

## P-Channel 150 V (D-S) MOSFET

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ.)
- 150	2.6 at V <sub>GS</sub> = - 10 V	- 0.52	4.2 nC
	2.7 at V <sub>GS</sub> = - 6 V	- 0.51	

### FEATURES

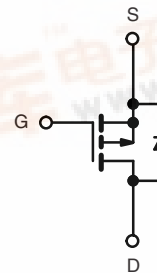
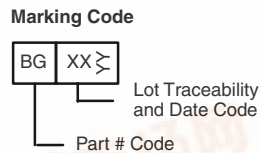
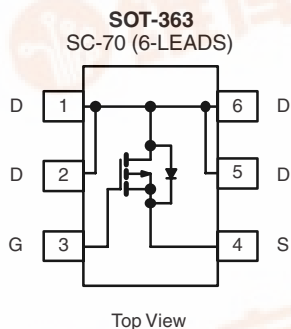
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETS
- Small, Thermally Enhanced SC-70 Package
- Ultra Low On-Resistance
- Compliant to RoHS Directive 2002/95/EC



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

### APPLICATIONS

- Active Clamp Circuits in dc-to-dc Power Supplies



P-Channel MOSFET

**Ordering Information:** Si1411DH-T1-E3 (Lead (Pb)-free)  
 Si1411DH-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted				
Parameter	Symbol	5 s	Steady State	Unit
Drain-Source Voltage	V <sub>DS</sub>	- 150		V
Gate-Source Voltage	V <sub>GS</sub>	± 20		
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	- 0.52	- 0.42
		T <sub>A</sub> = 85 °C	- 0.38	- 0.3
Pulsed Drain Current	I <sub>DM</sub>	- 0.8		A
Continuous Diode Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	- 1.3	- 0.83	
Single Pulse Avalanche Current	I <sub>AS</sub>	- 2.1		mJ
Single Pluse Avalanche Energy		E <sub>AS</sub>	0.22	
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	1.56	1.0
		T <sub>A</sub> = 85 °C	0.81	0.52
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	t ≤ 5 s	60	80
		Steady State	100	125
Maximum Junction-to-Foot (Drain)	R <sub>thJF</sub>	34	45	°C/W

Notes:

a. Surface mounted on 1" x 1" FR4 board.



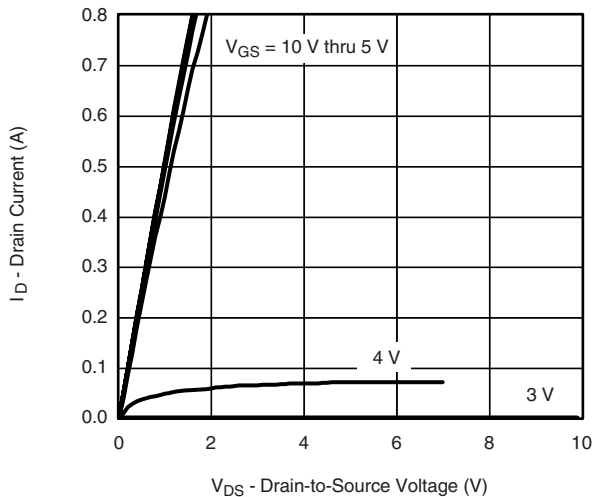
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -100\text{ }\mu\text{A}$	-2.5		-4.5	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -150\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -150\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			-5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}$	-0.8			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -0.5\text{ A}$		2.05	2.6	$\Omega$
		$V_{GS} = -6\text{ V}, I_D = -0.5\text{ A}$		2.14	2.7	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -10\text{ V}, I_D = -0.5\text{ A}$		1.5		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -1.4\text{ A}, V_{GS} = 0\text{ V}$		-0.80	-1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -75\text{ V}, V_{GS} = -10\text{ V}, I_D = -0.5\text{ A}$		4.2	6.3	nC
Gate-Source Charge	$Q_{gs}$			0.9		
Gate-Drain Charge	$Q_{gd}$			1.3		
Gate Resistance	$R_g$	$f = 1.0\text{ MHz}$		8.5		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -75\text{ V}, R_L = 75\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$		4.5	7	ns
Rise Time	$t_r$			11	17	
Turn-Off Delay Time	$t_{d(off)}$			9	14	
Fall Time	$t_f$			11	17	
Reverse Recovery Time	$t_{rr}$	$I_F = -0.5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		36	55	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			65	100	

