

## N-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY		
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
60	2.5 at V <sub>GS</sub> = 10 V	0.25
	3 at V <sub>GS</sub> = 4.5 V	0.23
	8 at V <sub>GS</sub> = 3 V	0.05

### FEATURES

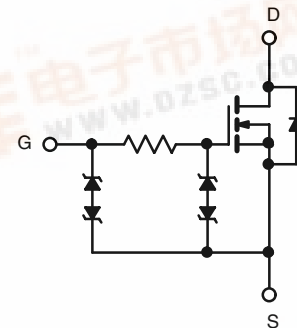
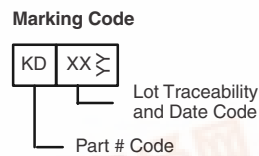
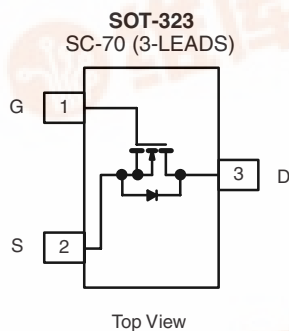
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET<sup>®</sup> Power MOSFET
- ESD Protected: 2000 V
- Compliant to RoHS Directive 2002/95/EC



RoHS  
COMPLIANT  
HALOGEN  
FREE  
Available

### APPLICATIONS

- P-Channel Driver
- Notebook PC
- Servers



Ordering Information: Si1330EDL-T1-E3 (Lead (Pb)-free)  
Si1330EDL-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>	60		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	0.25	0.24	A
		T <sub>A</sub> = 70 °C	0.2	0.19	
Pulsed Drain Current	I <sub>DM</sub>	1.0			
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	0.26	0.23		
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	0.31	0.28	W
		T <sub>A</sub> = 70 °C	0.20	0.18	
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	355	400	°C/W
		Steady State	380	450	
Maximum Junction-to-Foot (Drain)	R <sub>thJF</sub>	285	340		

Notes:

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



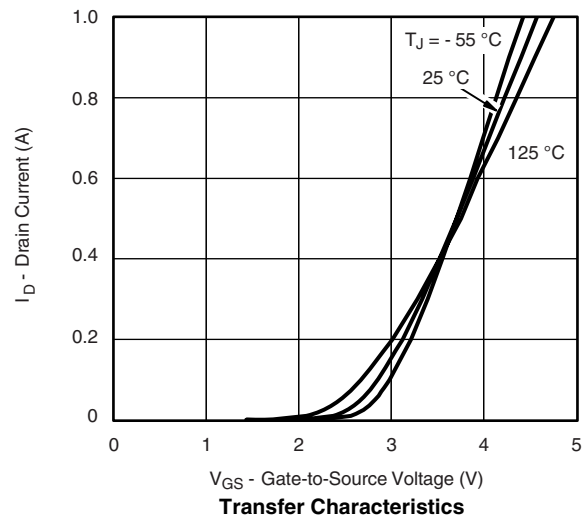
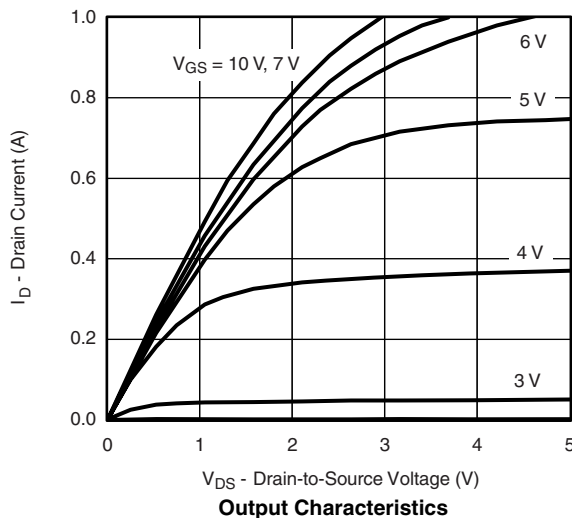
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted <sup>a</sup>						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 10\text{ }\mu\text{A}$	60			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1	2.0	2.5	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			$\pm 1$	$\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$ $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			1 10	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 7.5\text{ V}$	0.5			A
		$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}$	0.4			
		$V_{GS} = 3\text{ V}, V_{DS} = 10\text{ V}$	0.05			
Drain-Source On-Resistance <sup>b</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 0.25\text{ A}$		1.0	2.5	$\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 0.2\text{ A}$		1.4	3	
		$V_{GS} = 3\text{ V}, I_D = 0.025\text{ A}$		3.0	8	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}, I_D = 0.25\text{ A}$		350		mS
Diode Forward Voltage	$V_{SD}$	$I_S = 0.23\text{ A}, V_{GS} = 0\text{ V}$		0.83	1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}$ $I_D \cong 0.25\text{ A}$		0.4	0.6	nC
Gate-Source Charge	$Q_{gs}$			0.11		
Gate-Drain Charge	$Q_{gd}$			0.15		
Gate Resistance	$R_g$			173		$\Omega$
Turn-On Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}, R_L = 150\text{ }\Omega$ $I_D \cong 0.2\text{ A}, V_{GEN} = 10\text{ V}$ $R_g = 10\text{ }\Omega$		3.8	10	ns
	$t_r$			4.8	15	
Turn-Off Time	$t_{d(off)}$			12.8	20	
	$t_f$			9.6	15	

