

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

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (mΩ)(Typ.)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
40	1.2 at V <sub>GS</sub> = 10 V	170	70 nC
	2.0 at V <sub>GS</sub> = 4.5 V		

### FEATURES

- DT-Trench Power MOSFET
- Very low on-resistance
- Excellent gate charge x R<sub>DS(on)</sub> product(FOM)

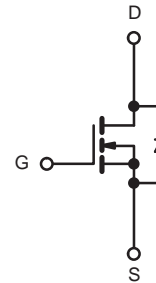
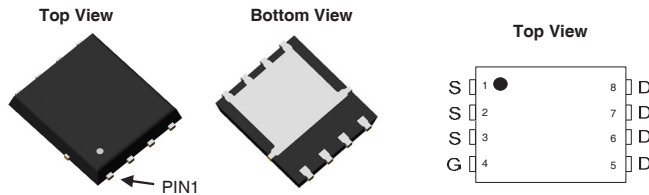


**RoHS**  
COMPLIANT

### APPLICATIONS

- Power Management
- Motor Drivers
- DC-DC Converters

DFN5X6-8L Pin Configuration



N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	40	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>C</sub> = 25 °C	170
		T <sub>C</sub> = 100 °C	120
Pulsed Drain Current <sup>b</sup>	I <sub>DM</sub>	510	A
Single Pulse Avalanche Energy	E <sub>AS</sub>	1125	mJ
Maximum Power Dissipation <sup>c</sup>	P <sub>D</sub>	T <sub>C</sub> = 25 °C	155 <sup>c</sup>
		T <sub>C</sub> = 100 °C	38
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150	°C
Soldering Recommendations (Peak Temperature)		260	

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>d</sup>	R <sub>thJA</sub>	-	62	°C/W
Maximum Junction-to-Case (Drain)	R <sub>thJC</sub>	-	0.8	

#### Notes

- Calculated continuous current based on maximum allowable junction temperature.
- Repetitive rating; pulse width limited by max. junction temperature.
- P<sub>d</sub> is based on max. junction temperature, using junction-case thermal resistance.
- The value of R<sub>thJA</sub> is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>a</sub>=25 °C.

