JJMICROELECTRONICS

±30V, 34A&-25A, 16mΩ&26mΩ N And P-channel Power Trench MOSFET

JMTQ120C03D

Features

- Excellent $R_{DS(ON)}$ and Low Gate Charge
- 100% UIS Tested
- 100% ΔVds Tested
- Halogen-free; RoHS-compliant
- Pb-free plating

Applications

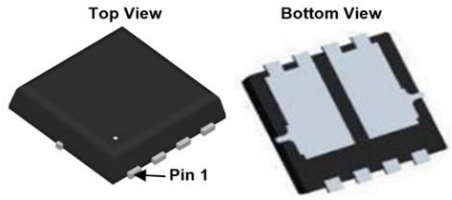
- Load Switch
- PWM Application
- Power Management

Product Summary

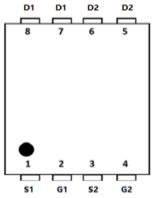
Parameters	N	P	Unit
V_{DSS}	30	-30	V
$V_{GS(th)_Typ}$	1.7	-1.6	V
I_D(@V_{GS}=10V)	34	-25	A
$R_{DS(ON)_Typ}$(@V_{GS}=10V	11	19	mΩ
$R_{DS(ON)_Typ}$(@V_{GS}=4.5V	16	26	mΩ

RoHS

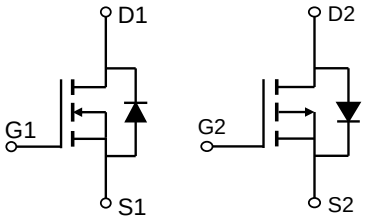
Lead-free Green



PDFN3x3-8L-D



Pin Assignment



Schematic Diagram

Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMTQ120C03D	Q120C03D	1	Tape&Reel	PDFN5x6-8L-D	5000	50000

Absolute Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Symbol	Parameter		Value-N	Value-P	Unit
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°C	34	-25	A
		T_C = 100°C	21	-16	
I_{DM}	Pulsed Drain Current (1)		Refer to Fig.4		A
E_{AS}	Single Pulsed Avalanche Energy (2)		23	31	mJ
P_D	Power Dissipation	T_C = 25°C	31	27	W
		T_C = 100°C	12	11	
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150		°C

Thermal Characteristics

Symbol	Parameter	Max		Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (3)	73	74	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	4.1	4.7	

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Electrical Characteristics-N(T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 30V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1.2	1.7	2.2	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(4)	V_{GS} = 10V, I_D = 10A	-	11	16	mΩ
		V_{GS} = 4.5V, I_D = 5A	-	16	25	mΩ
Dynamic Characteristics						
R_g	Gate Resistance	f = 1MHz	-	2.1	-	Ω
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 15V, f = 1MHz	586	821	1149	pF
C_{oss}	Output Capacitance		74	103	145	pF
C_{rss}	Reverse Transfer Capacitance		59	83	167	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 10V V_{DS} = 15V, I_D = 10A	12	17	23	nC
Q_{gs}	Gate Source Charge		-	3.1	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	3.5	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 10V, V_{DD} = 15V I_D= 10A, R_{GEN} = 3Ω	-	5.3	-	ns
t_r	Turn-On Rise Time		-	10	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	17	-	ns
t_f	Turn-Off Fall Time		-	4.4	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	34	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	135	A
V_{SD}	Body Diode Forward Voltage	V_{GS} = 0V, I_S = 10A	-		1.2	V
trr	Body Diode Reverse Recovery Time	I_F = 10A, di/dt = 100A/us	-	8.1	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	2.2	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting T_J=25C, V_{DD}=15V, V_{GS}=10V, R_G=25ohm, L=0.5mH, I_{AS}=9.66A, V_{DD}=0V during time in avalanche.
3. $R_{\theta JA}$ is measured with the device mounted on a 1inch^2 pad of 2oz copper FR4 PCB.
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

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Electrical Characteristics-P (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = -250μA, V_{GS} = 0V	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -30V, V_{GS} = 0V	-	-	-1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-1.1	-1.6	-2.1	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(5)	V_{GS} = -10V, I_D = -10A	-	19	27	mΩ
		V_{GS} = -4.5V, I_D = -5A	-	26	43	mΩ
Dynamic Characteristics						
R_g	Gate Resistance	f = 1MHz	-	6.6	-	Ω
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = -15V, f = 1MHz	984	1377	1928	pF
C_{oss}	Output Capacitance		102	143	200	pF
C_{rss}	Reverse Transfer Capacitance		88	123	246	pF
Q_g	Total Gate Charge	V_{GS} = 0 to -10V, V_{DS} = -15V, I_D = -10A	18	25	35	nC
Q_{gs}	Gate Source Charge		-	4.5	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	4.4	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = -10V, V_{DD} = -15V, I_D= -10A, R_{GEN} = 3Ω	-	5.7	-	ns
t_r	Turn-On Rise Time		-	1.5	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	35	-	ns
t_f	Turn-Off Fall Time		-	10	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	-4	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	-14	A
V_{SD}	Body Diode Forward Voltage	V_{GS} = 0V, I_S = -3A	-		-1.2	V
trr	Body Diode Reverse Recovery Time	I_F = -20A, di/dt = -100A/us	8	11	16	ns
Qrr	Body Diode Reverse Recovery Charge		-	3.8	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting T_J=25C, V_{DD}=-15V, V_{GS}=-10V, R_G=25ohm, L=0.5mH, I_{AS}=-11.2A, V_{DD}=0V during time in avalanche.
3. $R_{\theta JA}$ is measured with the device mounted on a minimum recommended pad of 2oz copper FR4 PCB.
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

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Typical Performance Characteristics-N

