

250mA CMOS Regulator Monolithic IC MM312□□P

Outline

This is a 250mA output low saturation regulator IC that achieves low current consumption (1μA typ.). Output capacity is 0.1μF ESR-free, and the package is SOT89-3A, making it highly versatile for use in cordless telephones and portable devices. Output precision is ±2%.

Features

- | | |
|--|--|
| 1. Low current consumption | 1μA typ. (no load) |
| 2. Output voltage | 2.0~6.0V (0.1V step) |
| 3. Low input/output voltage difference | 180mV typ. ($V_O=3.0V$, $I_{OUT}=80mA$) |
| 4. Low output capacitor | 0.1μF |
| 5. Allowable loss | 500mW |

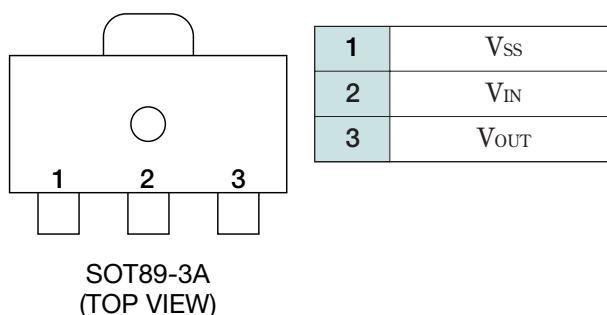
Package

SOT89-3A

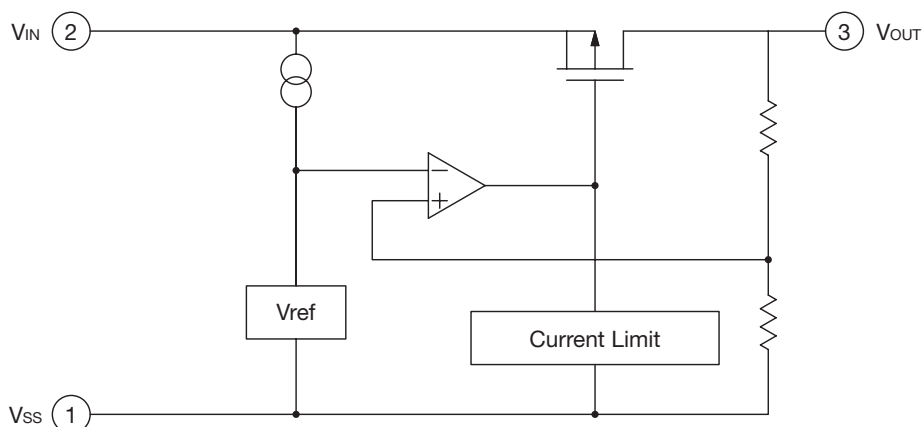
Applications

1. Portable devices
2. AV equipment
3. PC peripherals with memory
4. Office equipment, etc.

Pin Assignment



Block Diagram



Pin Description

Pin no.	Pin name	Functions
1	V _{SS}	GND pin
2	V _{IN}	Voltage-supply pin
3	V _{OUT}	Output pin

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T _{STG}	-40~+125	°C
Supply voltage	V _{DD}	12	V
Output voltage	V _{OUT}	V _{SS} -0.3~V _{IN} +0.3	V
Output current	I _O max.	500	mA
Allowable loss	P _d	500	mW

Recommended Operating Conditions (Ta=25°C)

Item	Symbol	Ratings	Units
Operating ambient temperature	T _{JOP}	-40~+85	°C
Input voltage (max.)	V _{IN} max.	10	V

Electrical Characteristics 1 (Except where noted otherwise, Ta=25°C, VIN=VOUT (typ.) +1V, IOUT=40mA)

