

Description

JMT N And P-channel Enhancement Mode Power MOSFET

Features

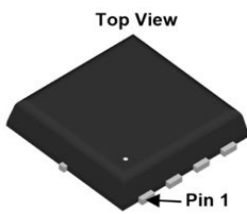
- N-channel: 40V, 14A
 $R_{DS(ON)} < 21m\Omega @ V_{GS} = 10V$
 $R_{DS(ON)} < 25m\Omega @ V_{GS} = 4.5V$
- P-channel: -40V, -14A
 $R_{DS(ON)} < 40m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 49m\Omega @ V_{GS} = -4.5V$
- Excellent Gate Charge x $R_{DS(ON)}$ Product(FOM)
- Very Low On-resistance $R_{DS(ON)}$
- Fast Switching Speed

Applications

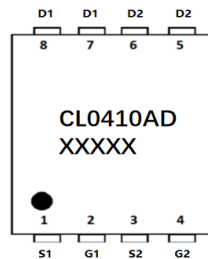
- Battery Protection
- Load Switch
- Power Management



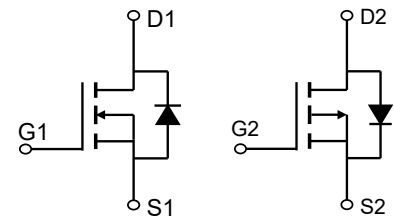
100% UIS TESTED!
100% ΔVds TESTED!



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)
CL0410AD	JMCL0410AUD	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	40	-40	V
V_{GS}	Gate-to-Source Voltage	±20		V
I_D	Continuous Drain Current	$T_C = 25^\circ C$	14	-14
		$T_C = 100^\circ C$	9	-9
I_{DM}	Pulsed Drain Current ⁽¹⁾	56	-56	A
E_{AS}	Single Pulsed Avalanche Energy ⁽²⁾	20	20	mJ
P_D	Power Dissipation	$T_C = 25^\circ C$		14
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ⁽³⁾			64
$R_{\theta JC}$	Thermal Resistance, Junction to Case			8.8
T_J, T_{STG}	Junction & Storage Temperature Range			-55 to 150



N-channel Electrical Characteristics (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	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 40V, 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	1.0	1.5	2.5	V
R _{DS(ON)}	Static Drain-Source ON-Resistance ⁽⁴⁾	V _{GS} = 10V, I _D = 14A	-	16	21	mΩ
		V _{GS} = 4.5V, I _D = 10A	-	19	25	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = 20V, f = 1MHz	-	1061	-	pF
C _{oss}	Output Capacitance		-	74	-	pF
C _{rss}	Reverse Transfer Capacitance		-	62	-	pF
Q _g	Total Gate Charge	V _{GS} = 0 to 10V V _{DD} = 20V, I _D = 5A	-	23	-	nC
Q _{gs}	Gate Source Charge		-	3.5	-	nC
Q _{gd}	Gate Drain("Miller") Charge		-	4	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On DelayTime	V _{GS} = 10V, V _{DD} = 20V I _D = 5A, R _{GEN} = 3Ω	-	6	-	ns
t _r	Turn-On Rise Time		-	6	-	ns
t _{d(off)}	Turn-Off DelayTime		-	24	-	ns
t _f	Turn-Off Fall Time		-	3	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	14	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	56	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = 14A	-	-	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F = 5A, di/dt = 100A/μs	-	10	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	5	-	nC



P-channel Electrical Characteristics (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	-40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -40V, 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	-1.8	-2.3	V
R _{DS(ON)}	Static Drain-Source ON-Resistance ⁽⁴⁾	V _{GS} = -10V, I _D = -5A	-	31	40	mΩ
		V _{GS} = -4.5V, I _D = -3A	-	38	49	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = -20V, f = 1MHz	-	1117	-	pF
C _{oss}	Output Capacitance		-	89	-	pF
C _{rss}	Reverse Transfer Capacitance		-	74	-	pF
Q _g	Total Gate Charge	V _{GS} = 0 to -10V V _{DD} = -20V, I _D = -5A	-	22	-	nC
Q _{gs}	Gate Source Charge		-	4	-	nC
Q _{gd}	Gate Drain("Miller") Charge		-	4	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On DelayTime	V _{GS} = -10V, V _{DD} = -20V I _D = -5A, R _{GEN} = 3Ω	-	5	-	ns
t _r	Turn-On Rise Time		-	2	-	ns
t _{d(off)}	Turn-Off DelayTime		-	54	-	ns
t _f	Turn-Off Fall Time		-	25	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-14	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-56	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = -14A	-	-	-1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F = -5A, di/dt = 100A/μs	-	13	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	7	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting T_J = 25°C, V_{DD} = 20V, V_G = 10V, R_G = 25ohm, L = 0.5mH, I_{AS} = 9A
Starting T_J = 25°C, V_{DD} = -20V, V_G = -10V, R_G = 25ohm, L = 0.5mH, I_{AS} = -9A
 3. R_{θJA} is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB
 4. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%.

