

## Description

### JMT N And P-channel Enhancement Mode Power MOSFET

#### Features

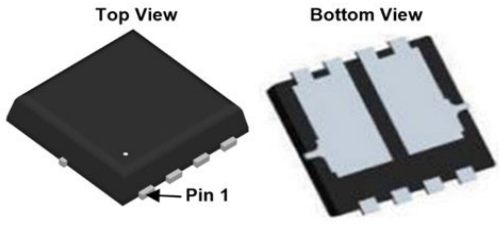
- N-channel: 30V, 10A  
 $R_{DS(ON)} < 21m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)} < 30m\Omega @ V_{GS} = 4.5V$
- P-channel: -30V, -8A  
 $R_{DS(ON)} < 27m\Omega @ V_{GS} = -10V$   
 $R_{DS(ON)} < 38m\Omega @ V_{GS} = -4.5V$
- Excellent Gate Charge x  $R_{DS(ON)}$  Product(FOM)
- Very Low On-resistance  $R_{DS(ON)}$
- Fast Switching Speed

#### Applications

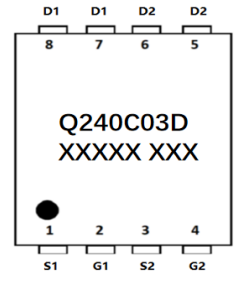
- Battery Protection
- Load Switch
- Power Management



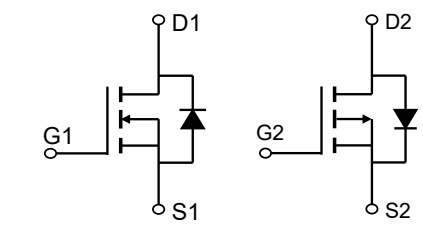
**100% UIS TESTED!**  
**100% ΔVds TESTED!**



PDFN3x3-8L-D



Marking and Pin Assignment



Schematic Diagram

### Package Marking and Ordering Information

Device Marking	Device	Outline	Package	Reel Size	Reel(pcs)	Per Carton (pcs)
Q240C03D	JMTQ240C03D	TAPING	PDFN3x3-8L-D	13"	5000	50000

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

Symbol	Parameter	Value-N-channel	Value-P-channel	Units
$V_{DS}$	Drain-to-Source Voltage	30	-30	V
$V_{GS}$	Gate-to-Source Voltage	±20		V
$I_D$	Continuous Drain Current	$T_C = 25^\circ C$	10	-8
		$T_C = 100^\circ C$	6.3	-5.1
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	40	-32	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(2)</sup>	12	20	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ C$		15
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>(3)</sup>			66
$R_{\theta JC}$	Thermal Resistance, Junction to Case			8.3
$T_J, T_{STG}$	Junction & Storage Temperature Range			-55 to 150



## N-channel 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	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
<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	1.0	1.7	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> = 5A	-	16	21	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3A	-	23	30	mΩ
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 15V, f = 1MHz	-	481	-	pF
C <sub>oss</sub>	Output Capacitance		-	69	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	53	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 0 to 10V V <sub>DD</sub> = 15V, I <sub>D</sub> = 3A	-	10	-	nC
Q <sub>gs</sub>	Gate Source Charge		-	2	-	nC
Q <sub>gd</sub>	Gate Drain("Miller") Charge		-	2	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 15V I <sub>D</sub> = 3A, R <sub>GEN</sub> = 3Ω	-	4	-	ns
t <sub>r</sub>	Turn-On Rise Time		-	6	-	ns
t <sub>d(off)</sub>	Turn-Off DelayTime		-	12	-	ns
t <sub>f</sub>	Turn-Off Fall Time		-	3	-	ns
<b>Drain-Source Diode Characteristics and Max Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	10	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	40	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 10A	-	-	1.2	V
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> = 3A, di/dt = 100A/μs	-	8	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	2	-	nC



## P-channel 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	-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
<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	-1	-1.7	-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> = -7A	-	21	27	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4A	-	29	38	mΩ
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = -15V, f = 1MHz	-	859	-	pF
C <sub>oss</sub>	Output Capacitance		-	110	-	pF
C <sub>riss</sub>	Reverse Transfer Capacitance		-	84	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 0 to -10V V <sub>DD</sub> = -15V, I <sub>D</sub> = -3A	-	16	-	nC
Q <sub>gs</sub>	Gate Source Charge		-	3	-	nC
Q <sub>gd</sub>	Gate Drain("Miller") Charge		-	3	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> = -10V, V <sub>DD</sub> = -15V I <sub>D</sub> = -3A, R <sub>GEN</sub> = 3Ω	-	4	-	ns
t <sub>r</sub>	Turn-On Rise Time		-	2	-	ns
t <sub>d(off)</sub>	Turn-Off DelayTime		-	38	-	ns
t <sub>f</sub>	Turn-Off Fall Time		-	22	-	ns
<b>Drain-Source Diode Characteristics and Max Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	-8	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-32	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = -8A	-	-	-1.2	V
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> = -3A, di/dt = 100A/μs	-	10	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	3	-	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> = 20V, V<sub>G</sub> = 10V, R<sub>G</sub> = 25ohm, L = 0.5mH, I<sub>AS</sub> = 7A  
Starting T<sub>J</sub> = 25°C, V<sub>DD</sub> = -20V, V<sub>G</sub> = -10V, R<sub>G</sub> = 25ohm, L = 0.5mH, I<sub>AS</sub> = -9A
  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-N

