

## P-Channel 60-V (D-S) MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>	$Q_g$ (Typ.)
- 60	0.022 at $V_{GS} = - 10$ V	- 55	147 nC
	0.032 at $V_{GS} = - 4.5$ V	- 40	

### FEATURES

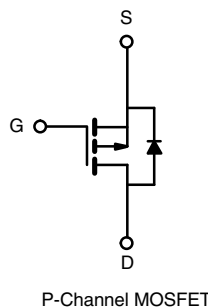
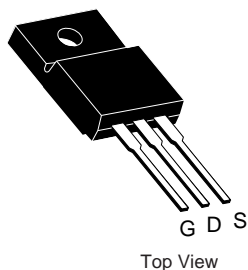
- DT-Trench Power MOSFET
- 100 %  $R_g$  and UIS Tested



### APPLICATIONS

- Load Switch

TO-220 FULLPAK



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	- 60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 150$ °C)	$I_D$	$T_C = 25$ °C	A
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °C	
Pulsed Drain Current	$I_{DM}$	- 220	A
Avalanche Current Pulse	$I_{AS}$	- 55	
Single Pulse Avalanche Energy	$E_{AS}$	255	mJ
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25$ °C	A
		$T_A = 25$ °C	
Maximum Power Dissipation	$P_D$	$T_C = 25$ °C	W
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °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 <sup>b</sup>	$R_{thJA}$	40	65	°C/W
Maximum Junction-to-Case	$R_{thJC}$	0.38	0.62	

Notes:

a. Based on  $T_C = 25$  °C.

b. Surface mounted on 1" x 1" FR4 board.

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	- 60			V
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = - 250 μA		38		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>			- 5.2		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	- 1		- 3	V
Gate-Source 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> = - 48 V, V <sub>GS</sub> = 0 V			- 1	μA
		V <sub>DS</sub> = - 48 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> = - 5 V, V <sub>GS</sub> = - 10 V	- 55			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 30 A		0.022	0.03	Ω
		V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 20 A		0.032	0.042	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = - 15 V, I <sub>D</sub> = - 50 A		17		S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = - 48 V, V <sub>GS</sub> = 0 V, f = 1 MHz		7750		pF
Output Capacitance	C <sub>oss</sub>			480		
Reverse Transfer Capacitance	C <sub>rss</sub>			281		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = - 48 V, V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 30 A		147		nC
		V <sub>DS</sub> = - 48 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 20 A		37		
Gate-Source Charge	Q <sub>gs</sub>			15		
Gate-Drain Charge	Q <sub>gd</sub>			21		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		4.4		Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = - 48 V, R <sub>L</sub> = 2 Ω I <sub>D</sub> ≅ - 10 A, V <sub>GEN</sub> = - 10 V, R <sub>g</sub> = 1 Ω		73		ns
Rise Time	t <sub>r</sub>			158		
Turn-Off Delay Time	t <sub>d(off)</sub>			212		
Fall Time	t <sub>f</sub>			165		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			- 55	A
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				- 220	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = - 30 A		- 0.7	- 1.5	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = - 50 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C		47		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			57		nC
Reverse Recovery Fall Time	t <sub>a</sub>			27		ns
Reverse Recovery Rise Time	t <sub>b</sub>			15		

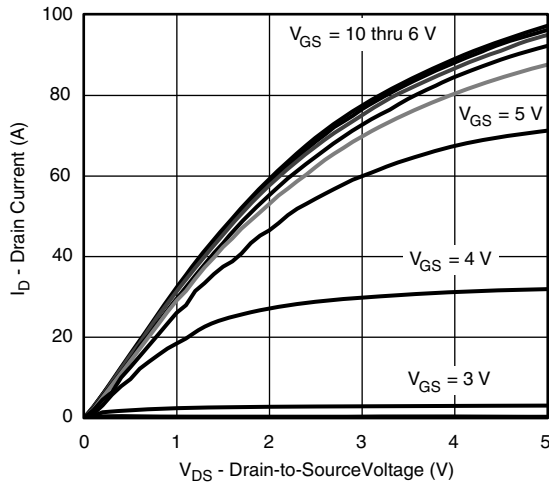
Notes:

a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

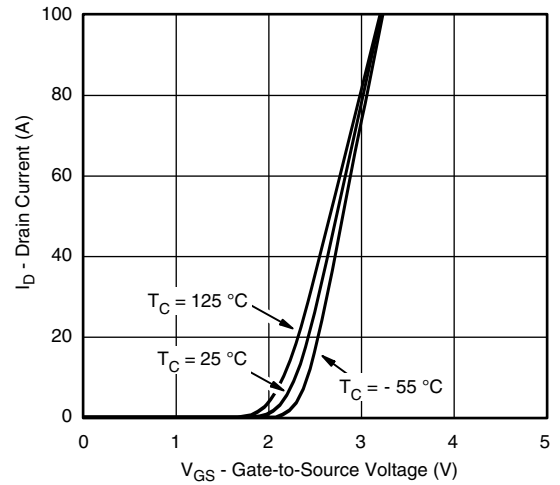
b. Guaranteed by design, not subject to production testing.

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.

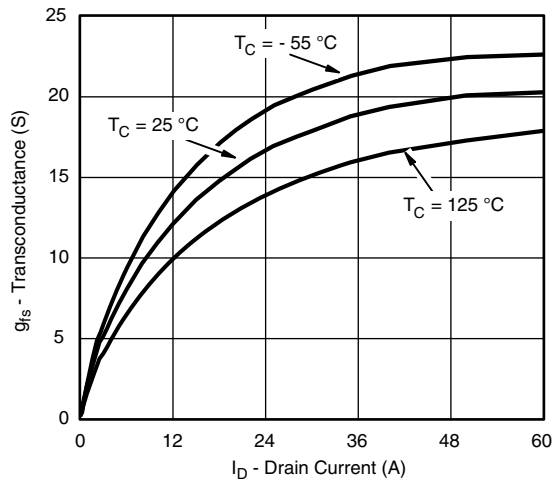
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



