

N-Channel 12 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
12	0.095 at $V_{GS} = 4.5$ V	1.32	5.25
	0.104 at $V_{GS} = 2.5$ V	1.26	
	0.114 at $V_{GS} = 1.8$ V	0.88	

FEATURES

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

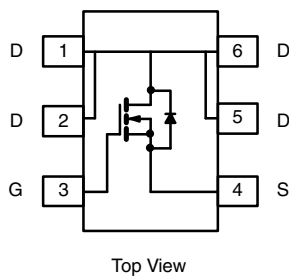


RoHS
COMPLIANT
HALOGEN
FREE

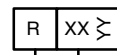
APPLICATIONS

- Load Switch for Portable Devices

SC-89 (6-LEADS)

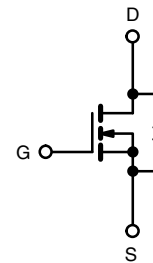


Marking Code



Lot Traceability
and Date Code

Part # Code



Ordering Information: Si1054X-T1-GE3 (Lead (Pb)-free and Halogen-free)

N-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	12	V
Gate-Source Voltage	V_{GS}	± 8	
Continuous Drain Current ($T_J = 150$ °C)	I_D	1.32 ^{b, c}	A
		1.05 ^{b, c}	
Pulsed Drain Current	I_{DM}	6	
Continuous Source-Drain Diode Current	I_S	0.2 ^{b, c}	W
Maximum Power Dissipation ^a	P_D	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 ^{b, d}	R_{thJA}	440	530	°C/W
		540	650	

Notes:

- Based on $T_A = 25$ °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 °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	12			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		12.23		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 2.76		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.4		1	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 12 V, V _{GS} = 0 V			1	nA
		V _{DS} = 12 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	6			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 1.32 A		0.079	0.095	Ω
		V _{GS} = 2.5 V, I _D = 1.26 A		0.087	0.104	
		V _{GS} = 1.8 V, I _D = 0.88 A		0.095	0.114	
Forward Transconductance	g _{fs}	V _{DS} = 4.5 V, I _D = 1.32 A		6.25		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 6 V, V _{GS} = 0 V, f = 1 MHz		480		pF
Output Capacitance	C _{oss}			142		
Reverse Transfer Capacitance	C _{rss}			92		
Total Gate Charge	Q _g	V _{DS} = 6 V, V _{GS} = 5 V, I _D = 1.32 A		5.71	8.57	nC
Gate-Source Charge	Q _{gs}	V _{DS} = 6 V, V _{GS} = 4.5 V, I _D = 1.32 A		5.25	7.9	
Gate-Drain Charge	Q _{gd}			0.83		
				1.54		
Gate Resistance	R _g	f = 1 MHz		3.5	5.25	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 6 V, R _L = 5.71 Ω I _D ≅ 1.05 A, V _{GEN} = 4.5 V, R _g = 1 Ω		5.5	8.25	ns
Rise Time	t _r			13	19.5	
Turn-Off Delay Time	t _{d(off)}			37	55.5	
Fall Time	t _f			14	21	
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current ^a	I _{SM}				6	A
Body Diode Voltage	V _{SD}	I _S = 1.0 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 1.0 A, dI/dt = 100 A/μs		19.3	28.95	ns
Body Diode Reverse Recovery Charge	Q _{rr}			5.8	8.7	nC
Reverse Recovery Fall Time	t _a			7.4		ns
Reverse Recovery Rise Time	t _b			11.9		

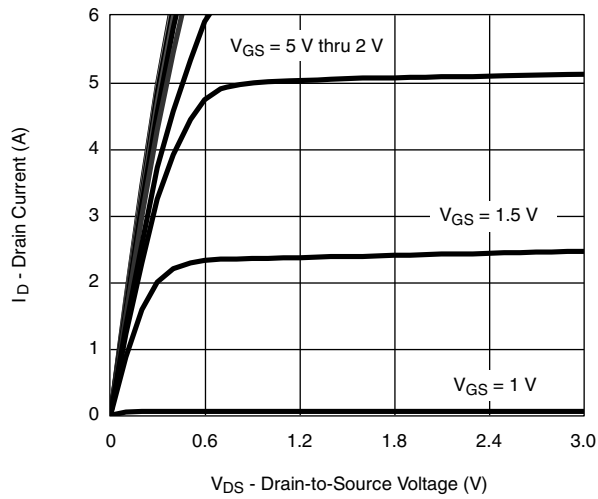
Notes:

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

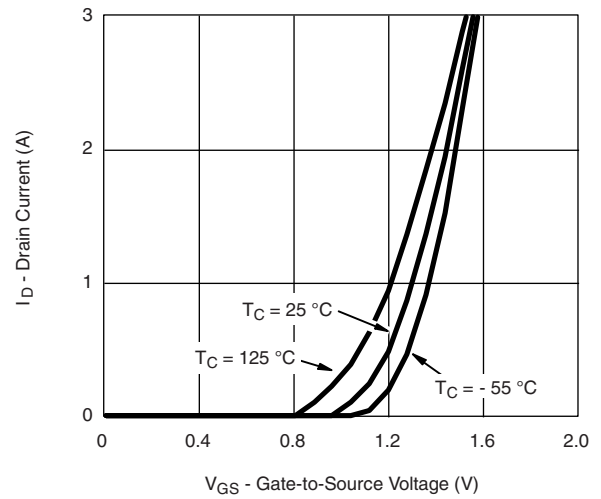
b. Guaranteed by design, not subject to production testing.

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.

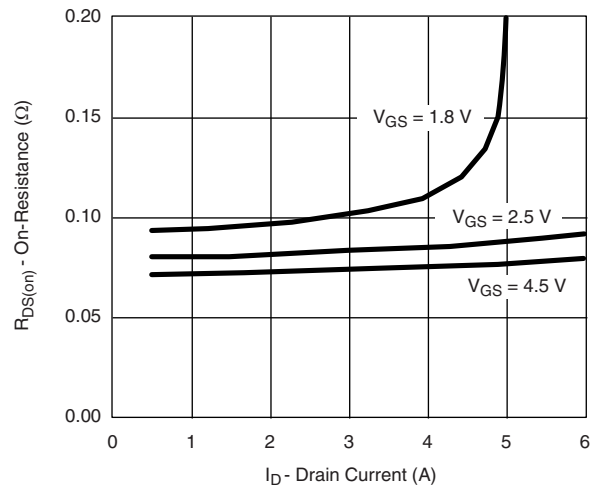
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



