

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

### PRODUCT SUMMARY

| $V_{DS}$ (V) | $R_{DS(on)}$ ( $\Omega$ )   | $I_D$ (A) <sup>b</sup> |
|--------------|-----------------------------|------------------------|
| - 30         | 0.072 at $V_{GS} = - 10$ V  | - 2.8                  |
|              | 0.120 at $V_{GS} = - 4.5$ V | - 2.0                  |

### FEATURES

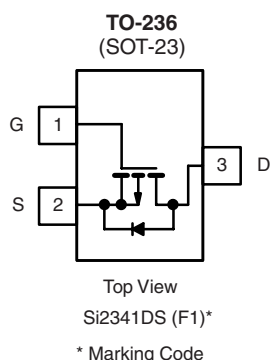
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET<sup>®</sup> Power MOSFETS
- Compliant to RoHS Directive 2002/95/EC



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

### APPLICATIONS

- Load Switch
- PA Switch



Ordering Information: Si2341DS-T1-E3 (Lead (Pb)-free)  
Si2341DS-T1-GE3 (Lead (Pb)-free and Halogen-free)

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

| Parameter                                                                     |                                    | Symbol         | 5 s         | Steady State | Unit               |
|-------------------------------------------------------------------------------|------------------------------------|----------------|-------------|--------------|--------------------|
| Drain-Source Voltage                                                          |                                    | $V_{DS}$       | - 30        |              | V                  |
| Gate-Source Voltage                                                           |                                    | $V_{GS}$       | $\pm$ 20    |              |                    |
| Continuous Drain Current ( $T_J = 150\text{ }^{\circ}\text{C}$ ) <sup>b</sup> | $T_A = 25\text{ }^{\circ}\text{C}$ | $I_D$          | - 2.8       | - 2.5        | A                  |
|                                                                               | $T_A = 70\text{ }^{\circ}\text{C}$ |                | - 2.2       | - 2.0        |                    |
| Pulsed Drain Current <sup>a</sup>                                             |                                    | $I_{DM}$       | - 12        |              |                    |
| Continuous Source Current (Diode Conduction) <sup>b</sup>                     |                                    | $I_S$          | - 0.75      | - 0.6        | W                  |
| Power Dissipation <sup>b</sup>                                                | $T_A = 25\text{ }^{\circ}\text{C}$ | $P_D$          | 0.9         | 0.71         |                    |
|                                                                               | $T_A = 70\text{ }^{\circ}\text{C}$ |                | 0.57        | 0.45         |                    |
| Operating Junction and Storage Temperature Range                              |                                    | $T_J, T_{sta}$ | - 55 to 150 |              | $^{\circ}\text{C}$ |

### THERMAL RESISTANCE RATINGS

| Parameter                                | Symbol     | Typical | Maximum | Unit |
|------------------------------------------|------------|---------|---------|------|
| Maximum Junction-to-Ambient <sup>b</sup> | $R_{thJA}$ | 115     | 140     | °C/W |
| Maximum Junction-to-Ambient <sup>c</sup> |            | 140     | 175     |      |
| Maximum Junction-to-Foot (Drain)         | $R_{thJF}$ | 60      | 75      |      |

Notes:

- Pulse width limited by maximum junction temperature.
- Surface mounted on FR4 board,  $t \leq 5$  s.
- Surface mounted on FR4 board.

