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

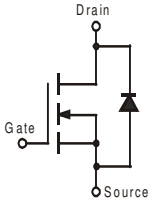
- Low Input Capacitance
- High BV_{DSS} Rating for Power Application
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified 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

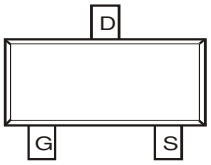
- Case: SC59 / SOT23
- Case Material: Molded Plastic "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See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

SOT23 SC59

Top View



Equivalent Circuit



Top View

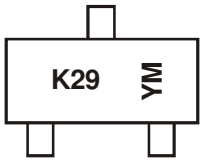
Ordering Information (Note 4)

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) & 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/.

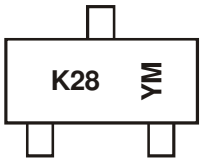
Marking Information

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_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	Steady State	T_A = +25°C T_A = +70°C	I_D	50 40	mA
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	70 55	mA
Continuous Drain Current (Note 5) V_{GS} = 5V	Steady State	T_A = +25°C T_A = +70°C	I_D	45 35	mA
Continuous Drain Current (Note 6) V_{GS} = 5V	Steady State	T_A = +25°C T_A = +70°C	I_D	65 50	mA
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)	$R_{\theta JA}$	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)	$R_{\theta JA}$	100	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

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, 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.

