



**THE DATASHEET OF
DMN6140LQ-13**



Product Summary

| BV _{DSS} | R _{DS(ON)} Max | I _D T _A = +25°C |
|-------------------|--------------------------------|--|
| 60V | 140mΩ @ V _{GS} = 10V | 2.3A |
| | 170mΩ @ V _{GS} = 4.5V | 2.1A |

Description and Applications

This new generation 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.

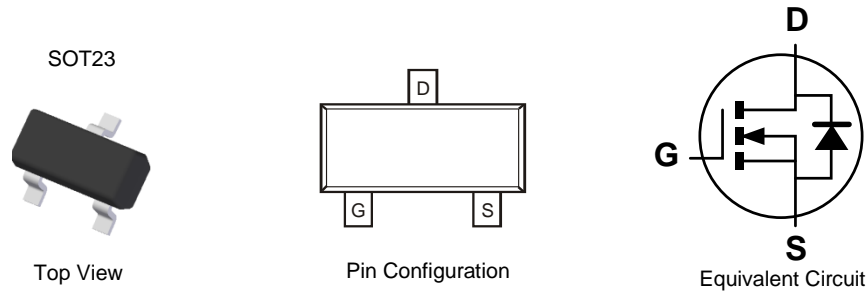
- DC-DC converters
- Power-management functions
- Analog switches

Features and Benefits

- Low On-Resistance
- 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)**
- **The DMN6140LQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

- Package: SOT23
- Package 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 Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.008 grams (Approximate)

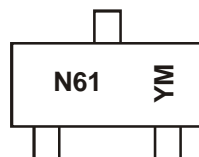


Ordering Information (Note 4)

| Part Number | Package | Packing | |
|--------------|---------|---------|-------------|
| | | Qty. | Carrier |
| DMN6140LQ-7 | SOT23 | 3,000 | Tape & Reel |
| DMN6140LQ-13 | SOT23 | 10,000 | 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/>.

Marking Information



N61 = Product Type Marking Code
 YM = Date Code Marking
 Y or Ÿ = Year (ex: K = 2023)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2015 | - | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 |
|------|------|---|------|------|------|------|------|------|------|------|------|------|
| Code | C | - | K | L | M | N | P | R | S | T | U | V |

| 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 | Unit |
|---|--------------|--|------------------|------------|------|
| Drain-Source Voltage | | | V _{DSS} | 60 | V |
| Gate-Source Voltage | | | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 5) V _{GS} = 10V | Steady State | T _A = +25°C T _A = +70°C | I _D | 1.6 1.2 | A |
| | t < 10s | T _A = +25°C T _A = +70°C | I _D | 2.0 1.6 | A |
| Continuous Drain Current (Note 6) V _{GS} = 10V | Steady State | T _A = +25°C T _A = +70°C | I _D | 2.3 1.8 | A |
| | t < 10s | T _A = +25°C T _A = +70°C | I _D | 2.9 2.3 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | I _S | 1.5 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | I _{DM} | 10 | A |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|--|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | T _A = +25°C | P _D | 0.7 | W |
| | T _A = +70°C | | 0.4 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R _{θJA} | 183 | °C/W |
| | t < 10s | | 115 | |
| Total Power Dissipation (Note 6) | T _A = +25°C | P _D | 1.3 | W |
| | T _A = +70°C | | 0.8 | |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R _{θJA} | 94 | °C/W |
| | t < 10s | | 61 | |
| Thermal Resistance, Junction to Case | | R _{θJC} | 39 | |
| 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} | 60 | — | — | V | V _{GS} = 0V, I _D = 250µA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | µA | V _{DS} = 60V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 1 | — | 3 | V | V _{DS} = V _{GS} , I _D = 250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 92 | 140 | mΩ | V _{GS} = 10V, I _D = 1.8A |
| | | | 115 | 170 | | V _{GS} = 4.5V, I _D = 1.3A |
| Forward Transfer Admittance | Y _{fs} | — | 2.2 | — | S | V _{DS} = 15V, I _D = 1.8A |
| Diode Forward Voltage | V _{SD} | — | 0.75 | 1.0 | V | V _{GS} = 0V, I _S = 0.45A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | — | 315 | — | pF | V _{DS} = 40V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 18 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 16 | — | | |
| Gate Resistance | R _g | — | 0.65 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = 10V) | Q _g | — | 8.6 | — | nC | V _{DS} = 30V, I _D = 1.8A |
| Total Gate Charge (V _{GS} = 5V) | Q _g | — | 4.1 | — | | |
| Gate-Source Charge | Q _{gs} | — | 1.0 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 1.7 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 2.6 | — | ns | V _{DS} = 30V, V _{GS} = 10V, R _G = 6.0Ω, I _D = 1.8A |
| Turn-On Rise Time | t _R | — | 3.6 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 16.3 | — | | |
| Turn-Off Fall Time | t _F | — | 2.7 | — | | |
| Reverse Recovery Time | t _{RR} | — | 16.8 | — | ns | I _F = 1.8A, di/dt = 100A/µs |
| Reverse Recovery Charge | Q _{RR} | — | 9.0 | — | nC | |

