

Description

JMT N And P-channel Enhancement Mode Power MOSFET

Features

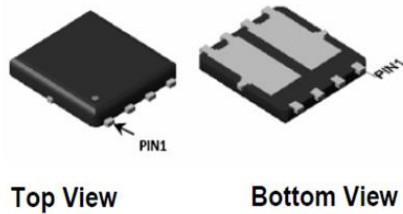
- N-channel: 40V, 16A
 $R_{DS(ON)} < 19m\Omega @ V_{GS} = 10V$
 $R_{DS(ON)} < 22m\Omega @ V_{GS} = 4.5V$
- P-channel: -40V, -16A
 $R_{DS(ON)} < 39m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 47m\Omega @ V_{GS} = -4.5V$
- Excellent Gate Charge x $R_{DS(ON)}$ Product(FOM)
- Very Low On-resistance $R_{DS(ON)}$
- Fast Switching Speed

Applications

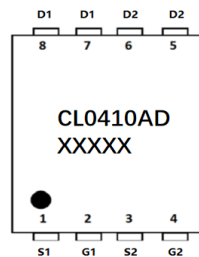
- Battery Protection
- Load Switch
- Power Management



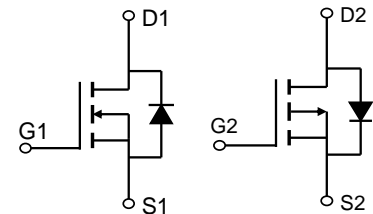
100% UIS TESTED!
100% ΔV_{ds} TESTED!



PDFN5x6-8L-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	JMCL0410AGD	TAPING	PDFN5x6-8L-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	$T_C = 25^\circ C$	16	-16
		$T_C = 100^\circ C$	10	-10
I_{DM}	Pulsed Drain Current ⁽¹⁾	64	-64	A
E_{AS}	Single Pulsed Avalanche Energy ⁽²⁾	20	20	mJ
P_D	Power Dissipation	$T_C = 25^\circ C$	50	
			50	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ⁽³⁾	50		$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.5		
T_J, T_{STG}	Junction & Storage Temperature Range	-55 to 150		$^\circ C$



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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 40\text{V}, V_{GS} = 0\text{V}$	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.0	1.5	2.5	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance ⁽⁴⁾	$V_{GS} = 10\text{V}, I_D = 15\text{A}$	-	14	19	$\text{m}\Omega$
		$V_{GS} = 4.5\text{V}, I_D = 10\text{A}$	-	17	22	$\text{m}\Omega$
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 20\text{V}, f = 1\text{MHz}$	-	1061	-	pF
C_{oss}	Output Capacitance		-	74	-	pF
C_{rss}	Reverse Transfer Capacitance		-	62	-	pF
Q_g	Total Gate Charge	$V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DD} = 20\text{V}, I_D = 5\text{A}$	-	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 Delay Time	$V_{GS} = 10\text{V}, V_{DD} = 20\text{V}$ $I_D = 5\text{A}, R_{GEN} = 3\Omega$	-	6	-	ns
t_r	Turn-On Rise Time		-	6	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	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		-	-	16	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	64	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 16\text{A}$	-	-	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F = 5\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	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	-	30	39	mΩ
		V _{GS} = -4.5V, I _D = -3A	-	36	47	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 Delay Time	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 Delay Time		-	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		-	-	-16	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-64	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = -16A	-	-	-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

