

## P-Channel 8 V (D-S) MOSFET

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
- 8	0.122 at V <sub>GS</sub> = - 4.5 V	1.2	5.91
	0.141 at V <sub>GS</sub> = - 2.5 V	1.1	
	0.168 at V <sub>GS</sub> = - 1.8 V	0.60	
	0.198 at V <sub>GS</sub> = - 1.5 V	0.50	

### FEATURES

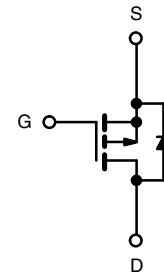
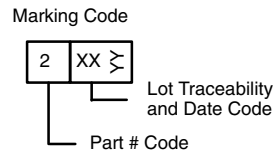
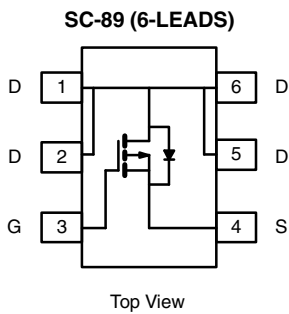
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET<sup>®</sup> Power MOSFET
- 100 % R<sub>g</sub> Tested
- Compliant to RoHS Directive 2002/95/EC



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

### APPLICATIONS

- Load Switch for Portable Applications



**Ordering Information:** Si1051X-T1-GE3 (Lead (Pb)-free and Halogen-free)

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V <sub>DS</sub>	- 8	V	
Gate-Source Voltage	V <sub>GS</sub>	± 5		
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	1.2 <sup>b, c</sup>	
		T <sub>A</sub> = 70 °C	0.97 <sup>b, c</sup>	
Pulsed Drain Current	I <sub>DM</sub>	- 8	A	
Continuous Source-Drain Diode Current	I <sub>S</sub>	0.2 <sup>b, c</sup>	A	
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	0.236 <sup>b, c</sup>	
		T <sub>A</sub> = 70 °C	0.151 <sup>b, c</sup>	
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>b, d</sup>	R <sub>thJA</sub>	t ≤ 5 s	440	530	°C/W
		Steady State	540	650	

**Notes:**

- Based on T<sub>A</sub> = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 650 °C/W.

