

## P-Channel 1.25-W, 1.8-V (G-S) MOSFET

### PRODUCT SUMMARY

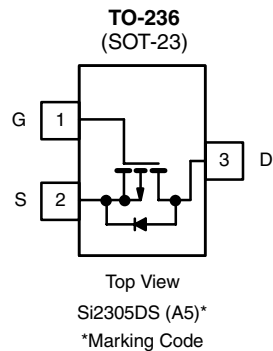
| $V_{DS}$ (V) | $r_{DS(on)}$ ( $\Omega$ )   | $I_D$ (A) |
|--------------|-----------------------------|-----------|
| - 8          | 0.052 at $V_{GS} = - 4.5$ V | $\pm 3.5$ |
|              | 0.071 at $V_{GS} = - 2.5$ V | $\pm 3$   |
|              | 0.108 at $V_{GS} = - 1.8$ V | $\pm 2$   |

### FEATURES

- TrenchFET® Power MOSFETs: 1.8 V Rated



**RoHS\***  
COMPLIANT



**Ordering Information:** Si2305DS-T1  
Si2305DS-T1-E3 (Lead (Pb)-free)

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

| Parameter                                                    | Symbol         | Limit       | Unit |
|--------------------------------------------------------------|----------------|-------------|------|
| Drain-Source Voltage                                         | $V_{DS}$       | - 8         | V    |
| Gate-Source Voltage                                          | $V_{GS}$       | $\pm 8$     |      |
| Continuous Drain Current ( $T_J = 150$ °C)                   | $I_D$          | $\pm 3.5$   | A    |
|                                                              |                | $\pm 2.8$   |      |
| Pulsed Drain Current                                         | $I_{DM}$       | $\pm 12$    |      |
| Continuous Source Current (Diode Conduction) <sup>a, b</sup> | $I_S$          | - 1.6       | W    |
| Maximum Power Dissipation <sup>a, b</sup>                    | $P_D$          | 1.25        |      |
|                                                              |                | 0.8         |      |
| 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> | $R_{thJA}$ |         | 100     | °C/W |
|                                          |            | 130     |         |      |

Notes:

a. Surface Mounted on FR4 Board.

b.  $t \leq 5$  sec.

\* Pb containing terminations are not RoHS compliant, exemptions may apply.