| MOSFET SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted |               |                                                                                                                                        |        |       |           |               |
|-----------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-----------|---------------|
| Parameter                                                                         | Symbol        | Test Conditions                                                                                                                        | Limits |       |           | Unit          |
|                                                                                   |               |                                                                                                                                        | Min.   | Typ.  | Max.      |               |
| Static                                                                            |               |                                                                                                                                        |        |       |           |               |
| Drain-Source Breakdown Voltage                                                    | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}$ , $I_D = -10\text{ }\mu\text{A}$                                                                                 | - 30   |       |           | V             |
| Gate-Threshold Voltage                                                            | $V_{GS(th)}$  | $V_{DS} = V_{GS}$ , $I_D = -250\text{ }\mu\text{A}$                                                                                    | - 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                                                   | $I_{DSS}$     | $V_{DS} = -24\text{ V}$ , $V_{GS} = 0\text{ V}$                                                                                        |        |       | - 1       | $\mu\text{A}$ |
|                                                                                   |               | $V_{DS} = -24\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 55\text{ }^{\circ}\text{C}$                                                   |        |       | - 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>                                           | $R_{DS(on)}$  | $V_{GS} = -10\text{ V}$ , $I_D = -2.8\text{ A}$                                                                                        |        | 0.057 | 0.072     | $\Omega$      |
|                                                                                   |               | $V_{GS} = -4.5\text{ V}$ , $I_D = -2.0\text{ A}$                                                                                       |        | 0.090 | 0.120     |               |
| Forward Transconductance <sup>a</sup>                                             | $g_{fs}$      | $V_{DS} = -5\text{ V}$ , $I_D = -2.8\text{ A}$                                                                                         |        | 8.0   |           | S             |
| Diode Forward Voltage                                                             | $V_{SD}$      | $I_S = -0.75\text{ A}$ , $V_{GS} = 0\text{ V}$                                                                                         |        | - 0.8 | - 1.2     | V             |
| Dynamic <sup>b</sup>                                                              |               |                                                                                                                                        |        |       |           |               |
| Total Gate Charge                                                                 | $Q_g$         | $V_{DS} = -15\text{ V}$ , $V_{GS} = -10\text{ V}$<br>$I_D \cong -2.8\text{ A}$                                                         |        | 9.5   | 15        | nC            |
| Gate-Source Charge                                                                | $Q_{gs}$      |                                                                                                                                        |        | 1.5   |           |               |
| Gate-Drain Charge                                                                 | $Q_{gd}$      |                                                                                                                                        |        | 2.5   |           |               |
| Input Capacitance                                                                 | $C_{iss}$     | $V_{DS} = -15\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$                                                                   |        | 400   |           | pF            |
| Output Capacitance                                                                | $C_{oss}$     |                                                                                                                                        |        | 95    |           |               |
| Reverse Transfer Capacitance                                                      | $C_{rss}$     |                                                                                                                                        |        | 70    |           |               |
| Switching <sup>c</sup>                                                            |               |                                                                                                                                        |        |       |           |               |
| Turn-On Time                                                                      | $t_{d(on)}$   | $V_{DD} = -15\text{ V}$ , $R_L = 15\text{ }\Omega$<br>$I_D \cong -1.0\text{ A}$ , $V_{GEN} = -4.5\text{ V}$<br>$R_g = 6\text{ }\Omega$ |        | 7     | 15        | ns            |
|                                                                                   | $t_r$         |                                                                                                                                        |        | 15    | 25        |               |
| Turn-Off Time                                                                     | $t_{d(off)}$  |                                                                                                                                        |        | 20    | 30        |               |
|                                                                                   | $t_f$         |                                                                                                                                        |        | 20    | 30        |               |

Notes:

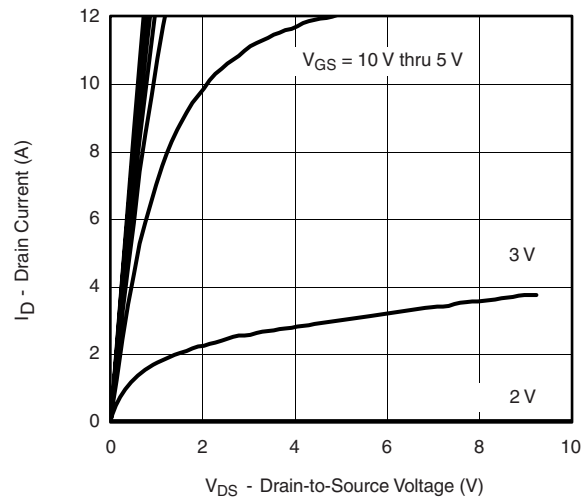
a. Pulse test:  $PW \leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. For DESIGN AID ONLY, not subject to production testing.

