



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

TrenchFET[®]
MOSFETs
1.8-V Rated**ESD Protected
2000 V****PRODUCT SUMMARY**

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (mA)
-20	1.2 @ $V_{GS} = -4.5$ V	-350
	1.6 @ $V_{GS} = -2.5$ V	-300
	2.7 @ $V_{GS} = -1.8$ 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

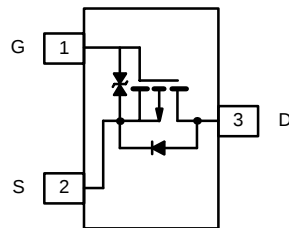
BENEFITS

- 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

**Ordering Information:**

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

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

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter		Symbol	5 secs	Steady State	Unit
Drain-Source Voltage		V_{DS}	−20		V
Gate-Source Voltage		V_{GS}	± 6		
Continuous Drain Current ($T_J = 150^{\circ}\text{C}$) ^b	$T_A = 25^{\circ}\text{C}$	I_D	−400	−350	mA
	$T_A = 85^{\circ}\text{C}$		−300	−275	
Pulsed Drain Current ^a		I_{DM}	−1000		
Continuous Source Current (diode conduction) ^b		I_S	−275	−250	
Maximum Power Dissipation ^b for SC-75	$T_A = 25^{\circ}\text{C}$	P_D	175	150	mW
	$T_A = 85^{\circ}\text{C}$		90	80	
Maximum Power Dissipation ^b for SC-89	$T_A = 25^{\circ}\text{C}$		275	250	
	$T_A = 85^{\circ}\text{C}$		160	140	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to 150		$^{\circ}\text{C}$
Gate-Source ESD Rating (HBM, Method 3015)		ESD	2000		V

Notes

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

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\ \mu\text{A}$	-0.45			V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}$, $V_{GS} = \pm 4.5\ \text{V}$		± 1	± 2	μA
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	μA
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\ \text{V}$, $V_{GS} = -4.5\ \text{V}$	-700			mA
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = -4.5\ \text{V}$, $I_D = -350\ \text{mA}$		0.8	1.2	Ω
		$V_{GS} = -2.5\ \text{V}$, $I_D = -300\ \text{mA}$		1.2	1.6	
		$V_{GS} = -1.8\ \text{V}$, $I_D = -150\ \text{mA}$		1.8	2.7	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\ \text{V}$, $I_D = -250\ \text{mA}$		0.4		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -150\ \text{mA}$, $V_{GS} = 0\ \text{V}$		-0.8	-1.2	V
Dynamic^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		

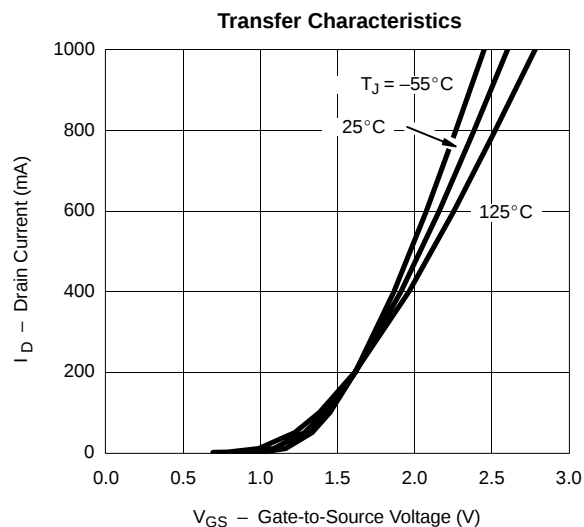
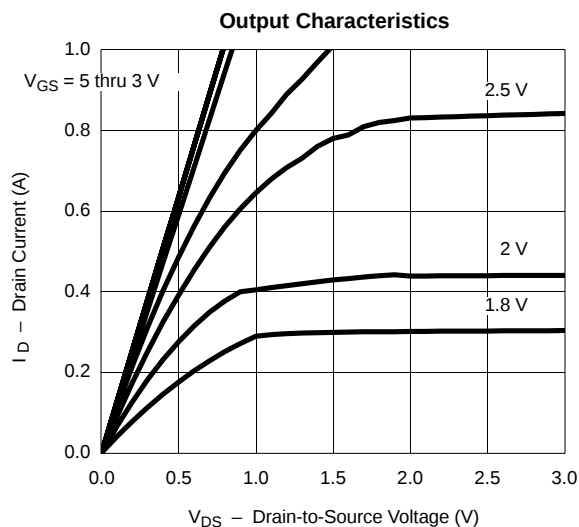
Notes