Figure 1: Power De-rating

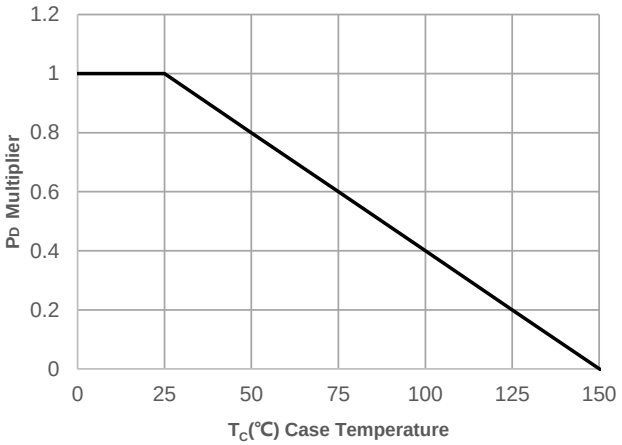


Figure 2: Current De-rating

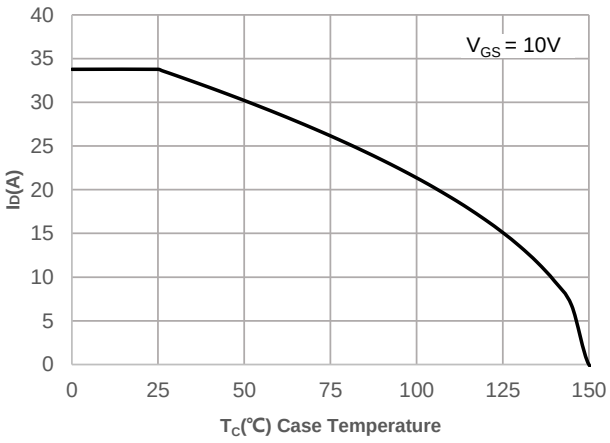


Figure 3: Normalized Maximum Transient Thermal Impedance

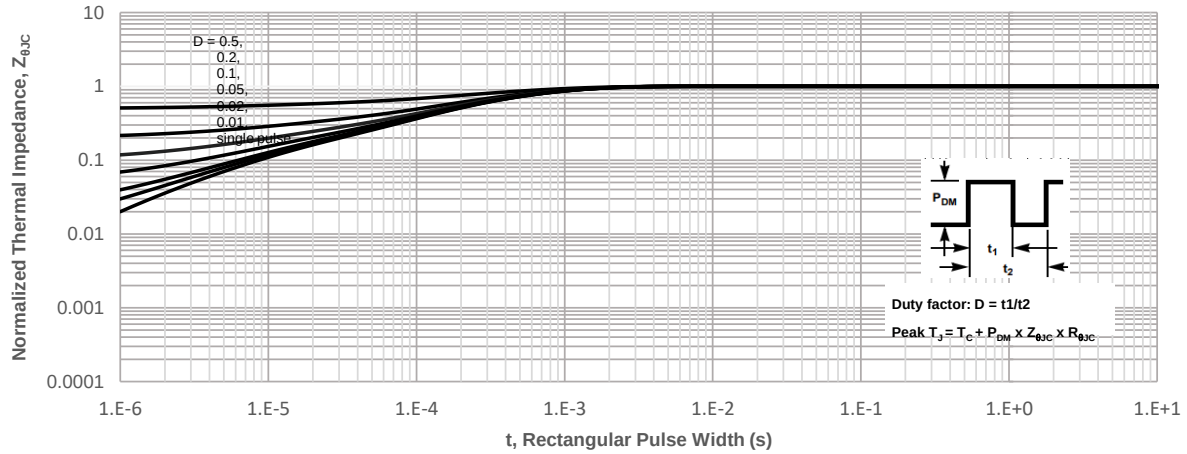
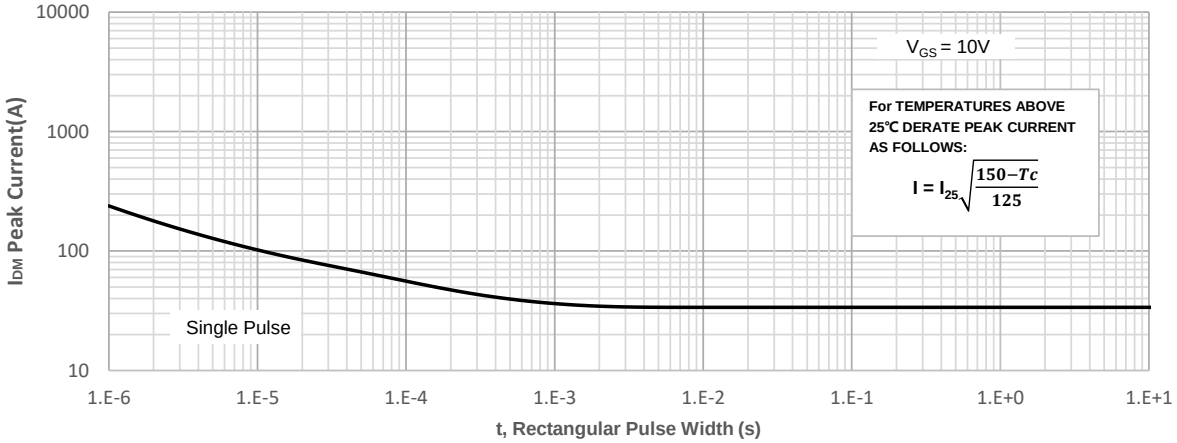


Figure 4: Peak Current Capacity



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Typical Performance Characteristics-N

