

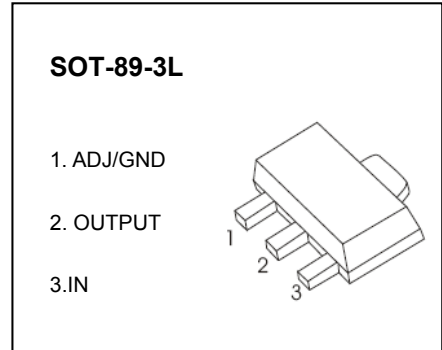


**1A LOW DROPOUT LINEAR REGULATOR**

## SCJA1117B-XXX-A

### FEATURES

- Low Dropout Voltage: 1.3V at 0.8A Output Current
- Trimmed Current Limit
- On-Chip Thermal Shutdown
- Three-Terminal Adjustable or Fixed 1.2V, 1.8V, 2.5V, 3.3V, 5V
- Operation Junction Temperature: -20 °C to 125 °C



### GENERAL DESCRIPTION

The SCJA1117B-XXX-A is a series of low dropout three-terminal regulators with a dropout of 1.3V(typ.) at 1A output current.

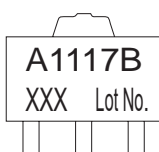
The SCJA1117B-XXX-A series provides current limiting and thermal shutdown. Its circuit includes a trimmed bandage reference to assure output voltage accuracy to be within 2%. Current limit is trimmed to ensure specified. Output current and controlled short-circuit current. On-chip thermal shutdown provides protection against any combination of ambient temperature that would create excessive junction temperature.

The SCJA1117B-XXX-A has an adjustable version, that can provide the output voltage from 1.25V to 12V with only 2 external resistors.

### APPLICATIONS

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

### Marking:



A1117B = Device code

XXX: output voltage

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## MAXIMUM RATINGS

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### ORDERING INFORMATION

Package	Operating Junction Temperature Range	Part NO.
SOT-89-3L	-20 to 125°C	SCJA1117B-ADJ-A
		SCJA1117B-1.2-A
		SCJA1117B-1.8-A
		SCJA1117B-2.5-A
		SCJA1117B-3.3-A
		SCJA1117B-5.0-A

### ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Input Voltage	V <sub>i</sub>	20	V
Thermal Resistance from Junction to Ambient	R <sub>θJA</sub>	250	°C/W
Operating Ambient Temperature	T <sub>A</sub>	-40~+85	°C
Operating Junction Temperature	T <sub>J</sub>	-40~+150	°C
Storage Temperature	T <sub>stg</sub>	-40~+150	°C
Lead Temperature (Soldering, 10s)	T <sub>L</sub>	260	°C
ESD Rating	Human Body Model, HBM	8	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 <sub>i</sub>	15	V
Operating Junction Temperature	T <sub>J</sub>	-20~+125	°C

# ELECTRICAL CHARACTERISTICS

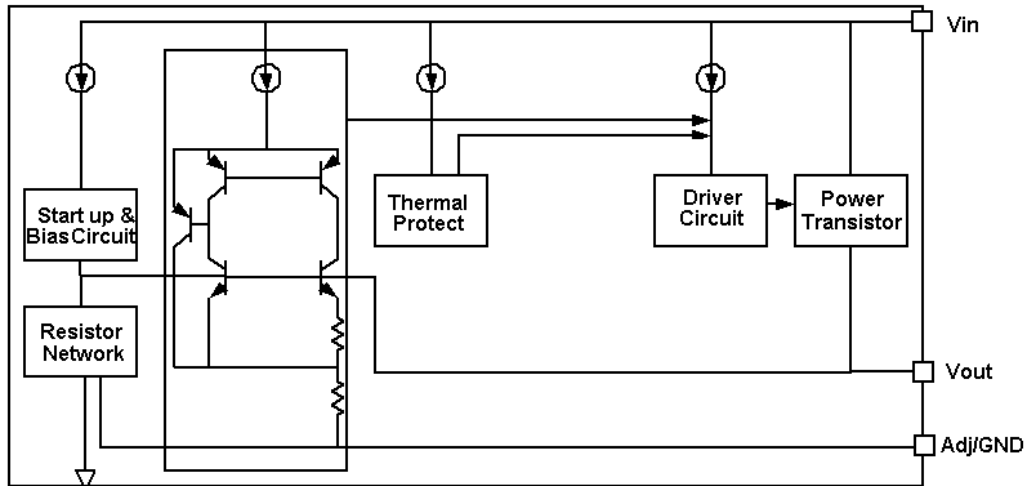
$T_J=25^\circ\text{C}$  unless otherwise specified.

