

**20V N-CHANNEL ENHANCEMENT MODE MOSFET IN SOT23**

**Product Summary**

| V <sub>(BR)DSS</sub> | R <sub>DS(on)</sub>            | I <sub>D</sub> Max (Note 5)   |
|----------------------|--------------------------------|-------------------------------|
| 20V                  | 175mΩ @ V <sub>GS</sub> = 4.5V | 1.40A @ T <sub>A</sub> = 25°C |
|                      | 240mΩ @ V <sub>GS</sub> = 2.5V | 1.20A @ T <sub>A</sub> = 25°C |
|                      | 360mΩ @ V <sub>GS</sub> = 1.8V | 1.0A @ T <sub>A</sub> = 25°C  |

**Features and Benefits**

- On resistance <200mΩ
- Low Gate Threshold Voltage
- Fast Switching Speed
- "Lead Free", RoHS Compliant (Note 1)
- Halogen and Antimony Free. "Green" Device (Note 2)
- ESD Protected Gate 2kV
- Qualified to AEC-Q101 Standards for High Reliability

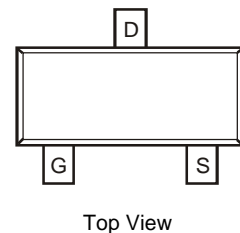
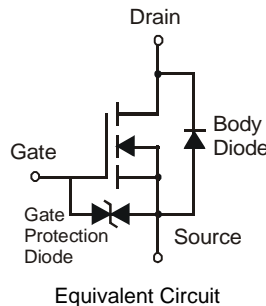
**Description and Applications**

This MOSFET has been designed to minimize the on-state resistance (R<sub>DS(on)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Load switch

**Mechanical Data**

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin
- Weight: 0.08 grams (approximate)

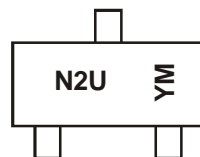


**Ordering Information (Note 3)**

| Part Number | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-------------|---------|--------------------|-----------------|-------------------|
| DMN2300U-7  | N2U     | 7                  | 8               | 3000              |

- Notes:
1. No purposefully added lead
  2. Diodes Inc's "Green" policy can be found on our website at <http://www.diodes.com>.
  3. For packaging details, go to our website at <http://www.diodes.com>.

**Marking Information**



N2U = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: Y = 2011)  
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|
| Code | Y    | Z    | A    | B    | C    | D    | E    |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

**Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                |              |                                | Symbol           | Value | Unit |
|-------------------------------|--------------|--------------------------------|------------------|-------|------|
| Drain-Source Voltage          |              |                                | V <sub>DSS</sub> | 20    | V    |
| Gate-Source Voltage           |              |                                | V <sub>GSS</sub> | ±8    | V    |
| Continuous Drain Current      | Steady State | T <sub>A</sub> = 25°C (Note 5) | I <sub>D</sub>   | 1.40  | A    |
|                               |              | T <sub>A</sub> = 85°C (Note 5) |                  | 1.01  |      |
|                               |              | T <sub>A</sub> = 25°C (Note 4) |                  | 1.24  |      |
| Pulsed Drain Current (Note 6) |              |                                | I <sub>DM</sub>  | 11    | A    |

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                          |          | Symbol                            | Value       | Unit |
|---|----------|-----------------------------------|-------------|------|
| Power Dissipation                       | (Note 4) | P <sub>D</sub>                    | 0.43        | W    |
|   | (Note 5) |                                   | 0.55        |      |
| Thermal Resistance, Junction to Ambient | (Note 4) | R <sub>θJA</sub>                  | 288         | °C/W |
|   | (Note 5) |                                   | 228         |      |
| Operating and Storage Temperature Range |          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
  - Device mounted on 25mm X 25mm square copper plate with FR-4 substrate PC board, 2oz copper
  - Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.

