上海贝岭 SHANGHAI BELLING

BL8503

250mA CMOS Low Dropout Voltage Low consumption Regulator

FEATURES

- Low power consumption: 3.0uA(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 ~ 10V
- Output voltage range: 1.2V~6.0V
  (customized on command in 0.1V steps)
- Highly accurate: ±2%(±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

DESCRIPTION

BL8503 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 BL8503 (I_Q=3.0uA) can greatly improve natural life of batteries.

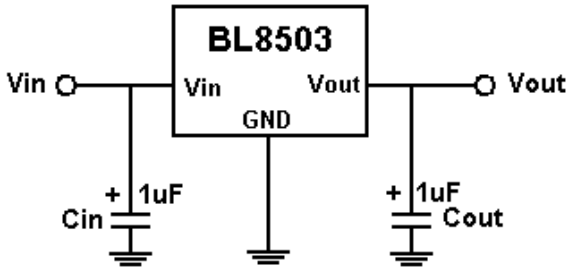
BL8503 can provide output value in the range of 1.2V~6.0V in 0.1V steps. It also can customized on command.

BL8503 includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module.

BL8503 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 ±2%.

BL8503 is available in SOT-89-3、SOT-23-3,TO-92 packages which is lead free，it also can available in these packages with lead.

TYPICAL APPLICATION

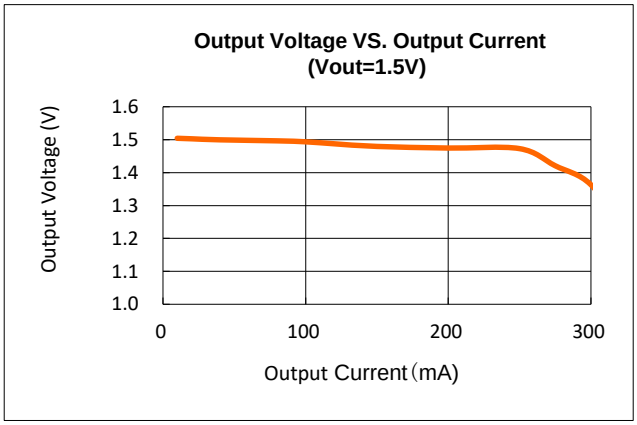


Note:

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

2) Output capacitor (C_{OUT}=1uF) is recommended in all application to assure the stability of circuit. Tantalum capacitor is recommended.

ELECTRICAL CHARACTERISTICS



SELECTION GUIDE

BL8503-XX X X X

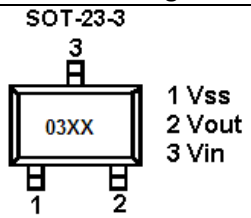
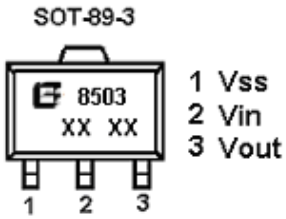
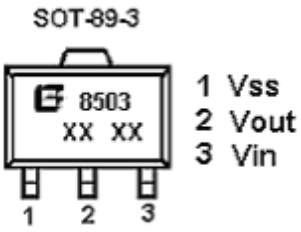
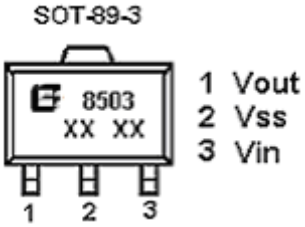
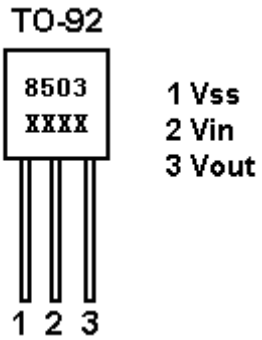
Packages：
RM：SOT-23-3
SM：SOT-89-3
(Default)
SA：SOT-89-3
SB：SOT-89-3
T：TO-92

Output accucy：
Default，±2%
1： ±1%
(customized)

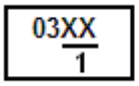
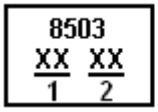
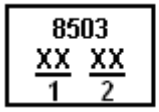
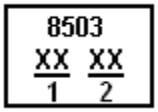
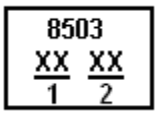
Temperature range：
P：Standard
(Default, lead free)
C：Standard
(customized)

Output Voltage：
12……1.2V
18……1.8V
21……2.1V
25……2.5V
28……2.8V
30……3.0V
33……3.3V
35……3.5V
40……4.0V
45……4.5V
……
50……5.0V
60……6.0V