Notes:

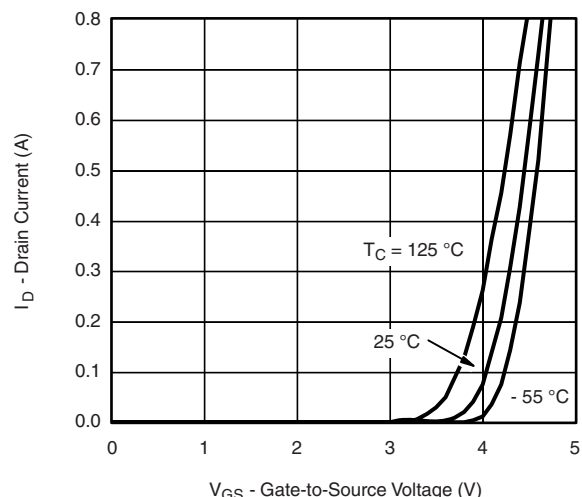
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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 $25\text{ }^\circ\text{C}$ , unless otherwise noted

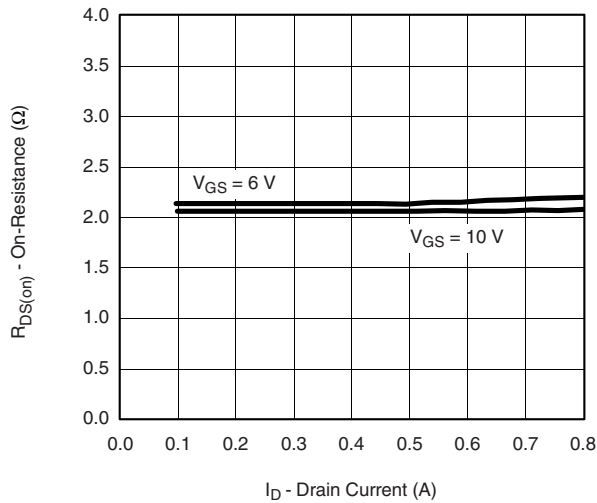


Output Characteristics

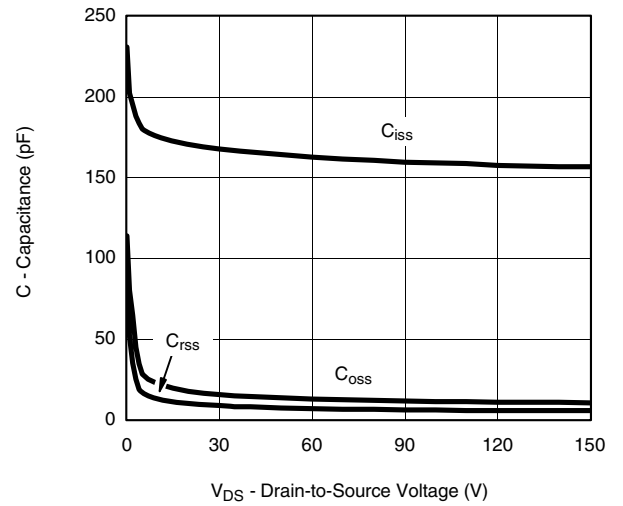


Transfer Characteristics

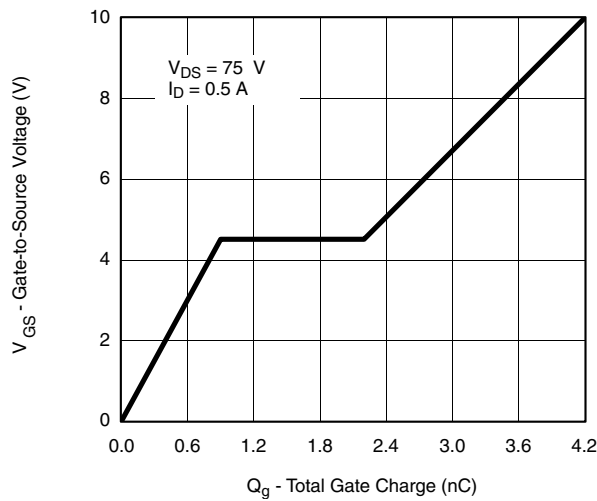
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



