

## Product Summary

|               |                                |                                    |
|---------------|--------------------------------|------------------------------------|
| $V_{(BR)DSS}$ | $R_{DS(on) \max}$              | $I_D$<br>$T_A = +25^\circ\text{C}$ |
| 20V           | 0.55Ω @ $V_{GS} = 4.5\text{V}$ | 540mA                              |

## Description

This MOSFET is designed to minimize the on-state resistance ( $R_{DS(on)}$ ) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

## Applications

- Load Switch

## Features

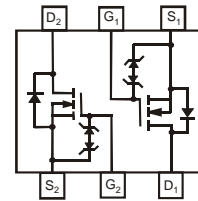
- Dual N-Channel MOSFET
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin Annealed over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208③
- Weight: 0.006 grams (Approximate)



Top View



Top View  
Internal Schematic

## Ordering Information (Note 4)

| Part Number  | Case   | Packaging         |
|--------------|--------|-------------------|
| DMN2004DWK-7 | SOT363 | 3,000/Tape & Reel |

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  - 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.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



NAB = Product Type Marking Code  
 YM = Date Code Marking  
 Y or Y = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year  | 2006 | 2007 | .... | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code  | T    | U    | .... | A    | B    | C    | D    | E    | F    | G    | H    | I    |
| 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 | Units |
|-------------------------------|--------------|------------------------|------------------|-------|-------|
| Drain-Source Voltage          |              |                        | V <sub>DSS</sub> | 20    | V     |
| Gate-Source Voltage           |              |                        | V <sub>GSS</sub> | ±8    | V     |
| Drain Current (Note 5)        | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 540   | mA    |
|                               |              | T <sub>A</sub> = +85°C |                  | 390   |       |
| Pulsed Drain Current (Note 6) |              |                        | I <sub>DM</sub>  | 1.5   | A     |