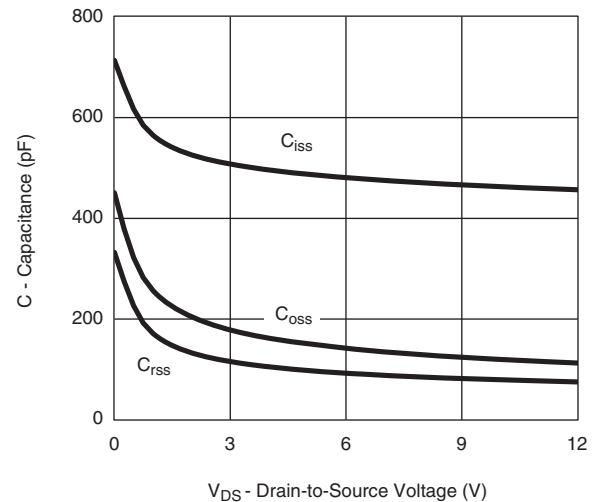
Output Characteristics



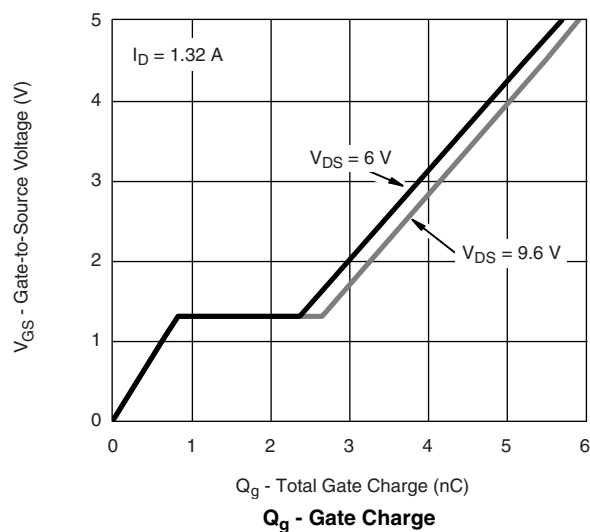
Transfer Characteristics



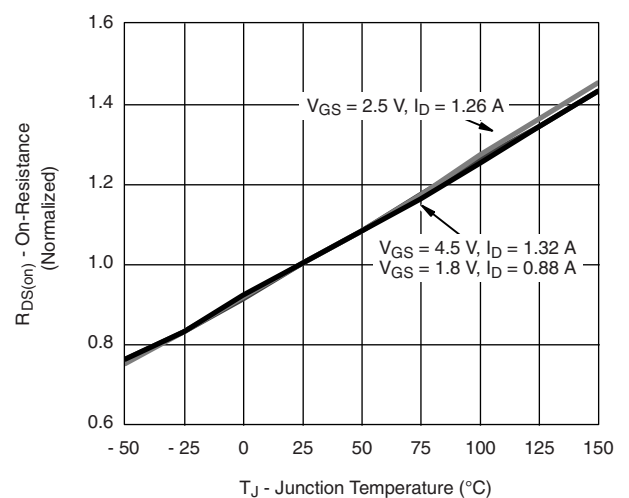
On-Resistance vs. Drain Current



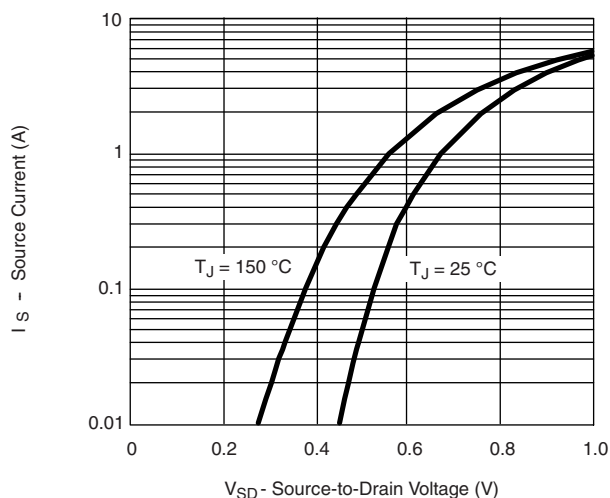
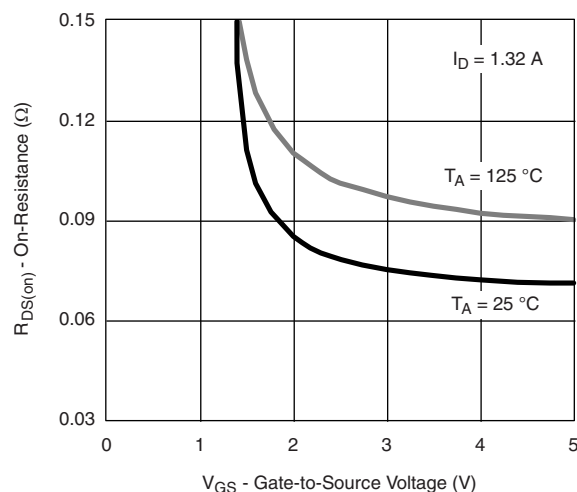
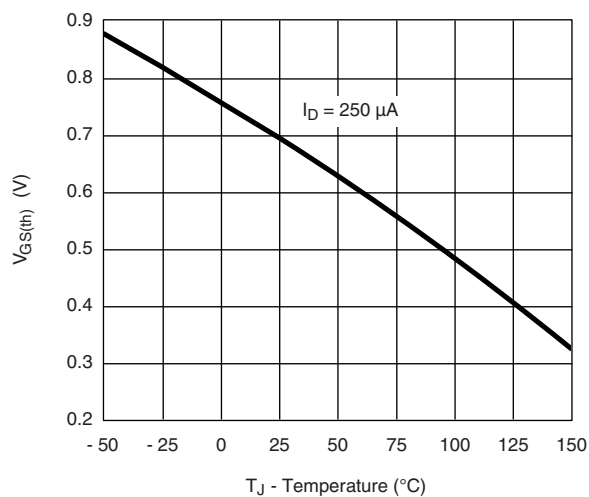
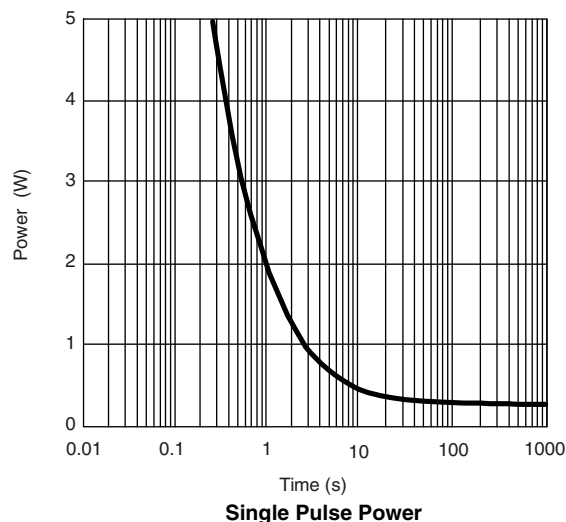
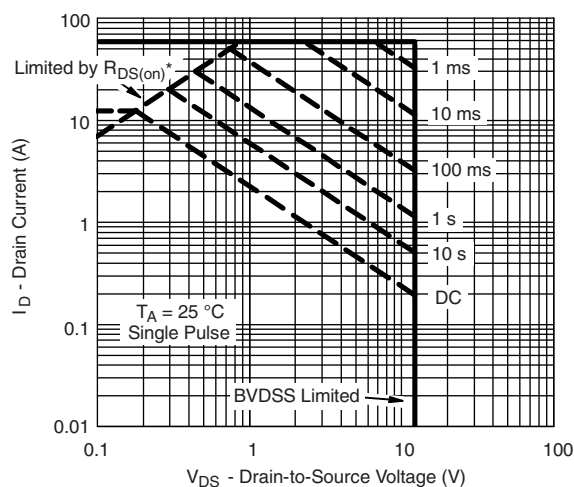
Capacitance



