

## 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)	Q <sub>g</sub> (TYP.)
40	4.8 at V <sub>GS</sub> = 10 V	60	40 nC
	5.9 at V <sub>GS</sub> = 10 V	52	

### FEATURES

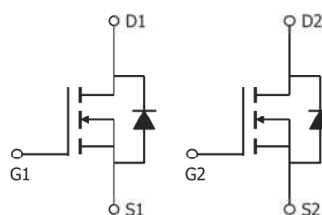
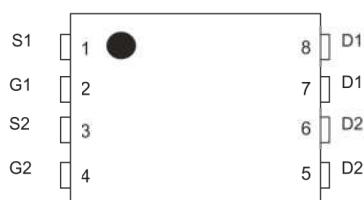
- DT-Trench Power MOSFET
- 100 % Rg and UIS tested

### APPLICATIONS

- DC Fan
- Motor Drive Applications
- Networking
- DC/AC inverter
- Half / Full Bridge Topology


**RoHS**  
 COMPLIANT

Top View



### ABSOLUTE MAXIMUM RATINGS (T<sub>C</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)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	A
		T <sub>C</sub> = 70 °C	
Pulsed Drain Current (t = 100 μs)	I <sub>DM</sub>	180	
Avalanche Current	I <sub>AS</sub>	55	
Single Avalanche Energy <sup>a</sup>	E <sub>AS</sub>	97	mJ
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>C</sub> = 25 °C	W
		T <sub>C</sub> = 70 °C	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

### THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) <sup>c</sup>	R <sub>thJA</sub>	40	°C/W
Junction-to-Case (Drain)	R <sub>thJC</sub>	2.5	

### Notes

- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).

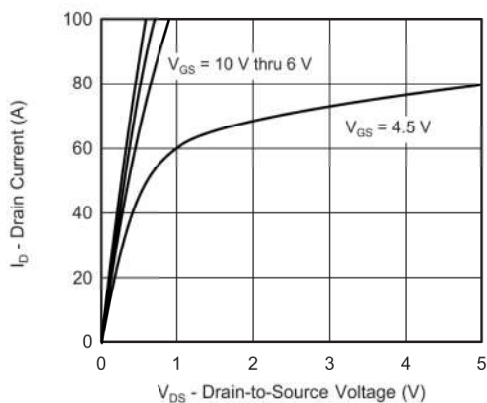
SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	40	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1	-	3	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V	-	-	1	μA
		V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C	-	-	10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 10 V, V <sub>GS</sub> = 10 V	60	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	-	4.8	5.8	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A	-	5.9	8.0	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A	-	98	-	S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 20 V, f = 1 MHz	-	2480	-	pF
Output Capacitance	C <sub>oss</sub>		-	378	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	103	-	
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	-	40	-	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>		-	7.3	-	
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>		-	6.9	-	
Gate Resistance	R <sub>g</sub>	f = 1 MHz	-	2.5	-	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 20 V, R <sub>L</sub> = 2 Ω I <sub>D</sub> = 20 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω	-	15	-	ns
Rise Time <sup>c</sup>	t <sub>r</sub>		-	10	-	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>		-	38	-	
Fall Time <sup>c</sup>	t <sub>f</sub>		-	12	-	
Drain-Source Body Diode Ratings and Characteristics <sup>b</sup> (T <sub>C</sub> = 25 °C)						
Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	-	-	60	A
Pulsed Current (t = 100 μs)	I <sub>SM</sub>		-	-	180	A
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 1 A, V <sub>GS</sub> = 0 V	-	0.6	1	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 20 A, di/dt = 100 A/μs	-	30	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>		-	25	-	μC

**Notes**

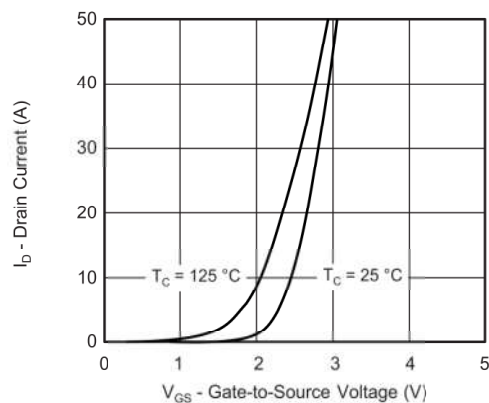
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

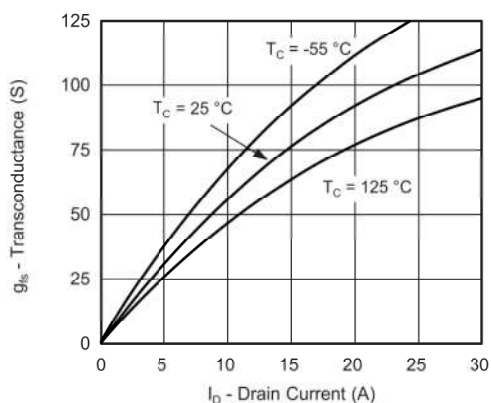
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)