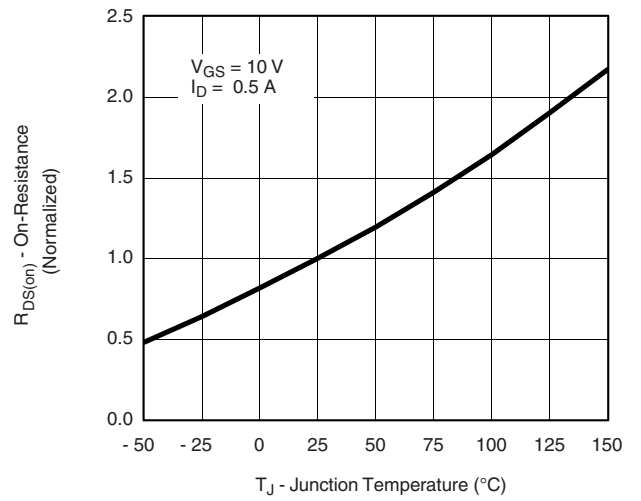
**On-Resistance vs. Drain Current**



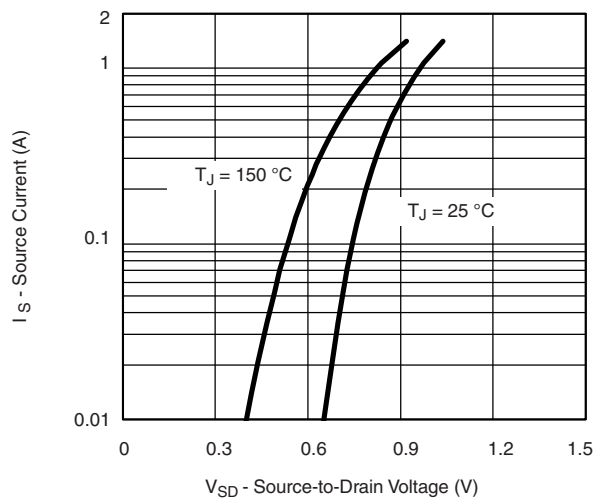
**Capacitance**



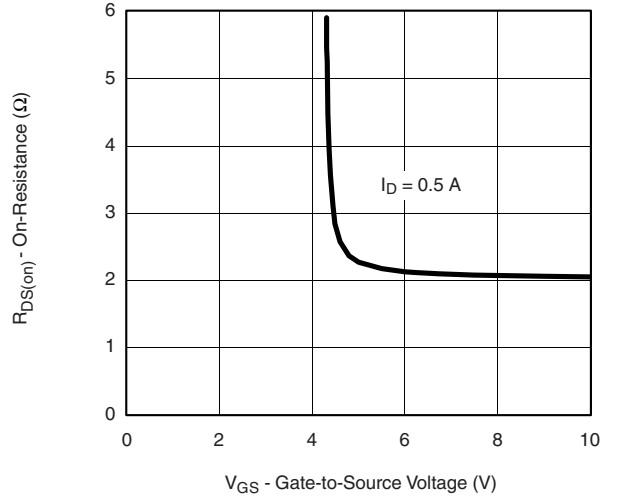
