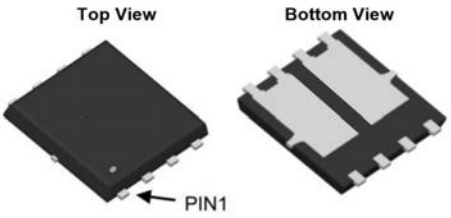
Product Summary

- N-Channel: 20V, 25A
  $R_{DS(ON)}$ Typ= 7.0mΩ @ V_{GS} = 4.5V
  $R_{DS(ON)}$ Typ= 10mΩ @ V_{GS} = 2.5V
- P-Channel: -20V, -20A
  $R_{DS(ON)}$ Typ= 12mΩ @ V_{GS} = -4.5V
  $R_{DS(ON)}$ Typ= 16mΩ @ V_{GS} = -2.5V



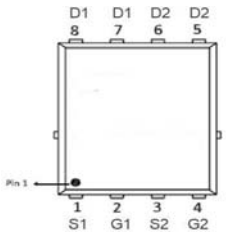
PDFN3x3-8L-D

Features

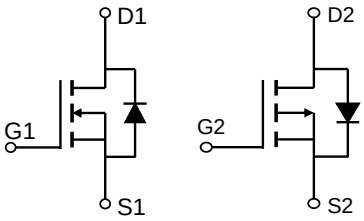
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- 100% UIS Tested
- 100% ΔVds Tested
- Halogen-free; RoHS-compliant
- Pb-free plating

Applications

- Load Switch
- PWM Application
- Power Management



Pin Assignment



Schematic Diagram

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

Symbol	Parameter		Value-N	Value-P	Unit
V_{DS}	Drain-to-Source Voltage		20	-20	V
V_{GS}	Gate-to-Source Voltage		±12		V
I_D	Continuous Drain Current	T_C = 25°C	25	-20	A
		T_C = 100°C	17	-14	
I_{DM}	Pulsed Drain Current (1)		100	-80	A
E_{AS}	Single Pulsed Avalanche Energy (2)		90	81	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	

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	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 20V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	0.5	0.8	1.0	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(4)	V_{GS} = 4.5V, I_D = 25A	-	7.0	8	mΩ
		V_{GS} = 2.5V, I_D = 10A	-	10	12	mΩ
Dynamic Characteristics						
R_g	Gate Resistance	f = 1MHz	-	1.8	-	Ω
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 10V, f = 1MHz	-	1504	-	pF
C_{oss}	Output Capacitance		-	190	-	pF
C_{rss}	Reverse Transfer Capacitance		-	170	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 4.5V, V_{DS} = 10V, I_D = 12A	-	18	-	nC
Q_{gs}	Gate Source Charge		-	3.5	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	5.5	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 4.5V, V_{DD} = 10V, I_D= 12A, R_{GEN} = 3Ω	-	9	-	ns
t_r	Turn-On Rise Time		-	19	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	38	-	ns
t_f	Turn-Off Fall Time		-	24	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	25	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	100	A
V_{SD}	Body Diode Forward Voltage	V_{GS} = 0V, I_S = 12A	-		1.2	V
trr	Body Diode Reverse Recovery Time	I_F = 12A, di/dt = 200A/us	-	7.5	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	1.6	-	nC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2. E_{AS} condition: Starting T_J=25C, V_{DD}=10V, V_{GS}=4.5V, R_G=25ohm, L=0.5mH, I_{AS}=19A, 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%.

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} = -20V, V_{GS} = 0V	-	-	-1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-0.4	-0.8	-1.0	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(5)	V_{GS} = -4.5V, I_D = -10A	-	12	15	mΩ
		V_{GS} = -2.5V, I_D = -5A	-	16	20	mΩ
Dynamic Characteristics						
R_g	Gate Resistance	f = 1MHz	-	9.9	-	Ω
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = -10V, f = 1MHz	-	1731	-	pF
C_{oss}	Output Capacitance		-	167	-	pF
C_{rss}	Reverse Transfer Capacitance		-	139	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to -4.5V, V_{DS} = -10V, I_D = -10A	-	16	-	nC
Q_{gs}	Gate Source Charge		-	3	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	4	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{DD} = -10V, I_D= -12A, V_{GS}= -4.5V, R_{GEN}=2.4Ω	-	14	-	ns
t_r	Turn-On Rise Time		-	79	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	76	-	ns
t_f	Turn-Off Fall Time		-	76	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	-20	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	-80	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	-	180	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	300	-	nC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2. E_{AS} condition: Starting T_J=25C, V_{DD}=-10V, V_{GS}=-4.5V, R_G=25ohm, L=0.5mH, I_{AS}=-18A, 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%.

