

N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
20	0.420 at V _{GS} = 4.5 V	0.606	0.92
	0.501 at V _{GS} = 2.5 V	0.505	
	0.660 at V _{GS} = 1.8 V	0.15	

FEATURES

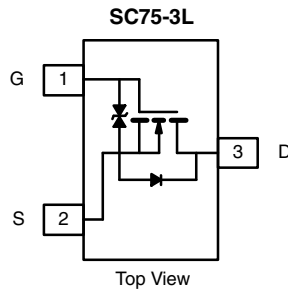
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET: 1.8 V Rated
- ESD Protected: 2000 V
- Compliant to RoHS Directive 2002/95/EC



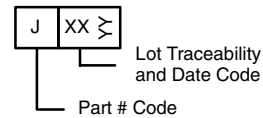
RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Cell Phones, Pagers



Marking Code



Ordering Information: Si1046R-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}	± 8	
Continuous Drain Current (T _J = 150 °C) ^a	T _A = 25 °C	0.606 ^{b, c}	A
	T _A = 70 °C	0.485 ^{b, c}	
Pulsed Drain Current	I _{DM}	2.5	
Continuous Source-Drain Diode Current	T _A = 25 °C	I _S	0.21 ^{b, c}
Maximum Power Dissipation ^a	T _A = 25 °C	P _D	0.25 ^{b, c}
	T _A = 70 °C		0.16 ^{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	440	530	°C/W
	Steady State	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.

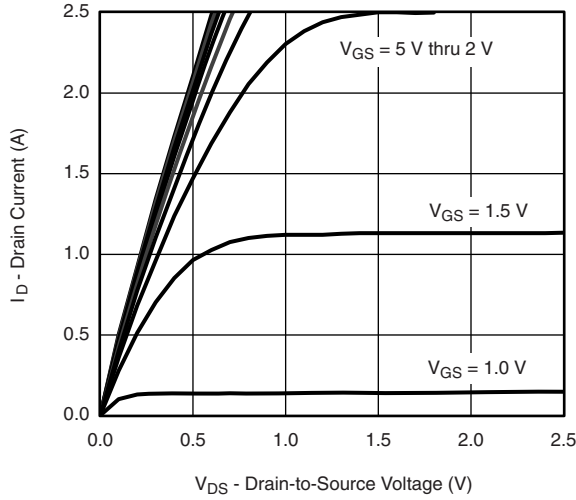
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		20.5		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 2.12		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.35		0.95	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 30	mA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 4.5\text{ V}$	2.5			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 0.606\text{ A}$		0.336	0.420	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 0.505\text{ A}$		0.395	0.501	
		$V_{GS} = 1.8\text{ V}, I_D = 0.150\text{ A}$		0.438	0.660	
Forward Transconductance	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 0.606\text{ A}$		2.1		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		66		pF
Output Capacitance	C_{oss}			17		
Reverse Transfer Capacitance	C_{rss}			7		
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 5\text{ V}, I_D = 0.606\text{ A}$		0.99	1.49	nC
		$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 0.606\text{ A}$		0.92	1.38	
Gate-Source Charge	Q_{gs}			0.15		
Gate-Drain Charge	Q_{gd}			0.30		
Gate Resistance	R_g	$f = 1\text{ MHz}$		212		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 20.8\text{ }\Omega$ $I_D \cong 0.48\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		17	26	ns
Rise Time	t_r			19	28.5	
Turn-Off Delay Time	$t_{d(off)}$			76	114	
Fall Time	t_f			27	41	
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current ^a	I_{SM}				2.5	A
Body Diode Voltage	V_{SD}	$I_S = 0.48\text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 1.0\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		16	24	nC
Body Diode Reverse Recovery Charge	Q_{rr}			4.8	7.2	ns
Reverse Recovery Fall Time	t_a			12.3		
Reverse Recovery Rise Time	t_b			3.7		

Notes:

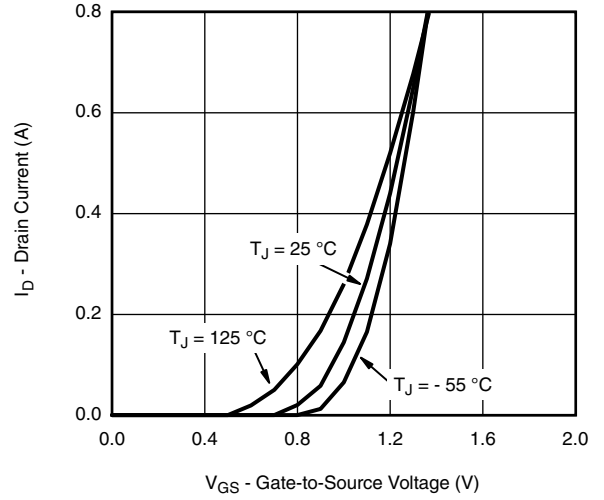
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

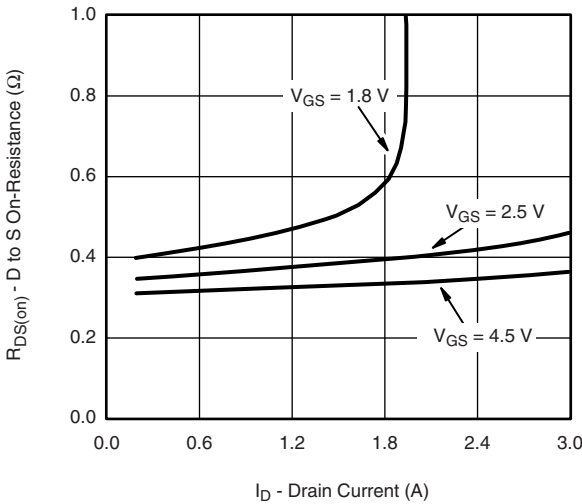
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



