

# -30V, -40A, 9.3mΩ P-channel Power Trench MOSFET

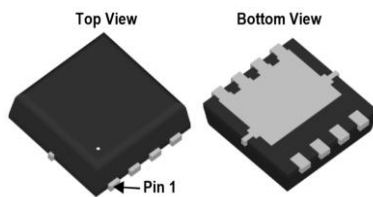
## JMTQ100P03A

### Features

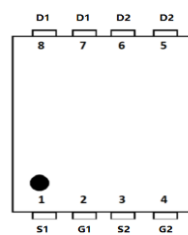
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- 100% UIS Tested
- 100%  $\Delta V_{ds}$  Tested
- Halogen-free; RoHS-compliant
- Pb-free plating
- **Applications**
- Load Switch
- PWM Application
- Power Management

### Product Summary

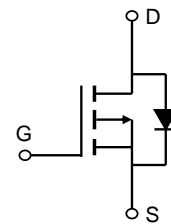
Parameters	Value	Unit
$V_{DSS}$	-30	V
$V_{GS(th\_Typ)}$	-1.6	V
$I_D(@V_{GS}=-10V)$	-40	A
$R_{DS(ON\_Typ)}(@V_{GS}=-10V)$	6.4	mΩ
$R_{DS(ON\_Typ)}(@V_{GS}=-4.5V)$	9.3	mΩ



PDFN3X3-8L Top View



Pin Assignment



Schematic Diagram

### Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMTQ100P03A	Q100P03A	1	Tape&Reel	PDFN3x3-8L	5000	50000

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

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-to-Source Voltage	-30	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	Refer to Fig.4	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(2)</sup>	206	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	W
		$T_C = 100^\circ\text{C}$	
$T_J, T_{STG}$	Junction & Storage Temperature Range	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>(3)</sup>	41	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	4.4	