Typical Performance Characteristics-N

Figure 1: Output Characteristics

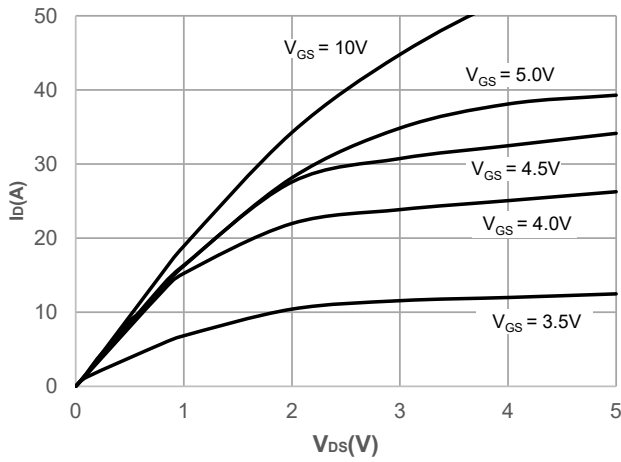


Figure 2: Typical Transfer Characteristics

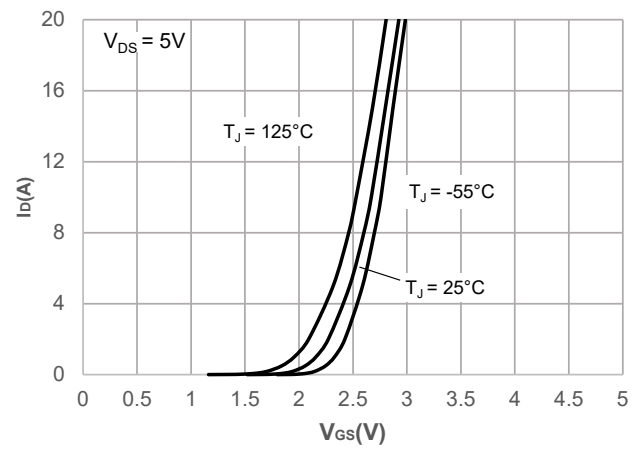


Figure 3: On-resistance vs. Drain Current

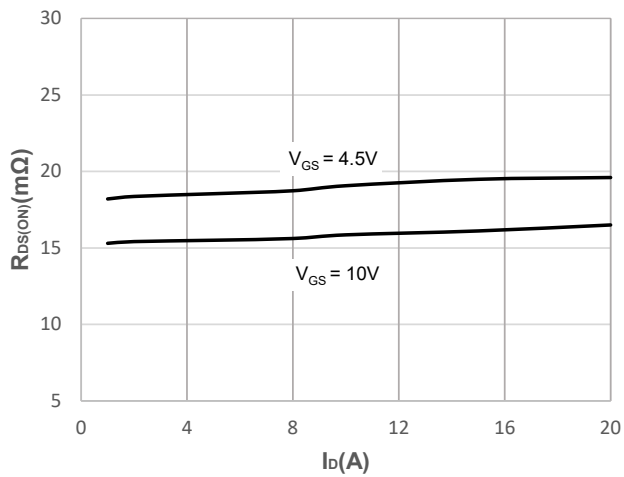


Figure 4: Body Diode Characteristics

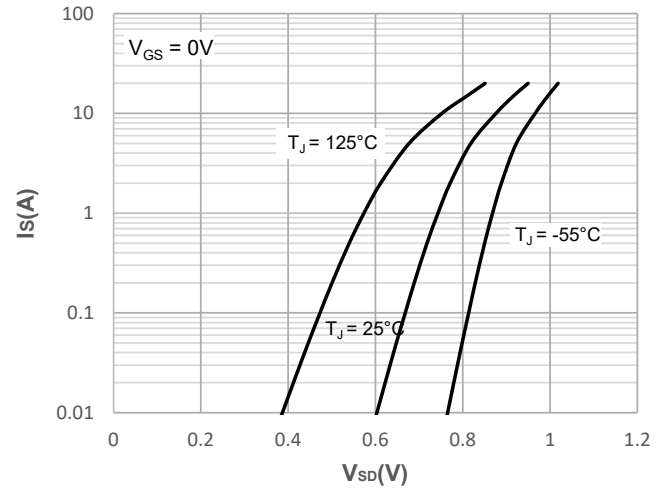


Figure 5: Gate Charge Characteristics

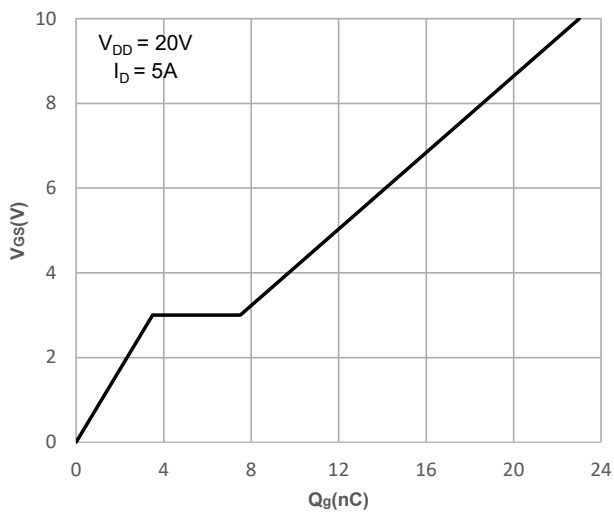
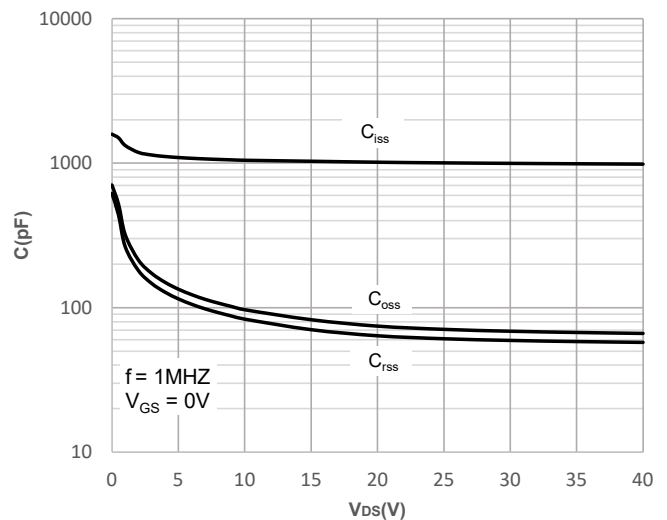


