AP2201

Chipown

Super Small Package
PFM Control Step-Up Switching Regulator

General Description

The AP2201 Series is a CMOS PFM-control step-up switching regulator that mainly consists of a reference voltage source, an oscillator, and a comparator, enabling products with a low ripple over a wide range, high efficiency, and high output current. Products with a fixed duty ratio of 75 %（Lower Output Voltage）or 88%(Higher Output Voltage) are also available. With the AP2201 Series, a step-up switching regulator can be configured by using an external coil, capacitor, and diode. A protection circuit turns off the built-in MOS FET when the voltage at the CONT pin exceeds the limit to prevent it from being damaged. This feature, along with the mini package and low current consumption, makes the AP2201 Series ideal for applications such as the power supply unit of portable equipment.

Features

- ˙Low voltage operation: Startup at 0.9 V min
                                (Iout 1 mA) guaranteed
- ˙Low input current: 2.3uA (Vout 3.3 V)

- Duty ratio: 75 % Built-in fixed-type PFM controller
- External parts: Coil, capacitor, and diode
- Output voltage: Settable to between 1.5 to 6.0V accuracy of 2%

Applications

- Power supply for portable equipment such as digital cameras, electronic notebooks, and PDA
- Power supply for audio equipment such as portable CD/MD players
- Constant voltage power supply for cameras, video equipment, and communications equipment
- Power supply for microcomputers

Package

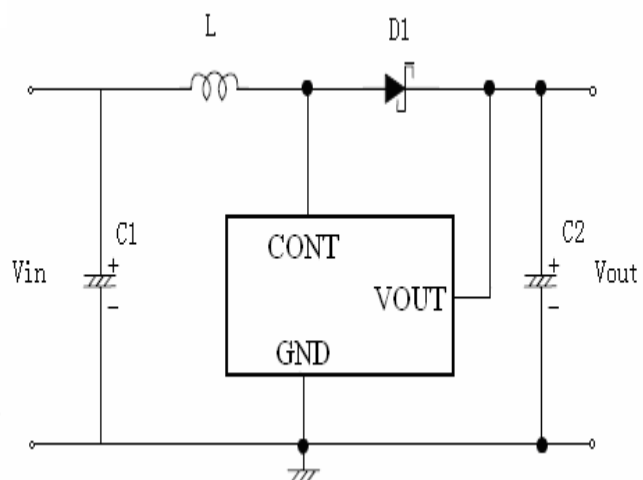- S0T-23-3
- SOT-89-3

Block Diagram
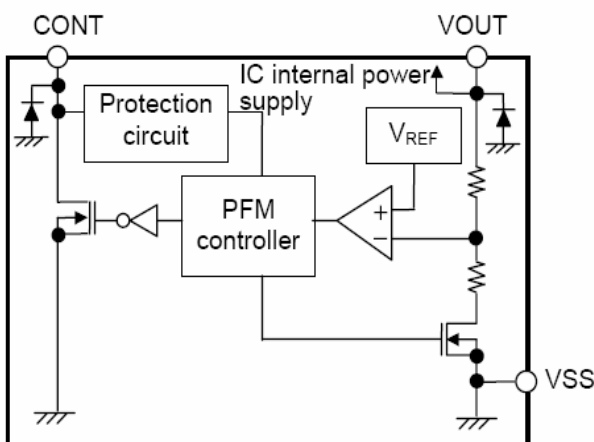
Application Circuit

Figure 1

AP2201

Chipown

Absolute Maximum Ratings

PARAMETER	SYMBOL		MAXIMUM RATING	UNIT
Input voltage	VDD		Vss-0.3～Vss+10	
Output voltage	VOUT		Vss-0.3～Vss+10	V
	VCONT		Vss-0.3～Vss+10	
Output Current	ILX		300	mA
Power dissipation	PD	SOT-23-3	150	mW
		SOT-89-3	500	
Operating ambient temperature	Topr		-40～＋80	℃
Storage ambient temperature	Tstg		-40～＋125	

