



## General Description

The XC6504Axx1MR-G is a high accuracy, low noise, high speed CMOS Linear regulator with low power consumption and low dropout voltage, which provide large output currents even when the difference of the input-output voltage is small. The devices offer a new level of cost effective performance in cellular phones, laptop and ebook computers, and other portable devices.

The current limiter's fold-back circuit also operates as a short circuit protection and an output current limiter at the output pin.

The XC6504Axx1MR-G regulators are available in standard SOT-23-5L package. Standard products are Pb-free and Halogen-free.

## Features

- Input voltage: 1.5V~6.5V
- Output range: 1.2V~5.0V
- Maximum output current: 400mA@VOUT=3.3V
- PSRR: 60dB@1KHz
- Dropout voltage: 180mV @ IOUT=100mA
- Quiescent current: 0.5uA Typ
- Shut-down current: < 1uA
- Recommend capacitor: 1uF
- Built-in Short-Circuit Protection, Current Limiter

## Application

- Radio control systems
- Cellphones, radiophone, digital cameras
- Bluetooth, wireless handsets
- Others portable consumer equipments

## Pin Configuration And Descriptions

SOT-23-5L(Top View)

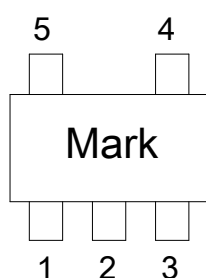


Table1:XC6504Axx1MR-G series (SOT-23-5L PKG)

| PIN NO | PIN NAME | FUNCTION                          |
|--------|----------|-----------------------------------|
| 1      | VIN      | Input                             |
| 2      | GND      | Ground                            |
| 3      | EN       | Enable(Active high, not floating) |
| 4      | NC       | Not connected                     |
| 5      | VOUT     | Output                            |

## Order Information

| Orderable Device | Package   | Output Voltage | Packing Option |
|------------------|-----------|----------------|----------------|
| XC6504Axx1MR-G   | SOT-23-5L | 1.2V-5.0V      | 3000/Reel      |

xx:From 12-50



## Absolute Maximum Ratings

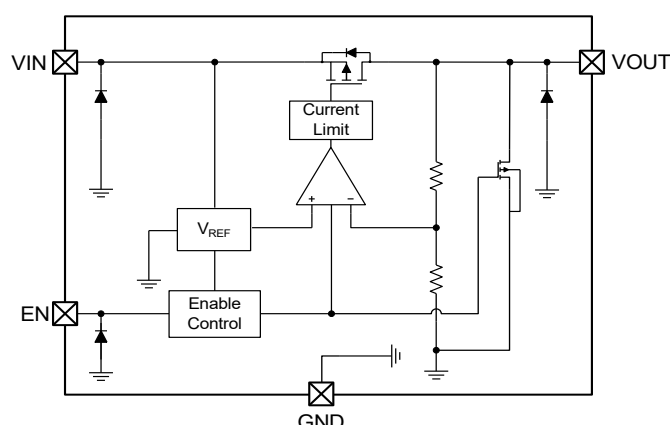
| Description                          | Symbol    | Value Range | Unit |
|--------------------------------------|-----------|-------------|------|
| Input Voltage                        | $V_{IN}$  | -0.3~+8     | V    |
| Storage Temperature Range            | $T_{STG}$ | -55~+150    | °C   |
| Operating Free-air Temperature Range | $T_A$     | -40~+125    | °C   |
| Output Current                       |           | 450         | mA   |
| Package Lead Soldering Temperature   |           | 260         | °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 | $\theta_{JA}$ | SOT-23-5L | 260         | °C/W |
| Power dissipation  | $P_W$         | SOT-23-5L | 0.4         | W    |

