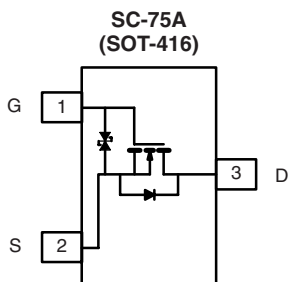


## N-Channel 60-V (D-S) MOSFET

### PRODUCT SUMMARY

$V_{DS(min.)}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$V_{GS(th)}$ (V)	$I_D$ (mA)
60	1.25 at $V_{GS} = 10$ V	1 to 2.5	330



Marking Code: E

Ordering Information: Si1022R-T1-E3 (Lead (Pb)-free)  
Si1022R-T1-GE3 (Lead (Pb)-free and Halogen-free)

### FEATURES

- Halogen-free Option Available
- TrenchFET® Power MOSFETs
- Low On-Resistance: 1.25  $\Omega$
- Low Threshold: 2.5 V
- Low Input Capacitance: 30 pF
- Fast Switching Speed: 25 ns
- Low Input and Output Leakage
- Miniature Package
- ESD Protected: 2000 V


**RoHS**  
COMPLIANT

### APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid State Relays

### BENEFITS

- Low Offset Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Low Error Voltage
- Small Board Area

### ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ , unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>a</sup>	$I_D$	$T_A = 25^\circ\text{C}$	330
		$T_A = 85^\circ\text{C}$	240
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	650	mA
Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25^\circ\text{C}$	250
		$T_A = 85^\circ\text{C}$	130
Thermal Resistance, Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	500	$^\circ\text{C/W}$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	$^\circ\text{C}$

Notes:

a. Surface Mounted on FR4 board, Power Applied for  $t \leq 10$  s.

<b>SPECIFICATIONS</b> $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 10\text{ }\mu\text{A}$	60			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 0.25\text{ mA}$	1		2.5	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 10\text{ V}$ $T_J = 85\text{ }^{\circ}\text{C}$			$\pm 150$	nA
		$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 5\text{ V}$			$\pm 20$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ $T_J = 85\text{ }^{\circ}\text{C}$			10	
		$V_{DS} = 60\text{ V}$ , $V_{GS} = 0\text{ V}$			1	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 10\text{ V}$ , $V_{GS} = 4.5\text{ V}$	500			mA
		$V_{DS} = 7.5\text{ V}$ , $V_{GS} = 10\text{ V}$	800			
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}$ , $I_D = 200\text{ mA}$ $T_J = 125\text{ }^{\circ}\text{C}$			3.0	$\Omega$
		$V_{GS} = 10\text{ V}$ , $I_D = 500\text{ mA}$			1.25	
		$T_J = 125\text{ }^{\circ}\text{C}$			2.25	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}$ , $I_D = 200\text{ mA}$	100			mS
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$V_{GS} = 0\text{ V}$ , $I_S = 200\text{ mA}$			1.3	V
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$		30		pF
Output Capacitance	$C_{oss}$			6		nC
Reverse Transfer Capacitance	$C_{rss}$			2.5		
Gate Charge	$Q_g$	$V_{DS} = 10\text{ V}$ , $I_D = 250\text{ mA}$ , $V_{GS} = 4.5\text{ V}$			0.6	
<b>Switching<sup>b, c</sup></b>						
Turn-On Time	$t_{(on)}$	$V_{DD} = 30\text{ V}$ , $R_L = 150\text{ }\Omega$ , $I_D = 200\text{ mA}$ , $V_{GEN} = 10\text{ V}$ , $R_G = 10\text{ }\Omega$			25	ns
Turn-Off Time	$t_{(off)}$				35	

Notes:

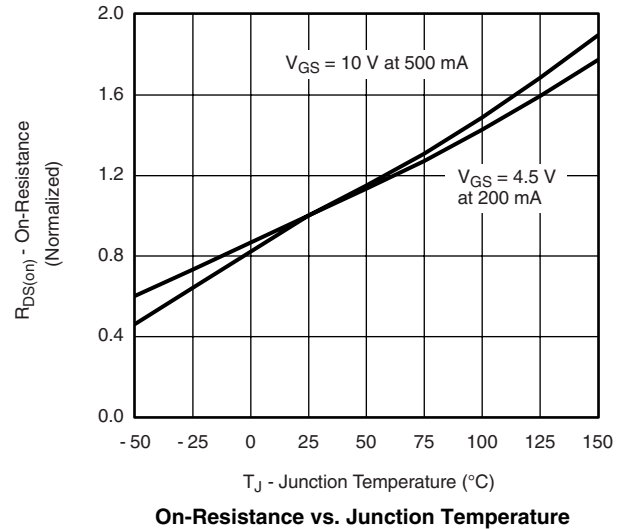
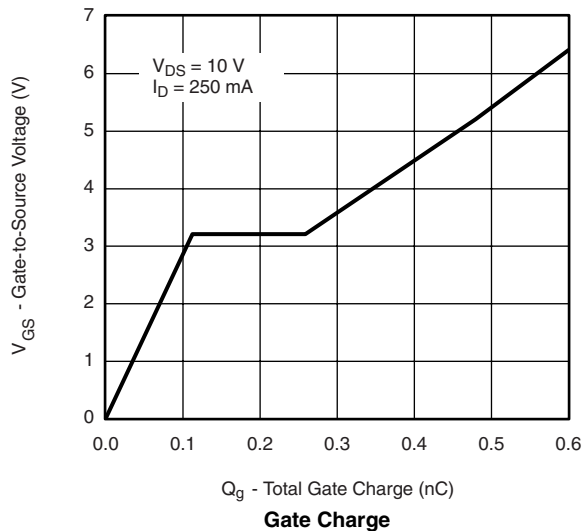
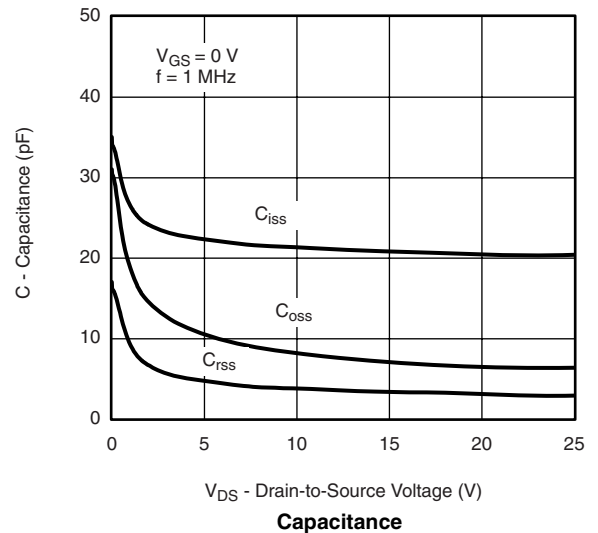
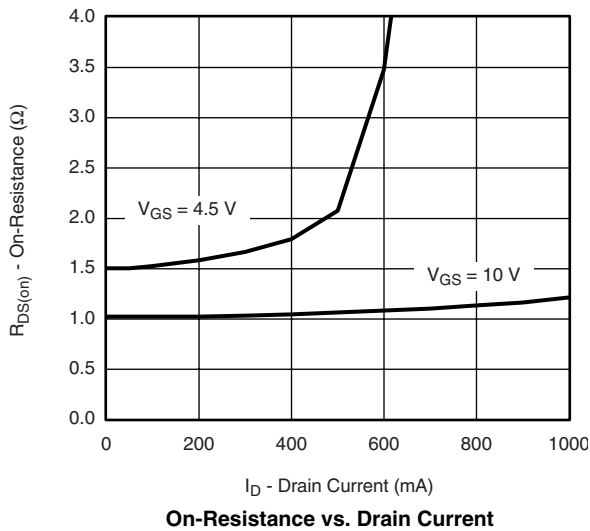