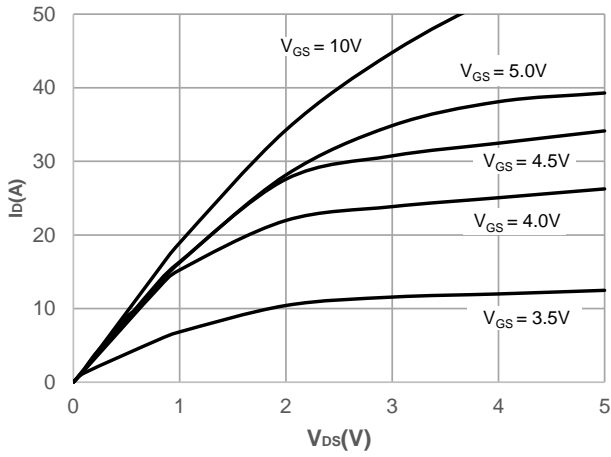


Figure 2: Typical Transfer Characteristics

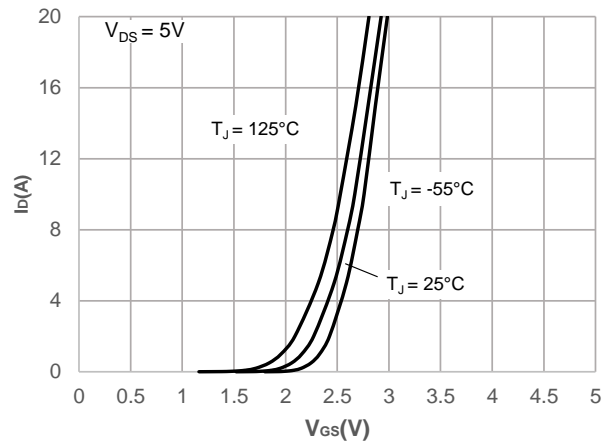


Figure 3: On-resistance vs. Drain Current

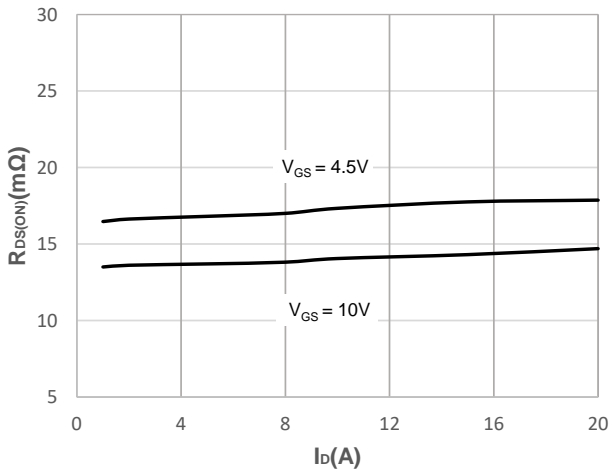


Figure 4: Body Diode Characteristics

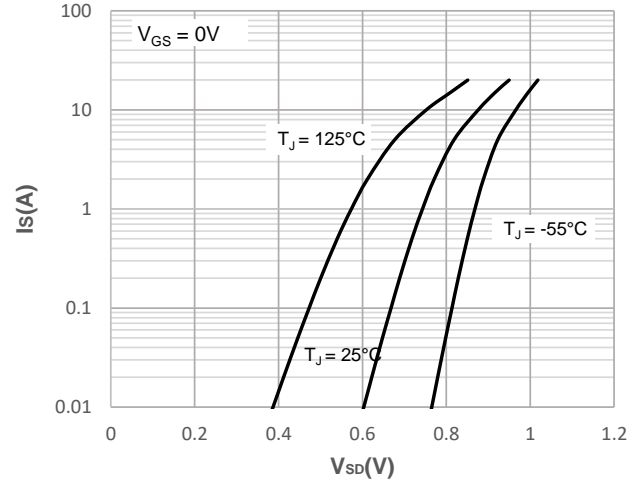


Figure 5: Gate Charge Characteristics

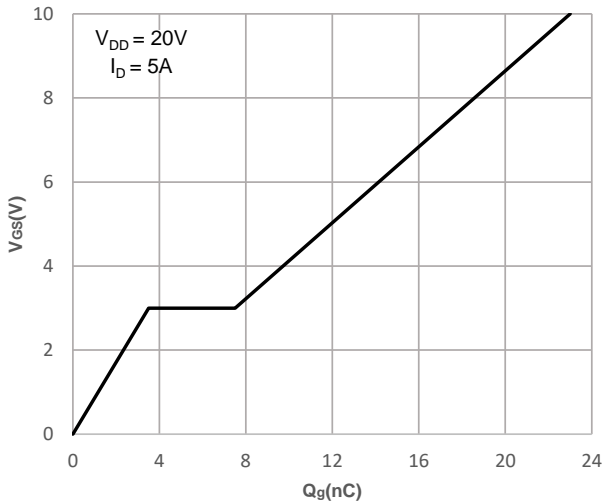
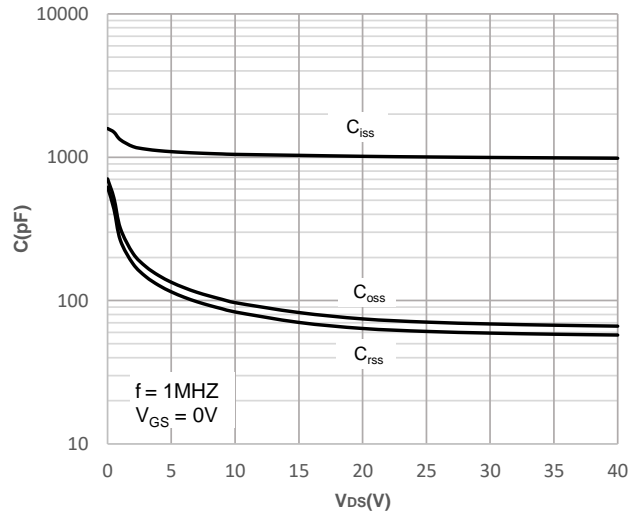