## Block Diagram



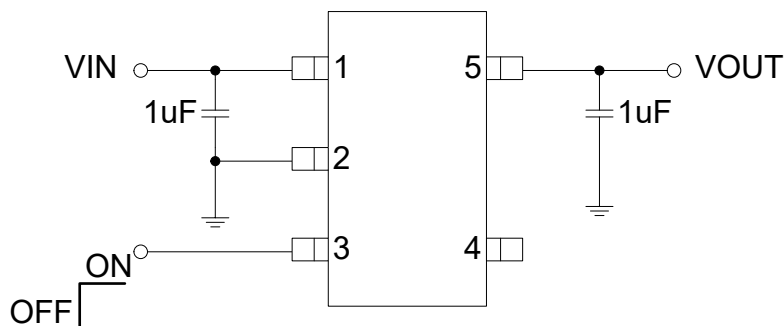


## DC Characteristics (unless otherwise noted $T_A=25^{\circ}\text{C}$ )

| Symbol            | Items                       | Conditions   | Min          | Typ       | Max          | Unit          |
|-------------------|-----------------------------|--|--------------|-----------|--------------|---------------|
| $V_{IN}$          | Input Voltage               |  | 1.5          | --        | 6.5          | V             |
| $V_{OUT}$         | Output Range                | $V_{OUT} \leq 2.5\text{V}$ , $I_{OUT}=1\text{mA}$                      | $V_{OUT}-50$ | $V_{OUT}$ | $V_{OUT}+50$ | mV            |
|                   |                             | $2.5\text{V} \leq V_{OUT} \leq 5\text{V}$ , $I_{OUT}=1\text{mA}$       | -2           | $V_{OUT}$ | 2            | %             |
| $I_Q$             | Quiescent Current           | $V_{OUT}=3.3\text{V}$ , $I_{OUT}=0$                                    | --           | 0.5       | --           | $\mu\text{A}$ |
| $I_{LIMIT}$       | Current Limit               | $V_{IN}=V_{EN}=4.5\text{V}$  | --           | 400       | --           | mA            |
| $V_{DROP}$        | Dropout Voltage             | $V_{OUT}=3.3\text{V}$ , $I_{OUT}=100\text{mA}$                         | --           | 180       | --           | mV            |
|                   |                             | $V_{OUT}=3.3\text{V}$ , $I_{OUT}=200\text{mA}$                         | --           | 400       | --           |               |
| $\Delta V_{LINE}$ | Line Regulation             | $V_{IN}=2.7\sim 5.5\text{V}$ , $I_{OUT}=1\text{mA}$                    | --           | 0.01      | 0.15         | %/V           |
| $\Delta V_{LOAD}$ | Load Regulation             | $V_{OUT}=3.3\text{V}$ , $I_{OUT}=1\sim 300\text{mA}$                   | --           | 40        | --           | mV            |
| $I_{SHORT}$       | Short Current               | $V_{EN}=V_{IN}$ , $V_{OUT}$ Short to GND with $1\Omega$                | --           | 35        | --           | mA            |
| $I_{SHDN}$        | Shut-down Current           | $V_{EN}=0\text{V}$   | --           | --        | 1            | $\mu\text{A}$ |
| PSRR              | Power Supply Rejection Rate | $V_{IN}=5V_{DC}+0.5V_{P-P}$<br>$F=1\text{KHz}$ , $I_{OUT}=10\text{mA}$ |              | 60        |              | dB            |
| $V_{ENH}$         | EN logic high voltage       | $V_{IN}=5.5\text{V}$ , $I_{OUT}=1\text{mA}$                            | 1.2          | --        | $V_{IN}$     | V             |
| $V_{ENL}$         | EN logic low voltage        | $V_{IN}=5.5\text{V}$ , $V_{OUT}=0\text{V}$                             | --           | --        | 0.4          | V             |
| $I_{EN}$          | EN Input Current            | $V_{EN}=0$ to $5.5\text{V}$  | --           | --        | 1            | $\mu\text{A}$ |

## Application Circuit

### Basic Circuits





## Function Description

In general, all the capacitors need to be low leakage, Any leakage the capacitors have will reduce efficiency, will reduce efficiency, increase the quiescent current.