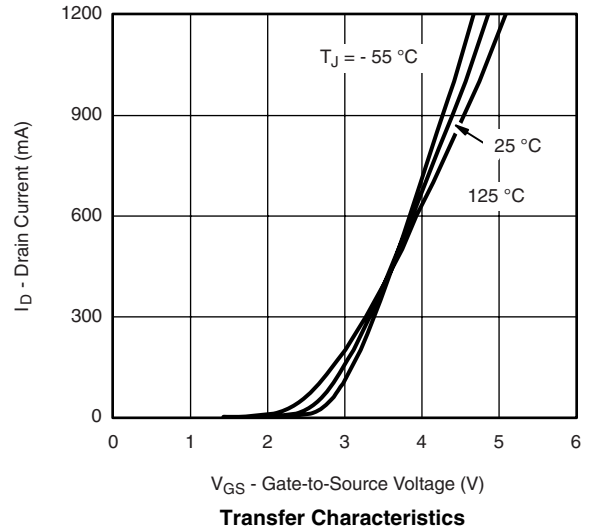
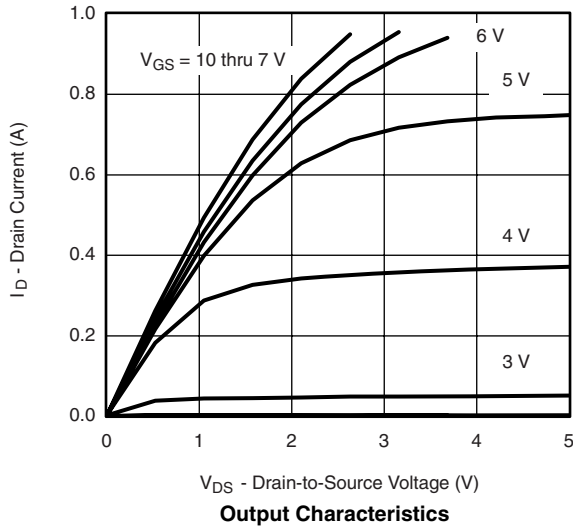
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

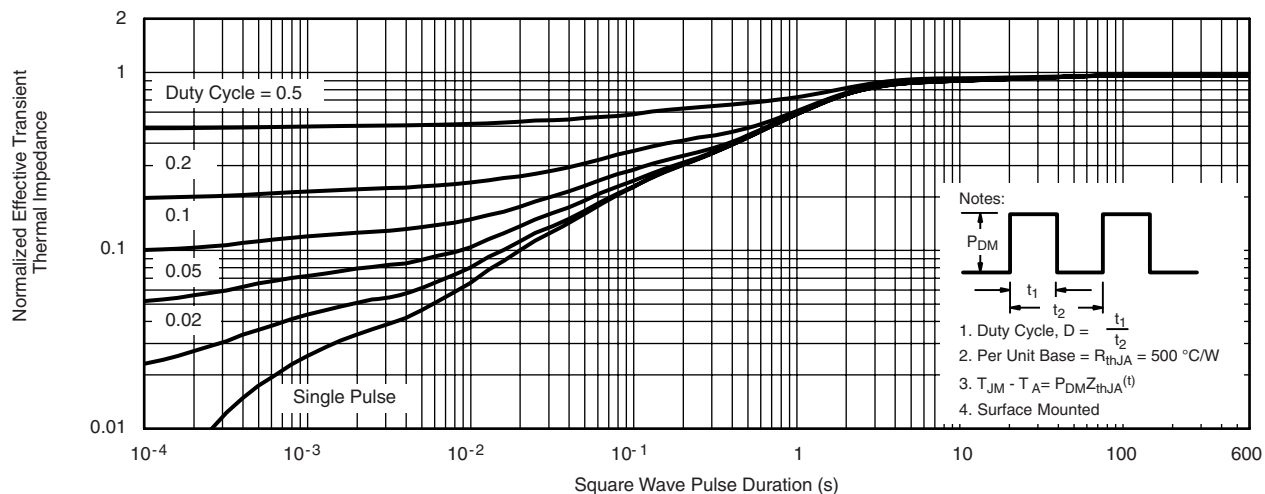
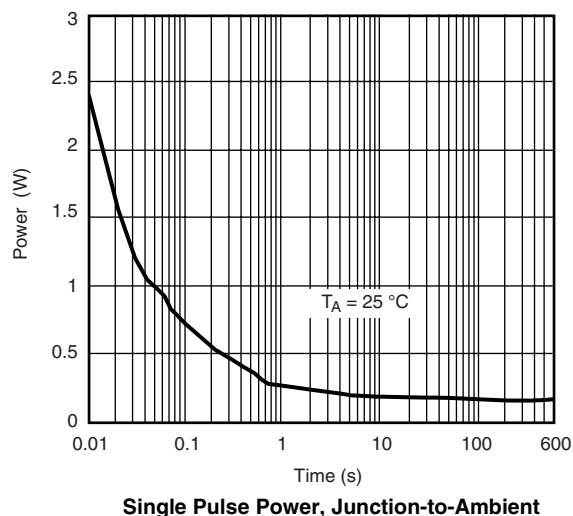
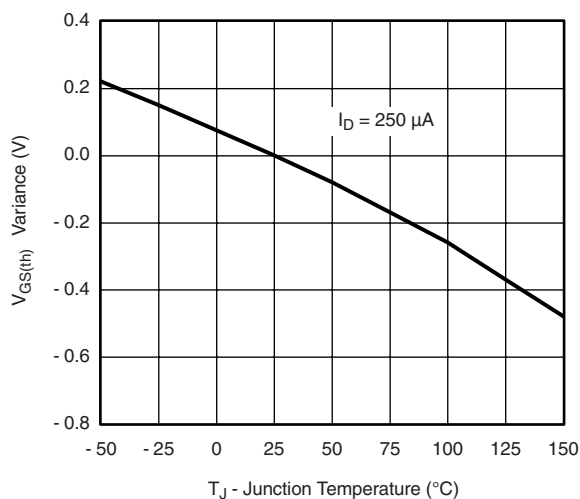
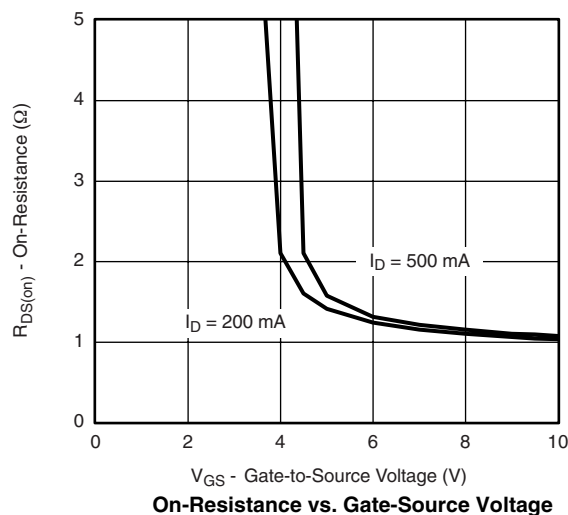
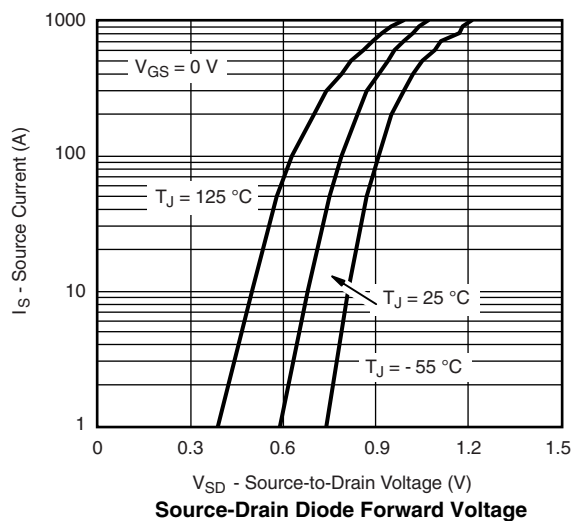
b. For DESIGN AID ONLY, not subject to production testing.

c. Switching time is essentially independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## TYPICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$ , unless otherwise noted



**TYPICAL CHARACTERISTICS**  $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted


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