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

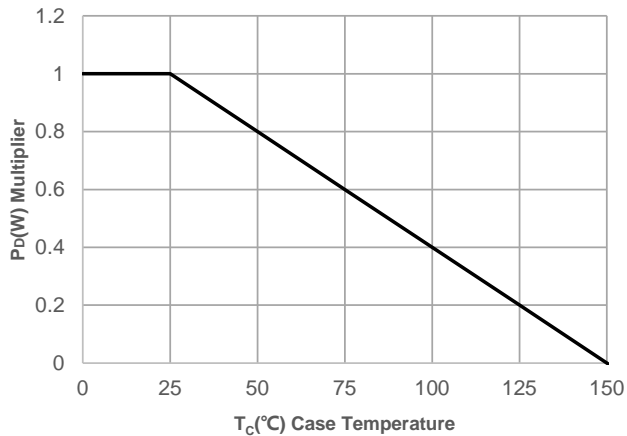
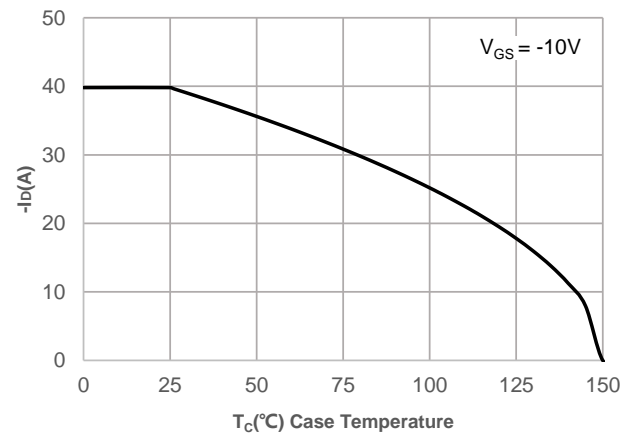
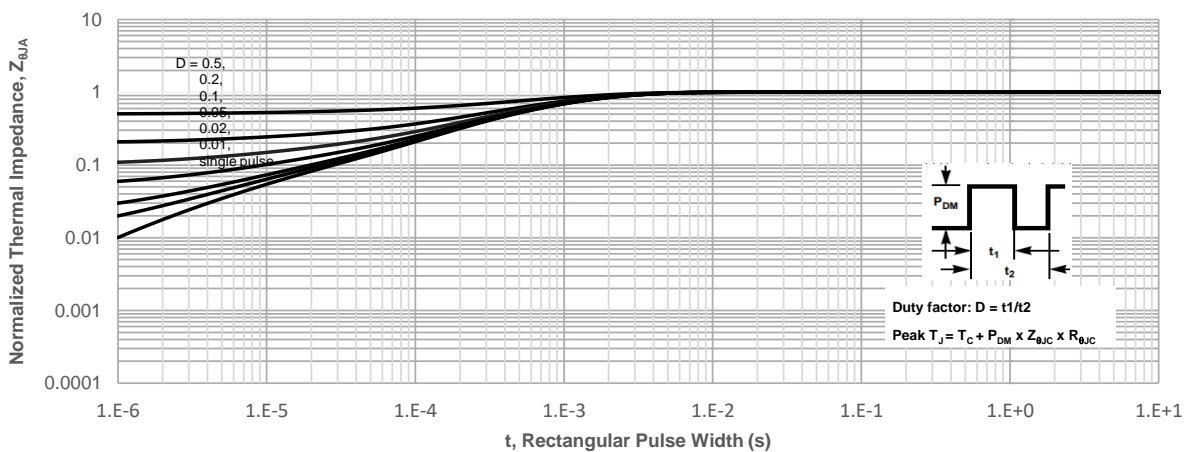
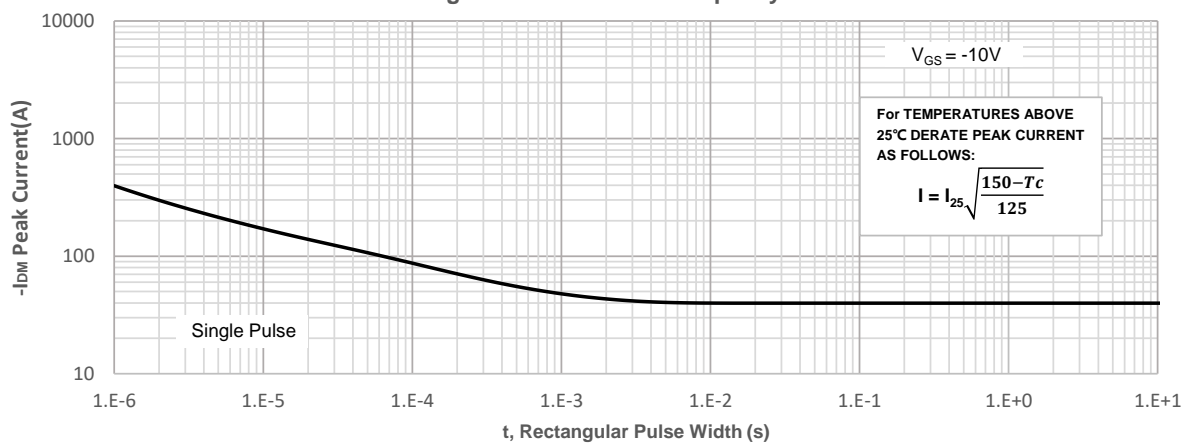
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V	-30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V	-	-	-1.0	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
On Characteristics						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.1	-1.6	-2.5	V
R <sub>DS(ON)</sub>	Static Drain-Source ON-Resistance <sup>(4)</sup>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -30A	-	6.4	9.4	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -20A	-	9.3	15.1	mΩ
Dynamic Characteristics						
R <sub>g</sub>	Gate Resistance	f = 1MHz	-	5.6	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = -15V, f = 1MHz	2489	3485.2	4705	pF