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

Electrical Characteristics

(Ta 25℃ unless otherwise specified)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Test circuit
Output voltage	VOUT	-	VOUT(s)×0.98	VOUT(s)	VOUT(S)×1.02	V	1
Input Voltage	VIN	-	-	-	10		
Operation start voltage	VST1	IOUT=1mA	-	-	0.9		
OSC start voltage	VST2	No external parts, Voltage applied to VOUT, CONT pin pulled up to VOUT via 300 Ωresistor	-	-	0.8		2
Input current without load	IIN	IOUT＝0	－	9.0	－	uA	1
Current consumption 1	ISS1	VOUT＝Output voltage ×0.95		23.2	38.6	uA	2
Current consumption 2	ISS2	VOUT＝Output voltage ＋0.5	－	2.9	4.4		
Switching current	ISW	VCONT=0.4V	65.0	118.2	－	mA	
LX pin limit voltage	VLXLMT	Apply to LX pin, Confirm oscillation stop	－	0.9	－	V	
Line regulation	△VOUT1	VIN＝VOUT（S）×0.4～0.6	－	30	60	mV	1
Load regulation	△VOUT2	IOUT=10uA～ VOUT(S)/250×1.25	－	30	60		

Output voltage temperature coefficient	△VOUT △Ta*VOUT	Ta=-40℃～＋85℃	—	±50	—	ppm /℃	2
Maximum oscillation frequency	fosc	VOUT＝Output voltage×0.95，Measured waveform at CONT pin	280	330	370	kHz	
Duty ratio	Duty	VOUT＝Output voltage×0.95，Measured waveform at CONT pin	70	75	80	%	
			84	88	92		
Efficiency	EFFI	—	—	88	—	%	1

Remarks   VOUT(S) specified above is the set output voltage value, and VOUT is the typical value of the actual output voltage.

Test Circuits
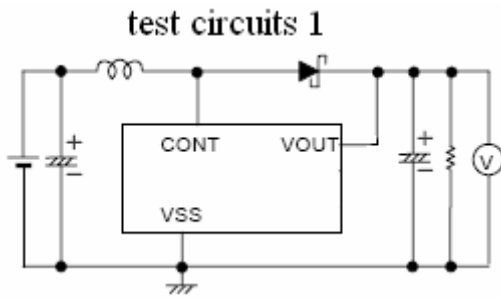
Figure 2
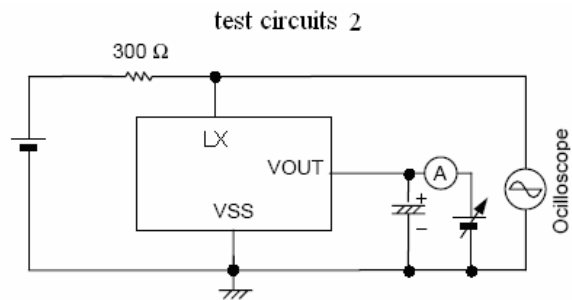
Figure 3

Typical Application Circuit
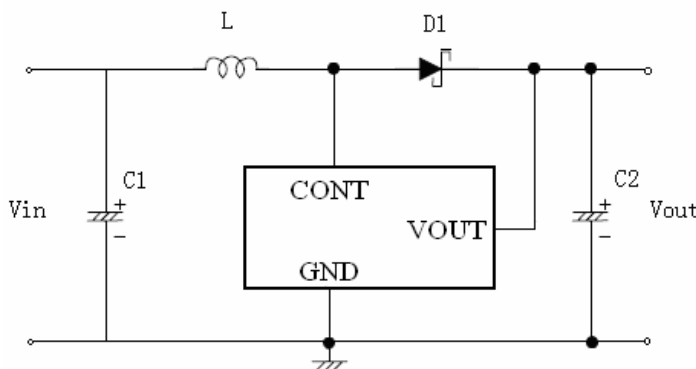
Components Normal Value：
C1   10uF
C2   47uF
 L   47uH
D1   1N5818
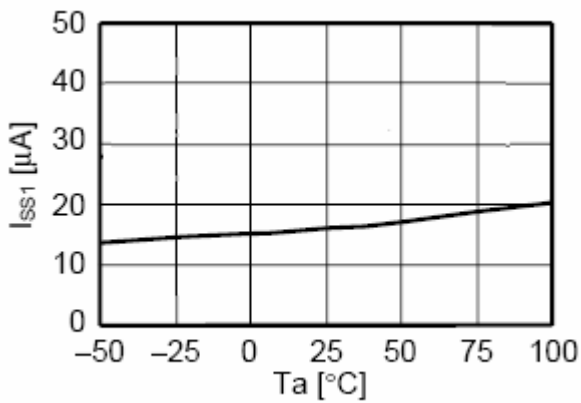
Figure 4

