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 Option Available**
- TrenchFET® Power MOSFET
- 100 % R_g Tested

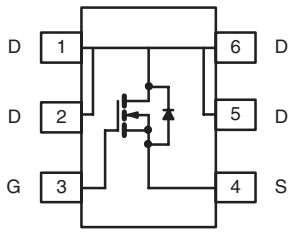
Pb-free

RoHS
COMPLIANT

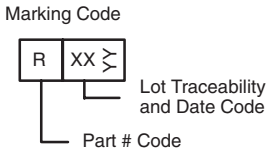
APPLICATIONS

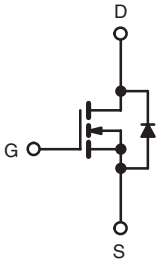
- Load Switch for Portable Devices

SC-89 (6-LEADS)



Top View





N-Channel MOSFET

Ordering Information: Si1054X-T1-E3 (Lead (Pb)-free)
Si1054X-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}	12	V
Gate-Source Voltage		V_{GS}	± 8	
Continuous Drain Current (T_J = 150 °C)	T_A = 25 °C	I_D	1.32[b, c]	A
	T_A = 70 °C		1.05[b, c]	
Pulsed Drain Current		I_{DM}	6	
Continuous Source-Drain Diode Current	T_A = 25 °C	I_S	0.2[b, c]	
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	0.236[b, c]	W
	T_A = 70 °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]	t ≤ 5 s	R_{thJA}	440	530	°C/W
	Steady State		540	650	

Notes:
a. Based on T_A = 25 °C.
b. Surface Mounted on 1" x 1" FR4 board.
c. t = 5 s.
d. 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	$\Delta V_{DS}/T_J$	I_D = 250 µA		12.23		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 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
		V_{DS} = 6 V, V_{GS} = 4.5 V, I_D = 1.32 A		5.25	7.9	
Gate-Source Charge	Q_{gs}			0.83		
Gate-Drain Charge	Q_{gd}			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		

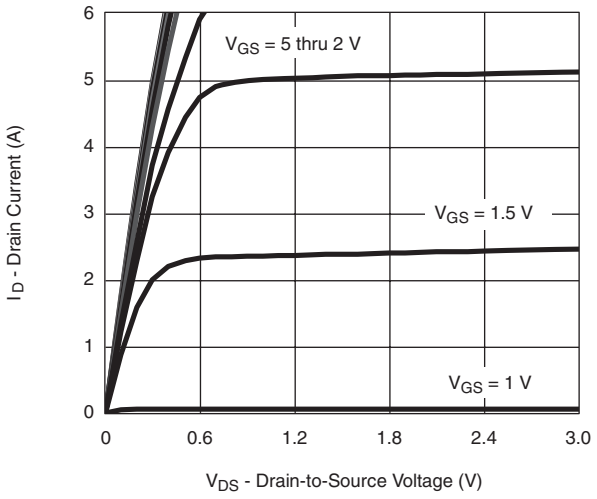
Notes:

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

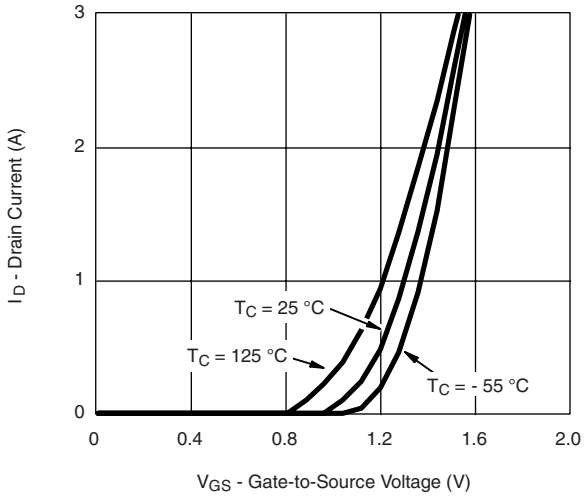
b. Guaranteed by design, not subject to production testing.

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.

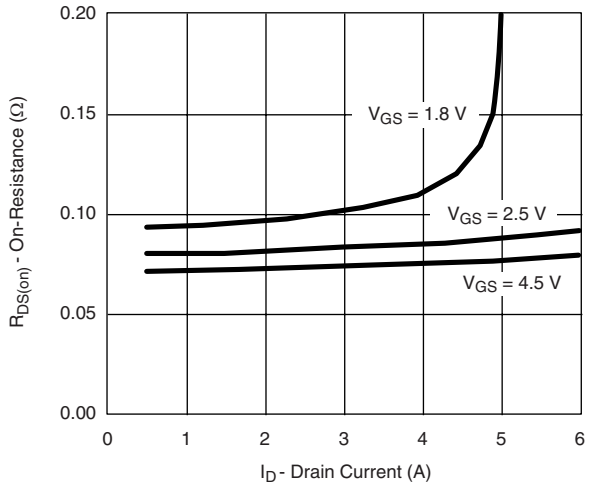
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