Parameter	Symbol	Part NO.	Test conditions	Min	Typ	Max	Unit
Reference Voltage	$V_{IROC}$	SCJA1117B-ADJ-A	$I_{OUT}=10\text{mA}$ , $V_{IN}=3.25\text{V}$	1.225	1.25	1.275	V
			$10\text{mA}\leq I_{OUT}\leq 1\text{A}$ , $2.75\text{V}\leq V_{IN}-V_{OUT}\leq 12\text{V}$	1.219	1.25	1.281	
Output Voltage	$V_O$	SCJA1117B-1.2-A	$I_{OUT}=10\text{mA}$ , $V_{IN}=3.2\text{V}$	1.176	1.2	1.224	V
			$10\text{mA}\leq I_{OUT}\leq 1\text{A}$ , $2.7\text{V}\leq V_{IN}\leq 12\text{V}$	1.170	1.2	1.230	
		SCJA1117B-1.5-A	$I_{OUT}=10\text{mA}$ , $V_{IN}=3.5\text{V}$	1.470	1.5	1.530	
			$10\text{mA}\leq I_{OUT}\leq 1\text{A}$ , $3\text{V}\leq V_{IN}\leq 12\text{V}$	1.463	1.5	1.537	
		SCJA1117B-1.8-A	$I_{OUT}=10\text{mA}$ , $V_{IN}=3.8\text{V}$	1.764	1.8	1.836	
			$10\text{mA}\leq I_{OUT}\leq 1\text{A}$ , $3.3\text{V}\leq V_{IN}\leq 12\text{V}$	1.755	1.8	1.845	
		SCJA1117B-2.5-A	$I_{OUT}=10\text{mA}$ , $V_{IN}=4.5\text{V}$	2.450	2.5	2.550	
			$10\text{mA}\leq I_{OUT}\leq 1\text{A}$ , $4\text{V}\leq V_{IN}\leq 12\text{V}$	2.438	2.5	2.562	
		SCJA1117B-3.3-A	$I_{OUT}=10\text{mA}$ , $V_{IN}=5.3\text{V}$	3.234	3.3	3.366	
			$10\text{mA}\leq I_{OUT}\leq 1\text{A}$ , $4.8\text{V}\leq V_{IN}\leq 12\text{V}$	3.218	3.3	3.382	
		SCJA1117B-5.0-A	$I_{OUT}=10\text{mA}$ , $V_{IN}=7.0\text{V}$	4.900	5.0	5.100	
			$10\text{mA}\leq I_{OUT}\leq 1\text{A}$ , $6.5\text{V}\leq V_{IN}\leq 12\text{V}$	4.875	5.0	5.125	
Line Regulation	LNR	SCJA1117B-ADJ-A	$I_{OUT}=10\text{mA}$ , $1.5\text{V}\leq V_{IN}-V_{OUT}\leq 10.75\text{V}$		0.03	0.2	% %/V
		SCJA1117B-1.2-A	$I_{OUT}=10\text{mA}$ , $1.5\text{V}\leq V_{IN}-V_{OUT}\leq 8.8\text{V}$		0.03	0.2	
		SCJA1117B-1.5-A	$I_{OUT}=10\text{mA}$ , $1.5\text{V}\leq V_{IN}-V_{OUT}\leq 8.5\text{V}$		0.03	0.2	
		SCJA1117B-1.8-A	$I_{OUT}=10\text{mA}$ , $1.5\text{V}\leq V_{IN}-V_{OUT}\leq 10.2\text{V}$		0.03	0.2	
		SCJA1117B-2.5-A	$I_{OUT}=10\text{mA}$ , $1.5\text{V}\leq V_{IN}-V_{OUT}\leq 9.5\text{V}$		0.03	0.2	
		SCJA1117B-3.3-A	$I_{OUT}=10\text{mA}$ , $1.5\text{V}\leq V_{IN}-V_{OUT}\leq 8.7\text{V}$		0.03	0.2	
		SCJA1117B-5.0-A	$I_{OUT}=10\text{mA}$ , $1.5\text{V}\leq V_{IN}-V_{OUT}\leq 7\text{V}$		0.03	0.2	
Load Regulation	LDR	SCJA1117B-ADJ-A	$V_{IN}-V_{OUT}=1.5\text{V}$ , $10\text{mA}\leq I_{OUT}\leq 1\text{A}$		2	8	mV
		SCJA1117B-1.2-A			2	8	
		SCJA1117B-1.5-A			2	8	
		SCJA1117B-1.8-A			3	12	
		SCJA1117B-2.5-A			4	16	
		SCJA1117B-3.3-A			6	24	
		SCJA1117B-5.0-A			9	36	
Dropout Voltage	$V_D$		$I_{OUT}=1\text{A}$		1.3	1.5	V
Adjust Pin Current	$I_{Adj}$	SCJA1117B-ADJ-A	$V_{IN}=5\text{V}$ , $I_{OUT}=10\text{mA}$		55	120	$\mu\text{A}$
			$V_{IN}=5\text{V}$ , $I_{OUT}=1\text{A}$		55	120	$\mu\text{A}$
$I_{Adj}$ change	$I_{change}$	SCJA1117B-ADJ-A	$V_{IN}=5\text{V}$ , $10\text{mA}\leq I_{OUT}\leq 1\text{A}$		0.2	10	$\mu\text{A}$
Minimum Load Current	$I_L$	SCJA1117B-ADJ-A			2	10	mA
Quiescent Current	$I_q$	SCJA1117B-1.2-A	$V_{IN}=10\text{V}$		2	5	mA
		SCJA1117B-1.5-A	$V_{IN}=10\text{V}$		2	5	mA
		SCJA1117B-1.8-A	$V_{IN}=12\text{V}$		2	5	mA
		SCJA1117B-2.5-A	$V_{IN}=12\text{V}$		2	5	mA
		SCJA1117B-3.3-A	$V_{IN}=12\text{V}$		2	5	mA
		SCJA1117B-5.0-A	$V_{IN}=12\text{V}$		2	5	mA
Ripple Rejection	RR		$f=1\text{kHz}$ , $C_{IN}=10\mu\text{F}/25\text{V}$ , $C_{OUT}=10\mu\text{F}/25\text{V}$ , $V_{IN}-V_{OUT}=2\text{V}$ , $I_{OUT}=10\text{mA}$		60		dB