Figure 1: Output Characteristics

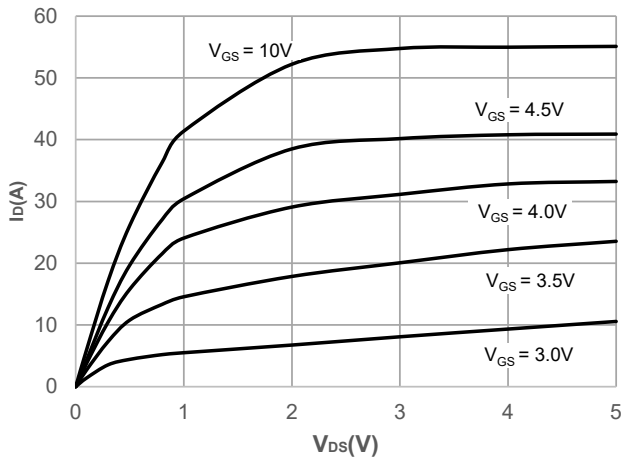


Figure 2: Typical Transfer Characteristics

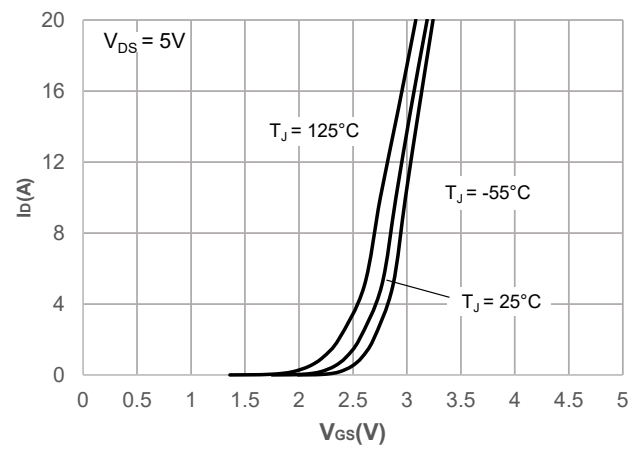


Figure 3: On-resistance vs. Drain Current

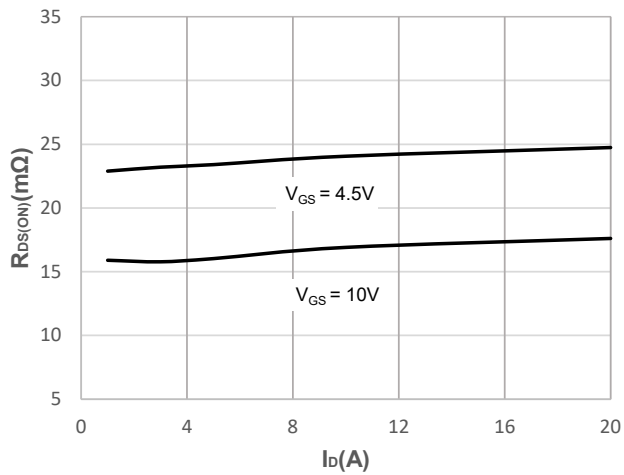


Figure 4: Body Diode Characteristics

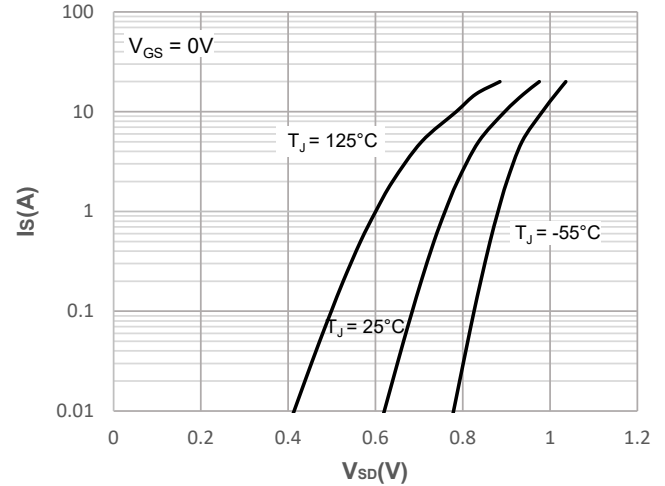


Figure 5: Gate Charge Characteristics

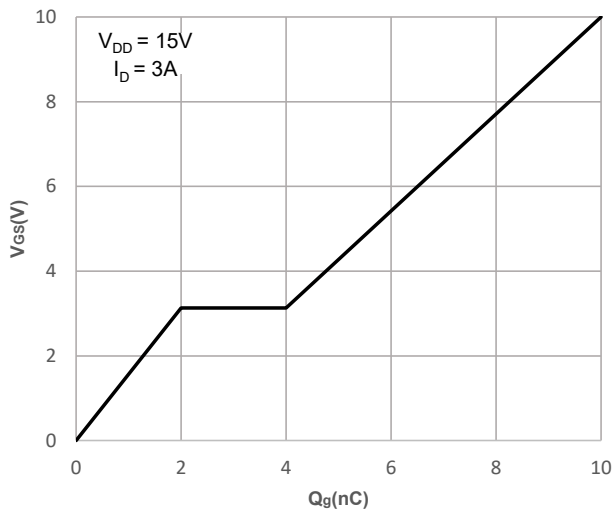
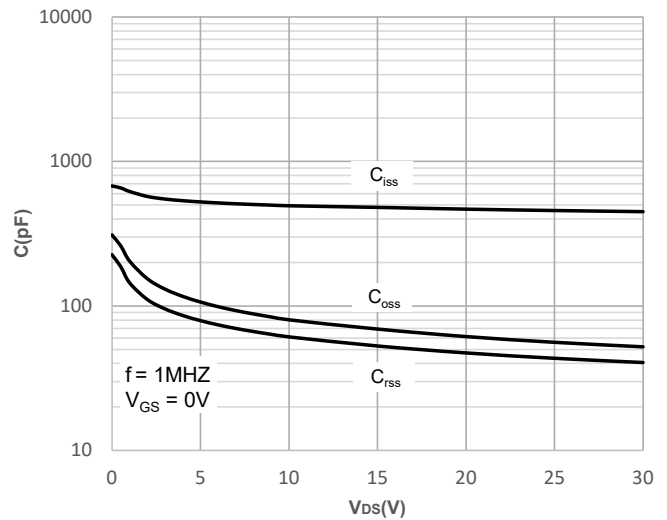