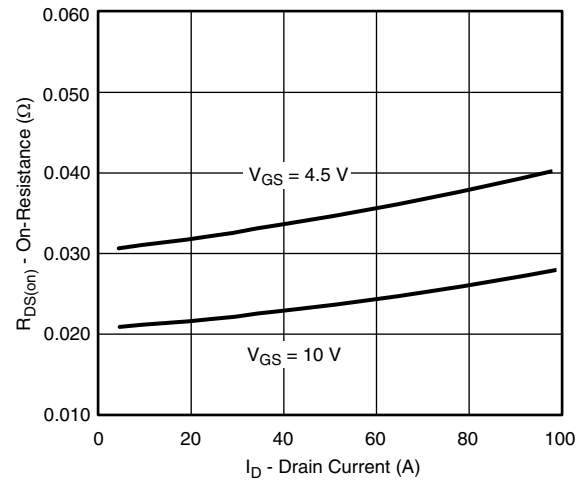
**Output Characteristics**



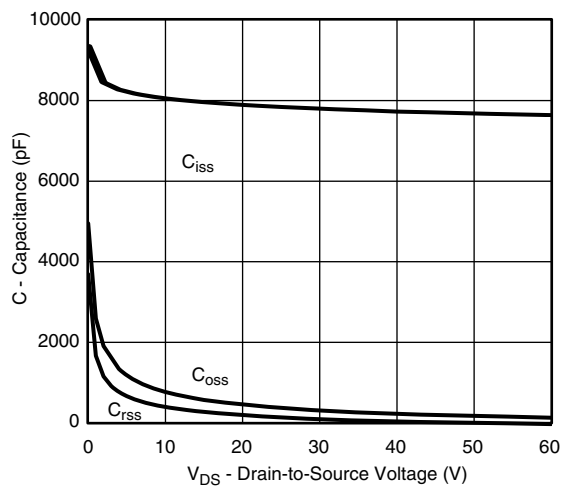
**Transfer Characteristics**



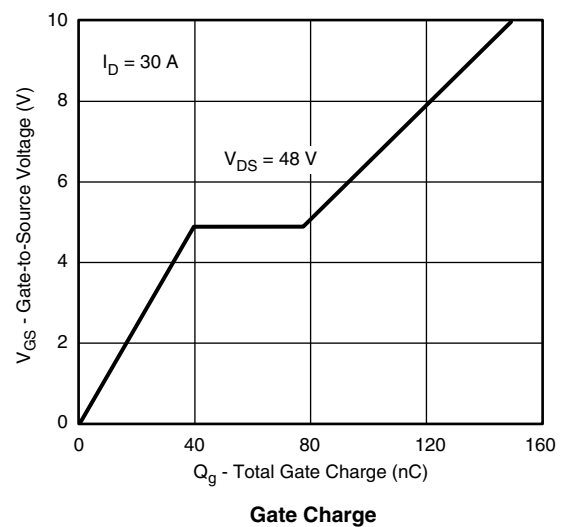
**Transconductance**



**On-Resistance vs. Drain Current**

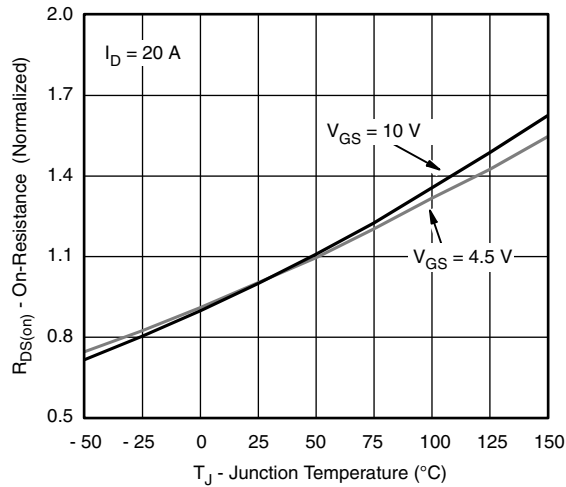


**Capacitance**

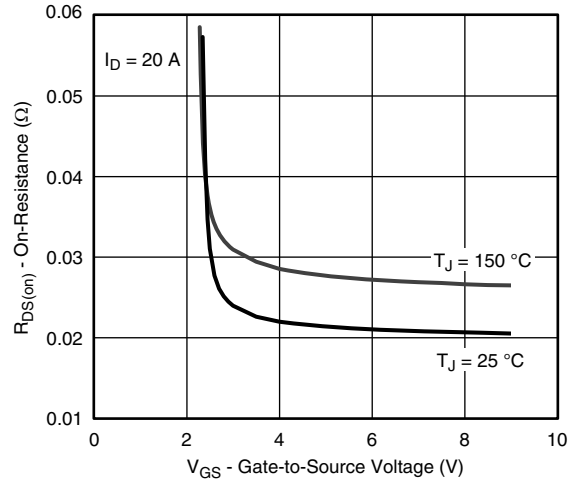


**Gate Charge**

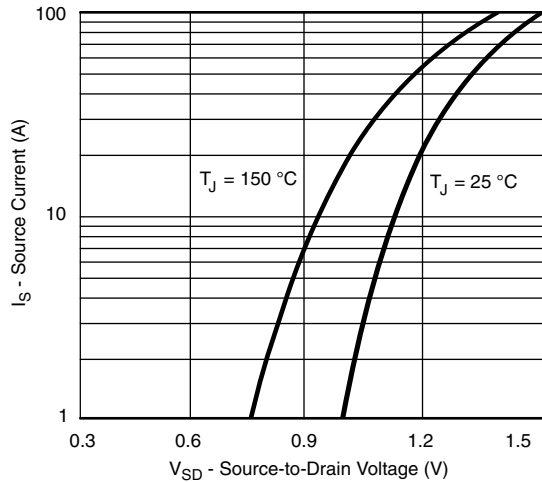
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



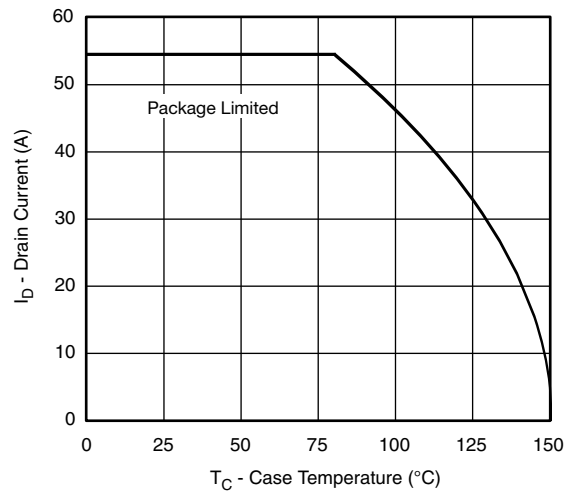
**On-Resistance vs. Gate-to-Source Voltage**



