

## P-Channel 20-V (D-S) Power MOSFET

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (m)(Typ.)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ.)
- 20	24 at V <sub>GS</sub> = - 4.5 V	- 7 <sup>a</sup>	17 nC
	30 at V <sub>GS</sub> = - 2.5 V		

### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> and UIS Tested
- ESD Protected

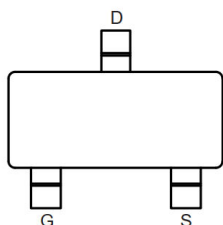
### APPLICATIONS

- Portable Devices
  - Load Switch
  - Battery Switch

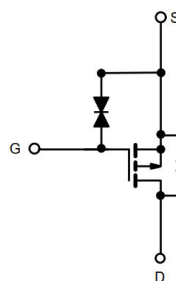


**RoHS**  
COMPLIANT

SOT-23 Pin Configuration



Top View



P-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS T<sub>A</sub> = 25 °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	- 20	V
Gate-Source Voltage	V <sub>GS</sub>	± 8	
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	- 7 <sup>a</sup>
		T <sub>C</sub> = 70 °C	- 5.8 <sup>a</sup>
		T <sub>A</sub> = 25 °C	- 3 <sup>b, c</sup>
		T <sub>A</sub> = 70 °C	- 2.3 <sup>b, c</sup>
Pulsed Drain Current	I <sub>DM</sub>	- 21	A
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	- 5.5 <sup>a</sup>
		T <sub>A</sub> = 25 °C	- 2.5 <sup>b, c</sup>
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	6
		T <sub>C</sub> = 70 °C	3.9
		T <sub>A</sub> = 25 °C	1.6 <sup>b, c</sup>
		T <sub>A</sub> = 70 °C	1.05 <sup>b, c</sup>
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) <sup>d, e</sup>		260	

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b, e</sup>	R <sub>thJA</sub>	40	60	°C/W
Maximum Junction-to-Case (Drain)	R <sub>thJC</sub>	5.5	6.5	

Notes:

a. Package limited.

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

c. t = 5 s.

d. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

e. Maximum under Steady State conditions is 80 °C/W.

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	- 20			V
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = - 250 μA		- 12		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>			3		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	- 0.3		- 1	V
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 8 V			± 20	μA
		V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 4.5 V			± 0.5	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 20 V, V <sub>GS</sub> = 0 V			- 1	
		V <sub>DS</sub> = - 16 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> = - 4.5 V	- 7			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 4 A		24	30	mΩ
		V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 3 A		30	40	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = - 5 V, I <sub>D</sub> = - 4 A		10		S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz		1318		pF
Output Capacitance	C <sub>oss</sub>			162		
Reverse Transfer Capacitance	C <sub>rss</sub>			141		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = - 10 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 4 A		17		nC
Gate-Source Charge	Q <sub>gs</sub>			2		
Gate-Drain Charge	Q <sub>gd</sub>			4		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		16		Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = - 10 V, I <sub>D</sub> = - 4 A, V <sub>GEN</sub> = - 4.5 V, R <sub>g</sub> = 25 Ω		9		nS
Rise Time	t <sub>r</sub>			30		
Turn-Off Delay Time	t <sub>d(off)</sub>			68		
Fall Time	t <sub>f</sub>			20		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			- 7	A
Pulse Diode Forward Current	I <sub>SM</sub>				- 21	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = - 1 A, V <sub>GS</sub> = 0 V		- 0.6	- 1	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 4 A, dI/dt = 100 A/μs, T <sub>J</sub> = 25 °C		30		nS
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			20		nC
Reverse Recovery Fall Time	t <sub>a</sub>			13		nS
Reverse Recovery Rise Time	t <sub>b</sub>			17		

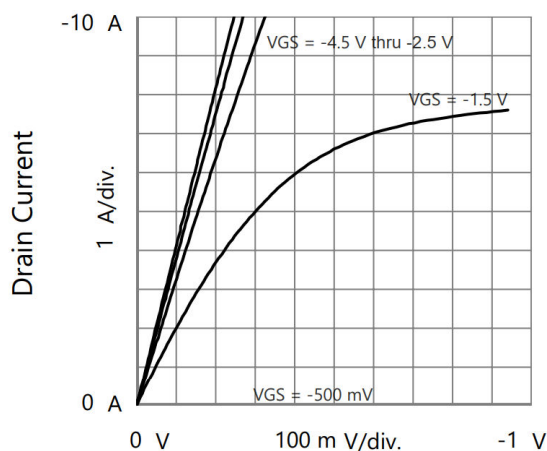
Notes:

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

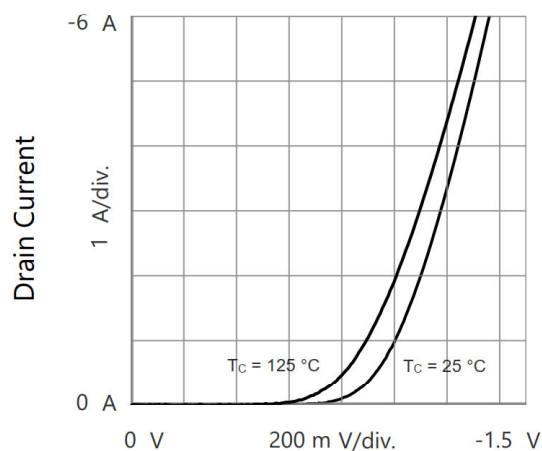
b. Guaranteed by design, not subject to production testing.

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.

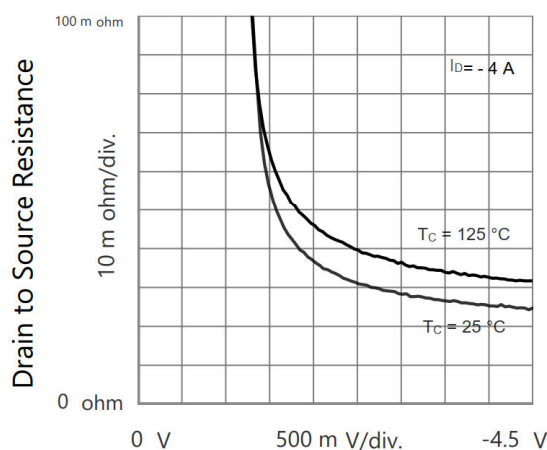
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



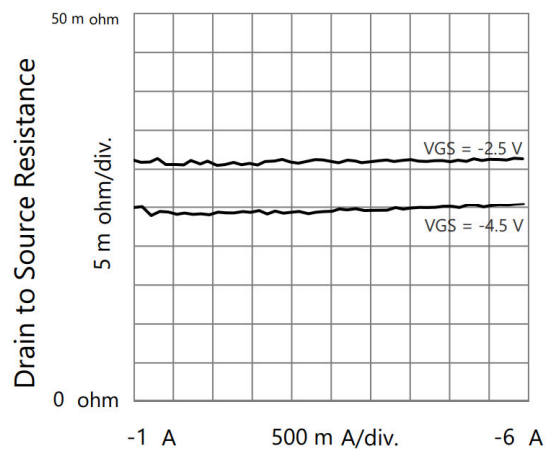
Drain to Source Voltage  
Output Characteristics



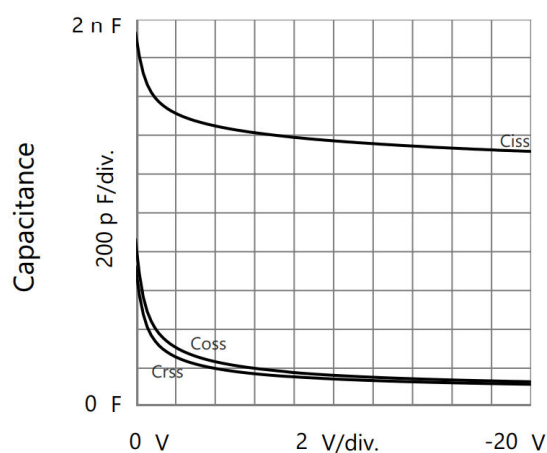
Gate to Source Voltage  
Transfer Characteristics



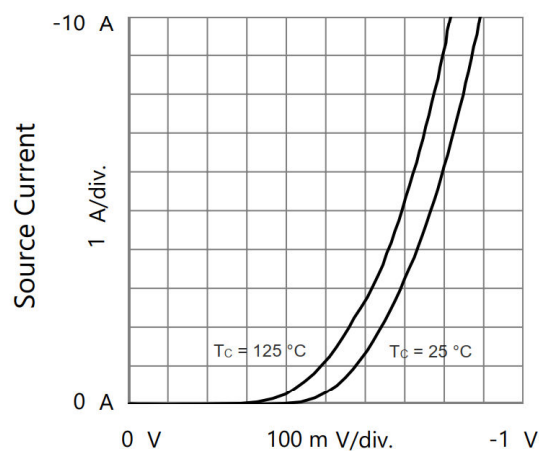
Gate to Source Voltage  
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current  
Drain to Source Resistance vs. Drain Current