Figure 6: Capacitance Characteristics



## Typical Performance Characteristics-N

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

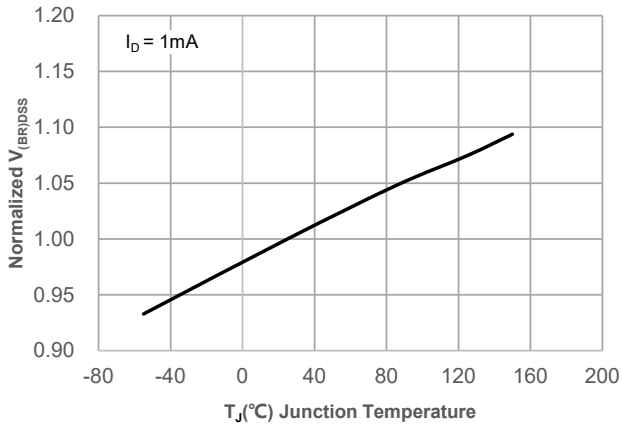


Figure 8: Normalized on Resistance vs. Junction Temperature

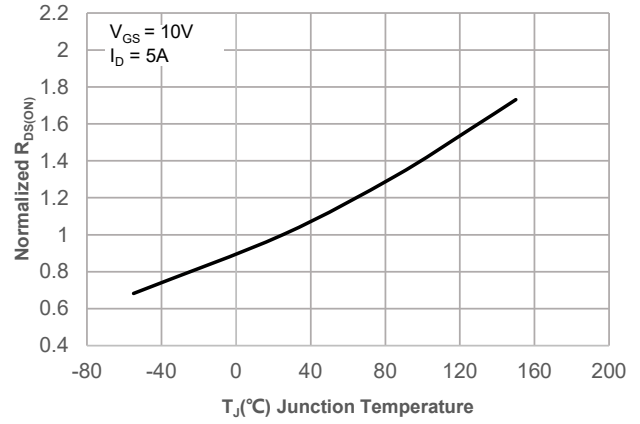


Figure 9: Maximum Safe Operating Area

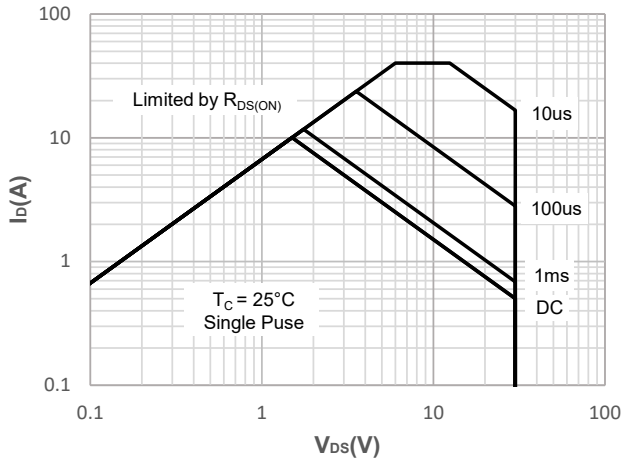


Figure 10: Maximum Continuous Driant Current vs. Case Temperature

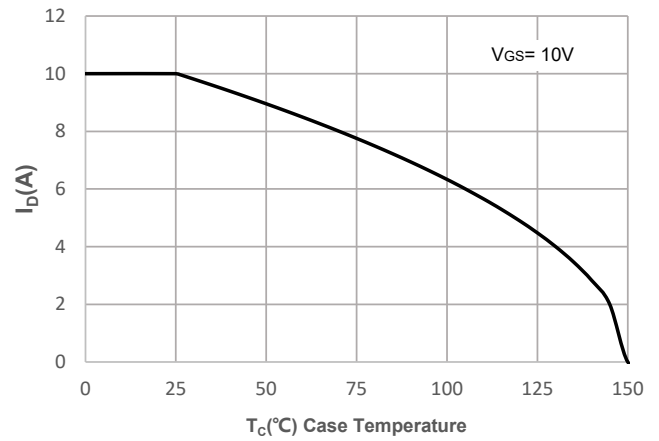


