

P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 20	0.115 at $V_{GS} = - 4.5$ V	- 2.9
	0.155 at $V_{GS} = - 2.5$ V	- 2.4
	0.220 at $V_{GS} = - 1.8$ V	- 2.0

FEATURES

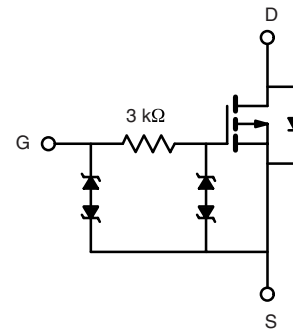
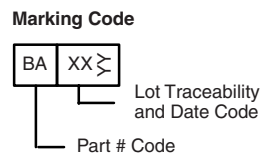
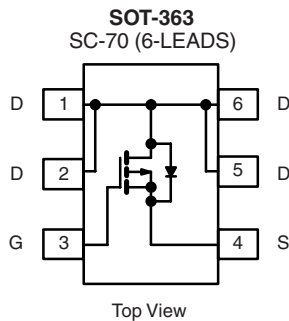
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET: 1.8 V Rated
- ESD Protected: 3000 V
- Thermally Enhanced SC-70 Package
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Load Switching
- PA Switch
- Level Switch



Ordering Information: Si1413EDH-T1-E3 (Lead (Pb)-free)
Si1413EDH-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	5 s	Steady State	Unit
Drain-Source Voltage	V_{DS}	- 20		V
Gate-Source Voltage	V_{GS}	± 12		
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	$T_A = 25$ °C	- 2.9	- 2.3
		$T_A = 85$ °C	- 2.0	- 1.6
Pulsed Drain Current	I_{DM}	- 8		A
Continuous Diode Current (Diode Conduction) ^a	I_S	- 1.4	- 0.9	
Maximum Power Dissipation ^a	P_D	$T_A = 25$ °C	1.56	1.0
		$T_A = 85$ °C	0.81	0.52
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150		°C

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	R_{thJA}	$t \leq 5$ s	60	80
		Steady State	100	125
Maximum Junction-to-Foot (Drain)	R_{thJF}	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
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -100\text{ }\mu\text{A}$	-0.45			V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$			± 1.5	μA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			± 10	mA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			-5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -4.5\text{ V}$	-4			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -2.9\text{ A}$		0.095	0.115	Ω
		$V_{GS} = -2.5\text{ V}, I_D = -2.4\text{ A}$		0.125	0.155	
		$V_{GS} = -1.8\text{ V}, I_D = -1.0\text{ A}$		0.180	0.220	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -2.9\text{ A}$		6		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -1.4\text{ A}, V_{GS} = 0\text{ V}$		-0.8	-1.1	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -2.9\text{ A}$		5.6	8	nC
Gate-Source Charge	Q_{gs}		1.2			
Gate-Drain Charge	Q_{gd}		1.2			
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$		0.75	1.1	μs
Rise Time	t_r		1.6	2.3		
Turn-Off Delay Time	$t_{d(off)}$		3.9	5.5		
Fall Time	t_f		3.9	5.5		

