

## Description

### JMT N-channel Enhancement Mode Power MOSFET

#### Features

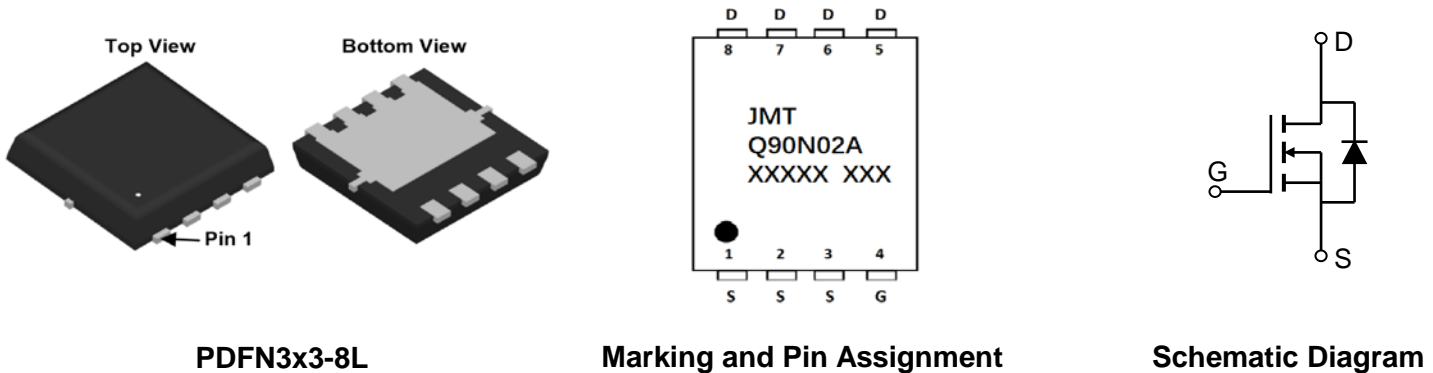
- 20V, 60A
- $R_{DS(ON)} < 3.9m\Omega @ V_{GS} = 4.5V$
- $R_{DS(ON)} < 4.9m\Omega @ V_{GS} = 2.5V$
- Advanced Trench Technology
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead Free

#### Applications

- Load Switch
- PWM Application
- Power Management



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



PDFN3x3-8L

Marking and Pin Assignment

Schematic Diagram

### Package Marking and Ordering Information

Device Marking	Device	Outline	Package	Reel Size	Reel(pcs)	Per Carton (pcs)
JMTQ90N02A	JMTQ90N02A	TAPING	PDFN3x3-8L	13"	5000	50000

### 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	$T_C = 25^\circ C$	60
		$T_C = 100^\circ C$	38
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	240	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(2)</sup>	121	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ C$	39
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>(3)</sup>	40	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.2	
$T_J, T_{STG}$	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	-	3.0	3.9	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		-	-	60	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	240	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>	Body Diode Reverse Recovery Time	I <sub>F</sub> = 20A, di/dt = 100A/us	-	16	-	ns
Q <sub>rr</sub>	Body Diode 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>=25C, V<sub>DD</sub>=10V, V<sub>G</sub>=10V, R<sub>G</sub>=25ohm, L=0.5mH, I<sub>AS</sub>=22A
  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