Figure 6: Capacitance Characteristics



Typical Performance Characteristics-N

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

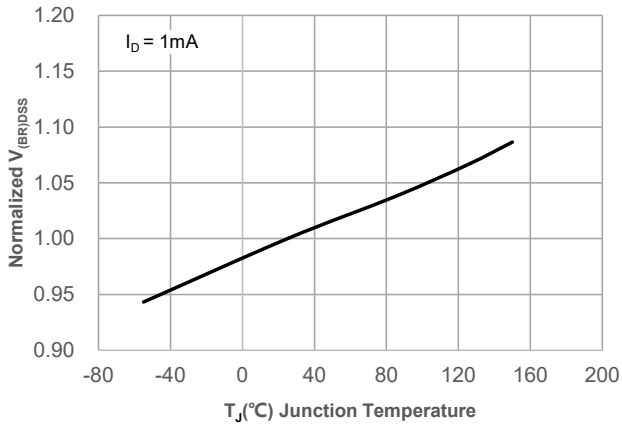


Figure 8: Normalized on Resistance vs. Junction Temperature

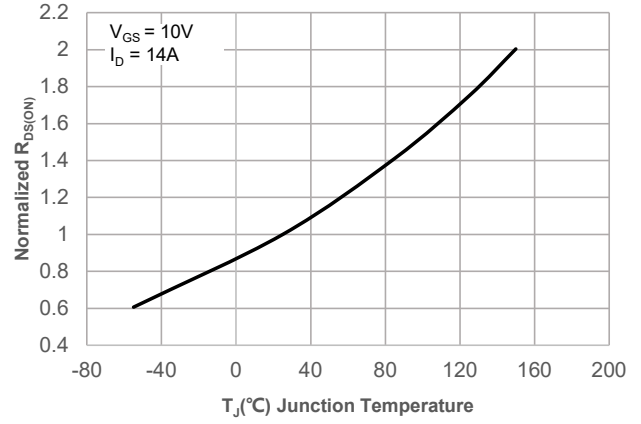


Figure 9: Maximum Safe Operating Area

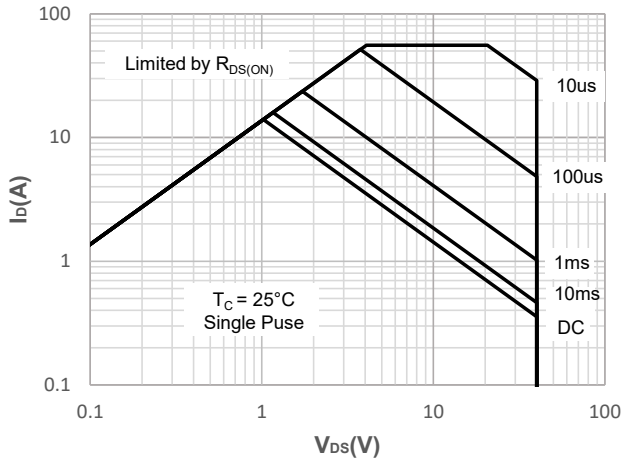


Figure 10: Maximum Continuous Driand Current vs. Case Temperature

