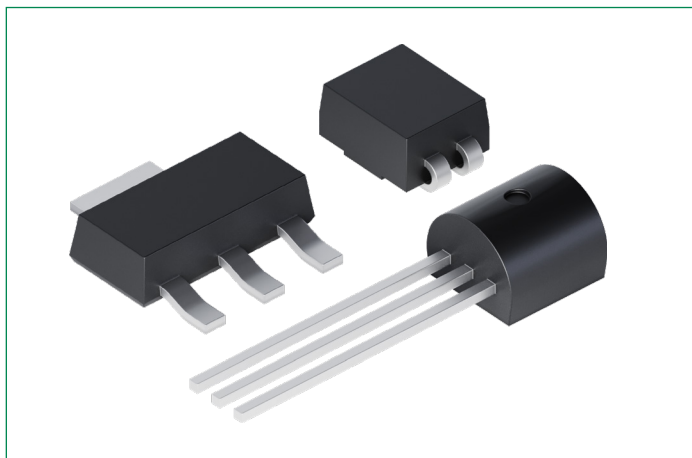


S6002xS Series

EV Series 2 A Sensitive SCRs

HF RoHS



Description

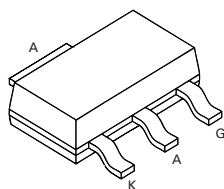
The S6002xS series offers very high di/dt capability through small die planar construction design. It is glass-passivated to ensure long term reliability and parametric stability.

Features

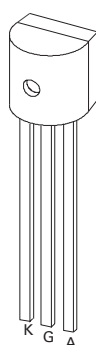
- Surge current capability > 24 A
- High di/dt capability of 500 A/μs
- Blocking voltage (V_{DRM}/V_{RRM}) capability up to 600 V
- Improved turn-off time (t_q) < 55 μs
- Sensitive gate for direct microprocessor interface
- RoHS compliant and halogen-free
- Through-hole and surface mount packages

Pinout Diagram

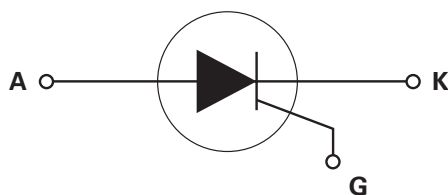
SOT-223



TO-92



Compak



K: Cathode; **A:** Anode; **G:** Gate

Applications

These devices are specifically designed for capacitor discharge applications such as high-power gas flame ignition.

Product Summary

Characteristic	Value	Unit
$I_{T(RMS)}$	2	A
V_{DRM}/V_{RRM}	600	V
I_{GT}	200	μA

Maximum Ratings

Symbol	Characteristics	Conditions			Value	Units
I _{T(RMS)}	On-state RMS Current	TO-92	T _C = 65 °C	Full sine wave	2	A
		SOT-223	T _C = 95 °C			
		Compak	T _C = 75 °C			
I _{T(AV)}	Average On-state Current	TO-92	T _C = 65 °C		1.2	A
		SOT-223	T _C = 95 °C			
		Compak	T _C = 75 °C			
I _{TSM}	Non-repetitive Surge Peak On-state Current	TO-92 SOT-223 Compak	f = 50 Hz	T _{vi} initial = 25 °C, Full cycle	22.5	A
			f = 60 Hz		25	
I ² t	I ² t Value for Fusing	f = 50 Hz		t _p = 10 ms	2.5	A ² s
di/dt	Critical Rate of Rise of On-state Current	TO-92 SOT-223 Compak	I _G = 10 mA	T _{vi} = 125 °C	500	A/μs
I _{GM}	Peak Gate Current	t _p = 20 μs		T _{vi} = 125 °C	1.0	A
P _{G(AV)}	Average Gate Power Dissipation	T _{vi} = 125 °C			0.2	W
T _{stg}	Storage Temperature Range	–			–40 to 150	°C
T _{vi}	Virtual Junction Temperature Range	–			–40 to 125	°C

Electrical Characteristics ($T_{vj} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

