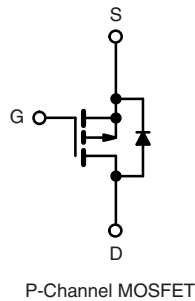
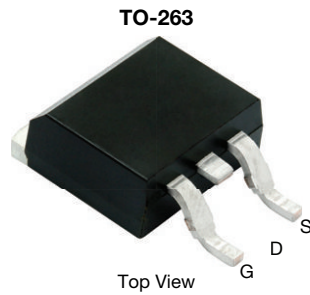


## Automotive P-Channel 40 V (D-S) 175 °C MOSFET



### FEATURES

- TrenchFET® power MOSFET
- Package with low thermal resistance
- 100 % R<sub>g</sub> and UIS tested
- AEC-Q101 qualified
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

PRODUCT SUMMARY	
V <sub>DS</sub> (V)	-40
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = -10 V	0.00300
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = -4.5 V	0.00380
I <sub>D</sub> (A)	-120
Configuration	Single
Package	TO-263

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 <sup>a</sup>	T <sub>C</sub> = 25 °C	I <sub>D</sub>	-120	A
	T <sub>C</sub> = 125 °C		-120	
Continuous Source Current (Diode conduction) <sup>a</sup>		I <sub>S</sub>	-120	
Pulsed Drain Current <sup>b</sup>		I <sub>DM</sub>	-300	
Single Pulse Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	-60	
Single Pulse Avalanche Energy		E <sub>AS</sub>	180	
Maximum Power Dissipation <sup>b</sup>	T <sub>C</sub> = 25 °C	P <sub>D</sub>	375	W
	T <sub>C</sub> = 125 °C		125	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°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>	0.4	

### Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).



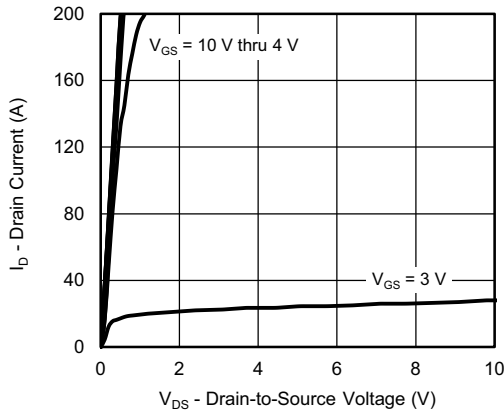
SPECIFICATIONS (T <sub>C</sub> = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
<b>Static</b>							
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-40	-	-	V	
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-1.5	-2.0	-2.5		
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>GS</sub> = 0 V	V <sub>DS</sub> = -40 V	-	-	-1	μA
		V <sub>GS</sub> = 0 V	V <sub>DS</sub> = -40 V, T <sub>J</sub> = 125 °C	-	-	-50	
		V <sub>GS</sub> = 0 V	V <sub>DS</sub> = -40 V, T <sub>J</sub> = 175 °C	-	-	-450	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>GS</sub> = -10 V	V <sub>DS</sub> ≤ -5 V	-100	-	-	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	-	0.00250	0.00300	Ω
		V <sub>GS</sub> = -10 V	I <sub>D</sub> = -30 A, T <sub>J</sub> = 125 °C	-	-	0.00440	
		V <sub>GS</sub> = -10 V	I <sub>D</sub> = -30 A, T <sub>J</sub> = 175 °C	-	-	0.00520	
		V <sub>GS</sub> = -4.5 V	I <sub>D</sub> = -25 A	-	0.00316	0.00380	
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -25 A	-	123	-	S	
<b>Dynamic <sup>b</sup></b>							
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = -25 V, f = 1 MHz	-	30 000	39 000	pF
Output Capacitance	C <sub>oss</sub>			-	1850	2500	
Reverse Transfer Capacitance	C <sub>rss</sub>			-	1550	2100	
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>GS</sub> = -10 V	V <sub>DS</sub> = -20 V, I <sub>D</sub> = -80 A	-	527	800	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			-	89	-	
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			-	100	-	
Gate Resistance	R <sub>g</sub>	f = 1 MHz		1	2.26	3.5	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = -20 V, R <sub>L</sub> = 0.3 Ω I <sub>D</sub> ≅ -80 A, V <sub>GEN</sub> = -10 V, R <sub>g</sub> = 1 Ω		-	21	35	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			-	30	50	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			-	250	400	
Fall Time <sup>c</sup>	t <sub>f</sub>			-	165	300	
<b>Source-Drain Diode Ratings and Characteristics <sup>b</sup></b>							
Pulsed Current <sup>a</sup>	I <sub>SM</sub>			-	-	-300	A
Forward Voltage	V <sub>SD</sub>	I <sub>F</sub> = -80 A, V <sub>GS</sub> = 0 V		-	-0.85	-1.5	V
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = -50 A, di/dt = 100 A/μs		-	70	140	ns
Body diode reverse recovery charge	Q <sub>rr</sub>			-	134	270	nC
Reverse recovery fall time	t <sub>a</sub>			-	43	-	ns
Reverse recovery rise time	t <sub>b</sub>			-	35	-	
Body diode peak reverse recovery current	I <sub>RM(REC)</sub>					-	-4