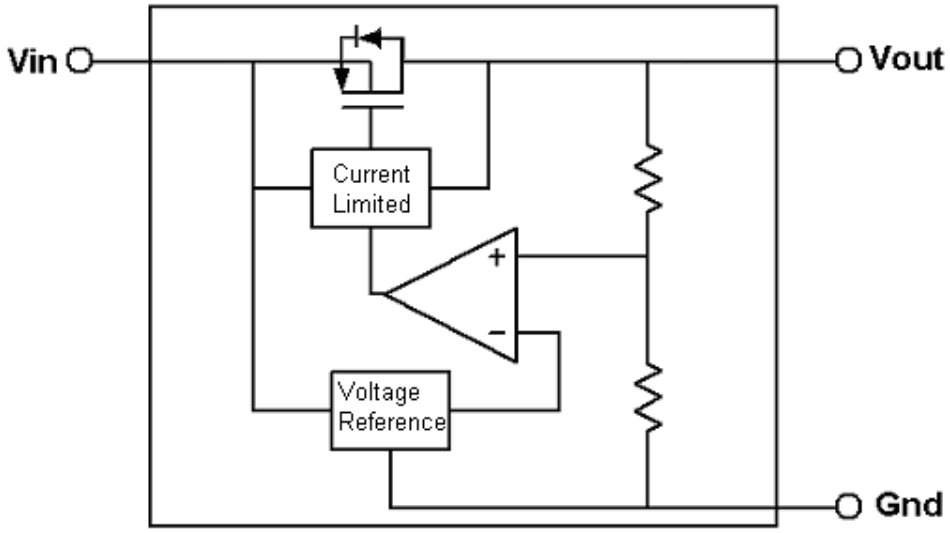
PIN ASSIGNMENT

Product classification	Pin configuration
BL8503-□□□PRM	
BL8503-□□□PSM	
BL8503-□□□PSA	
BL8503-□□□PSB	
BL8503-□□□PT	
Vss	Ground
Vin	Supply voltage input
Vout	Output voltage

PRODUCT CLASSIFICATION

Product Name	Output Voltage	Package Type	Package Marking
BL8503-12PRM	1.2V	SOT-23-3	 1 Output voltage
BL8503-15PRM	1.5V	SOT-23-3	
BL8503-21PRM	2.1V	SOT-23-3	
BL8503-25PRM	2.5V	SOT-23-3	
BL8503-30PRM	3.0V	SOT-23-3	
----------	----------	SOT-23-3	
BL8503-50PRM	5.0V	SOT-23-3	
BL8503-12PSM	1.2V	SOT-89-3	 1 Output voltage 2 Lot No.
BL8503-15PSM	1.5V	SOT-89-3	
BL8503-21PSM	2.1V	SOT-89-3	
BL8503-25PSM	2.5V	SOT-89-3	
BL8503-30PSM	3.0V	SOT-89-3	
----------	----------	SOT-89-3	
BL8503-50PSM	5.0V	SOT-89-3	
BL8503-12PSA	1.2V	SOT-89-3	 1 Output voltage 2 Lot No.
BL8503-15PSA	1.5V	SOT-89-3	
BL8503-21PSA	2.1V	SOT-89-3	
BL8503-25PSA	2.5V	SOT-89-3	
BL8503-30PSA	3.0V	SOT-89-3	
----------	----------	SOT-89-3	
BL8503-50PSA	5.0V	SOT-89-3	
BL8503-12PSB	1.2V	SOT-89-3	 1 Output voltage 2 Lot No.
BL8503-15PSB	1.5V	SOT-89-3	
BL8503-21PSB	2.1V	SOT-89-3	
BL8503-25PSB	2.5V	SOT-89-3	
BL8503-30PSB	3.0V	SOT-89-3	
----------	----------	SOT-89-3	
BL8503-50PSB	5.0V	SOT-89-3	
BL8503-12PT	1.2V	TO-92	 1 Output voltage 2 Lot No.
BL8503-15PT	1.5V	TO-92	
BL8503-21PT	2.1V	TO-92	
BL8503-25PT	2.5V	TO-92	
BL8503-30PT	3.0V	TO-92	
----------	----------	TO-92	
BL8503-50PT	5.0V	TO-92	

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATING

Parameter		Value
Max input voltage		10V
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)		-40°C -150°C
Lead temperature & time		260°C,10S

Note:

Exceed these limits to damage to the device.

Exposure to absolute maximum rating conditions may affect device reliability.

RECOMMENDED WORK CONDITIONS

Item	Min	Recommended	Max.	Unit
Input voltage range			8	V
Ambient temperature	-40		85	°C

ELECTRICAL CHARACTERISTICS

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

BL8503-1.5V

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IN}	Input voltage				8	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

$\frac{\Delta Vout}{\Delta Vin \cdot Vout}$	Line regulation	I_{OUT}=40mA 1.6V≤V_{IN}≤8V		0.2	0.3	%/V
$\Delta Vout$	Load regulation	V_{IN}=2.5V 1mA≤I_{OUT}≤100mA		20	40	mV
I_Q	Quiescent current	V_{IN}=2.5V		3.0	5.0	uA
$\frac{\Delta Vout}{\Delta T \cdot Vout}$	Output voltage temperature coefficient	I_{OUT}=10mA		50		ppm/°C

BL8503-1.8V

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IN}	Input voltage				8	V
V_{OUT}	Output voltage		1.764	1.8	1.836	V
I_{OUT} (Max.)	Maximum output current	V_{IN}=2.8V,V_{OUT}>1.764	250			mA
Dropout Voltage	Input-output voltage differential	I_{OUT}=100mA		270	400	mV
$\frac{\Delta Vout}{\Delta Vin \cdot Vout}$	Line regulation	I_{OUT}=40mA 2V≤V_{IN}≤8V		0.2	0.3	%/V
$\Delta Vout$	Load regulation	V_{IN}=2.8V 1mA≤I_{OUT}≤100mA		20	40	mV
I_Q	Quiescent current	V_{IN}=2.8V		3.0	5.0	uA
$\frac{\Delta Vout}{\Delta T \cdot Vout}$	Output voltage temperature coefficient	I_{OUT}=10mA		50		ppm/°C

