

# IC for Regulator+Reset Monolithic IC MM1437

September 22, 1999

## Outline

This IC combines a low saturation 5V regulator, adapted for low power consumption, and a reset function (regulator output monitoring), for which there is significant market need, that uses the built-in 4.2V, 4.5V and 4.7V detection delay circuit.

## Features

- 1. Low drop voltage 0.25V typ.
- 2. High input voltage 18V max.
- 3. Internal thermal shutdown circuit.
- 4. Internal current-limiting circuit.
- 5. Adjustment-free reset detection voltage A rank: 4.2V typ. B rank: 4.5V typ. C rank: 4.7V typ.
- 6. Easy to set delay time from voltage detection to reset release.

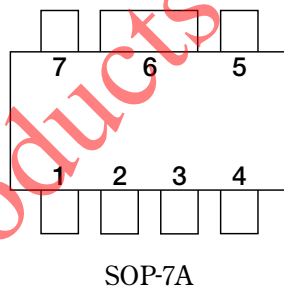
## Package

SOP-7A

## Applications

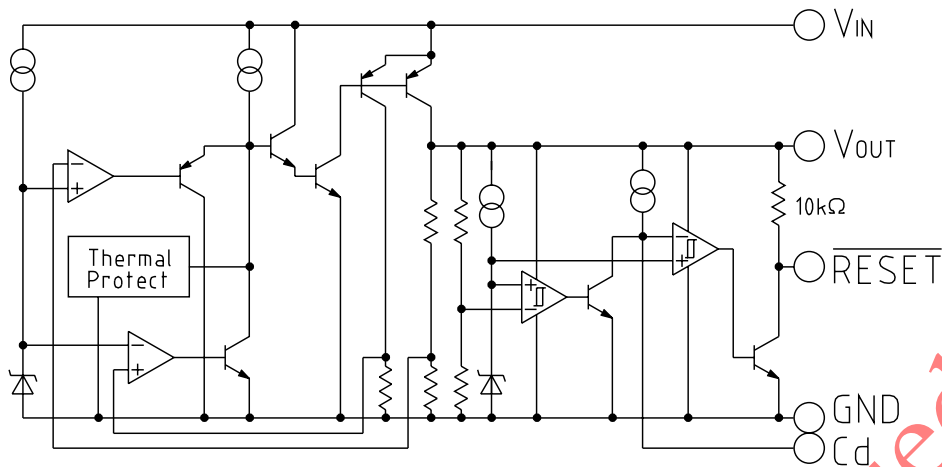
TV, monitors, air conditioners, others.

## Pin Assignment



1	GND
2	$\overline{\text{RESET}}$
3	Cd
4	V <sub>IN</sub>
5	V <sub>OUT</sub>
6	GND
7	N.C

Equivalent Circuit Diagram



Pin Description

Pin No.	Pin name	Functions	Equivalent circuit diagram						
1	GND	GND pin							
2	RESET	Output pin voltage detection output V <sub>OUT</sub> pin voltage detection output pin RESET pin logic <table border="1" style="margin-left: 20px;"> <tr> <td></td> <td>RESET</td> </tr> <tr> <td>V<sub>OUT</sub>&lt;V<sub>S</sub></td> <td>L</td> </tr> <tr> <td>V<sub>OUT</sub>&gt;V<sub>S</sub></td> <td>H</td> </tr> </table>		RESET	V <sub>OUT</sub> <V <sub>S</sub>	L	V <sub>OUT</sub> >V <sub>S</sub>	H	
	RESET								
V <sub>OUT</sub> <V <sub>S</sub>	L								
V <sub>OUT</sub> >V <sub>S</sub>	H								
3	Cd	Delay time capacitor pin RESET pin output delay time can be set by the capacitance connected to the Cd pin. t <sub>PLH</sub> = 100000 · C t <sub>PLH</sub> : transmission delay time [s] C: capacitor value [F]							
4	V <sub>IN</sub>	Voltage supply input pin							
5	V <sub>OUT</sub>	Regulator output pin							
6	GND	GND pin							
7	N.C								

## Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Operating temperature	T <sub>OPR</sub>	-20~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+125	°C
Supply voltage	V <sub>CC</sub>	-0.3~+18	V
Output current	I <sub>OUT</sub>	200	mA
Power dissipation	P <sub>d</sub>	650*	mW

