

## N-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY			
$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A) <sup>a, e</sup>	$Q_g$ (Typ.)
40	10 at $V_{GS} = 10$ V	35	6.5 nC
	12.5 at $V_{GS} = 4.5$ V	30	

### FEATURES

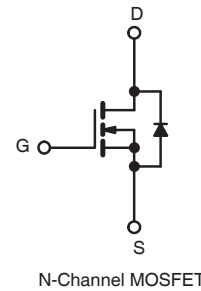
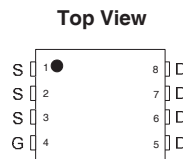
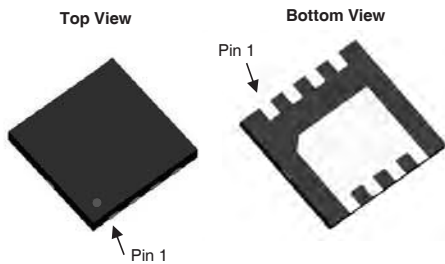
- DT-SGT Power MOSFET
- 100 %  $R_g$  and UIS Tested
- Low Gate Charge



### APPLICATIONS

- Power Management in Switches
- DC/DC Converter

### DFN 3\*3-8L



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C)	$I_D$	$T_C = 25$ °C	35 <sup>a, e</sup>
		$T_C = 70$ °C	30 <sup>e</sup>
		$T_A = 25$ °C	10 <sup>b, c</sup>
		$T_A = 70$ °C	6 <sup>b, c</sup>
Pulsed Drain Current	$I_{DM}$	140	A
Avalanche Current Pulse	$I_{AS}$	33	
Single Pulse Avalanche Energy	$E_{AS}$	50	
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25$ °C	35 <sup>a, e</sup>
		$T_A = 25$ °C	10 <sup>b, c</sup>
Maximum Power Dissipation	$P_D$	$T_C = 25$ °C	29
		$T_C = 70$ °C	18.5
		$T_A = 25$ °C	2.7 <sup>b, c</sup>
		$T_A = 70$ °C	1.5 <sup>b, c</sup>
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 <sup>b, d</sup>	$R_{thJA}$	40	55	°C/W
Maximum Junction-to-Case	$R_{thJC}$	3.5	4.5	

Notes:

- Based on  $T_C = 25$  °C.
- Surface mounted on 1" x 1" FR4 board.
- $t = 10$  s.
- Maximum under steady state conditions is 90 °C/W.
- Package limitation.

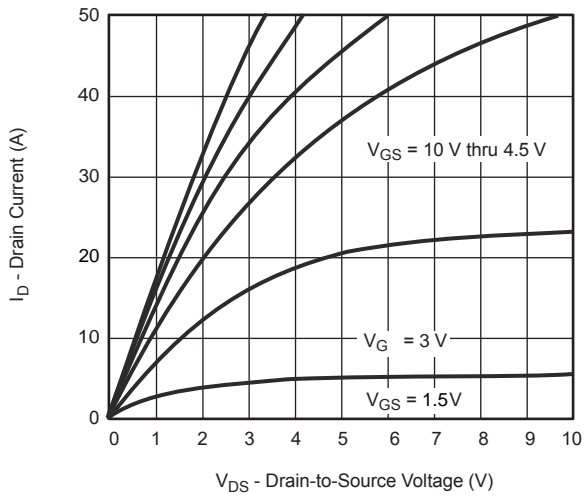
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		37		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		3	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	$I_{DSS}$	$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	35			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$		10	13	m $\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 8\text{ A}$		12.5	16	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 10\text{ A}$		33		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		265		$\mu\text{F}$
Output Capacitance	$C_{oss}$			72		
Reverse Transfer Capacitance	$C_{rss}$			9		
Total Gate Charge	$Q_g$	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$		6.5		nC
		$V_{DS} = 20\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 8\text{ A}$		3		
$Q_{gs}$			0.7			
$Q_{gd}$			1.1			
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		1	2	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 0.555\text{ }\Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		4		ns
Rise Time	$t_r$			2.1		
Turn-Off Delay Time	$t_{d(off)}$			8		
Fall Time	$t_f$			2		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 0.625\text{ }\Omega$ $I_D \cong 8\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		4.5		
Rise Time	$t_r$			5.9		
Turn-Off Delay Time	$t_{d(off)}$			11		
Fall Time	$t_f$			2.5		
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			35	A
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				140	
Body Diode Voltage	$V_{SD}$	$I_S = 12\text{ A}$		0.7	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 10\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		15		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			10		nC
Reverse Recovery Fall Time	$t_a$			8		ns
Reverse Recovery Rise Time	$t_b$			10		