C <sub>oss</sub>	Output Capacitance		283	397	536	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		240	336	454	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 0 to -10V V <sub>DS</sub> = -15V, I <sub>D</sub> = -20A	44	62	83	nC
Q <sub>gs</sub>	Gate Source Charge		7	10	13	nC
Q <sub>gd</sub>	Gate Drain("Miller") Charge		9	12	16	nC
Switching Characteristics						
t <sub>d(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> = -10V, V <sub>DD</sub> = -15V I <sub>D</sub> = -20A, R <sub>GEN</sub> = 3Ω	-	16	-	ns
t <sub>r</sub>	Turn-On Rise Time		-	62	-	ns
t <sub>d(off)</sub>	Turn-Off DelayTime		-	55	-	ns
t <sub>f</sub>	Turn-Off Fall Time		-	70	-	ns
Body Diode Characteristics						
I <sub>S</sub>	Maximum Continuous Body Diode Forward Current		-	-	-40	A
I <sub>SM</sub>	Maximum Pulsed Body Diode Forward Current		-	-	-159	A
V <sub>SD</sub>	Body Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = -30A	-		1.2	V
trr	Body Diode Reverse Recovery Time	I <sub>F</sub> = -15A, di/dt = 100A/us	15	22	29	ns
Qrr	Body Diode Reverse Recovery Charge		-	11.5	-	nC

