

# CMOS Regulator Monolithic IC MM303X Series

## Outline

This IC is a voltage regulator IC developed using the CMOS process. Super low consumption current of 1.5  $\mu\text{A}$  typ. (MM303X) (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              | 1.5 $\mu\text{A}$ typ. (when not loaded, excluding the CE terminal current) |
| 2. Super low consumption current (when off)   | 0.1 $\mu\text{A}$ typ.                                                      |
| 3. High precision output voltage              | $\pm 2\%$                                                                   |
| 4. Input/output voltage difference            | 40mV typ. ( $I_o = 1\text{mA}$ MM3033A)                                     |
| 5. Good input stability                       | 0.05%/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                             | 1.7~5.5V (0.1V step)                                                        |

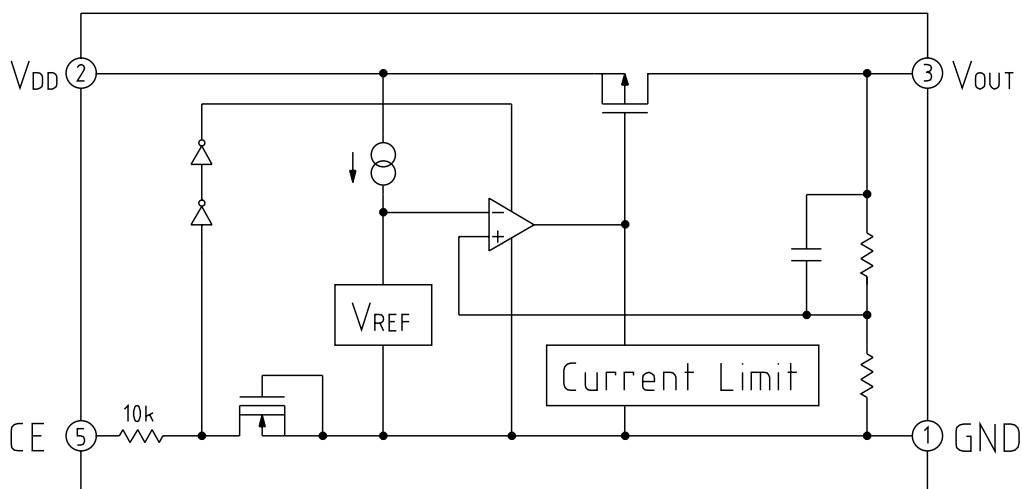
## Package

SC-82AB

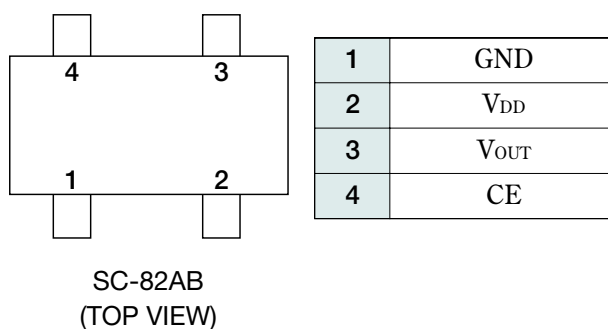
## Applications

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 <sub>DD</sub>	Voltage-Supply pin						
3	V <sub>OUT</sub>	Regulator output pin						
4	CE	No connection pin						
		<table><tr><td>CE</td><td>OUTPUT</td></tr><tr><td>L</td><td>OFF</td></tr><tr><td>H</td><td>ON</td></tr></table>	CE	OUTPUT	L	OFF	H	ON
		CE	OUTPUT					
		L	OFF					
		H	ON					
ON/OFF-Control pin								
Connect CE-pin with VDD-								
pin,when it is not used.								

