

## P-Channel 1.8-V (G-S) MOSFET

**TrenchFET<sup>®</sup>**  
MOSFETs  
1.8-V Rated



**ESD Protected  
2000 V**

PRODUCT SUMMARY		
V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (mA)
-20	1.2 @ V <sub>GS</sub> = -4.5 V	-350
	1.6 @ V <sub>GS</sub> = -2.5 V	-300
	2.7 @ V <sub>GS</sub> = -1.8 V	-150

### FEATURES

- High-Side Switching
- Low On-Resistance: 1.2 Ω
- Low Threshold: 0.8 V (typ)
- Fast Switching Speed: 14 ns
- 1.8-V Operation
- Gate-Source ESD Protection

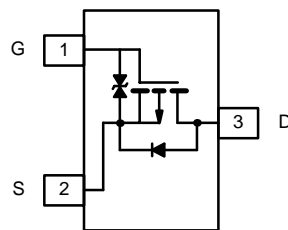
### BENEFITS

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Low Battery Voltage Operation

### APPLICATIONS

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

SC-75A or SC-89



Top View

#### Ordering Information:

SC-75A (SOT-416):  
Si1013R-Marking Code : D

SC-89 (SOT-490):  
Si1013X-Marking Code: B

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)					
Parameter	Symbol	5 secs	Steady State	Unit	
Drain-Source Voltage	V <sub>DS</sub>	-20		V	
Gate-Source Voltage	V <sub>GS</sub>	±6			
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>b</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	-400	-350	mA
		T <sub>A</sub> = 85 °C	-300	-275	
Pulsed Drain Current <sup>a</sup>	I <sub>DM</sub>	-1000			
Continuous Source Current (diode conduction) <sup>b</sup>	I <sub>S</sub>	-275	-250		
Maximum Power Dissipation <sup>b</sup> for SC-75	P <sub>D</sub>	T <sub>A</sub> = 25 °C	175	150	mW
		T <sub>A</sub> = 85 °C	90	80	
Maximum Power Dissipation <sup>b</sup> for SC-89	P <sub>D</sub>	T <sub>A</sub> = 25 °C	275	250	
		T <sub>A</sub> = 85 °C	160	140	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150		°C	
Gate-Source ESD Rating (HBM, Method 3015)	ESD	2000		V	

Notes

- Pulse width limited by maximum junction temperature.
- Surface Mounted on FR4 Board.

**SPECIFICATIONS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

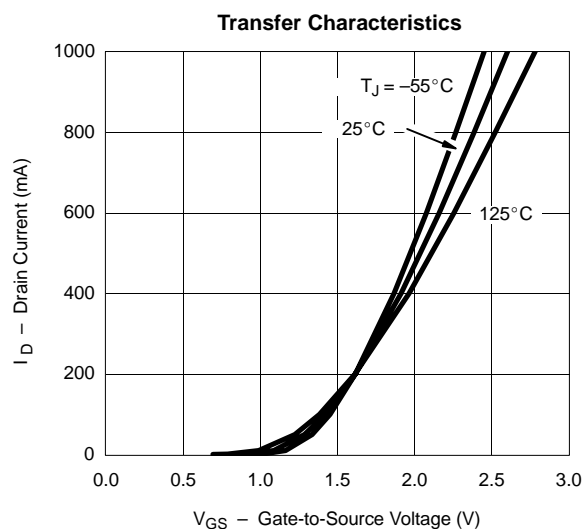
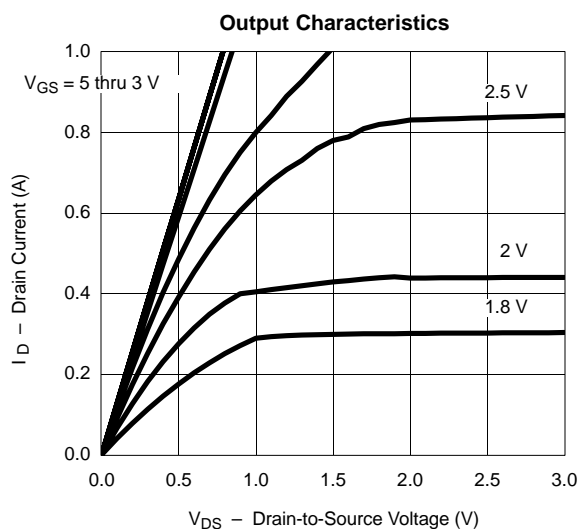
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-0.45			V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 4.5\ \text{V}$		$\pm 1$	$\pm 2$	$\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16\ \text{V}, V_{GS} = 0\ \text{V}$		-0.3	-100	nA
		$V_{DS} = -16\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 85^\circ\text{C}$			-5	$\mu\text{A}$
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\ \text{V}, V_{GS} = -4.5\ \text{V}$	-700			mA
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = -4.5\ \text{V}, I_D = -350\ \text{mA}$		0.8	1.2	$\Omega$
		$V_{GS} = -2.5\ \text{V}, I_D = -300\ \text{mA}$		1.2	1.6	
		$V_{GS} = -1.8\ \text{V}, I_D = -150\ \text{mA}$		1.8	2.7	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -10\ \text{V}, I_D = -250\ \text{mA}$		0.4		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -150\ \text{mA}, V_{GS} = 0\ \text{V}$		-0.8	-1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -10\ \text{V}, V_{GS} = -4.5\ \text{V}, I_D = -250\ \text{mA}$		1500		pC
Gate-Source Charge	$Q_{GS}$			150		
Gate-Drain Charge	$Q_{gd}$			450		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\ \text{V}, R_L = 47\ \Omega$ $I_D \cong -200\ \text{mA}, V_{GEN} = -4.5\ \text{V}, R_G = 10\ \Omega$		5		ns
Rise Time	$t_r$			9		
Turn-Off Delay Time	$t_{d(off)}$			35		
Fall Time	$t_f$			11		