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

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

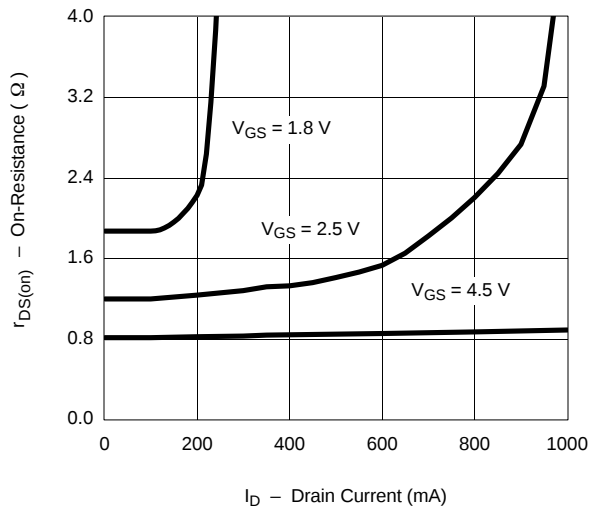
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS NOTED)

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

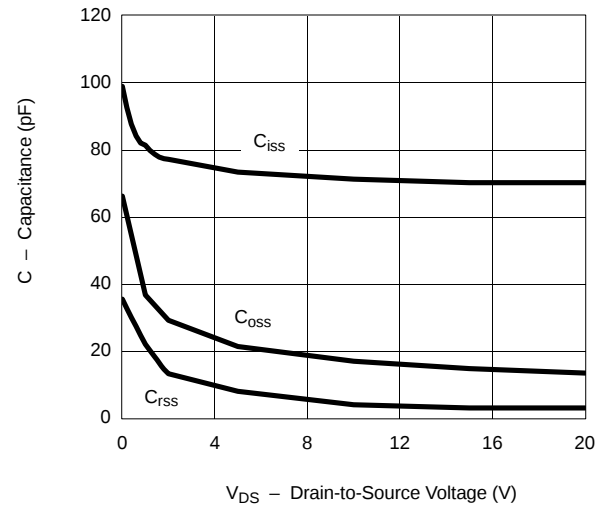


**TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS NOTED)**

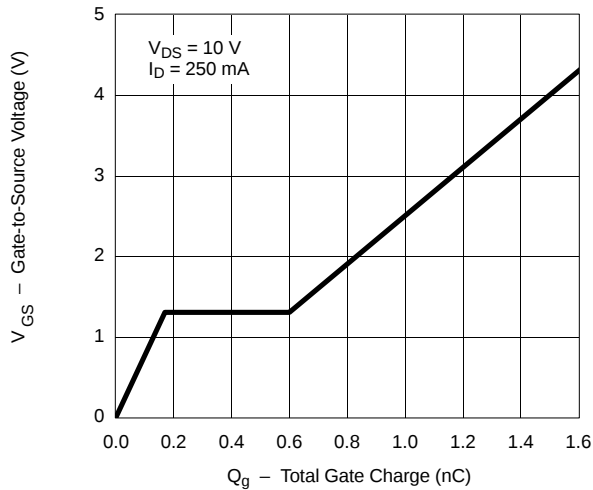
On-Resistance vs. Drain Current



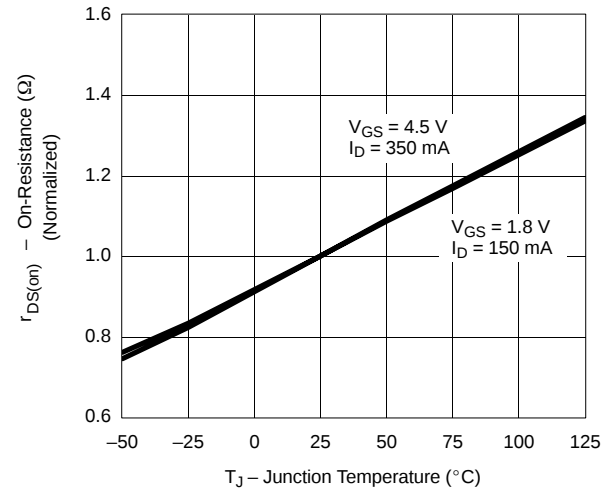
Capacitance



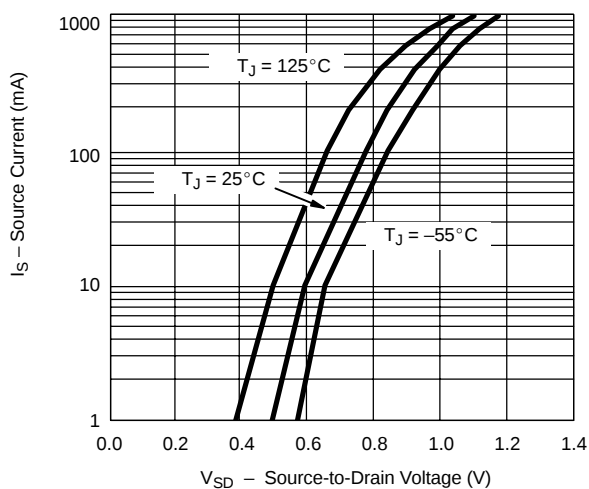
Gate Charge



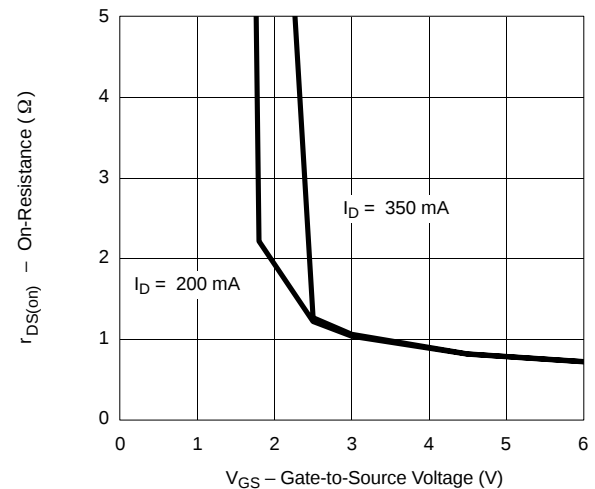
