

N-Channel Trench Power MOSFET

Features

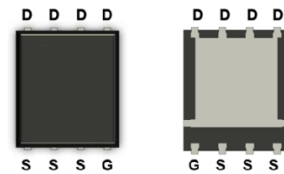
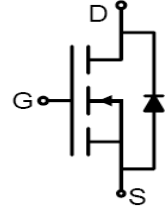
- 60V, 50A, $R_{DS(ON)}=13m\Omega@V_{GS}=10V$
- Reliable and Rugged
- Advanced trench process technology High Density Cell Design For Ultra Low On-Resistance

Application

- Battery protection
- Power management

Product Summary

V_{DS}	60V
$R_{DS(on)}@V_{GS}=10V$	13m Ω
I_D	50A



DFN5X6-8L

Package Not to Scale

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	60	V
Continuous drain current $T_C = 25^\circ\text{C}$ (Silicon limit) $T_C = 25^\circ\text{C}$ (Package limit) $T_C = 100^\circ\text{C}$ (Silicon limit)	I_D	- 50 37.5	A
Pulsed drain current $T_C = 25^\circ\text{C}$, t_p limited by T_{jmax}	$I_{D\ pulse}$	175	
Avalanche energy, single pulse ($L=0.5mH, R_g=25\Omega$)	E_{AS}	150	mJ
Gate-emitter voltage	V_{GS}	± 20	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	115	W
Operating junction and storage temperature	T_j, T_{stg}	-55~175	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.8	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	50	

Electrical Characteristic, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	

Static Characteristic

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$ $T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	1.2	1.8	2.5	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$ $T_j=25^\circ\text{C}$ $T_j=125^\circ\text{C}$	-	-	1 50	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-100	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=50A,$ $T_j=25^\circ\text{C}$	-	9.5	13	m Ω
Transconductance	g_{fs}	$V_{DS}=10V, I_D=50A$	-	100	-	S

Dynamic Characteristic

Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V,$ $f=1\text{MHz}$	-	4203	-	pF
Output Capacitance	C_{oss}		-	262	-	
Reverse Transfer Capacitance	C_{rss}		-	187	-	
Gate Total Charge	Q_G	$V_{GS}=10V, V_{DS}=25V,$ $I_D=30A, f=1\text{MHz}$	-	84	-	nC
Gate-Source charge	Q_{gs}		-	14	-	
Gate-Drain charge	Q_{gd}		-	30	-	
Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ\text{C}, V_{DD}=25V,$ $I_{DS}=30A, R_L=3\Omega$	-	10	-	ns
Rise time	t_r		-	13	-	
Turn-off delay time	$t_{d(off)}$		-	20	-	
Fall time	t_f		-	30	-	
Gate resistance	R_G	$V_{GS}=0V, V_{DS}=0V,$ $f=1\text{MHz}$	-	1.8	-	Ω

Body Diode Characteristic

Maximum Continuous Drain to Source Diode Forward Current	I_S		-	-	50	A
Maximum Pulsed Drain to Source Diode Forward Current	I_{SM}		-	-	175	A
Drain to Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=30A$	-	0.8	1.0	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F=20A,$ $di/dt=100A/\mu s$	-	35	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	60	-	nC

