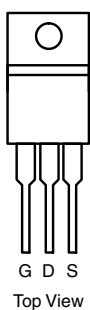


## P-Channel 60-V (D-S) MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>	$Q_g$ (Typ.)
- 60	0.0078 at $V_{GS} = - 10$ V	- 98	141 nC
	0.0098 at $V_{GS} = - 4.5$ V	- 80	

**TO-220AB**


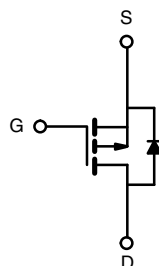
### FEATURES

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



### APPLICATIONS

- Load Switch



P-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		$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 150$ °C)	$T_C = 25$ °C	$I_D$	- 98 <sup>a</sup>	A
	$T_C = 70$ °C		- 56	
	$T_A = 25$ °C		12 <sup>b</sup>	
	$T_A = 70$ °C		- 8.9 <sup>b</sup>	
Pulsed Drain Current		$I_{DM}$	- 320	
Avalanche Current Pulse		$I_{AS}$	- 90	mJ
Single Pulse Avalanche Energy		$E_{AS}$	320	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	$I_S$	98 <sup>a</sup>	A
	$T_A = 25$ °C		3.4 <sup>b</sup>	
Maximum Power Dissipation	$T_C = 25$ °C	$P_D$	185 <sup>a</sup>	W
	$T_C = 70$ °C		116 <sup>a</sup>	
	$T_A = 25$ °C		4.5 <sup>b</sup>	
	$T_A = 70$ °C		2.3 <sup>b</sup>	
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>	Steady State	$R_{thJA}$	35	65	°C/W
Maximum Junction-to-Case	Steady State	$R_{thJC}$	0.35	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	- 98			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		0.0078	0.0096	Ω
		V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 20 A		0.0098	0.0126	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = - 15 V, I <sub>D</sub> = - 50 A		20		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		8500		pF
Output Capacitance	C <sub>oss</sub>			490		
Reverse Transfer Capacitance	C <sub>rss</sub>			280		
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		141		nC
		V <sub>DS</sub> = - 48 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 20 A		39		
Q <sub>gs</sub>			16			
Q <sub>gd</sub>			23			
Gate Resistance	R <sub>g</sub>	f = 1 MHz		4.5		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		70		ns
Rise Time	t <sub>r</sub>			155		
Turn-Off Delay Time	t <sub>d(off)</sub>			210		
Fall Time	t <sub>f</sub>			160		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			- 98	A
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				- 320	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = - 30 A		- 0.7	- 1.2	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		48		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			59		nC
Reverse Recovery Fall Time	t <sub>a</sub>			29		ns
Reverse Recovery Rise Time	t <sub>b</sub>			12		

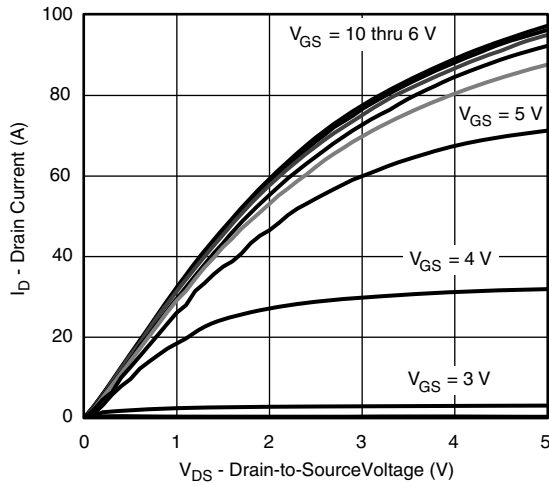
Notes:

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

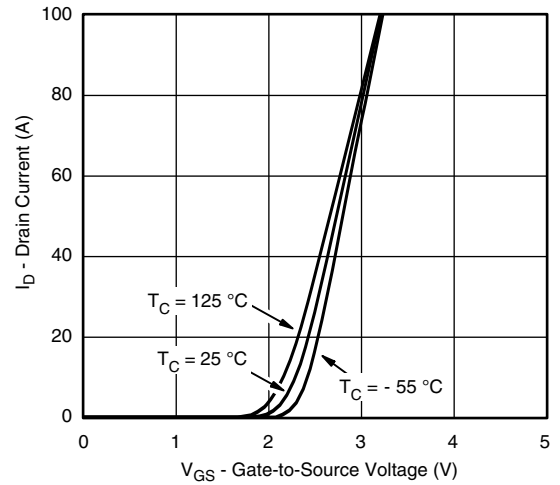
b. Guaranteed by design, not subject to production testing.

