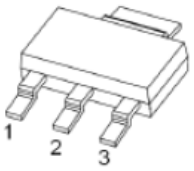
1A LOW DROPOUT LINEAR REGULATOR

SCJT1117B Series

FEATURES

- Low Dropout Voltage: 1.3V(typ.) at 1A Output Current
- Thermal Shutdown
- Three-Terminal Adjustable to 1.2V,1.5V,1.8V, 2.5V, 3.3V, 5V
- Operation Junction Temperature: -40°C to 125°C
- Space-saving SOT-223 packages

SOT-223



1. ADJ/GND
2. OUTPUT
3.IN

GENERAL DESCRIPTION

The SCJT1117B series is a group of low dropout three-terminal regulators with a dropout of 1.3V(typ.) at 1A output current.

The SCJT1117B series is available in an adjustable version, which can set the output voltage from 1.25V to 12 V with only two external resistors. In addition, it is available in five fixed voltages: 1.2V, 1.5V, 1.8 V, 2.5 V, 3.3 V and 5 V.

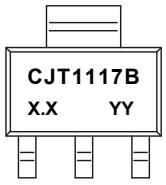
The SCJT1117B series offer thermal shutdown protection. Its circuit includes a Zener trimmed bandgap reference to assure output voltage accuracy to within ±2%.

A minimum of 10μF tantalum capacitor is required at the output to improve the transient response and stability.

APPLICATIONS

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-Video Player
- NIC/Switch
- Telecom Modem
- ADSL Modem
- Printer and Other Peripheral Equipment

MARKING



"**CJT1117B**": Device serial number.

"**X.X**": Output voltage, for example, if V_{OUT} = 3.0V, "**X.X**" = 3.0.

"**YY**": A code composed of one number and one uppercase letter, indicates weekly record information of production.

ORDERING INFORMATION

Package	Operating Junction Temperature Range	Part NO.
SOT-223	-40 to 125℃	SCJT1117B-ADJ
		SCJT1117B-1.2
		SCJT1117B-1.5
		SCJT1117B-1.8
		SCJT1117B-2.5
		SCJT1117B-3.3
		SCJT1117B-5.0

ABOSLUTE MAXIMUM RATINGS (T_a=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Input Voltage	V_i	20	V
Operating Ambient Temperature	T_A	-40~+85	℃
Maximum Junction Temperature	T_j	-40~+150	℃
Storage Temperature	T_{stg}	-40~+150	℃
Lead Temperature (Soldering, 10s)	T_L	260	℃
ESD Rating	**Human Body Model, HBM**	2.5	kV

Note: Stresses greater than those listed under ”Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Value	Unit
Input Voltage	V_i	15	V
Operating Junction Temperature	T_j	-40~+125	℃

THERMAL METRIC

Parameter	Symbol	Value	Unit
Junction-to-ambient thermal resistance	$R_{\Theta JA}$	100	°C/W
Junction-to-case thermal resistance	$R_{\Theta JC}$	20	°C/W
Power dissipation	P_D	Internally Limited	W

Thermal metric is measured in still air with T_A = 25°C and mounted on a 1 in^2 FR-4 substrate PCB covered with 2 ounces of copper.