Notes:

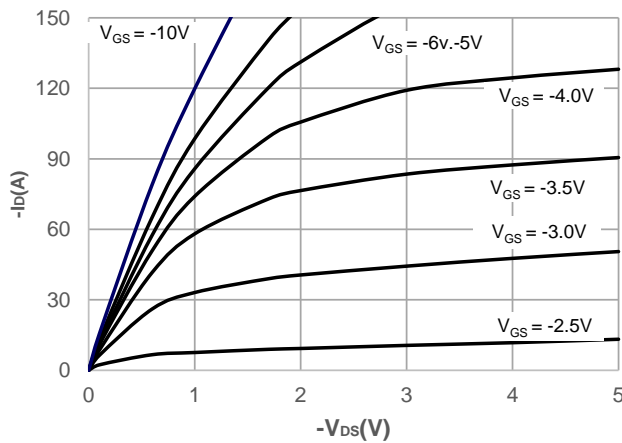
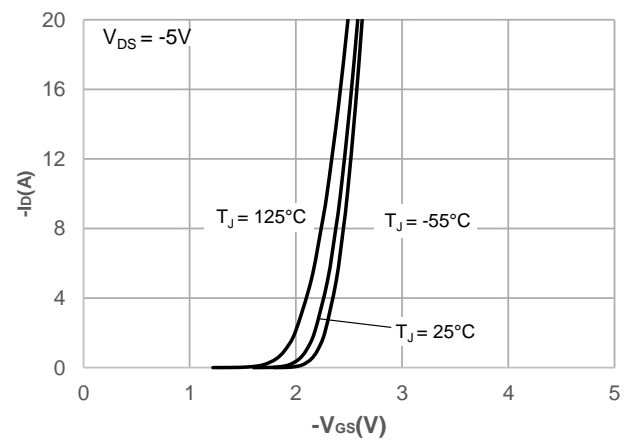
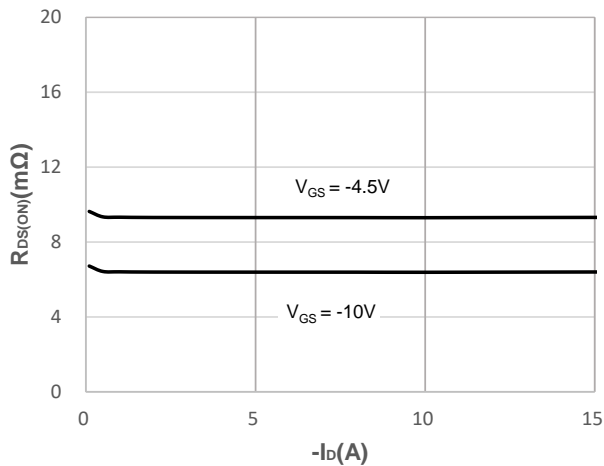
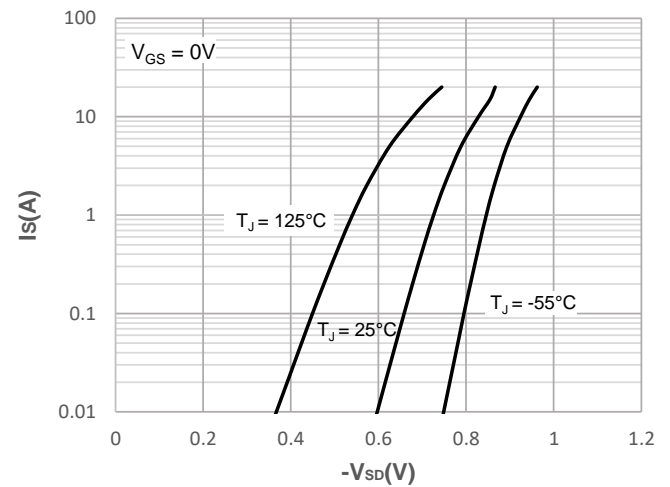
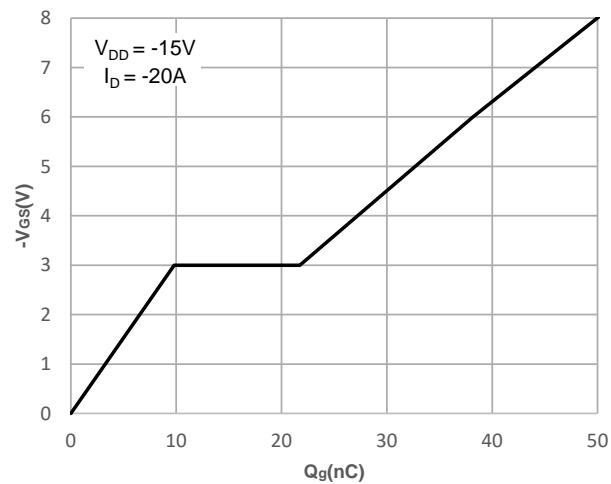
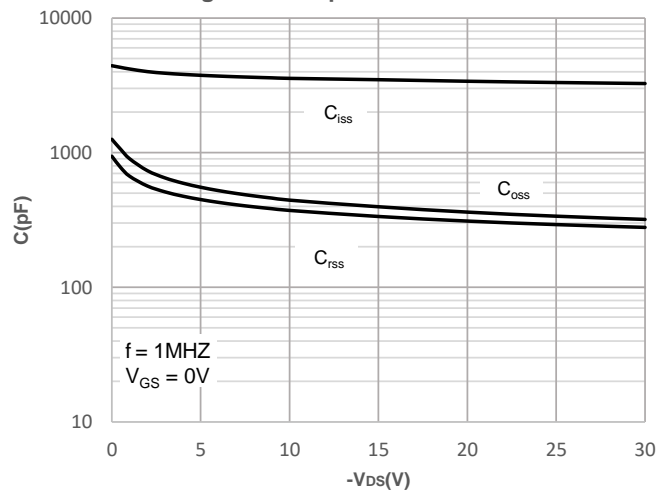
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2.  $E_{AS}$  condition: Starting  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = -15\text{V}$ ,  $V_G = -10\text{V}$ ,  $R_G = 250\Omega$ ,  $L = 0.5\text{mH}$ ,  $I_{AS} = -24.08\text{A}$ ,  $V_{DD} = 0\text{V}$  during time in avalanche.
3.  $R_{\theta JA}$  is measured with the device mounted on a  $1\text{inch}^2$  pad of 2oz copper FR4 PCB.
4. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$ .



