

CMOS Regulator Monolithic IC MM302X Series

Outline

This IC is a voltage regulator IC developed using the CMOS process. Super low consumption current of 2.5 μA typ. (when not loaded), has been achieved through the use of the CMOS process. Also, the output voltage has a high accuracy of $\pm 2\%$.

Features

- | | |
|---|---|
| 1. Super low consumption current | 2.5 μA typ. (when not loaded, excluding the CE terminal current) |
| 2. Super low consumption current (when off) | 0.1 μA typ. |
| 3. High precision output voltage | $\pm 2\%$ |
| 4. Input/output voltage difference | 0.3V typ. ($I_o=60\text{mA}$ MM3023A) |
| 5. Good input stability | 0.15%/V typ. |
| 6. Built-in short-circuit restriction circuit | 60mA typ. |
| 7. Wide operating temperature range | $-30\sim+85^\circ\text{C}$ |
| 8. Output voltage | 2.0~5.5V (0.1V step) |

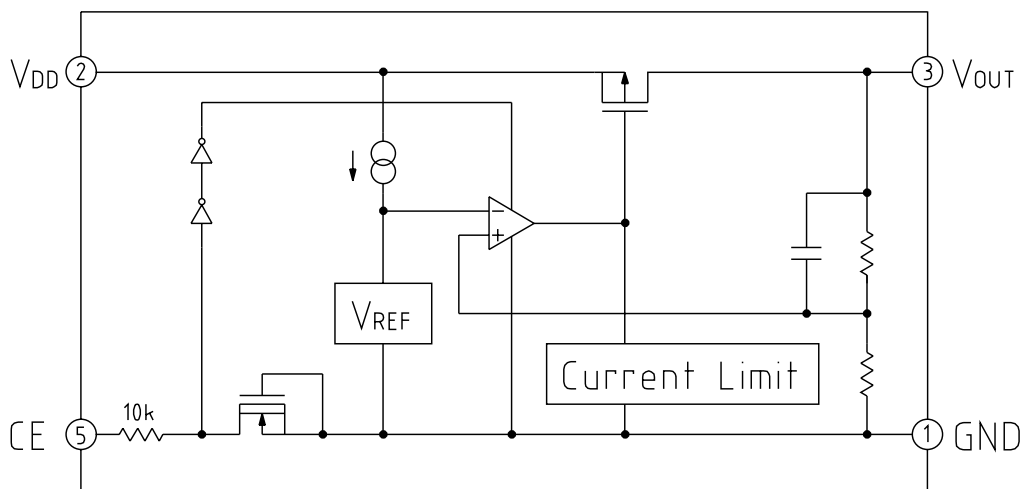
Package

SOT-25 (Mini Mold)

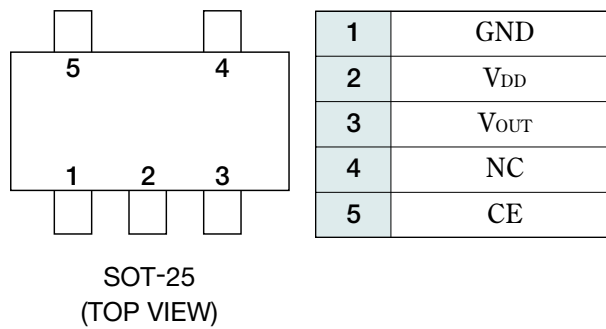
Applications

1. Devices that use batteries
2. Portable communications devices
3. Household electronics products

Block Diagram



Pin Assignment



Pin Description

| Pin No. | Pin name | Functions |
|---------|------------------|----------------------|
| 1 | GND | GND Pin |
| 2 | V _{DD} | Voltage-supply pin |
| 3 | V _{OUT} | Regulator output pin |
| 4 | NC | No connection pin |
| 5 | CE | ON/OFF-Control pin |
| | | CE OUTPUT |
| | | L OFF |
| | | H ON |

