

**Maximum Ratings – Q1** (@TA = +25°C unless otherwise specified.)

| Characteristic                                           |              |                        | Symbol           | Value | Unit |
|----------------------------------------------------------|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage                                     |              |                        | V <sub>DSS</sub> | 30    | V    |
| Gate-Source Voltage                                      |              |                        | V <sub>GSS</sub> | ±20   | V    |
| Continuous Drain Current (Note 7) V <sub>GS</sub> = 10V  | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 3.4   | A    |
|                                                          |              | T <sub>A</sub> = +70°C |                  | 2.7   |      |
| Continuous Drain Current (Note 7) V <sub>GS</sub> = 4.5V | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 2.7   | A    |
|                                                          |              | T <sub>A</sub> = +70°C |                  | 2.2   |      |
| Maximum Continuous Body Diode Forward Current (Note 5)   |              |                        | I <sub>S</sub>   | 1.5   | A    |
| Pulsed Drain Current (Note 5)                            |              |                        | I <sub>DM</sub>  | 25    | A    |

**Maximum Ratings – Q2** (@TA = +25°C unless otherwise specified.)

| Characteristic                                            |              |                                                  | Symbol           | Value        | Unit |
|-----------------------------------------------------------|--------------|--------------------------------------------------|------------------|--------------|------|
| Drain-Source Voltage                                      |              |                                                  | V <sub>DSS</sub> | -30          | V    |
| Gate-Source Voltage                                       |              |                                                  | V <sub>GSS</sub> | ±20          | V    |
| Continuous Drain Current (Note 7) V <sub>GS</sub> = -10V  | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -2.8<br>-2.4 | A    |
| Continuous Drain Current (Note 7) V <sub>GS</sub> = -4.5V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -2.3<br>-2.1 | A    |
| Maximum Continuous Body Diode Forward Current (Note 7)    |              |                                                  | I <sub>S</sub>   | -1.5         | A    |
| Pulsed Drain Current (Note 7)                             |              |                                                  | I <sub>D</sub>   | -20          | A    |

**Thermal Characteristics**

| Characteristic                                   |                        | Symbol                            | Value       | Units |
|--------------------------------------------------|------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 6)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 0.84        | W     |
|                                                  | T <sub>A</sub> = +70°C |                                   | 0.52        |       |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State           | R <sub>θJA</sub>                  | 155         | °C/W  |
|                                                  | t < 10s                |                                   | 109         |       |
| Total Power Dissipation (Note 7)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 1.27        | W     |
|                                                  | T <sub>A</sub> = +70°C |                                   | 0.8         |       |
| Thermal Resistance, Junction to Ambient (Note 7) | Steady State           | R <sub>θJA</sub>                  | 102         | °C/W  |
|                                                  | t < 10s                |                                   | 71          |       |
| Thermal Resistance, Junction to Case (Note 7)    |                        | R <sub>θJC</sub>                  | 34          |       |
| Operating and Storage Temperature Range          |                        | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

- Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.  
7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