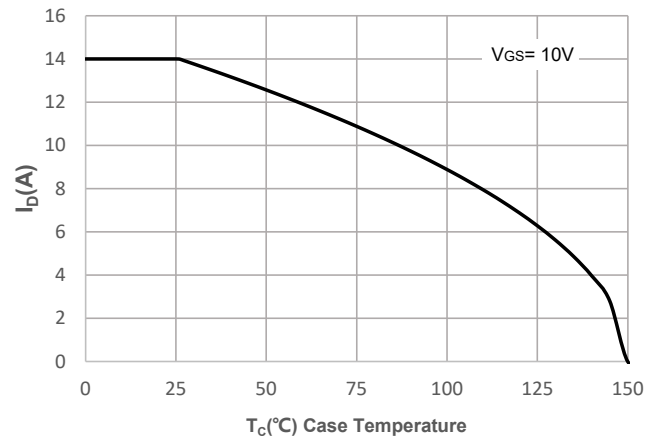


Figure 11: Normalized Maximum Transient Thermal Impedance

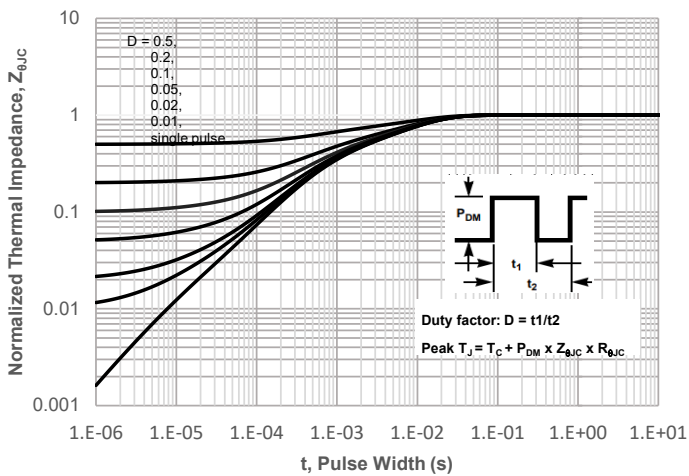
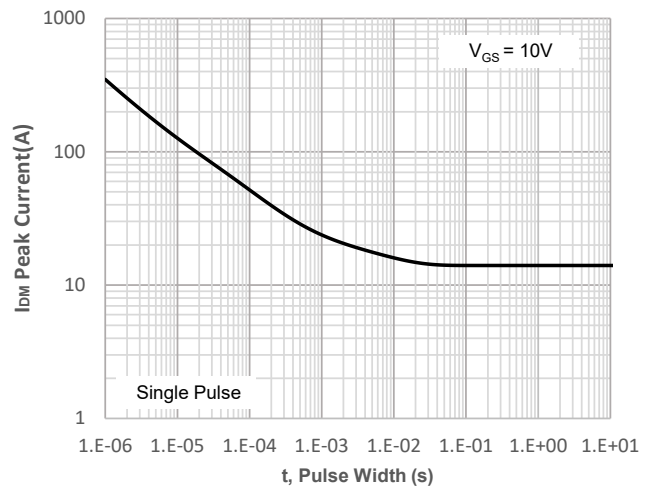


Figure 12: Peak Current Capacity



Test Circuit-N

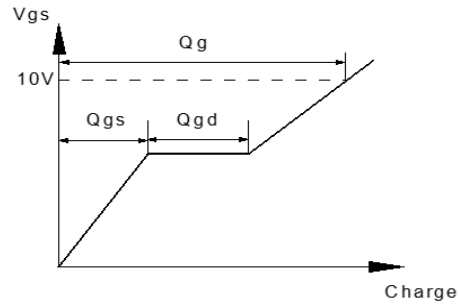
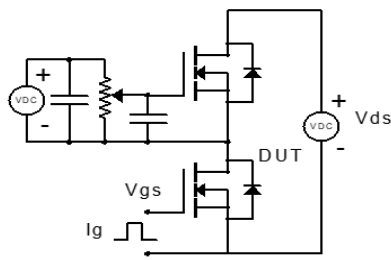


Figure 1: Gate Charge Test Circuit & Waveform

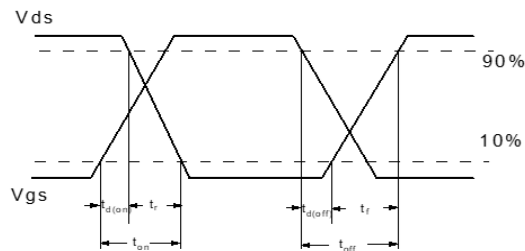
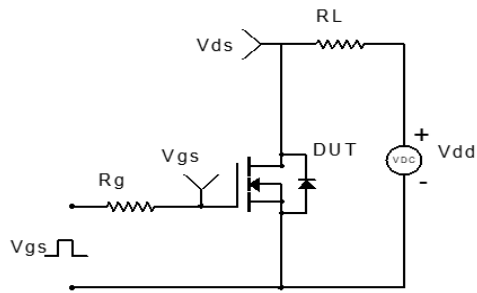