Figure 5: Output Characteristics

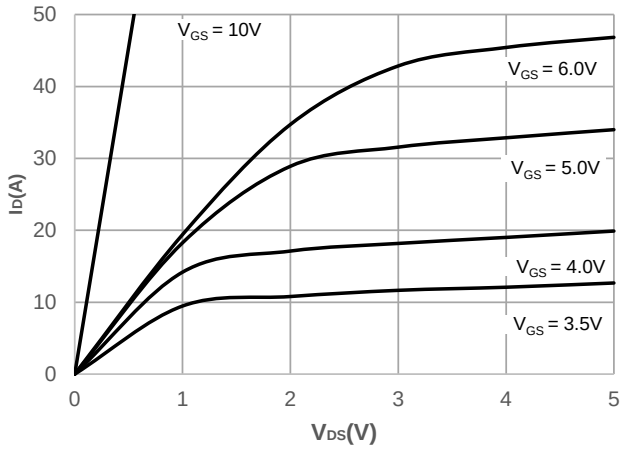


Figure 6: Typical Transfer Characteristics

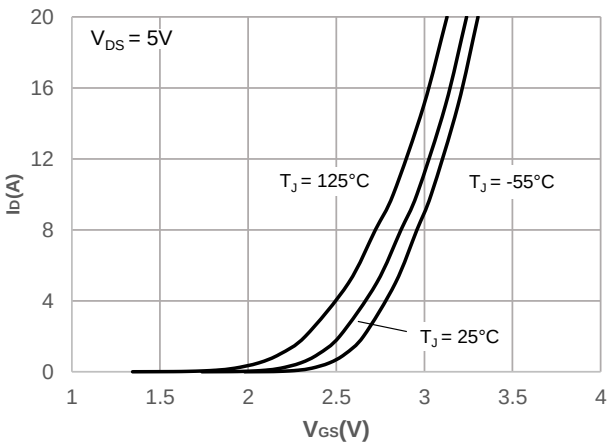


Figure 7: On-resistance vs. Drain Current

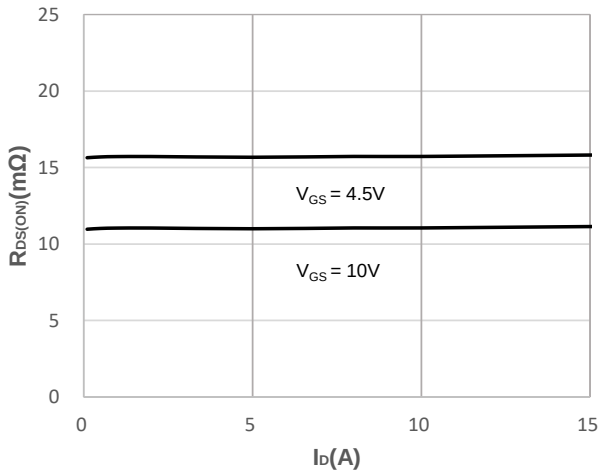


Figure 8: Body Diode Characteristics

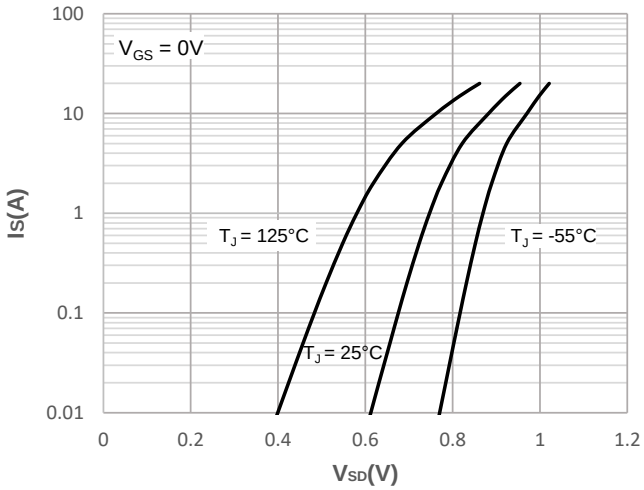


Figure 9: Gate Charge Characteristics

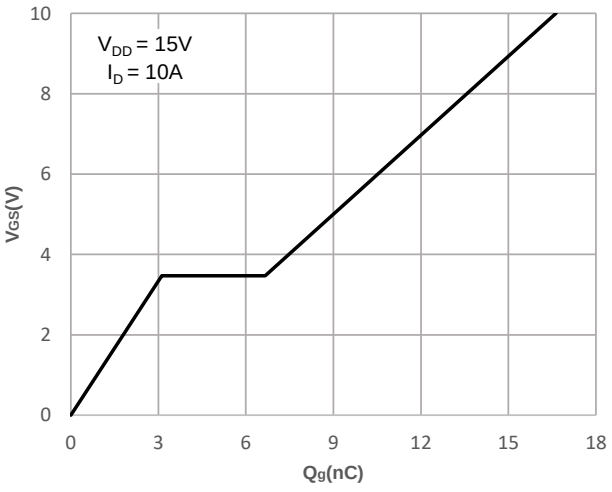
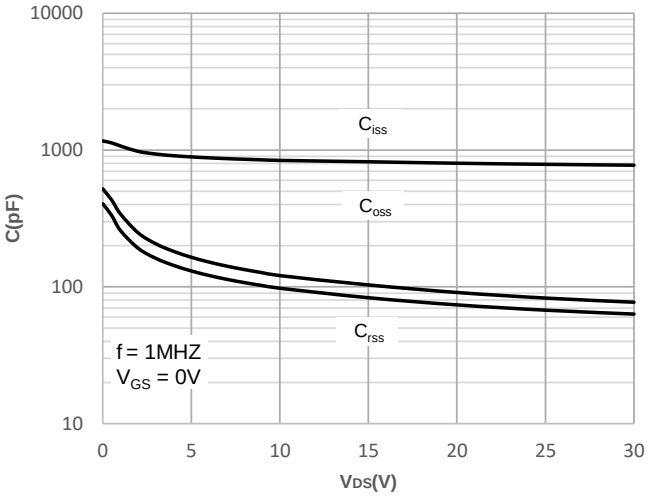


Figure 10: Capacitance Characteristics



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Typical Performance Characteristics-N

