

Product Summary

| BV _{DSS} | R _{DS(ON)} Max | I _D Max |
|-------------------|-------------------------------|--------------------|
| 20V | 35mΩ @ V _{GS} = 10V | 4.6A |
| | 40mΩ @ V _{GS} = 4.5V | 4.3A |

Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **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**

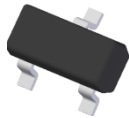
Description and Applications

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

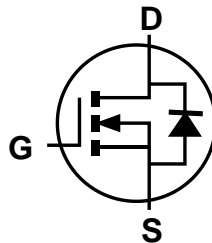
- Battery Charging
- Power Management Functions
- DC-DC Converters
- Portable Power Adaptors

Mechanical Data

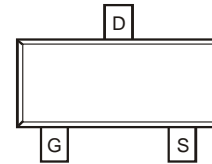
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound.
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe.
Solderable per MIL-STD-202, Method 208 (E3)
- Terminals Connections: See Diagram Below
- Weight: 0.009 grams (Approximate)



Top View



Internal Schematic



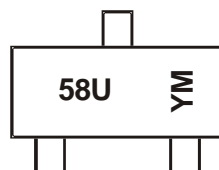
Top View

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-------------|-------|--------------------|
| DMN2058U-7 | SOT23 | 3,000/Tape & Reel |
| DMN2058U-13 | SOT23 | 10,000/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 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



58U = Product Type Marking Code
 YM = Date Code Marking
 Y or Y̅ = Year (ex: D = 2016)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|------|------|------|------|------|------|------|------|------|
| Code | D | E | F | G | H | I | J | K |

| 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°C unless otherwise specified.)

| Characteristic | | | Symbol | Value | Units |
|---|-----------------|------------------------|------------------|-------|-------|
| Drain-Source Voltage | | | V _{DSS} | 20 | V |
| Gate-Source Voltage | | | V _{GSS} | ±12 | V |
| Continuous Drain Current (Note 6) V _{GS} = 10V | Steady State | T _A = +25°C | I _D | 4.6 | A |
| | | T _A = +70°C | | 3.7 | |
| Maximum Body Diode Forward Current (Note 6) | | | I _S | 1.2 | A |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) | | | I _{DM} | 24 | A |