**Notes**

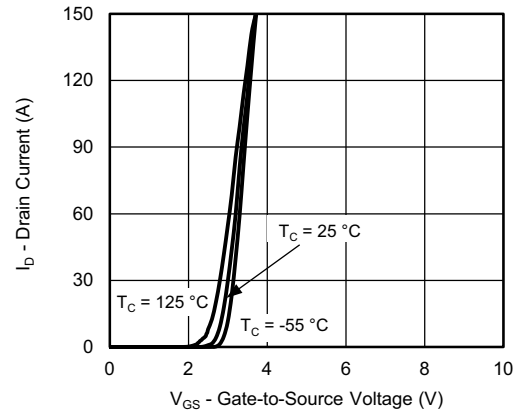
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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.

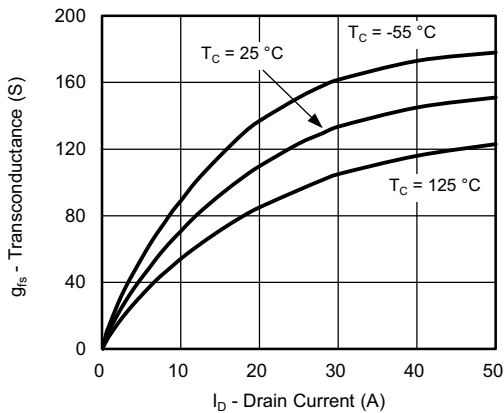
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