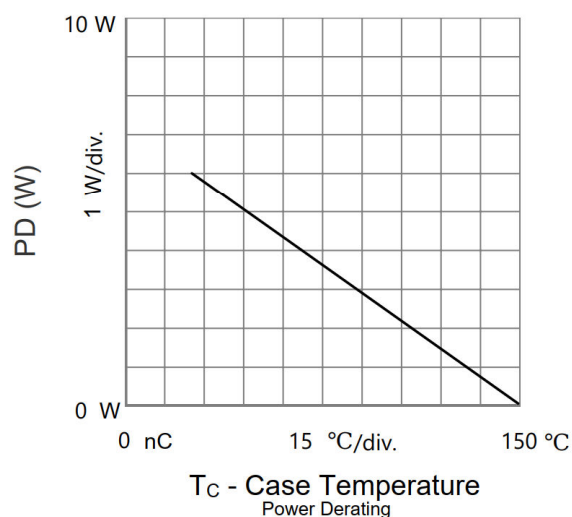
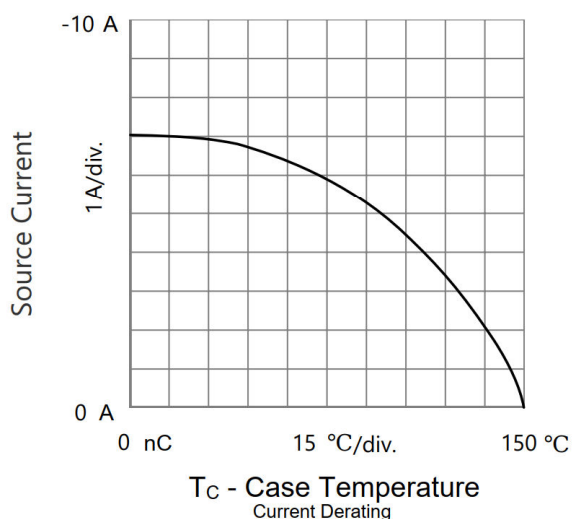
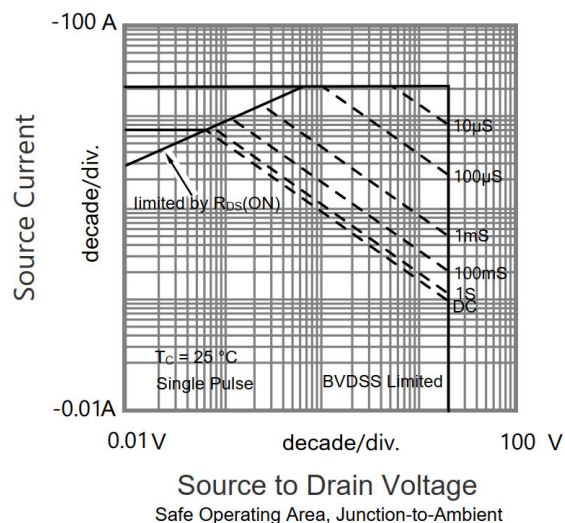
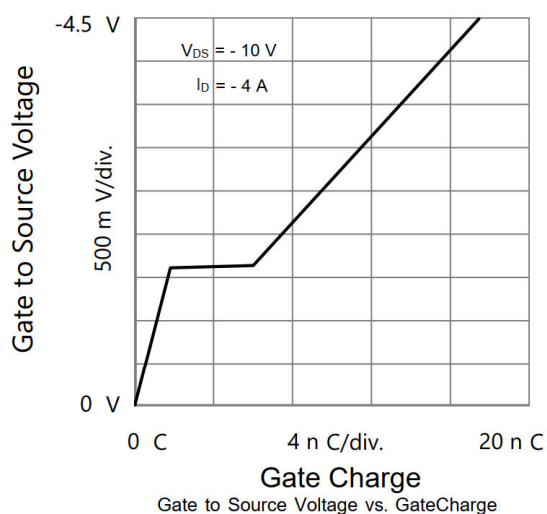


