

## P-Channel 1.8 V (G-S) MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
- 12	0.165 at $V_{GS} = - 4.5$ V	- 0.95
	0.220 at $V_{GS} = - 2.5$ V	- 0.82
	0.280 at $V_{GS} = - 1.8$ V	- 0.67

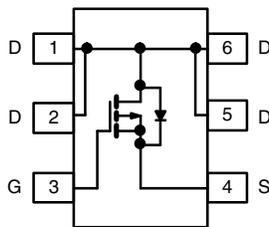
### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET<sup>®</sup> Power MOSFET
- Low Threshold
- Smallest LITTLE FOOT<sup>®</sup> Package: 1.6 mm x 1.6 mm
- Low 0.6 mm Profile
- Compliant to RoHS Directive 2002/95/EC



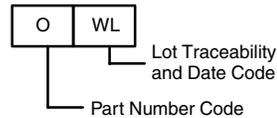
**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### SC-89 (6-LEADS)



Top View

### Marking Code



### APPLICATIONS

- Cell Phones and Pagers
- Load Switch

**Ordering Information:** Si1039X-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	$V_{DS}$	- 12		V	
Gate-Source Voltage	$V_{GS}$	$\pm 8$			
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$I_D$	$T_A = 25$ °C	- 0.95	- 0.87	A
		$T_A = 70$ °C	- 0.76	- 0.69	
Pulsed Drain Current	$I_{DM}$	- 4			
Continuous Diode Current (Diode Conduction) <sup>a</sup>	$I_S$	- 0.18	- 0.14		
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25$ °C	0.21	0.17	W
		$T_A = 70$ °C	0.13	0.10	
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>	$R_{thJA}$	$t \leq 5$ s	500	600	°C/W
		Steady State	600	720	

Notes:

a. Surface mounted on 1" x 1" FR4 board with minimum copper.



SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	- 0.45			V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 12 V, V <sub>GS</sub> = 0 V			- 1	μA
		V <sub>DS</sub> = - 12 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 70 °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			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 0.87 A		0.140	0.165	Ω
		V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 0.75 A		0.180	0.220	
		V <sub>GS</sub> = - 1.8 V, I <sub>D</sub> = - 0.2 A		0.230	0.280	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = - 10 V, I <sub>D</sub> = - 0.87 A		3.5		S
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = - 0.14 A, V <sub>GS</sub> = 0 V		- 0.78	- 1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = - 6 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 0.87 A		3.8	6	nC
Gate-Source Charge	Q <sub>gs</sub>			0.7		
Gate-Drain Charge	Q <sub>gd</sub>			0.8		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = - 6 V, R <sub>L</sub> = 12 Ω I <sub>D</sub> ≅ - 0.5 A, V <sub>GEN</sub> = - 4.5 V, R <sub>g</sub> = 6 Ω		15	30	ns
Rise Time	t <sub>r</sub>			20	40	
Turn-Off Delay Time	t <sub>d(off)</sub>			30	60	
Fall Time	t <sub>f</sub>			16	30	
Source-Drain Reverse Recovery Time	t <sub>rr</sub>		I <sub>F</sub> = - 0.14 A, dI/dt = 100 A/μs		20	

