

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

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
60	2.5 at $V_{GS} = 10$ V	0.25
	3 at $V_{GS} = 4.5$ V	0.23
	8 at $V_{GS} = 3$ V	0.05

### FEATURES

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

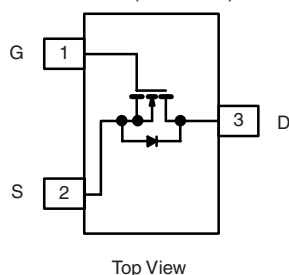


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

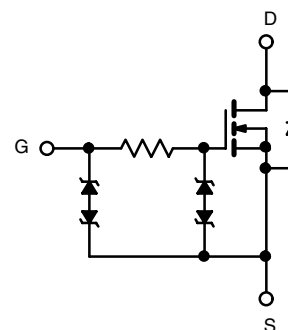
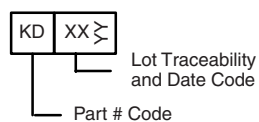
### APPLICATIONS

- P-Channel Driver
- Notebook PC
- Servers

**SOT-323**  
SC-70 (3-LEADS)



Marking Code



**Ordering Information:** Si1330EDL-T1-E3 (Lead (Pb)-free)  
Si1330EDL-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	$V_{DS}$	60		V
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$I_D$	0.25	0.24	A
		0.2	0.19	
Pulsed Drain Current	$I_{DM}$	1.0		
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	0.26	0.23	
Maximum Power Dissipation <sup>a</sup>	$P_D$	0.31	0.28	W
		0.20	0.18	
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 <sup>a</sup>	$R_{thJA}$	355	400	°C/W
		380	450	
Maximum Junction-to-Foot (Drain)	$R_{thJF}$	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>

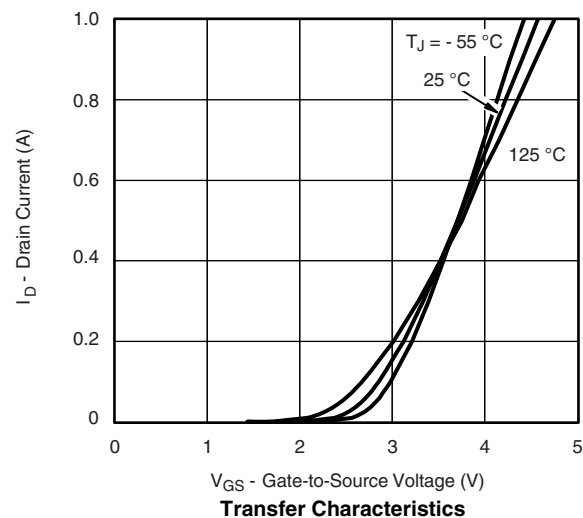
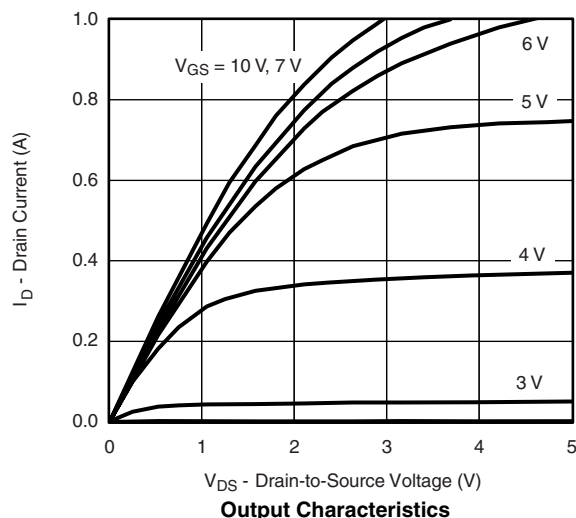
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 10\text{ }\mu\text{A}$	60			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	1	2.0	2.5	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 10\text{ V}$			$\pm 1$	$\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60\text{ V}$ , $V_{GS} = 0\text{ V}$			1	
		$V_{DS} = 60\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 55\text{ }^{\circ}\text{C}$			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
Dynamic <sup>b</sup>						
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:

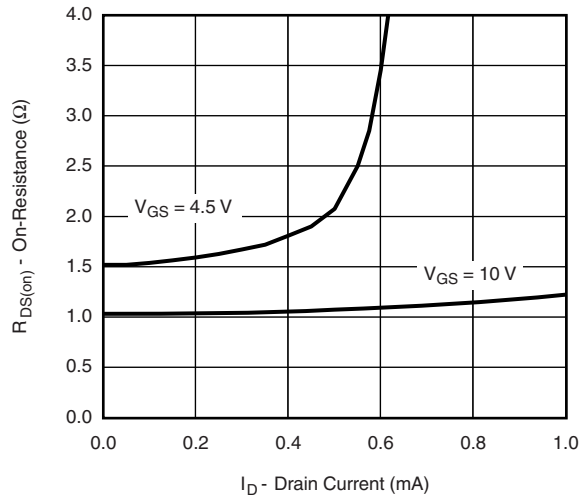
a. Pulse test:  $PW \leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

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

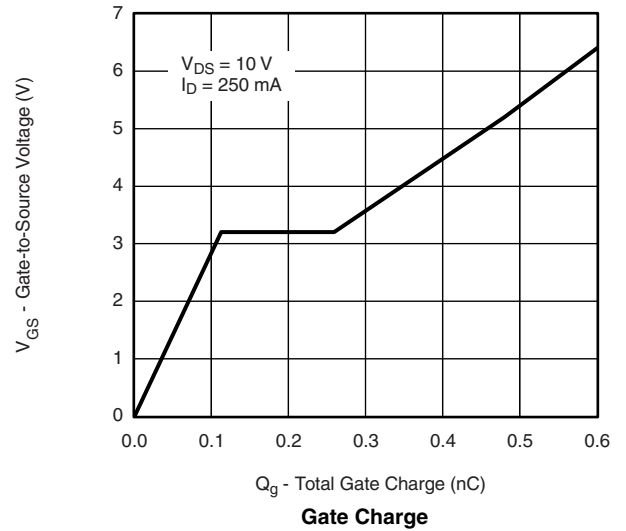
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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

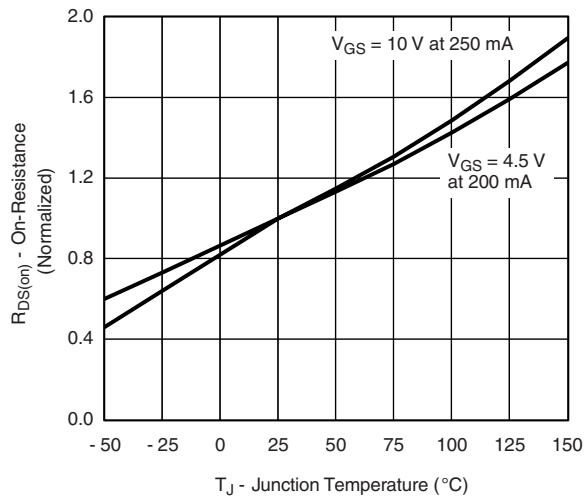
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



