

P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 20	0.184 at $V_{GS} = - 4.5$ V	- 0.94	4.23
	0.268 at $V_{GS} = - 2.5$ V	- 0.78	

FEATURES

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

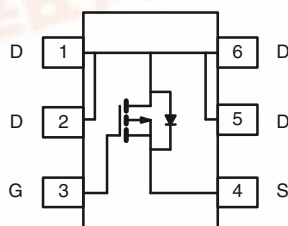


RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

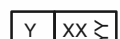
- Load Switch for Portable Devices

SC-89 (6-LEADS)



Top View

Marking Code



Lot Traceability
and Date Code

Part # Code



P-Channel MOSFET

Ordering Information: Si1069X-T1-GE3 (Lead (Pb)-free and Halogen-free)

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 20	V
Gate-Source Voltage	V_{GS}	± 12	
Continuous Drain Current ($T_J = 150$ °C)	$T_A = 25$ °C	I_D	A
	$T_A = 70$ °C	- 0.94 ^{b, c} - 0.75 ^{b, c}	
Pulsed Drain Current	I_{DM}	- 8	W
Continuous Source-Drain Diode Current	$T_A = 25$ °C	I_S	
Maximum Power Dissipation ^a	$T_A = 25$ °C	P_D	W
	$T_A = 70$ °C	0.236 ^{b, c} 0.151 ^{b, c}	
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, b}	$t \leq 5$ s	R_{thJA}	440	°C/W
	Steady State		540	

Notes:

a. Based on $T_A = 25$ °C.

b. Surface mounted on 1" x 1" FR4 board.

c. $t = 5$ s.

SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 16.7		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			2.95		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 0.6		- 1.5	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 20 V, V _{GS} = 0 V			- 1	nA
		V _{DS} = - 20 V, V _{GS} = 0 V, T _J = 85 °C			- 10	μA
On-State Drain Current ^a	I _{D(on)}	V _{DS} = ≥ 5 V, V _{GS} = - 4.5 V	- 8			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 4.5 V, I _D = - 0.94 A		0.153	0.184	Ω
		V _{GS} = - 2.5 V, I _D = - 0.78 A		0.218	0.268	
Forward Transconductance	g _{fs}	V _{DS} = - 10 V, I _D = - 0.94 A		4		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 10 V, V _{GS} = 0 V, f = 1 MHz		308		pF
Output Capacitance	C _{oss}			78		
Reverse Transfer Capacitance	C _{rss}			59		
Total Gate Charge	Q _g	V _{DS} = - 10 V, V _{GS} = - 5 V, I _D = - 0.94 A		4.57	6.86	nC
		V _{DS} = - 10 V, V _{GS} = - 4.5 V, I _D = - 0.94 A		4.23	6.35	
Gate-Source Charge	Q _{gs}			0.71		
Gate-Drain Charge	Q _{gd}			1.67		
Gate Resistance	R _g	f = 1 MHz		9	13.5	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 13.3 Ω I _D ≅ - 0.75 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		19	28.5	ns
Rise Time	t _r			31	47	
Turn-Off DelayTime	t _{d(off)}			23	34.5	
Fall Time	t _f			7	10.5	
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current ^a	I _{SM}				8	A
Body Diode Voltage	V _{SD}	I _S = - 0.64 A		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 0.64 A, dl/dt = 100 A/μs		19	28.5	nC
Body Diode Reverse Recovery Charge	Q _{rr}			6.65	10	ns
Reverse Recovery Fall Time	t _a			7		
Reverse Recovery Rise Time	t _b			12		