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

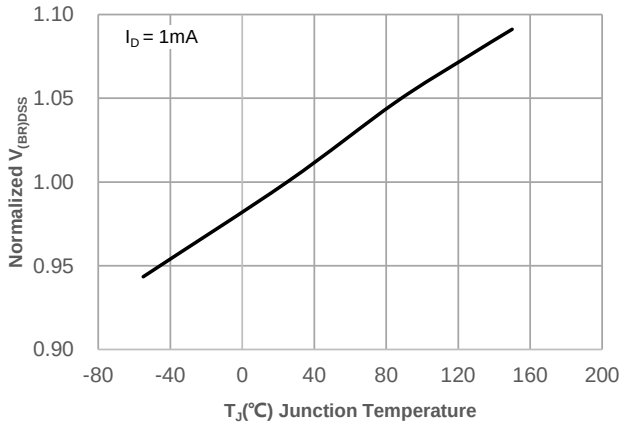


Figure 12: Normalized on Resistance vs. Junction Temperature

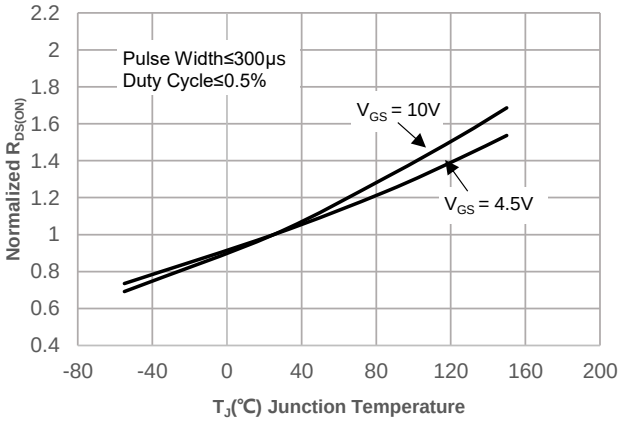


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

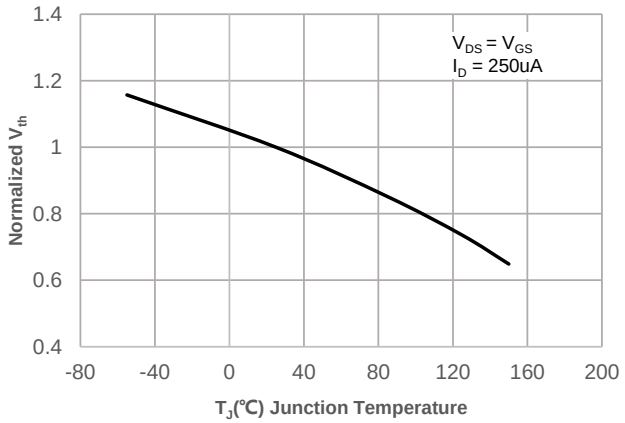


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

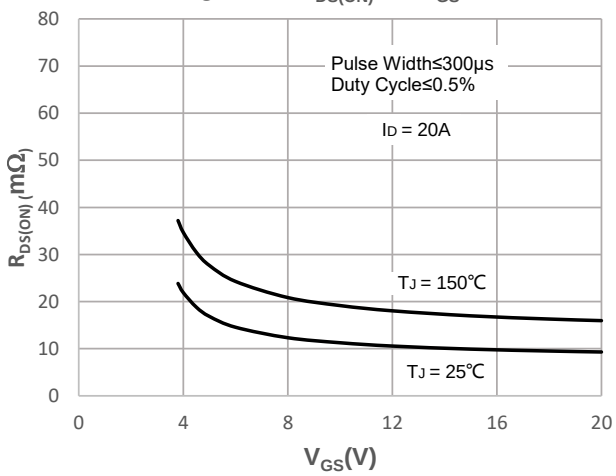
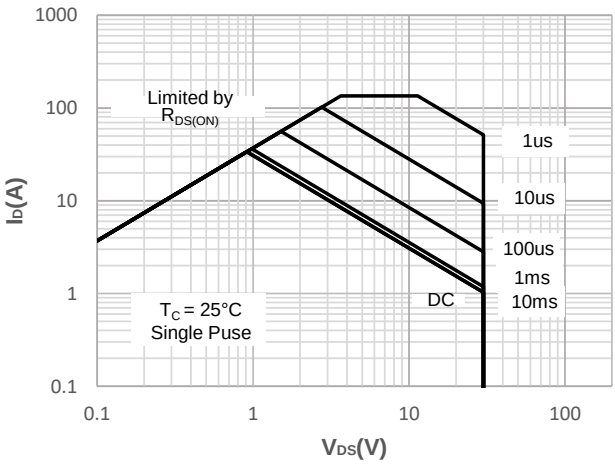


Figure 15: Maximum Safe Operating Area



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Typical Performance Characteristics-P