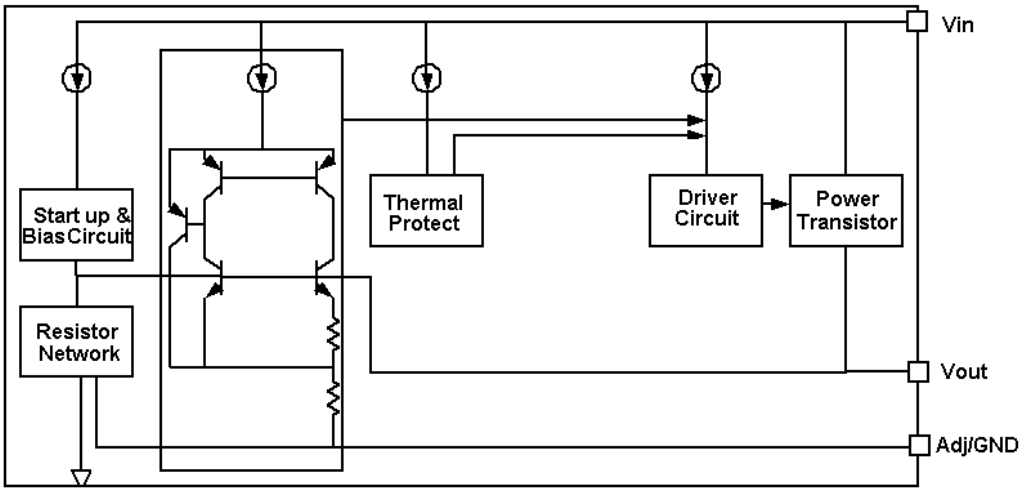
ELECTRICAL CHARACTERISTICS

V_{IN}≤10V, T_J=25℃ unless otherwise specified.

Parameter	Symbol	Part NO.	Test conditions	Min	Typ	Max	Unit
Reference Voltage	V_{IROC}	**SCJT1117B-ADJ**	I_{OUT}=10mA, V_{IN} =3.25V	1.225	1.25	1.275	V
			10mA≤I_{OUT}≤1A, 2.75V≤V_{IN} -V_{OUT} ≤12V	1.219	1.25	1.281	
Output Voltage	V_O	**SCJT1117B-1.2**	I_{OUT}=10mA, V_{IN}=3.2V	1.176	1.2	1.224	V
			10mA≤I_{OUT}≤1A, 2.7V≤V_{IN} ≤12V	1.170	1.2	1.230	
		SCJT1117B-1.5	I_{OUT}=10mA, V_{IN}=3.5V	1.470	1.5	1.530	
			10mA≤I_{OUT}≤1A, 3V≤V_{IN} ≤12V	1.463	1.5	1.537	
		SCJT1117B-1.8	I_{OUT}=10mA, V_{IN}=3.8V	1.764	1.8	1.836	
			10mA≤I_{OUT}≤1A, 3.3V≤V_{IN} ≤12V	1.755	1.8	1.845	
		SCJT1117B-2.5	I_{OUT}=10mA, V_{IN}=4.5V	2.450	2.5	2.550	
			10mA≤I_{OUT}≤1A, 4V≤V_{IN} ≤12V	2.438	2.5	2.562	
		SCJT1117B-3.3	I_{OUT}=10mA, V_{IN}=5.3V	3.234	3.3	3.366	
			10mA≤I_{OUT}≤1A, 4.8V≤V_{IN} ≤12V	3.218	3.3	3.382	
		SCJT1117B-5.0	I_{OUT}=10mA, V_{IN}=7.0V	4.900	5.0	5.100	
			10mA≤I_{OUT}≤1A, 6.5V≤V_{IN} ≤12V	4.875	5.0	5.125	
Line Regulation	LNR	**SCJT1117B-ADJ**	I_{OUT}=10mA, 1.5V≤V_{IN} -V_{OUT} ≤10.75V		0.03	0.2	%
		SCJT1117B-1.2	I_{OUT}=10mA, 1.5V≤V_{IN} -V_{OUT} ≤8.8V		0.03	0.2	%/V
		SCJT1117B-1.5	I_{OUT}=10mA, 1.5V≤V_{IN} -V_{OUT} ≤8.5V		0.03	0.2	
		SCJT1117B-1.8	I_{OUT}=10mA, 1.5V≤V_{IN} -V_{OUT} ≤10.2V		0.03	0.2	
		SCJT1117B-2.5	I_{OUT}=10mA, 1.5V≤V_{IN} -V_{OUT} ≤9.5V		0.03	0.2	
		SCJT1117B-3.3	I_{OUT} =10mA, 1.5V≤V_{IN} -V_{OUT} ≤8.7V		0.03	0.2	
		SCJT1117B-5.0	I_{OUT}=10mA, 1.5V ≤V_{IN} -V_{OUT} ≤7V		0.03	0.2	
Load Regulation	LDR	**SCJT1117B-ADJ**	V_{IN}-V_{OUT}=1.5V, 10mA≤I_{OUT} ≤1A		2	8	mV
		SCJT1117B-1.2			2	8	mV
		SCJT1117B-1.5			2	8	
		SCJT1117B-1.8			3	12	
		SCJT1117B-2.5			4	16	
		SCJT1117B-3.3			6	24	
		SCJT1117B-5.0			9	36	
Dropout Voltage	**V_D**		I_{OUT}=1A		1.3	1.5	V
Adjust Pin Current	I_{Adj}	**SCJT1117B-ADJ**	V_{IN}= 5V, I_{OUT}=10mA		55	120	μA
			V_{IN}= 5V, I_{OUT}=1A		55	120	μA
I_{Adj} change	I_{change}	**SCJT1117B-ADJ**	V_{IN}= 5V 10mA≤I_{OUT}≤1A		0.2	10	μA
Minimum Load Current	I_L	**SCJT1117B-ADJ**			2	10	mA
Quiescent Current	I_q	**SCJT1117B-1.2**	V_{IN}= 10V		2	5	mA
		SCJT1117B-1.5	V_{IN}= 10V		2	5	mA
		SCJT1117B-1.8	V_{IN}= 12V		2	5	mA
		SCJT1117B-2.5	V_{IN}= 12V		2	5	mA
		SCJT1117B-3.3	V_{IN}= 12V		2	5	mA
		SCJT1117B-5.0	V_{IN}= 12V		2	5	mA
Ripple Rejection	RR		f=120Hz,C_{OUT}=22μF Tantalum, V_{IN}-V_{OUT}=3V, I_{OUT}=1A		60		dB