Figure 2: Resistive Switching Test Circuit & Waveform

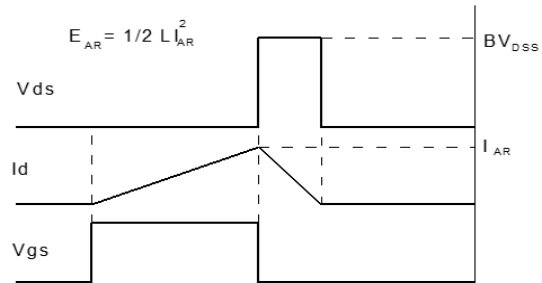
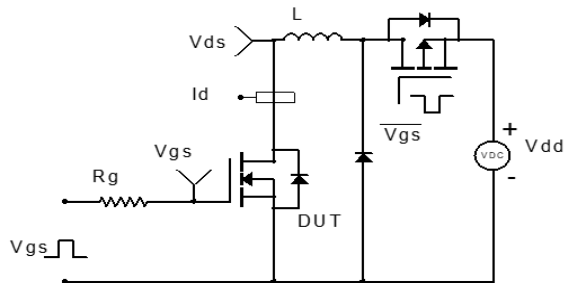


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

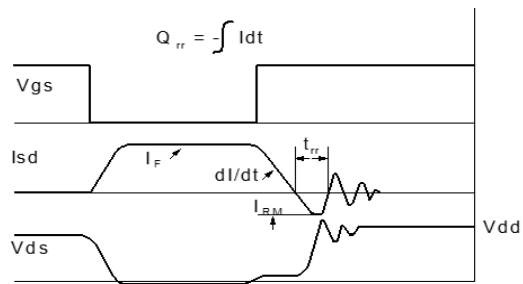
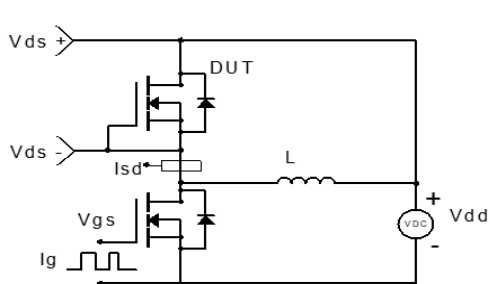


