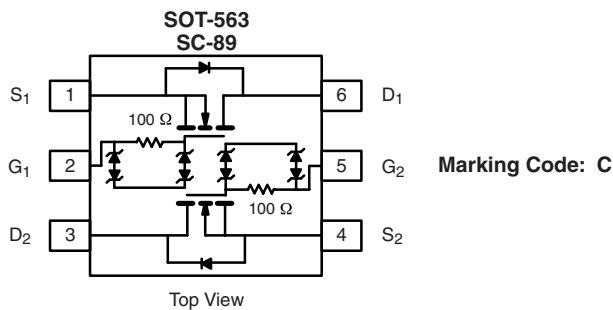


Dual N-Channel 20-V (D-S) MOSFET

| PRODUCT SUMMARY | | |
|-----------------|---------------------------|------------|
| V_{DS} (V) | $R_{DS(on)}$ (Ω) | 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 |



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

FEATURES

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



RoHS
COMPLIANT

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} | ± 6 | | | |
| Continuous Drain Current ($T_J = 150$ °C) ^a | I_D | $T_A = 25$ °C | 515 | 485 | mA |
| | | $T_A = 85$ °C | 370 | 350 | |
| Pulsed Drain Current ^b | I_{DM} | 650 | | | |
| Continuous Source Current (Diode Conduction) ^a | I_S | 450 | 380 | | |
| Maximum Power Dissipation ^a | P_D | $T_A = 25$ °C | 280 | 250 | mW |
| | | $T_A = 85$ °C | 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.

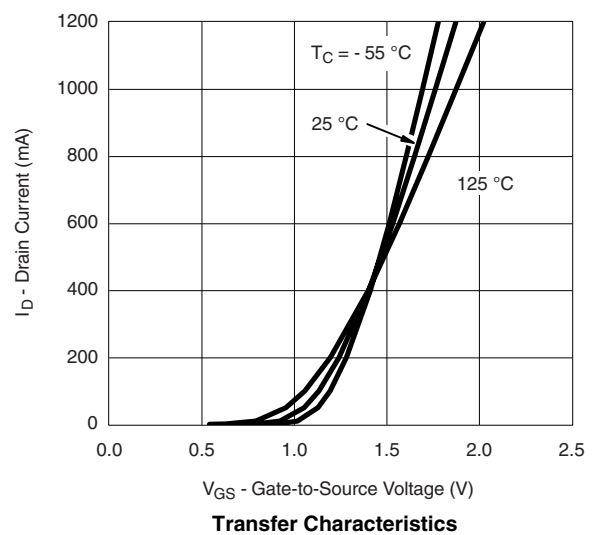
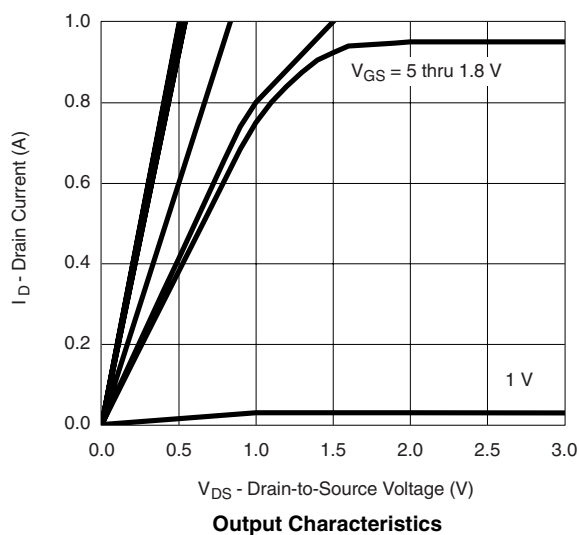
| SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted | | | | | | |
|--|--------------|---|------|-----------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Static | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}$,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

Notes:

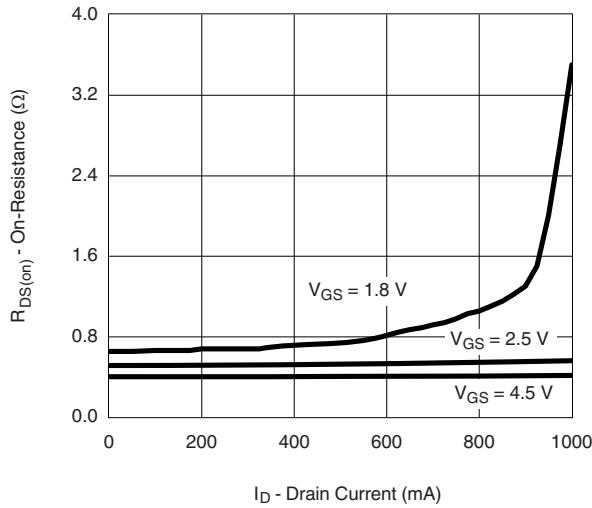
- a. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