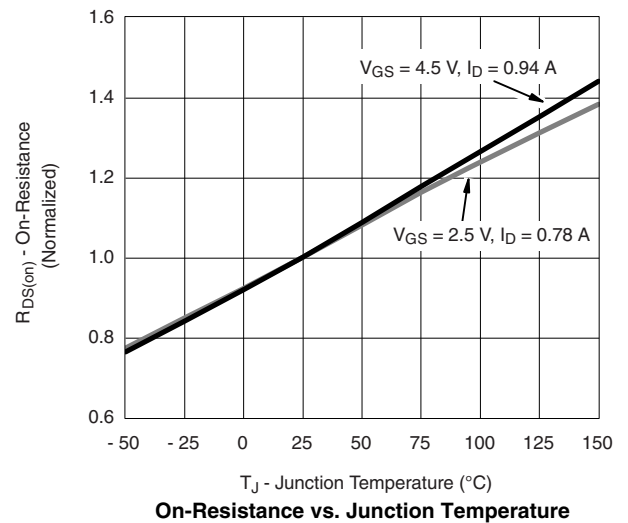
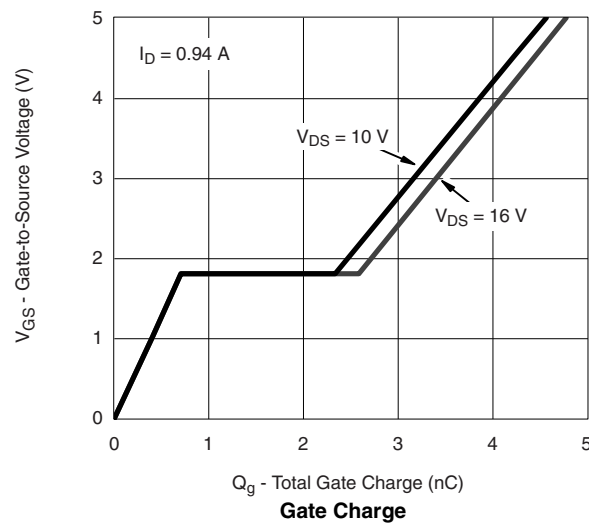
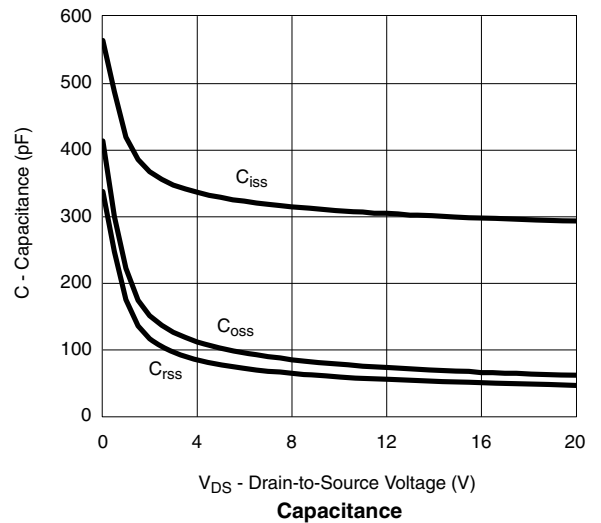
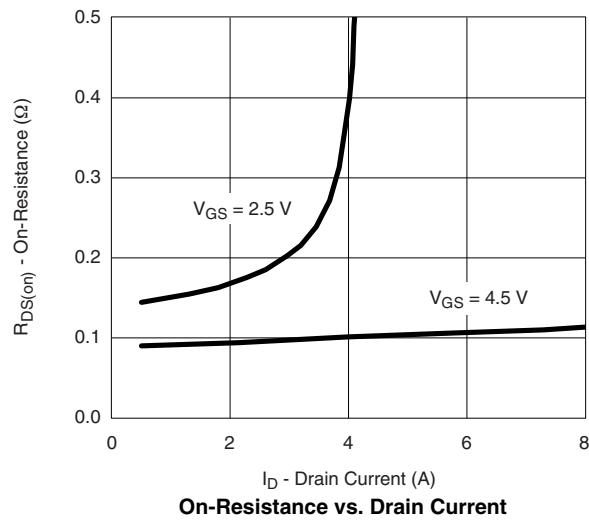
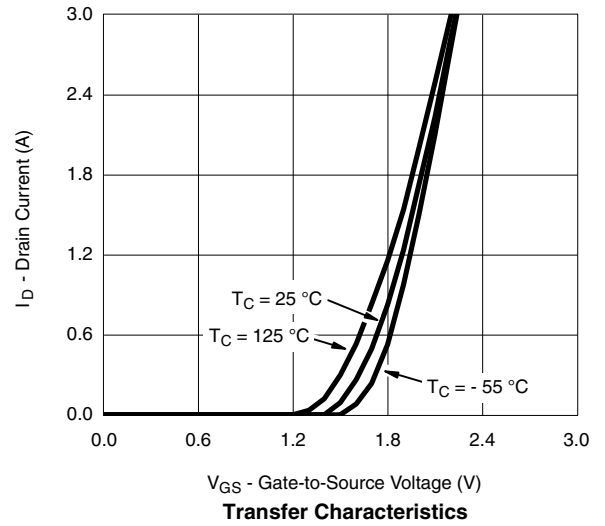
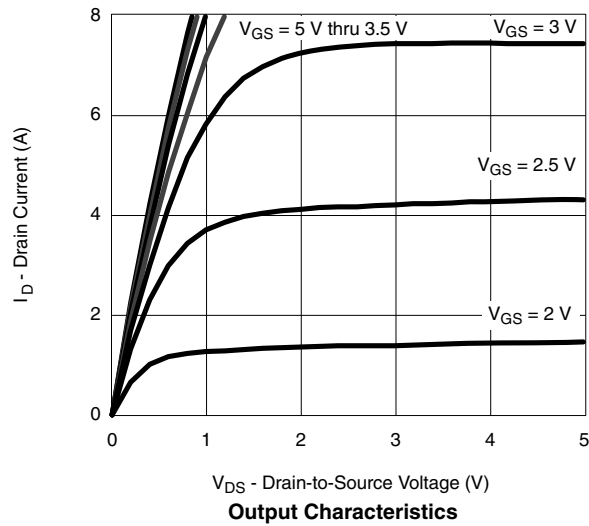
Notes:

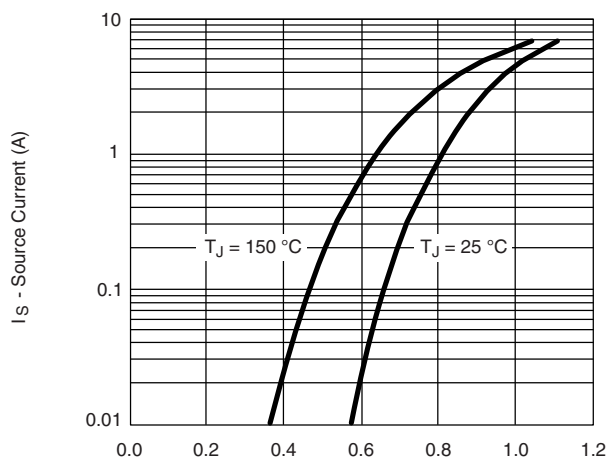
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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

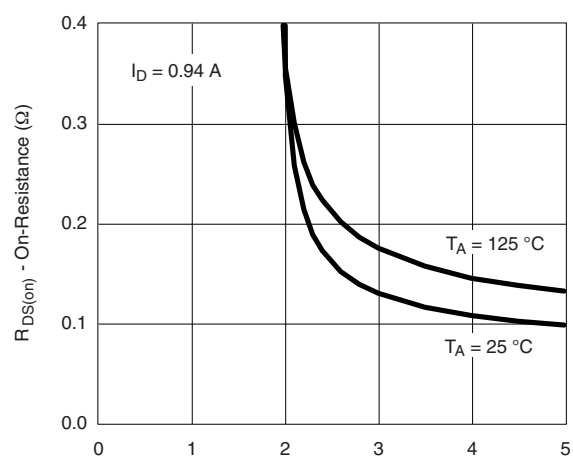
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

