



## P-Channel 40-V (D-S) MOSFET

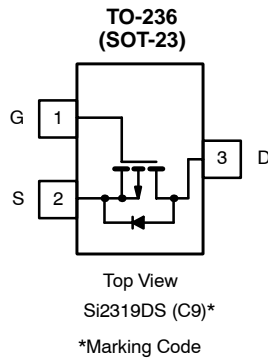
| PRODUCT SUMMARY |                           |                        |
|-----------------|---------------------------|------------------------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) <sup>b</sup> |
| -40             | 0.082 @ $V_{GS} = -10$ V  | -3.0                   |
|                 | 0.130 @ $V_{GS} = -4.5$ V | -2.4                   |

**FEATURES**

- TrenchFET® Power MOSFET

**APPLICATIONS**

- Load Switch



Ordering Information: Si2319DS-T1  
Si2319DS-T1—E3 (Lead Free)

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                          |                |            |              |                  |
|---|--------------------------|----------------|------------|--------------|------------------|
| Parameter   |                          | Symbol         | 5 sec      | Steady State | Unit             |
| Drain-Source Voltage  |                          | $V_{DS}$       | -40        |              | V                |
| Gate-Source Voltage   |                          | $V_{GS}$       | $\pm 20$   |              |                  |
| Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>b</sup>         | $T_A = 25^\circ\text{C}$ | $I_D$          | -3.0       | -2.3         | A                |
|   | $T_A = 70^\circ\text{C}$ |                | -2.4       | -1.85        |                  |
| Pulsed Drain Current <sup>a</sup>   |                          | $I_{DM}$       | -12        |              |                  |
| Continuous Source Current (Diode Conduction) <sup>b</sup>                   |                          | $I_S$          | -1.0       | -0.62        |                  |
| Power Dissipation <sup>b</sup>  | $T_A = 25^\circ\text{C}$ | $P_D$          | 1.25       | 0.75         | W                |
|   | $T_A = 70^\circ\text{C}$ |                | 0.8        | 0.48         |                  |
| Operating Junction and Storage Temperature Range                            |                          | $T_J, T_{stg}$ | -55 to 150 |              | $^\circ\text{C}$ |

| THERMAL RESISTANCE RATINGS               |            |         |         |                    |
|--|------------|---------|---------|--------------------|
| Parameter                                | Symbol     | Typical | Maximum | Unit               |
| Maximum Junction-to-Ambient <sup>b</sup> | $R_{thJA}$ | 75      | 100     | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient <sup>c</sup> |            | 120     | 166     |                    |
| Maximum Junction-to-Foot (Drain)         | $R_{thJF}$ | 40      | 50      |                    |

**Notes**

- Pulse width limited by maximum junction temperature.
- Surface Mounted on FR4 Board,  $t \leq 5$  sec.
- Surface Mounted on FR4 Board.

For SPICE model information via the Worldwide Web: <http://www.vishay.com/www/product/spice.htm>

