

## P-Channel 30 V (D-S) MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)	$Q_g$ (Typ.)
- 30	0.167 at $V_{GS} = - 10$ V	0.96	3.25
	0.188 at $V_{GS} = - 4.5$ V	0.90	
	0.244 at $V_{GS} = - 2.5$ V	0.79	

### FEATURES

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

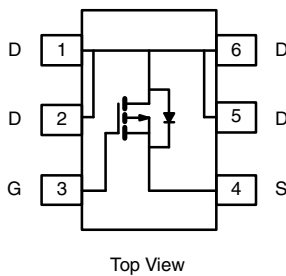


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

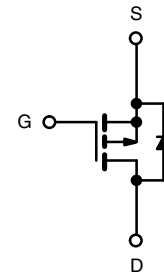
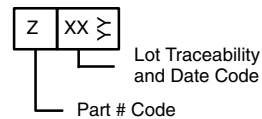
### APPLICATIONS

- Load Switch for Portable Devices

SC-89 (6-LEADS)



Marking Code



Ordering Information: Si1071X-T1-GE3 (Lead (Pb)-free and Halogen-free)

P-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	- 30	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	
Continuous Drain Current ( $T_J = 150$ °C)	$T_A = 25$ °C	- 0.96 <sup>b, c</sup>	A
	$T_A = 70$ °C	- 0.76 <sup>b, c</sup>	
Pulsed Drain Current	$I_{DM}$	- 8	
Continuous Source-Drain Diode Current	$T_A = 25$ °C	$I_S$	- 0.2 <sup>b, c</sup>
Maximum Power Dissipation <sup>a</sup>	$T_A = 25$ °C	$P_D$	0.236 <sup>b, c</sup>
	$T_A = 70$ °C		0.151 <sup>b, c</sup>
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, b</sup>	$t \leq 5$ s	$R_{thJA}$	440	530
	Steady State		540	650

Notes:

- Maximum under steady state conditions is 650 °C/W.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$  s.

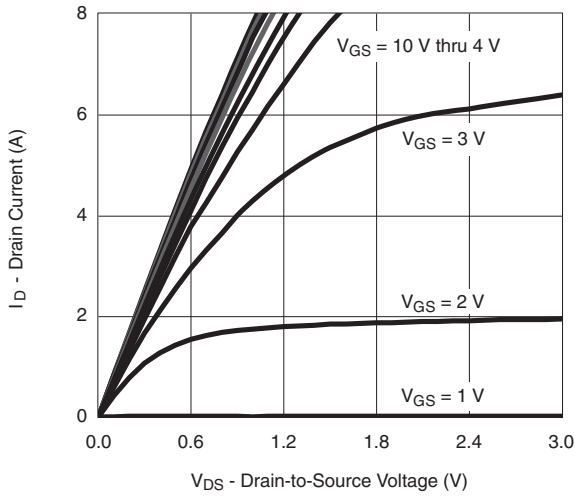
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 30			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 32.07		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			3.02		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 0.7		- 1.45	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			- 1	nA
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			- 10	$\mu\text{A}$
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = -10\text{ V}$	- 8			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -0.96\text{ A}$		0.139	0.167	$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -0.9\text{ A}$		0.147	0.177	
		$V_{GS} = -2.5\text{ V}, I_D = -0.79\text{ A}$		0.195	0.244	
Forward Transconductance	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -0.96\text{ A}$		4.25		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		315		pF
Output Capacitance	$C_{oss}$			60		
Reverse Transfer Capacitance	$C_{rss}$			45		
Total Gate Charge	$Q_g$	$V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -0.96\text{ A}$		4.43	6.64	nC
		$V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -0.96\text{ A}$		8.87	13.3	
Gate-Source Charge	$Q_{gs}$			0.83		
Gate-Drain Charge	$Q_{gd}$			1.57		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		9.8	14.7	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 19.74\text{ }\Omega$ $I_D \cong -0.76\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		3.8	5.7	ns
Rise Time	$t_r$			12	18	
Turn-Off Delay Time	$t_{d(off)}$			18	27	
Fall Time	$t_f$			7	10.5	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 20.27\text{ }\Omega$ $I_D \cong -0.74\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		13	20	
Rise Time	$t_r$			25	38	
Turn-Off Delay Time	$t_{d(off)}$			36	54	
Fall Time	$t_f$			14	21	
<b>Drain-Source Body Diode Characteristics</b>						
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				8	A
Body Diode Voltage	$V_{SD}$	$I_S = -0.63\text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -0.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		12.7	19.05	nC
Body Diode Reverse Recovery	$Q_{rr}$			5.7	8.6	
Reverse Recovery Fall Time	$t_a$			8.9		ns
Reverse Recovery Rise Time	$t_b$			3.8		

