

N-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
30	0.099 at $V_{GS} = 4.5$ V	1.2 ^a	3.5
	0.140 at $V_{GS} = 2.5$ V	1.0	

FEATURES

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

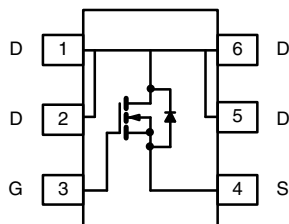


RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

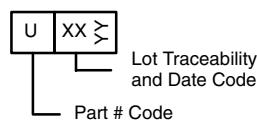
- Load Switch for Portable Devices

SC-89 (6-LEADS)



Top View

Marking Code



Ordering Information: Si1070X-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}	30	V
Gate-Source Voltage	V_{GS}	± 12	
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	1.2 ^{b, c}	A
		1 ^{b, c}	
Pulsed Drain Current	I_{DM}	6	
Avalanche Current	I_{AS}	9	mJ
Repetitive Avalanche Energy	E_{AS}	4.01	
Continuous Source-Drain Diode Current	I_S	0.2 ^{b, c}	A
Maximum Power Dissipation ^a	P_D	0.236 ^{b, c}	W
		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 ^{b, d}	R_{thJA}	440	530	°C/W
		540	650	

Notes:

- Based on $T_C = 25$ °C.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$ s.
- Maximum under steady state conditions is 650 °C/W.

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}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		24.5		mV/ $^{\circ}\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-3.81		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	0.7		1.55	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 12\text{ V}$			± 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	μA
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 4.5\text{ V}$	6			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}$, $I_D = 1.2\text{ A}$		0.082	0.099	Ω
		$V_{GS} = 2.5\text{ V}$, $I_D = 1.0\text{ A}$		0.116	0.140	
Forward Transconductance	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 1.2\text{ A}$		5		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		385		pF
Output Capacitance	C_{oss}			55		
Reverse Transfer Capacitance	C_{rss}			30		
Total Gate Charge	Q_g	$V_{DS} = 15\text{ V}$, $V_{GS} = 5\text{ V}$, $I_D = 1.2\text{ A}$		3.8	8.3	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 15\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 4.6\text{ A}$		3.5	4.1	
Gate-Drain Charge	Q_{gd}			1.1		
Gate Resistance	R_g			0.98		
Turn-On Delay Time	$t_{d(on)}$	$f = 1\text{ MHz}$ $V_{DD} = 15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \equiv 1.0\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\text{ }\Omega$		4.7	6.2	Ω
Rise Time	t_r			10	15	
Turn-Off Delay Time	$t_{d(off)}$			22	33	
Fall Time	t_f			14	21	
				6	9	
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current ^a	I_{SM}				6	A
Body Diode Voltage	V_{SD}	$I_S = 1.2\text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 3.8\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$		19.4	29.5	nC
Body Diode Reverse Recovery Charge	Q_{rr}			18.43	27.5	
Reverse Recovery Fall Time	t_a			16.4		
Reverse Recovery Rise Time	t_b			3		

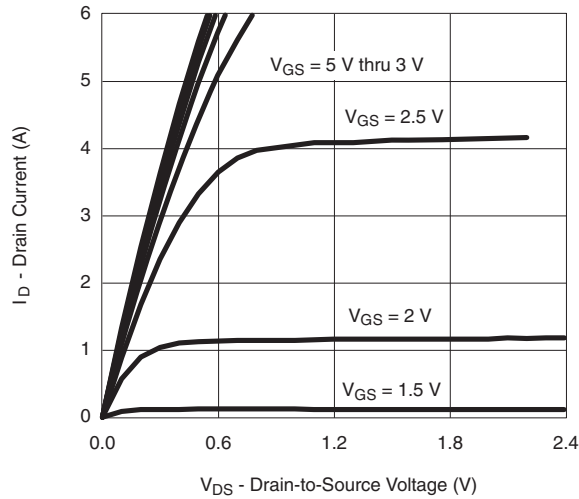
Notes:

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

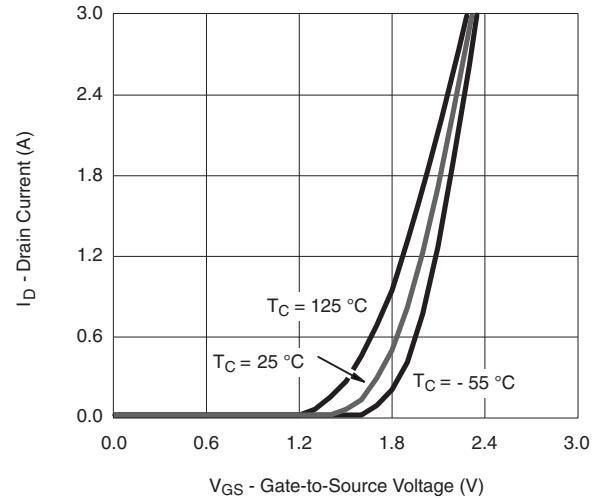
b. Guaranteed by design, not subject to production testing.