**Electrical Characteristics – Q1 NMOS** (@  $T_A = +25^\circ\text{C}$  unless otherwise stated.)

| Characteristic                          | Symbol       | Min | Typ | Max       | Unit       | Test Condition                                               |
|-----------------------------------------|--------------|-----|-----|-----------|------------|--------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 8)</b>     |              |     |     |           |            |                                                              |
| Drain-Source Breakdown Voltage          | $BV_{DSS}$   | 30  | -   | -         | V          | $V_{GS} = 0V, I_D = 250\mu A$                                |
| Zero Gate Voltage Drain Current         | $I_{DSS}$    | -   | -   | 1.0       | $\mu A$    | $V_{DS} = 24V, V_{GS} = 0V$                                  |
| Gate-Source Leakage                     | $I_{GSS}$    | -   | -   | $\pm 100$ | nA         | $V_{GS} = \pm 20V, V_{DS} = 0V$                              |
| <b>ON CHARACTERISTICS (Note 8)</b>      |              |     |     |           |            |                                                              |
| Gate Threshold Voltage                  | $V_{GS(th)}$ | 1.0 | -   | 2.3       | V          | $V_{DS} = V_{GS}, I_D = 250\mu A$                            |
| Static Drain-Source On-Resistance       | $R_{DS(on)}$ | -   | 38  | 60        | m $\Omega$ | $V_{GS} = 10V, I_D = 3.1A$                                   |
|                                         |              |     | 55  | 100       |            | $V_{GS} = 4.5V, I_D = 2A$                                    |
| Forward Transfer Admittance             | $ Y_{fs} $   | -   | 4   | -         | S          | $V_{DS} = 5V, I_D = 3.1A$                                    |
| Diode Forward Voltage                   | $V_{SD}$     | -   | 0.8 | 1         | V          | $V_{GS} = 0V, I_S = 1A$                                      |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b> |              |     |     |           |            |                                                              |
| Input Capacitance                       | $C_{iss}$    | -   | 290 | 400       | pF         | $V_{DS} = 15V, V_{GS} = 0V, f = 1.2MHz$                      |
| Output Capacitance                      | $C_{oss}$    | -   | 40  | 80        |            |                                                              |
| Reverse Transfer Capacitance            | $C_{rss}$    | -   | 40  | 80        |            |                                                              |
| Gate Resistance                         | $R_g$        | -   | 1.4 | -         | $\Omega$   | $V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$                         |
| Total Gate Charge ( $V_{GS} = 4.5V$ )   | $Q_g$        | -   | 4   | 6         | nC         | $V_{DS} = 15V, V_{GS} = 4.5V, I_D = 3.1A$                    |
| Total Gate Charge ( $V_{GS} = 10V$ )    | $Q_g$        | -   | 9   | 13        |            |                                                              |
| Gate-Source Charge                      | $Q_{gs}$     | -   | 1.2 | -         |            |                                                              |
| Gate-Drain Charge                       | $Q_{gd}$     | -   | 1.5 | -         |            |                                                              |
| Turn-On Delay Time                      | $t_{D(on)}$  | -   | 3   | -         | ns         | $V_{GS} = 10V, V_{DS} = 15V, R_G = 3\Omega, R_L = 4.7\Omega$ |
| Turn-On Rise Time                       | $t_r$        | -   | 5   | -         |            |                                                              |
| Turn-Off Delay Time                     | $t_{D(off)}$ | -   | 13  | -         |            |                                                              |
| Turn-Off Fall Time                      | $t_f$        | -   | 3   | -         |            |                                                              |

Notes: 8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to product testing.