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1in. square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

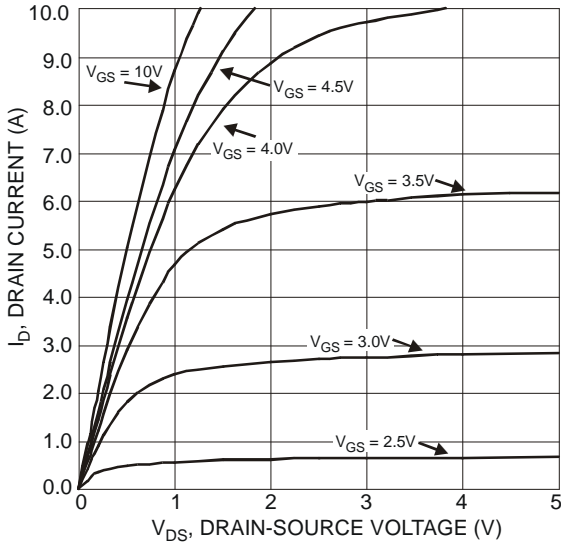


Figure 1 Typical Output Characteristic

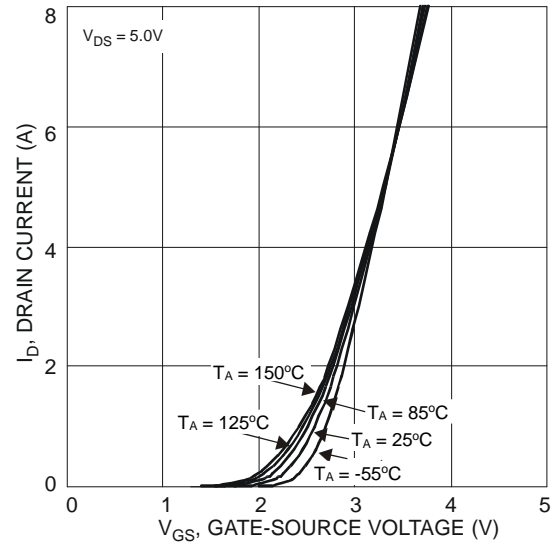


Figure 2 Typical Transfer Characteristics

