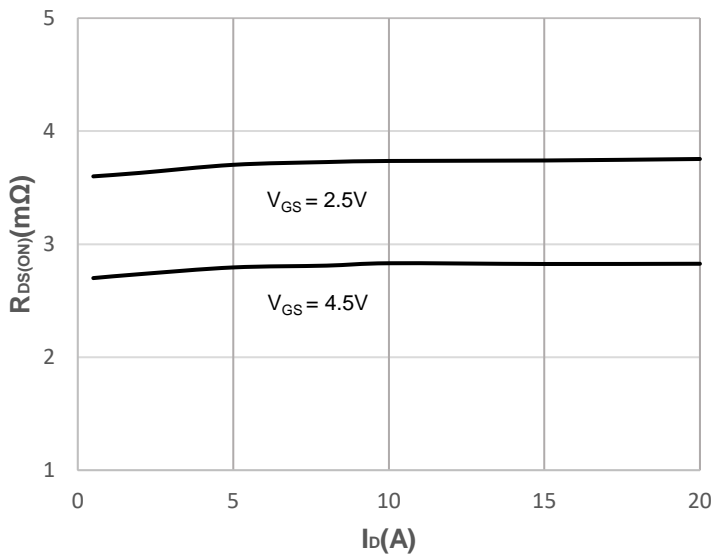


Figure 4: Body Diode Characteristics

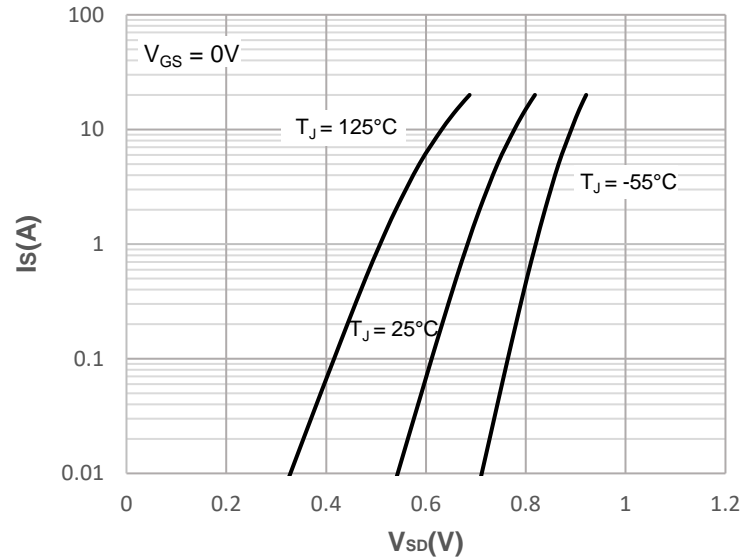


Figure 5: Gate Charge Characteristics

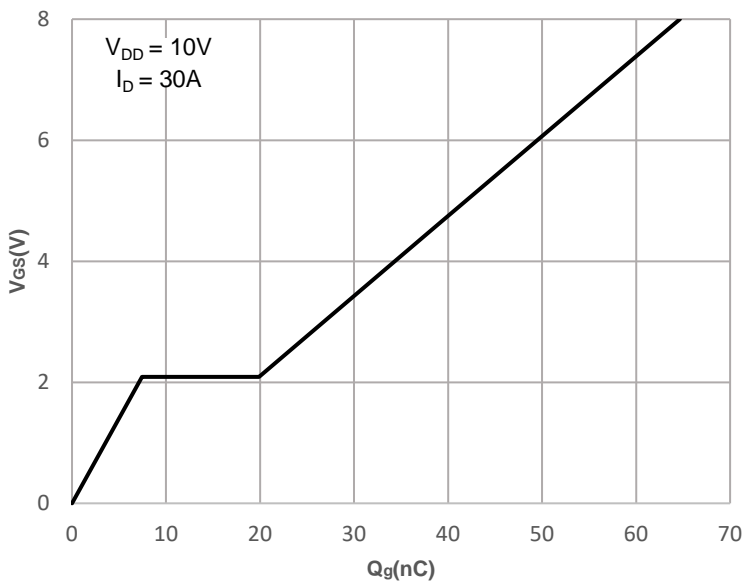
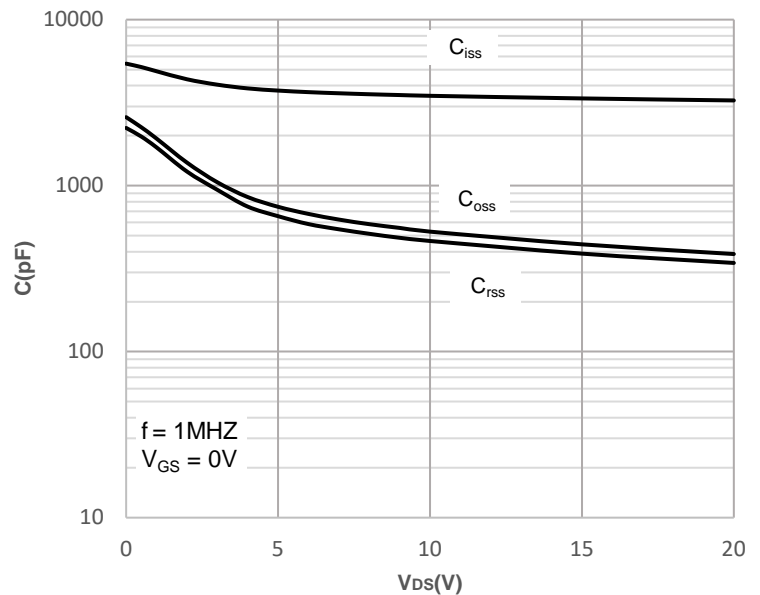


