

# Microminiature Low-Power Consumption Low-Saturation Regulator Monolithic IC MM1385

## Outline

This IC is a microminiature stabilized power supply device featuring an output voltage precision of within  $\pm 2\%$  and output currents of up to 200mA; the input/output voltage difference at 50mA is only 0.1V. This chip is provided with an output noise reduction pin and output on/off control pin, and is ideal for use in portable equipment.

## Features

- |                           |  |
|---------------------------|--|
| 1. No-load input current  | 95 $\mu$ A typ.  |
| 2. I/O voltage difference | 0.1V typ.(I <sub>o</sub> =50mA)                        |
| 3. Ripple rejection ratio | 70dB typ.  |
| 4. Output current         | 150mA max.   |
| 5. Output noise voltage   | 35 $\mu$ Vrms typ.                                     |
| 6. Output voltage rank    | 2~3.3V(0.1V step), 3.5V/3.8V/4V/4.2V/4.5V/4.8V/5V/5.2V |
| 7. Output on/off control  | High→ON, Low→OFF                                       |

## Package

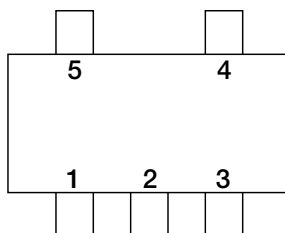
SOT-25A (MM1385□N)

\*The output voltage rank appears in the boxes.

## Applications

1. Cordless phones
2. Portable phones, PHS
3. Portable minidiscs
4. Other portable equipment which uses batteries

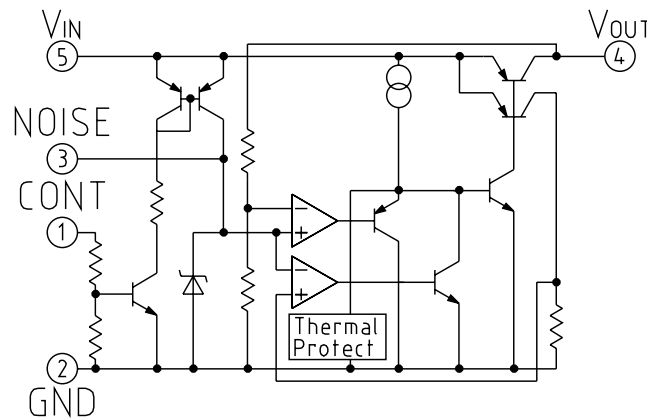
## Pin Assignment



SOT-25A  
(TOP VIEW)

1	CONT
2	GND
3	NOISE
4	V <sub>OUT</sub>
5	V <sub>IN</sub>

Block Diagram



Absolute Maximum Ratings

Item	Symbol	Ratings	Units
Storage temperature	T <sub>STG</sub>	-40~+125	°C
Operating temperature	T <sub>OPR</sub>	-20~+75	°C
Power supply current	V <sub>CC</sub>	-0.3~+12	V
Output current	I <sub>OUT</sub>	200	mA
Power consumption	P <sub>d</sub>	150	mW

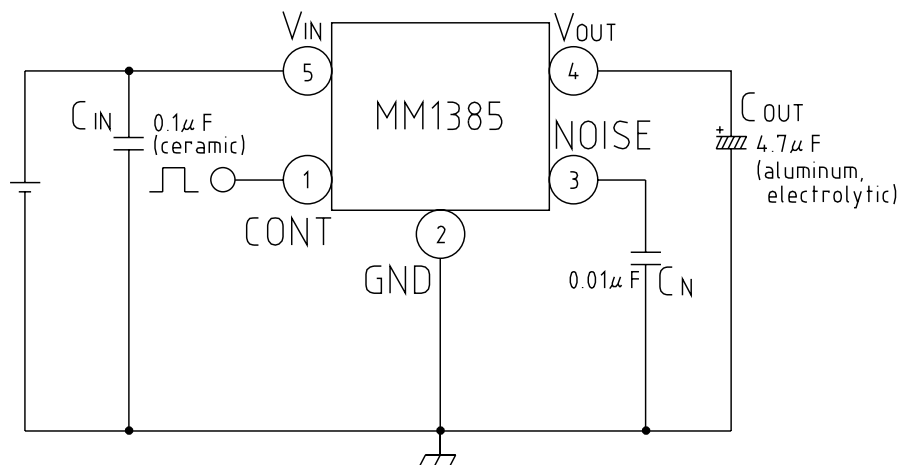
Recommended Operating Conditions

Item	Symbol	Ratings	Units
Operating temperature	T <sub>OP</sub>	-20~+75	°C
Output current	I <sub>OP</sub>	0~150	mA
Operating voltage	V <sub>OP</sub>	1.8~12	V

