

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	Package	$I_D$ $T_A = +25^\circ C$
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

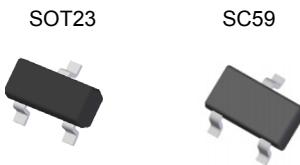
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

## Features

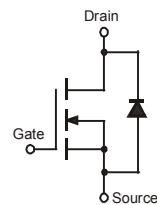
- Low Input Capacitance
- High BVDss rating for power application
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability

## Mechanical Data

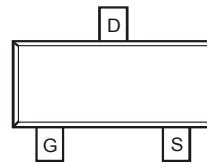
- Case: SC59 / SOT23
- Case Material: Molded Plastic "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper leadframe Solderable per MIL-STD-202, Method 208 (e3)
- Terminal Connections: See Diagram
- Weight: 0.008 grams (approximate)



Top View



Equivalent Circuit



Top View

## Ordering Information (Note 4)

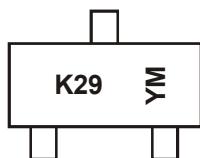
Part Number	Case	Packaging
BSS127SSN-7	SC59	3000/Tape & Reel
BSS127S-7	SOT23	3000/Tape & Reel

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>.

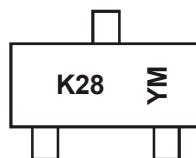
## Marking Information

SOT23



K29 = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: W = 2009)  
M = Month (ex: 9 = September)

SC59



K28 = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: W = 2009)  
M = Month (ex: 9 = September)

### 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** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	600	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 5) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	50 40	mA
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	70 55	mA
Continuous Drain Current (Note 5) $V_{GS} = 5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	45 35	mA
Continuous Drain Current (Note 6) $V_{GS} = 5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	65 50	mA
Pulsed Drain Current @ $T_{SP} = +25^\circ\text{C}$ (Notes 7)			$I_{DM}$	0.16	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Units
Power Dissipation, @ $T_A = +25^\circ\text{C}$ (Note 5)	$P_D$	0.61	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 5)	$R_{\theta JA}$	204	°C/W
Power Dissipation, @ $T_A = +25^\circ\text{C}$ (Note 6)	$P_D$	1.25	W
Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 6)	$R_{\theta JA}$	100	°C/W
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	600	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	$I_{DSS}$	—	—	0.1	$\mu\text{A}$	$V_{DS} = 600\text{V}, V_{GS} = 0\text{V}$
Gate-Body Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(\text{th})}$	3	—	4.5	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(\text{ON})}$	—	80	160	$\Omega$	$V_{GS} = 10\text{V}, I_D = 16\text{mA}$
		—	95	190		$V_{GS} = 5.0\text{V}, I_D = 16\text{mA}$
Forward Transfer Admittance	$ Y_{fs} $	—	76	—	mS	$V_{DS} = 10\text{V}, I_D = 16\text{mA}$
Diode Forward Voltage	$V_{SD}$	—	—	1.5	V	$V_{GS} = 0\text{V}, I_S = 16\text{mA}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	21.8	—	pF	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	2.2	—		
Reverse Transfer Capacitance	$C_{rss}$	—	0.3	—		
Total Gate Charge	$Q_g$	—	1.08	—	nC	$V_{GS} = 10\text{V}, V_{DD} = 300\text{V}, I_D = 0.01\text{A}$
Gate-Source Charge	$Q_{gs}$	—	0.08	—		
Gate-Drain Charge	$Q_{gd}$	—	0.50	—		
Turn-On Delay Time	$t_{D(\text{on})}$	—	5.0	—	ns	$V_{DD} = 300\text{V}, V_{GS} = 10\text{V}, R_{\text{GEN}} = 6\Omega, I_D = 10\text{mA}$
Turn-On Rise Time	$t_r$	—	7.2	—	ns	
Turn-Off Delay Time	$t_{D(\text{off})}$	—	28.7	—	ns	
Turn-Off Fall Time	$t_f$	—	168	—	ns	$V_R = 300\text{V}, I_F = 0.016\text{A}, \frac{dI}{dt} = 100\text{A}/\mu\text{s}$
Reverse Recovery Time	$T_{rr}$	—	131	—	ns	
Reverse Recovery Charge	$Q_{rr}$	—	32	—	nC	

Notes:

5. Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
6. Device mounted on 1" x 1" FR-4 PCB with high coverage 2 oz. Copper, single sided.
7. Repetitive rating, pulse width limited by junction temperature, 10 $\mu\text{s}$  pulse, duty cycle = 1%.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing.