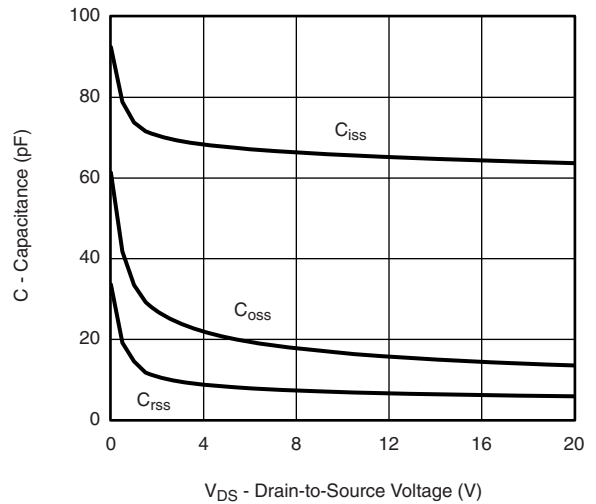
Output Characteristics



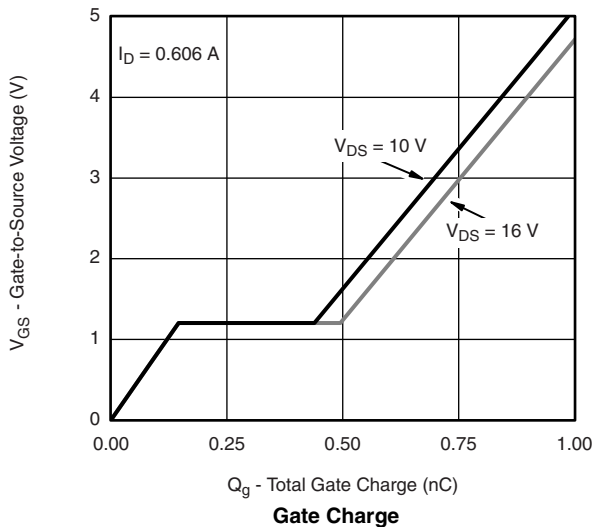
Transfer Characteristics



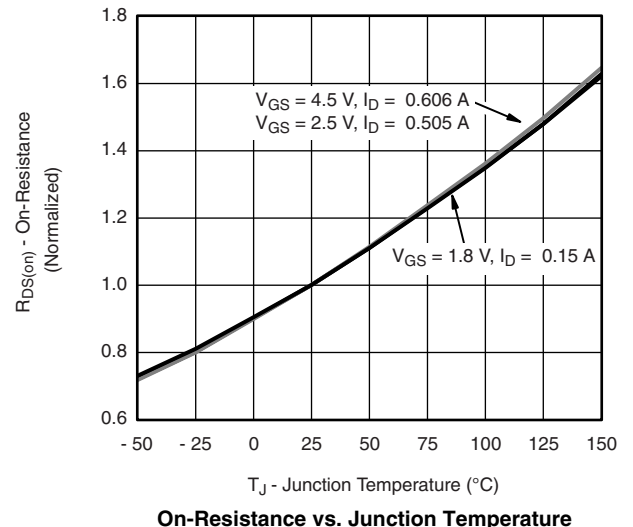
On-Resistance vs. Drain Current



