

**Maximum Ratings – Total Device** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                          | Symbol                            | Value       | Unit |
|-----------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)              | P <sub>D</sub>                    | 200         | mW   |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub>                  | 625         | °C/W |
| Operating and Storage Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**Maximum Ratings N-CHANNEL – Q<sub>1</sub>, 2N7002 Section** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                             | Symbol           | Value | Unit |
|--------------------------------------------|------------------|-------|------|
| Drain-Source Voltage                       | V <sub>DSS</sub> | 60    | V    |
| Drain-Gate Voltage R <sub>GS</sub> ≤ 1.0MΩ | V <sub>DGR</sub> | 60    | V    |
| Gate-Source Voltage                        | V <sub>GSS</sub> | ±20   | V    |
| Continuous Pulsed                          |                  | ±40   |      |
| Drain Current (Note 5)                     | I <sub>D</sub>   | 115   | mA   |
| Continuous                                 |                  | 73    |      |
| Continuous @ +100°C Pulsed                 |                  | 800   |      |

**Maximum Ratings P-CHANNEL – Q<sub>2</sub>, BSS84 Section** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                            | Symbol           | Value | Unit |
|-------------------------------------------|------------------|-------|------|
| Drain-Source Voltage                      | V <sub>DSS</sub> | -50   | V    |
| Drain-Gate Voltage R <sub>GS</sub> ≤ 20KΩ | V <sub>DGR</sub> | -50   | V    |
| Gate-Source Voltage                       | V <sub>GSS</sub> | ±20   | V    |
| Continuous                                |                  |       |      |
| Drain Current (Note 5)                    | I <sub>D</sub>   | -130  | mA   |
| Continuous                                |                  |       |      |

Note: 5. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Incorporated's suggested pad layout document, which can be found on our website at <http://www.diodes.com/package-outlines.html>.

**Electrical Characteristics N-CHANNEL – Q<sub>1</sub>, 2N7002 Section** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                                                             | Symbol              | Min | Typ        | Max         | Unit | Test Condition                                                                                                         |
|--------------------------------------------------------------------------------------------|---------------------|-----|------------|-------------|------|------------------------------------------------------------------------------------------------------------------------|
| OFF CHARACTERISTICS (Note 6)                                                               |                     |     |            |             |      |                                                                                                                        |
| Drain-Source Breakdown Voltage                                                             | BV <sub>DSS</sub>   | 60  | 70         | —           | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 10μA                                                                            |
| Zero Gate Voltage Drain Current<br>@ T <sub>C</sub> = +25°C<br>@ T <sub>C</sub> = +125°C   | I <sub>DSS</sub>    | —   | —          | 1.0<br>500  | μA   | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V                                                                            |
| Gate-Body Leakage                                                                          | I <sub>GSS</sub>    | —   | —          | ±10         | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                                           |
| ON CHARACTERISTICS (Note 6)                                                                |                     |     |            |             |      |                                                                                                                        |
| Gate Threshold Voltage                                                                     | V <sub>GS(TH)</sub> | 1.0 | —          | 2.5         | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                                             |
| Static Drain-Source On-Resistance<br>@ T <sub>J</sub> = +25°C<br>@ T <sub>J</sub> = +125°C | R <sub>DS(ON)</sub> | —   | 3.2<br>4.4 | 7.5<br>13.5 | Ω    | V <sub>GS</sub> = 5.0V, I <sub>D</sub> = 0.05A<br>V <sub>GS</sub> = 10V, I <sub>D</sub> = 0.5A                         |
| On-State Drain Current                                                                     | I <sub>D(ON)</sub>  | 0.5 | 1.0        | —           | A    | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 7.5V                                                                          |
| Forward Transconductance                                                                   | g <sub>FS</sub>     | 80  | —          | —           | mS   | V <sub>DS</sub> =10V, I <sub>D</sub> = 0.2A                                                                            |
| DYNAMIC CHARACTERISTICS                                                                    |                     |     |            |             |      |                                                                                                                        |
| Input Capacitance                                                                          | C <sub>ISS</sub>    | —   | 22         | 50          | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz                                                                |
| Output Capacitance                                                                         | C <sub>OSS</sub>    | —   | 11         | 25          | pF   |                                                                                                                        |
| Reverse Transfer Capacitance                                                               | C <sub>RSS</sub>    | —   | 2.0        | 5.0         | pF   |                                                                                                                        |
| SWITCHING CHARACTERISTICS                                                                  |                     |     |            |             |      |                                                                                                                        |
| Turn-On Delay Time                                                                         | t <sub>D(ON)</sub>  | —   | 7.0        | 20          | ns   | V <sub>DD</sub> = 30V, I <sub>D</sub> = 0.2A,<br>R <sub>L</sub> = 150Ω, V <sub>GEN</sub> = 10V, R <sub>GEN</sub> = 25Ω |
| Turn-Off Delay Time                                                                        | t <sub>D(OFF)</sub> | —   | 11         | 20          | ns   |                                                                                                                        |

