



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

PRODUCT SUMMARY					
V <sub>DS</sub> (V)	$R_{DS(on)}$ ( $\Omega$ )	I <sub>D</sub> (A)			
20	0.070 at V <sub>GS</sub> = 4.5 V	3.7			
	0.080 at $V_{GS} = 2.5 \text{ V}$	3.4			
	0.100 at V <sub>GS</sub> = 1.8 V	3.0			

### **FEATURES**

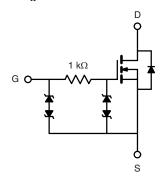
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET<sup>®</sup> Power MOSFETs: 1.8 V Rated
- ESD Protected: 2000 V
- Thermally Enhanced SC-70 Package
- Compliant to RoHS Directive 2002/95/EC

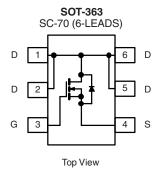


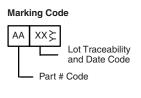


#### **APPLICATIONS**

Load Switching







Ordering Information: Si1410EDH-T1-E3 (Lead (Pb)-free)

Si1410EDH-T1-GE3 (Lead (Pb)-free and Halogen-free)

<b>ABSOLUTE MAXIMUM RATINGS</b>	$T_A = 25 ^{\circ}\text{C}$ , 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>	± 12		
Continuous Drain Current /T 150 °C\a	T <sub>A</sub> = 25 °C	- I <sub>D</sub>	3.7	2.9	A
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	T <sub>A</sub> = 85 °C		2.6	2.0	
Pulsed Drain Current		I <sub>DM</sub>	8		A
Continuous Diode Current (Diode Conduction) <sup>a</sup>		I <sub>S</sub>	1.4	0.9	
Maximum Power Dissipation <sup>a</sup>	T <sub>A</sub> = 25 °C	P <sub>D</sub>	1.56	1.0	W
	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>	t ≤ 5 s	R <sub>thJA</sub>	60	80	°C/W
Waximum Junction-to-Ambient	Steady State		100	125	
Maximum Junction-to-Foot (Drain)	Steady State	R <sub>thJF</sub>	34	45	

Notes:

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

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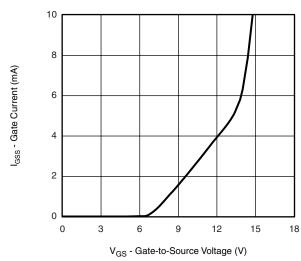
<b>SPECIFICATIONS</b> T <sub>J</sub> = 25 °C, unless otherwise noted								
Parameter	Symbol	Test Conditions Min.		Тур.	Max.	Unit		
Static								
Gate Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250 \mu A$	0.45			V		
Gate-Body Leakage	1	$V_{DS} = 0 V, V_{GS} = \pm 4.5 V$			± 1	μΑ		
	IGSS	$V_{DS} = 0 V, V_{GS} = \pm 12 V$			± 10	mA		
Zero Gate Voltage Drain Current		$V_{DS} = 16 \text{ V}, V_{GS} = 0 \text{ V}$			1	μΑ		
	I <sub>DSS</sub>	$V_{DS}$ = 16 V, $V_{GS}$ = 0 V, $T_J$ = 85 °C			5			
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	4			Α		
		$V_{GS} = 4.5 \text{ V}, I_D = 3.7 \text{ A}$		0.055	0.070			
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	$V_{GS} = 2.5 \text{ V}, I_D = 3.4 \text{ A}$		0.065	0.080	Ω		
		V <sub>GS</sub> = 1.8 V, I <sub>D</sub> = 1.7 A		0.080	0.100			
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 3.7 A		10		S		
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	I <sub>S</sub> = 1.4 A, V <sub>GS</sub> = 0 V		0.75	1.1	V		
Dynamic <sup>b</sup>								
Total Gate Charge	Qg			5.6	8			
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_{D} = 3.7 \text{ A}$		0.75		nC		
Gate-Drain Charge	Q <sub>gd</sub>			1.10				
Turn-On Delay Time	t <sub>d(on)</sub>			0.15	0.25			
Rise Time	t <sub>r</sub>	$V_{DD} = 10 \text{ V, } R_L = 10 \Omega$ $I_D \cong 1 \text{ A, } V_{GEN} = 4.5 \text{ V, } R_g = 6 \Omega$		0.4	0.6			
Turn-Off Delay Time	t <sub>d(off)</sub>			1.9	2.8	μs		
Fall Time	t <sub>f</sub>			1.2	1.8			