Figure 1: Power De-rating

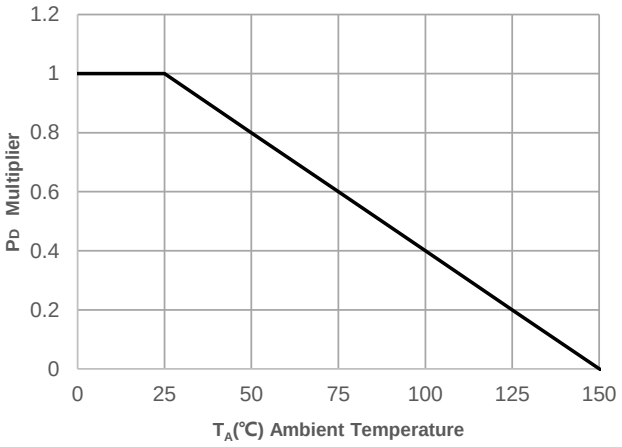


Figure 2: Current De-rating

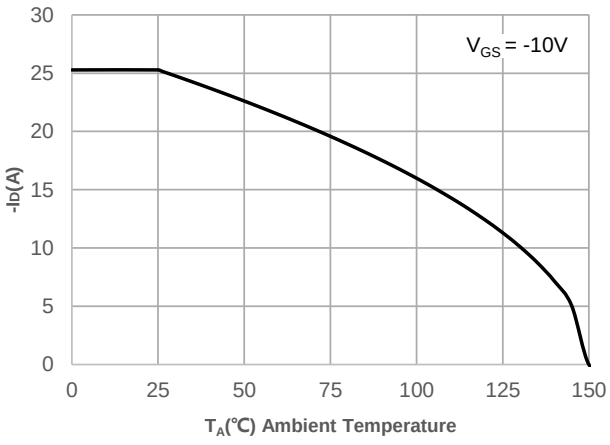


Figure 3: Normalized Maximum Transient Thermal Impedance

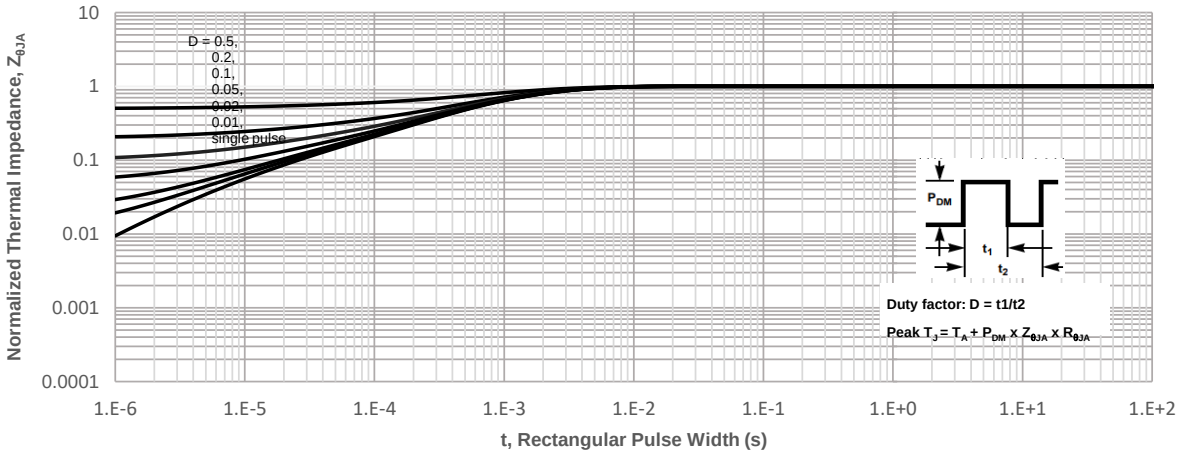
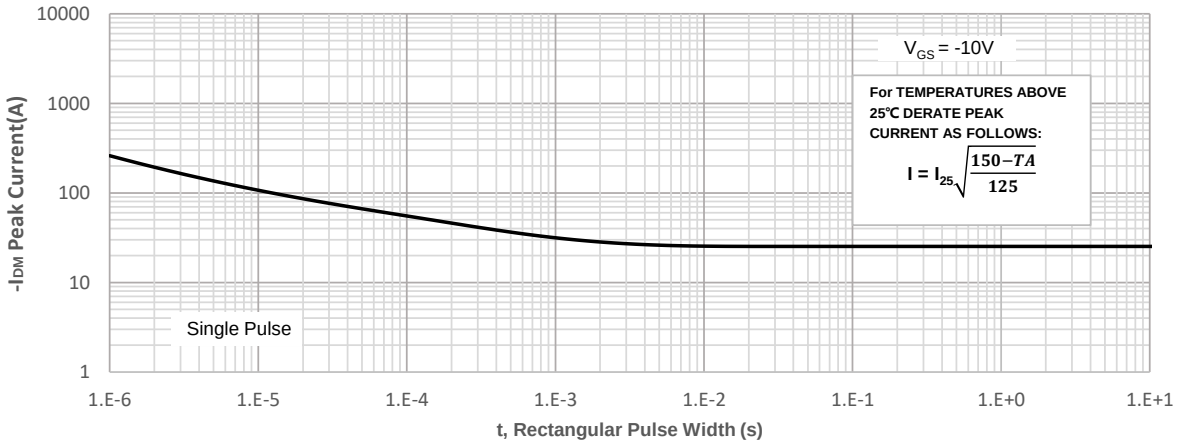


Figure 4: Peak Current Capacity



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Typical Performance Characteristics-P