**Thermal Characteristics**

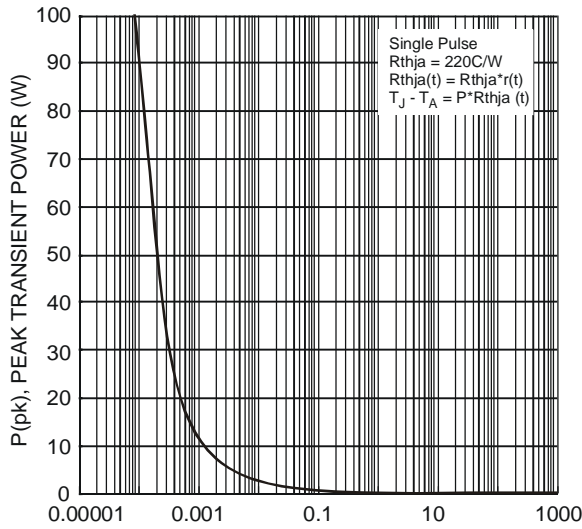


Fig. 1 Single Maximum Power Dissipation

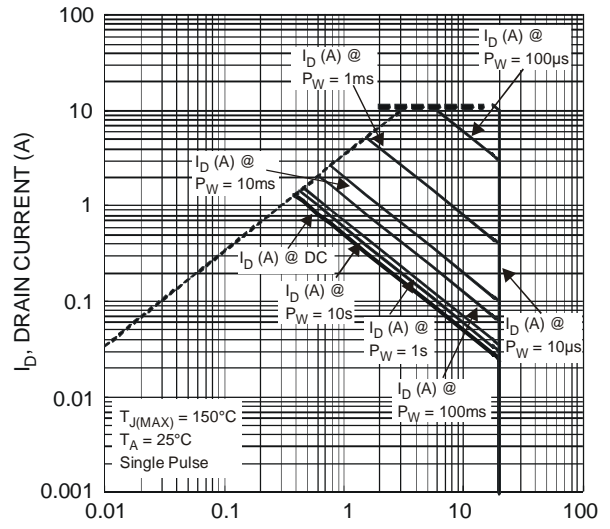
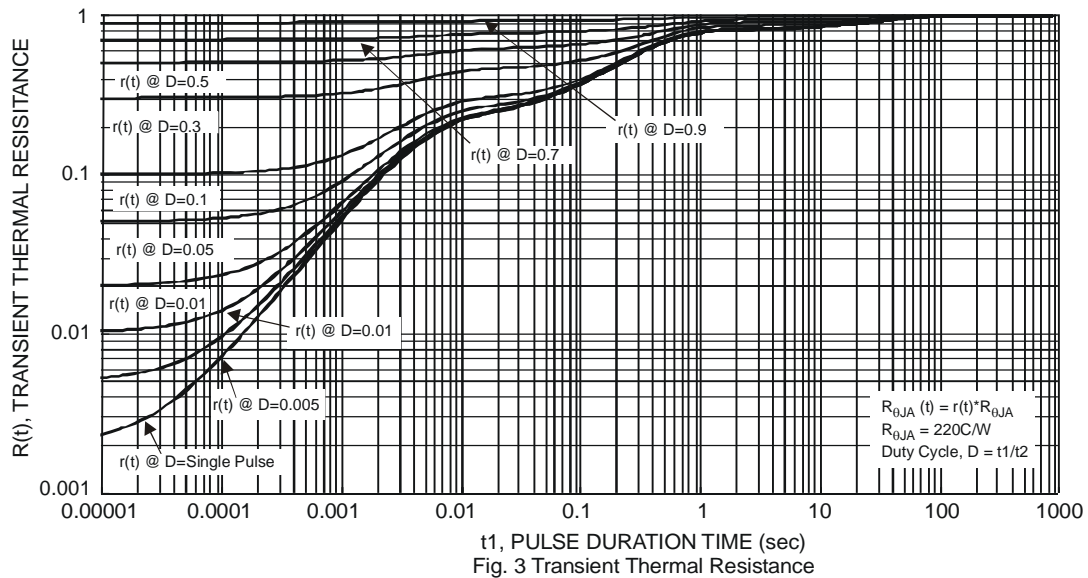