**Electrical Characteristics P-CHANNEL – Q<sub>2</sub>, BSS84 Section** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                    | Symbol              | Min  | Typ | Max              | Unit           | Test Condition                                                                                                                                                                                                        |
|-----------------------------------|---------------------|------|-----|------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OFF CHARACTERISTICS (Note 6)      |                     |      |     |                  |                |                                                                                                                                                                                                                       |
| Drain-Source Breakdown Voltage    | BV <sub>DSS</sub>   | -50  | —   | —                | V              | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA                                                                                                                                                                         |
| Zero Gate Voltage Drain Current   | I <sub>DSS</sub>    | —    | —   | -1<br>-2<br>-100 | μA<br>μA<br>nA | V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C<br>V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V, T <sub>J</sub> = +125°C<br>V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C |
| Gate-Body Leakage                 | I <sub>GSS</sub>    | —    | —   | ±10              | nA             | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                                                                                                                                          |
| ON CHARACTERISTICS (Note 6)       |                     |      |     |                  |                |                                                                                                                                                                                                                       |
| Gate Threshold Voltage            | V <sub>GS(TH)</sub> | -0.8 | —   | -2.0             | V              | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -1mA                                                                                                                                                             |
| Static Drain-Source On-Resistance | R <sub>DS(ON)</sub> | —    | —   | 10               | Ω              | V <sub>GS</sub> = -5V, I <sub>D</sub> = -0.100A                                                                                                                                                                       |
| Forward Transconductance          | g <sub>FS</sub>     | 0.05 | —   | —                | S              | V <sub>DS</sub> = -25V, I <sub>D</sub> = -0.1A                                                                                                                                                                        |
| DYNAMIC CHARACTERISTICS           |                     |      |     |                  |                |                                                                                                                                                                                                                       |
| Input Capacitance                 | C <sub>iSS</sub>    | —    | —   | 45               | pF             | V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1.0MHz                                                                                                                                                              |
| Output Capacitance                | C <sub>oSS</sub>    | —    | —   | 25               | pF             |                                                                                                                                                                                                                       |
| Reverse Transfer Capacitance      | C <sub>rSS</sub>    | —    | —   | 12               | pF             |                                                                                                                                                                                                                       |
| SWITCHING CHARACTERISTICS         |                     |      |     |                  |                |                                                                                                                                                                                                                       |
| Turn-On Delay Time                | t <sub>D(ON)</sub>  | —    | 10  | —                | ns             | V <sub>DD</sub> = -30V, I <sub>D</sub> = -0.27A,<br>R <sub>GEN</sub> = 50Ω, V <sub>GS</sub> = -10V                                                                                                                    |
| Turn-Off Delay Time               | t <sub>D(OFF)</sub> | —    | 18  | —                | ns             |                                                                                                                                                                                                                       |

Note: 6. Short duration pulse test used to minimize self-heating effect.

