

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

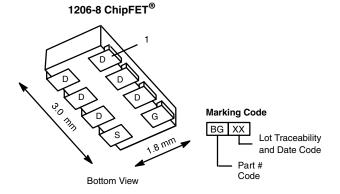
PRODUCT SUMMARY			
V <sub>DS</sub> (V)	$R_{DS(on)}(\Omega)$	I <sub>D</sub> (A)	
- 20	0.076 at V <sub>GS</sub> = - 4.5 V	- 4.8	
	0.110 at V <sub>GS</sub> = - 2.5 V	- 4.0	
	0.160 at V <sub>GS</sub> = - 1.8 V	- 3.3	

#### **FEATURES**

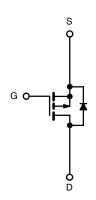
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET® Power MOSFETs: 1.8 V Rated



ROHS COMPLIANT HALOGEN FREE



Ordering Information: Si5447DC-T1-E3 (Lead (Pb)-free) Si5447DC-T1-GE3 (Lead (Pb)-free and Halogen-free)



P-Channel MOSFET

<b>ABSOLUTE MAXIMUM RATINGS</b> T	<sub>A</sub> = 25 °C, unle	ss otherwise r	noted			
Parameter		Symbol	5 s	Steady State	Unit	
Drain-Source Voltage		V <sub>DS</sub>	- 20		V	
Gate-Source Voltage		V <sub>GS</sub>	± 8			
Continuous Drain Comment /T 150 90\d	T <sub>A</sub> = 25 °C	- I <sub>D</sub>	- 4.8	- 3.5		
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	T <sub>A</sub> = 85 °C		- 3.5	- 2.5	Δ.	
Pulsed Drain Current		I <sub>DM</sub>	- 15		Α	
Continuous Source Current <sup>a</sup>		I <sub>S</sub>	- 2.1	- 1.1		
M	T <sub>A</sub> = 25 °C	P <sub>D</sub>	2.5	1.3	W	
Maximum Power Dissipation <sup>a</sup>	T <sub>A</sub> = 85 °C		1.3	0.7	VV	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C	
Soldering Recommendations (Peak Temperature) <sup>b, c</sup>			260			

THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a</sup>	t ≤ 5 s	- R <sub>thJA</sub>	43	50	°C/W	
	Steady State		83	95		
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	14	20	1	

#### Notes:

- a. Surface Mounted on 1" x 1" FR4 board.
- b. See Reliability Manual for profile. The ChipFET is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

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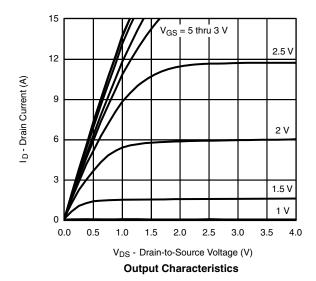
Parameter	Symbol	Test Conditions Min.		Тур.	Max.	Unit	
Static							
Gate Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$	- 0.45			V	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 8 V			± 100	nA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 16 V, V <sub>GS</sub> = 0 V			- 1	4	
		V <sub>DS</sub> = - 16 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 85 °C			- 5	μΑ	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \le -5 \text{ V}, V_{GS} = -4.5 \text{ V}$	- 15			Α	
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 3.5 A		0.064	0.076		
		V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 2.9 A		0.091	0.110 Ω		
		V <sub>GS</sub> = - 1.8 V, I <sub>D</sub> = - 1 A		0.130	0.160	1	
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = - 10 V, I <sub>D</sub> = - 3.5 A		9		S	
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	I <sub>S</sub> = - 1.1 A, V <sub>GS</sub> = 0 V		- 0.8	- 1.2	V	
Dynamic <sup>b</sup>							
Total Gate Charge	$Q_g$			6.5	10		
Gate-Source Charge	$Q_{gs}$	$V_{DS} = -10 \text{ V}, V_{GS} = -4.5 \text{ V}, I_{D} = -3.5 \text{ A}$		1.4		nC	
Gate-Drain Charge	$Q_{gd}$			1.3			
Turn-On Delay Time	t <sub>d(on)</sub>			14	21		
Rise Time	t <sub>r</sub>	$V_{DD}$ = - 10 V, $R_L$ = 10 $\Omega$		29	45		
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D\cong$ - 1 A, $V_{GEN}=$ - 4.5 V, $R_G=6~\Omega$		42	65	ns	
Fall Time	t <sub>f</sub>			35	55		
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = - 1.1 A, dl/dt = 100 A/μs		30	60		