Figure 6: Capacitance Characteristics



Typical Performance Characteristics-N

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

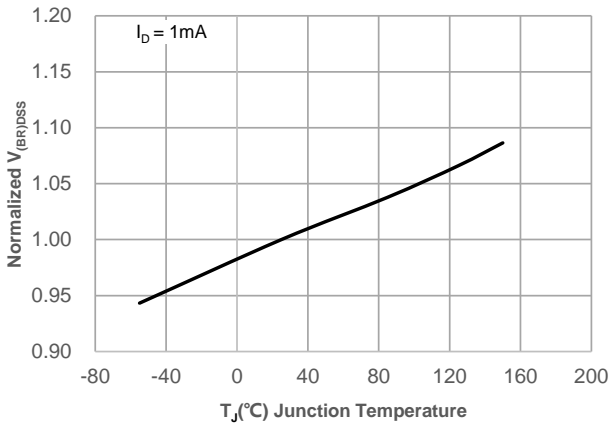


Figure 8: Normalized on Resistance vs. Junction Temperature

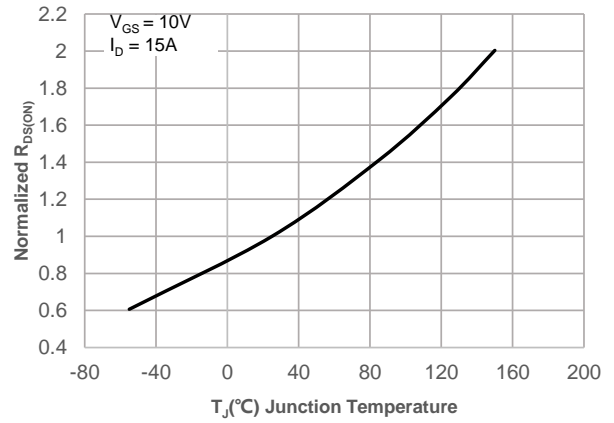


Figure 9: Maximum Safe Operating Area

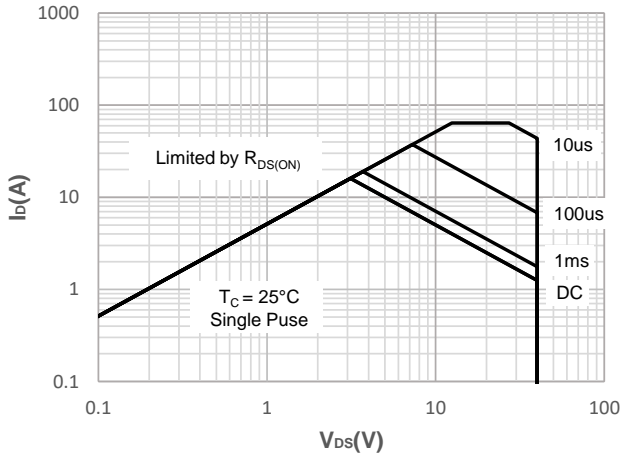


Figure 10: Maximum Continuous Driand Current vs. Case Temperature

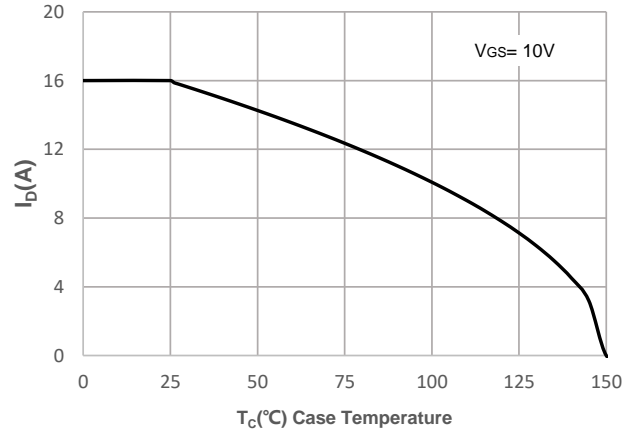


Figure 11: Normalized Maximum Transient Thermal Impedance

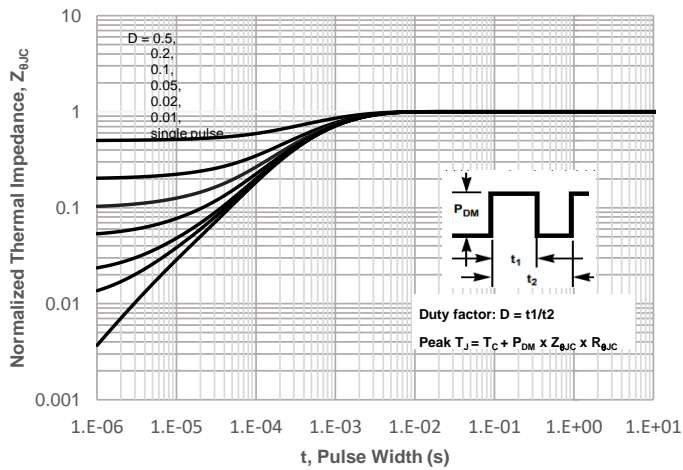
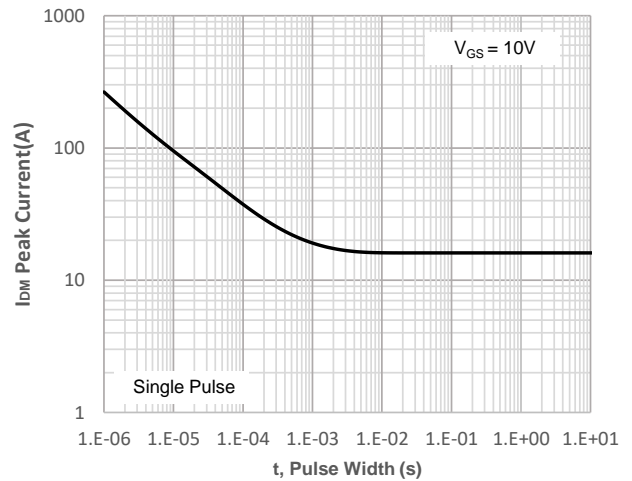


