P-Channel 20-V (D-S) MOSFET

TrenchFET®
MOSFETs
1.5-V Rated

ESD Protected
2000 V

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (mA)
-20	8 @ V_{GS} = -4.5 V	-150
	12 @ V_{GS} = -2.5 V	-125
	15 @ V_{GS} = -1.8 V	-100
	20 @ V_{GS} = -1.5 V	-30

FEATURES

- High-Side Switching
- Low On-Resistance: 8 Ω
- Low Threshold: 0.9 V (typ)
- Fast Switching Speed: 45 ns
- 1.8-V Operation
- Gate-Source ESD Protection

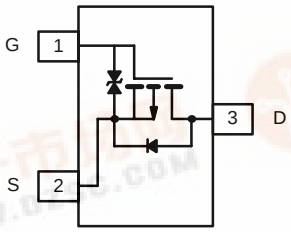
BENEFITS

- 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

SC-75A (SOT- 416): Si1031R
SC-89 (SOT- 490): Si1031X

Marking Code: H

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)								
Parameter		Symbol	Si1031R		Si1031X		Unit
			5 secs	Steady State	5 secs	Steady State	
Drain-Source Voltage		V_{DS}	-20				V
Gate-Source Voltage		V_{GS}	±6				
Continuous Drain Current (T_J = 150°C)[a]	T_A = 25°C	I_D	-150	-140	-165	-155	mA
	T_A = 85°C		-110	-100	-150	-125	
Pulsed Drain Current[a]		I_{DM}	-500		-600		
Continuous Source Current (diode conduction)[a]		I_S	-250	-200	-340	-240	
Maximum Power Dissipation[a]	T_A = 25°C	P_D	280	250	340	300	mW
	T_A = 85°C		145	130	170	150	
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. Surface Mounted on FR4 Board.

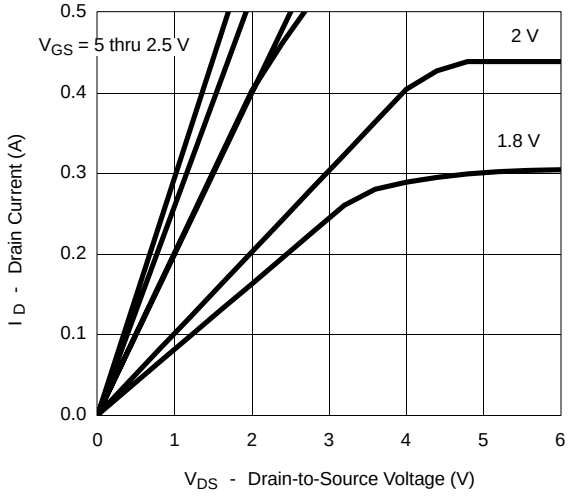
SPECIFICATIONS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ[a]	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -250 μA	-0.40		-1.20	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±2.8 V		±0.5	±1	μA
		V_{DS} = 0 V, V_{GS} = ±4.5 V		±1	±2	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -16 V, V_{GS} = 0 V		-1	-500	nA
		V_{DS} = -16 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	-200			mA
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = -4.5 V, I_D = -150 mA			8	Ω
		V_{GS} = -2.5 V, I_D = -125 m A			12	
		V_{GS} = -1.8 V, I_D = -100 m A			15	
		V_{GS} = -1.5 V, I_D = -30 m A			20	
Forward Transconductance[a]	g_{fs}	V_{DS} = -10 V, I_D = -150 mA		0.4		S
Diode Forward Voltage[a]	V_{SD}	I_S = -150 mA, V_{GS} = 0 V			-1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = -10 V, V_{GS} = -4.5 V, I_D = -150 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 = 65 Ω I_D ≅ -150 mA, V_{GEN} = -4.5 V, R_G = 10 Ω			55	ns
Rise Time	t_r				30	
Turn-Off Delay Time	$t_{d(off)}$				60	
Fall Time	t_f				30	

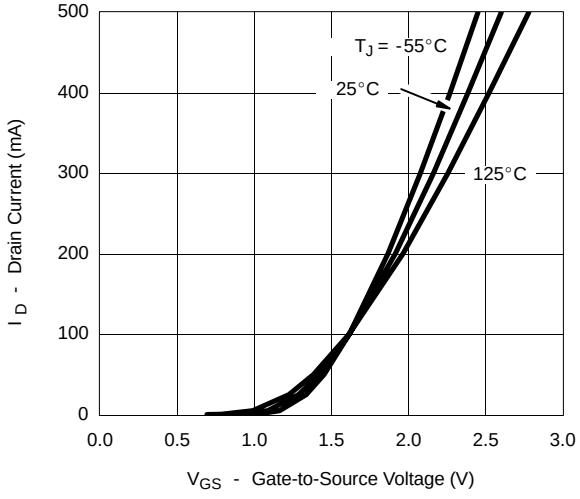
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS NOTED)