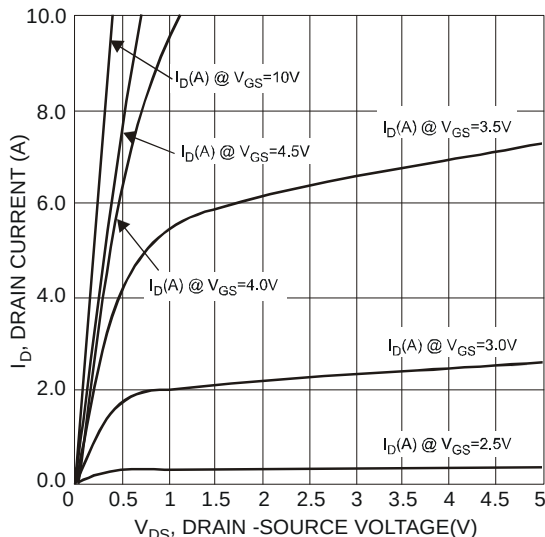


Fig. 1 Typical Output Characteristics

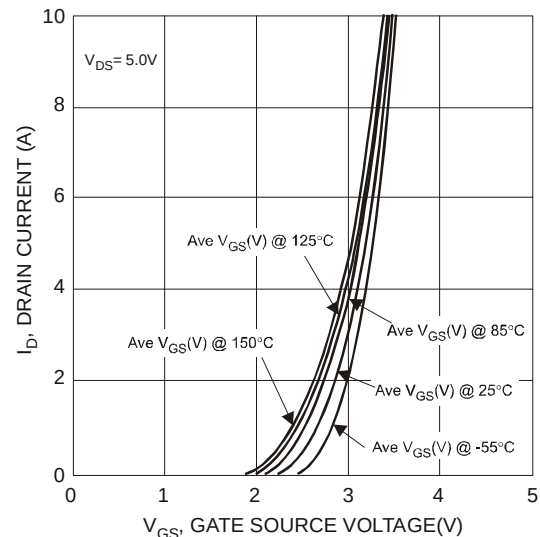


Fig. 2 Typical Transfer Characteristics

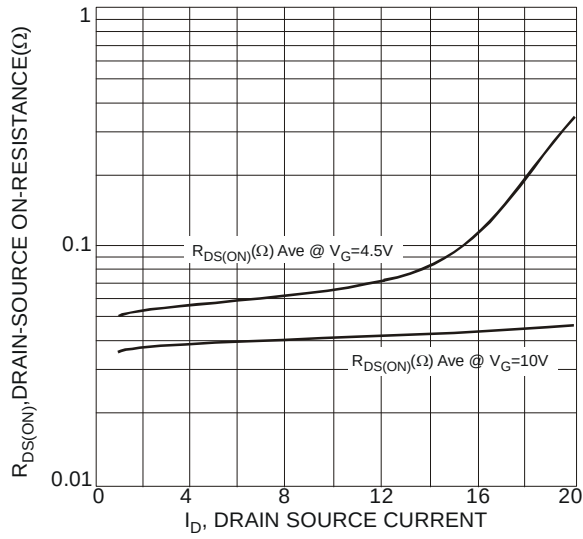


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

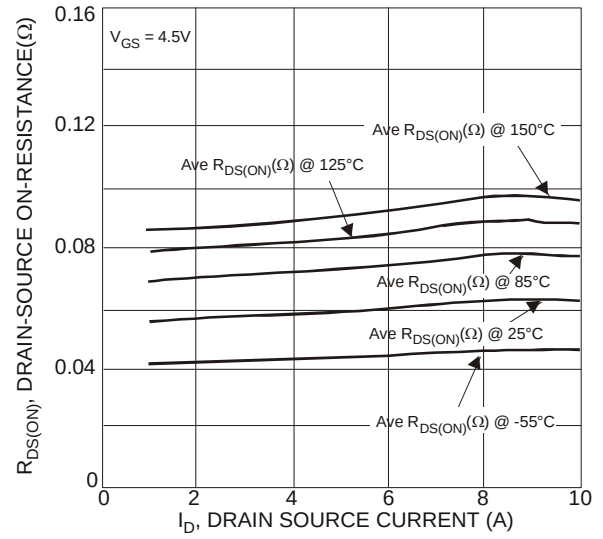


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

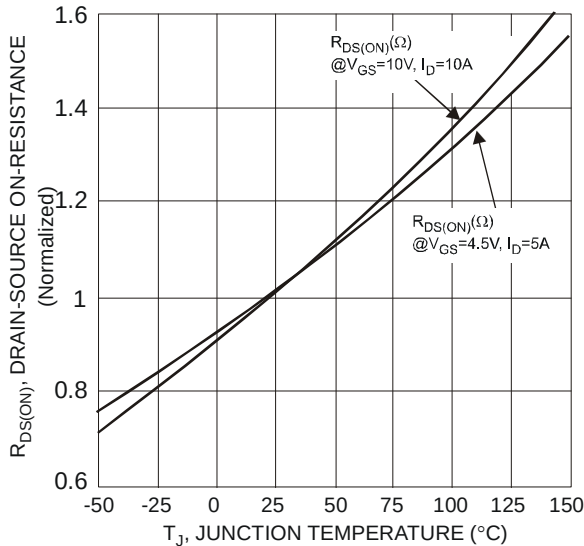