FUNCTIONAL BLOCK and TYPICAL APPLICATION

FUNCTIONAL BLOCK DIAGRAM



DETAILED DESCRIPTION

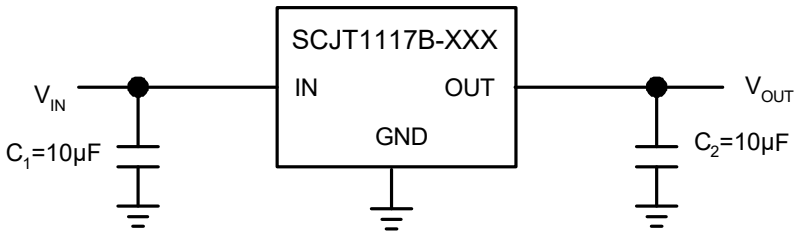
SCJT1117B-XXX is a series of low dropout voltage, three terminal regulators. Its application circuit is very simple: the fixed version only needs two capacitors and the adjustable version only needs two resistors and two capacitors to work. It is composed of some modules including start-up circuit, bias circuit, bandgap, thermal shutdown, power transistors and its driver circuit and so on.

The thermal shut down modules can assure chip and its application system working safety when the junction temperature is larger than 170°C.

The bandgap module provides stable reference voltage, whose temperature coefficient is compensated by careful design considerations. The temperature coefficient is under 100 ppm/°C. And the accuracy of output voltage is guaranteed by trimming technique.

TYPICAL APPLICATION

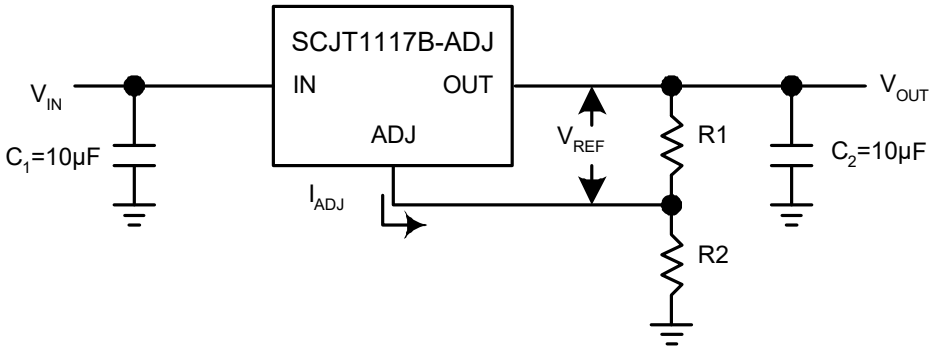
Fixed Output Voltage Version



1) Recommend using 10uF tan capacitor as bypass capacitor (C1) for all application circuit.
2) Recommend using 10uF tan capacitor to assure circuit stability.

