



## N-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (mA)
20	5 @ $V_{GS} = 4.5$ V	200
	7 @ $V_{GS} = 2.5$ V	175
	9 @ $V_{GS} = 1.8$ V	150
	10 @ $V_{GS} = 1.5$ V	50

**TrenchFET®**

MOSFETs

**1.5-V Rated**



**ESD Protected  
2000 V**

### FEATURES

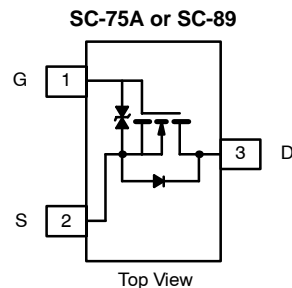
- Low-Side Switching
- Low On-Resistance: 5  $\Omega$
- Low Threshold: 0.9 V (typ)
- Fast Switching Speed: 35 ns
- 1.8-V Operation
- Gate-Source ESD Protection

### 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



Ordering Information:

SC-75A (SOT-416): Si1032R-T1  
 SC-75A (SOT-416): Si1032R-T1—E3 (Lead Free)  
 SC-89 (SOT-490): Si1032X-T1  
 SC-89 (SOT-490): Si1032X-T1—E3 (Lead Free)

Marking Code: G

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

Parameter	Symbol	Si1032R		Si1032X		Unit
		5 secs	Steady State	5 secs	Steady State	
Drain-Source Voltage	$V_{DS}$	20				V
Gate-Source Voltage	$V_{GS}$	$\pm 6$				
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>	$T_A = 25^\circ\text{C}$	200	140	210	200	mA
	$T_A = 85^\circ\text{C}$	110	100	150	140	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	500		600		
Continuous Source Current (diode conduction) <sup>a</sup>	$I_S$	250	200	300	240	
Maximum Power Dissipation <sup>a</sup> for SC-75	$T_A = 25^\circ\text{C}$	280	250	340	300	mW
	$T_A = 85^\circ\text{C}$	145	130	170	150	
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

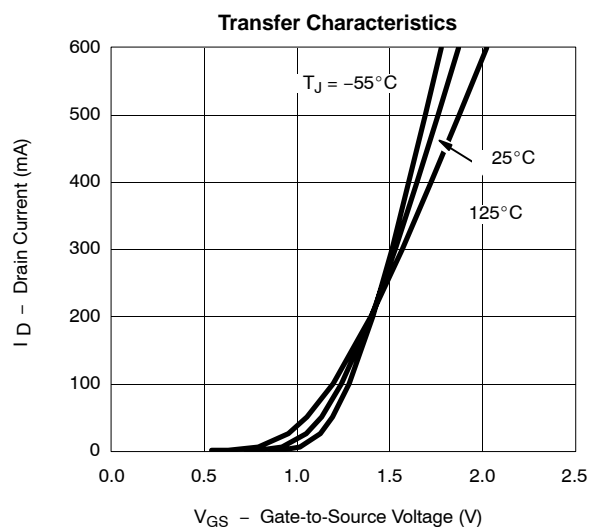
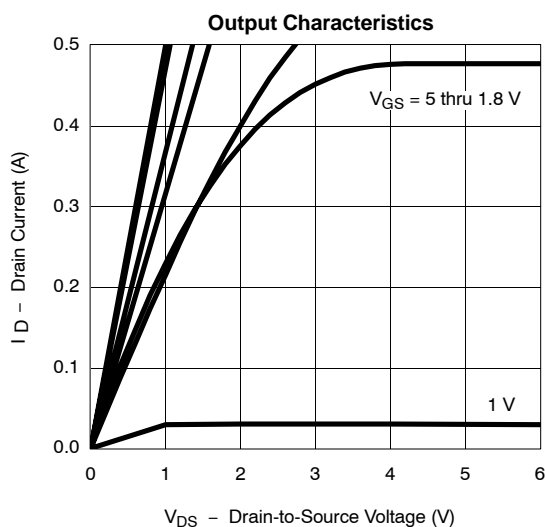
c. Surface Mounted on FR4 Board.