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

Item	Symbol	Ratings	Unit
Storage Temperature	T <sub>STG</sub>	-40~+125	°C
Operating Temperature	T <sub>OPR</sub>	-30~+85	°C
Supply Voltage	V <sub>DD</sub>	-0.3~+9	V
Output Current	I <sub>OUT</sub>	150	mA
Allowable loss	P <sub>d</sub>	150 (Alone)	mW

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

Item	Symbol	Ratings	Unit
Operating Temperature	T <sub>OP</sub>	-30~+85	°C
Supply Voltage	V <sub>OP</sub>	V <sub>OUT</sub> +0.3~8	V

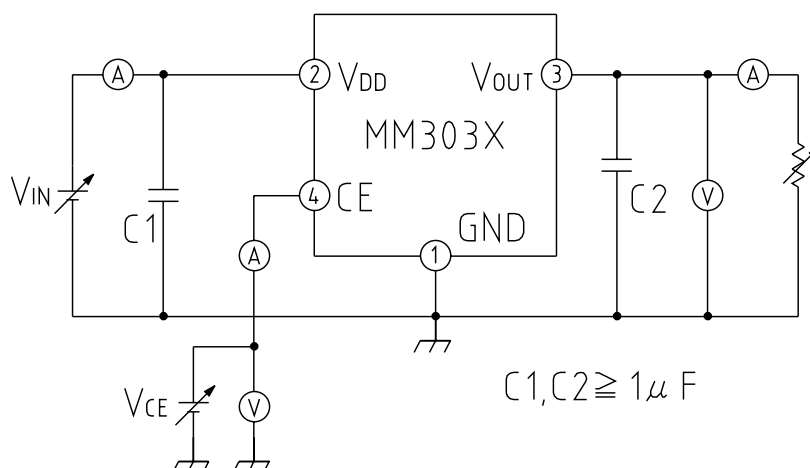
**Electrical Characteristics** (Ambient Temperature,  $T_a=25^{\circ}\text{C}$ ,  $V_{\text{IN}}=V_{\text{CE}}$ )

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit
Quiescent Current	$I_{\text{SS}}$	$V_{\text{IN}}=V_{\text{OUT}}+2.0\text{V}$		1.5	3.0	$\mu\text{A}$
Input Current(OFF)	$I_{\text{standby}}$	$V_{\text{IN}}=V_{\text{OUT}}+2.0\text{V}$ , $V_{\text{CE}}=0\text{V}$		0.1	1.0	$\mu\text{A}$
Line Regulation	$\Delta V_{\text{OUT}}/\Delta V_{\text{IN}}$	$I_{\text{OUT}}=1\text{mA}$ , $V_{\text{OUT}}+0.5\text{V} \leq V_{\text{IN}} \leq 8\text{V}$	0	0.05	0.20	%/V
Input Voltage	$V_{\text{IN}}$				8	V
Output voltage temperature coefficient	$\Delta V_{\text{OUT}}/\Delta T_{\text{opt}}$	$I_{\text{OUT}}=10\text{mA}$ $-30^{\circ}\text{C} \leq T_{\text{OPT}} \leq 85^{\circ}\text{C}$		$\pm 100$		ppm/ $^{\circ}\text{C}$
Short current	$I_{\text{lim}}$	$V_{\text{IN}}=V_{\text{OUT}}+2.0\text{V}$ , $V_{\text{OUT}}=0\text{V}$		60		mA
CE pin current when ON	$I_{\text{CE}}$	$V_{\text{IN}}=V_{\text{OUT}}+2.0\text{V}$		0.1	1.0	$\mu\text{A}$
CE input voltage "H"	$V_{\text{CEH}}$	$V_{\text{IN}}=V_{\text{OUT}}+2.0\text{V}$	$V_{\text{IN}}-1$		$V_{\text{IN}}$	V
CE input voltage "L"	$V_{\text{CEL}}$	$V_{\text{IN}}=V_{\text{OUT}}+2.0\text{V}$			0.25	V