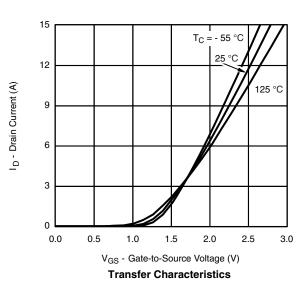
#### Notes:

- a. Pulse test; pulse width  $\leq$  300  $\mu$ 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







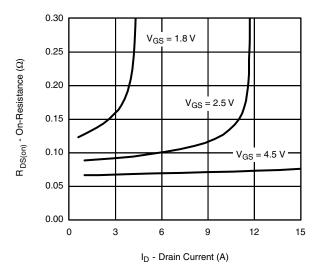




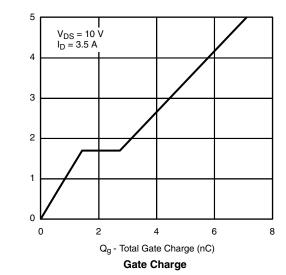
V<sub>GS</sub> - Gate-to-Source Voltage (V)

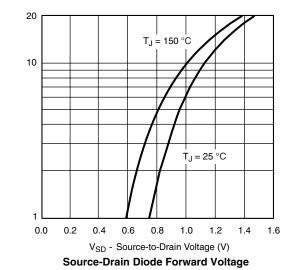
S - Source Current (A)

## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



#### On-Resistance vs. Drain Current





1200
1000
C<sub>iss</sub>

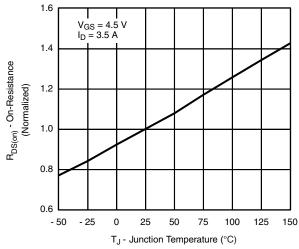
600
200
C<sub>rss</sub>

C<sub>oss</sub>

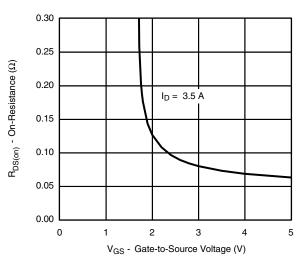
0
400
200
0
4 8 12 16 20

V<sub>DS</sub> - Drain-to-Source Voltage (V)





#### On-Resistance vs. Junction Temperature

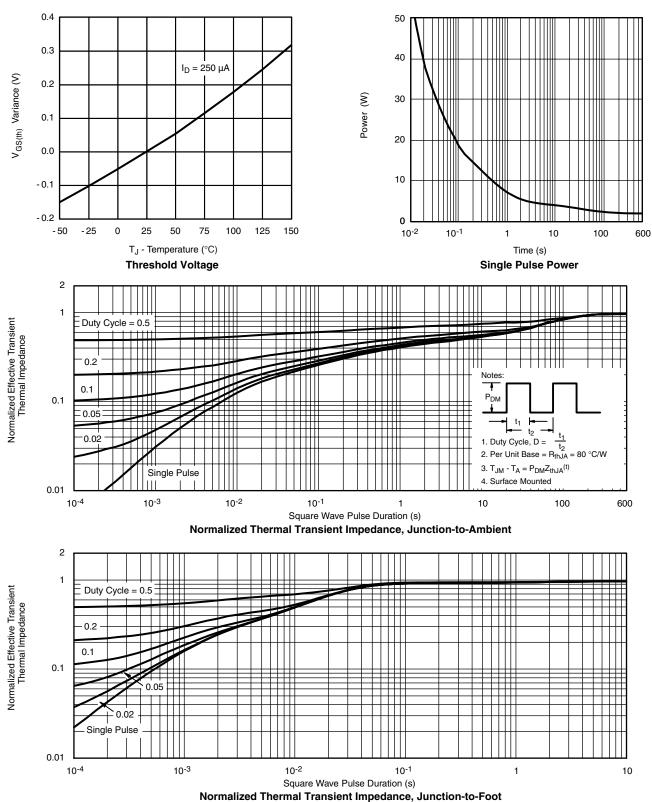


On-Resistance vs. Gate-to-Source Voltage

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## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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