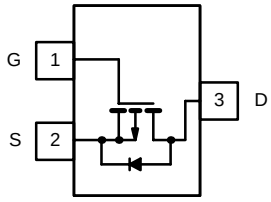
# P-Channel 2.5-V (G-S) MOSFET

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $r_{DS(on)}$ (Ω) | $I_D$ (A)[b] |
| –20 | 0.130 @ $V_{GS}$ = –4.5 V | –2.0 |
| | 0.190 @ $V_{GS}$ = –2.5 V | –1.6 |

**TO-236**
**(SOT-23)**




Top View

Si2301DS (1A)*

*Marking Code

| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C UNLESS OTHERWISE NOTED) | | | | | |
|---|---|---|---|---|---|
| Parameter | | Symbol | 5 sec | Steady State | Unit |
| Drain-Source Voltage | | $V_{DS}$ | –20 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±8 | | |
| Continuous Drain Current ($T_J$ = 150°C)[b] | $T_A$= 25°C | $I_D$ | –2.0 | –1.75 | A |
| | $T_A$= 70°C | | –1.6 | –1.4 | |
| Pulsed Drain Current[a] | | $I_{DM}$ | –10 | | |
| Continuous Source Current (Diode Conduction)[b] | | $I_S$ | –0.75 | –0.6 | |
| Power Dissipation[b] | $T_A$= 25°C | $P_D$ | 0.9 | 0.7 | W |
| | $T_A$= 70°C | | 0.57 | 0.45 | |
| 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[b] | $R_{thJA}$ | 115 | 140 | °C/W |
| Maximum Junction-to-Ambient[c] | | 140 | 175 | |

Notes
a. Pulse width limited by maximum junction temperature.
b. Surface Mounted on FR4 Board, t ≤ 5 sec.
c. Surface Mounted on FR4 Board.

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

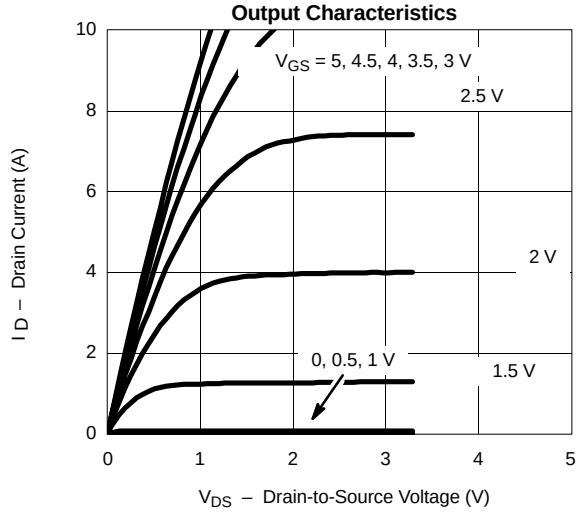
## SPECIFICATIONS ($T_J$ = 25°C UNLESS OTHERWISE NOTED)

| Parameter | Symbol | Test Conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = –250 μA | –20 | | | V |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = –250 μA | –0.45 | | –0.95 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±8 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = –16 V, $V_{GS}$ = 0 V | | | –1 | μA |
| | | $V_{DS}$ = –16 V, $V_{GS}$ = 0 V, $T_J$ = 55°C | | | –10 | |
| On-State Drain Current[a] | $I_{D(on)}$ | $V_{DS}$ ≤ –5 V, $V_{GS}$ = –4.5 V | –6 | | | A |
| | | $V_{DS}$ ≤ –5 V, $V_{GS}$ = –2.5 V | –3 | | | |
| Drain-Source On-Resistance[a] | $r_{DS(on)}$ | $V_{GS}$ = –4.5 V, $I_D$ = –2.8 A | | 0.093 | 0.130 | Ω |
| | | $V_{GS}$ = –2.5 V, $I_D$ = –2.0 A | | 0.140 | 0.190 | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = –5 V, $I_D$ = –2.8 A | | 6.5 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$ = –0.75 A, $V_{GS}$ = 0 V | | –0.80 | –1.2 | V |
| **Dynamic[b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = –6 V, $V_{GS}$ = –4.5 V<br>$I_D$ ≅ –2.8 A | | 4.2 | 10 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 0.8 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 0.8 | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = –6 V, $V_{GS}$ = 0, f = 1 MHz | | 500 | | pF |
| Output Capacitance | $C_{oss}$ | | | 115 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 62 | | |
| **Switching[c]** | | | | | | |
| Turn-On Time | $t_{d(on)}$ | $V_{DD}$ = –6 V, $R_L$ = 6 Ω<br>$I_D$ ≅ –1.0 A, $V_{GEN}$ = –4.5 V<br>$R_G$ = 6 Ω | | 6 | 25 | ns |
| | $t_r$ | | | 30 | 60 | |
| Turn-Off Time | $t_{d(off)}$ | | | 25 | 70 | |
| | $t_f$ | | | 10 | 60 | |