Typical Performance Characteristics-N

Figure 1: Output Characteristics

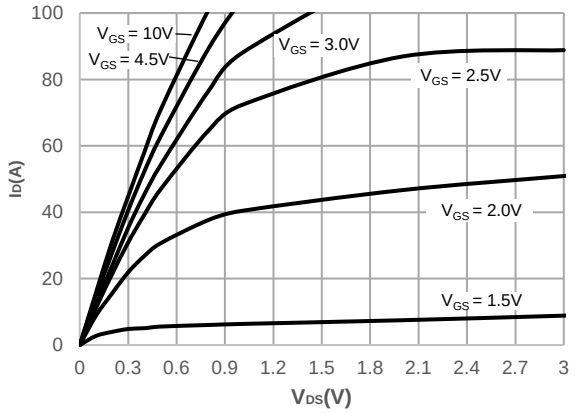


Figure 2: Typical Transfer Characteristics

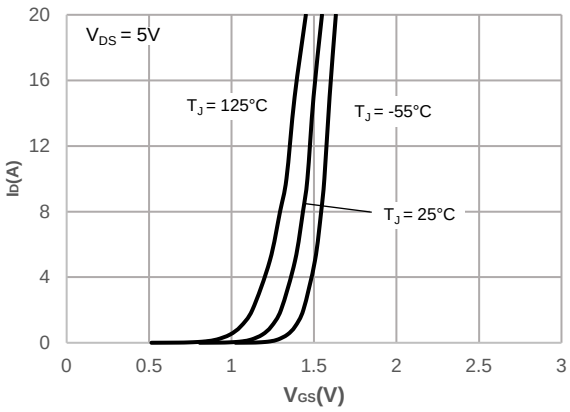


Figure 3: On-resistance vs. Drain Current

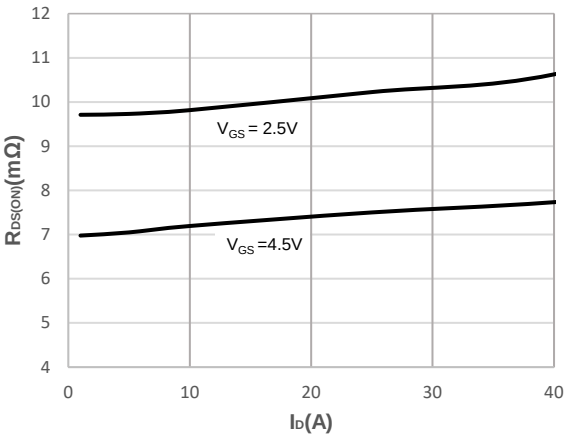


Figure 4: Body Diode Characteristics

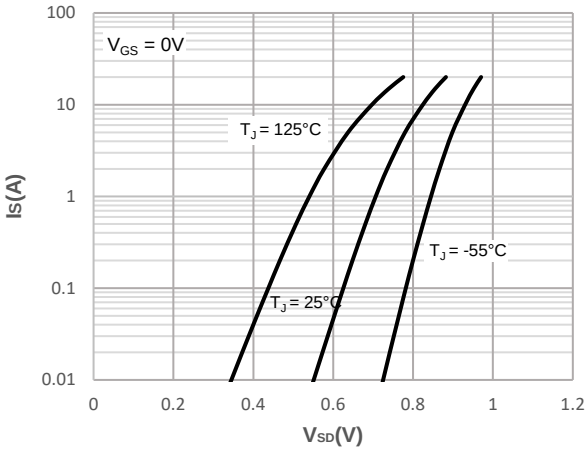


Figure 5: Gate Charge Characteristics

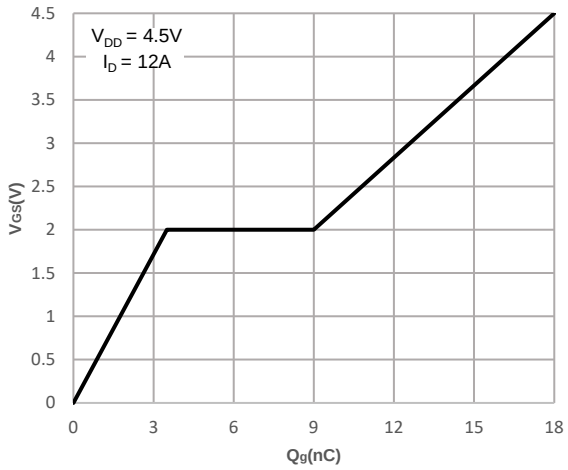
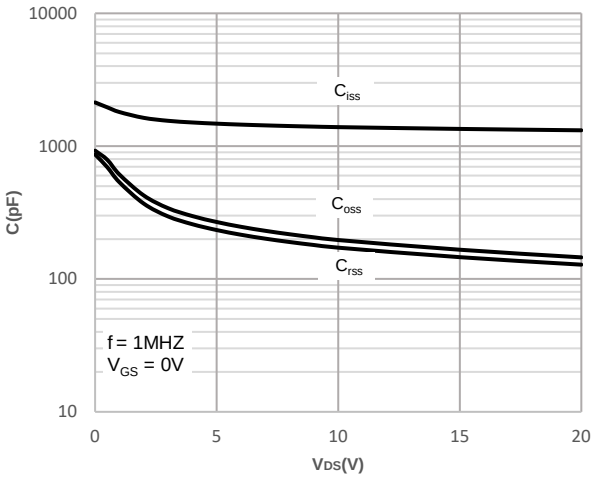