Fig. 5 On-Resistance Variation with Temperature

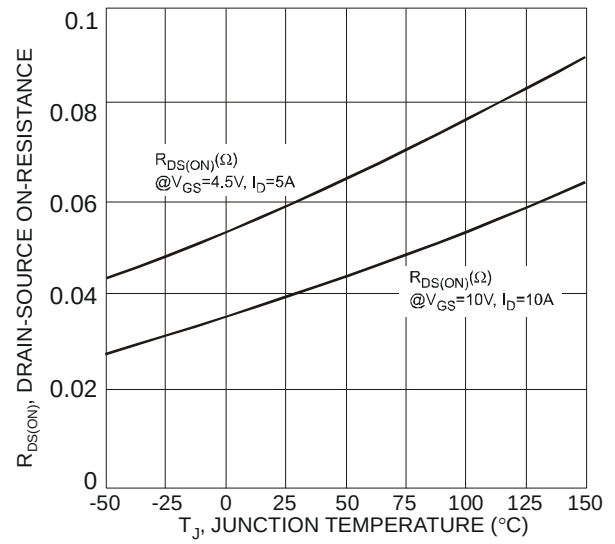


Fig. 6 On-Resistance Variation with Temperature

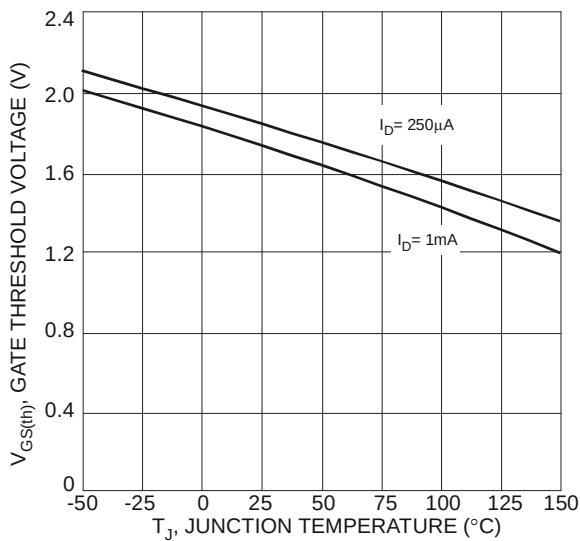


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

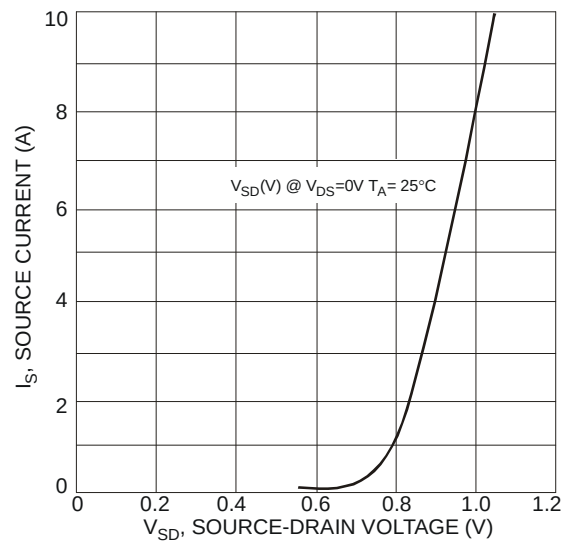
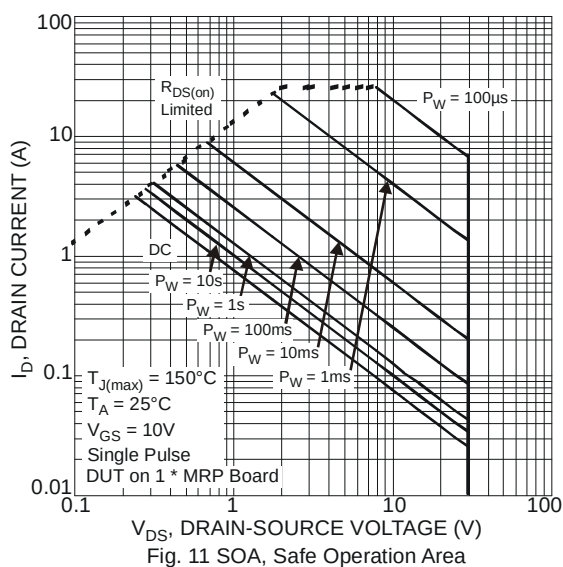
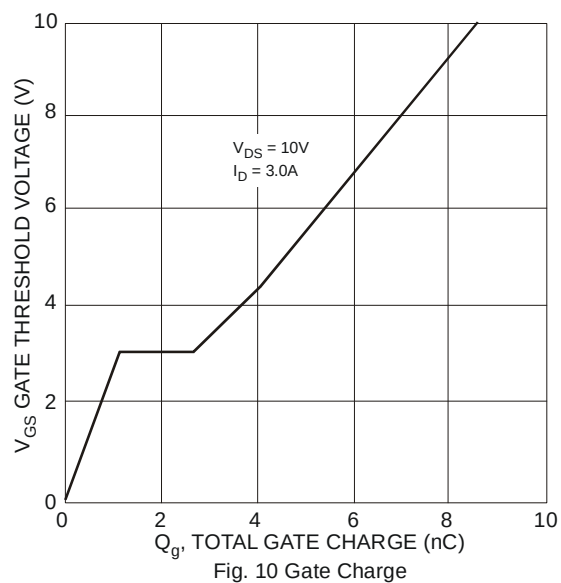
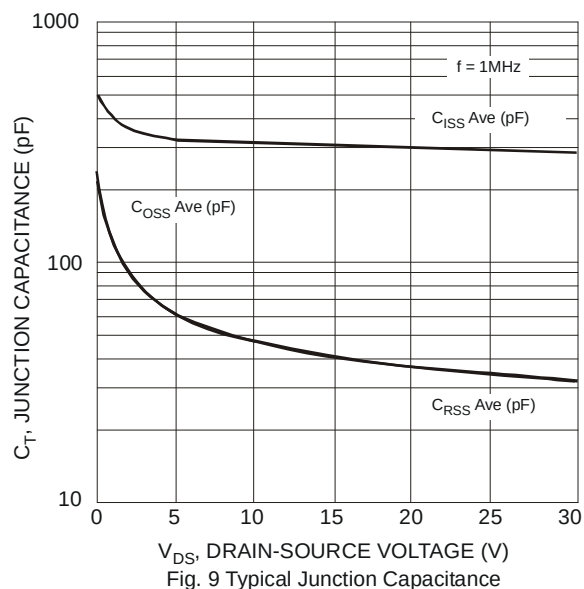


