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

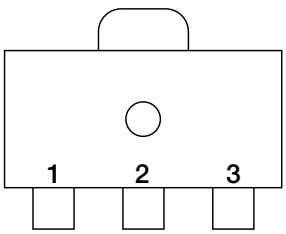
Package

SOT89-3A

Applications

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

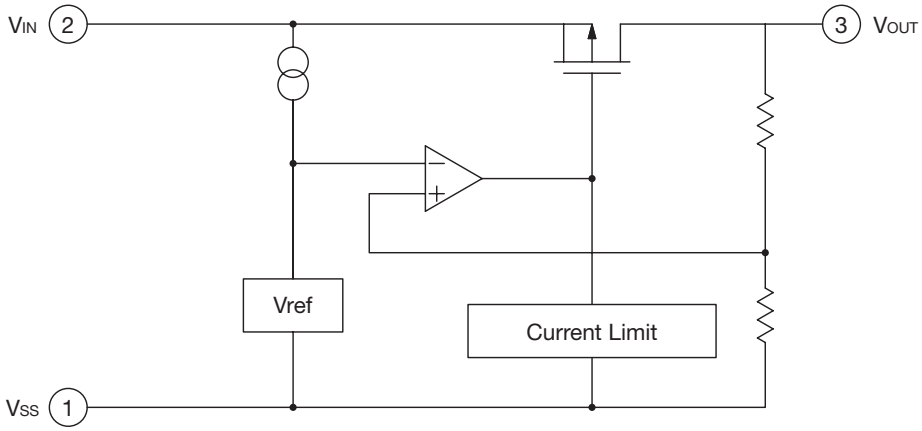
Pin Assignment



1	V_{SS}
2	V_{IN}
3	V_{OUT}

SOT89-3A
(TOP VIEW)

Block Diagram



Pin Description

Pin no.	Pin name	Functions
1	VSS	GND pin
2	VIN	Voltage-supply pin
3	VOUT	Output pin

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	TSTG	–40~+125	°C
Supply voltage	VDD	12	V
Output voltage	VOUT	VSS–0.3~VIN+0.3	V
Output current	Io max.	500	mA
Allowable loss	Pd	500	mW

Recommended Operating Conditions (Ta=25°C)

Item	Symbol	Ratings	Units
Operating ambient temperature	TJOP	–40~+85	°C
Input voltage (max.)	VIN max.	10	V

Electrical Characteristics 1 (Except where noted otherwise, Ta=25°C, V_{IN}=V_{OUT} (typ.) +1V, I_{OUT}=40mA)

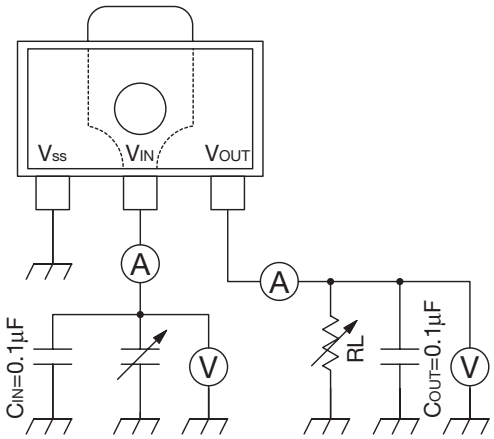
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
No-Load input current	I_{SS}	I_{OUT}=0mA		1	4.5	μA
Output voltage	V_{OUT}		×0.98		×1.02	V
Line Regulation	V_{LINE}	V_{IN}=Vo typ. +1~10V, I_{OUT}=40mA		0.2	0.3	%/V
Load Regulation	V_{LOAD}	Please refer to Electrical Characteristics 2				mV
Output current	I_{OUT}		250			mA
Dropout voltage 1	$V_{IO}1$	Please refer to Electrical Characteristics 2				V
Dropout voltage 2	$V_{IO}2$	Please refer to Electrical Characteristics 2				V
V_{OUT} temperature Coefficient *	$\Delta V_{OUT}/\Delta T$	I_{OUT}=40mA, −40 ≦ T_{OP} ≦ 85°C		±100		ppm/℃

* The parameter is guaranteed by design.