Figure 6: Capacitance Characteristics



Typical Performance Characteristics-N

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

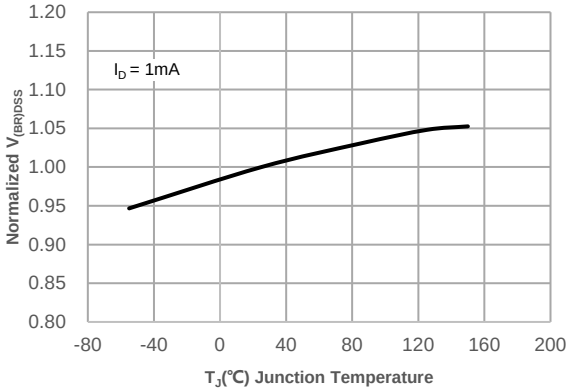


Figure 8: Normalized on Resistance vs. Junction Temperature

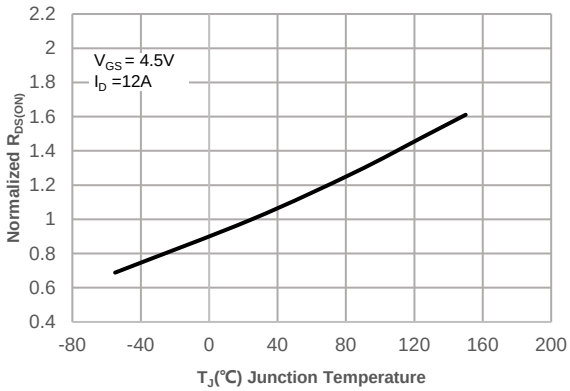


Figure 9: Maximum Safe Operating Area

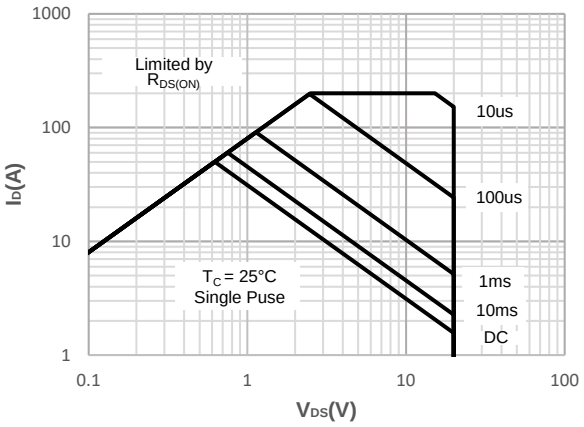


Figure 10: Maximum Continuous Drian Current vs. Case Temperature

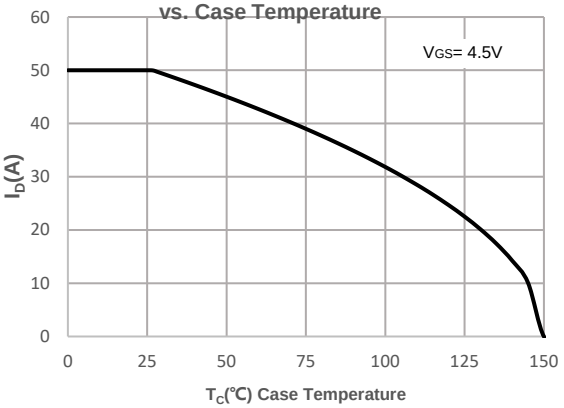


Figure 11: Normalized Maximum Transient Thermal Impedance

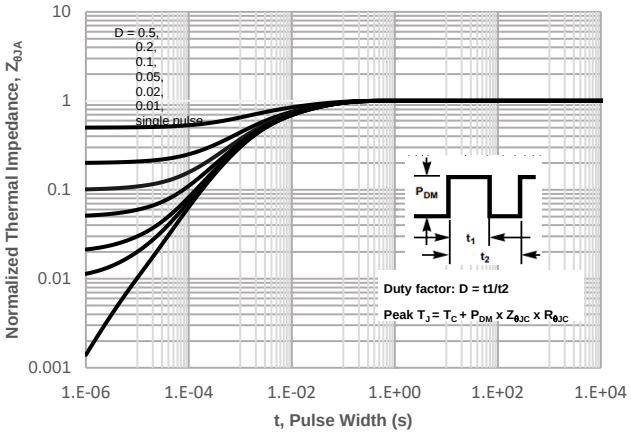
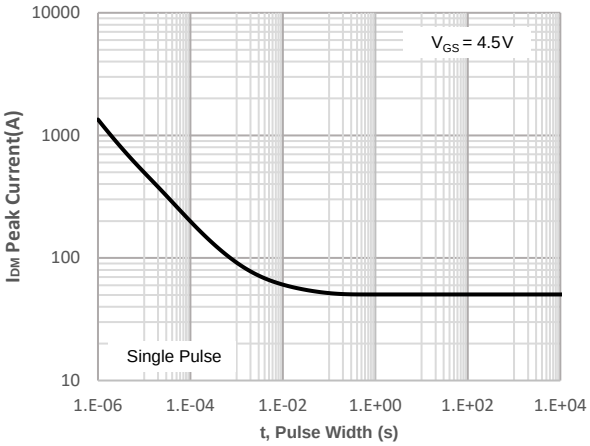