# N-CHANNEL – 2N7002 Section

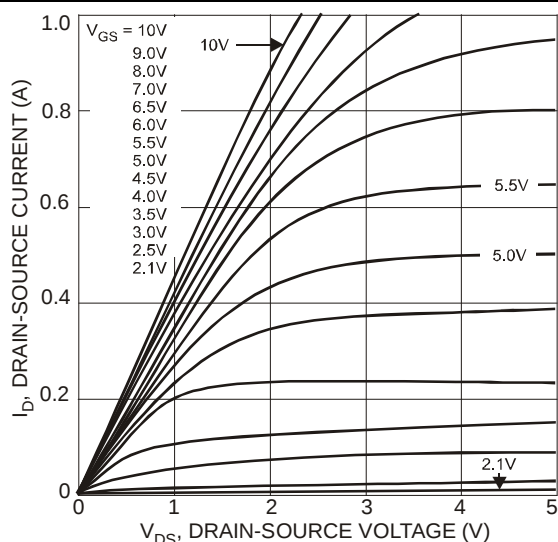


Figure 1 On-Region Characteristics

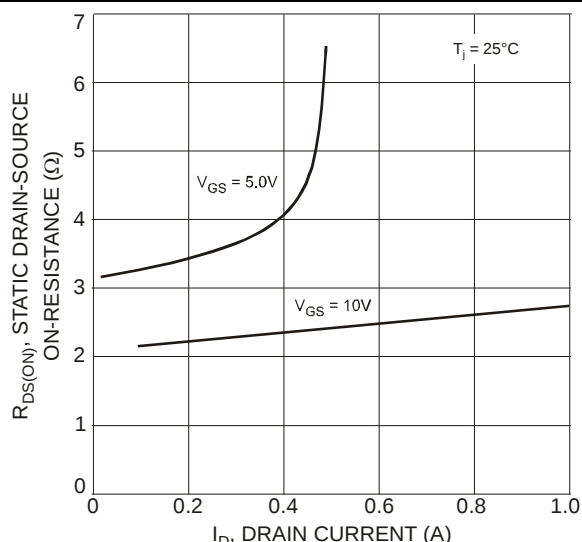


Figure 2 On-Resistance vs. Drain Current

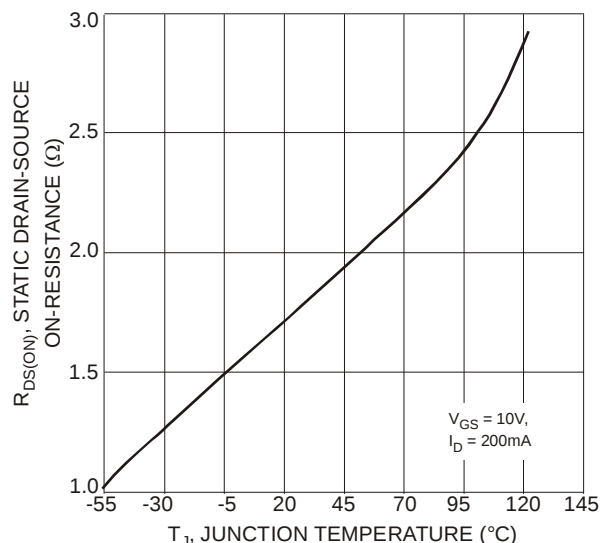


Figure 3 On-Resistance vs. Junction Temperature

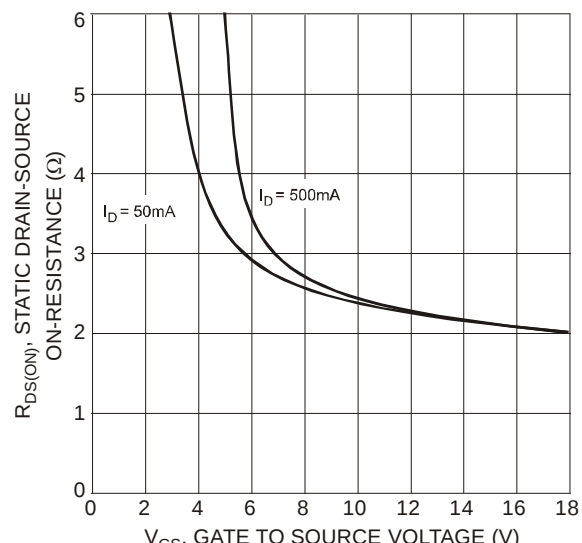


Figure 4 On-Resistance vs. Gate-Source Voltage

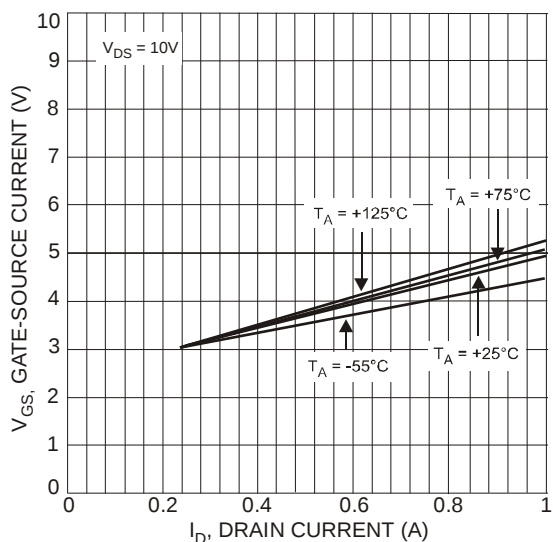


Figure 5 Typical Transfer Characteristics

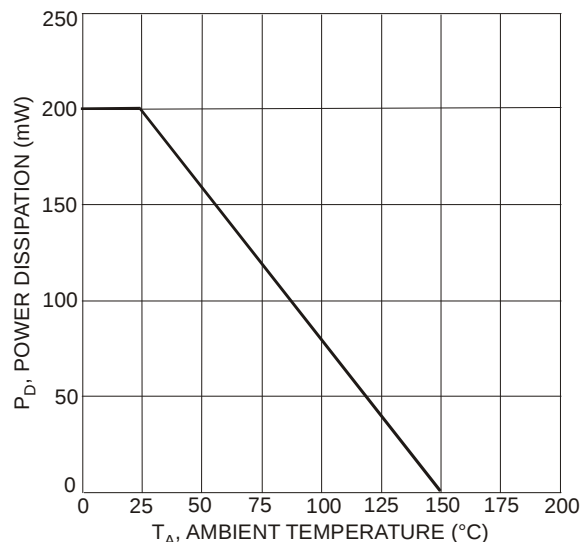


Figure 6 Max Power Dissipation vs. Ambient Temperature

