

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	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

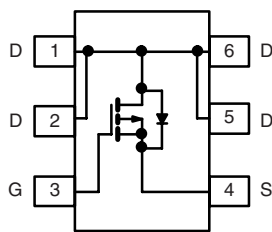
FEATURES

- Halogen-free Option Available
- TrenchFET[®] Power MOSFET
- Low Threshold
- Smallest LITTLE FOOT[®] Package: 1.6 mm x 1.6 mm
- Low 0.6 mm Profile

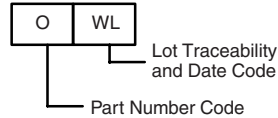

RoHS
COMPLIANT

APPLICATIONS

- Cell Phones and Pagers
- Load Switch

SC-89 (6-LEADS)


Top View

Marking Code


Ordering Information: Si1039X-T1-E3 (Lead (Pb)-free)
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}	± 8			
Continuous Drain Current ($T_J = 150$ °C) ^a	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) ^a	I_S	- 0.18	- 0.14		
Maximum Power Dissipation ^a	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 ^a	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.

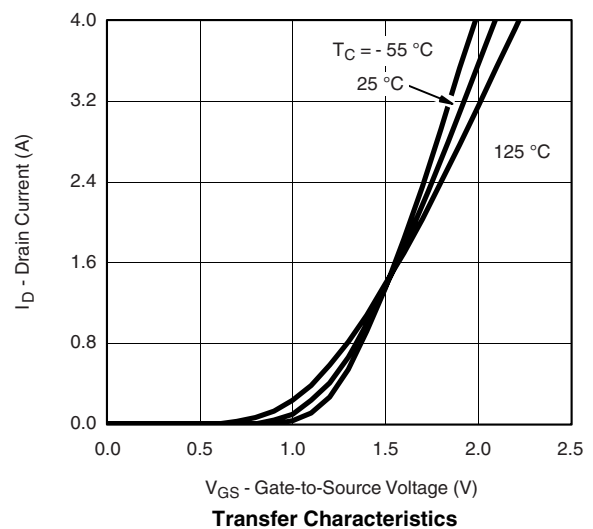
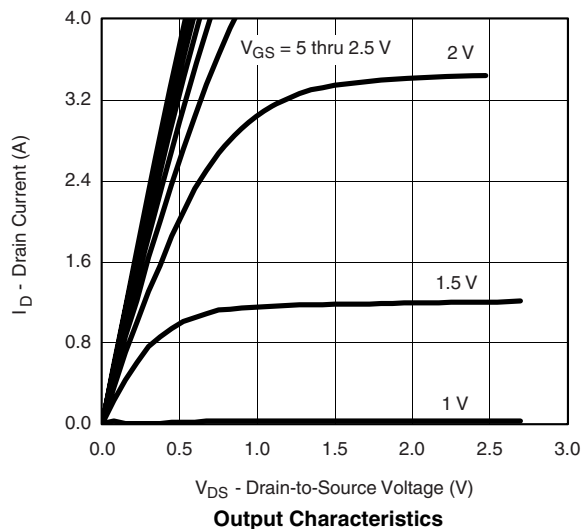
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.45			V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -12\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -12\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			-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	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -0.87\text{ A}$		0.140	0.165	Ω
		$V_{GS} = -2.5\text{ V}, I_D = -0.75\text{ A}$		0.180	0.220	
		$V_{GS} = -1.8\text{ V}, I_D = -0.2\text{ A}$		0.230	0.280	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -0.87\text{ A}$		3.5		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -0.14\text{ A}, V_{GS} = 0\text{ V}$		-0.78	-1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -6\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -0.87\text{ A}$		3.8	6	nC
Gate-Source Charge	Q_{gs}			0.7		
Gate-Drain Charge	Q_{gd}			0.8		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -6\text{ V}, R_L = 12\text{ }\Omega$ $I_D \cong -0.5\text{ A}, V_{GEN} = -4.5\text{ V}, R_G = 6\text{ }\Omega$		15	30	ns
Rise Time	t_r			20	40	
Turn-Off Delay Time	$t_{d(off)}$			30	60	
Fall Time	t_f			16	30	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -0.14\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		20	40	

Notes:

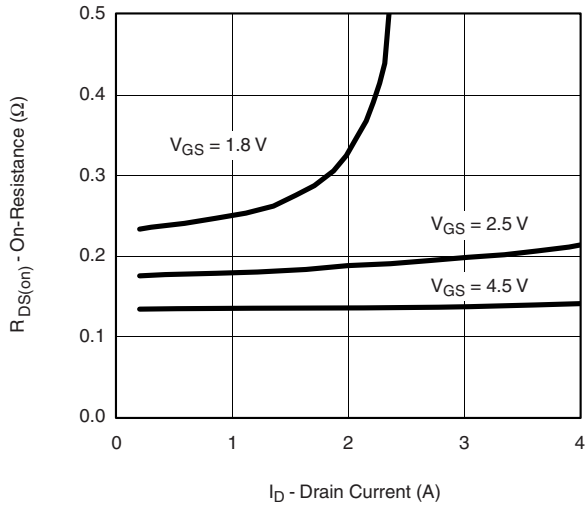
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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.