BL8503-2.8V

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IN}	Input voltage				8	V
V_{OUT}	Output voltage		2.744	2.8	2.856	V
I_{OUT} (Max.)	Maximum output current	V_{IN}=4V,V_{OUT}>2.744V	250			mA
Dropout Voltage	Input-output voltage differential	I_{OUT}=100mA		170	300	mV
		I_{OUT}=200mA		320	500	
$\frac{\Delta Vout}{\Delta Vin \cdot Vout}$	Line regulation	I_{OUT}=40mA 3V≤V_{IN}≤8V		0.2	0.3	%/V
$\Delta Vout$	Load regulation	V_{IN}=3.8V 1mA≤I_{OUT}≤100mA		20	40	mV
I_Q	Quiescent current	V_{IN}=3.8V		3.0	5.0	uA
$\frac{\Delta Vout}{\Delta T \cdot Vout}$	Output voltage temperature coefficient	I_{OUT}=10mA		50		ppm/°C

BL8503-3.0V

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IN}	Input voltage				8	V
V_{OUT}	Output voltage		2.94	3.0	3.06	V
I_{OUT} (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	
$\frac{\Delta Vout}{\Delta Vin \cdot Vout}$	Line regulation	I_{OUT}=40mA 3.2V≤V_{IN}≤8V		0.2	0.3	%/V
$\Delta Vout$	Load regulation	V_{IN}=4.0V 1mA≤I_{OUT}≤100mA		20	40	mV
I_Q	Quiescent current	V_{IN}=4V		3.0	5.0	uA
$\frac{\Delta Vout}{\Delta T \cdot Vout}$	Output voltage temperature coefficient	I_{OUT}=10mA		50		ppm/°C

BL8503-5.0V

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IN}	Input voltage				8	V
V_{OUT}	Output voltage		4.9	5.0	5.1	V
I_{OUT} (Max.)	Maximum output current	V_{IN}=6V,V_{OUT}>4.9V	250			mA
Dropout Voltage	Input-output voltage differential	I_{OUT}=100mA		170	300	mV
		I_{OUT}=200mA		320	500	
$\frac{\Delta Vout}{\Delta Vin \cdot Vout}$	Line regulation	I_{OUT}=40mA 5.2V≤V_{IN}≤8V		0.2	0.3	%/V
$\Delta Vout$	Load regulation	V_{IN}=6.0V 1mA≤I_{OUT}≤100mA		20	40	mV
I_Q	Quiescent current	V_{IN}=6V		3.0	5.0	uA
$\frac{\Delta Vout}{\Delta T \cdot Vout}$	Output voltage temperature coefficient	I_{OUT}=10mA		50		ppm/°C

EXPLANATION

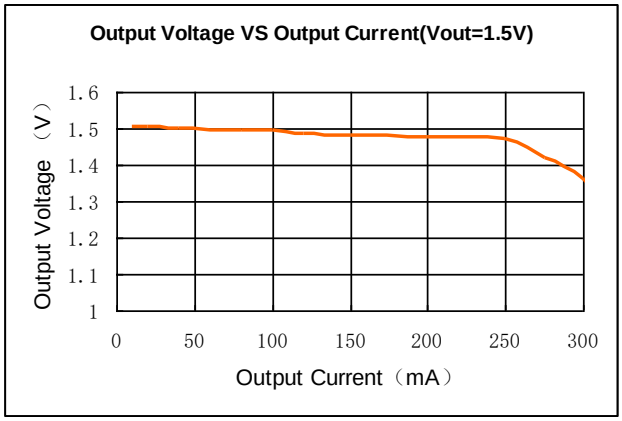
BL8503 is a series of low dropout voltage and low power consumption three pins regulator. Its application circuit is very simple, which only needs two outside capacitors. It is composed of these modules: high accuracy voltage reference, current limit circuit, error amplifier, output driver and power transistor.

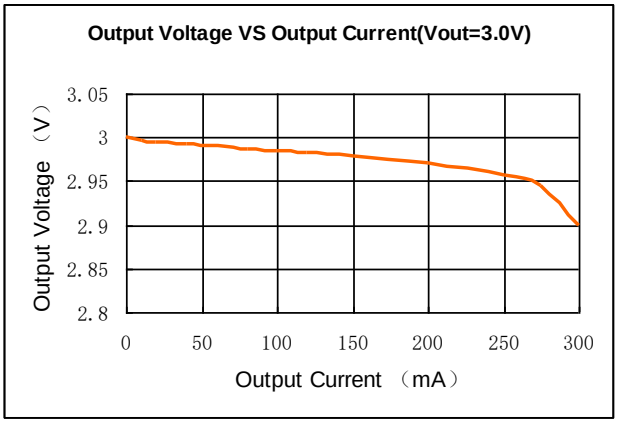
Current Limit module can keep chip and power system away from danger when load current is more than 250mA.