Typical Performance Characteristics

Figure 1: Power Dissipation

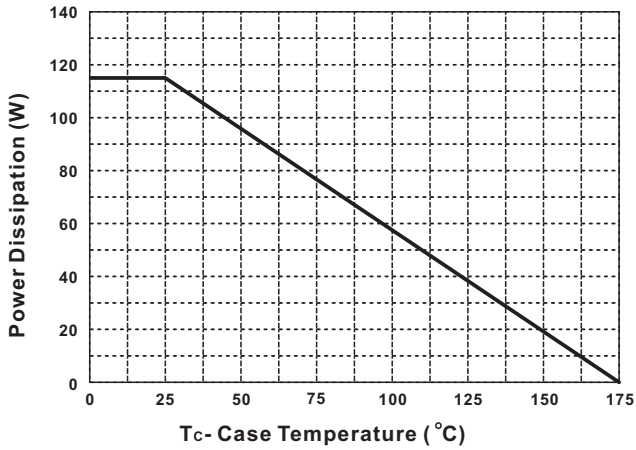


Figure 2: Drain Current

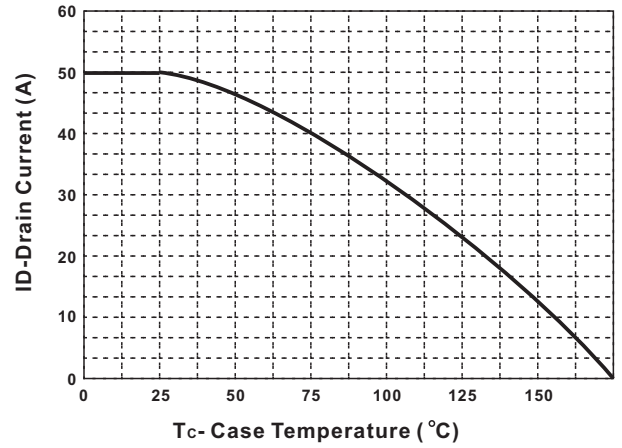


Figure 3: Safe Operation Area

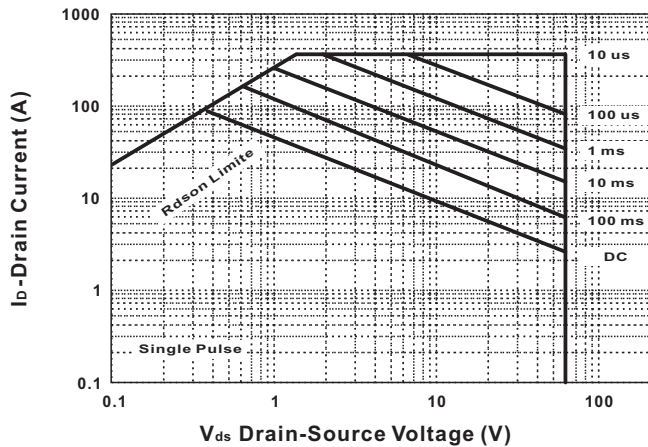


Figure 4: Thermal Transient Impedance

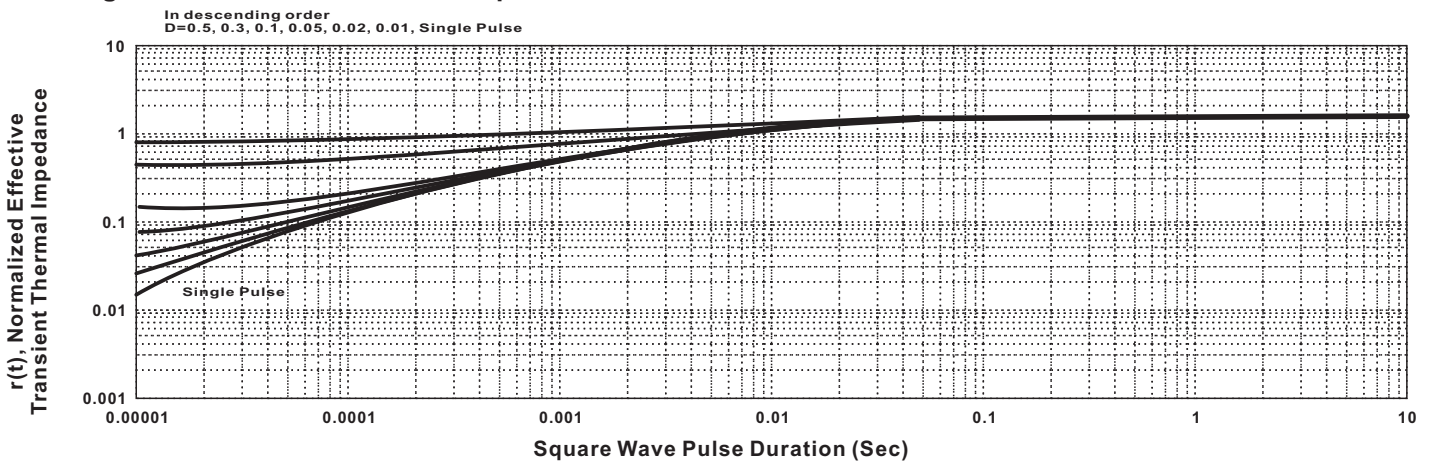


Figure 5: Output Characteristics

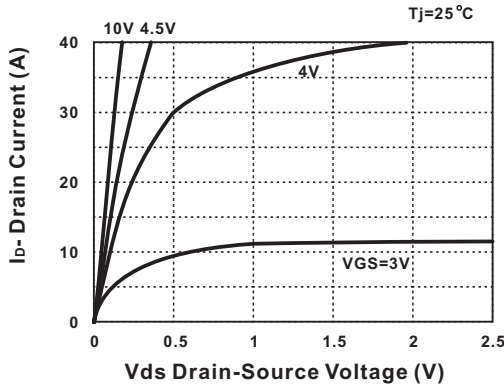