Figure 6: Capacitance Characteristics



## Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

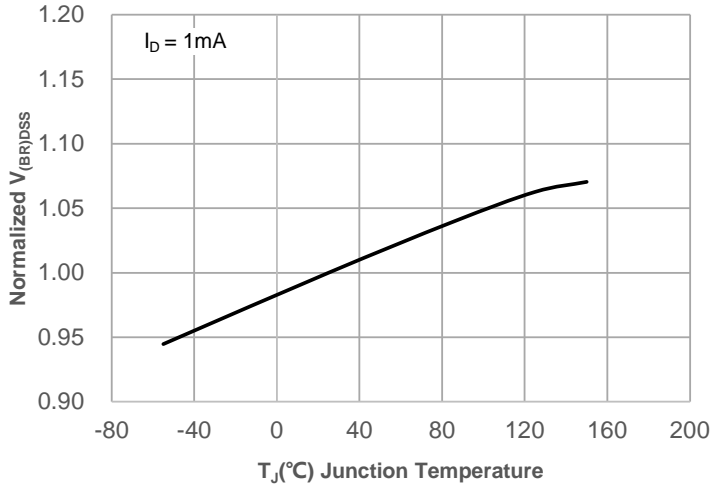


Figure 8: Normalized on Resistance vs. Junction Temperature

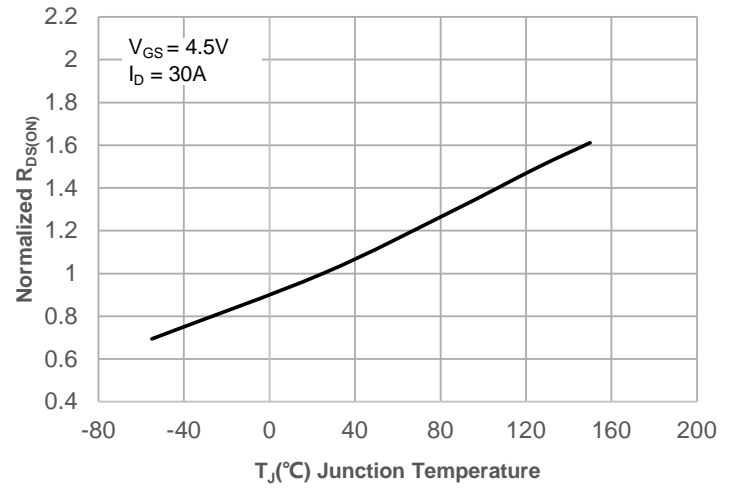


Figure 9: Maximum Safe Operating Area