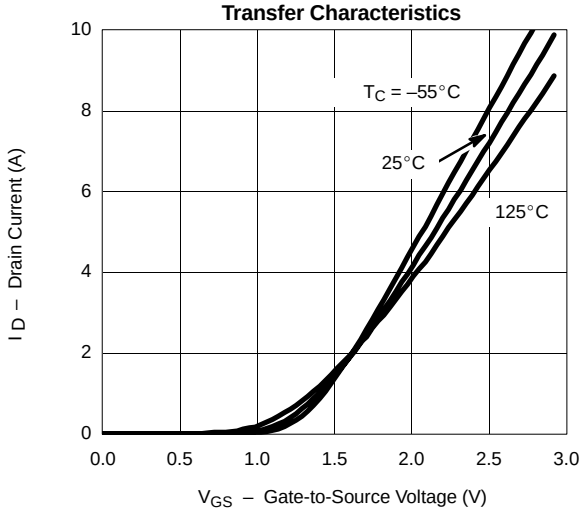
Notes
a. Pulse test: PW ≤ 300 μs duty cycle ≤ 2%.
b. For DESIGN AID ONLY, not subject to production testing.
c. Switching time is essentially independent of operating temperature. • FaxBack 408-970-5600

## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

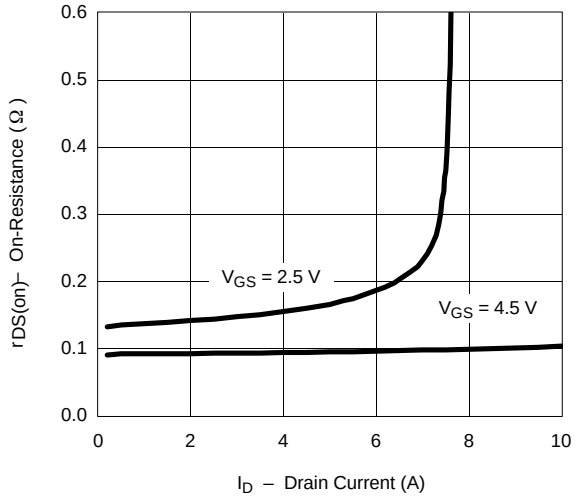
**Output Characteristics**



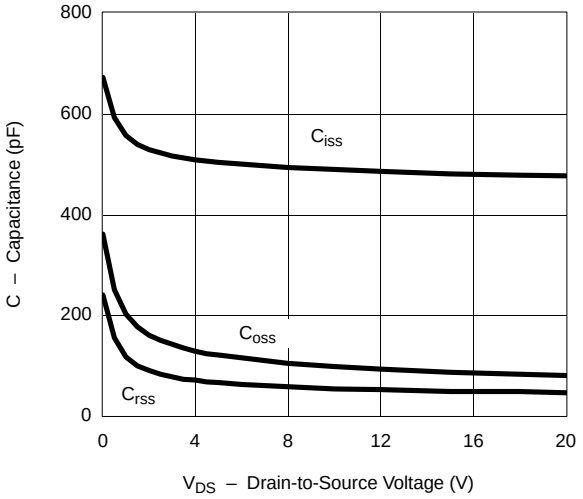