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.

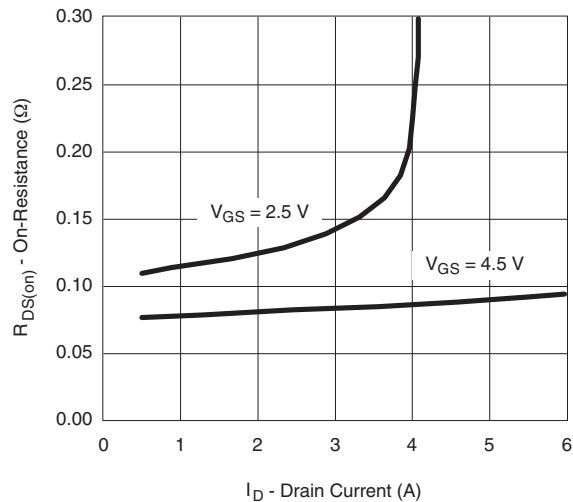
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



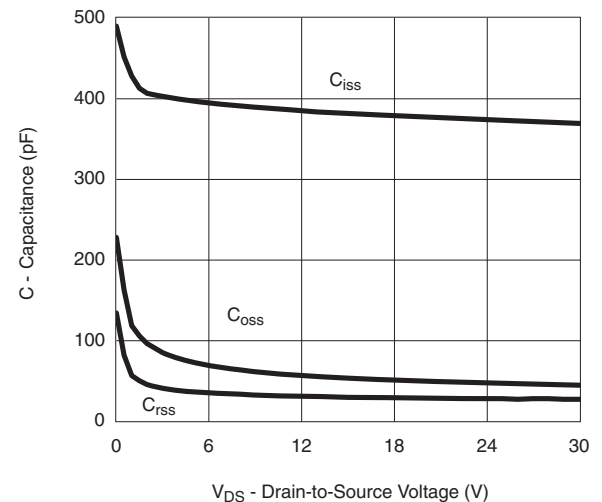
Output Characteristics



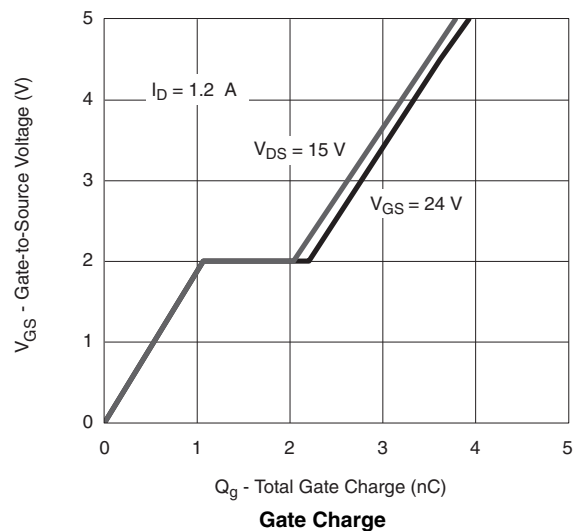
Transfer Characteristics Curves vs. Temp.



