

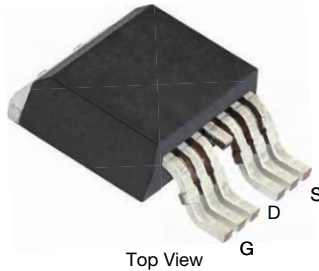
## IRF3805S-7PPBF-VB Datasheet

### N-Channel 60 V (D-S) 175 °C MOSFET

#### PRODUCT SUMMARY

$V_{DS}$ (V)	60
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 10$ V	0.00163
$I_D$ (A)	150
Configuration	Single
Package	TO-263-7L

TO-263 7-Lead

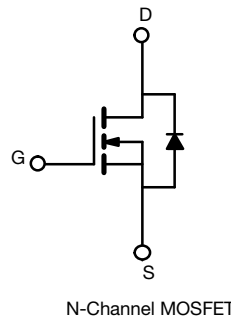


#### FEATURES

- Trench power MOSFET
- Package with low thermal resistance
- 100 %  $R_g$  and UIS tested



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



#### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °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	$T_C = 25$ °C	$I_D$	150	A
	$T_C = 125$ °C		120 <sup>a</sup>	
Continuous source current (diode conduction) <sup>a</sup>		$I_S$	120	
Pulsed drain current <sup>b</sup>		$I_{DM}$	400	
Single pulse avalanche current	L = 0.1 mH	$I_{AS}$	75	
Single pulse avalanche energy		$E_{AS}$	281	mJ
Maximum power dissipation <sup>b</sup>	$T_C = 25$ °C	$P_D$	375	W
	$T_C = 125$ °C		125	
Operating junction and storage temperature range		$T_J, T_{stg}$	-55 to +175	°C

#### THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-ambient	PCB mount <sup>c</sup>	$R_{thJA}$	40	°C/W
Junction-to-case (drain)		$R_{thJC}$	0.4	

#### Notes

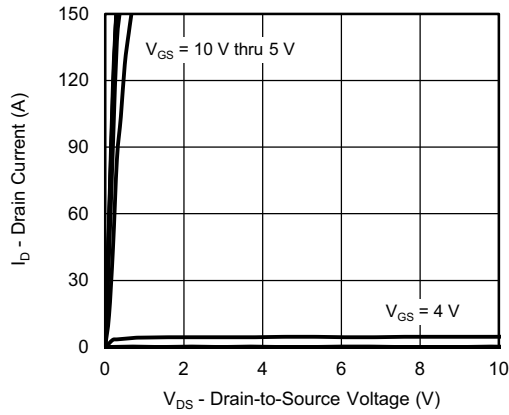
- a. Package limited  
 b. Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %  
 c. When mounted on 1" square PCB (FR4 material)

SPECIFICATIONS (T <sub>C</sub> = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA		60	-	-	V
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA		2.5	3.0	3.5	
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> = 60 V	-	-	1	μA
		V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 60 V, T <sub>J</sub> = 125 °C	-	-	50	
		V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 60 V, T <sub>J</sub> = 175 °C	-	-	250	μA
On-state drain current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>GS</sub> = 10 V	V <sub>DS</sub> ≥ 5 V	120	-	-	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	-	0.00163	-	Ω
		V <sub>GS</sub> = 10 V	I <sub>D</sub> = 30 A, T <sub>J</sub> = 125 °C	-	0.00300	-	
		V <sub>GS</sub> = 10 V	I <sub>D</sub> = 30 A, T <sub>J</sub> = 175 °C	-	0.00360	-	
Forward transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A		-	142	-	S
Dynamic <sup>b</sup>							
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 25 V, f = 1 MHz	-	9100	11 900	pF
Output capacitance	C <sub>oss</sub>			-	3550	4700	
Reverse transfer capacitance	C <sub>rss</sub>			-	160	220	
Total gate charge <sup>c</sup>	Q <sub>g</sub>	V <sub>GS</sub> = 10 V	V <sub>DS</sub> = 30 V, I <sub>D</sub> = 50 A	-	123	185	nC
Gate-source charge <sup>c</sup>	Q <sub>gs</sub>			-	40	-	
Gate-drain charge <sup>c</sup>	Q <sub>gd</sub>			-	19	-	
Gate resistance	R <sub>g</sub>	f = 1 MHz		4	8.6	13	Ω
Turn-on delay time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 30 V, R <sub>L</sub> = 0.6 Ω I <sub>D</sub> ≅ 50 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω		-	48	75	ns
Rise time <sup>c</sup>	t <sub>r</sub>			-	26	40	
Turn-off delay time <sup>c</sup>	t <sub>d(off)</sub>			-	105	160	
Fall time <sup>c</sup>	t <sub>f</sub>			-	25	40	
Source-Drain Diode Ratings and Characteristics <sup>b</sup>							
Pulsed current <sup>a</sup>	I <sub>SM</sub>			-	-	240	A
Forward voltage	V <sub>SD</sub>	I <sub>F</sub> = 50 A, V <sub>GS</sub> = 0 V		-	0.84	1.5	V
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 25 A, di/dt = 100 A/μs		-	100	200	ns
Body diode reverse recovery charge	Q <sub>rr</sub>			-	243	500	nC
Reverse recovery fall time	t <sub>a</sub>			-	48	-	ns
Reverse recovery rise time	t <sub>b</sub>			-	53	-	
Body diode peak reverse recovery current	I <sub>RM(REC)</sub>			-	-4.6	-	A

