

**N-CHANNEL ENHANCEMENT MODE FIELD MOSFET**

**Product Summary**

V <sub>(BR)DSS</sub>	R <sub>Ds(ON)</sub>	Package	I <sub>D</sub> T <sub>A</sub> = +25°C
600V	160Ω @ V <sub>GS</sub> = 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**

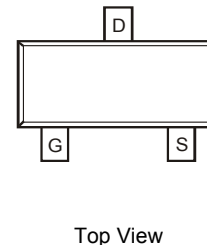
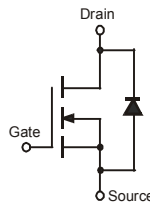
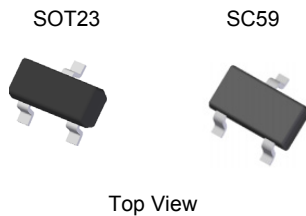
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

**Features**

- Low Input Capacitance
- High BVD<sub>SS</sub> 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**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 <sup>Ⓜ3</sup>
- Terminal Connections: See Diagram
- Weight: 0.008 grams (approximate)

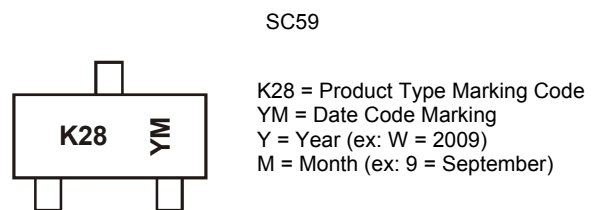
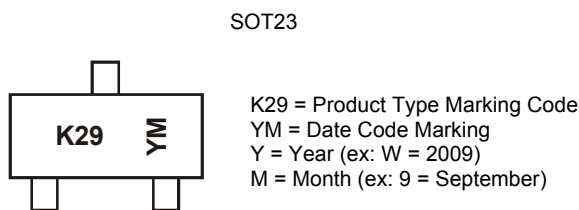


**Ordering Information** (Note 4)

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) compliant.
  2. See <http://www.diodes.com> 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>.

**Marking Information**



Date Code Key

Year	2009	2010	2011	2012	2013	2014	2015
Code	W	X	Y	Z	A	B	C

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>	600	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	50	mA
		T <sub>A</sub> = +70°C		40	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	70	mA
		T <sub>A</sub> = +70°C		55	
Continuous Drain Current (Note 5) V <sub>GS</sub> = 5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	45	mA
		T <sub>A</sub> = +70°C		35	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	65	mA
		T <sub>A</sub> = +70°C		50	
Pulsed Drain Current @ T <sub>SP</sub> = +25°C (Notes 7)			I <sub>DM</sub>	0.16	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Units
Power Dissipation, @T <sub>A</sub> = +25°C (Note 5)	P <sub>D</sub>	0.61	W
Thermal Resistance, Junction to Ambient @ T <sub>A</sub> = +25°C (Note 5)	R <sub>θJA</sub>	204	°C/W
Power Dissipation, @T <sub>A</sub> = +25°C (Note 6)	P <sub>D</sub>	1.25	W
Thermal Resistance, Junction to Ambient @ T <sub>A</sub> = +25°C (Note 6)	R <sub>θJA</sub>	100	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 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 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	600	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	0.1	μA	V <sub>DS</sub> = 600V, V <sub>GS</sub> = 0V
Gate-Body Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	3	—	4.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	80	160	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 16mA
		—	95	190		V <sub>GS</sub> = 5.0V, I <sub>D</sub> = 16mA
Forward Transfer Admittance	Y <sub>fs</sub>	—	76	—	mS	V <sub>DS</sub> = 10V, I <sub>D</sub> = 16mA
Diode Forward Voltage	V <sub>SD</sub>	—	—	1.5	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 16mA
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	21.8	—	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	2.2	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	0.3	—		
Total Gate Charge	Q <sub>g</sub>	—	1.08	—	nC	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 300V, I <sub>D</sub> = 0.01A
Gate-Source Charge	Q <sub>gs</sub>	—	0.08	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	0.50	—		
Turn-On Delay Time	t <sub>D(on)</sub>	—	5.0	—	ns	V <sub>DD</sub> = 300V, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = 6Ω, I <sub>D</sub> = 10mA
Turn-On Rise Time	t <sub>r</sub>	—	7.2	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	28.7	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	168	—	ns	
Reverse Recovery Time	T <sub>rr</sub>	—	131	—	ns	V <sub>R</sub> = 300V, I <sub>F</sub> = 0.016A, di/dt = 100A/μs
Reverse Recovery Charge	Q <sub>rr</sub>	—	32	—	nC	