Q_g - Gate Charge



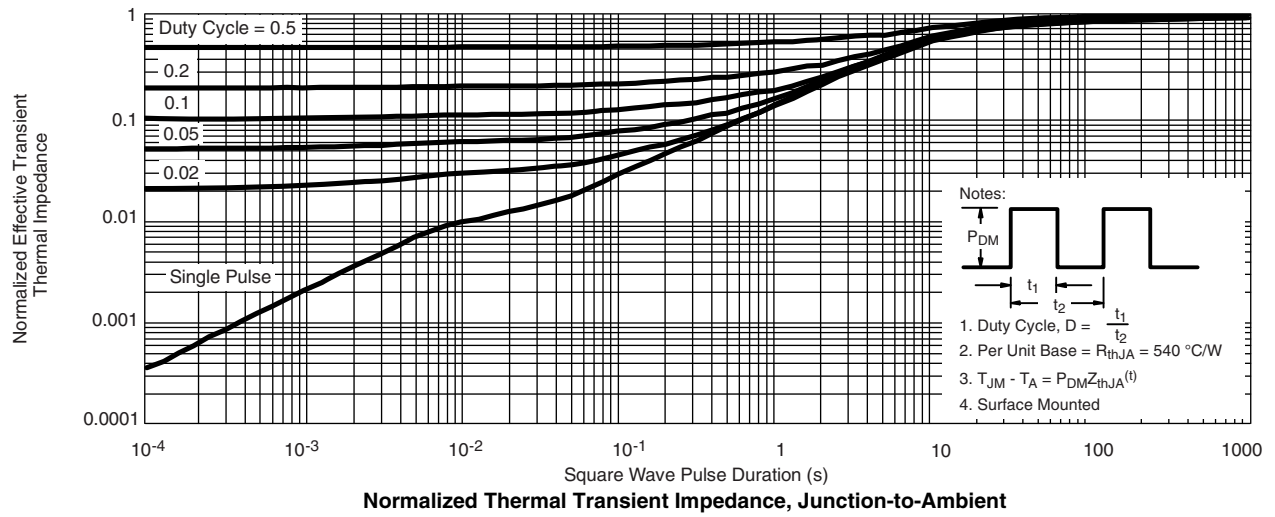
On-Resistance vs. Junction Temperature

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



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