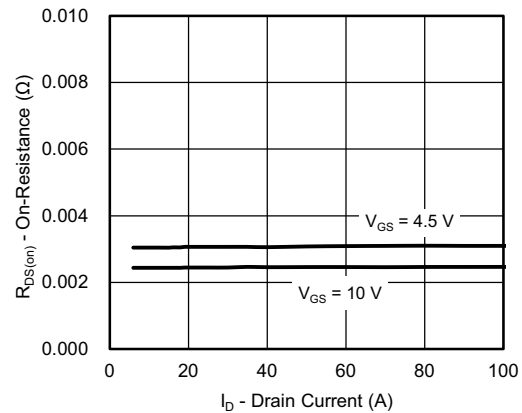
**Output Characteristics**



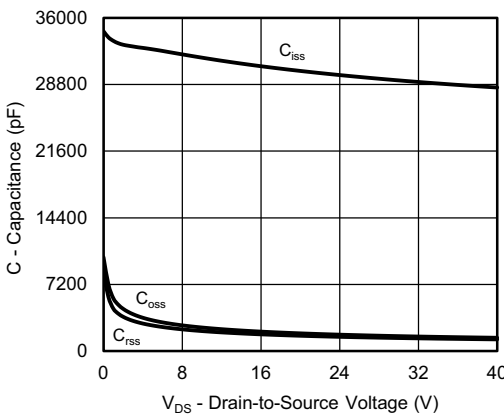
**Transfer Characteristics**



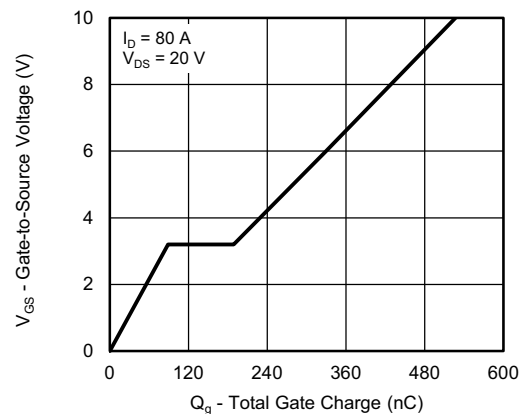
**Transconductance**



**On-Resistance vs. Drain Current**

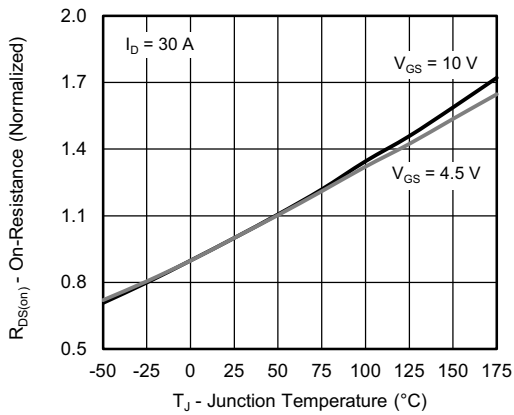


**Capacitance**

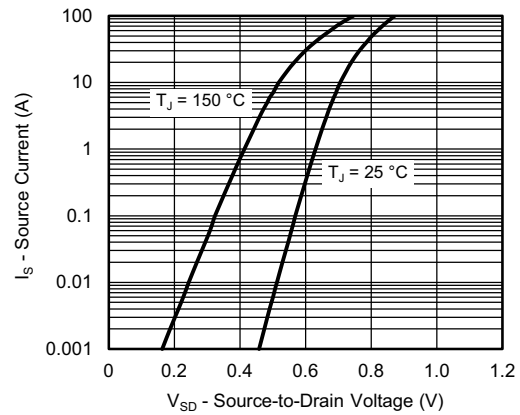


**Gate Charge**

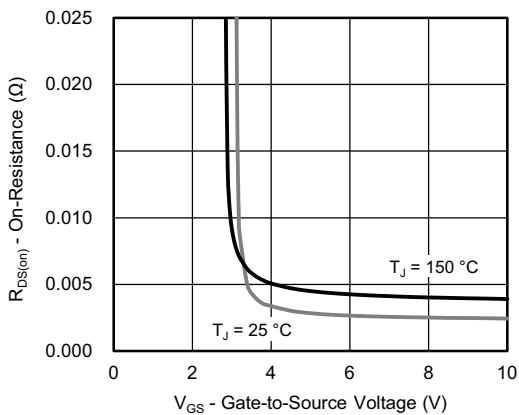
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



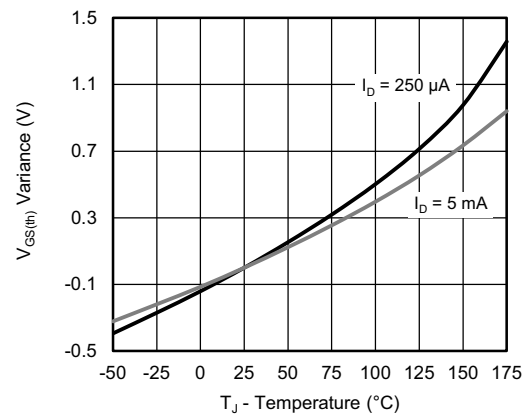
**On-Resistance vs. Junction Temperature**



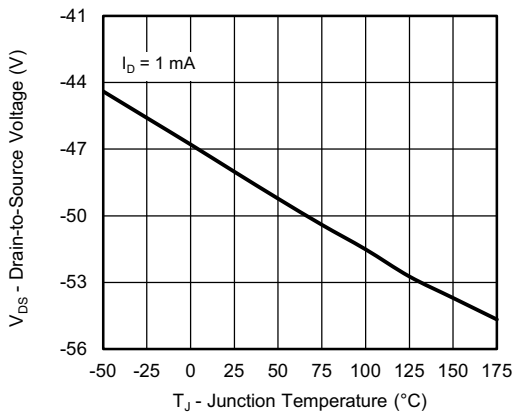
**Source Drain Diode Forward Voltage**



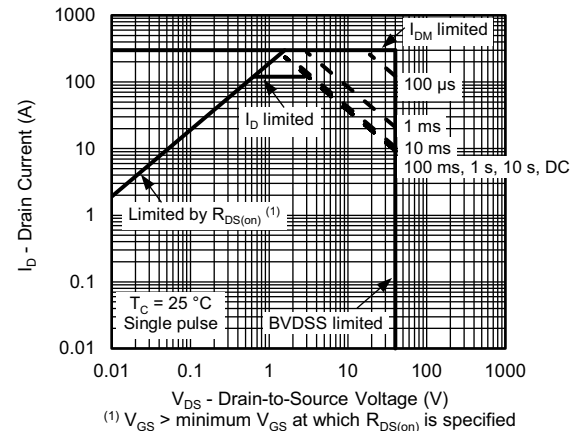
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



