

**N-CHANNEL ENHANCEMENT MODE FIELD MOSFET**
**Product Summary**

BV <sub>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**

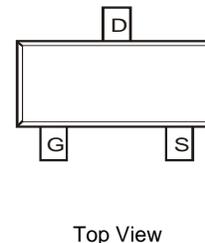
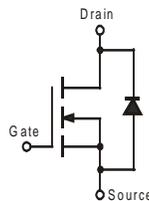
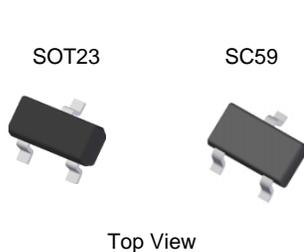
- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

**Features**

- Low Input Capacitance
- High BV<sub>DSS</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)**
- **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)

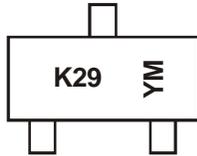

**Ordering Information** (Note 4)

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/>.

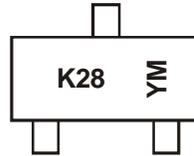
## Marking Information

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  
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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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
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	I <sub>D</sub>	T <sub>A</sub> = +25°C	50
		T <sub>A</sub> = +70°C	40
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	I <sub>D</sub>	T <sub>A</sub> = +25°C	70
		T <sub>A</sub> = +70°C	55
Continuous Drain Current (Note 5) V <sub>GS</sub> = 5V	I <sub>D</sub>	T <sub>A</sub> = +25°C	45
		T <sub>A</sub> = +70°C	35
Continuous Drain Current (Note 6) V <sub>GS</sub> = 5V	I <sub>D</sub>	T <sub>A</sub> = +25°C	65
		T <sub>A</sub> = +70°C	50
Pulsed Drain Current @ T <sub>SP</sub> = +25°C (Note 7)	I <sub>DM</sub>	0.16	A

## Thermal Characteristics

Characteristic	Symbol	Value	Unit
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