## Typical Performance Characteristics

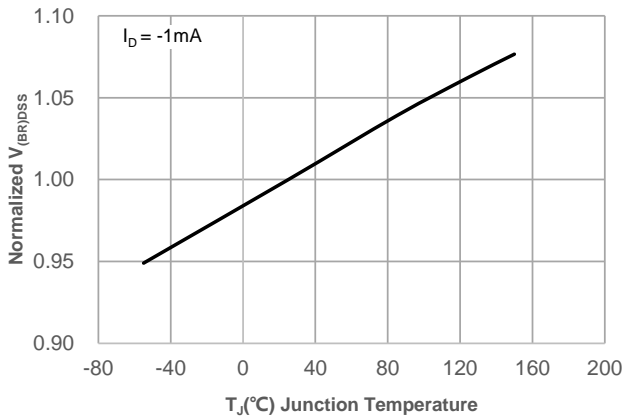
**Figure 1: Power De-rating**

**Figure 2: Current De-rating**

**Figure 3: Normalized Maximum Transient Thermal Impedance**

**Figure 4: Peak Current Capacity**


## Typical Performance Characteristics

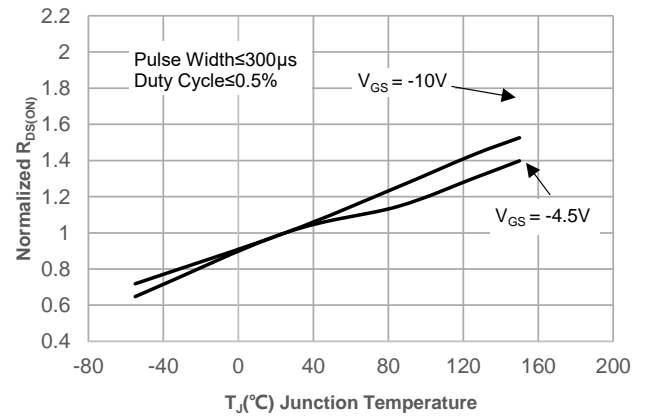
**Figure 5: Output Characteristics**

**Figure 6: Typical Transfer Characteristics**

**Figure 7: On-resistance vs. Drain Current**

**Figure 8: Body Diode Characteristics**

**Figure 9: Gate Charge Characteristics**

**Figure 10: Capacitance Characteristics**


## Typical Performance Characteristics

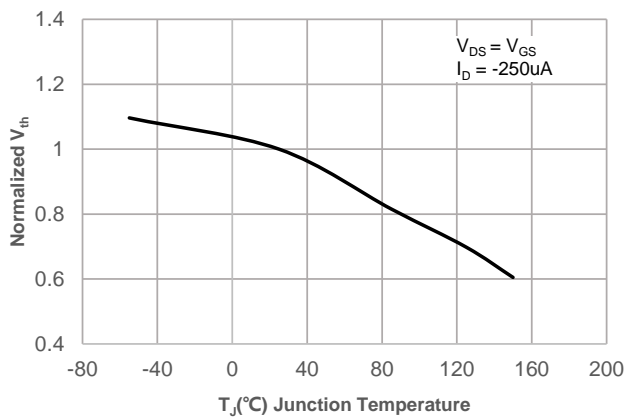
**Figure 11: Normalized Breakdown voltage vs. Junction Temperature**



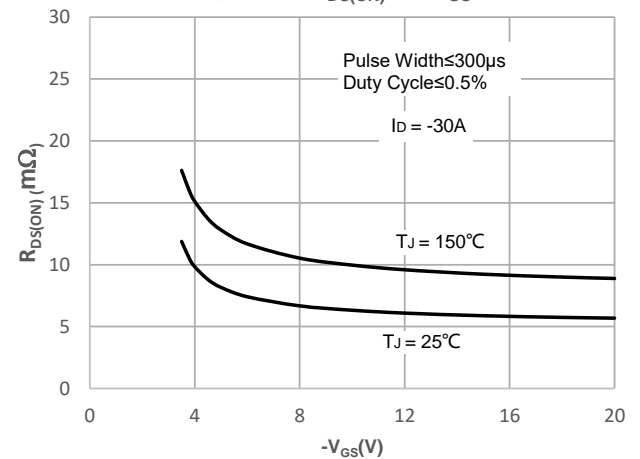
**Figure 12: Normalized on Resistance vs. Junction Temperature**