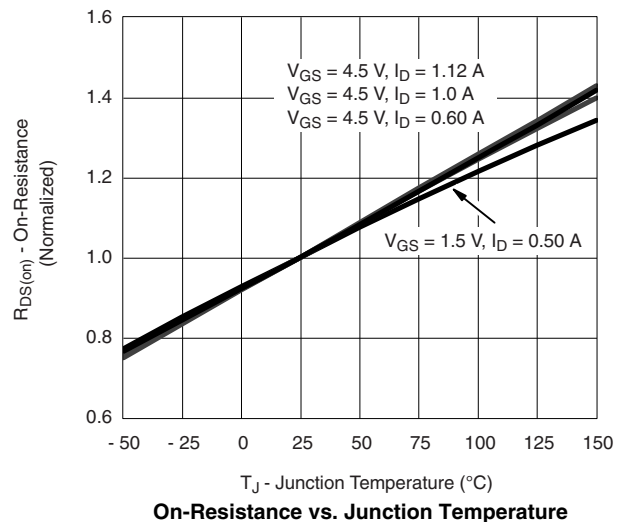
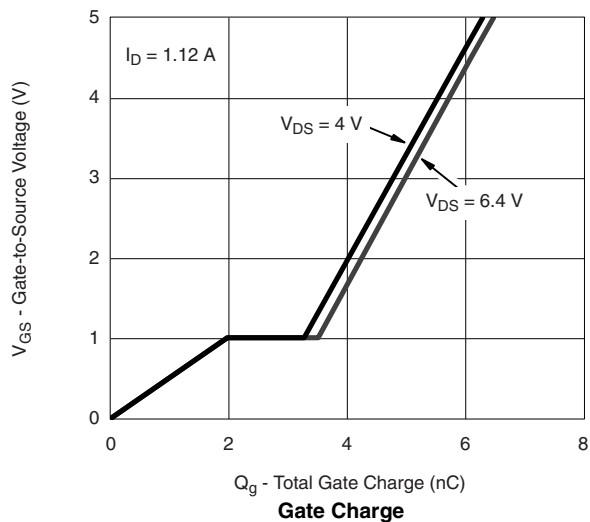
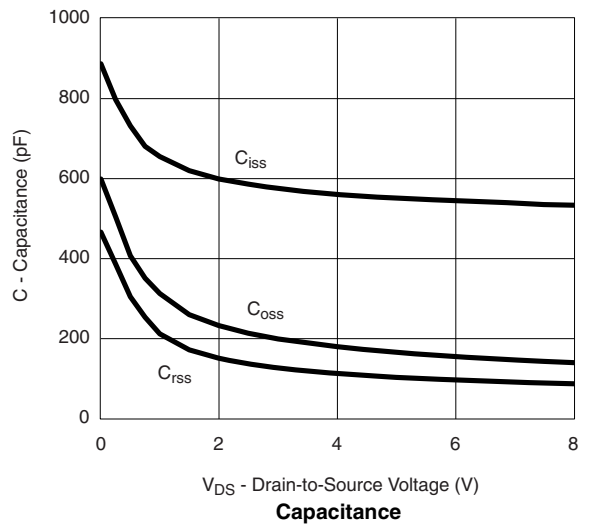
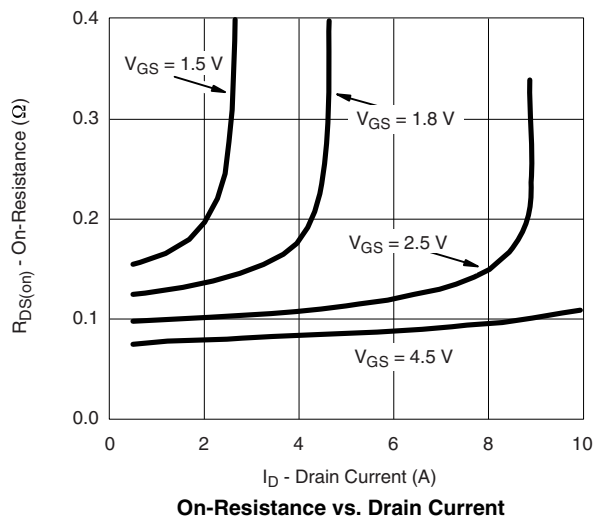
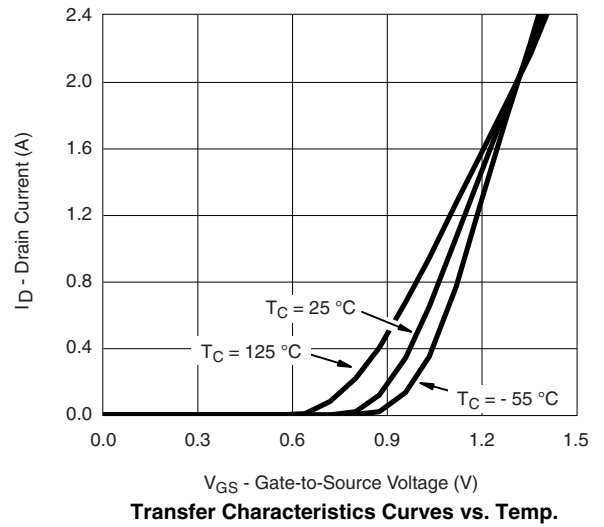
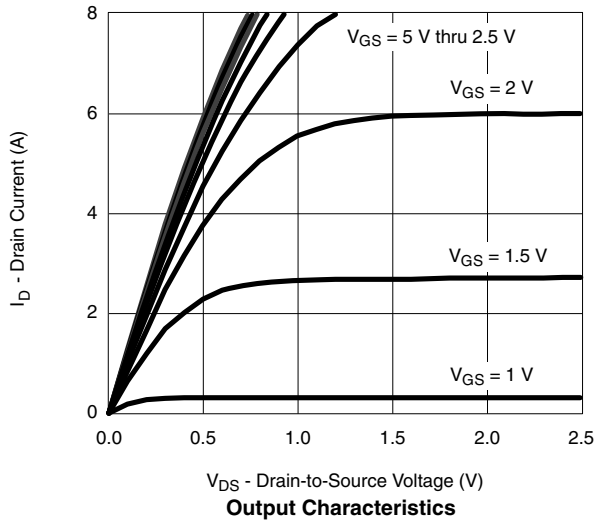
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 8			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 6.19		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			2.13		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 0.3		- 1	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -8\text{ V}, V_{GS} = 0\text{ V}$			- 1	nA
		$V_{DS} = -8\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			- 10	$\mu\text{A}$
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = -4.5\text{ V}$	- 8			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -1.2\text{ A}$		0.091	0.122	$\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -1.1\text{ A}$		0.106	0.141	
		$V_{GS} = -1.8\text{ V}, I_D = -0.60\text{ A}$		0.117	0.168	
		$V_{GS} = -1.5\text{ V}, I_D = -0.50\text{ A}$		0.129	0.198	
Forward Transconductance	$g_{fs}$	$V_{DS} = -4\text{ V}, I_D = -1.2\text{ A}$		4.93		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -4\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		560		pF
Output Capacitance	$C_{oss}$			180		
Reverse Transfer Capacitance	$C_{rss}$			112		
Total Gate Charge	$Q_g$	$V_{DS} = -4\text{ V}, V_{GS} = -5\text{ V}, I_D = -1.2\text{ A}$		6.3	9.45	nC
		$V_{DS} = -4\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -1.2\text{ A}$		5.91	8.87	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = -4\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -1.2\text{ A}$		1.98		
Gate-Drain Charge	$Q_{gd}$			1.25		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		9.8	14.7	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -4\text{ V}, R_L = 4.16\text{ }\Omega$ $I_D \cong -0.96\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		7.2	10.8	ns
Rise Time	$t_r$			36	54	
Turn-Off Delay Time	$t_{d(off)}$			52	78	
Fall Time	$t_f$			16	24	
<b>Drain-Source Body Diode Characteristics</b>						
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				- 8	A
Body Diode Voltage	$V_{SD}$	$I_S = -1.0\text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -1.0\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		18.8	28.2	nC
Body Diode Reverse Recovery Charge	$Q_{rr}$			4.7	7.05	ns
Reverse Recovery Fall Time	$t_a$			15		
Reverse Recovery Rise Time	$t_b$			3.8		