Symbol	Characteristics	Conditions		Value		Units
				Min.	Max.	
I _{GT}	DC Gate Trigger Current	V _D = 6 V, R _L = 100 Ω		20	200	μA
V _{GT}	DC Gate Trigger Voltage	V _D = 6 V, R _L = 100 Ω		–	0.8	V
V _{GRM}	Peak Reverse Gate Voltage	I _{RG} = 10 μA		5	–	V
I _H	Holding Current	R _{GK} = 1 kΩ		–	5	mA
dv/dt _(cr)	Critical Rate-of-rise of Off-stage Voltage	T _{vj} = 125 °C, V _D = 67 % of V _{DRM} , Exponential Waveform	R _{GK} = 1 kΩ	25	–	V/μs
V _{GD}	Non-trigger Gate Voltage	V _D = V _{DRM} , R _{GK} = 1 kΩ, T _{vj} = 125 °C		0.2	–	V
t _q	Turn-off Time	I _T = 0.5 A		–	55	μs
t _{gt}	Turn-on Time	I _G = 10 mA, P _W = 15 μs, I _T = 3.0 A _{pk}		–	5	μs

Thermal Characteristics

Symbol	Characteristics	Conditions		Value	Units
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (AC)	$I_T = 1.5\text{ A}_{(RMS)}$ ¹	TO-92	30	K/W
			SOT-223	15	
			Compak	25	
$R_{th(j-a)}$	Thermal Resistance, Junction to Ambient	$I_T = 1.5\text{ A}_{(RMS)}$ ¹	TO-92	160	K/W
			SOT-223	60	

Note 1: 60 Hz AC resistive load condition, 100% conduction

Static Characteristics (T_{vj} = 25 °C, unless otherwise specified)

Symbol	Characteristics	Conditions	Maximum Value	Units
V _{TM}	Peak On-state Voltage	I _{TM} = 3 A, tp = 380 μs	1.5	V
I _{DRM} /I _{RPM}	Repetitive Peak Off-state Current	T _{vj} = 25 °C @ V _D = V _{DRM} , R _{GK} = 1 kΩ	5	μA
		T _{vj} = 125 °C @ V _D = V _{DRM} , R _{GK} = 1 kΩ	500	