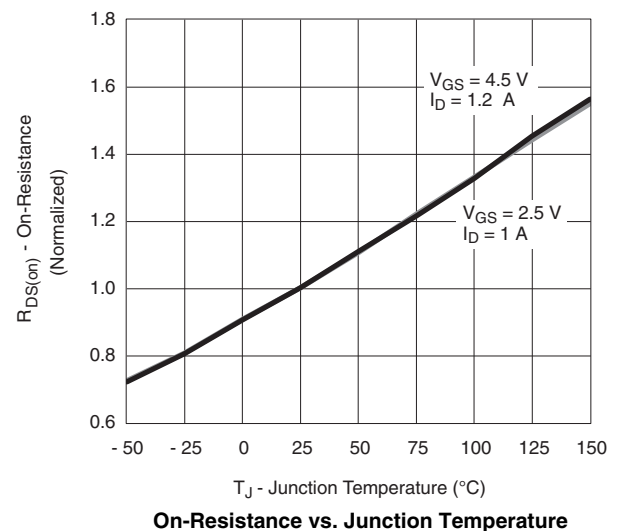
On-Resistance vs. Drain Current



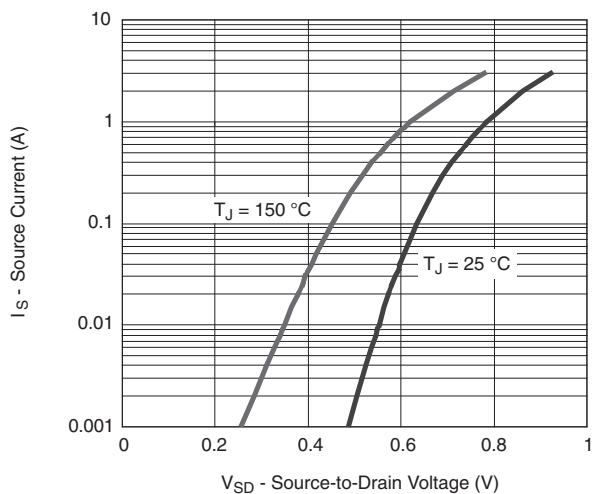
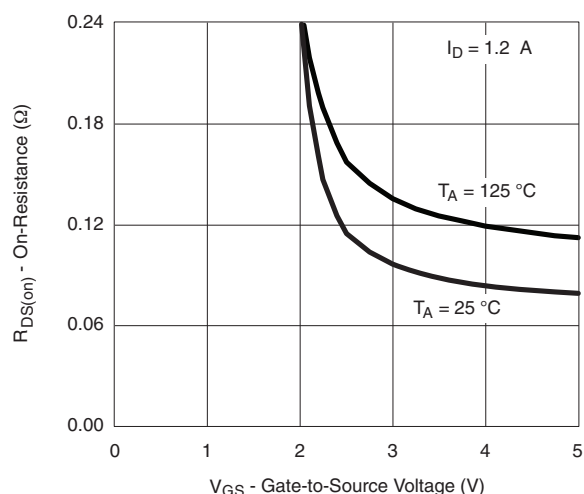
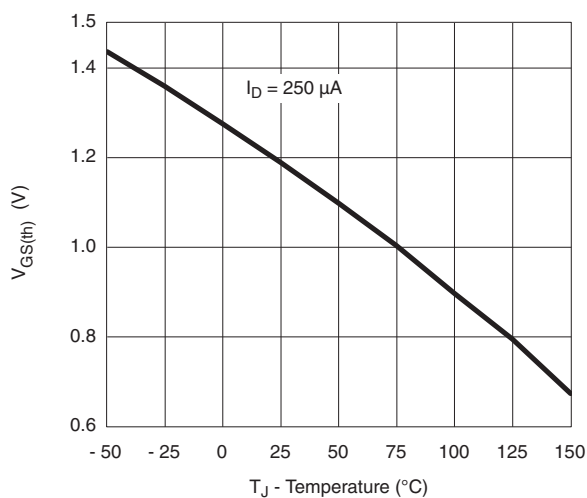
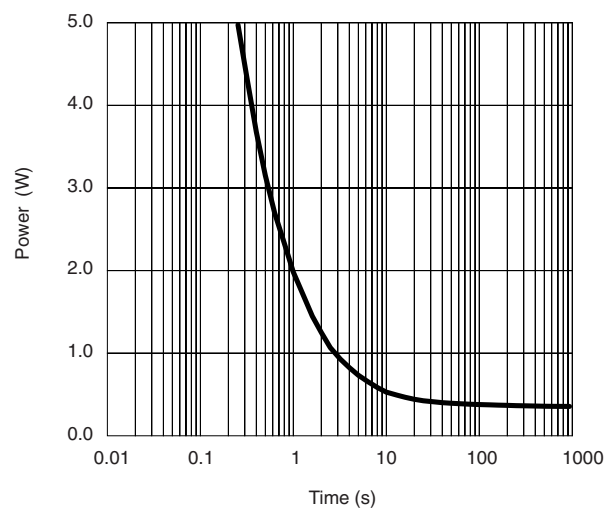
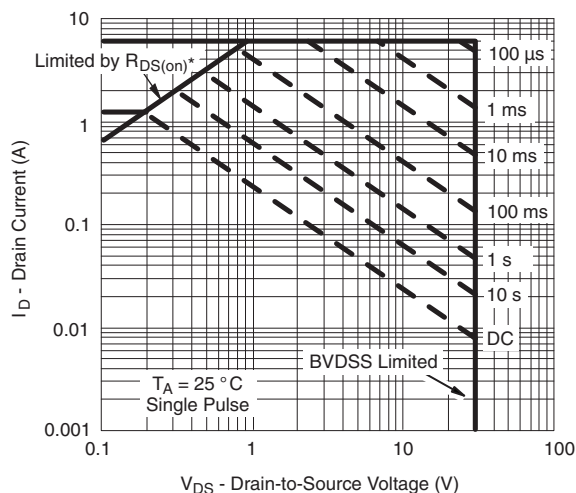
Capacitance