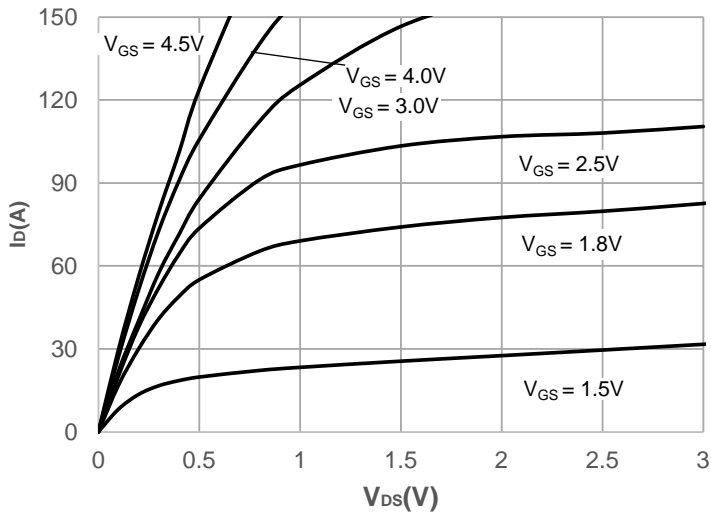


Figure 2: Typical Transfer Characteristics

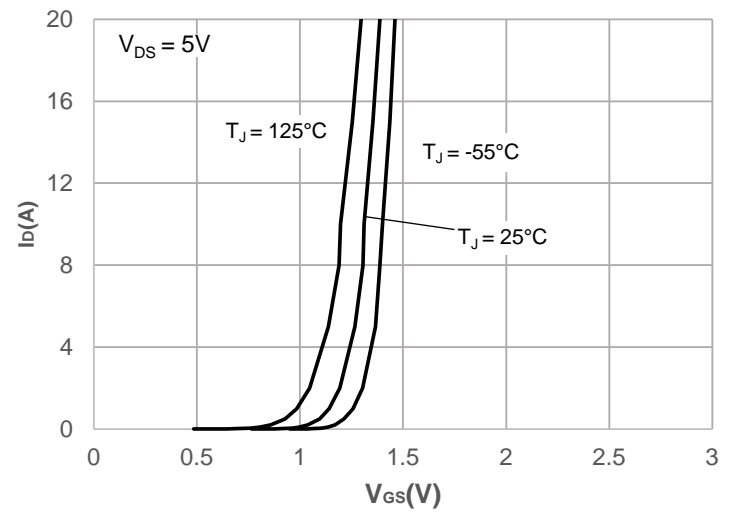


Figure 3: On-resistance vs. Drain Current

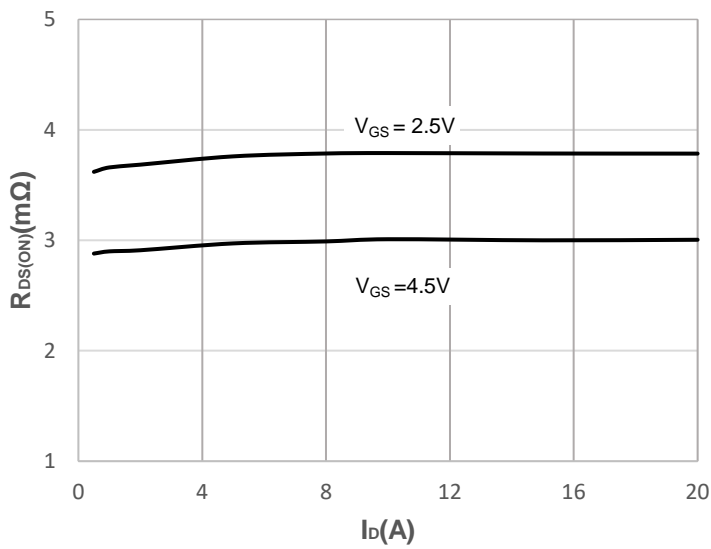


