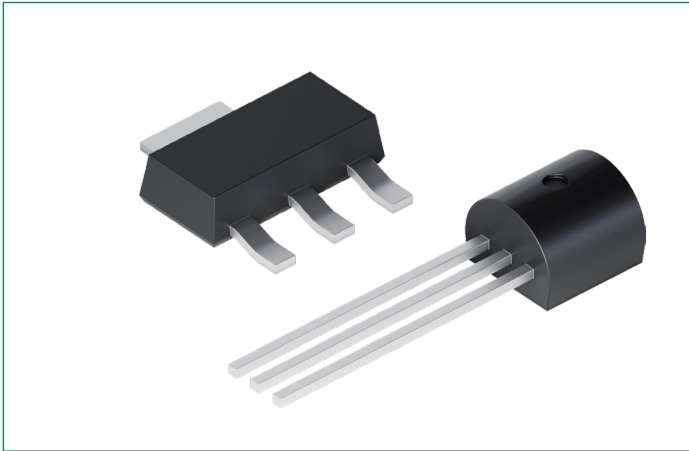


S802xSx Series

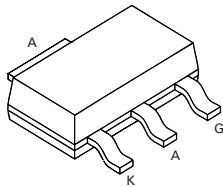
EV Series 1.5 A Sensitive SCRs

HF RoHS

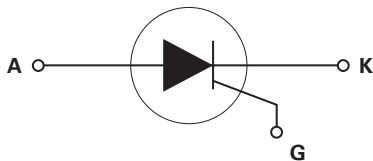
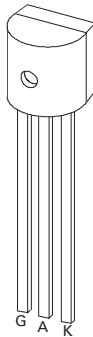


Pinout Diagram

SOT-223



TO-92



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

Description

The S802xSx series offers a high static dv/dt with a low turn off (t_q) time. It is specifically designed for Ground Fault Circuit Interrupter (GFCI), Arc Fault Circuit Interrupter (AFCI), Residual Current Device (RCD), and Residual Current Circuit Breaker with Overload Protection (RCBO) applications.

All SCR junctions are glass-passivated to ensure long term reliability and parametric stability.

Features

- Surge current capability up to 24 A
- Non-repetitive direct surge peak off-state voltage (V_{DSM}) up to 1250 V
- Non-repetitive reverse surge peak off-state voltage (V_{RSM}) up to 900 V
- High dv/dt noise immunity
- Blocking voltage (V_{DRM}/V_{RRM}) capability up to 800 V
- Improved turn-off time (t_q)
- Sensitive gate for direct microprocessor interface
- RoHS compliant and halogen-free

Applications

- Ground Fault Circuit Interrupter
- Arc Fault Circuit Interrupter
- Residual Current Device
- Residual Current Circuit Breaker with Overload Protection

Product Summary

Characteristic	Value	Unit
$I_{T(RMS)}$	1.5	A
V_{DRM}/V_{RRM}	800	V
V_{DSM} ($t_p = 50 \mu s$)	1250	V
V_{RSM} ($t_p = 50 \mu s$)	900	V
I_{GT}	20 to 100	μA

Maximum Ratings

Symbol	Characteristics	Conditions		Value	Units	
$I_{T(RMS)}$	On-state RMS Current	TO-92	$T_C = 65\text{ }^\circ\text{C}$	Full sine wave	1.5	A
		SOT-223	$T_C = 80\text{ }^\circ\text{C}$			
$I_{T(AV)}$	Average On-state Current	TO-92	$T_C = 65\text{ }^\circ\text{C}$	0.9	A	
		SOT-223	$T_C = 80\text{ }^\circ\text{C}$			
I_{TSM}	Non-repetitive Surge Peak On-state Current	f = 50 Hz		Half sine wave	20	A
		f = 60 Hz				
I^2t	I^2t Value for Fusing	f = 50 Hz		$t_p = 10\text{ ms}$	2.0	A^2s
di/dt	Critical Rate of Rise of On-state Current	$I_G = 10\text{ mA}$		$T_{vj} = 125\text{ }^\circ\text{C}$	80	$\text{A}/\mu\text{s}$
I_{GM}	Peak Gate Current	$t_p = 20\text{ }\mu\text{s}$		$T_{vj} = 125\text{ }^\circ\text{C}$	0.5	A
$P_{G(AV)}$	Average Gate Power Dissipation	$T_{vj} = 125\text{ }^\circ\text{C}$		0.2	W	
T_{stg}	Storage Temperature Range	-		-40 to 150	$^\circ\text{C}$	
T_{vj}	Virtual Junction Temperature Range	-		-40 to 125	$^\circ\text{C}$	