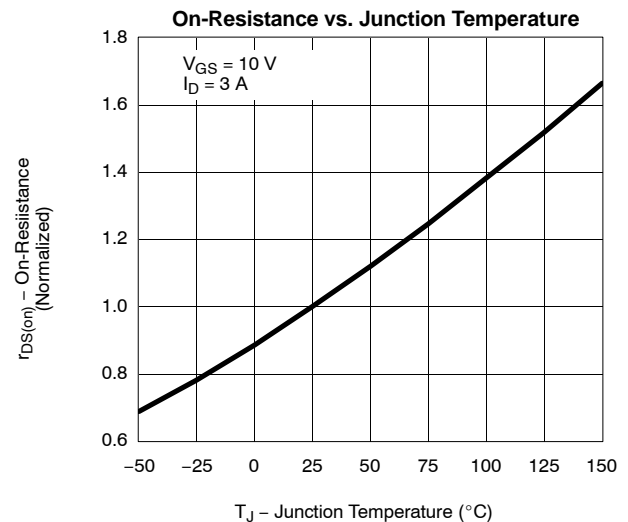
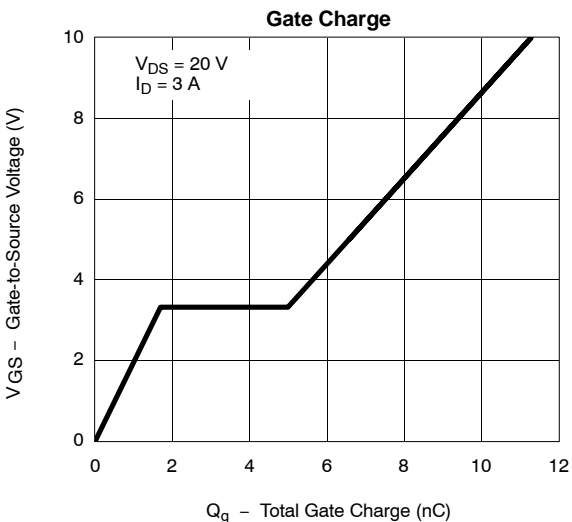
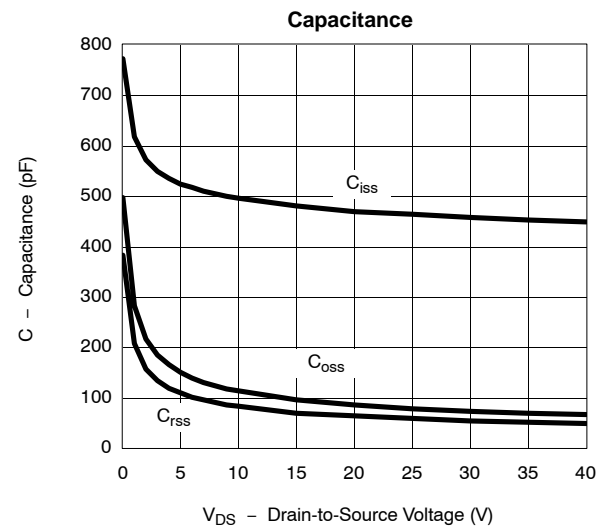
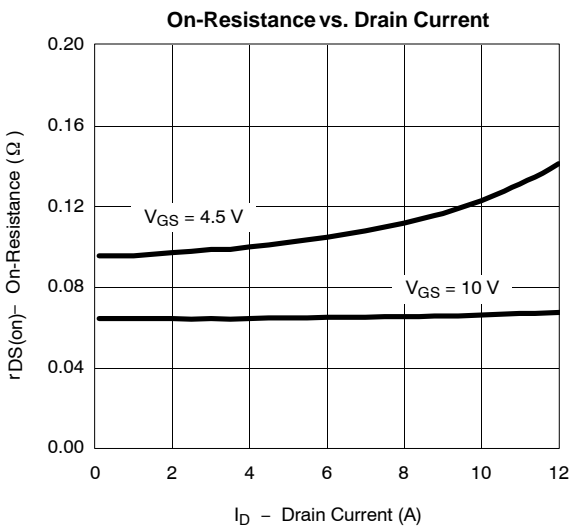
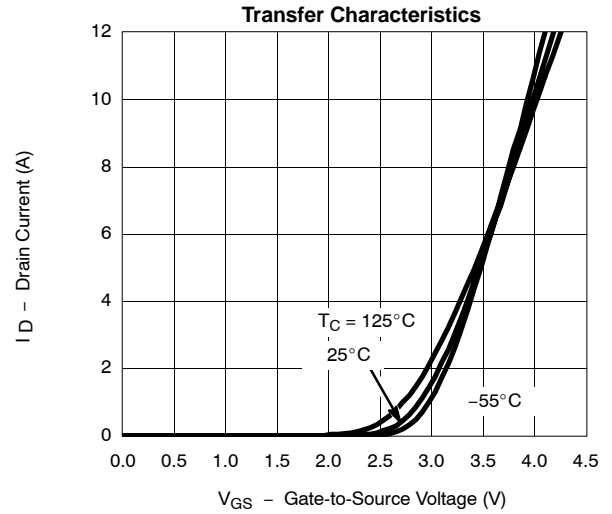
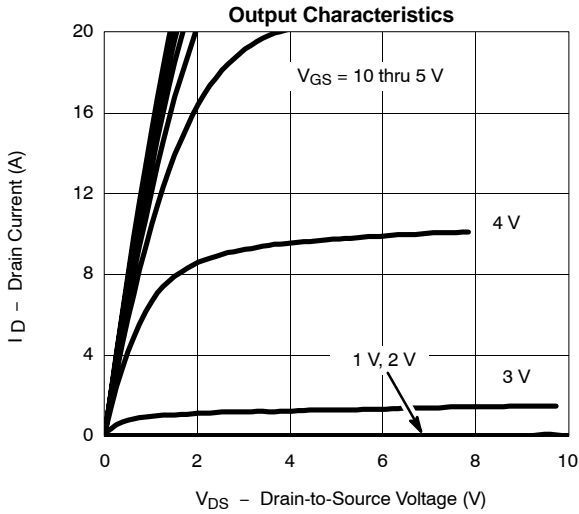
| SPECIFICATIONS ( $T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |               |  |        |       |           |               |
|---|---------------|--|--------|-------|-----------|---------------|
| Parameter   | Symbol        | Test Conditions  | Limits |       |           | Unit          |
|   |               |  | Min    | Typ   | Max       |               |
| <b>Static</b>   |               |  |        |       |           |               |
| Drain-Source Breakdown Voltage                                    | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$   | -40    |       |           | V             |
| Gate-Threshold Voltage  | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$   | -1.0   |       | -3.0      |               |
| Gate-Body Leakage   | $I_{GSS}$     | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$  |        |       | $\pm 100$ | nA            |
| Zero Gate Voltage Drain Current                                   | $I_{DSS}$     | $V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}$   |        |       | -1        | $\mu\text{A}$ |
|   |               | $V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}, T_J = 55^\circ\text{C}$   |        |       | -10       |               |
| On-State Drain Current <sup>a</sup>                               | $I_{D(on)}$   | $V_{DS} \leq -5\text{ V}, V_{GS} = -10\text{ V}$   | -6     |       |           | A             |
| Drain-Source On-Resistance <sup>a</sup>                           | $r_{DS(on)}$  | $V_{GS} = -10\text{ V}, I_D = -3.0\text{ A}$   |        | 0.065 | 0.082     | $\Omega$      |