Figure 4: Body Diode Characteristics

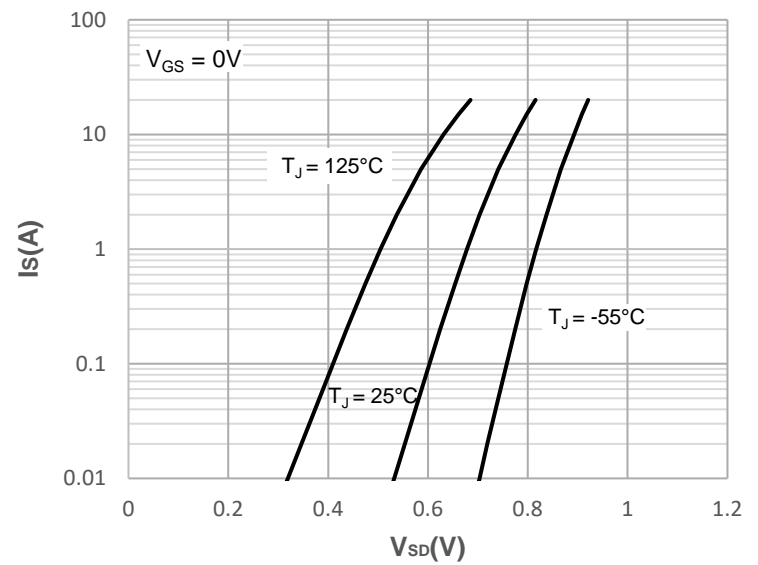


Figure 5: Gate Charge Characteristics

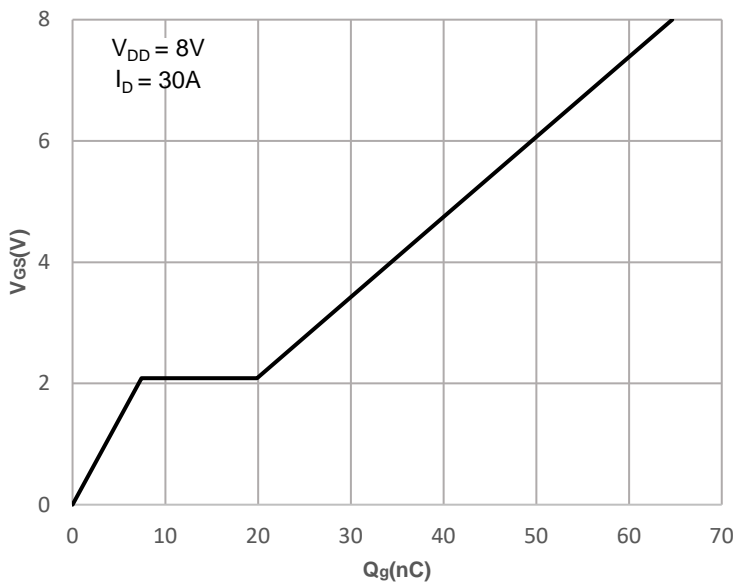
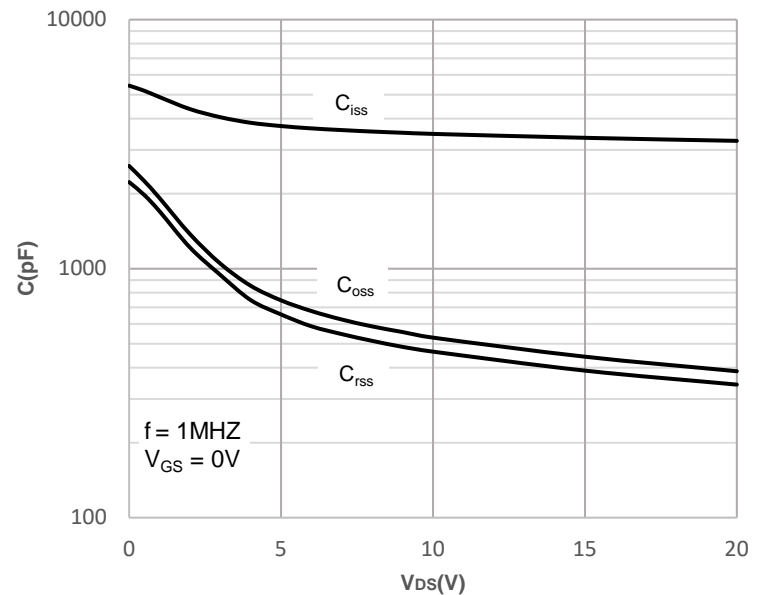