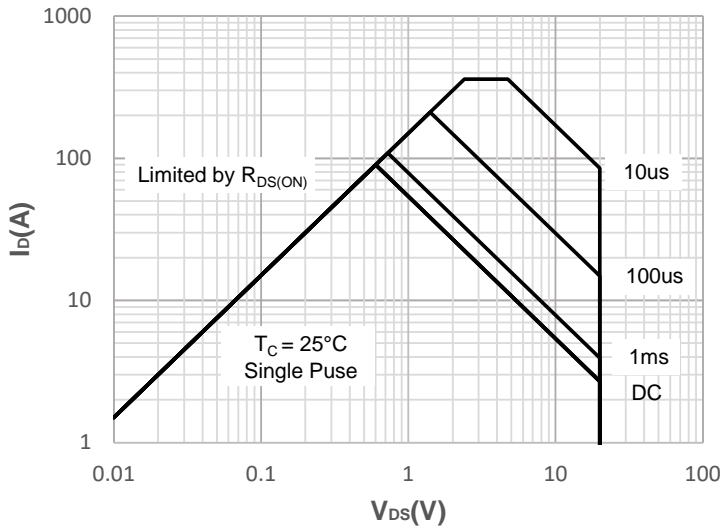


Figure 10: Maximum Continuous Driand Current vs. Case Temperature

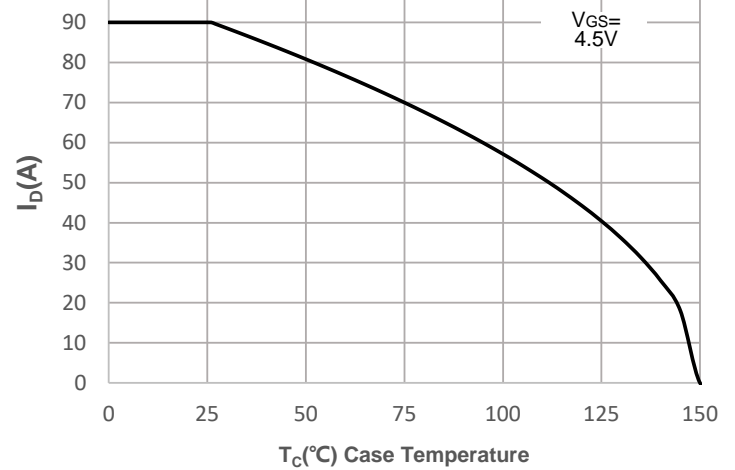


Figure 11: Normalized Maximum Transient Thermal Impedance

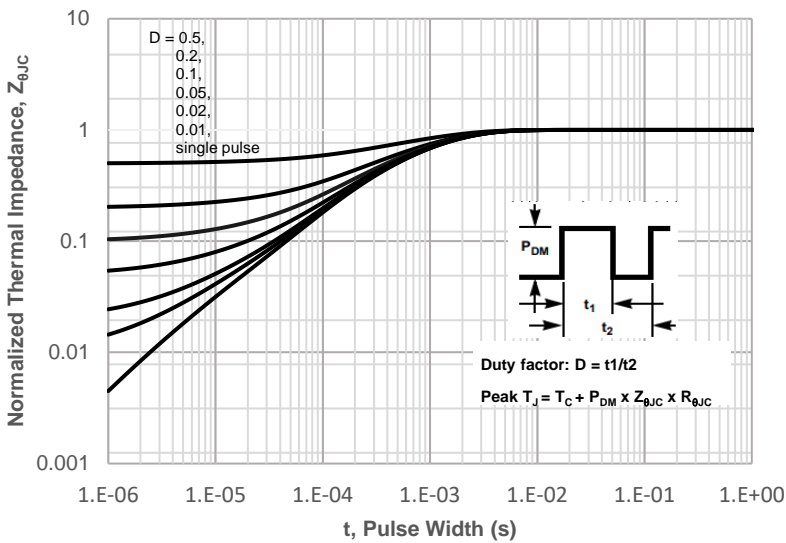
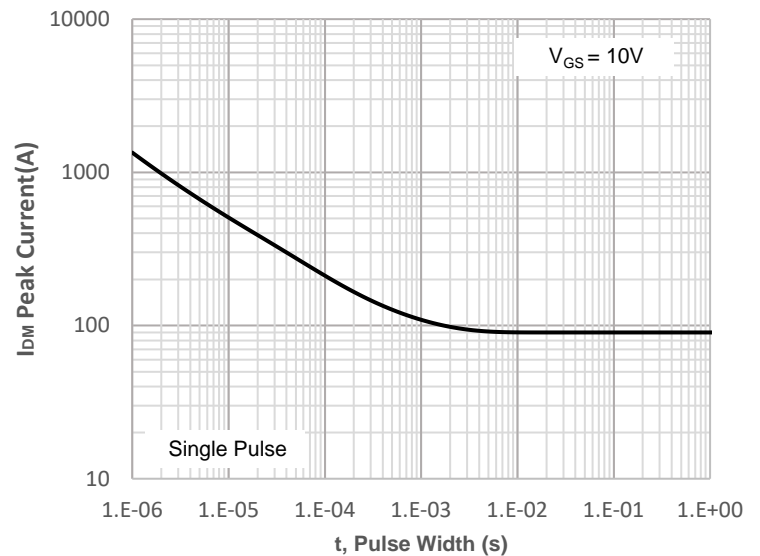