Figure 12: Peak Current Capacity



Typical Performance Characteristics-P

Figure1: Output Characteristics

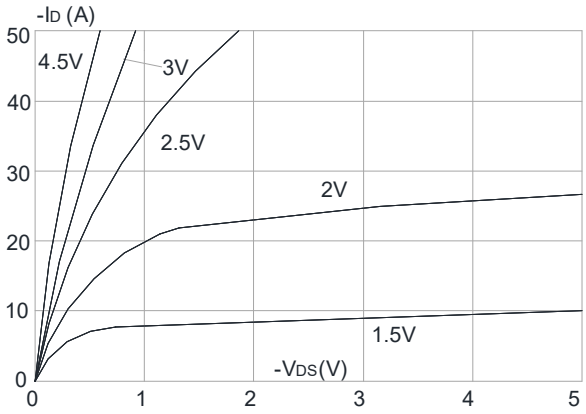


Figure 2: Typical Transfer Characteristics

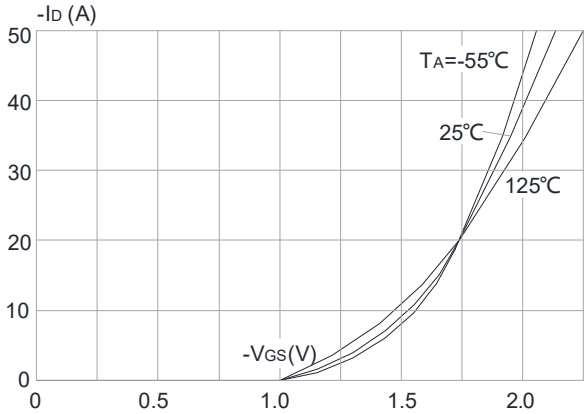


Figure 3: On-resistance vs. Drain Current

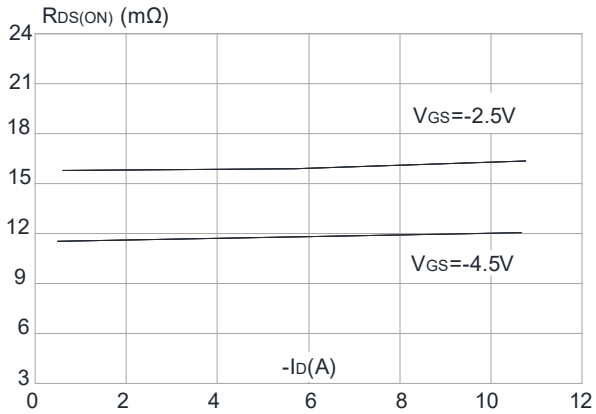


Figure 4: Body Diode Characteristics

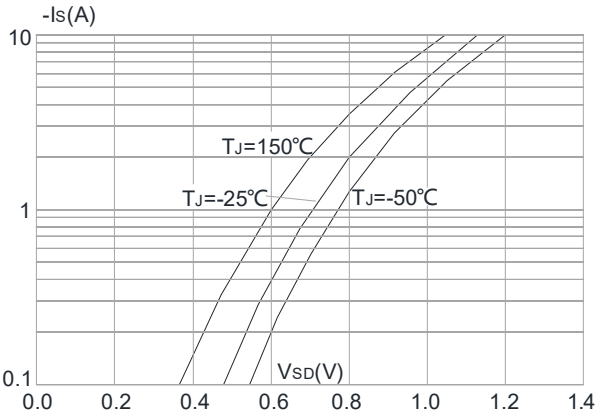


Figure 5: Gate Charge Characteristics

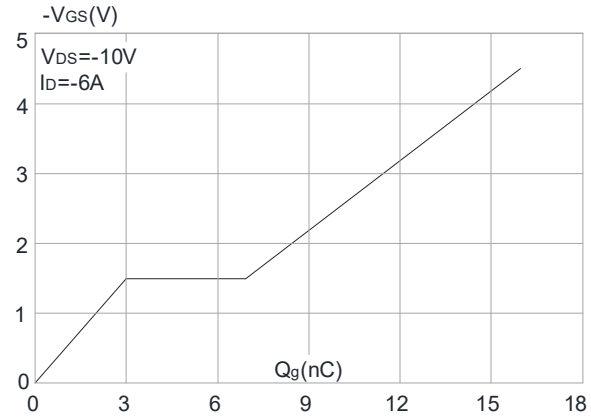
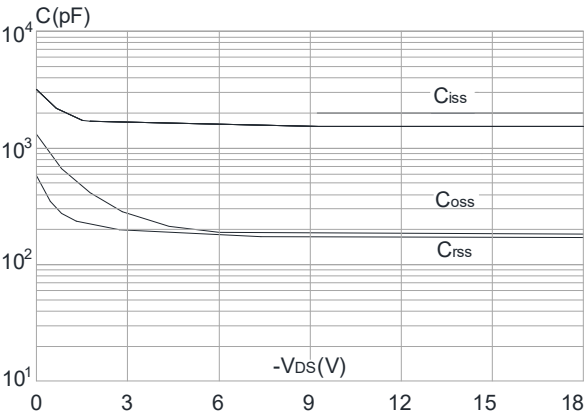