TYPICAL APPLICATION

Adjustable Output Voltage Version



$$V_{OUT} = V_{REF} \times (1 + R2/R1) + I_{ADJ} \times R2$$

The output voltage of adjustable version follows the equation: Vout=1.25×(1+R2/R1)+IAdj×R2. We can ignore IAdj because IAdj (about 50uA) is much less than the current of R1 (about 2~10mA).

1) To meet the minimum load current (>10mA) requirement, R1 is recommended to be 125ohm or lower. As SCJT1117B-ADJ can keep itself stable at load current about 2mA, R1 is not allowed to be higher than 625ohm.

2) Using a bypass capacitor (C_{ADJ}) between the ADJ pin and ground can improve ripple rejection. This bypass capacitor prevents ripple from being amplified as the output voltage is increased. The impedance of C_{ADJ} should be less than R1 to prevent ripple from being amplified. As R1 is normally in the range of 100Ω~500Ω, the value of C_{ADJ} should satisfy this equation: $1/(2\pi \times f_{ripple} \times C_{ADJ}) < R1$.

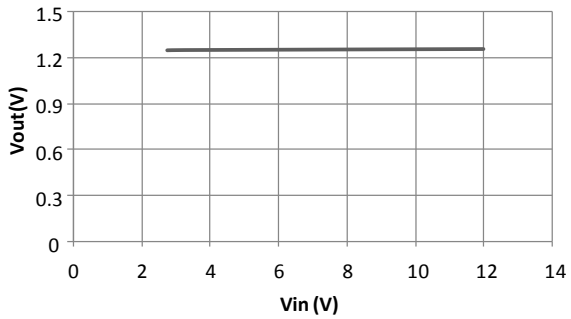
THERMAL CONSIDERATION

We have to take heat dissipation into great consideration when output current or differential voltage of input and output voltage is large. Because in such cases, the power dissipation consumed by SCJT1117B-ADJ is very large. SCJT1117B-ADJ series uses SOT-223 package type and its thermal resistance is about 20°C/W. And the copper area of application board can affect the total thermal resistance. If copper area is 5cm*5cm (two sides), the resistance is about 30° C/W. So the total thermal resistance is about 20°C/W+30°C/W. We can decrease total thermal resistance by increasing copper area in application board. When there is no good heat dissipation copper are in PCB, the total thermal resistance will be as high as 120°C/W, then the power dissipation of SCJT1117B-ADJ could allow on itself is less than 1W. And furthermore, SCJT1117B-ADJ will work at junction temperature higher than 125°C under such condition and no lifetime is guaranteed.

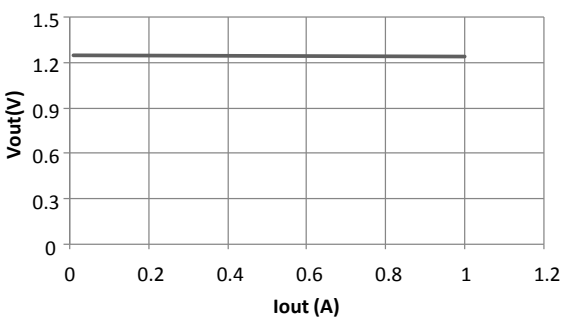
TYPICAL PERFORMANCE CHARACTERISTICS

T_A=25℃, unless otherwise noted.

