

N-CHANNEL ENHANCEMENT MODE FIELD MOSFET
Product Summary

| BV _{DSS} | R _{DS(ON)} | Package | I _D T _A = +25°C |
|-------------------|------------------------------|---------------|--|
| 600V | 160Ω @ V _{GS} = 10V | SC59 SOT23 | 70mA |

Description

This new generation uses advanced planar technology MOSFET, provide excellent high voltage and fast switching, making it ideal for small-signal and level shift applications.

Applications

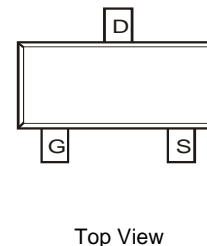
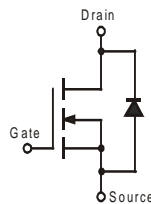
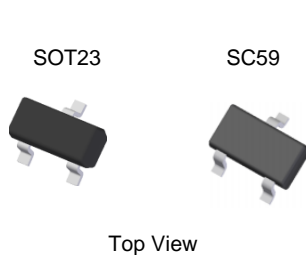
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

Features

- Low Input Capacitance
- High BV_{DSS} Rating for Power Application
- Low Input/Output Leakage
- **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-Q101, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at**
<https://www.diodes.com/products/automotive/automotive-products/>.
- **This part is qualified to JEDEC standards (as references in AEC-Q101) for High Reliability.**
<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

- Case: SC59 / 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**
- Terminal Connections: See Diagram
- Weight: 0.008 grams (Approximate)

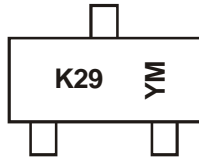

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-------------|-------|------------------|
| BSS127SSN-7 | SC59 | 3000/Tape & Reel |
| BSS127S-7 | SOT23 | 3000/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/>.

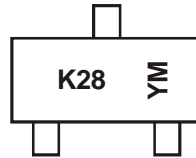
Marking Information

SOT23



K29 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: D = 2016)
 M = Month (ex: 9 = September)

SC59



K28 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: D = 2016)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|------|------|------|------|------|------|------|------|
| Code | A | B | C | D | E | F | G |

| 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} | 600 | V |
| Gate-Source Voltage | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 5) V _{GS} = 10V | I _D | T _A = +25°C | 50 |
| | | T _A = +70°C | 40 |
| Continuous Drain Current (Note 6) V _{GS} = 10V | I _D | T _A = +25°C | 70 |
| | | T _A = +70°C | 55 |
| Continuous Drain Current (Note 5) V _{GS} = 5V | I _D | T _A = +25°C | 45 |
| | | T _A = +70°C | 35 |
| Continuous Drain Current (Note 6) V _{GS} = 5V | I _D | T _A = +25°C | 65 |
| | | T _A = +70°C | 50 |
| Pulsed Drain Current @ T _{SP} = +25°C (Note 7) | I _{DM} | 0.16 | A |