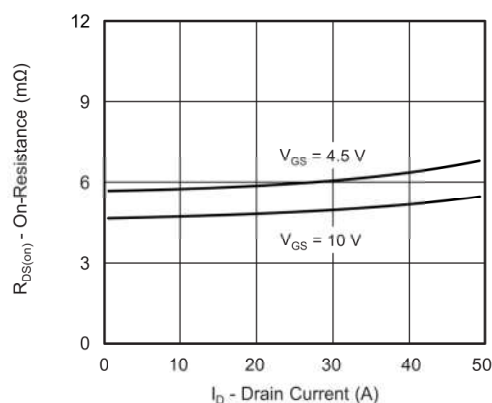
**Output Characteristics**



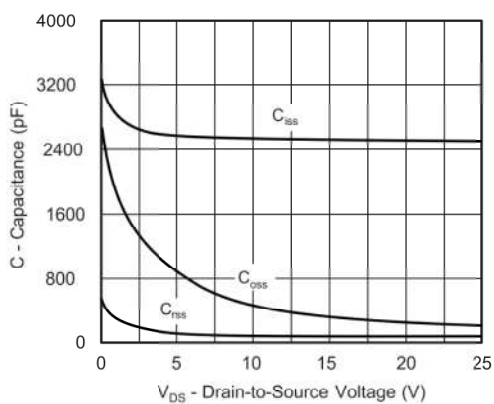
**Transfer Characteristics**



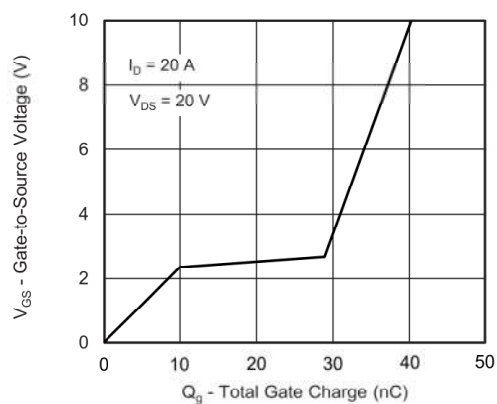
**Transconductance**



**On-Resistance vs. Drain Current**

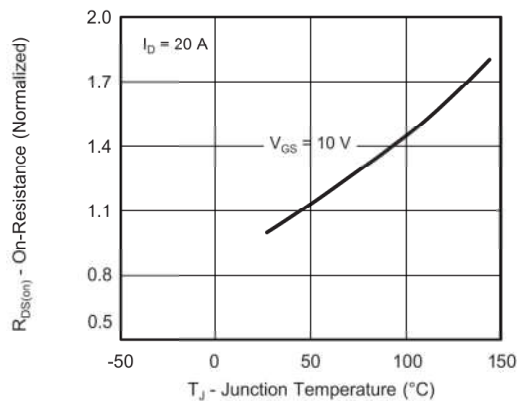


**Capacitance**

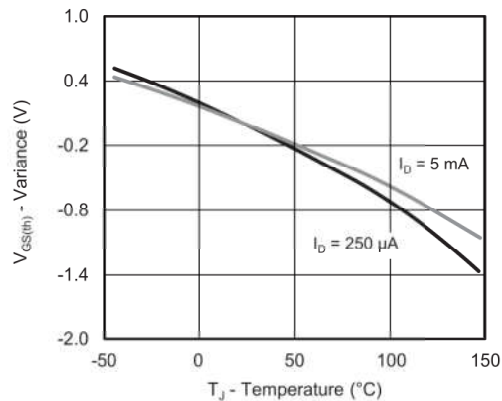


**Gate Charge**

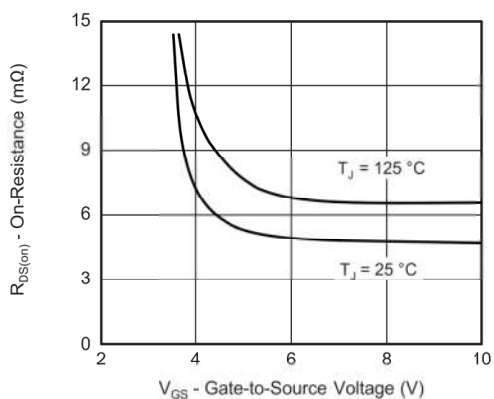
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)