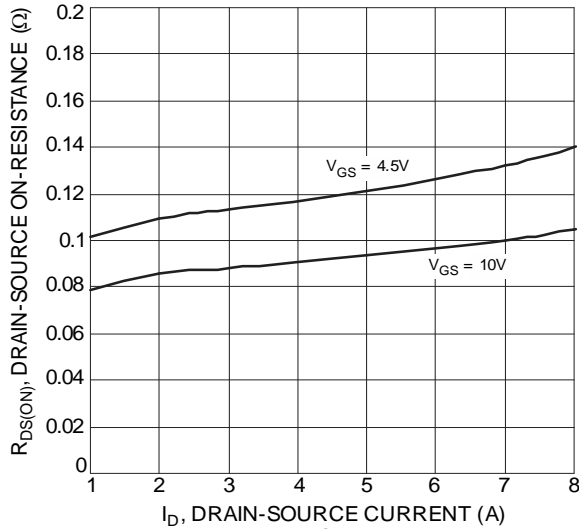


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

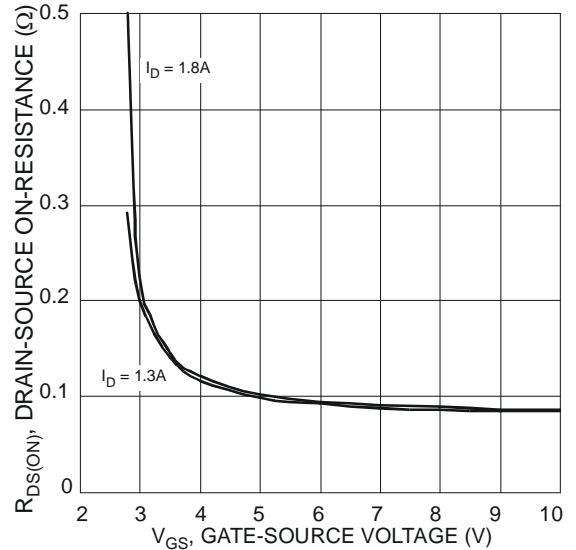


Figure 4 Typical Drain-Source On Resistance vs. Gate-Source Voltage

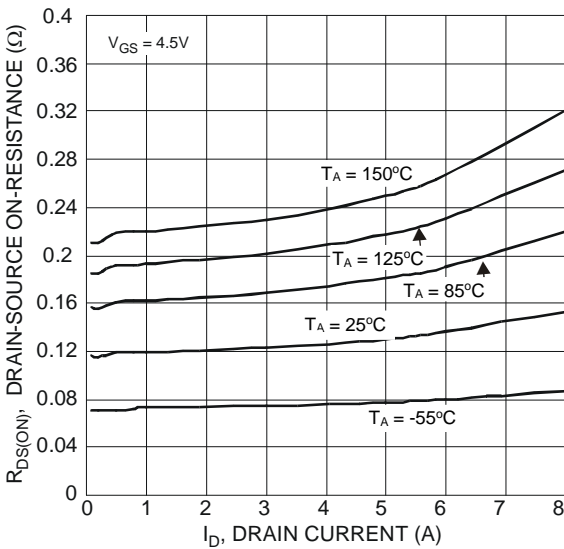


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

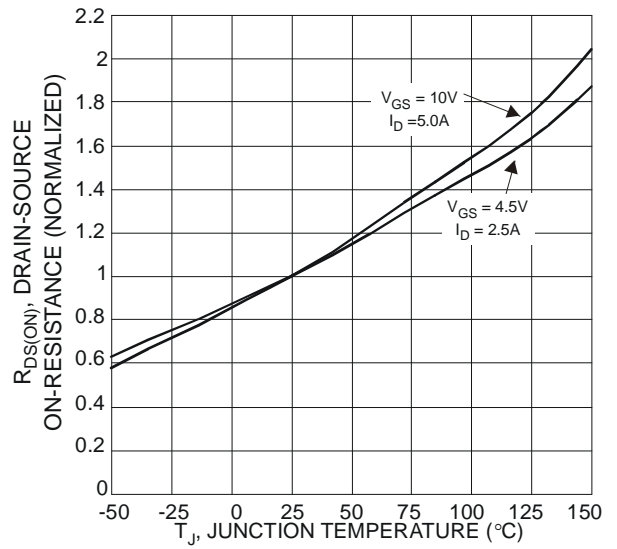
