

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) |

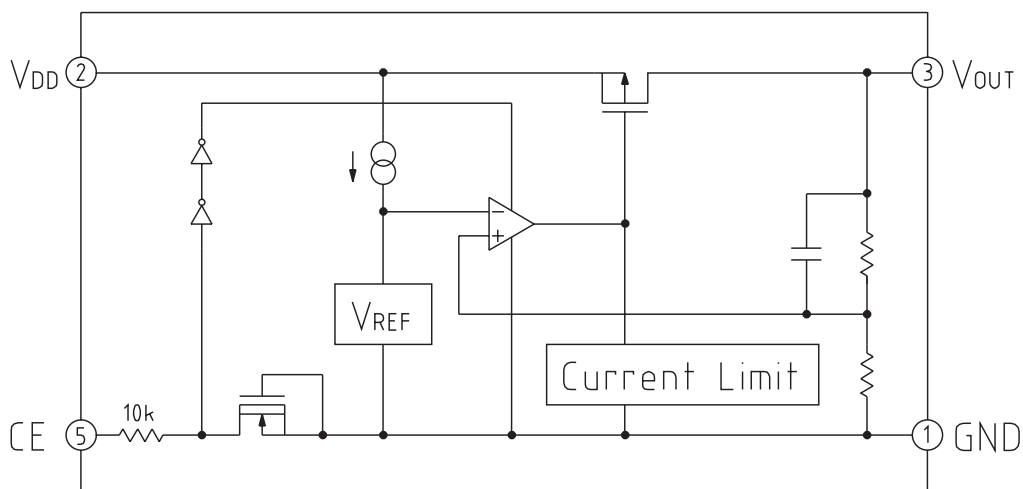
Package

SOT-25A (Mini Mold)

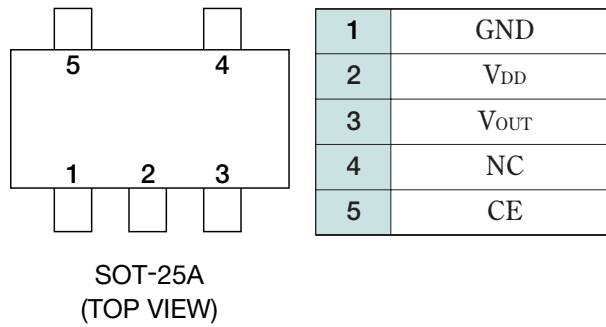
Applications

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	
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

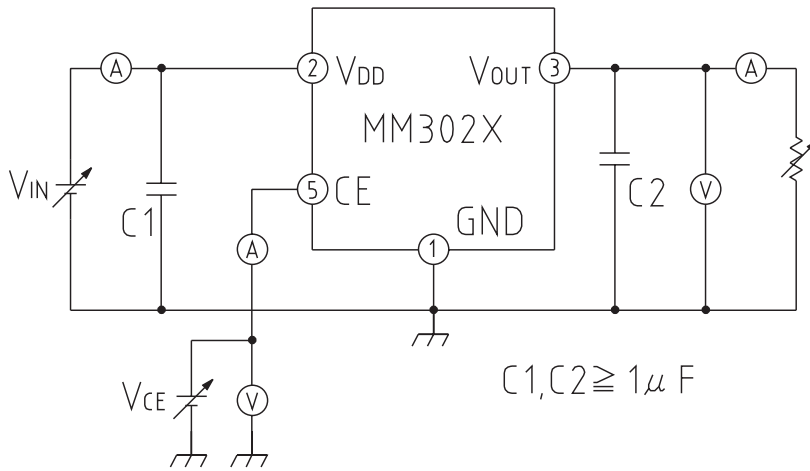
Electrical Characteristics (Ambient Temperature, $T_a=25^{\circ}\text{C}$, $V_{IN}=V_{CE}$)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit
Quiescent Current	I_{SS}	$V_{IN}=V_{OUT}+1.0\text{V}$		2.5	5.0	μA
Input Current(OFF)	$I_{standby}$	$V_{IN}=V_{OUT}+1.0\text{V}$, $V_{CE}=0\text{V}$		0.1	1.0	μA
Line Regulation	$\Delta V_{OUT}/\Delta V_{IN}$	$I_{OUT}=30\text{mA}$, $V_{OUT}+0.5\text{V} \leq V_{IN} \leq 8\text{V}$	0	0.15	0.30	%/V
Input Voltage	V_{IN}				8.0	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}	$V_{IN}=V_{OUT}+1.0\text{V}$, $V_{OUT}=0\text{V}$		60		mA
CE pin current when ON	I_{CE}	$V_{IN}=V_{OUT}+1.0\text{V}$		0.5	1.0	μA
CE input voltage "H"	V_{CEH}	$V_{IN}=V_{OUT}+1.0\text{V}$	$V_{IN}-1$		V_{IN}	V
CE input voltage "L"	V_{CEL}	$V_{IN}=V_{OUT}+1.0\text{V}$			0.25	V

