

250mA CMOS Low Dropout Voltage Low consumption Regulator

Features:

- Low Power Consumption: 1.0uA (Typ.)
- Maximum Output Current: 250mA
- Small Dropout Voltage:
170mV@100mA ($V_{out}=3.0V$)
400mV@250mA ($V_{out}=3.0V$)
- Input Voltage Range: 1.5V~12V
- Output Voltage Range: 1.2V~5.0V
(customized on command in 0.1V steps)
- Highly Accurate: $\pm 2\%$ ($\pm 1\%$ customized)
- Output Current Limit

Applications:

- Battery Powered equipment
- Power Management of MP3、PDA、DSC、Mouse、PS2 Games
- Reference Voltage Source
- Regulation after Switching Power

Outline:

BPB503 series is a group of positive voltage output, low power consumption, low dropout voltage, three terminal regulator. It can provide 250mA output current when input / output voltage differential drops to 400mV ($V_{in}=4.0V$ 、 $V_{out}=3.0V$)。The very low power consumption of BPB503 ($I_q=1.0uA$) can greatly improve natural life of batteries.

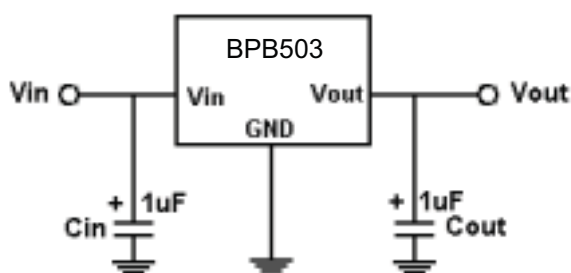
BPB503 can provide output value in the range of 1.2V~6.0V in 0.1V steps. It also can customized on command.

BPB503 includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module.

BPB503 has well load transient response and good temperature characteristic, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within $\pm 2\%$.

BPB503 is available in SOT-89-3, SOT-23-3 packages which is lead free, it also can available in these packages with lead.

BPB503 Typical Application Circuit

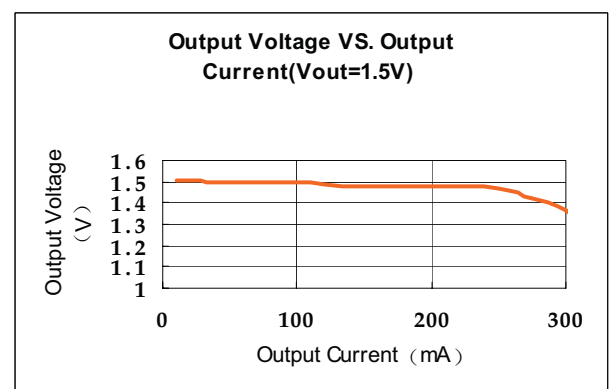


Application hints:

NOTE1: Input capacitor ($C_{in}=1uF$) is recommended in all application circuit. Tantalum capacitor is recommended.

NOTE2: Output capacitor ($C_{out}=1uF$) is recommended in all application to assure the stability of circuit. Tantalum capacitor is recommended.

BPB503 Typical Performance Characteristic:



Selection Guide:

BPB503-XX X X X

Packages:

RM: SOT-23-3

SM: SOT-89-3
(Default)

SA: SOT-89-3

SB: SOT-89-3

T: TO-92

Output accuracy:

Default, $\pm 2\%$

1: $\pm 1\%$
(customized)

Temperature range:

P: Standard
(Default, lead free)

C: Standard
(customized)

Output Voltage:

12.....1.2V

21.....2.1V

25.....2.5V

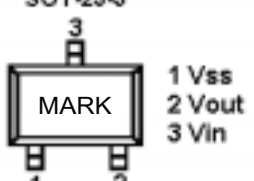
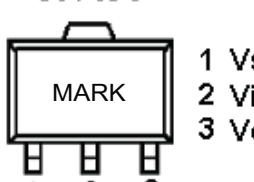
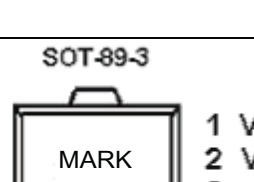
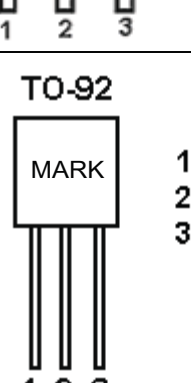
30.....3.0V

35.....3.5V

.....