Figure 11: Normalized Maximum Transient Thermal Impedance

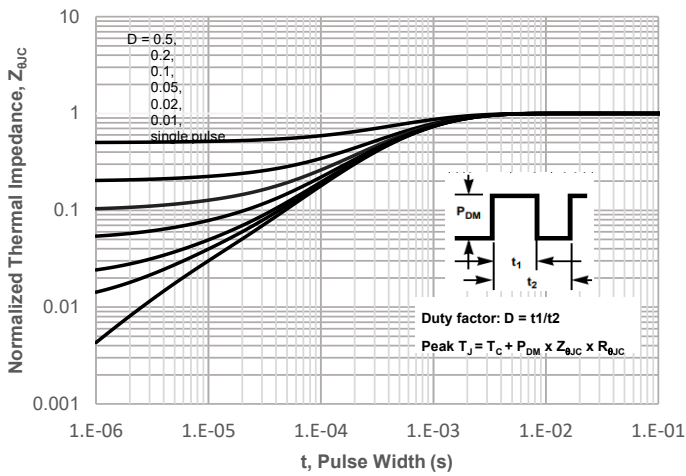
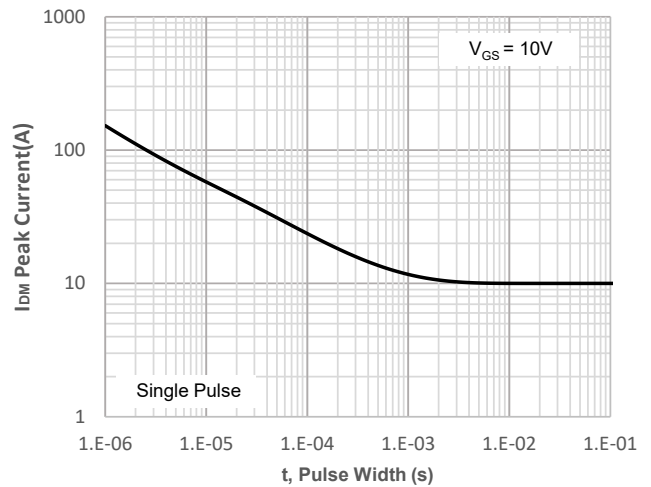
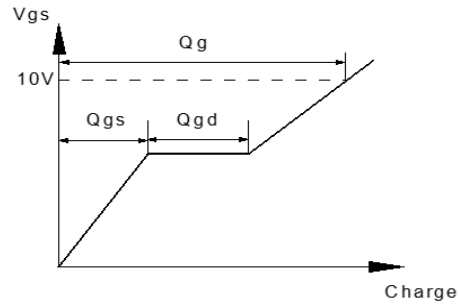
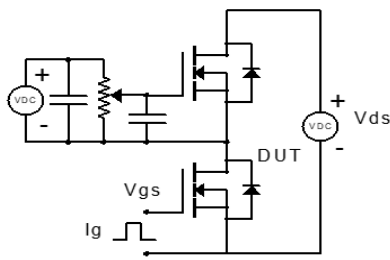


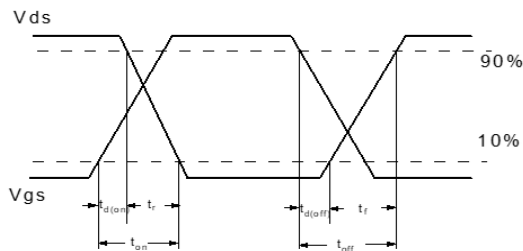
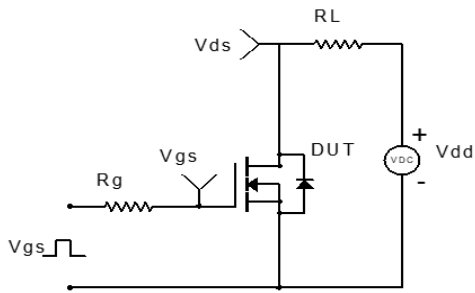
Figure 12: Peak Current Capacity



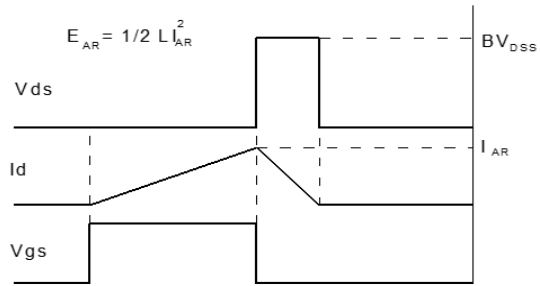
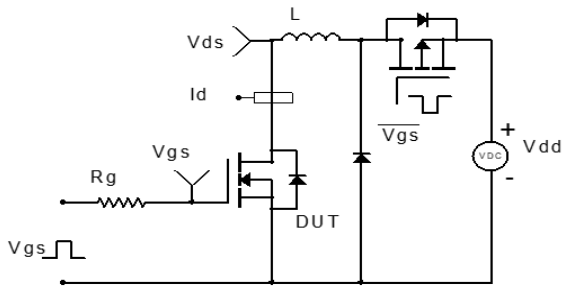
## Test Circuit-N