Absolute Maximum Ratings (Ambient Temperature, Ta=25°C)

| Item | Symbol | Ratings | Unit |
|-----------------------|------------------|-------------|------|
| Storage Temperature | T _{STG} | -40~+125 | °C |
| Operating Temperature | T _{OPR} | -30~+85 | °C |
| Supply Voltage | V _{DD} | -0.3~+9 | V |
| Output Current | I _{OUT} | 150 | mA |
| Allowable loss | P _d | 150 (Alone) | mW |

Recommended Operating Conditions (Ambient Temperature, Ta=25°C)

| Item | Symbol | Ratings | Unit |
|-----------------------|-----------------|-------------------------|------|
| Operating Temperature | T _{OP} | -30~+85 | °C |
| Supply Voltage | V _{OP} | V _{OUT} +0.3~8 | V |

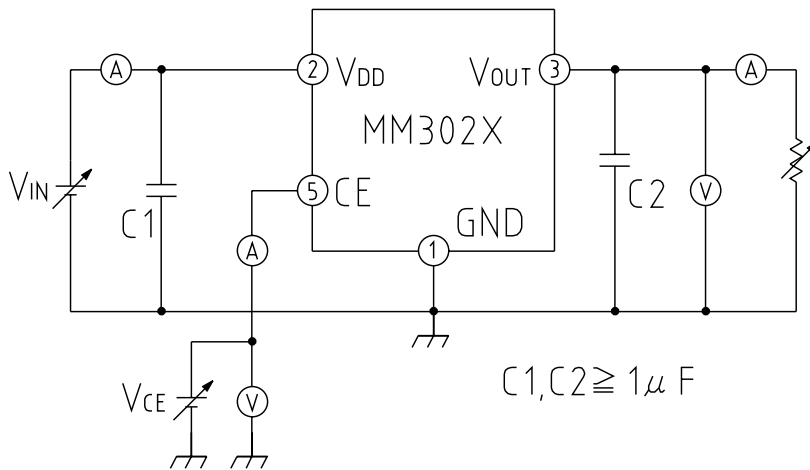
Electrical Characteristics (Ambient Temperature, Ta=25°C, VIN=VCE)

| Item | Symbol | Measurement conditions | Min. | Typ. | Max. | Unit |
|--|---------------------------------|---|--------------------|------|-----------------|--------|
| Quiescent Current | I _{SS} | V _{IN} =V _{OUT} +1.0V | | 2.5 | 5.0 | μA |
| Input Current(OFF) | I _{standby} | V _{IN} =V _{OUT} +1.0V, V _{CE} =0V | | 0.1 | 1.0 | μA |
| Line Regulation | $\Delta V_{OUT}/\Delta V_{IN}$ | I _{OUT} =30mA, V _{OUT} +0.5V ≤ V _{IN} ≤ 8V | 0 | 0.15 | 0.30 | %/V |
| Input Voltage | V _{IN} | | | | 8.0 | V |
| Output voltage temperature coefficient | $\Delta V_{OUT}/\Delta V_{opt}$ | I _{OUT} =10mA -30°C ≤ T _{OPT} ≤ 85°C | | ±100 | | ppm/°C |
| Short current | I _{lim} | V _{IN} =V _{OUT} +1.0V, V _{OUT} =0V | | 60 | | mA |
| CE pin current when ON | I _{CE} | V _{IN} =V _{OUT} +1.0V | | 0.5 | 1.0 | μA |
| CE input voltage "H" | V _{CEH} | V _{IN} =V _{OUT} +1.0V | V _{IN} -1 | | V _{IN} | V |
| CE input voltage "L" | V _{CEL} | V _{IN} =V _{OUT} +1.0V | | | 0.25 | V |

