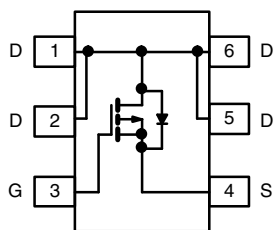


## P-Channel 1.8 V (G-S) MOSFET

### PRODUCT SUMMARY

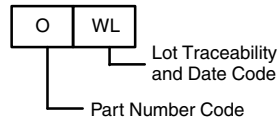
| $V_{DS}$ (V) | $R_{DS(on)}$ ( $\Omega$ )   | $I_D$ (A) |
|--------------|-----------------------------|-----------|
| - 12         | 0.165 at $V_{GS} = - 4.5$ V | - 0.95    |
|              | 0.220 at $V_{GS} = - 2.5$ V | - 0.82    |
|              | 0.280 at $V_{GS} = - 1.8$ V | - 0.67    |

### SC-89 (6-LEADS)



Top View

### Marking Code



**Ordering Information:** Si1039X-T1-GE3 (Lead (Pb)-free and Halogen-free)

### FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFET
- Low Threshold
- Smallest LITTLE FOOT® Package: 1.6 mm x 1.6 mm
- Low 0.6 mm Profile
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### APPLICATIONS

- Cell Phones and Pagers
- Load Switch

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

| Parameter                                                | Symbol         | 5 s         | Steady State | Unit |
|----------------------------------------------------------|----------------|-------------|--------------|------|
| Drain-Source Voltage                                     | $V_{DS}$       | - 12        |              | V    |
| Gate-Source Voltage                                      | $V_{GS}$       | $\pm 8$     |              |      |
| Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>  | $I_D$          | - 0.95      | - 0.87       | A    |
|                                                          |                | - 0.76      | - 0.69       |      |
| Pulsed Drain Current                                     | $I_{DM}$       | - 4         |              |      |
| Continuous Diode Current (Diode Conduction) <sup>a</sup> | $I_S$          | - 0.18      | - 0.14       |      |
| Maximum Power Dissipation <sup>a</sup>                   | $P_D$          | 0.21        | 0.17         | W    |
|                                                          |                | 0.13        | 0.10         |      |
| 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 <sup>a</sup> | $R_{thJA}$ | 500     | 600     | °C/W |
|                                          |            | 600     | 720     |      |

Notes:

a. Surface mounted on 1" x 1" FR4 board with minimum copper.