|   |               | $V_{GS} = -4.5\text{ V}, I_D = -2.4\text{ A}$  |        | 0.100 | 0.130     |               |
| Forward Transconductance <sup>a</sup>                             | $g_{fs}$      | $V_{DS} = -5\text{ V}, I_D = -3.0\text{ A}$  |        | 7.0   |           | S             |
| Diode Forward Voltage   | $V_{SD}$      | $I_S = -1.25\text{ A}, V_{GS} = 0\text{ V}$  |        | -0.8  | -1.2      | V             |
| <b>Dynamic<sup>b</sup></b>  |               |  |        |       |           |               |
| Total Gate Charge   | $Q_g$         | $V_{DS} = -20\text{ V}, V_{GS} = -10\text{ V}$<br>$I_D \cong -3\text{ A}$  |        | 11.3  | 17        | nC            |
| Gate-Source Charge  | $Q_{gs}$      |  |        | 1.7   |           |               |
| Gate-Drain Charge   | $Q_{gd}$      |  |        | 3.3   |           |               |
| Input Capacitance   | $C_{iss}$     | $V_{DS} = -20\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$  |        | 470   |           | pF            |
| Output Capacitance  | $C_{oss}$     |  |        | 85    |           |               |
| Reverse Transfer Capacitance                                      | $C_{rss}$     |  |        | 65    |           |               |
| <b>Switching<sup>c</sup></b>                                      |               |  |        |       |           |               |
| Turn-On Time  | $t_{d(on)}$   | $V_{DD} = -20\text{ V}, R_L = 20\ \Omega$<br>$I_D \cong -1.0\text{ A}, V_{GEN} = -4.5\text{ V}$<br>$R_g = 6\ \Omega$ |        | 7     | 15        | ns            |
|   | $t_r$         |  |        | 15    | 25        |               |
| Turn-Off Time   | $t_{d(off)}$  |  |        | 25    | 40        |               |
|   | $t_f$         |  |        | 25    | 40        |               |