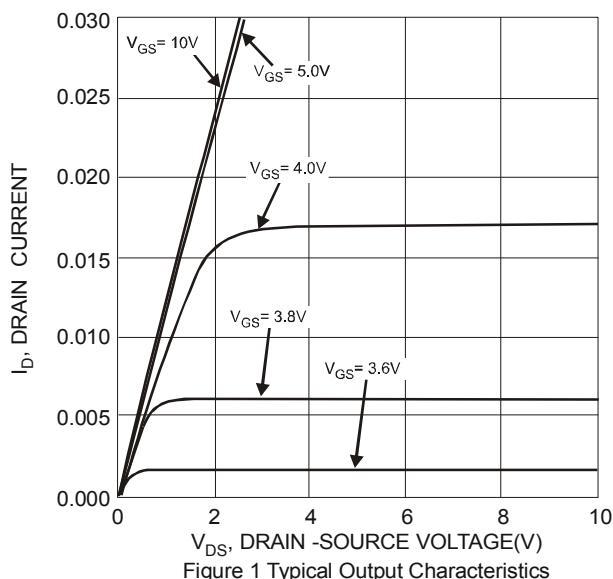


Figure 1 Typical Output Characteristics

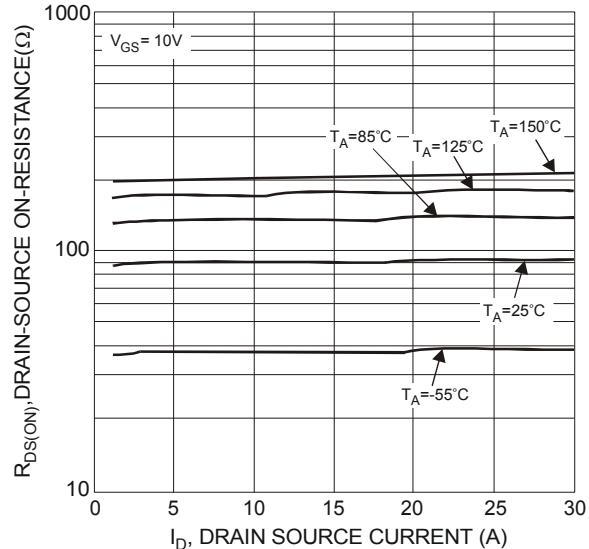


Figure 3 Typical On-Resistance vs.  
Drain Current and Temperature

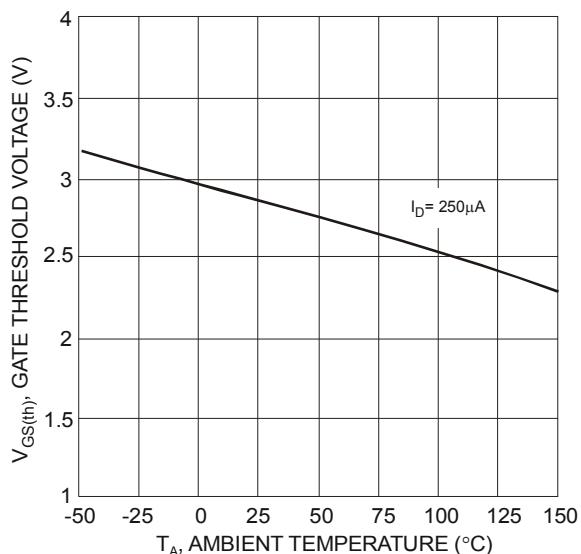


Figure 5 Gate Threshold Variation vs. Ambient Temperature

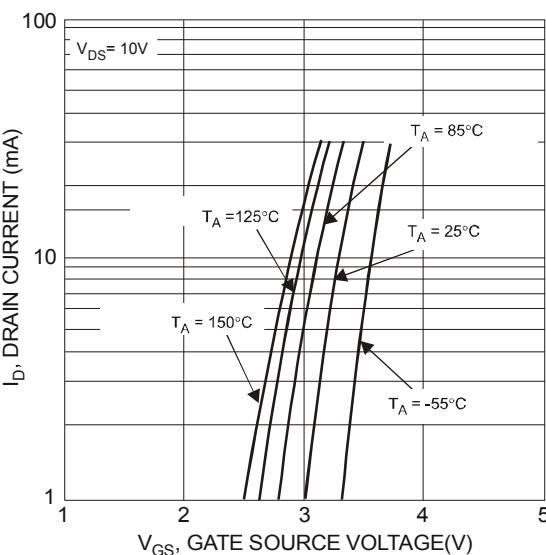


Figure 2 Typical Transfer Characteristics