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

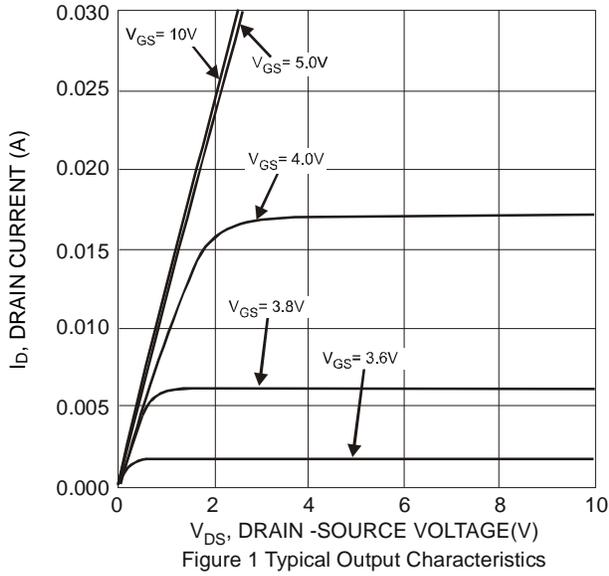


Figure 1 Typical Output Characteristics

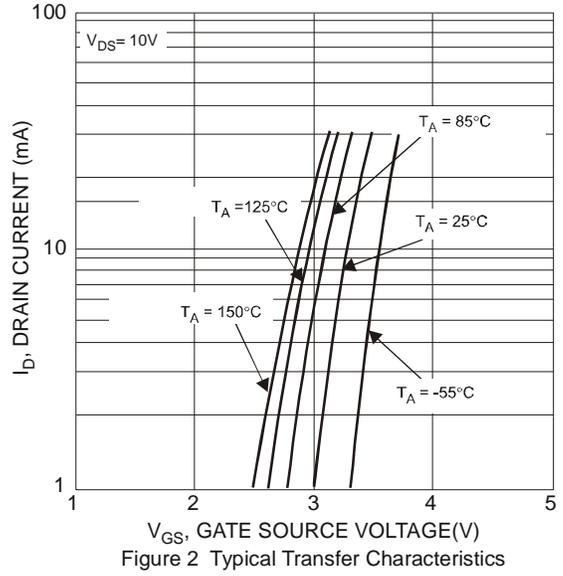


Figure 2 Typical Transfer Characteristics

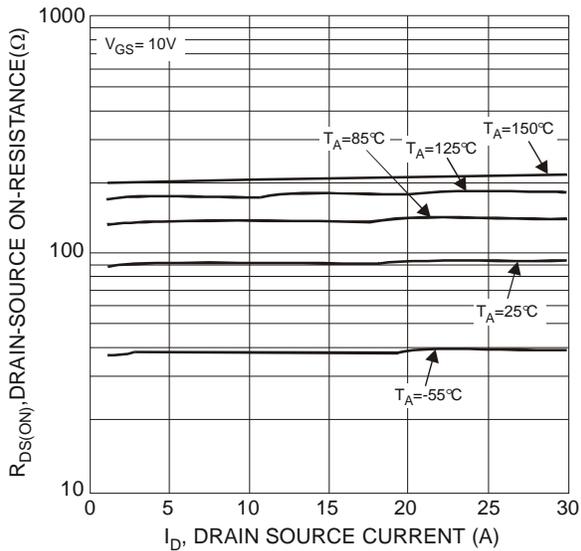


Figure 3 Typical On-Resistance vs. Drain Current and Temperature

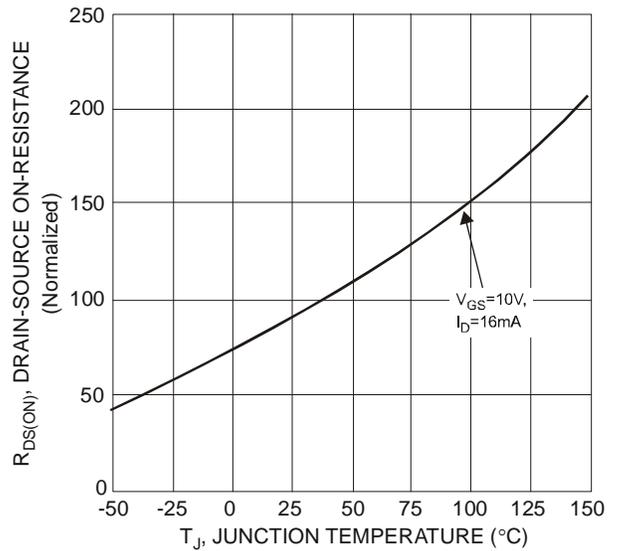


Figure 4 On-Resistance Variation with Temperature

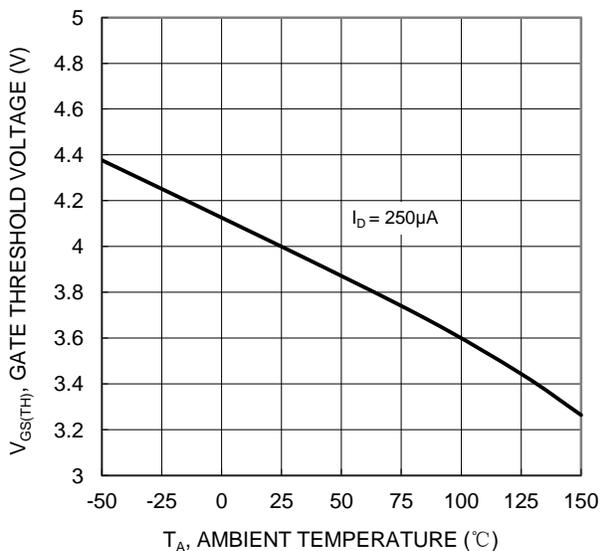


Figure 5. Gate Threshold Variation vs. Ambient Temperature

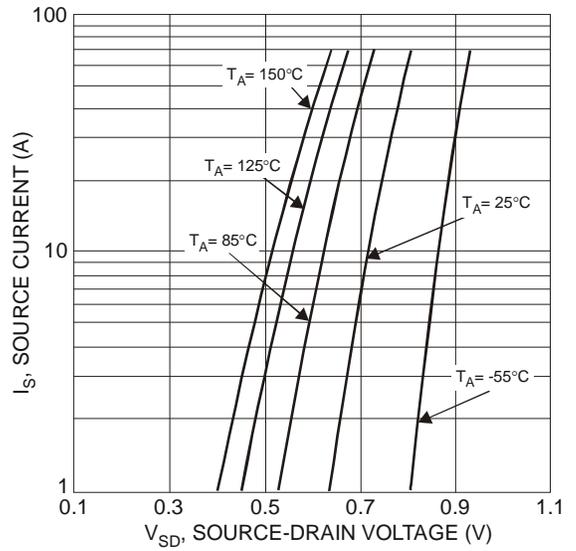


Figure 6 Diode Forward Voltage vs. Current