Fig. 2 SOA, Safe Operation Area



**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic  | Symbol              | Min  | Typ  | Max  | Unit | Test Condition   |
|---|---------------------|------|------|------|------|--|
| <b>OFF CHARACTERISTICS (Note 7)</b>                   |                     |      |      |      |      |  |
| Drain-Source Breakdown Voltage                        | BV <sub>DSS</sub>   | 20   | -    | -    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 10μA  |
| Zero Gate Voltage Drain Current T <sub>J</sub> = 25°C | I <sub>DSS</sub>    | -    | -    | 1    | μA   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V  |
| Gate-Source Leakage                                   | I <sub>GSS</sub>    | -    | -    | 10   | μA   | V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 7)</b>                    |                     |      |      |      |      |  |
| Gate Threshold Voltage                                | V <sub>GS(th)</sub> | 0.45 | -    | 0.95 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                               |
| Static Drain-Source On-Resistance                     | R <sub>DS(on)</sub> | -    |      | 175  | mΩ   | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 300mA   |
|   |                     |      |      | 240  |      | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 250mA   |
|   |                     |      |      | 360  |      | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 100mA   |
| Forward Transfer Admittance                           | Y <sub>fs</sub>     | 40   | -    | -    | mS   | V <sub>DS</sub> = 3V, I <sub>D</sub> = 30mA  |
| Diode Forward Voltage                                 | V <sub>SD</sub>     | -    | 0.7  | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 300mA   |
| <b>DYNAMIC CHARACTERISTICS (Note 7)</b>               |                     |      |      |      |      |  |
| Input Capacitance                                     | C <sub>iss</sub>    | -    | 64.3 | -    | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                               |
| Output Capacitance                                    | C <sub>oss</sub>    | -    | 6.1  | -    | pF   |  |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    | -    | 4.5  | -    | pF   |  |
| Gate Resistance                                       | R <sub>g</sub>      | -    | 70   | -    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                     |
| Total Gate Charge                                     | Q <sub>g</sub>      | -    | 1.6  | -    | nC   | V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 15V,<br>I <sub>D</sub> = 1A                    |
| Gate-Source Charge                                    | Q <sub>gs</sub>     | -    | 0.2  | -    | nC   |  |
| Gate-Drain Charge                                     | Q <sub>gd</sub>     | -    | 0.2  | -    | nC   |  |
| Turn-On Delay Time                                    | t <sub>D(on)</sub>  | -    | 3.5  | -    | ns   | V <sub>DS</sub> = 10V, I <sub>D</sub> = 1A<br>V <sub>GS</sub> = 10V, R <sub>G</sub> = 6Ω |
| Turn-On Rise Time                                     | t <sub>r</sub>      | -    | 2.8  | -    | ns   |  |
| Turn-Off Delay Time                                   | t <sub>D(off)</sub> | -    | 38   | -    | ns   |  |
| Turn-Off Fall Time                                    | t <sub>f</sub>      | -    | 13   | -    | ns   |  |

Notes: 7. Short duration pulse test used to minimize self-heating effect.