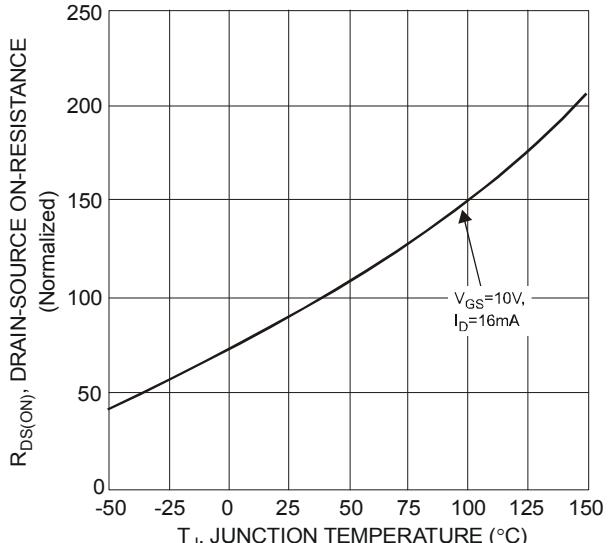


Figure 4 On-Resistance Variation with Temperature

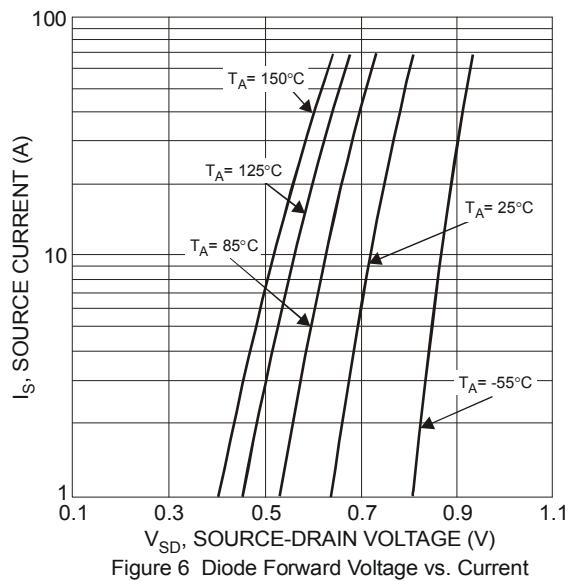


Figure 6 Diode Forward Voltage vs. Current

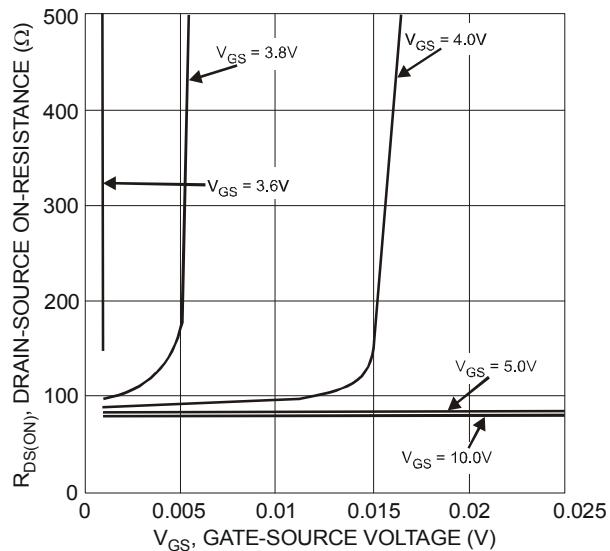


Figure 7 Typical On-Resistance vs. Drain Current and Gate Voltage

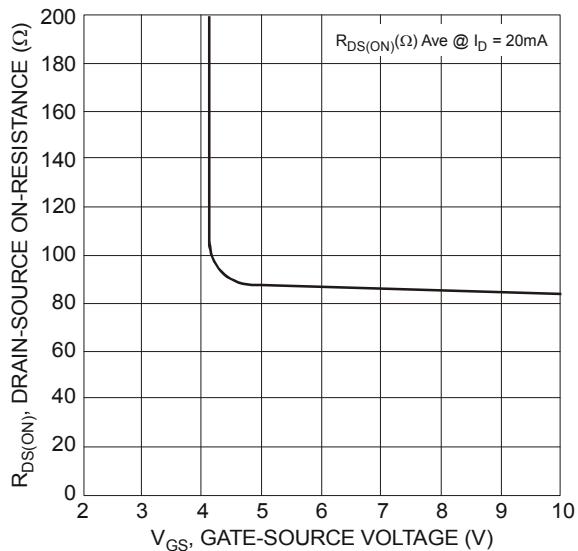


Figure 8 Typical Transfer Characteristic

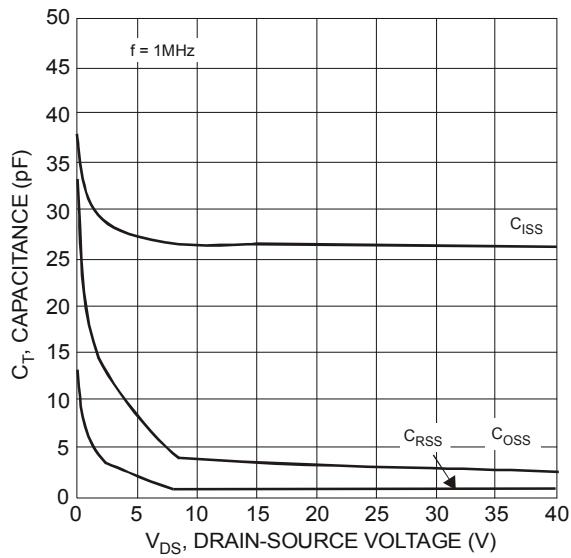