Figure 12: Peak Current Capacity



Typical Performance Characteristics-P

Figure 1: Output Characteristics

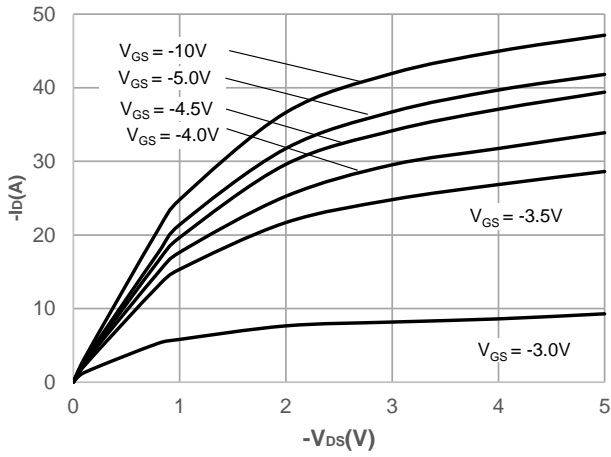


Figure 2: Typical Transfer Characteristics

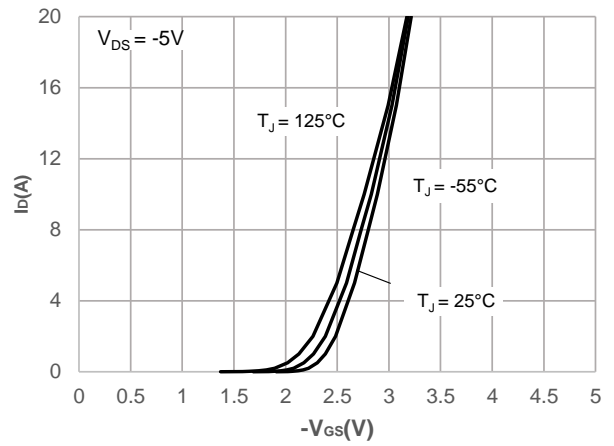


Figure 3: On-resistance vs. Drain Current

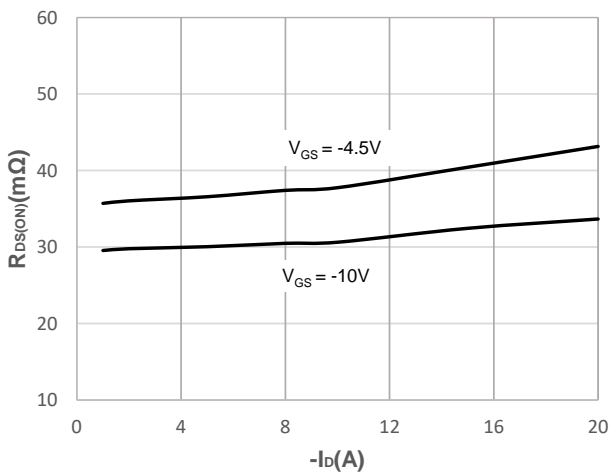


Figure 4: Body Diode Characteristics

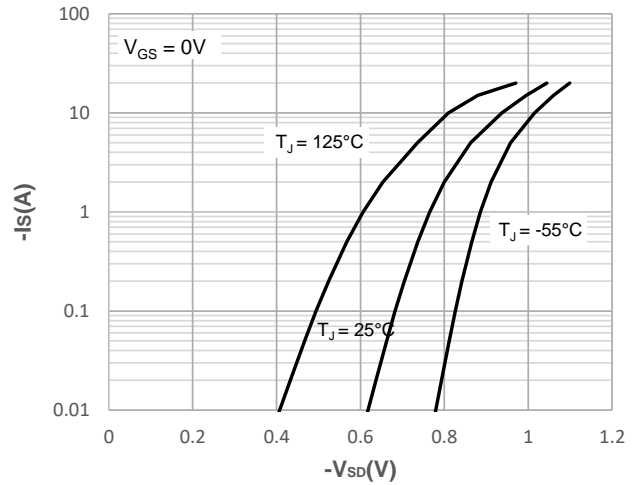


Figure 5: Gate Charge Characteristics

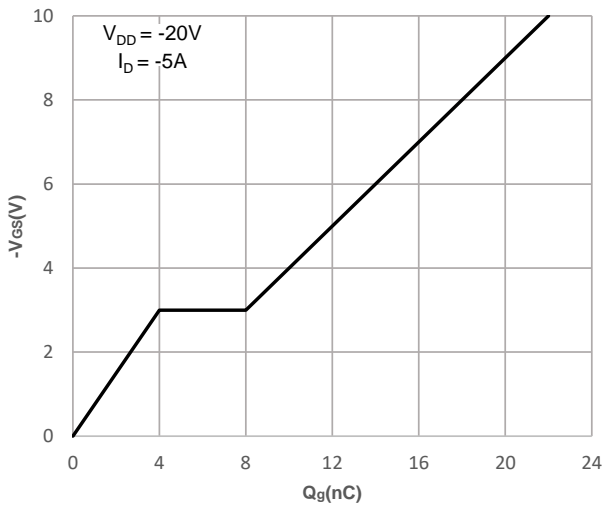
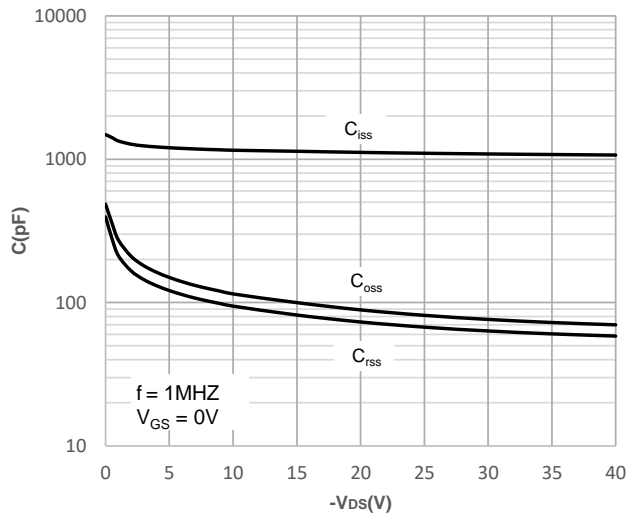