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.

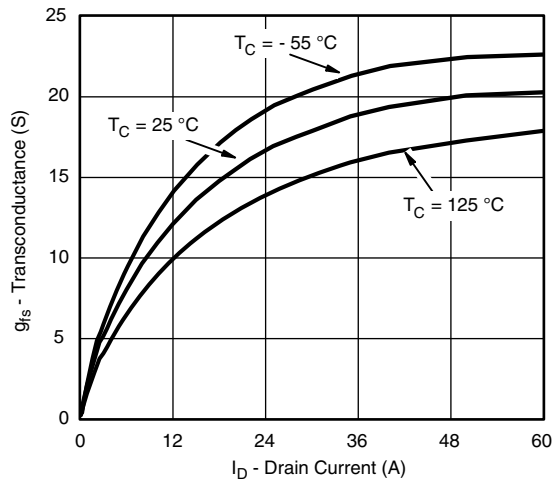
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



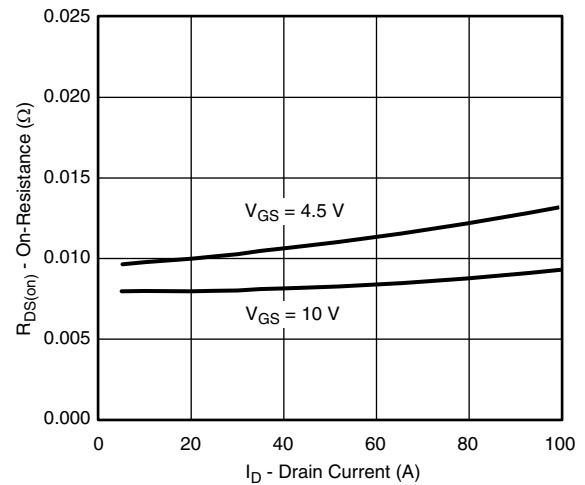
**Output Characteristics**



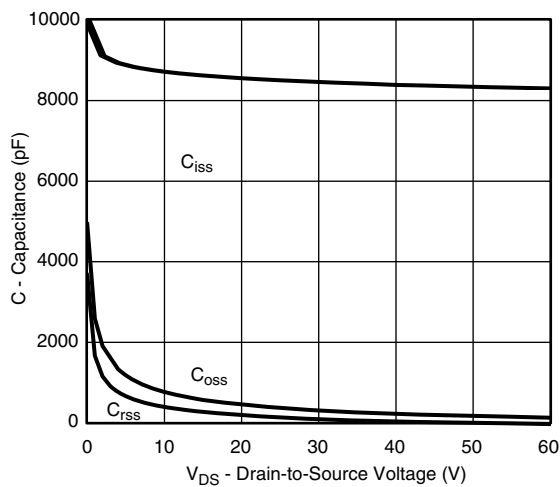
**Transfer Characteristics**



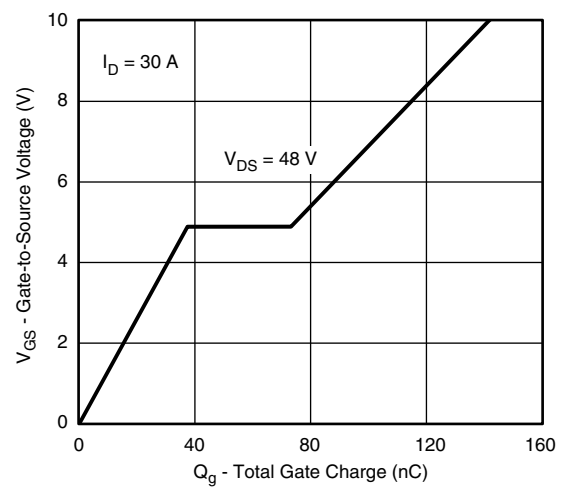