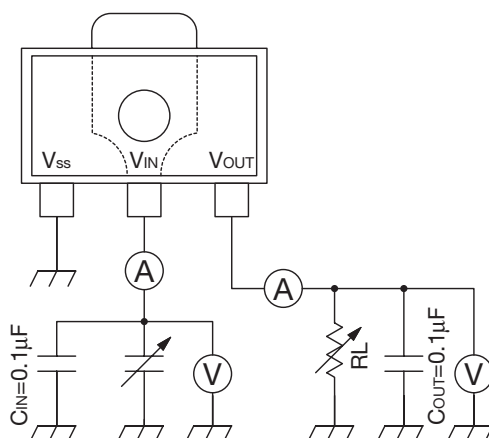
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
No-Load input current	ISS	IOUT=0mA		1	4.5	μA
Output voltage	VOUT		×0.98		×1.02	V
Line Regulation	VLINE	VIN=Vo typ. +1~10V, IOUT=40mA		0.2	0.3	%/V
Load Regulation	VLOAD	Please refer to Electrical Characteristics 2				mV
Output current	IOUT		250			mA
Dropout voltage 1	VIO1	Please refer to Electrical Characteristics 2				V
Dropout voltage 2	VIO2	Please refer to Electrical Characteristics 2				V
VOUT temperature Coefficient *	ΔVOUT/ΔT	IOUT=40mA, -40 ≤ TOP ≤ 85°C		±100		ppm/°C

* The parameter is guaranteed by design.

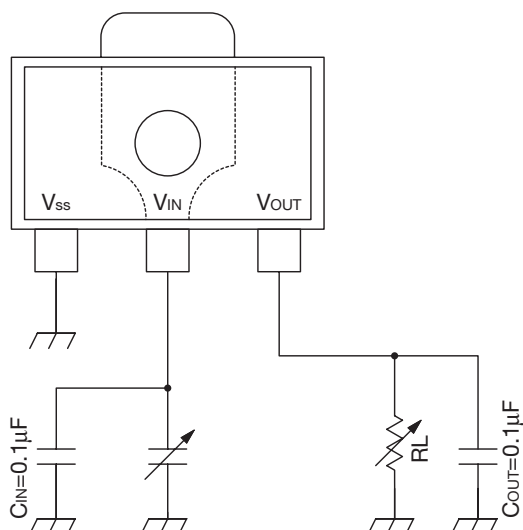
Electrical Characteristics 2 (Except where noted otherwise, Ta=25°C, VIN=VOUT (typ.) +1V, IOUT=40mA)