Output Characteristics

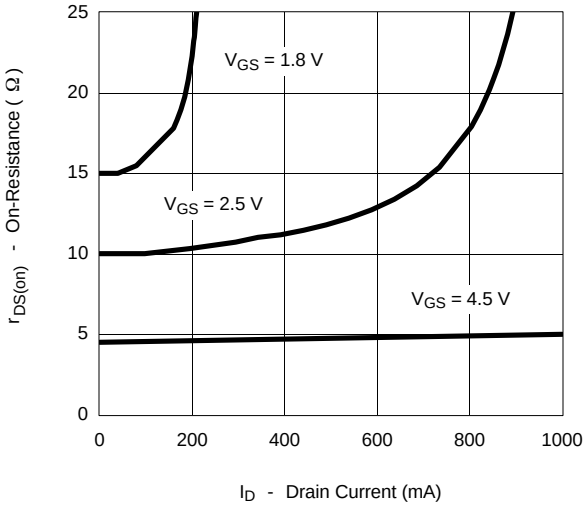


Transfer Characteristics

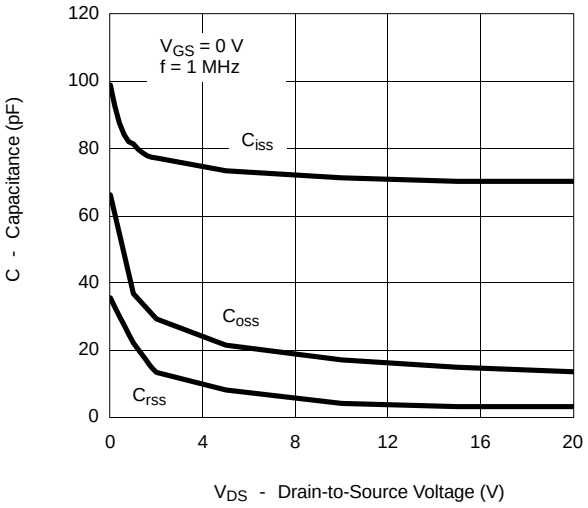


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS NOTED)