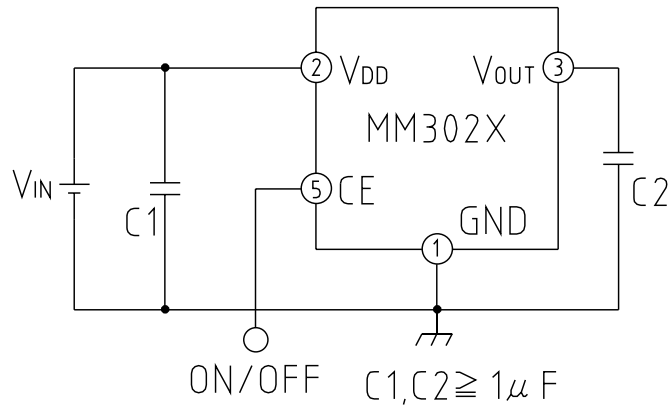
Electrical Characteristics 2 (Ambient Temperature, Ta=25°C, VIN=VCE)

| Product Name | PARAMETER | | | | | | | | | | | | |
|--------------|---|-------|-------|-------|--|------|------|---|------|------|--|------|------|
| | Output Voltage | | | | Output Current | | | Load Regulation | | | Input-Output differential Voltage | | |
| | V _{OUT} (V) | | | | I _{OUT} (mA) | | | ΔV _{OUT} /ΔI _{OUT} (mV) | | | V _{DIF} (V) | | |
| | TEST CONDISIONS | MIN. | TYP. | MAX. | TEST CONDISIONS | MIN. | TYP. | TEST CONDISIONS | TYP. | MAX. | TEST CONDISIONS | TYP. | MAX. |
| MM3022A | V _{IN} -V _{OUT} =1.0V I _{OUT} =10mA | 1.960 | 2.000 | 2.040 | V _{IN} -V _{OUT} =1.0V | 25 | 40 | V _{IN} -V _{OUT} =1.0V 1mA ≤ I _{OUT} ≤ 40mA | 40 | 80 | V _{IN} =V _{OUT} -0.2V I _{OUT} = 40mA | 0.3 | 0.5 |
| MM3022B | | | | | | | | | | | | | |
| MM3022C | | | | | | | | | | | | | |
| MM3022D | | | | | | | | | | | | | |
| MM3022E | | | | | | | | | | | | | |
| MM3022F | | | | | | | | | | | | | |
| MM3022G | | | | | | | | | | | | | |
| MM3022H | | | | | | | | | | | | | |
| MM3022J | | | | | | | | | | | | | |
| MM3022K | | | | | | | | | | | | | |
| MM3023A | | | | | | | | | | | | | |
| MM3023B | | | | | | | | | | | | | |
| MM3023C | | | | | | | | | | | | | |
| MM3023D | | | | | | | | | | | | | |
| MM3023E | | | | | | | | | | | | | |
| MM3023F | | | | | | | | | | | | | |
| MM3023G | | | | | | | | | | | | | |
| MM3023H | | | | | | | | | | | | | |
| MM3023J | | | | | | | | | | | | | |
| MM3023K | | | | | | | | | | | | | |
| MM3024A | | | | | | | | | | | | | |
| MM3024B | | | | | | | | | | | | | |
| MM3024C | | | | | | | | | | | | | |
| MM3024D | | | | | | | | | | | | | |
| MM3024E | | | | | | | | | | | | | |
| MM3024F | | | | | | | | | | | | | |
| MM3024G | | | | | | | | | | | | | |
| MM3024H | | | | | | | | | | | | | |
| MM3024J | | | | | | | | | | | | | |
| MM3024K | | | | | | | | | | | | | |
| MM3025A | | | | | | | | | | | | | |
| MM3025B | | | | | | | | | | | | | |
| MM3025C | | | | | | | | | | | | | |
| MM3025D | | | | | | | | | | | | | |
| MM3025E | | | | | | | | | | | | | |
| MM3025F | | | | | | | | | | | | | |