Figure 6: Capacitance Characteristics



Typical Performance Characteristics-P

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

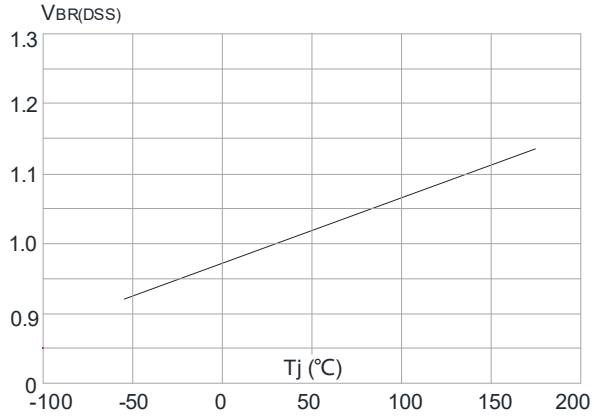


Figure 8: Normalized on Resistance vs. Junction Temperature

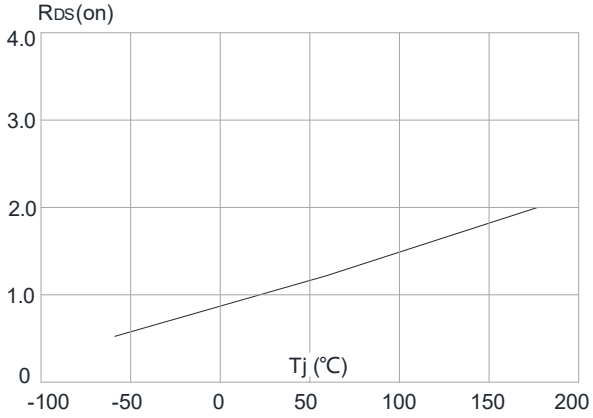


Figure 9: Maximum Safe Operating Area

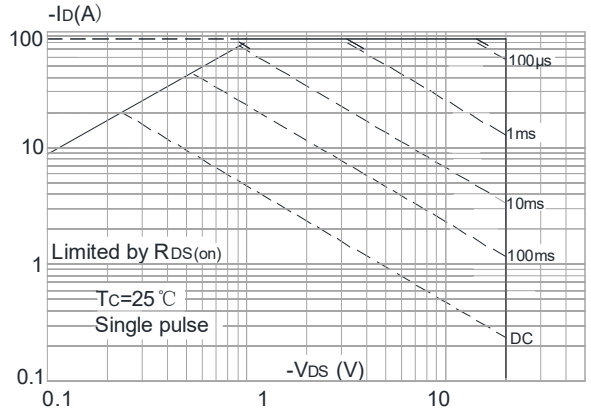


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

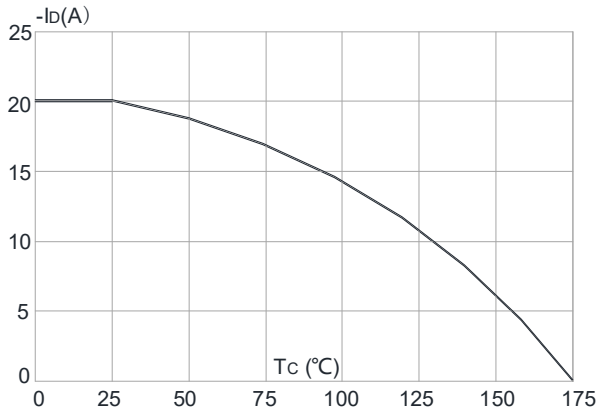
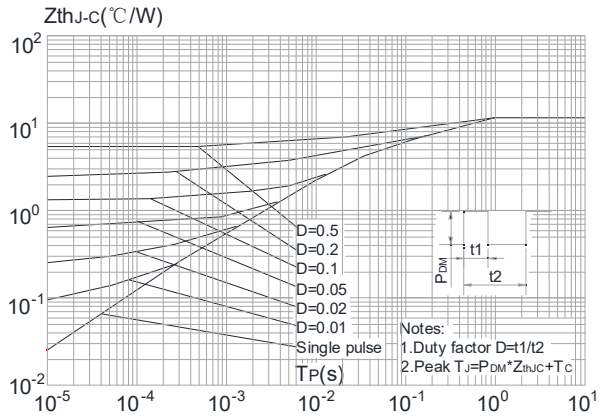