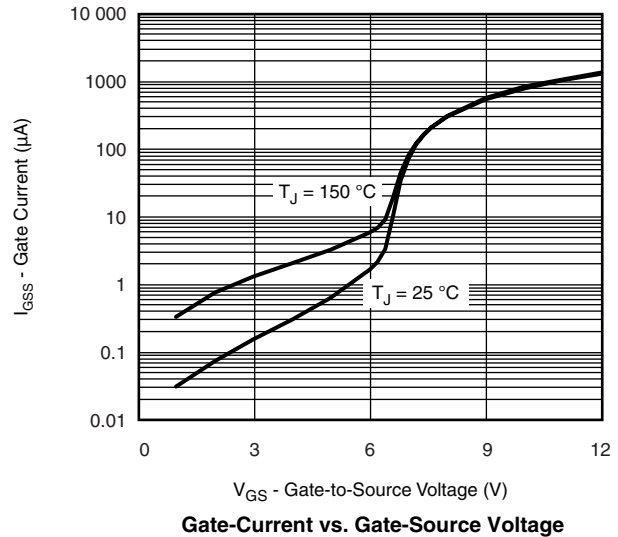
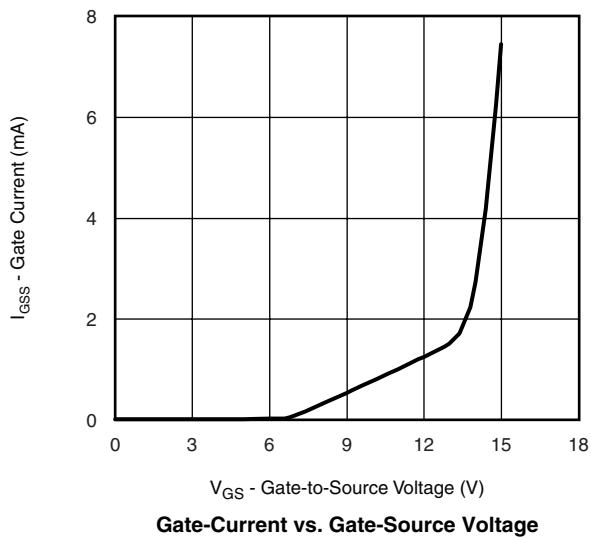
Notes:

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

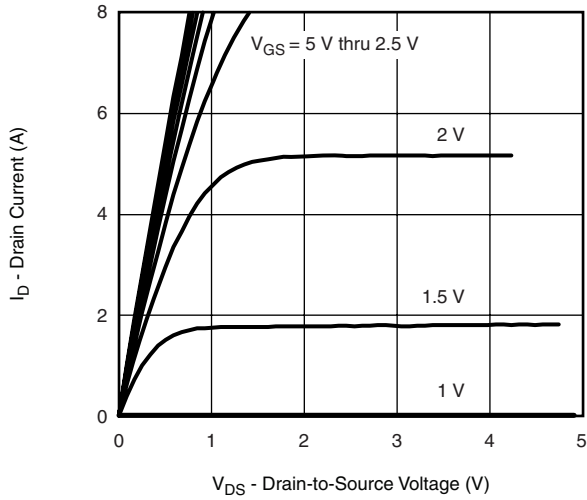
b. Guaranteed by design, not subject to production testing.

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.

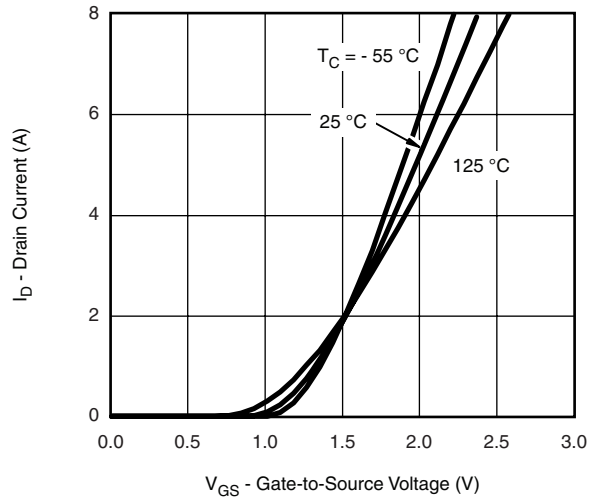
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$, unless otherwise noted



