

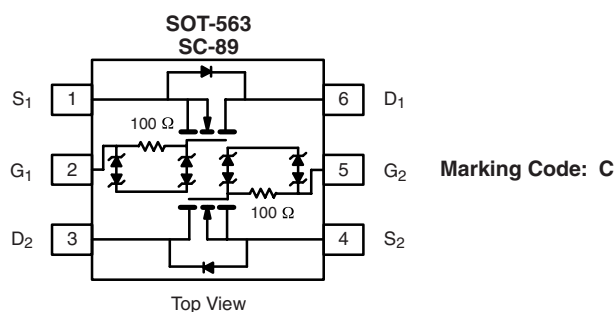
## Dual N-Channel 20-V (D-S) MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (mA)
20	0.70 at $V_{GS} = 4.5$ V	600
	0.85 at $V_{GS} = 2.5$ V	500
	1.25 at $V_{GS} = 1.8$ V	350

### FEATURES

- Halogen-free Option Available
- TrenchFET® Power MOSFET: 1.8 V Rated
- Very Small Footprint
- High-Side Switching
- Low On-Resistance: 0.7  $\Omega$
- Low Threshold: 0.8 V (typ.)
- Fast Switching Speed: 10 ns
- 1.8 V Operation
- Gate-Source ESD Protected: 2000 V


**RoHS**  
COMPLIANT


Ordering Information: Si1024X-T1-E3 (Lead (Pb)-free)  
Si1024X-T1-GE3 (Lead (Pb)-free and Halogen-free)

### 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

### ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	5 s	Steady State	Unit
Drain-Source Voltage	$V_{DS}$	20		V
Gate-Source Voltage	$V_{GS}$	$\pm 6$		
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$I_D$	515	485	mA
		370	350	
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	650		
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	450	380	
Maximum Power Dissipation <sup>a</sup>	$P_D$	280	250	mW
		145	130	
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.

b. Pulse width limited by maximum junction temperature.

<b>SPECIFICATIONS</b> $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	0.45		0.9	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 4.5\text{ V}$		$\pm 0.5$	$\pm 1.0$	$\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20\text{ V}$ , $V_{GS} = 0\text{ V}$		0.3	100	nA
		$V_{DS} = 20\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 85\text{ }^{\circ}\text{C}$			5	$\mu\text{A}$
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}$ , $V_{GS} = 4.5\text{ V}$	700			mA
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}$ , $I_D = 600\text{ mA}$		0.41	0.70	$\Omega$
		$V_{GS} = 2.5\text{ V}$ , $I_D = 500\text{ mA}$		0.53	0.85	
		$V_{GS} = 1.8\text{ V}$ , $I_D = 350\text{ mA}$		0.70	1.25	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}$ , $I_D = 400\text{ mA}$		1.0		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 150\text{ mA}$ , $V_{GS} = 0\text{ V}$		0.8	1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 10\text{ V}$ , $V_{GS} = 4.5\text{ V}$ , $I_D = 250\text{ mA}$		750		pC
Gate-Source Charge	$Q_{gs}$			75		
Gate-Drain Charge	$Q_{gd}$			225		
Turn-On Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}$ , $R_L = 47\text{ }\Omega$ $I_D \approx 200\text{ mA}$ , $V_{GEN} = 4.5\text{ V}$ , $R_G = 10\text{ }\Omega$		10		ns
Turn-Off Time	$t_{d(off)}$			36		