Figure 6: Drain-Source On Resistance

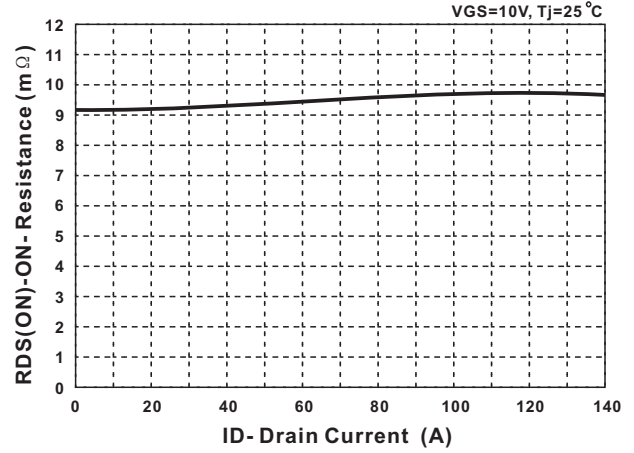


Figure 7: On-Resistance vs. Temperature

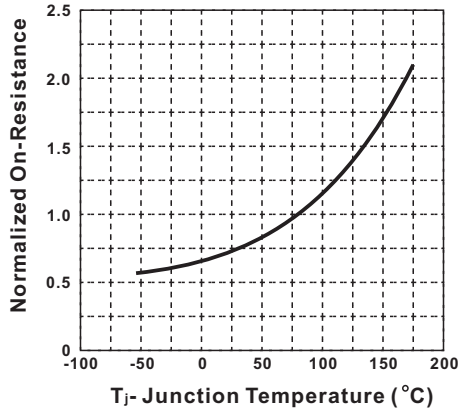


Figure 8: Source-Drain Diode Forward

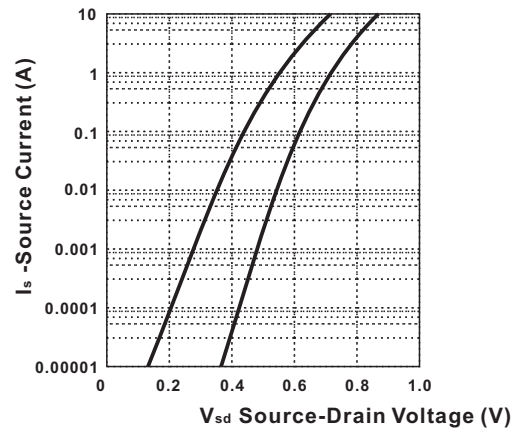


Figure 9: Capacitance Characteristics

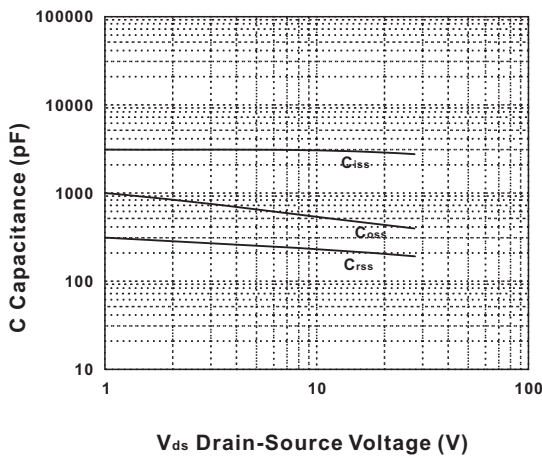
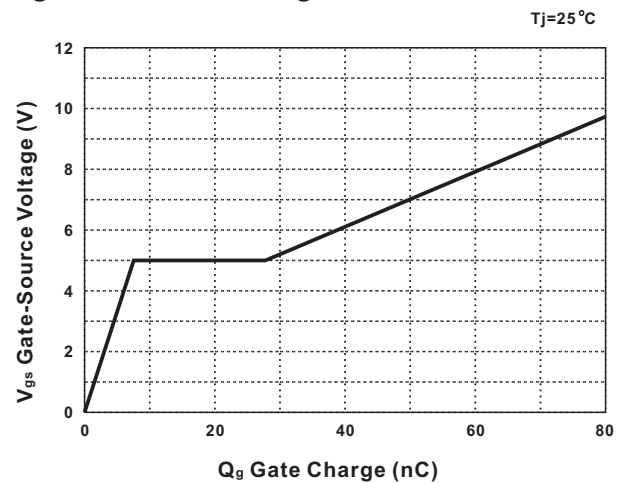
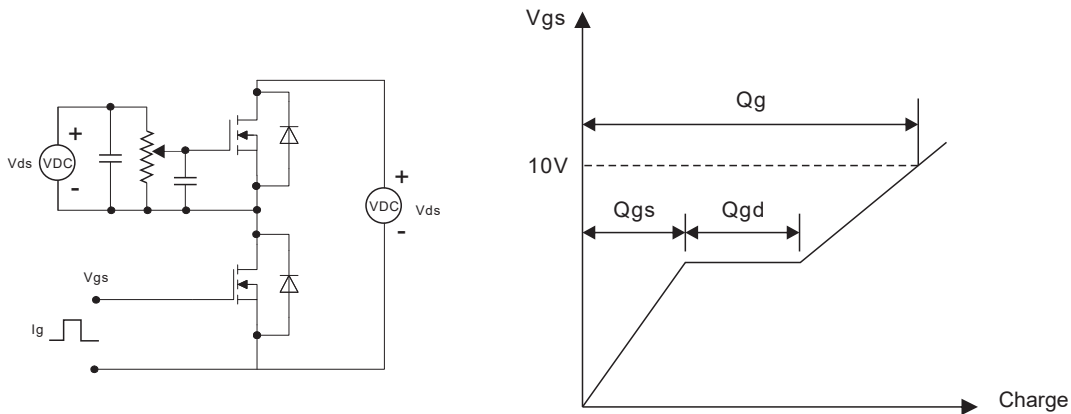