- 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%.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

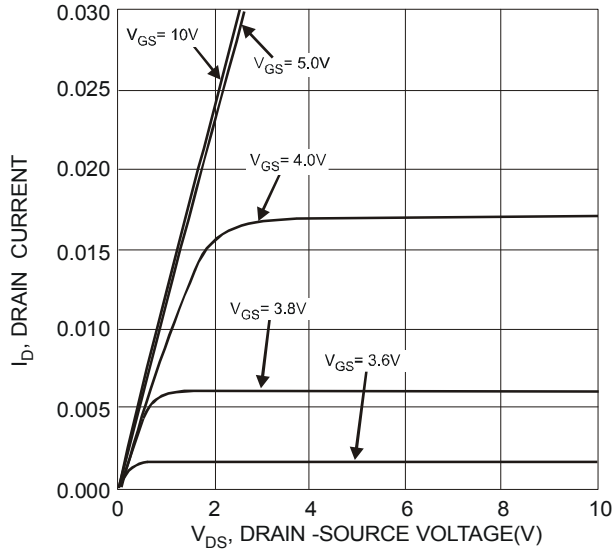


Figure 1 Typical Output Characteristics

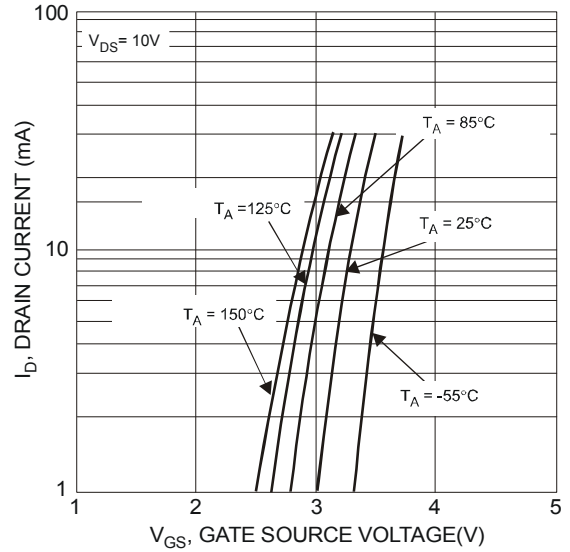


Figure 2 Typical Transfer Characteristics

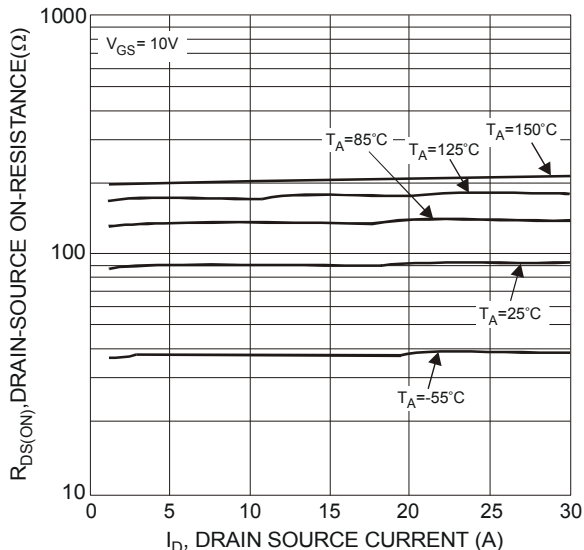


Figure 3 Typical On-Resistance vs. Drain Current and Temperature

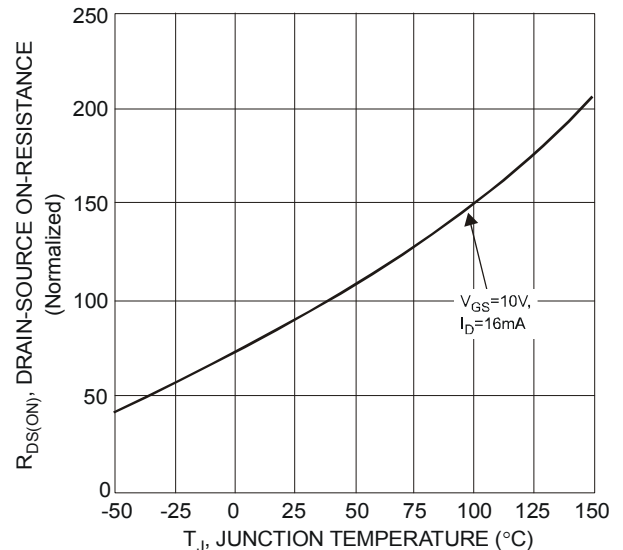