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit

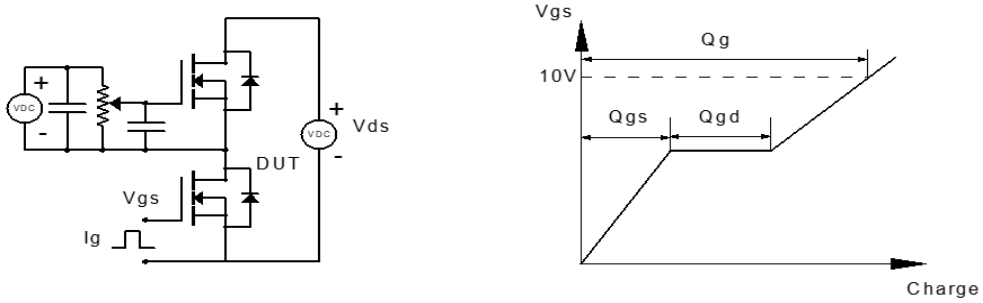


Figure 1: Gate Charge Test Circuit & Waveform

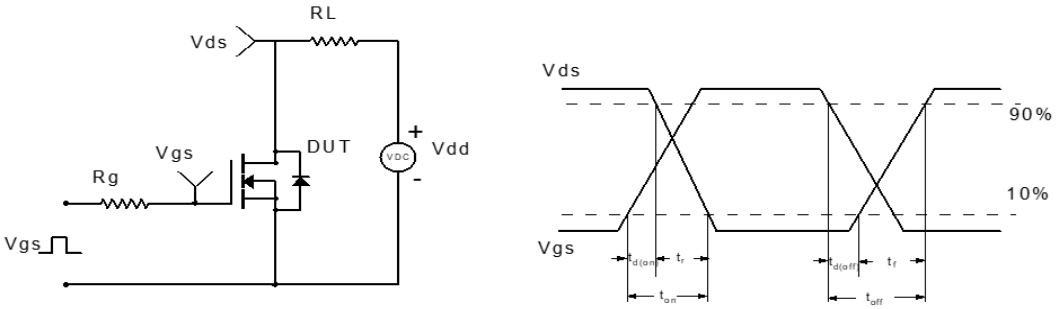


Figure 2: Resistive Switching Test Circuit & Waveform

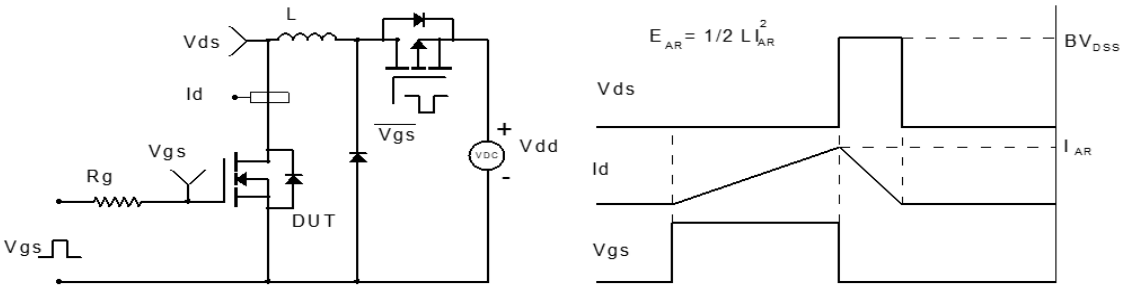


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