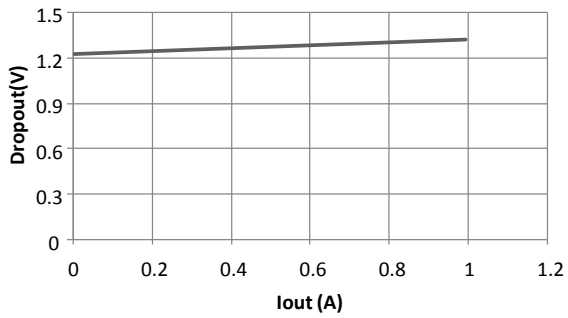
Line regulation



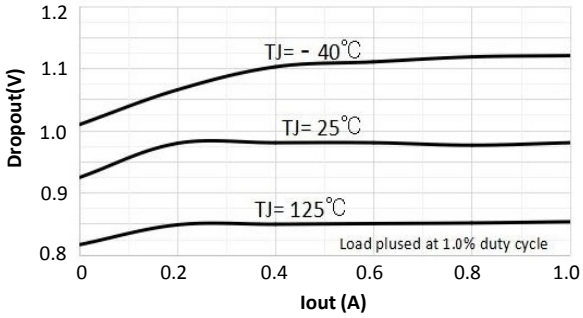
Load regulation



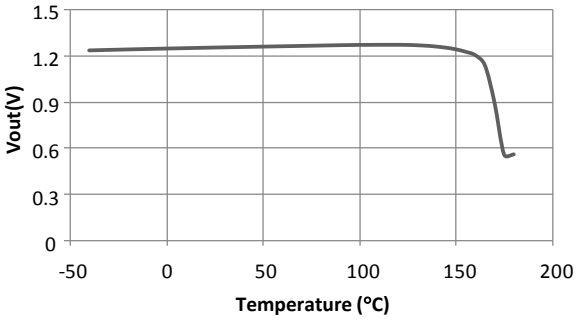
Dropout Voltage (ADJ Except)



Dropout Voltage (ADJ Only)



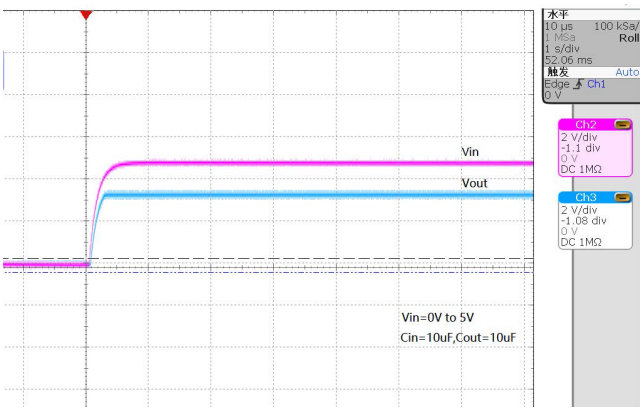
Thermal performance with OTP



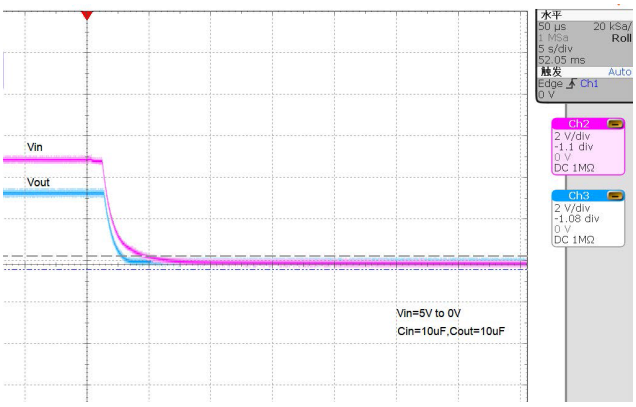
TYPICAL PERFORMANCE CHARACTERISTICS

T_A=25℃, unless otherwise noted.