**Gate Charge**



**On-Resistance vs. Junction Temperature**

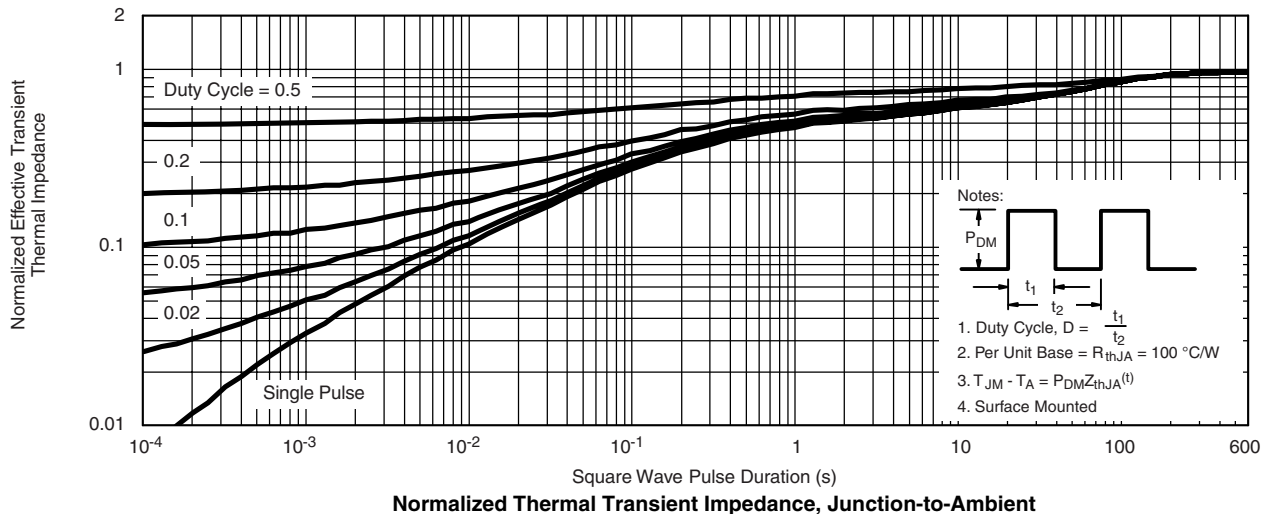
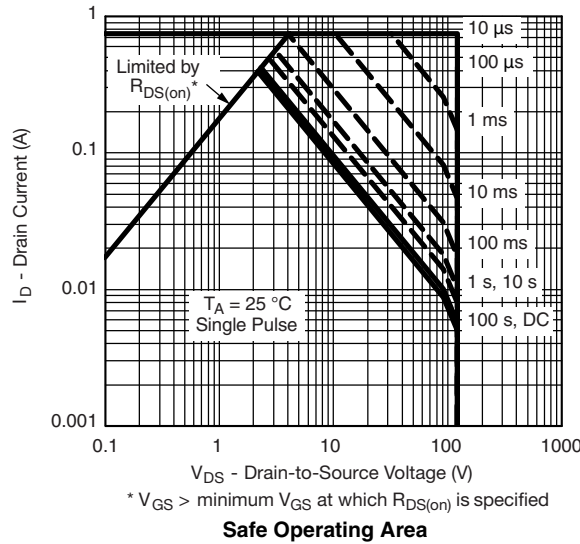
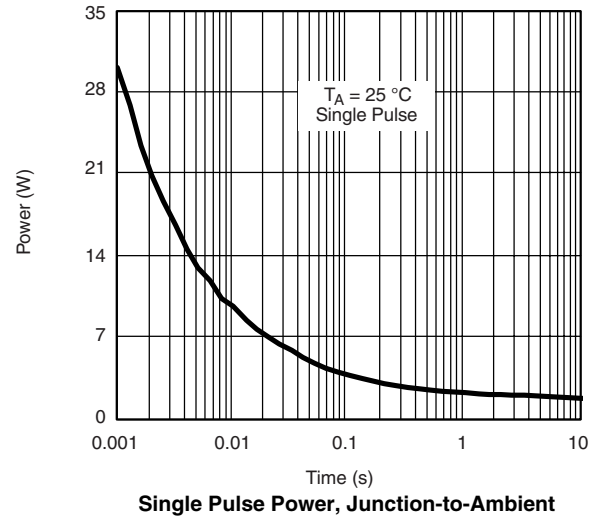
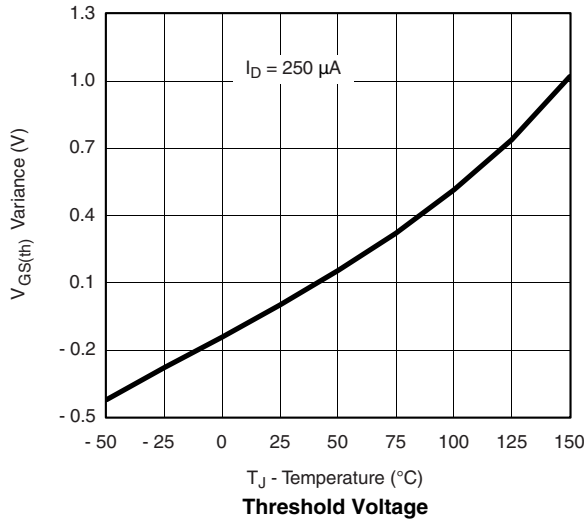


