N-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (mΩ)(Typ.)	I_D (A)[a, e]	Q_g (Typ.)
40	1.4 at V_{GS} = 10 V	120	40 nC
	2.1 at V_{GS} = 4.5 V	100	

FEATURES

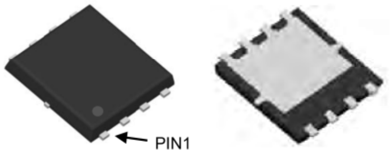
- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

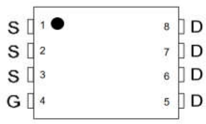
APPLICATIONS

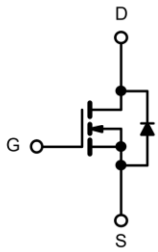
- Notebook PC Core
- VRM/POL

RoHS COMPLIANT

DFN5X6







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)	T_C = 25 °C	I_D	120[a, e]	A
	T_C = 70 °C		100[e]	
	T_A = 25 °C		38[b, c]	
	T_A = 70 °C		26.9[b, c]	
Pulsed Drain Current		I_{DM}	420	
Avalanche Current Pulse	L = 0.1 mH	I_{AS}	40	
Single Pulse Avalanche Energy		E_{AS}	540	mJ
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	120[a, e]	A
	T_A = 25 °C		5.28[b, c]	
Maximum Power Dissipation	T_C = 25 °C	P_D	140[a]	W
	T_C = 70 °C		98	
	T_A = 25 °C		4.10[b, c]	
	T_A = 70 °C		2.82[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 ≤ 10 s	R_{thJA}	15	18	°C/W
Maximum Junction-to-Case	Steady State	R_{thJC}	0.45	0.7	

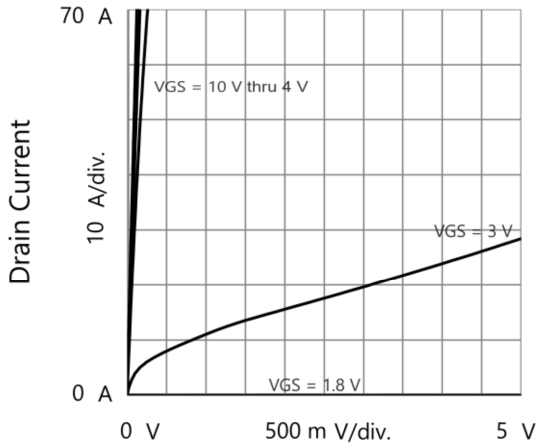
Notes:
a. Based on T_C = 25 °C.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. Maximum under steady state conditions is 90 °C/W.
e. Calculated based on maximum junction temperature.

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min .**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	40			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		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 µA	1.2		2.2	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40 V, V_{GS} = 0 V			1	µA
		V_{DS} = 32 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	120			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A		1.4	1.9	mΩ
		V_{GS} = 4.5 V, I_D = 10 A		2.1	2.9	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 15 A		78		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz		2960		pF
Output Capacitance	C_{oss}			898		
Reverse Transfer Capacitance	C_{rss}			63		
Total Gate Charge	Q_g	V_{DS} = 20 V, V_{GS} = 10 V, I_D = 20 A		40		nC
Gate-Source Charge	Q_{gs}			5.8		
Gate-Drain Charge	Q_{gd}			22		
Gate Resistance	R_g	f = 1 MHz		14		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 20 V, R_L = 0.555 Ω $I_D \cong$ 20A, V_{GEN} = 10 V, R_g = 1 Ω		16		ns
Rise Time	t_r			10		
Turn-Off Delay Time	$t_{d(off)}$			56		
Fall Time	t_f			10		
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 20 V, R_L = 0.625 Ω $I_D \cong$ 10 A, V_{GEN} = 4.5 V, R_g = 1 Ω		12		
Rise Time	t_r			150		
Turn-Off Delay Time	$t_{d(off)}$			55		
Fall Time	t_f			12		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			120	A
Pulse Diode Forward Current[a]	I_{SM}				420	
Body Diode Voltage	V_{SD}	I_S = 20 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 20 A, di/dt = 100 A/µs, T_J = 25 °C		35		ns
Body Diode Reverse Recovery Charge	Q_{rr}			90.2		nC
Reverse Recovery Fall Time	t_a			27		ns
Reverse Recovery Rise Time	t_b			25		

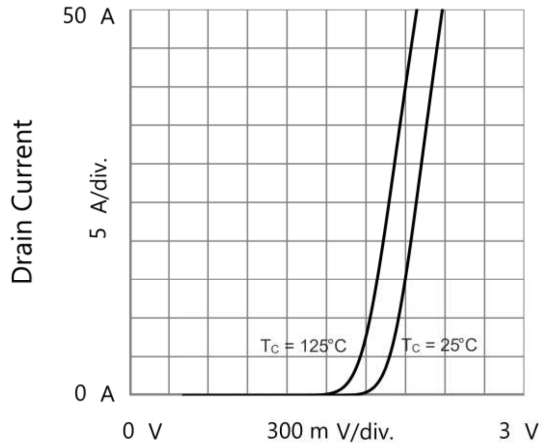
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