50.....5.0V

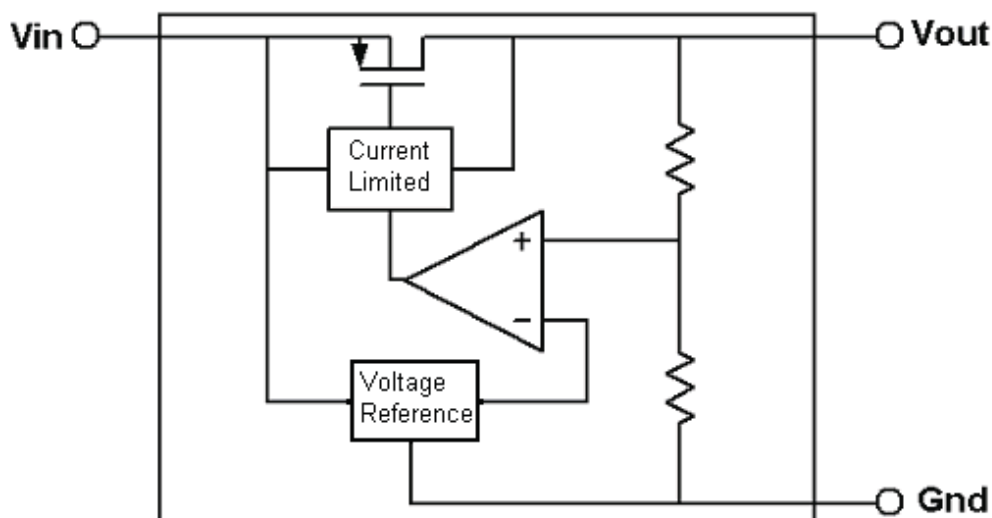
Pin Assignment:

Product Classification	Pin Configuration
BPB503-□□□PRM	SOT-23-3  1 Vss 2 Vout 3 Vin
BPB503-□□□PSM	SOT-89-3  1 Vss 2 Vin 3 Vout
BPB503-□□□PSA	SOT-89-3  1 Vss 2 Vout 3 Vin
BPB503-□□□PSB	SOT-89-3  1 Vout 2 Vss 3 Vin
BPB503-□□□PT	TO-92  1 Vss 2 Vin 3 Vout

Pin Description:

Pin number				PIN Name	Function
SOT-23-3	SOT-89-3 (SM)	SOT-89-3 (SA)	SOT-89-3 (SB)		
1	1	1	2	Vss	Ground
3	2	3	3	Vin	Supply voltage input
2	3	2	1	Vout	Output Voltage
—	—	—	—	NC	No connect
—	—	—	—	NC	No connect

Block Diagram:



Absolute Maximum Ratings:

Max input voltage	13V
Junction Temperature (T _J)	125°C
Ambient Temperature(T _A)	-40°C~85°C
Power Dissipation	
SOT-23-3	0.15W
SOT-23-5	0.25W
SOT-89-3	0.5W
Storage Temperature(T _s)	-45°C~150°C
Lead Temperature and Time	260°C,10S

Recommended Work Conditions:

Item	Min	Recommended	Max	unit
Input Voltage Range			12	V
Ambient Temperature	-40		+125	°C

Electrical Characteristics:

(Test Conditions: C_{in}=1uF,C_{out}=1uF,T_A=25°C, unless otherwise specified.)

BPB503-1.5V

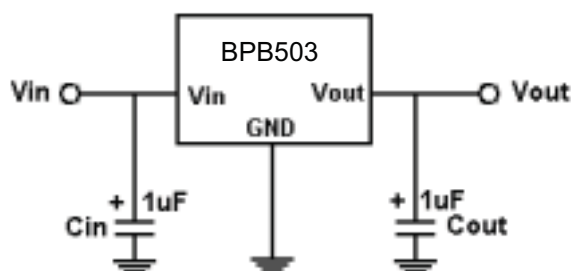
Symbol	Parameter	Conditions	Min	Typ	Max	Units
V _{in}	Input Voltage				12	V
V _{out}	Output Voltage		1.47	1.5	1.53	V
I _{out} (Max.)	Maximum Output Current	V _{in} =2.5V,V _{out} >1.47	250			mA
Dropout Voltage	Input-Output Voltage Differential	I _{out} =100mA		270	400	mV
$\frac{\Delta V_{out}}{\Delta V_{in} \cdot V_{out}}$	Line Regulation	I _{out} =40mA 1.6V≤V _{in} ≤12V		0.2	0.3	%/V
ΔV_{out}	Load Regulation	V _{in} =2.5V 1mA≤I _{out} ≤100mA		20	40	mV
I _q	Quiescent Current	V _{in} =2.5V		1.0	3.0	uA

$\frac{\Delta V_{out}}{\Delta T \cdot V_{out}}$	Output Voltage Temperature Coefficient	$I_{out}=10mA$		50		ppm/°C
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BPB503-3.0V

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{in}	Input Voltage				12	V
V_{out}	Output Voltage		2.94	3.0	3.06	V
$I_{out}(\text{Max.})$	Maximum Output Current	$V_{in}=4V, V_{out}>2.94V$	250			mA
Dropout Voltage	Input-Output Voltage Differential	$I_{out}=100mA$		170	300	mV
		$I_{out}=200mA$		320	500	
$\frac{\Delta V_{out}}{\Delta V_{in} \cdot V_{out}}$	Line Regulation	$I_{out}=40mA$ $3.2V \leq V_{in} \leq 12V$		0.2	0.3	%/V
ΔV_{out}	Load Regulation	$V_{in}=4.0V$ $1mA \leq I_{out} \leq 100mA$		20	40	mV
I_q	Quiescent Current	$V_{in}=4V$		1.0	3.0	uA
$\frac{\Delta V_{out}}{\Delta T \cdot V_{out}}$	Output Voltage Temperature Coefficient	$I_{out}=10mA$		50		ppm/°C

Typical Application Circuit:



Application hints:

NOTE1 : Input capacitor ($C_{in}=1\mu F$) is recommended in all application circuit. Tantalum capacitor is recommended.