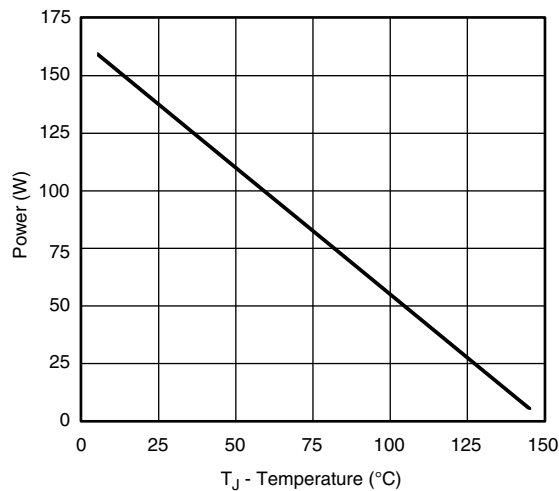
**On-Resistance vs. Gate-to-Source Voltage**



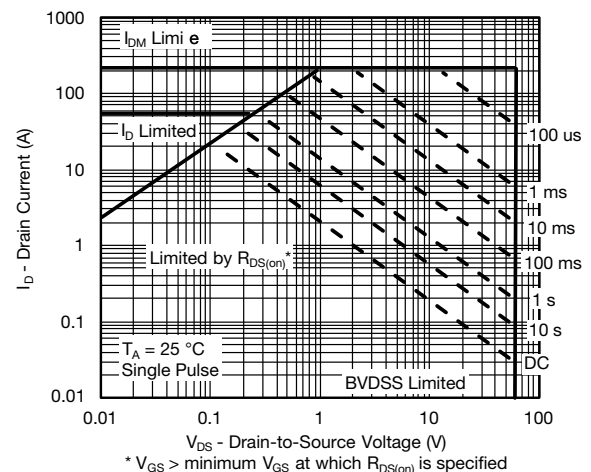
**Source-Drain Diode Forward Voltage**



**Max. Drain Current vs. Case Temperature**

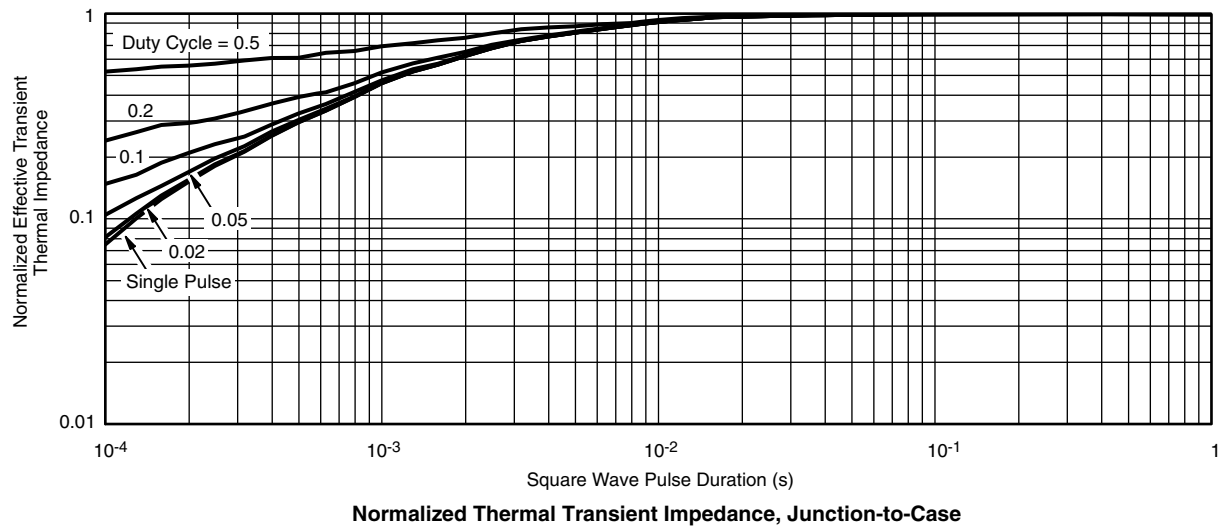


**Power Derating, Junction-to-Case**



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

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



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