Notes:

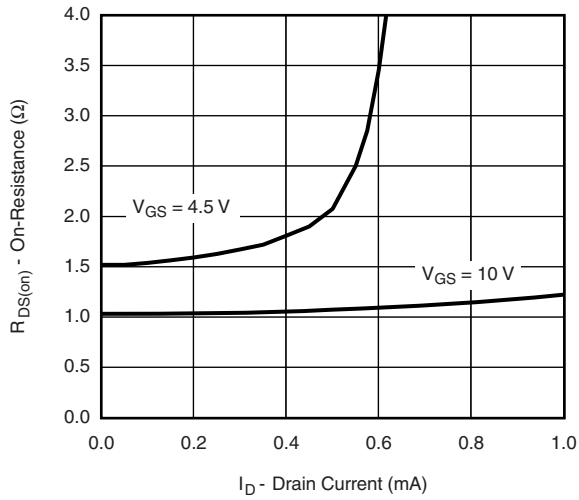
- a. Pulse test:  $PW \leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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.

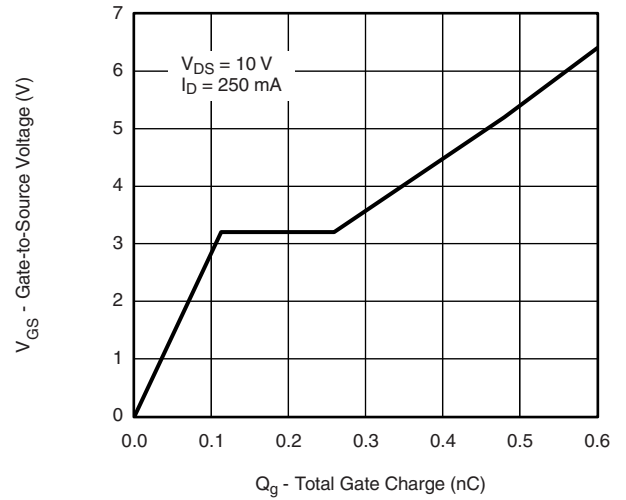
**TYPICAL CHARACTERISTICS**  $25\text{ }^\circ\text{C}$ , unless otherwise noted



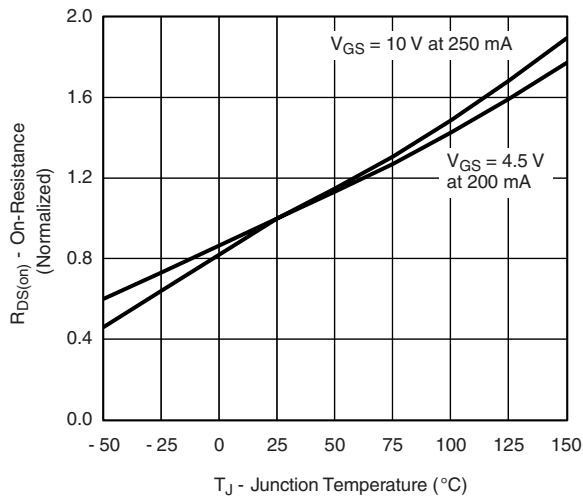
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