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.40	0.7	1.2	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 2.8\ \text{V}$		$\pm 0.5$	$\pm 1.0$	$\mu\text{A}$
		$V_{DS} = 0\ \text{V}, V_{GS} = \pm 4.5\ \text{V}$		$\pm 1.0$	$\pm 3.0$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20\ \text{V}, V_{GS} = 0\ \text{V}$			1	
		$V_{DS} = 20\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 55^\circ\text{C}$			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5\ \text{V}, V_{GS} = 4.5\ \text{V}$	250			mA
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 4.5\ \text{V}, I_D = 200\ \text{mA}$			5	$\Omega$
		$V_{GS} = 2.5\ \text{V}, I_D = 175\ \text{mA}$			7	
		$V_{GS} = 1.8\ \text{V}, I_D = 150\ \text{mA}$			9	
		$V_{DS} = 1.5\ \text{V}, I_D = 40\ \text{mA}$			10	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10\ \text{V}, I_D = 200\ \text{mA}$		0.5		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 150\ \text{mA}, V_{GS} = 0\ \text{V}$			1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 10\ \text{V}, V_{GS} = 4.5\ \text{V}, I_D = 150\ \text{mA}$		750		$\mu\text{C}$
Gate-Source Charge	$Q_{gs}$			75		
Gate-Drain Charge	$Q_{gd}$			225		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\ \text{V}, R_L = 47\ \Omega$ $I_D \cong 200\ \text{mA}, V_{GEN} = 4.5\ \text{V}, R_G = 10\ \Omega$			50	ns
Rise Time	$t_r$				25	
Turn-Off Delay Time	$t_{d(off)}$				50	
Fall Time	$t_f$				25	

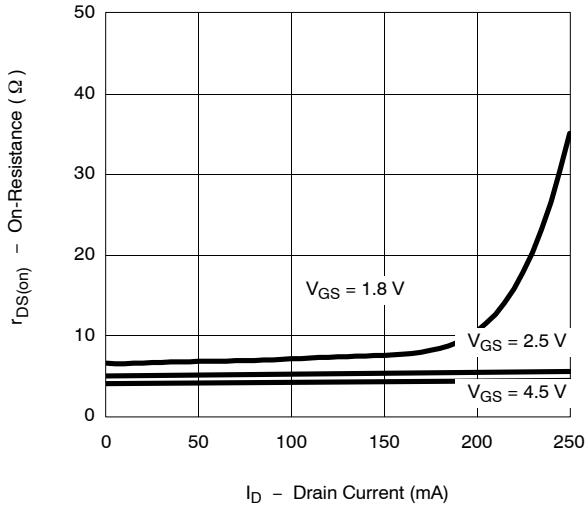
## Notes

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

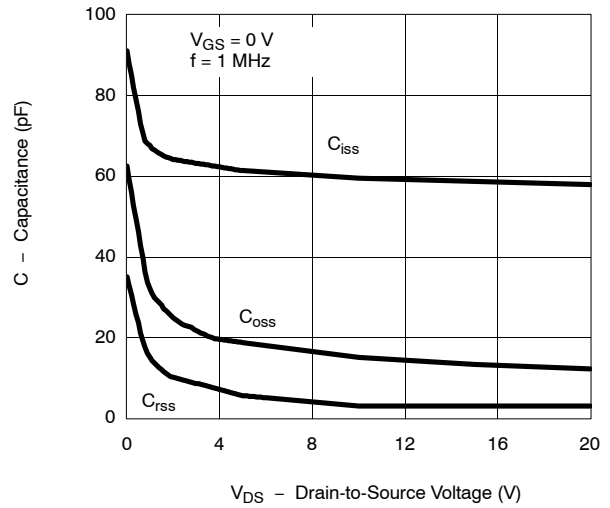
**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS NOTED)**