## Notes

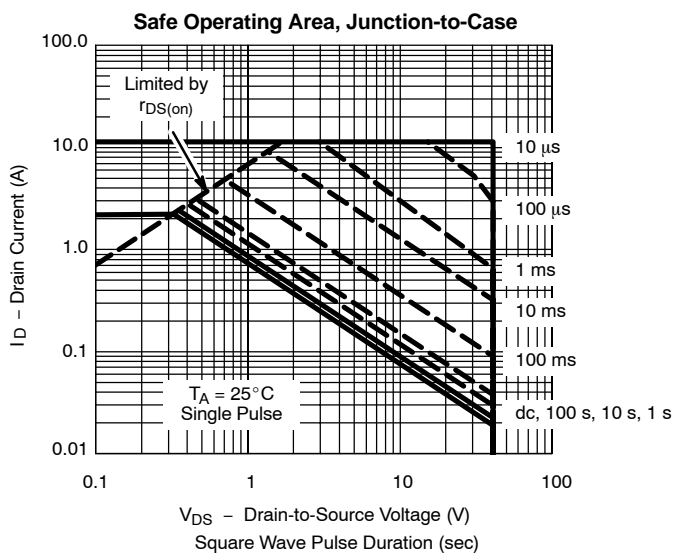
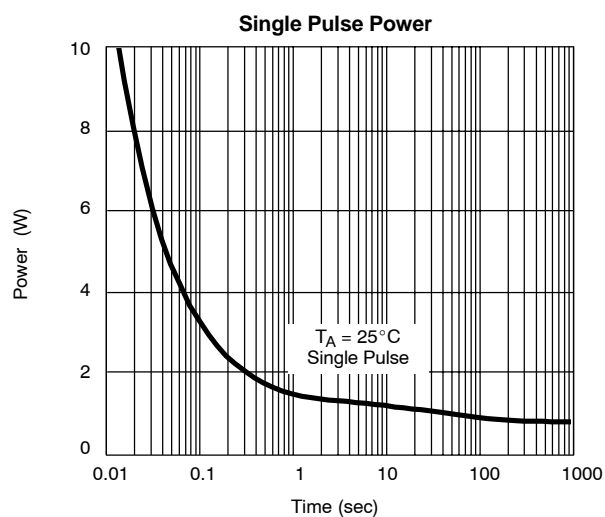
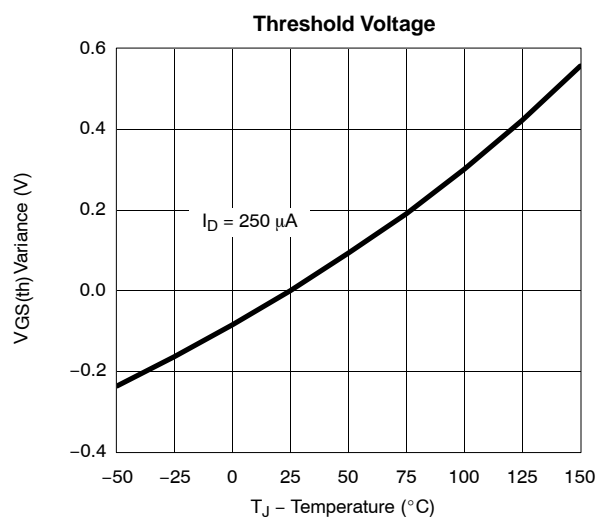
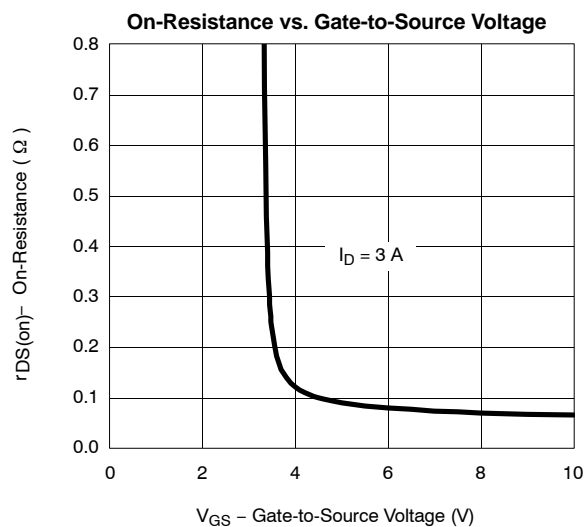
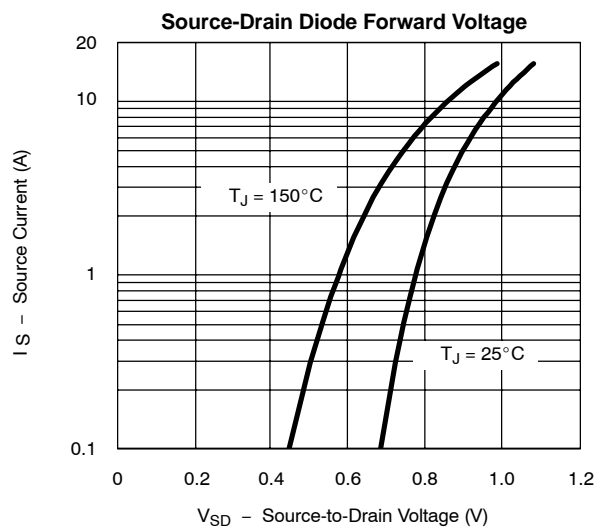
- a. Pulse test:  $PW \leq 300\ \mu\text{s}$  duty cycle  $\leq 2\%$ .  
b. For DESIGN AID ONLY, not subject to production testing.  
c. Switching time is essentially independent of operating temperature. • FaxBack 408-970-5600