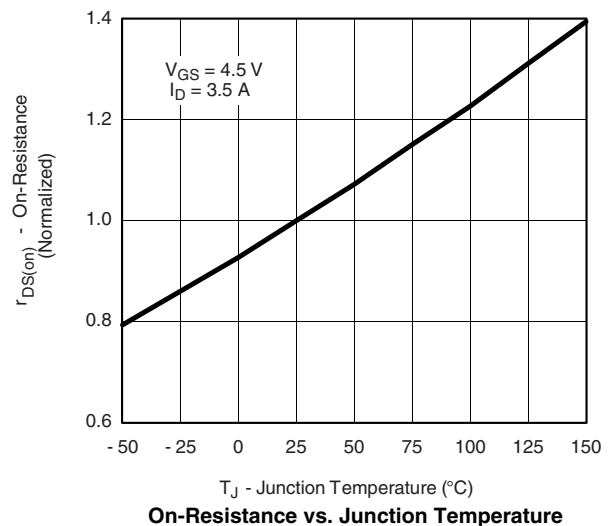
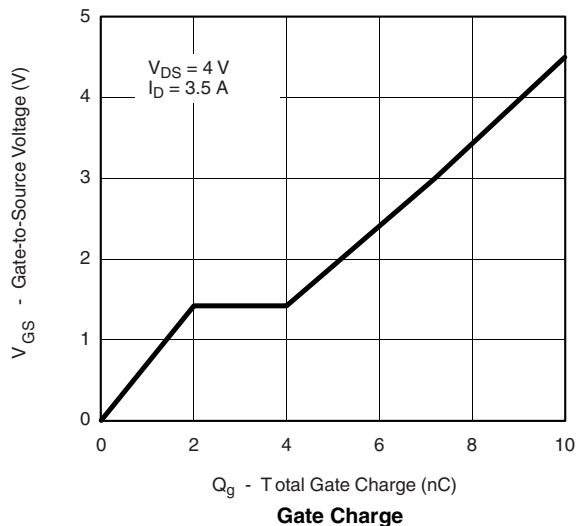
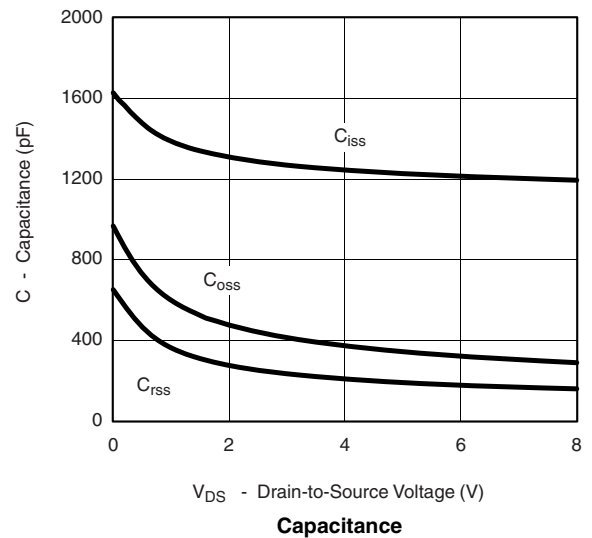
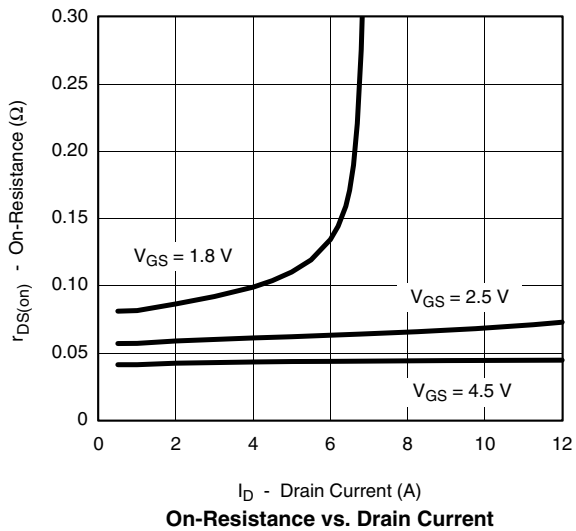
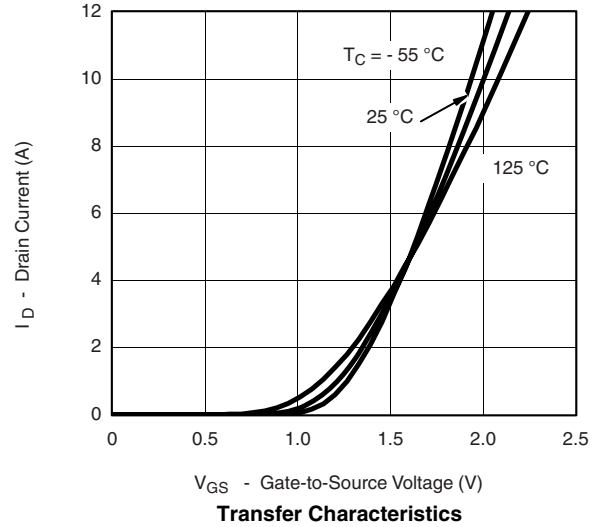
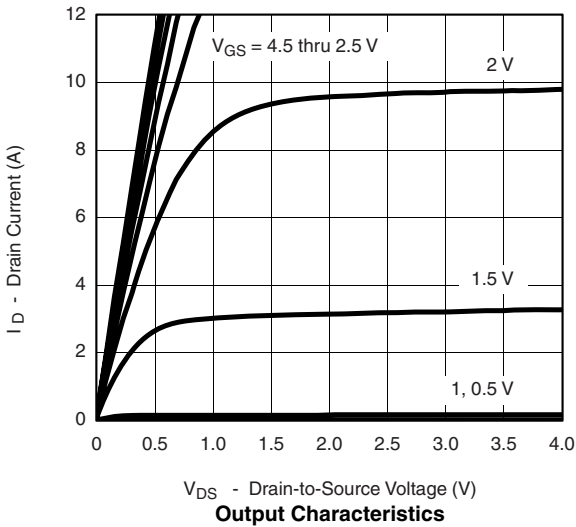
| SPECIFICATIONS T <sub>J</sub> = 25 °C, unless otherwise noted |                      |                                                                                                                             |        |       |       |      |
|---------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------|--------|-------|-------|------|
| Parameter                                                     | Symbol               | Test Conditions                                                                                                             | Limits |       |       | Unit |
|                                                               |                      |                                                                                                                             | Min    | Typ   | Max   |      |
| Static                                                        |                      |                                                                                                                             |        |       |       |      |
| Drain-Source Breakdown Voltage                                | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0 V, I <sub>D</sub> = - 10 μA                                                                             | - 8    |       |       | V    |
| Gate-Threshold Voltage                                        | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA                                                               | - 0.45 |       | - 0.8 |      |
| Gate-Body Leakage                                             | I <sub>GSS</sub>     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 8 V                                                                              |        |       | ± 100 | nA   |
| Zero Gate Voltage Drain Current                               | I <sub>DSS</sub>     | V <sub>DS</sub> = - 8 V, V <sub>GS</sub> = 0 V                                                                              |        |       | - 1   | μA   |
|                                                               |                      | V <sub>DS</sub> = - 8 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C                                                      |        |       | - 10  |      |
| On-State Drain Current <sup>a</sup>                           | I <sub>D(on)</sub>   | V <sub>DS</sub> ≤ - 5 V, V <sub>GS</sub> = - 4.5 V                                                                          | - 6    |       |       | A    |
|                                                               |                      | V <sub>DS</sub> ≤ - 5 V, V <sub>GS</sub> = - 2.5 V                                                                          | - 3    |       |       |      |
| Drain-Source On-Resistance <sup>a</sup>                       | r <sub>DS(on)</sub>  | V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 3.5 A                                                                         |        | 0.044 | 0.052 | Ω    |
|                                                               |                      | V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 3 A                                                                           |        | 0.060 | 0.071 |      |
