

N-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (m Ω)(TYP.)	I_D (A) ^{a, e}	Q_g (TYP.)
40	1.5 at $V_{GS} = 10$ V	145	57 nC

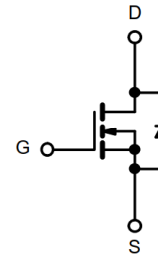
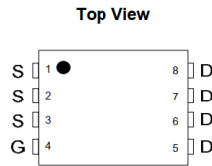
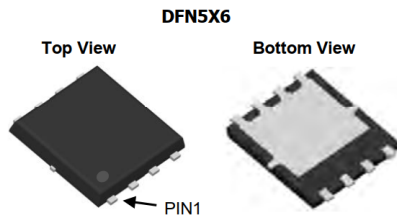
FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested



APPLICATIONS

- Notebook PC Core
- VRM/POL



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	I_D	$T_C = 25$ °C	145 ^{a, e}
		$T_C = 70$ °C	133 ^e
		$T_A = 25$ °C	32 ^{b, c}
		$T_A = 70$ °C	21.2 ^{b, c}
Pulsed Drain Current	I_{DM}	788	mJ
Avalanche Current Pulse	I_{AS}	143	
Single Pulse Avalanche Energy	E_{AS}	513	
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	145 ^{a, e}
		$T_A = 25$ °C	5.36 ^{b, c}
Maximum Power Dissipation	P_D	$T_C = 25$ °C	118 ^a
		$T_C = 70$ °C	88.3
		$T_A = 25$ °C	4.05 ^{b, c}
		$T_A = 70$ °C	2.59 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	15	20	°C/W
Maximum Junction-to-Case	R_{thJC}	0.85	1.2	

Notes:

- a. Based on $T_C = 25$ °C.
- b. Surface mounted on 1" x 1" FR4 board.
- c. $t = 10$ s.
- d. Maximum under steady state conditions is 90 °C/W.
- e. Calculated based on maximum junction temperature.

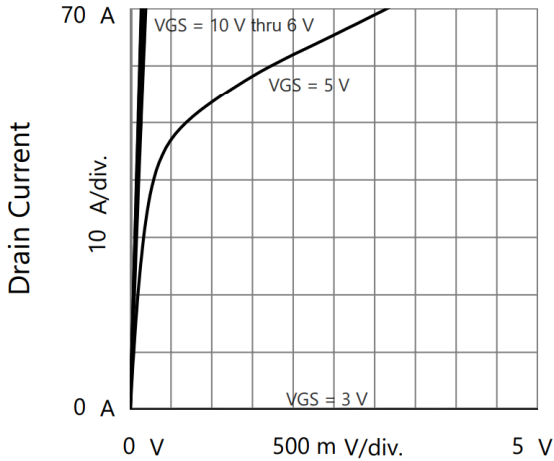
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min .	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		35		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 5.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4	V
Gate-Source 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
		$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	145			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$		1.5	1.8	m Ω
Forward Transconductance ^a	g_{fs}	$V_{DS} = 20\text{ V}, I_D = 30\text{ A}$		75		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		5210		pF
Output Capacitance	C_{oss}			1530		
Reverse Transfer Capacitance	C_{rss}			11		
Total Gate Charge	Q_g	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 30\text{ A}$		57		nC
Gate-Source Charge	Q_{gs}			16		
Gate-Drain Charge	Q_{gd}			24		
Gate Resistance	R_g	$f = 1\text{ MHz}$		7		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 0.555\text{ }\Omega$ $I_D \cong 30\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		15		ns
Rise Time	t_r			10		
Turn-Off Delay Time	$t_{d(off)}$			66		
Fall Time	t_f			11		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			145	A
Pulse Diode Forward Current ^a	I_{SM}				788	
Body Diode Voltage	V_{SD}	$I_S = 30\text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 30\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		35		ns
Body Diode Reverse Recovery Charge	Q_{rr}			120		nC
Reverse Recovery Fall Time	t_a			33		ns
Reverse Recovery Rise Time	t_b			25		

Notes:

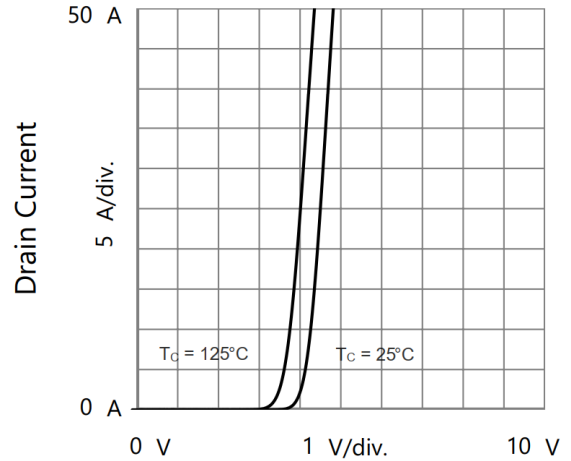
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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.

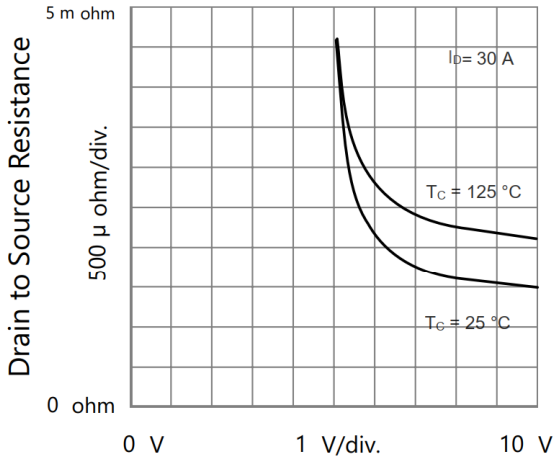
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



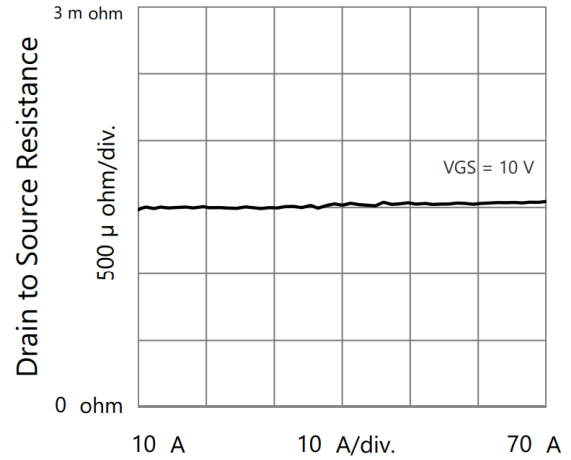
Drain to Source Voltage
Output Characteristics



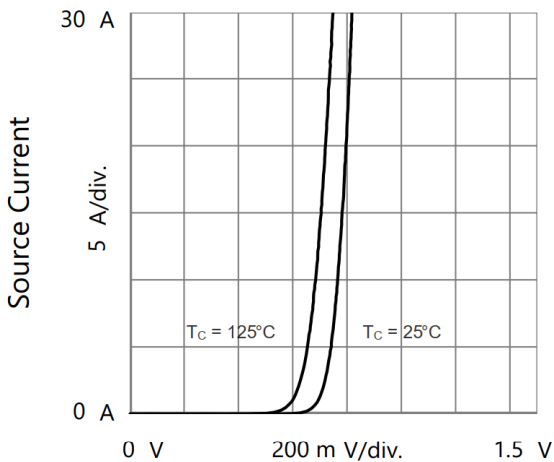
Gate to Source Voltage
Transfer Characteristics



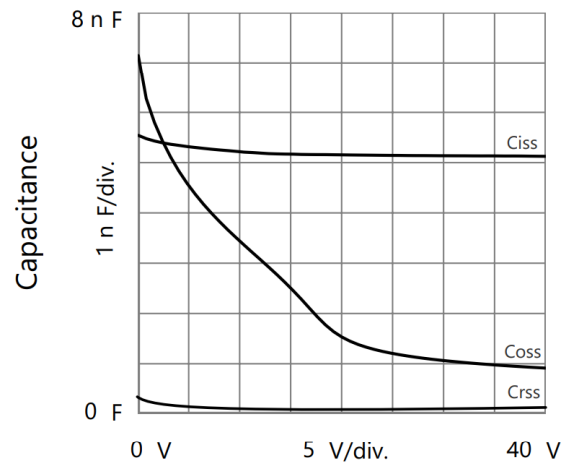
Gate to Source Voltage
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current
Drain to Source Resistance vs. Drain Current

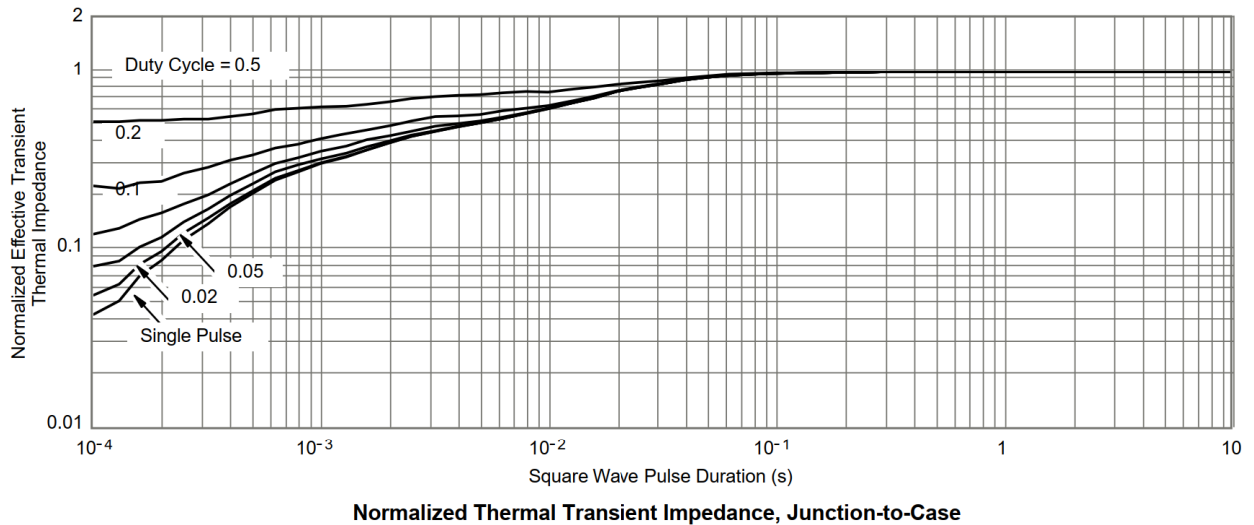
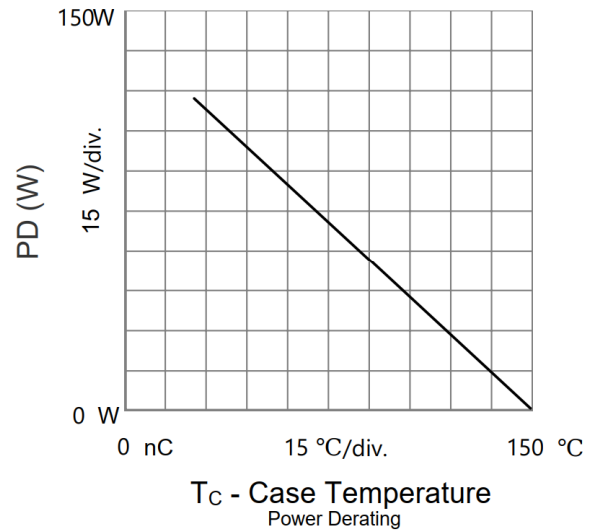
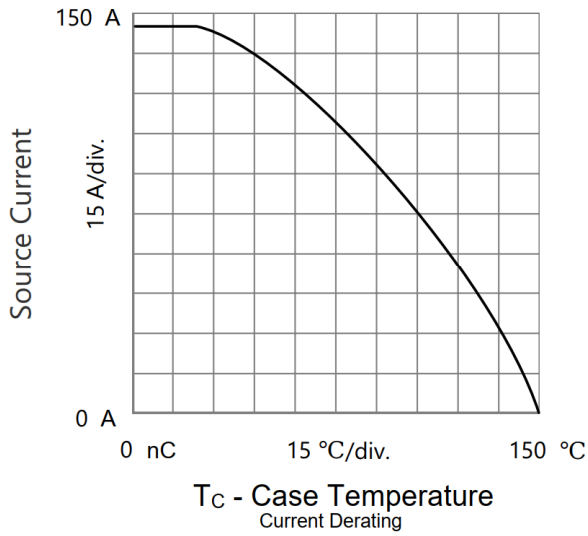
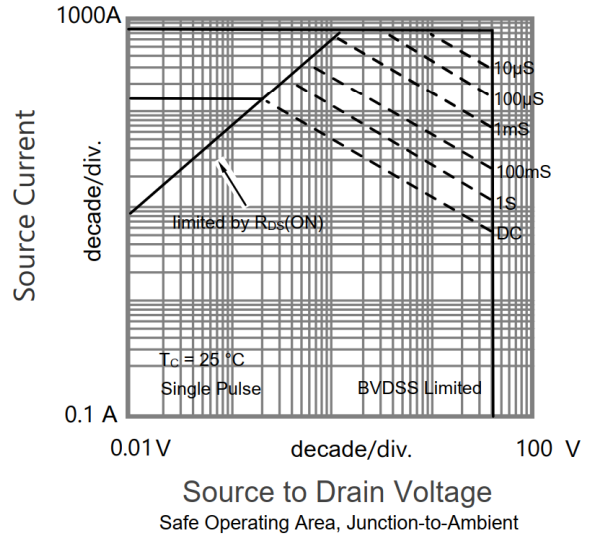
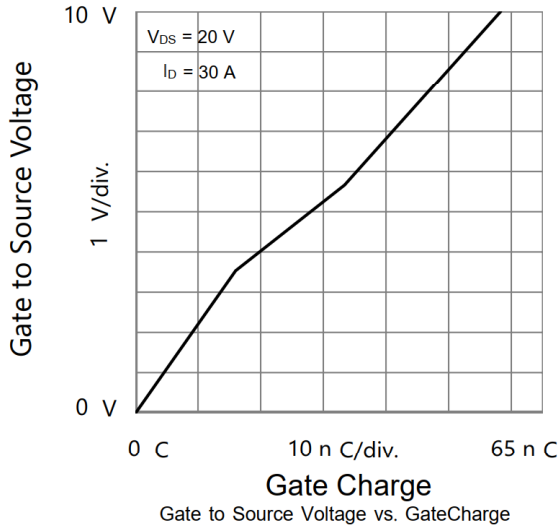


Source to Drain Voltage
Body Diode Forward Characteristics

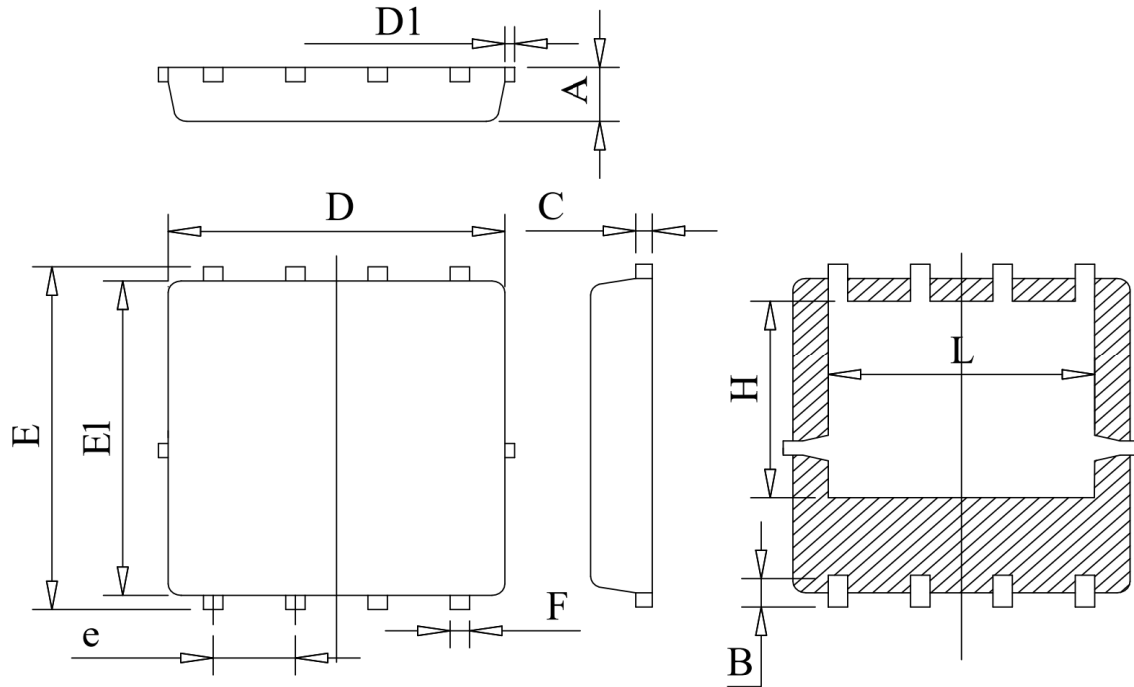


Drain to Source Voltage
Capacitances

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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