Figure 9 Typical Junction Capacitance

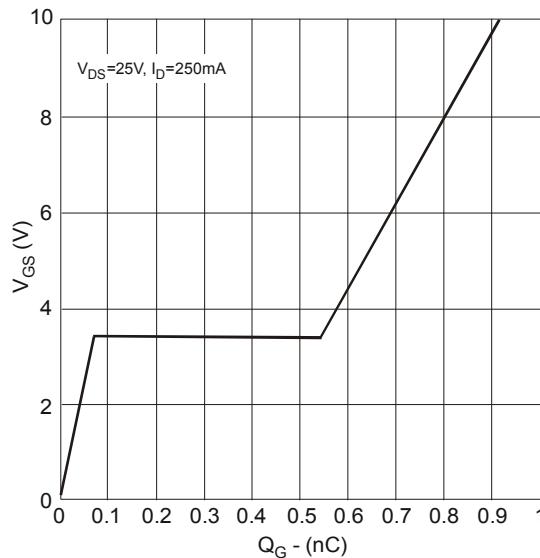


Figure 10 Gate Charge Characteristics

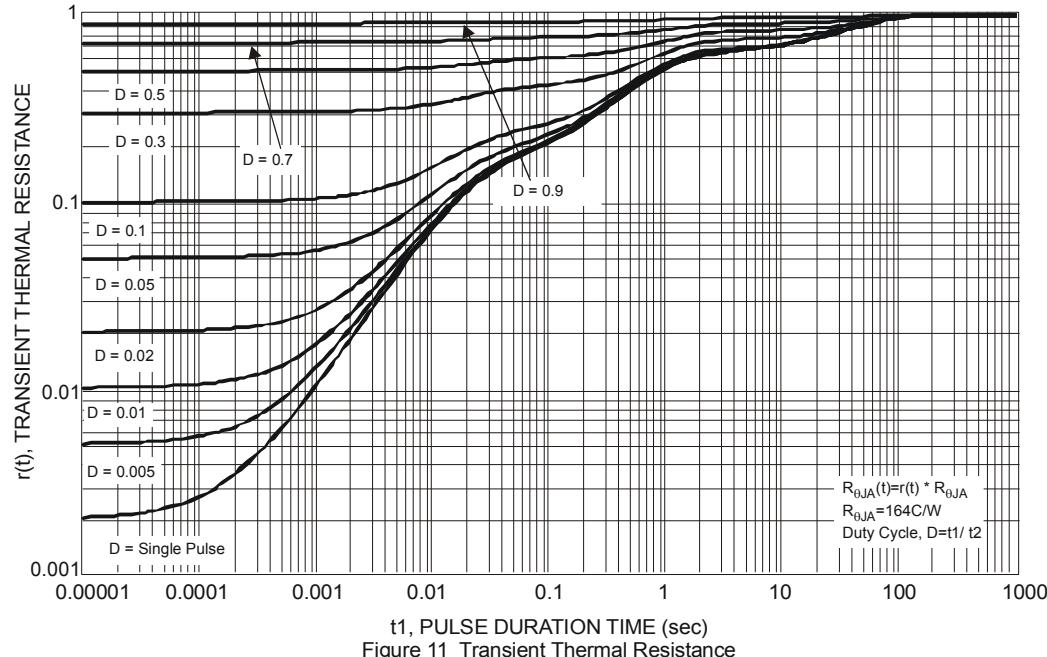
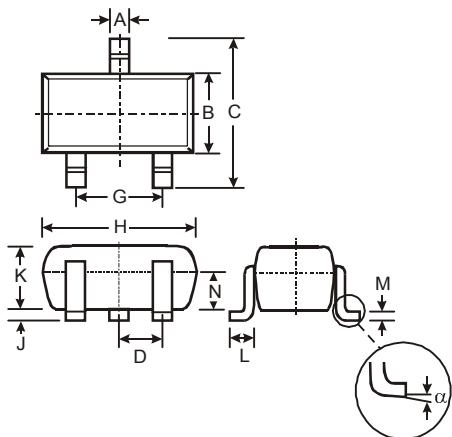


Figure 11 Transient Thermal Resistance

## Package Outline Dimensions

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

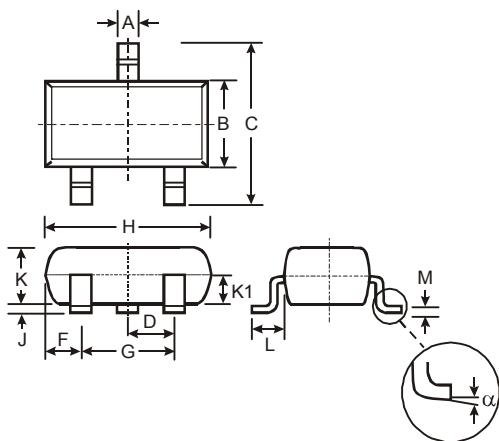
**SC59**



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**



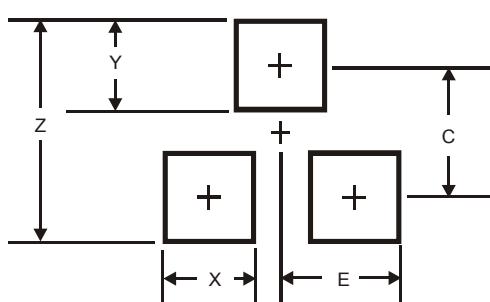
SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-

All Dimensions in mm

## Suggested Pad Layout

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

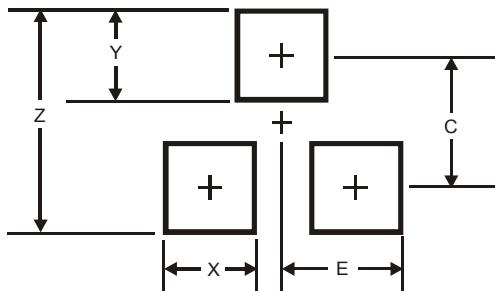
**SC59**



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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