Typical Performance Characteristics

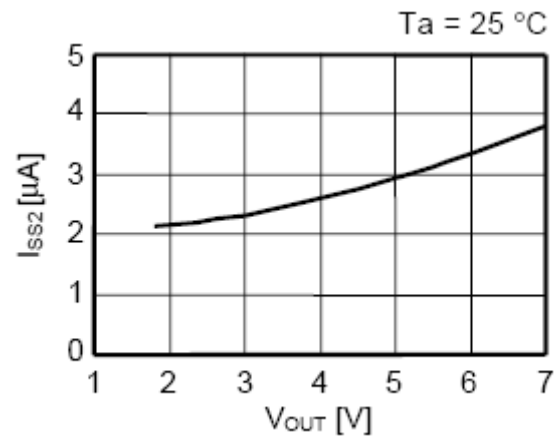1．Input voltage vs. Power Supply Input Current at No Load
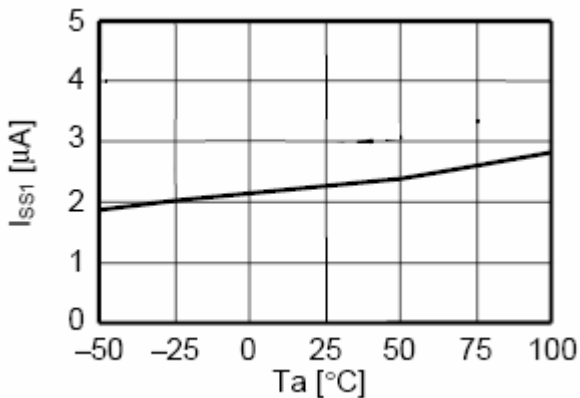

3. Temperature vs. Current consumption 1
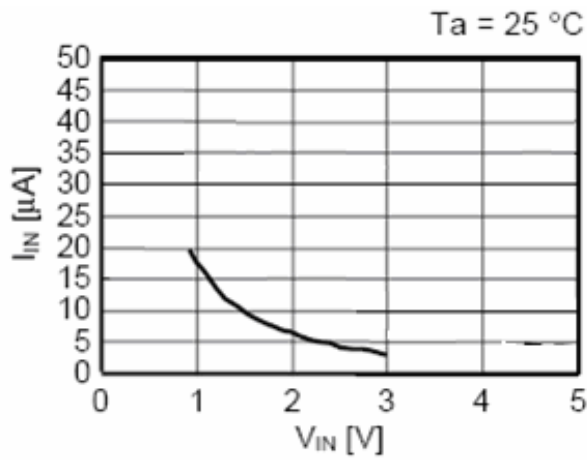
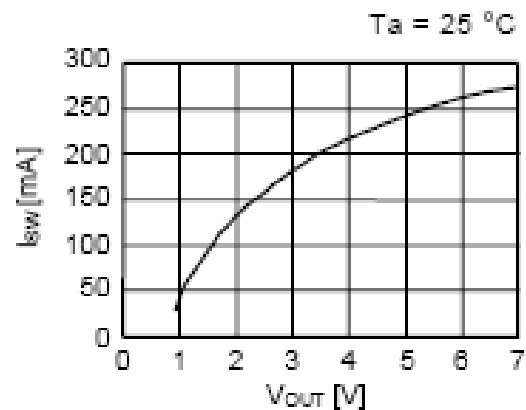5．Temperature vs. Current consumption 2
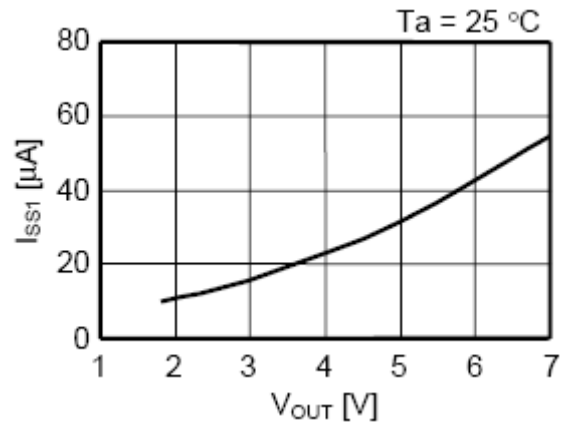
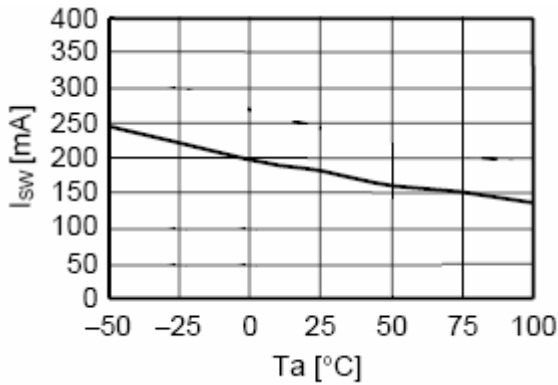