## Notes

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

**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS NOTED)**

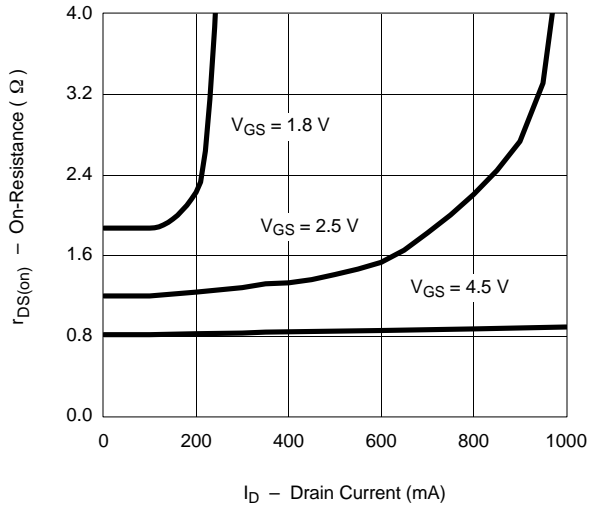
For the following graphs, p-channel negative polarities for all voltage and current values are represented as positive values.



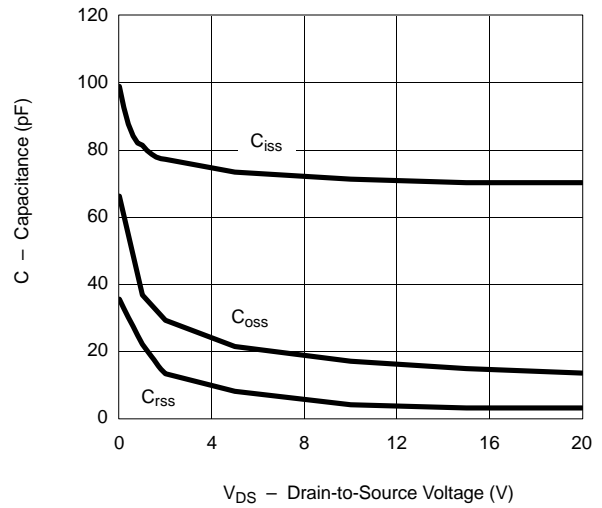


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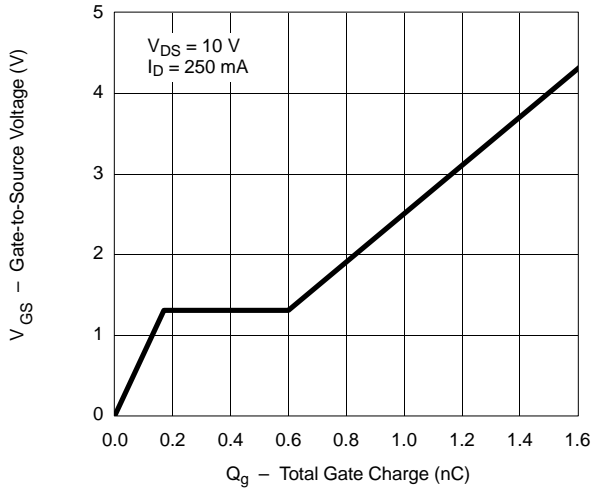
On-Resistance vs. Drain Current