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

Symbol	Characteristics	Conditions	Value			Units	
			Min.	Typ.	Max.		
I_{GT}	DC Gate Trigger Current	$V_D = 6\text{ V}, R_L = 100\text{ }\Omega$	20	60	100	μA	
V_{GT}	DC Gate Trigger Voltage	$V_D = 6\text{ V}, R_L = 100\text{ }\Omega$	-	-	0.8	V	
V_{GRM}	Peak Reverse Gate Voltage	$I_{RG} = 10\text{ }\mu\text{A}$	8	-	-	V	
I_H	Holding Current	$R_{GK} = 1\text{ k}\Omega$, Initial current = 20 mA	-	-	3	mA	
dv/dt _(cr)	Critical Rate-of-rise of Off-stage Voltage	$T_{vj} = 125\text{ }^\circ\text{C}$, $V_D = 67\%$ of V_{DRM} , Exponential Waveform	$R_{GK} = 1\text{ k}\Omega$	40	-	-	$\text{V}/\mu\text{s}$
			$R_{GK} = 220\text{ k}\Omega$	250	-	-	
V_{GD}	Non-trigger Gate Voltage	$V_D = \frac{1}{2}V_{DRM}$, $R_{GK} = 1\text{ k}\Omega$, $T_{vj} = 125\text{ }^\circ\text{C}$	0.2	-	-	V	
t_q	Turn-off Time	$I_T = 0.5\text{ A}$	-	-	35	μs	
t_{gt}	Turn-on Time	$I_G = 10\text{ mA}$, $P_W = 15\text{ }\mu\text{s}$, $I_T = 1.6\text{ A}_{pk}$	-	2.3	-	μs	

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

Symbol	Characteristics	Conditions	Maximum Value	Units
V_{TM}	Peak On-state Voltage	1.5 A device, $I_{TM} = 4\text{ A}$, $t_p = 380\text{ }\mu\text{s}$	1.8	V
V_{TO}	Threshold Voltage	-	1.03	V
R_D	Dynamic Resistance	-	106	$\text{m}\Omega$
I_{DRM}/I_{RRM}	Repetitive Peak Off-state Current	$T_{vj} = 25\text{ }^\circ\text{C}$	3	μA
		$T_{vj} = 125\text{ }^\circ\text{C}$	500	

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	35	K/W
			SOT-223	25	
$R_{th(j-a)}$	Thermal Resistance, Junction to Ambient	$I_T = 1.5\text{ A}_{(RMS)}$ ¹	TO-92	150	K/W
			SOT-223	60	