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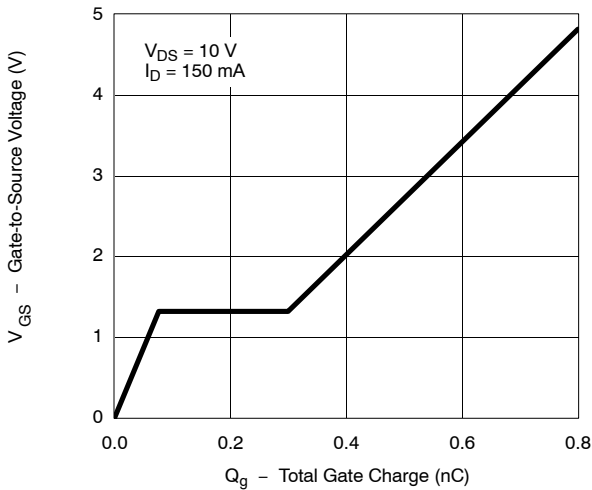
**On-Resistance vs. Drain Current**



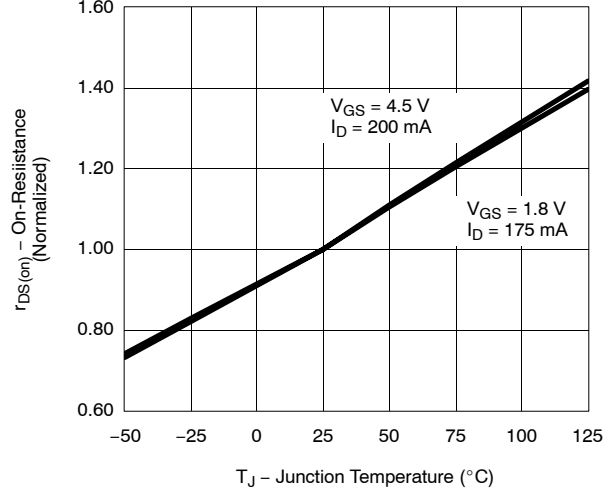
**Capacitance**



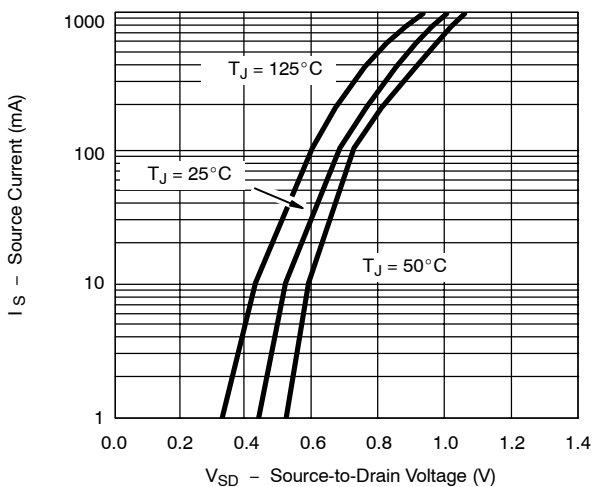
**Gate Charge**



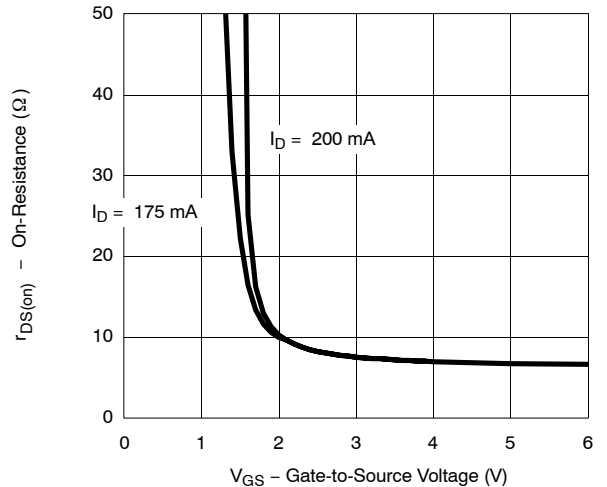
**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**



**On-Resistance vs. Gate-to-Source Voltage**



**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C UNLESS NOTED)**