#### Notes:

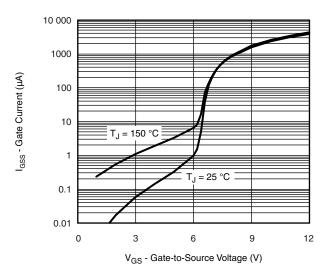
- a. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

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







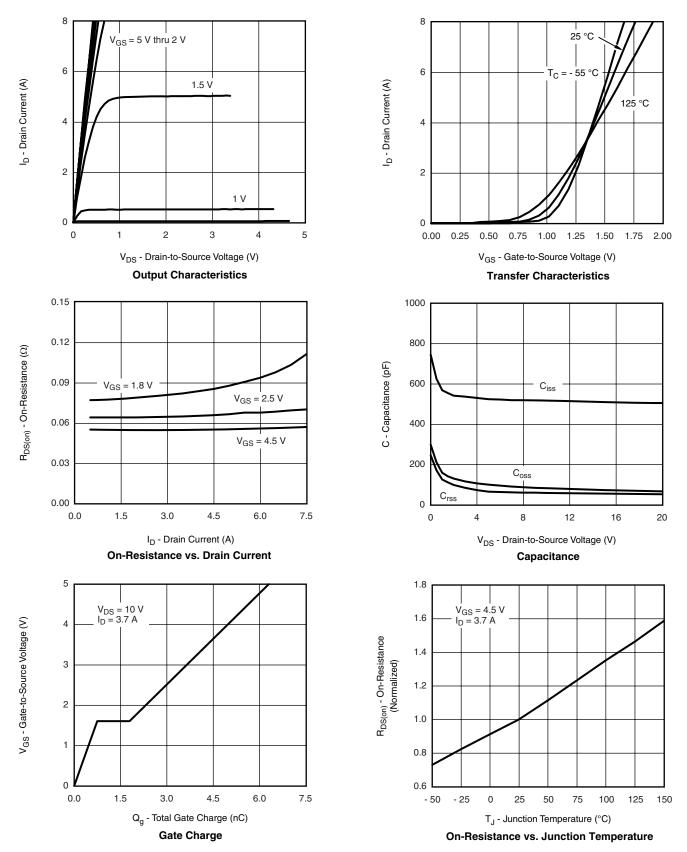
Gate-Current vs. Gate-Source Voltage







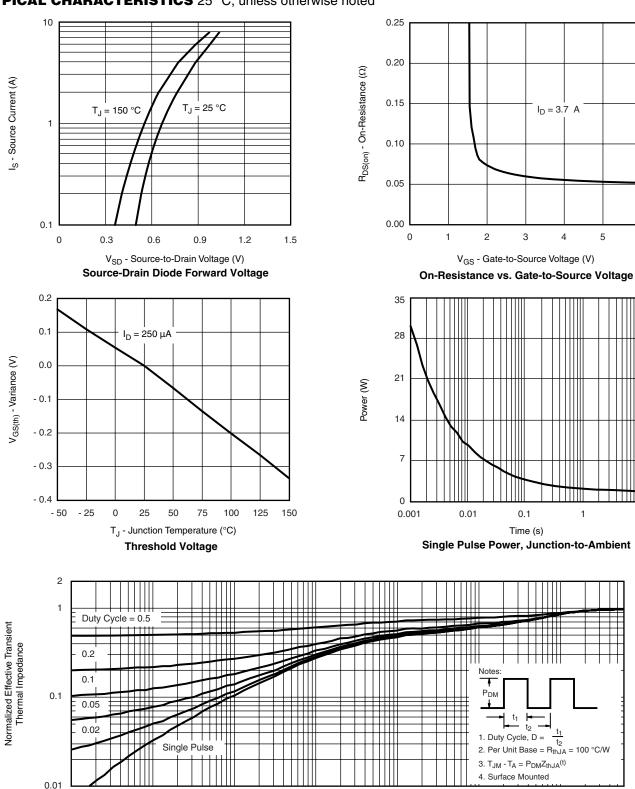
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



10<sup>-1</sup>

10<sup>-4</sup>

10<sup>-3</sup>

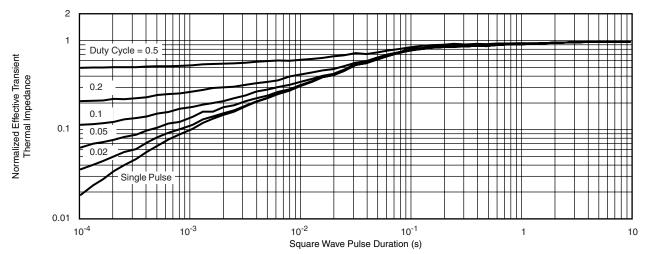
10<sup>-2</sup>

600

100



## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Foot

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