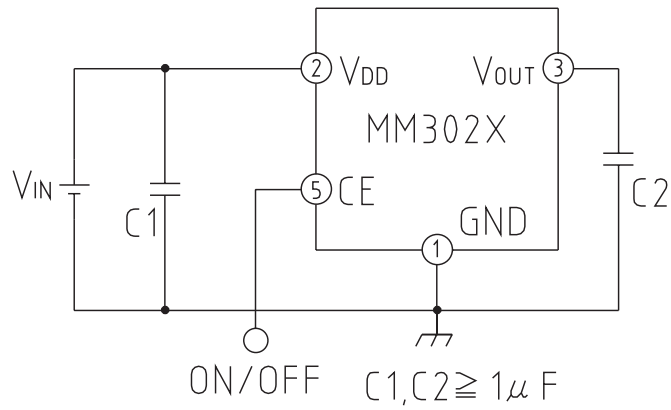
Electrical Characteristics 2 (Ambient Temperature, Ta=25°C, VIN=VCE)

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 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													
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MM3024H													
MM3024J													
MM3024K													
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MM3025E													
MM3025F													

Measuring Circuit



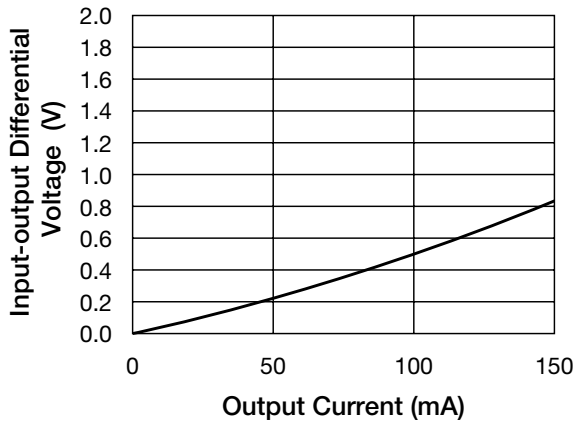
Typical Application Circuit



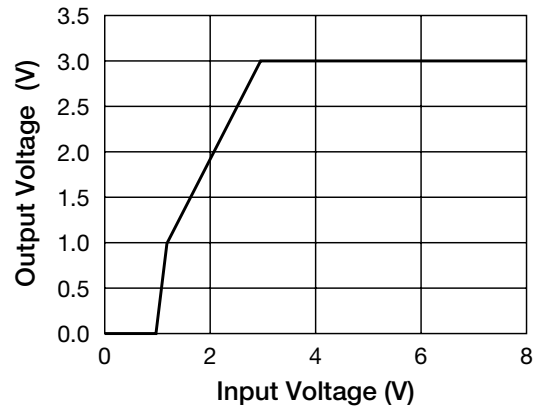
Note: This regulator is not internally compensated and thus requires an external output-capacitor(COUT) for stability.