Note: \* When mounted on a 55×20 mm paper phenol board

## Recommended Operating Conditions

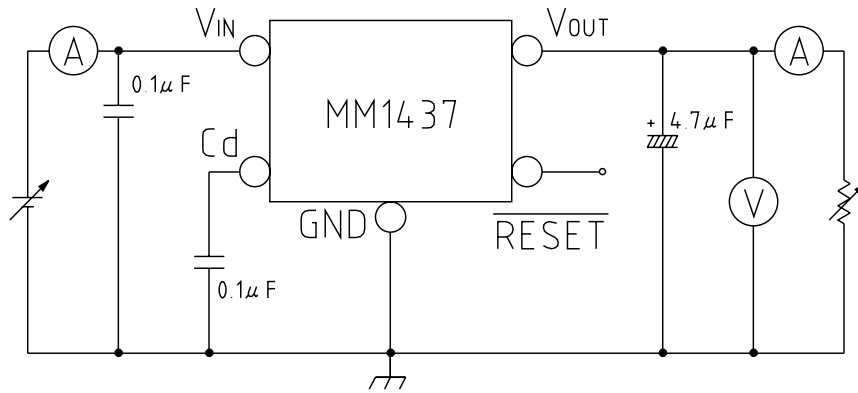
Item	Symbol	Ratings	Unit
Operating temperature	T <sub>OP</sub>	-20~+85	°C
Output current	I <sub>OP</sub>	0~150	mA
Operating voltage	V <sub>OP</sub>	2~16	V

## Electrical Characteristics (Typical model MM1437A) (Except where noted otherwise, Ta=25°C)

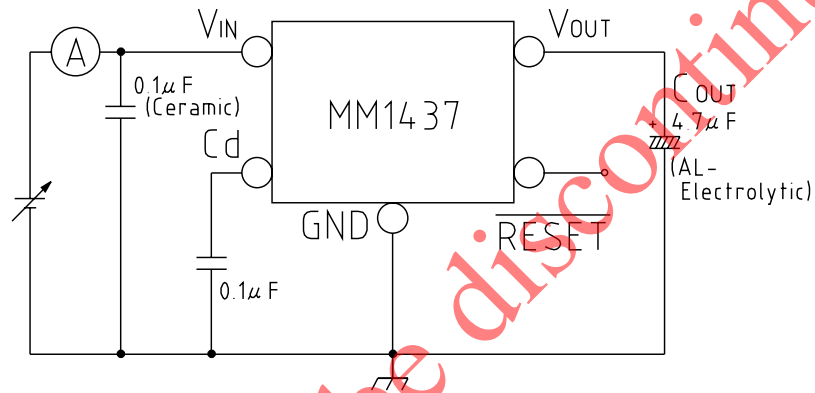
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit
No-load input current 1	I <sub>ccq1</sub>	V <sub>IN</sub> =6V I <sub>OUT</sub> =0mA		400	800	μA
No-load input current 2	I <sub>ccq2</sub>	V <sub>IN</sub> =4V I <sub>OUT</sub> =0mA		2.5		mA
<b>Regulator</b>						
Output voltage	V <sub>OUT</sub>	V <sub>IN</sub> =6V I <sub>OUT</sub> =30mA	4.90	5.00	5.10	V
Input-output differential voltage	V <sub>i0</sub>	V <sub>IN</sub> =4.8V I <sub>OUT</sub> =150 mA		0.25	0.50	V
Line regulation	ΔV <sub>1</sub>	V <sub>IN</sub> =6V~10V I <sub>OUT</sub> =30mA		10	30	mV
Load regulation	ΔV <sub>2</sub>	V <sub>IN</sub> =6V I <sub>OUT</sub> =0~150mA		40	80	mV
Vo temperature coefficient *	ΔV <sub>OUT</sub> /ΔT	T <sub>j</sub> =-20~+85°C V <sub>IN</sub> =6V I <sub>OUT</sub> =30mA		100		ppm/°C
Ripple rejection *	RR	V <sub>IN</sub> =6V f=120Hz V <sub>RIPPLE</sub> =1V <sub>P-P</sub> , I <sub>OUT</sub> =30mA	50	60		dB
Output noise voltage *	V <sub>n</sub>	V <sub>IN</sub> =6V, f=20~80kHz I <sub>OUT</sub> =30mA		200	400	μV <sub>rms</sub>
<b>Reset</b>						
Detecting voltage	V <sub>S</sub>	V <sub>IN</sub> =H→L	4.03	4.2	4.37	V
Vs temperature coefficient *	ΔV <sub>S</sub> /ΔT	T <sub>j</sub> =-20~+85°C		100		ppm/°C
Hysteresis voltage	ΔV <sub>S</sub>	V <sub>OUT</sub> =H→L→H	25	50	100	mV
Low-level output voltage	V <sub>OL</sub>	V <sub>OUT</sub> =3.9V		100	200	mV
RESET delay time	t <sub>PLH</sub>	C <sub>d</sub> =0.1μF	5	10	15	ms
"L" transmission delay time *	t <sub>PHL</sub>	C <sub>d</sub> =0.1μF		30	90	μs
Threshold operating voltage	V <sub>OPL</sub>	V <sub>OL</sub> =0.4V		0.65	0.85	V