Notes:

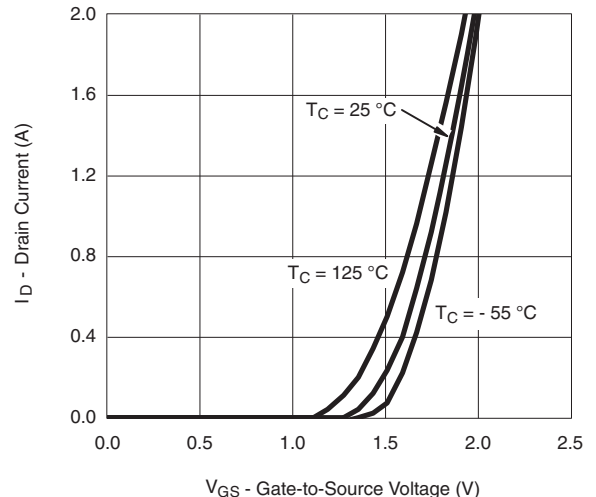
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.

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.

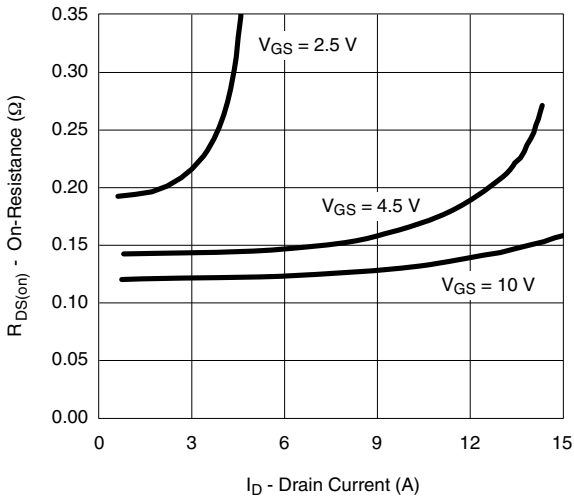
**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)



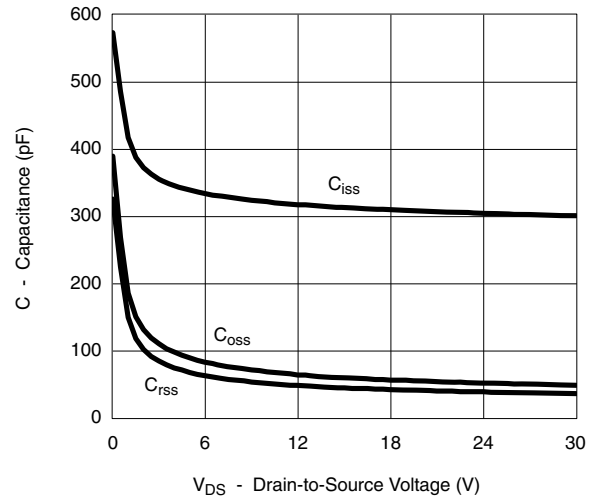
**Output Characteristics**



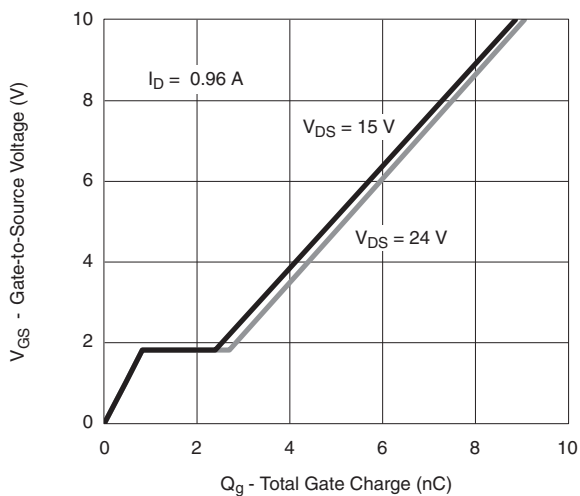
**Transfer Characteristics Curves vs. Temp.**