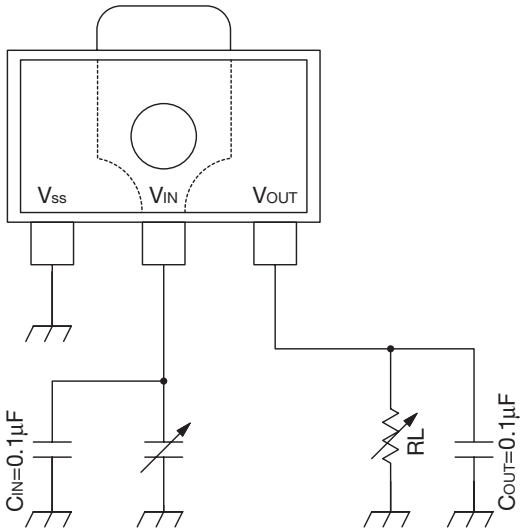
Electrical Characteristics 2 (Except where noted otherwise, Ta=25°C, V_{IN}=V_{OUT} (typ.) +1V, I_{OUT}=40mA)

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, V_{IN}= V_{OUT}+1V	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		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

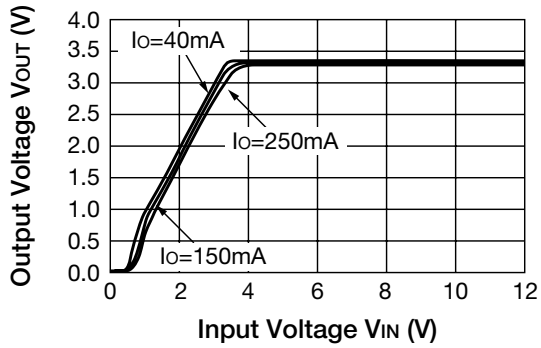


★Temperature Characteristics : B

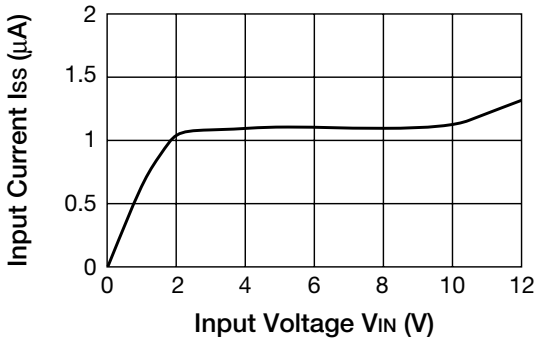
Note: 1 The output capacitor is required between output and GND to prevent oscillation.
Note: 2 The ESR of capacitor must be defined in ESR stability area.
It is possible to use a ceramic capacitor without ESR resistance for output.
The ceramic capacitor must be used more than 0.1µF and B temperature characteristics.
Note: 3 The wire of V_{IN} and V_{SS} 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, Ta=25°C, V_{IN}=V_O+1V, C_{IN}=C_{OUT}=1.0µF)

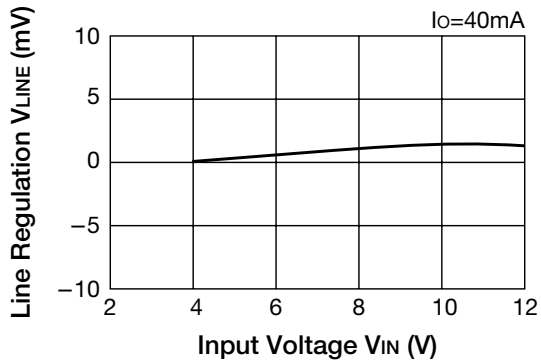
Output Voltage



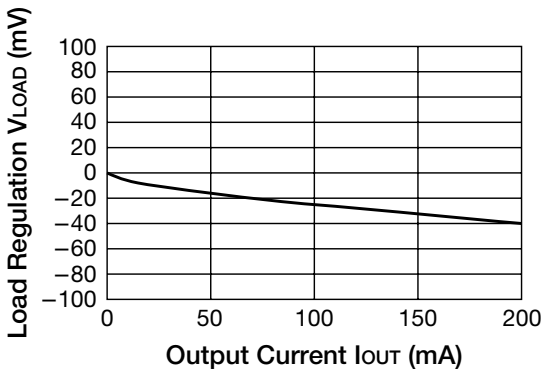
No-Load Input Current



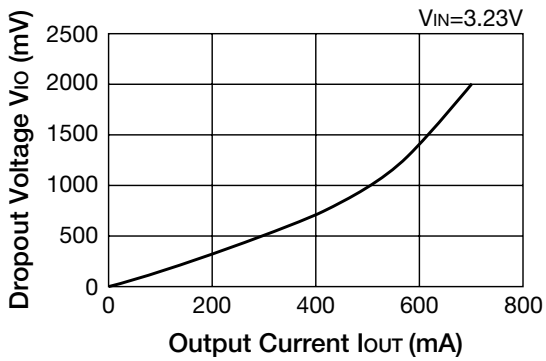
Line Regulation



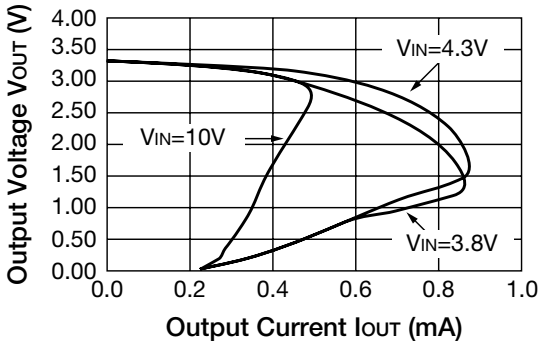
Load Regulation



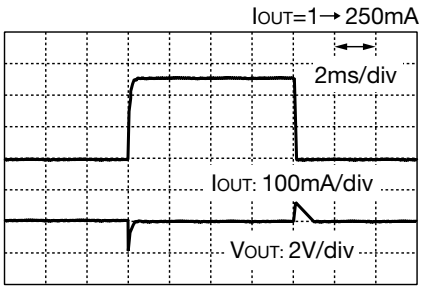
Dropout Voltage



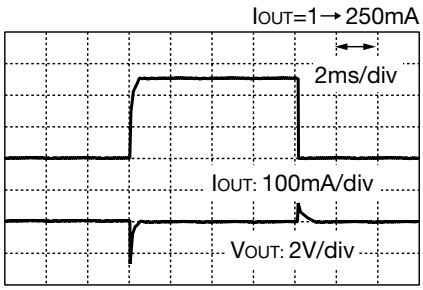
Current Limit



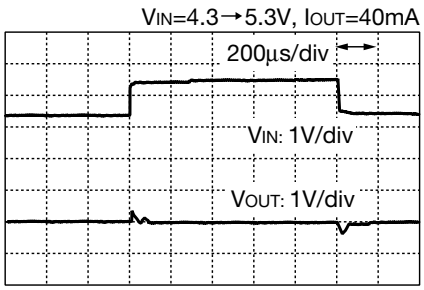
Load transient response (COUT=1µF)



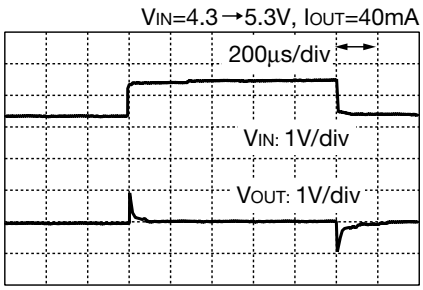
Load transient response (without COUT)



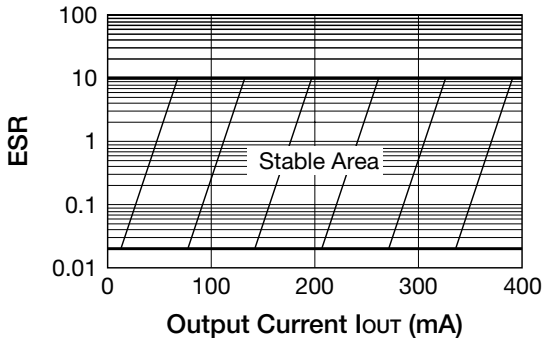
Input transient response (COUT=1µF)



Input transient response (without COUT)

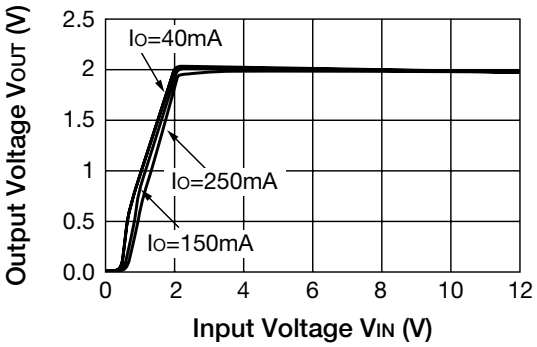


ESR

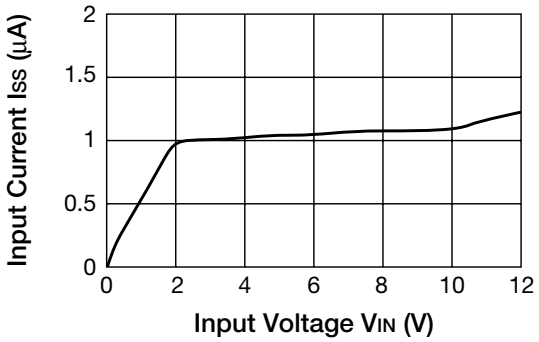


* ESR does not measure more then 10Ω.