Figure 6: Capacitance Characteristics



Typical Performance Characteristics-P

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

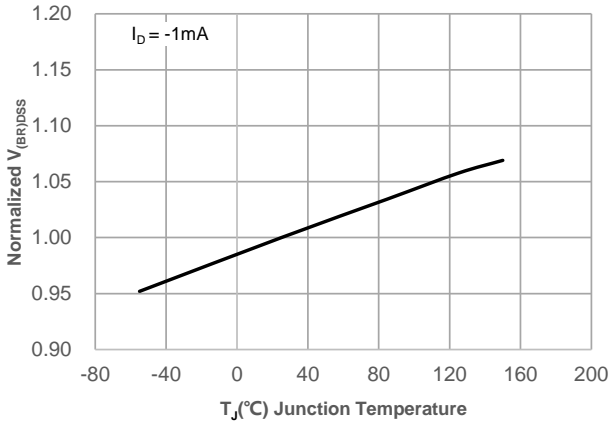


Figure 8: Normalized on Resistance vs. Junction Temperature

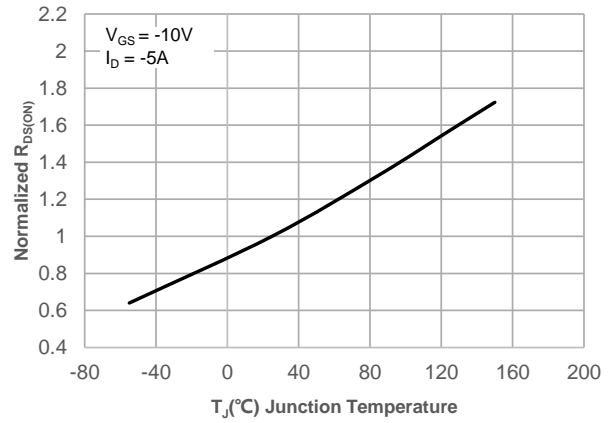


Figure 9: Maximum Safe Operating Area

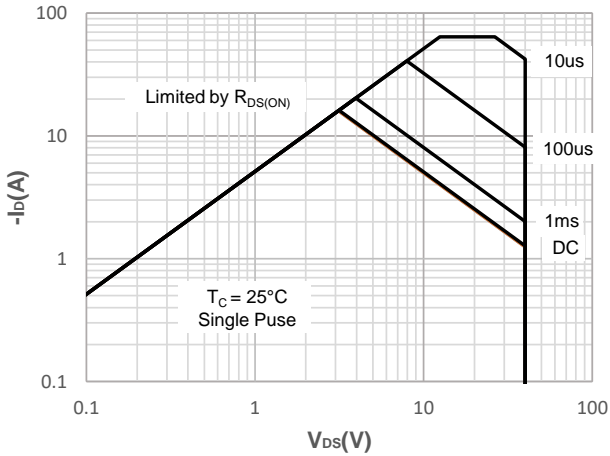