**Transfer Characteristics**



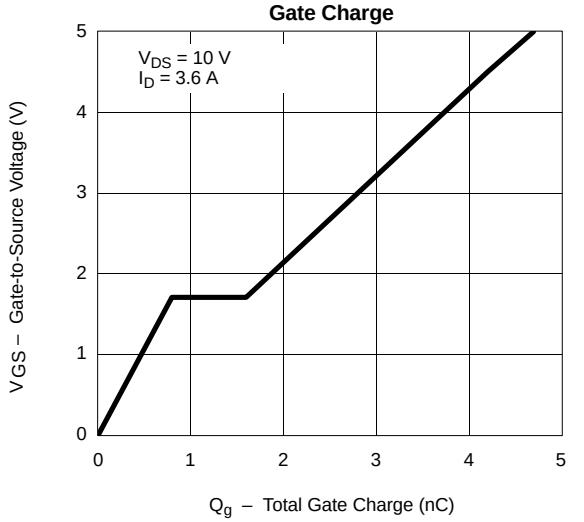

**On-Resistance vs. Drain Current**



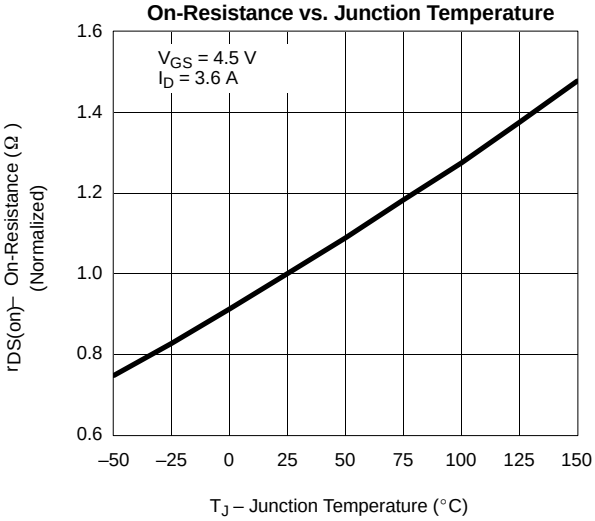

**Capacitance**




**Gate Charge**

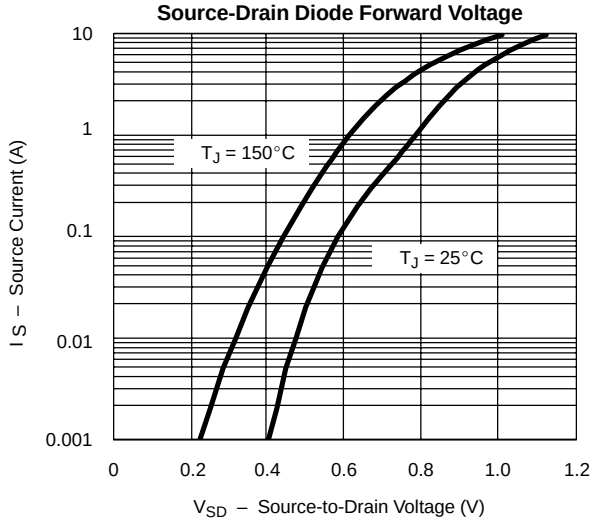



**On-Resistance vs. Junction Temperature**

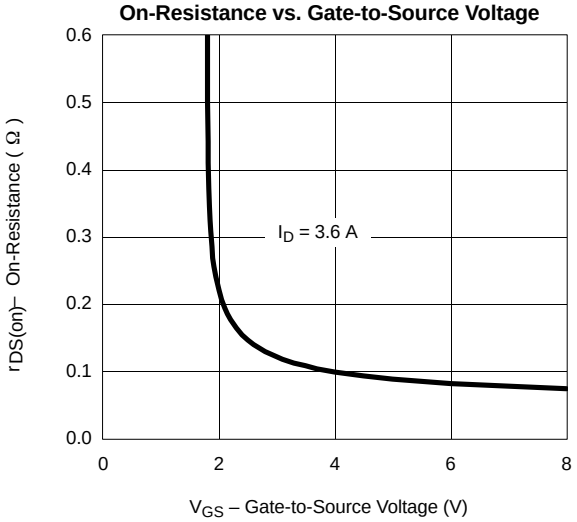


## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