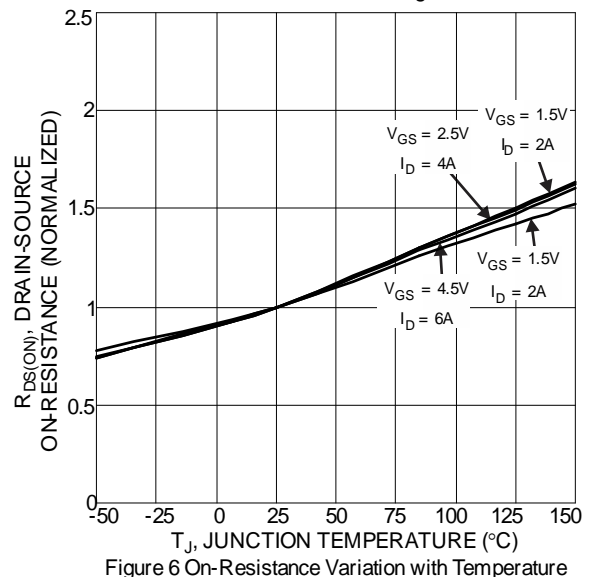
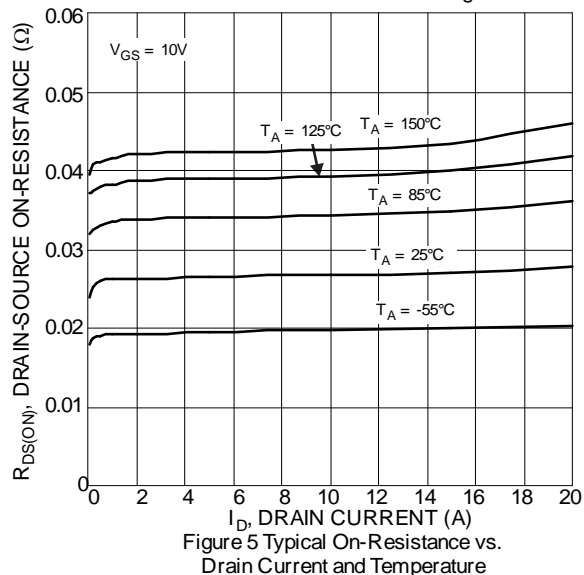
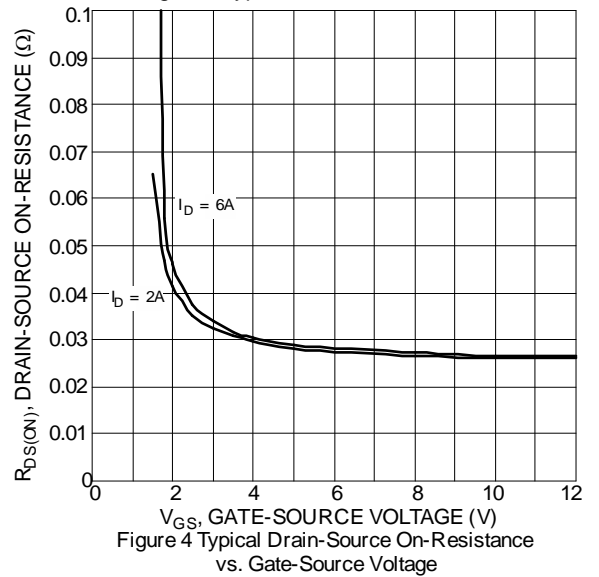
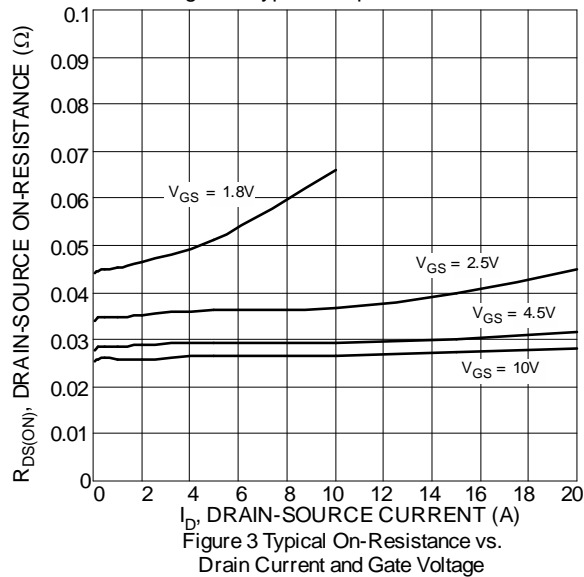
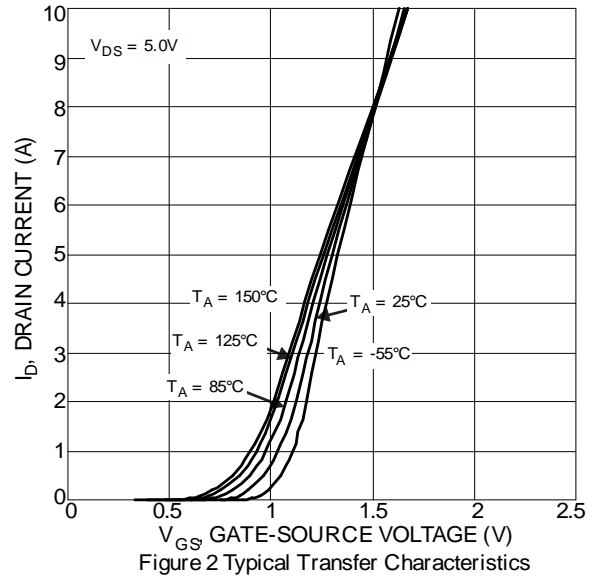
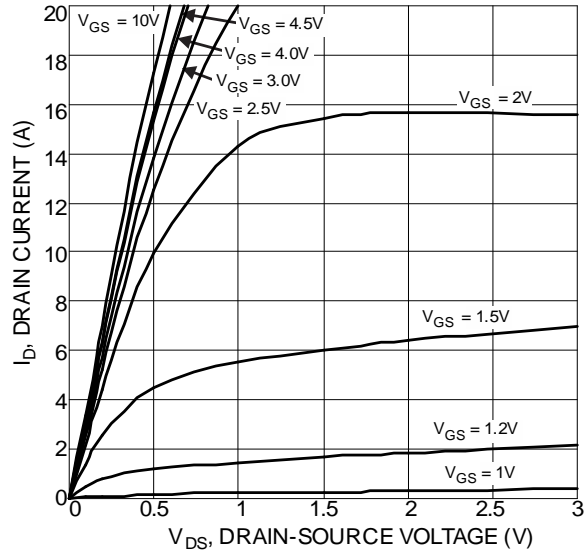
Thermal Characteristics

| Characteristic | | Symbol | Value | Unit |
|--|--------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 5) | | P _D | 0.74 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R _{θJA} | 172 | °C/W |
| Power Dissipation (Note 6) | | P _D | 1.13 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R _{θJA} | 111 | °C/W |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics (@T_A = +25°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} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | μA | V _{DS} = 20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±12V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 0.4 | 0.6 | 1.2 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 27 | 35 | mΩ | V _{GS} = 10V, I _D = 6.0A |
| | | — | 30 | 40 | | V _{GS} = 4.5V, I _D = 5.0A |
| | | — | 37 | 60 | | V _{GS} = 2.5V, I _D = 4.0A |
| | | — | 49 | 91 | | V _{GS} = 1.8V, I _D = 2.0A |
| Diode Forward Voltage | V _{SD} | — | 0.7 | 1.2 | V | V _{GS} = 0V, I _S = 1A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{ISS} | — | 281 | — | pF | V _{DS} = 10V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{OSS} | — | 50 | — | | |
| Reverse Transfer Capacitance | C _{RSS} | — | 39 | — | | |
| Gate Resistance | R _G | — | 3.1 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _G | — | 3.6 | — | nC | V _{DS} = 10V, I _D = 6.0A |
| Total Gate Charge (V _{GS} = 10V) | Q _G | — | 7.7 | — | | |
| Gate-Source Charge | Q _{GS} | — | 0.5 | — | | |
| Gate-Drain Charge | Q _{GD} | — | 0.9 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 2.0 | — | ns | V _{GS} = 4.5V, V _{DD} = 10V, R _G = 6Ω, I _D = 6.0A |
| Turn-On Rise Time | t _r | — | 4.9 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 9.9 | — | | |
| Turn-Off Fall Time | t _f | — | 3.3 | — | | |
| Body Diode Reverse Recovery Time | t _{RR} | — | 5.4 | — | ns | I _F = 6.0A, di/dt = 100A/μs |
| Body Diode Reverse Recovery Charge | Q _{RR} | — | 0.7 | — | nC | I _F = 6.0A, di/dt = 100A/μs |

