

## N-Channel 55 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, e</sup>	Q <sub>g</sub> (Typ.)
55	1.1 at V <sub>GS</sub> = 10 V	160	95 nC
	1.7 at V <sub>GS</sub> = 4.5 V		

### FEATURES

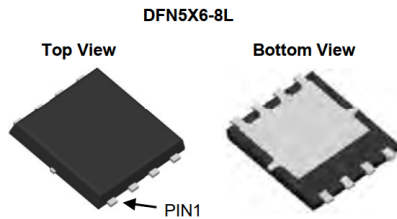
- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> and UIS Tested

### APPLICATIONS

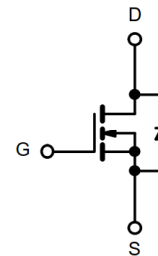
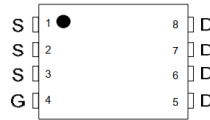
- Notebook PC Core
- VRM/POL



RoHS  
COMPLIANT



Top View



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>	55	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	
Continuous Drain Current (T <sub>J</sub> = 175 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	160 <sup>a, e</sup>
		T <sub>C</sub> = 70 °C	138 <sup>e</sup>
		T <sub>A</sub> = 25 °C	18 <sup>b, c</sup>
		T <sub>A</sub> = 70 °C	14.5 <sup>b, c</sup>
Pulsed Drain Current	I <sub>DM</sub>	640	A
Avalanche Current Pulse	I <sub>AS</sub>	153	
Single Pulse Avalanche Energy	E <sub>AS</sub>	495	
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	160 <sup>a, e</sup>
		T <sub>A</sub> = 25 °C	4.69 <sup>b, c</sup>
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	208 <sup>a</sup>
		T <sub>C</sub> = 70 °C	175
		T <sub>A</sub> = 25 °C	6.2 <sup>b, c</sup>
		T <sub>A</sub> = 70 °C	5.3 <sup>b, c</sup>
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b, d</sup>	R <sub>thJA</sub>	18	25	°C/W
Maximum Junction-to-Case	R <sub>thJC</sub>	0.6	0.8	

Notes:

- Based on T<sub>C</sub> = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under steady state conditions is 90 °C/W.
- Calculated based on maximum junction temperature.

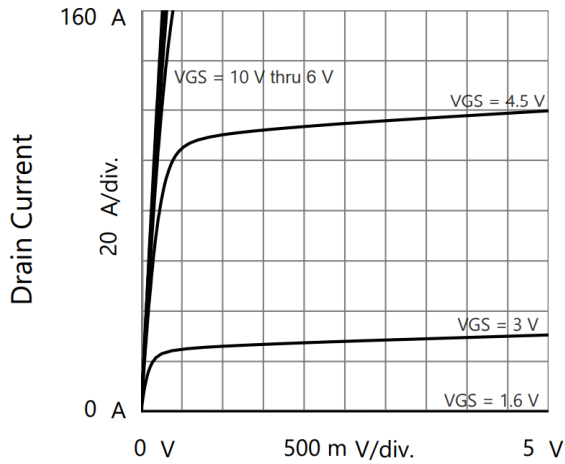
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min .	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	55	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		3.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-		$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 55\text{ V}, V_{GS} = 0\text{ V}$	-		1	$\mu\text{A}$
		$V_{DS} = 55\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-		10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	160			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	1.1	1.4	m $\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	-	1.7	2.3	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 5\text{ V}, I_D = 20\text{ A}$	-	100		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	6520	-	pF
Output Capacitance	$C_{oss}$		-	1490	-	
Reverse Transfer Capacitance	$C_{rss}$		-	30	-	
Total Gate Charge	$Q_g$	$V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	95	-	nC
Gate-Source Charge	$Q_{gs}$		-	11	-	
Gate-Drain Charge	$Q_{gd}$		-	14	-	
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	-	5.3	-	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}, I_D = 20\text{ A},$ $V_{GEN} = 10\text{ V}, R_g = 1\Omega$	-	19	-	ns
Rise Time	$t_r$		-	10	-	
Turn-Off Delay Time	$t_{d(off)}$		-	38	-	
Fall Time	$t_f$		-	12	-	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$	-	-	160	A
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$		-	-	640	
Body Diode Voltage	$V_{SD}$	$I_S = 1\text{ A}$	-	0.6	1.0	
V Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$	-	30	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	100	-	nC
Reverse Recovery Fall Time	$t_a$		-	29	-	ns
Reverse Recovery Rise Time	$t_b$		-	23	-	

Notes:

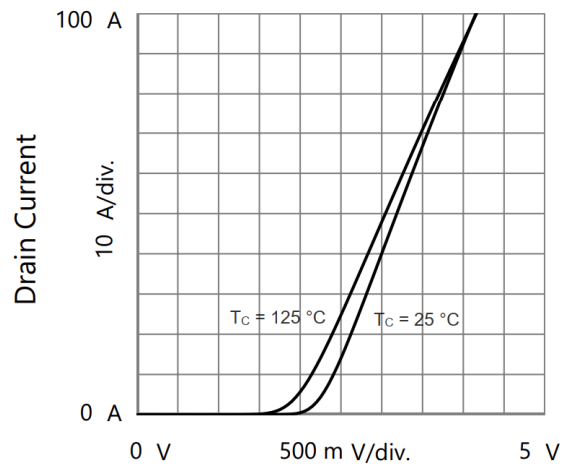
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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.

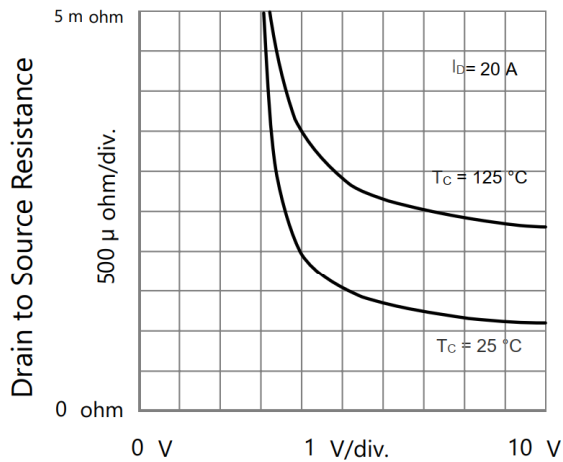
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



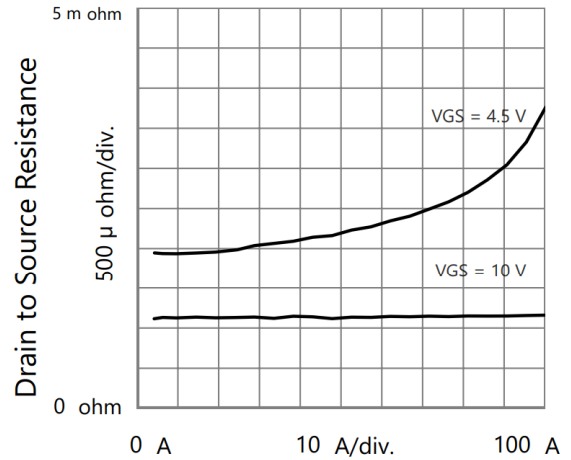
Drain to Source Voltage  
Output Characteristics



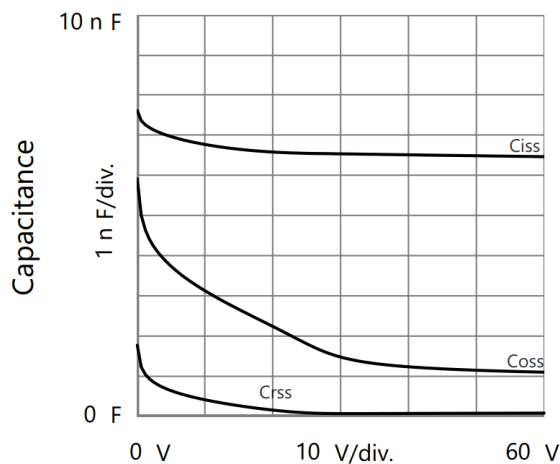
Gate to Source Voltage  
Transfer Characteristics



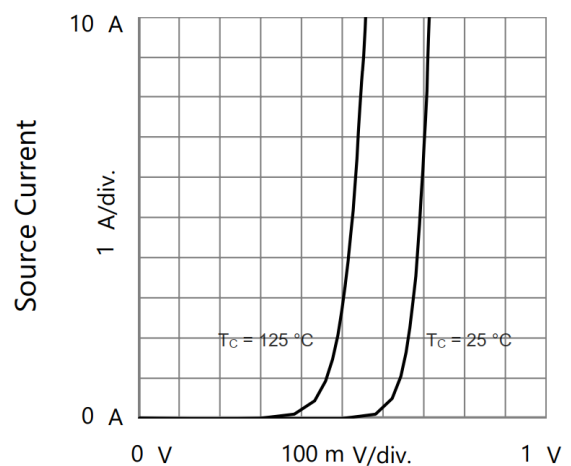
Gate to Source Voltage  
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current  
Drain to Source Resistance vs. Drain Current