On-Resistance vs. Junction Temperature

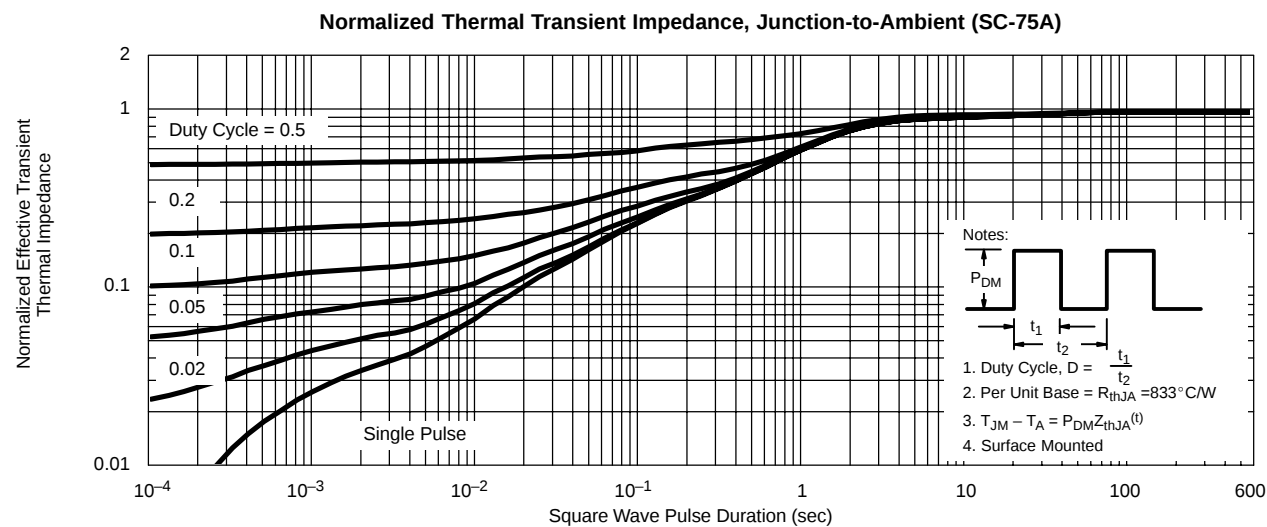
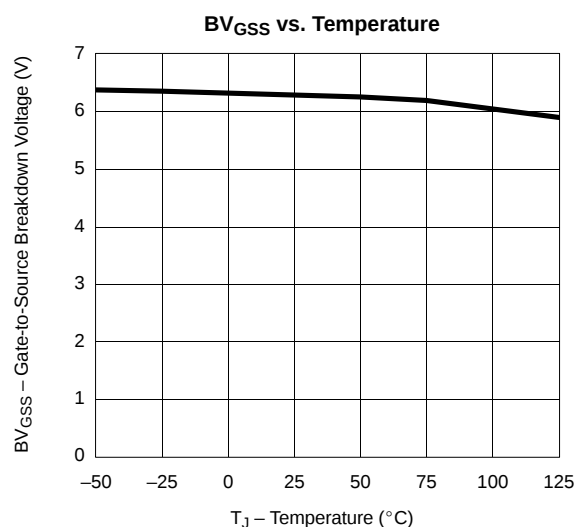
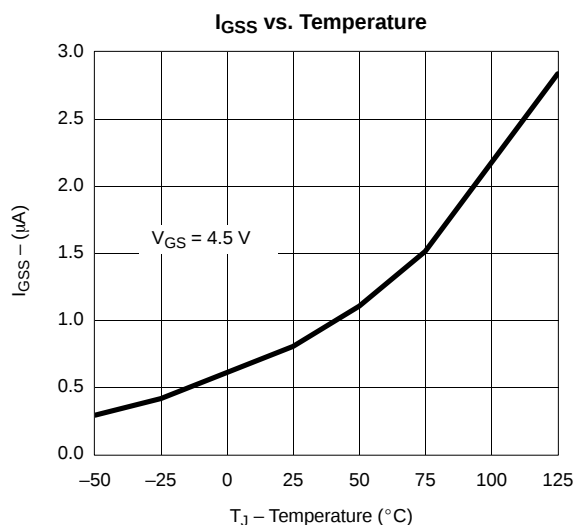
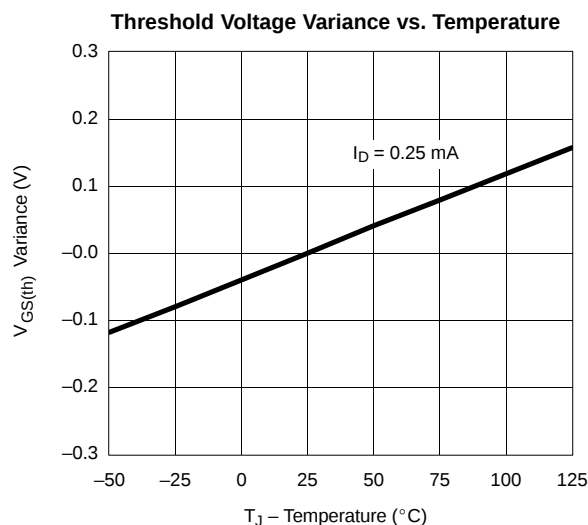


Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



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