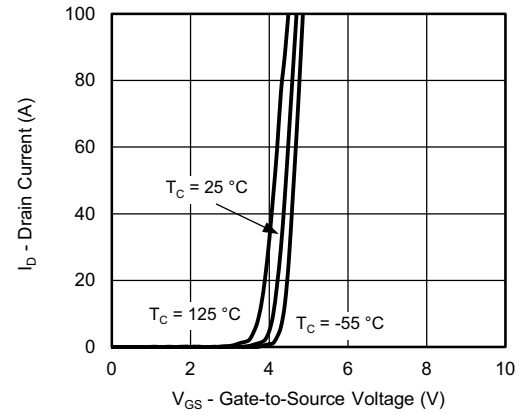
**Notes**

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

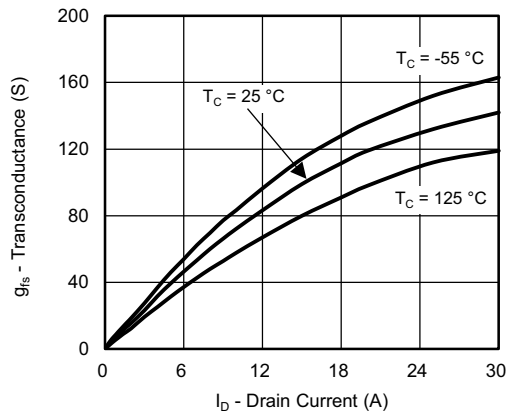
**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)