Figure 10: Maximum Continuous Driand Current vs. Case Temperature

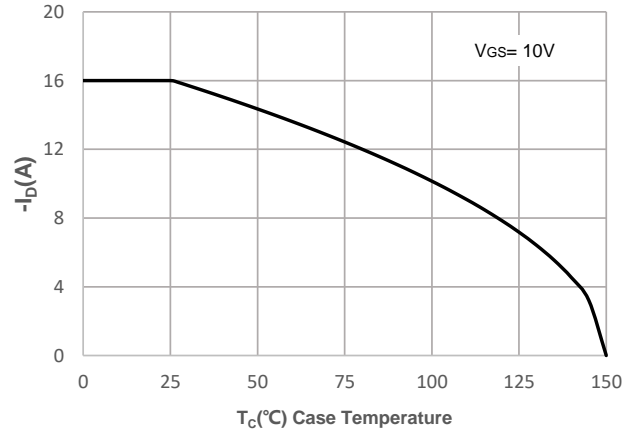


Figure 11: Normalized Maximum Transient Thermal Impedance

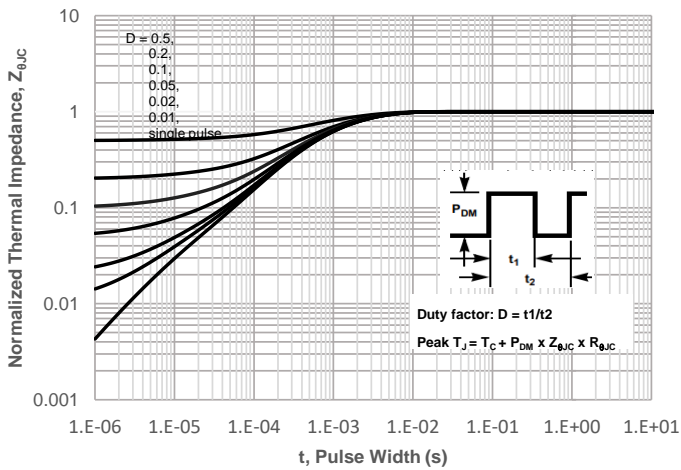
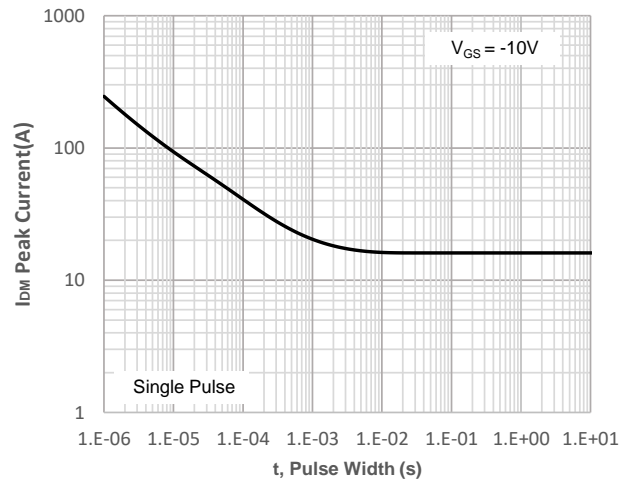


Figure 12: Peak Current Capacity



Test Circuit-N

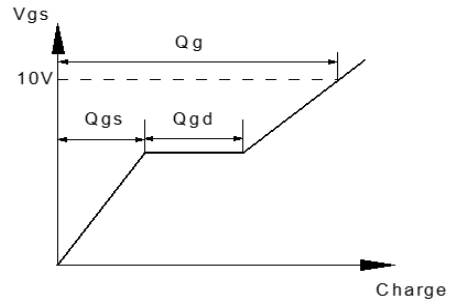
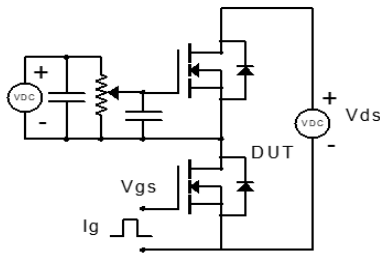