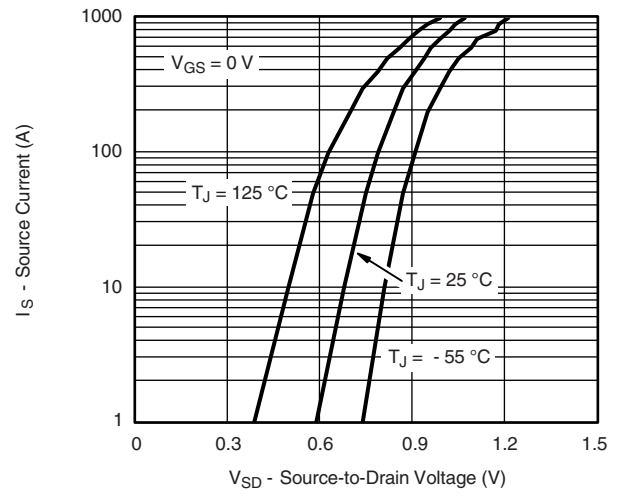
**On-Resistance vs. Drain Current**



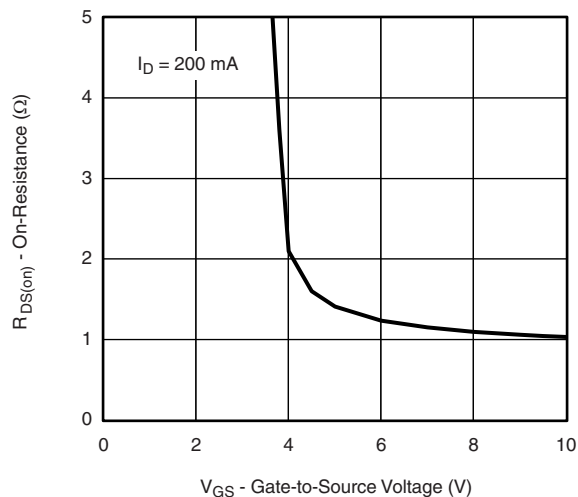
**Gate Charge**



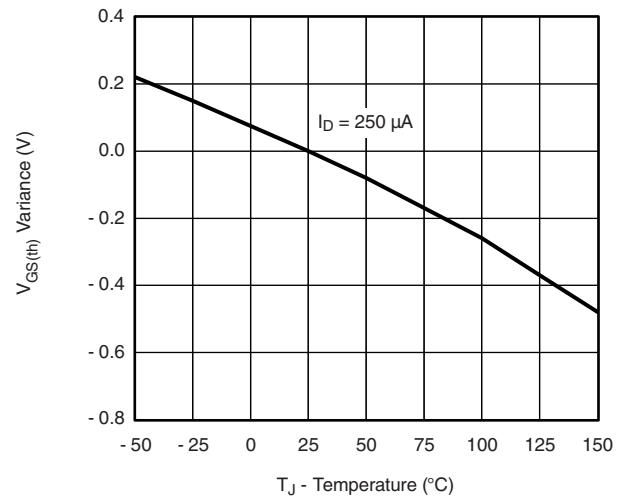
**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**