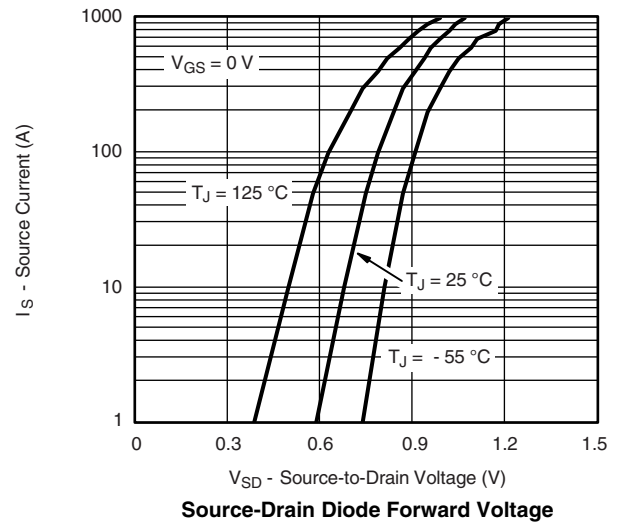
On-Resistance vs. Drain Current



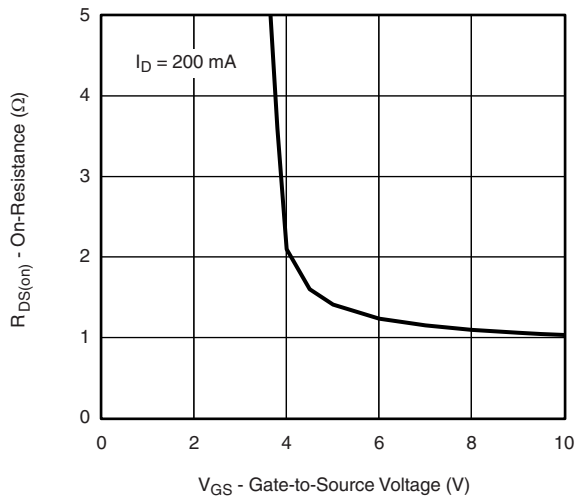
Gate Charge



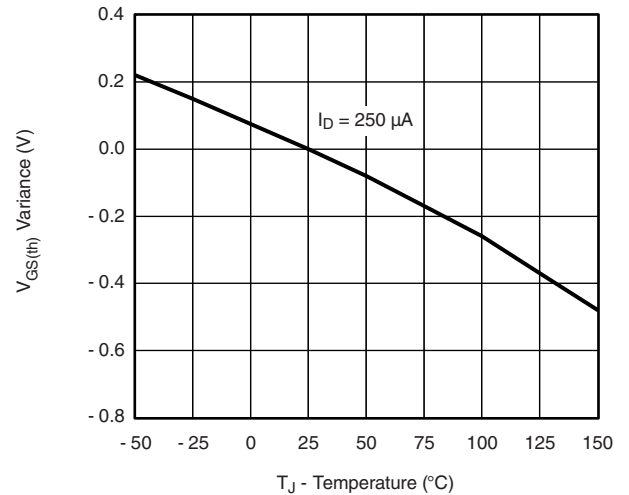
On-Resistance vs. Junction Temperature



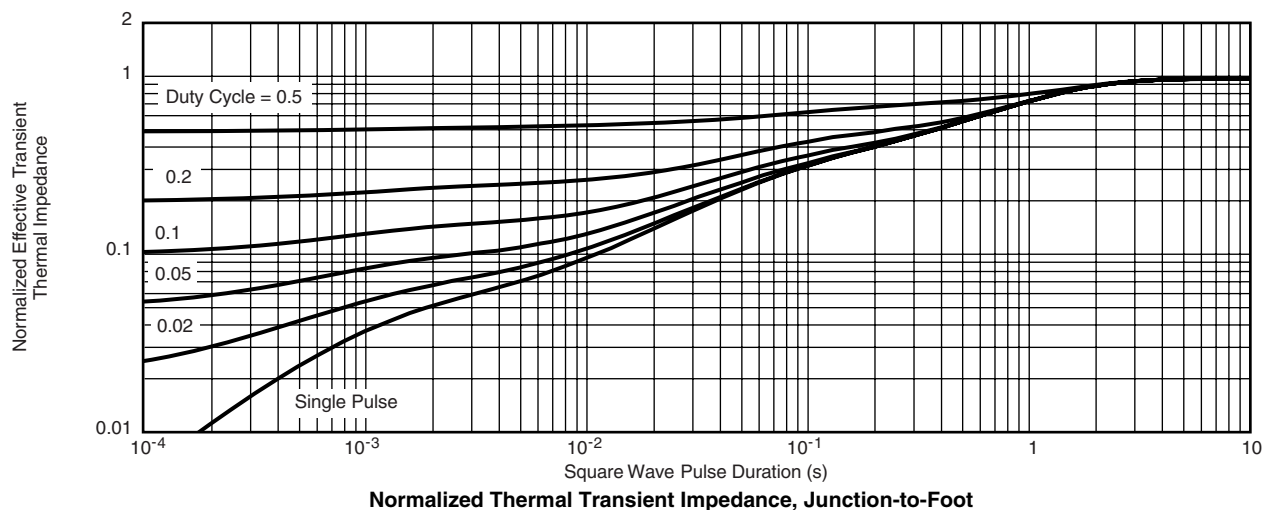
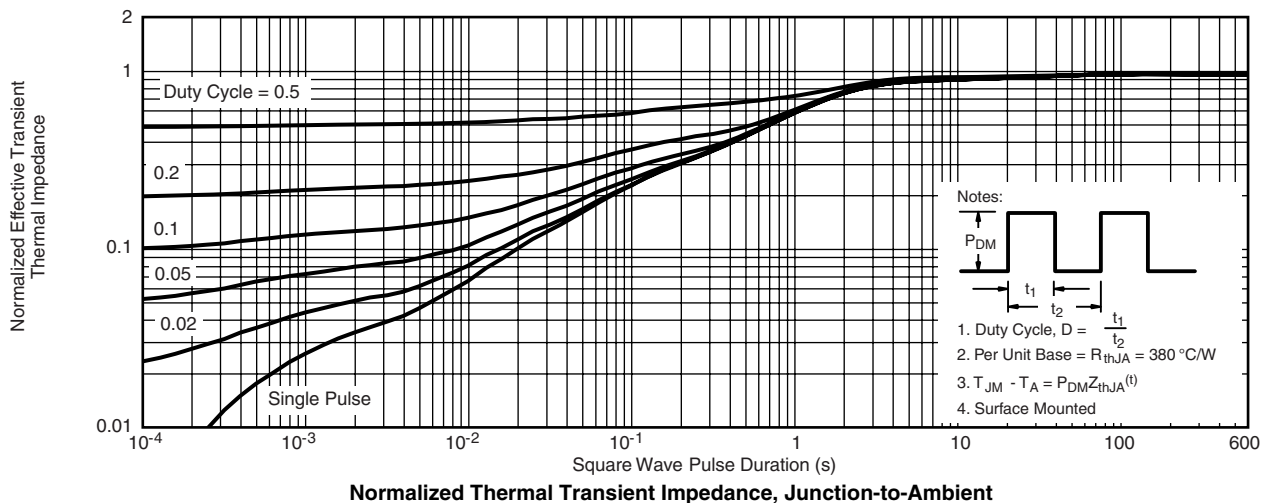