Measuring Circuit



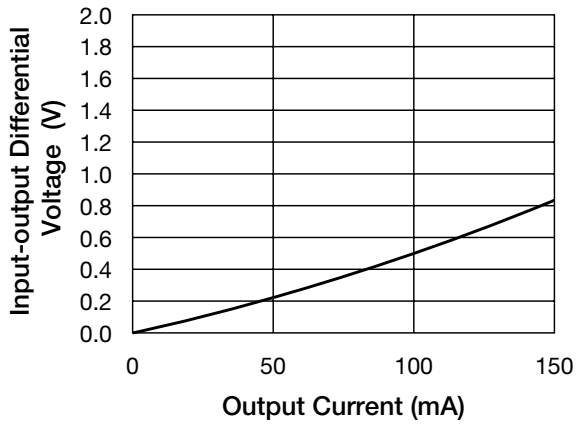
Typical Application Circuit



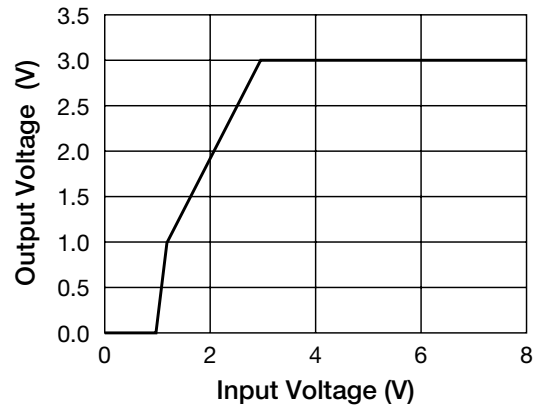
Note: This regulator is not internally compensated and thus requires an external output-capacitor(COUT) for stability.

Characteristics (3.0V product Ambient Temperature, Ta=25°C)