A recent trend in the design of portable devices has been to use ceramic capacitors to filter DC-DC converter inputs. Ceramic capacitors are often chosen because of their small size, low equivalent series resistance (ESR) and high RMS current capability. Also, recently, designers have been looking to ceramic capacitors due to shortages of tantalum capacitors.

Unfortunately, using ceramic capacitors for input filtering can cause problems. Applying a voltage step to a ceramic capacitor causes a large current surge that stores energy in the inductance of the power leads. A large voltage spike is created when the stored energy is transferred from these inductance into the ceramic capacitor. These voltage spikes can easily be twice the amplitude of the input voltage step.

Many types of capacitors can be used for input by-pass, however, caution must be exercised when using multi layer ceramic capacitors (MLCC). Because of the self-resonant frequency generated under some start-up conditions, such as connecting the LDO input to a live power source.

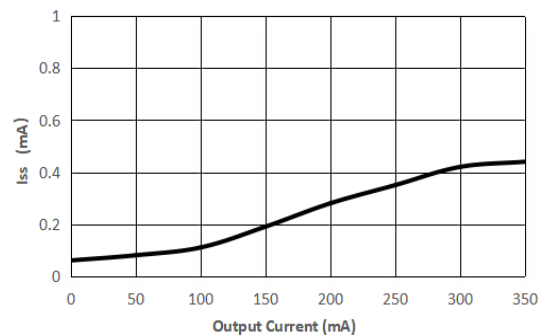
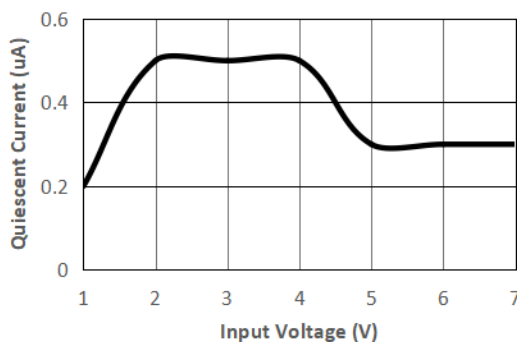
The LDO also requires an output capacitor for loop stability. Connect a 1uF tantalum capacitor from OUT to GND close to the pins. For improved transient response, this output capacitor may be ceramic.

## Typical Characteristics

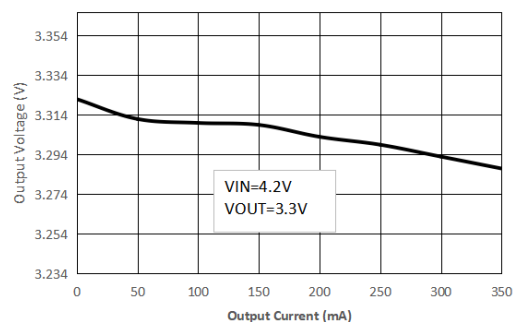
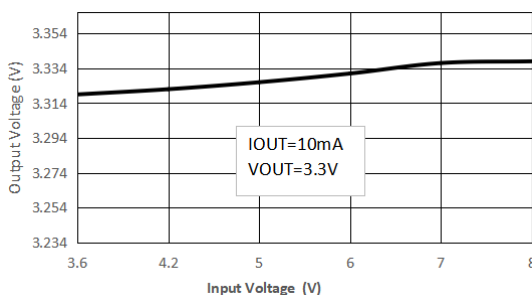
$C_{IN}=1\mu F$ ,  $C_{OUT}=1\mu F$ ,  $V_{IN}=4.5V$ ,  $V_{OUT}=3.3V$ , SOT-23-5L,  $T_A=25^\circ C$

(Unless specified otherwise. Package: SOT-23-5L)