Figure 1: Gate Charge Test Circuit & Waveform

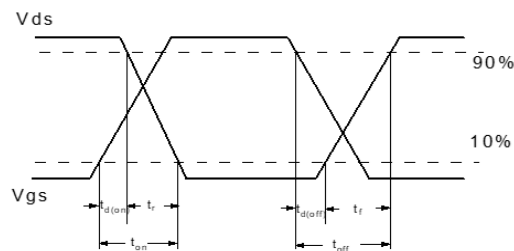
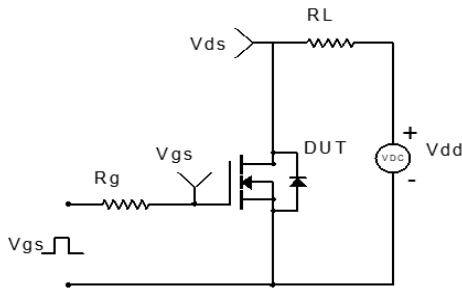


Figure 2: Resistive Switching Test Circuit & Waveform

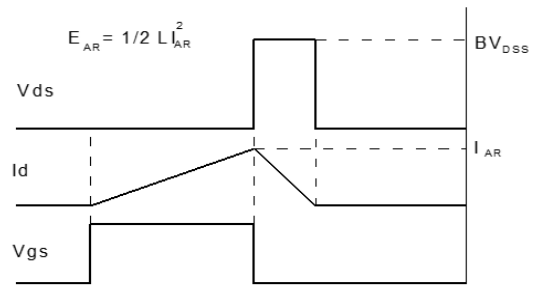
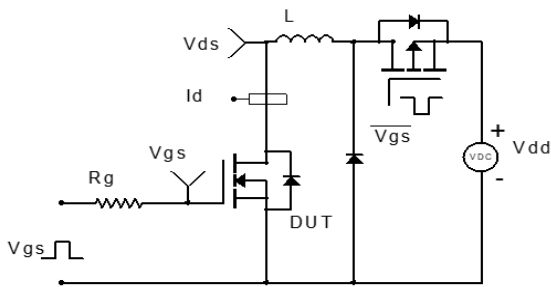


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

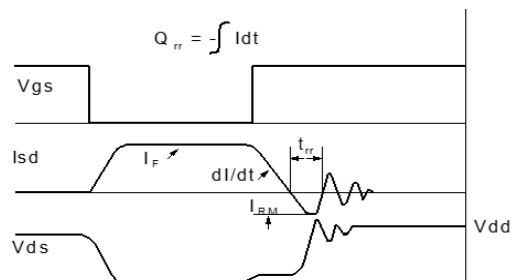
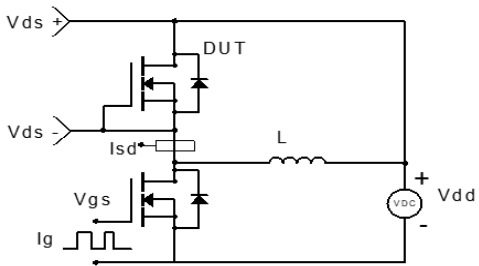


Figure 4: Diode Recovery Test Circuit & Waveform

Test Circuit-P

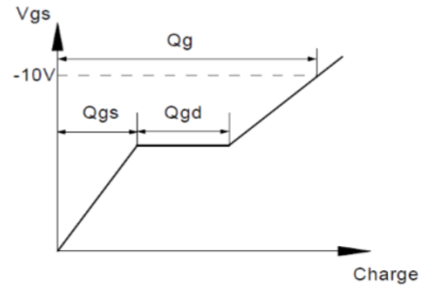
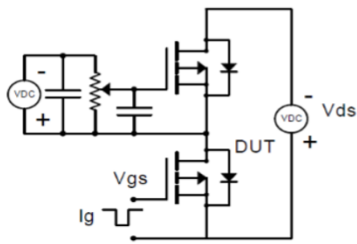


Figure 1: Gate Charge Test Circuit & Waveform

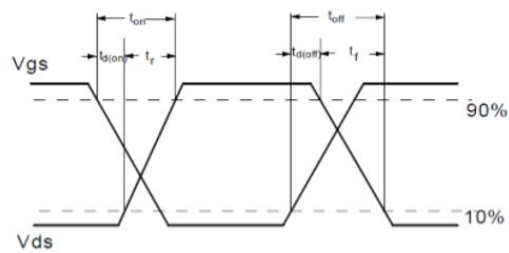
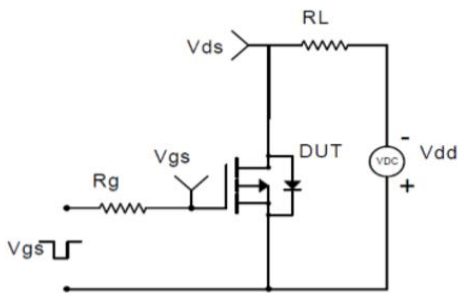