Fig. 8 Diode Forward Voltage vs. Current



# Electrical Characteristics – Q2 PMOS (@ T<sub>A</sub> = +25°C unless otherwise stated.)

| Characteristic                              | Symbol              | Min  | Typ      | Max       | Unit | Test Condition                                                                                  |
|---------------------------------------------|---------------------|------|----------|-----------|------|-------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 8)</b>         |                     |      |          |           |      |                                                                                                 |
| Drain-Source Breakdown Voltage              | BV <sub>DSS</sub>   | -30  | -        | -         | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA                                                   |
| Zero Gate Voltage Drain Current             | I <sub>DSS</sub>    | -    | -        | -1.0      | μA   | V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V                                                    |
| Gate-Source Leakage                         | I <sub>GSS</sub>    | -    | -        | ±100      | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                    |
| <b>ON CHARACTERISTICS (Note 8)</b>          |                     |      |          |           |      |                                                                                                 |
| Gate Threshold Voltage                      | V <sub>GS(th)</sub> | -1.0 | -        | -2.3      | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                     |
| Static Drain-Source On-Resistance           | R <sub>DS(ON)</sub> | -    | 73<br>99 | 95<br>140 | mΩ   | V <sub>GS</sub> = -10V, I <sub>D</sub> = -2.7A<br>V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2A |
| Forward Transfer Admittance                 | Y <sub>fs</sub>     | -    | 6        | -         | S    | V <sub>DS</sub> = -5V, I <sub>D</sub> = -2.7A                                                   |
| Diode Forward Voltage                       | V <sub>SD</sub>     | -    | -0.8     | -1.0      | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A                                                      |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>     |                     |      |          |           |      |                                                                                                 |
| Input Capacitance                           | C <sub>iss</sub>    | -    | 350      | 420       | pF   | V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V,<br>f = 1.2MHz                                     |
| Output Capacitance                          | C <sub>oss</sub>    | -    | 50       | 100       |      |                                                                                                 |
| Reverse Transfer Capacitance                | C <sub>rss</sub>    | -    | 45       | 80        |      |                                                                                                 |
| Gate Resistance                             | R <sub>g</sub>      | -    | 17.1     | -         | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                            |
| Total Gate Charge (V <sub>GS</sub> = -4.5V) | Q <sub>g</sub>      | -    | 4        | 6         | nC   | V <sub>DS</sub> = -15V, V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3A                           |
| Total Gate Charge (V <sub>GS</sub> = -10V)  | Q <sub>g</sub>      | -    | 7        | 9         |      |                                                                                                 |
| Gate-Source Charge                          | Q <sub>gs</sub>     | -    | 0.9      | -         |      |                                                                                                 |
| Gate-Drain Charge                           | Q <sub>gd</sub>     | -    | 1.2      | -         | ns   | V <sub>GS</sub> = -10V, V <sub>DS</sub> = -15V,<br>R <sub>G</sub> = 6Ω, R <sub>L</sub> = 15Ω    |
| Turn-On Delay Time                          | t <sub>D(on)</sub>  | -    | 4.8      | -         |      |                                                                                                 |
| Turn-On Rise Time                           | t <sub>r</sub>      | -    | 7.3      | -         |      |                                                                                                 |
| Turn-Off Delay Time                         | t <sub>D(off)</sub> | -    | 20       | -         |      |                                                                                                 |
| Turn-Off Fall Time                          | t <sub>f</sub>      | -    | 13       | -         |      |                                                                                                 |

Notes: 8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to production testing.

