



P-Channel 30-V (D-S) MOSFET

| PRODUCT SUMMARY | | | |
|-----------------|-----------------------------|-----------|--------------|
| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) | Q_g (Typ.) |
| - 30 | 0.167 at $V_{GS} = - 10$ V | 0.96 | 3.25 |
| | 0.188 at $V_{GS} = - 4.5$ V | 0.90 | |
| | 0.244 at $V_{GS} = - 2.5$ V | 0.79 | |

FEATURES

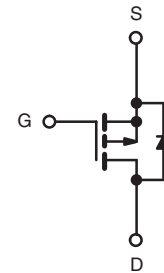
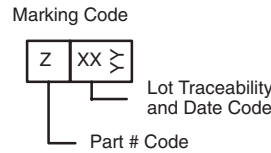
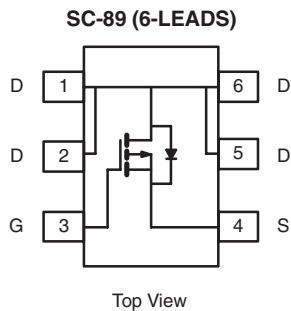
- Halogen-free Option Available
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested



RoHS
COMPLIANT

APPLICATIONS

- Load Switch for Portable Devices



Ordering Information: Si1071X-T1-E3 (Lead (Pb)-free)
Si1071X-T1-GE3 (Lead (Pb)-free and Halogen-free)

| ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted | | | | |
|----------------------------------------------------------------|----------------|-----------------------|------|--|
| Parameter | Symbol | Limit | Unit | |
| Drain-Source Voltage | V_{DS} | - 30 | V | |
| Gate-Source Voltage | V_{GS} | ± 12 | | |
| Continuous Drain Current ($T_J = 150$ °C) | I_D | $T_A = 25$ °C | A | |
| | | $T_A = 70$ °C | | |
| Pulsed Drain Current | I_{DM} | - 8 | A | |
| Continuous Source-Drain Diode Current | I_S | - 0.2 ^{b, c} | | |
| Maximum Power Dissipation ^a | P_D | $T_A = 25$ °C | W | |
| | | $T_A = 70$ °C | | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | - 55 to 150 | °C | |

| THERMAL RESISTANCE RATINGS | | | | | |
|---------------------------------------------|------------|--------------|---------|------|------|
| Parameter | Symbol | Typical | Maximum | Unit | |
| Maximum Junction-to-Ambient ^{a, b} | R_{thJA} | $t \leq 5$ s | 440 | 530 | °C/W |
| | | Steady State | 540 | 650 | |

Notes:

- Maximum under Steady State conditions is 650 °C/W.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 5$ s.



| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | |
|--------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------|---------|-----------|----------------------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$ | - 30 | | | V |
| V_{DS} Temperature Coefficient | $\Delta V_{DS}/T_J$ | $I_D = -250\text{ }\mu\text{A}$ | | - 32.07 | | mV/ $^\circ\text{C}$ |
| $V_{GS(th)}$ Temperature Coefficient | $\Delta V_{GS(th)}/T_J$ | | | 3.02 | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$ | - 0.7 | | - 1.45 | V |
| Gate-Source Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$ | | | - 1 | nA |
| | | $V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$ | | | - 10 | μA |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \geq 5\text{ V}, V_{GS} = -10\text{ V}$ | - 8 | | | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}, I_D = -0.96\text{ A}$ | | 0.139 | 0.167 | Ω |
| | | $V_{GS} = -4.5\text{ V}, I_D = -0.9\text{ A}$ | | 0.147 | 0.177 | |
| | | $V_{GS} = -2.5\text{ V}, I_D = -0.79\text{ A}$ | | 0.195 | 0.244 | |
| Forward Transconductance | g_{fs} | $V_{DS} = -15\text{ V}, I_D = -0.96\text{ A}$ | | 4.25 | | S |
| Dynamic^b | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | | 315 | | pF |
| Output Capacitance | C_{oss} | | | 60 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 45 | | |
| Total Gate Charge | Q_g | $V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -0.96\text{ A}$ | | 4.43 | 6.64 | nC |
| | | | | 8.87 | 13.3 | |
| Gate-Source Charge | Q_{gs} | $V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -0.96\text{ A}$ | | 0.83 | | nC |
| Gate-Drain Charge | Q_{gd} | | | 1.57 | | |
| Gate Resistance | R_g | | $f = 1\text{ MHz}$ | | 9.8 | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = -15\text{ V}, R_L = 19.74\text{ }\Omega$ $I_D \cong -0.76\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$ | | 3.8 | 5.7 | ns |
| Rise Time | t_r | | | 12 | 18 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 18 | 27 | |
| Fall Time | t_f | | | 7 | 10.5 | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = -15\text{ V}, R_L = 20.27\text{ }\Omega$ $I_D \cong -0.74\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$ | | 13 | 20 | ns |
| Rise Time | t_r | | | 25 | 38 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 36 | 54 | |
| Fall Time | t_f | | | 14 | 21 | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Pulse Diode Forward Current ^a | I_{SM} | | | | 8 | A |
| Body Diode Voltage | V_{SD} | $I_S = -0.63\text{ A}$ | | 0.8 | 1.2 | V |
| Body Diode Reverse Recovery Time | t_{rr} | $I_F = -0.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | | 12.7 | 19.05 | nC |
| Body Diode Reverse Recovery Charge | Q_{rr} | | | 5.7 | 8.6 | ns |
| Reverse Recovery Fall Time | t_a | | | 8.9 | | |
| Reverse Recovery Rise Time | t_b | | | 3.8 | | |