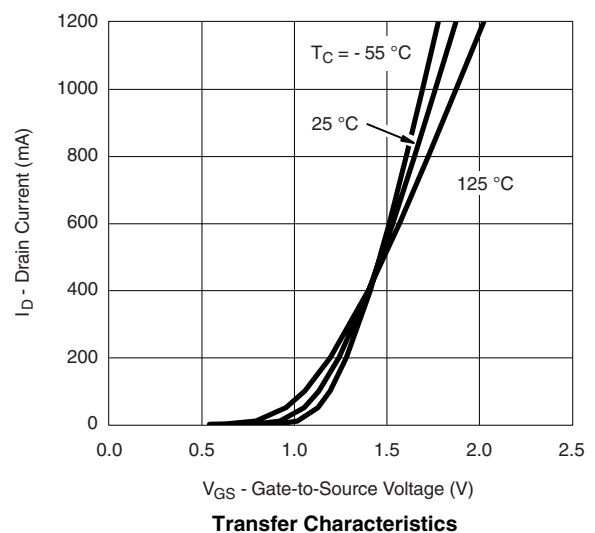
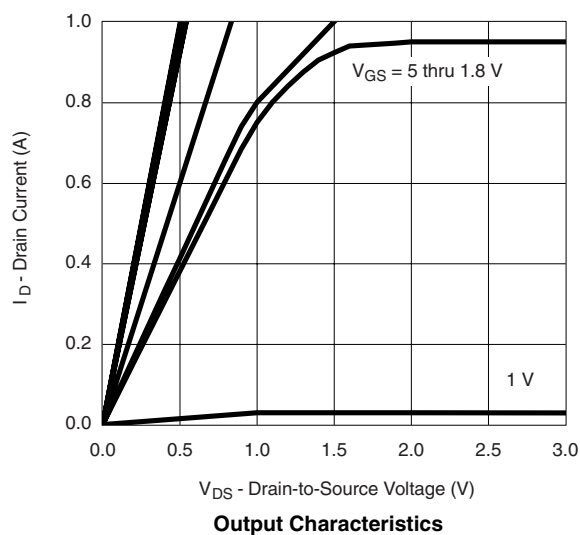
Notes:

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

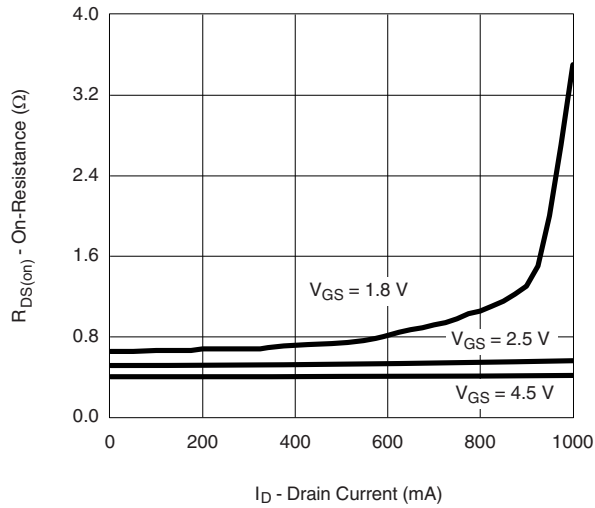
b. Guaranteed by design, not subject to production testing.

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.

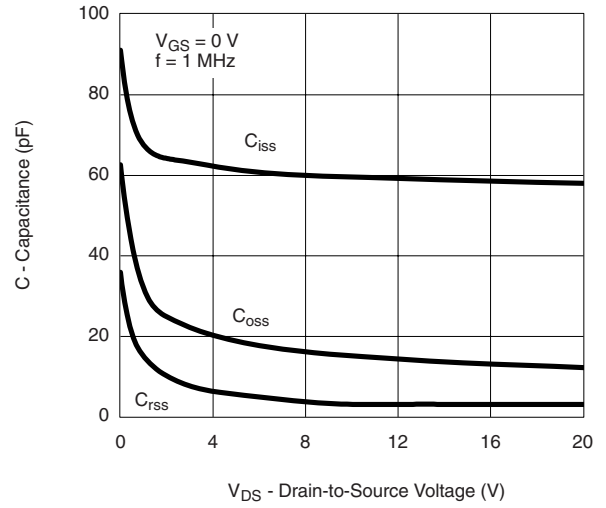
## TYPICAL CHARACTERISTICS $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted



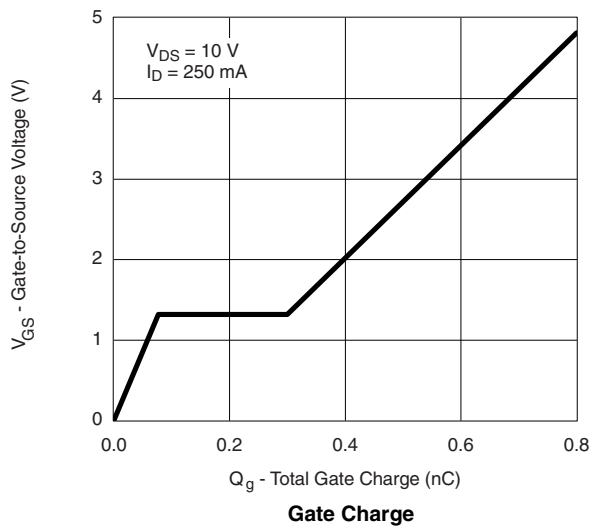
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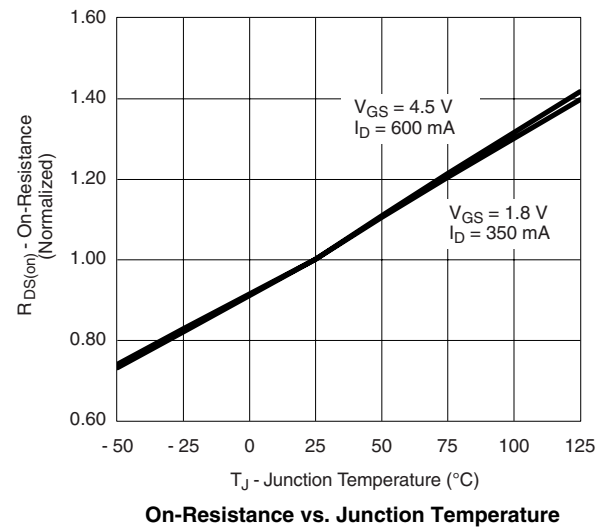
On-Resistance vs. Drain Current