### (1) Quiescent current vs Input voltage

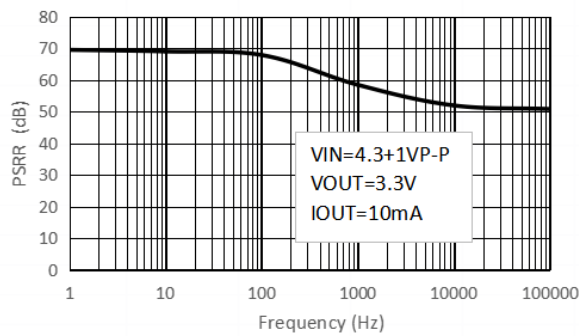


### (2) Output Voltage vs Input voltage

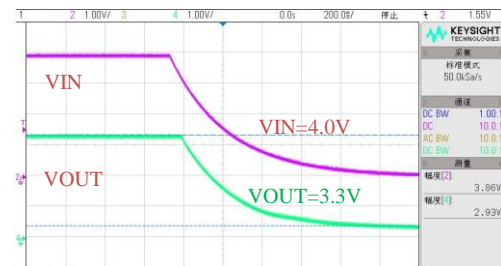
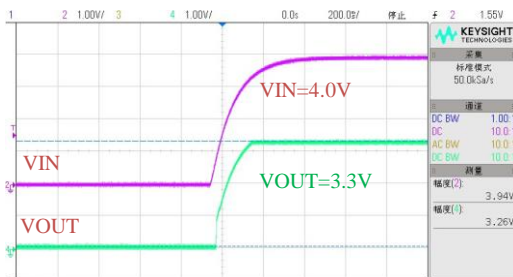




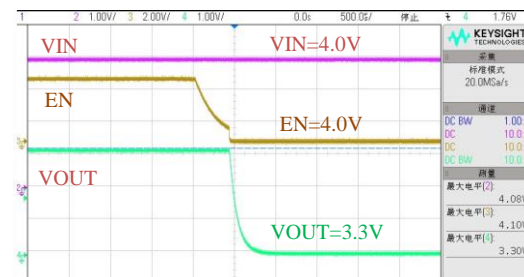
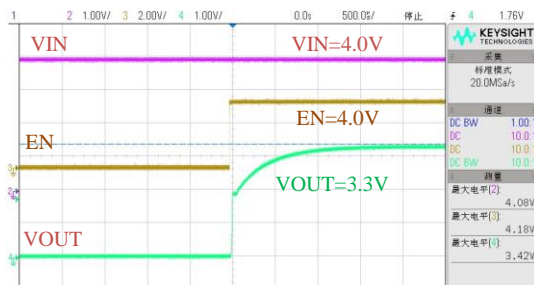
### (3) PSRR vs Frequency



### Power ON / OFF

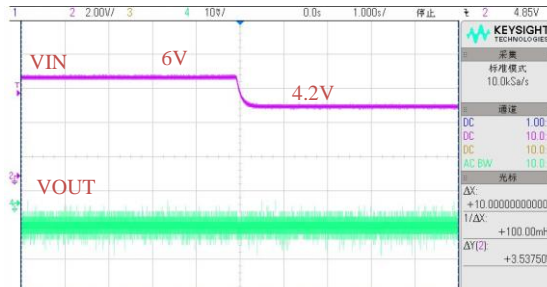
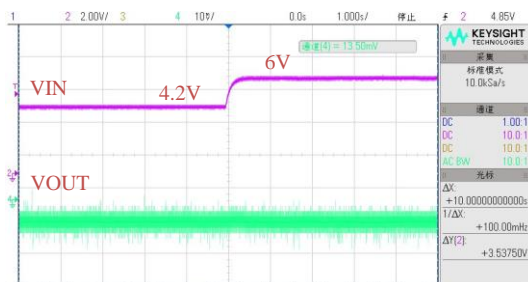