Figure 12: Peak Current Capacity



## Test Circuit

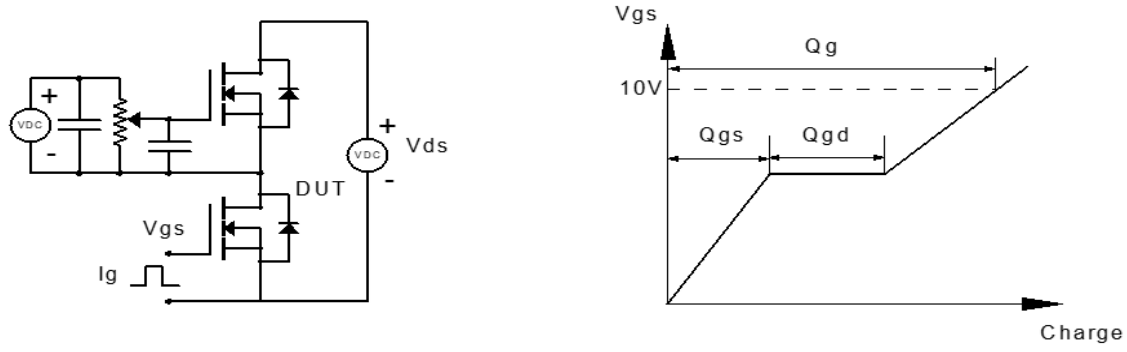


Figure 1: Gate Charge Test Circuit & Waveform

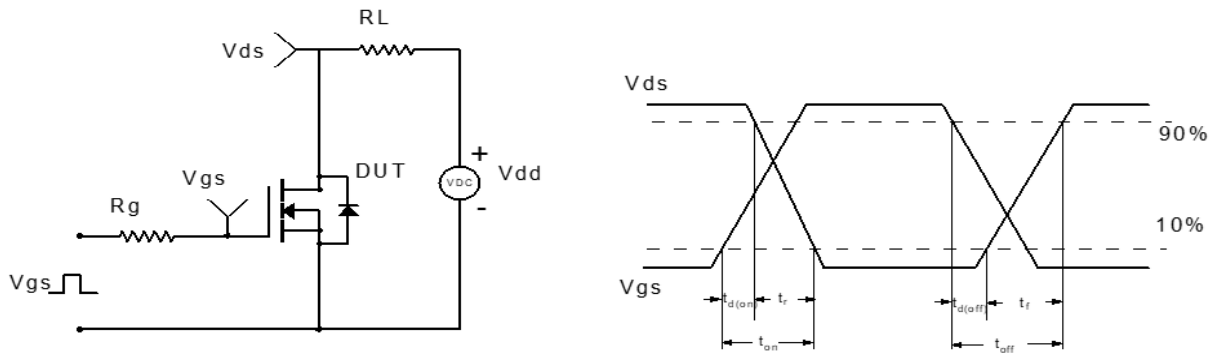


Figure 2: Resistive Switching Test Circuit & Waveform

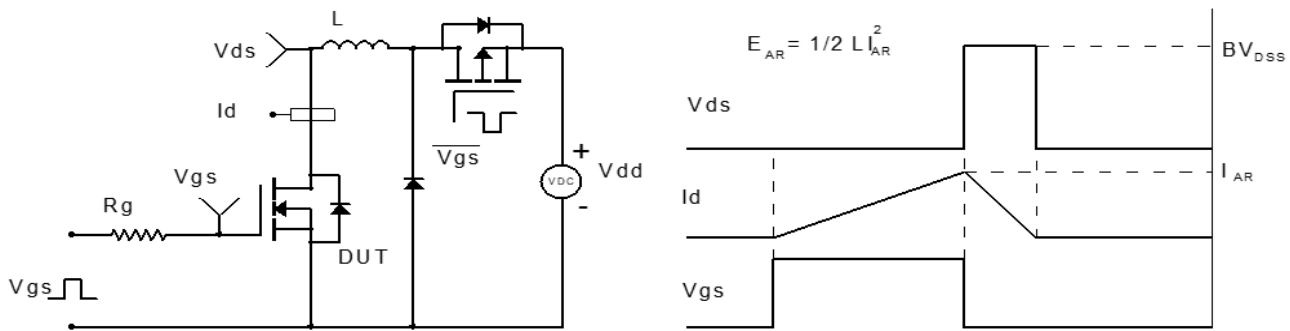