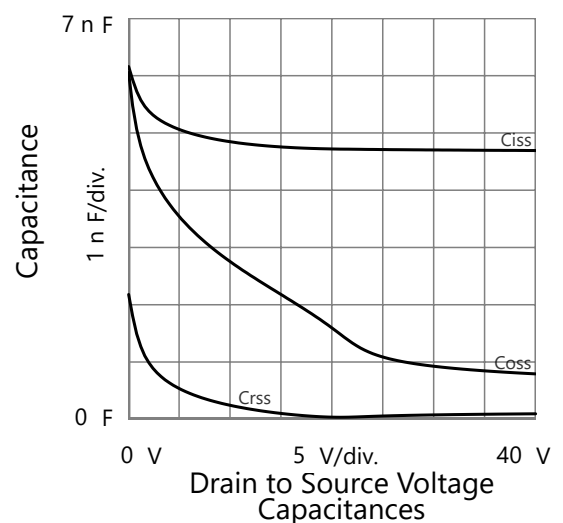
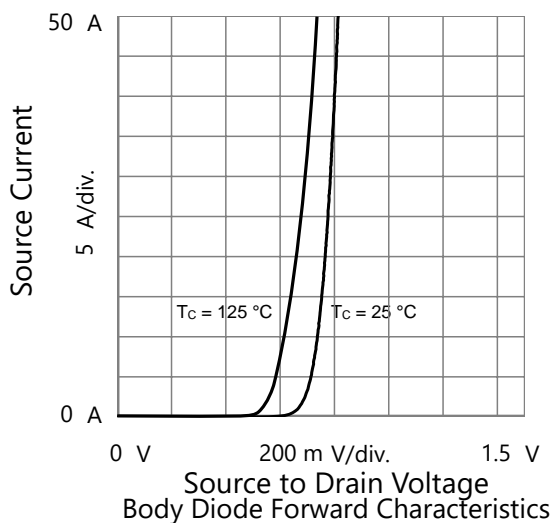
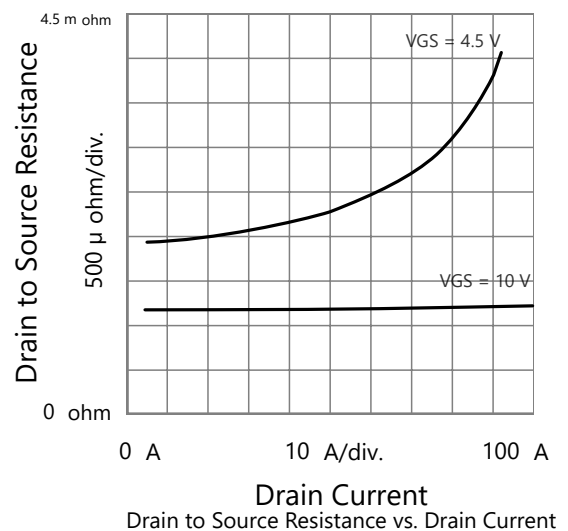
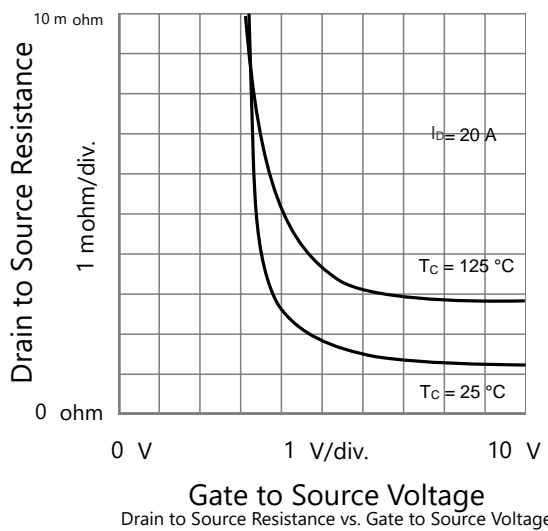
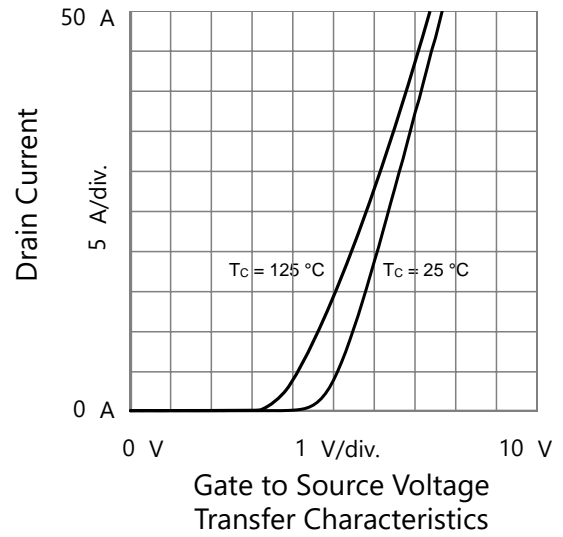
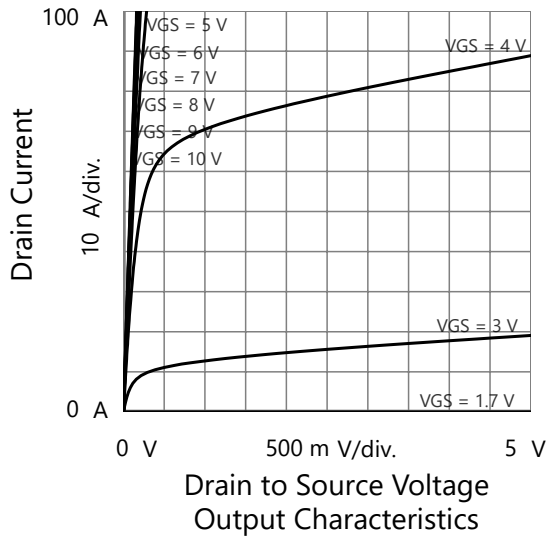
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1	-	3	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-	-	10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	170	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	1.2	1.6	m $\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$	-	2	2.5	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 5\text{ V}, I_D = 20\text{ A}$	-	76	-	S
<b>Dynamic <sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}, f = 1\text{ MHz}$	-	4720	-	pF
Output Capacitance	$C_{oss}$		-	1590	-	
Reverse Transfer Capacitance	$C_{rss}$		-	16	-	
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	70	-	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$		-	8.3	-	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$		-	13.6	-	
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	-	2.8	-	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 20\text{ V}, I_D = 20\text{ A},$ $V_{GEN} = 10\text{ V}, R_g = 2\text{ }\Omega$	-	12	-	ns
Rise Time <sup>c</sup>	$t_r$		-	9	-	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$		-	38	-	
Fall Time <sup>c</sup>	$t_f$		-	10	-	
<b>Drain-Source Body Diode Ratings and Characteristics <sup>b</sup></b> ( $T_C = 25\text{ }^\circ\text{C}$ )						
Continuous Source Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$	-	-	170	A
Pulsed Source Current	$I_{SM}$		-	-	510	A
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = 1\text{ A}, V_{GS} = 0\text{ V}$	-	-	1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	32	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	112	-	nC