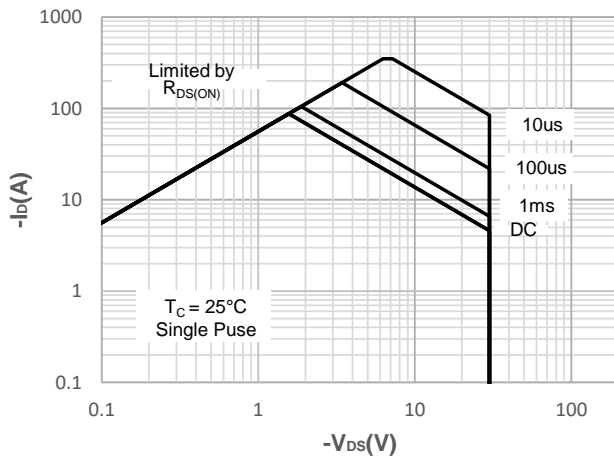
**Figure 13: Normalized Threshold Voltage vs. Junction Temperature**



**Figure 14:  $R_{DS(ON)}$  vs.  $V_{GS}$**



**Figure 15: Maximum Safe Operating Area**



## Test Circuit

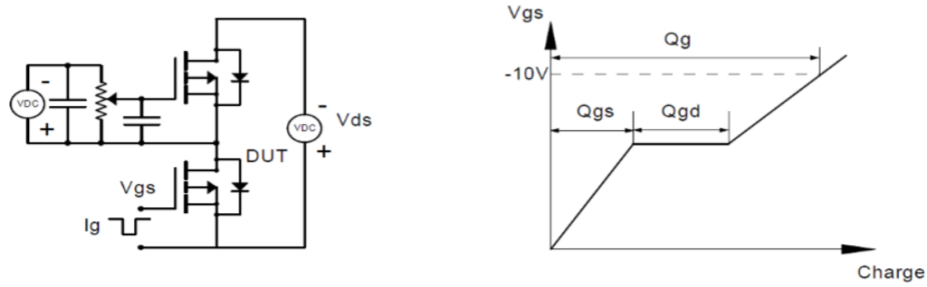


Figure 1: Gate Charge Test Circuit & Waveform

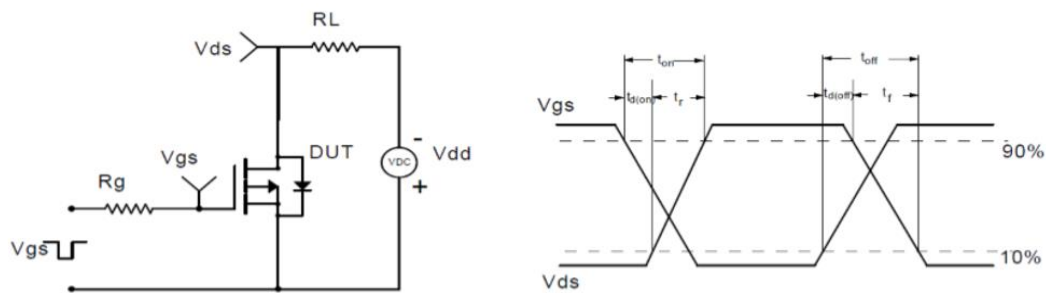


Figure 2: Resistive Switching Test Circuit & Waveform

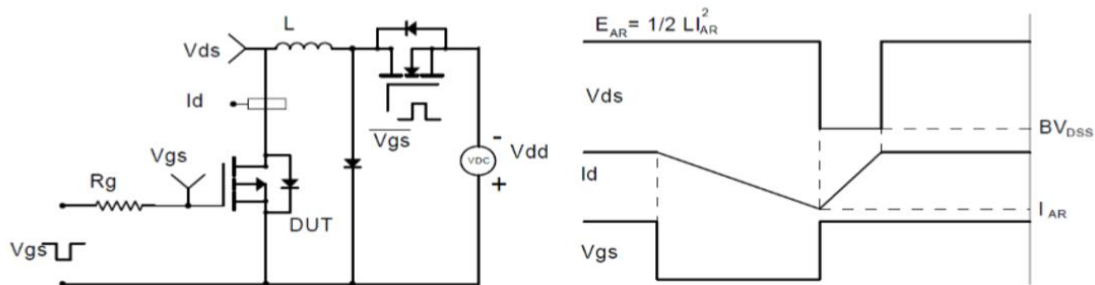


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

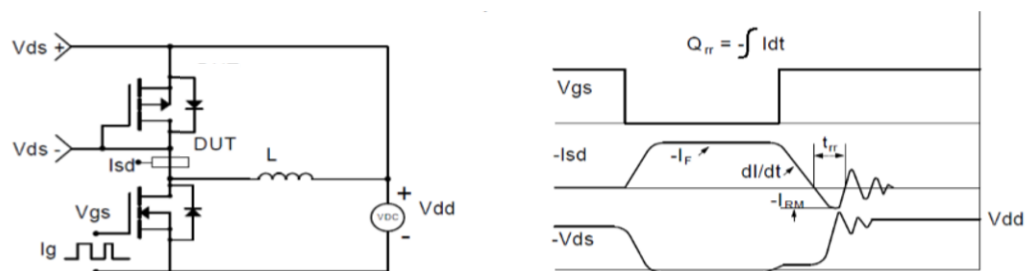


Figure 4: Diode Recovery Test Circuit & Waveform