Thermal Characteristics

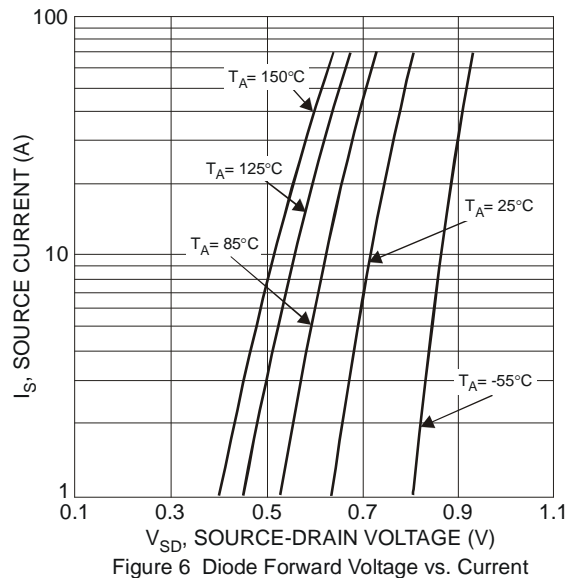
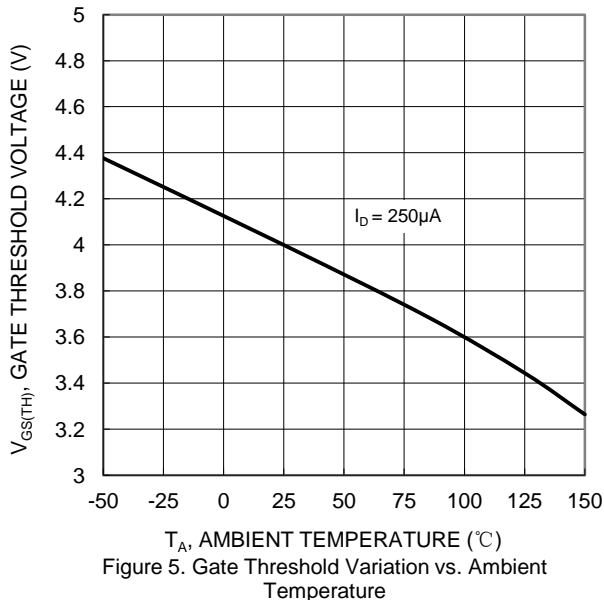
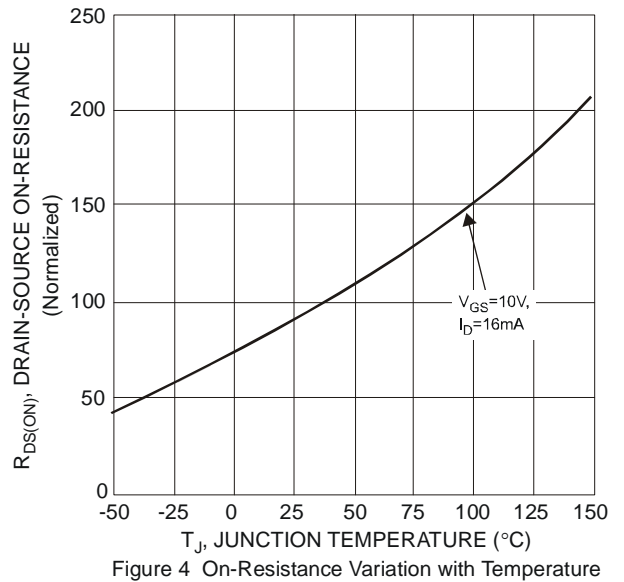
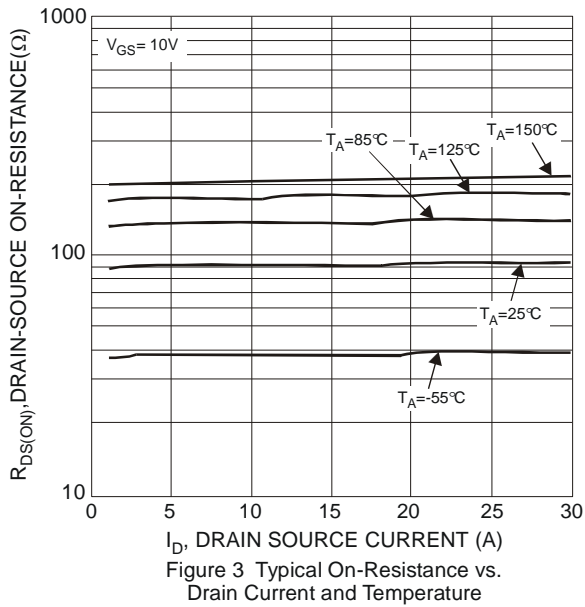
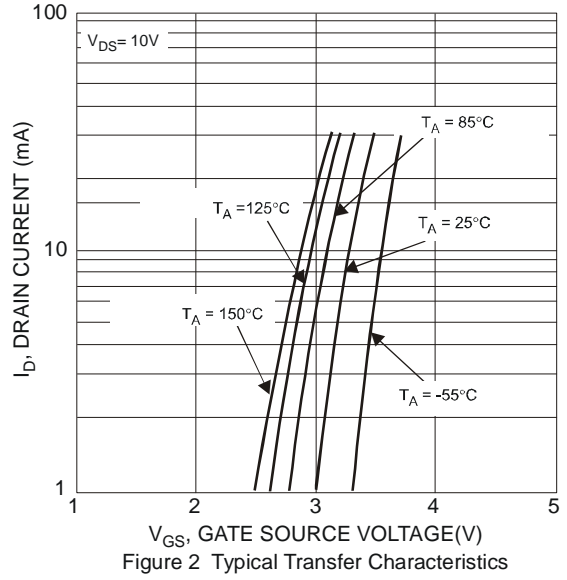
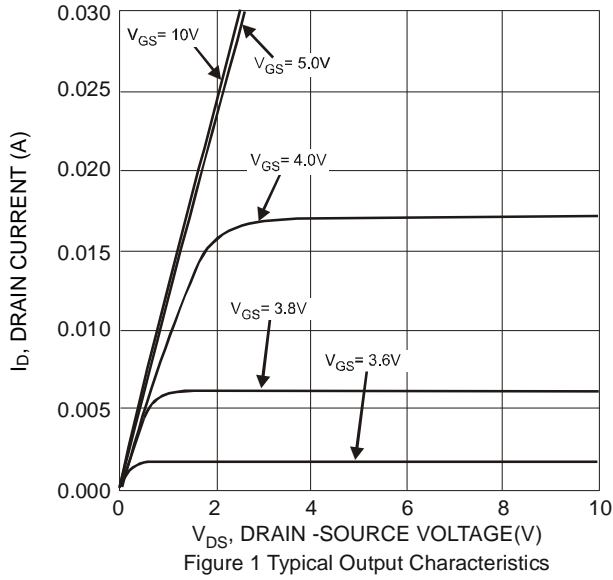
| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Power Dissipation, @T _A = +25°C (Note 5) | P _D | 0.61 | W |
| Thermal Resistance, Junction to Ambient @ T _A = +25°C (Note 5) | R _{θJA} | 204 | °C/W |
| Power Dissipation, @T _A = +25°C (Note 6) | P _D | 1.25 | W |
| Thermal Resistance, Junction to Ambient @ T _A = +25°C (Note 6) | R _{θJA} | 100 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