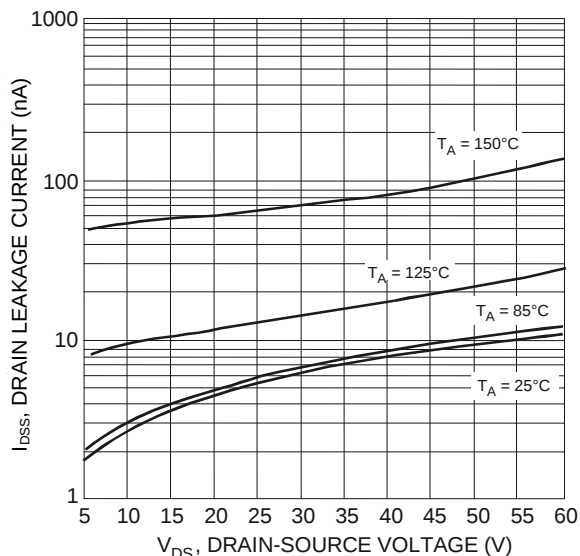


Figure 7 Typical Drain-Source Leakage Current vs. Voltage

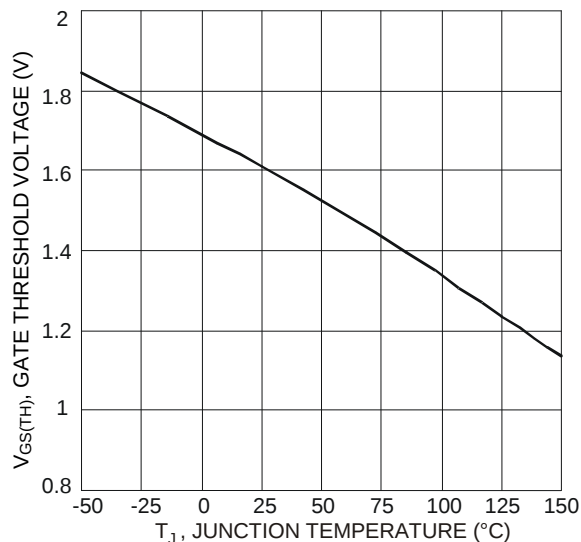


Figure 8 Gate Threshold Variation vs. Junction Temperature

## P-CHANNEL – BSS84 Section

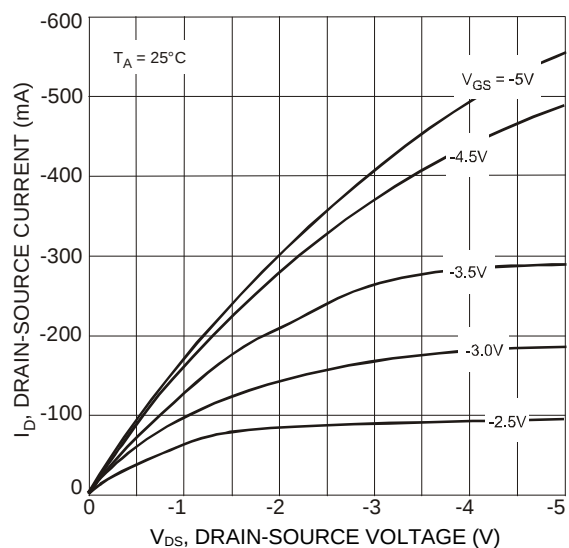


Figure 9 Drain-Source Current vs. Drain-Source Voltage

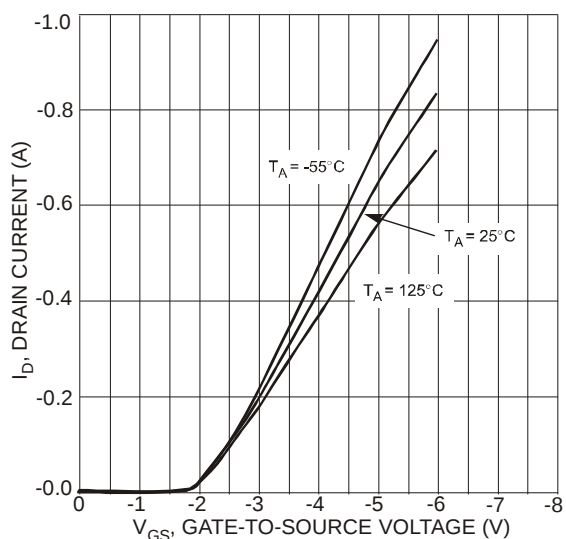


Figure 10 Drain Current vs. Gate-Source Voltage

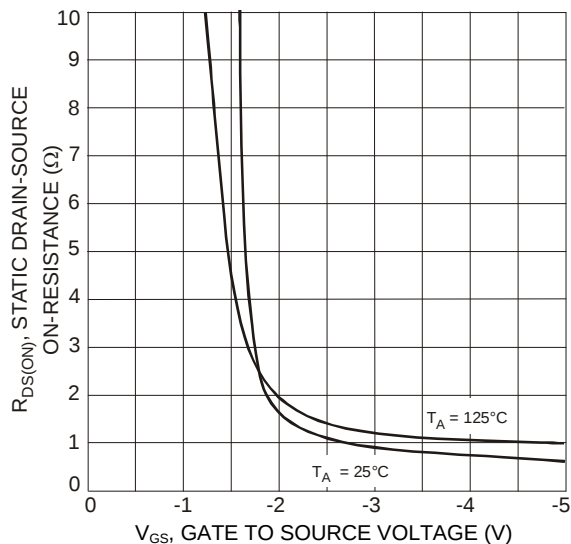


Figure 11 On-Resistance vs. Gate-Source Voltage