Figure 6: Capacitance Characteristics



## Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

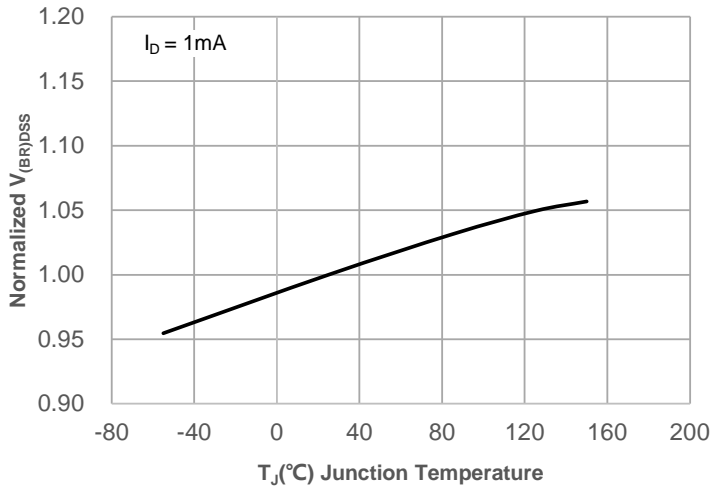


Figure 8: Normalized on Resistance vs. Junction Temperature

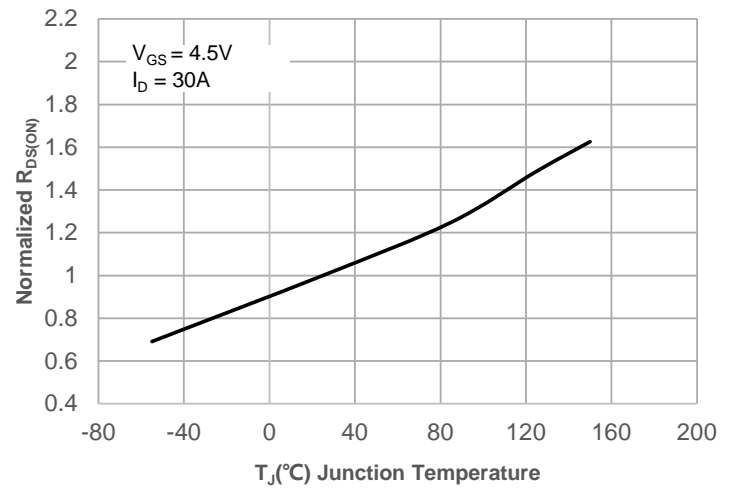


Figure 9: Maximum Safe Operating Area