\* With package soldering to copper area over backside ground plane or internal power plane  $R_{\theta JA}$  can vary from  $46^\circ\text{C}/\text{W}$  to  $>90^\circ\text{C}/\text{W}$  depending on mounting technique and the size of the copper area

# FUNCTIONAL BLOCK and TYPICAL APPLICATION

## FUNCTIONAL BLOCK DIAGRAM



## DETAILED DESCRIPTION

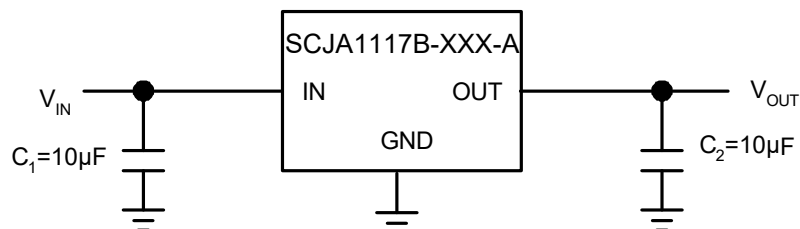
SCJA1117B-XXX-A is a series of low dropout voltage, three terminal regulators. Its application circuit is very simple: the fixed version only needs two capacitors and the adjustable version only needs two resistors and two capacitors to work. It is composed of some modules including start-up circuit, 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 140°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.