Figure 4 On-Resistance Variation with Temperature

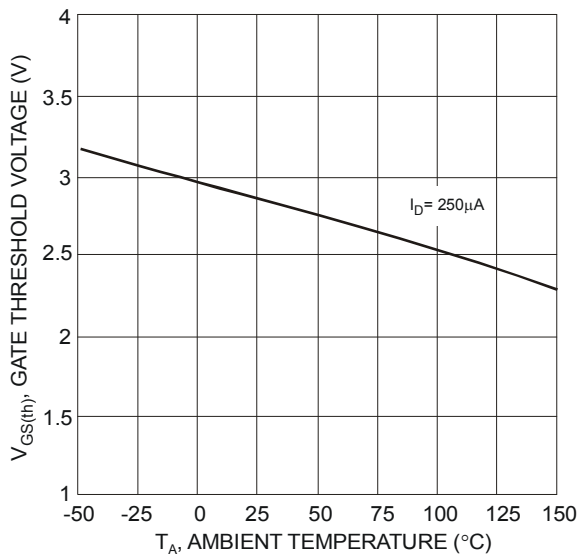


Figure 5 Gate Threshold Variation vs. Ambient Temperature

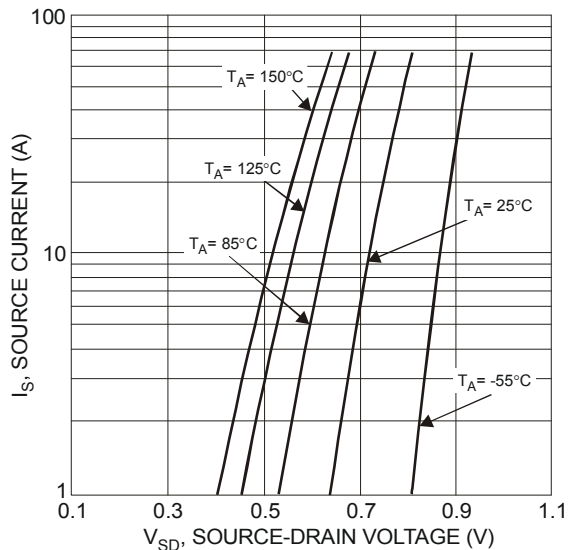


Figure 6 Diode Forward Voltage vs. Current

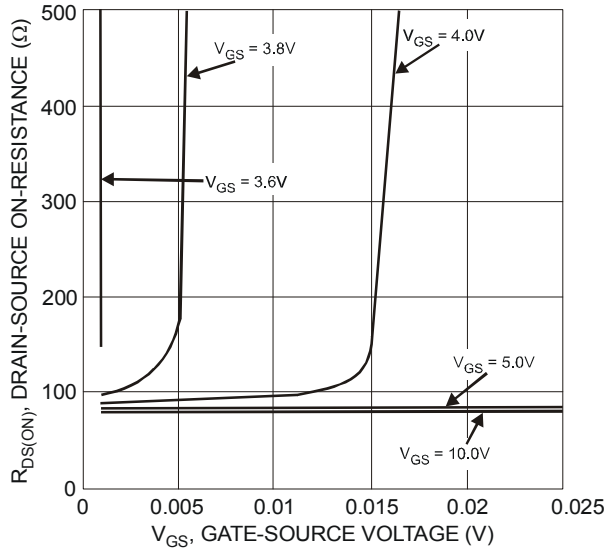


Figure 7 Typical On-Resistance vs. Drain Current and Gate Voltage

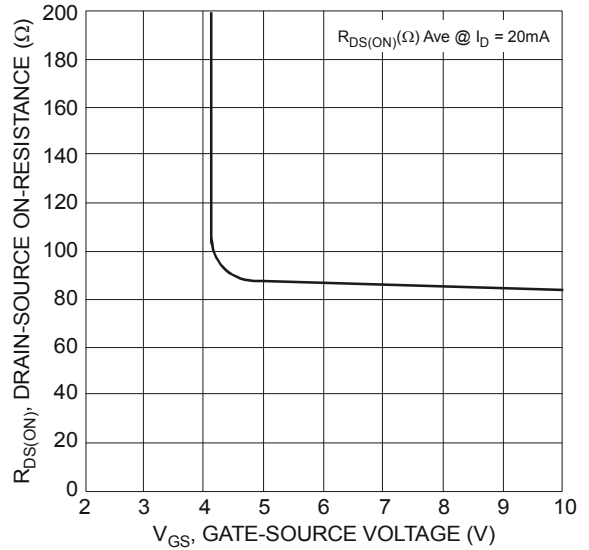


Figure 8 Typical Transfer Characteristic

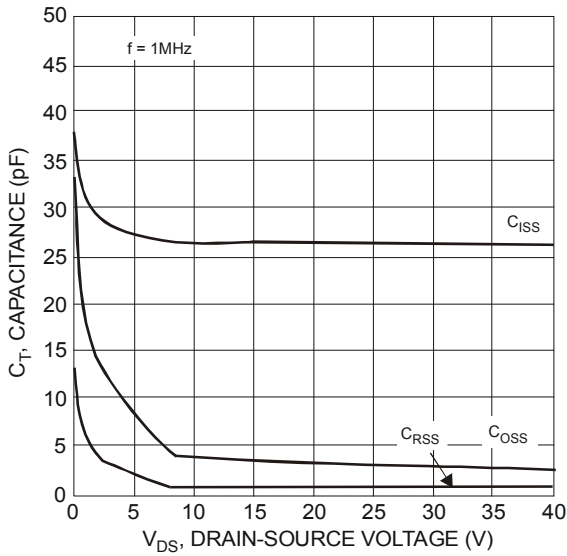