Model No.	Item												
	Output voltage				Dropout voltage 1			Dropout voltage 2			Load Regulation		
	V _{OUT} (V)				V _{IO1} (mV)			V _{IO2} (mV)			V _{LOAD} (mV)		
	Test conditions	Min.	Typ.	Max.	Test conditions	Typ.	Max.	Test conditions	Typ.	Max.	Test conditions	Typ.	Max.
MM3122A	I _{OUT} = 40mA	1.960	2.000	2.040	I _{OUT} = 60mA V _{IN} = V _O ×0.98V	180	360	I _{OUT} = 120mA V _{IN} = V _O ×0.98V	400	700	1mA ≤ I _{OUT} ≤ 60mA V _{IN} = V _{OUT} +1V	10	90
MM3122B		2.058	2.100	2.142									
MM3122C		2.156	2.200	2.244									
MM3122D		2.254	2.300	2.346									
MM3122E		2.352	2.400	2.448									
MM3122F		2.450	2.500	2.550									
MM3122G		2.548	2.600	2.652									
MM3122H		2.646	2.700	2.754									
MM3122J		2.744	2.800	2.856									
MM3122K		2.842	2.900	2.958									
MM3123A		2.940	3.000	3.060	I _{OUT} = 80mA V _{IN} = V _O ×0.98V	180	360	I _{OUT} = 160mA V _{IN} = V _O ×0.98V	400	700	1mA ≤ I _{OUT} ≤ 80mA V _{IN} = V _{OUT} +1V	10	90
MM3123B		3.038	3.100	3.162									
MM3123C		3.136	3.200	3.264									
MM3123D		3.234	3.300	3.366									
MM3123E		3.332	3.400	3.468									
MM3123F		3.430	3.500	3.570									
MM3123G		3.528	3.600	3.672									
MM3123H		3.626	3.700	3.774									
MM3123J		3.724	3.800	3.876									
MM3123K		3.822	3.900	3.978									
MM3124A		3.920	4.000	4.080	I _{OUT} = 100mA V _{IN} = V _O ×0.98V	170	330	I _{OUT} = 200mA V _{IN} = V _O ×0.98V	400	630	1mA ≤ I _{OUT} ≤ 100mA	10	90
MM3124B		4.018	4.100	4.182									
MM3124C		4.116	4.200	4.284									
MM3124D		4.214	4.300	4.386									
MM3124E		4.312	4.400	4.488									
MM3124F		4.410	4.500	4.590									
MM3124G		4.508	4.600	4.692									
MM3124H		4.606	4.700	4.794									
MM3124J		4.704	4.800	4.896									
MM3124K		4.802	4.900	4.998									
MM3125A		4.900	5.000	5.100	I _{OUT} = 100mA V _{IN} = V _O ×0.98V	120	300	I _{OUT} = 200mA V _{IN} = V _O ×0.98V	380	600	V _{IN} = V _{OUT} +1V	10	80
MM3125B		4.998	5.100	5.202									
MM3125C	5.096	5.200	5.304										
MM3125D	5.194	5.300	5.406										
MM3125E	5.292	5.400	5.508										
MM3125F	5.390	5.500	5.610										
MM3125G	5.488	5.600	5.712										
MM3125H	5.586	5.700	5.814										
MM3125J	5.684	5.800	5.916										
MM3125K	5.782	5.900	6.018										
MM3126A	5.880	6.000	6.120										

Measuring Circuit



Application Circuit



★Temperature Characteristics : B

Note: 1 The output capacitor is required between output and GND to prevent oscillation.

Note: 2 The ESR of capacitor must be defined in ESR stability area.

It is possible to use a ceramic capacitor without ESR resistance for output.

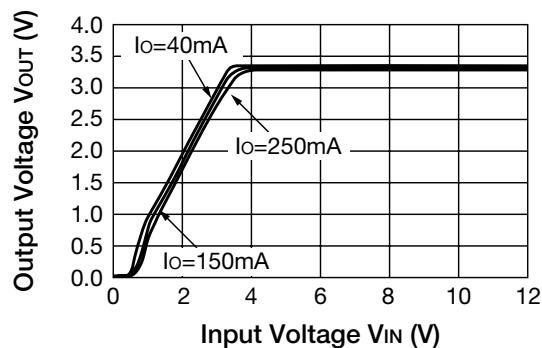
The ceramic capacitor must be used more than 0.1μF and B temperature characteristics.

Note: 3 The wire of VIN and VSS is required to print full ground plane for noise and stability.

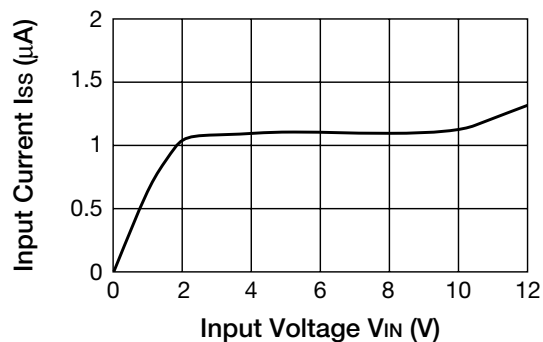
Note: 4 The input capacitor must be connected a distance of less than 1cm from input pin.