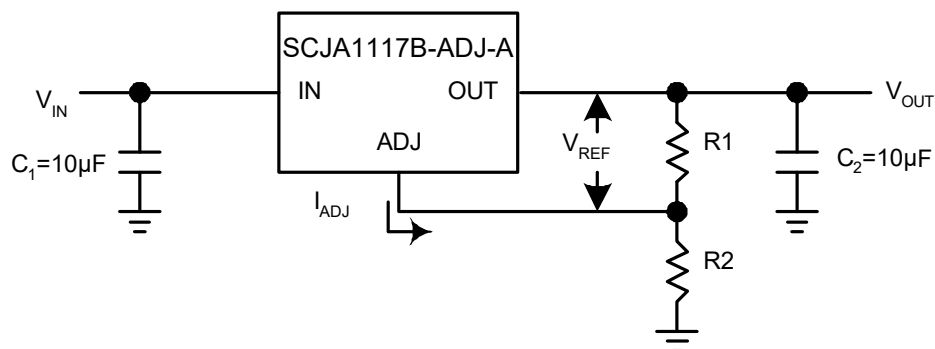
## TYPICAL APPLICATION

### 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.

## 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:  $V_{out} = 1.25 \times (1 + R2/R1) + I_{Adj} \times R2$ . We can ignore  $I_{Adj}$  because  $I_{Adj}$  (about 50µA) 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 SCJA1117B-ADJ-A 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:  $1/(2\pi \times f_{ripple} \times C_{ADJ}) < R1$ .

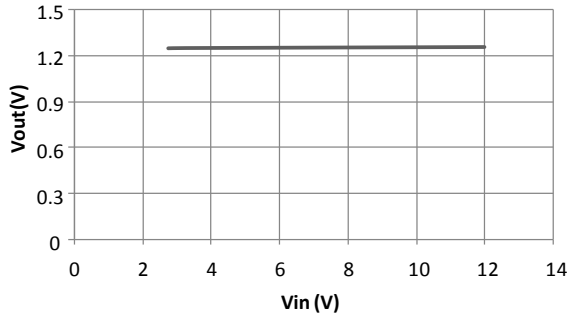
## THERMAL CONSIDERATION

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 SCJA1117B-ADJ-A is very large. SCJA1117B-ADJ-A 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 SCJA1117B-ADJ-A could allow on itself is less than 1W. And furthermore, SCJA1117B-ADJ-A will work at junction temperature higher than 125°C under such condition and no lifetime is guaranteed.

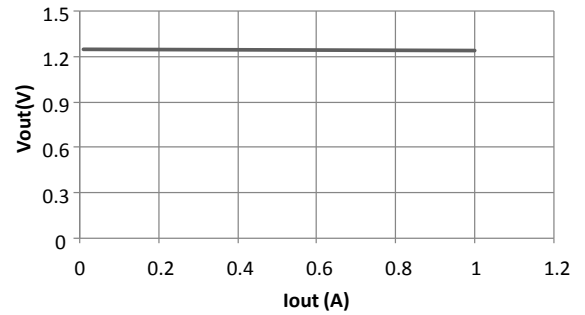
# TYPICAL PERFORMANCE CHARACTERISTICS

$T_A=25^{\circ}\text{C}$ , unless otherwise noted.

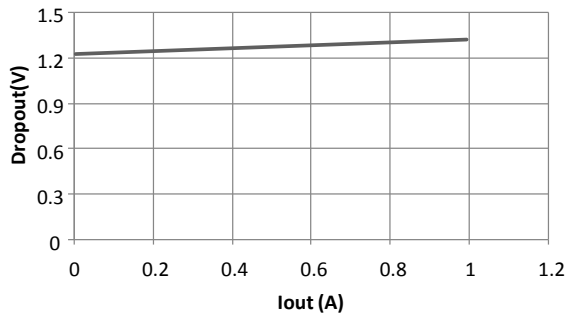
### Line regulation



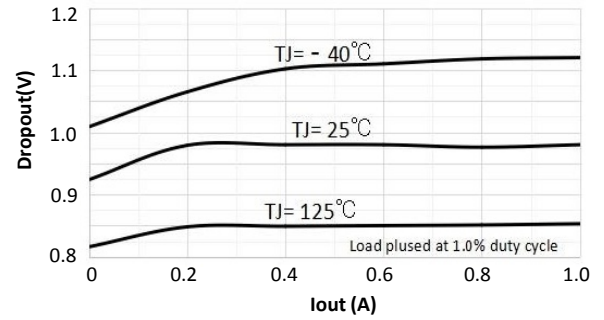
### Load regulation



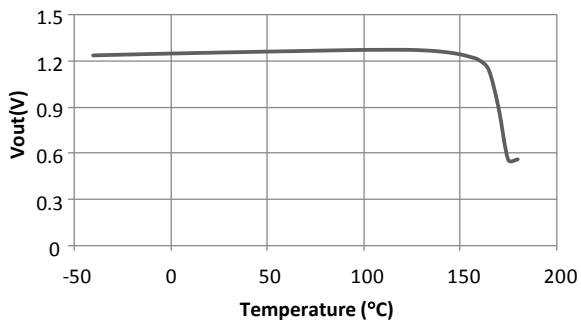
### Dropout Voltage (ADJ Except)