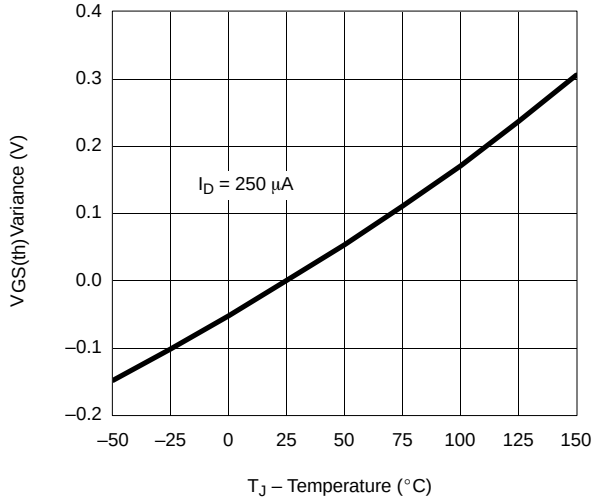
**Source-Drain Diode Forward Voltage**



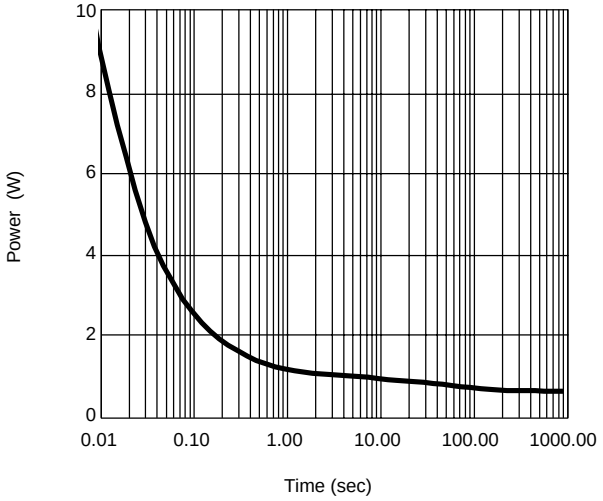

**On-Resistance vs. Gate-to-Source Voltage**



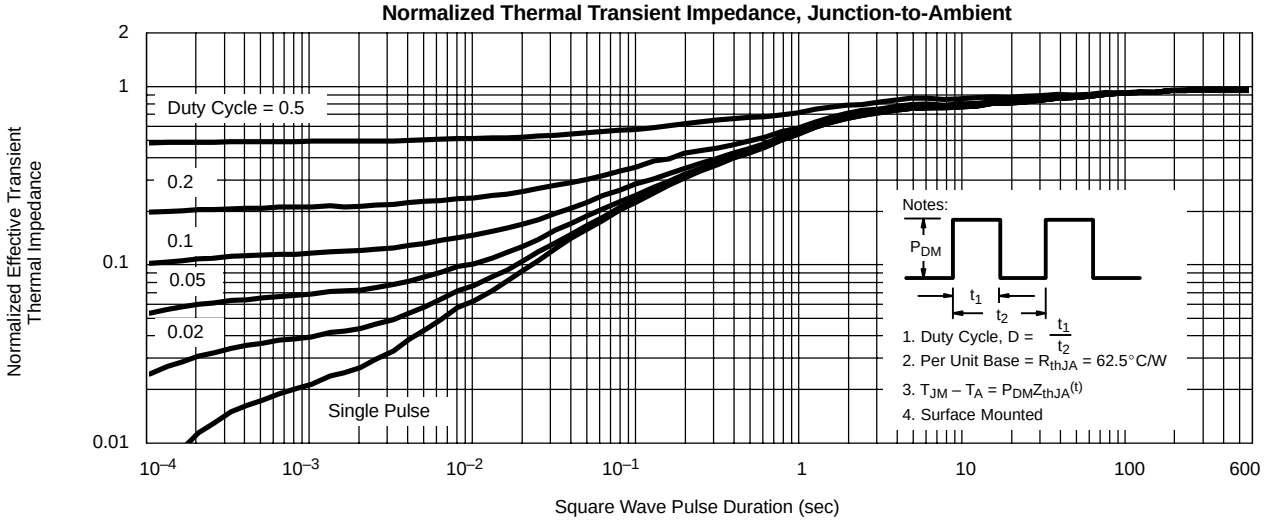

**Threshold Voltage**




**Single Pulse Power**




**Normalized Thermal Transient Impedance, Junction-to-Ambient**



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