Characteristics (Except where noted otherwise, $T_a=25^{\circ}\text{C}$, $V_{IN}=V_O+1\text{V}$, $C_{IN}=C_{OUT}=1.0\mu\text{F}$)

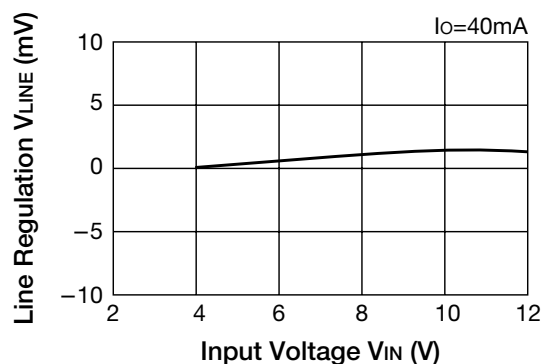
Output Voltage



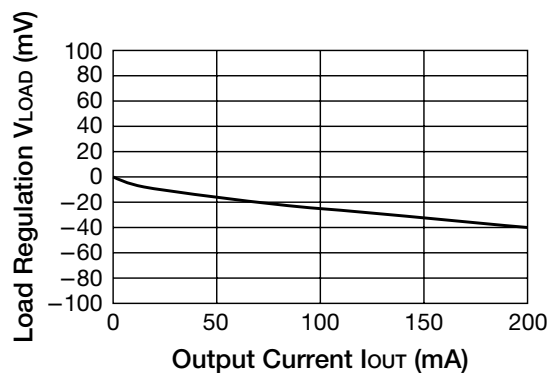
No-Load Input Current



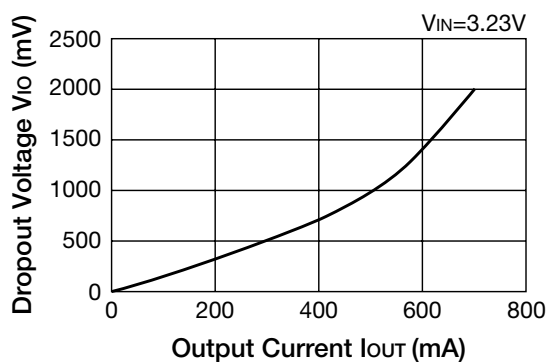
Line Regulation



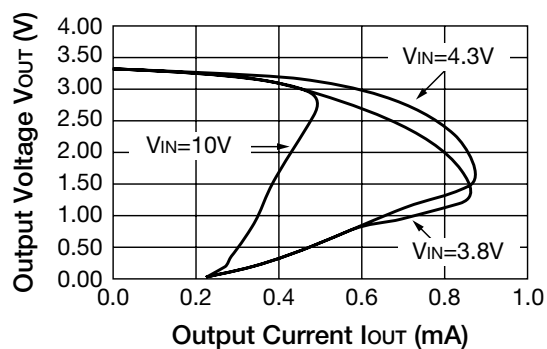
Load Regulation



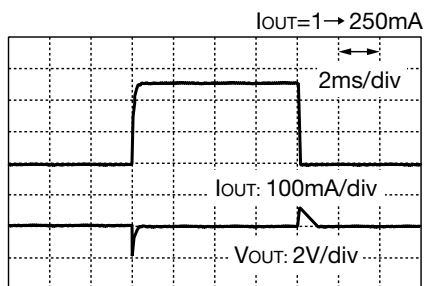
Dropout Voltage



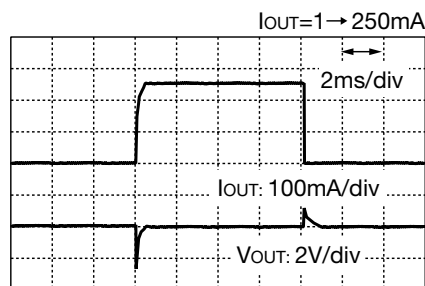
Current Limit



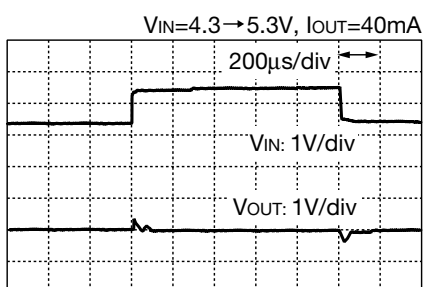
Load transient response ($C_{OUT}=1\mu F$)