Notes:

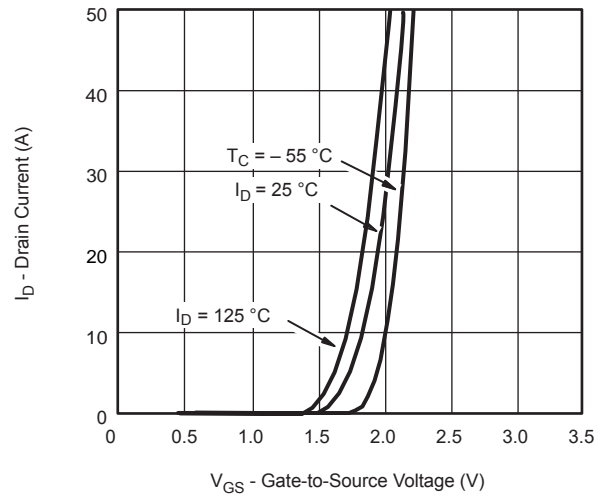
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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.

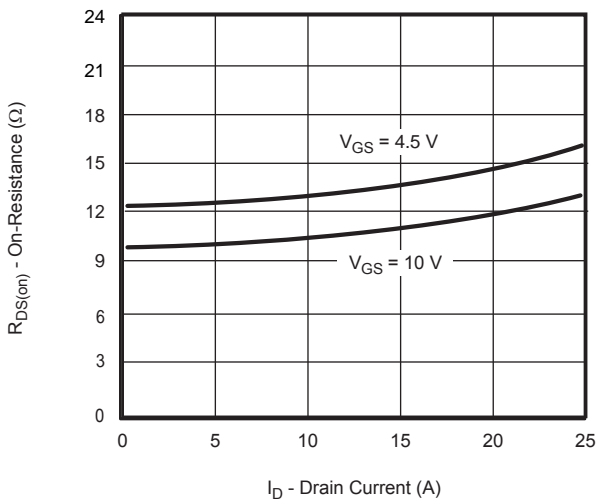
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