- Notes:
- Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
 - Device mounted on 1" x 1" FR-4 PCB with high coverage 2 oz. Copper, single sided.
 - Repetitive rating, pulse width limited by junction temperature, 10μs pulse, duty cycle = 1%.

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|-----|------|------|------|---|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 600 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | — | — | 0.1 | μA | V _{DS} = 600V, V _{GS} = 0V |
| Gate-Body Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 3 | — | 4.5 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 80 | 160 | Ω | V _{GS} = 10V, I _D = 16mA |
| | | — | 95 | 190 | | V _{GS} = 5.0V, I _D = 16mA |
| Forward Transfer Admittance | Y _{fs} | — | 76 | — | mS | V _{DS} = 10V, I _D = 16mA |
| Diode Forward Voltage | V _{SD} | — | — | 1.5 | V | V _{GS} = 0V, I _S = 16mA |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iSS} | — | 21.8 | — | pF | V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oSS} | — | 2.2 | — | | |
| Reverse Transfer Capacitance | C _{rSS} | — | 0.3 | — | | |
| Total Gate Charge | Q _g | — | 1.08 | — | nC | V _{GS} = 10V, V _{DD} = 300V, I _D = 0.01A |
| Gate-Source Charge | Q _{gs} | — | 0.08 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 0.50 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 5.0 | — | ns | V _{DD} = 300V, V _{GS} = 10V, R _{GEN} = 6Ω, I _D = 10mA |
| Turn-On Rise Time | t _R | — | 7.2 | — | ns | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 28.7 | — | ns | |
| Turn-Off Fall Time | t _F | — | 168 | — | ns | |
| Reverse Recovery Time | t _{RR} | — | 131 | — | ns | V _R = 300V, I _F = 0.016A, di/dt = 100A/μs |
| Reverse Recovery Charge | Q _{RR} | — | 32 | — | nC | |

Notes: 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to production testing.