**Source-Drain Diode Forward Voltage**

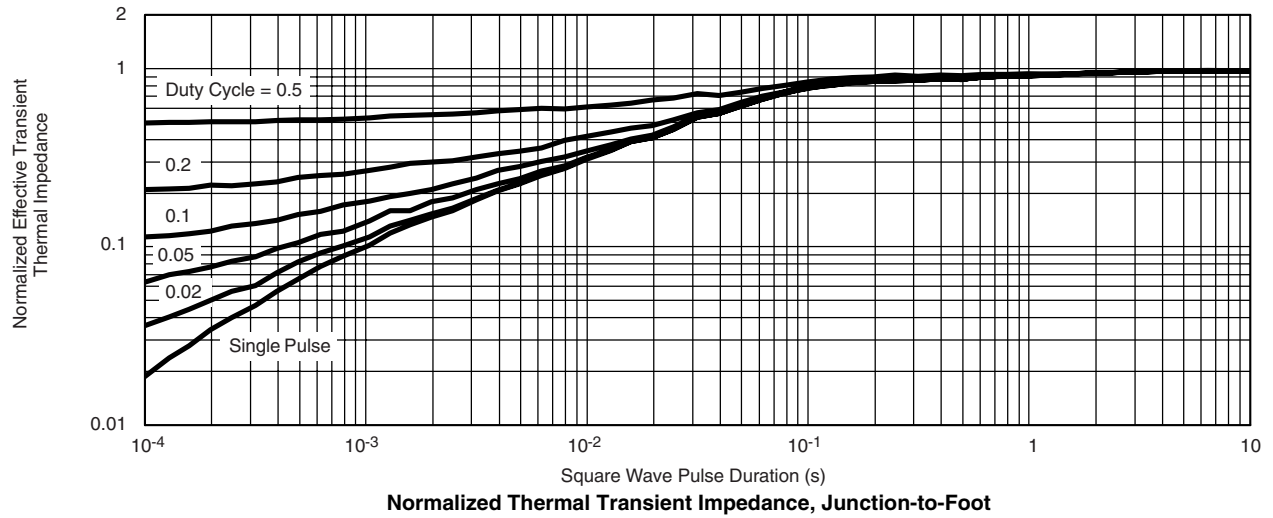


**On-Resistance vs. Gate-to-Source Voltage**

## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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



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