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 Swtiching Speed: 14 ns
- 1.8-V Operation
- Gate-Source ESD Protection

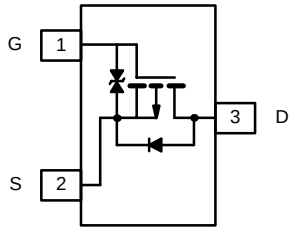
BENEFITS

- 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_A = 25°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°C)[b]	T_A = 25°C	I_D	–400	–350	mA
	T_A = 85°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°C	P_D	175	150	mW
	T_A = 85°C		90	80	
Maximum Power Dissipation[b] for SC-89	T_A = 25°C		275	250	
	T_A = 85°C		160	140	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	–55 to 150		°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°C UNLESS OTHERWISE NOTED)

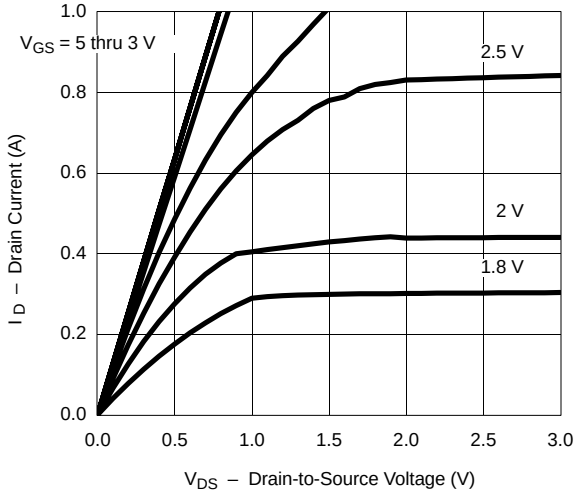
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = –250 μA	–0.45			V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±4.5 V		±1	±2	μA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –16 V, V_{GS} = 0 V		–0.3	–100	nA
		V_{DS} = –16 V, V_{GS} = 0 V, T_J = 85°C			–5	μA
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = –5 V, V_{GS} = –4.5 V	–700			mA
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = –4.5 V, I_D = –350 mA		0.8	1.2	Ω
		V_{GS} = –2.5 V, I_D = –300 m A		1.2	1.6	
		V_{GS} = –1.8 V, I_D = –150 m A		1.8	2.7	
Forward Transconductance[a]	g_{fs}	V_{DS} = –10 V, I_D = –250 mA		0.4		S
Diode Forward Voltage[a]	V_{SD}	I_S = –150 mA, V_{GS} = 0 V		–0.8	–1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = –10 V, V_{GS} = –4.5 V, I_D = –250 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 V, R_L = 47 Ω I_D ≅ –200 mA, V_{GEN} = –4.5 V, R_G = 10 Ω		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 ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

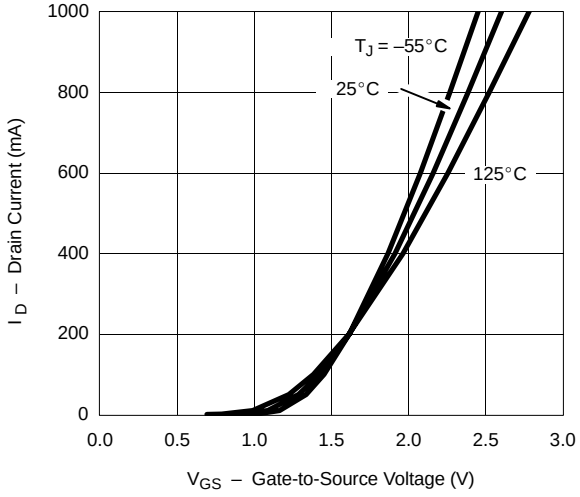
TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS NOTED)