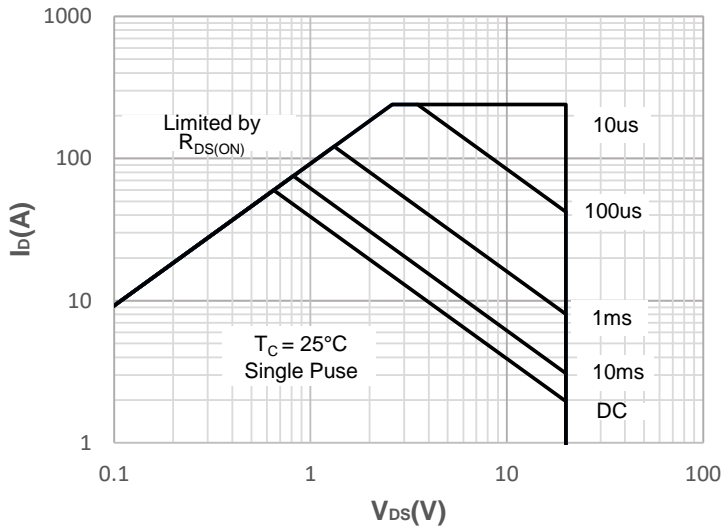


Figure 10: Maximum Continuous Driant Current vs. Case Temperature

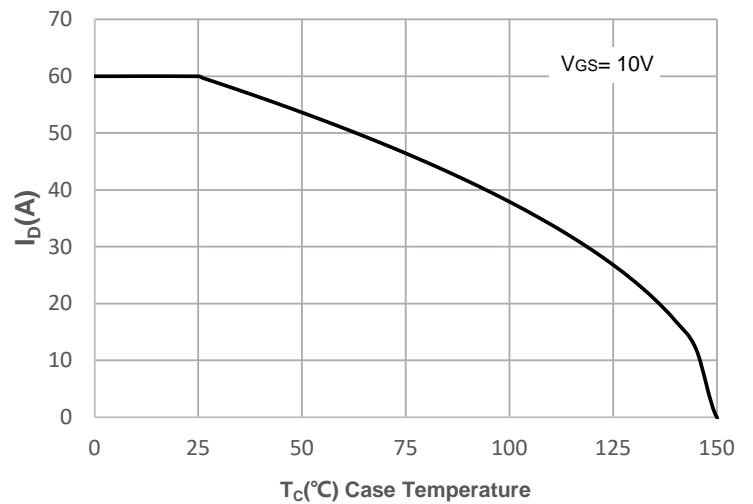


Figure 11: Normalized Maximum Transient Thermal Impedance

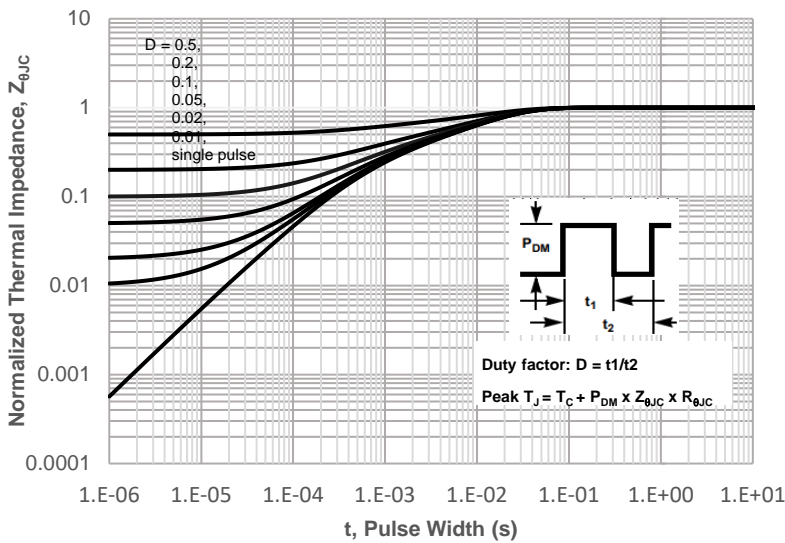
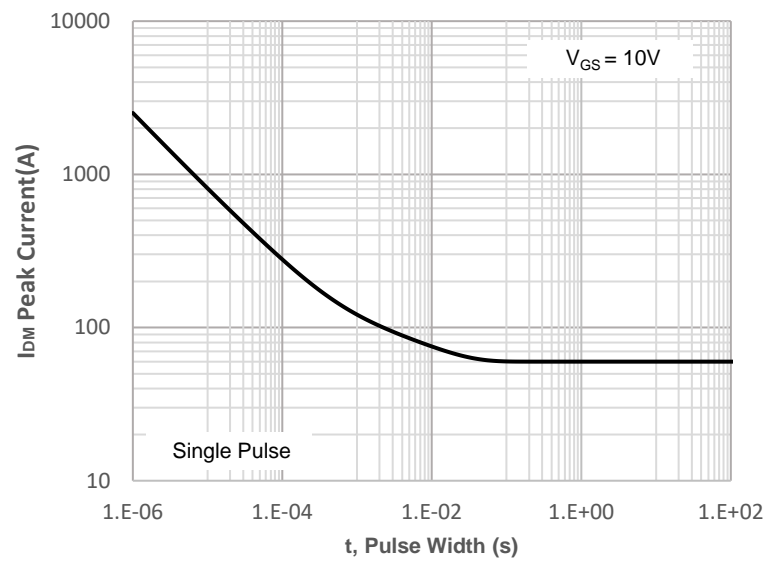


