



# LC1210

REV1.9-Revised June 2013

## 200mA Low Consumption Linear Regulator

### DESCRIPTION

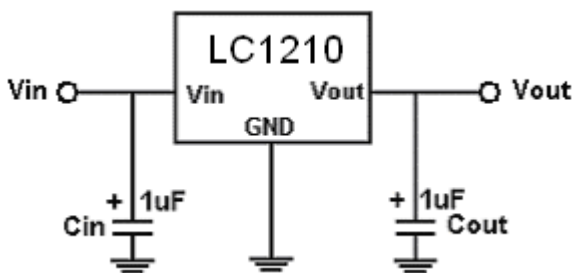
LC1210 series is a group of positive voltage output, low power consumption, low dropout voltage, three terminal regulator. It can provide 200mA output current when input / output voltage differential drops to 430mV ( $V_{out}=2.8V$ ), And it also provides foldback short-circuit protection and output current limit function. The very low power consumption of LC1210 ( $I_q=1.0\mu A$ ) can greatly improve natural life of batteries.

LC1210 can provide output value in the range of 1.1V~5.5V in 0.1V steps. It also can customized on command.

LC1210 includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module.

LC1210 has well load transient response and good temperature characteristic, And it uses trimming technique to guarantee output voltage accuracy within  $\pm 2\%$ .

### TYPICAL APPLICATION



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

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

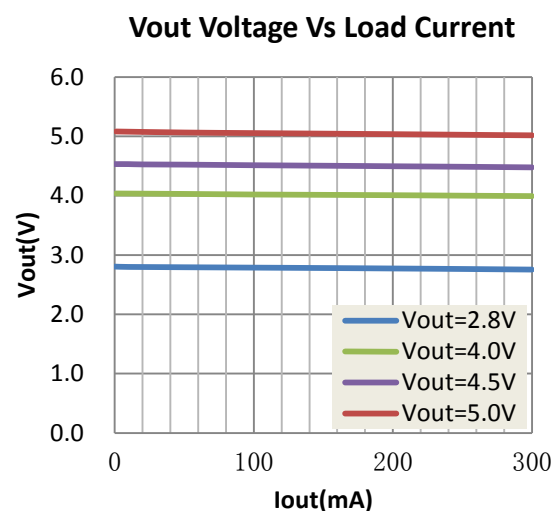
### FEATURES

- Low Power Consumption:1.0uA (Typ.)
- Maximum Output Current:200mA
- Small Dropout Voltage  
210mV@100mA ( $V_{out}=2.8V$ )  
430mV@200mA ( $V_{out}=2.8V$ )
- Input Voltage Range:1.5V~12V
- Output Voltage Range:1.1V~5.5V (customized on command in 0.1V steps)
- Highly Accurate: $\pm 2\%$ ( $\pm 1\%$  customized)
- Output Current Limit  
420mA@ $V_{out}=2.8V$
- Foldback Short-circuit Current  
90mA@ $V_{out}=2.8V$

### APPLICATIONS

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

### ELECTRICAL CHARACTERISTICS



## ORDERING INFORMATION

### LC1210 1 2 3 4 5

Code	Description
1	Temperature&Rohs: C: -40~85°C , Pb Free Rohs Std. H: -40~85°C, Halogen Free
2	Package type: B3:SOT-23-3 B5:SOT-23-5 C3:SOT-89-3 C3B:SOT-89-3 (B) HA:TO-92 HB:TO-92
3	Packing type: TR:Tape&Reel (Standard) BG:Bag (TO-92) PT:Reel (TO-92)
4	Output voltage: e.g. 11=1.1V 15=1.5V 55=5.5V
5	Voltage accuracy: 1=±1% Blank(default)=±2%

## MARKING DESCRIPTON

N: Product Code

X: Output Voltage

Output Voltage Code

VOUT	Code	VOUT	Code	VOUT	Code
1.2V	2	3.0V	0	4.4V	4
1.3V	3	3.1V	1	4.5V	5
1.5V	5	3.2V	2	4.6V	6
1.8V	8	3.3V	3	4.7V	7
2.0V	0	3.4V	4	4.8V	8
2.1V	1	3.5V	5	4.9V	9
2.2V	2	3.6V	6	5.0V	0
2.3V	3	3.7V	7	5.1V	1
2.4V	4	3.8V	8	5.2V	2
2.5V	5	3.9V	9	5.3V	3
2.6V	6	4.0V	0	5.4V	4
2.7V	7	4.1V	1	5.5V	5
2.8V	8	4.2V	2		
2.9V	9	4.3V	3		

Y: The Year of manufacturing, "1" stands for year 2011, "2" stands for year 2012, and "8" stands for year 2018.  
W: The week of manufacturing. "A" stands for week 1, "Z" stands for week 26, "A" stands for week 27, "Z" stands for week 52.

## PIN CONFIGURATION

Product Classification		LC1210CB3TR□□□
Marking		SOT-23-3
NXYWI	N:Product Code	<p>1 GND 2 Vout 3 Vin</p>
	X:Output Voltage	
	YW: Date Code	
Product Classification		LC1210CB5TR□□□
Marking		SOT-23-5
NXYWI	N: Product Code	<p>1 Vin 2 GND 3 IC 4 IC 5 Vout</p>
	X: Output Voltage	
	YW: Date Code	
Product Classification		LC1210CC3TR□□□
Marking		SOT-89-3
NXXI LLBYW	N:Product Code	<p>1 GND 2 Vin 3 Vout</p>
	XX:Output Voltage	
	LL:LOT NO.	
	B:FAB Code	
	YW:Date Code	
Product Classification		LC1210CC3BTR□□□
Marking		SOT-89-3
NXXIB LLBYW	N:Product Code	<p>1 Vout 2 GND 3 Vin</p>
	XX:Output Voltage	
	LL:LOT NO.	
	B:FAB Code	
	YW:Date Code	

Product Classification		LC1210CHABG□□□ LC1210CHAPT□□□
Marking		T0-92
NXXIA LLBYW	N:Product Code	<p>1 Vout 2 GND 3 Vin</p>
	XX:Output Voltage	
	LL:LOT NO.	
	B:FAB Code	
	YW:Date Code	
Product Classification		LC1210CHBBG□□□ LC1210CHBPT□□□
Marking		T0-92
NXXIB LLBYW	N:Product Code	<p>1 GND 2 Vin 3 Vout</p>
	XX:Output Voltage	
	LL:LOT NO.	
	B:FAB Code	
	YW:Date Code	
GND	Ground Pin	
Vin	Supply Voltage Input	
Vout	Output Voltage	

## ABSOLUTE MAXIMUM RATING

Parameter		Value
Max Input Voltage		14V
Operating Junction Temperature(Tj)		125°C
Ambient Temperature(Ta)		-40°C -85°C
Power Dissipation	SOT-23-3	250mW
	SOT-23-5	250mW
	SOT-89-3	500mW
	TO-92	500mW
Storage Temperature(Ts)		-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

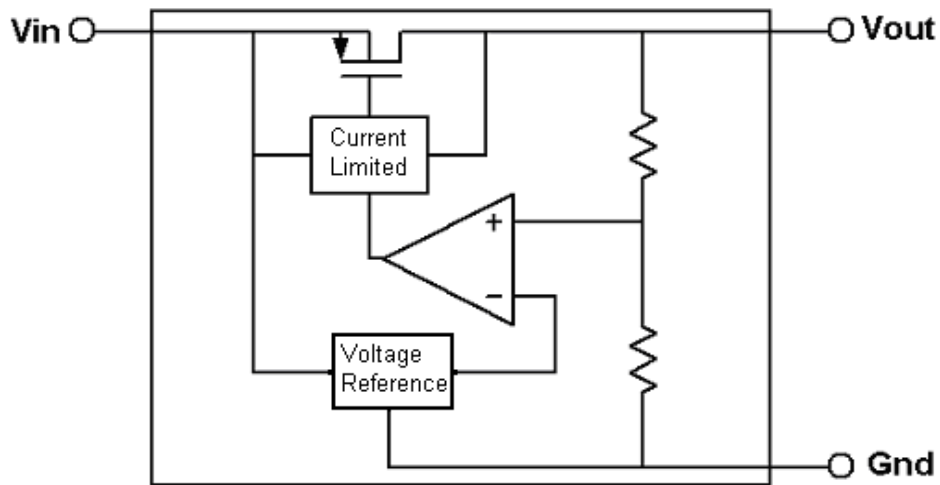
Item	Min	Recommended	Max.	Unit
Input Voltage Range			12	V
Ambient Temperature	-40		85	°C

## ELECTRICAL CHARACTERISTICS

(Test Conditions: Cin=1uF, Cout=1uF, TA=25°C, Unless Otherwise Specified)

Symbol	Parameter	Conditions	Min	Type	Max	Units
Vin	Input Voltage				12	V
Vout	Output Voltage		Vout x0.98		Vout X1.02	V
Iout(Max.)	Maximum Output Current	Vin-Vout=1V	200			mA
Dropout Voltage	Input-Output Voltage Differential	Iout=100mA	Vout ≤ 1.8V	600	1000	mV
			Vout ≥ 1.8V	300	600	
$\frac{\Delta V_{out}}{\Delta V_{in} \cdot V_{out}}$	Line Regulation	Iout=10mA 1.5V ≤ Vin ≤ 8V		0.2	0.3	%/V
$\Delta V_{out}$	Load Regulation	Vin=Set Vout+1V 1mA ≤ Iout ≤ 100mA		20	40	mV
Iq	Quiescent Current	Vin=Set Vout+1V		1.0	5.0	uA
$\frac{\Delta V_{out}}{\Delta T \cdot V_{out}}$	Output Voltage Temperature Coefficient	Iout=10mA		100		ppm/°C

## BLOCK DIAGRAM



## EXPLANATION

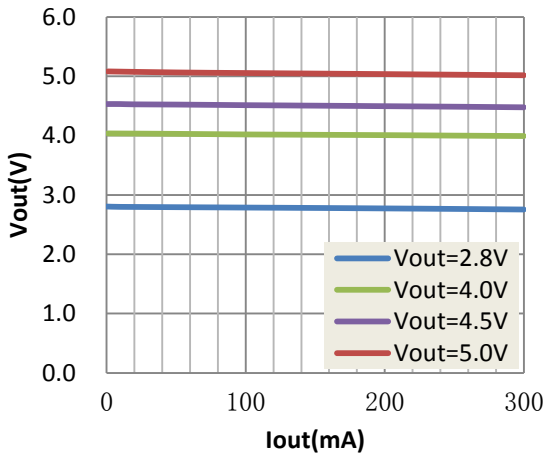
LC1210 is a series of low dropout voltage and low power consumption three pins regulator. Its application circuit is very simple, which only needs two outside capacitors. It is composed of these modules: high accuracy voltage reference, current limit circuit, error amplifier, output driver and power transistor.

Current Limit module can keep chip and power system away from danger when load current is more than 200mA.

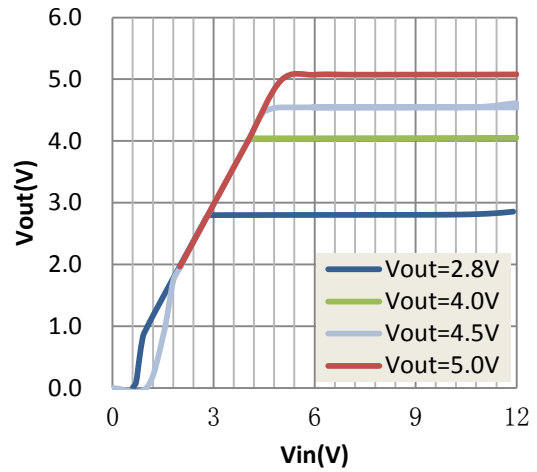
LC1210 uses trimming technique to assure the accuracy of output value within  $\pm 2\%$ , at the same time, temperature compensation is elaborately considered in this chip, which makes LC1210's temperature coefficient within  $100\text{ppm}/^\circ\text{C}$ .

## TYPICAL PERFORMANCE CHARACTERISTICS

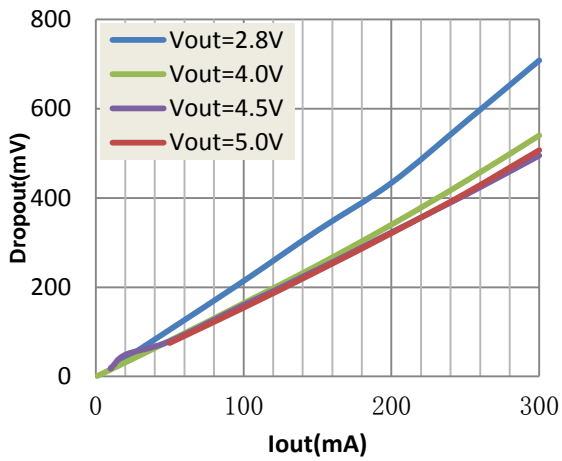
### Vout Voltage Vs Load Current



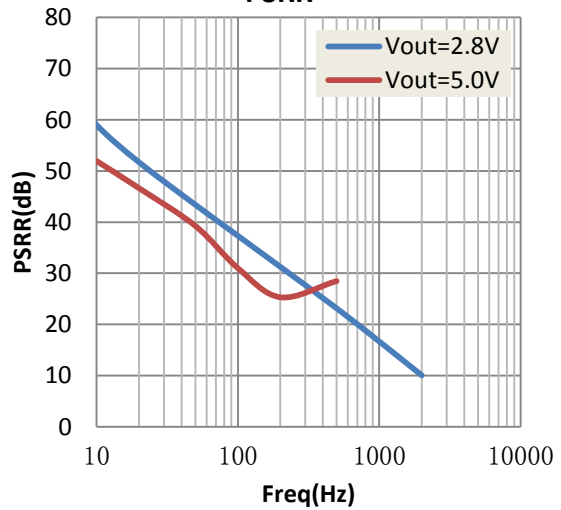
### Line Regulation



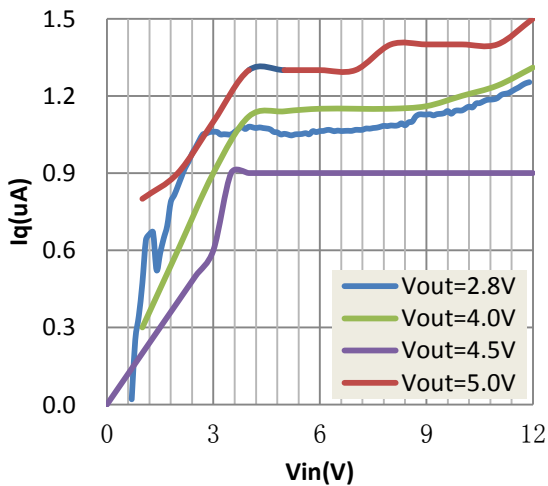
### Dropout Voltage Vs Load Current



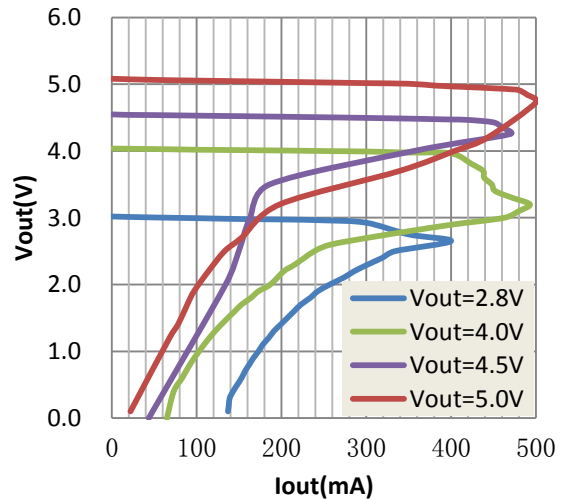
### PSRR



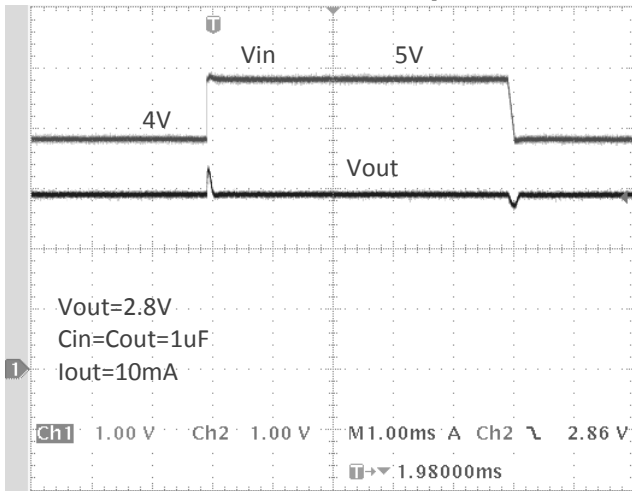
### Iq



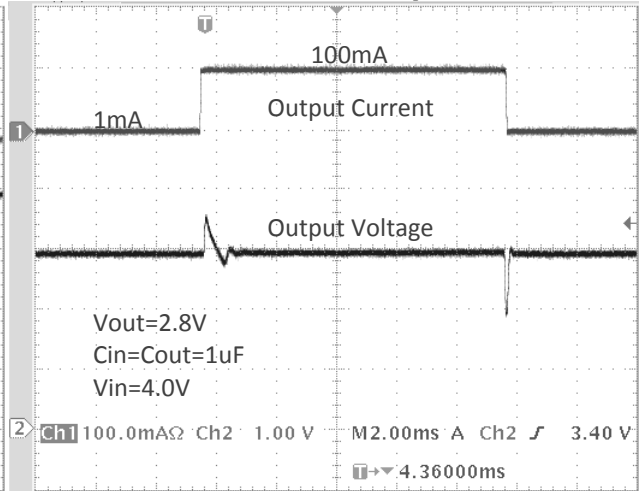
### Current Limit



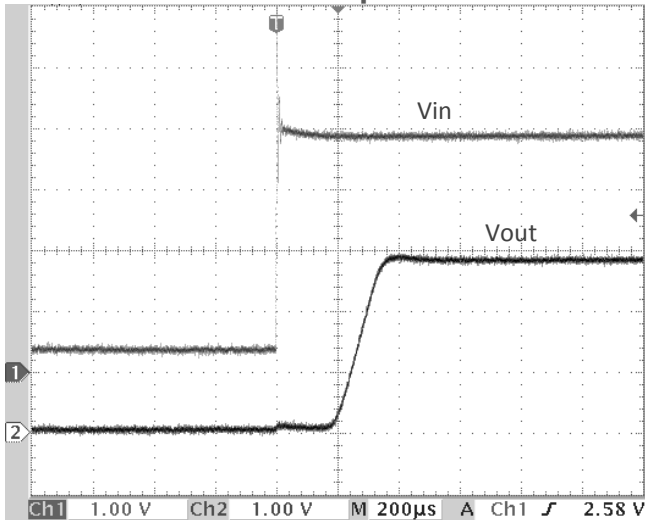
### Line transient response



### Load transient response



### Start up



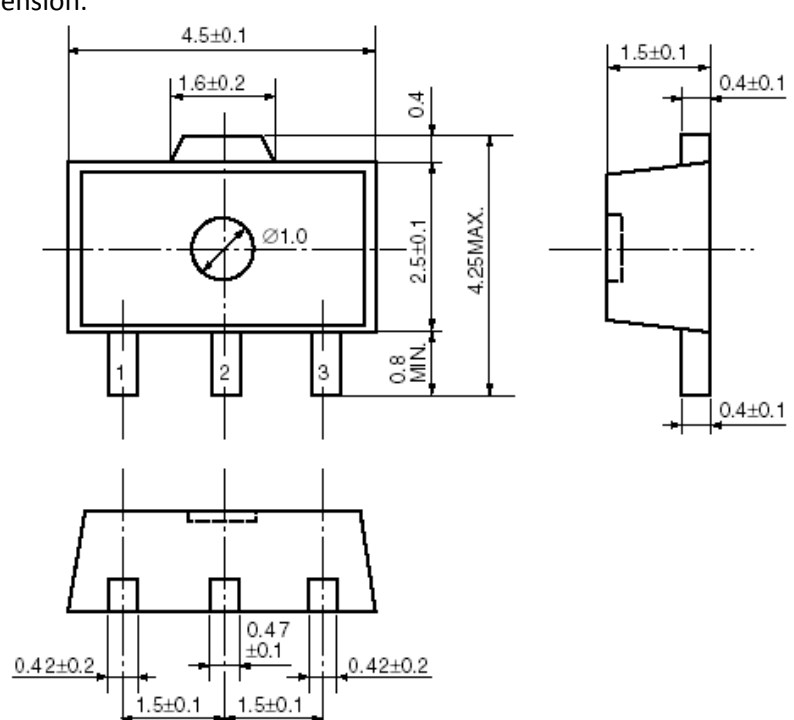
## PACKAGE LINE

Package	SOT-23-3	Devices per reel	3000Pcs	Unit	mm
Package dimension:					
<p>Technical drawing of the SOT-23-3 package. The top view shows a width of <math>2.9 \pm 0.2</math> mm and a lead spacing of <math>1.9 \pm 0.2</math> mm between leads 1 and 2. Lead 3 is centered, with a width of <math>0.4 \pm 0.1</math> mm. The body height is <math>1.6 \pm 0.2</math> mm, and the total height including leads is <math>2.8 \pm 0.3</math> mm. The side view shows a maximum lead height of 1.4 mm, a lead width of <math>1.1 \pm 0.2</math> mm, a lead thickness of 0.8 mm, and a lead angle of 0 to 0.1 degrees. The lead height at the base is <math>0.16 \pm 0.06</math> mm, and the lead thickness at the base is 0.2 mm minimum. The perspective view shows the package from an isometric angle.</p>					

Package	SOT-23-5	Devices per reel	3000Pcs	Unit	mm
Package Dimension:					
<p>Technical drawing of the SOT-23-5 package. The top view shows a width of <math>2.9 \pm 0.2</math> mm and a lead spacing of <math>1.9 \pm 0.2</math> mm between leads 1 and 2. Leads 3 and 4 are centered, with a width of <math>0.4 \pm 0.1</math> mm. The body height is <math>1.6 \pm 0.2</math> mm, and the total height including leads is <math>2.8 \pm 0.3</math> mm. The side view shows a maximum lead height of 1.4 mm, a lead width of <math>1.1 \pm 0.2</math> mm, a lead thickness of <math>0.8 \pm 0.1</math> mm, and a lead angle of 0 to 0.1 degrees. The lead height at the base is <math>0.15 \pm 0.05</math> mm, and the lead thickness at the base is 0.2 mm minimum. The perspective view shows the package from an isometric angle.</p>					



# LC1210

Package	SOT-89-3	Devices per reel	1000Pcs	Unit	mm
Package Dimension:					
 <p>The technical drawing illustrates the LC1210 SOT-89-3 package in three views: top, side, and bottom. The top view shows a rectangular package with a width of <math>4.5 \pm 0.1</math> mm and a central circular feature with a diameter of <math>\varnothing 1.0</math> mm. A smaller feature on top has a width of <math>1.6 \pm 0.2</math> mm and a height of <math>0.4</math> mm. The package height is <math>2.5 \pm 0.1</math> mm, with a maximum height of <math>4.25</math> mm. The lead height is <math>0.8</math> mm (MIN). The side view shows a width of <math>1.5 \pm 0.1</math> mm and a lead height of <math>0.4 \pm 0.1</math> mm. The bottom view shows a trapezoidal shape with a central width of <math>1.5 \pm 0.1</math> mm and a lead height of <math>0.47 \pm 0.1</math> mm. The distance from the center to the outer edges is <math>0.42 \pm 0.2</math> mm.</p>					

Package	TO-92	Devices per Bag	1000Pcs	Unit	mm
		Devices per reel	2000Pcs		

Package Dimension:

TO-92

