

**450V P-CHANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

|                         |                              |  |
|-------------------------|------------------------------|--|
| <b>BV<sub>DSS</sub></b> | <b>R<sub>DS(ON)</sub></b>    | <b>I<sub>D</sub></b><br><b>T<sub>C</sub> = +25°C</b> |
| -450V                   | 21Ω @ V <sub>GS</sub> = -10V | -0.6A  |

**Description**

This 450V enhancement mode P-channel MOSFET provides users with a competitive specification offering efficient power handling capability, high impedance and is free from thermal runaway and thermally induced secondary breakdown. Applications benefiting from this device include a variety of Telecom and general high-voltage switching circuits.

**Applications**

- Load Switching
- Uninterrupted Power Supply

**Features and Benefits**

- Low Gate Drive
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

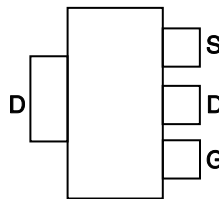
**Mechanical Data**

- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208 **e3**
- Weight: 0.112 grams (Approximate)

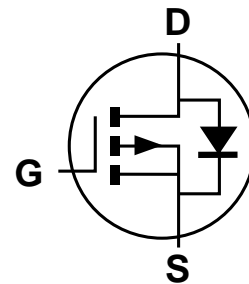
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

**Ordering Information** (Note 4)

| Part Number    | Qualification | Case   | Packaging           |
|----------------|---------------|--------|---------------------|
| DMP45H21DHE-13 | Standard      | SOT223 | 2,500 / Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**


⑆ = Manufacturer's Marking  
 P450HE = Marking Code  
 YWW = Date Code Marking  
 Y or Y = Year (ex: 7 = 2017)  
 WW = Week (01 to 53)

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

| Characteristic  | Symbol                 | Value          | Unit      |
|---|------------------------|----------------|-----------|
| Drain-Source Voltage  | V <sub>DSS</sub>       | -450           | V         |
| Gate-Source Voltage   | V <sub>GSS</sub>       | ±30            | V         |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V             | T <sub>C</sub> = +25°C | I <sub>D</sub> | -0.6<br>A |
|   | T <sub>C</sub> = +70°C | I <sub>D</sub> | -0.4<br>A |
| Pulsed Drain Current (10μs pulse, duty cycle = 1%)(Note5)           | I <sub>DM</sub>        | -1.2           | A         |
| Maximum Body Diode Continuous Current (Note5)                       | I <sub>S</sub>         | -0.9           | A         |
| Avalanche Energy (Note 8) L=60mH                                    | E <sub>AS</sub>        | 30             | mJ        |
| Avalanche Current (Note 8) L=60mH                                   | I <sub>AS</sub>        | -1             | A         |
| Peak Diode Recovery dv/dt (I <sub>SD</sub> ≤ 1.0A, di/dt ≤ 100A/μs) | dv/dt                  | 26             | V/ns      |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                          | Symbol                            | Value                  | Unit      |
|---|-----------------------------------|------------------------|-----------|
| Total Power Dissipation (Note 6)        | P <sub>D</sub>                    | T <sub>C</sub> = +25°C | 12.5<br>W |
|   |                                   | T <sub>C</sub> = +70°C | 8         |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub>                  | 108                    | °C/W      |
| Thermal Resistance, Junction to Case    | R <sub>θJC</sub>                  | 10                     | °C/W      |
| Operating and Storage Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150            | °C        |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                          | Symbol              | Min  | Typ   | Max  | Unit | Test Condition   |
|---|---------------------|------|-------|------|------|--|
| <b>OFF CHARACTERISTICS (Note 6)</b>     |                     |      |       |      |      |  |
| Drain-Source Breakdown Voltage          | BV <sub>DSS</sub>   | -450 | —     | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA  |
| Zero Gate Voltage Drain Current         | I <sub>DSS</sub>    | —    | —     | -1   | μA   | V <sub>DS</sub> = -450V, V <sub>GS</sub> = 0V  |
| Gate-Source Leakage                     | I <sub>GSS</sub>    | —    | —     | ±100 | nA   | V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 6)</b>      |                     |      |       |      |      |  |
| Gate Threshold Voltage                  | V <sub>GS(TH)</sub> | -3.0 | -4    | -5.0 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                          |
| Static Drain-Source On-Resistance       | R <sub>DS(ON)</sub> | —    | 13    | 21   | Ω    | V <sub>GS</sub> = -10V, I <sub>D</sub> = -0.3A                                       |
| Diode Forward Voltage                   | V <sub>SD</sub>     | —    | -0.84 | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A   |
| <b>DYNAMIC CHARACTERISTICS (Note 7)</b> |                     |      |       |      |      |  |
| Input Capacitance                       | C <sub>ISS</sub>    | —    | 1,003 | —    | pF   | V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1.0MHz                             |
| Output Capacitance                      | C <sub>OSS</sub>    | —    | 25.5  | —    |      |  |
| Reverse Transfer Capacitance            | C <sub>rss</sub>    | —    | 2.3   | —    |      |  |
| Gate Resistance                         | R <sub>G</sub>      | —    | 615   | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                               |
| Total Gate Charge                       | Q <sub>g</sub>      | —    | 4.2   | —    | nC   | V <sub>DS</sub> = -225V, I <sub>D</sub> = -1A, V <sub>GS</sub> = -10V                |
| Gate-Source Charge                      | Q <sub>gs</sub>     | —    | 1.1   | —    |      |  |
| Gate-Drain Charge                       | Q <sub>gd</sub>     | —    | 2.1   | —    |      |  |
| Turn-On Delay Time                      | t <sub>D(ON)</sub>  | —    | 17    | —    | ns   | V <sub>DD</sub> = -225V, R <sub>G</sub> = 3.0Ω, I <sub>D</sub> = -1A                 |
| Turn-On Rise Time                       | t <sub>R</sub>      | —    | 22    | —    |      |  |
| Turn-Off Delay Time                     | t <sub>D(OFF)</sub> | —    | 18    | —    |      |  |
| Turn-Off Fall Time                      | t <sub>F</sub>      | —    | 21    | —    |      |  |
| Body Diode Reverse Recovery Time        | t <sub>RR</sub>     | —    | 113   | —    | ns   | V <sub>GS</sub> = 0V, V <sub>DD</sub> = -200V, I <sub>S</sub> = -1A, di/dt = 100A/μs |
| Body Diode Reverse Recovery Charge      | Q <sub>RR</sub>     | —    | 540   | —    | nC   | V <sub>GS</sub> = 0V, V <sub>DD</sub> = -200V, I <sub>S</sub> = -1A, di/dt = 100A/μs |

- Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout
  7. Short duration pulse test used to minimize self-heating effect.
  8. Guaranteed by design. Not subject to production testing.

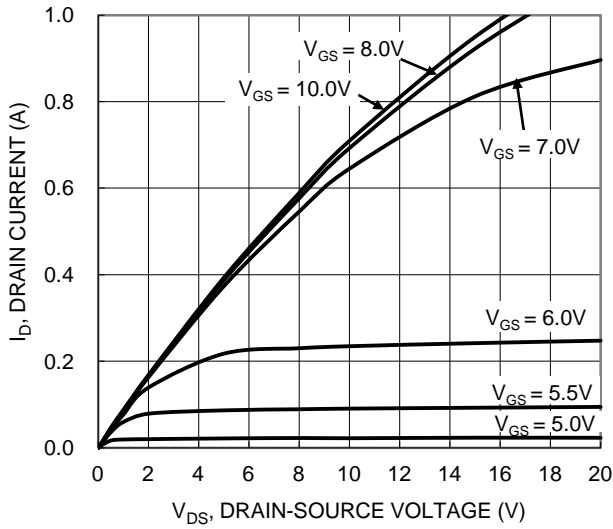


Figure 1. Typical Output Characteristic

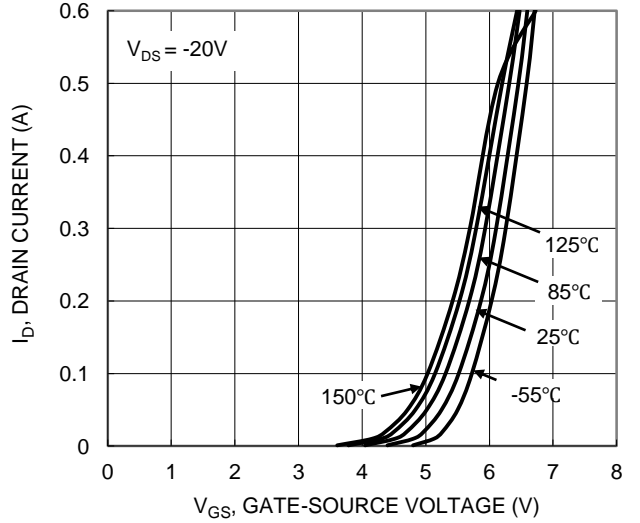


Figure 2. Typical Transfer Characteristic

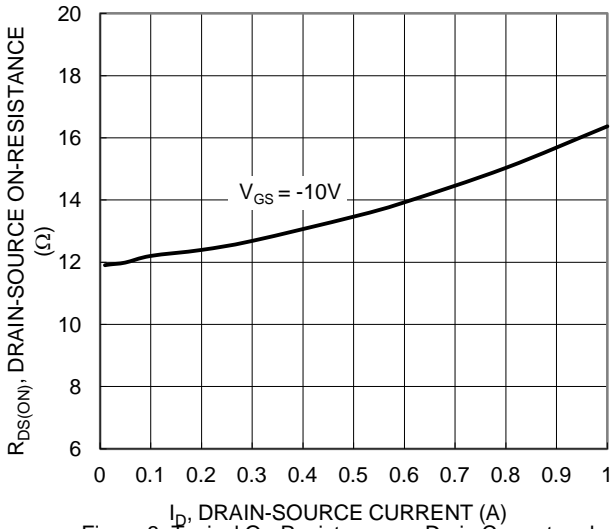


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

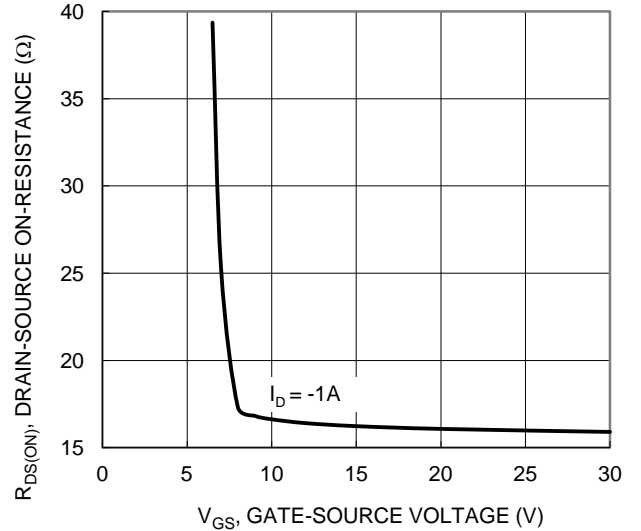