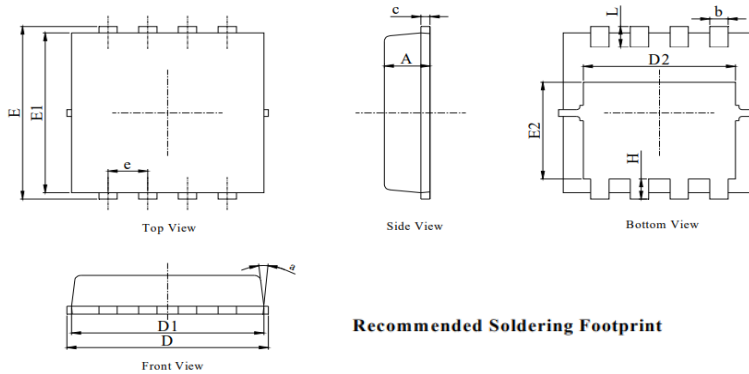
## Package Mechanical Data(PDFN-3X3-8L)

### NOTES:

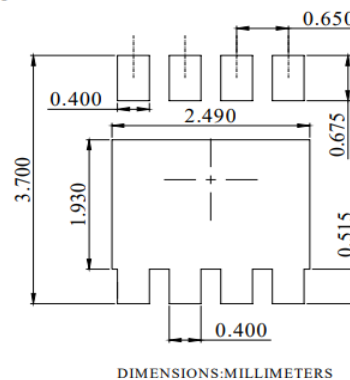
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. ALL DIMNESIONS IN MILLIMETER (ANNGLE IN DEGREE).
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.20	0.25
D	3.00	3.15	3.25
D1	2.95	3.05	3.15
D2	2.39	2.49	2.59
E	3.20	3.30	3.40
E1	2.95	3.05	3.15
E2	1.70	1.80	1.90
e	0.65 BSC		
H	0.30	0.40	0.50
L	0.25	0.40	0.50
a	---	---	15°

Package Outline



Recommended Soldering Footprint



DIMENSIONS:MILLIMETERS

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