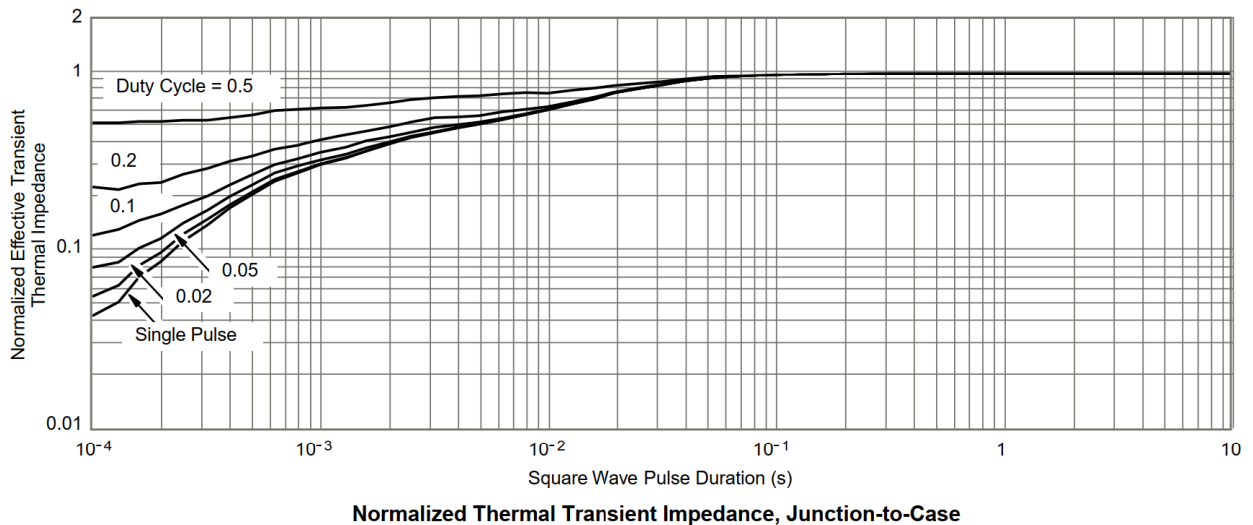
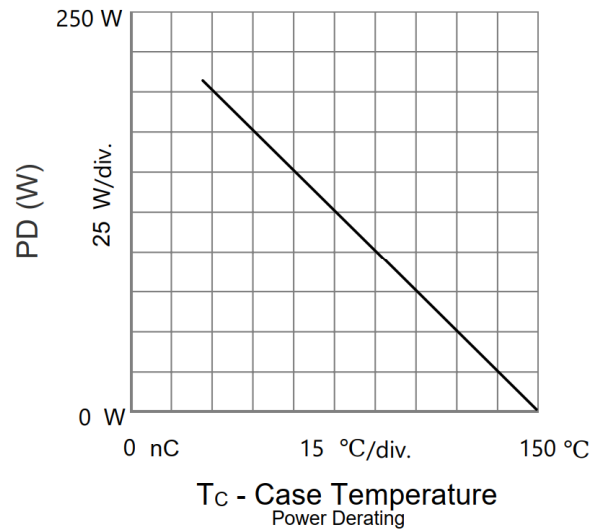
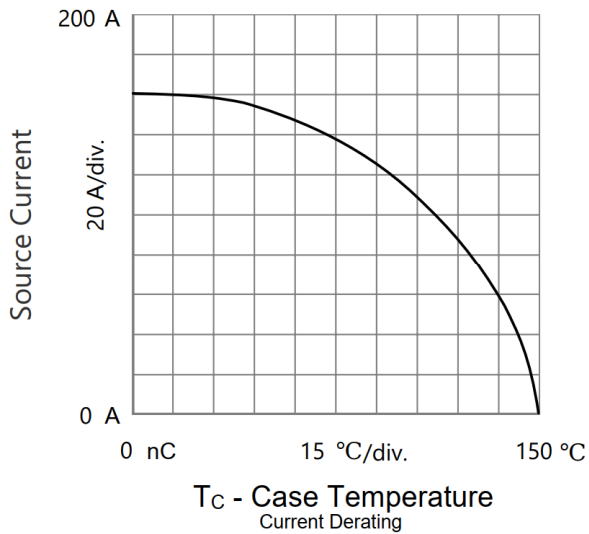
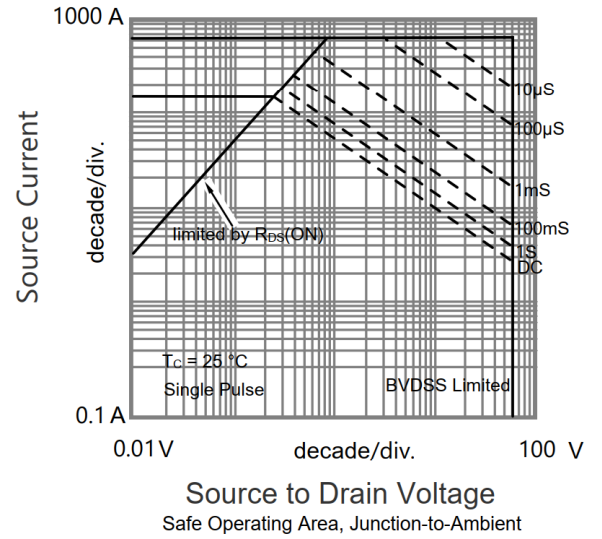
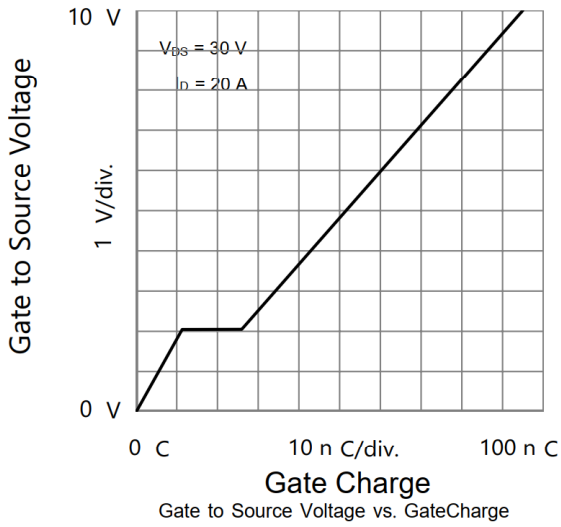