**Transconductance**



**On-Resistance vs. Drain Current**

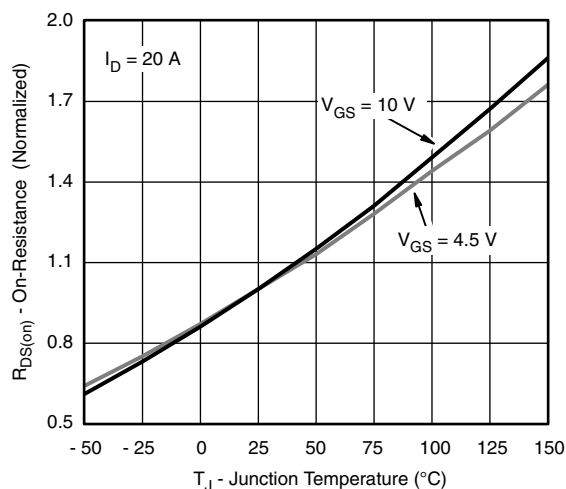


**Capacitance**

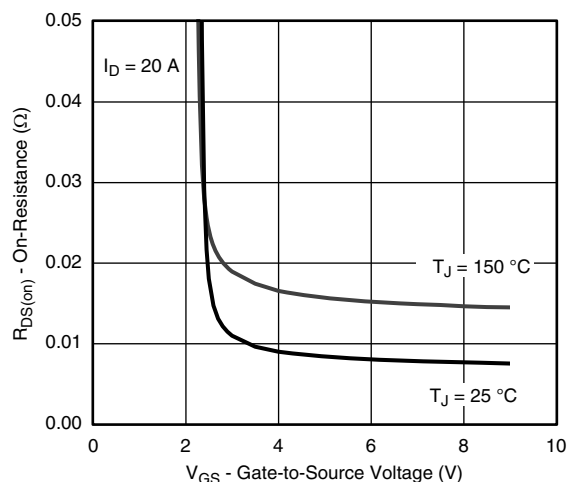


**Gate Charge**

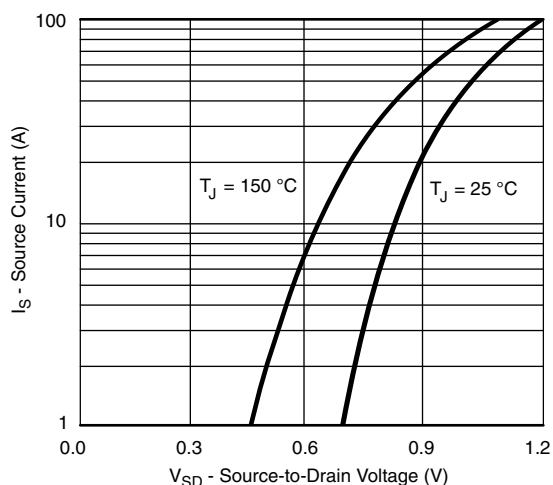
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



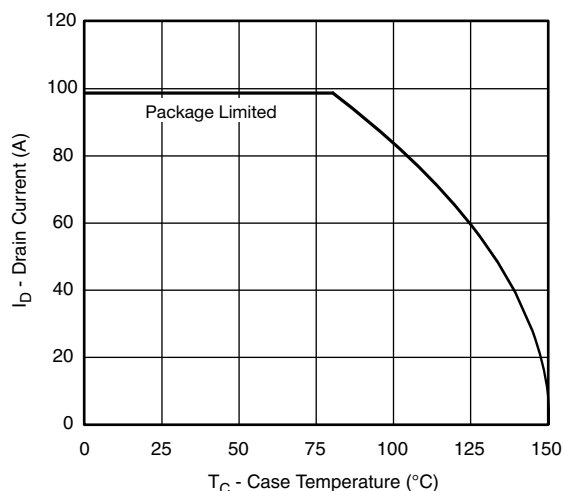
**On-Resistance vs. Gate-to-Source Voltage**