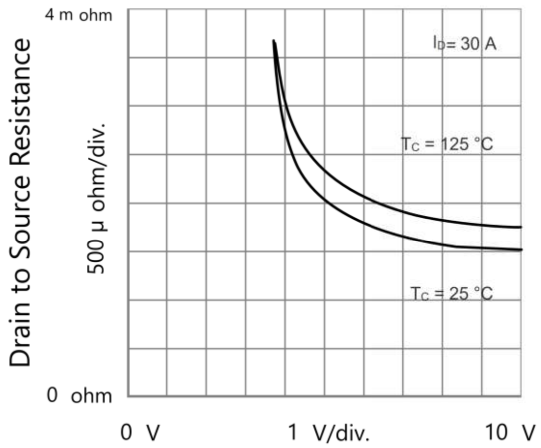
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



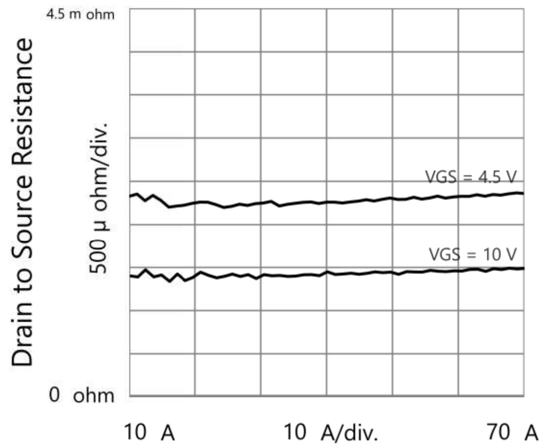
Drain to Source Voltage
Output Characteristics



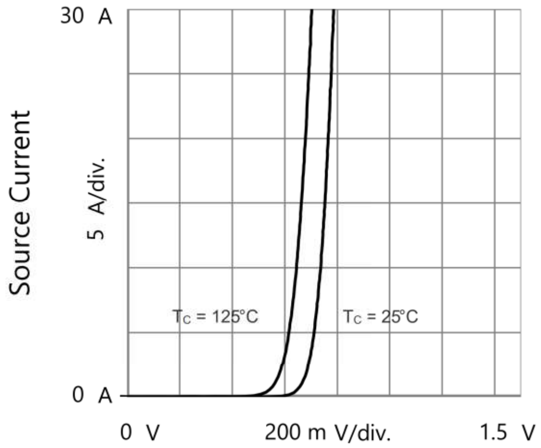
Gate to Source Voltage
Transfer Characteristics



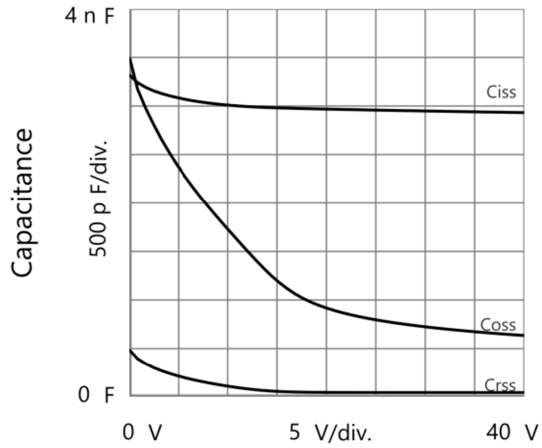
Gate to Source Voltage
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current
Drain to Source Resistance vs. Drain Current