Capacitance

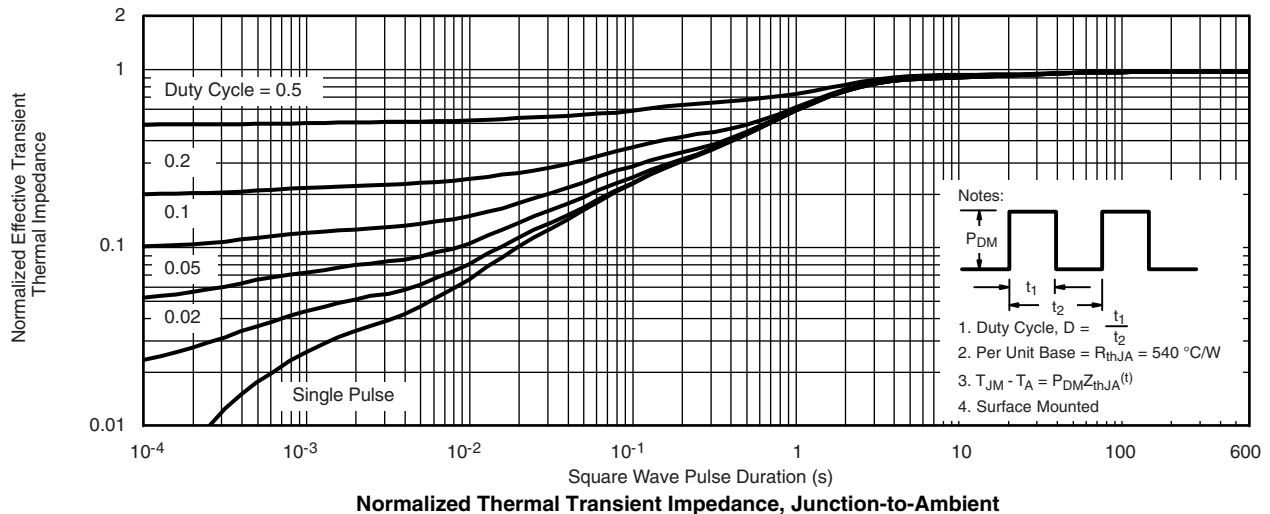
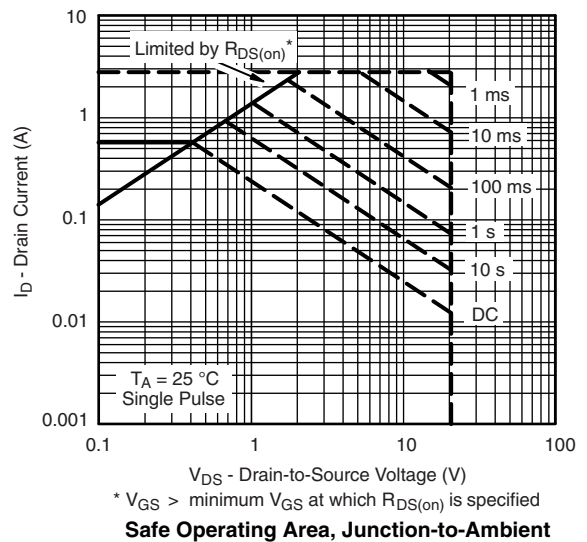
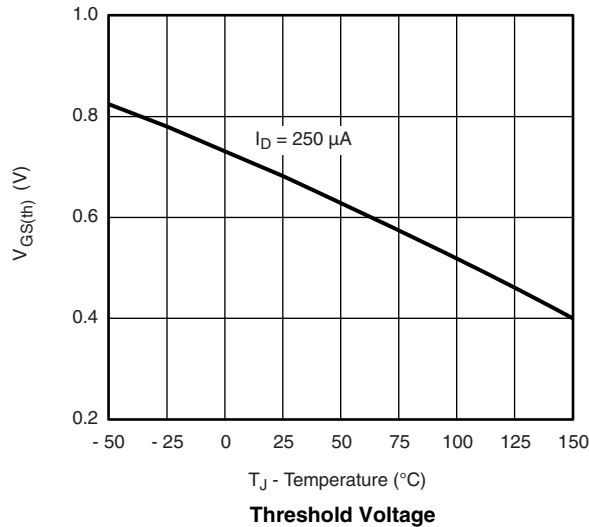
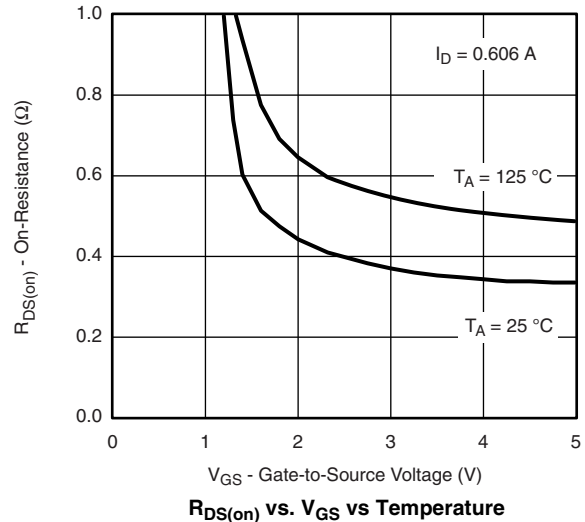
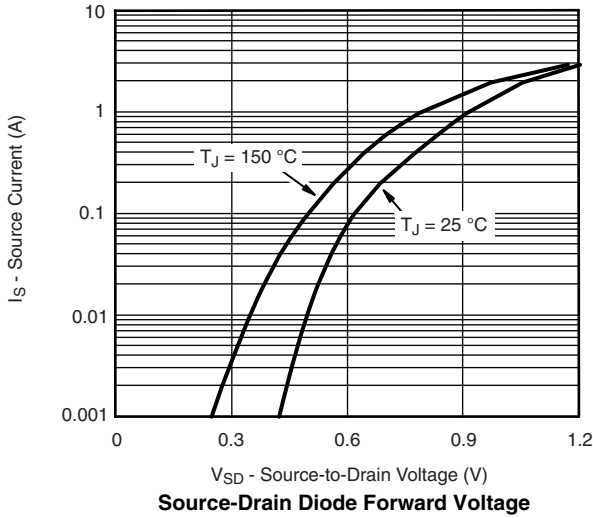