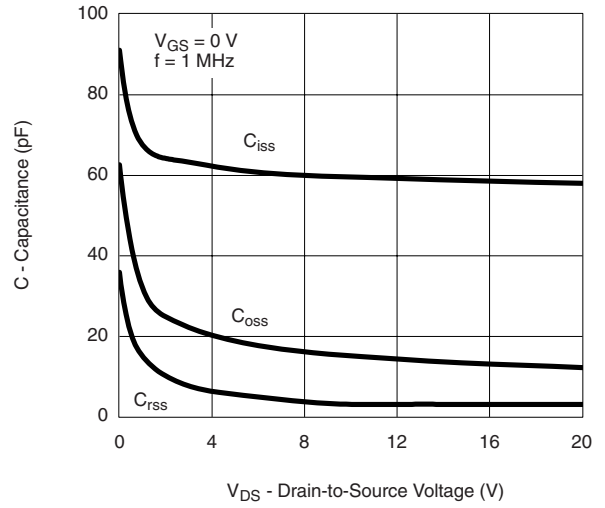
TYPICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, unless otherwise noted



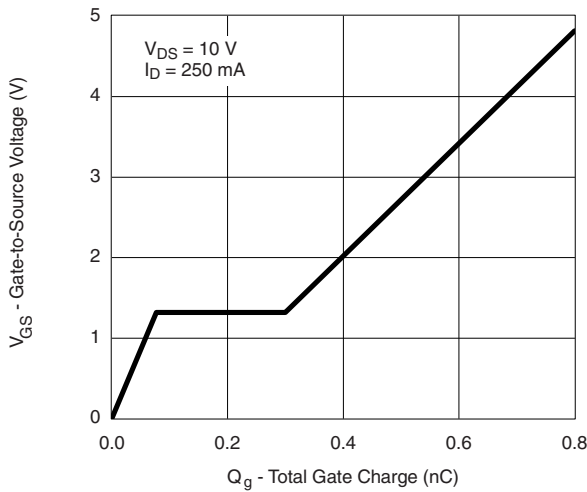
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