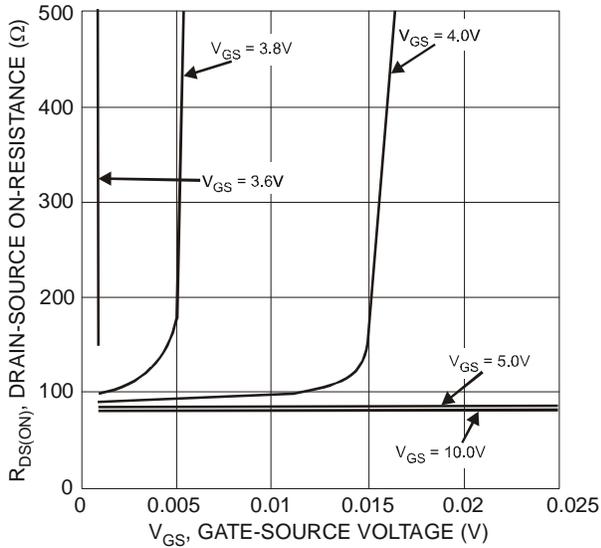


Figure 7 Typical On-Resistance vs. Drain Current and Gate Voltage

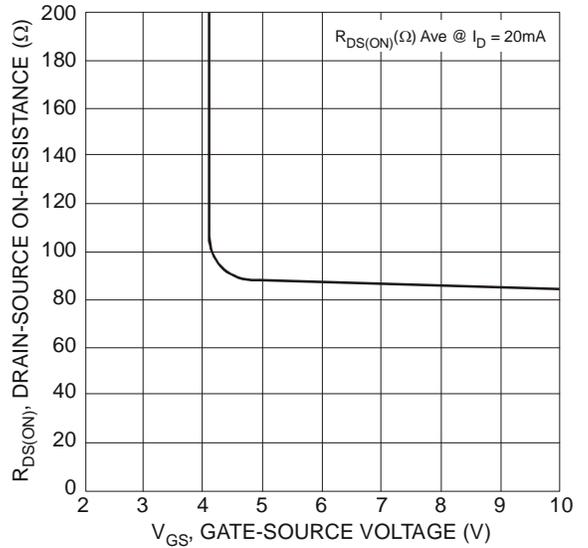


Figure 8 Typical Transfer Characteristic

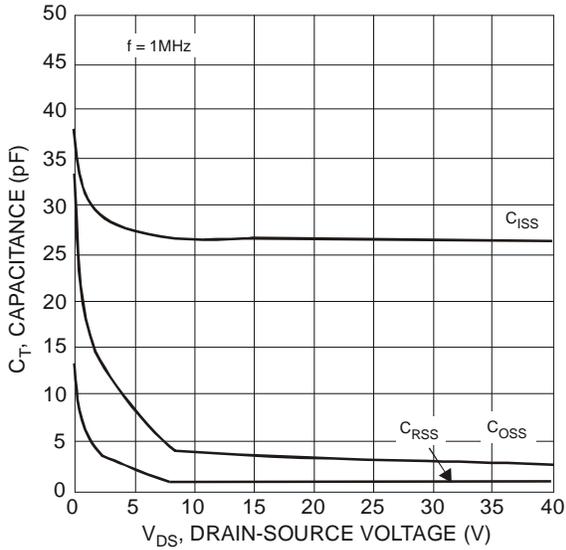


Figure 9 Typical Junction Capacitance

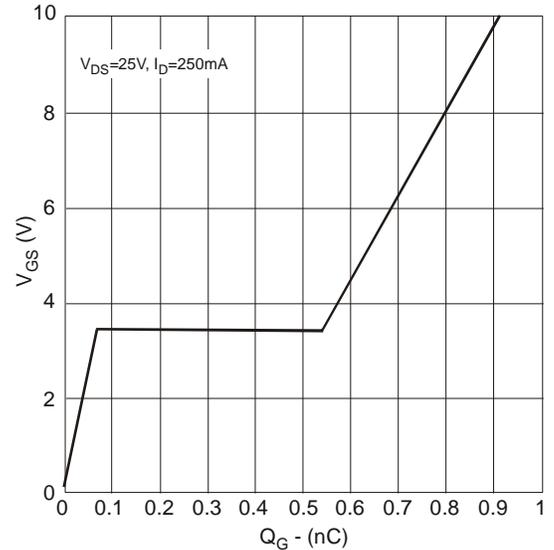


Figure 10 Gate Charge Characteristics

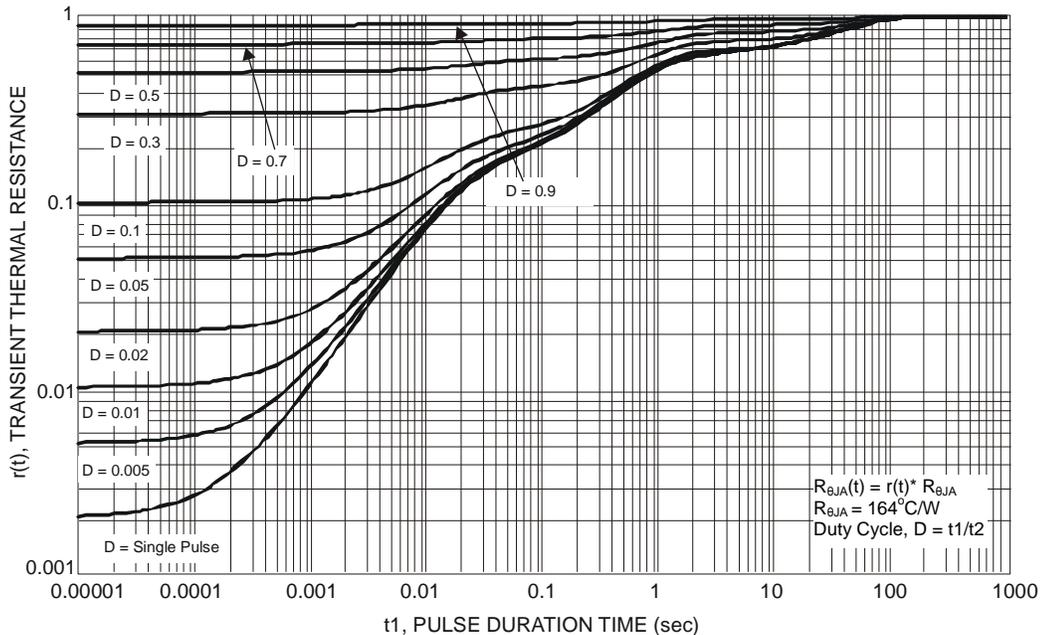


Figure 11 Transient Thermal Resistance

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

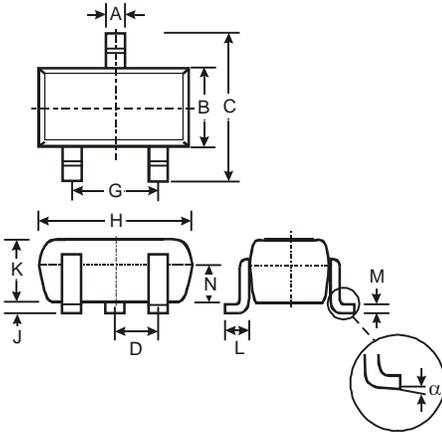
$$R_{\theta JA} = 164^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t1/t2$$