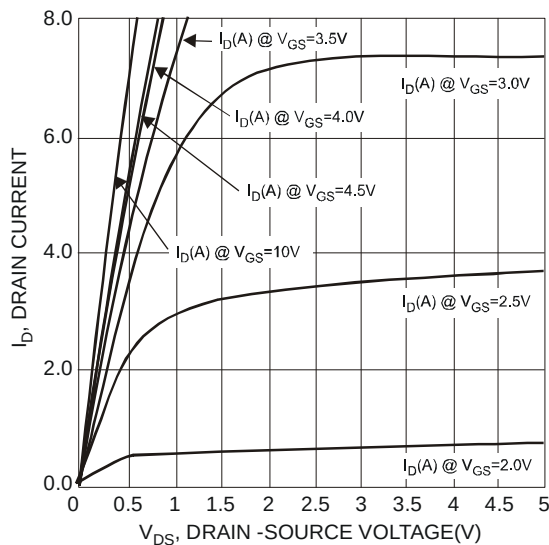


Fig. 12 Typical Output Characteristics

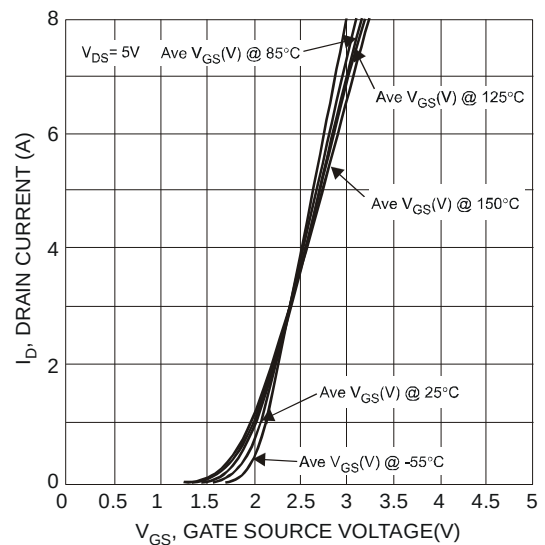


Fig. 13 Typical Transfer Characteristics

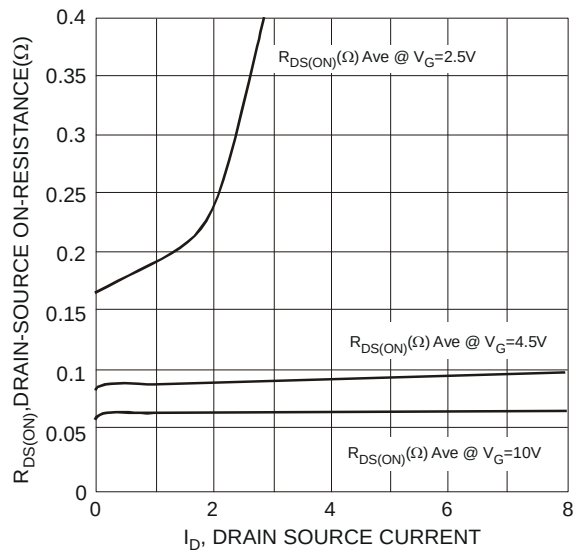


Fig. 14 Typical On-Resistance vs. Drain Current and Gate Voltage

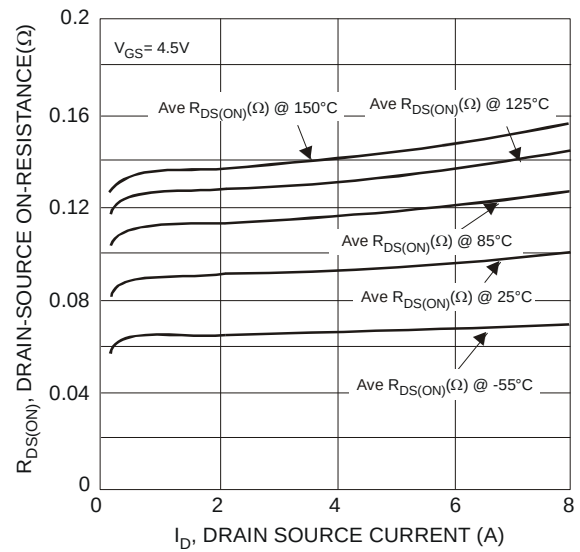


Fig. 15 Typical On-Resistance vs. Drain Current and Temperature