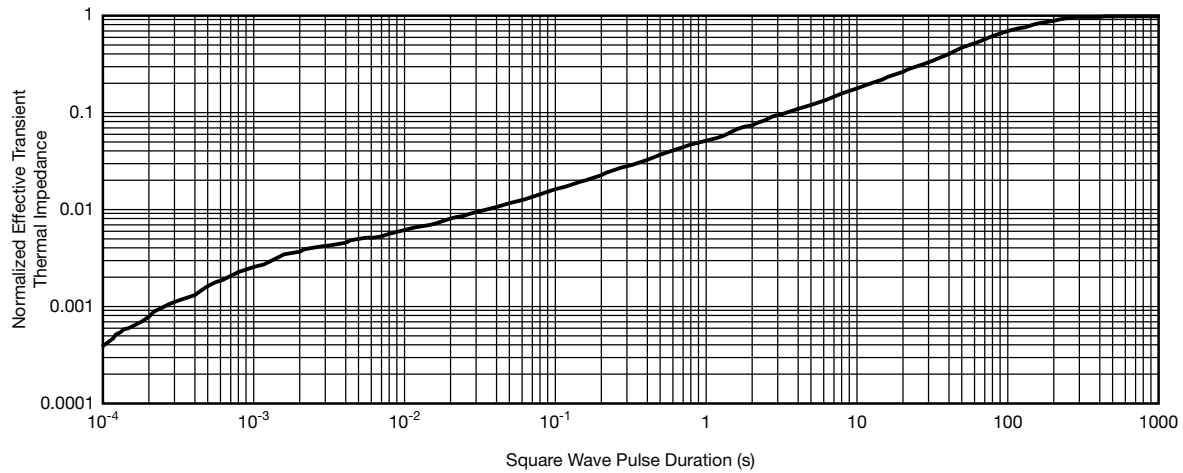
**Drain Source Breakdown vs. Junction Temperature**



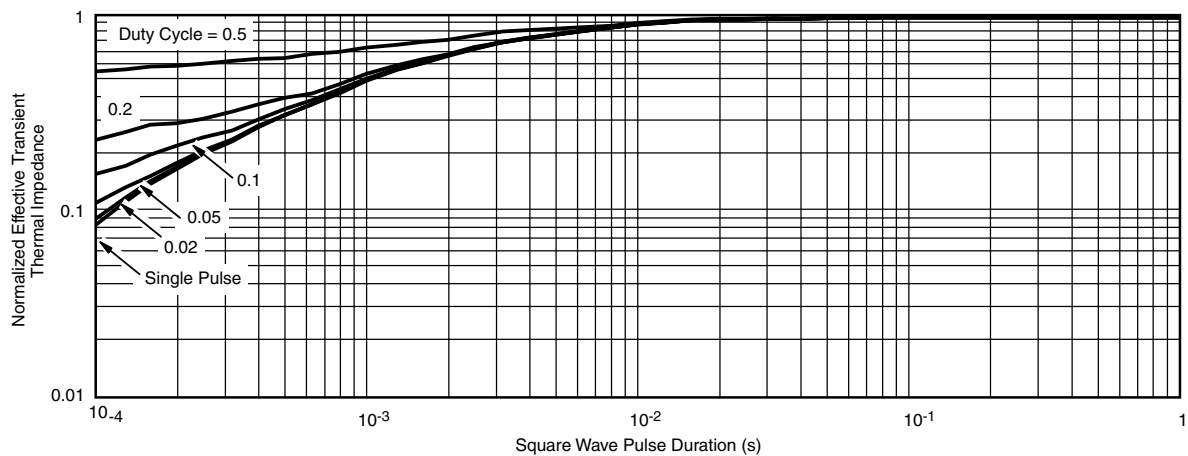
**Safe Operating Area**



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



**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Case**

**Note**

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction to Ambient ( $25\text{ }^\circ\text{C}$ )
  - Normalized Transient Thermal Impedance Junction to Case ( $25\text{ }^\circ\text{C}$ )
 are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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