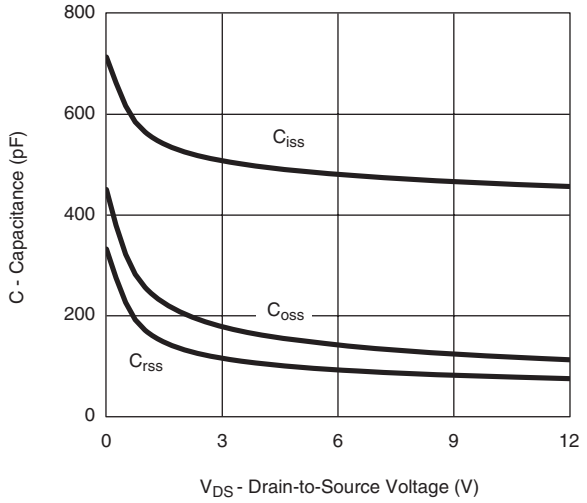
Output Characteristics



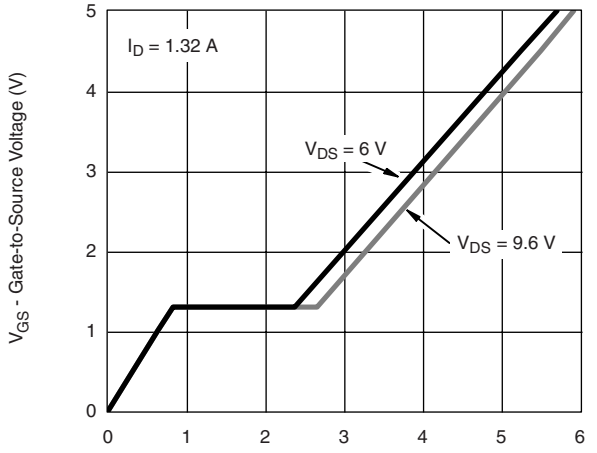
Transfer Characteristics



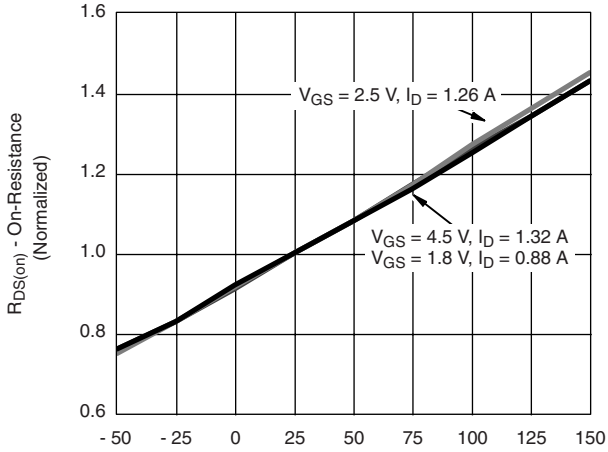
On-Resistance vs. Drain Current



Capacitance

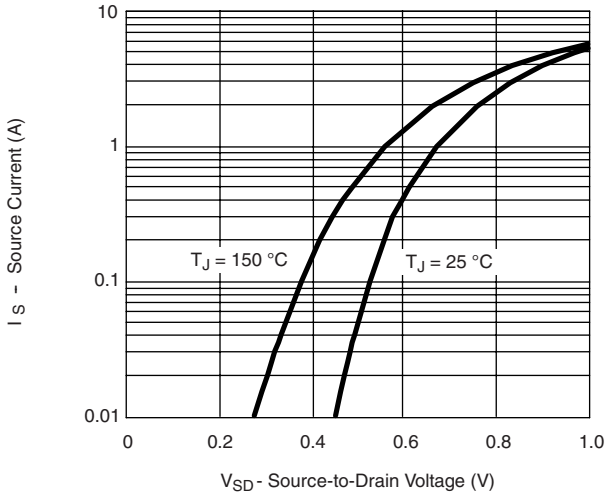


Q_g - Gate Charge

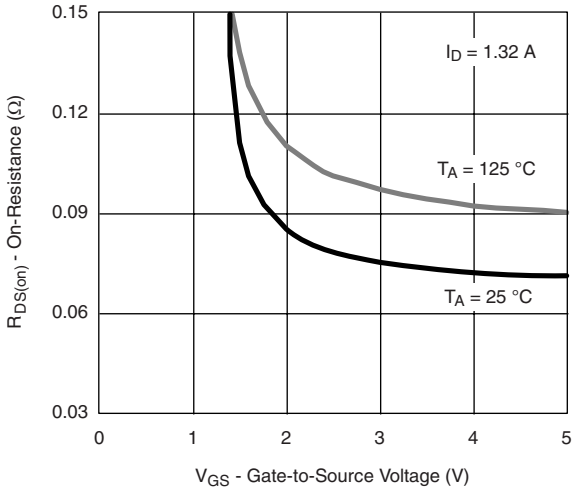


On-Resistance vs. Junction Temperature

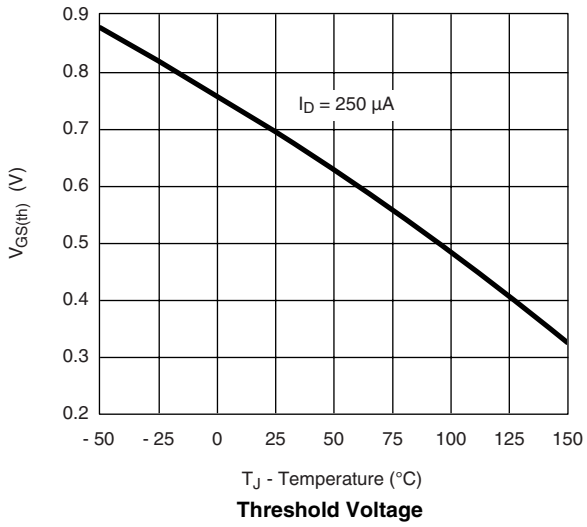
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