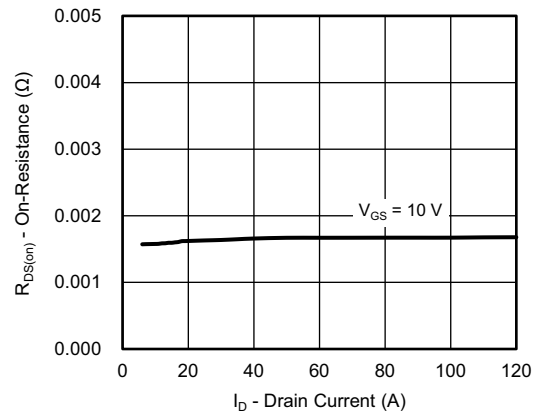
**Output Characteristics**



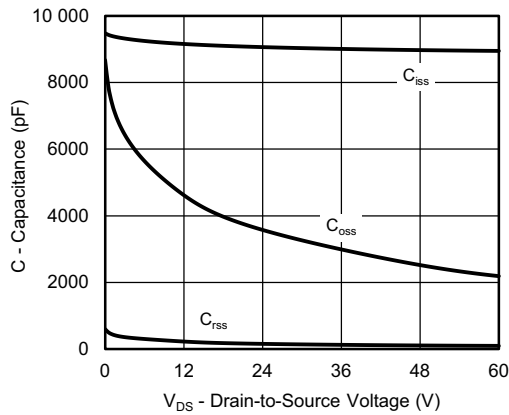
**Transfer Characteristics**



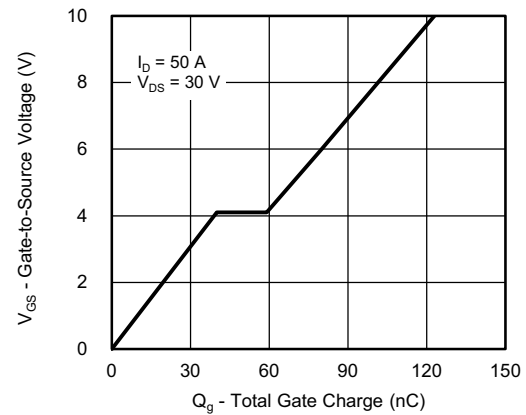
**Transconductance**



**On-Resistance vs. Drain Current**

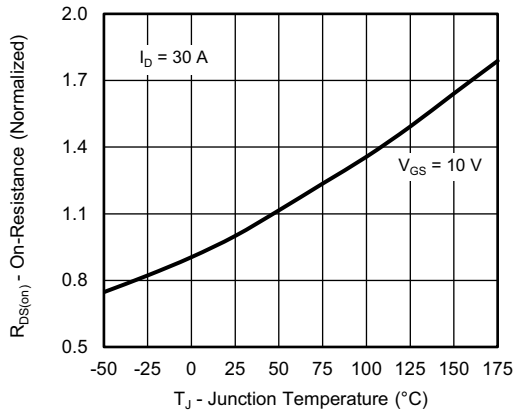


**Capacitance**

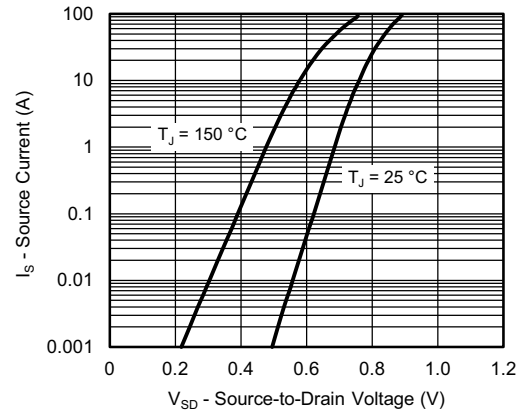


**Gate Charge**

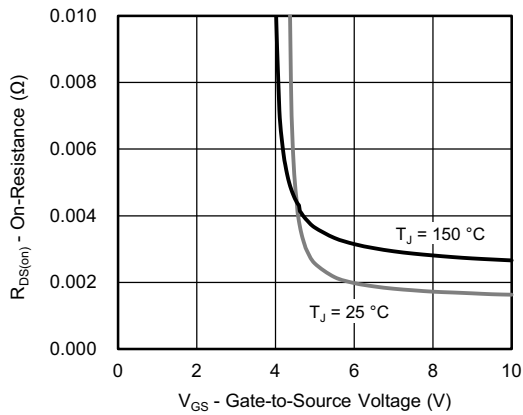
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)



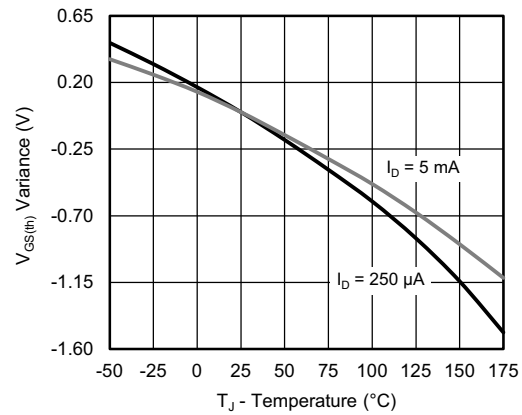
**On-Resistance vs. Junction Temperature**