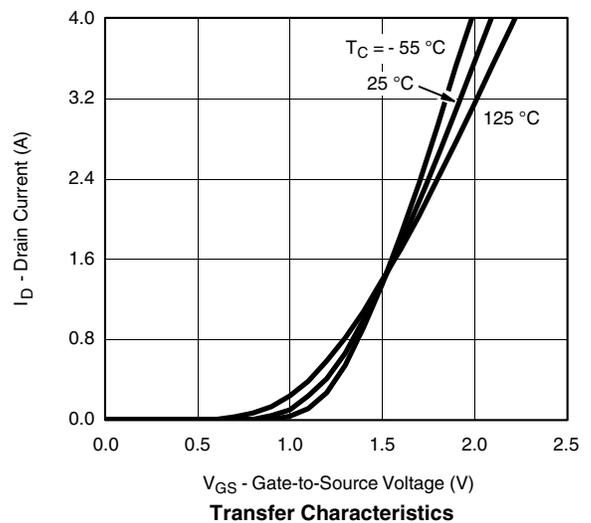
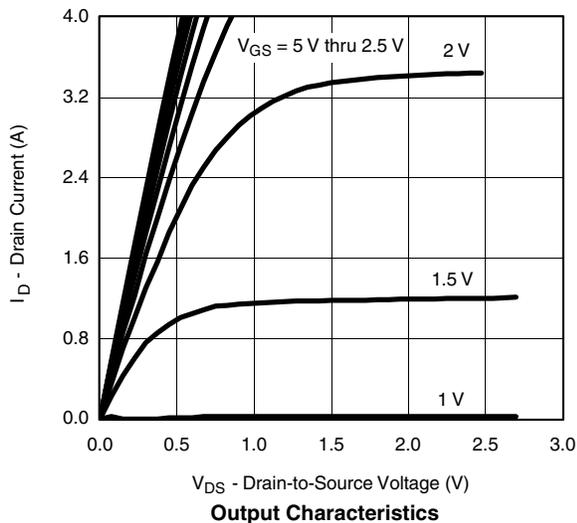
Notes:

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

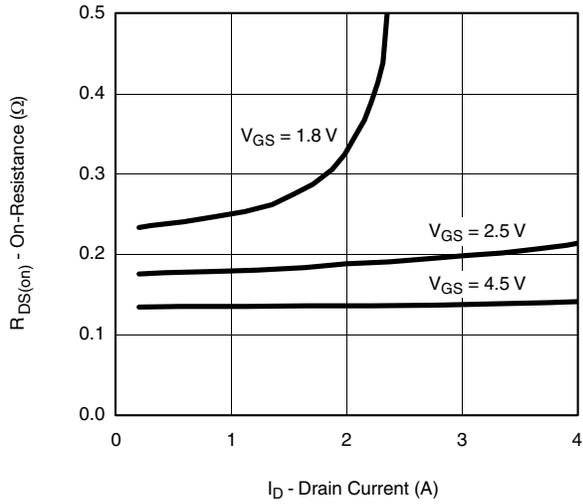
b. Guaranteed by design, not subject to production testing.

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.

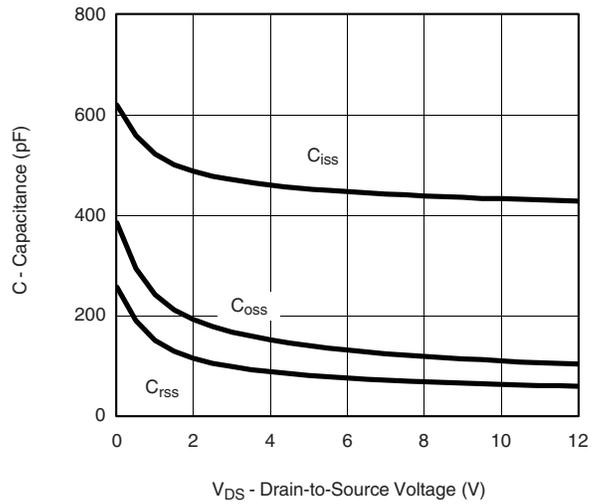
**TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**