Figure 5: Output Characteristics

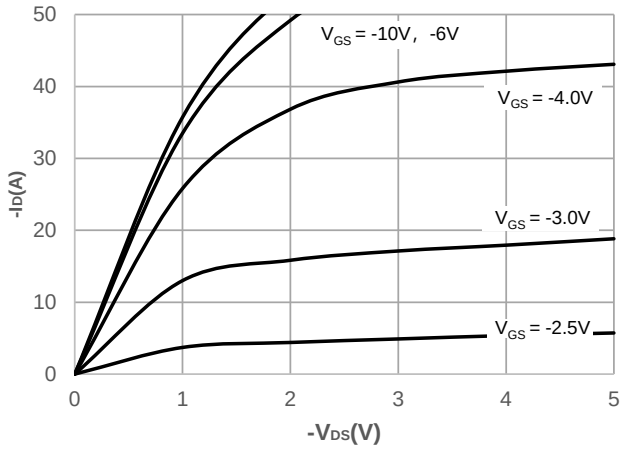


Figure 6: Typical Transfer Characteristics

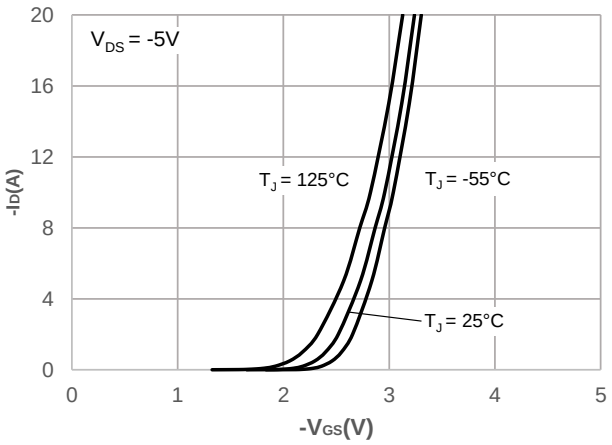


Figure 7: On-resistance vs. Drain Current

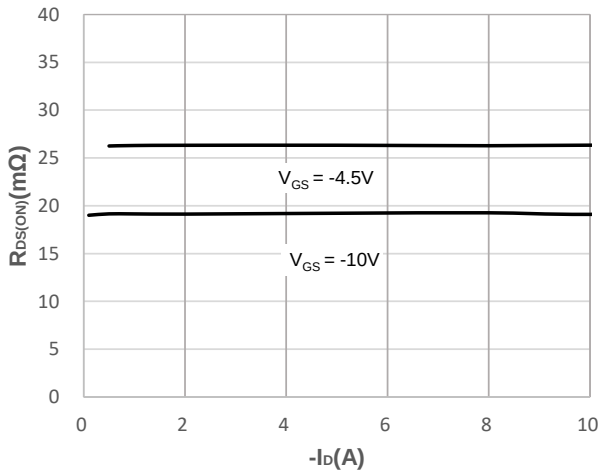


Figure 8: Body Diode Characteristics

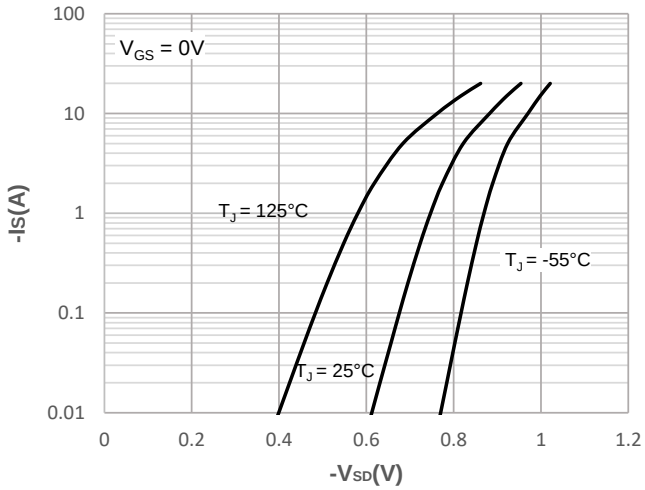


Figure 9: Gate Charge Characteristics

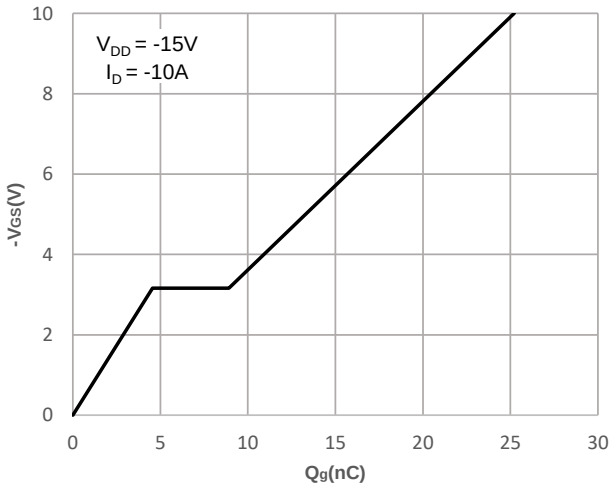
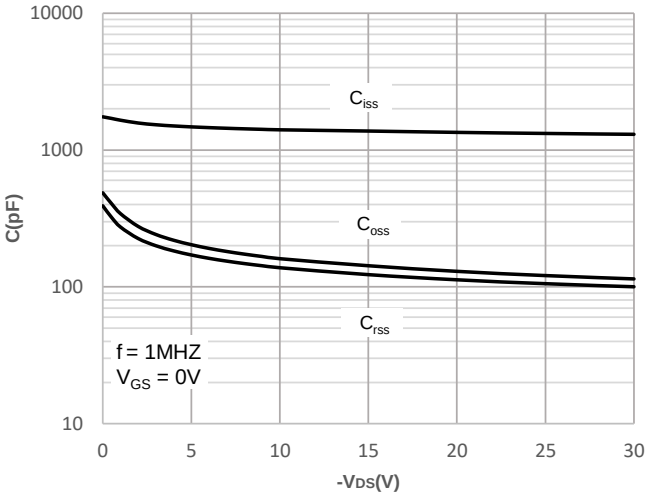


Figure 10: Capacitance Characteristics



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Typical Performance Characteristics-P