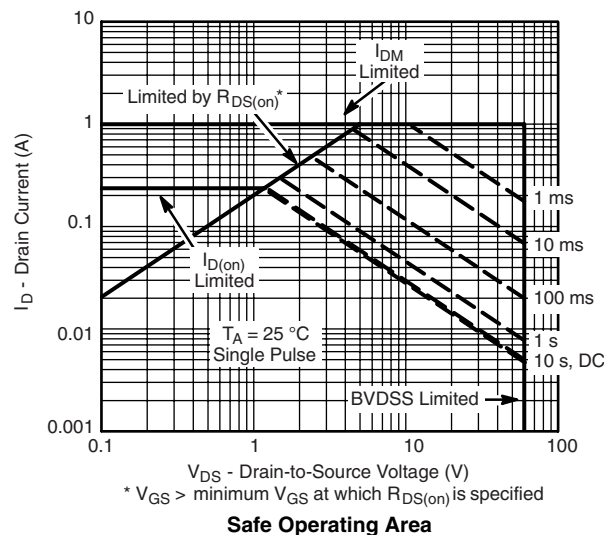
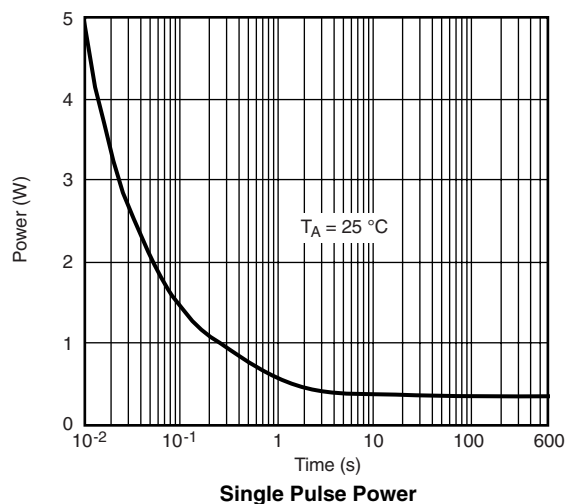
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-Source Voltage



Threshold Voltage Variance over Temperature

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

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