**Notes**

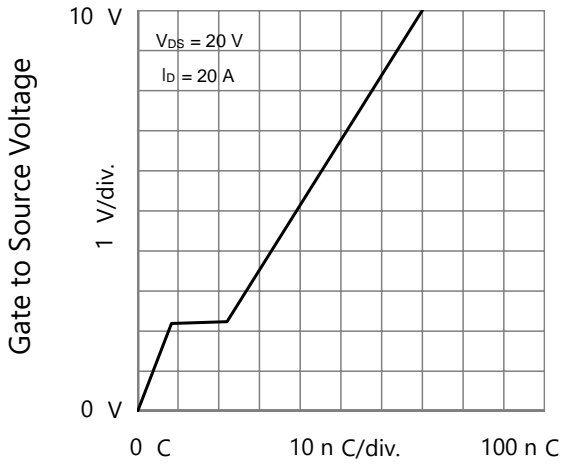
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

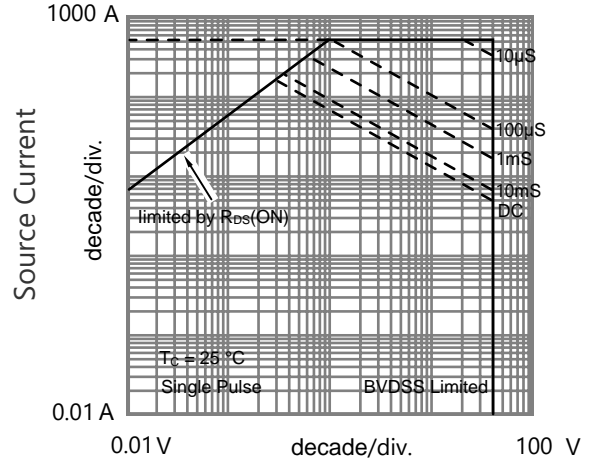
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



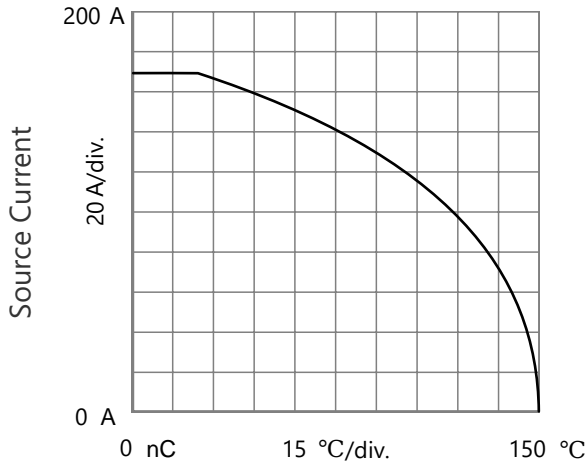
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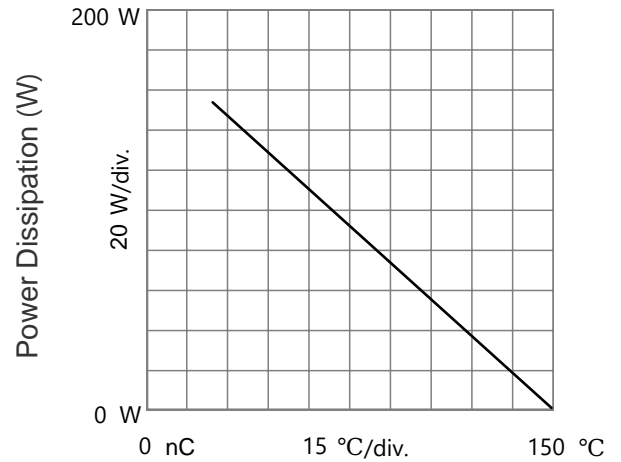
**Gate to Source Voltage vs. Gate Charge**