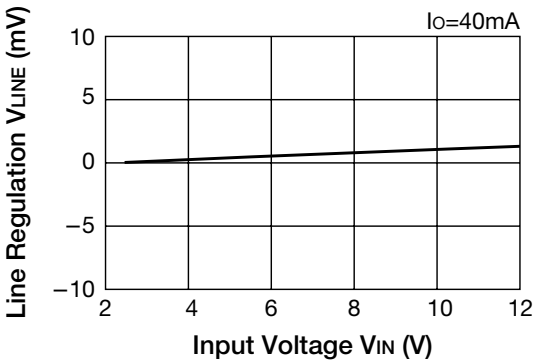
Output Voltage



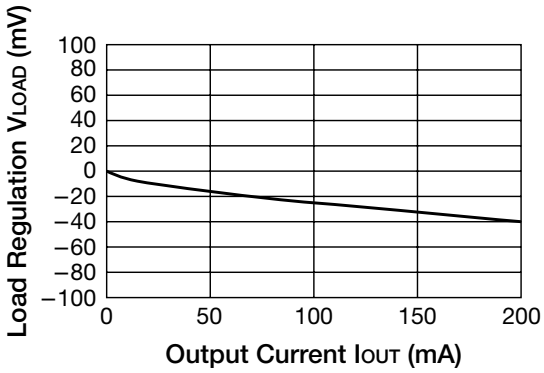
No-Load Input Current



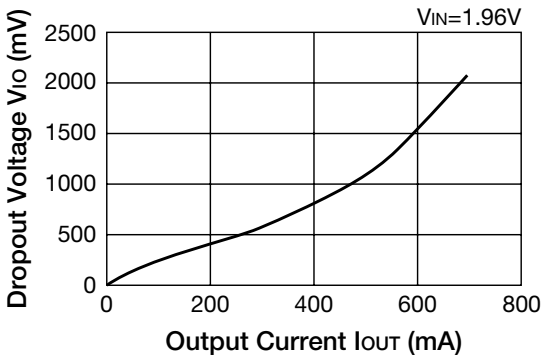
Line Regulation



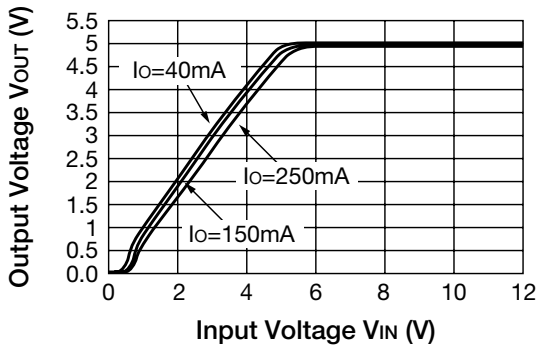
Load Regulation



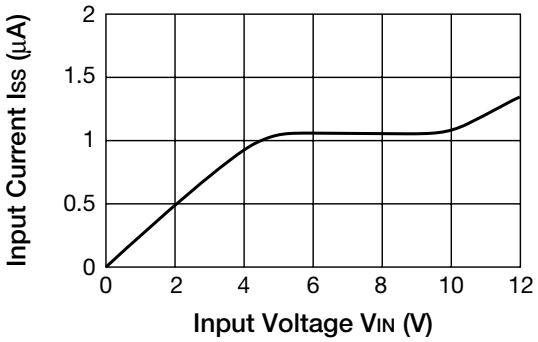
Dropout Voltage



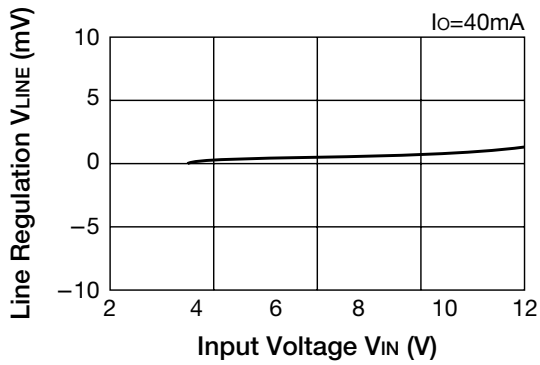
Output Voltage



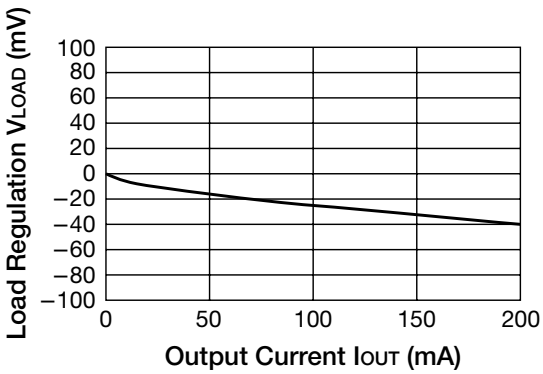
No-Load Input Current



Line Regulation



Load Regulation



Dropout Voltage