2. Output Voltage vs. Current Consumption 1
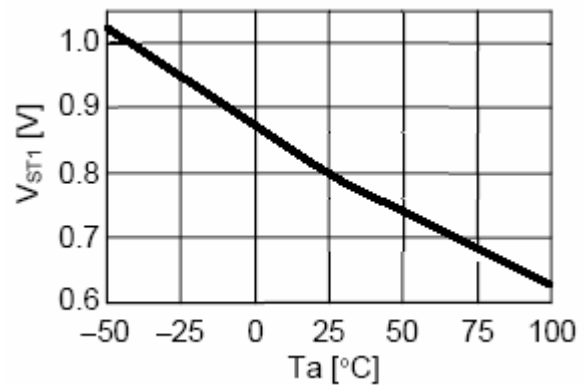

4.Output Voltage vs. Current consumption 2

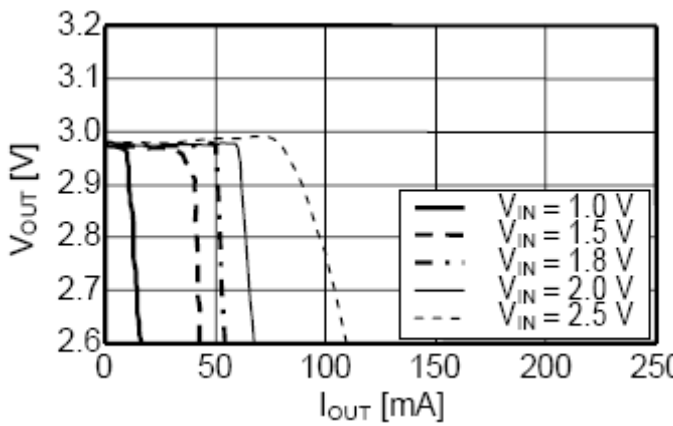6. Output Voltage vs. Switching Current
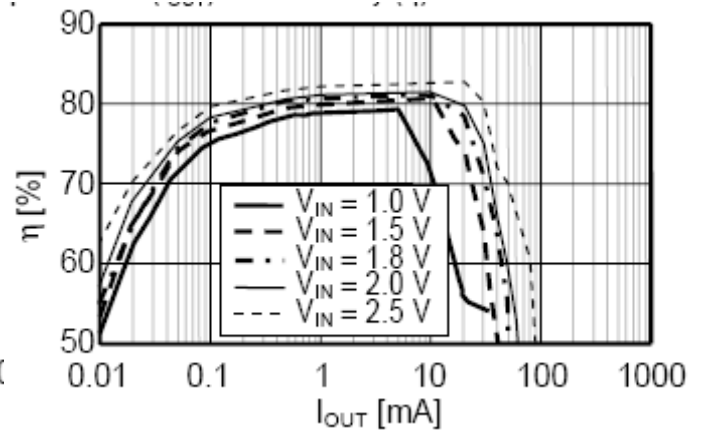
7. Temperature vs. Switching Current
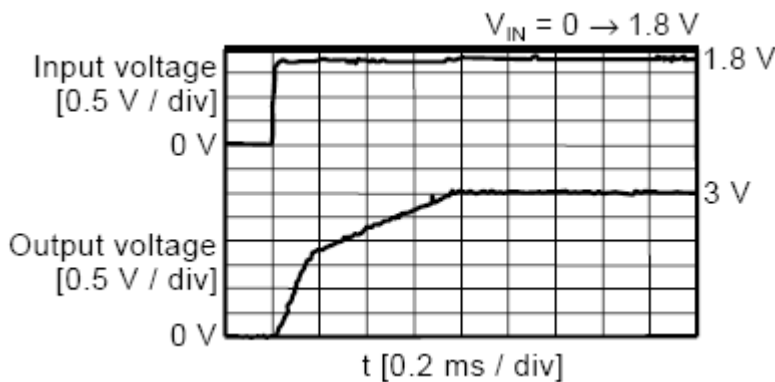

8. Temperature vs. Operation Start Voltage
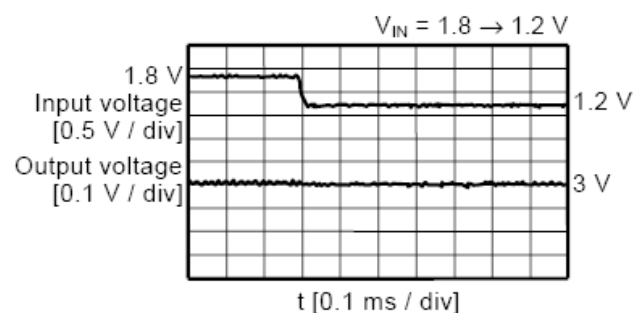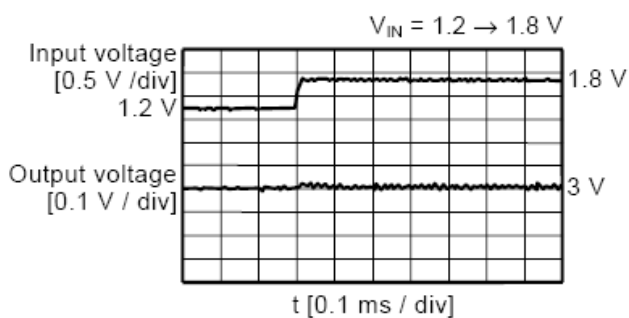

9. Output Current vs. Output Voltage
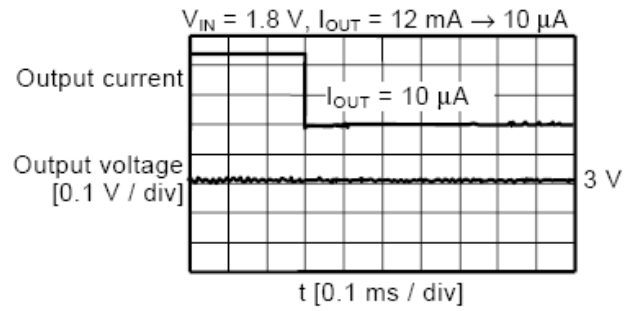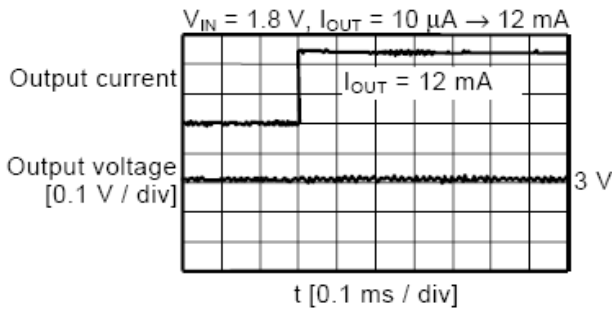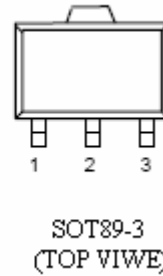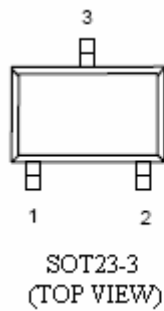

10. Output Current vs. Efficiency

11. Power On

12. Power Supply Voltage Fluctuation(Ta=25℃,RL=250Ω)

13. Load Current Fluctuation(Ta=25℃)

Pin Configuration

SOT23-3
(TOP VIEW)

SOT89-3
(TOP VIWE)

Remark Please contact the marketing department for other packages.

Pin Assignment

PIN MUMBER		PIN NAME	FUNCTION
SOT23-3	SOT89-3		
3	2	Vout	OUTPUT
1	1	Vss	GROUND
2	3	CONT	EXTERNAL COIL CONNECTION

Ordering Information

AP2201P②③④⑤⑥
①

DESIGNATOR	SYMBOL	DESCRIPTION	DESIGNATOR	SYMBOL	DESCRIPTION
①	01	Indicates the product number	④	2	Output Voltage Accuracy e.g. 2: ±2%
②③	15～70	Output Voltage e.g. 30:3.0V 50:5.0V	⑤	M	SOT23-3
				P	SOT89-3
			⑥	R	Embossed Tape :Standard Feed
				L	Embossed Tape :Reverse Feed

