



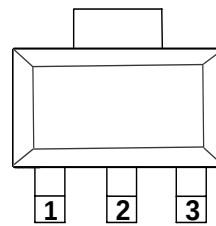
## GENERAL DESCRIPTION

XC6201P series are a set of Low Dropout Linear Regulator ICs implemented in CMOS technology. They can withstand voltage 10V. And they are available with low voltage drop and low quiescent current, widely used in audio, video and communication appliances.

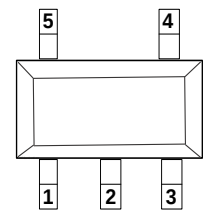
## FEATURES

- Low Power Consumption
- Low Voltage Drop
- Low Temperature Coefficient
- Withstanding Voltage 12V
- Quiescent Current 2.0 $\mu$ A
- Output Voltage Accuracy: tolerance  $\pm 2\%$
- High output current: 300mA

## PIN CONFIGURATION



SOT-89



SOT23-5L

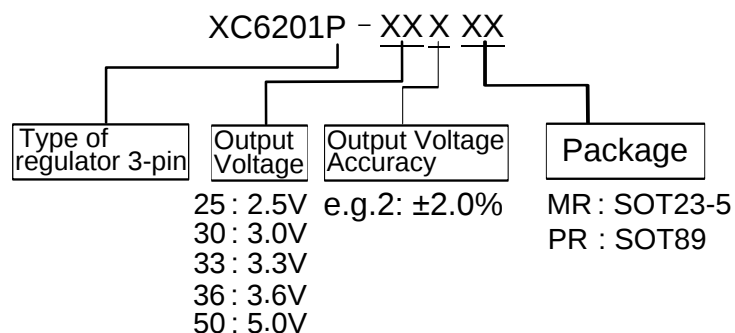
## TYPICAL APPLICATIONS

- Battery-powered Equipments
- Communication Equipments
- Audio/Video Equipments
- Smart Battery Packs
- Smoke Detectors
- CO2 DETECTORS

## PIN DESCRIPTION

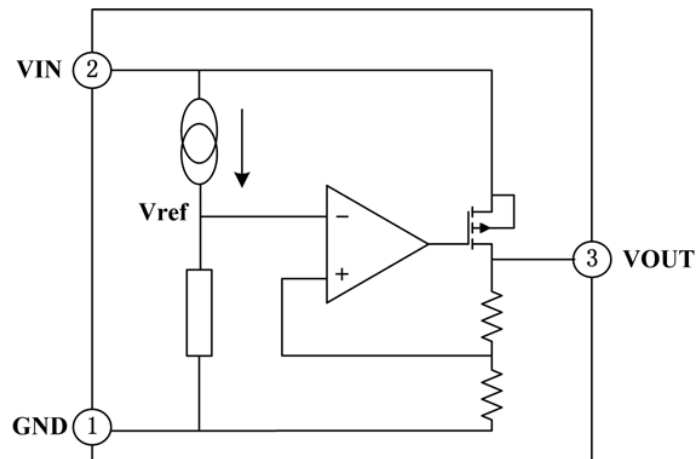
| PIN No.  |        | Name             | Functions Description |
|----------|--------|------------------|-----------------------|
| SOT23-5L | SOT-89 |                  |                       |
| 2        | 2      | GND              | ground                |
| 1        | 3      | V <sub>IN</sub>  | input                 |
| 5        | 1      | V <sub>OUT</sub> | output                |
| 3        |        | NC               | No Connect            |
| 4        |        | NC               | No Connect            |

## OUTPUT





## FUNCTIONAL BLOCK DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

| Description                          | Symbol    | Value range     | Unit               |
|--------------------------------------|-----------|-----------------|--------------------|
| Limit Power Voltage                  | $V_{IN}$  | $-0.3 \sim +15$ | V                  |
| Storage Temperature Range            | $T_{STG}$ | $-50 \sim +125$ | $^{\circ}\text{C}$ |
| Operating Free-air Temperature Range | $T_A$     | $-40 \sim +85$  | $^{\circ}\text{C}$ |

**Note :** Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation 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.

## HEAT DISSIPATION

| Description        | Symbol        | Package | Value range | Unit                        |
|--------------------|---------------|---------|-------------|-----------------------------|
| Thermal resistance | $\theta_{JA}$ | SOT89   | 200         | $^{\circ}\text{C}/\text{W}$ |
|                    |               | SOT23-5 | 500         | $^{\circ}\text{C}/\text{W}$ |
| Power dissipation  | $P_W$         | SOT89   | 500         | mW                          |
|                    |               | SOT23-5 | 200         | mW                          |



## DC CHARACTERISTICS (unless otherwise noted $T_A = +25^{\circ}\text{C}$ )

( $V_{IN} = V_{OUT} + 2.0\text{V}$ ,  $C_{IN} = C_L = 10\mu\text{F}$ ,  $T_A = 25^{\circ}\text{C}$ , unless otherwise noted)

### Series +2.5V OUTPUT

| Parameter                    | Symbol                                     | Test Condition                                                                                                         | Min   | Typ       | Max   | Unit                    |
|------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------|-----------|-------|-------------------------|
| Output Voltage               | $V_{OUT}$                                  | $V_{IN} = V_{OUT} + 2.0\text{V}$ , $I_{OUT} = 10\text{mA}$                                                             | 2.450 | 2.500     | 2.550 | V                       |
| Output Current               | $I_{OUT}$                                  | $V_{IN} = V_{OUT} + 2.0\text{V}$                                                                                       | 300   | —         | —     | mA                      |
| Load Regulation              | $\Delta V_{OUT}$                           | $V_{IN} = V_{OUT} + 2.0\text{V}$<br>$1\text{mA} \leq I_{OUT} \leq 300\text{mA}$                                        | —     | 37        | 100   | mV                      |
| Voltage Drop                 | $V_{DIF}$                                  | $I_{OUT} = 10\text{mA}$ , $\Delta V_{OUT} = 2\%$                                                                       | —     | 35        | 55    | mV                      |
| Quiescent Current            | $I_{SS}$                                   | —                                                                                                                      | —     | 2.0       | 3.0   | $\mu\text{A}$           |
| Line Regulation              | $\Delta V_{OUT} / V_{OUT} * \Delta V_{IN}$ | $V_{OUT} + 1.0\text{V} \leq V_{IN} \leq 12\text{V}$ ,<br>$I_{OUT} = 1\text{mA}$                                        | —     | —         | 0.2   | %/V                     |
| Input Voltage                | $V_{IN}$                                   | —                                                                                                                      | —     | —         | 12    | V                       |
| Temperature Coefficient      | $\Delta V_{OUT} / \Delta T_A * V_{OUT}$    | $V_{IN} = V_{OUT} + 2.0\text{V}$ , $I_{OUT} = 10\text{mA}$ ,<br>$-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$ | —     | $\pm 100$ | —     | ppm/ $^{\circ}\text{C}$ |
| Output Short Circuit Current | $I_{lim}$                                  | $V_{OUT} = 0\text{V}$                                                                                                  | —     | 400       | —     |                         |

**Note :** When  $V_{IN} = V_{OUT} + 2.0\text{V}$ , as the output voltage declined 2%, the  $V_{DIF} = V_{IN} - V_{OUT}$ .

### Series +3.0V OUTPUT

| Parameter                    | Symbol                                     | Test Condition                                                                                                         | Min  | Typ       | Max  | Unit                    |
|------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------|-----------|------|-------------------------|
| Output Voltage               | $V_{OUT}$                                  | $V_{IN} = V_{OUT} + 2.0\text{V}$ , $I_{OUT} = 10\text{mA}$                                                             | 2.94 | 3.0       | 3.06 | V                       |
| Output Current               | $I_{OUT}$                                  | $V_{IN} = V_{OUT} + 2.0\text{V}$                                                                                       | 300  | —         | —    | mA                      |
| Load Regulation              | $\Delta V_{OUT}$                           | $V_{IN} = V_{OUT} + 2.0\text{V}$<br>$1\text{mA} \leq I_{OUT} \leq 300\text{mA}$                                        | —    | 37        | 100  | mV                      |
| Voltage Drop                 | $V_{DIF}$                                  | $I_{OUT} = 100\text{mA}$ , $\Delta V_{OUT} = 2\%$                                                                      | —    | 210       | 300  | mV                      |
| Quiescent Current            | $I_{SS}$                                   | —                                                                                                                      | —    | 2.0       | 3.0  | $\mu\text{A}$           |
| Line Regulation              | $\Delta V_{OUT} / V_{OUT} * \Delta V_{IN}$ | $V_{OUT} + 1.0\text{V} \leq V_{IN} \leq 12\text{V}$ ,<br>$I_{OUT} = 1\text{mA}$                                        | —    | —         | 0.2  | %/V                     |
| Input Voltage                | $V_{IN}$                                   | —                                                                                                                      | —    | —         | 12   | V                       |
| Temperature Coefficient      | $\Delta V_{OUT} / \Delta T_A * V_{OUT}$    | $V_{IN} = V_{OUT} + 2.0\text{V}$ , $I_{OUT} = 10\text{mA}$ ,<br>$-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$ | —    | $\pm 100$ | —    | ppm/ $^{\circ}\text{C}$ |
| Output Short Circuit Current | $I_{lim}$                                  | $V_{OUT} = 0\text{V}$                                                                                                  | —    | 400       | —    | mA                      |

**Note :** When  $V_{IN} = V_{OUT} + 2.0\text{V}$ , as the output voltage declined 2%, the  $V_{DIF} = V_{IN} - V_{OUT}$ .



**Series +3.3V OUTPUT**

| Parameter                    | Symbol                                               | Test Condition                                                                       | Min  | Typ       | Max  | Unit                |
|------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------|------|-----------|------|---------------------|
| Output Voltage               | $V_{OUT}$                                            | $V_{IN}=V_{OUT}+2.0V$ , $I_{OUT}=10mA$                                               | 2.23 | 3.3       | 3.36 | V                   |
| Output Current               | $I_{OUT}$                                            | $V_{IN}=V_{OUT}+2.0V$                                                                | 300  | —         | —    | mA                  |
| Load Regulation              | $\Delta V_{OUT}$                                     | $V_{IN}=V_{OUT}+2.0V$<br>$1mA \leq I_{OUT} \leq 300mA$                               | —    | 37        | 100  | mV                  |
| Voltage Drop                 | $V_{DIF}$                                            | $I_{OUT}=100mA$ , $\Delta V_{OUT}=2\%$                                               | —    | 195       | 300  | mV                  |
| Quiescent Current            | $I_{SS}$                                             | —                                                                                    | —    | 2.0       | 3.0  | $\mu A$             |
| Line Regulation              | $\frac{\Delta V_{OUT}}{V_{OUT}} \cdot \Delta V_{IN}$ | $V_{OUT}+1.0V \leq V_{IN} \leq 12V$ ,<br>$I_{OUT}=1mA$                               | —    | —         | 0.2  | %/V                 |
| Input Voltage                | $V_{IN}$                                             | —                                                                                    | —    | —         | 12   | V                   |
| Temperature Coefficient      | $\frac{\Delta V_{OUT}}{\Delta T_A} \cdot V_{OUT}$    | $V_{IN}=V_{OUT}+2.0V$ , $I_{OUT}=10mA$ ,<br>$-40^{\circ}C \leq T_A \leq 85^{\circ}C$ | —    | $\pm 100$ | —    | ppm/<br>$^{\circ}C$ |
| Output Short Circuit Current | $I_{lim}$                                            | $V_{OUT}=0V$                                                                         | —    | 400       | —    | mA                  |

**Note :** When  $V_{IN}=V_{OUT}+2.0V$ , as the output voltage declined 2%, the  $V_{DIF}=V_{IN}-V_{OUT}$ .

**Series +3.6V OUTPUT**

| Parameter                    | Symbol                                               | Test Condition                                                                       | Min  | Typ       | Max  | Unit                |
|------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------|------|-----------|------|---------------------|
| Output Voltage               | $V_{OUT}$                                            | $V_{IN}=V_{OUT}+2.0V$ , $I_{OUT}=10mA$                                               | 3.52 | 3.6       | 3.67 | V                   |
| Output Current               | $I_{OUT}$                                            | $V_{IN}=V_{OUT}+2.0V$                                                                | 300  | —         | —    | mA                  |
| Load Regulation              | $\Delta V_{OUT}$                                     | $V_{IN}=V_{OUT}+2.0V$<br>$1mA \leq I_{OUT} \leq 300mA$                               | —    | 37        | 100  | mV                  |
| Voltage Drop                 | $V_{DIF}$                                            | $I_{OUT}=100mA$ , $\Delta V_{OUT}=2\%$                                               | —    | 180       | 300  | mV                  |
| Quiescent Current            | $I_{SS}$                                             | —                                                                                    | —    | 2.0       | 3.0  | $\mu A$             |
| Line Regulation              | $\frac{\Delta V_{OUT}}{V_{OUT}} \cdot \Delta V_{IN}$ | $V_{OUT}+1.0V \leq V_{IN} \leq 12V$ ,<br>$I_{OUT}=1mA$                               | —    | —         | 0.2  | %/V                 |
| Input Voltage                | $V_{IN}$                                             | —                                                                                    | —    | —         | 12   | V                   |
| Temperature Coefficient      | $\frac{\Delta V_{OUT}}{\Delta T_A} \cdot V_{OUT}$    | $V_{IN}=V_{OUT}+2.0V$ , $I_{OUT}=10mA$ ,<br>$-40^{\circ}C \leq T_A \leq 85^{\circ}C$ | —    | $\pm 100$ | —    | ppm/<br>$^{\circ}C$ |
| Output Short Circuit Current | $I_{lim}$                                            | $V_{OUT}=0V$                                                                         | —    | 400       | —    |                     |

**Note :** When  $V_{IN}=V_{OUT}+2.0V$ , as the output voltage declined 2%, the  $V_{DIF}=V_{IN}-V_{OUT}$ .



**Series +5.0V OUTPUT**

| Parameter                    | Symbol                                               | Test Condition                                                                       | Min | Typ       | Max | Unit                |
|------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------|-----|-----------|-----|---------------------|
| Output Voltage               | $V_{OUT}$                                            | $V_{IN}=V_{OUT}+2.0V$ , $I_{OUT}=10mA$                                               | 4.9 | 5.0       | 5.1 | V                   |
| Output Current               | $I_{OUT}$                                            | $V_{IN}=V_{OUT}+2.0V$                                                                | 300 | —         | —   | mA                  |
| Load Regulation              | $\Delta V_{OUT}$                                     | $V_{IN}=V_{OUT}+2.0V$<br>$1mA \leq I_{OUT} \leq 300mA$                               | —   | 37        | 100 | mV                  |
| Voltage Drop                 | $V_{DIF}$                                            | $I_{OUT}=100mA$ , $\Delta V_{OUT}=2\%$                                               | —   | 170       | 300 | mV                  |
| Quiescent Current            | $I_{SS}$                                             | —                                                                                    | —   | 2.0       | 3.0 | $\mu A$             |
| Line Regulation              | $\frac{\Delta V_{OUT}}{V_{OUT}} \cdot \Delta V_{IN}$ | $V_{OUT}+1.0V \leq V_{IN} \leq 12V$ ,<br>$I_{OUT}=1mA$                               | —   | —         | 0.2 | %/V                 |
| Input Voltage                | $V_{IN}$                                             | —                                                                                    | —   | —         | 12  | V                   |
| Temperature Coefficient      | $\frac{\Delta V_{OUT}}{\Delta T_A} \cdot V_{OUT}$    | $V_{IN}=V_{OUT}+2.0V$ , $I_{OUT}=10mA$ ,<br>$-40^{\circ}C \leq T_A \leq 85^{\circ}C$ | —   | $\pm 100$ | —   | ppm/<br>$^{\circ}C$ |
| Output Short Circuit Current | $I_{lim}$                                            | $V_{OUT}=0V$                                                                         | —   | 400       | —   | mA                  |

**Note :** When  $V_{IN}=V_{OUT}+2.0V$ , as the output voltage declined 2%, the  $V_{DIF}=V_{IN}-V_{OUT}$ .

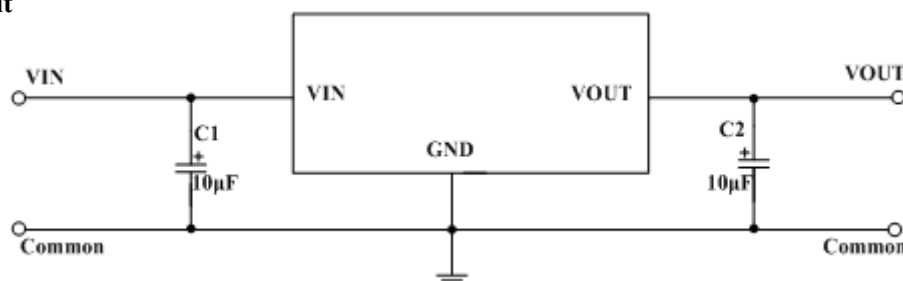
## FUNCTIONAL DESCRIPTION

XC6201P series are linear voltage regulator ICs withstanding 12V voltage. The series IC consists of a voltage reference, an error amplifier, a current limiter and a phase compensation circuit plus a driver transistor. The output stabilization capacitor is also compatible with low ESR ceramic capacitors.

The over current protection circuit and the over voltage protection circuit are built-in. The protection circuit will operate when the output current or input voltage reaches limit level.

## TYPICAL APPLICATION CIRCUIT

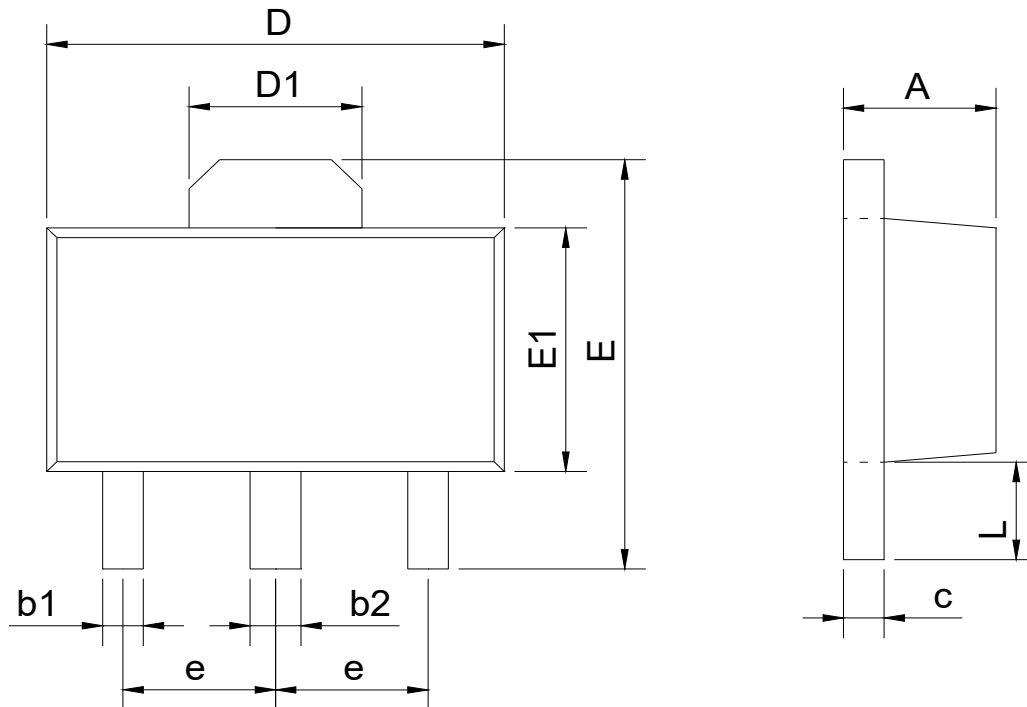
### Basic Circuit





## PACKAGE INFORMATION

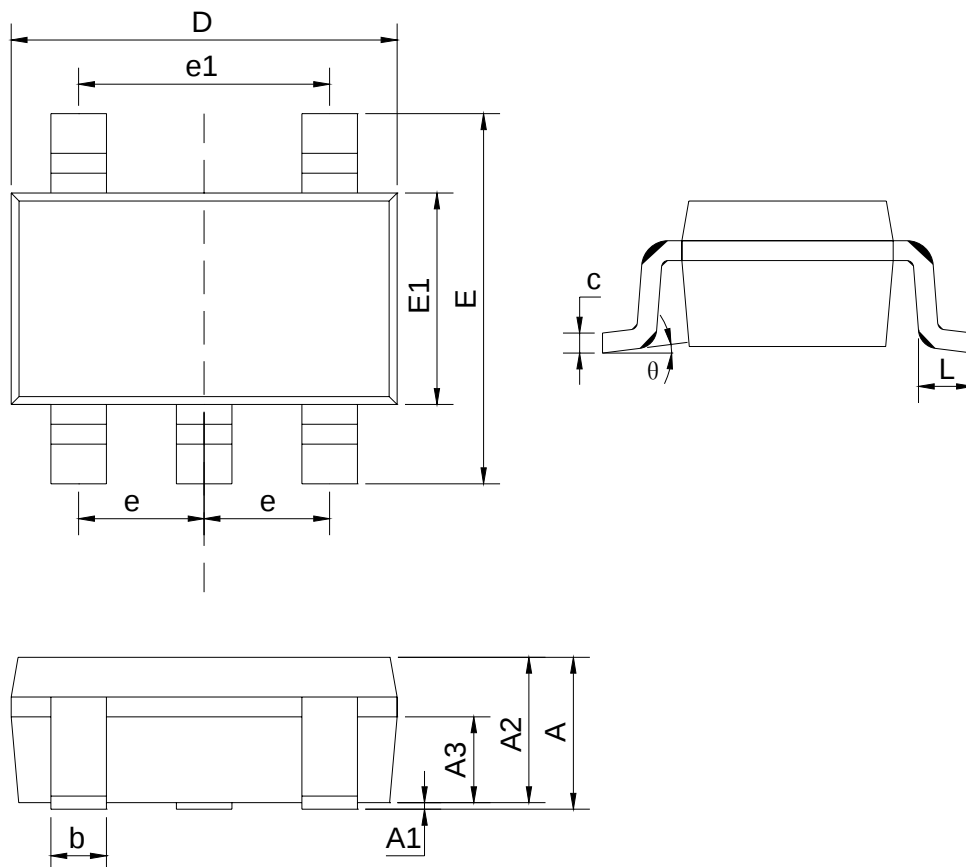
### SOT-89



| SYMBOL | mm      |      |
|--------|---------|------|
|        | min     | max  |
| A      | 1.40    | 1.60 |
| b1     | 0.35    | 0.50 |
| b2     | 0.45    | 0.60 |
| c      | 0.36    | 0.46 |
| D      | 4.30    | 4.70 |
| D1     | 1.40    | 1.80 |
| E      | 4.00    | 4.40 |
| E1     | 2.30    | 2.70 |
| e      | 1.50BSC |      |
| L      | 0.80    | 1.20 |



SOT23-5L



| SYMBOL   | mm      |      |
|----------|---------|------|
|          | min     | max  |
| A        |         | 1.35 |
| A1       | 0.04    | 0.15 |
| A2       | 1.00    | 1.20 |
| A3       | 0.55    | 0.75 |
| b        | 0.38    | 0.48 |
| c        | 0.10    | 0.25 |
| D        | 2.72    | 3.12 |
| E        | 2.60    | 3.00 |
| E1       | 1.40    | 1.80 |
| e        | 0.95BSC |      |
| e1       | 1.90BSC |      |
| L        | 0.30    | 0.60 |
| $\theta$ | 0       | 8°   |



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