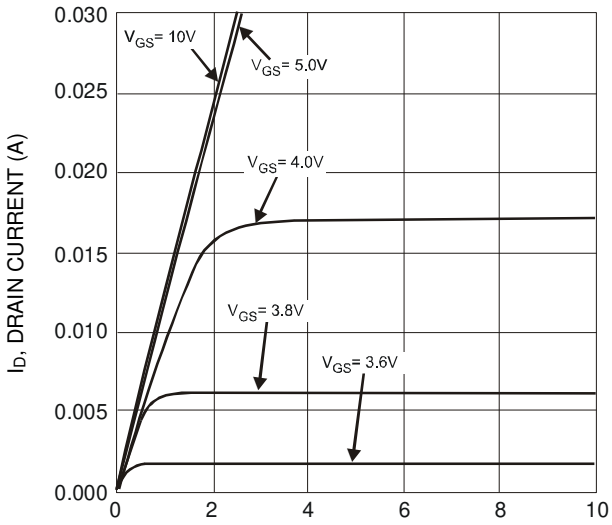


Figure 1 Typical Output Characteristics

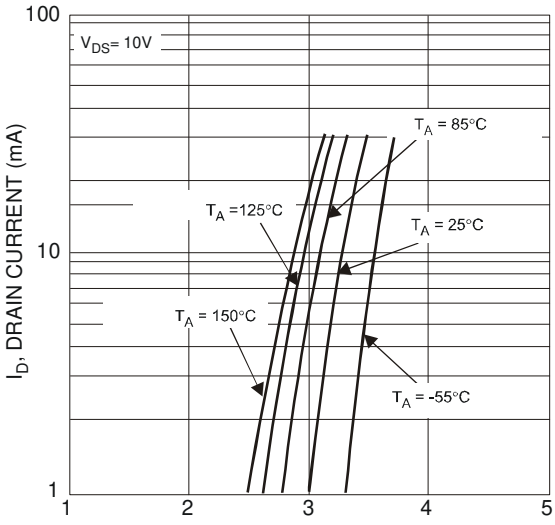


Figure 2 Typical Transfer Characteristics

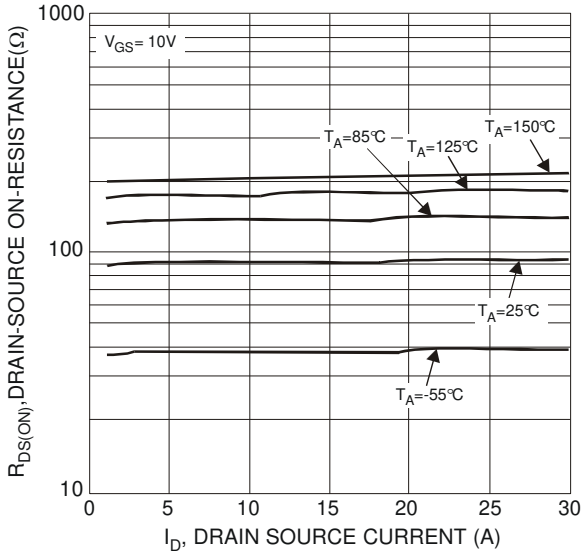


Figure 3 Typical On-Resistance vs. Drain Current and Temperature

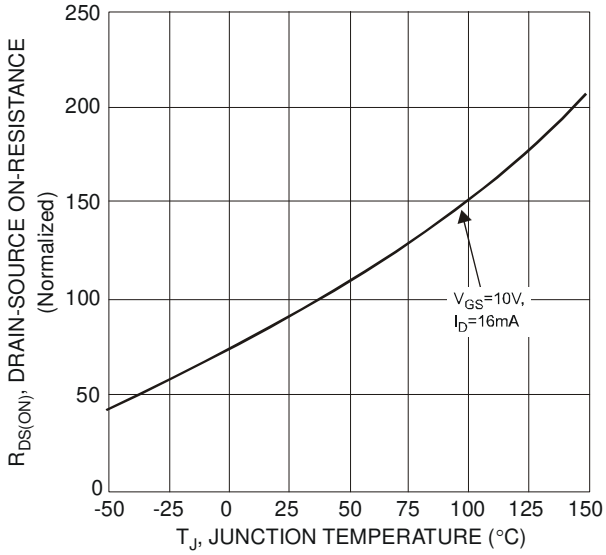


Figure 4 On-Resistance Variation with Temperature

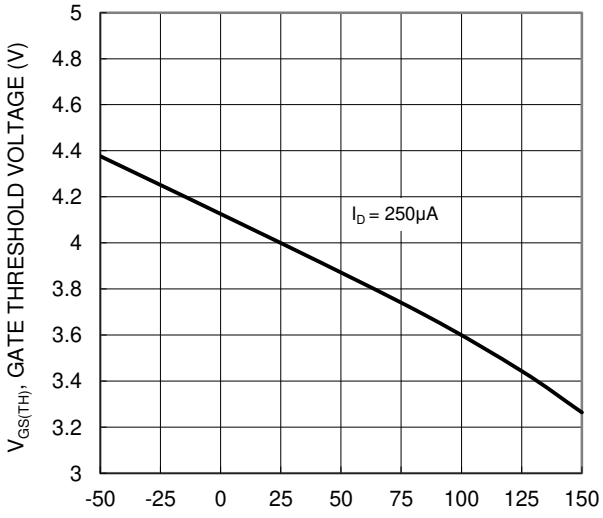


Figure 5. Gate Threshold Variation vs. Ambient Temperature

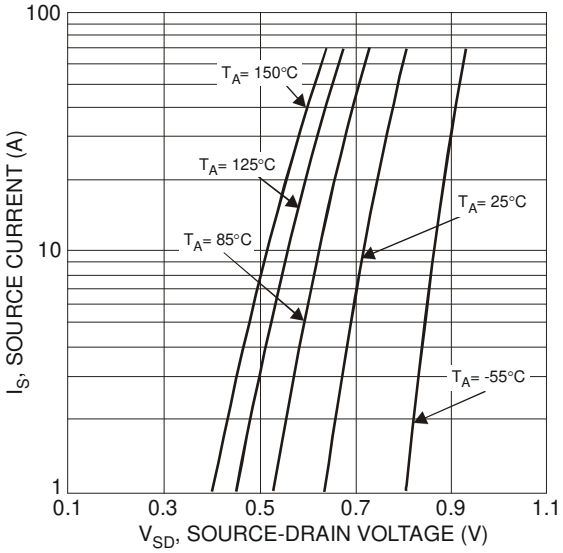