NOTE2 : Output capacitor ($C_{out}=1\mu F$) is recommended in all application to assure the stability of circuit. Tantalum capacitor is recommended.

Explanation:

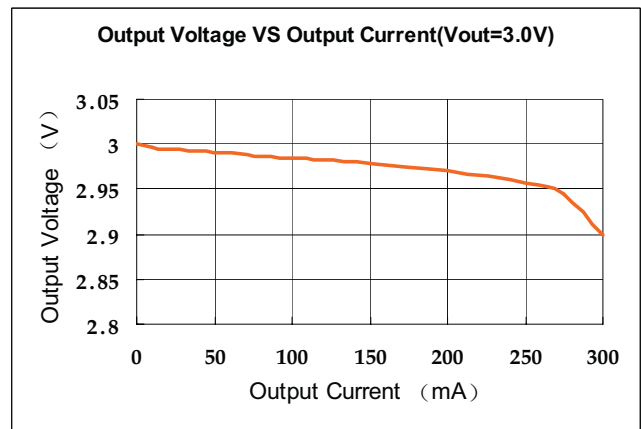
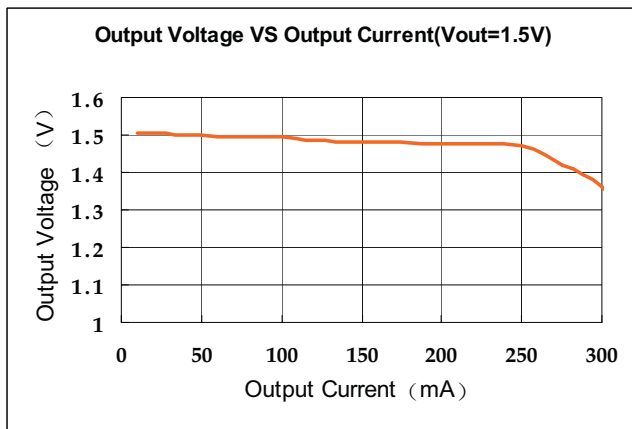
BPB503 is a series of low dropout voltage and low power consumption three pins regulator. Its application circuit is very simple, which only needs two outside capacitors. It is composed of these modules: high accuracy voltage reference, current limit circuit, error amplifier, output driver and power transistor.

Current Limit module can keep chip and power system away from danger when load current is more than 250mA.

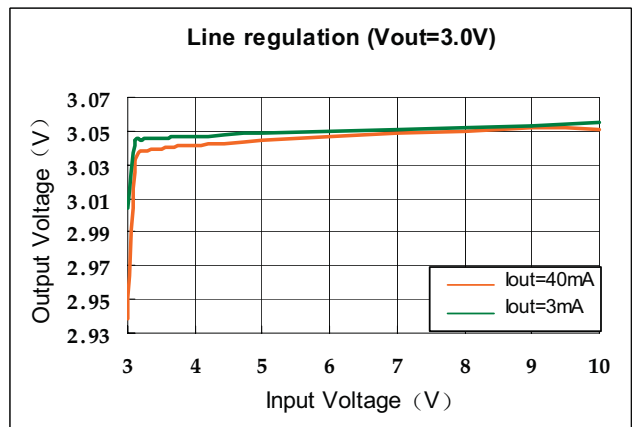
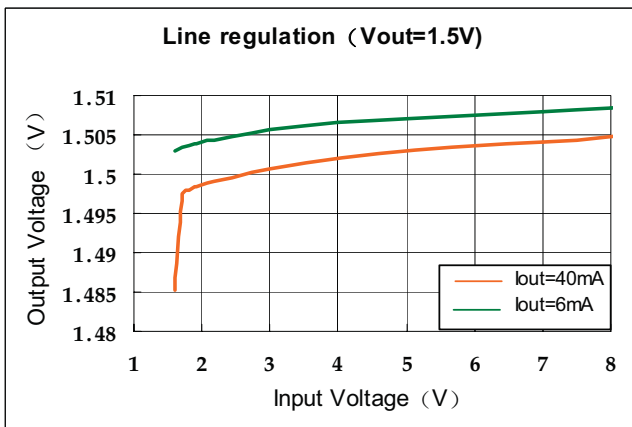
BPB503 uses trimming technique to assure the accuracy of output value within $\pm 2\%$, at the same time, temperature compensated is elaborately considered in this chip, which makes BPB503's temperature coefficient within 50ppm/°C.