Figure 4: Diode Recovery Test Circuit & Waveform

Typical Performance Characteristics-P

Figure 1: Output Characteristics

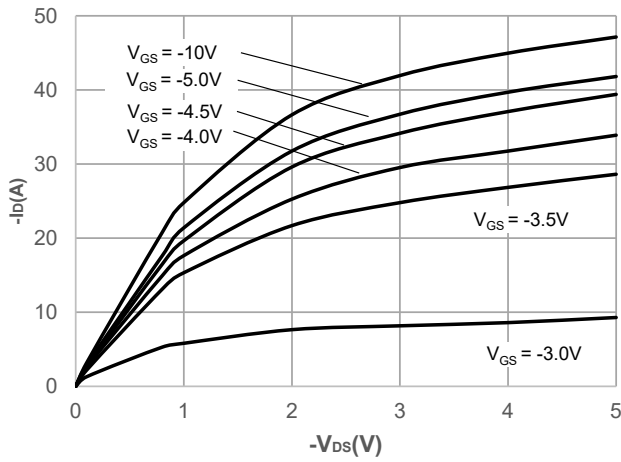


Figure 2: Typical Transfer Characteristics

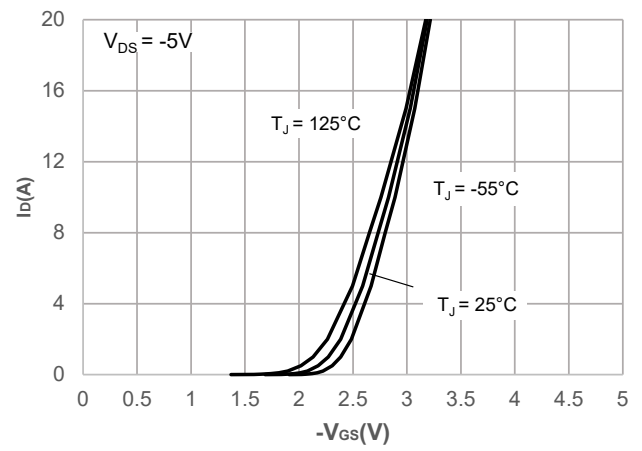


Figure 3: On-resistance vs. Drain Current

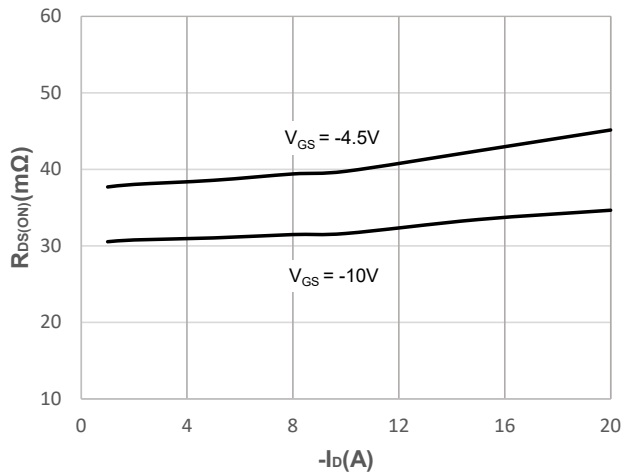


Figure 4: Body Diode Characteristics

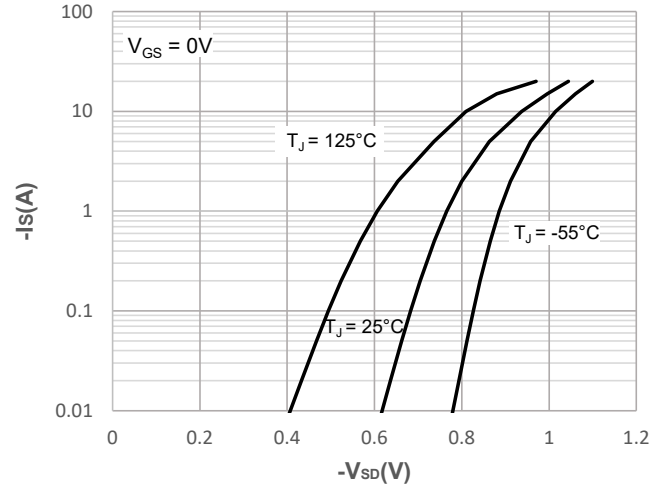


Figure 5: Gate Charge Characteristics

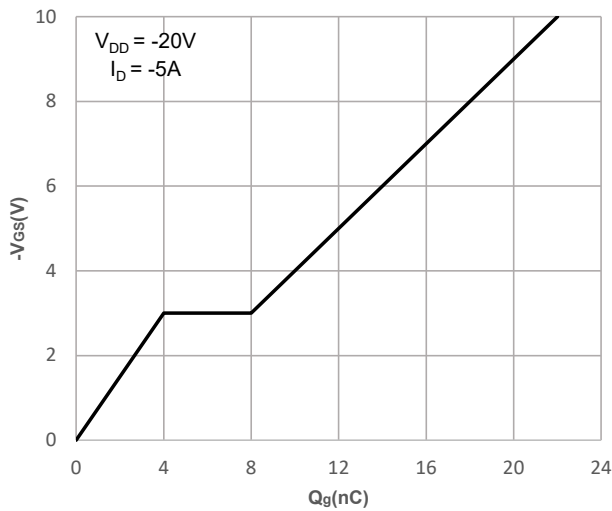
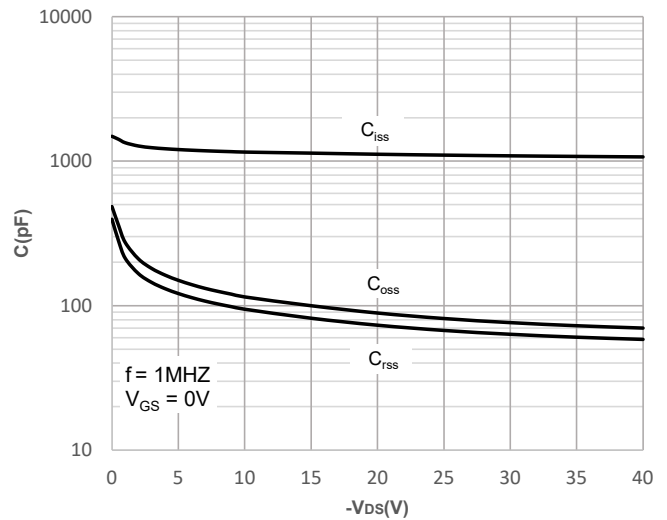