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

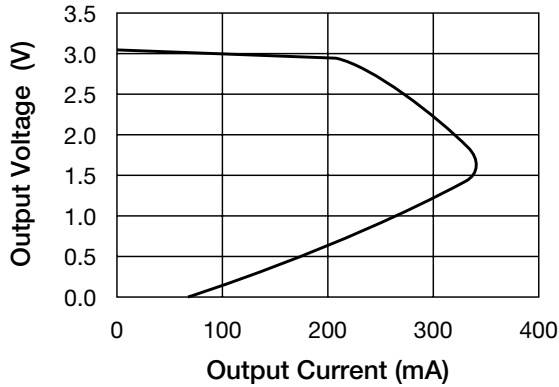
Input-output Differential Voltage



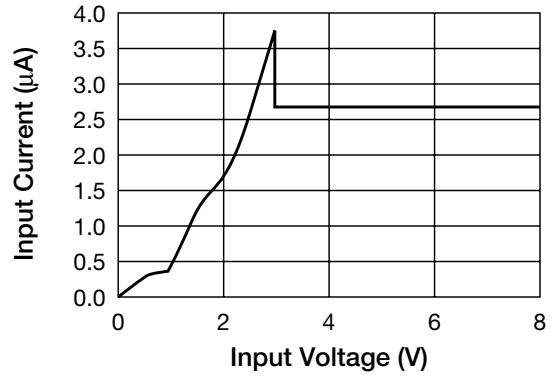
Line Stability



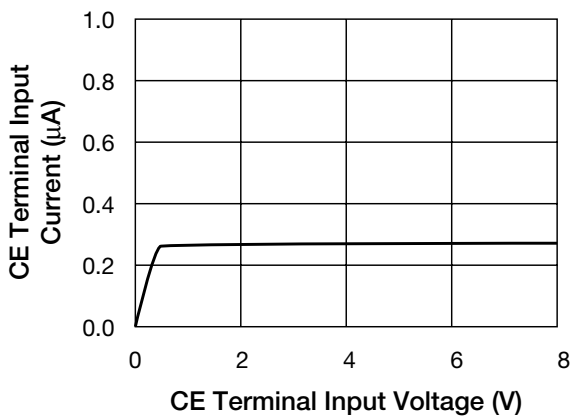
Load Regulation



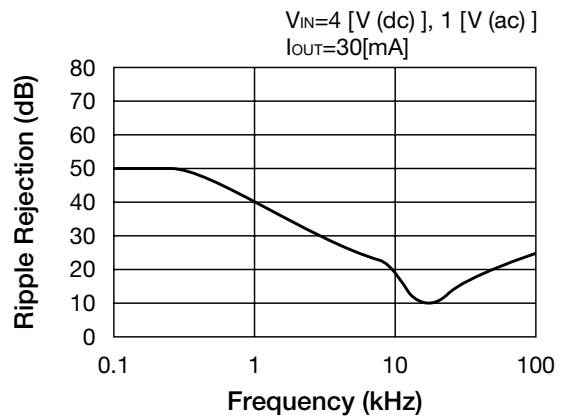
Input Current



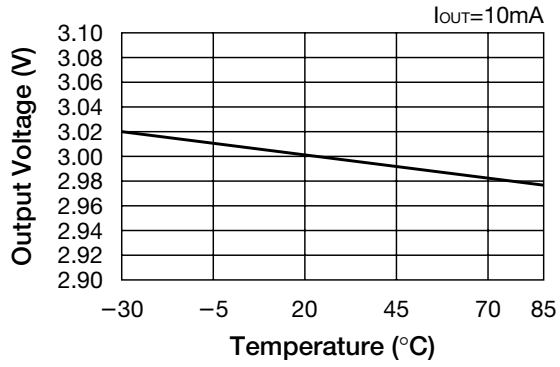
CE Terminal Input Current – CE Terminal Input Voltage



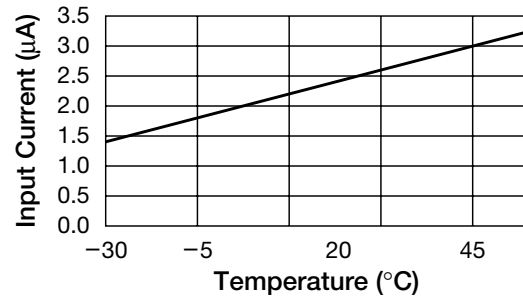
Ripple Rejection



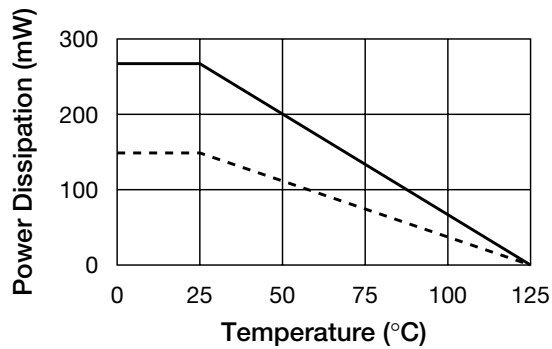
■ Output Voltage – Temperature



■ Input Current – Temperature

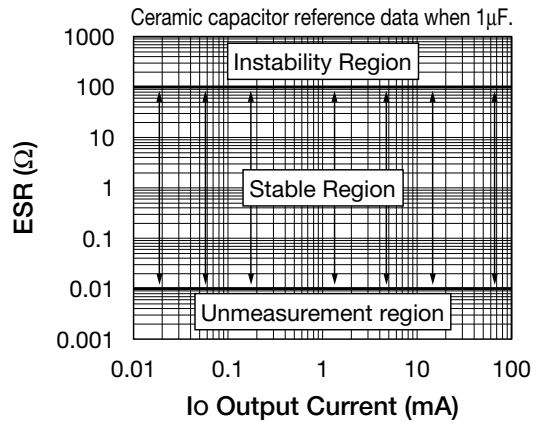


■ Power Dissipation



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

■ ESR Stable region



Note: Reference data