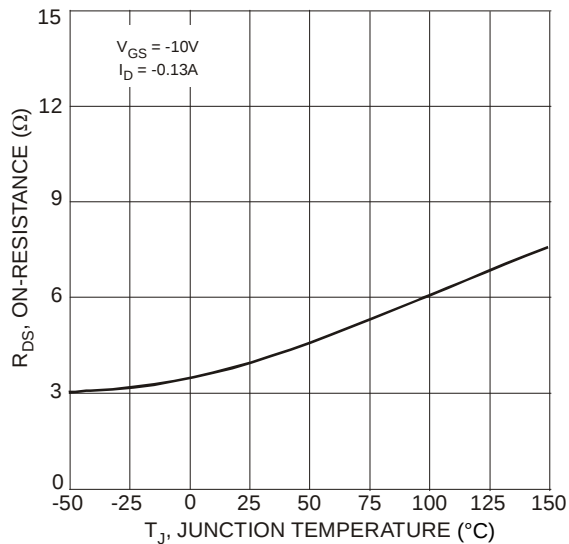


Figure 12 On-Resistance vs. Junction Temperature

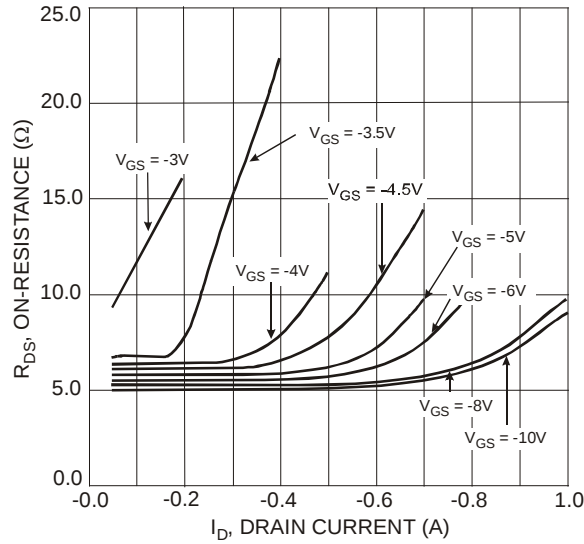


Figure 13 On-Resistance vs. Drain Current

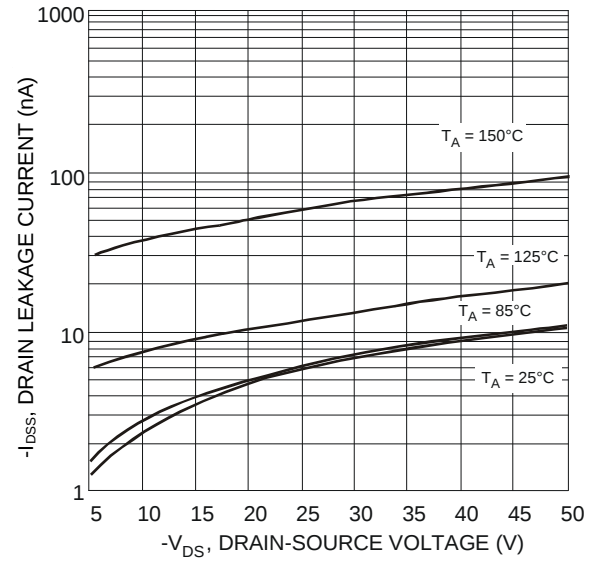


Figure 14 Typical Drain-Source Leakage Current vs. Voltage

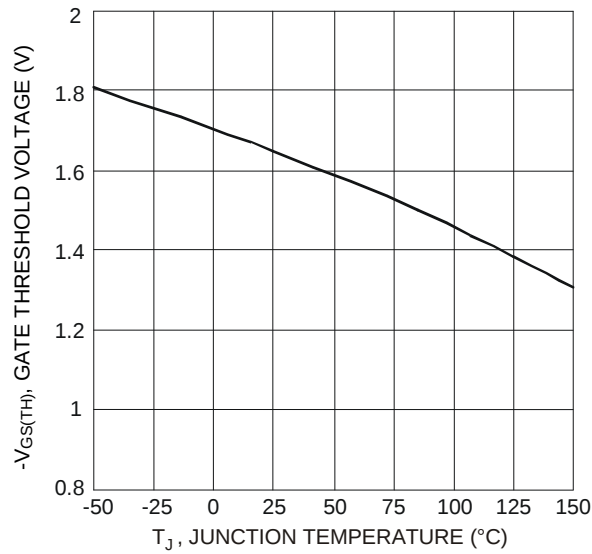
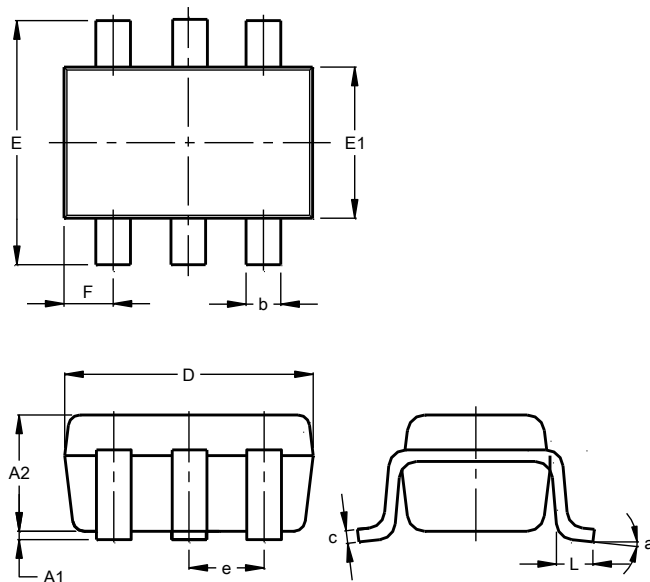


Figure 15 Gate Threshold Variation vs. Junction Temperature

## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT363**

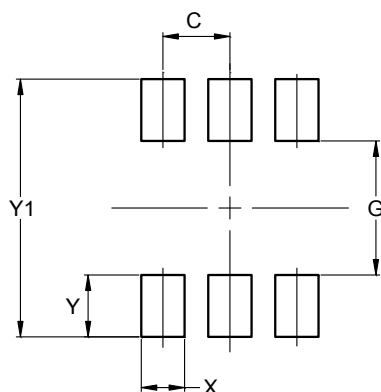


| SOT363               |           |      |       |
|----------------------|-----------|------|-------|
| Dim                  | Min       | Max  | Typ   |
| A1                   | 0.00      | 0.10 | 0.05  |
| A2                   | 0.90      | 1.00 | 0.95  |
| b                    | 0.10      | 0.30 | 0.25  |
| c                    | 0.10      | 0.22 | 0.11  |
| D                    | 1.80      | 2.20 | 2.15  |
| E                    | 2.00      | 2.20 | 2.10  |
| E1                   | 1.15      | 1.35 | 1.30  |
| e                    | 0.650 BSC |      |       |
| F                    | 0.40      | 0.45 | 0.425 |
| L                    | 0.25      | 0.40 | 0.30  |
| a                    | 0°        | 8°   | --    |
| All Dimensions in mm |           |      |       |

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT363**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.650         |
| G          | 1.300         |
| X          | 0.420         |
| Y          | 0.600         |
| Y1         | 2.500         |

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