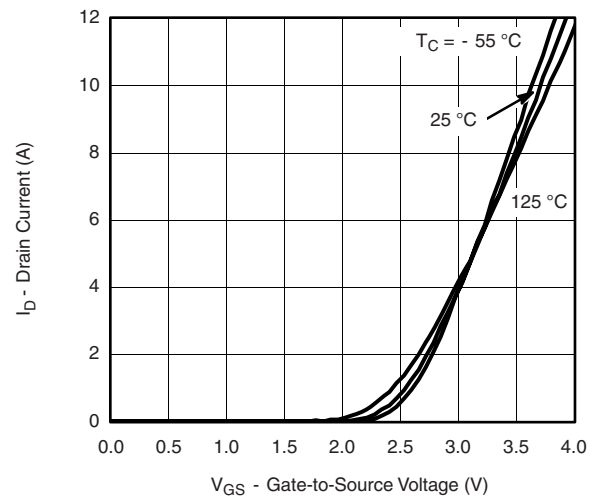
c. Switching time is essentially independent of operating temperature.

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.

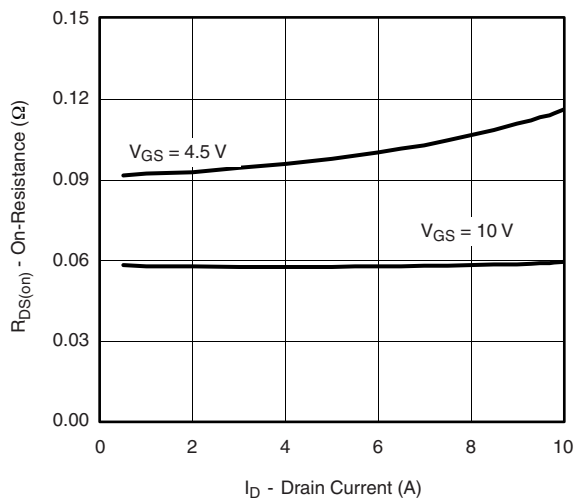
## TYPICAL CHARACTERISTICS 25 °C unless noted