BL8503 uses trimming technique to assure the accuracy of output value within±2%, at the same time, temperature compensated is elaborately considered in this chip, which makes BL8503's temperature coefficient within 50ppm/℃。

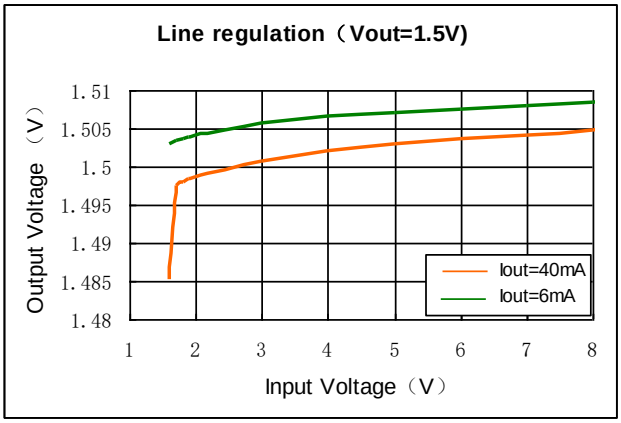
TYPICAL PERFORMANCE CHARACTERISTICS

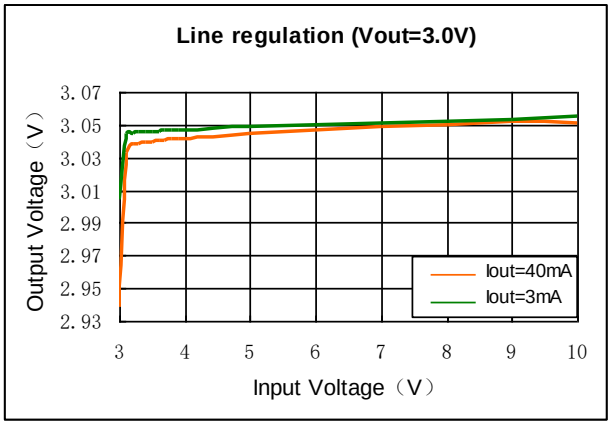
1.Load regulation



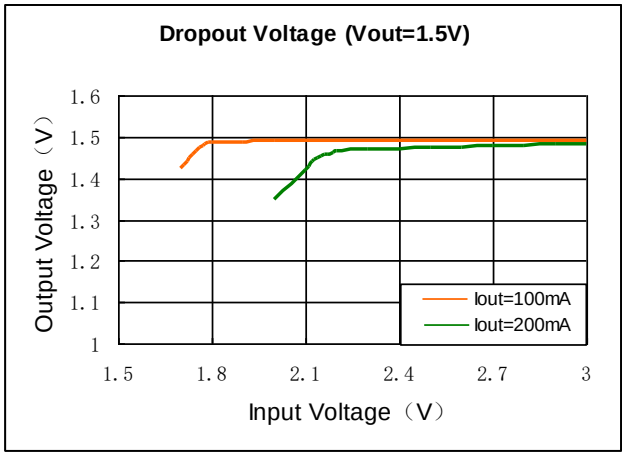


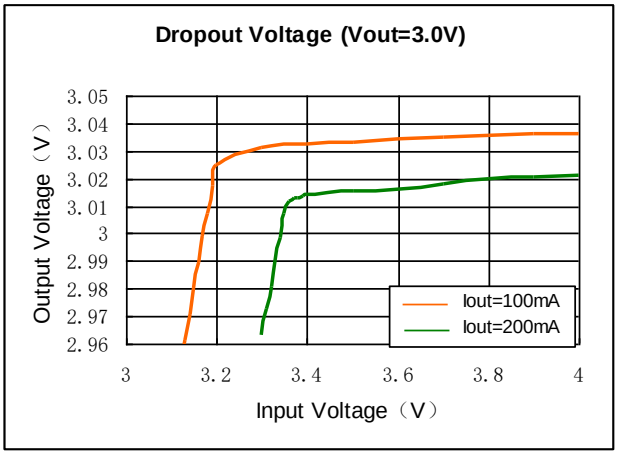
2.Line Regulation