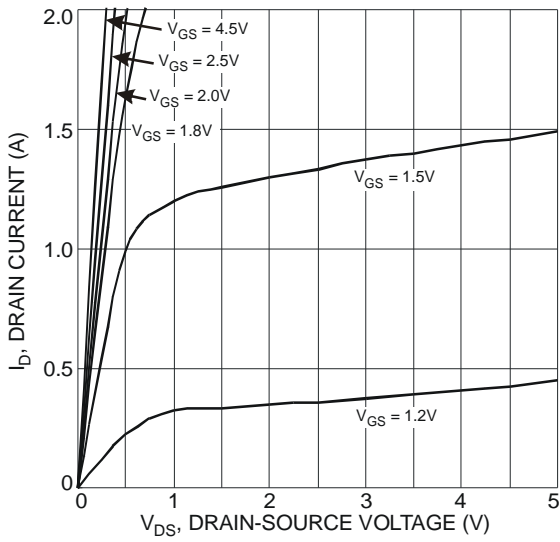


Fig. 4 Typical Output Characteristic

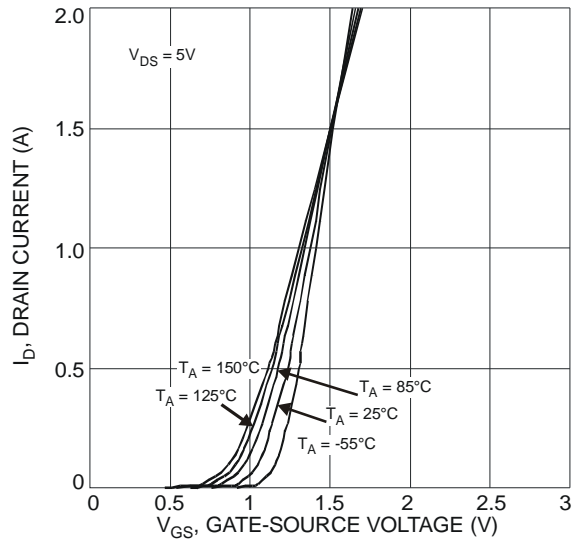


Fig. 5 Typical Transfer Characteristic

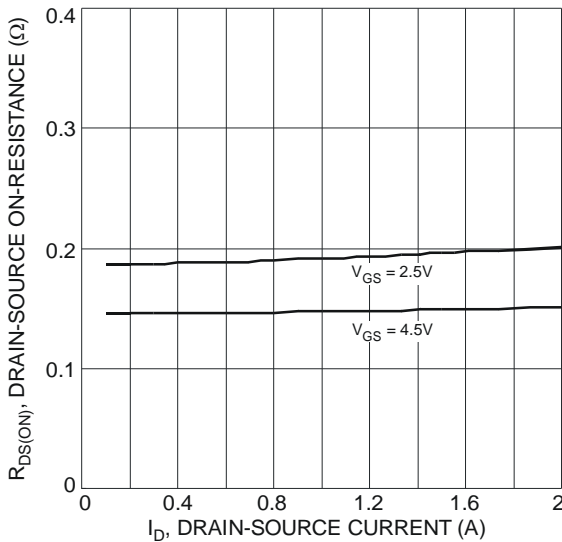


Fig. 6 Typical On-Resistance vs. Drain Current and Gate Voltage

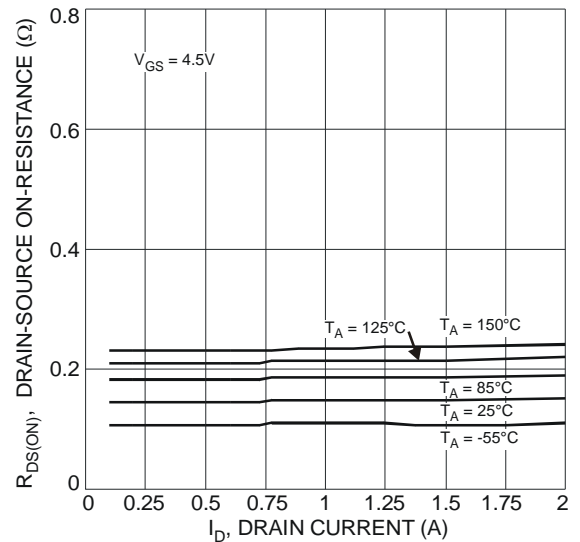


Fig. 7 Typical On-Resistance vs. Drain Current and Temperature

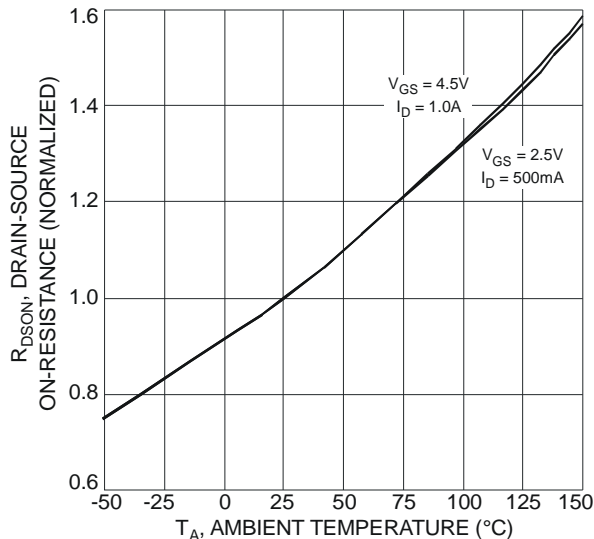


Fig. 8 On-Resistance Variation with Temperature

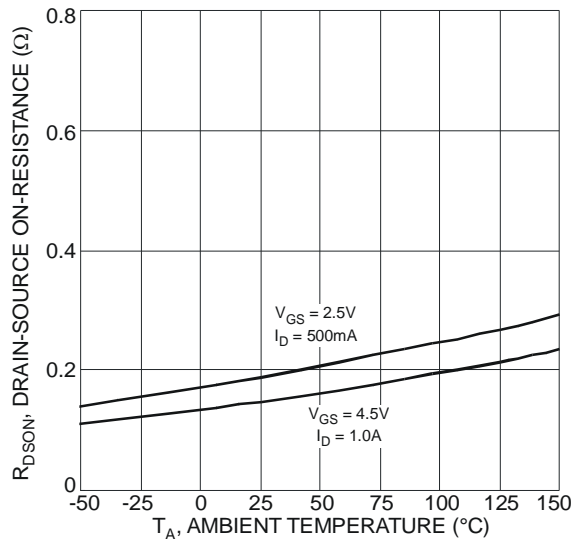


Fig. 9 On-Resistance Variation with Temperature

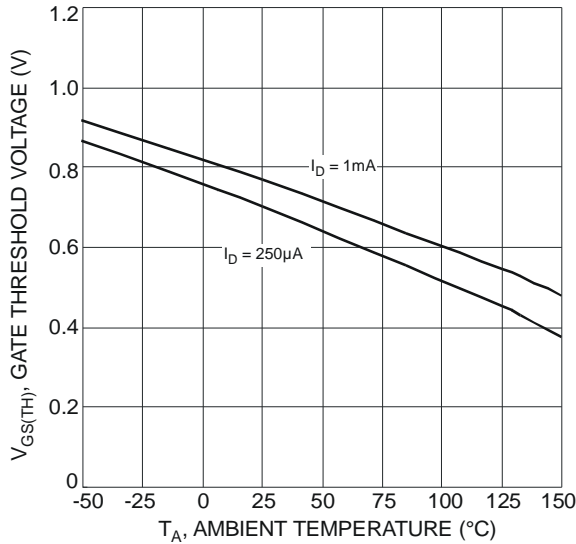


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

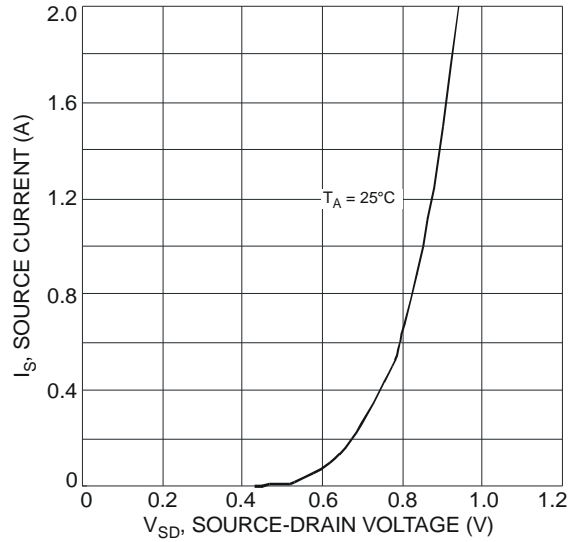


Fig. 11 Diode Forward Voltage vs. Current