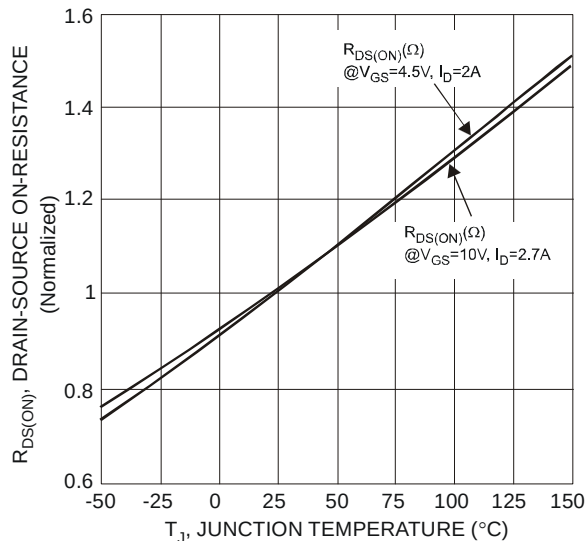


Fig. 16 On-Resistance Variation with Temperature

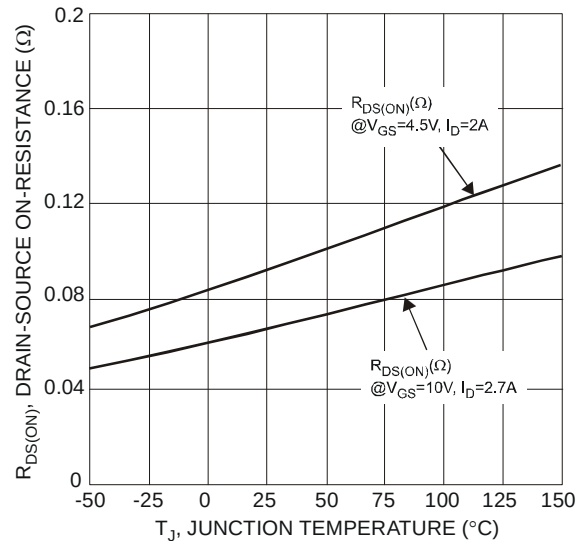


Fig. 17 On-Resistance Variation with Temperature

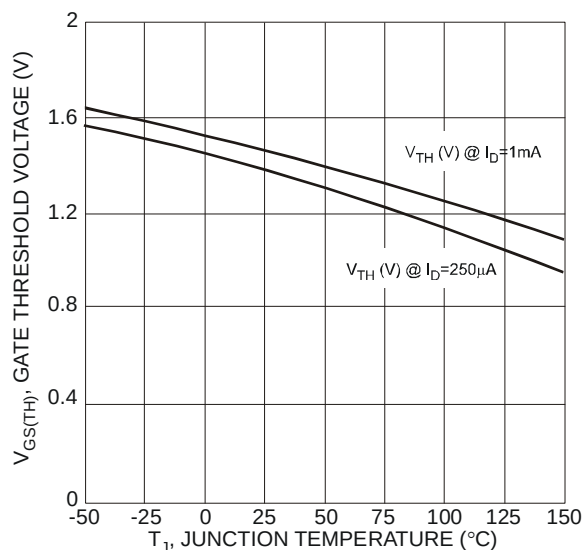


Fig. 18 Gate Threshold Variation vs. Ambient Temperature

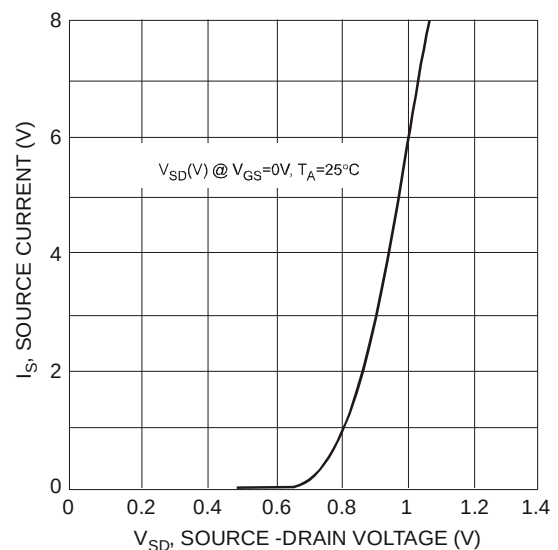