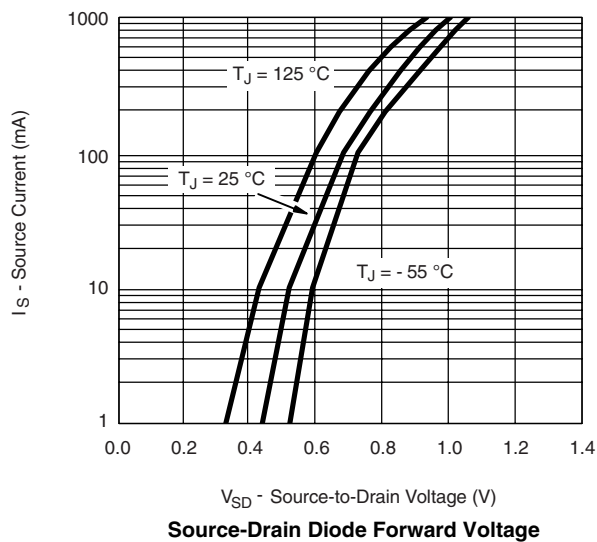
Capacitance



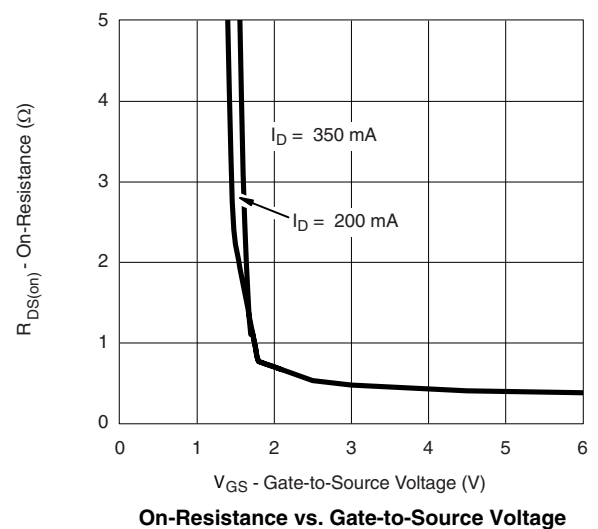
Gate Charge



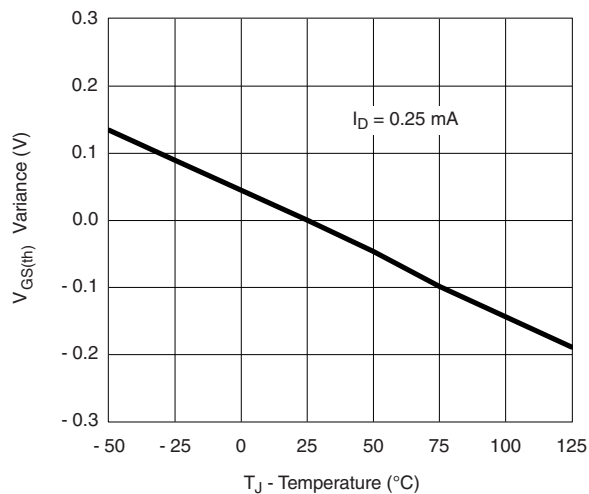
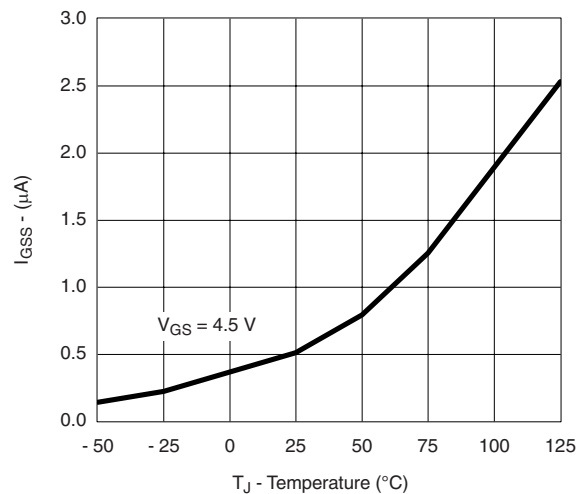
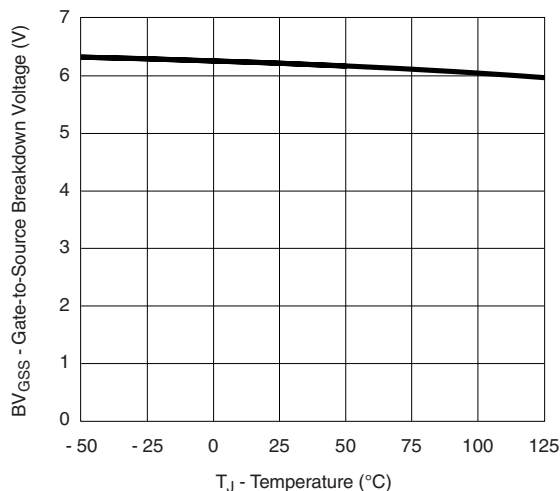
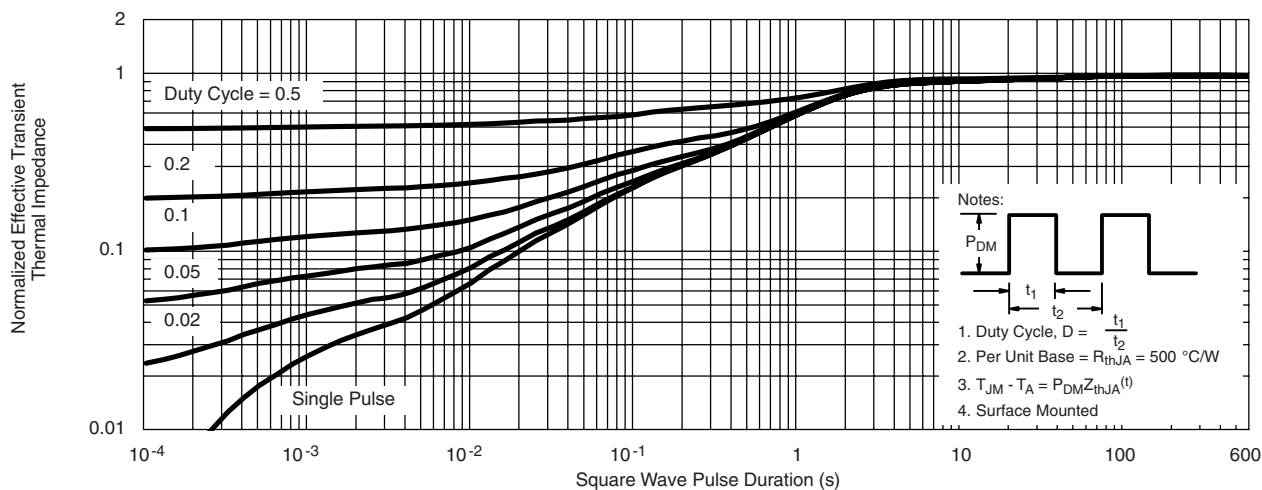
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

**TYPICAL CHARACTERISTICS**  $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted**Threshold Voltage Variance vs. Temperature** **$I_{GSS}$  vs. Temperature** **$BV_{GSS}$  vs. Temperature****Normalized Thermal Transient Impedance, Junction-to-Ambient**

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