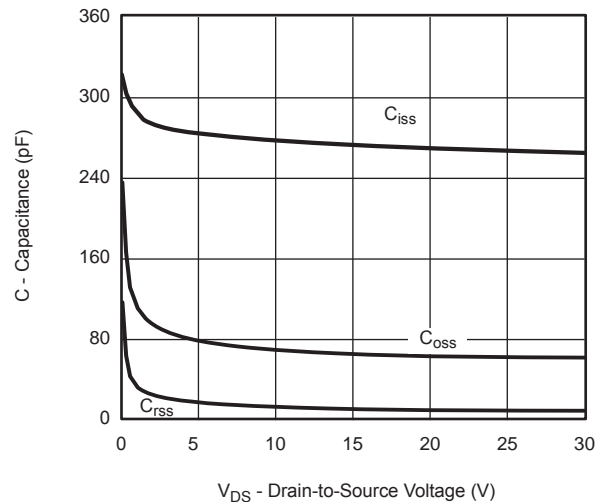
**Output Characteristics**



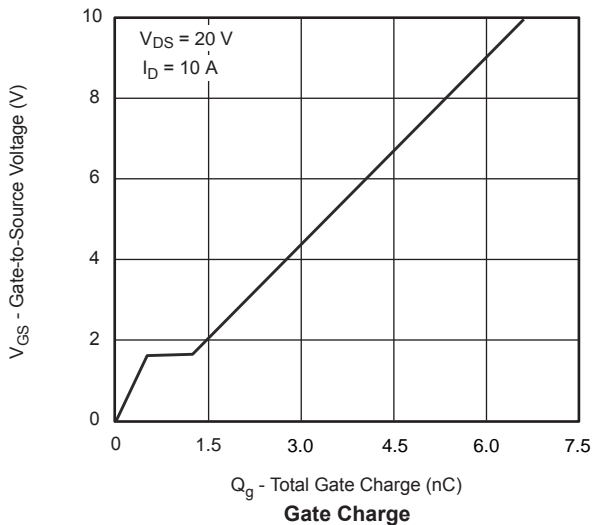
**Transfer Characteristics**



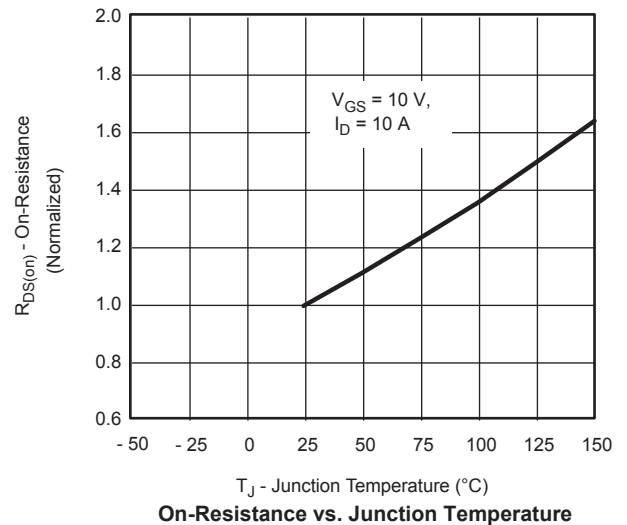
**On-Resistance vs. Drain Current**



**Capacitance**

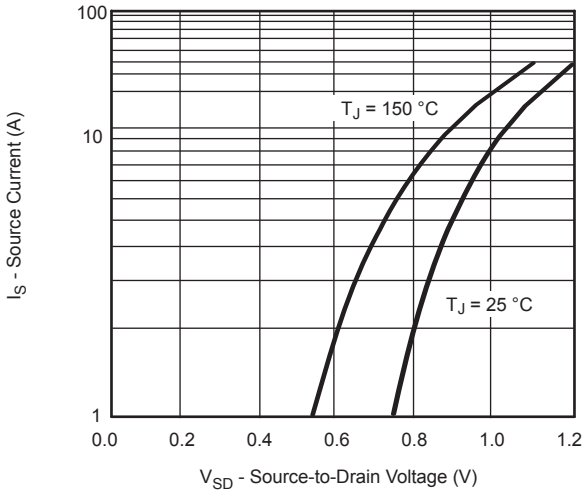


**Gate Charge**

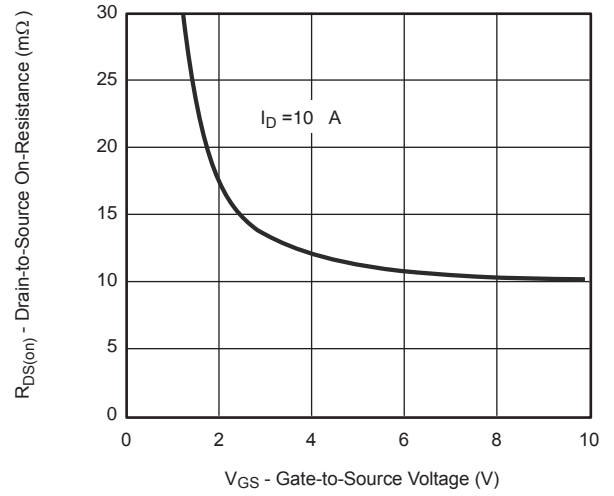


**On-Resistance vs. Junction Temperature**

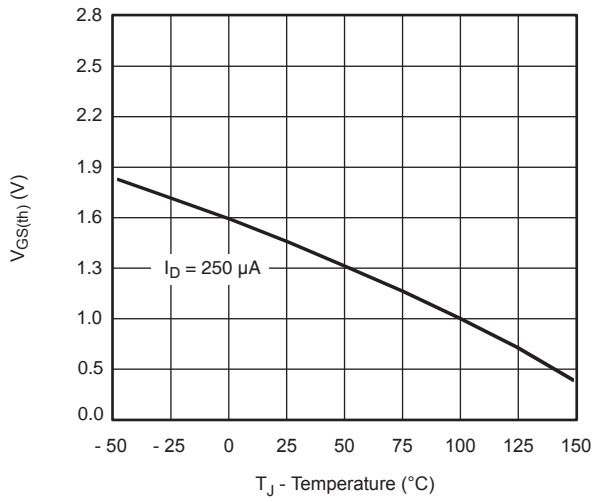
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