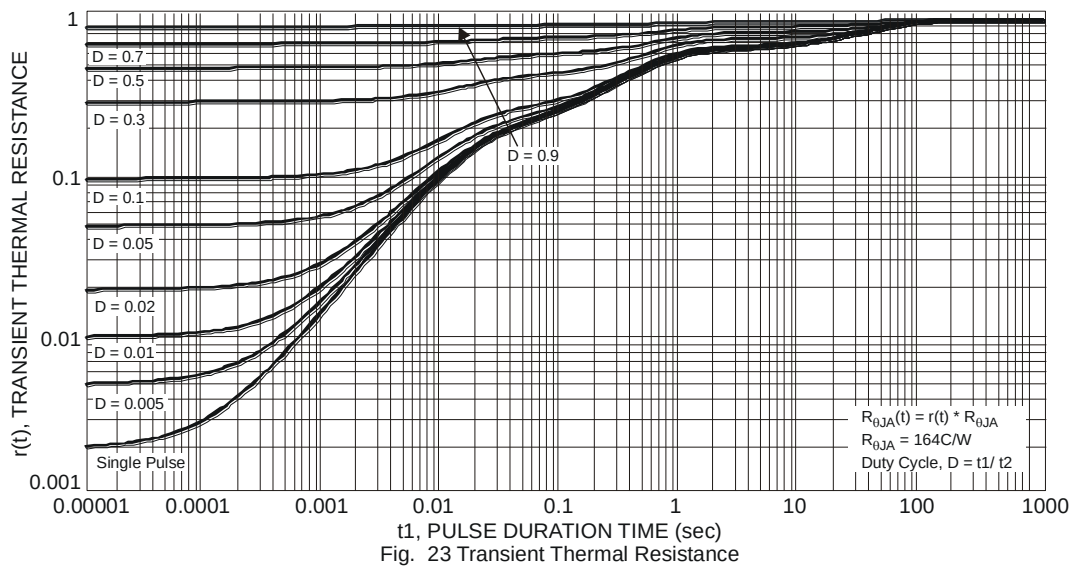
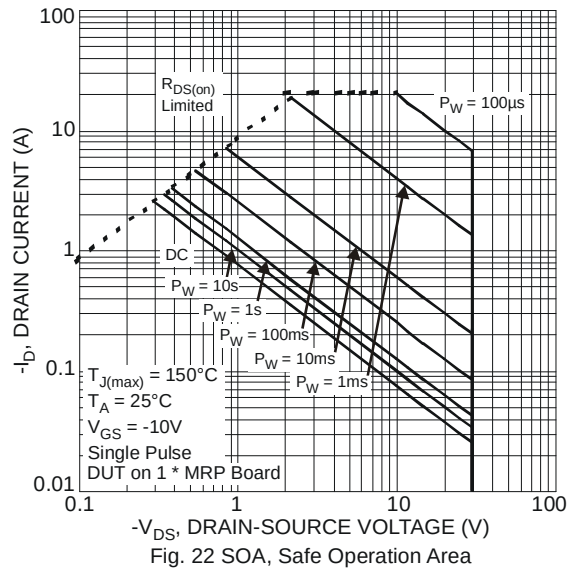
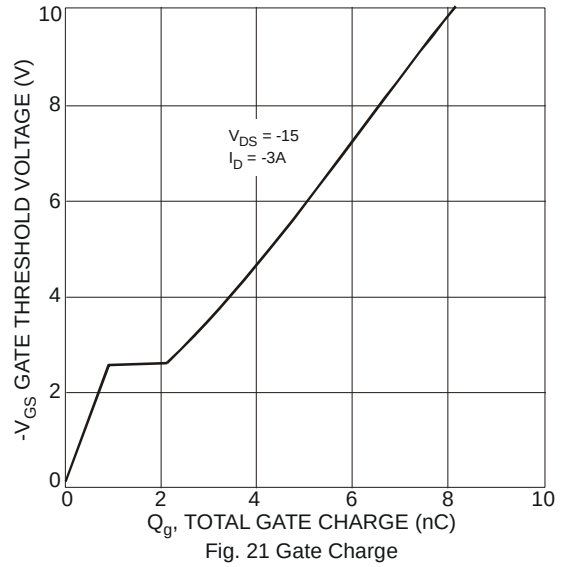
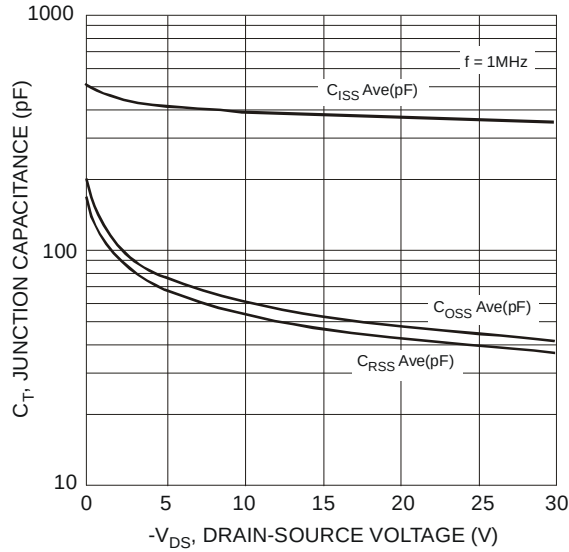
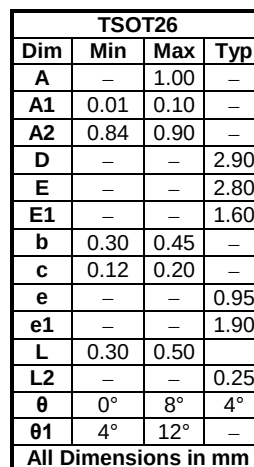


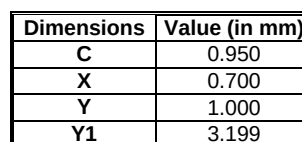
Fig. 19 Diode Forward Voltage vs. Current



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