AP2201

Chipown

Marking

- **SOT23-3,SOT89-3**
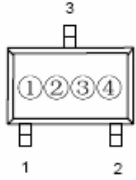
SOT23-3 (TOP VIEW)   SOT89-3 (TOP VIWE)
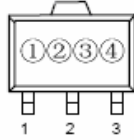
① Represents the product name

SYMBOL	PRODUCT NAME
A	AP2201P*****

② Represents the type of regulator

VOLTAGE(V)	0.1～3.0	3.1～6.0
SYMBOL	5	6

③ Represents the Output Voltage

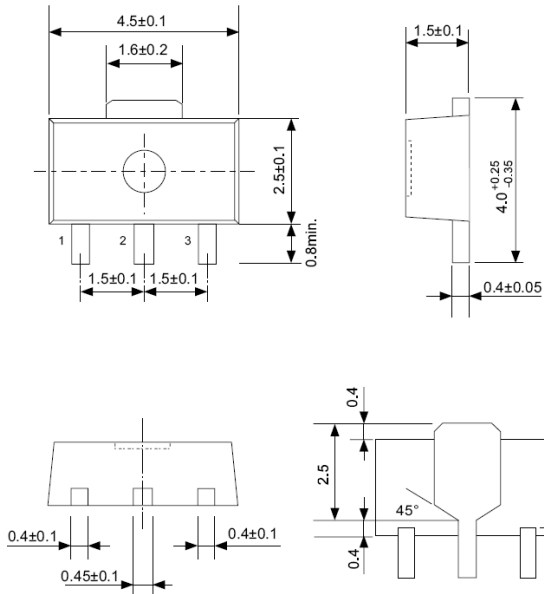| SYMBOL	OUTPUT VOLTAGE（V）			SYMBOL	OUTPUT VOLTAGE（V）		
0	-	3.1	-	F	1.6	4.6	-
1	-	3.2	-	H	1.7	4.7	-
2	-	3.3	-	K	1.8	4.8	-
3	-	3.4	-	L	1.9	4.9	-
4	-	3.5	-	M	2	5.0	-
5	-	3.6	-	N	2.1	5.1	-
6	-	3.7	-	P	2.2	5.2	-
7	-	3.8	-	R	2.3	5.3	-
8	-	3.9	-	S	2.4	5.4	-
9	-	4	-	T	2.5	5.5	-
A	-	4.1	-	U	2.6	5.6	-
B	-	4.2	-	V	2.7	5.7	-
C	-	4.3	-	X	2.8	5.8	-
D	-	4.4	-	Y	2.9	5.9	-
E	1.5	4.5	-	Z	3	6.0	-

④Represents the assembly lot No.

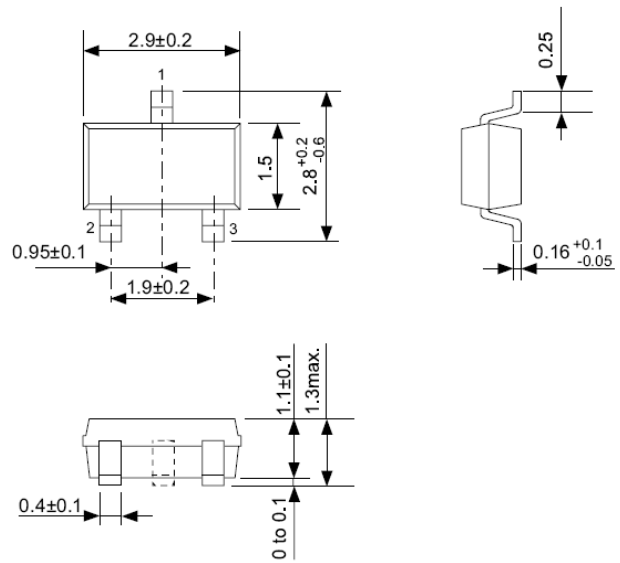0～9，A～Z repeated (G,I,J,O,Q,W expected)

Chipown

Packaging Information

SOT-89-3

SOT23-3

IMPORTANT NOTICE

Chipown Microelectronics Co. Ltd. reserves the right to make changes without further notice to any products or specifications herein. Chipown Microelectronics Co. Ltd. does not assume any responsibility for use of any its products for any particular purpose, nor does Chipown Microelectronics Co. Ltd assume any liability arising out of the application or use of any its products or circuits. Chipown Microelectronics Co. Ltd does not convey any license under its patent rights or other rights nor the rights of others.