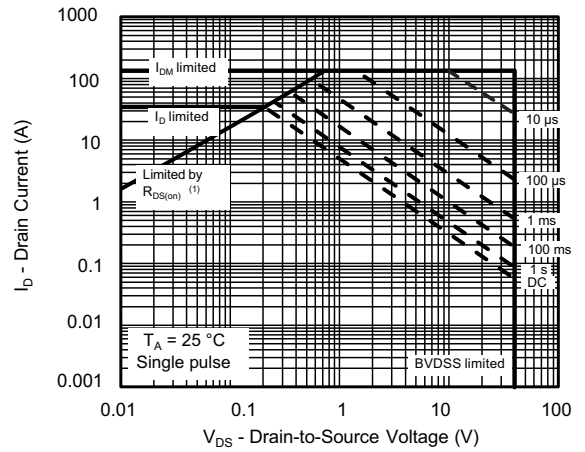
**Source-Drain Diode Forward Voltage**



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

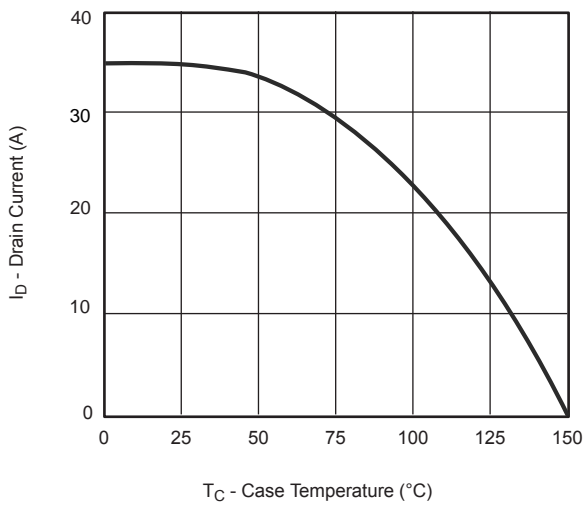


**Threshold Voltage**

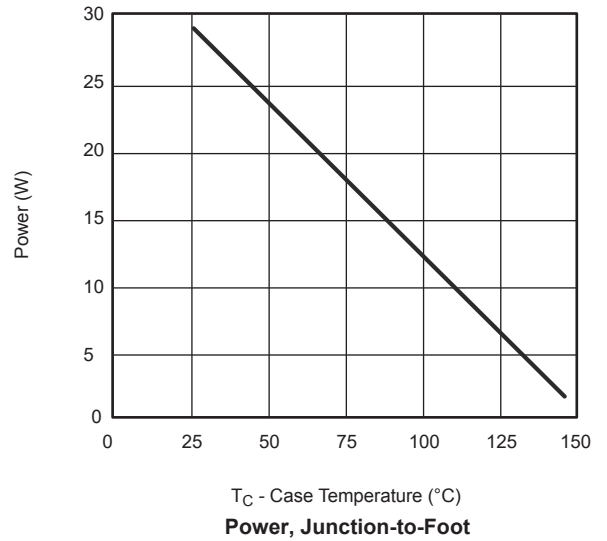


(1)  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

**Safe Operating Area, Junction-to-Ambient**

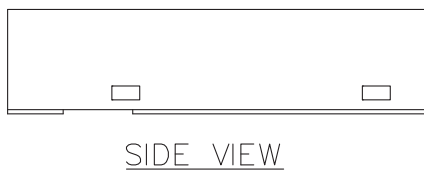