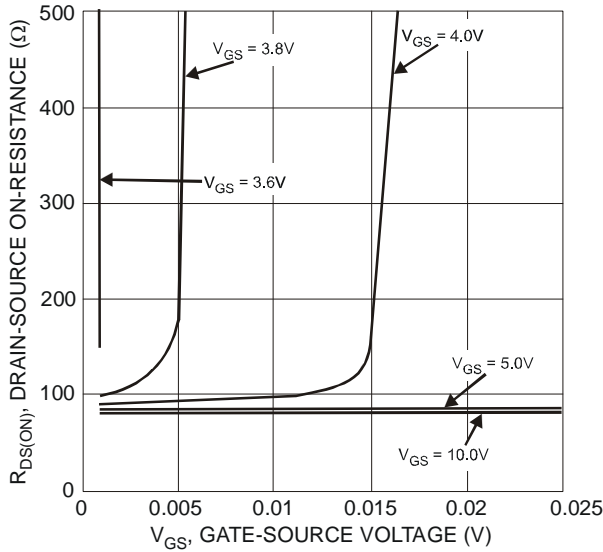


Figure 7 Typical On-Resistance vs. Drain Current and Gate Voltage

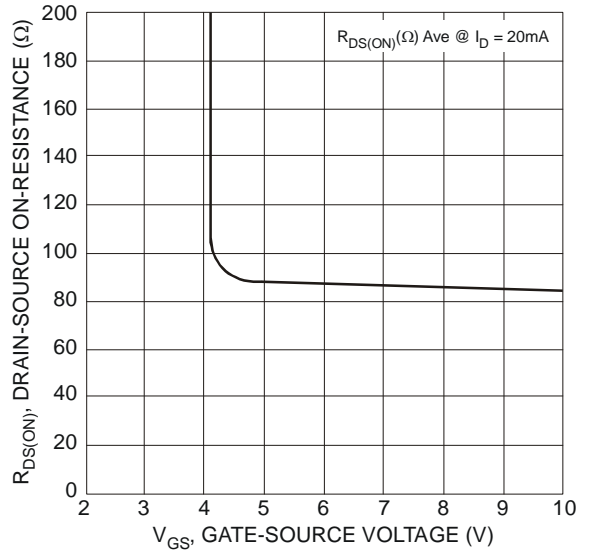


Figure 8 Typical Transfer Characteristic

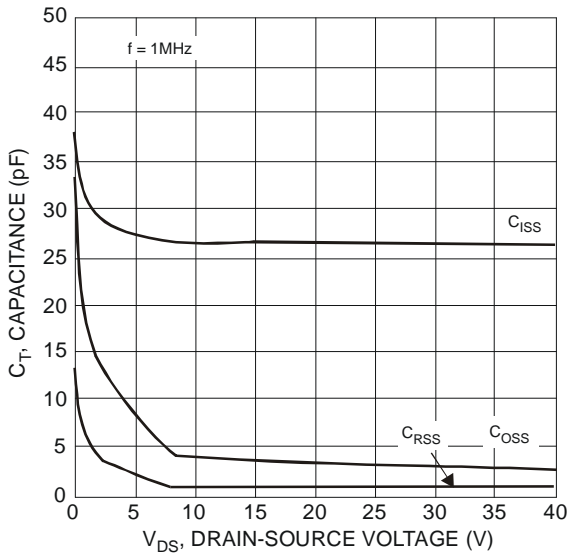


Figure 9 Typical Junction Capacitance

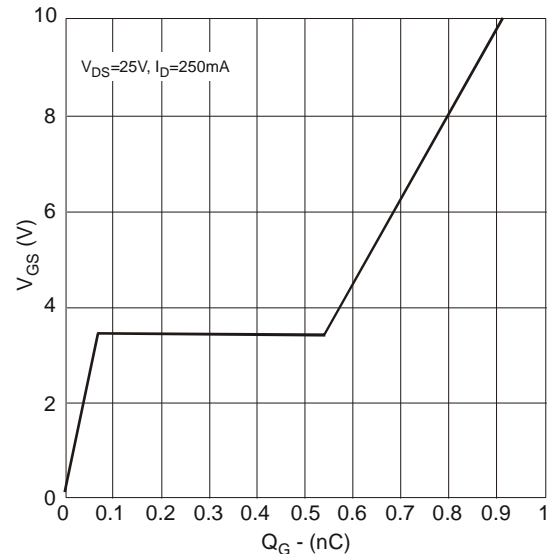


Figure 10 Gate Charge Characteristics

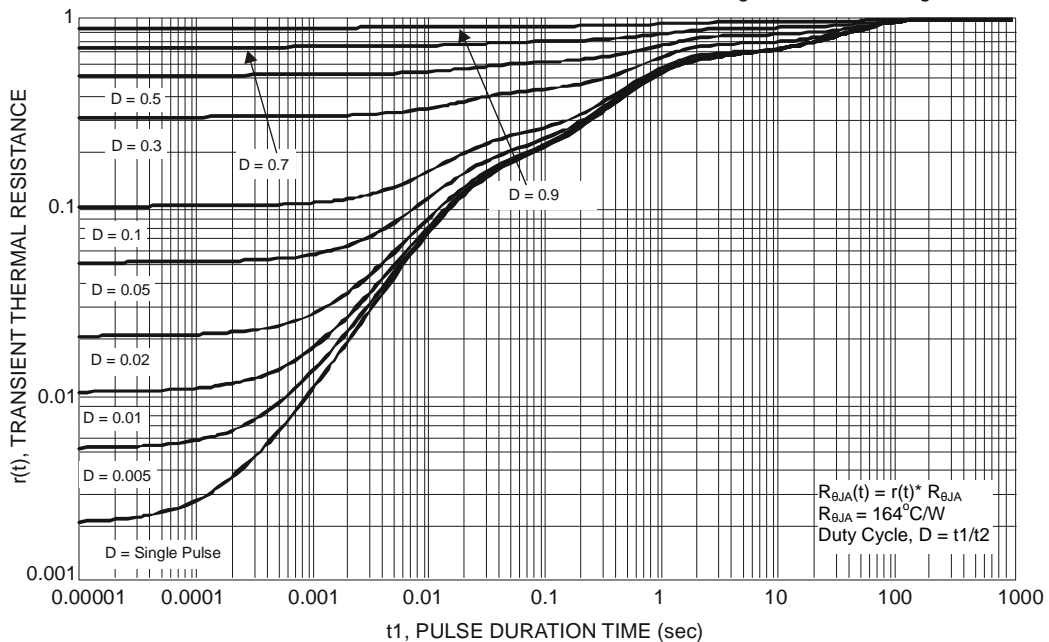


Figure 11 Transient Thermal Resistance

$$R_{\theta JA}(t) = r(t) \cdot R_{\theta JA}$$

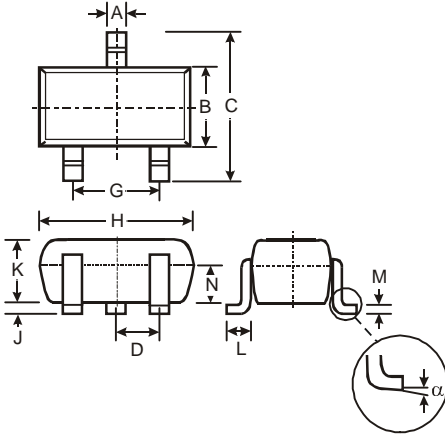
$$R_{\theta JA} = 164^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t_1/t_2$$

Package Outline Dimensions

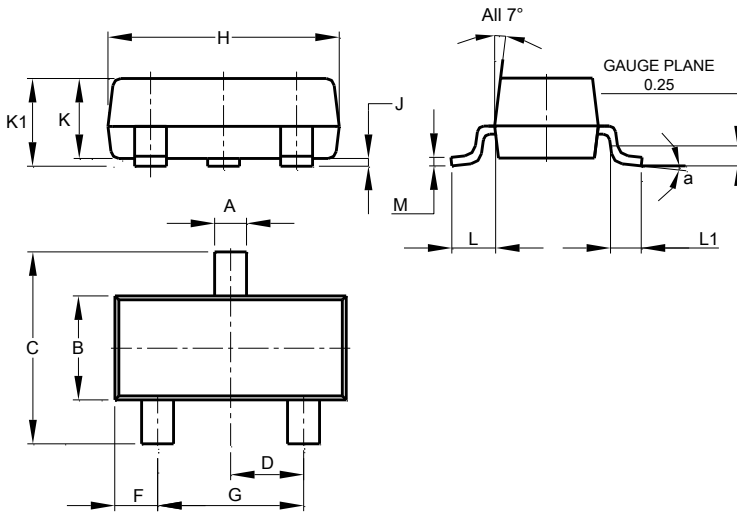
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SC59



| SC59 | | | |
|----------------------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 0.35 | 0.50 | 0.38 |