Characteristic Curves

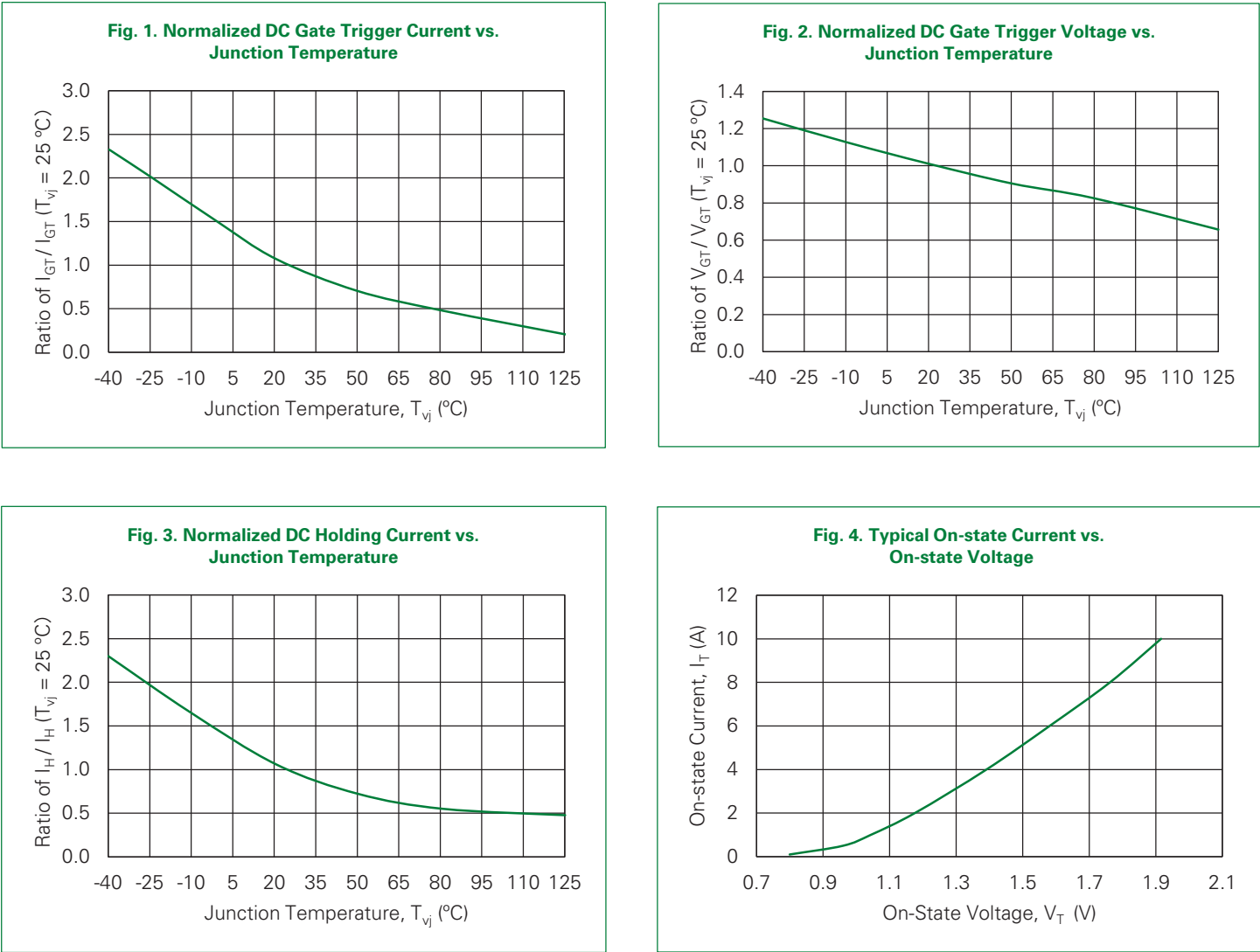
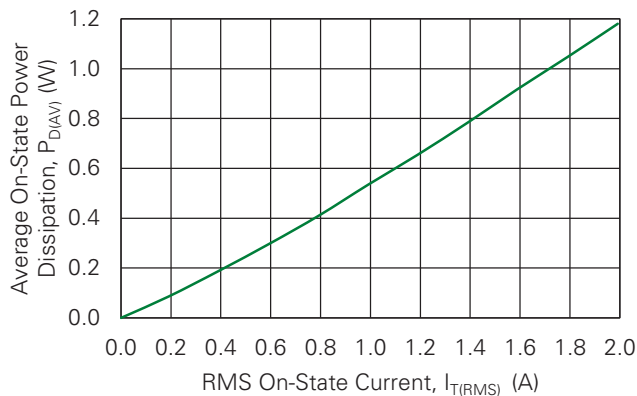
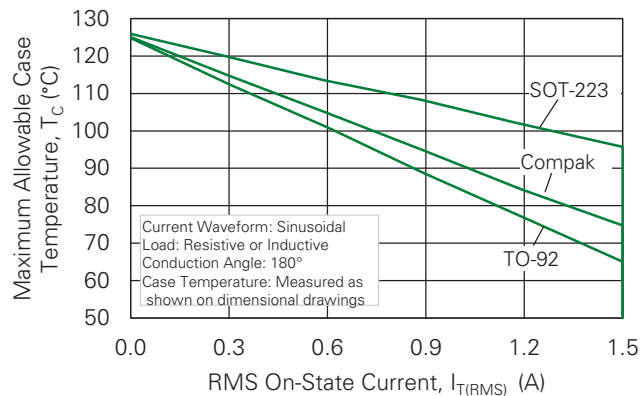
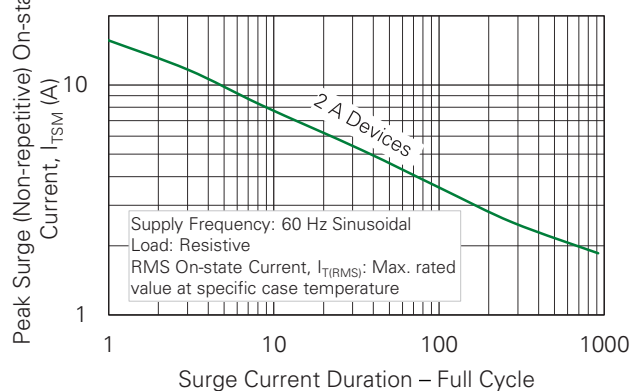
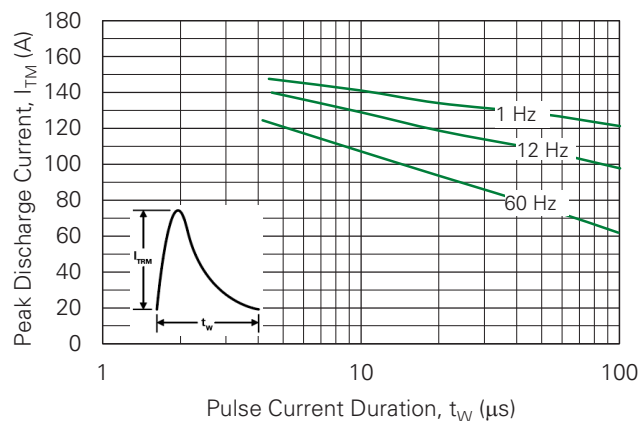
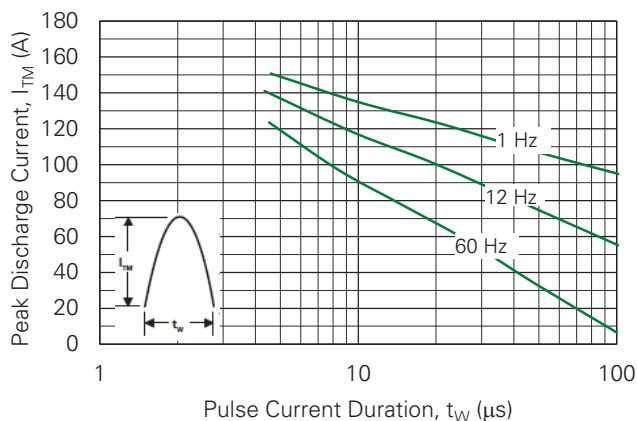


