

N-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (m Ω)(Typ.)	I_D (A) ^{a, e}	Q_g (Typ.)
60	1.8 at $V_{GS} = 10$ V	180	105 nC
	2.8 at $V_{GS} = 4.5$ V		

FEATURES

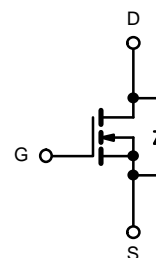
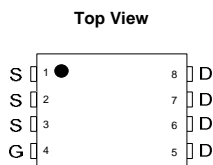
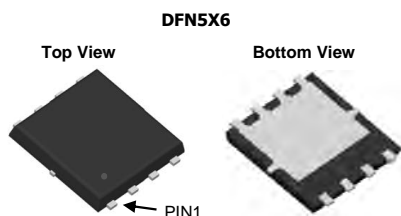
- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested



RoHS
COMPLIANT

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}	60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	$T_C = 25$ °C	I_D	180 ^{a, e}	A
	$T_C = 70$ °C		160 ^e	
	$T_A = 25$ °C		30 ^{b, c}	
	$T_A = 70$ °C		20 ^{b, c}	
Pulsed Drain Current		I_{DM}	720	
Avalanche Current Pulse	L = 0.1 mH	I_{AS}	175	
Single Pulse Avalanche Energy		E_{AS}	650	mJ
Continuous Source-Drain Diode Current	$T_C = 25$ °C	I_S	180 ^{a, e}	A
	$T_A = 25$ °C		4.69 ^{b, c}	
Maximum Power Dissipation	$T_C = 25$ °C	P_D	250 ^a	W
	$T_C = 70$ °C		175	
	$T_A = 25$ °C		7.5 ^{b, c}	
	$T_A = 70$ °C		5.3 ^{b, c}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	$t \leq 10$ s	R_{thJA}	18	25	°C/W
Maximum Junction-to-Case	Steady State	R_{thJC}	0.6	0.8	

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.

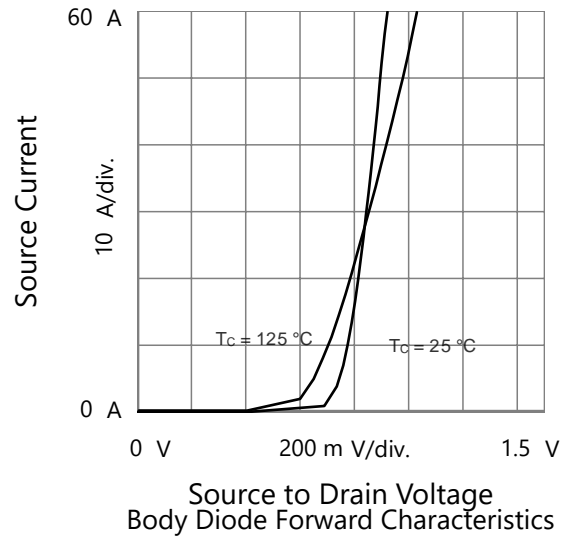
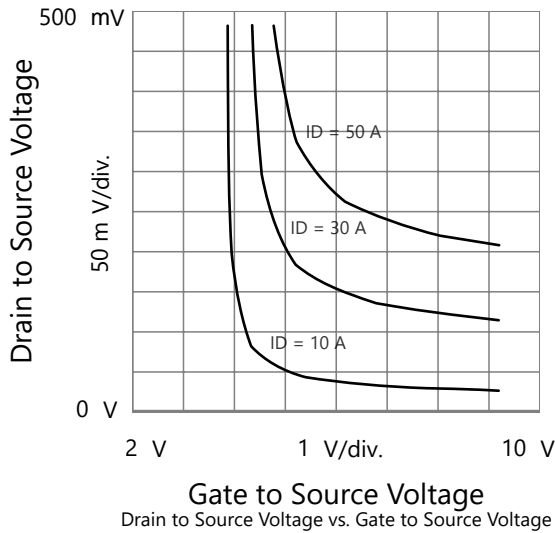
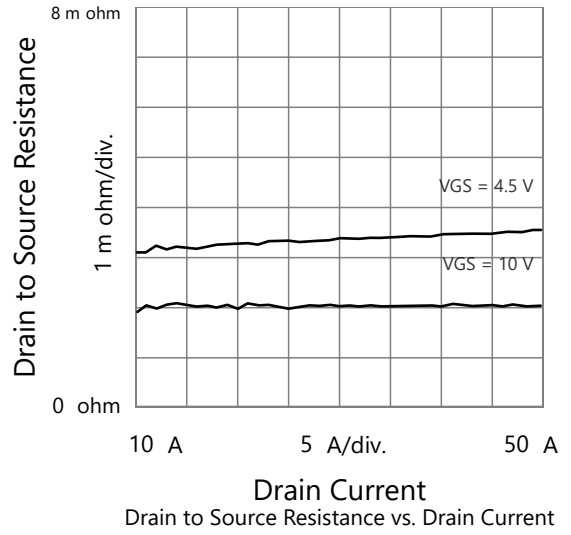
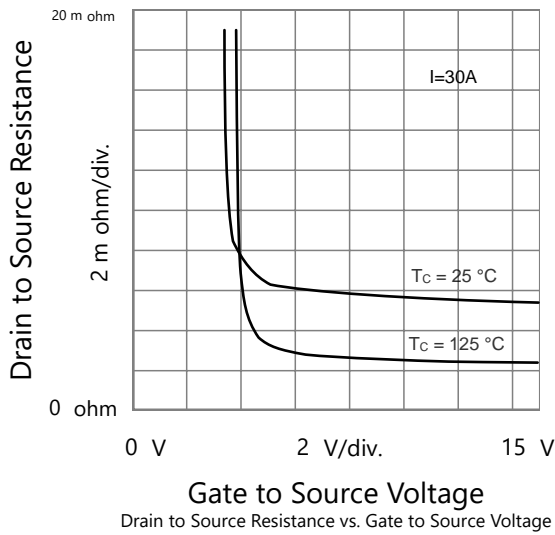
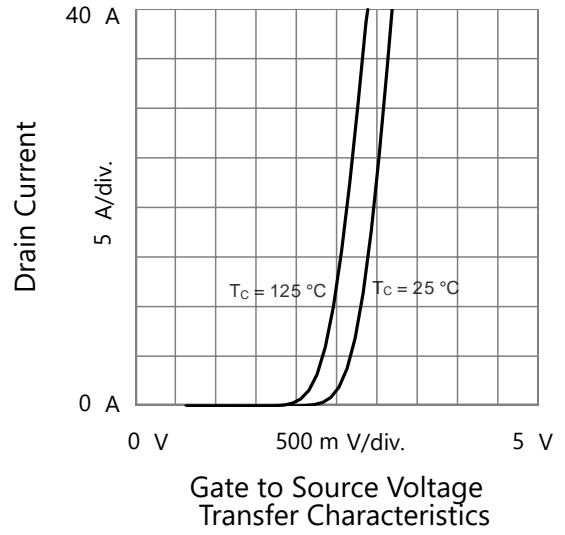
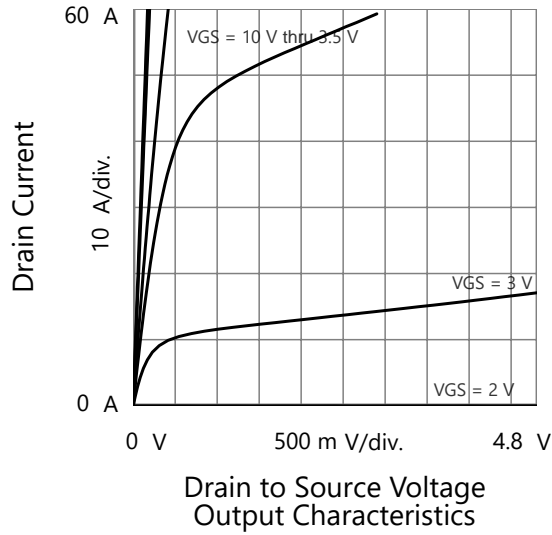
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min .	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$	-	35	-	mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		-	-5.5	-	
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		3.0	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}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$	-		1	μA
		$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-		10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	180			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$	-	1.8	2.5	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 30\text{ A}$	-	2.8	3.6	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 5\text{ V}, I_D = 20\text{ A}$	-	110		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	7080	-	pF
Output Capacitance	C_{oss}		-	1440	-	
Reverse Transfer Capacitance	C_{rss}		-	3	-	
Total Gate Charge	Q_g	$V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 30\text{ A}$	-	105	-	nC
Gate-Source Charge	Q_{gs}		-	84	-	
Gate-Drain Charge	Q_{gd}		-	16	-	
Gate Resistance	R_g	$f = 1\text{ MHz}$	-	1.5	-	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}, R_L = 0.555\Omega$ $I_D = 30\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\Omega$	-	19	-	ns
Rise Time	t_r		-	20	-	
Turn-Off Delay Time	$t_{d(off)}$		-	31	-	
Fall Time	t_f		-	6	-	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$	-		180	A
Pulse Diode Forward Current ^a	I_{SM}		-		720	
Body Diode Voltage	V_{SD}	$I_S = 20\text{ A}$	-	0.8	1.2	
V Body Diode Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$	-	55	78	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	97	170	nC
Reverse Recovery Fall Time	t_a		-	29		ns
Reverse Recovery Rise Time	t_b		-	23		

Notes:

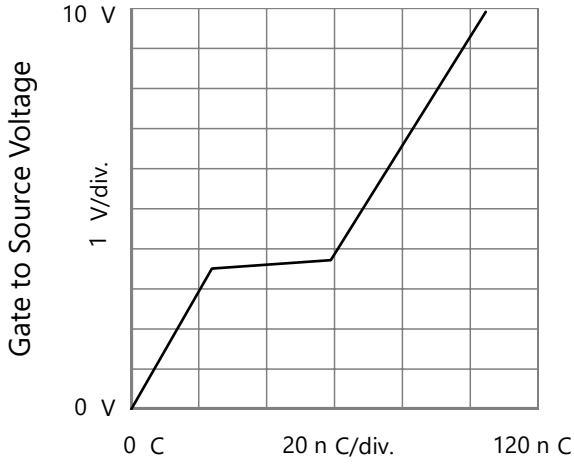
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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.

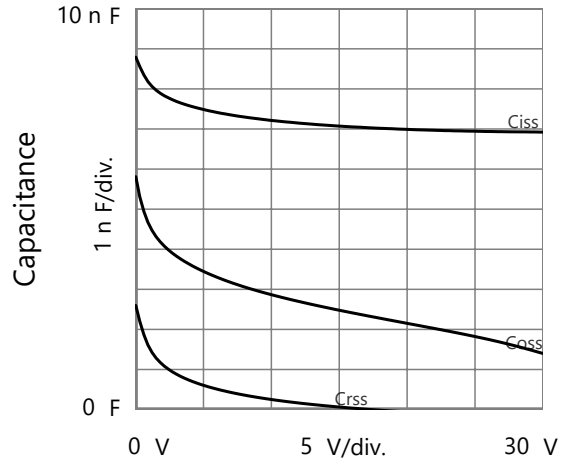
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



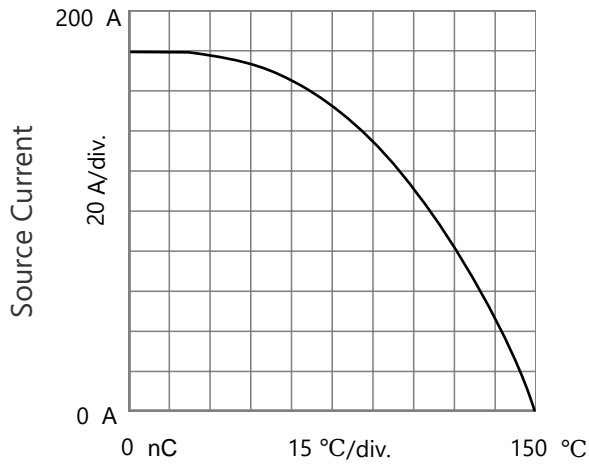
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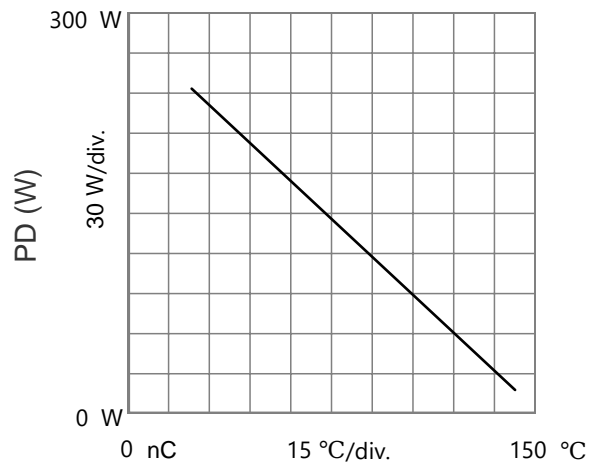
Gate Charge
Gate to Source Voltage vs. Gate Charge



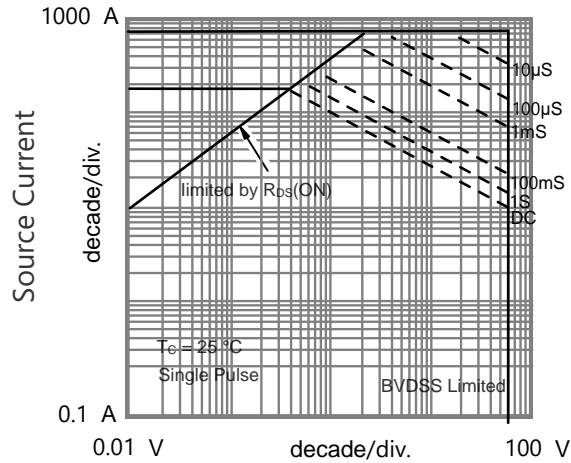
Drain to Source Voltage Capacitances



T_C - Case Temperature
Current Derating



T_C - Case Temperature
Power Derating



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

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