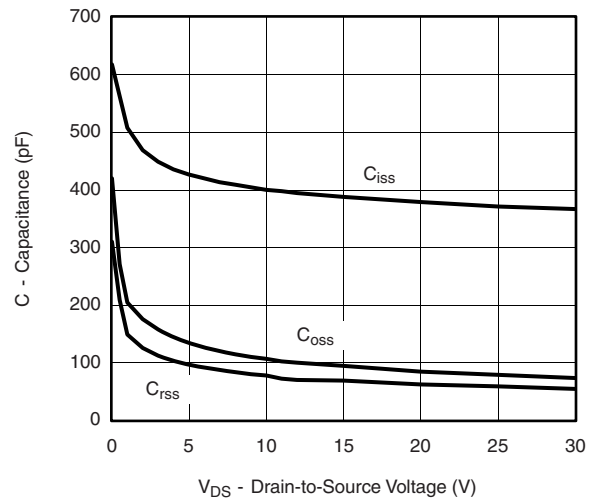
Output Characteristics



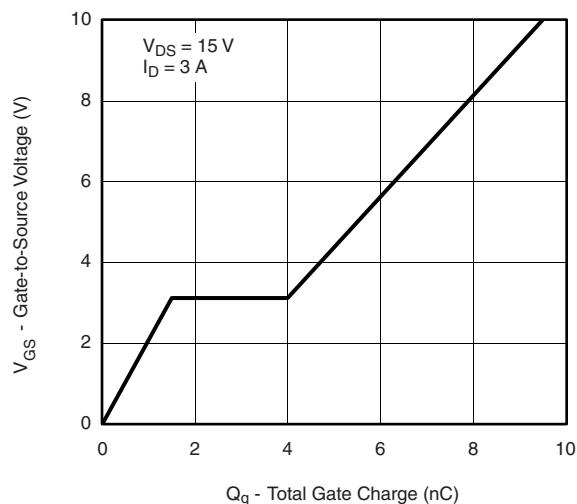
Transfer Characteristics



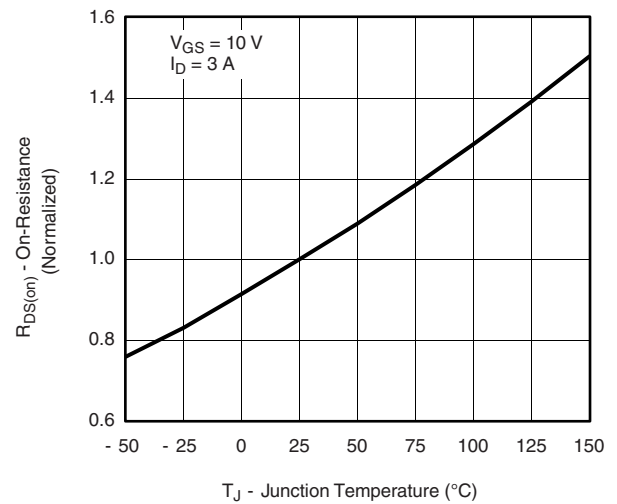
On-Resistance vs. Drain Current



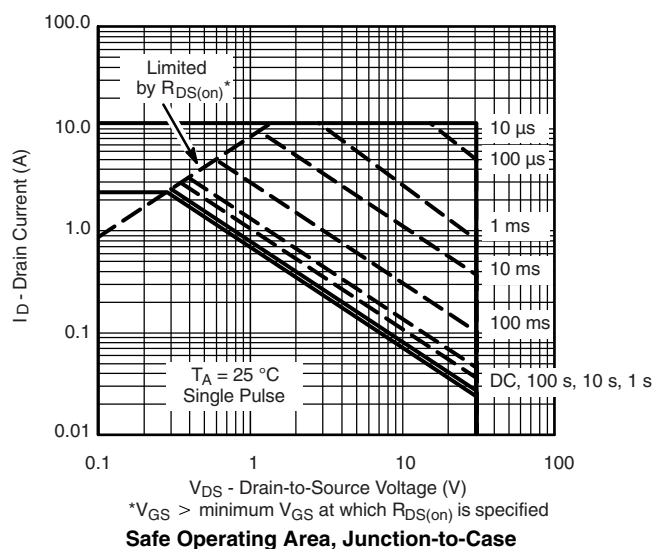
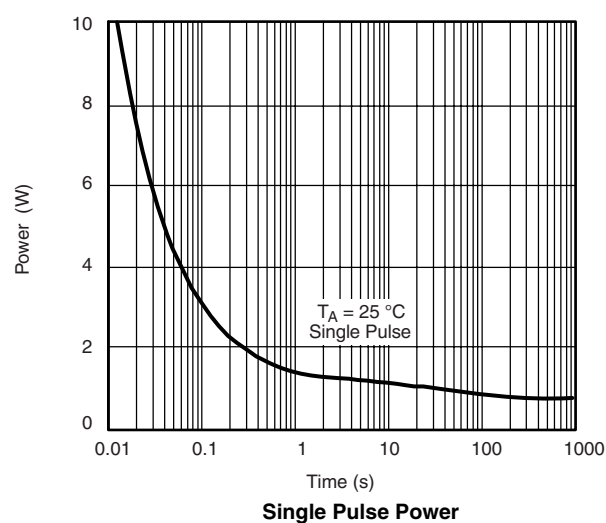
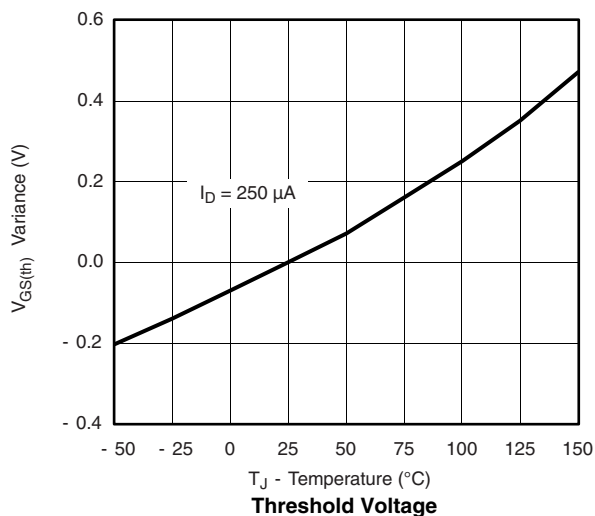
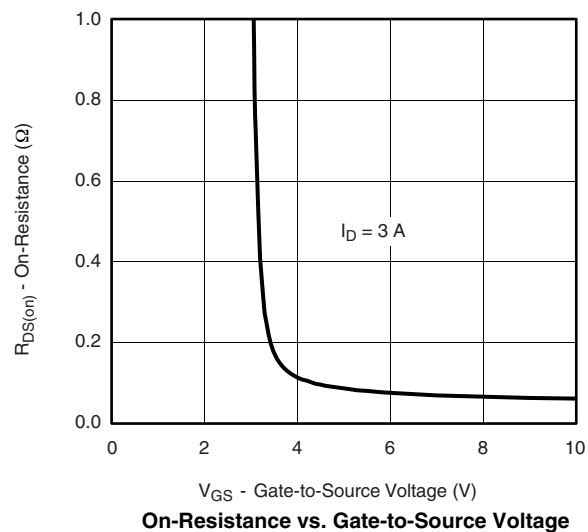
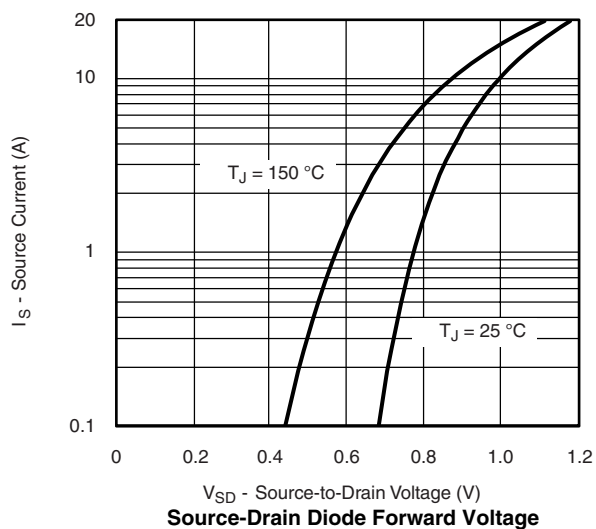
Capacitance