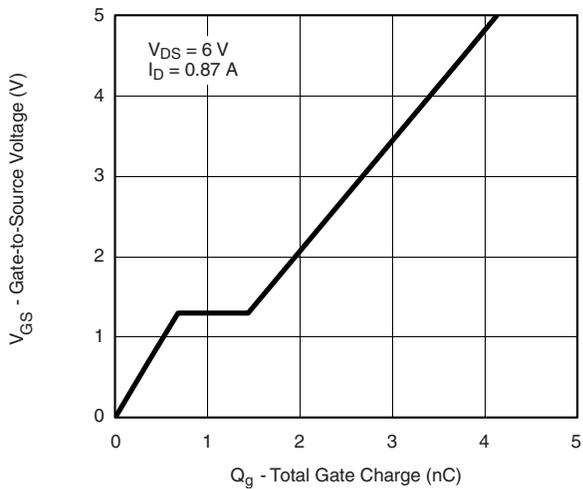
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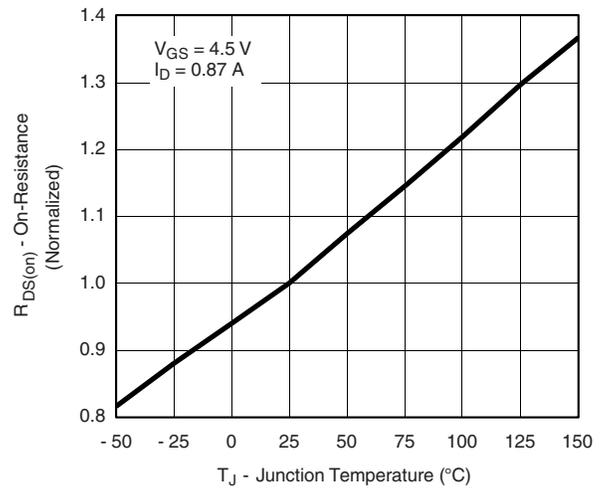
**On-Resistance vs. Drain Current**