Fig. 5. Typical Power Dissipation vs. RMS On-state Current**Fig. 6. Maximum Allowable Case Temperature vs. RMS On-state Current****Fig. 7. Surge Peak On-state Current vs. Number of Cycles****Fig. 8. Peak Repetitive Capacitor Discharge Current**

Notes:

1. Gate control may be lost during and immediately following surge current interval.
2. Overload should not be repeated until junction temperature has returned to steady-state rated value.

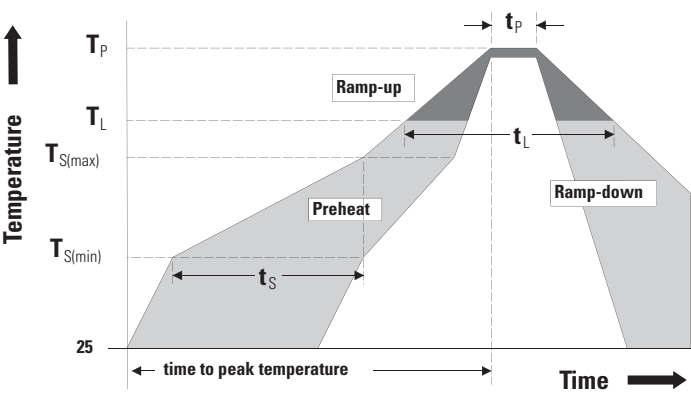
Fig. 9. Peak Repetitive Sinusoidal Pulse Current

Soldering Parameters

Characteristic		Value
Reflow Condition		Pb – Free assembly
Pre-heat	Temperature Min ($T_{s(min)}$)	150°C
	Temperature Max ($T_{s(max)}$)	200°C
	Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus Temp)(T_L) to peak		5 °C/second max
$T_{s(max)}$ to T_L - Ramp-up Rate		5 °C/second max
Reflow	Temperature (T_L) (Liquidus)	217°C
	Time (t_L)	60 – 150 seconds
Peak Temperature (T_P)		260 ^{+0/-5} °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		5 °C/second max
Time 25°C to peak Temperature (T_P)		8 minutes max
Do Not Exceed		280°C