**SPECIFICATIONS** ( $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)

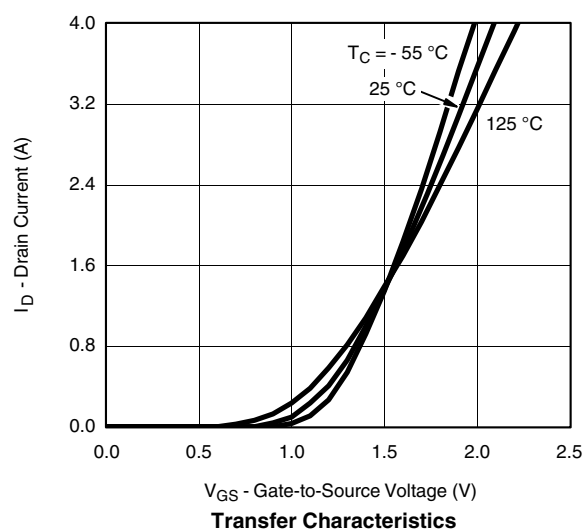
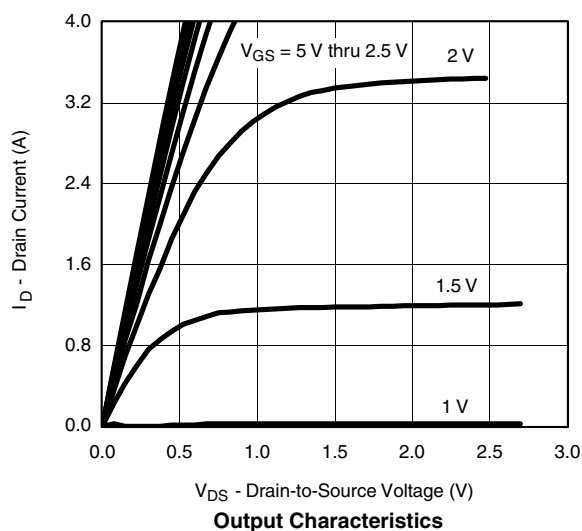
| Parameter                                     | Symbol       | Test Conditions                                                                                                                      | Min.  | Typ.  | Max.      | Unit          |
|-----------------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-----------|---------------|
| <b>Static</b>                                 |              |                                                                                                                                      |       |       |           |               |
| Gate Threshold Voltage                        | $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = -250\text{ }\mu\text{A}$                                                                                  | -0.45 |       |           | V             |
| Gate-Body Leakage                             | $I_{GSS}$    | $V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 8\text{ V}$                                                                                    |       |       | $\pm 100$ | nA            |
| Zero Gate Voltage Drain Current               | $I_{DSS}$    | $V_{DS} = -12\text{ V}$ , $V_{GS} = 0\text{ V}$                                                                                      |       |       | -1        | $\mu\text{A}$ |
|                                               |              | $V_{DS} = -12\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 70\text{ }^{\circ}\text{C}$                                                 |       |       | -5        |               |
| On-State Drain Current <sup>a</sup>           | $I_{D(on)}$  | $V_{DS} = -5\text{ V}$ , $V_{GS} = -4.5\text{ V}$                                                                                    | -4    |       |           | A             |
| Drain-Source On-State Resistance <sup>a</sup> | $R_{DS(on)}$ | $V_{GS} = -4.5\text{ V}$ , $I_D = -0.87\text{ A}$                                                                                    |       | 0.140 | 0.165     | $\Omega$      |
|                                               |              | $V_{GS} = -2.5\text{ V}$ , $I_D = -0.75\text{ A}$                                                                                    |       | 0.180 | 0.220     |               |
|                                               |              | $V_{GS} = -1.8\text{ V}$ , $I_D = -0.2\text{ A}$                                                                                     |       | 0.230 | 0.280     |               |
| Forward Transconductance <sup>a</sup>         | $g_{fs}$     | $V_{DS} = -10\text{ V}$ , $I_D = -0.87\text{ A}$                                                                                     |       | 3.5   |           | S             |
| Diode Forward Voltage <sup>a</sup>            | $V_{SD}$     | $I_S = -0.14\text{ A}$ , $V_{GS} = 0\text{ V}$                                                                                       |       | -0.78 | -1.2      | V             |
| <b>Dynamic<sup>b</sup></b>                    |              |                                                                                                                                      |       |       |           |               |
| Total Gate Charge                             | $Q_g$        | $V_{DS} = -6\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -0.87\text{ A}$                                                           |       | 3.8   | 6         | nC            |
| Gate-Source Charge                            | $Q_{gs}$     |                                                                                                                                      |       | 0.7   |           |               |
| Gate-Drain Charge                             | $Q_{gd}$     |                                                                                                                                      |       | 0.8   |           |               |
| Turn-On Delay Time                            | $t_{d(on)}$  | $V_{DD} = -6\text{ V}$ , $R_L = 12\text{ }\Omega$<br>$I_D \cong -0.5\text{ A}$ , $V_{GEN} = -4.5\text{ V}$ , $R_g = 6\text{ }\Omega$ |       | 15    | 30        | ns            |
| Rise Time                                     | $t_r$        |                                                                                                                                      |       | 20    | 40        |               |
| Turn-Off Delay Time                           | $t_{d(off)}$ |                                                                                                                                      |       | 30    | 60        |               |
| Fall Time                                     | $t_f$        |                                                                                                                                      |       | 16    | 30        |               |
| Source-Drain Reverse Recovery Time            | $t_{rr}$     |                                                                                                                                      |       | 20    | 40        |               |

Notes:

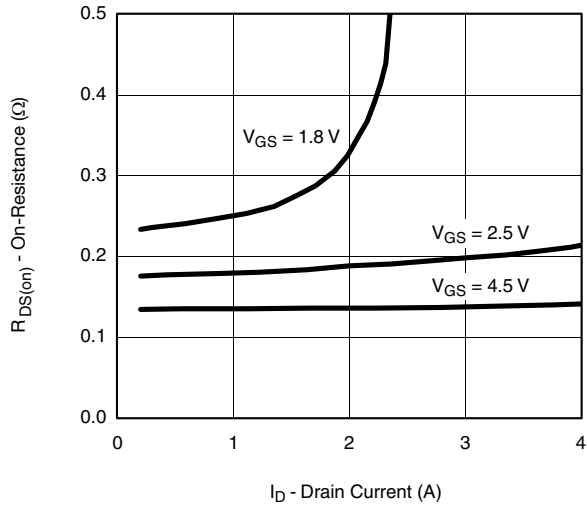
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

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

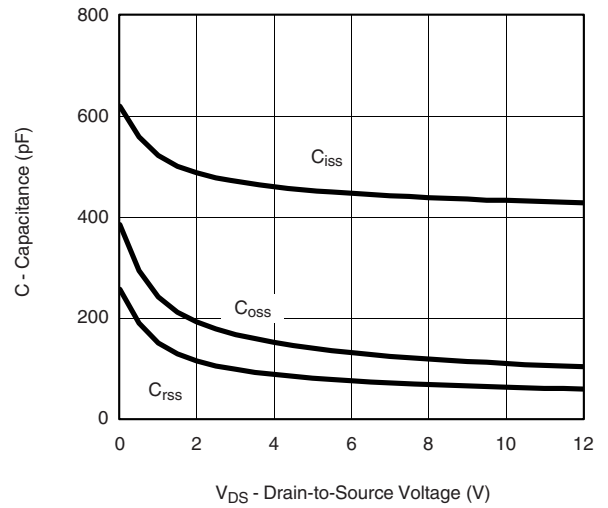
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

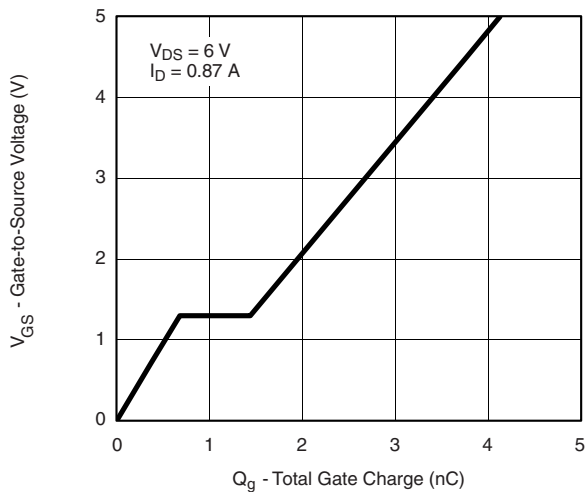
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