Typical Performance Characteristics:

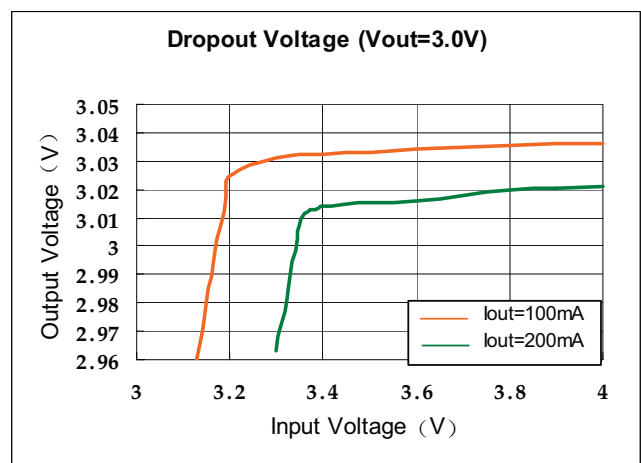
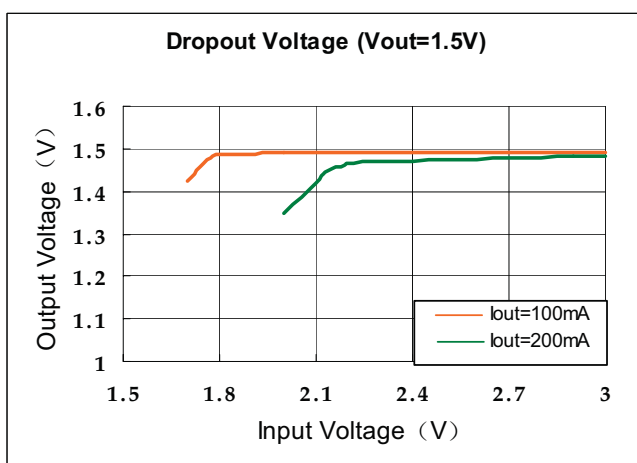
1. Load regulation



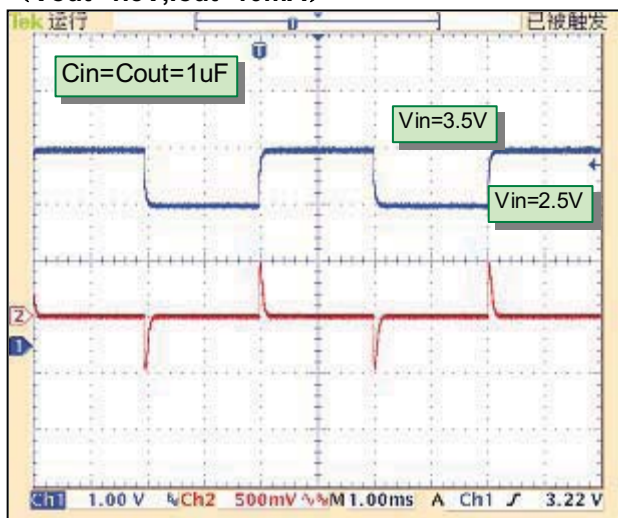
2. Line Regulation



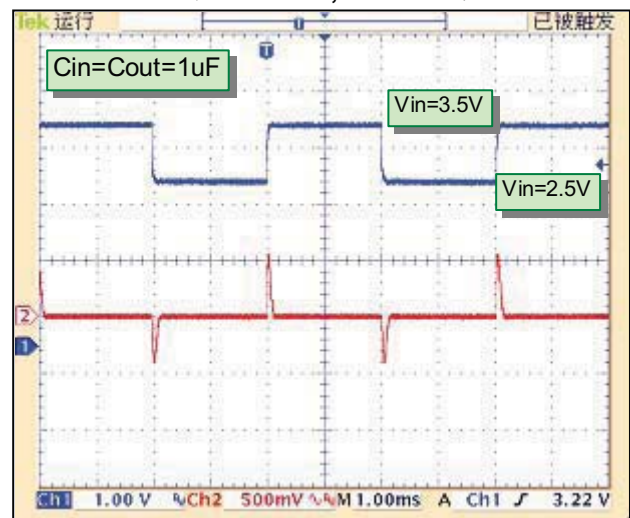
3. Dropout Voltage



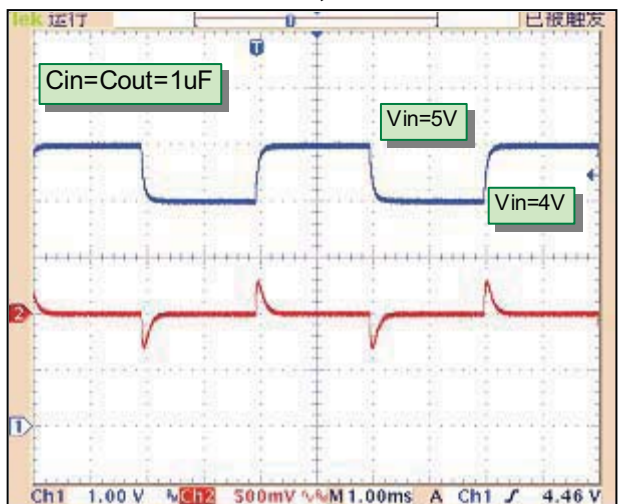
4. Input Voltage transient response ($V_{out}=1.5V, I_{out}=10mA$)