Physical Specifications

Characteristic	Value
Terminal Finish	100% Matte Tin-plated
Body Material	UL Recognized epoxy meeting flammability rating 94 V-0
Lead Material	Copper Alloy



Environmental Specifications

Test	Specifications and Conditions
AC Blocking	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 125 °C for 1008 hours
Temperature/Humidity	EIA / JEDEC, JESD22-A101, 1008 hours; 160 V - DC: 85 °C; 85 % relative humidity
Temperature Cycling	MIL-STD-750, M-1051,1000 cycles; -40 °C to +150 °C; 15-min dwell-time
High-temperature Storage	MIL-STD-750, M-1031, 1008 hours; 150 °C
Low-temperature Storage	1008 hours; -40 °C
Resistance to Solder Heat	MIL-STD-750: Method 2031
Solderability	ANSI/J-STD-002: category 3, Test A
Lead Bend	MIL-STD-750, M-2036 Cond E

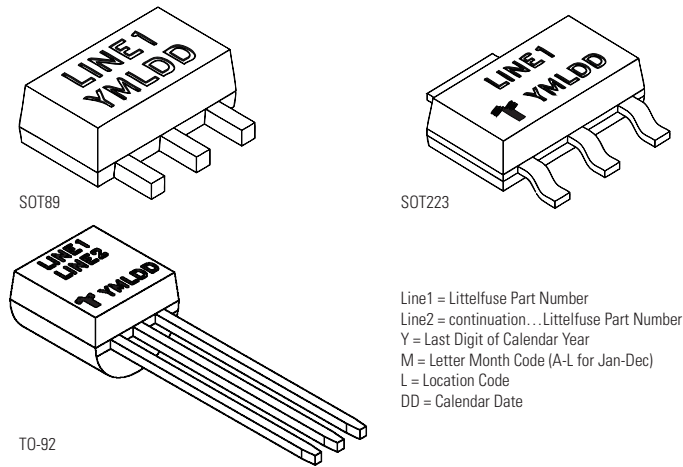
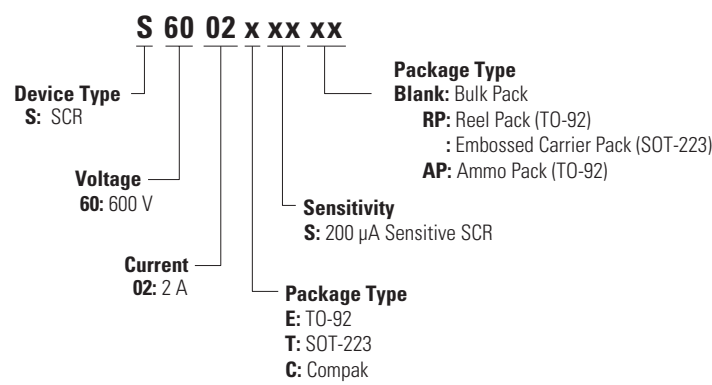
Product Selector

Part Number	Voltage	Gate Sensitivity	Package
	600 V		
S6002ES	X	200 μA	TO-92
S802TS	X	200 μA	SOT-223
S6002CS	X	200 μA	Compak

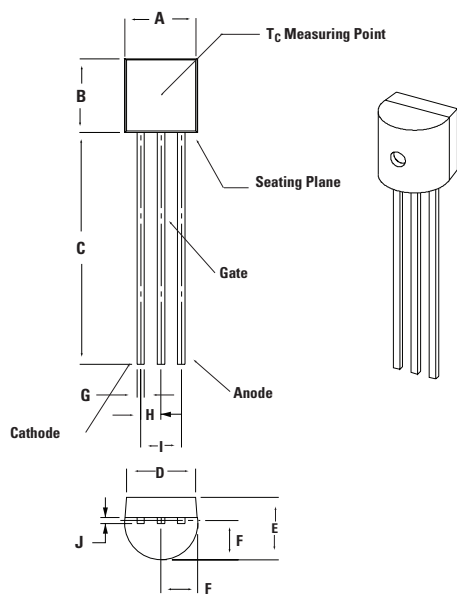
Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
S6002ES	S6002ES	0.217 g	Bulk	2500
S6002ESAP	S6002ES	0.217 g	Ammo Pack	2000
S6002ESRP	S6002ES	0.217 g	Tape & Reel	2000
S6002TSRP	S6002TS	0.120 g	Tape & Reel	1000
S6002CSRP	S6002CS	0.120 g	Tape & Reel	2500