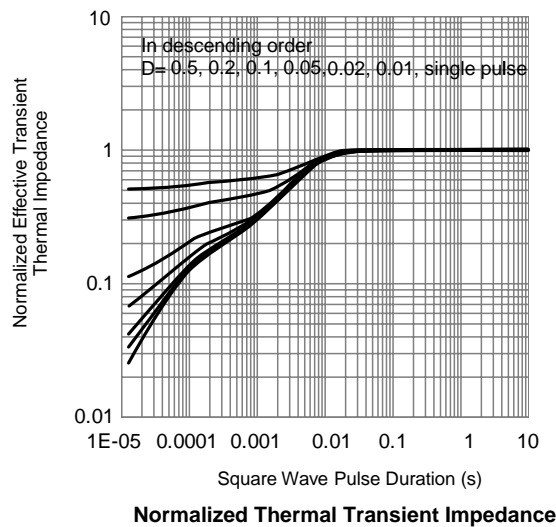
**Source to Drain Voltage**  
Safe Operating Area, Junction-to-Ambient



**T<sub>C</sub> - Case Temperature**  
Current Derating

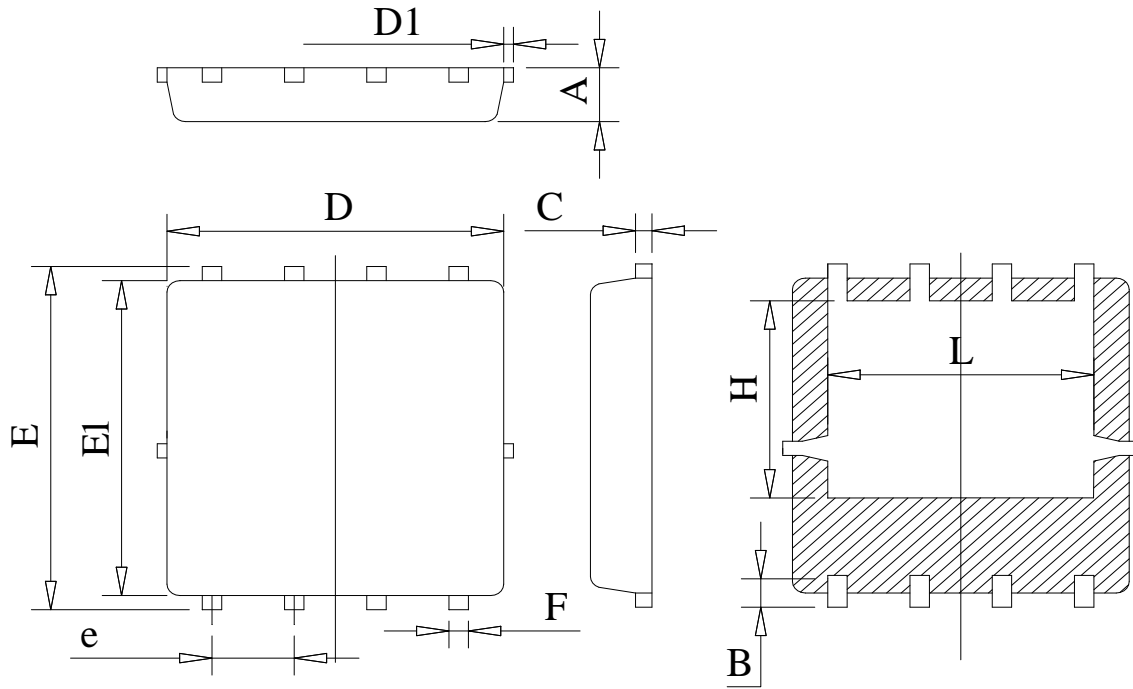


**T<sub>C</sub> - Case Temperature**  
Current Derating



**Normalized Thermal Transient Impedance**

**DFN5\*6-8L PACKAGE OUTLINE**



**COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)**

Unit : mm

Symbol	Min	Typ	Max
A	0.78	0.95	1.12
B	0.45	0.58	0.78
C	0.18	0.254	0.36
D	4.70	5.20	5.45
D1			0.18
E	5.85	6.05	6.25
E1	5.38	5.55	5.98
e	1.15	1.27	1.40
F	0.18	0.30	0.52
H	3.25	3.47	3.70
L	3.75	4.00	4.25

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