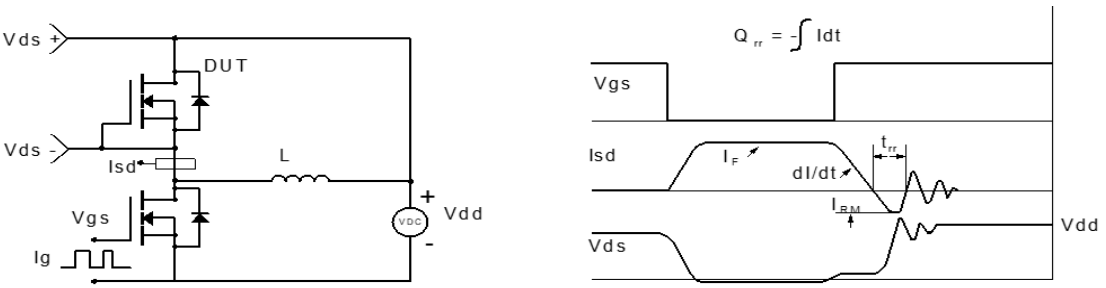


Figure 4: Diode Recovery Test Circuit & Waveform

Test Circuit

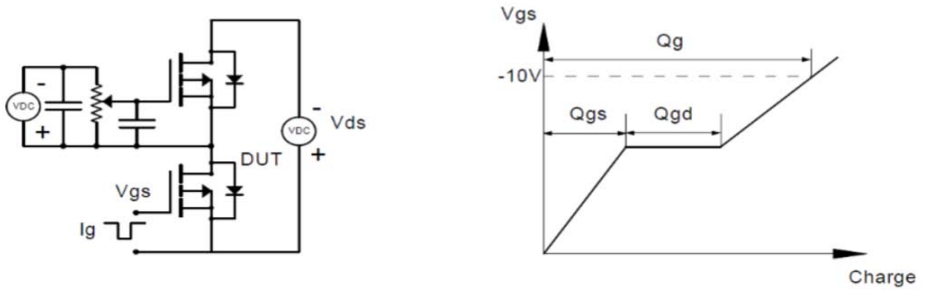


Figure 1: Gate Charge Test Circuit & Waveform

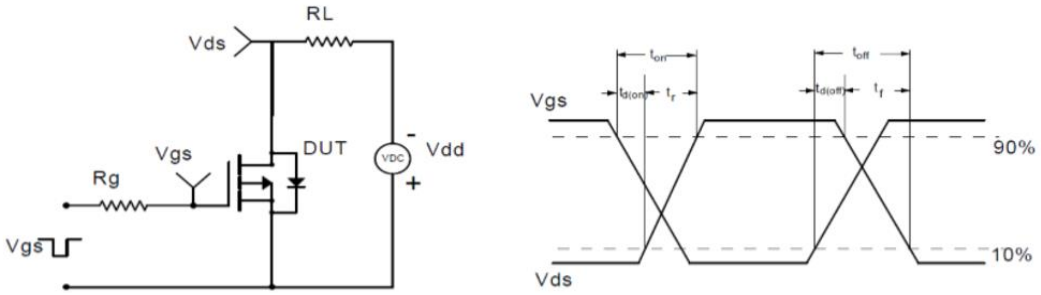


Figure 2: Resistive Switching Test Circuit & Waveform

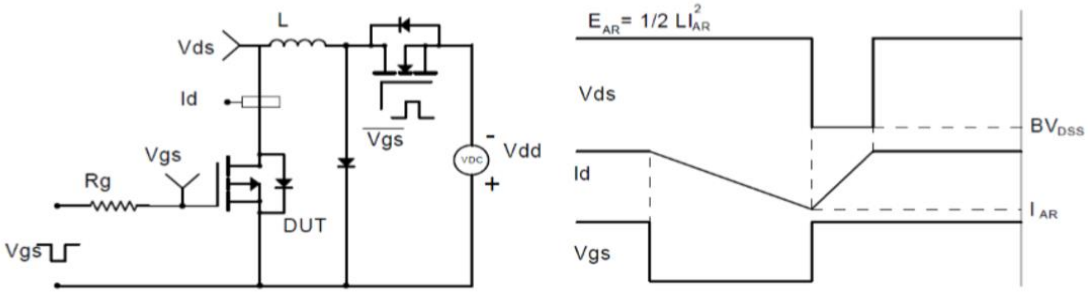