|                                                               |                      | V <sub>GS</sub> = - 1.8 V, I <sub>D</sub> = - 2 A                                                                           |        | 0.087 | 0.108 |      |
| Forward Transconductance <sup>a</sup>                         | g <sub>fs</sub>      | V <sub>DS</sub> = - 5 V, I <sub>D</sub> = - 3.5 A                                                                           |        | 8.5   |       | S    |
| Diode Forward Voltage                                         | V <sub>SD</sub>      | I <sub>S</sub> = - 1.6 A, V <sub>GS</sub> = 0 V                                                                             |        |       | - 1.2 | V    |
| Dynamic <sup>b</sup>                                          |                      |                                                                                                                             |        |       |       |      |
| Total Gate Charge                                             | Q <sub>g</sub>       | V <sub>DS</sub> = - 4 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> ≅ - 3.5 A                                                |        | 10    | 15    | nC   |
| Gate-Source Charge                                            | Q <sub>gs</sub>      |                                                                                                                             |        | 2     |       |      |
| Gate-Drain Charge                                             | Q <sub>gd</sub>      |                                                                                                                             |        | 2     |       |      |
| Input Capacitance                                             | C <sub>iss</sub>     | V <sub>DS</sub> = - 4 V, V <sub>GS</sub> = 0 V, f = 1 MHz                                                                   |        | 1245  |       | pF   |
| Output Capacitance                                            | C <sub>oss</sub>     |                                                                                                                             |        | 375   |       |      |
| Reverse Transfer Capacitance                                  | C <sub>rss</sub>     |                                                                                                                             |        | 210   |       |      |
| Switching <sup>b</sup>                                        |                      |                                                                                                                             |        |       |       |      |
| Turn-On Time                                                  | t <sub>d(on)</sub>   | V <sub>DD</sub> = - 4 V, R <sub>L</sub> = 4 Ω<br>I <sub>D</sub> ≅ - 1.0 A, V <sub>GEN</sub> = - 4.5 V, R <sub>G</sub> = 6 Ω |        | 13    | 20    | ns   |
|                                                               | t <sub>r</sub>       |                                                                                                                             |        | 25    | 40    |      |
| Turn-Off Time                                                 | t <sub>d(off)</sub>  |                                                                                                                             |        | 55    | 80    |      |
|                                                               | t <sub>f</sub>       |                                                                                                                             |        | 19    | 35    |      |