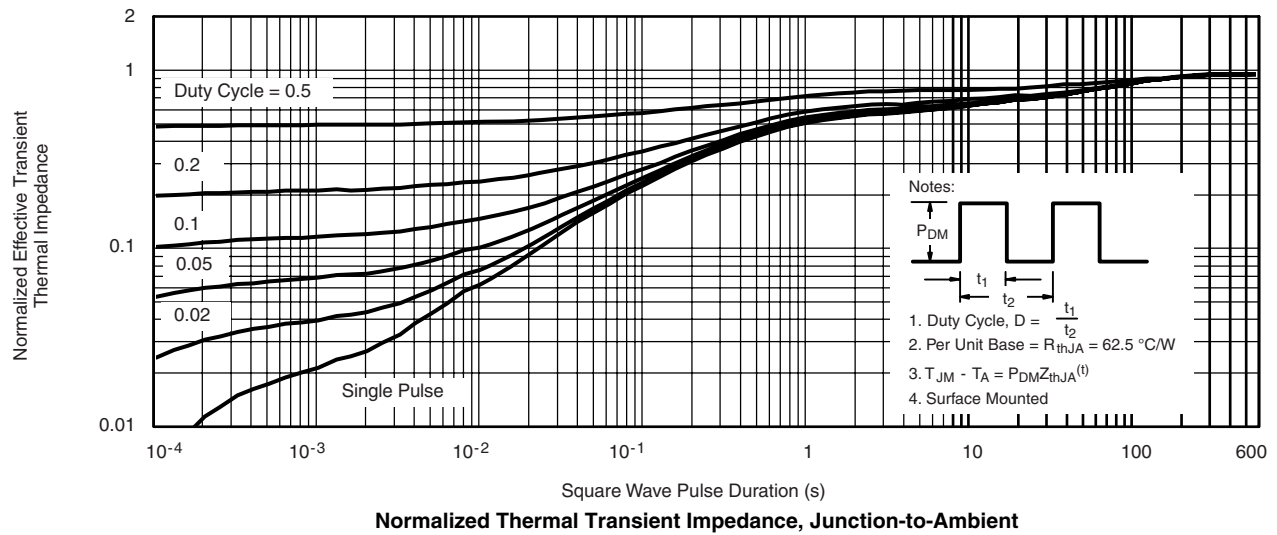
Gate Charge



On-Resistance vs. Junction Temperature

**TYPICAL CHARACTERISTICS** 25 °C unless noted

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