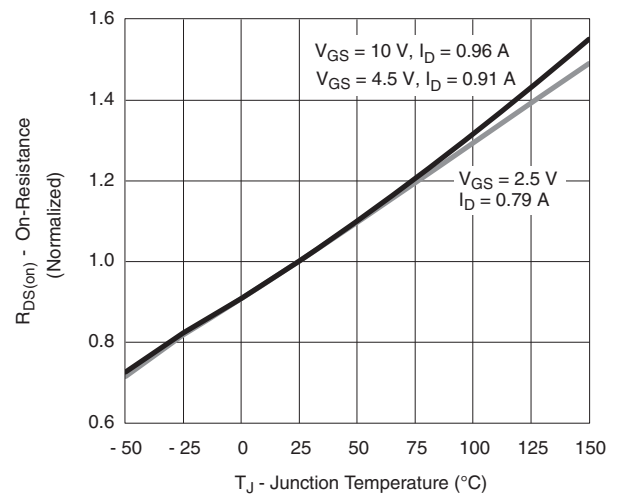
**On-Resistance vs. Drain Current**



**Capacitance**

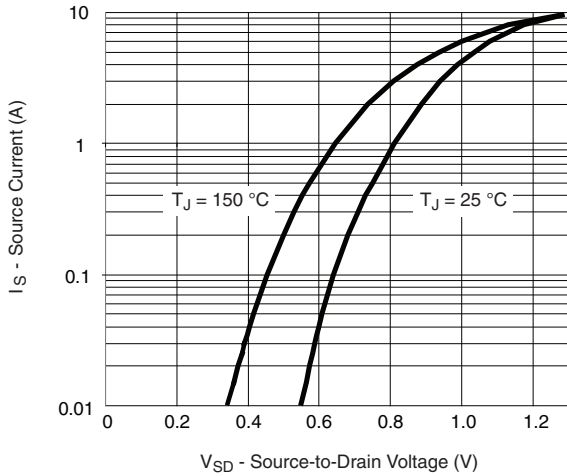


**Gate Charge**

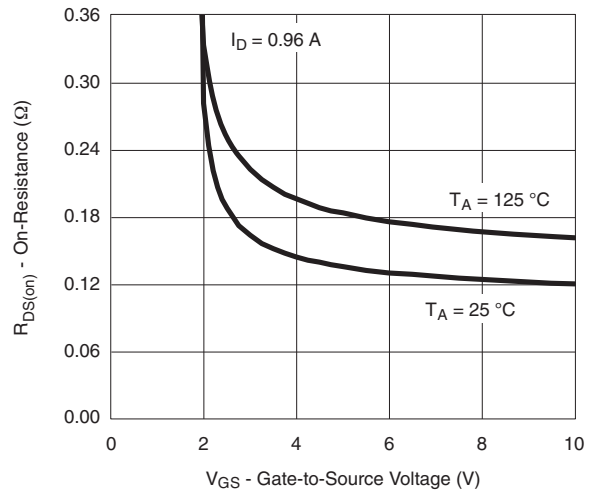


**On-Resistance vs. Junction Temperature**

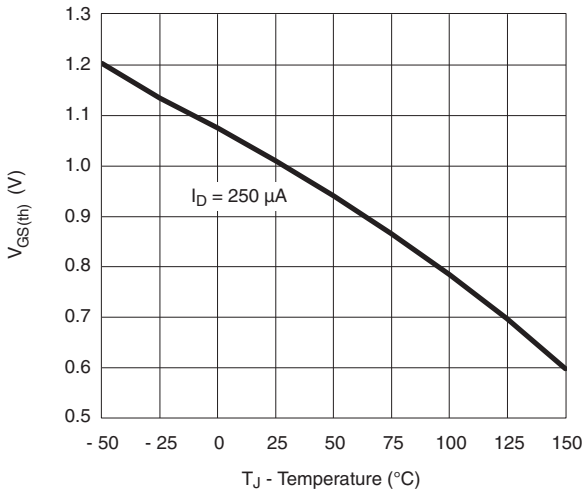
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