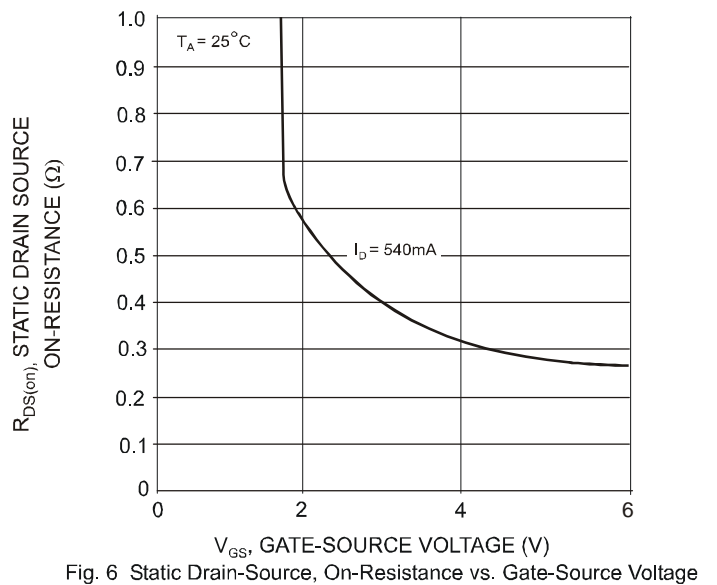
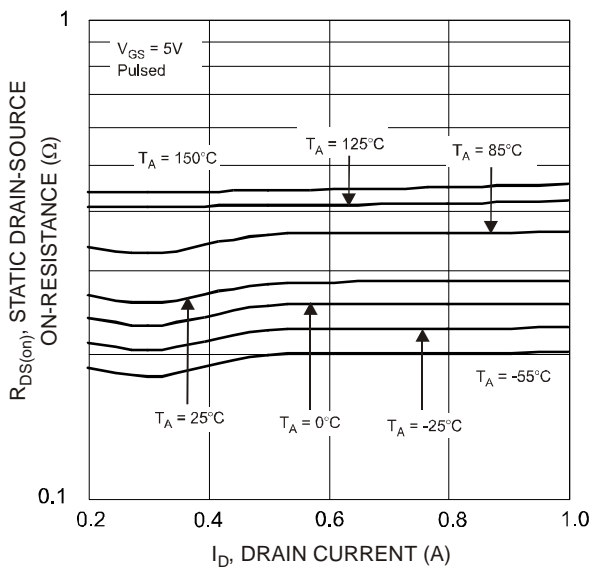
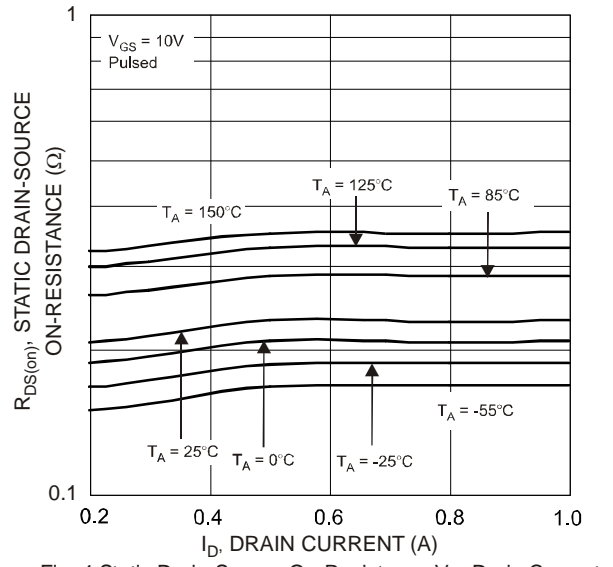
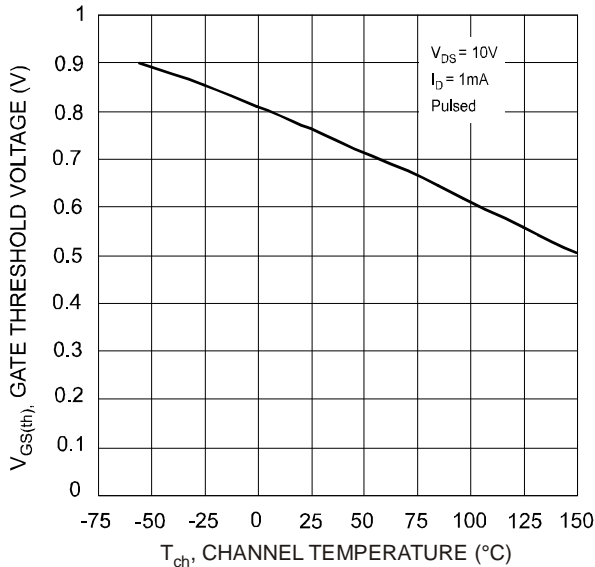
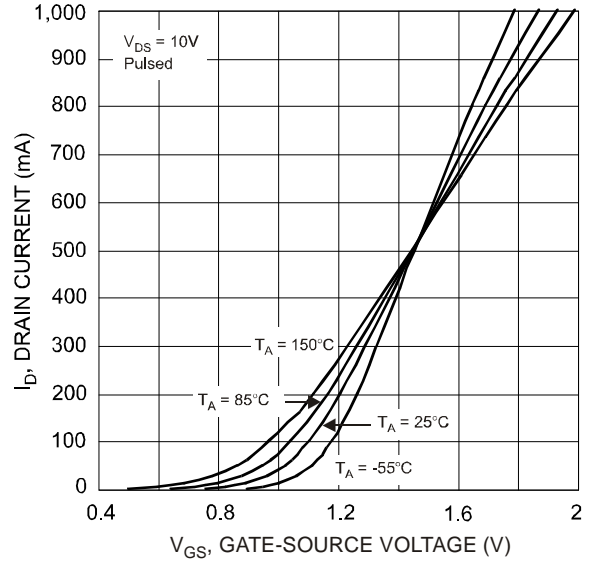
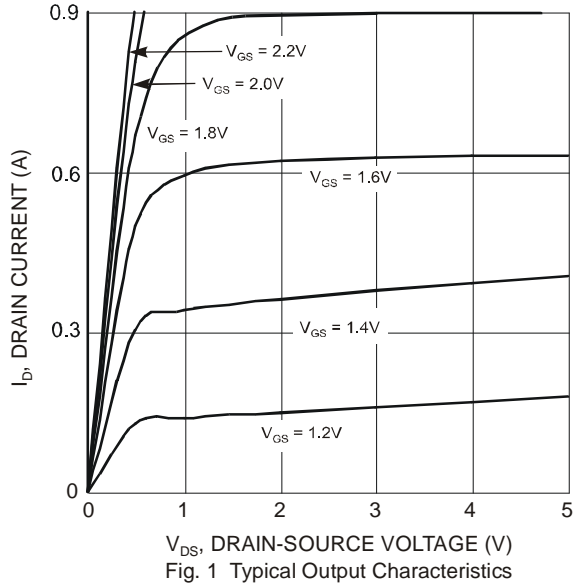
### Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                          | Symbol                            | Value       | Units |
|---|-----------------------------------|-------------|-------|
| Total 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> | -65 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 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            | I <sub>DSS</sub>    | -   | -    | 1    | μA   | V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | -   | -    | ±1   | μA   | V <sub>GS</sub> = ±4.5V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 7)</b>         |                     |     |      |      |      |   |
| Gate Threshold Voltage                     | V <sub>GS(th)</sub> | 0.5 | -    | 1.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                      |
| Static Drain-Source On-Resistance          | R <sub>DS(on)</sub> | -   | 0.4  | 0.55 | Ω    | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 540mA  |
|  |                     |     | 0.5  | 0.70 |      | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 500mA  |
|  |                     |     | 0.7  | 0.9  |      | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 350mA  |
| Forward Transfer Admittance                | Y <sub>fs</sub>     | 200 | -    | -    | mS   | V <sub>DS</sub> = 10V, I <sub>D</sub> = 0.2A  |
| Diode Forward Voltage (Note 7)             | V <sub>SD</sub>     | 0.5 | -    | 1.4  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 115mA  |
| <b>DYNAMIC CHARACTERISTICS (Note 7)</b>    |                     |     |      |      |      |   |
| Input Capacitance                          | C <sub>iss</sub>    | -   | 36   | 150  | pF   | V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                       |
| Output Capacitance                         | C <sub>oss</sub>    | -   | 5.7  | 25   | pF   |   |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | -   | 4.2  | 20   | pF   |   |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | -   | 0.53 | -    | nC   | V <sub>DS</sub> = 10V, I <sub>D</sub> = 250mA   |
| Total Gate Charge (V <sub>GS</sub> = 8.0V) | Q <sub>g</sub>      | -   | 0.95 | -    |      |   |
| Gate-Source Charge                         | Q <sub>gs</sub>     | -   | 0.08 | -    |      |   |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | -   | 0.07 | -    |      |   |
| Turn-On Delay Time                         | t <sub>D(on)</sub>  | -   | 4.1  | -    | ns   | V <sub>DD</sub> = 10V, R <sub>L</sub> = 47Ω,<br>V <sub>GEN</sub> = 4.5V, R <sub>GEN</sub> = 10Ω |
| Turn-On Rise Time                          | t <sub>r</sub>      | -   | 7.3  | -    | ns   |   |
| Turn-Off Delay Time                        | t <sub>D(off)</sub> | -   | 13.8 | -    | ns   |   |
| Turn-Off Fall Time                         | t <sub>f</sub>      | -   | 10.5 | -    | ns   |   |

- Notes: 5. Device mounted on FR-4 PCB.  
6. Pulse width ≤10μs, Duty Cycle ≤1%.  
7. Short duration pulse test used to minimize self-heating effect.



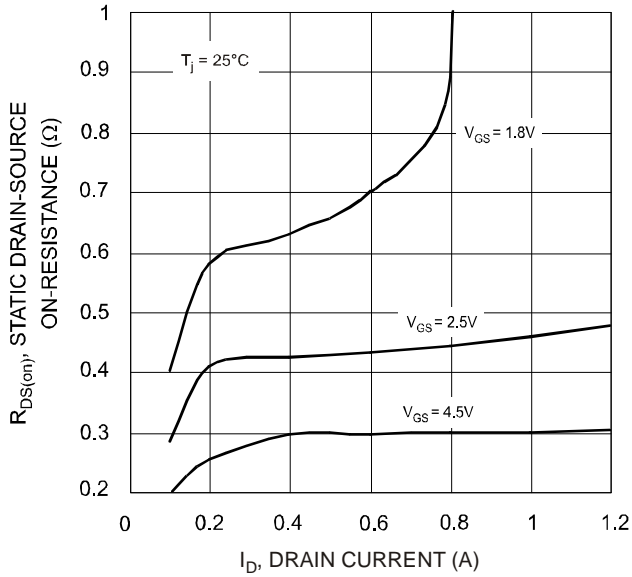


Fig. 7 On-Resistance vs. Drain Current and Gate Voltage

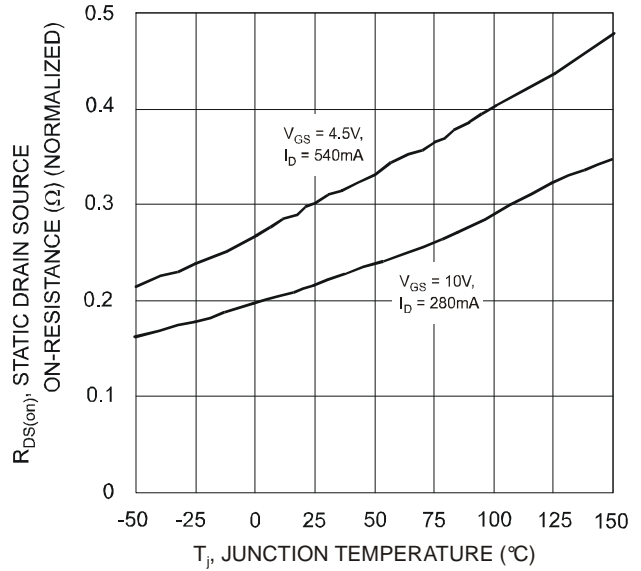


Fig. 8 Static Drain-Source, On-Resistance vs. Temperature

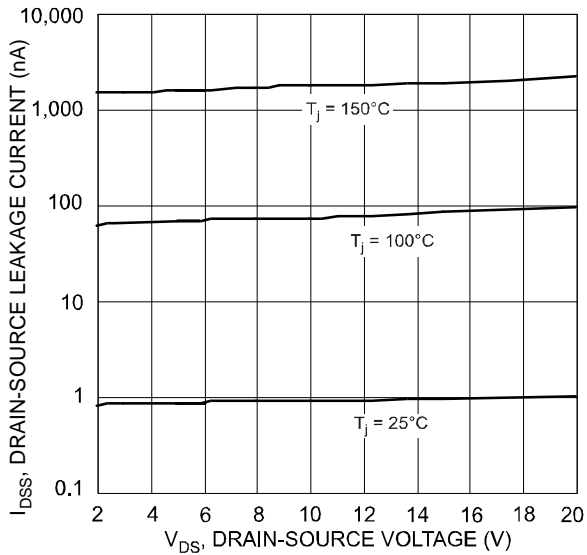


Fig. 9 Drain Source Leakage Current vs. Voltage

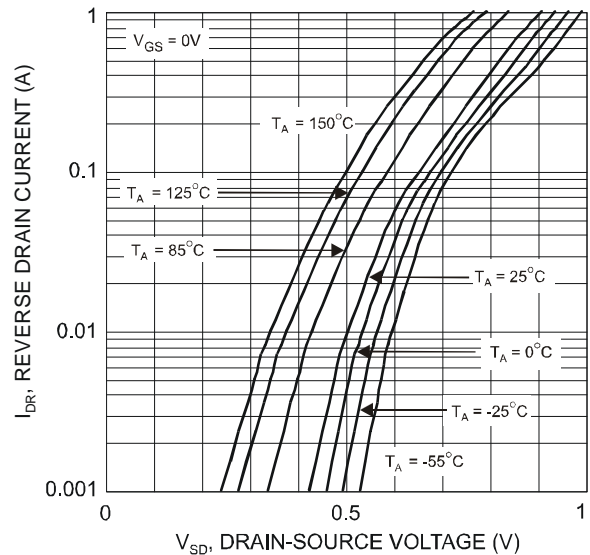


Fig. 10 Reverse Drain Current vs. Source-Drain Voltage

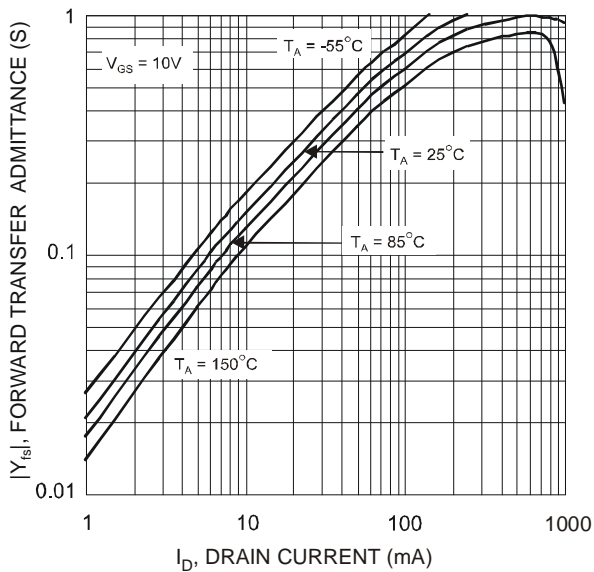


Fig. 11 Forward Transfer Admittance vs. Drain Current

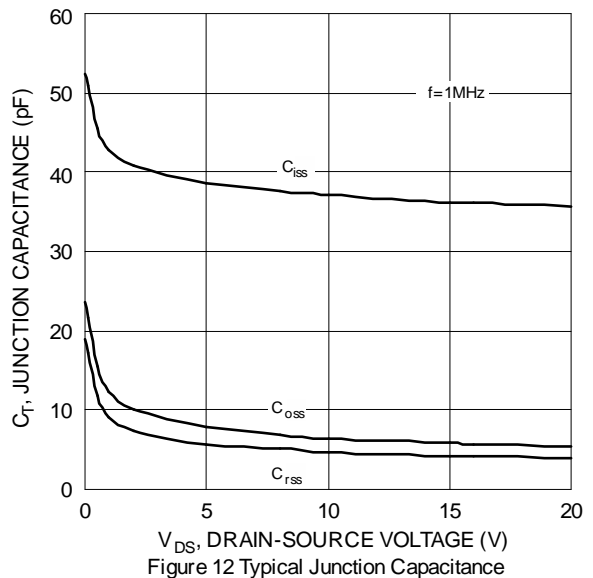
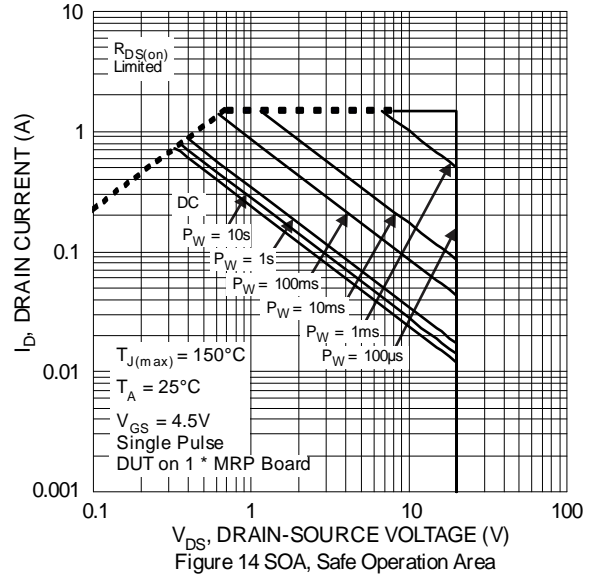
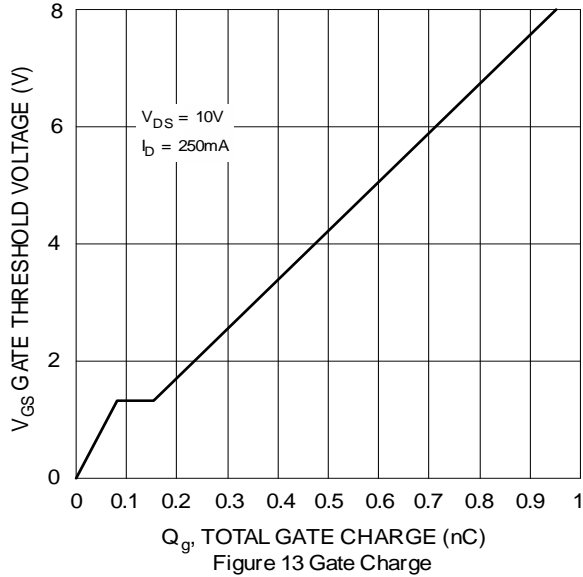
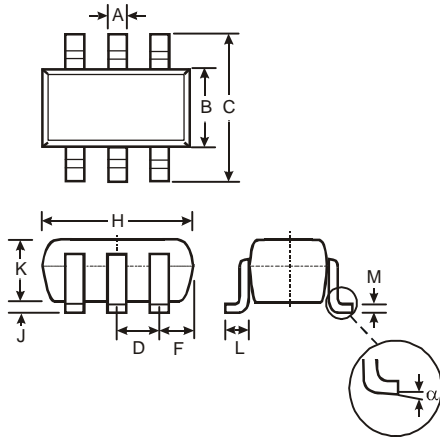


Figure 12 Typical Junction Capacitance



### Package Outline Dimensions

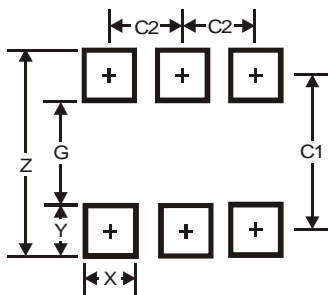
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT363               |          |      |       |
|----------------------|----------|------|-------|
| Dim                  | Min      | Max  | Typ   |
| A                    | 0.10     | 0.30 | 0.25  |
| B                    | 1.15     | 1.35 | 1.30  |
| C                    | 2.00     | 2.20 | 2.10  |
| D                    | 0.65 Typ |      |       |
| F                    | 0.40     | 0.45 | 0.425 |
| H                    | 1.80     | 2.20 | 2.15  |
| J                    | 0        | 0.10 | 0.05  |
| K                    | 0.90     | 1.00 | 1.00  |
| L                    | 0.25     | 0.40 | 0.30  |
| M                    | 0.10     | 0.22 | 0.11  |
| α                    | 0°       | 8°   | -     |
| All Dimensions in mm |          |      |       |

### Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | SOT363 |
|------------|--------|
| Z          | 2.5    |
| G          | 1.3    |
| X          | 0.42   |
| Y          | 0.6    |
| C1         | 1.9    |
| C2         | 0.65   |

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