### Dropout Voltage (ADJ Only)



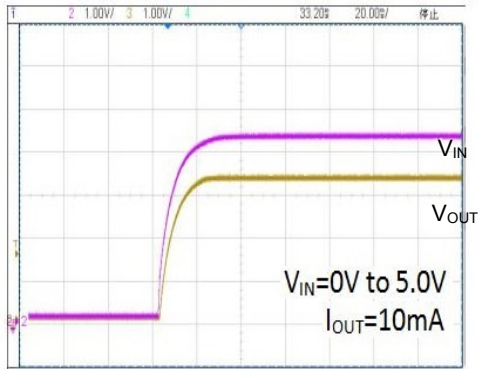
### Thermal performance with OTP



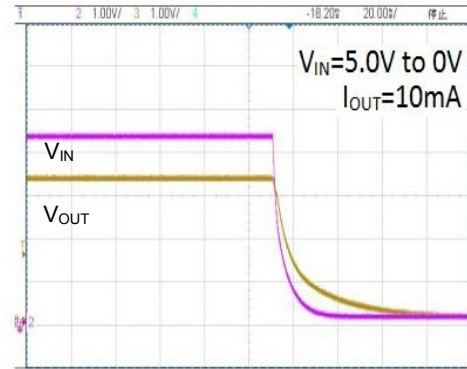
# TYPICAL PERFORMANCE CHARACTERISTICS

$T_A=25^{\circ}\text{C}$ , unless otherwise noted.