Notes:

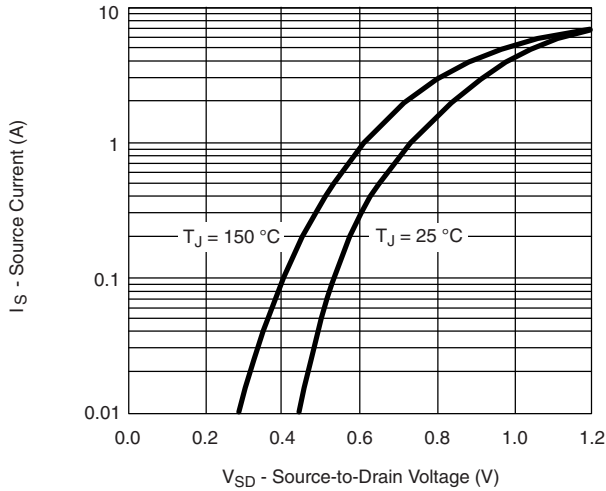
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.

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.

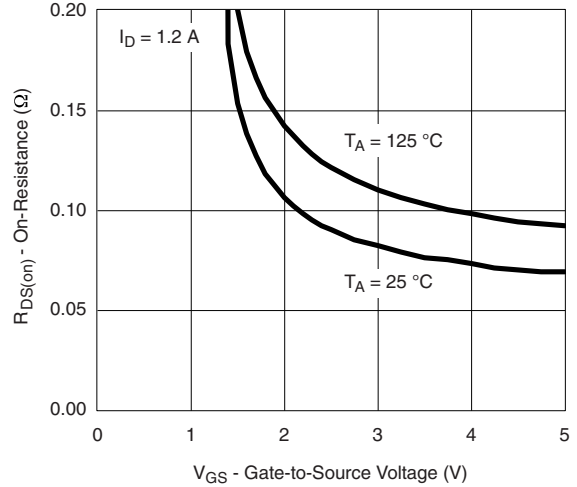
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