Figure 4. Typical Transfer Characteristic

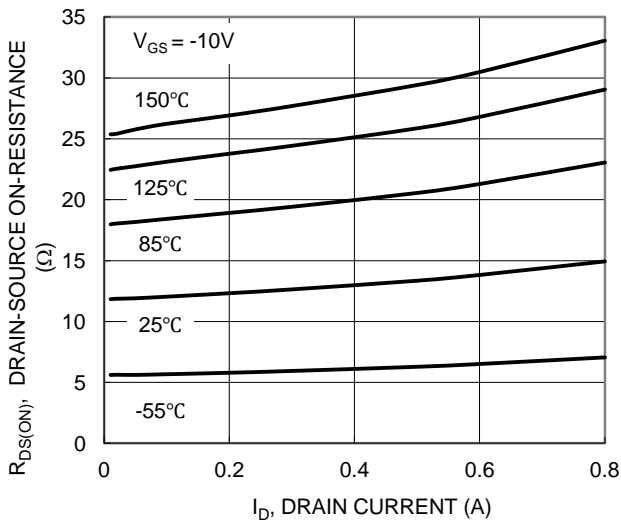


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

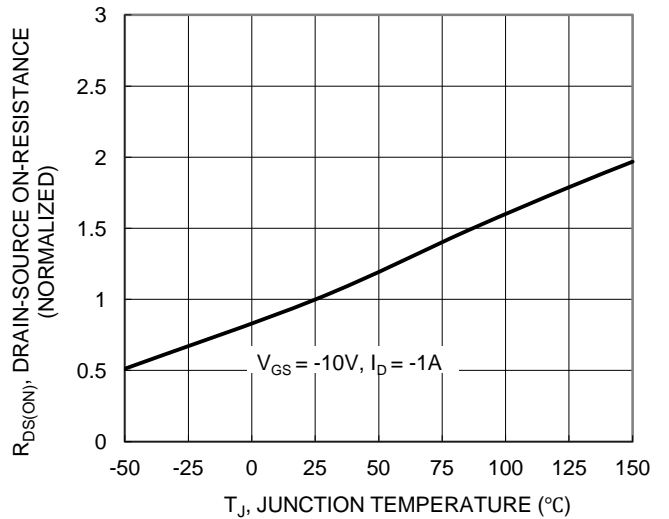
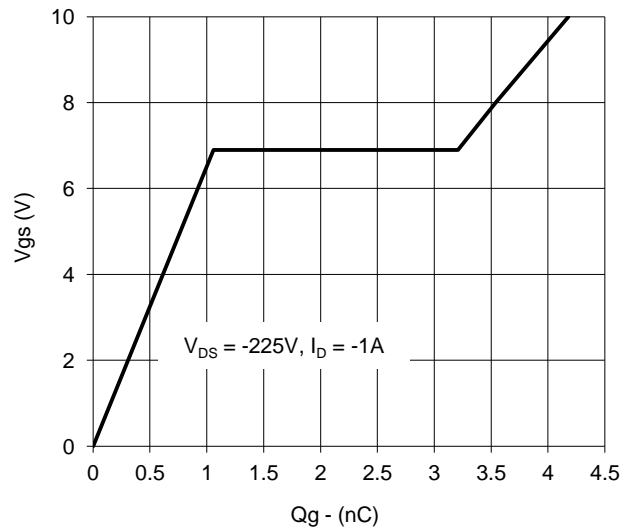
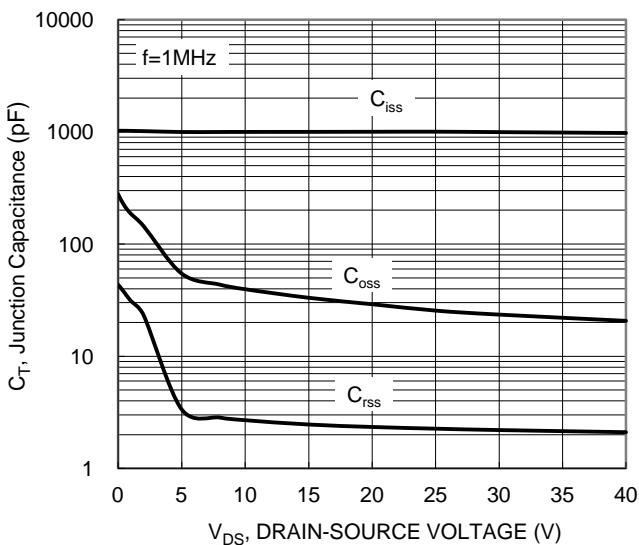