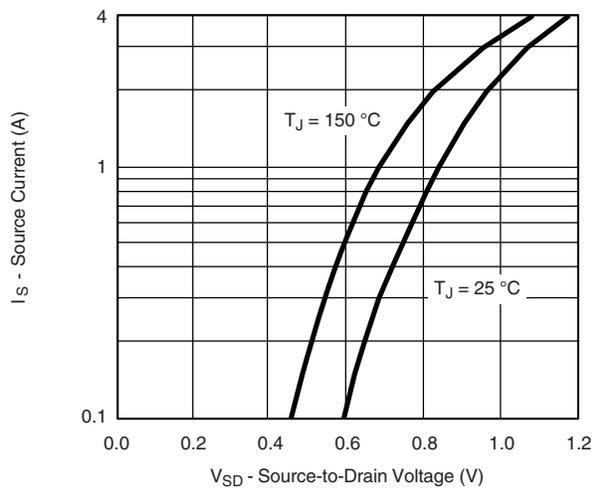
**Capacitance**



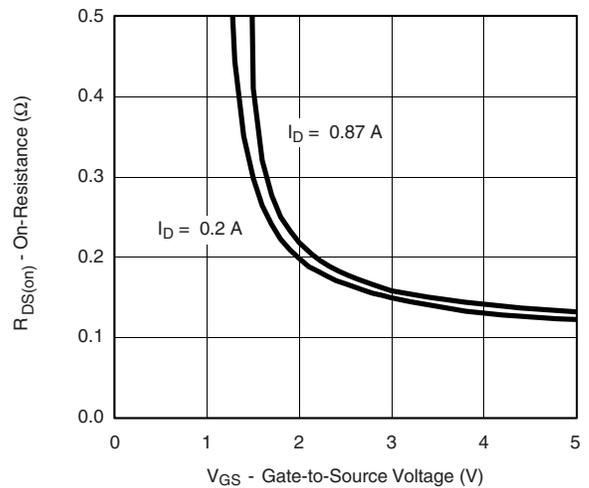
**Gate Charge**



**On-Resistance vs. Junction Temperature**

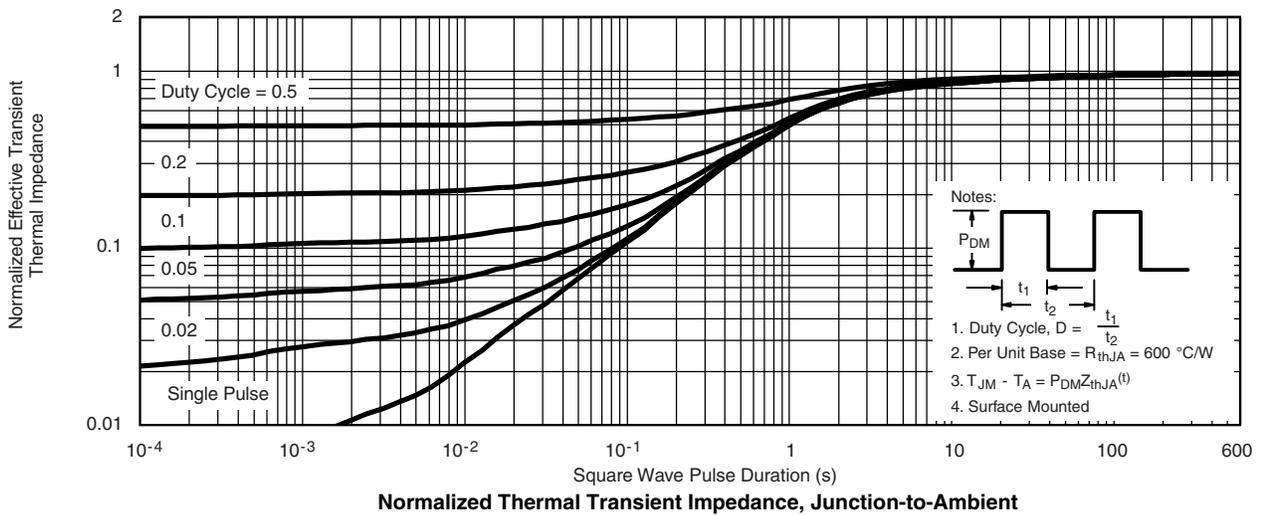
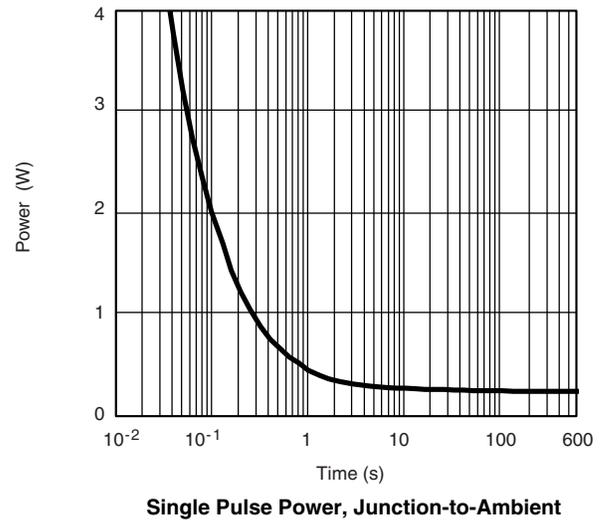
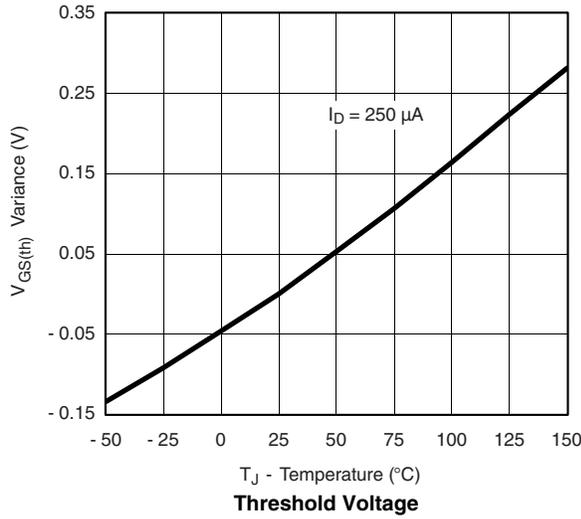


**Source-Drain Diode Forward Voltage**



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

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



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