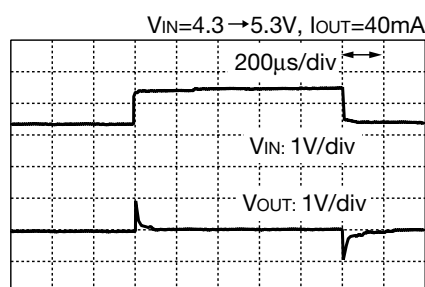
Load transient response (without C_{OUT})



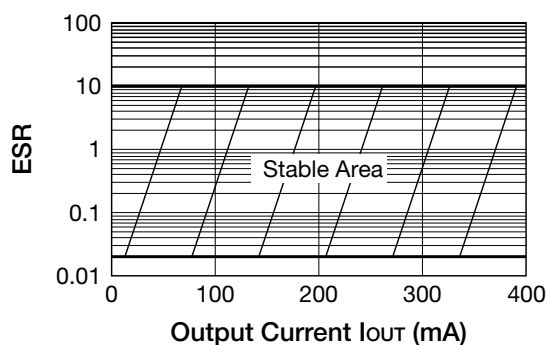
Input transient response ($C_{OUT}=1\mu F$)



Input transient response (without C_{OUT})

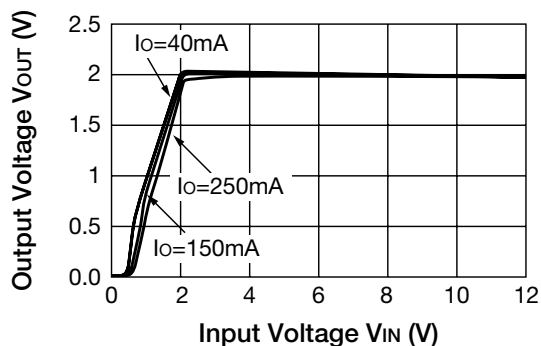


ESR

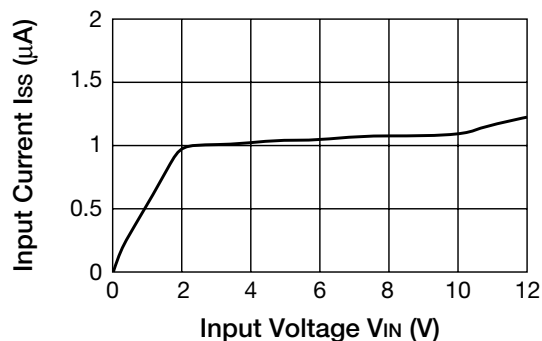


* ESR does not measure more than 10Ω.