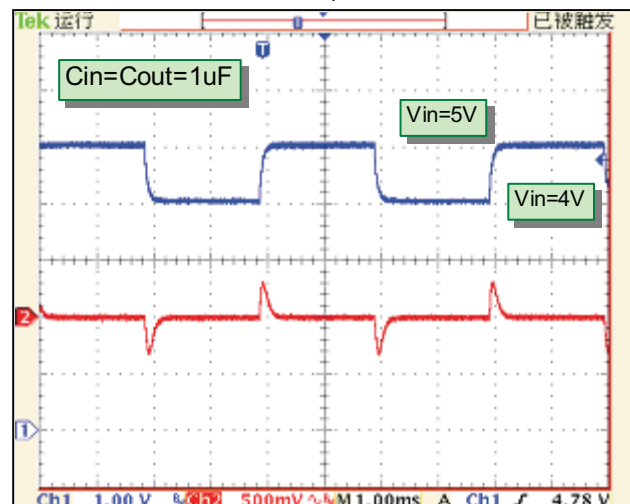
Input Voltage transient response ($V_{out}=1.5V, I_{out}=1mA$)



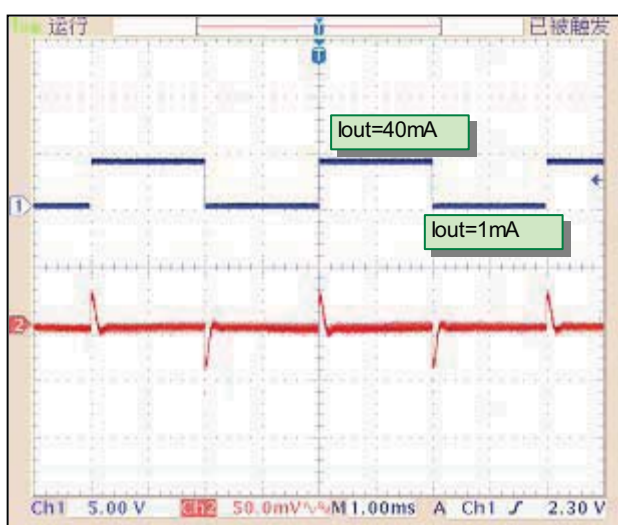
Input Voltage transient response ($V_{out}=3.0V, I_{out}=10mA$)



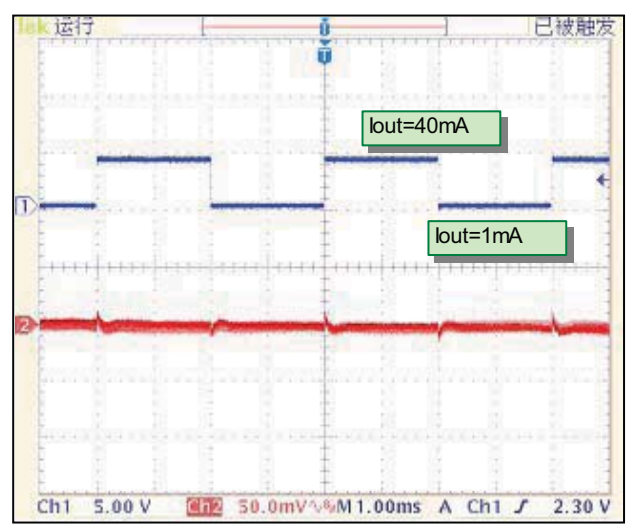
Input Voltage transient response ($V_{out}=3.0V, I_{out}=1mA$)