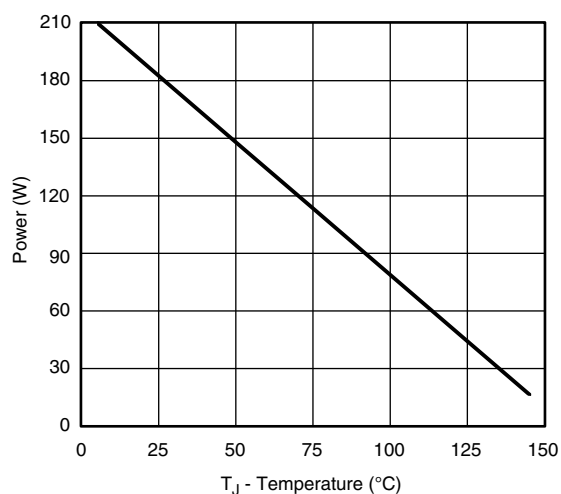
**On-Resistance vs. Gate-to-Source Voltage**



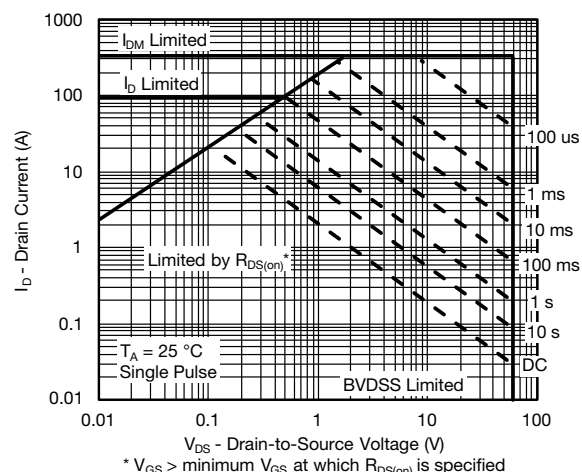
**Source-Drain Diode Forward Voltage**



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

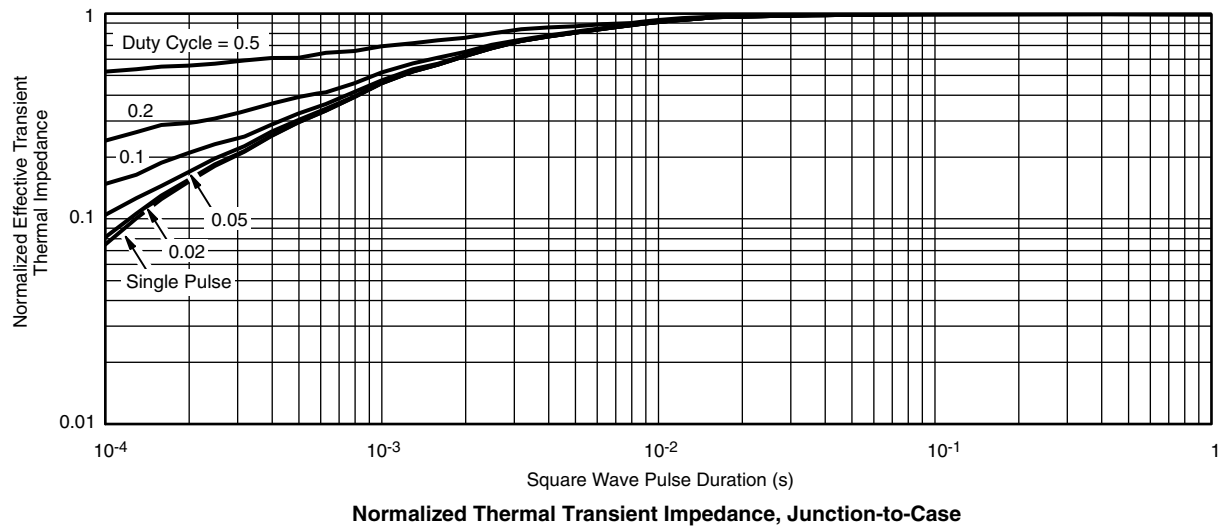


**Power Derating, Junction-to-Case**



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

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



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