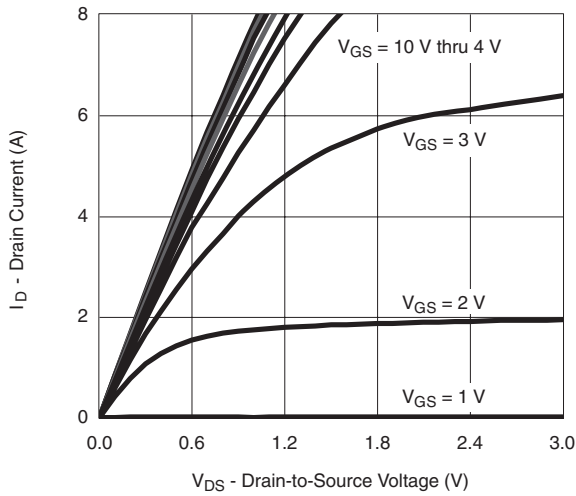
Notes:

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

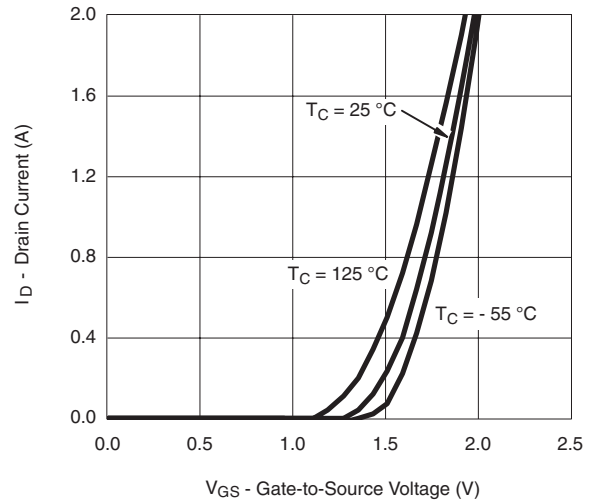
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



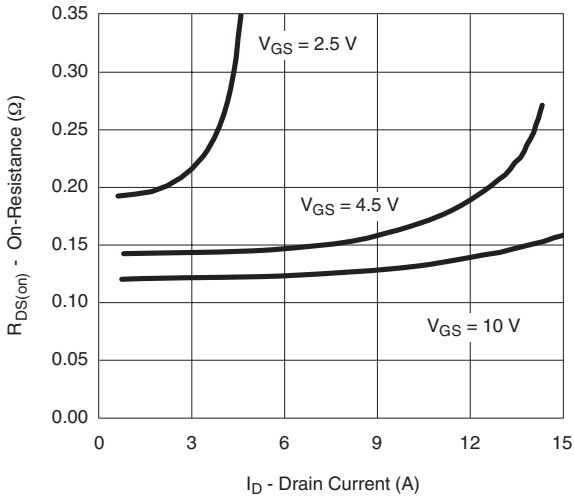
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