Figure 2: Resistive Switching Test Circuit & Waveform

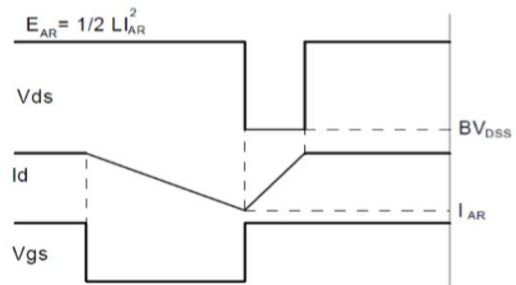
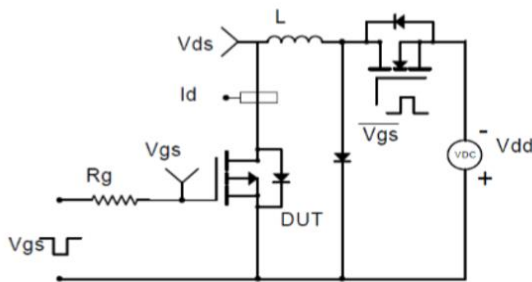


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

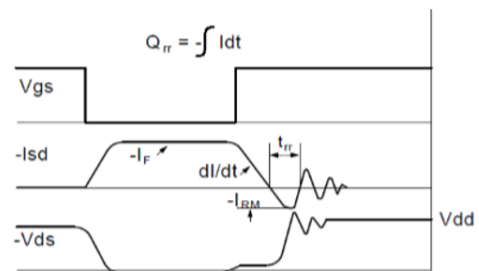
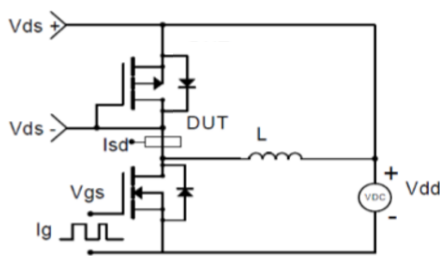
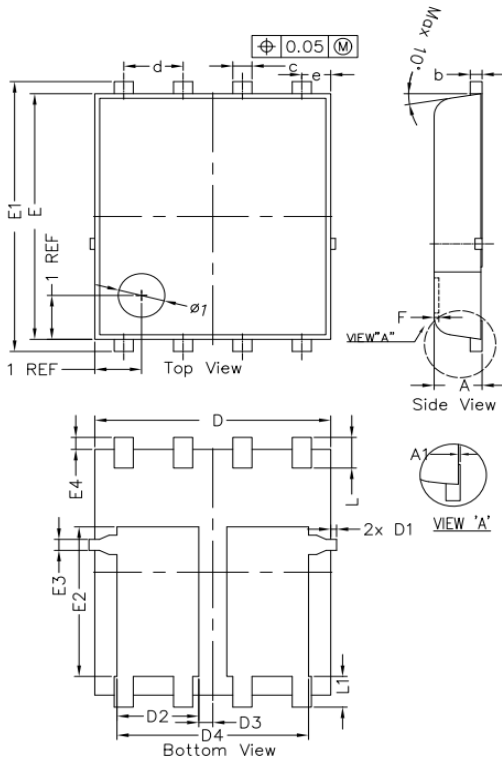


Figure 4: Diode Recovery Test Circuit & Waveform



Package Mechanical Data(PDFN5x6-8L-D)



SYMBOLS	DIMENSION IN MM			DIMENSION IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
* A	0.900	1.000	1.100	0.035	0.039	0.043
A1	0.000	---	0.050	0.000	----	0.002
b	0.246	0.254	0.312	0.010	0.010	0.012
* c	0.310	0.410	0.510	0.012	0.016	0.020
d	1.27 BSC			0.050 BSC		
* D	4.950	5.050	5.150	0.195	0.199	0.203
*D1	---	---	0.125	---	---	0.005
*D2	1.650	1.750	1.850	0.065	0.069	0.073
D3	0.200	0.300	0.400	0.008	0.012	0.016
D4	4.000	4.100	4.200	0.157	0.161	0.165
e	0.62 BSC			0.024 BSC		
* E	5.500	5.600	5.700	0.217	0.220	0.224
* E1	6.050	6.150	6.250	0.238	0.242	0.246
E2	3.310	3.410	3.510	0.130	0.134	0.138
E3	0.150	0.250	0.350	0.006	0.010	0.014
* E4	0.175	0.275	0.375	0.007	0.011	0.015
F	-	-	0.100	-	-	0.004
* L	0.500	0.600	0.700	0.02	0.02	0.03
L1	0.600	0.700	0.800	0.02	0.03	0.03

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