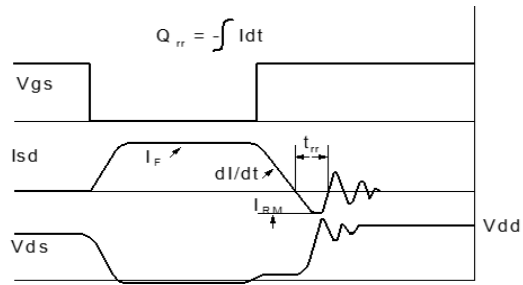
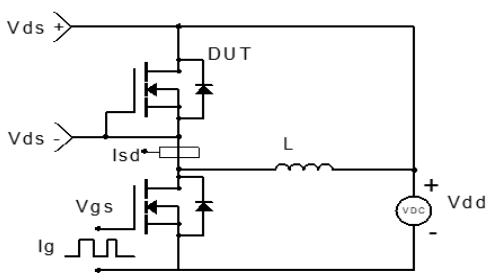
**Figure 1: Gate Charge Test Circuit & Waveform**



**Figure 2: Resistive Switching Test Circuit & Waveform**



**Figure 3: Unclamped Inductive Switching Test Circuit & Waveform**



**Figure 4: Diode Recovery Test Circuit & Waveform**

## Typical Performance Characteristics-P

Figure 1: Output Characteristics