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

Characteristic Curves

Fig. 1. Normalized DC Gate Trigger Current vs. Junction Temperature

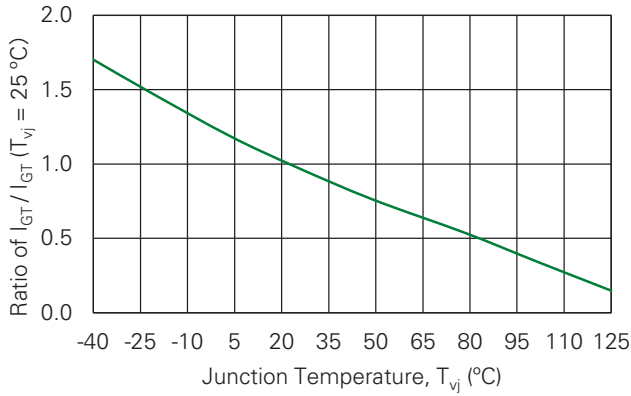


Fig. 2. Normalized DC Holding Current vs. Junction Temperature

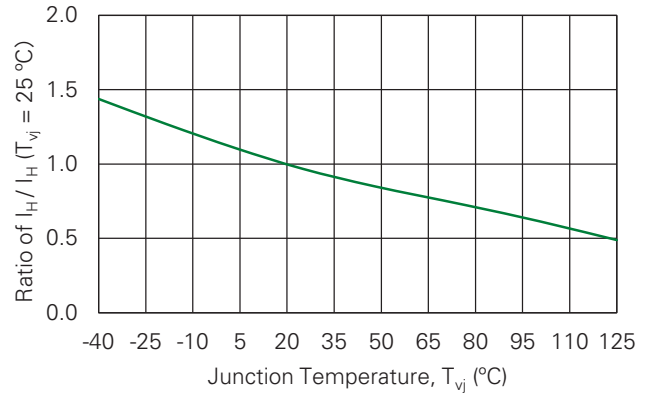


Fig. 3. Normalized DC Gate Trigger Voltage vs. Junction Temperature

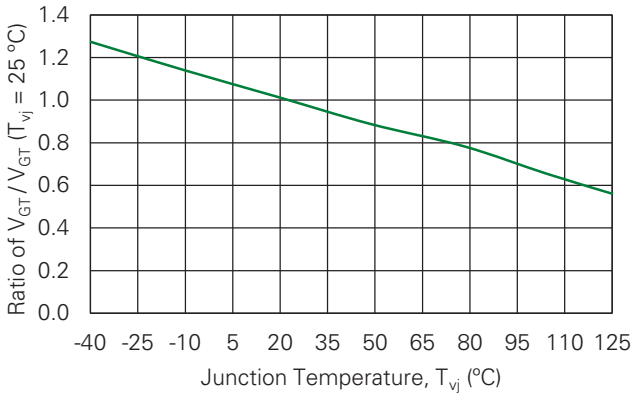


Fig. 4. Typical On-state Current vs. On-state Voltage

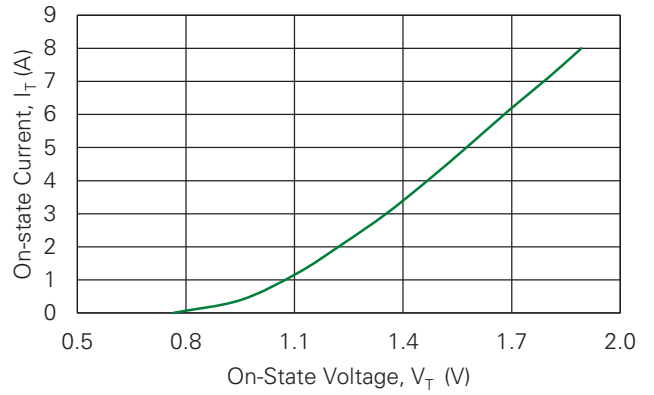


Fig. 5. Typical Power Dissipation vs. RMS On-state Current

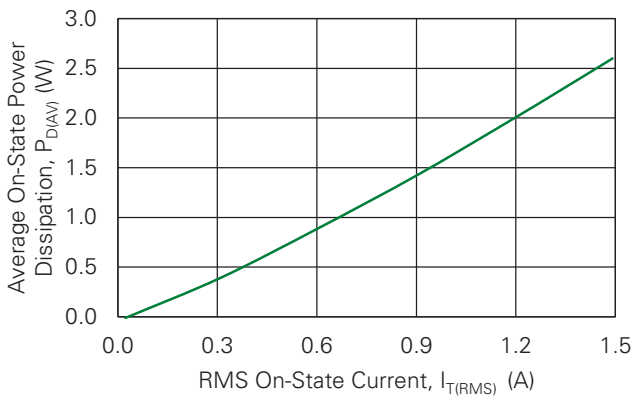


Fig. 6. Maximum Allowable Case Temperature vs. RMS On-state Current

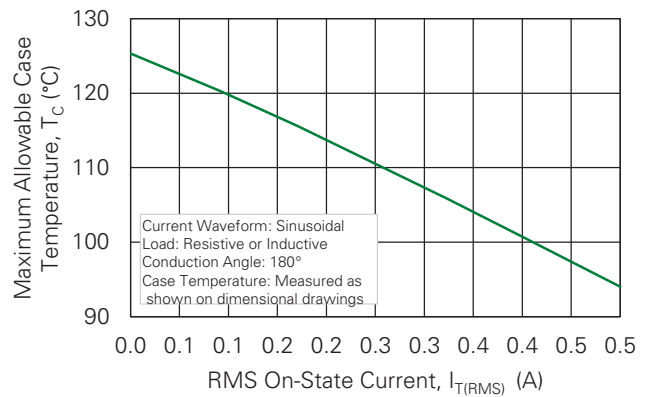
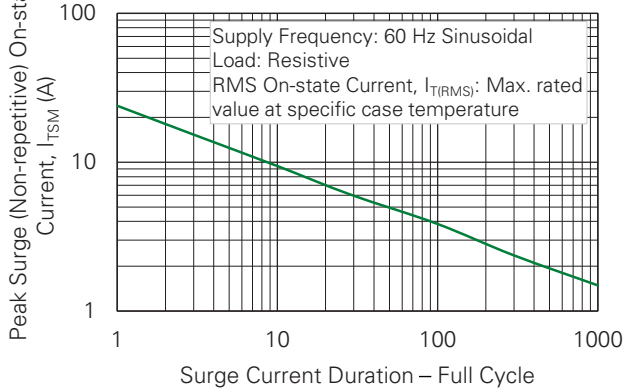