Part Numbering and Marking

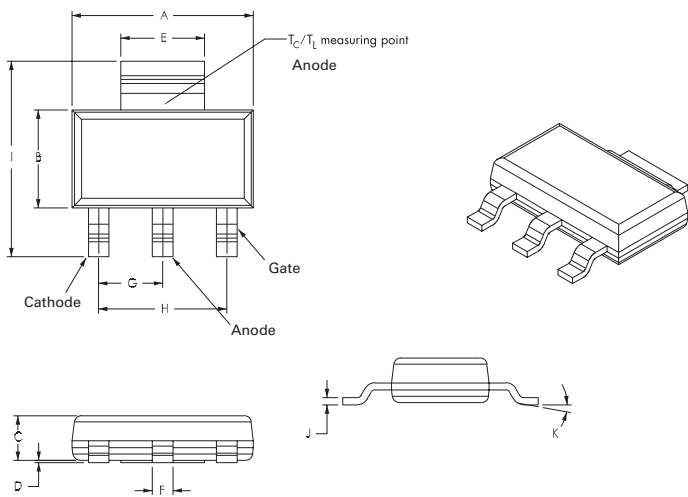


Package Dimensions TO-92 (E Package)

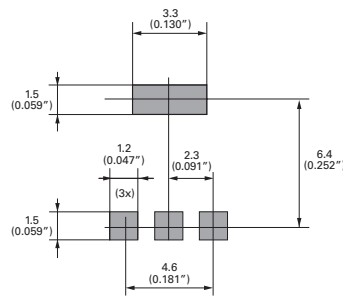


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max
A	4.450	5.200	0.175	0.205
B	4.320	5.330	0.170	0.210
C	12.70	–	0.500	–
D	3.430	–	0.135	–
E	3.180	4.190	0.125	0.165
F	2.040	2.660	0.080	0.105
G	0.407	0.533	0.016	0.021
H	1.150	1.390	0.045	0.055
I	2.420	2.660	0.095	0.105
J	0.380	0.500	0.015	0.020

Package Dimensions SOT-223



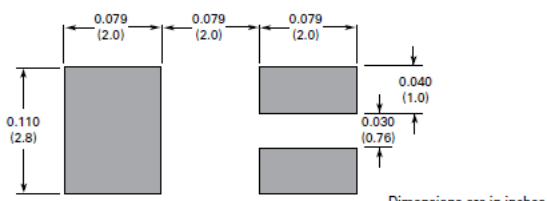
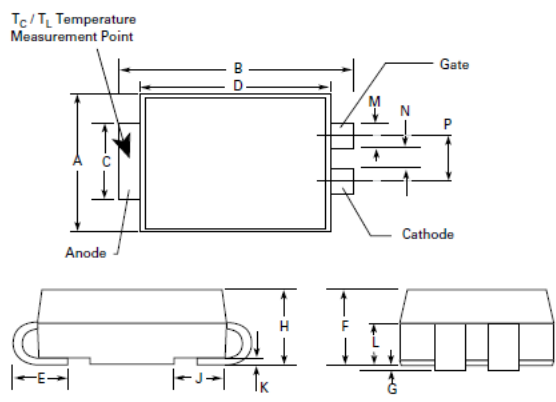
Pad Layout for SOT-223



Dimensions in Millimeters (Inches)

Symbol	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30	6.50	6.70	0.248	0.256	0.264
B	3.30	3.50	3.70	0.130	0.138	0.146
C	–	–	1.80	–	–	0.071
D	0.02	–	0.10	0.001	–	0.004
E	2.90	3.00	3.15	0.114	0.118	0.124
F	0.60	0.70	0.85	0.024	0.027	0.034
G	–	2.30	–	–	0.090	–
H	–	4.60	–	–	0.181	–
I	6.70	7.00	7.30	0.264	0.276	0.287
J	0.24	0.26	0.35	0.009	0.010	0.014
K	10° MAX.					