Drain to Source Voltage  
Capacitances

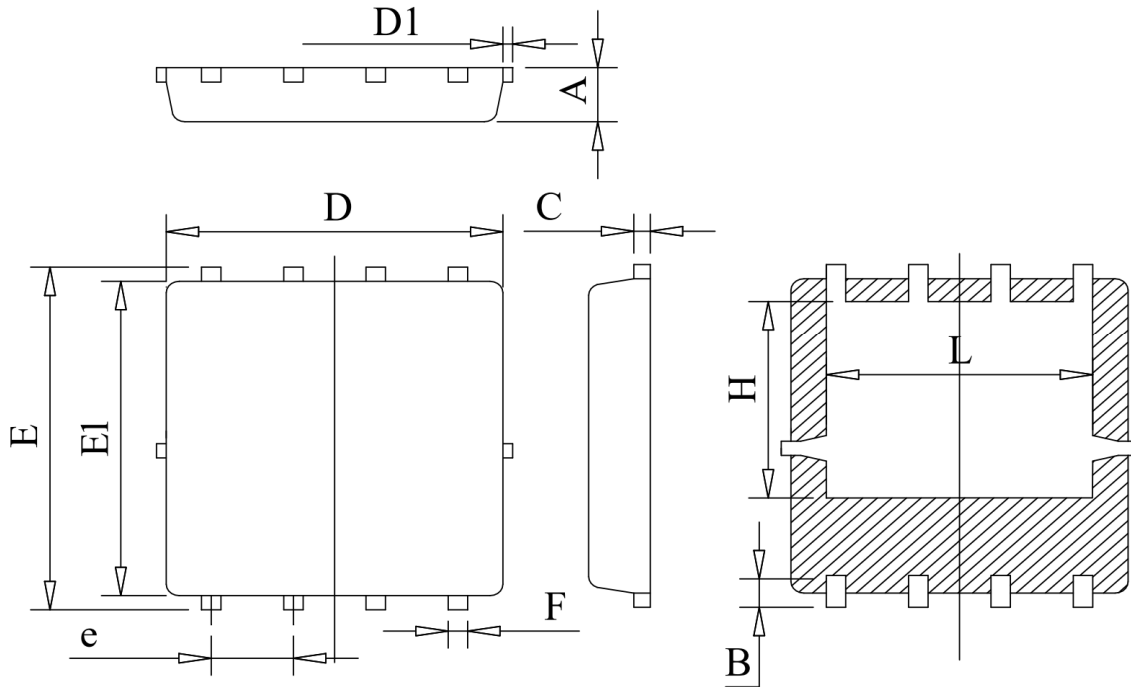


Source to Drain Voltage  
Body Diode Forward Characteristics

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



DFN5X6-8L 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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