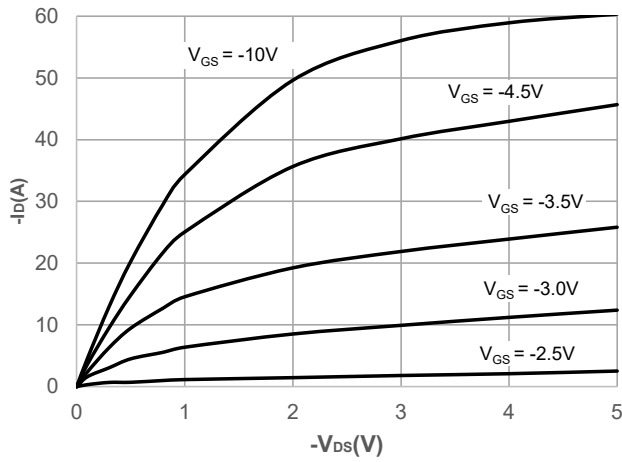


Figure 2: Typical Transfer Characteristics

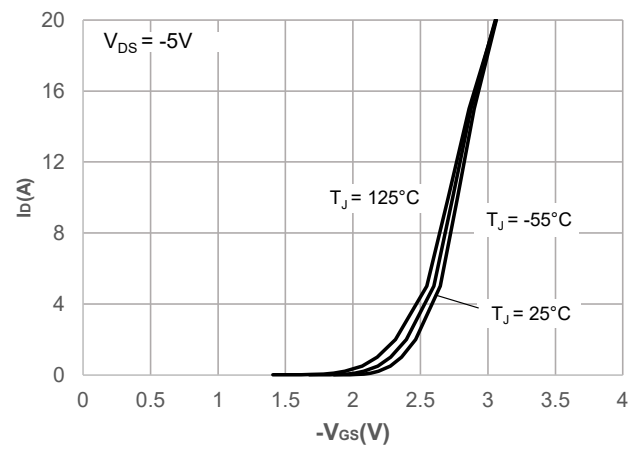


Figure 3: On-resistance vs. Drain Current

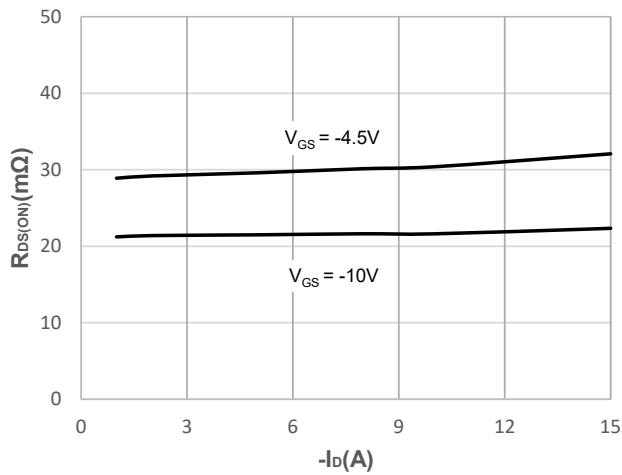


Figure 4: Body Diode Characteristics

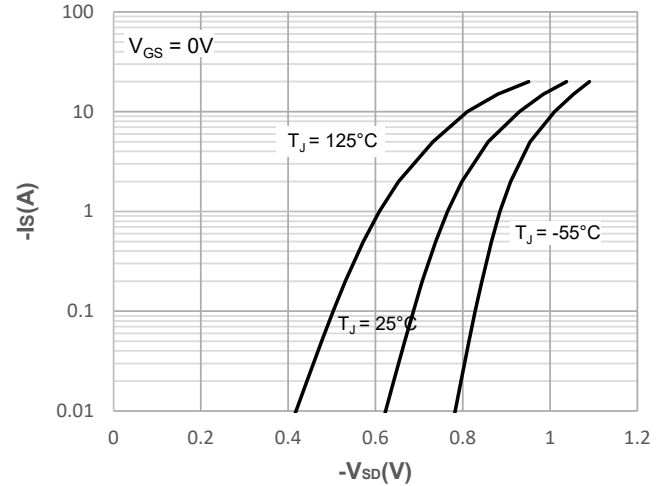


Figure 5: Gate Charge Characteristics

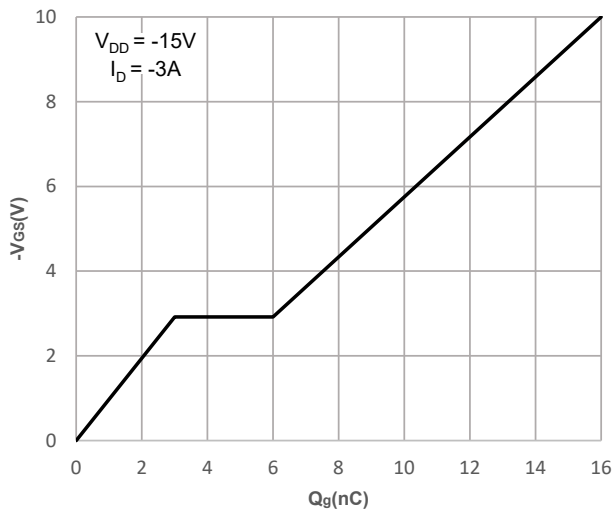
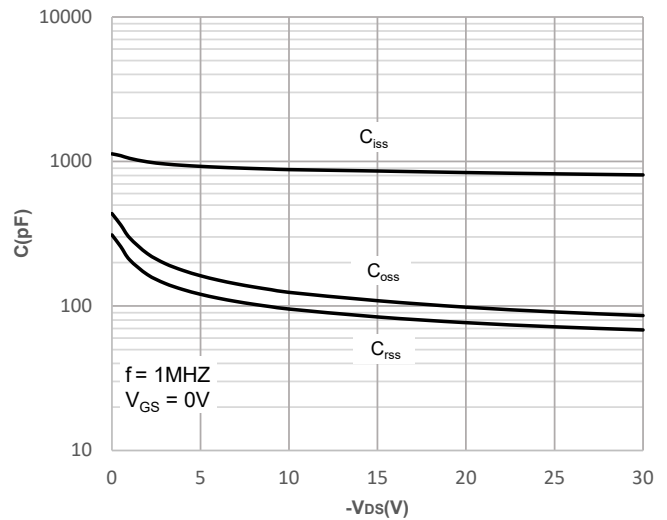