Note : \* design guaranteed

Measuring Circuit



Application Circuit

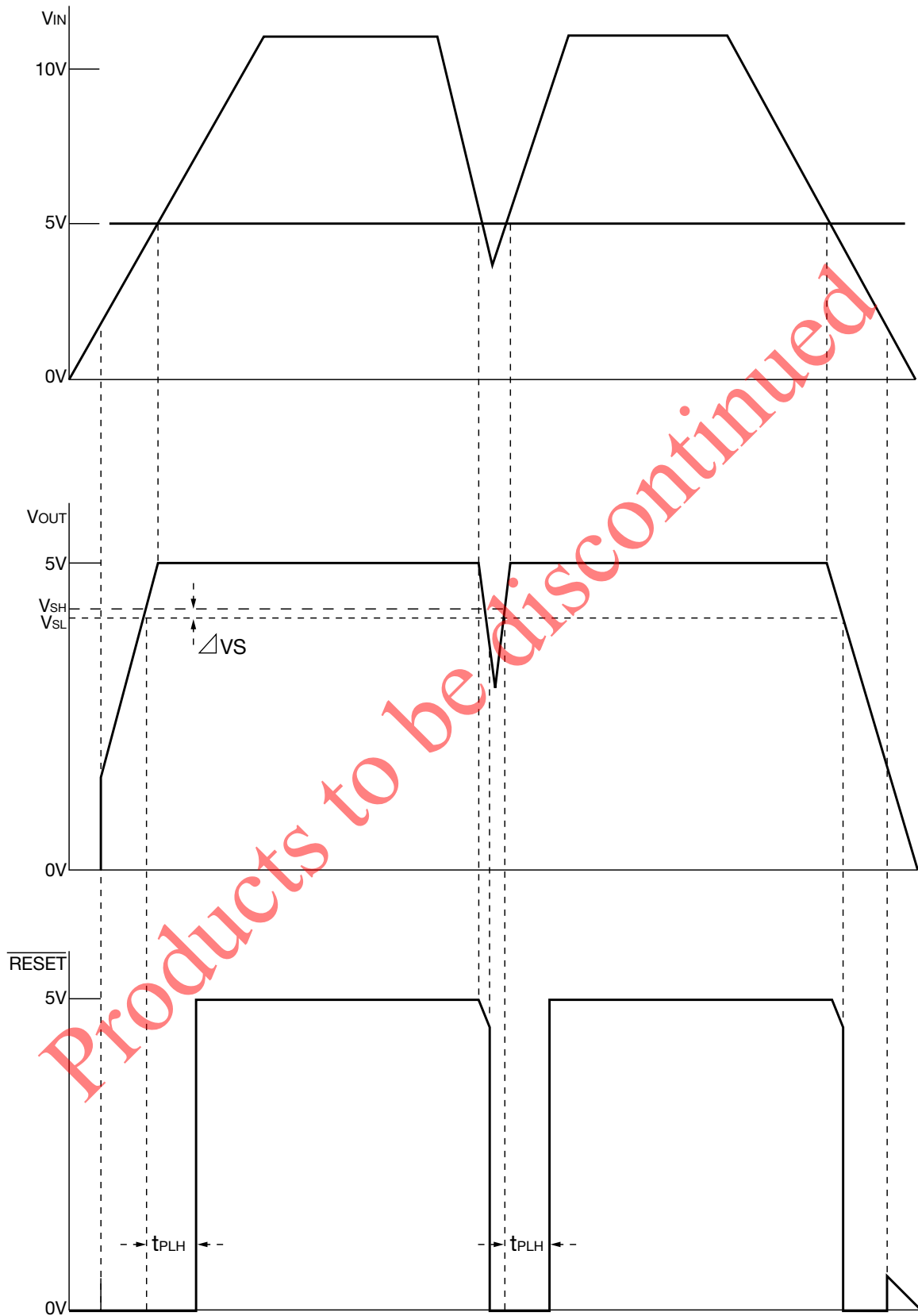


Note 1 : This regulator is not internally compensated and thus requires an external output-capacitor (C<sub>OUT</sub>) for stability.

Note 2 : RESET-terminal with a built-in pull-up resistance (10kΩ).