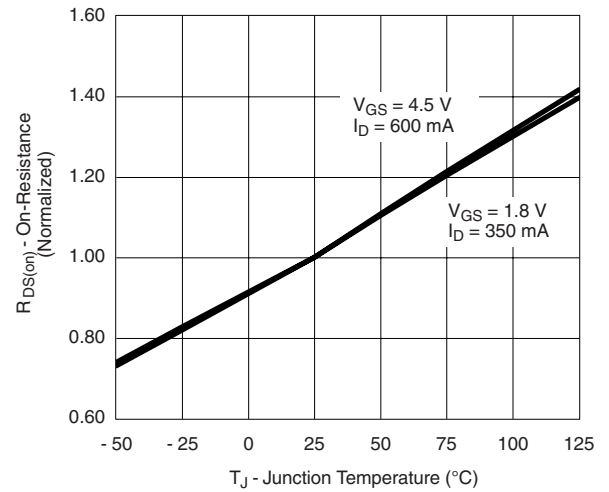
On-Resistance vs. Drain Current



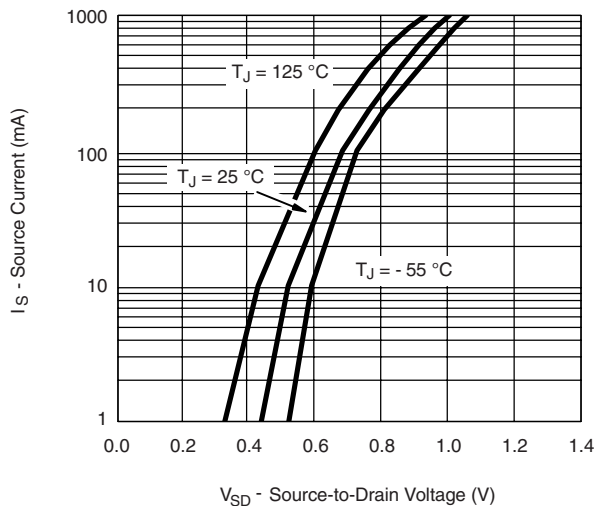
Capacitance



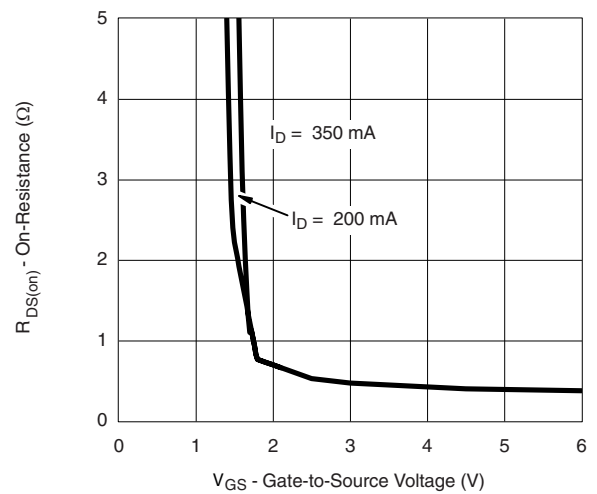
Gate Charge



On-Resistance vs. Junction Temperature

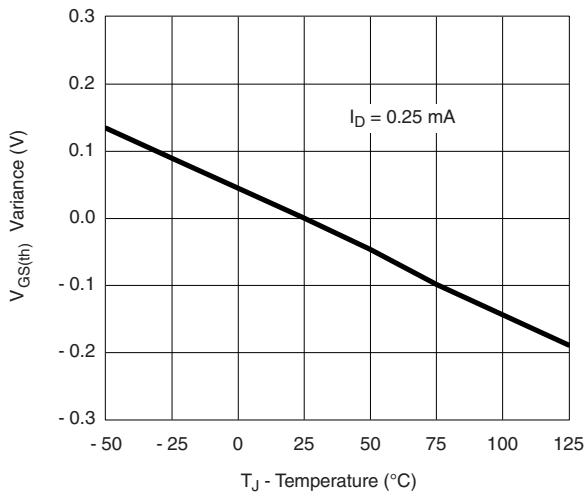


Source-Drain Diode Forward Voltage

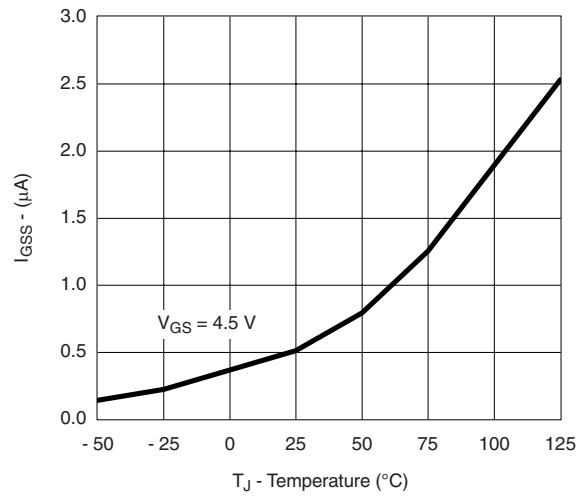


On-Resistance vs. Gate-to-Source Voltage

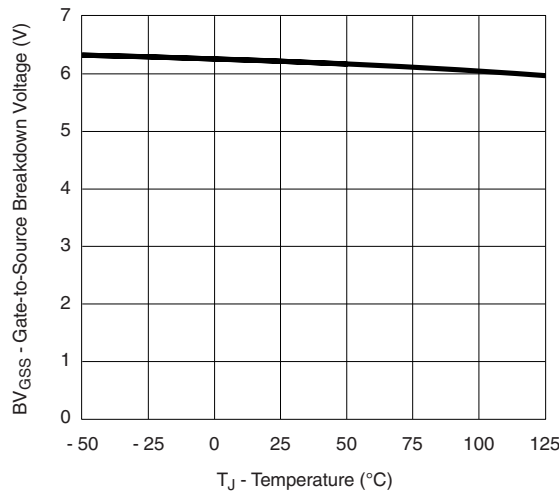
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



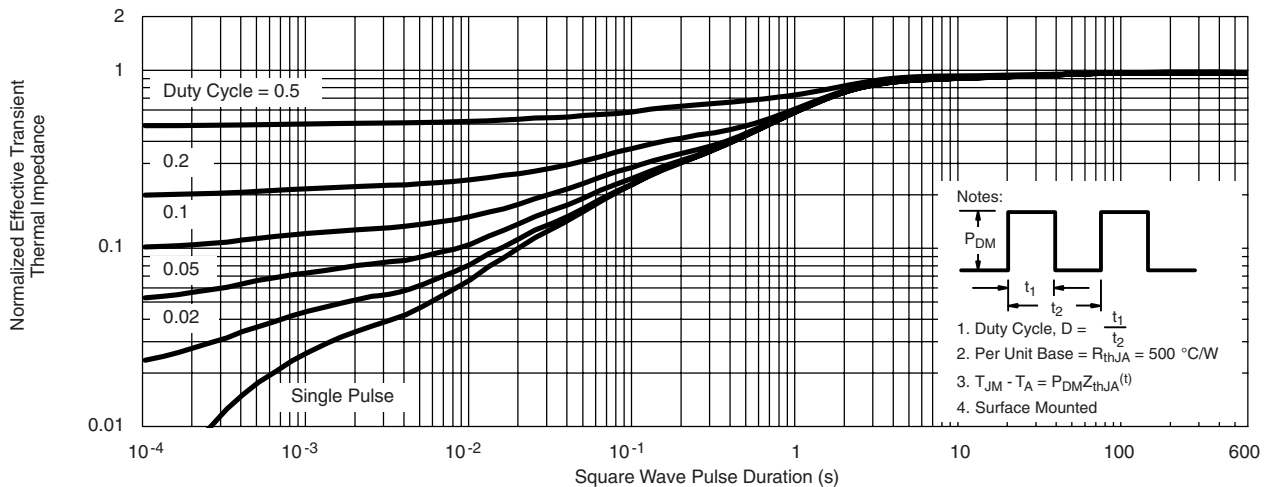
Threshold Voltage Variance vs. Temperature



I_{GSS} vs. Temperature



BV_{GSS} vs. Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient

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