

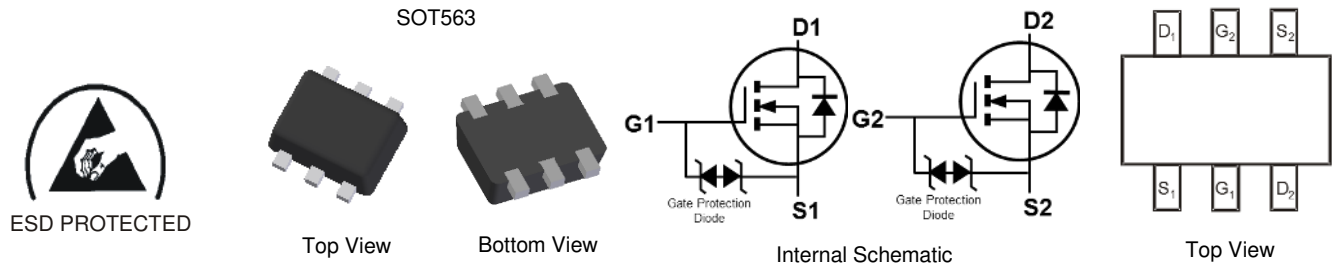
DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Features

- Dual N-Channel MOSFET
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surface Mount Package
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

Mechanical Data

- Case: SOT563
- 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 Copper Lead Frame. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.006 grams (Approximate)

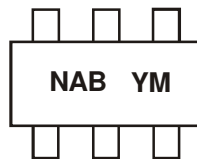


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|--------------|--------|---------------------------|
| DMN2004VK-7 | SOT563 | 3000/Tape & Reel |
| DMN2004VK-7B | SOT563 | 8000/Tape & Reel (Note 5) |
| DMN2004VK-13 | SOT563 | 10000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.
 5. Change the pitch from 4mm to 2mm in T & R.

Marking Information



NAB = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: G = 2019)
 M = Month (ex: 9 = September)

Date Code Key

| | | | | | | | | | | | | |
|--------------|------|-----|------|------|------|------|------|------|------|------|------|------|
| Year | 2010 | ... | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| Code | X | ... | G | H | I | J | K | L | M | N | O | P |
| 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 ($T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit | |
|--|--------------|-----------|---------------------------|------|----|
| Drain-Source Voltage | | V_{DSS} | 20 | V | |
| Gate-Source Voltage | | V_{GSS} | ± 8 | V | |
| Drain Current (Note 6) | Steady State | I_D | $T_A = +25^\circ\text{C}$ | 540 | mA |
| | | | $T_A = +85^\circ\text{C}$ | 390 | |
| Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%) | | I_{DM} | 1.5 | A | |

Thermal Characteristics ($T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|---------------------------|
| Total Power Dissipation (Note 6) | P_D | 250 | mW |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 500 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

Electrical Characteristics ($T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|-----|------|---------|---------------|--|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 20 | — | — | V | $V_{GS} = 0\text{V}, I_D = 10\mu\text{A}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 1 | μA | $V_{DS} = 16\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | ± 1 | μA | $V_{GS} = \pm 4.5\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 0.5 | — | 1.0 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 0.4 | 0.55 | Ω | $V_{GS} = 4.5\text{V}, I_D = 540\text{mA}$ |
| | | | 0.5 | 0.70 | | $V_{GS} = 2.5\text{V}, I_D = 500\text{mA}$ |
| | | | 0.7 | 0.9 | | $V_{GS} = 1.8\text{V}, I_D = 350\text{mA}$ |
| Forward Transfer Admittance | $ Y_{fs} $ | 200 | — | — | ms | $V_{DS} = 10\text{V}, I_D = 0.2\text{A}$ |
| Diode Forward Voltage | V_{SD} | 0.5 | — | 1.4 | V | $V_{GS} = 0\text{V}, I_S = 115\text{mA}$ |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C_{iss} | — | — | 150 | pF | $V_{DS} = 16\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$ |
| Output Capacitance | C_{oss} | — | — | 25 | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | — | 20 | pF | |
| SWITCHING CHARACTERISTICS (Note 8) | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 8.0 | — | ns | $V_{DD} = 10\text{V}, R_L = 47\Omega,$ $I_D = 200\text{mA}, V_{GEN} = 4.5\text{V},$ $R_G = 10\Omega$ |
| Rise Time | t_R | — | 13.3 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 53.5 | — | ns | |
| Fall Time | t_F | — | 36.1 | — | ns | |

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

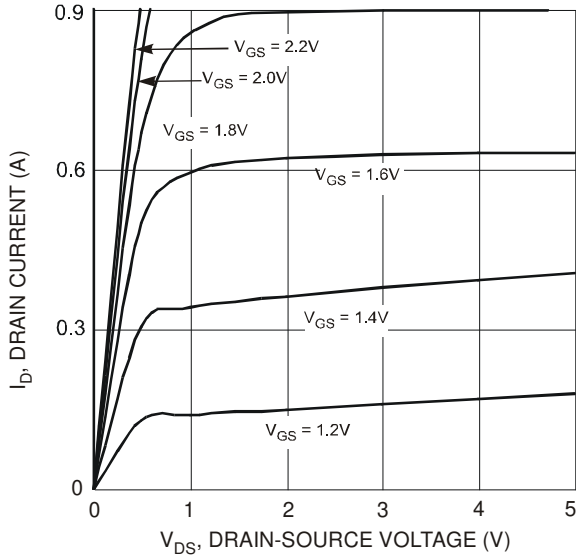


Fig. 1 Typical Output Characteristics

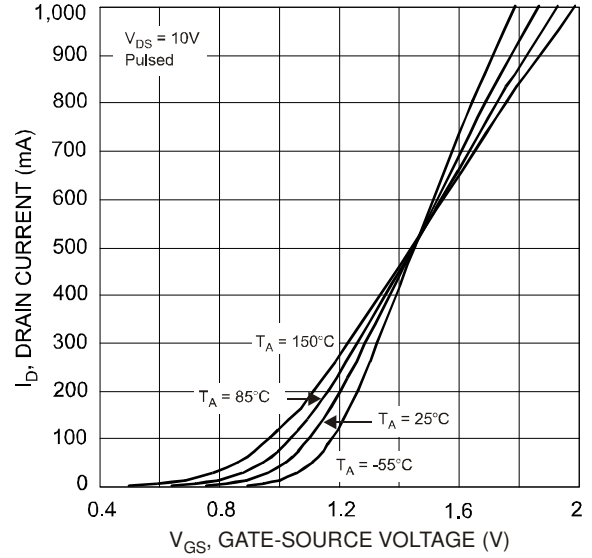


Fig. 2 Reverse Drain Current vs. Source-Drain Voltage

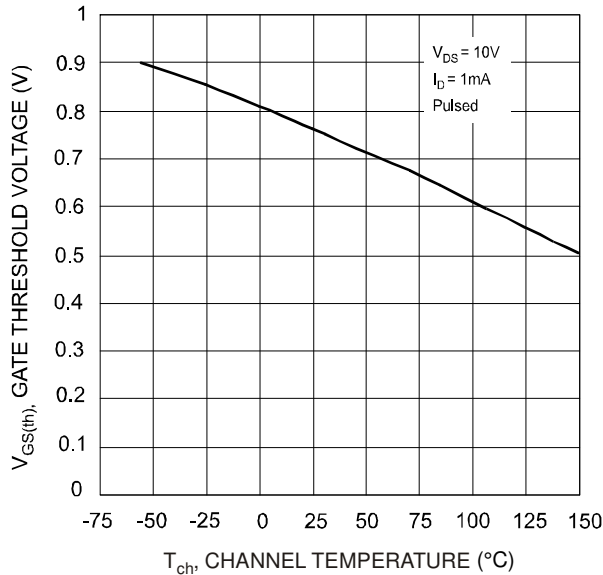


Fig. 3 Gate Threshold Voltage vs. Channel Temperature

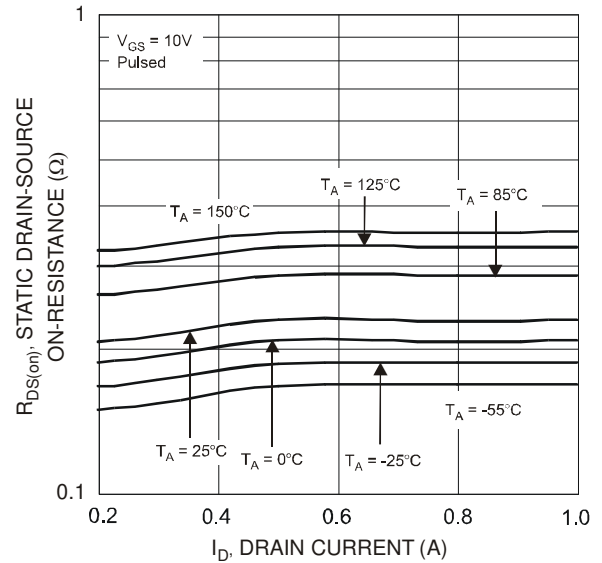


Fig. 4 Static Drain-Source On-Resistance vs. Drain Current

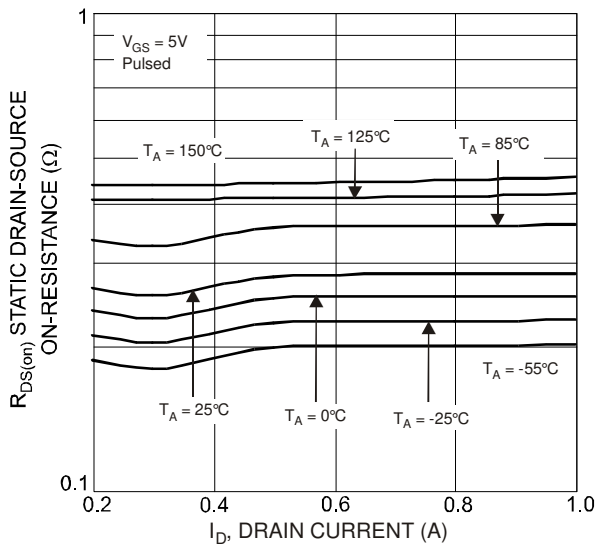


Fig. 5 Static Drain-Source On-Resistance vs. Drain Current

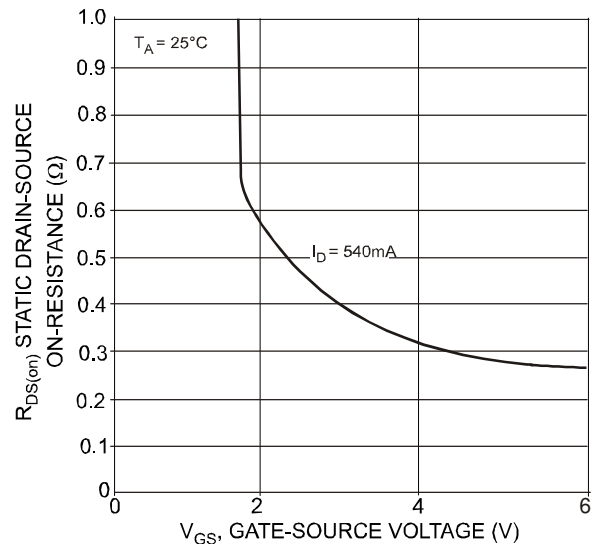


Fig. 6 Static Drain-Source, On-Resistance vs. Gate-Source Voltage

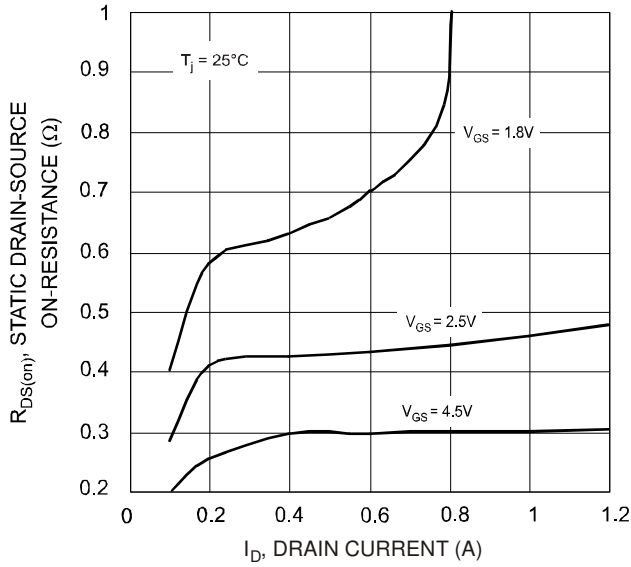


Fig. 7 On-Resistance vs. Drain Current and Gate Voltage

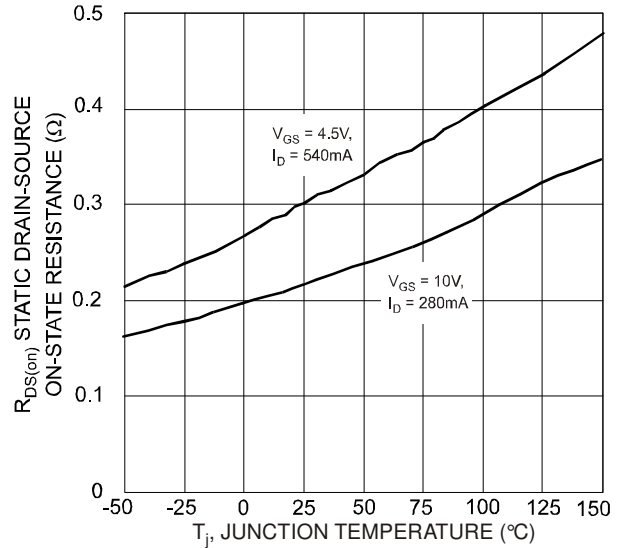


Fig. 8 Static Drain-Source, On-Resistance vs. Temperature

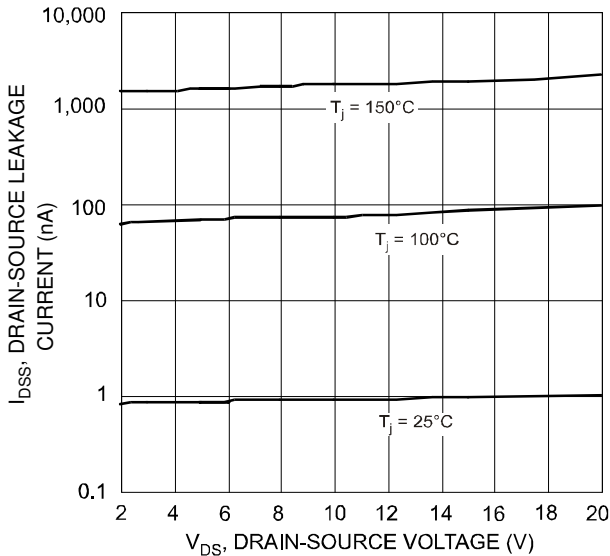


Fig. 9 Drain Source Leakage Current vs. Voltage

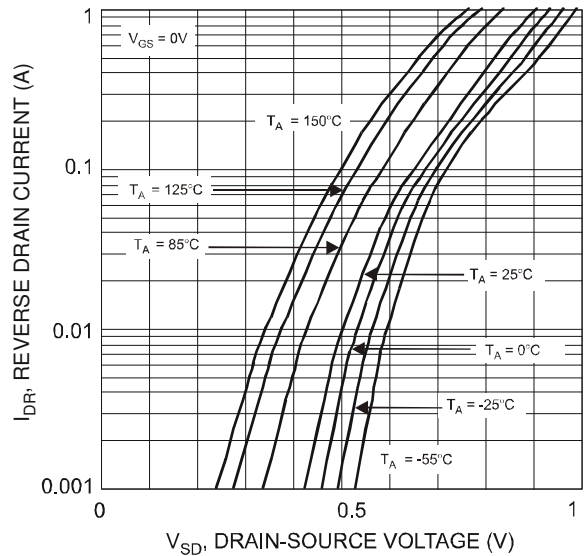