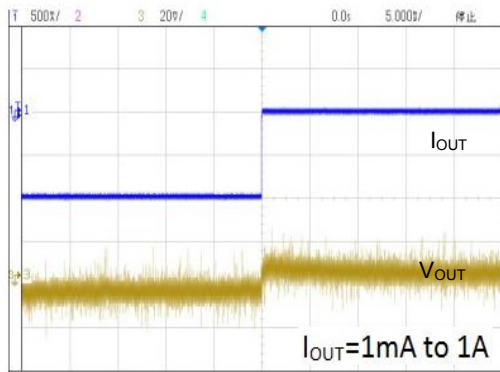
Power ON / OFF



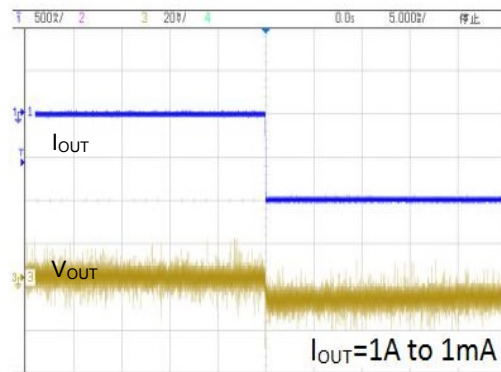
Power ON / OFF



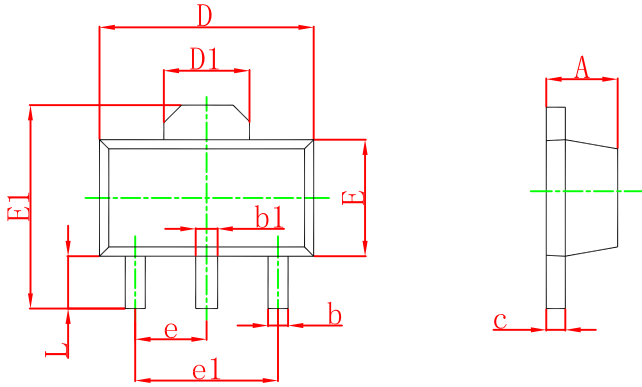
Load Transient Response



Load Transient Response

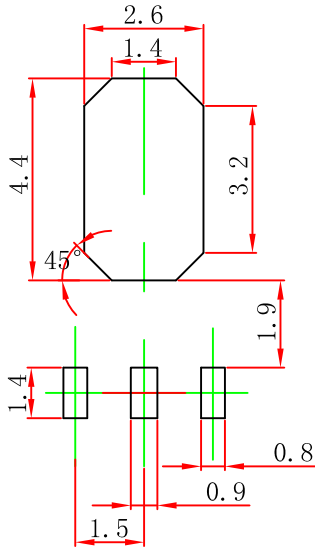


## SOT-89-3L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

## SOT-89-3L Suggested Pad Layout



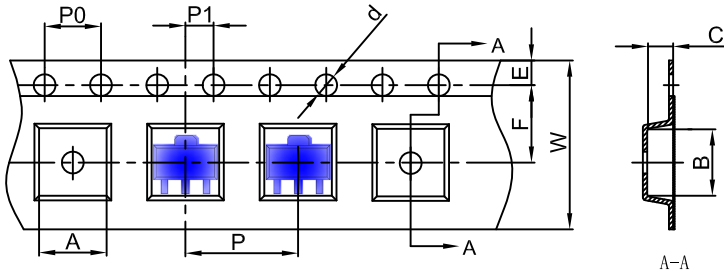
### Note:

1. Controlling dimension in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purpose only.



# SOT-89-3L Tape and Reel

## SOT-89-3L Embossed Carrier Tape

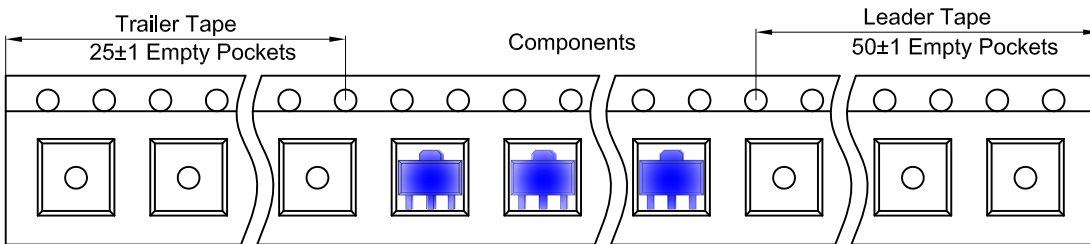


### Packaging Description:

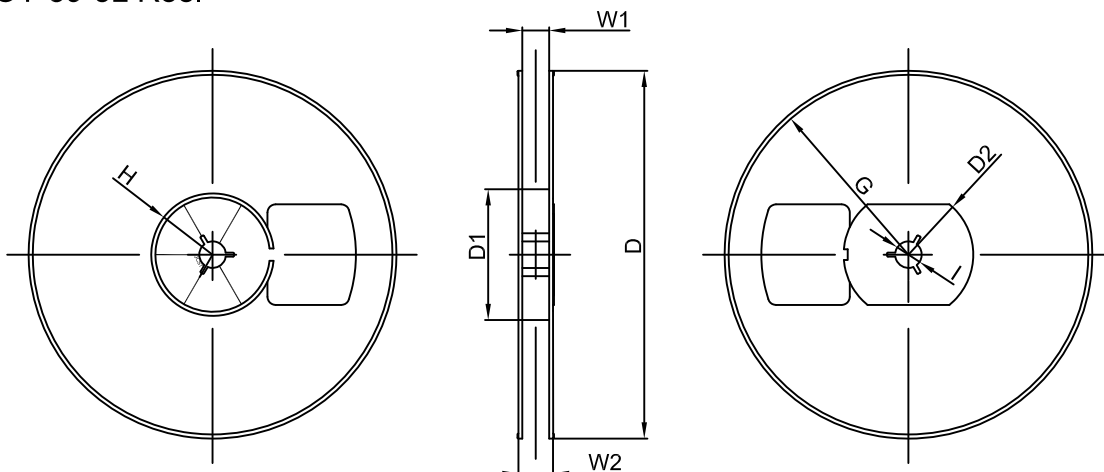
SOT-89-3L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 1,000 units per 7" or 18.0 cm 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-89-3L	4.85	4.45	1.85	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

## SOT-89-3L Tape Leader and Trailer



## SOT-89-3L Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7" Dia	Ø180.00	60.00	R32.00	R86.50	R30.00	Ø13.00	13.20	16.50

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
1000 pcs	7 inch	10,000 pcs	203×203×195	40,000 pcs	438×438×220	