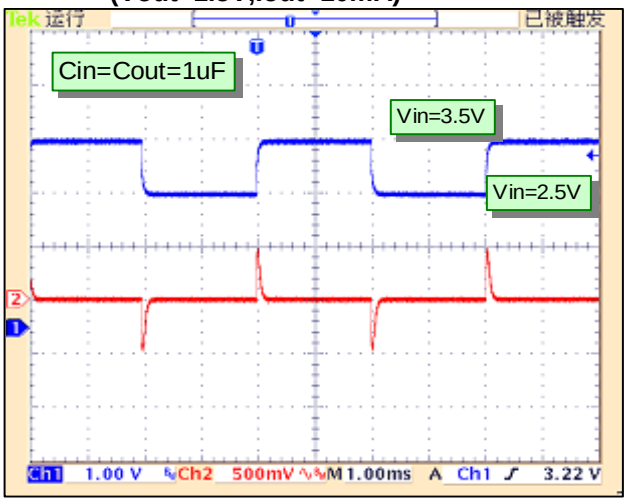


3.Dropout Voltage

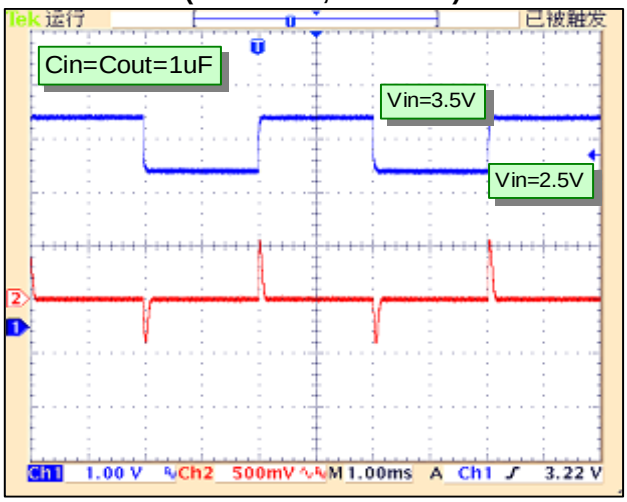




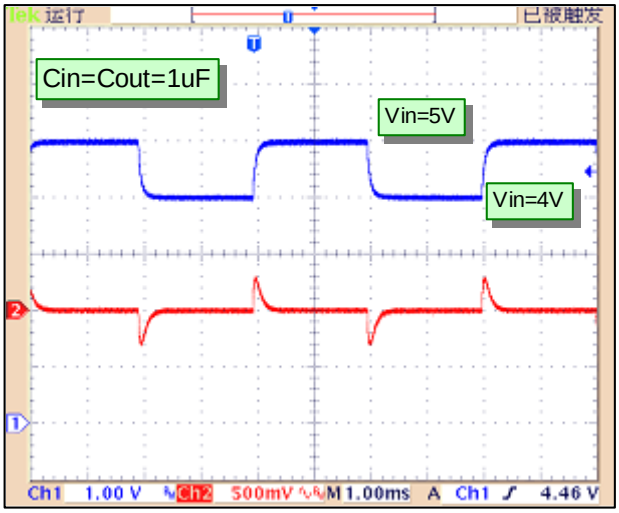
4. Input Voltage transient response (Vout=1.5V,Iout=10mA)



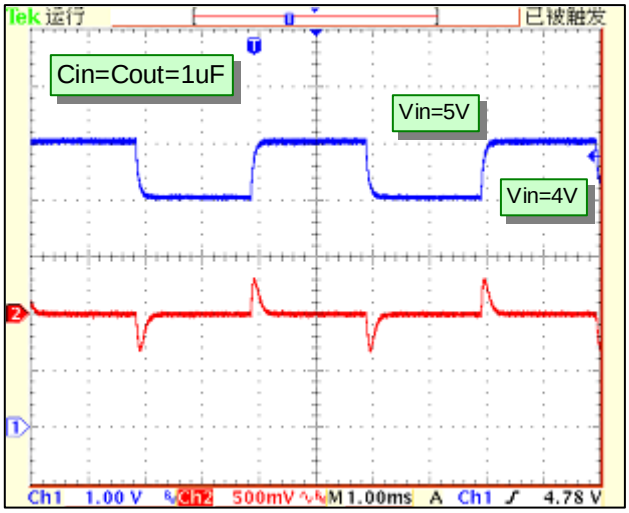
Input Voltage transient response (Vout=1.5V,Iout=1mA)



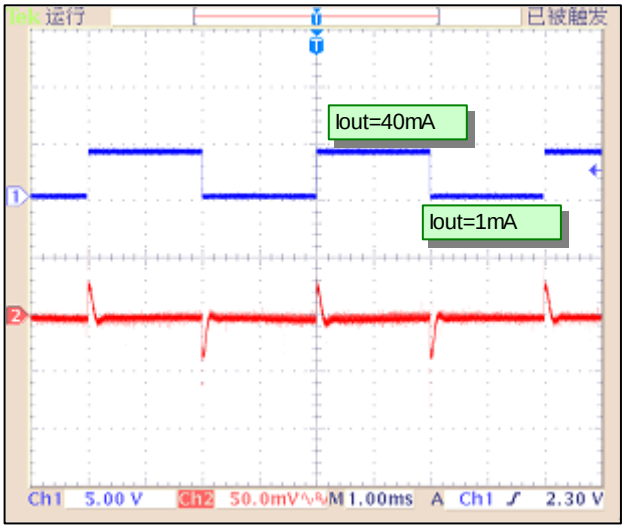
Input Voltage transient response (Vout=3.0V,Iout=10mA)



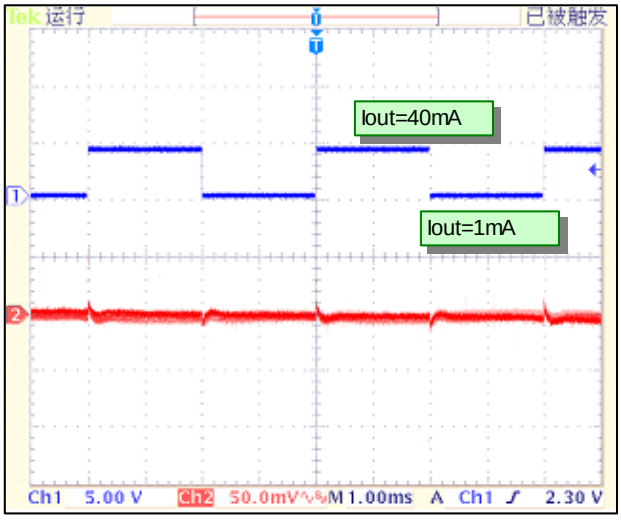
Input Voltage transient response (Vout=3.0V,Iout=1mA)