Figure 6: Capacitance Characteristics



Typical Performance Characteristics-P

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

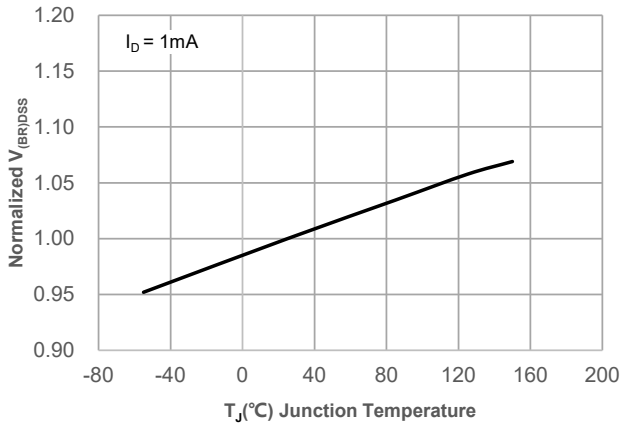


Figure 8: Normalized on Resistance vs. Junction Temperature

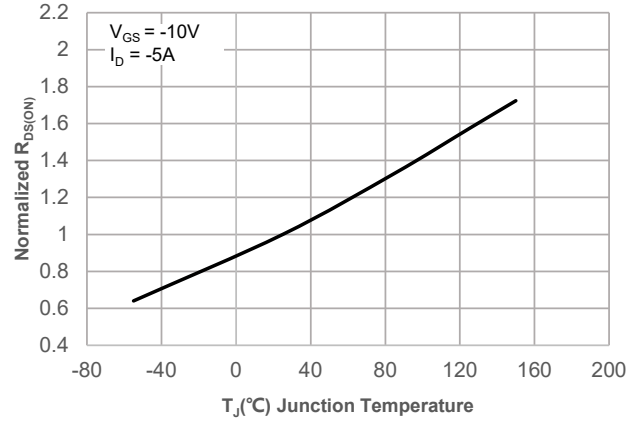


Figure 9: Maximum Safe Operating Area

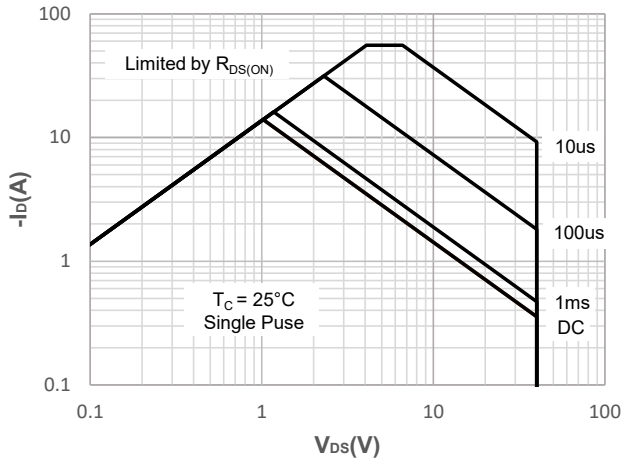


Figure 10: Maximum Continuous Driand Current vs. Case Temperature

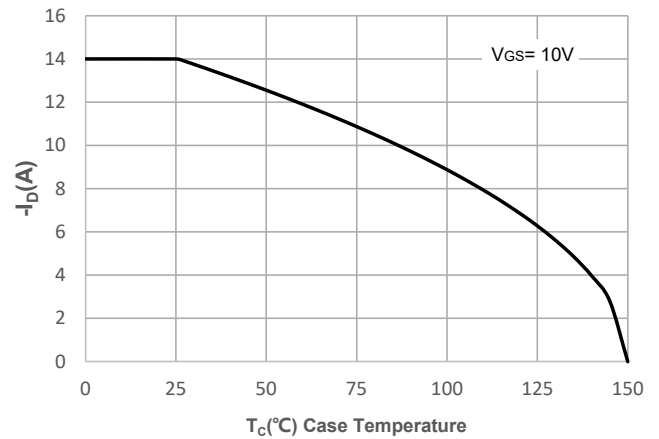


Figure 11: Normalized Maximum Transient Thermal Impedance

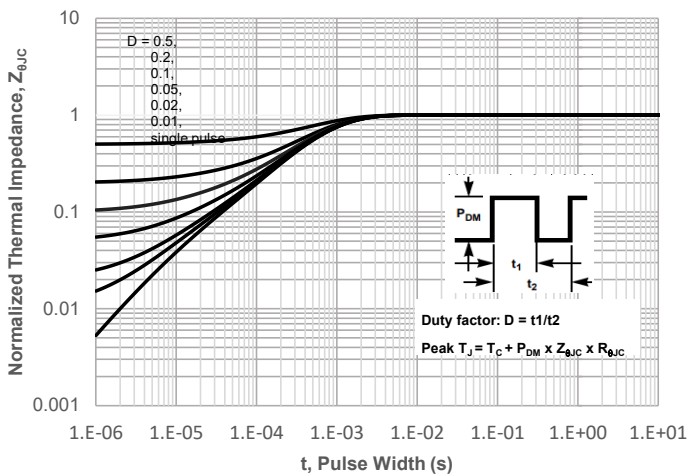
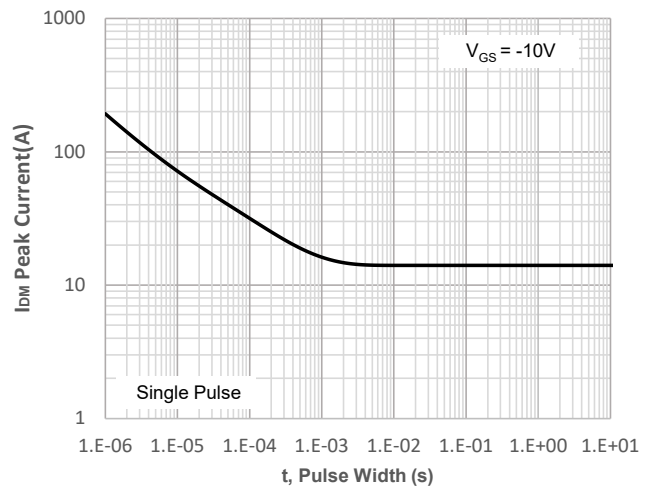