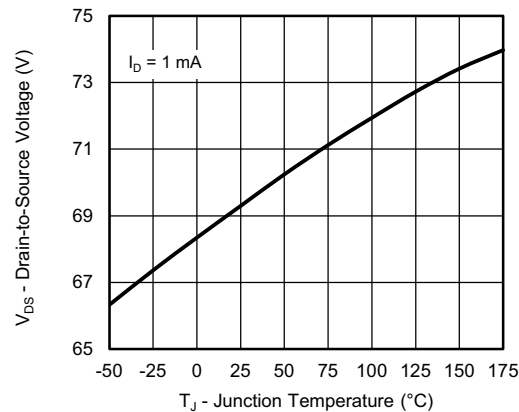
**Source Drain Diode Forward Voltage**



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

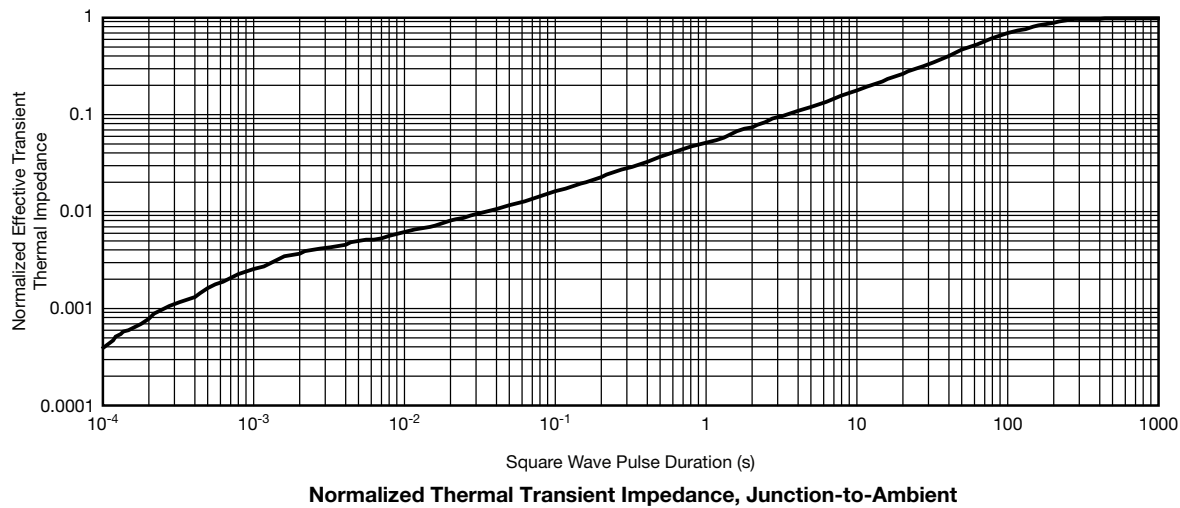
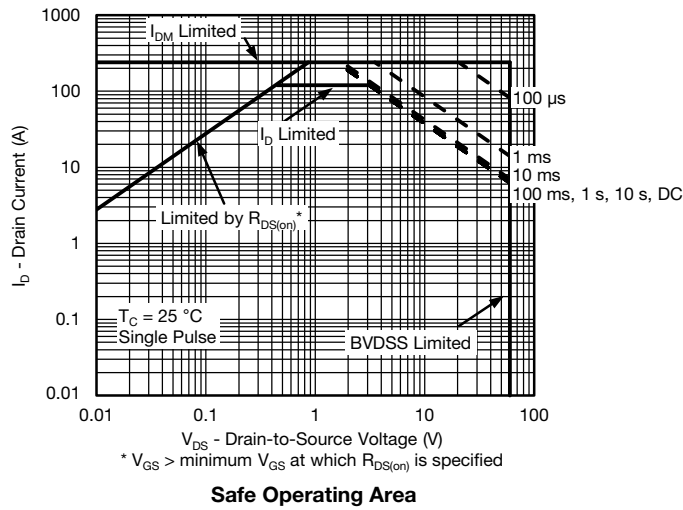


**Threshold Voltage**

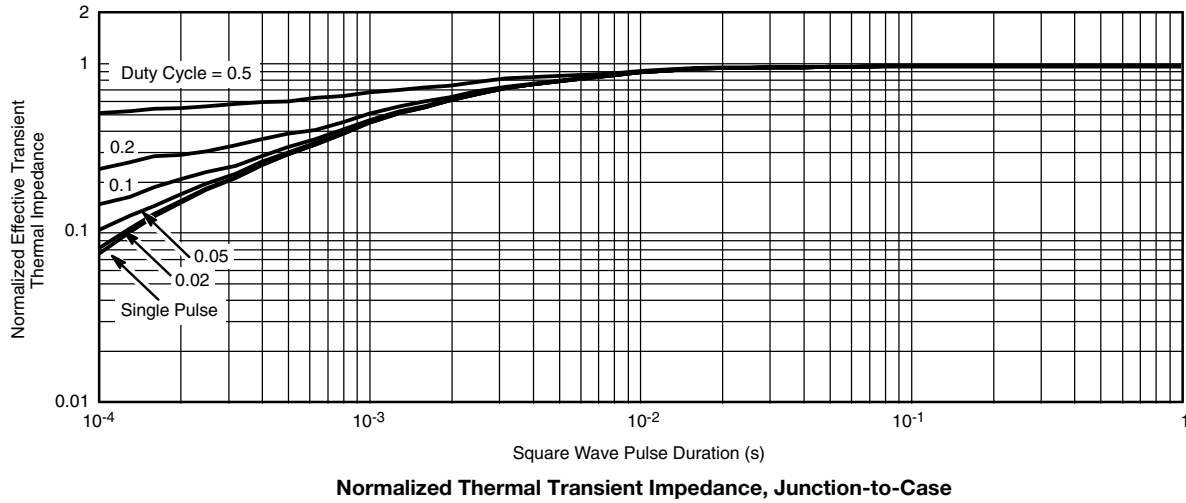


**Drain Source Breakdown vs. Junction Temperature**

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



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



**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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