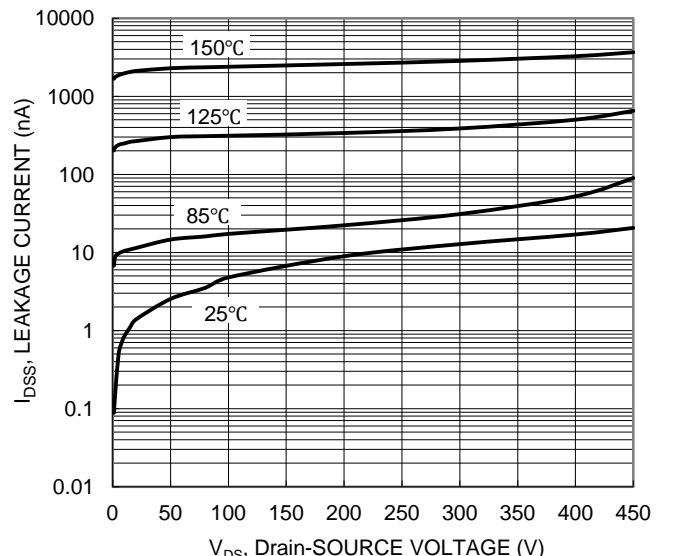
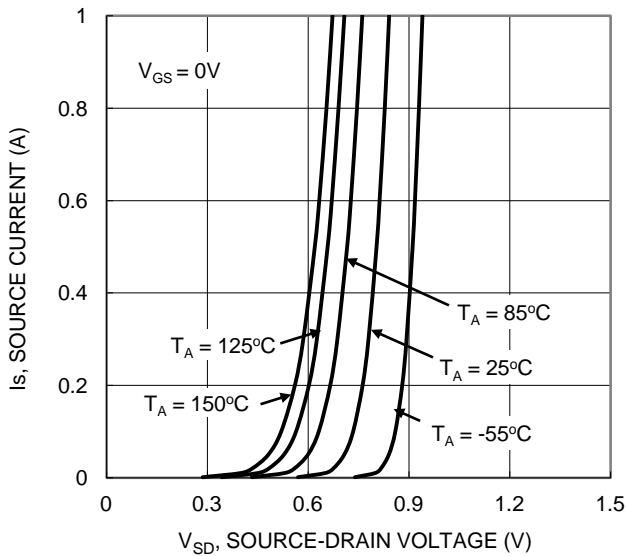
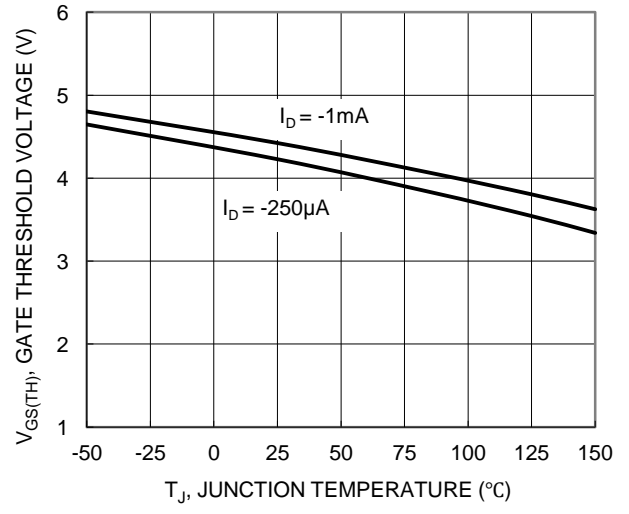
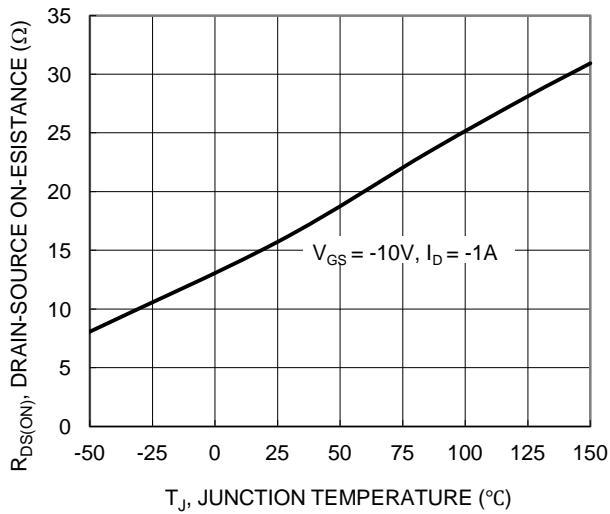
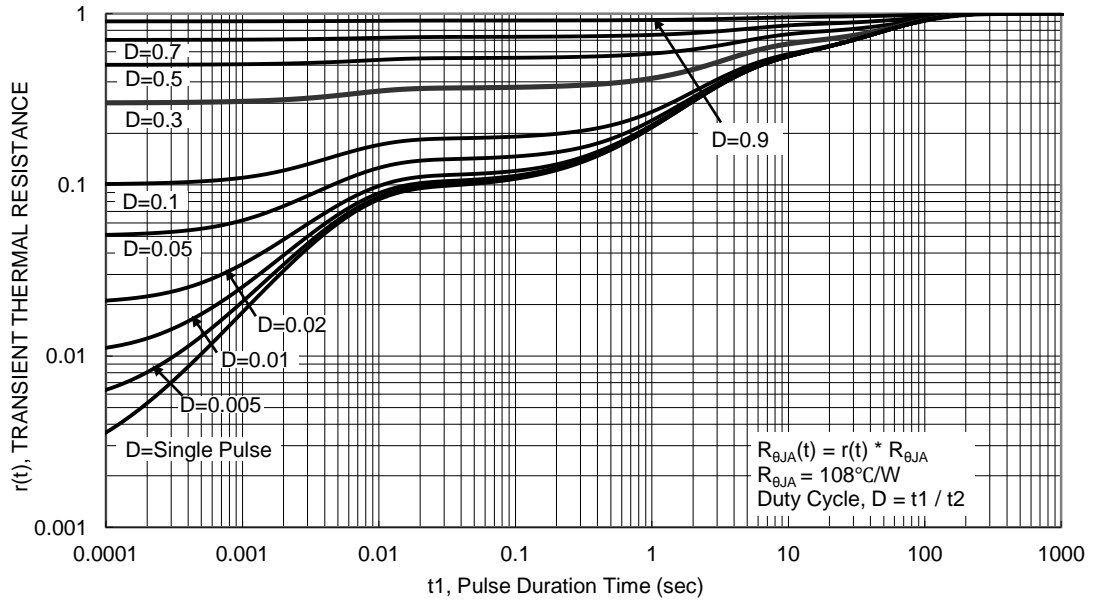
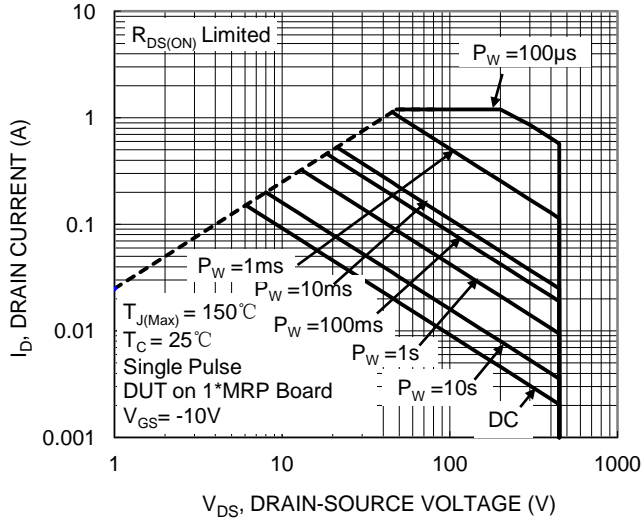