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

Output Characteristics

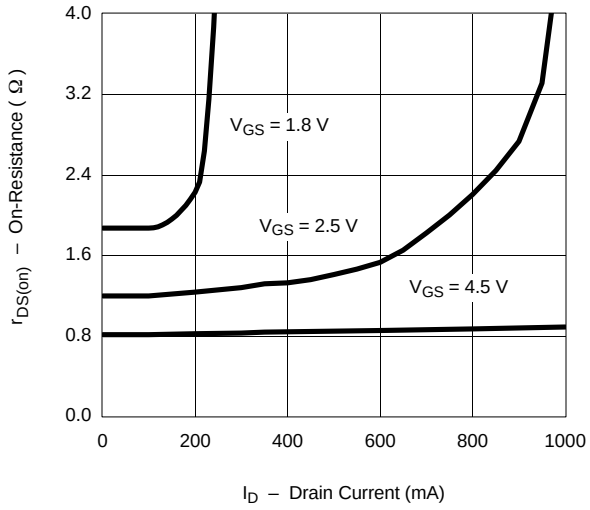


Transfer Characteristics

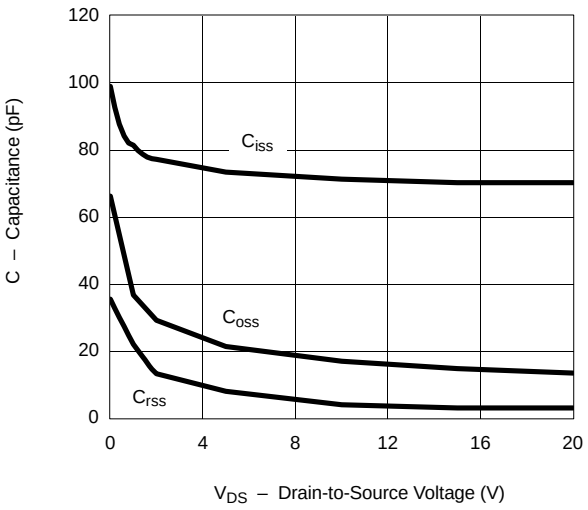


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS NOTED)

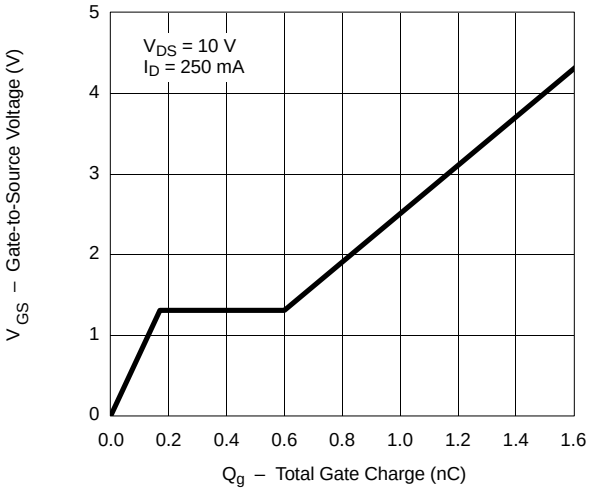
On-Resistance vs. Drain Current



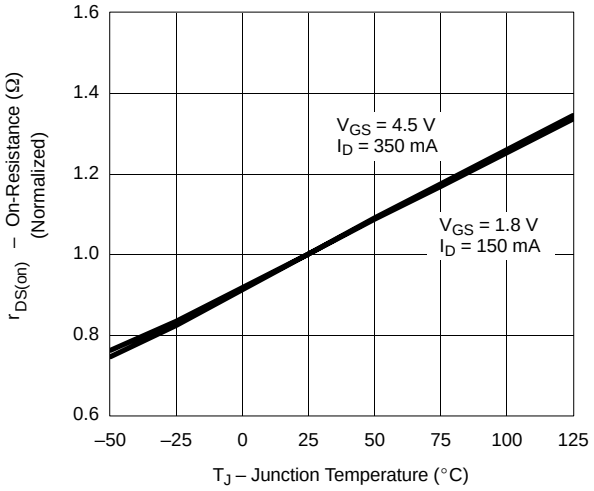
Capacitance



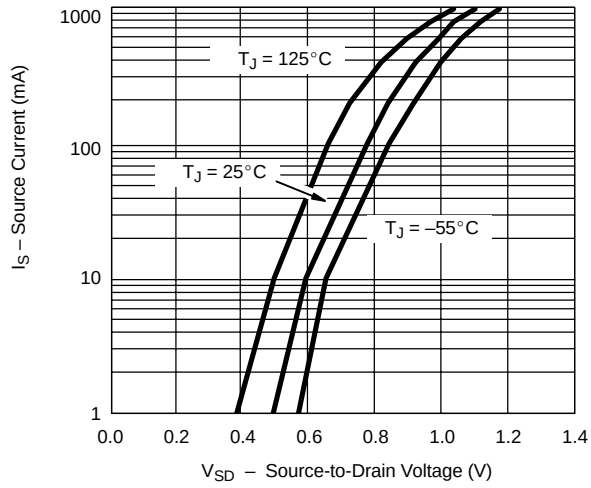
Gate Charge



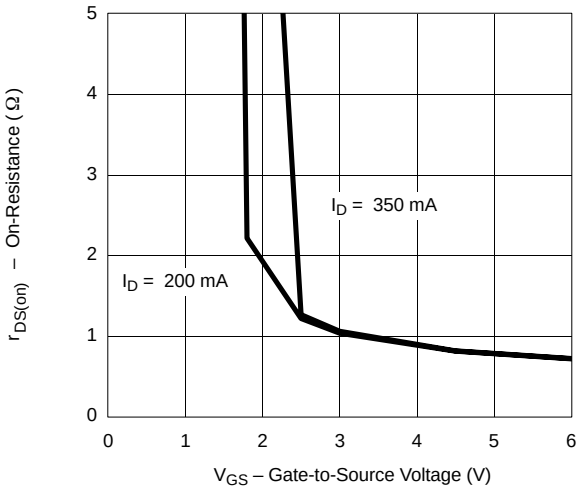
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

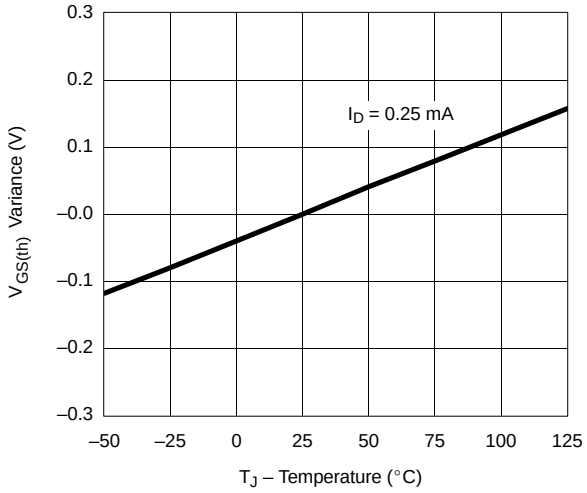


On-Resistance vs. Gate-to-Source Voltage

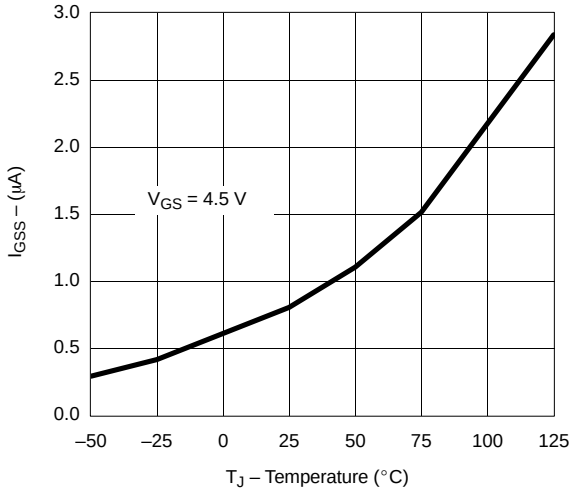


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS NOTED)

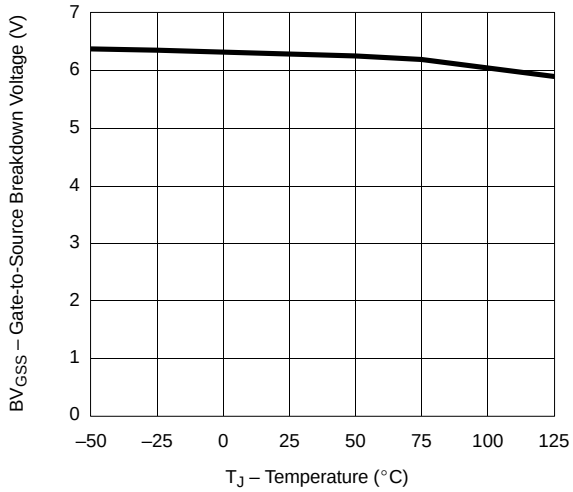
Threshold Voltage Variance vs. Temperature



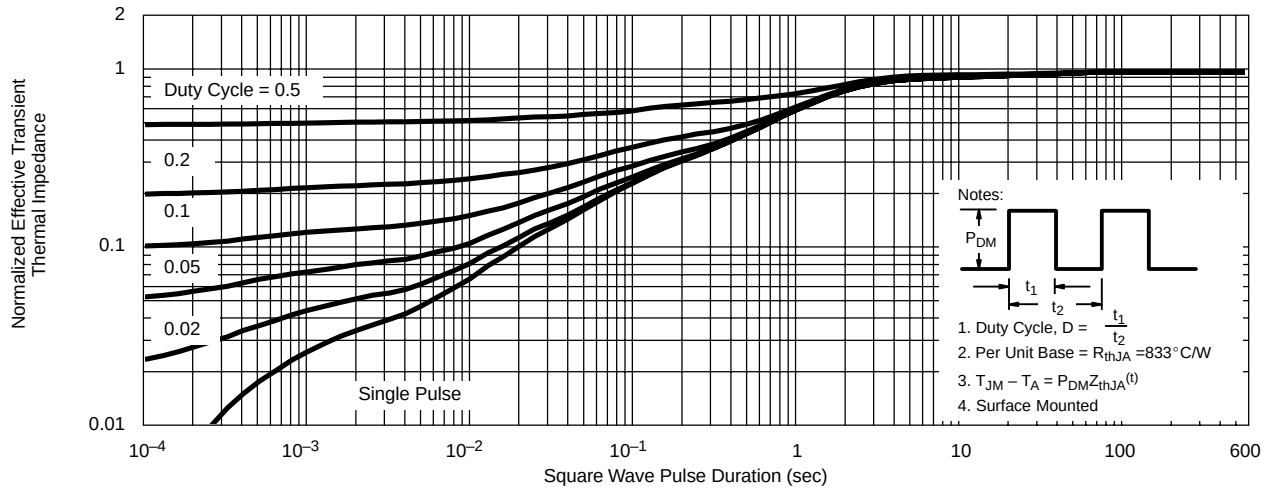
I_{GSS} vs. Temperature



BV_{GSS} vs. Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient (SC-75A)



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TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS NOTED)