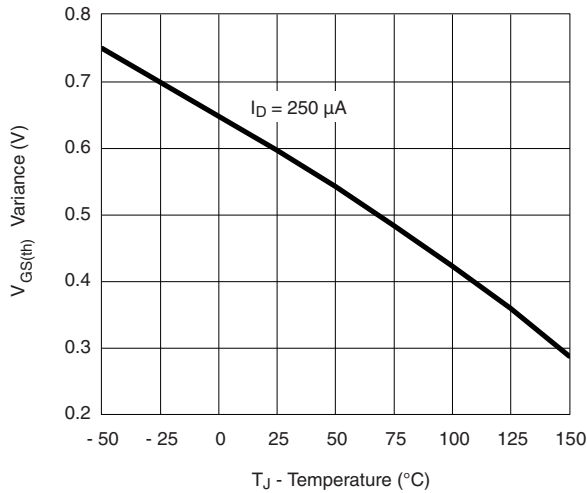
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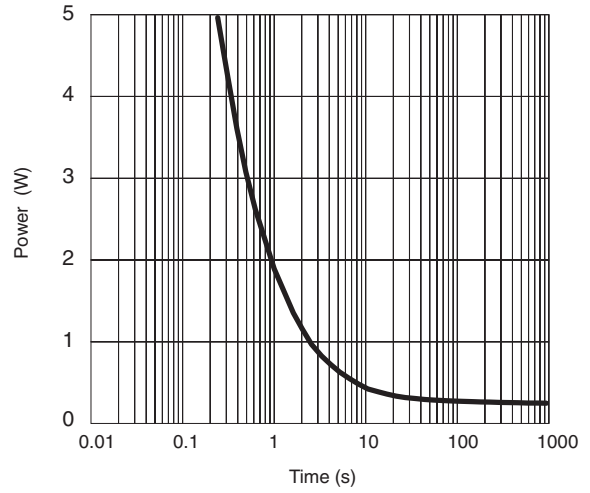
**Source-Drain Diode Forward Voltage**



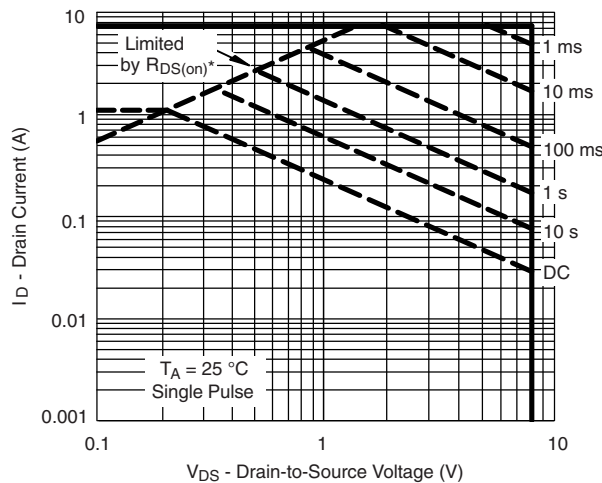
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



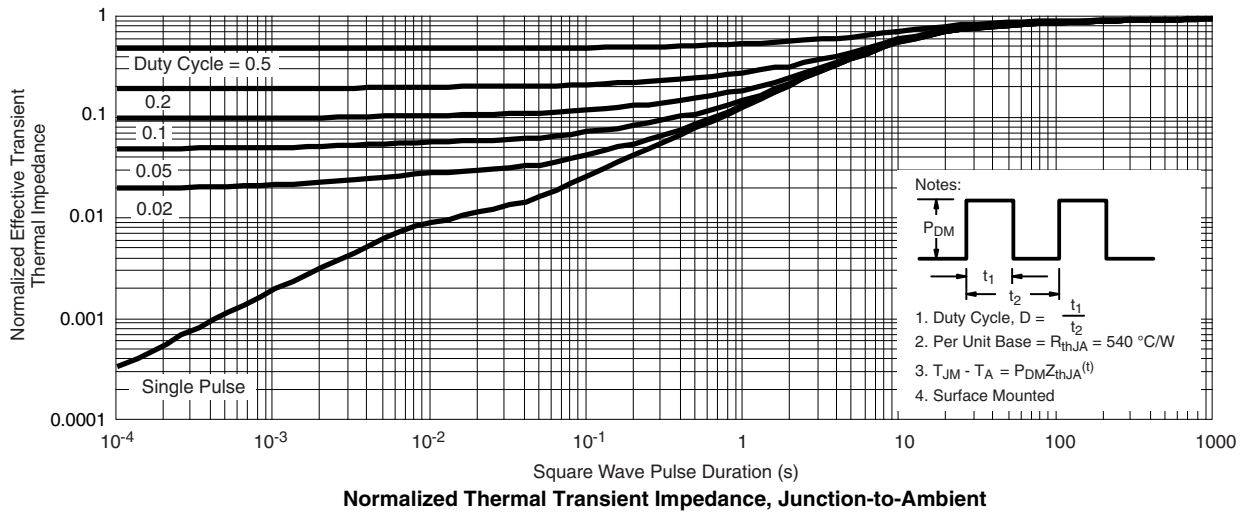
**Single Pulse Power**



\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

**Safe Operating Area, Junction-to-Ambient**

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



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