**Package Outline Dimensions**

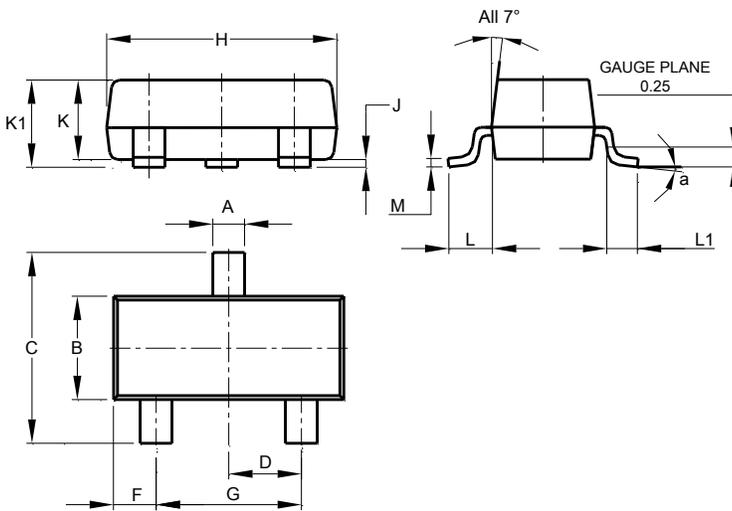
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**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**

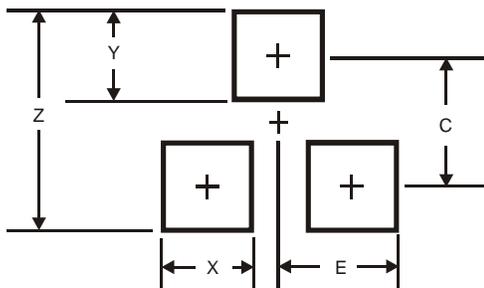


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

**Suggested Pad Layout**

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

**SC59**

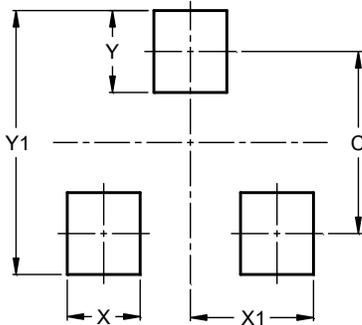


Dimensions	Value (in mm)
Z	3.4
X	0.8
Y	1.0
C	2.4
E	1.35

## 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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