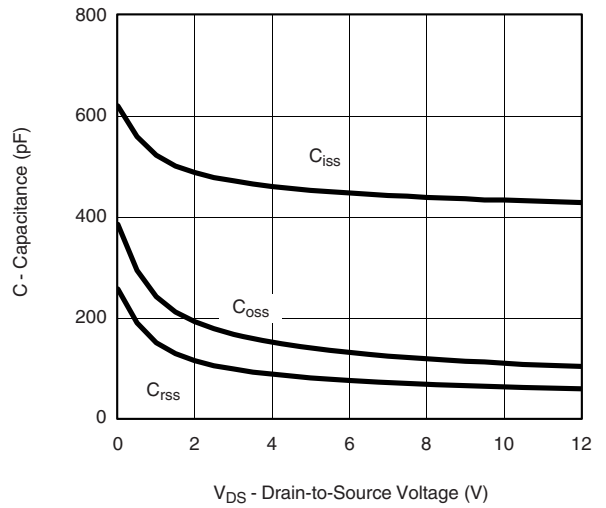
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$, unless otherwise noted



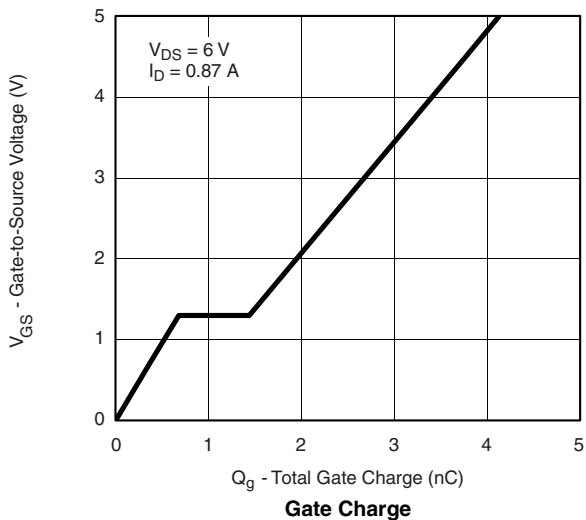
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