Fig. 10 Reverse Drain Current vs. Source-Drain Voltage

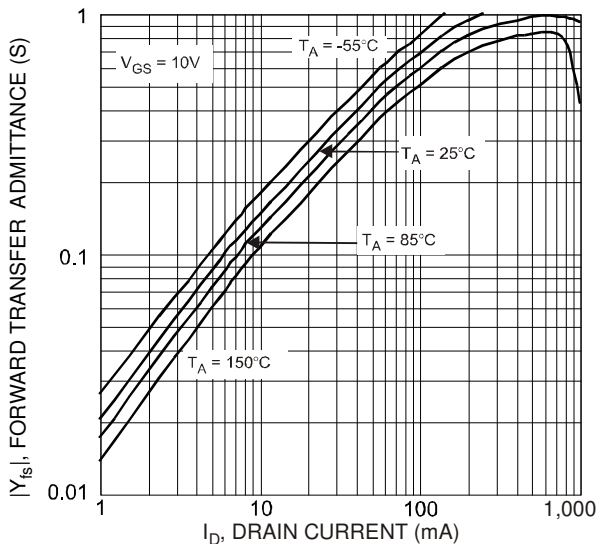


Fig. 11 Forward Transfer Admittance vs. Drain Current

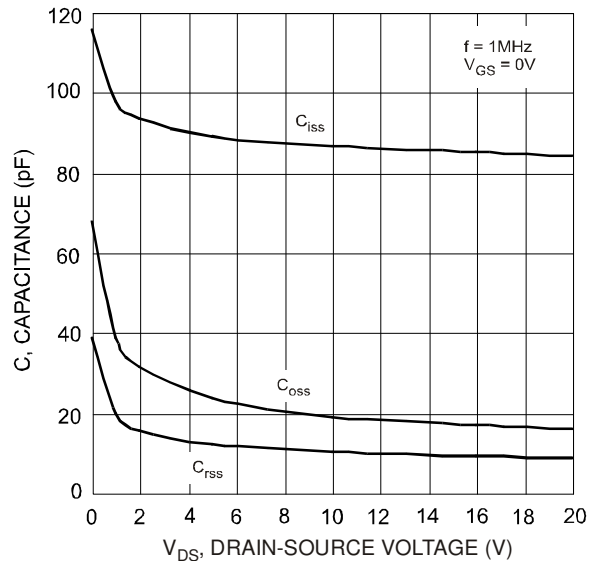
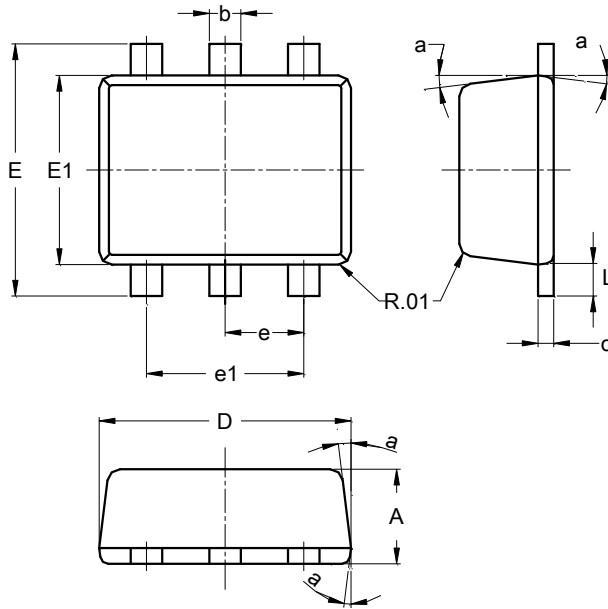


Fig. 12 Capacitance Variation

Package Outline Dimensions

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

SOT563

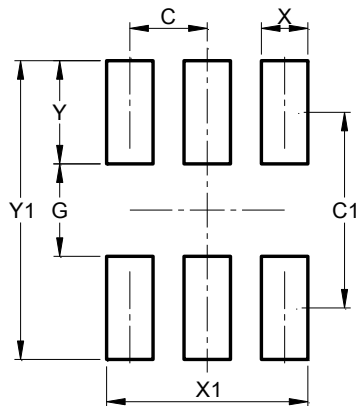


| SOT563 | | | |
|----------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | 0.55 | 0.60 | 0.60 |
| b | 0.15 | 0.30 | 0.20 |
| c | 0.10 | 0.18 | 0.11 |
| D | 1.50 | 1.70 | 1.60 |
| E | 1.55 | 1.70 | 1.60 |
| E1 | 1.10 | 1.25 | 1.20 |
| e | -- | -- | 0.50 |
| e1 | 0.90 | 1.10 | 1.00 |
| L | 0.10 | 0.30 | 0.20 |
| a | 8° | 9° | 7° |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

SOT563



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.500 |
| C1 | 1.270 |
| G | 0.600 |
| X | 0.300 |
| X1 | 1.300 |
| Y | 0.670 |
| Y1 | 1.940 |

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