### EN ON/OFF

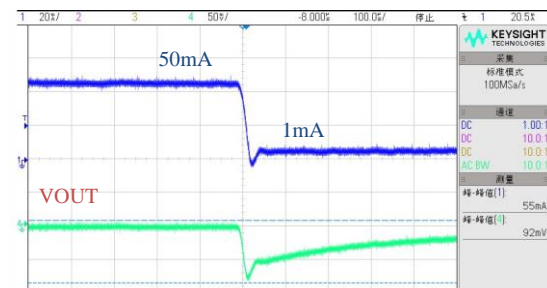
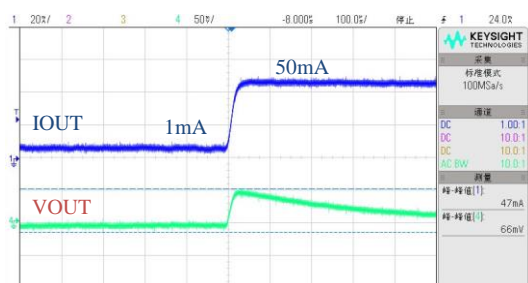




### Line Transient

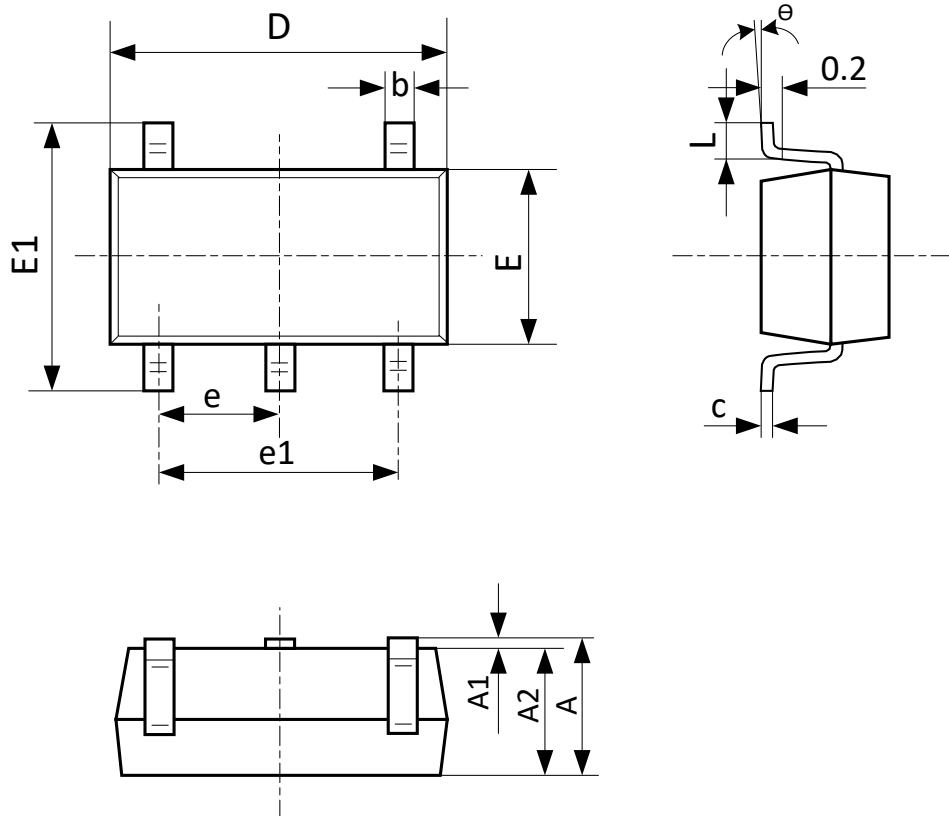


### Load Transient





Package Outline Dimensions  
SOT-23-5L



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 1.050                     | 1.150 | 0.041                | 0.045 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.100                     | 0.200 | 0.004                | 0.008 |
| D      | 2.820                     | 3.020 | 0.111                | 0.119 |
| E      | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1     | 2.650                     | 2.950 | 0.104                | 0.116 |
| e      | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.300                     | 0.600 | 0.012                | 0.024 |
| θ      | 0℃                        | 8℃    | 0℃                   | 8℃    |



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