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

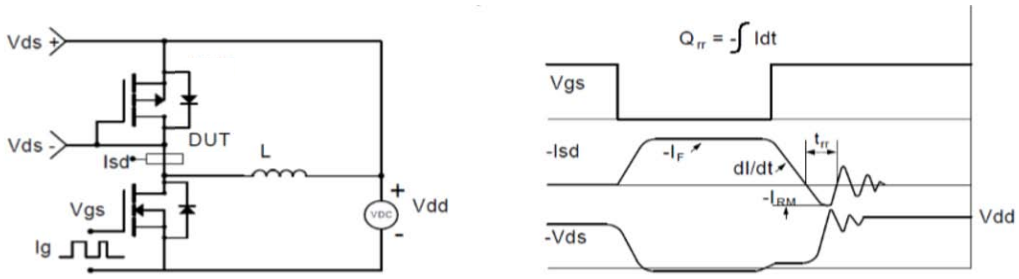
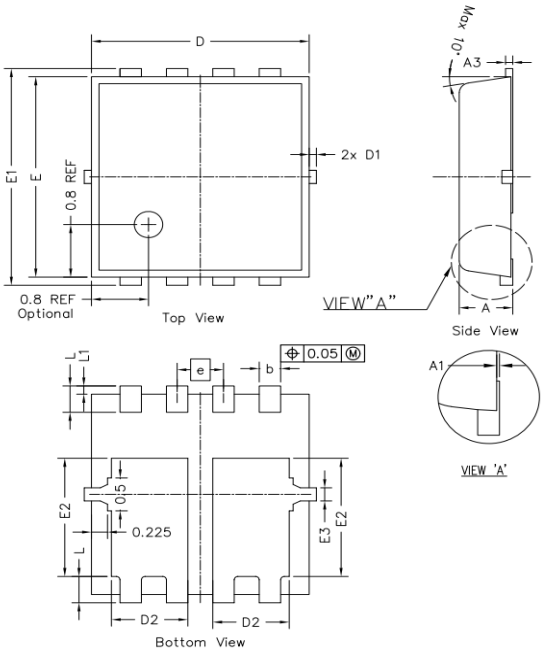


Figure 4: Diode Recovery Test Circuit & Waveform

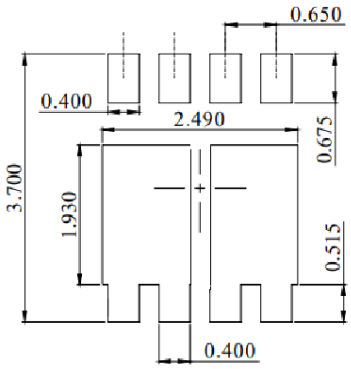
Package Mechanical Data(PDFN3X3-8L-D)

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