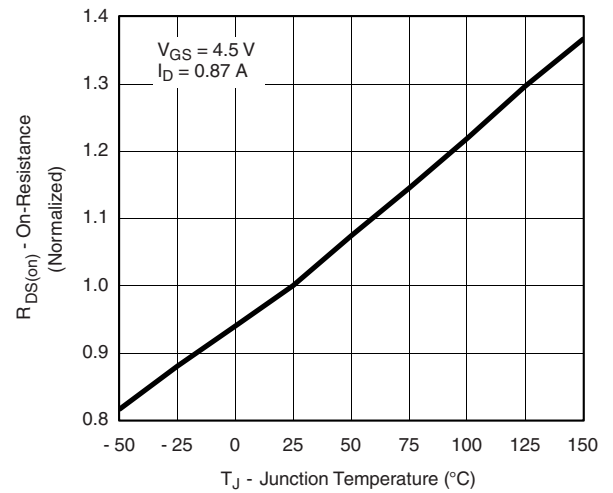
On-Resistance vs. Drain Current



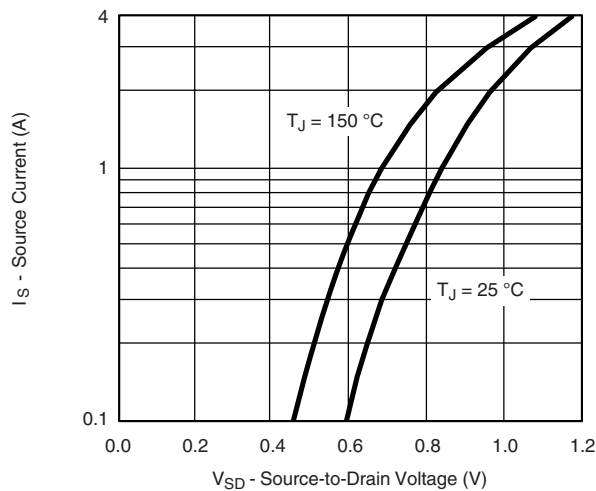
Capacitance



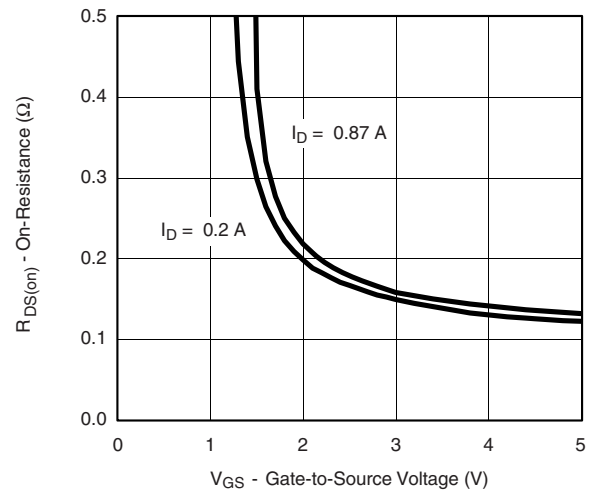
Gate Charge



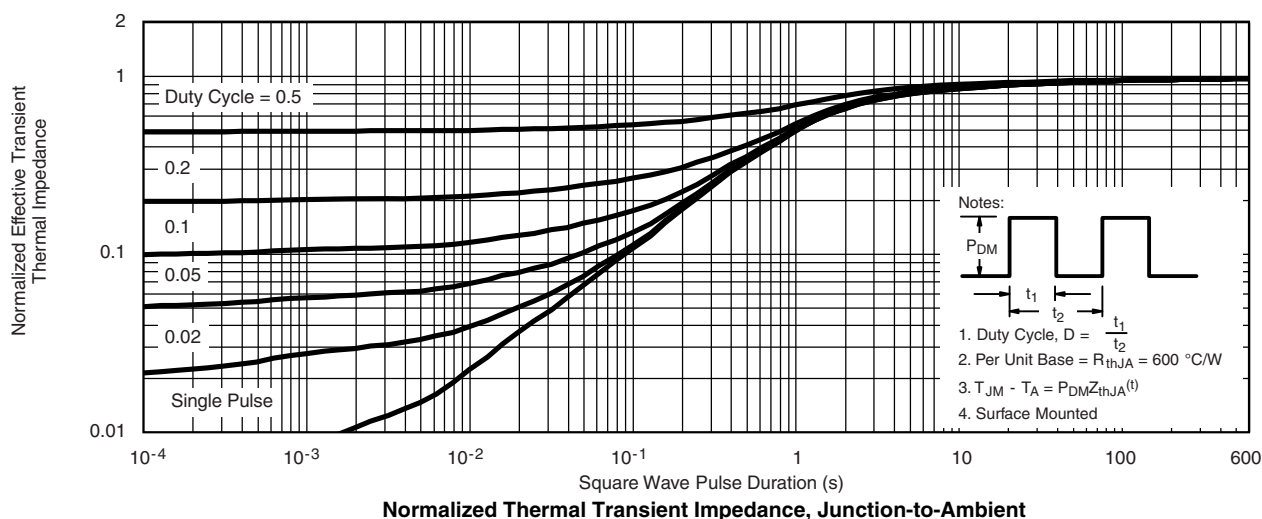
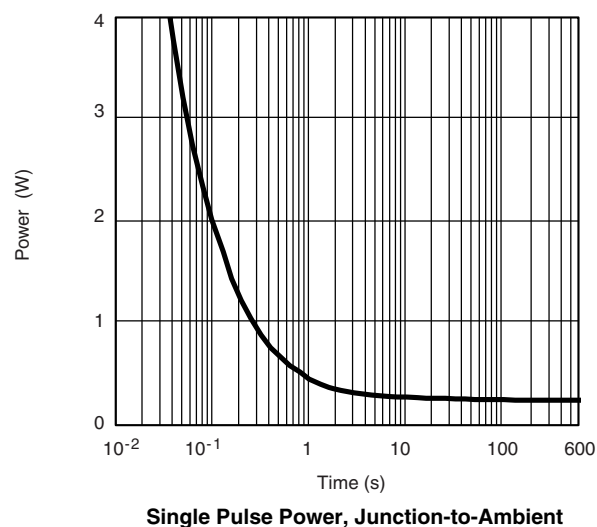
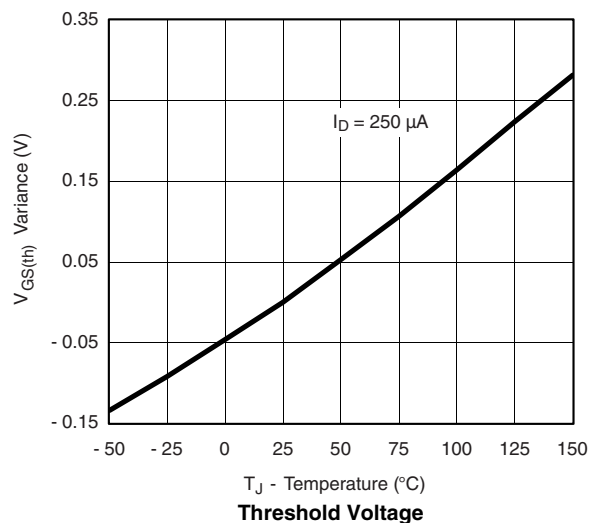
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