Fig. 7. Surge Peak On-state Current vs. Number of Cycles



Notes:

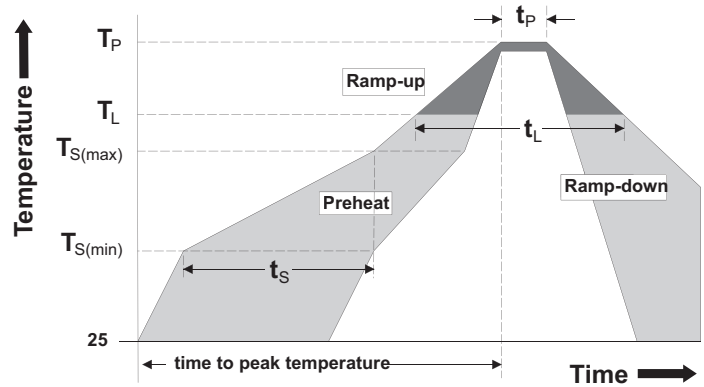
1. Gate control may be lost during and immediately following surge current interval.
2. Overload should not be repeated until junction temperature has returned to steady-state rated value.

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_g)	60 – 120 secs
Average ramp up rate (Liquidus Temp)(T_L) to peak		3 °C/second max
$T_{s(max)}$ to T_L - Ramp-up Rate		3 °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)		30 seconds
Ramp-down Rate		6 °C/second max
Time 25°C to peak Temperature (T_p)		8 minutes max
Do Not Exceed		260°C

Physical Specifications

Characteristic	Value
Terminal Finish	100% Matte Tin-plated
Body Material	UL Recognized compound meeting flammability rating 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; 320 V - DC: 85 °C; 85 % relative humidity
Temperature Cycling	MIL-STD-750, M-1051, 1000 cycles; -55 °C to +150 °C; 15-min dwell-time
UHAST	JESD22-A118, 96 hours, 130 °C, 85%RH
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

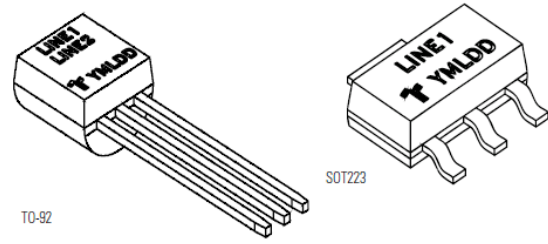
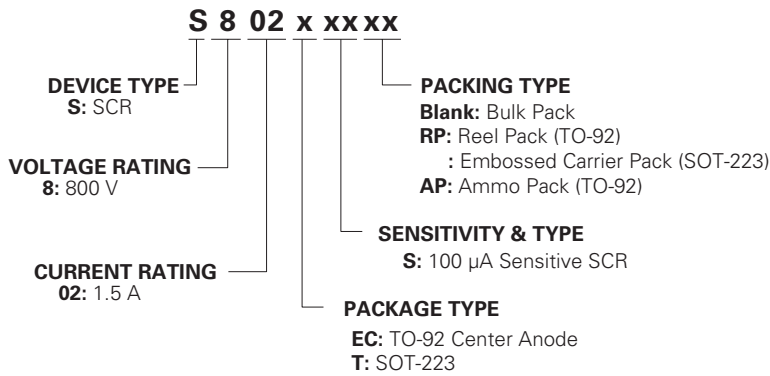
Product Selector

Part Number	Voltage	Gate Sensitivity	Package
	800 V		
S802ECS	X	100 μ A	TO-92
S802TS	X	100 μ A	SOT-223