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

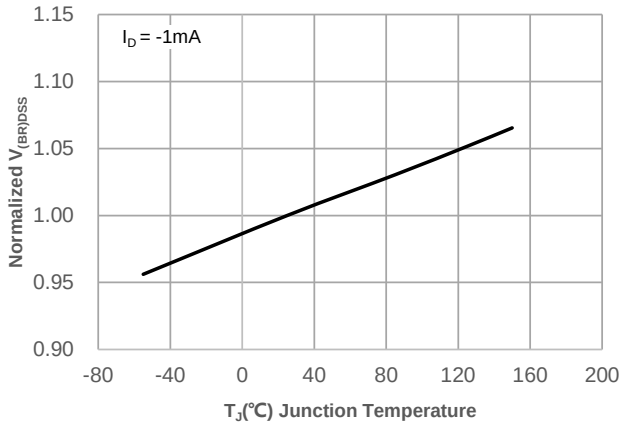


Figure 12: Normalized on Resistance vs. Junction Temperature

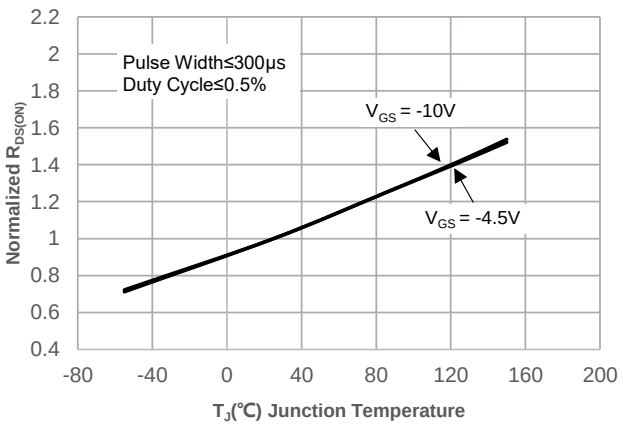


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

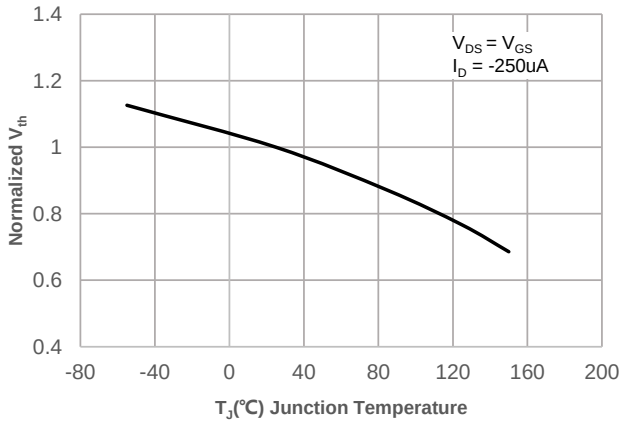


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

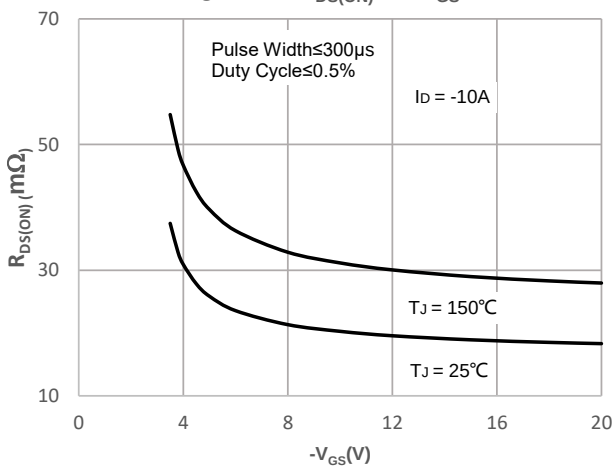
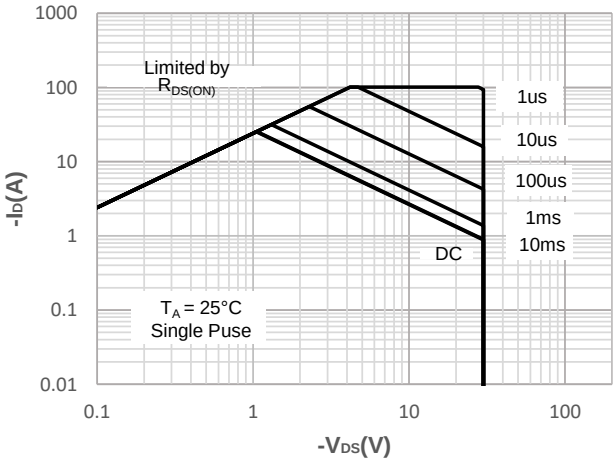