Figure 6. On-Resistance Variation with Temperature

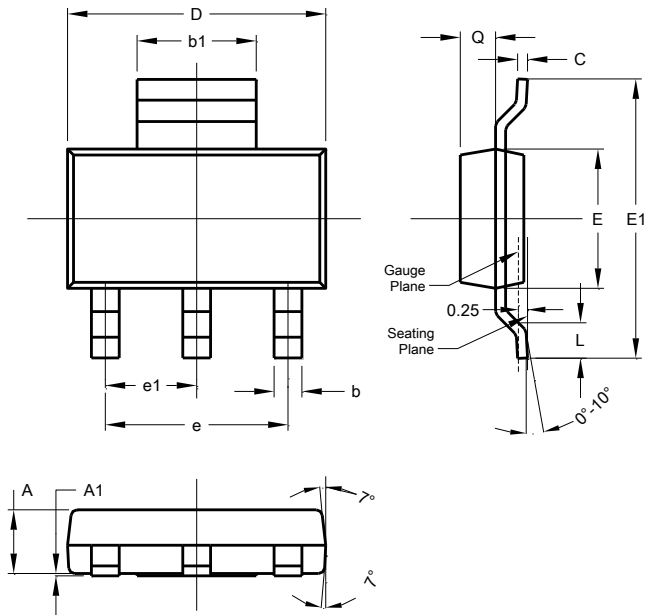




**Package Outline Dimensions**

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

**SOT223**

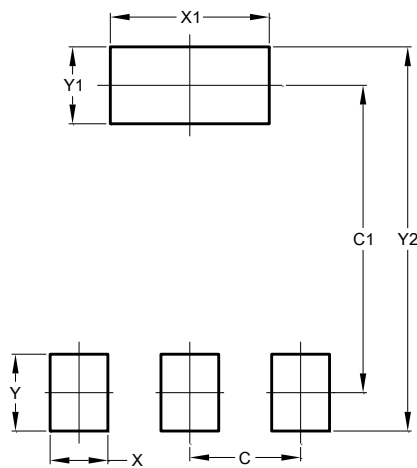


| SOT223               |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A                    | 1.55  | 1.65 | 1.60 |
| A1                   | 0.010 | 0.15 | 0.05 |
| b                    | 0.60  | 0.80 | 0.70 |
| b1                   | 2.90  | 3.10 | 3.00 |
| C                    | 0.20  | 0.30 | 0.25 |
| D                    | 6.45  | 6.55 | 6.50 |
| E                    | 3.45  | 3.55 | 3.50 |
| E1                   | 6.90  | 7.10 | 7.00 |
| e                    | -     | -    | 4.60 |
| e1                   | -     | -    | 2.30 |
| L                    | 0.85  | 1.05 | 0.95 |
| Q                    | 0.84  | 0.94 | 0.89 |
| All Dimensions in mm |       |      |      |

**Suggested Pad Layout**

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

**SOT223**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 2.30          |
| C1         | 6.40          |
| X          | 1.20          |
| X1         | 3.30          |
| Y          | 1.60          |
| Y1         | 1.60          |
| Y2         | 8.00          |

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