Packing Options

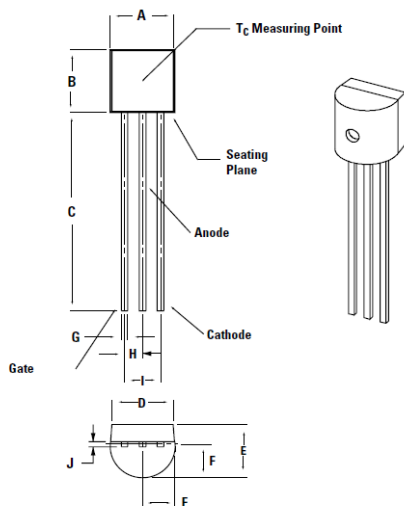
Part Number	Marking	Weight	Packing Mode	Base Quantity
S802ECS	S802ECS	0.217 g	Bulk	2500
S802ECSR	S802ECS	0.217 g	Tape & Reel	2000
S802ECSAP	S802ECS	0.217 g	Ammo Pack	2000
S802TSRP	S802TS	0.120 g	Tape & Reel	1000

Part Numbering and Marking



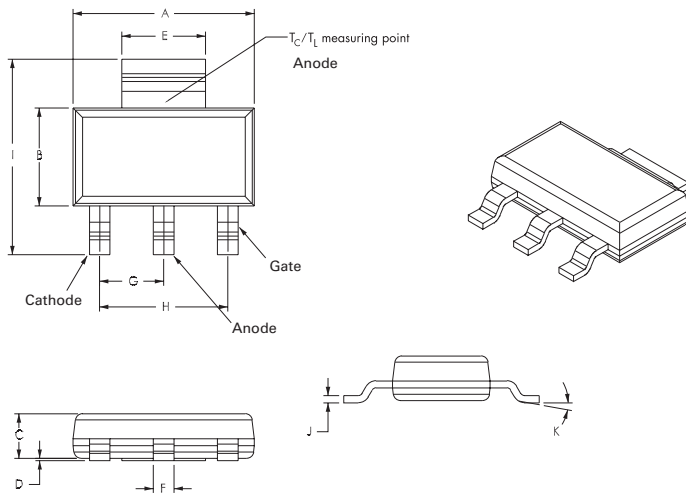
Line1 = Littelfuse Part Number
Line2 = continuation...Littelfuse Part Number
Y = Last Digit of Calendar Year
M = Letter Month Code (A-L for Jan-Dec)
L = Location Code
DD = Calendar Date

Package Dimensions TO-92



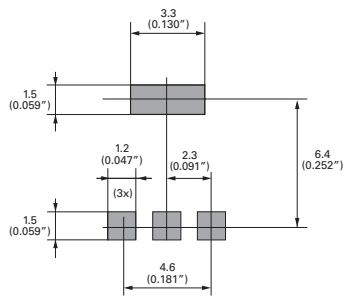
Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.450	5.200	0.175	0.205
B	4.320	5.330	0.170	0.210
C	12.70	–	0.500	–
D	3.430	–	0.135	–
E	3.180	4.190	0.125	0.165
F	2.040	2.660	0.080	0.105
G	0.407	0.533	0.016	0.021
H	1.150	1.390	0.045	0.055
I	2.420	2.660	0.095	0.105
J	0.380	0.500	0.015	0.020

Package Dimensions SOT-223



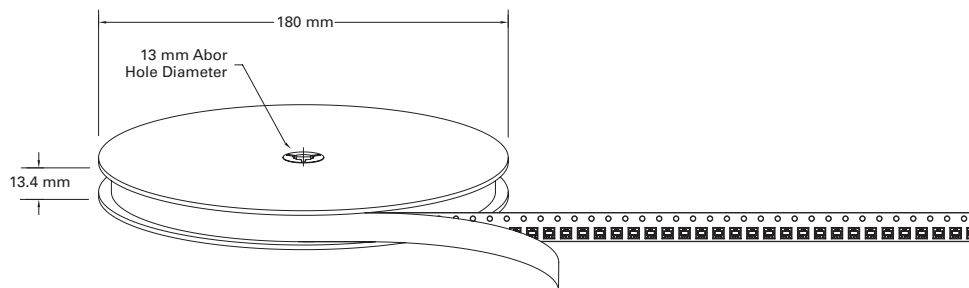
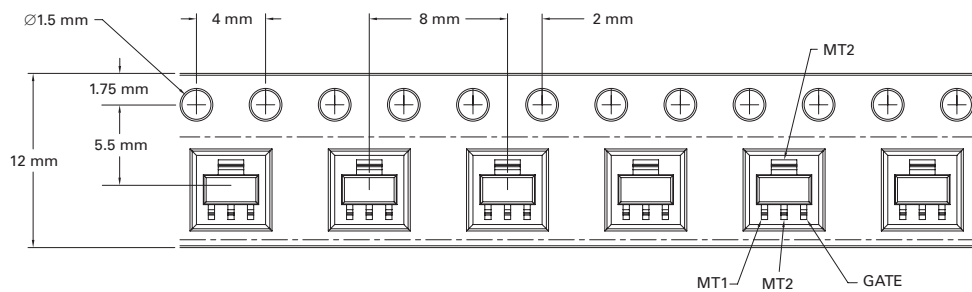
Symbol	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30	6.50	6.70	0.248	0.256	0.264
B	3.30	3.50	3.70	0.130	0.138	0.146
C	–	–	1.80	–	–	0.071
D	0.02	–	0.10	0.001	–	0.004
E	2.90	3.00	3.15	0.114	0.118	0.124
F	0.60	0.70	0.85	0.024	0.027	0.034
G	–	2.30	–	–	0.090	–
H	–	4.60	–	–	0.181	–
I	6.70	7.00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