Figure 6: Capacitance Characteristics



## Typical Performance Characteristics-P

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

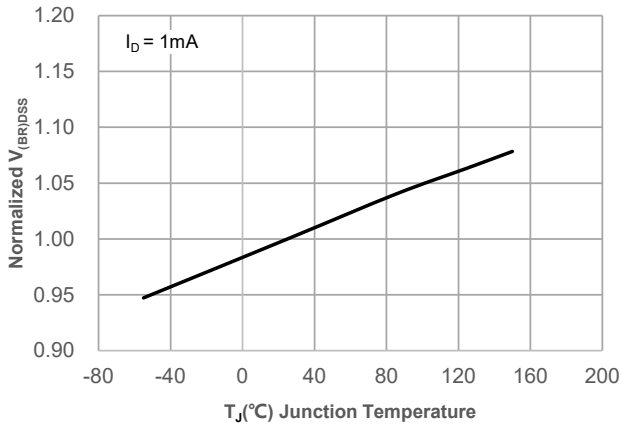


Figure 8: Normalized on Resistance vs. Junction Temperature

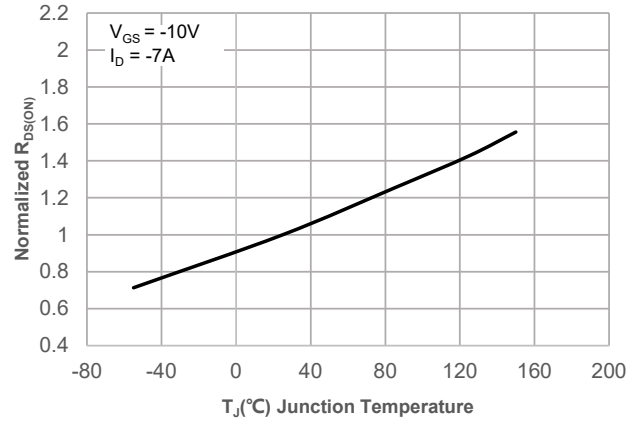


Figure 9: Maximum Safe Operating Area

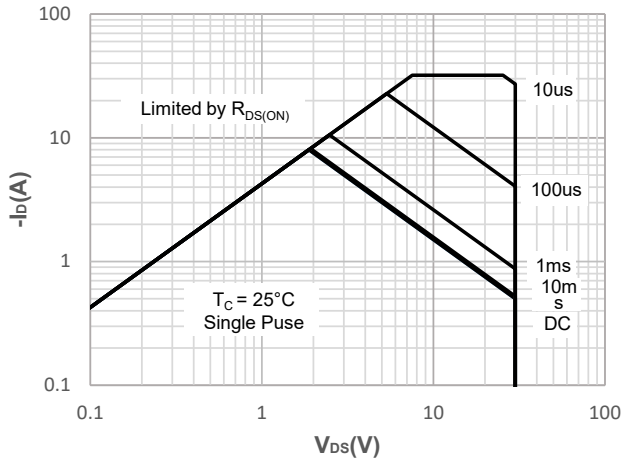


Figure 10: Maximum Continuous Driand Current vs. Case Temperature

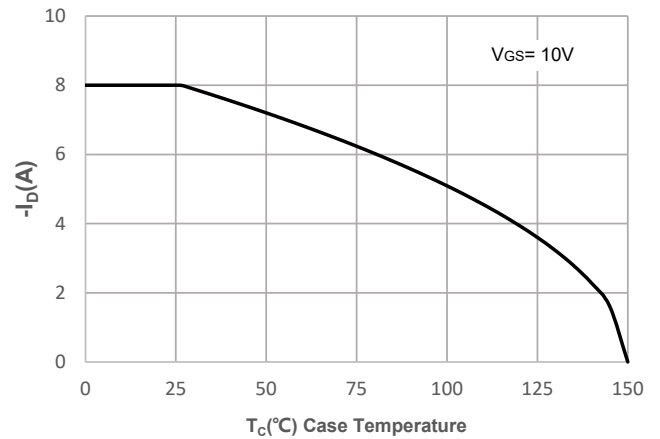


Figure 11: Normalized Maximum Transient Thermal Impedance

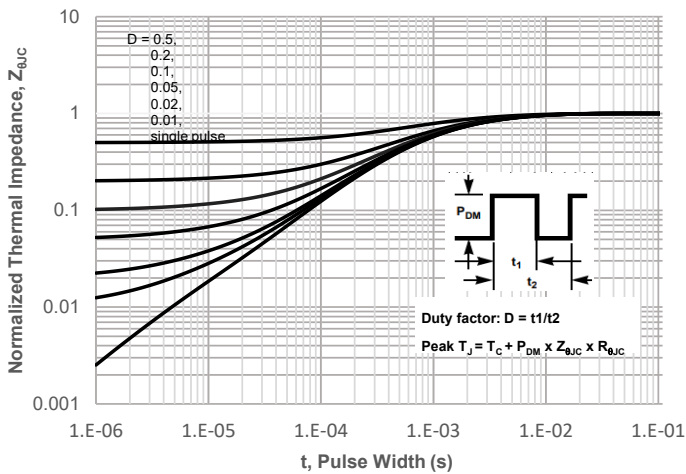
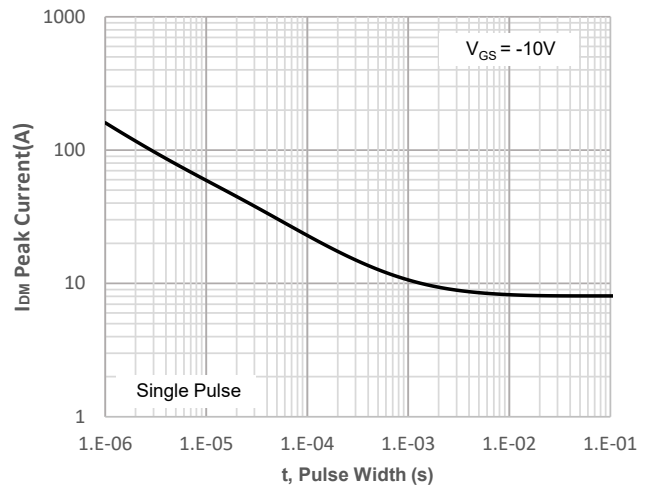