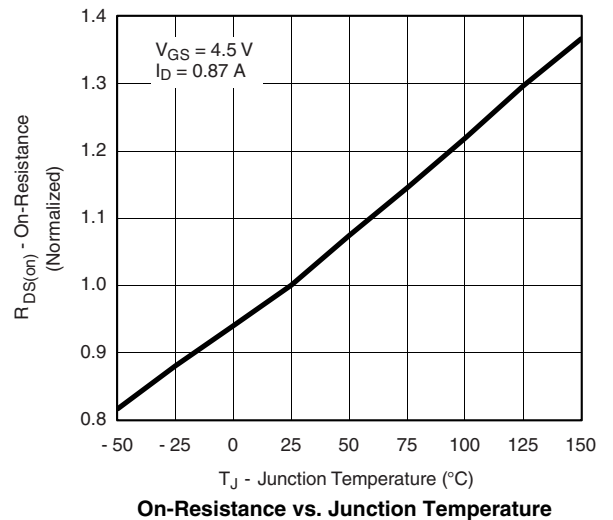
On-Resistance vs. Drain Current



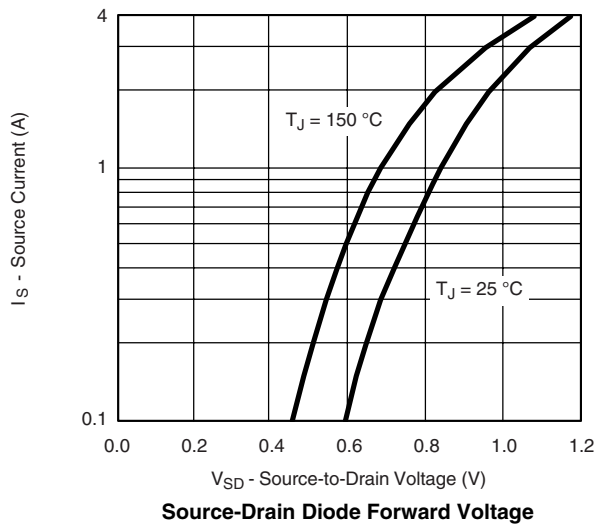
Capacitance



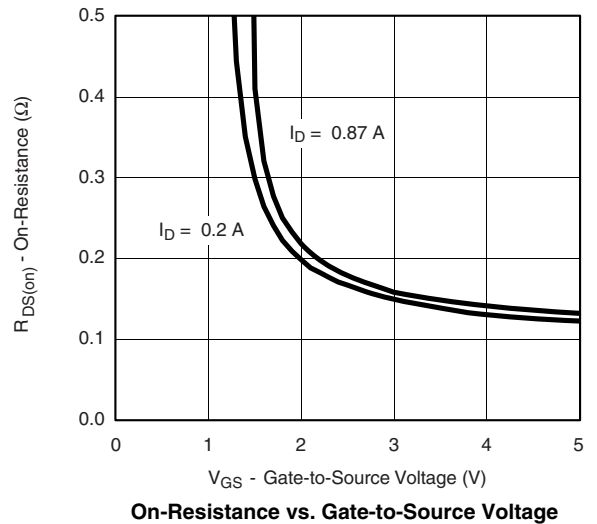
Gate Charge



On-Resistance vs. Junction Temperature

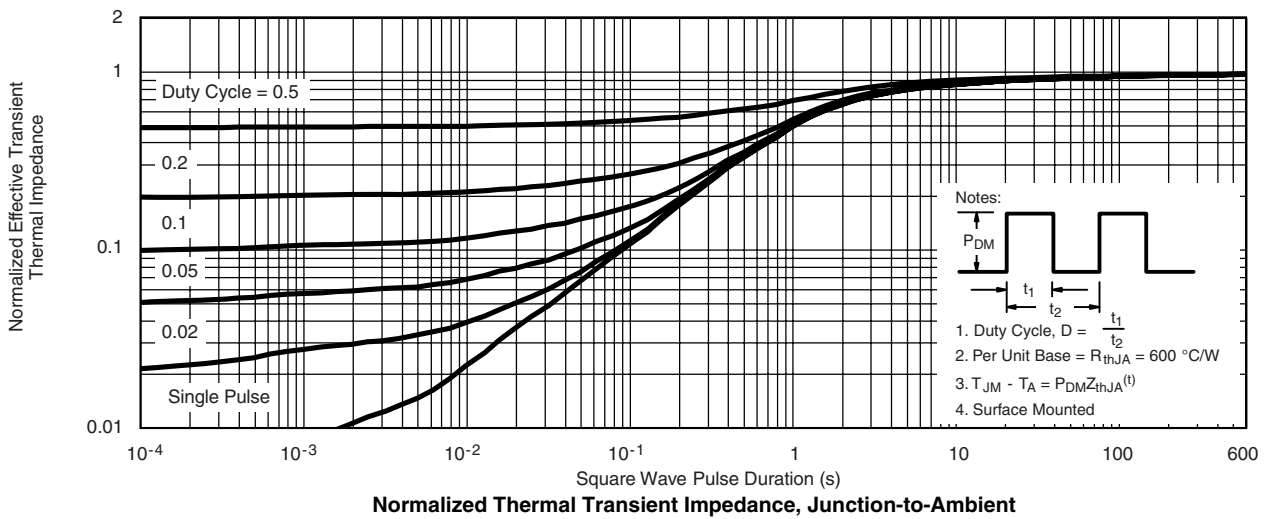
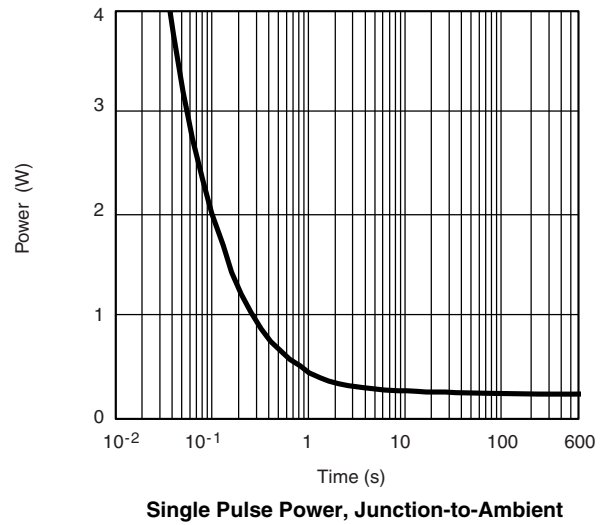
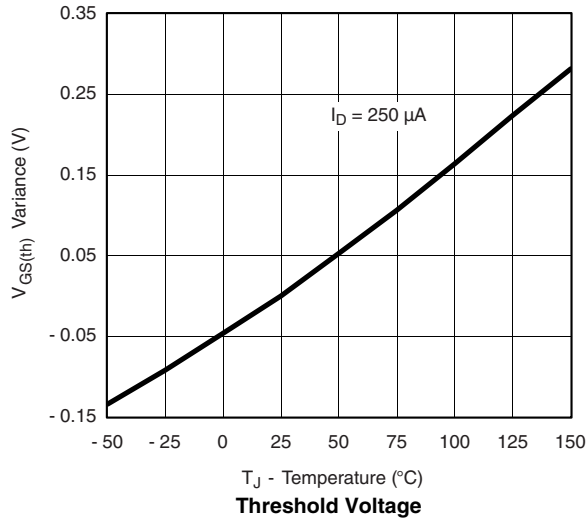


Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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