Figure 9 Typical Junction Capacitance

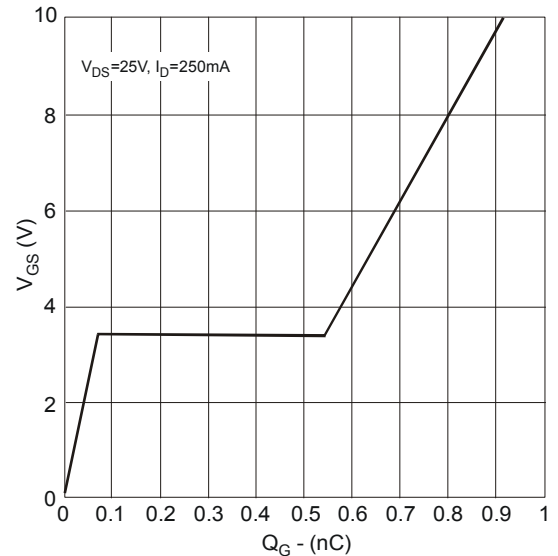


Figure 10 Gate Charge Characteristics

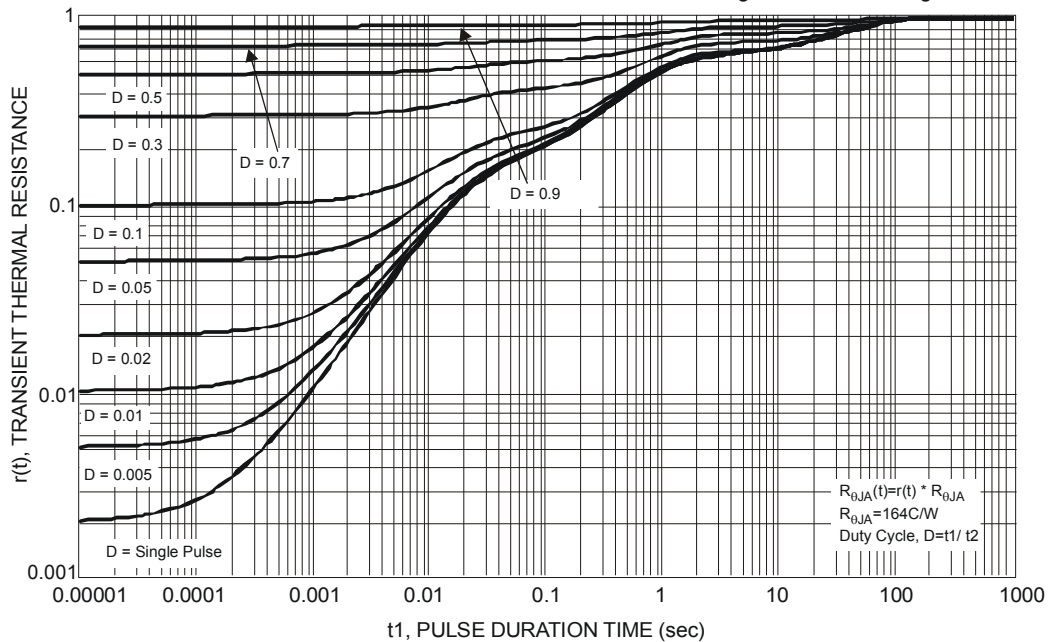
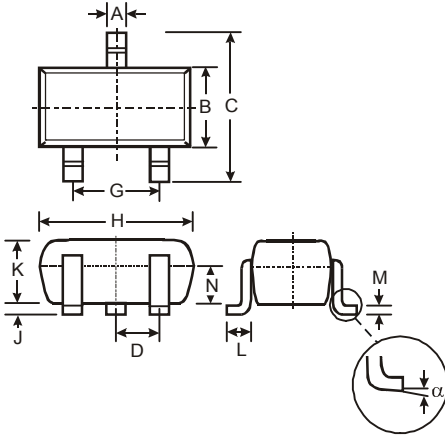


Figure 11 Transient Thermal Resistance

## Package Outline Dimensions

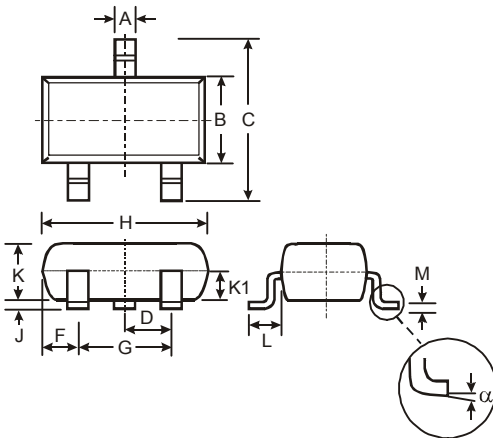
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

### 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

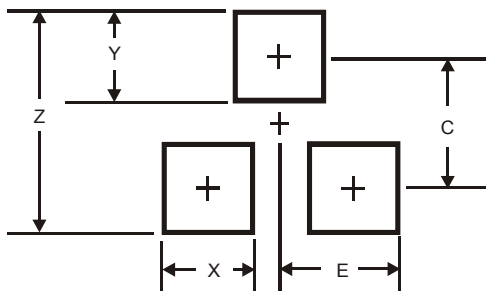


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-
All Dimensions in mm			

## Suggested Pad Layout

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

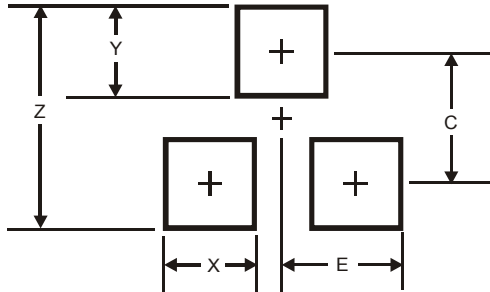
### SC59



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

**Suggested Pad Layout** (cont.)

**SOT23**



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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