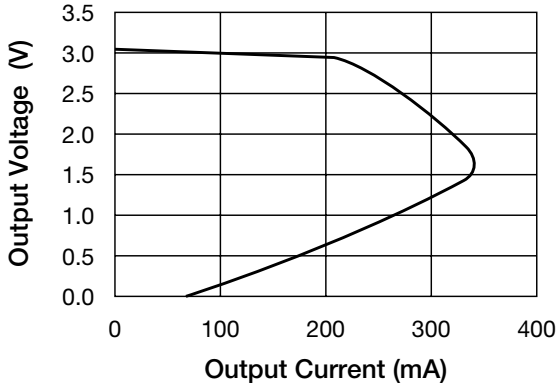
Input-output Differential Voltage



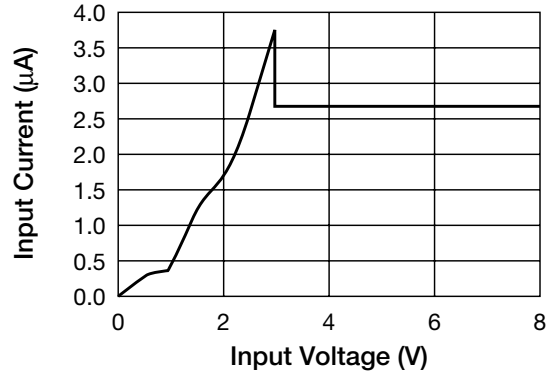
Line Stability



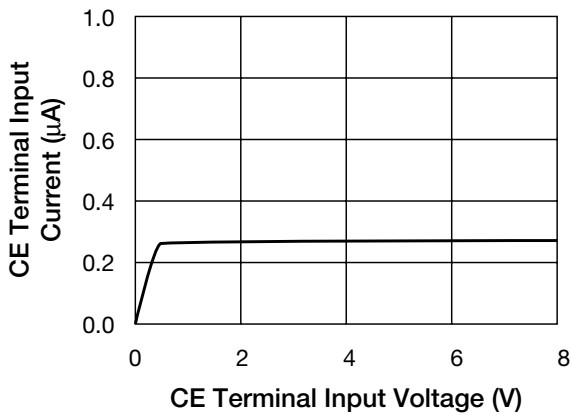
Load Regulation



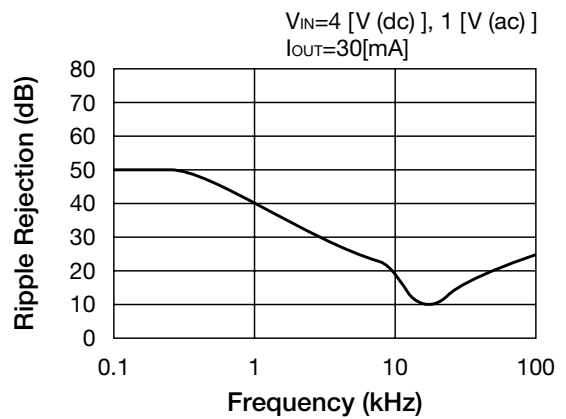
Input Current



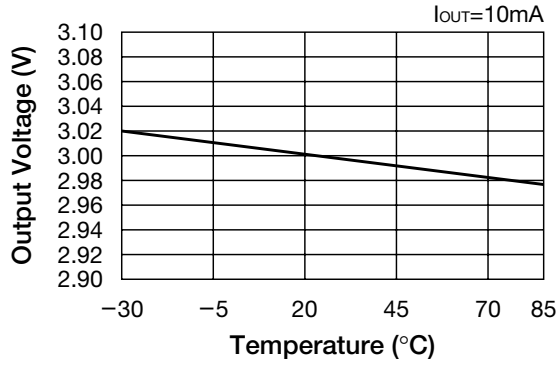
CE Terminal Input Current VS CE Terminal Input Voltage



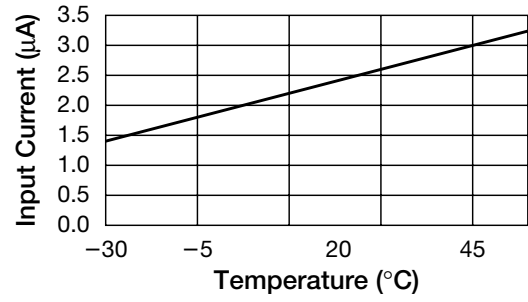
Ripple Rejection



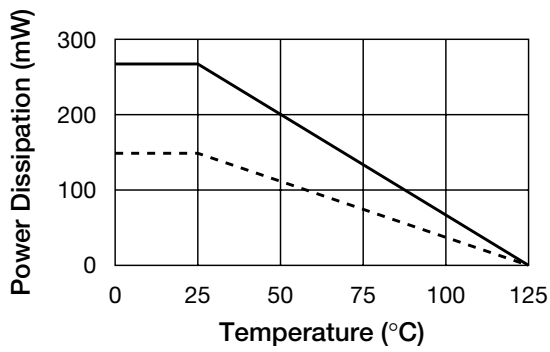
■ Output Voltage VS Temperature



■ Input Current VS Temperature

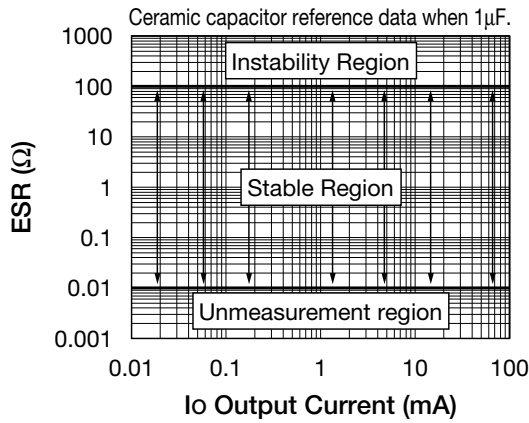


■ Power Dissipation



— On Board (Glass Epoxy Resin)
11.9 × 17.9 × 0.7mm
- - - Alone

■ ESR Stable region



Note: Reference data