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

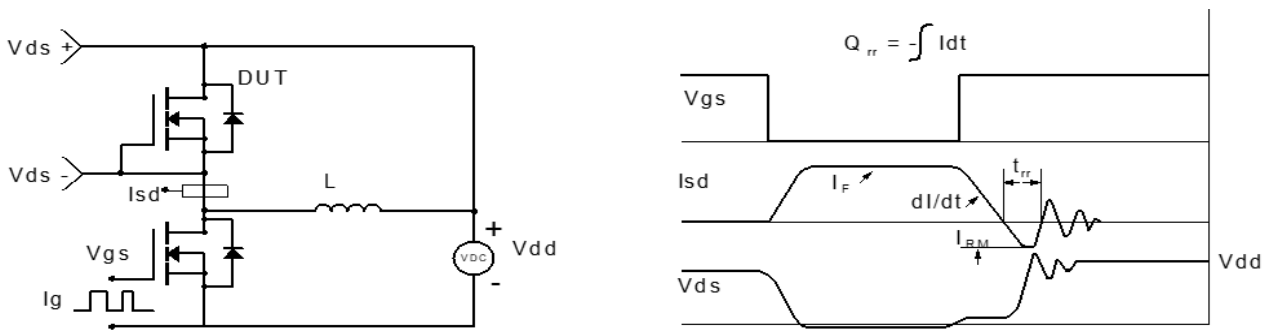
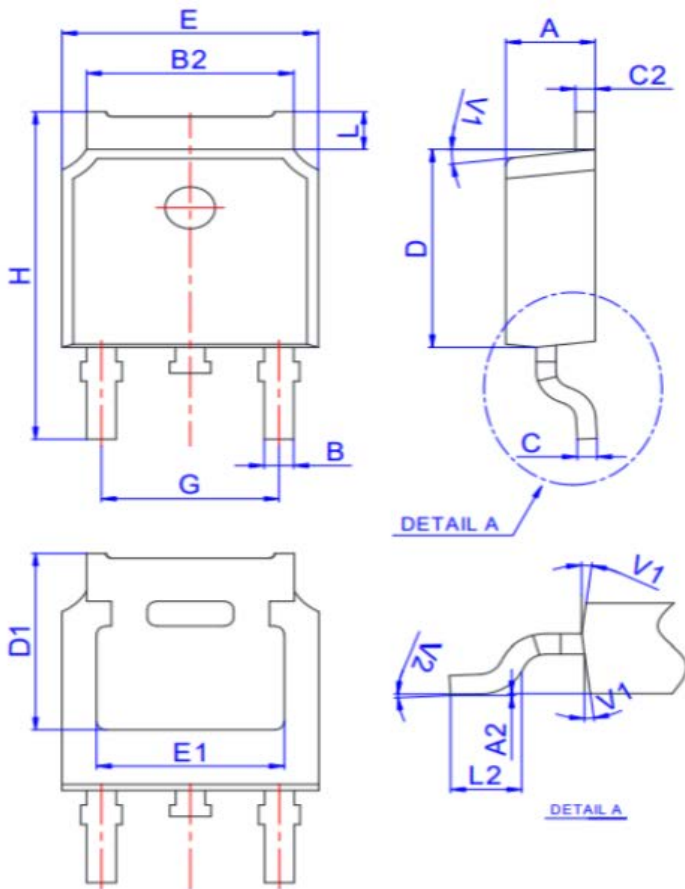


Figure 4: Diode Recovery Test Circuit & Waveform

## Package Mechanical Data(TO-252-3L)



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°

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