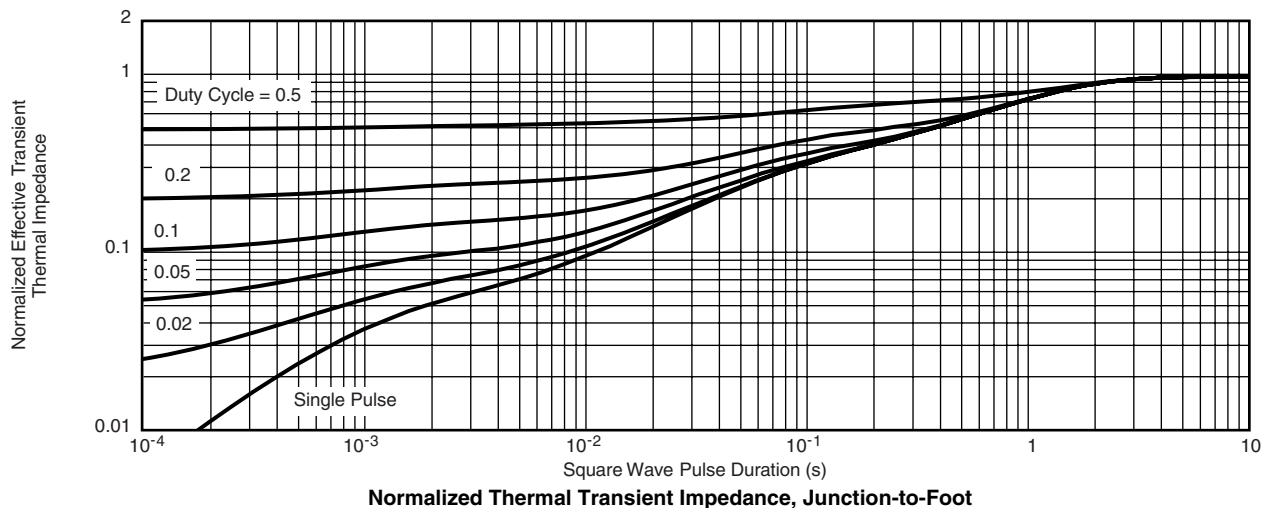
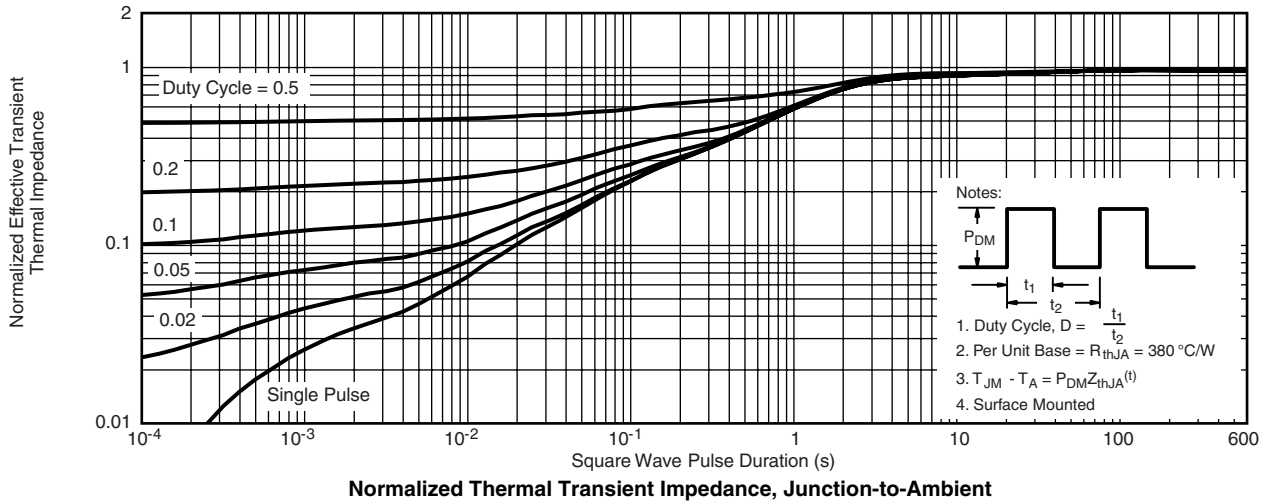
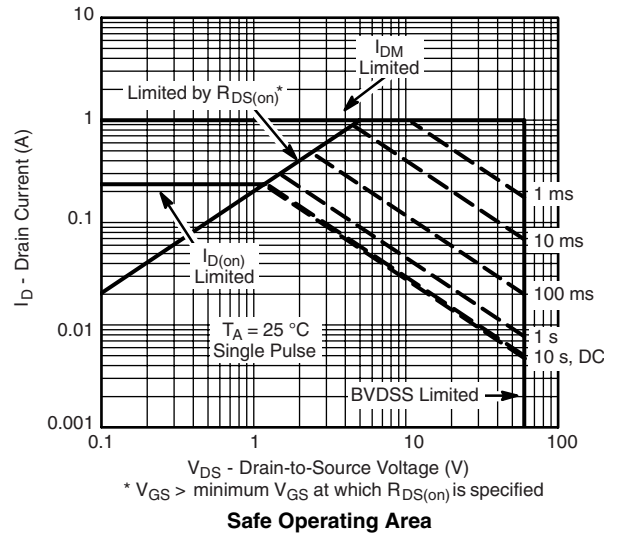
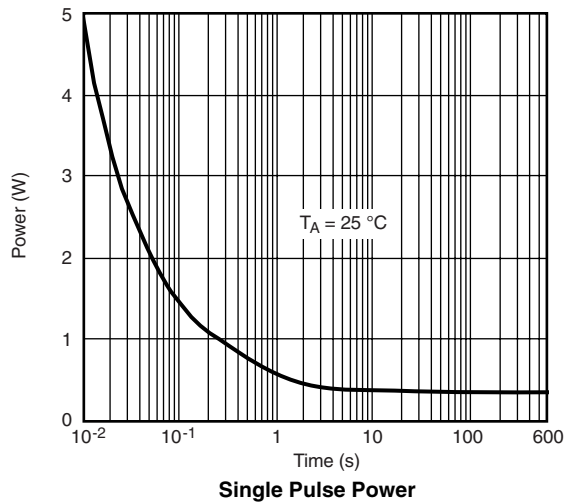


**On-Resistance vs. Gate-Source Voltage**



**Threshold Voltage Variance over Temperature**

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



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