5. Load transient response (Vout=1.5V)



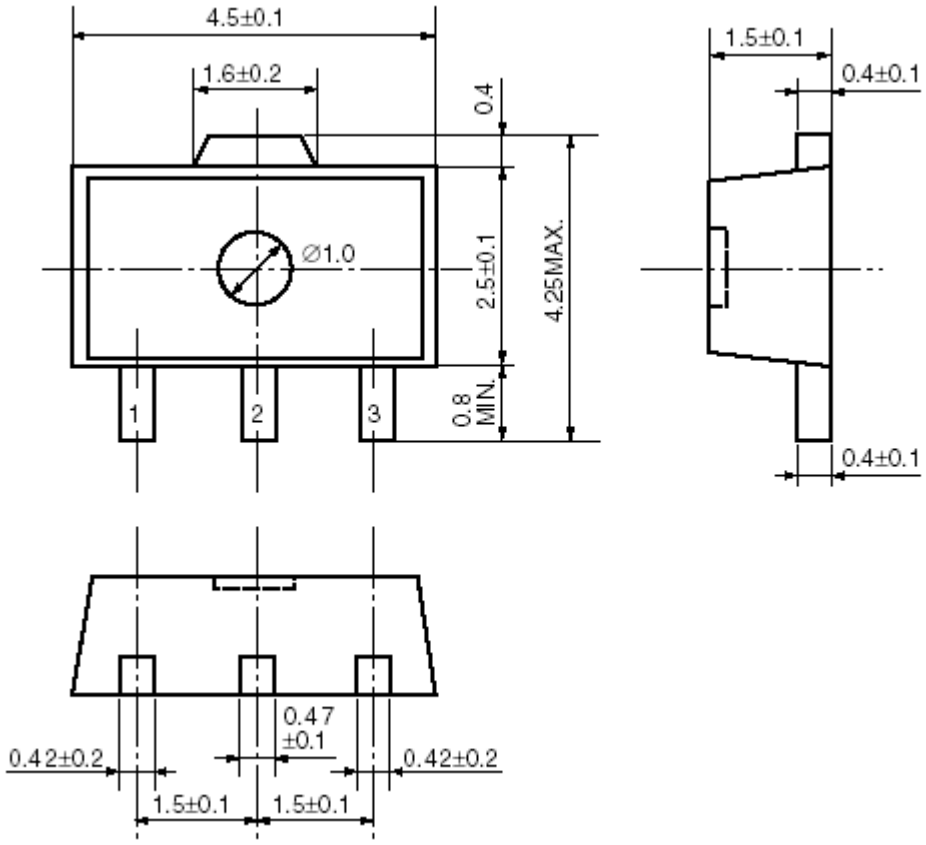
Load transient response (Vout=3.0V)



PACKAGE OUTLINE

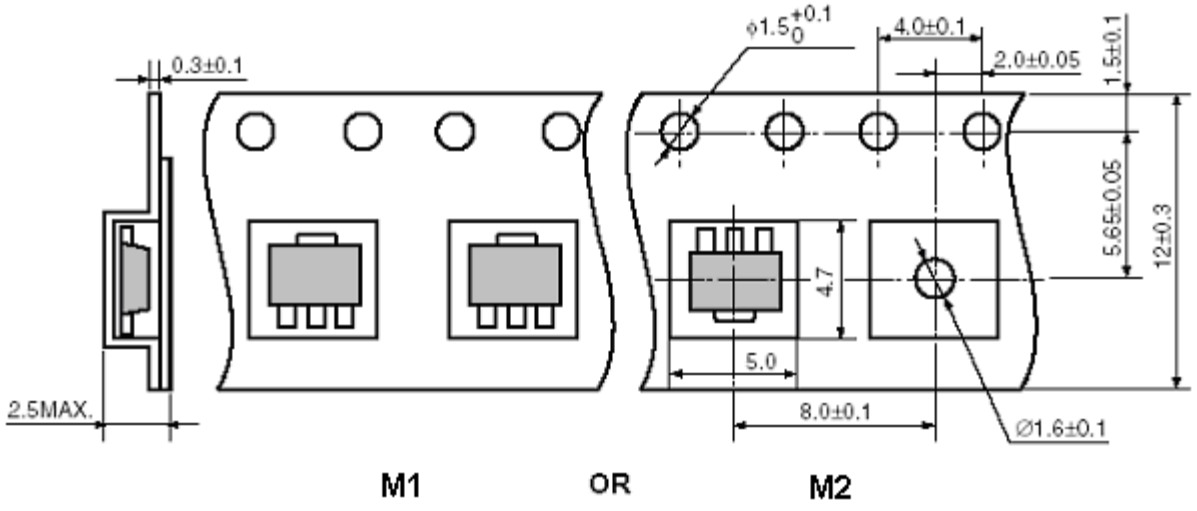
Package	SOT89-3	Devices per reel	1000Pcs

Package dimension：

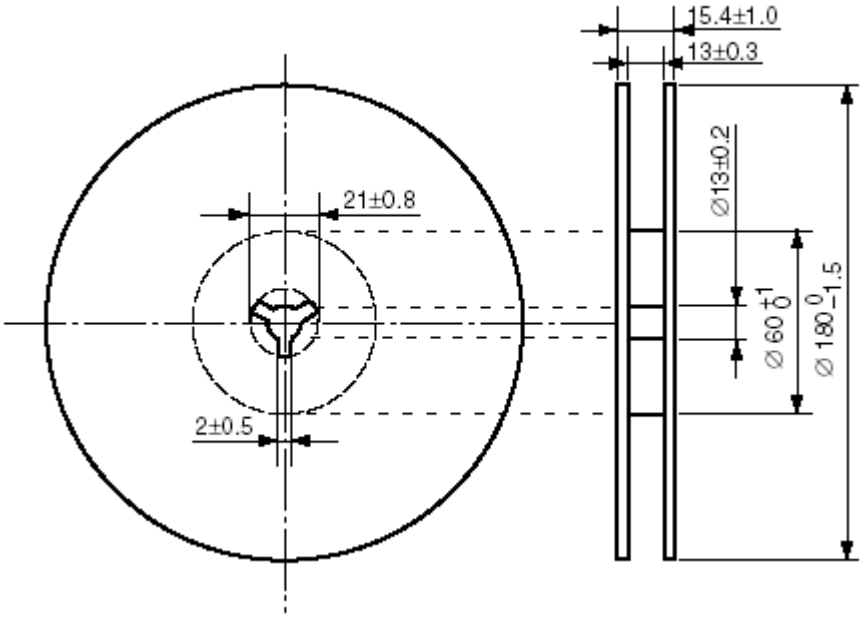


Unit: mm

Taping specification: (M1： Standard Type， M2： Customized)