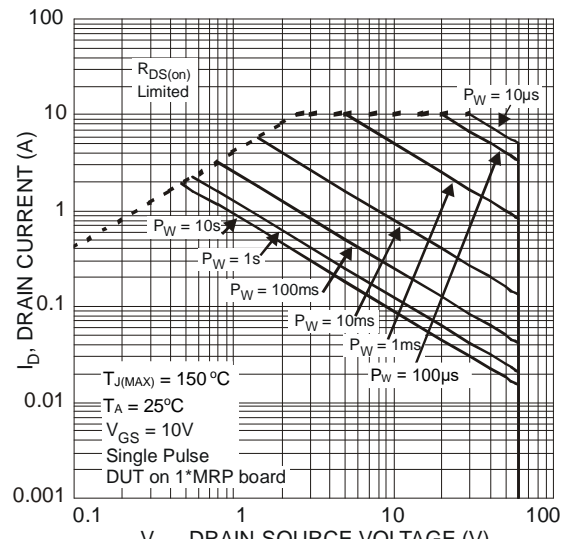
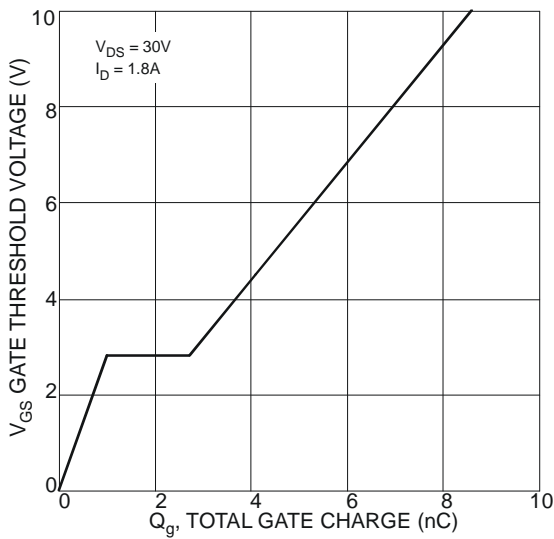
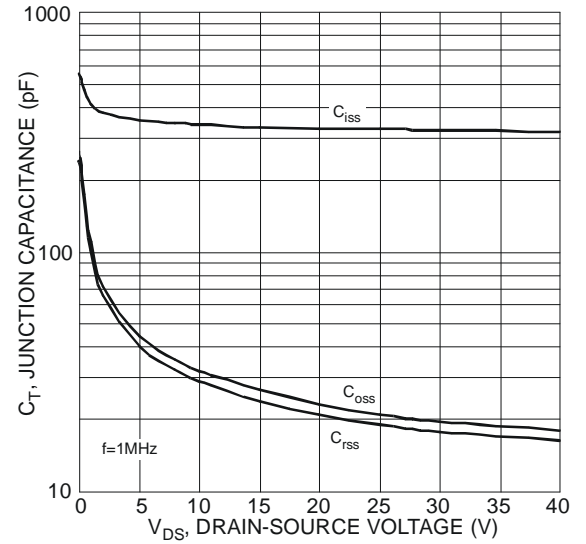
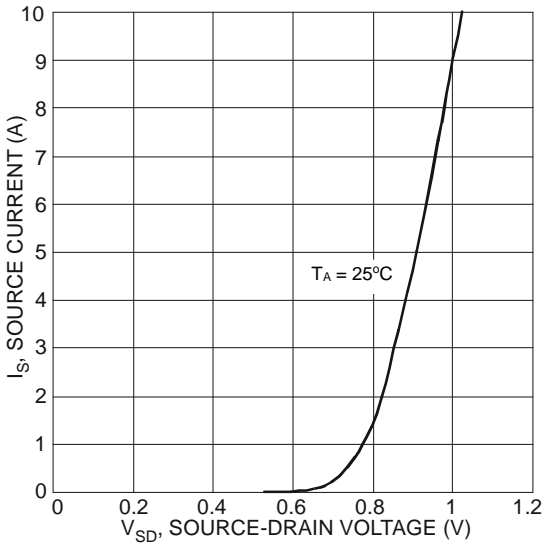
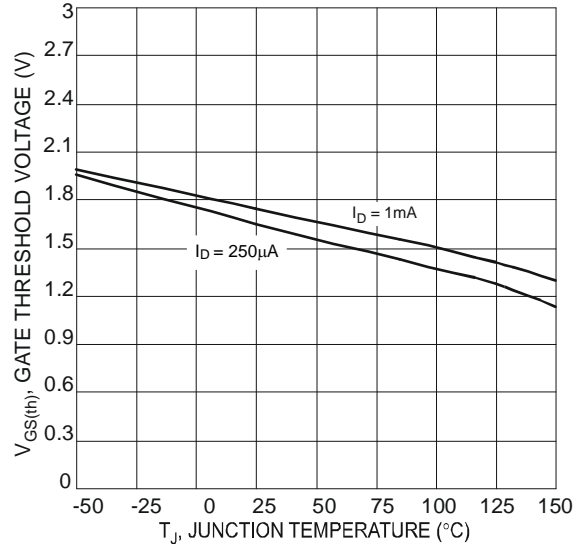
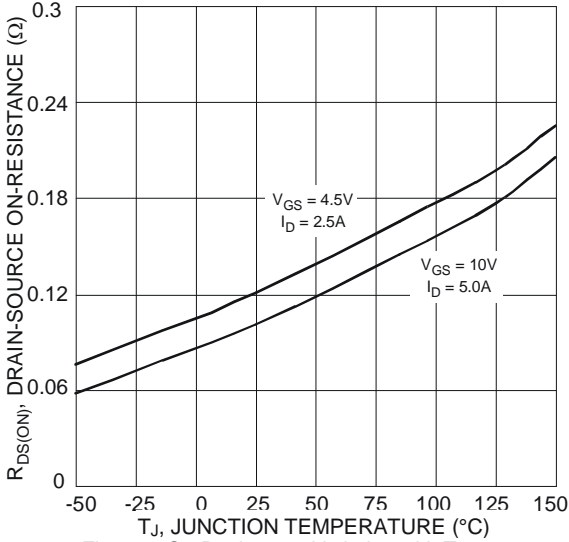
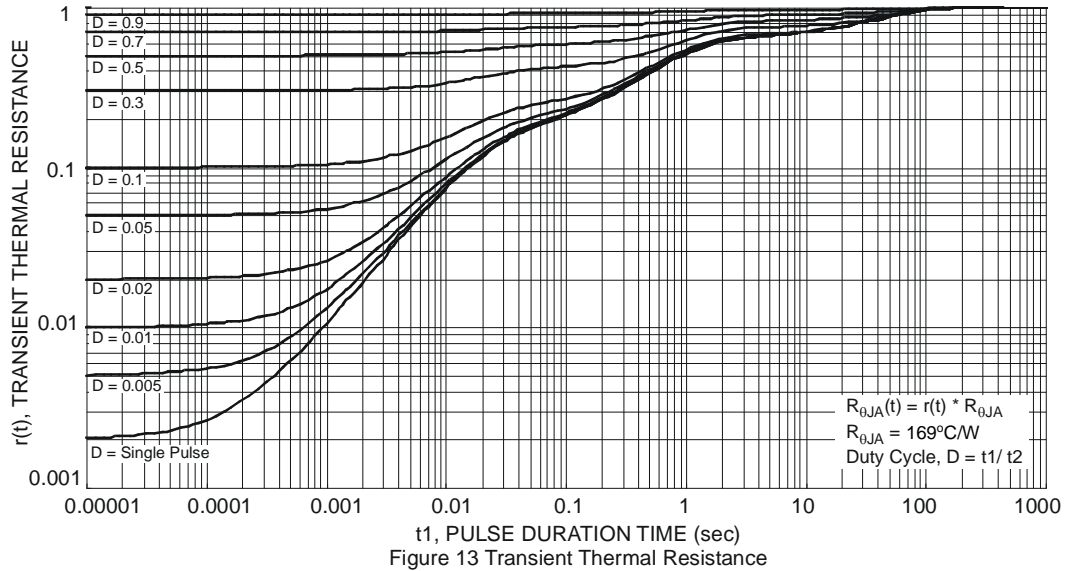


Figure 6 On-Resistance Variation with Temperature

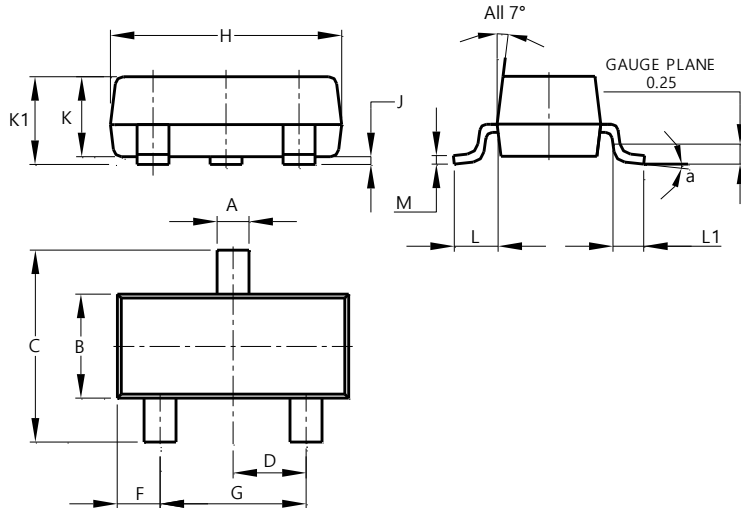




Package Outline Dimensions

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

SOT23

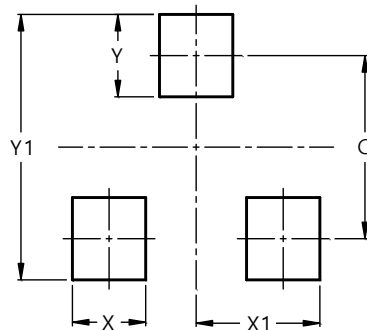


| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 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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