| B | 1.50 | 1.70 | 1.60 |
| C | 2.70 | 3.00 | 2.80 |
| D | - | - | 0.95 |
| G | - | - | 1.90 |
| H | 2.90 | 3.10 | 3.00 |
| J | 0.013 | 0.10 | 0.05 |
| K | 1.00 | 1.30 | 1.10 |
| L | 0.35 | 0.55 | 0.40 |
| M | 0.10 | 0.20 | 0.15 |
| N | 0.70 | 0.80 | 0.75 |
| α | 0° | 8° | - |
| All Dimensions in mm | | | |

SOT23

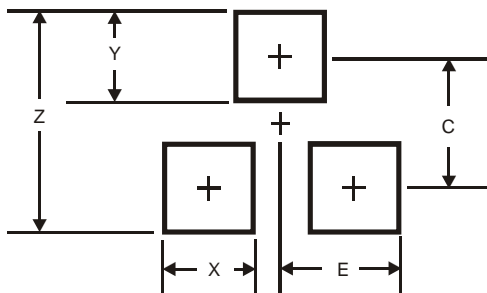


| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10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

SC59

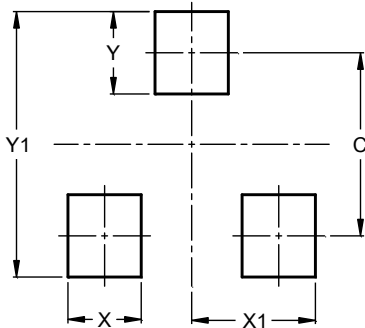


| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 3.4 |
| X | 0.8 |
| Y | 1.0 |
| C | 2.4 |
| E | 1.35 |

Suggested Pad Layout (cont.)

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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