Figure 15: Maximum Safe Operating Area



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Test Circuit

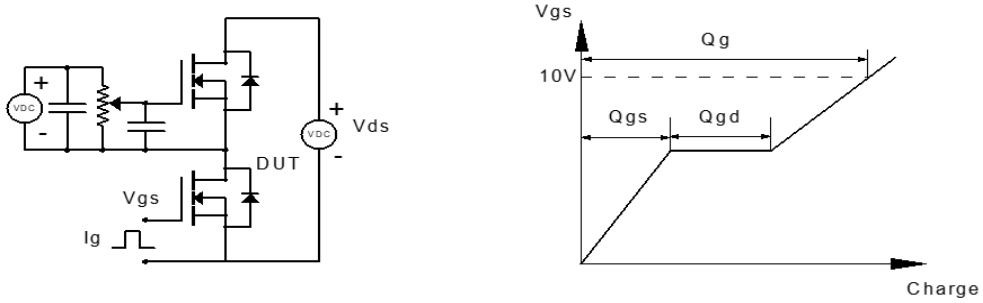

Figure 1: Gate Charge Test Circuit & Waveform

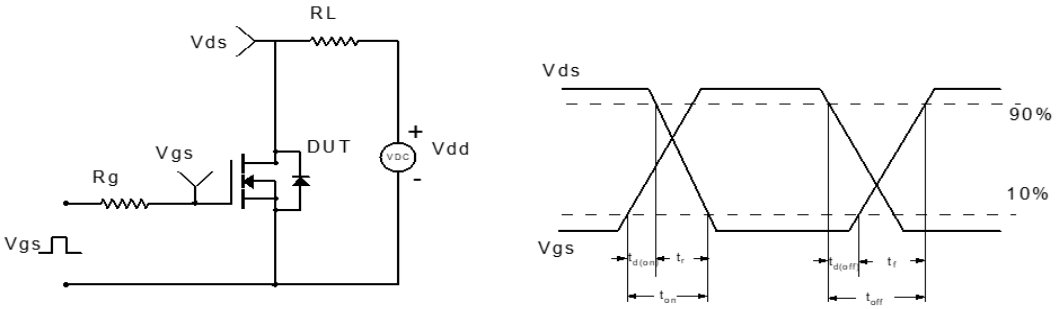

Figure 2: Resistive Switching Test Circuit & Waveform

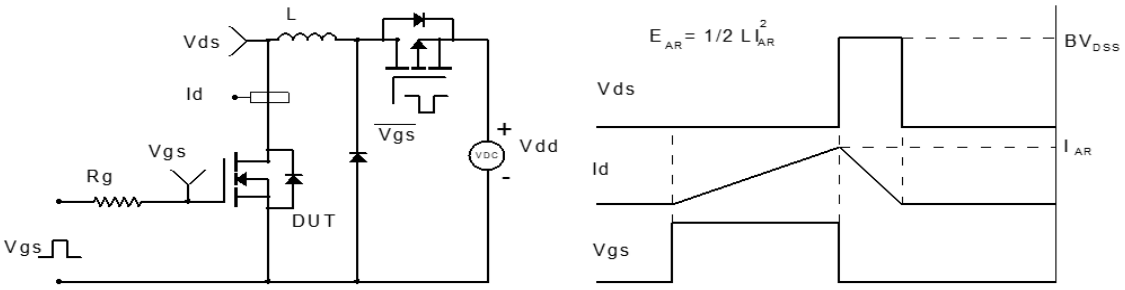

Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

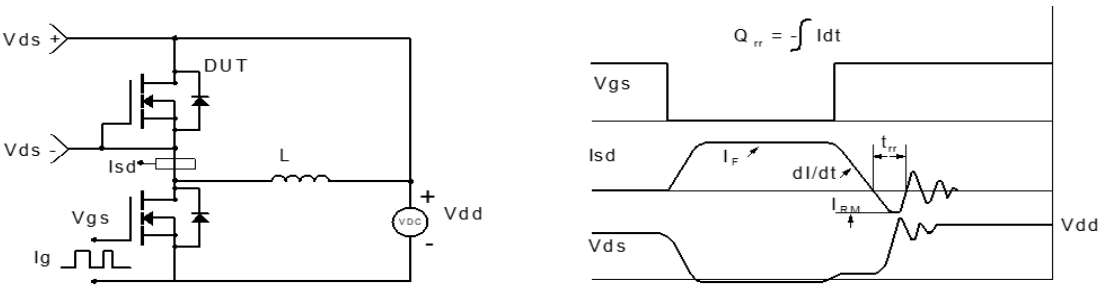

Figure 4: Diode Recovery Test Circuit & Waveform

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Test Circuit

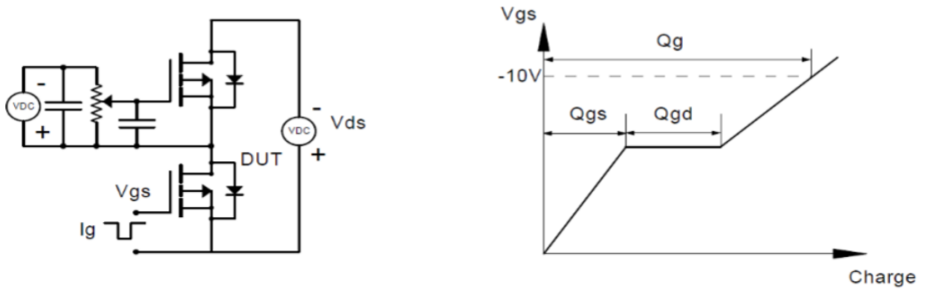

Figure 1: Gate Charge Test Circuit & Waveform

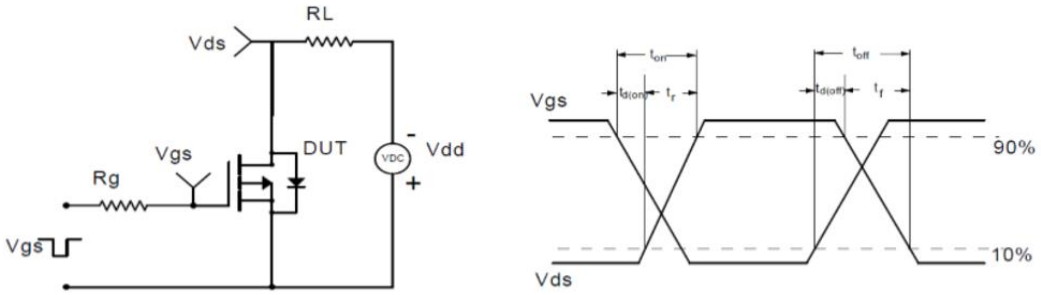

Figure 2: Resistive Switching Test Circuit & Waveform

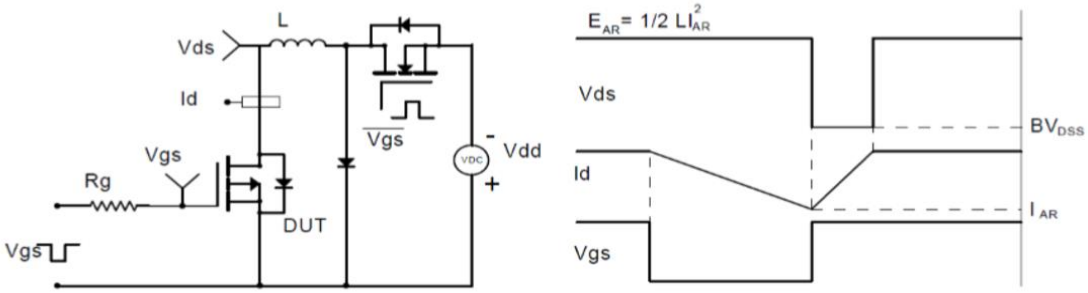

Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

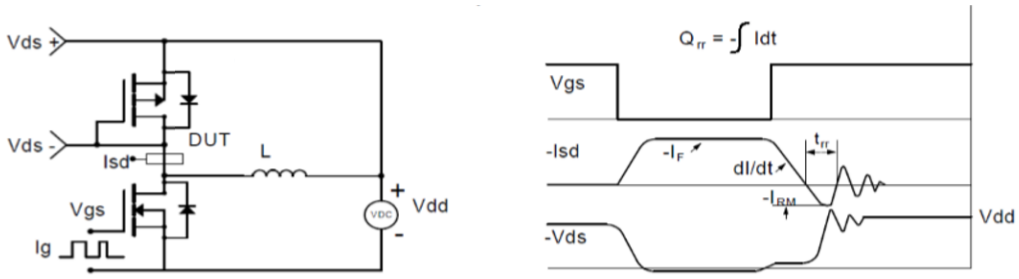

Figure 4: Diode Recovery Test Circuit & Waveform

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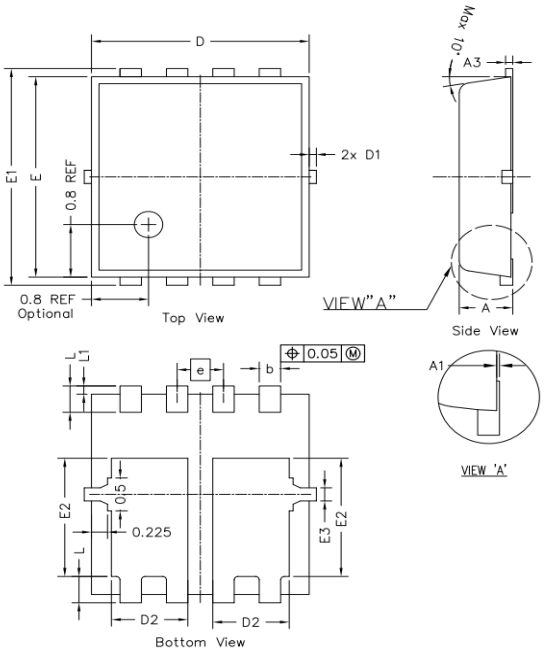
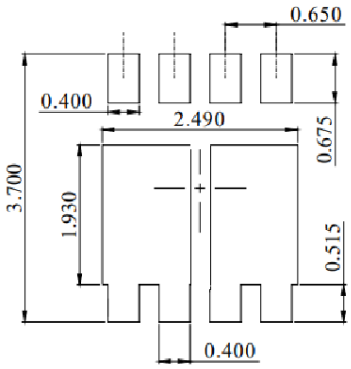
Package Mechanical Data(PDFN3X3-8L-D)

Package Outline



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

Recommended Soldering Footprint



DIMENSIONS:MILLIMETERS

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