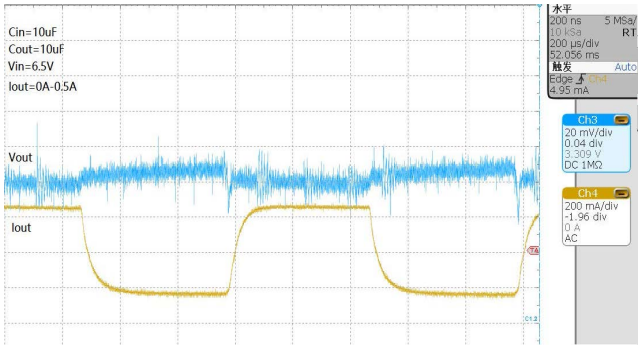
Power ON



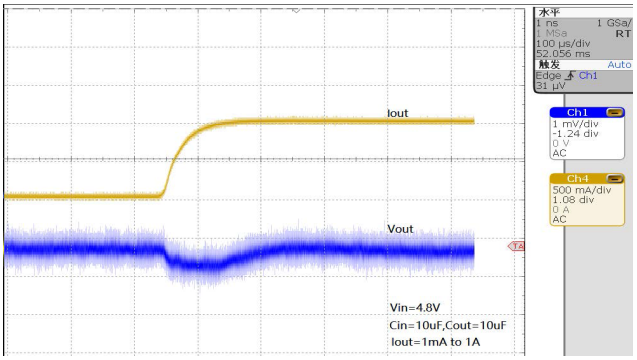
Power OFF



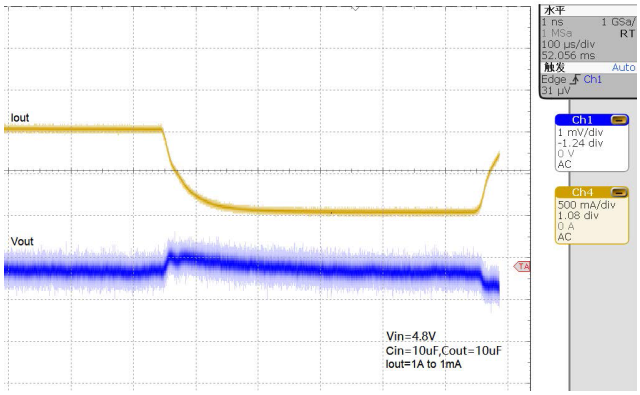
Load Transient Response



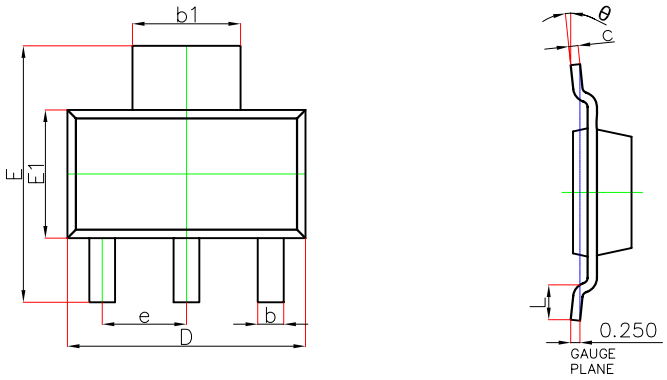
Load Transient Response

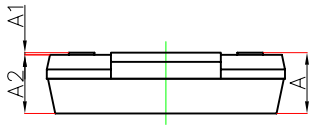


Load Transient Response



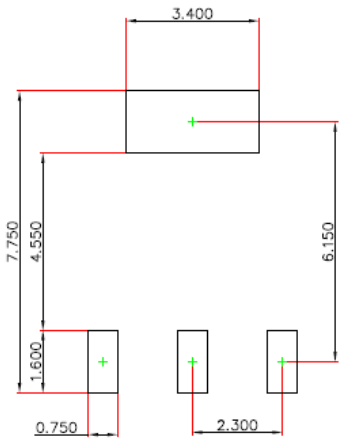
SOT-223 Package Outline Dimensions





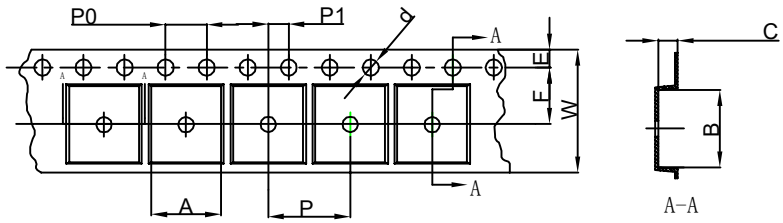
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	——	1.800	——	0.071
A1	0.020	0.100	0.001	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.840	0.026	0.033
b1	2.900	3.100	0.114	0.122
c	0.200	0.350	0.009	0.014
D	6.300	6.700	0.248	0.264
E	6.700	7.300	0.264	0.287
E1	3.300	3.700	0.130	0.146
e	2.300(BSC)		0.091(BSC)	
L	0.750	——	0.030	——
θ	0°	10°	0°	10°

SOT-223 Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.050mm.
3.The pad layout is for reference purposes only.