Figure 6 Diode Forward Voltage vs. Current

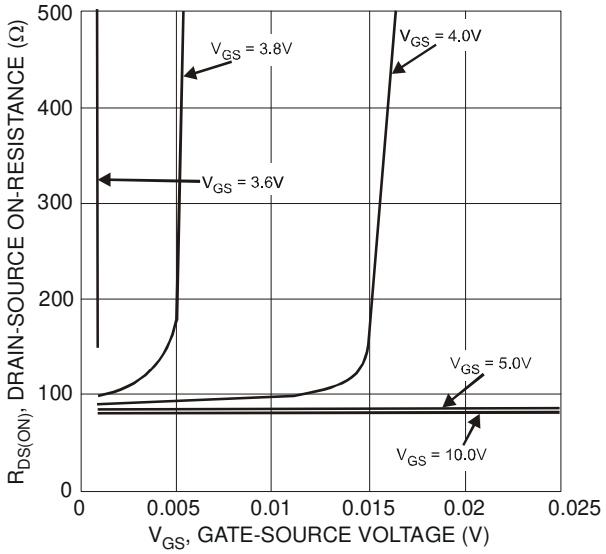


Figure 7 Typical On-Resistance vs. Drain Current and Gate Voltage

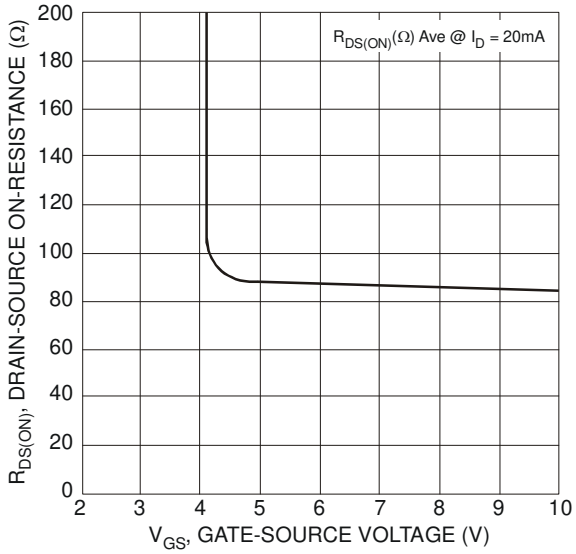


Figure 8 Typical Transfer Characteristic

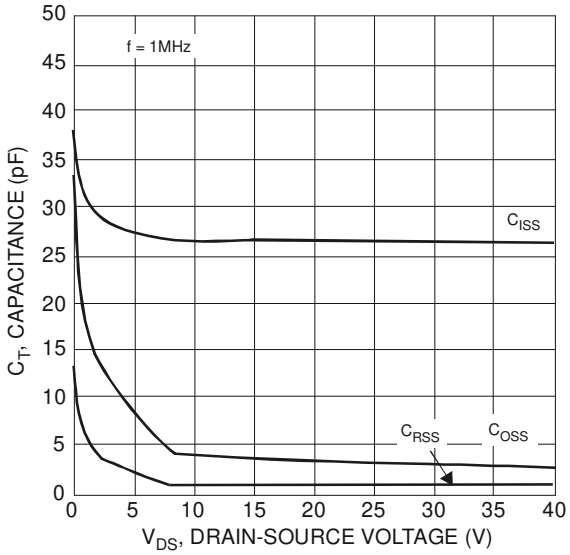


Figure 9 Typical Junction Capacitance

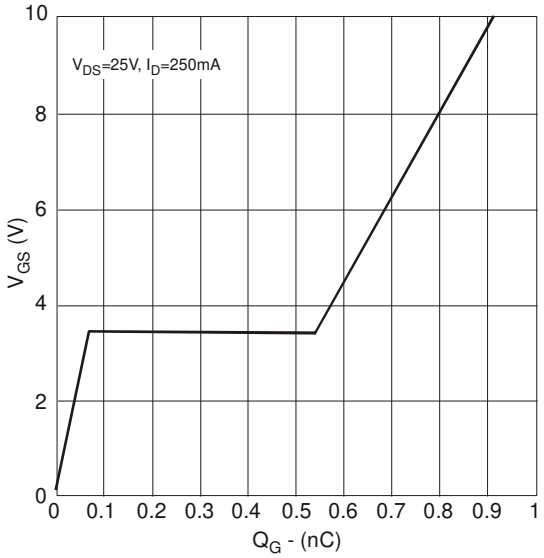


Figure 10 Gate Charge Characteristics

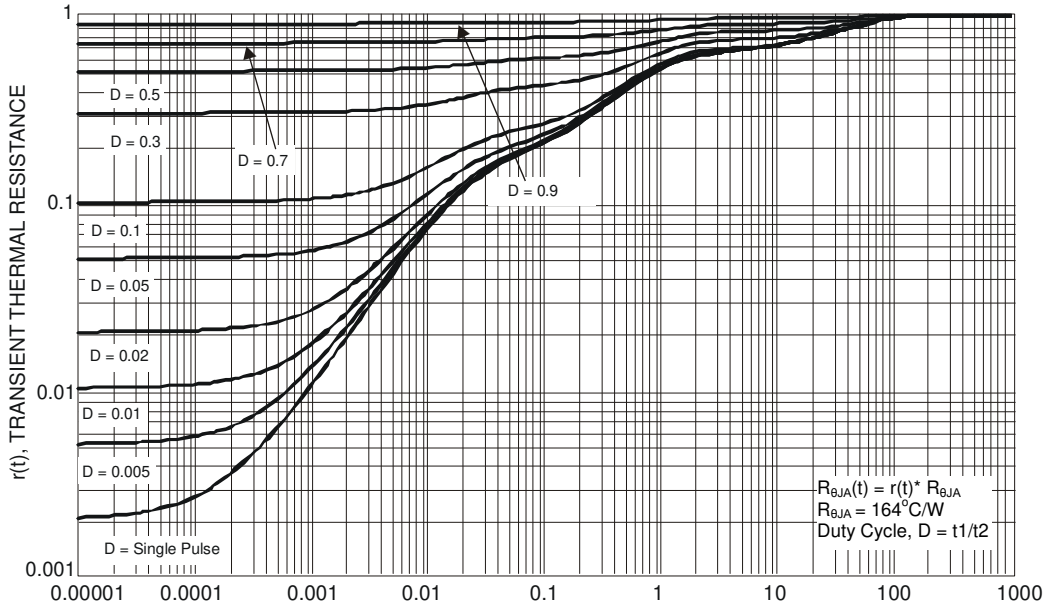
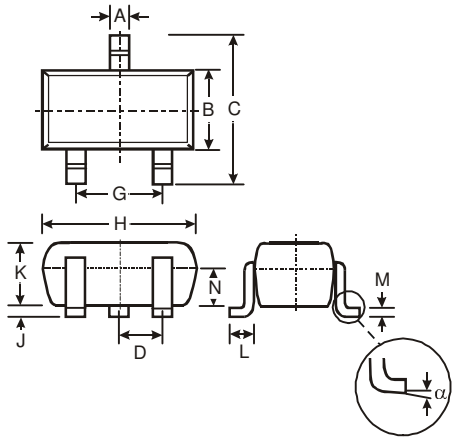