Gate Charge



On-Resistance vs. Junction Temperature

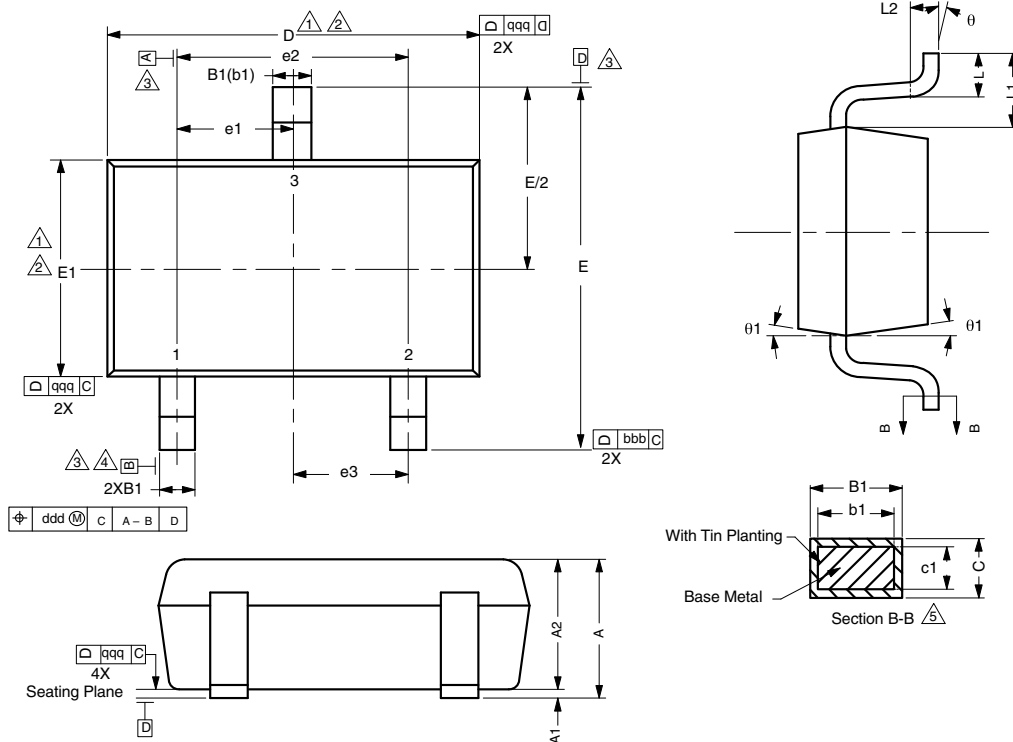
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



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SC-75A: 3-LEADS



Notes

Dimensions in millimeters will govern.

1. Dimension D does not include mold flash, protrusions or gate burrs. Mold flash protrusions or gate burrs shall not exceed 0.10 mm per end. Dimension E1 does not include Interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.10 mm per side.
2. Dimensions D and E1 are determined at the outmost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs and interlead flash, but including any mismatch between the top and bottom of the plastic body.
3. Datums A, B and D to be determined 0.10 mm from the lead tip.
4. Terminal positions are shown for reference only.
5. These dimensions apply to the flat section of the lead between 0.08 mm and 0.15 mm from the lead tip.

DIMENSIONS	TOLERANCES
aaa	0.10
bbb	0.10
ccc	0.10
ddd	0.10

DIM.	MILLIMETERS			NOTE
	MIN.	NOM.	MAX.	
A	-	-	0.80	
A ₁	0.00	-	0.10	
A ₂	0.65	0.70	0.80	
B ₁	0.19	-	0.24	5
b ₁	0.17	-	0.21	
c	0.13	-	0.15	5
c ₁	0.10	-	0.12	5
D	1.48	1.575	1.68	1, 2
E	1.50	1.60	1.70	
E ₁	0.66	0.76	0.86	1, 2
e ₁	0.50 BSC			
e ₂	1.00 BSC			
e ₃	0.50 BSC			
L	0.15	0.205	0.30	
L ₁	0.40 REF			
L ₂	0.15 BSC			
θ	0°	-	8°	
θ ₁	4°	-	10°	

ECN: E11-2210-Rev. D, 08-Aug-11
DWG: 5868

RECOMMENDED MINIMUM PADS FOR SC-75A: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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