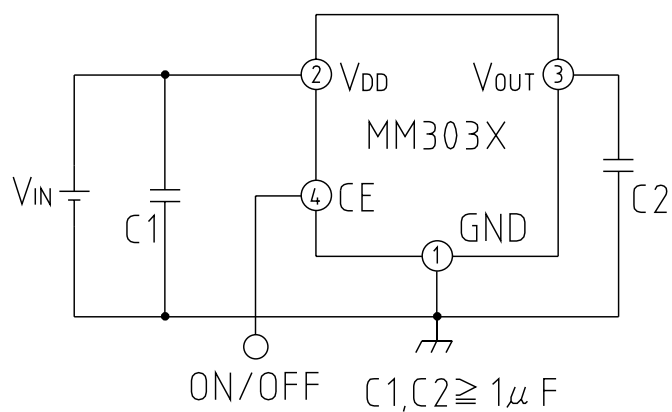
## Electrical Characteristics 2 (Ambient Temperature, $T_a=25^\circ\text{C}$ , $V_{IN}=V_{CE}$ )

[illegible]

## Measuring Circuit



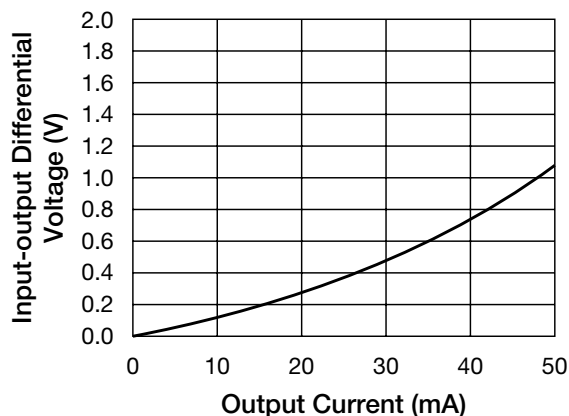
## Typical Application Circuit



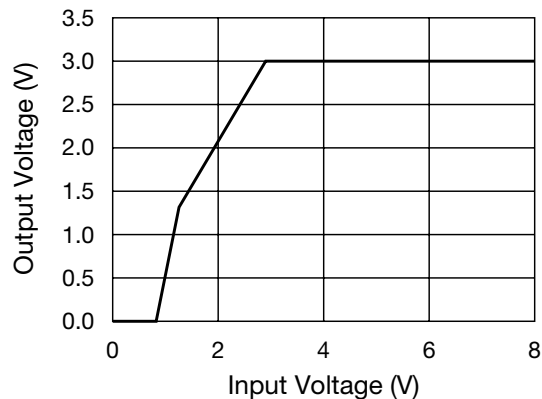
Note: This regulator is not internally compensated and thus requires an external output-capacitor(C<sub>OUT</sub>) for stability.