Figure 10: Gate Charge Characteristics

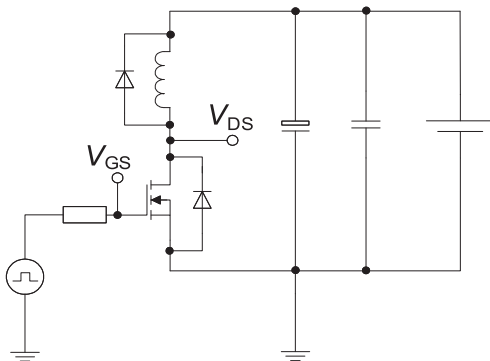


Test Circuit & Waveform

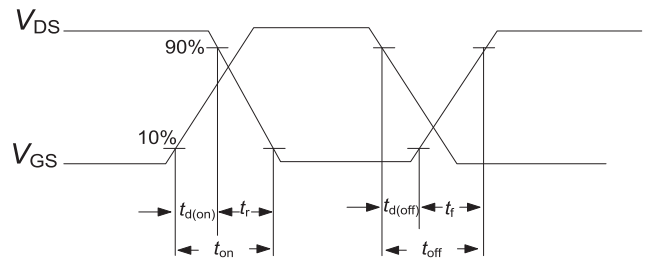
Gate Charge Test Circuit & Waveform



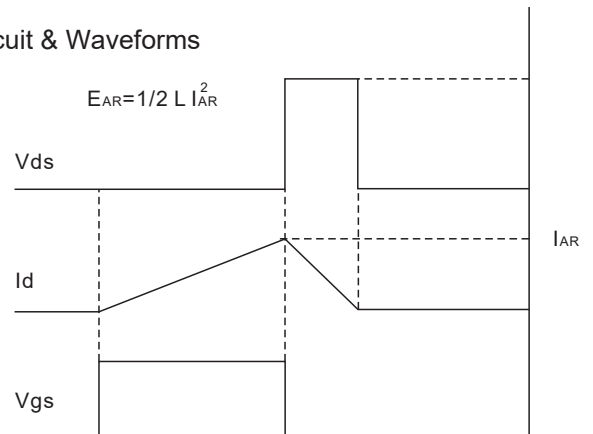
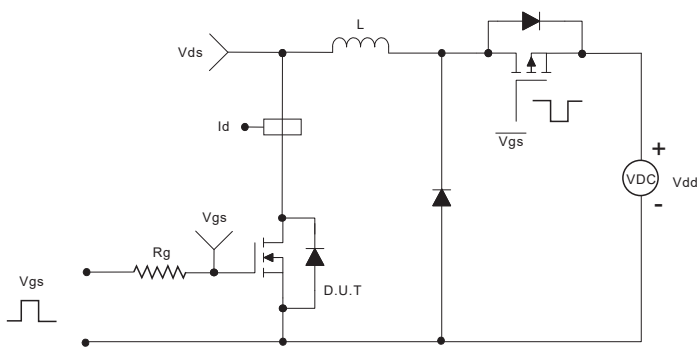
Switching Times Test Circuit for Inductive Load



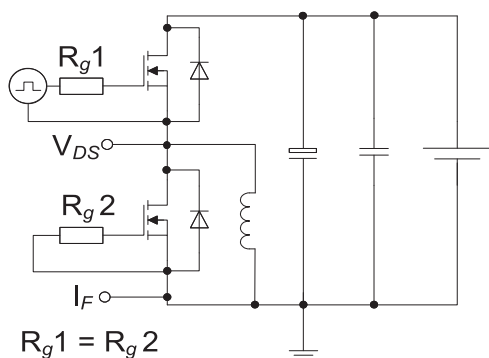
Switching Times Waveform



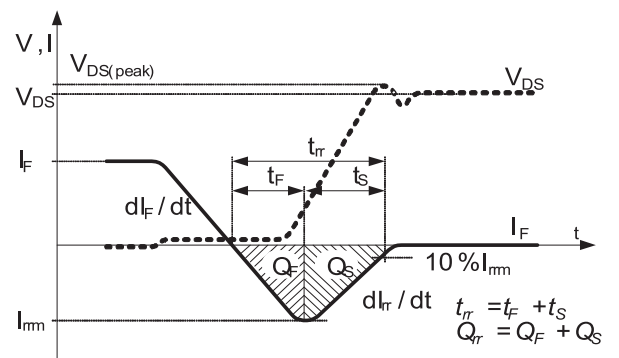
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

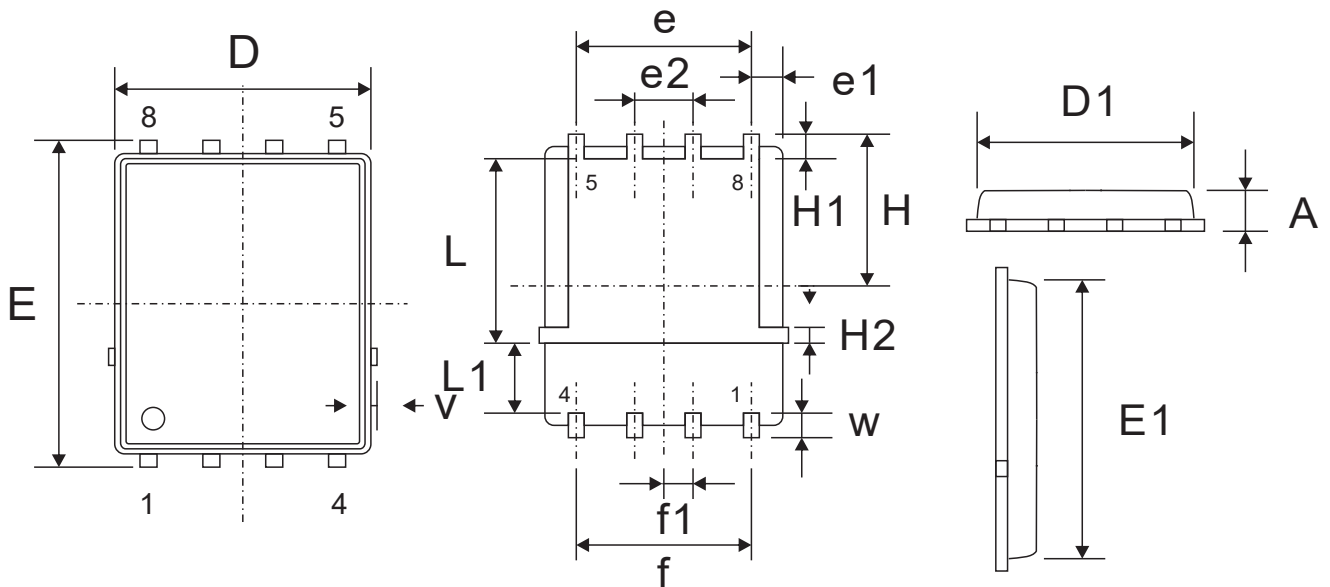


Test Circuit for Diode Characteristics



Diode Recovery Waveform



Package Mechanical Data-PDFN5X6-8L


Symbol	Dimensions in millimeters	
	Min.	Max.
A	0.90	1.20
D	4.90	5.30
D1	4.80	5.00
E	6.00	6.30
E1	5.65	5.85
e	3.72	3.92
e1	0.54 (Typ.)	
e2	1.27 (Typ.)	
f	3.82 (Typ.)	
f1	0.64 (Typ.)	
H	3.15 (Typ.)	
H1	0.59	0.79
H2	0.26	0.32
L	3.38	3.58
L1	1.39 (Typ.)	
v	0.13 (Typ.)	
w	0.64	0.84

Revision history

Date	Revision	Changes
28-May-2020	1.0	Initial release

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