Package Dimensions Compak (C Package)

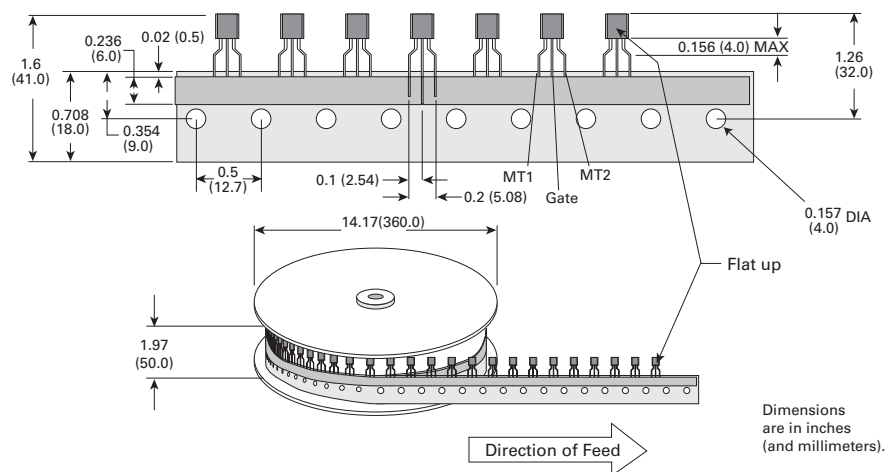


Pad Outline

Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max
A	3.30	3.95	0.130	0.156
B	5.10	5.60	0.201	0.220
C	1.95	2.20	0.077	0.087
D	4.05	4.60	0.159	0.181
E	0.75	1.60	0.030	0.063
F	1.90	2.45	0.075	0.096
G	0.05	0.20	0.002	0.008
H	1.95	2.65	0.077	0.104
J	1.09	1.35	0.043	0.053
K	0.15	0.41	0.006	0.016
L	0.76	1.40	0.030	0.055
M	0.56	0.71	0.022	0.028
N	0.69	0.84	0.027	0.033
P	1.32	1.47	0.052	0.058

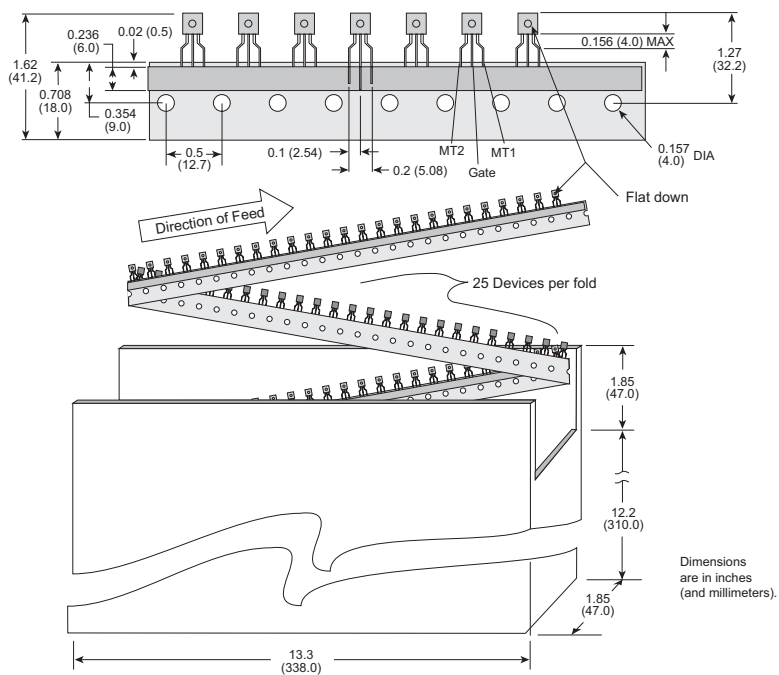
TO-92 (3-lead) Reel Pack (RP) Radial Leaded Specifications