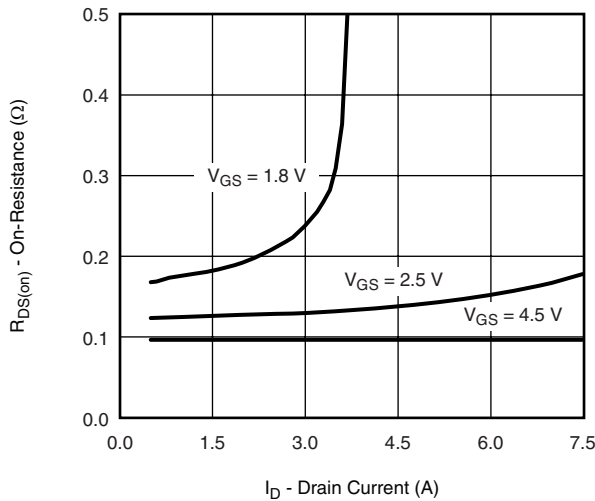
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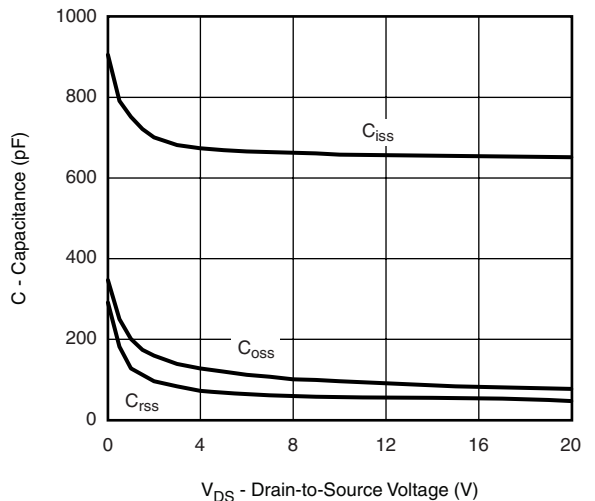
Output Characteristics