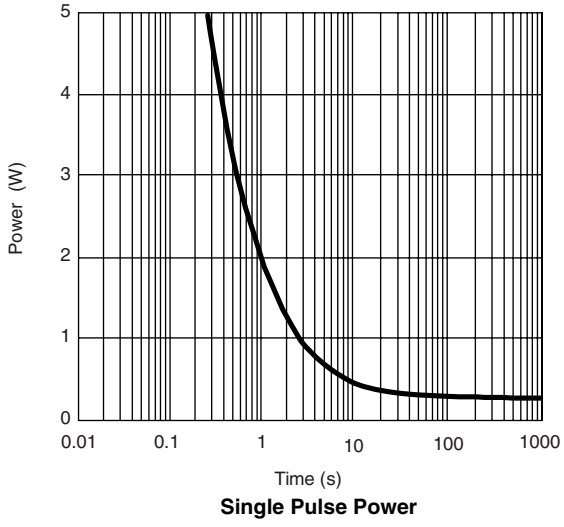
Source-Drain Diode Forward Voltage



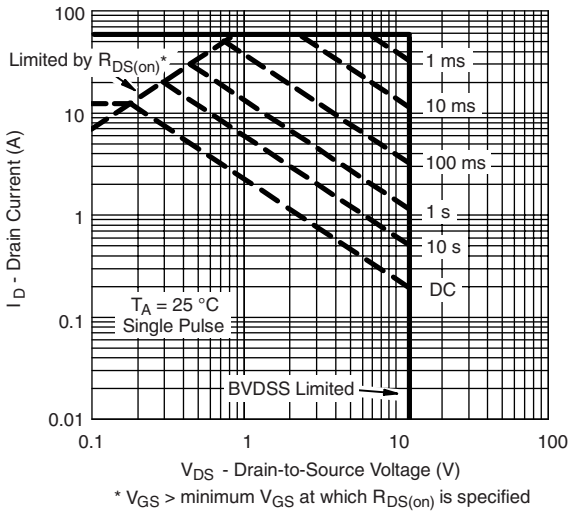
$R_{DS(on)}$ vs. V_{GS} vs. Temperature



Threshold Voltage



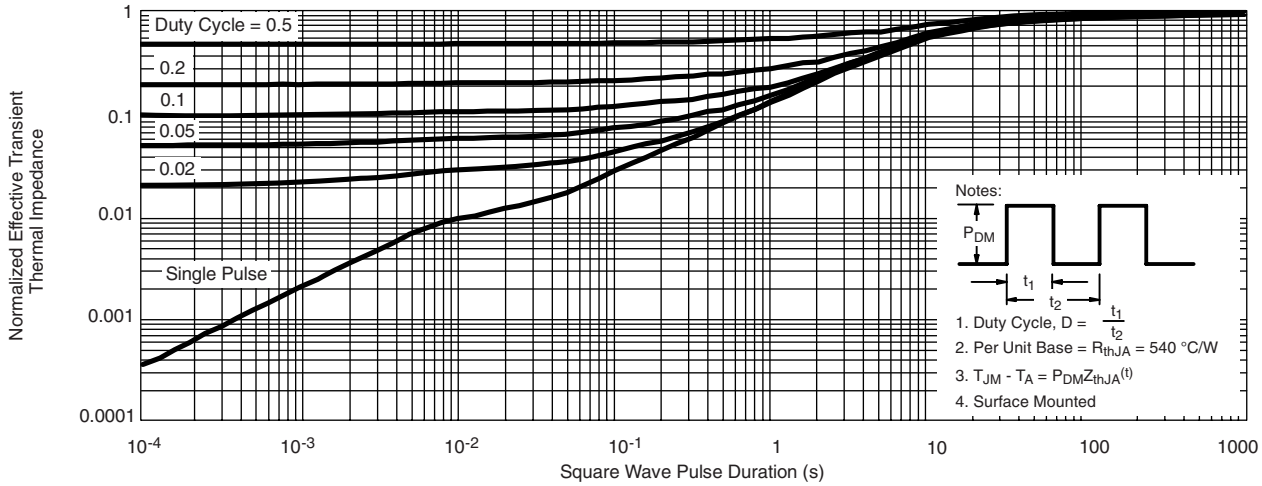
Single Pulse Power



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

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient

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