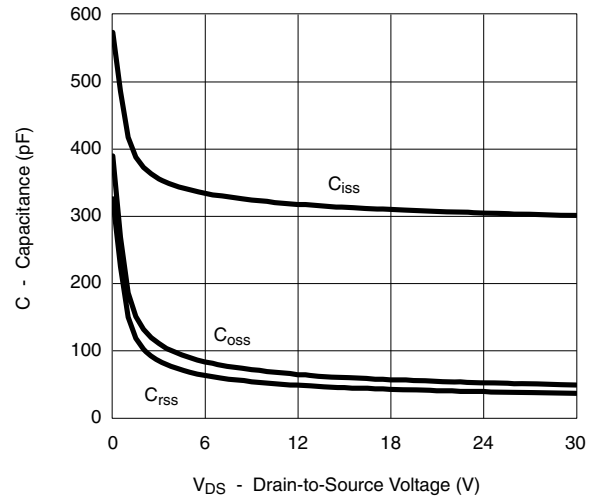
Output Characteristics



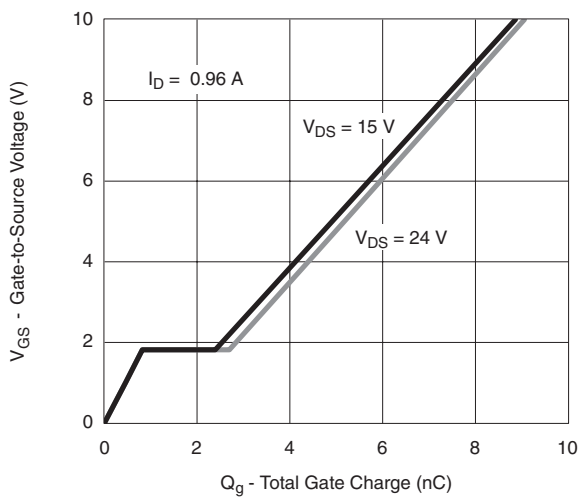
Transfer Characteristics Curves vs. Temp.