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



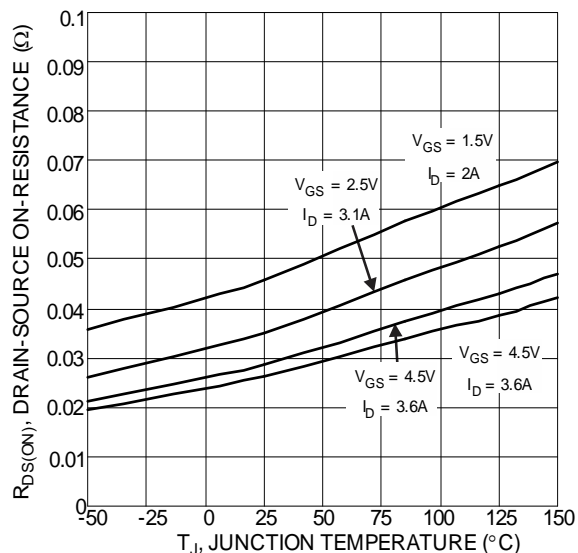


Figure 7 On-Resistance Variation with Temperature

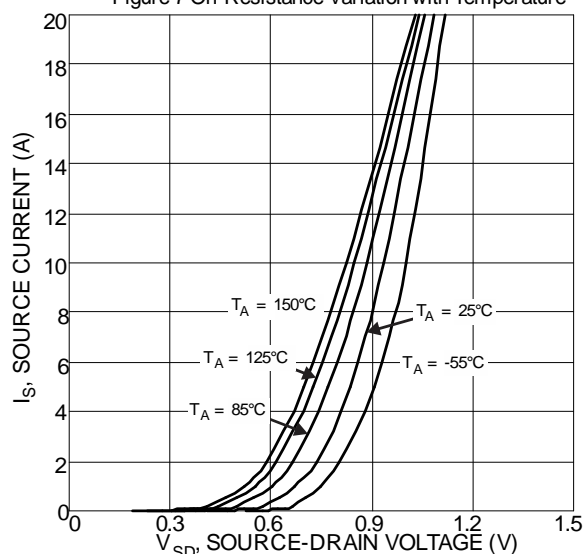


Figure 9 Diode Forward Voltage vs. Current

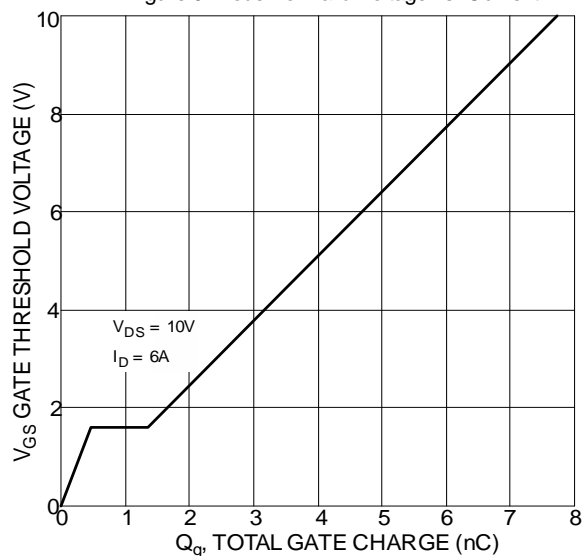


Figure 11 Gate Charge

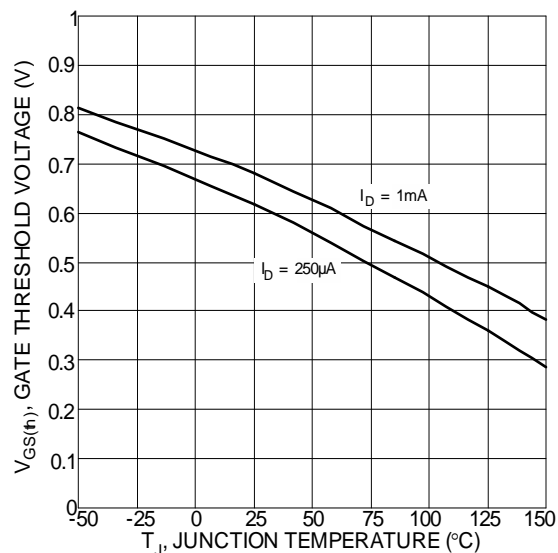


Figure 8 Gate Threshold Variation vs. Ambient Temperature

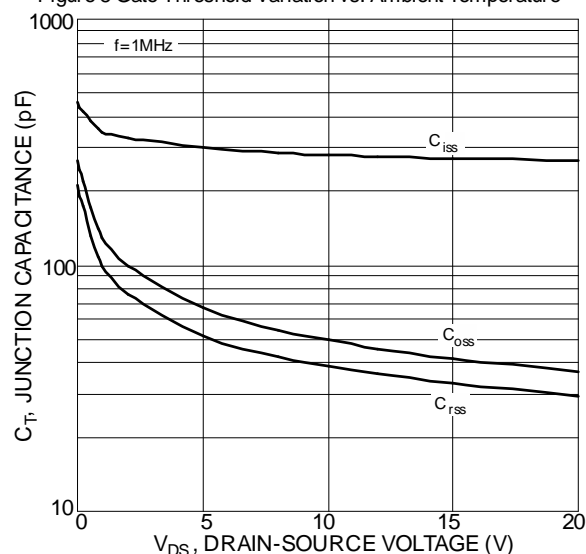


Figure 10 Typical Junction Capacitance

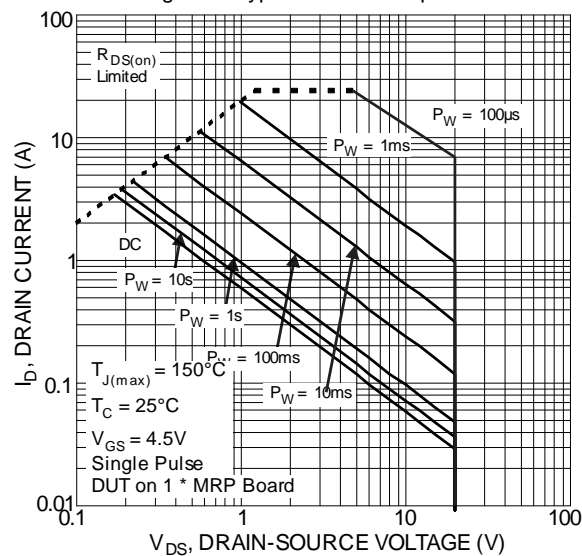
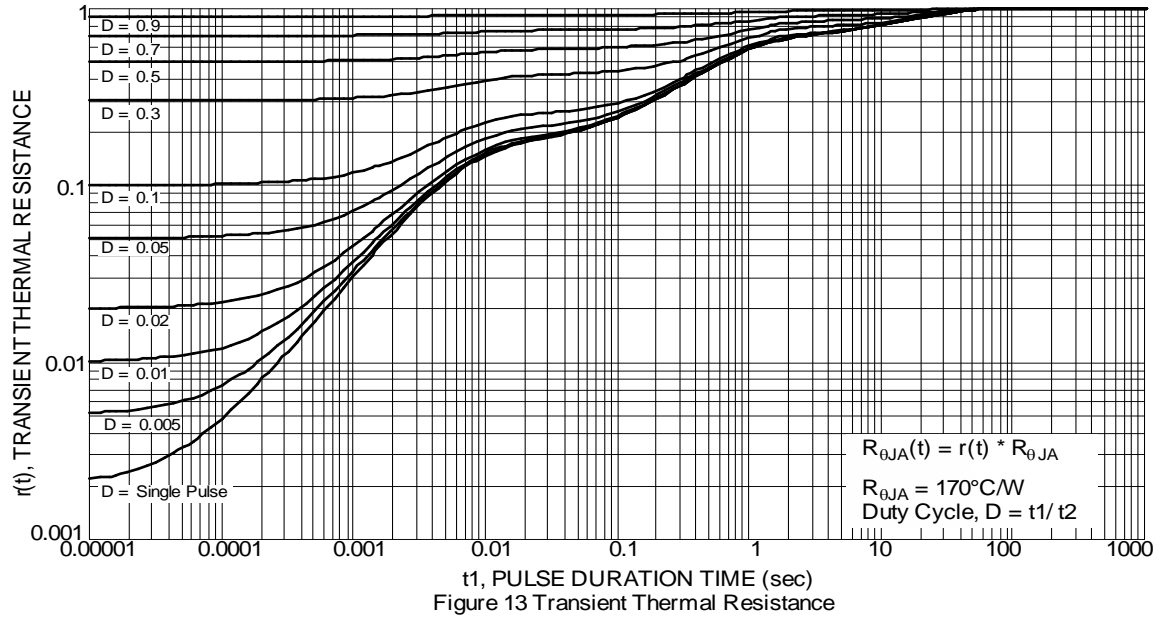


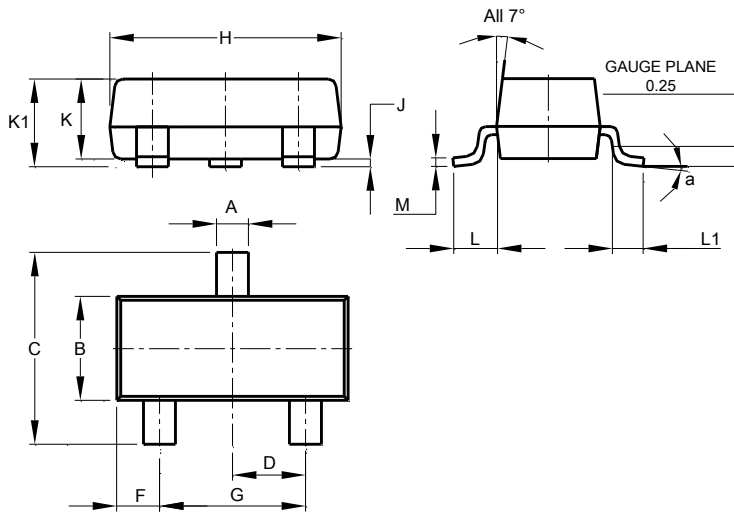
Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

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

SOT23

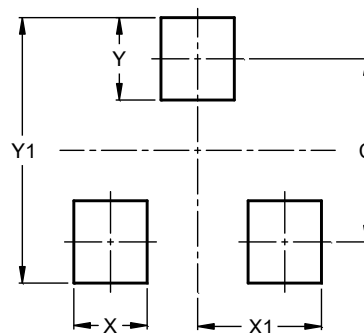


| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.890 | 1.00 | 0.975 |
| K1 | 0.903 | 1.10 | 1.025 |
| L | 0.45 | 0.61 | 0.55 |
| L1 | 0.25 | 0.55 | 0.40 |
| M | 0.085 | 0.150 | 0.110 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

SOT23



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 2.0 |
| X | 0.8 |
| X1 | 1.35 |
| Y | 0.9 |
| Y1 | 2.9 |

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