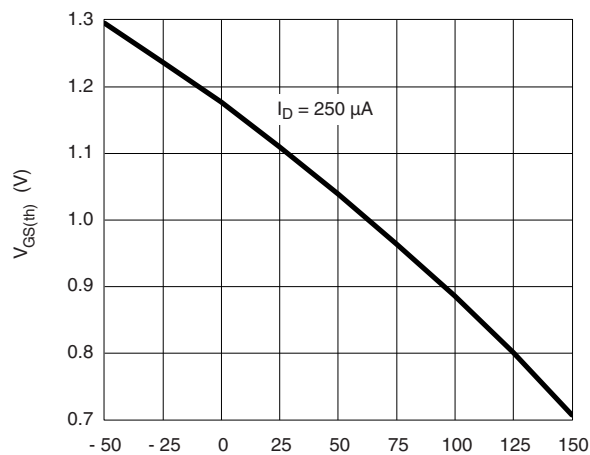


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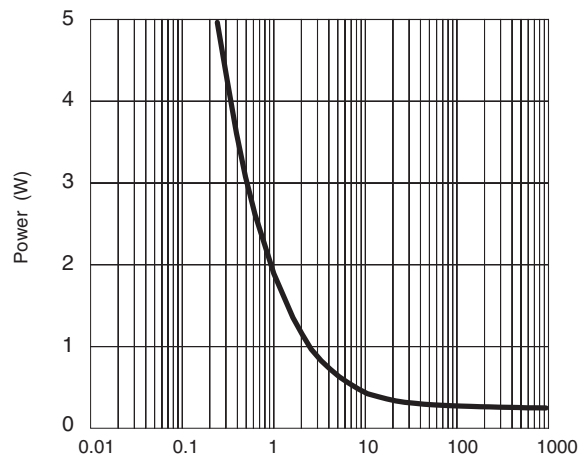
V_{SD} - Source-to-Drain Voltage (V)
Source-Drain Diode Forward Voltage



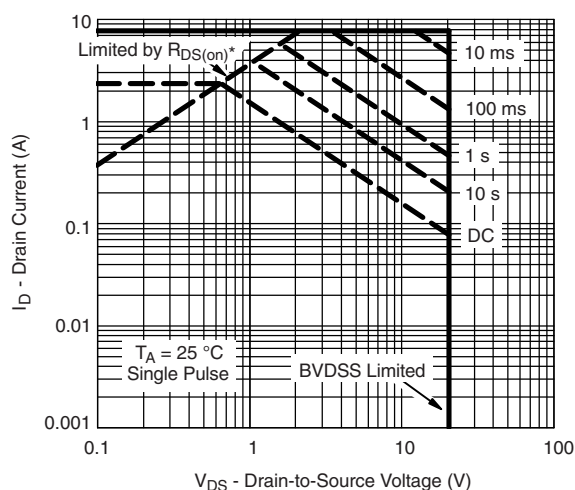
V_{GS} - Gate-to-Source Voltage (V)
On-Resistance vs. Gate-to-Source Voltage



T_J - Temperature ($^{\circ}\text{C}$)
Threshold Voltage



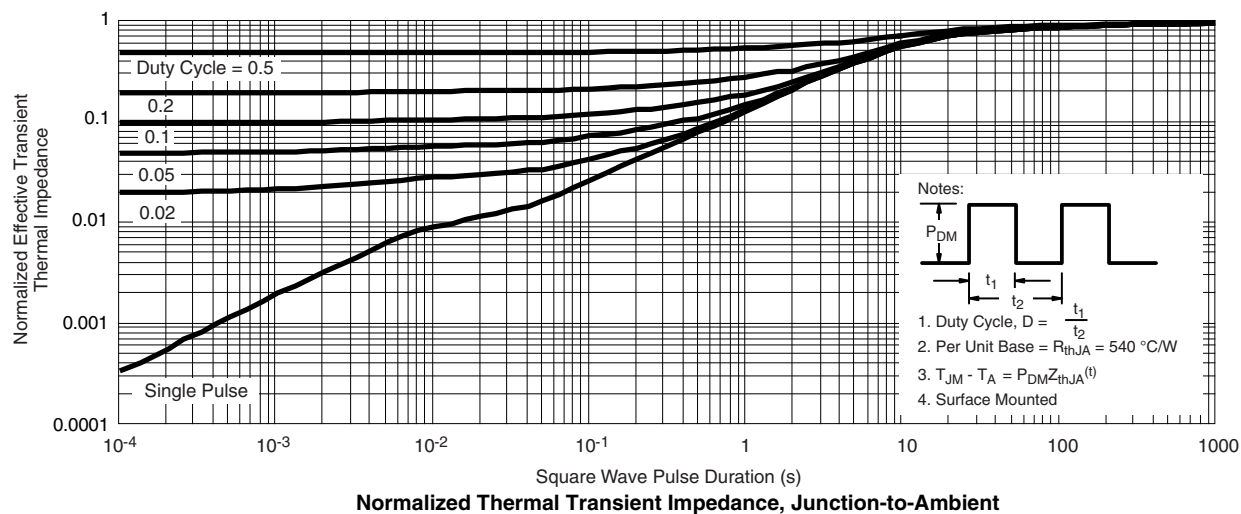
Time (s)
Single Pulse Power



* $V_{GS} >$ 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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