Figure 12: Peak Current Capacity



## Test Circuit

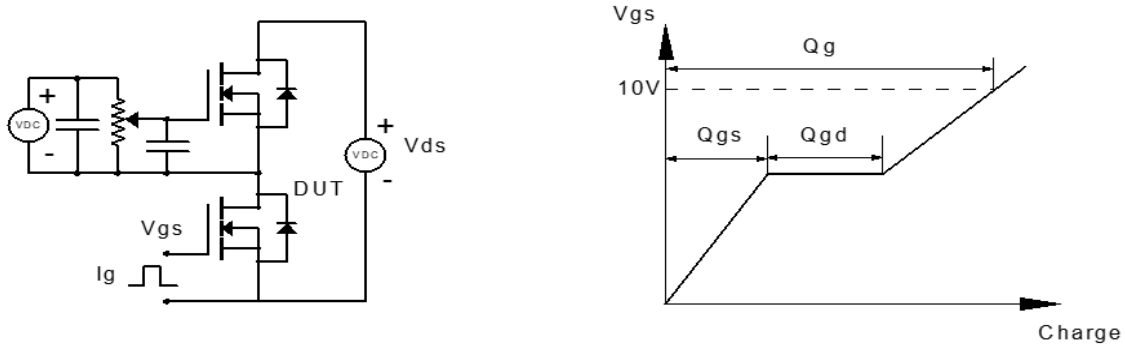


Figure 1: Gate Charge Test Circuit & Waveform

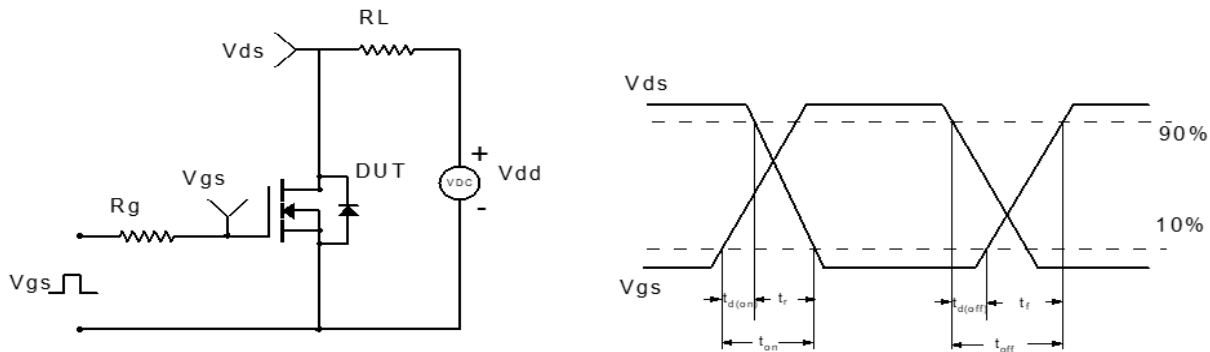


Figure 2: Resistive Switching Test Circuit & Waveform

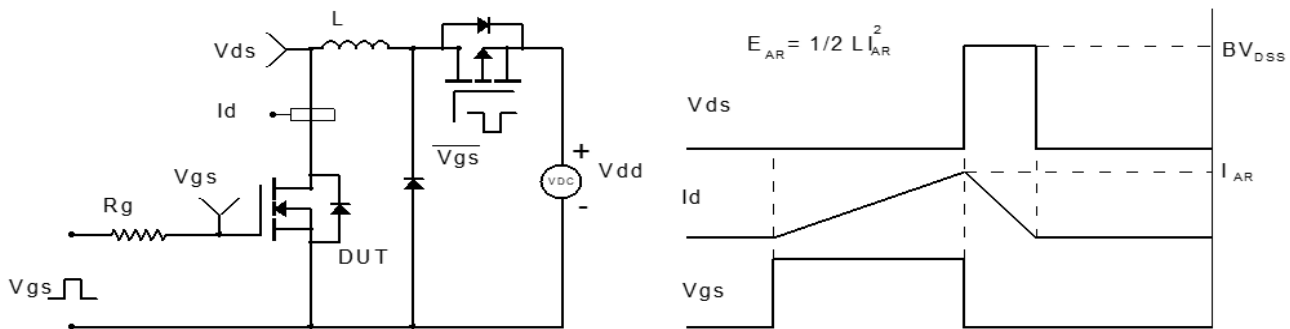


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

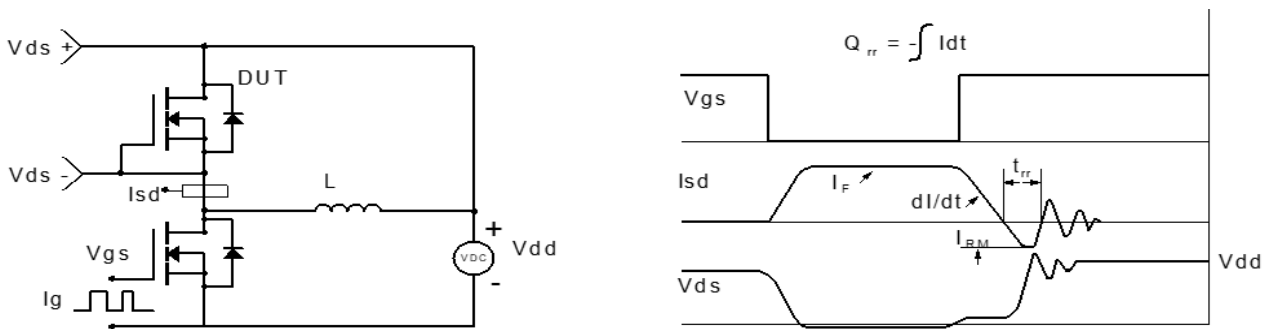
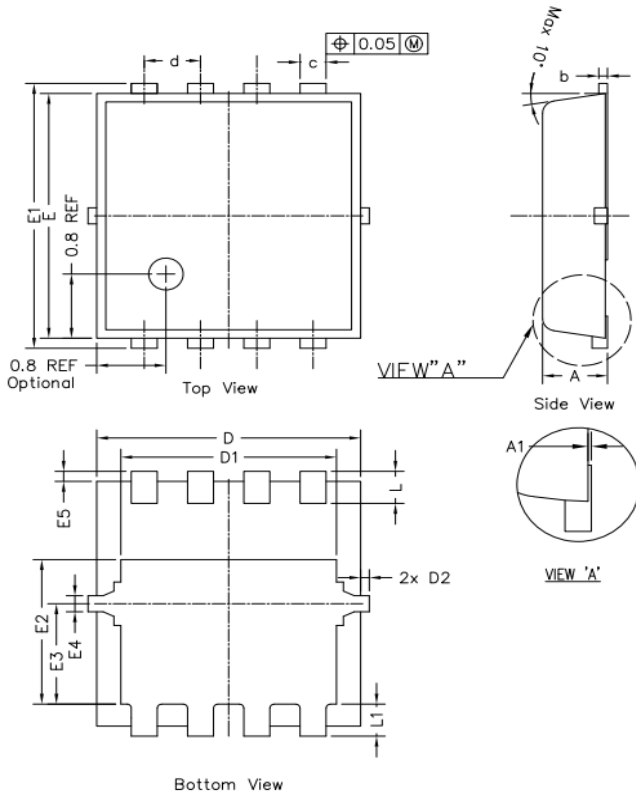


Figure 4: Diode Recovery Test Circuit & Waveform

## Package Mechanical Data(PDFN3x3-8L)



SYMBOLS	DIMENSION IN MM			DIMENSION IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.700	0.750	0.800	0.028	0.030	0.031
A1	---	---	0.050	----	----	0.002
b	0.144	0.152	0.202	0.006	0.006	0.008
c	0.250	0.300	0.350	0.010	0.012	0.014
d	0.65 BSC			0.026 BSC		
D	2.950	3.050	3.150	0.116	0.120	0.124
D1	2.390	2.490	2.590	0.094	0.098	0.102
D2	---	---	0.125	---	---	0.005
E	2.950	3.050	3.150	0.116	0.120	0.124
E1	3.200	3.300	3.400	0.126	0.130	0.134
E2	1.700	1.800	1.900	0.067	0.071	0.075
E3	1.150	1.250	1.350	0.045	0.049	0.053
E4	0.150	0.200	0.250	0.006	0.008	0.010
E5	0.075	0.125	0.175	0.003	0.005	0.007
L	0.300	0.400	0.500	0.01	0.02	0.02
L1	0.300	0.400	0.500	0.01	0.02	0.02

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