Drain to Source Voltage  
Capacitances

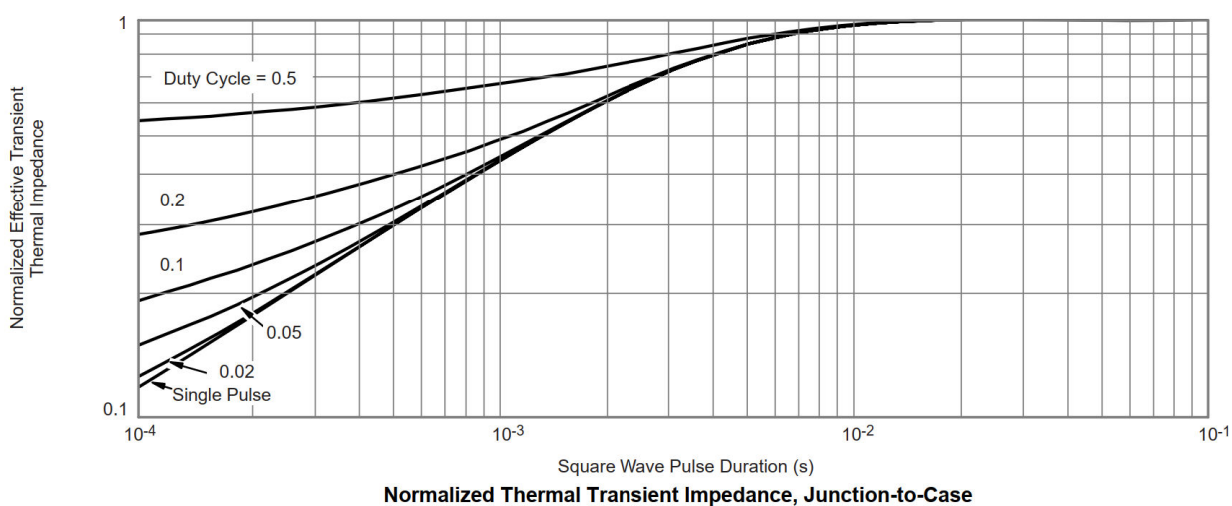
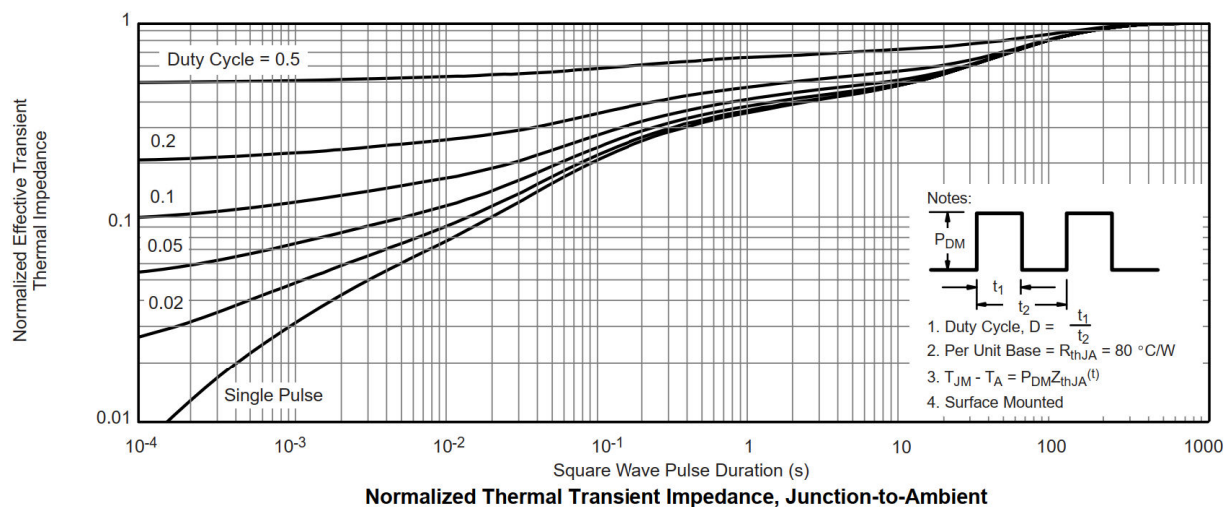


Source to Drain Voltage  
Body Diode Forward Characteristics

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



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



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