**Electrical Characteristics** (Except where noted otherwise,  $T_a=25^\circ\text{C}$ )

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Output voltage	$V_o$	$V_{IN}=V_o+1\text{V}$ , $I_o=30\text{mA}$ ,	$V_{OUT}^{-2\%}$	$V_{OUT}$	$V_{OUT}^{+2\%}$	V
No-load consumption current	$I_{ccq1}$	$V_{IN}=V_o+1\text{V}$ , $I_o=0\text{mA}$		95	190	$\mu\text{A}$
Input current while off	$I_{ccq2}$	$V_{IN}=V_o+1\text{V}$ , $V_{CONT}=0\text{V}$			0.1	$\mu\text{A}$
I/O voltage difference	$V_d$ min.	$V_{IN}=V_o-0.2\text{V}$ , $I_o=50\text{mA}$		0.1	0.2	V
Input fluctuations	$\Delta V_1$	$V_{IN}=V_o+1\text{V}\sim 10\text{V}$ , $I_o=50\text{mA}$		10	20	mV
Load fluctuation	$\Delta V_2$	$V_{IN}=V_o+1\text{V}$ , $I_o=0\sim 100\text{mA}$		30	60	mV
Output voltage temperature coefficient	$\Delta V_o/\Delta T$	$T_j=-20\sim +75^\circ\text{C}$ , $V_{IN}=V_o+1\text{V}$ , $I_o=30\text{mA}$		100		ppm/ $^\circ\text{C}$
Ripple rejection rate	RR	$V_{IN}=V_o+1\text{V}$ , $I_o=30\text{mA}$ , $V_{RIPPLE}=1V_{P-P}$ , $f=120\text{Hz}$	50	70		dB
Output noise voltage	$V_n$	$V_{IN}=V_o+1\text{V}$ , $f=20\sim 80\text{kHz}$ , $I_o=30\text{mA}$ , $C_n=0.01\mu\text{F}$		$\frac{35}{(3V\text{ item})}$		$\mu\text{V}_{rms}$
CONT pin current while on	$I_{ON}$	$V_{CONT}=1.6\text{V}$		5	10	$\mu\text{A}$
CONT pin high level	H		1.6		$V_{IN}^{+0.3\text{V}}$	V
CONT pin low level	L		-0.3		0.4	V

**Measuring Circuit**

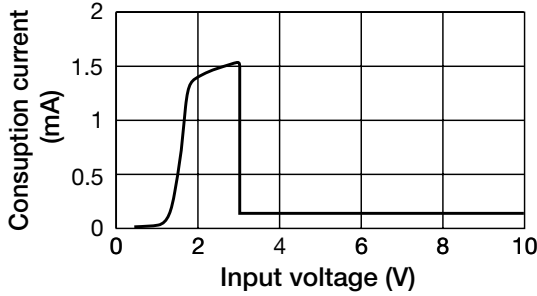


**Output Voltage Rank**

Rank	Voltage	Rank	Voltage
W	5.2V	G	3.1V
A	5.0V	H	3.0V
Q	4.9V	J	2.9V
Z	4.8V	K	2.8V
X	4.6V	L	2.7V
B	4.5V	M	2.6V
V	4.2V	N	2.5V
C	4.0V	P	2.4V
Y	3.8V	R	2.3V
I	3.6V	S	2.2V
D	3.5V	T	2.1V
E	3.3V	U	2.0V
F	3.2V		

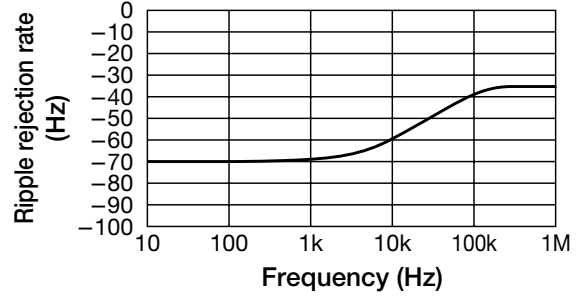
**Characteristics** (Represent data. H rank)