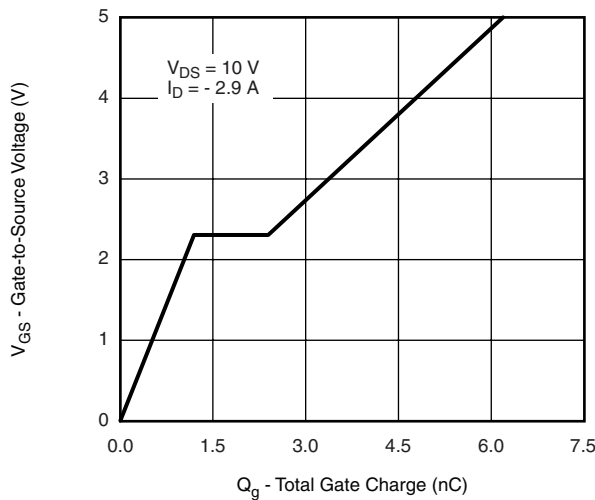
Transfer Characteristics



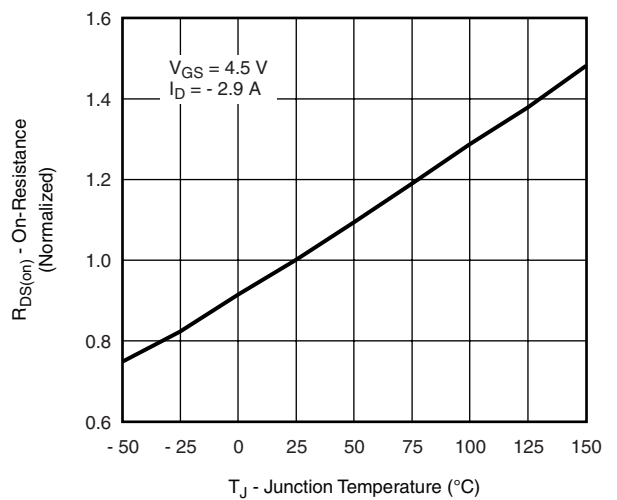
On-Resistance vs. Drain Current



Capacitance

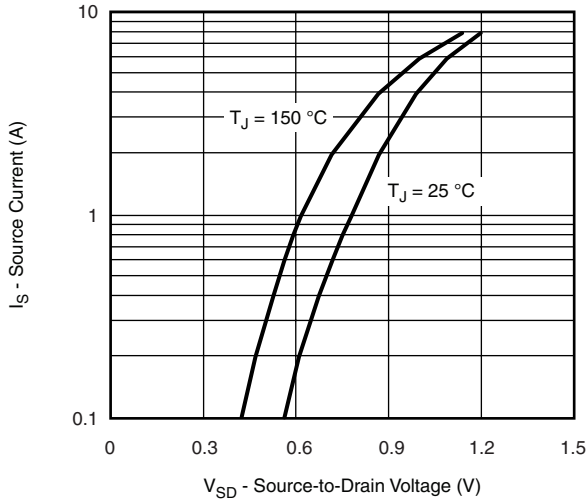


Gate Charge

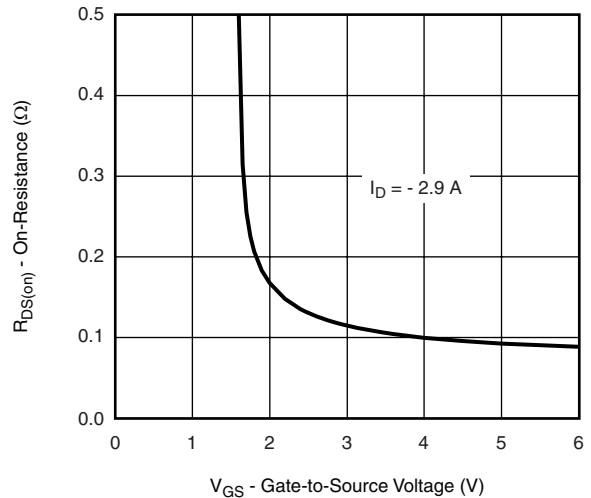


On-Resistance vs. Junction Temperature

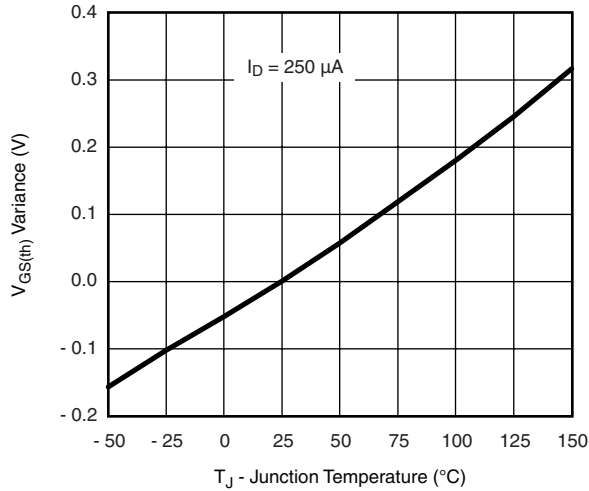
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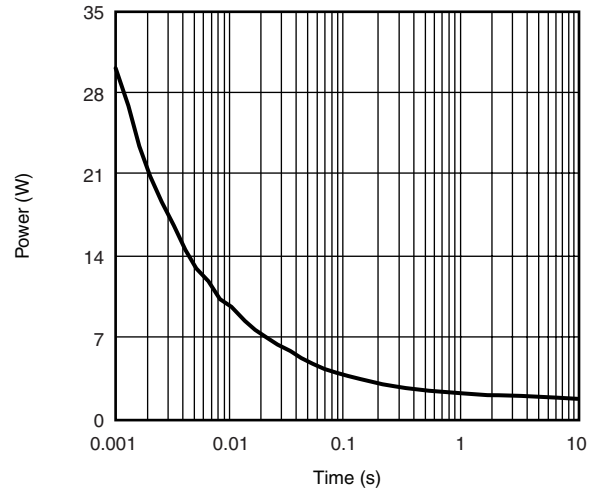
Source-Drain Diode Forward Voltage