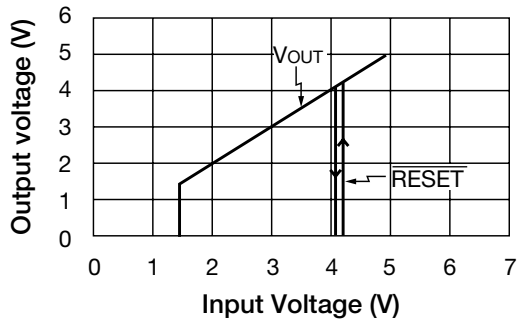
Products to be discontinued

Timing Chart

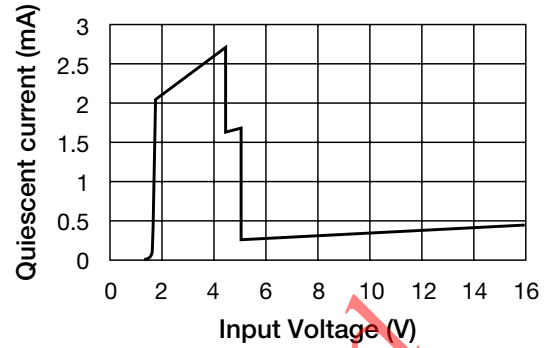


**Characteristics** (Typical model MM1437A)

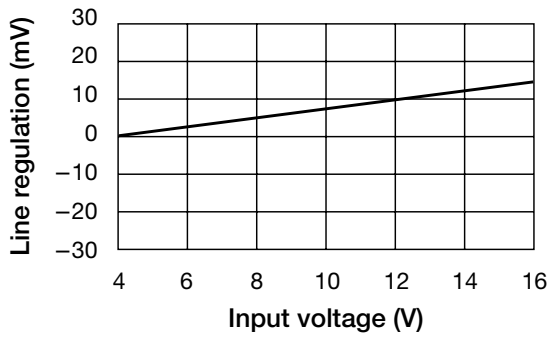
■ Detection voltage (I<sub>OUT</sub>=0mA)



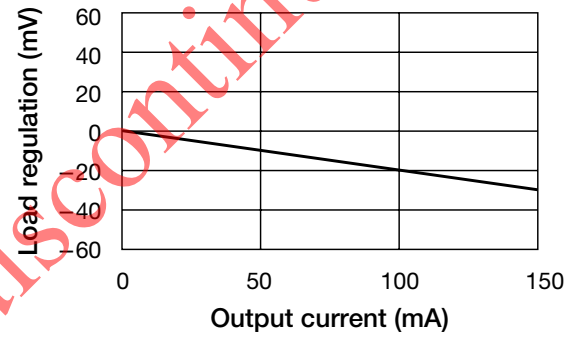
■ Quiescent current (I<sub>OUT</sub>=0mA)



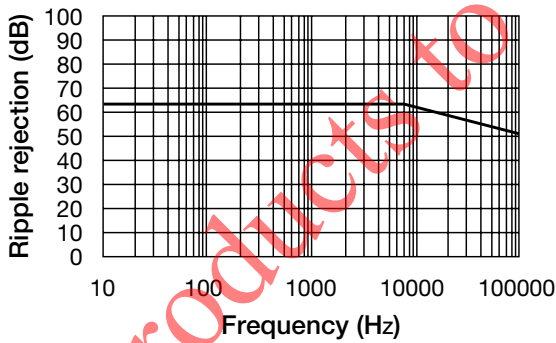
■ Line regulation



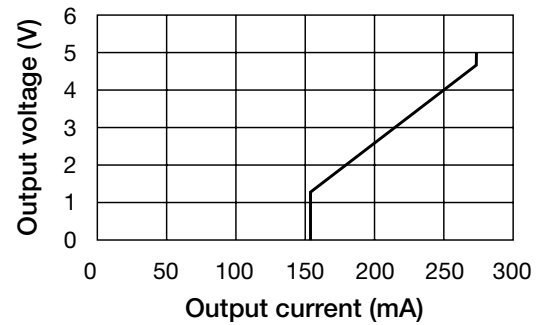
■ Load regulation



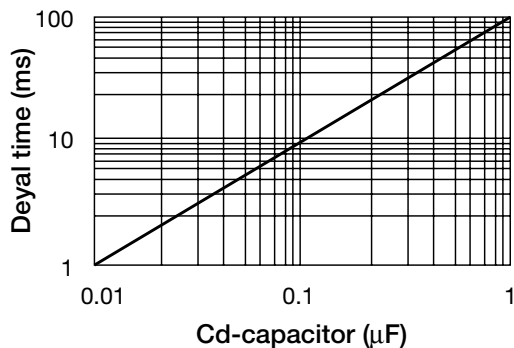
■ Ripple rejection



■ Current limit



■ RESET delay time



■ Allowable loss