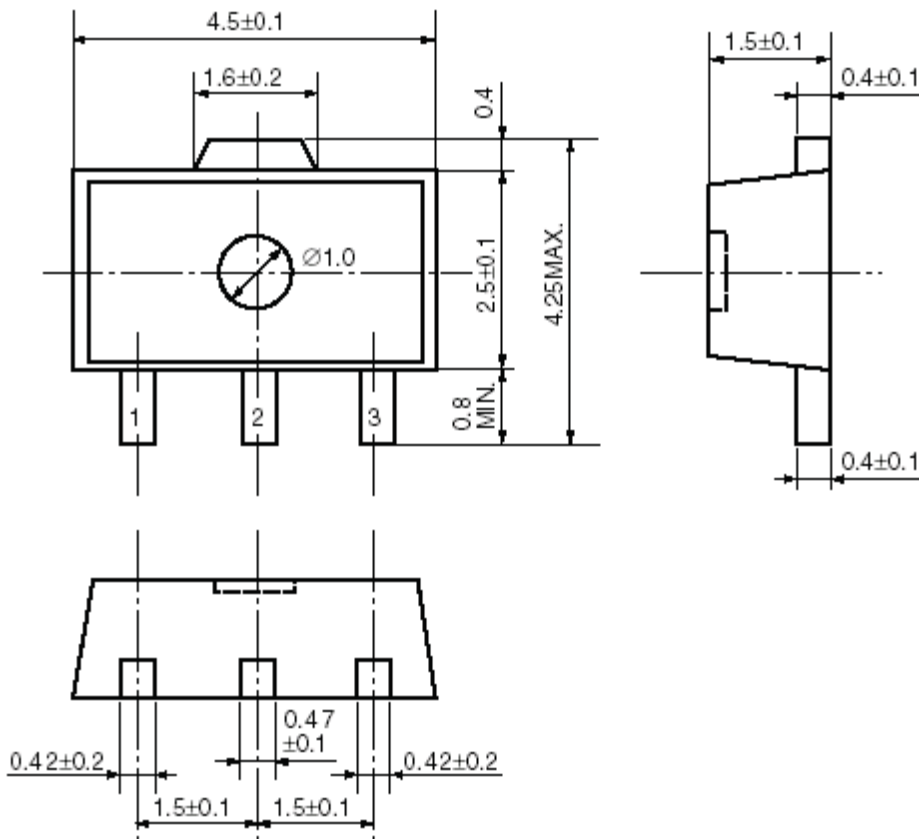
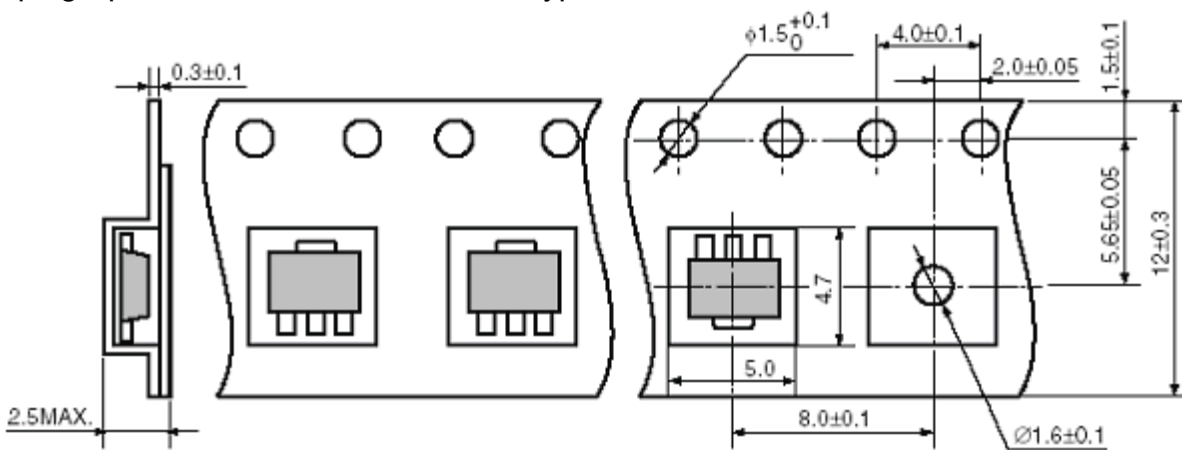
5. Load transient response ($V_{out}=1.5V$)



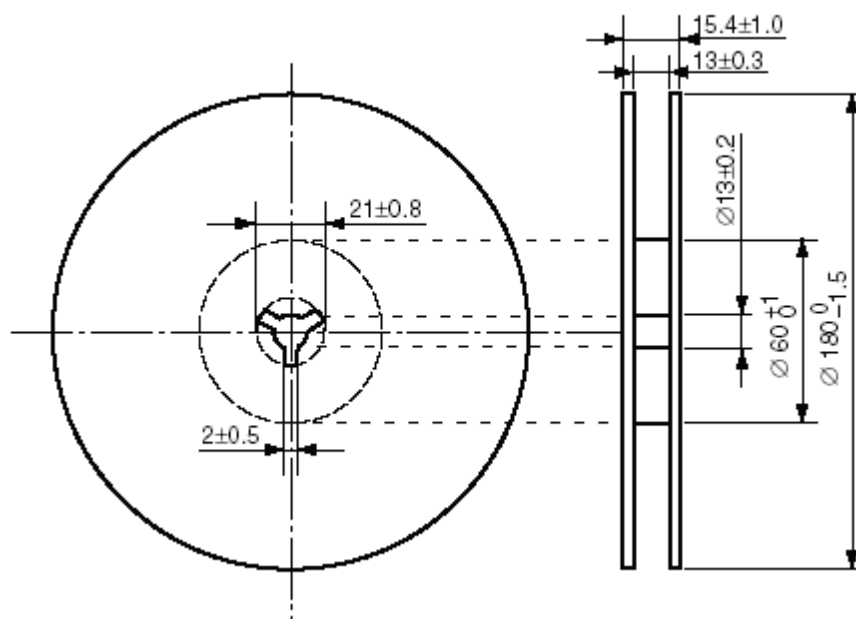
Load transient response ($V_{out}=3.0V$)



Package Outline:

Package	SOT-89-3	Devices per reel	1000	Unit	mm
Package Dimension:  The package drawing includes three views: top, side, and bottom. The top view shows a rectangular body with a central circular feature of diameter $\varnothing 1.0$. The overall width is 4.5 ± 0.1 mm, and the overall height is 4.25 MAX. mm. The side view shows a profile with a maximum height of 0.8 MIN. mm. The bottom view shows three mounting pads with dimensions 0.42 ± 0.2 mm, 1.5 ± 0.1 mm, and 0.47 ± 0.1 mm.					
Taping Specification: (M1: Standard Type, M2: Customized)  The taping specification drawing shows two views of the package: M1 (Standard Type) and M2 (Customized). The M1 view shows a package with a width of 2.5 MAX. mm and a height of 0.3 ± 0.1 mm. The M2 view shows a package with a width of 8.0 ± 0.1 mm and a height of 12 ± 0.3 mm. The M2 view also shows a central circular feature of diameter $\varnothing 1.6 \pm 0.1$ mm and a mounting pad of diameter $\varnothing 1.5 \pm 0.1$ mm.					