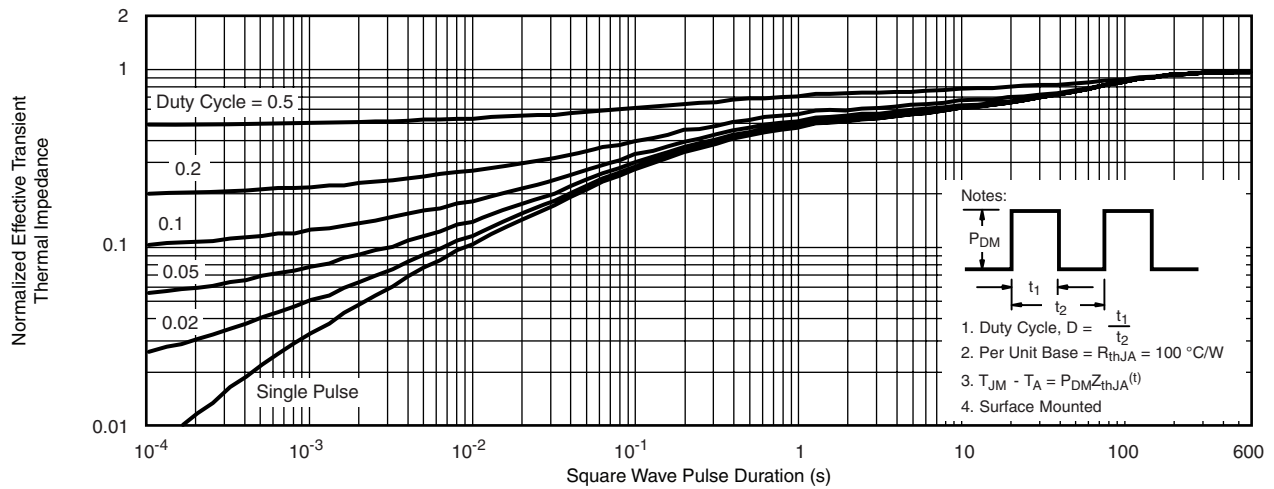
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



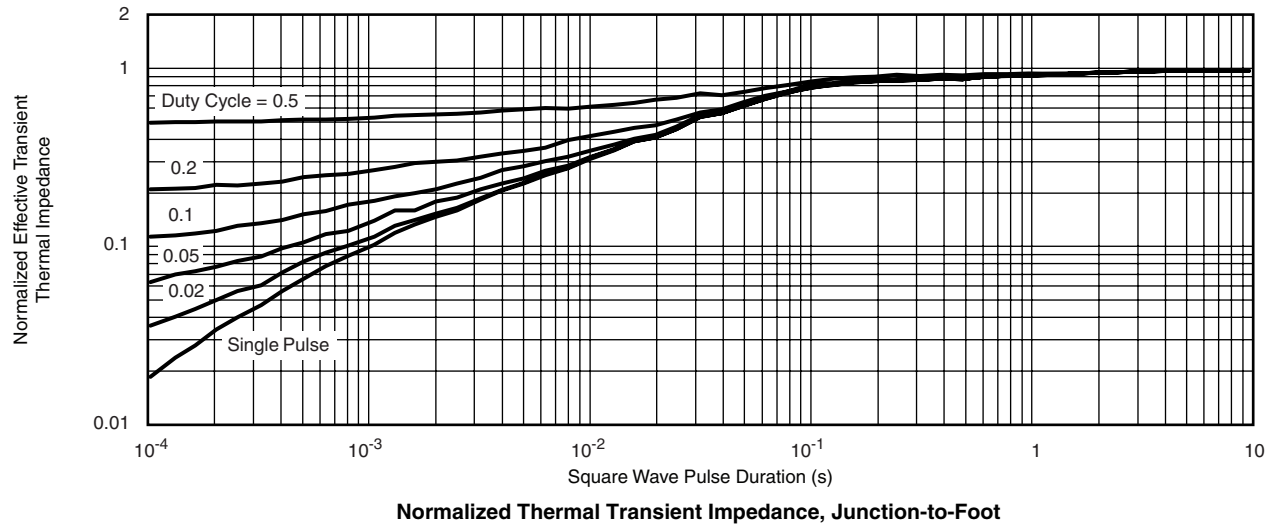
Single Pulse Power, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient

- Notes:
- Duty Cycle, $D = \frac{t_1}{t_2}$
 - Per Unit Base = $R_{thJA} = 100 \text{ } ^\circ\text{C/W}$
 - $T_{JM} - T_A = P_{DM}Z_{thJA}(t)$
 - Surface Mounted

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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