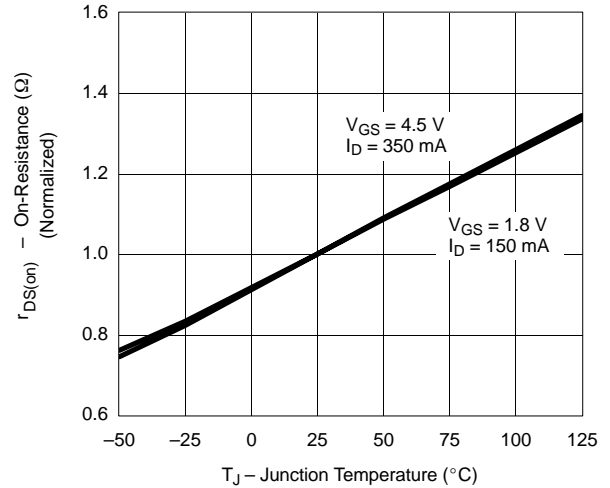
Capacitance



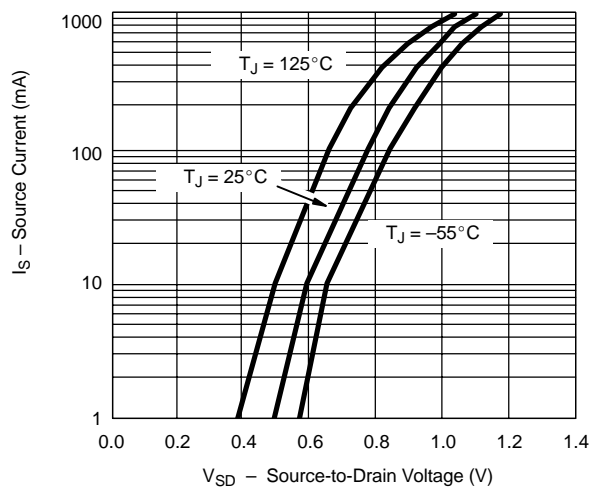
Gate Charge



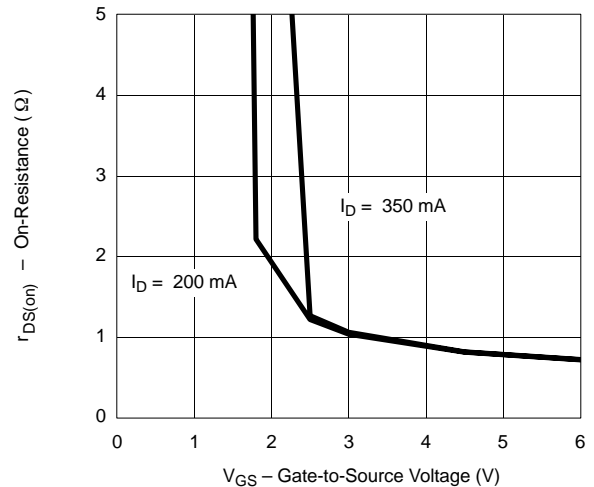
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

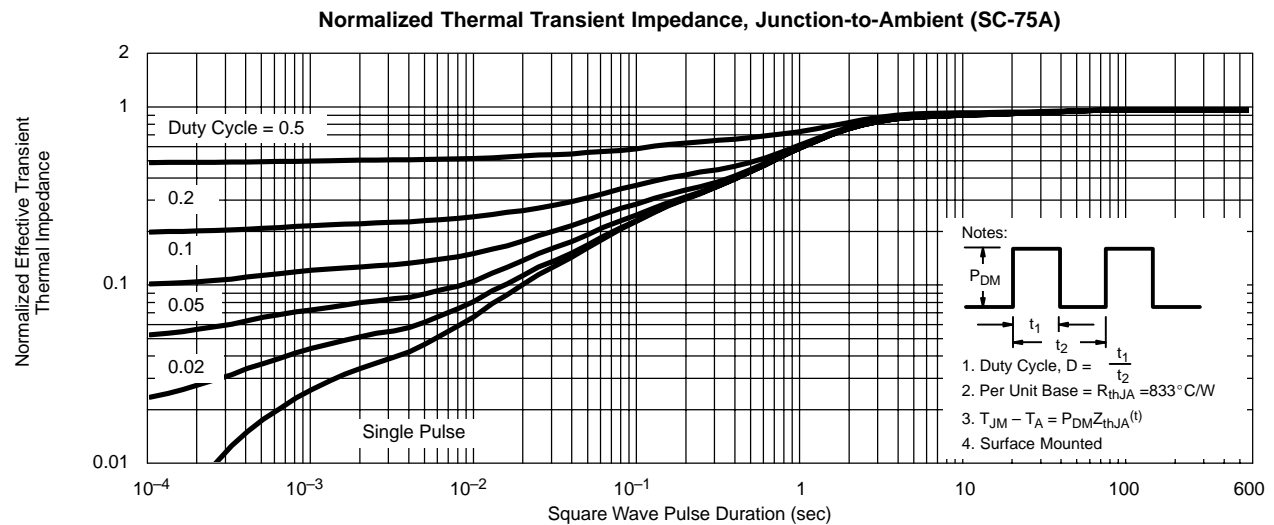
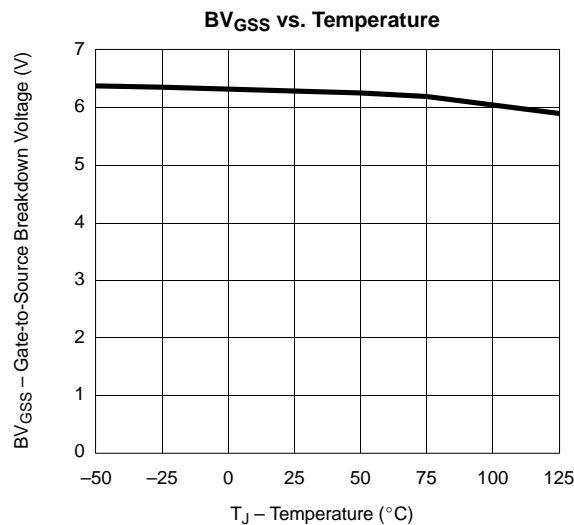
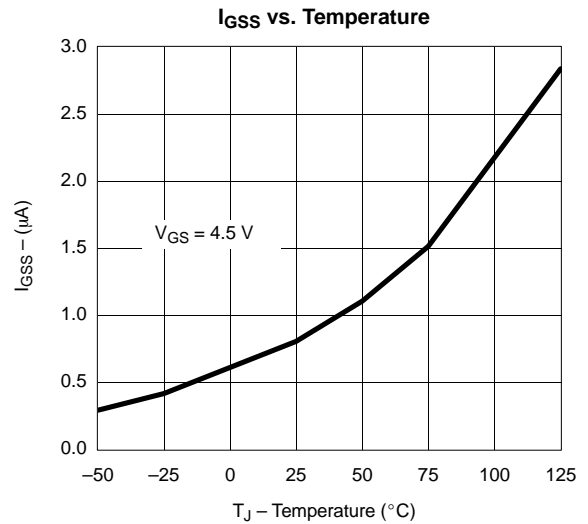
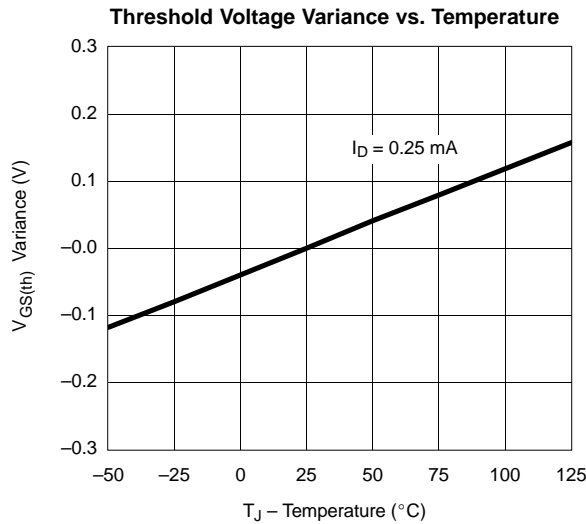


On-Resistance vs. Gate-to-Source Voltage





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