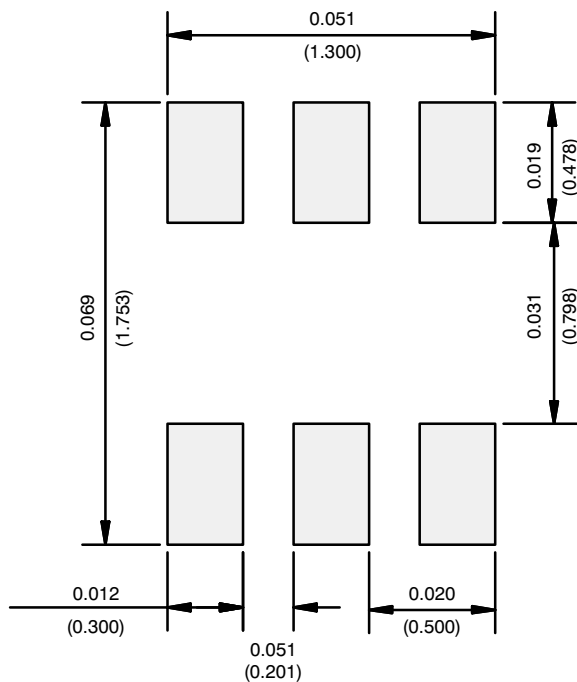
On-Resistance vs. Gate-to-Source Voltage

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

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## RECOMMENDED MINIMUM PADS FOR SC-89: 6-Lead



Recommended Minimum Pads  
Dimensions in Inches/(mm)

[Return to Index](#)



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