Gate Charge



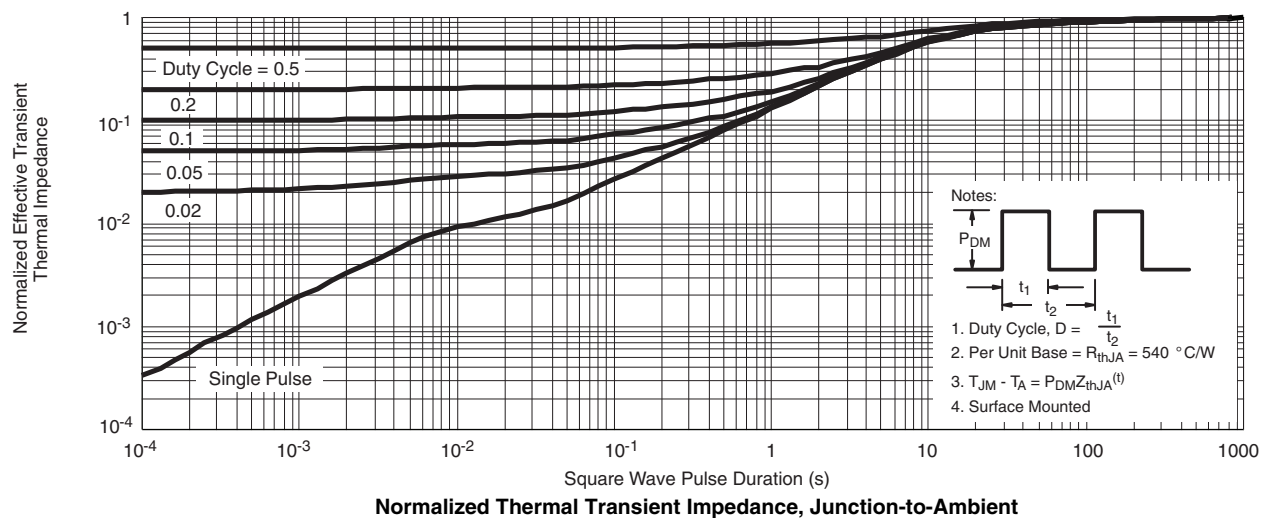
On-Resistance vs. Junction Temperature

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

Source-Drain Diode Forward Voltage

 $R_{DS(on)}$ vs. V_{GS} vs. Temperature

Threshold Voltage

Single Pulse Power


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

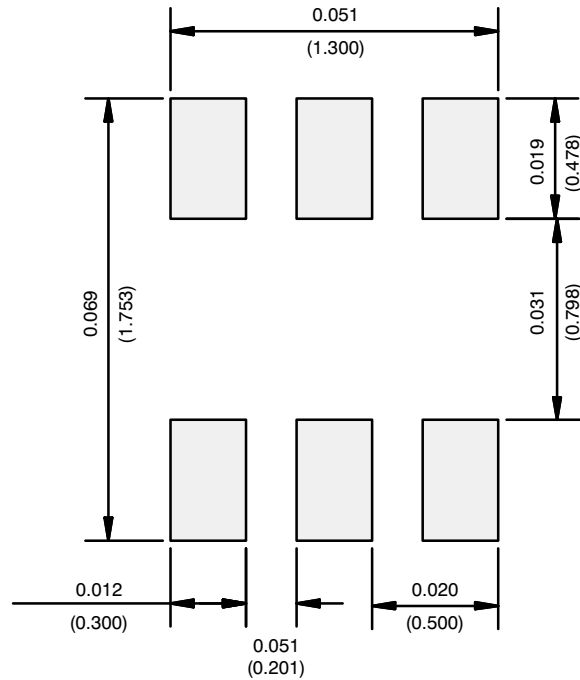
Safe Operating Area, Junction-to-Ambient

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



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RECOMMENDED MINIMUM PADS FOR SC-89: 6-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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