Figure 11 Transient Thermal Resistance

Package Outline Dimensions

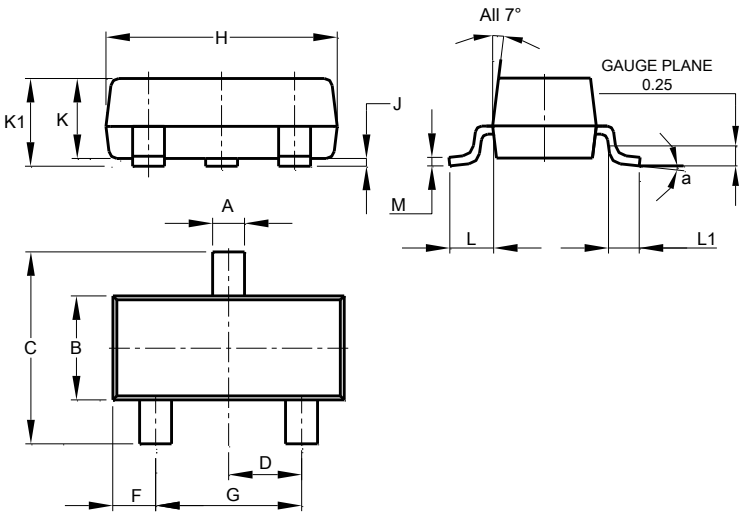
Please see http://www.diodes.com/package-outlines.html for the latest version.

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

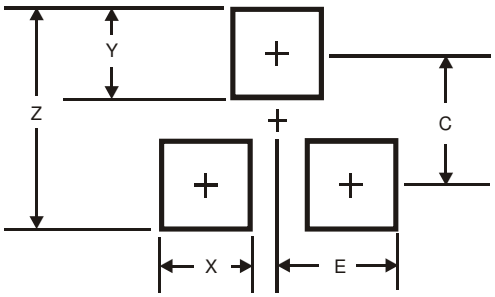


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

SC59

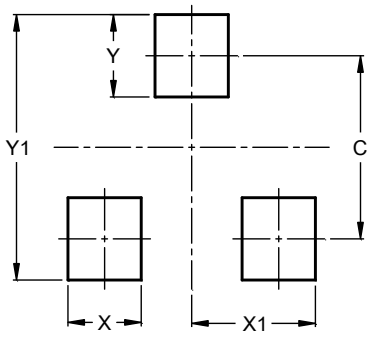


Dimensions	Value (in mm)
Z	3.4
X	0.8
Y	1.0
C	2.4
E	1.35

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