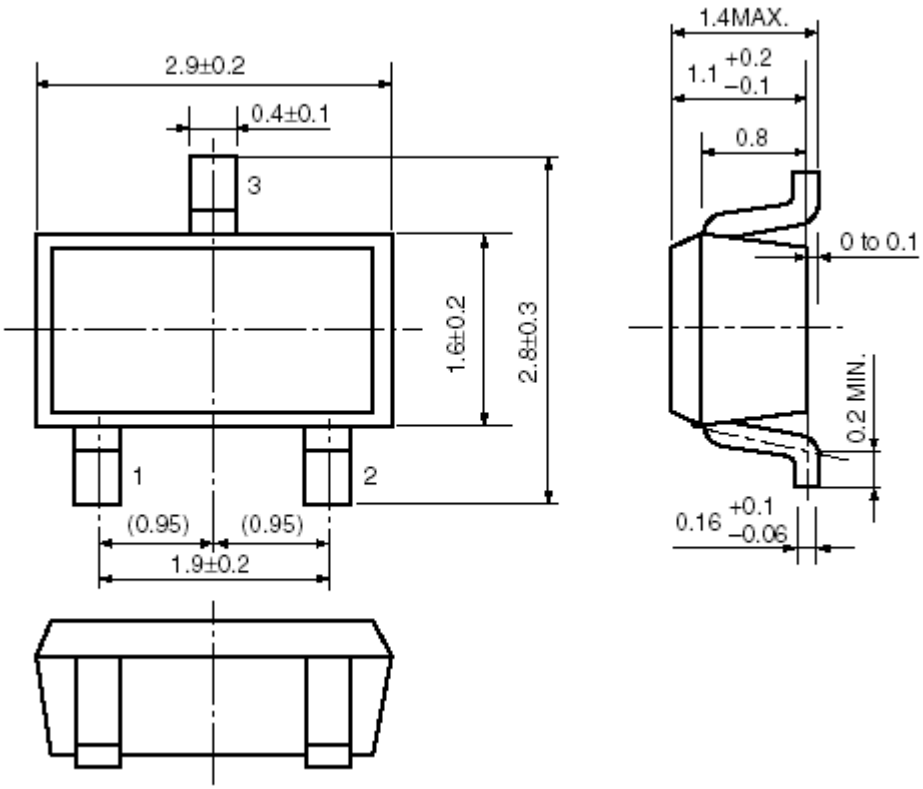


Taping reel dimension:



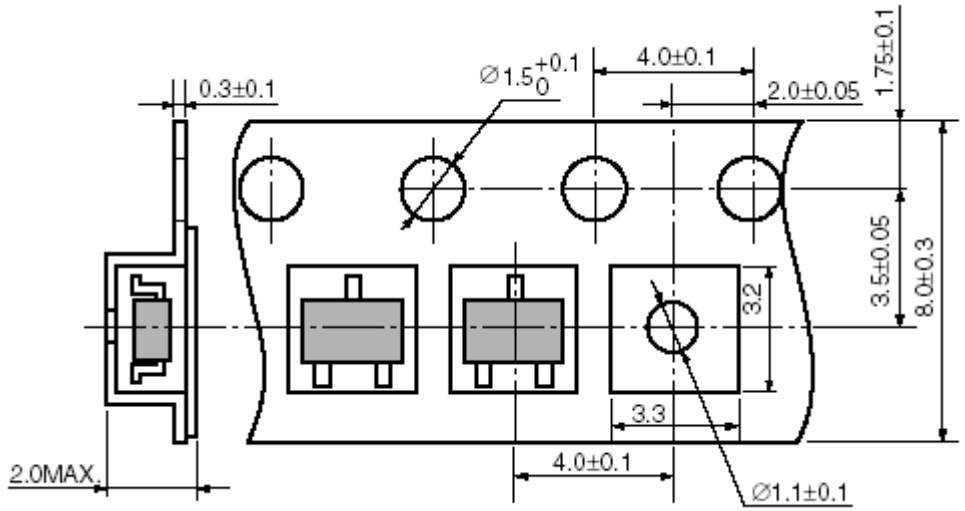
Package	SOT23-3	Devices per reel	3000pcs

Package dimension：

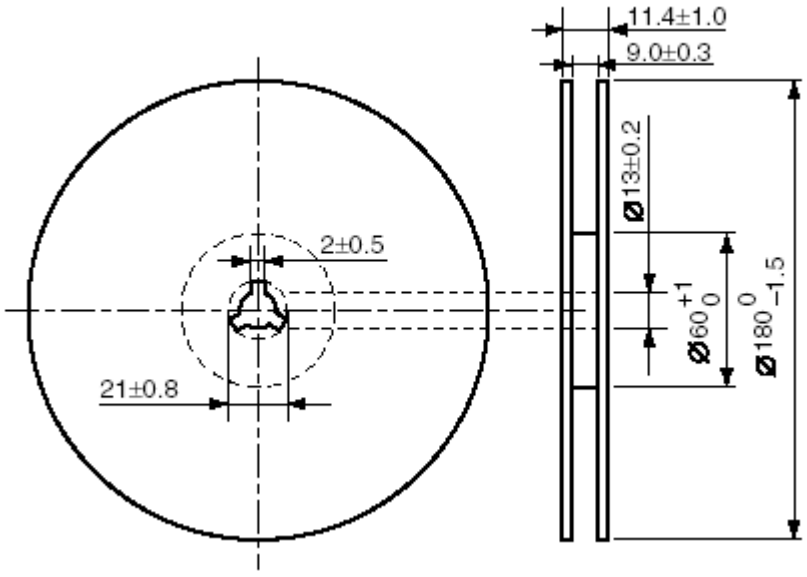


Unit: mm

Taping specification:

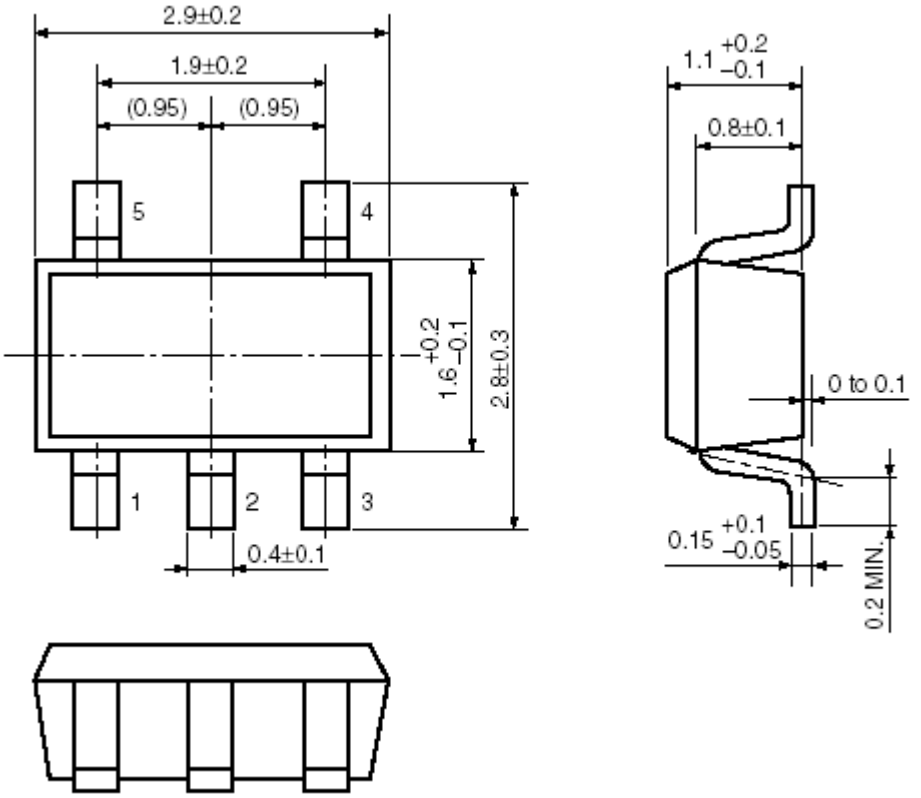


Taping reel dimension:



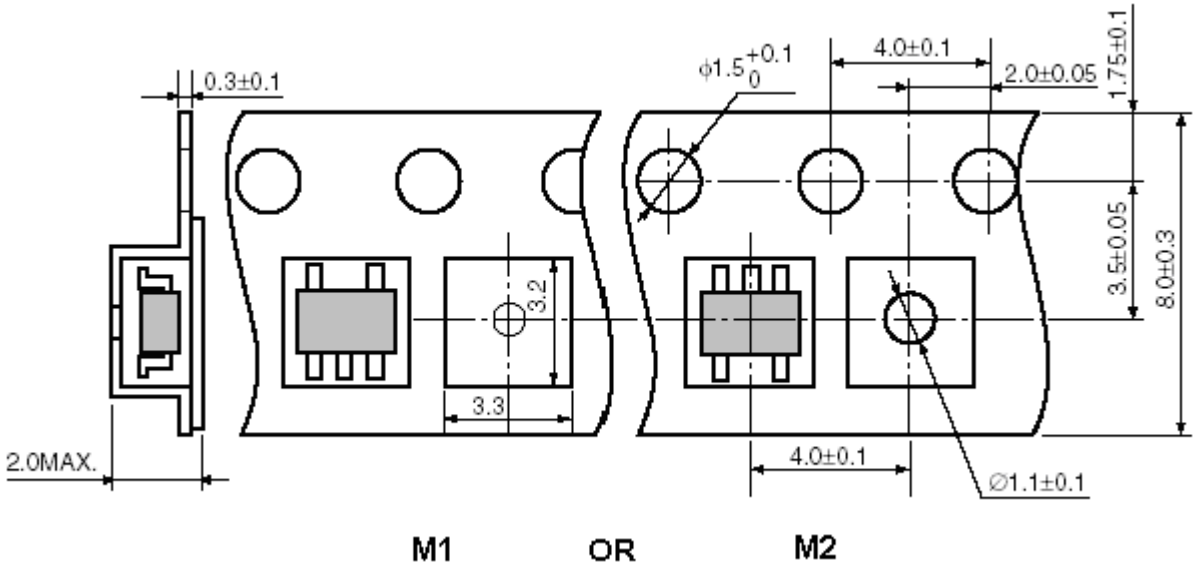
Package	SOT23-5	Devices per reel	3000pcs

Package dimension：



Unit: mm

Taping specification: (M1： Standard Type， M2： Customized)



Taping reel dimension: