

N-Channel 40 V (D-S) Power MOSFET



PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (mΩ) (TYP.)	I _D (A)	Q _g (TYP.)
40	4.8 at V _{GS} = 10 V	60	40 nC
	5.9 at V _{GS} = 10 V	52	

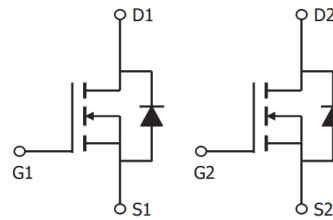
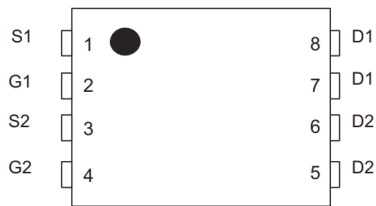
FEATURES

- DT-Trench Power MOSFET
- 100 % Rg and UIS tested

APPLICATIONS

- DC Fan
- Motor Drive Applications
- Networking
- DC/AC inverter
- Half / Full Bridge Topology

Top View



ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V _{DS}	40	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	60
		T _C = 70 °C	48
Pulsed Drain Current (t = 100 μs)	I _{DM}	180	A
Avalanche Current	I _{AS}	L = 0.1 mH	55
Single Avalanche Energy ^a			E _{AS}
Maximum Power Dissipation ^a	P _D	T _C = 25 °C	56 ^b
		T _C = 70 °C	35.9 ^b
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +150	°C

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) ^c	R _{thJA}	40	°C/W
Junction-to-Case (Drain)	R _{thJC}	2.5	

Notes

- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).

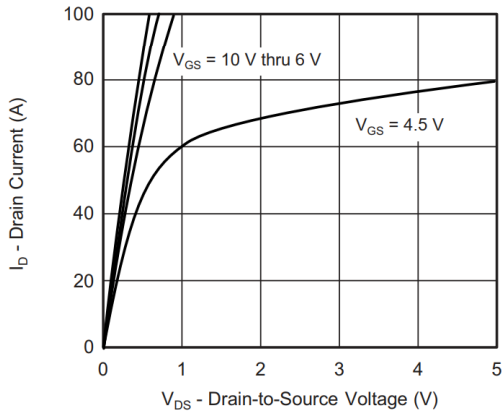
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1	-	3	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-	-	10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	60	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	4.8	5.8	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	-	5.9	8.0	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	-	98	-	S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}, f = 1\text{ MHz}$	-	2480	-	pF
Output Capacitance	C_{oss}		-	378	-	
Reverse Transfer Capacitance	C_{rss}		-	103	-	
Total Gate Charge ^c	Q_g	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	40	-	nC
Gate-Source Charge ^c	Q_{gs}		-	7.3	-	
Gate-Drain Charge ^c	Q_{gd}		-	6.9	-	
Gate Resistance	R_g	$f = 1\text{ MHz}$	-	2.5	-	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 2\text{ }\Omega$ $I_D = 20\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$	-	15	-	ns
Rise Time ^c	t_r		-	10	-	
Turn-Off Delay Time ^c	$t_{d(off)}$		-	38	-	
Fall Time ^c	t_f		-	12	-	
Drain-Source Body Diode Ratings and Characteristics ^b ($T_C = 25\text{ }^\circ\text{C}$)						
Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$	-	-	60	A
Pulsed Current ($t = 100\text{ }\mu\text{s}$)	I_{SM}		-	-	180	A
Forward Voltage ^a	V_{SD}	$I_F = 1\text{ A}, V_{GS} = 0\text{ V}$	-	0.6	1	V
Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	30	-	ns
Reverse Recovery Charge	Q_{rr}		-	25	-	μC

Notes

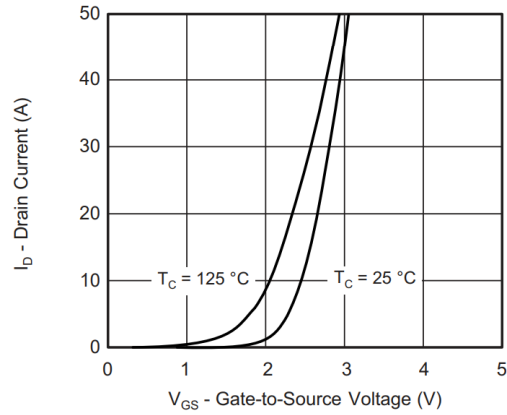
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

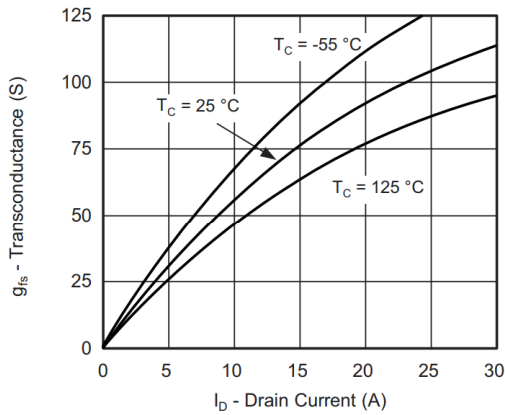
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



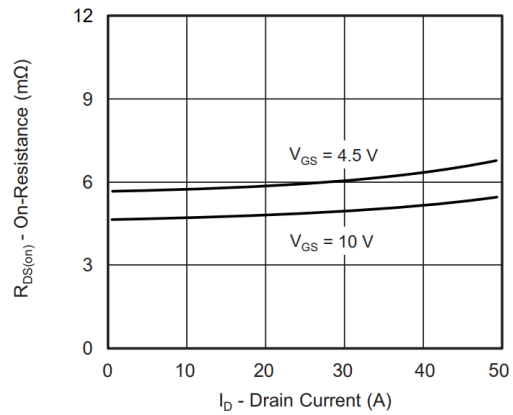
Output Characteristics



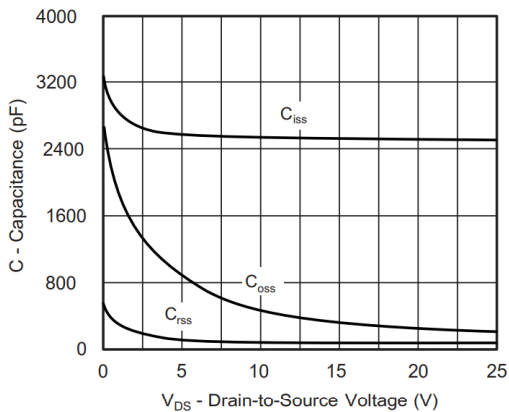
Transfer Characteristics



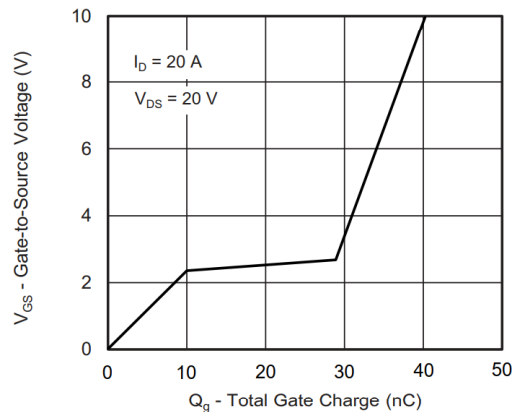
Transconductance



On-Resistance vs. Drain Current

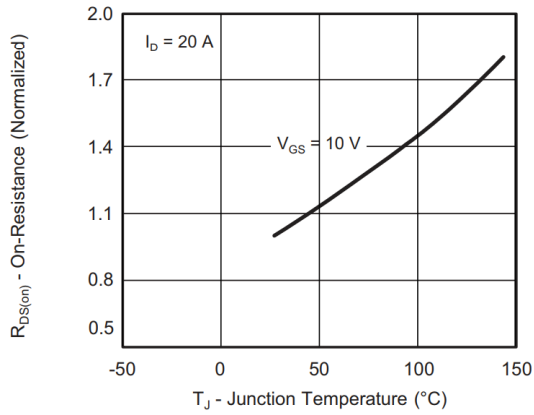


Capacitance

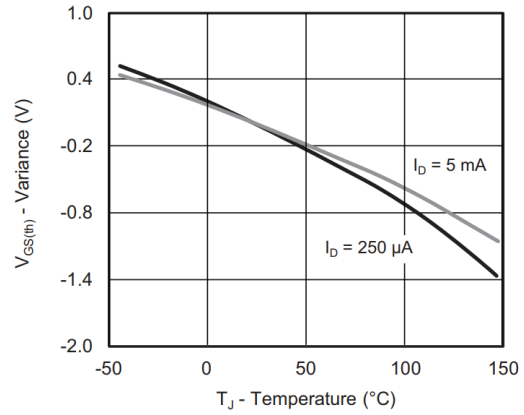


Gate Charge

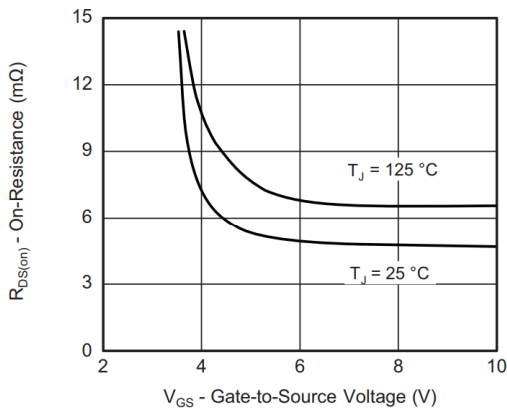
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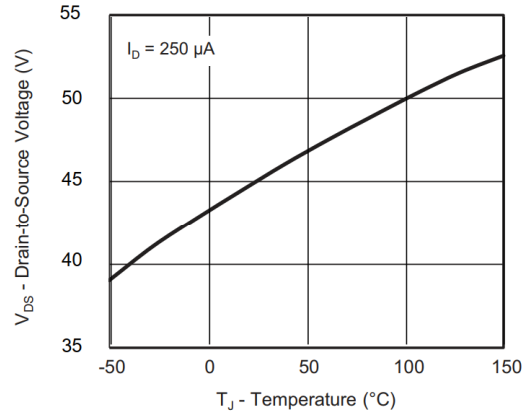
On-Resistance vs. Junction Temperature



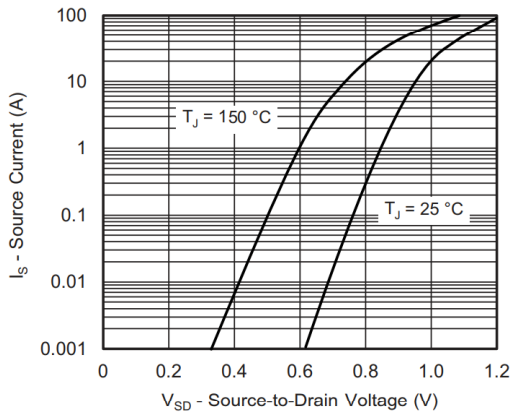
Threshold Voltage



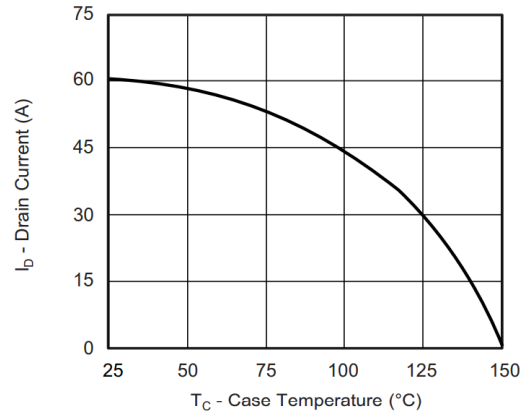
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature

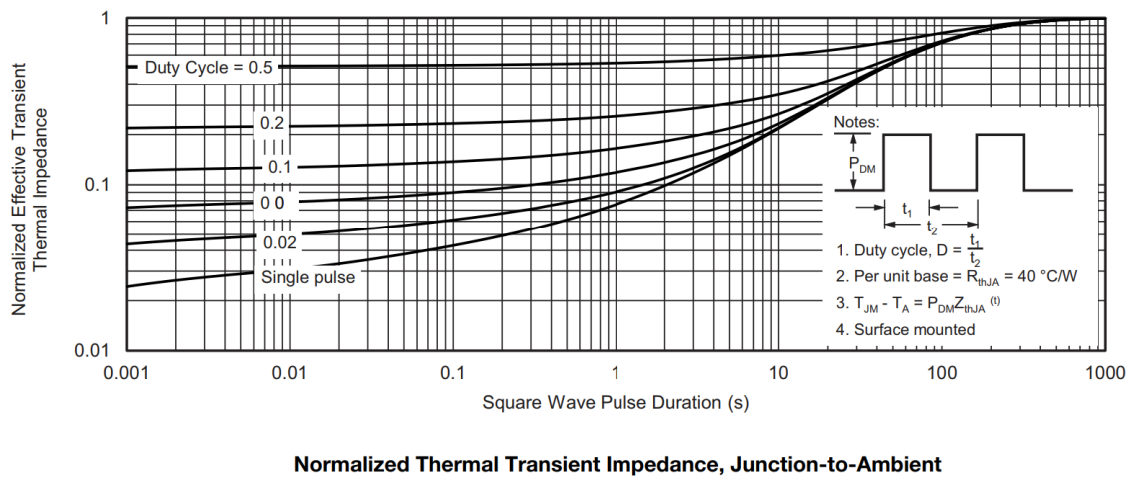
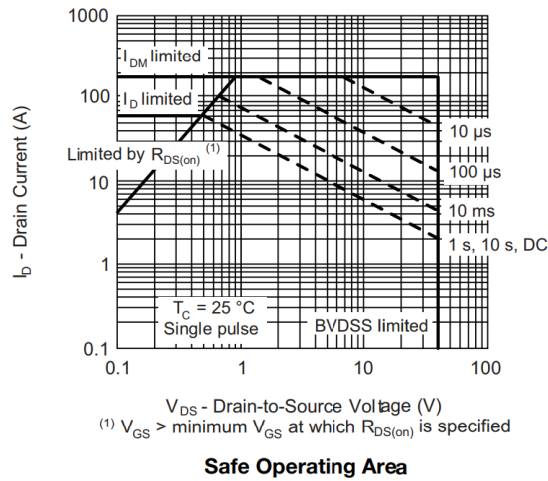


Source Drain Diode Forward Voltage

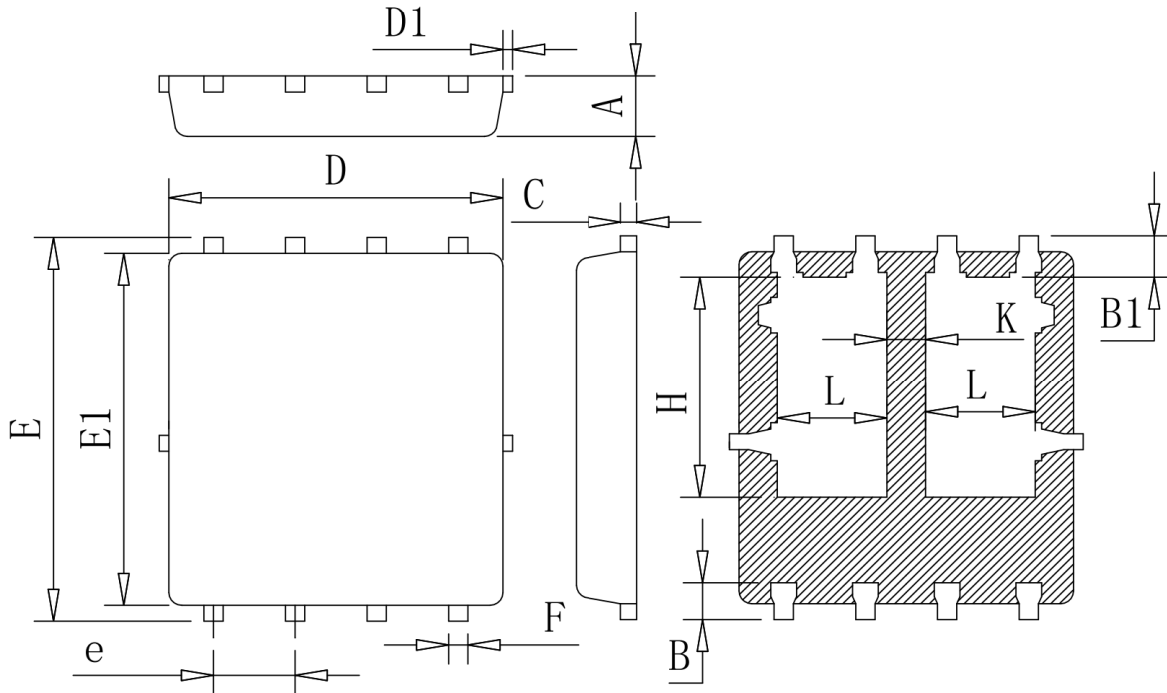


Current De-Rating

THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



DFN5X6-8L-D PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

Symbol	Min	Typ	Max
A	0.85	0.95	1.05
B	0.46	0.58	0.73
B1	0.52	0.65	0.78
C	0.18	0.254	0.32
D	4.70	5.20	5.50
D1	-	-	0.18
E	5.75	6.05	6.35
E1	5.35	5.65	5.85
e	1.15	1.27	1.50
F	0.15	0.30	0.50
H	3.15	3.47	3.80
L	1.35	1.70	2.10
K	0.35	0.60	1.00

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