Figure 12: Peak Current Capacity



Test Circuit-P

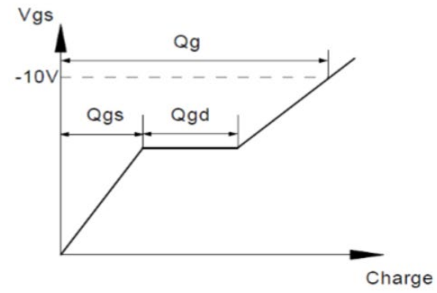
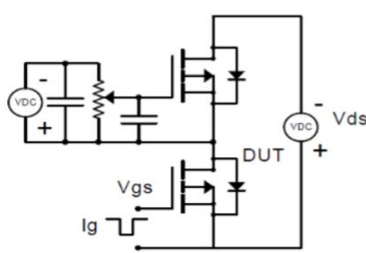


Figure 1: Gate Charge Test Circuit & Waveform

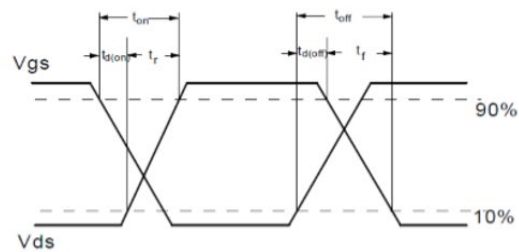
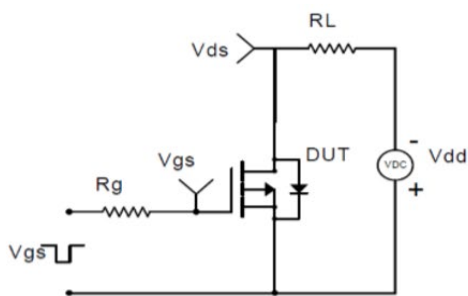


Figure 2: Resistive Switching Test Circuit & Waveform

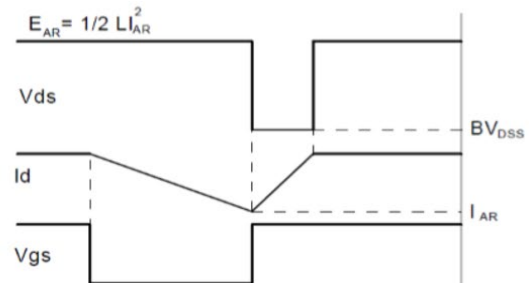
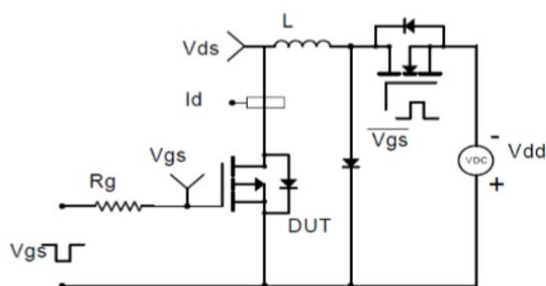


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

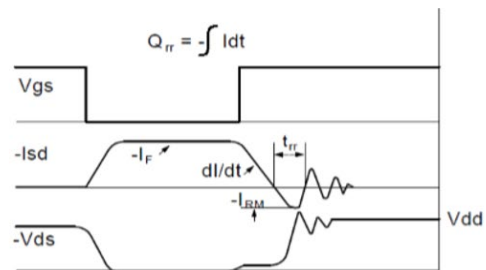
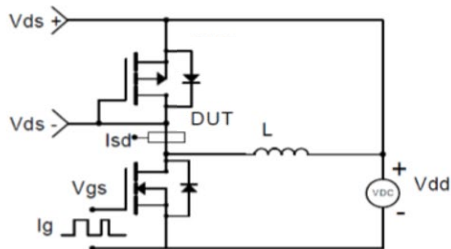
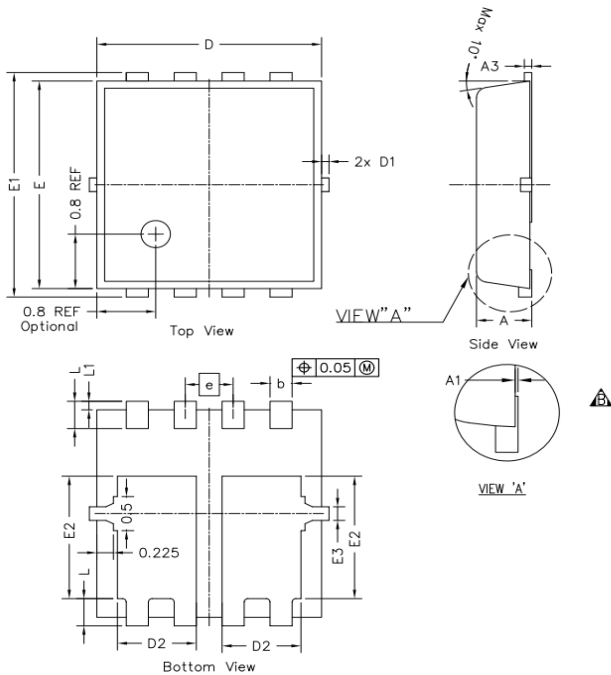


Figure 4: Diode Recovery Test Circuit & Waveform



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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