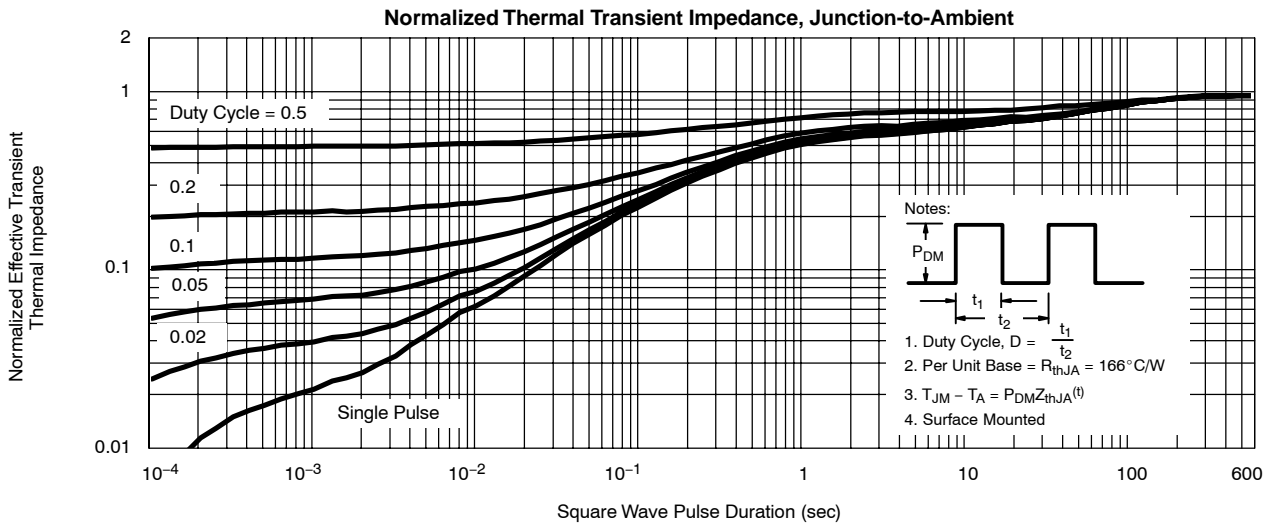
**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



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