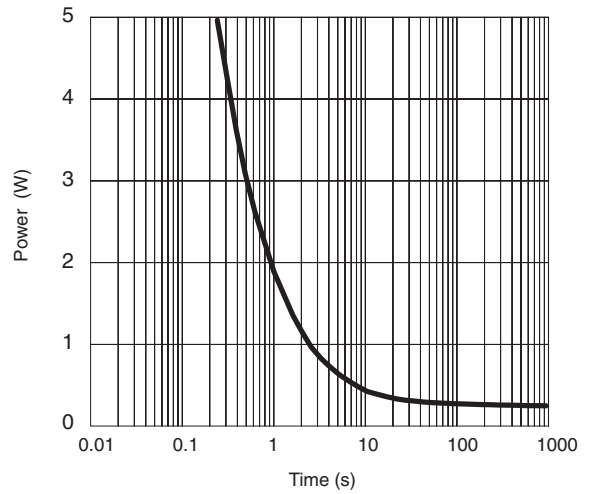
**Source-Drain Diode Forward Voltage**



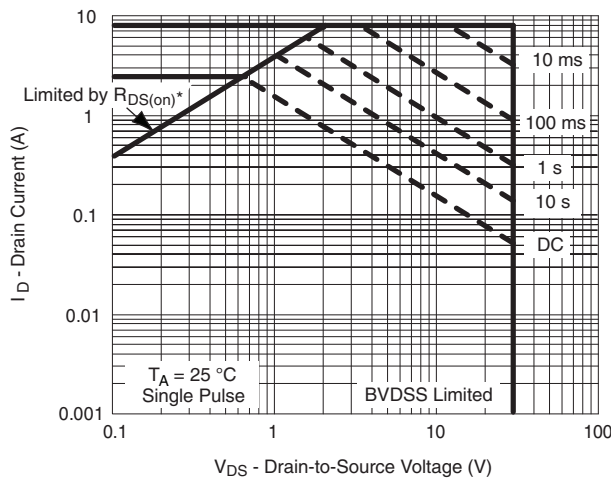
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



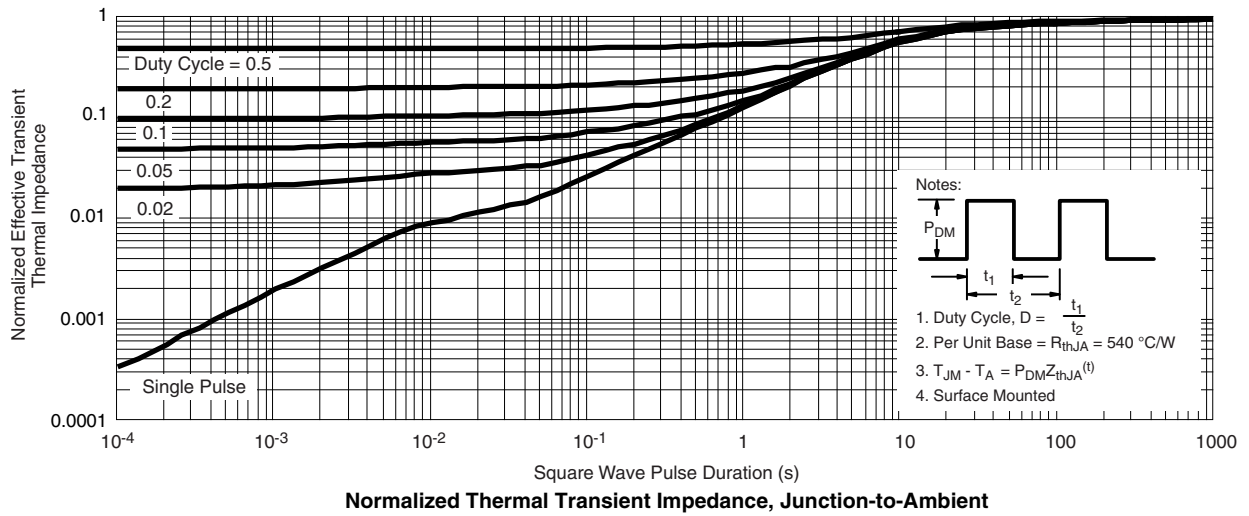
**Single Pulse Power**



\*  $V_{GS} >$  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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