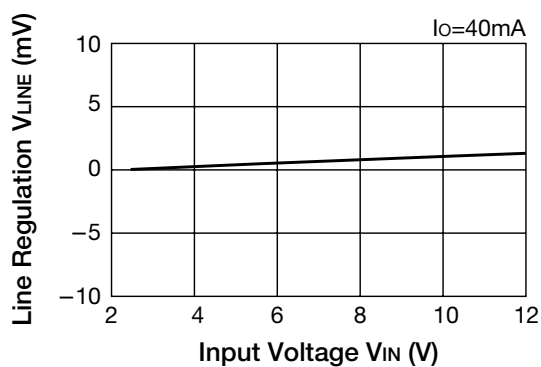
■ Output Voltage



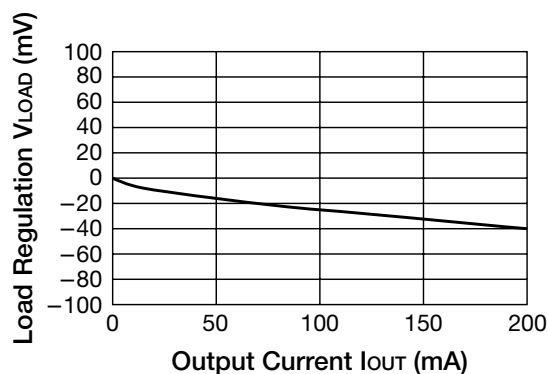
■ No-Load Input Current



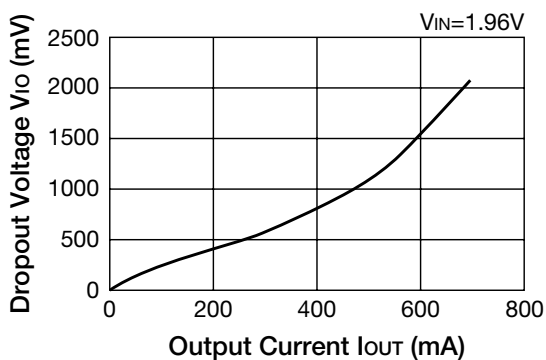
■ Line Regulation



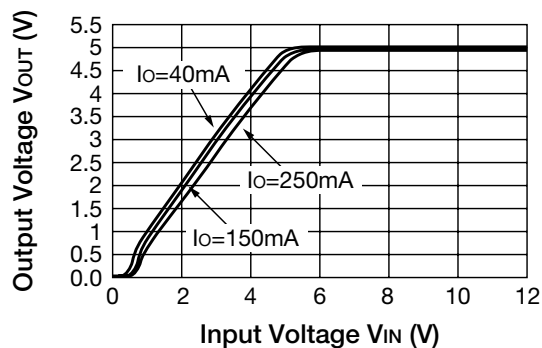
■ Load Regulation



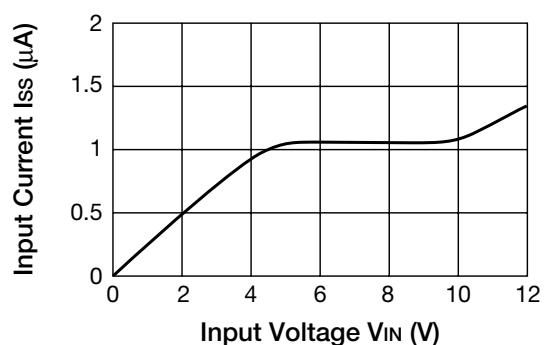
■ Dropout Voltage



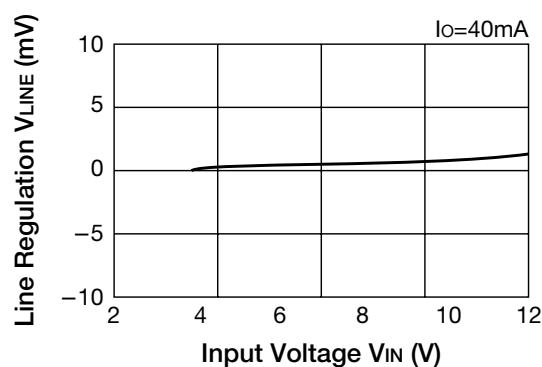
■ Output Voltage



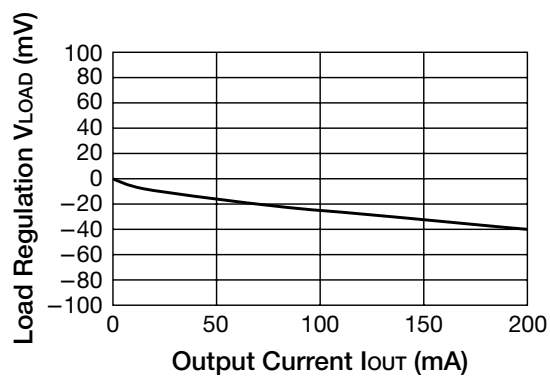
■ No-Load Input Current



■ Line Regulation



■ Load Regulation



■ Dropout Voltage