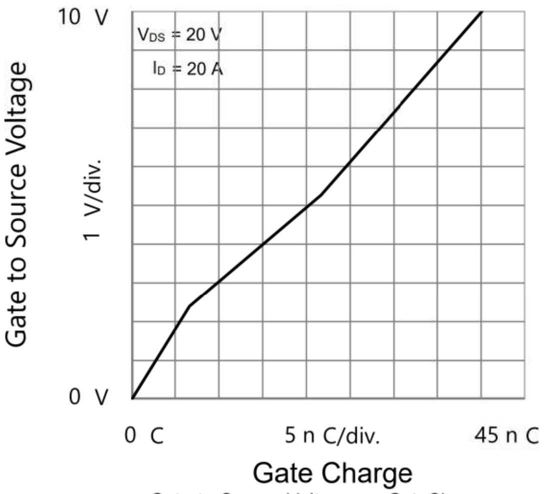


Source to Drain Voltage
Body Diode Forward Characteristics

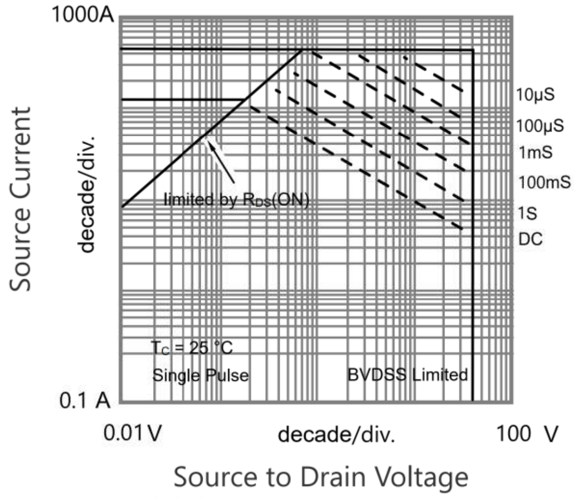


Drain to Source Voltage
Capacitances

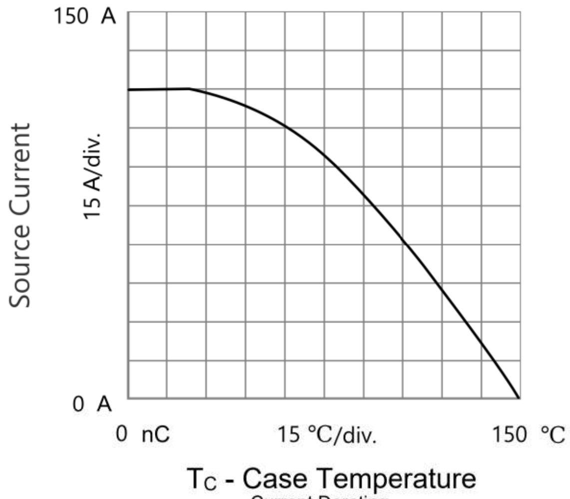
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



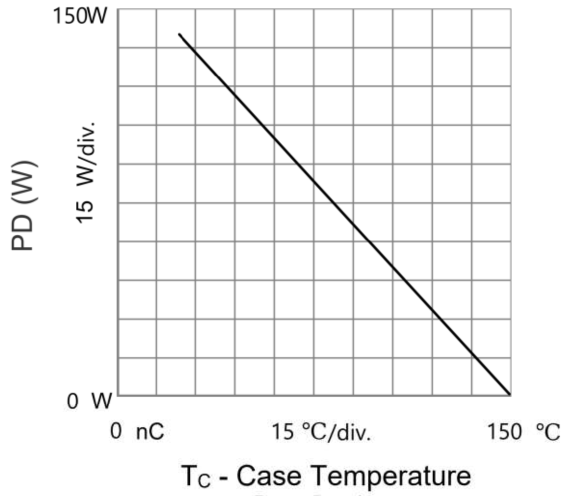
Gate to Source Voltage vs. GateCharge



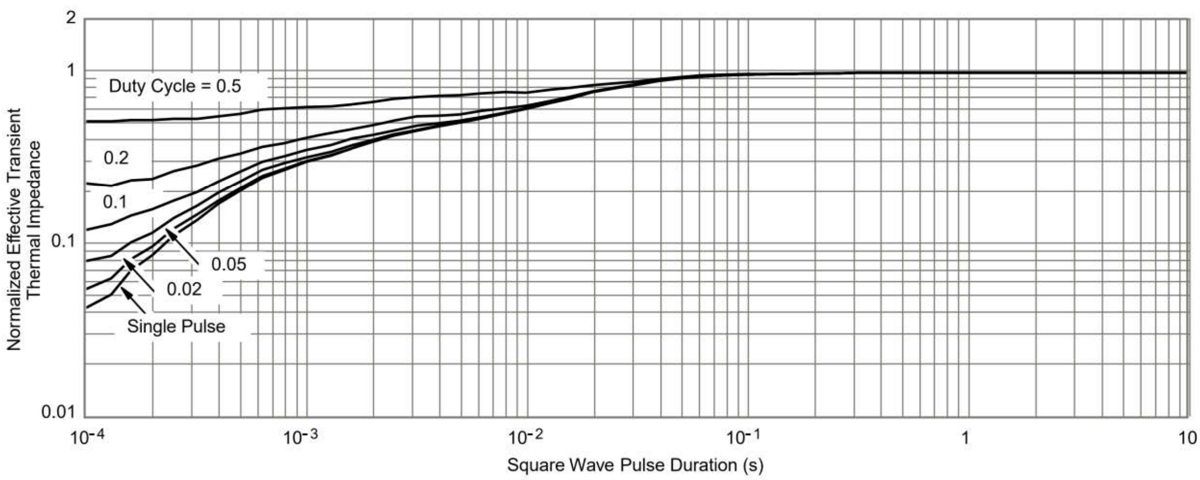
Safe Operating Area, Junction-to-Ambient



Current Derating



Power Derating



Normalized Thermal Transient Impedance, Junction-to-Case

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