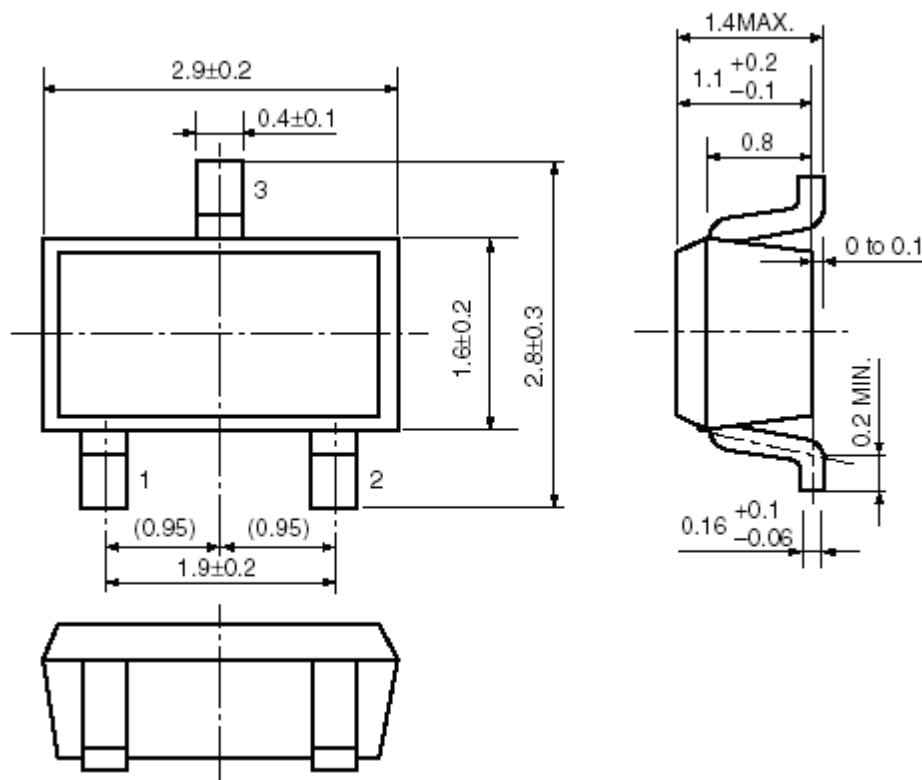
Taping Reel Dimension:



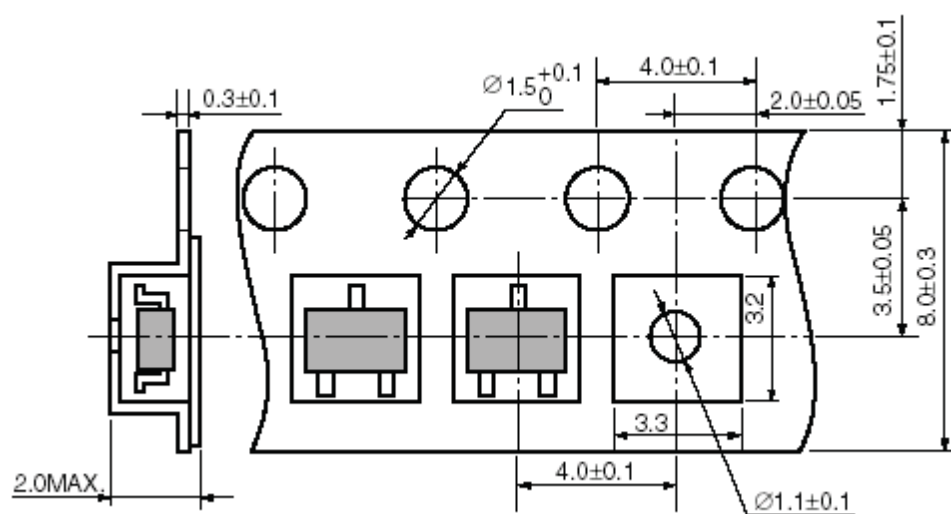
SOT-23-3:

Package	SOT-23-3	Devices per reel	3000	Unit	mm
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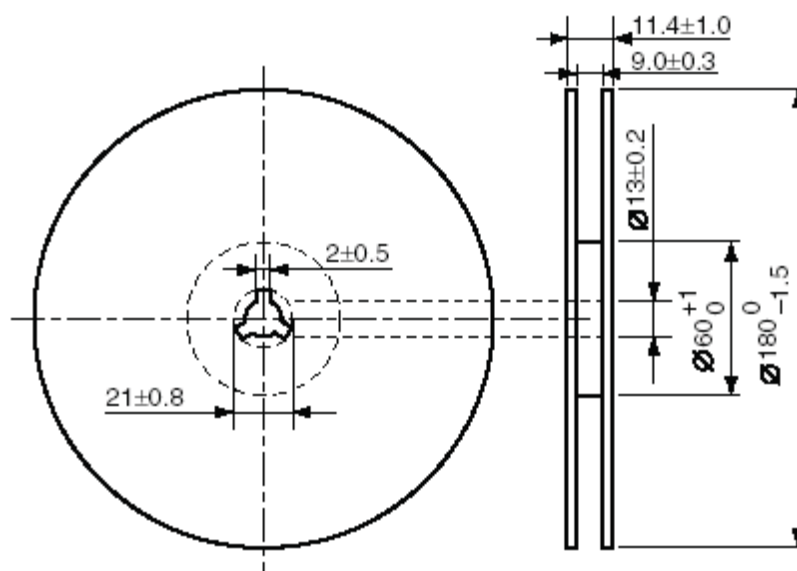
Package dimension:



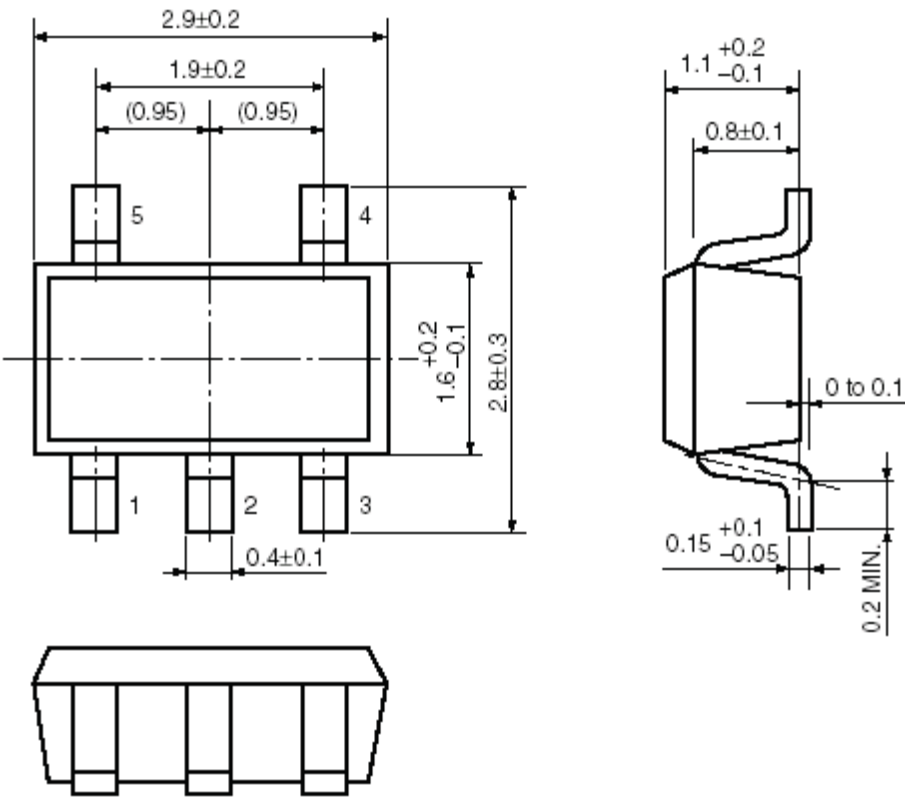
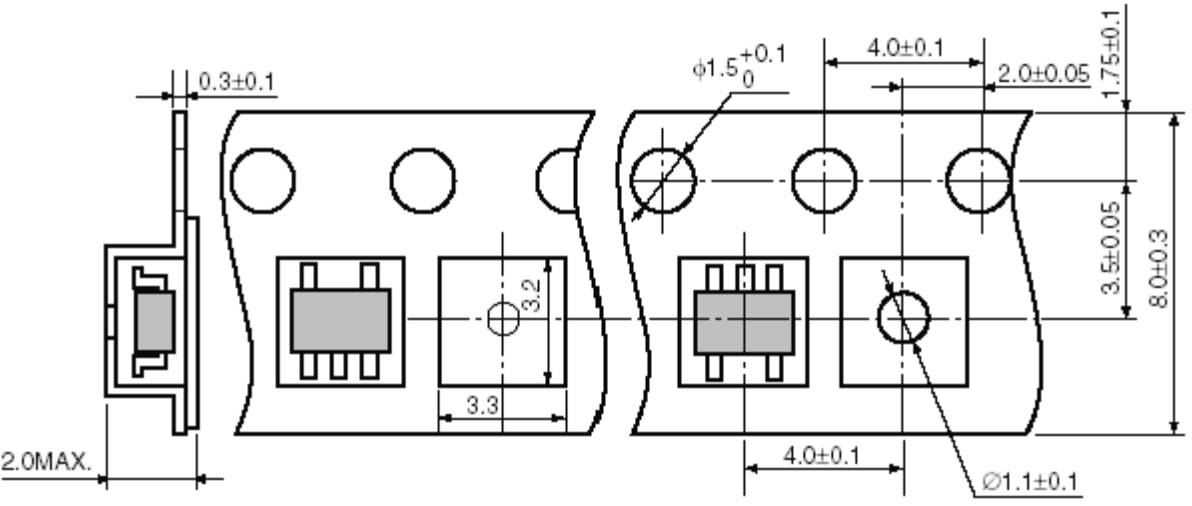
Taping Specification:



Taping reel dimension:



SOT-23-5:

Package	SOT-23-5	Devices per reel	3000	Unit	mm
Package specification: 					
Taping dimension: (M1: Standard Type , M2: Customized) 					

Taping reel dimension:

