

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 μA 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 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 | 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) |

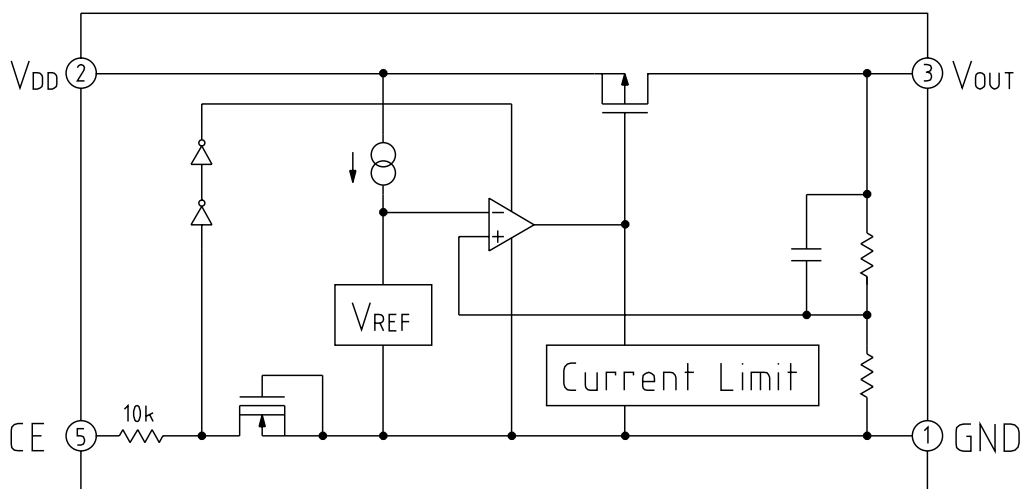
Package

SC-82AB

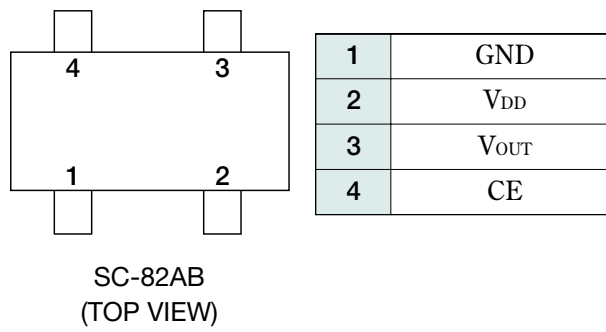
Applications

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 _{DD}	Voltage-Supply pin						
3	V _{OUT}	Regulator output pin						
4	CE	No connection pin						
		<table border="1" style="width: 100%;"> <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 V _{DD} -pin, when it is not used.								

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

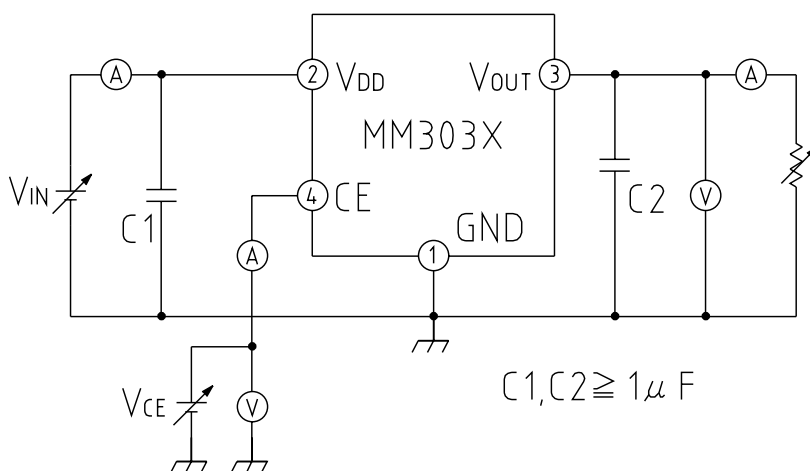
Electrical Characteristics (Ambient Temperature, $T_a=25^{\circ}\text{C}$, $V_{IN}=V_{CE}$)

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

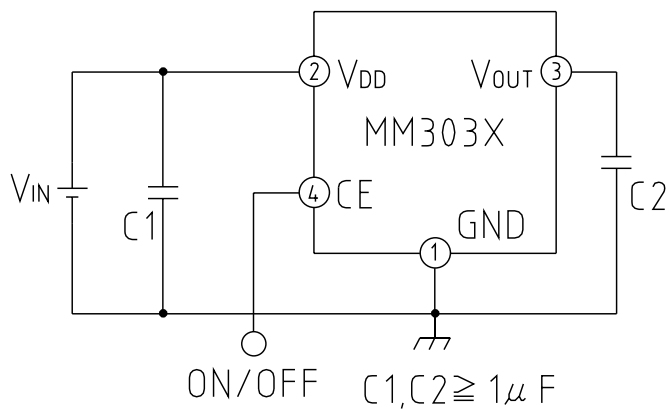
Electrical Characteristics 2 (Ambient Temperature, Ta=25°C, VIN=VCE)

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 CONDITIONS	MIN.	TYP.	MAX.	TEST CONDITIONS	MIN.	TYP.	TEST CONDITIONS	TYP.	MAX.	TEST CONDITIONS	TYP.
MM3031H	V _{IN} -V _{OUT} = 2.0V 10μA ≤ I _{OUT} ≤ 10mA	1.666	1.700	1.734	V _{IN} -V _{OUT} =2.0V	35		V _{IN} -V _{OUT} =2.0V 1mA ≤ I _{OUT} ≤ 35mA	30	45	60	90
MM3031J												
MM3031K												
MM3032A												
MM3032B												
MM3032C												
MM3032D												
MM3032E												
MM3032F												
MM3032G												
MM3032H												
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MM3035B												
MM3035C												
MM3035D												
MM3035E												
MM3035F												
						50		V _{IN} -V _{OUT} =2.0V 1mA ≤ I _{OUT} ≤ 50mA	40	60	35	55
						65		V _{IN} -V _{OUT} =2.0V 1mA ≤ I _{OUT} ≤ 65mA	50	70	25	40
						80		V _{IN} -V _{OUT} =2.0V 1mA ≤ I _{OUT} ≤ 80mA	60	90		

Measuring Circuit



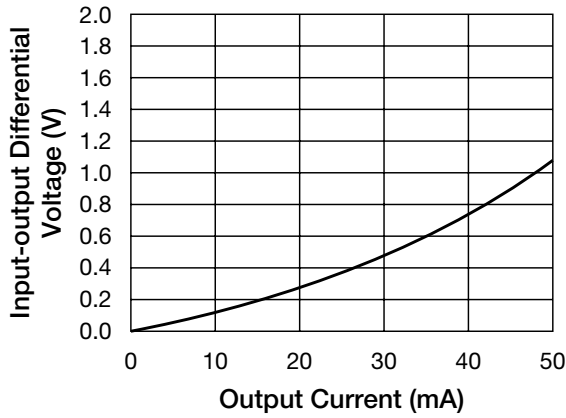
Typical Application Circuit



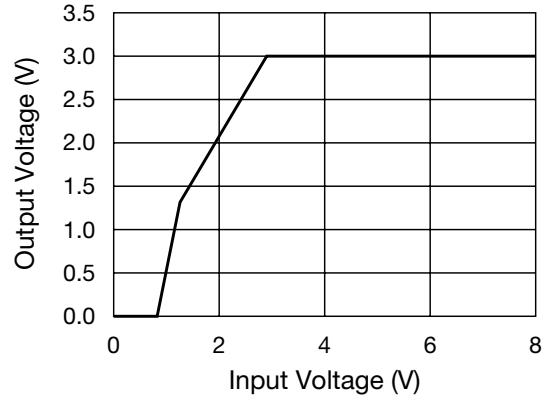
Note: This regulator is not internally compensated and thus requires an external output-capacitor(COUT) for stability.