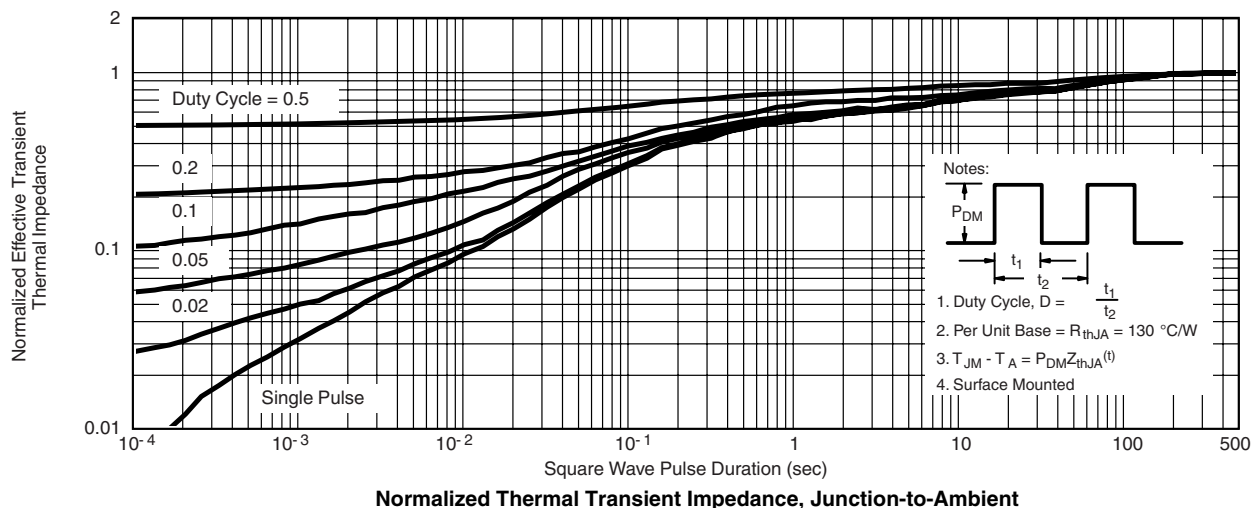
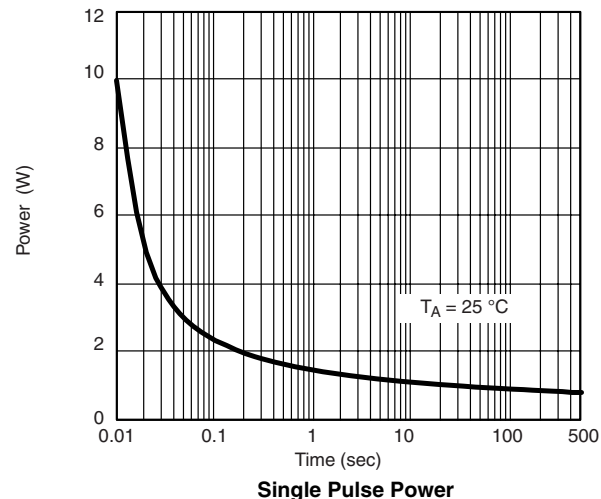
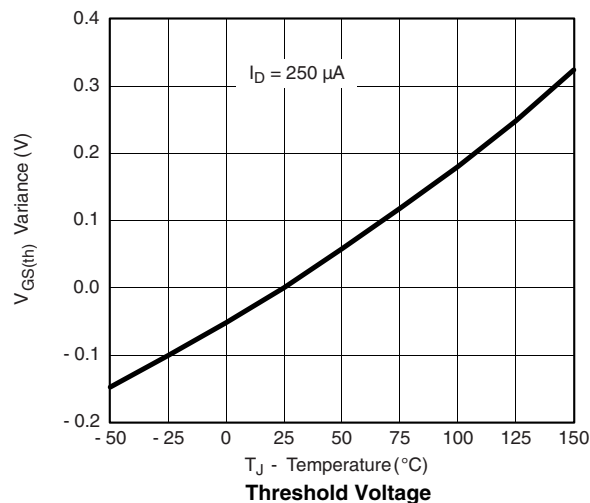
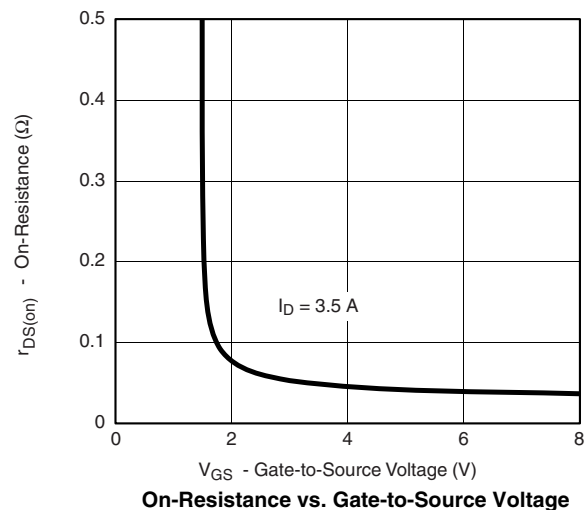
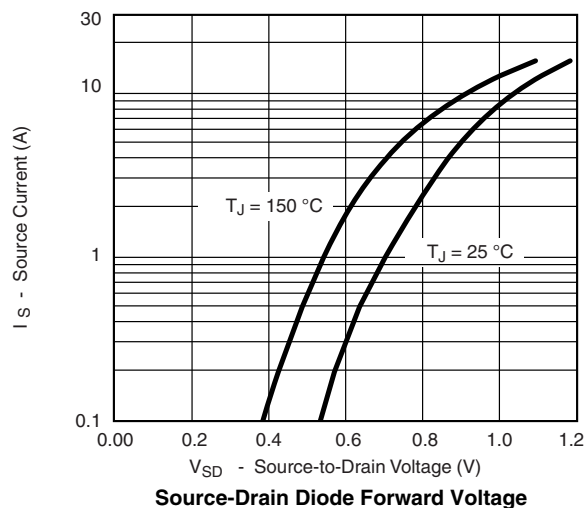
## Notes:

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

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 °C, unless noted



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