SOT-223 Embossed Carrier Tape

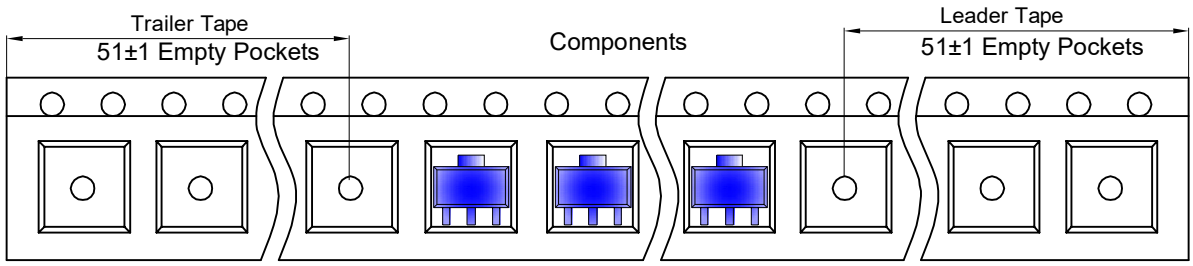


Packaging Description:

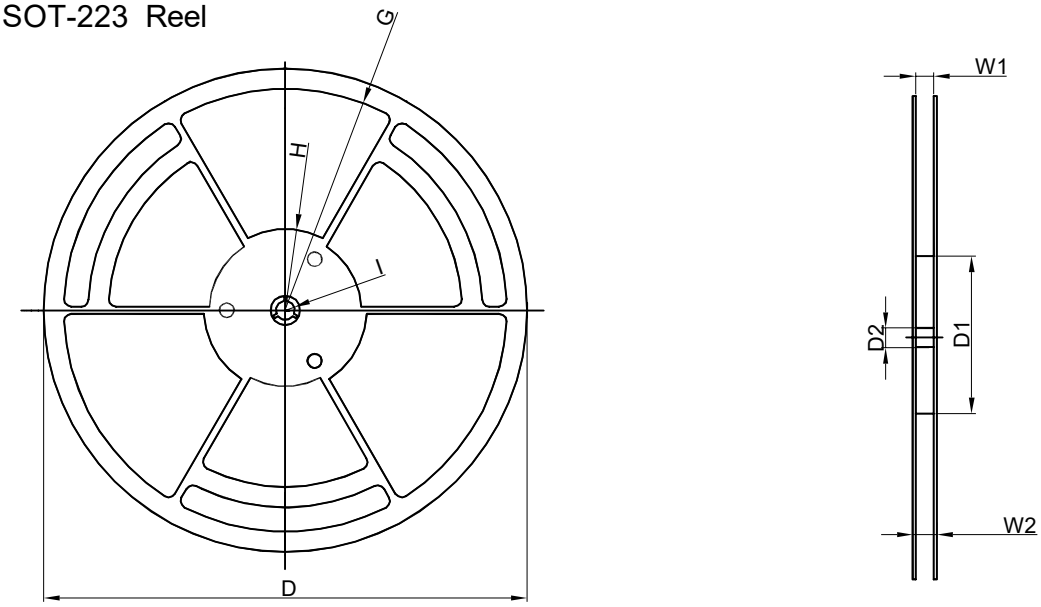
SOT-223 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 33.0cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-223	6.765	7.335	1.88	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

SOT-223 Tape Leader and Trailer



SOT-223 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
13"Dia	Ø330.00	100.00	13.00	R151.00	R56.00	R6.50	12.40	17.60

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
2,500 pcs	13 inch	2,500 pcs	336×336×48	20,000 pcs	445×355×365	

DISCLAIMER

IMPORTANT NOTICE, PLEASE READ CAREFULLY

The information in this data sheet is intended to describe the operation and characteristics of our products. JSCJ has the right to make any modification, enhancement, improvement, correction or other changes to any content in this data sheet, including but not limited to specification parameters, circuit design and application information, without prior notice.

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