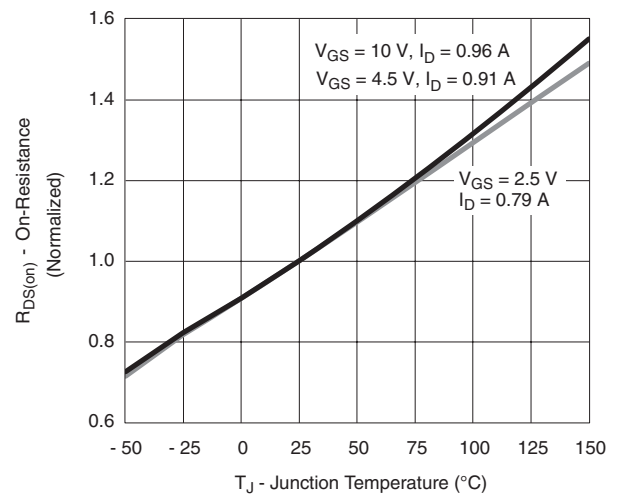
On-Resistance vs. Drain Current



Capacitance



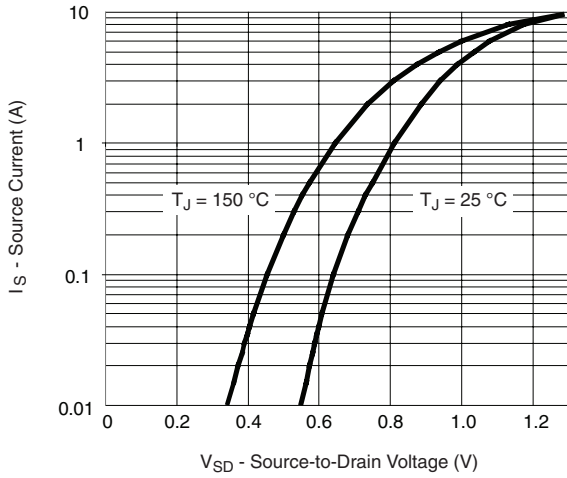
Gate Charge



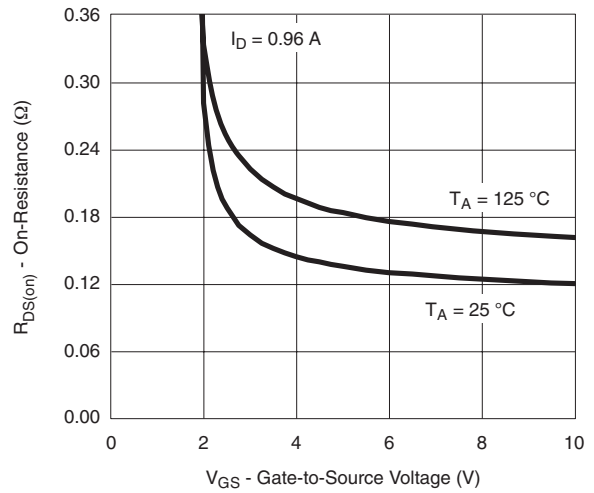
On-Resistance vs. Junction Temperature



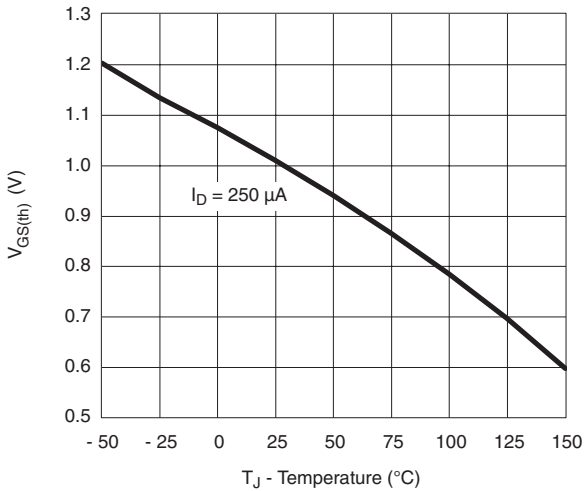
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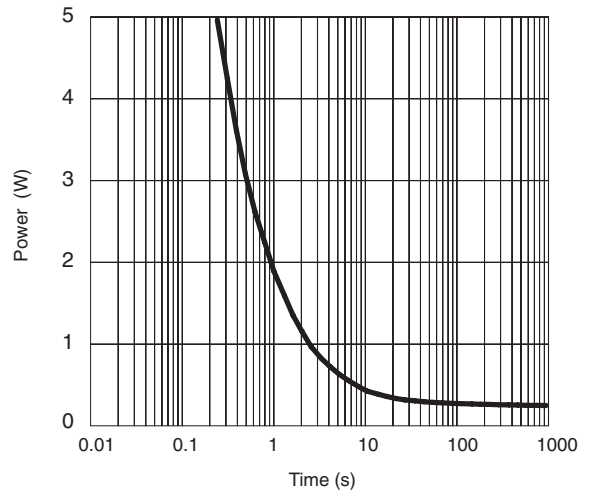
Source-Drain Diode Forward Voltage



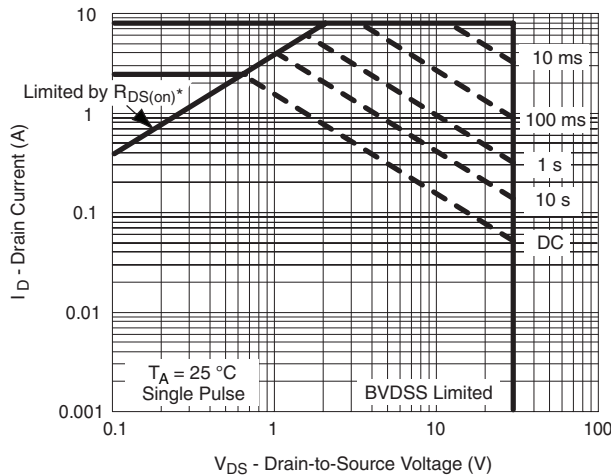
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



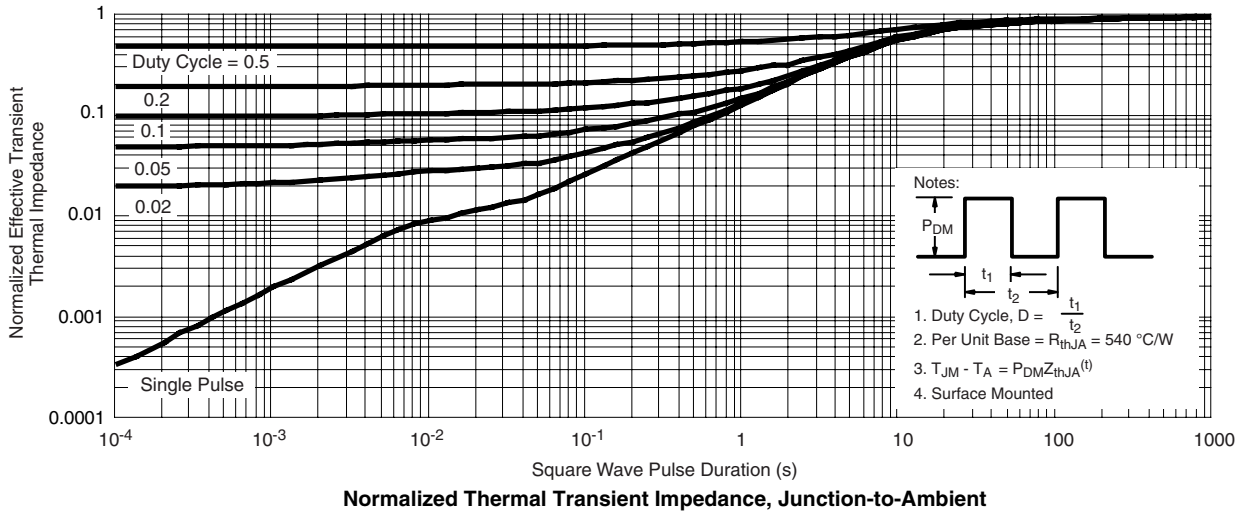
Single Pulse Power



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Ambient



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