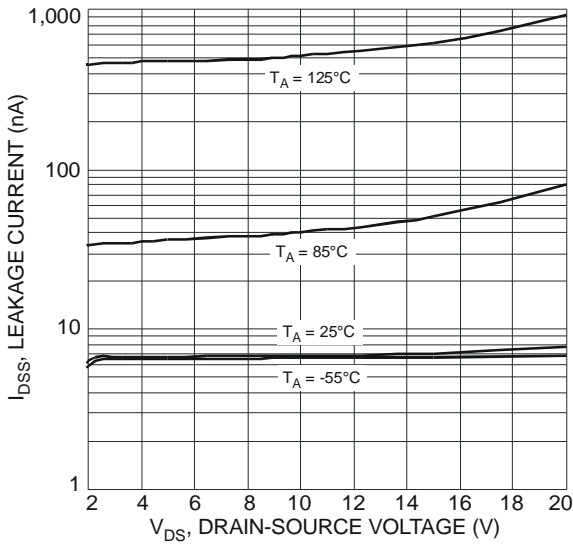


Fig. 12 Typical Leakage Current vs. Drain-Source Voltage

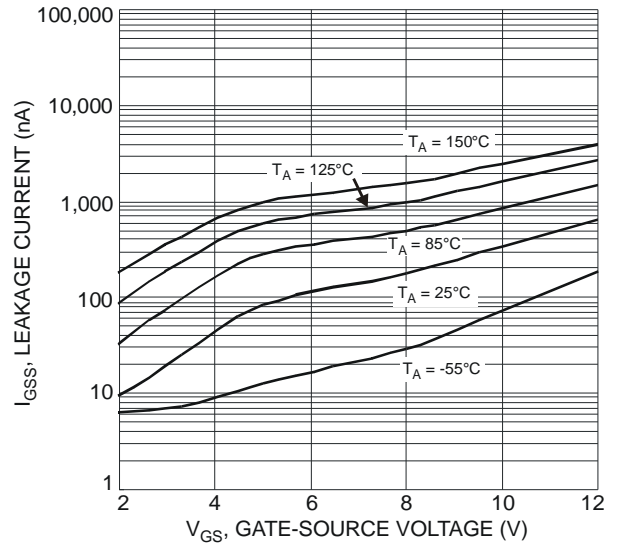


Fig. 13 Leakage Current vs. Gate-Source Voltage

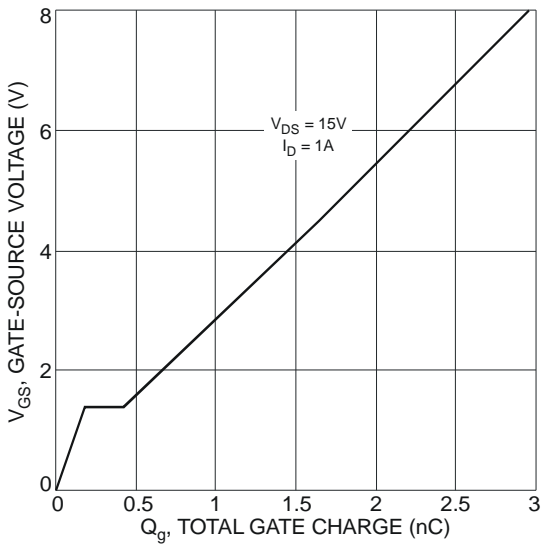
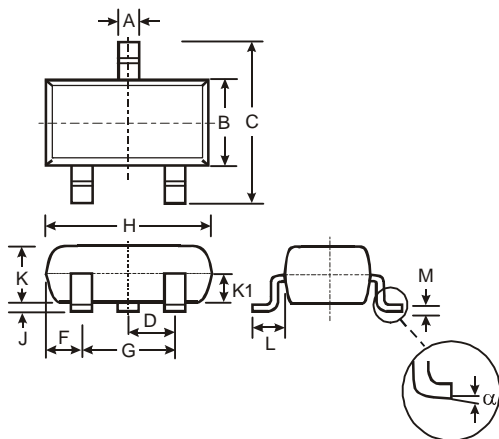


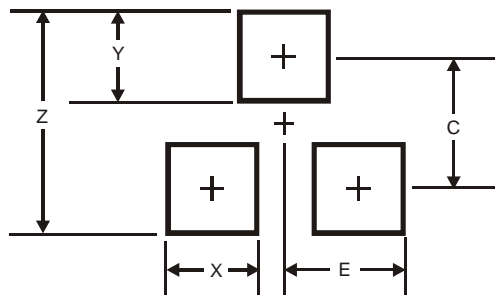
Fig. 14 Gate-Charge Characteristics

**Package Outline Dimensions**



| SOT23                |       |      |       |
|----------------------|-------|------|-------|
| Dim                  | Min   | Max  | Typ   |
| A                    | 0.37  | 0.51 | 0.40  |
| B                    | 1.20  | 1.40 | 1.30  |
| C                    | 2.30  | 2.50 | 2.40  |
| D                    | 0.89  | 1.03 | 0.915 |
| F                    | 0.45  | 0.60 | 0.535 |
| G                    | 1.78  | 2.05 | 1.83  |
| H                    | 2.80  | 3.00 | 2.90  |
| J                    | 0.013 | 0.10 | 0.05  |
| K                    | 0.903 | 1.10 | 1.00  |
| K1                   | -     | -    | 0.400 |
| L                    | 0.45  | 0.61 | 0.55  |
| M                    | 0.085 | 0.18 | 0.11  |
| α                    | 0°    | 8°   | -     |
| All Dimensions in mm |       |      |       |

**Suggested Pad Layout**



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 2.9           |
| X          | 0.8           |
| Y          | 0.9           |
| C          | 2.0           |
| E          | 1.35          |

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