Meets all EIA-468-C Standards

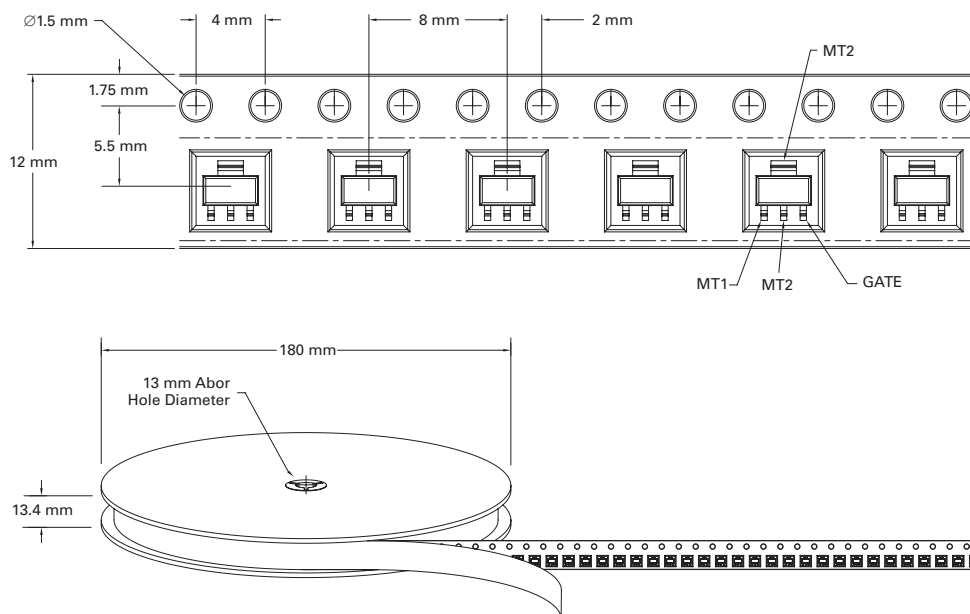


TO-92 (3-lead) Ammo Pack (AP) Radial Leaded Specifications

Meets all EIA-468-C Standards

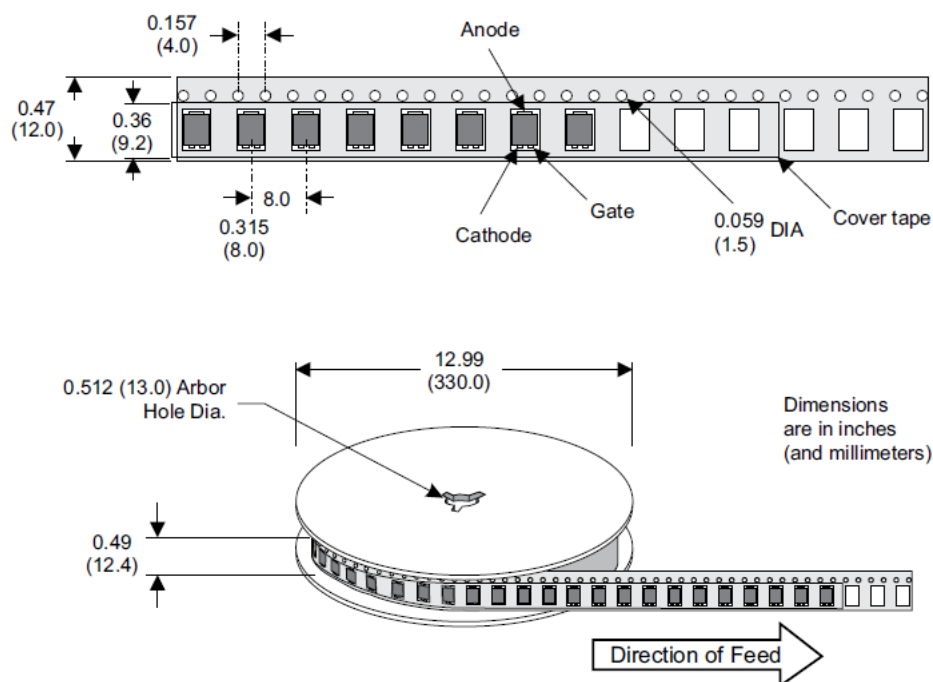


SOT-223 Reel Pack (RP) Specifications



Compak Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-1 Standards



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