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

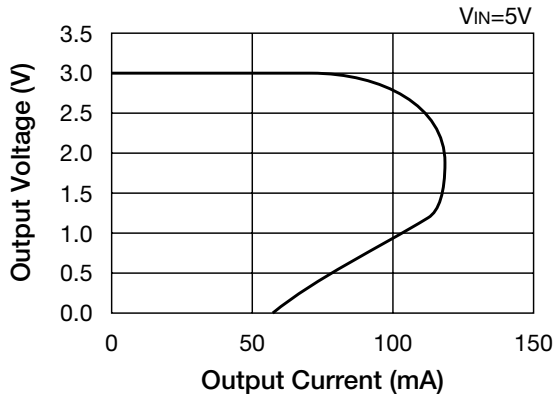
Input-output Differential Voltage



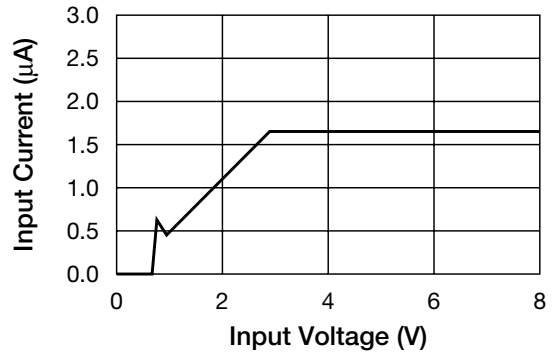
Line Regulation



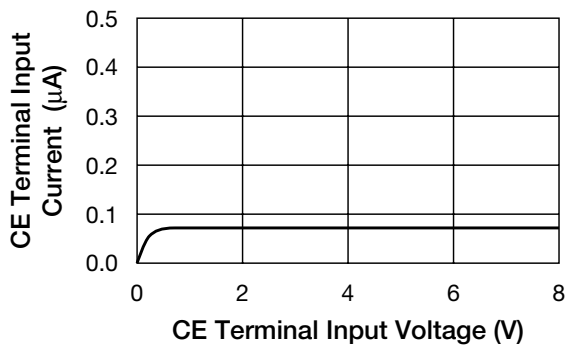
Load Regulation



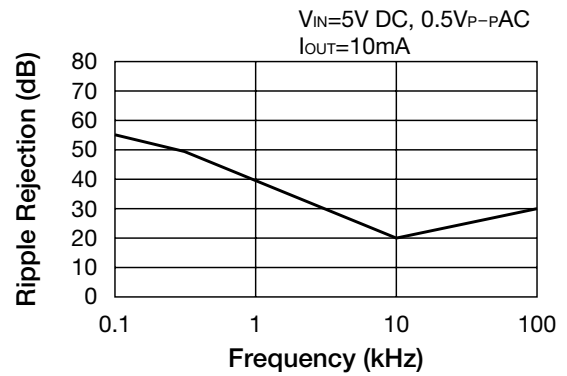
Input Current



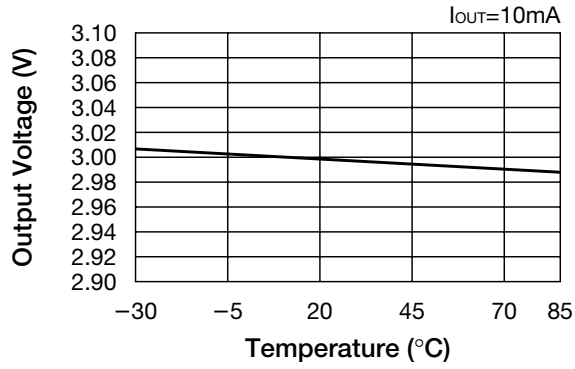
CE Terminal Input Current VS CE Terminal Input Voltage



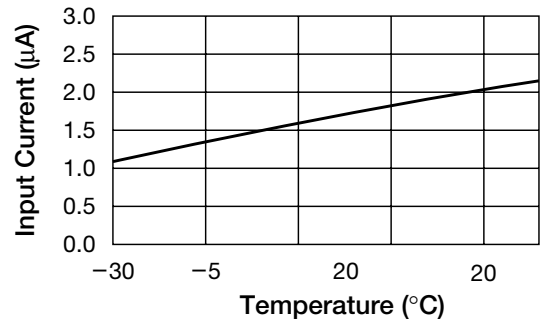
Ripple Rejection



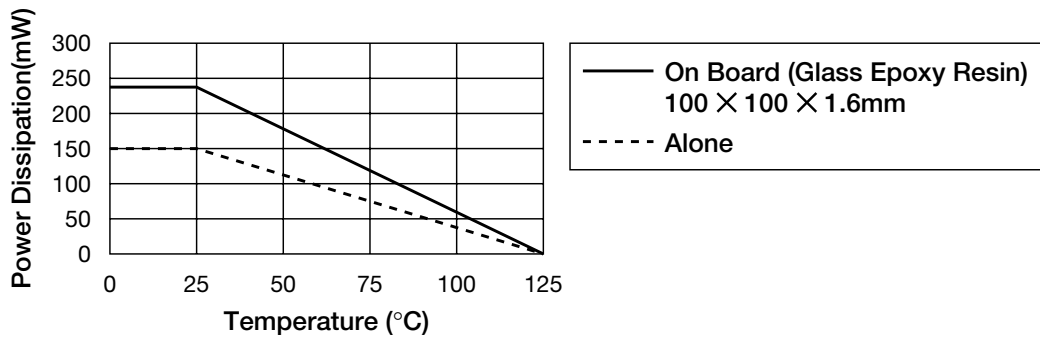
■ Output Voltage VS Temperature



■ Input Current VS Temperature



■ Power Dissipation



■ ESR Stable region