**No-load input current**

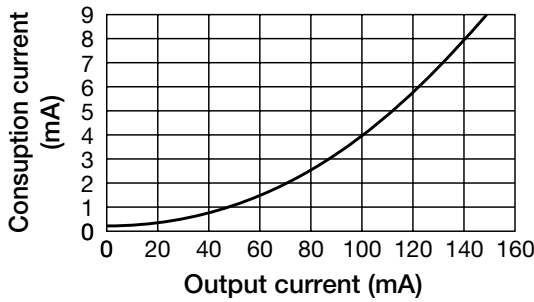


**Ripple rejection rate**

( $V_{IN}=4V, I_o=30mA, V_{ripple}=1V, C_{OUT}=4.7\mu F$ )

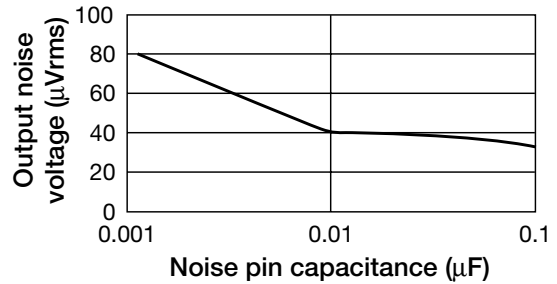


**Consumption current ( $V_{IN}=4V$ )**

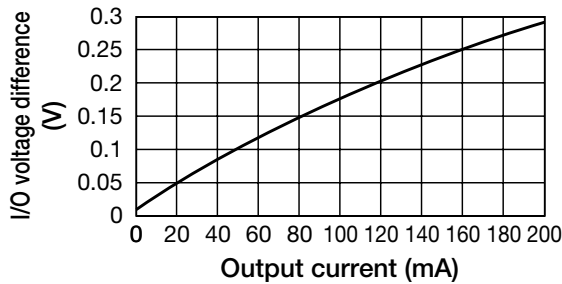


**Output noise voltage**

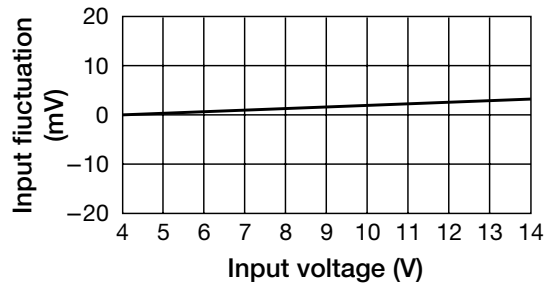
( $V_{IN}=4V, I_o=30mA, C_{OUT}=4.7\mu F$ )



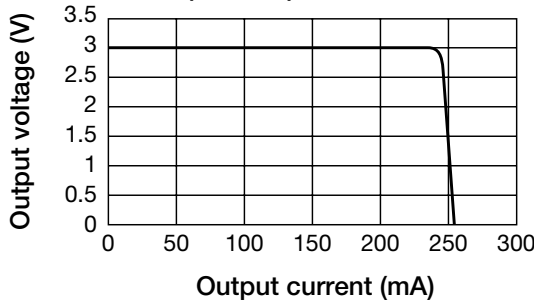
**I/O voltage difference ( $V_{IN}=2.8V$ )**



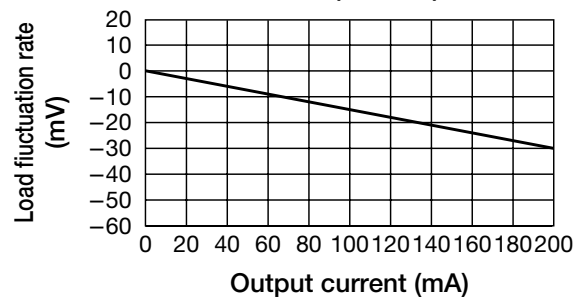
**Input fluctuation ( $I_o=30mA$ )**



**Current limit ( $V_{IN}=4V$ )**



**Load fluctuation rate ( $V_{IN}=4V$ )**



**ESR Stable region**

$V_{IN}=0\sim 12V, C_{OUT}=4.7\mu F$   
(Ceramic,  $ESR=0.02\Omega$  at 100kHz)