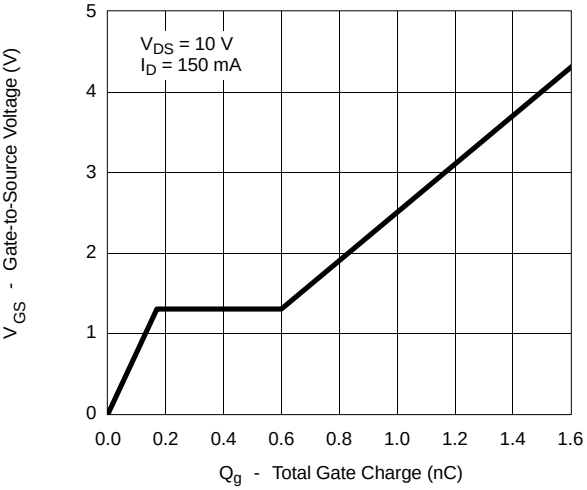
On-Resistance vs. Drain Current



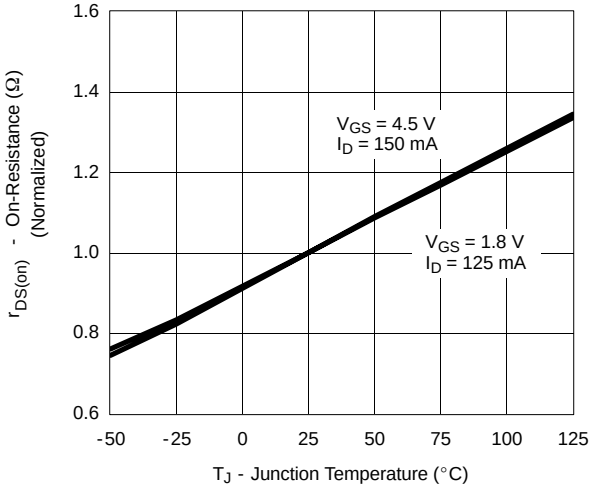
Capacitance



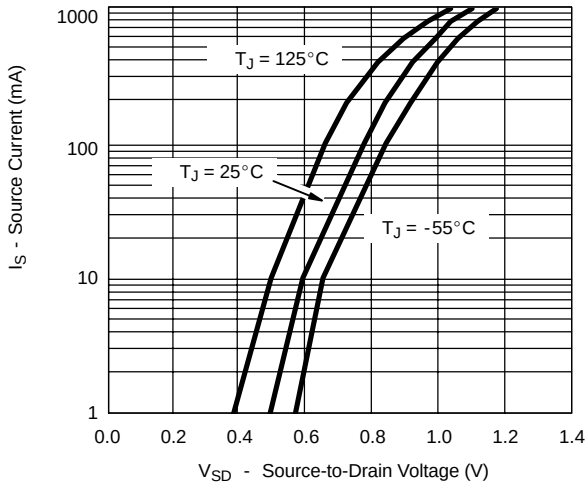
Gate Charge



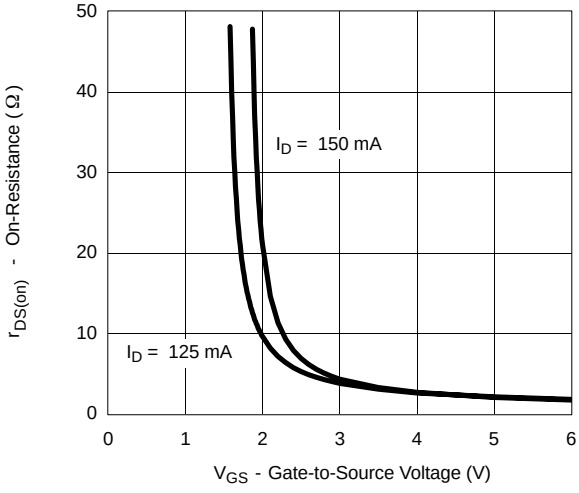
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

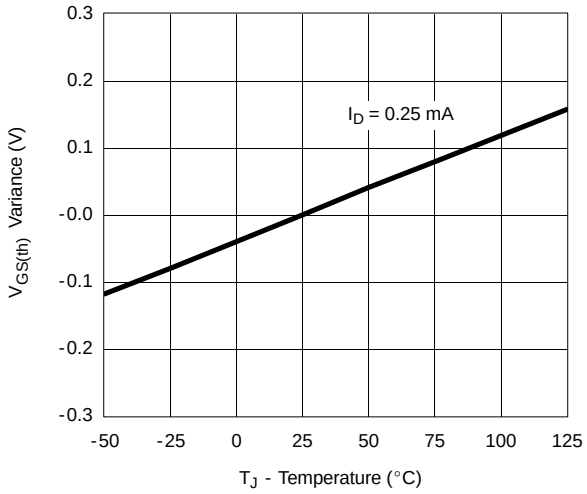


On-Resistance vs. Gate-to-Source Voltage

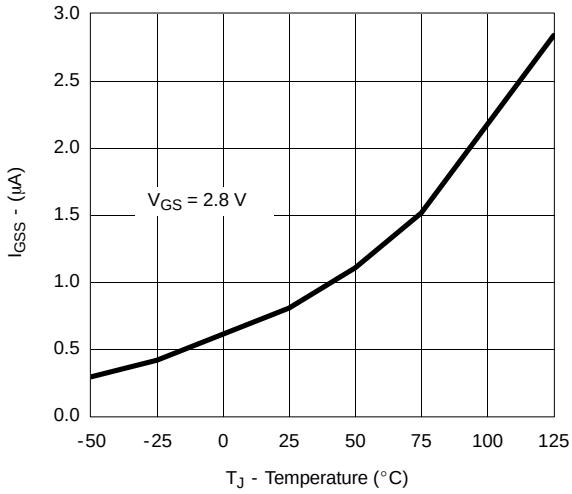


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS NOTED)

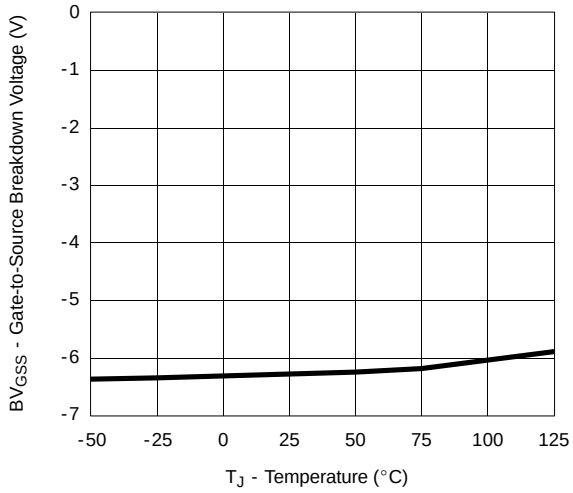
Threshold Voltage Variance vs. Temperature



I_{GSS} vs. Temperature



BV_{GSS} vs. Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient (SC-75A, Si1031R Only)