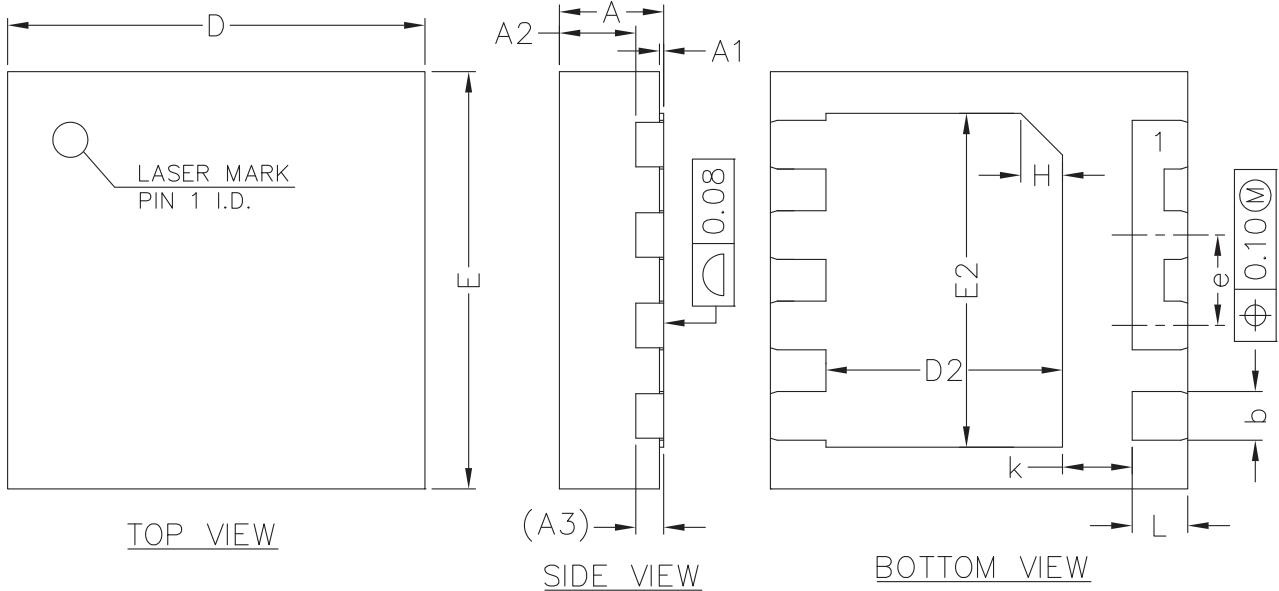


**Current Derating\***



**Power, Junction-to-Foot**

**DFN3\*3-8L Package Outline Dimensions**



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.50	0.55	0.60
A3	0.20REF		
b	0.30	0.35	0.40
D	2.90	3.00	3.10
E	2.90	3.00	3.10
D2	1.60	1.70	1.80
E2	2.30	2.40	2.50
e	0.55	0.65	0.75
K	0.40	0.50	0.60
L	0.35	0.40	0.45

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