Figure 12: Peak Current Capacity





## Test Circuit-P

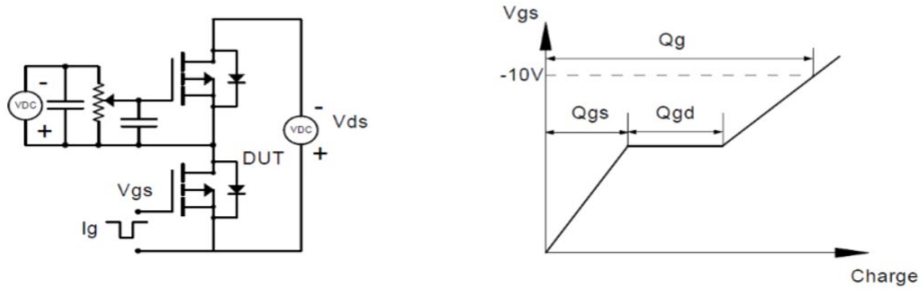


Figure 1: Gate Charge Test Circuit & Waveform

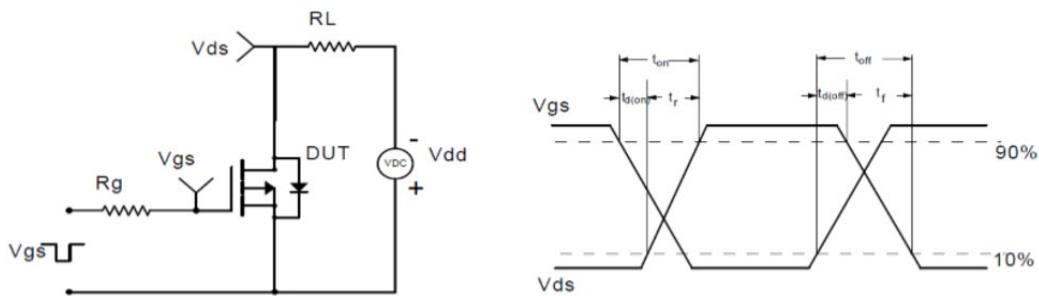


Figure 2: Resistive Switching Test Circuit & Waveform

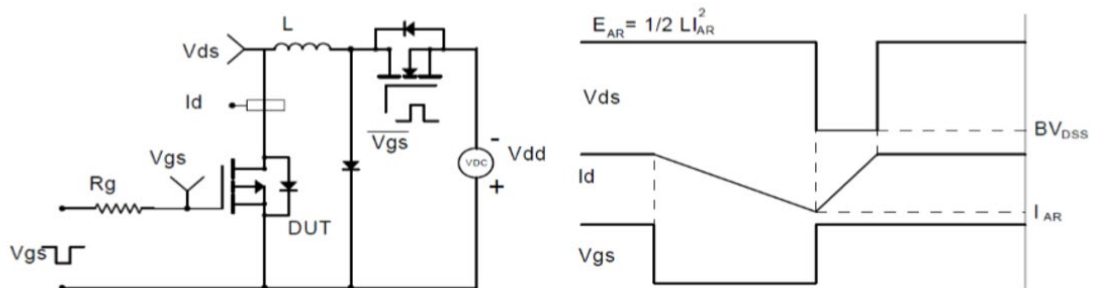


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

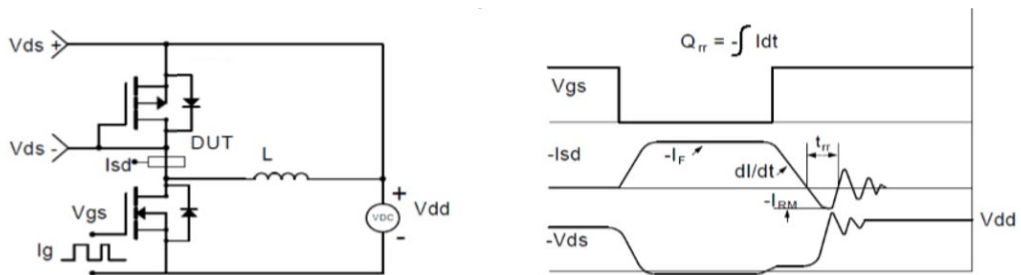
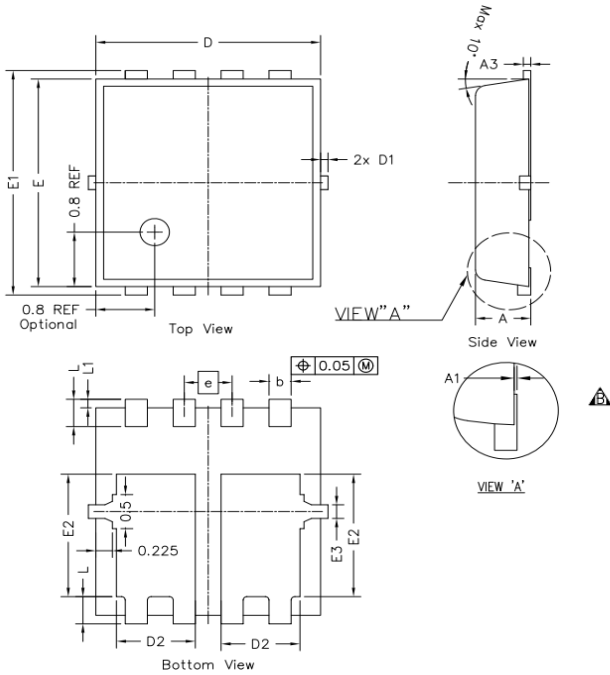


Figure 4: Diode Recovery Test Circuit & Waveform



## Package Mechanical Data(PDFN3x3-8L-D)



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
A3	0.144	0.152	0.202	0.006	0.006	0.008
b	0.250	0.300	0.350	0.010	0.012	0.014
e	0.65 BSC			0.026 BSC		
D	2.950	3.050	3.150	0.116	0.120	0.124
E	2.950	3.050	3.150	0.116	0.120	0.124
D1	---	---	0.125	----	----	0.005
E1	3.200	3.300	3.400	0.126	0.130	0.134
D2	0.970	1.070	1.170	0.038	0.042	0.046
E2	1.700	1.800	1.900	0.067	0.071	0.075
E3	0.150	0.200	0.250	0.006	0.008	0.010
L	0.300	0.400	0.500	0.012	0.016	0.020
L1	0.075	0.125	0.175	0.003	0.005	0.007

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