# Characteristics (3.0V product Ambient Temperature, $T_a=25^{\circ}\text{C}$ )

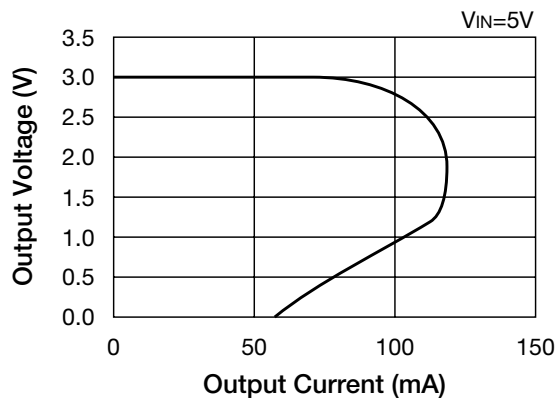
Input-output Differential Voltage



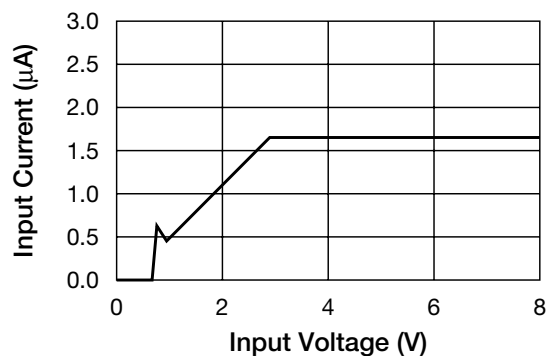
Line Regulation



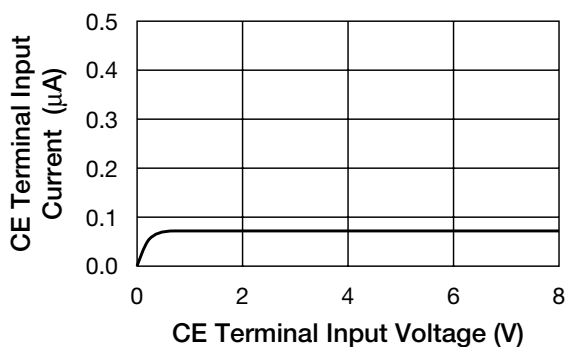
Load Regulation



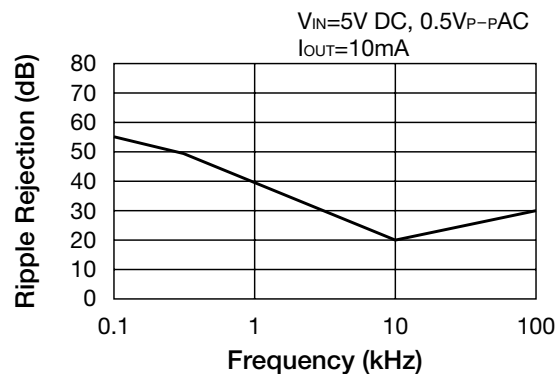
Input Current



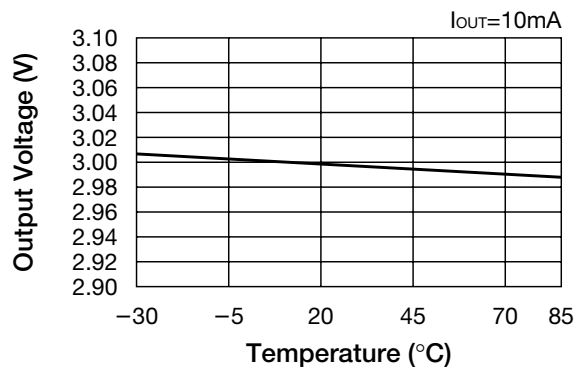
CE Terminal Input Current VS CE Terminal Input Voltage



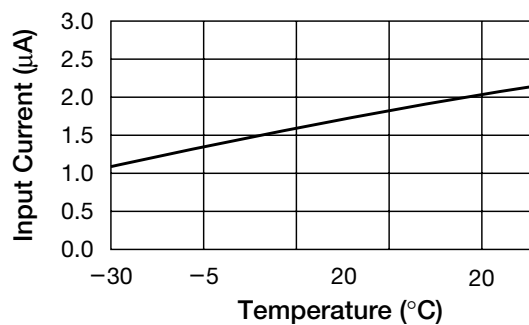
Ripple Rejection



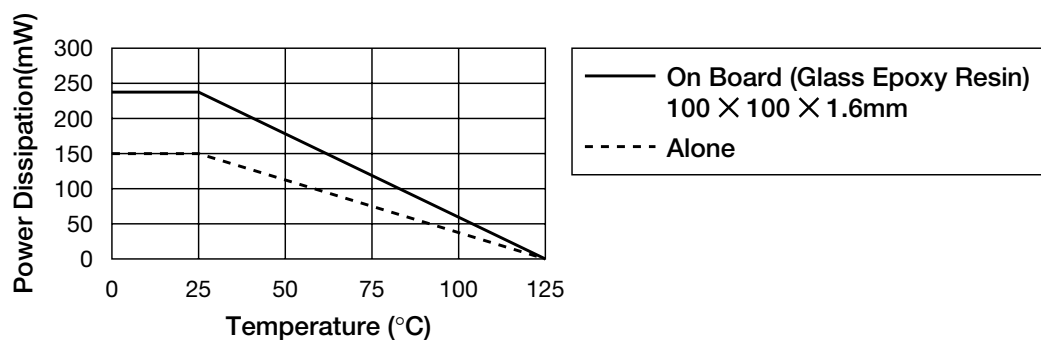
### Output Voltage VS Temperature



### Input Current VS Temperature



### Power Dissipation



### ESR Stable region