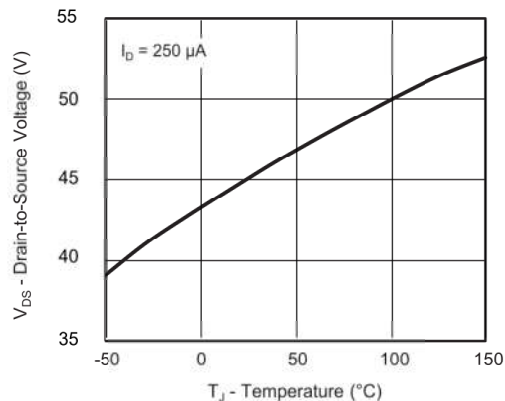
**On-Resistance vs. Junction Temperature**



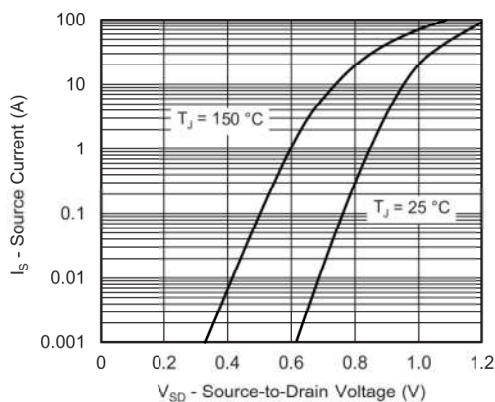
**Threshold Voltage**



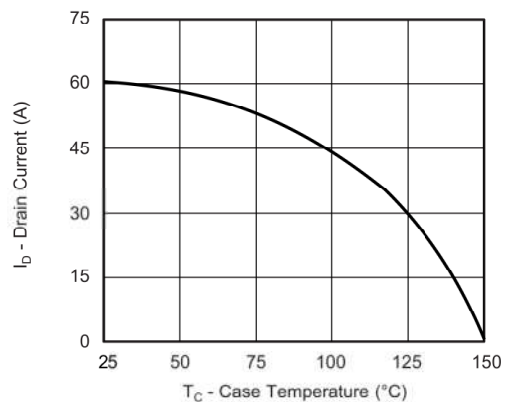
**On-Resistance vs. Gate-to-Source Voltage**



**Drain Source Breakdown vs. Junction Temperature**

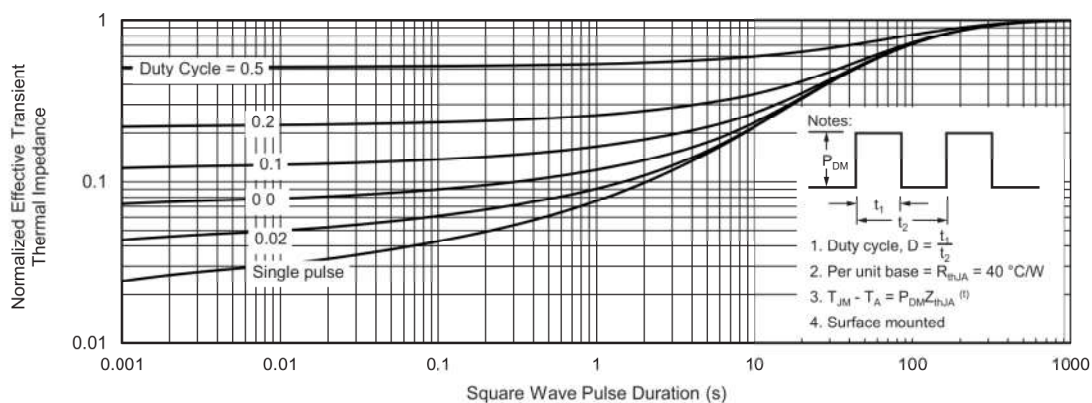
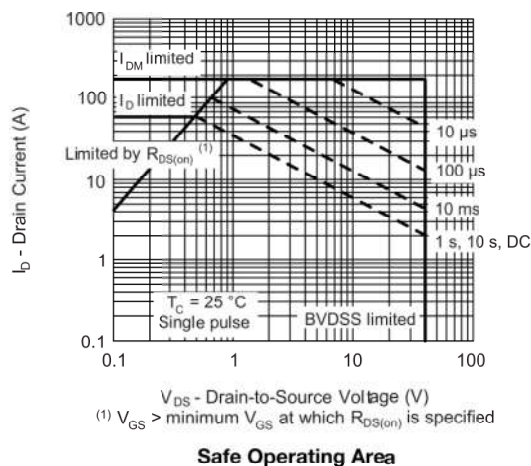


**Source Drain Diode Forward Voltage**



**Current De-Rating**

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



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