Pad Layout for SOT-223



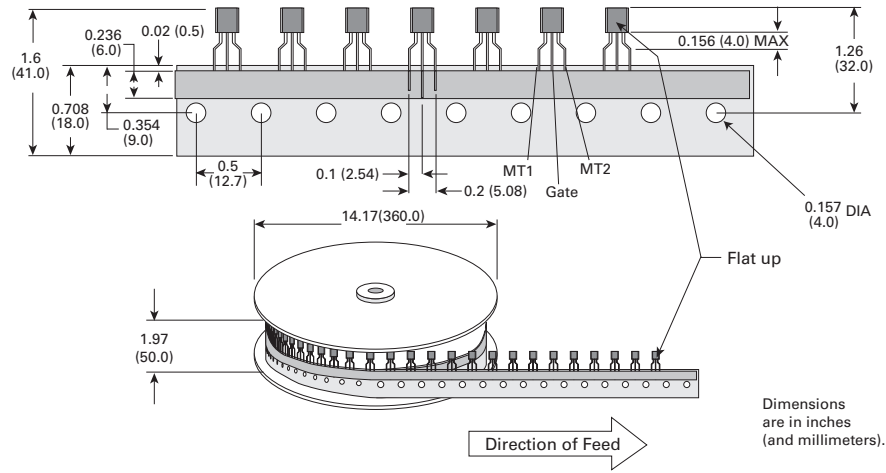
Dimensions in Millimeters (Inches)

SOT-223 Reel Pack (RP) Specifications



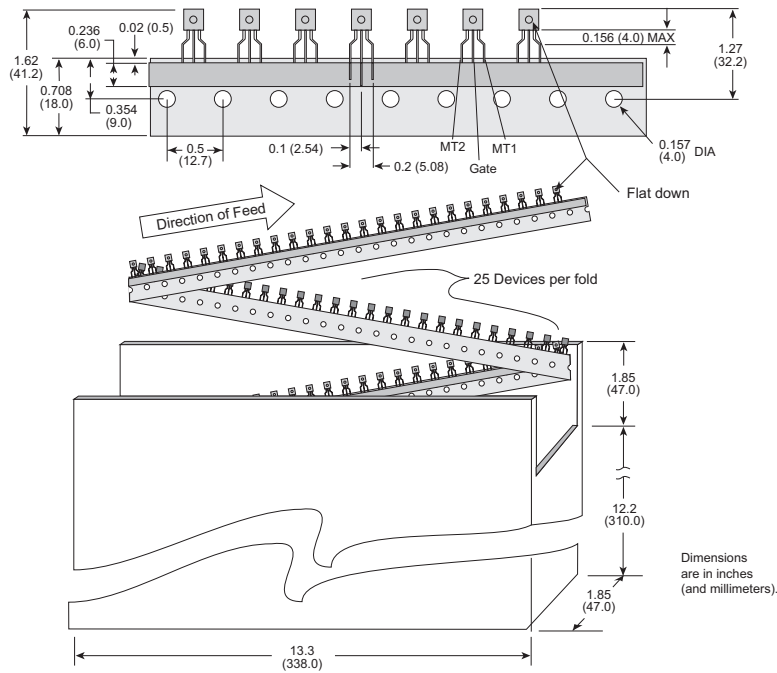
TO-92 (3-lead) Reel Pack (RP) Radial Leaded Specifications

Meets all EIA-468-C Standards



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

Meets all EIA-468-C Standards



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Part of:

