

# Regulator+Reset IC Monolithic IC MM1481

## Outline

This IC was developed for use in CD-ROM drives and other optical disc drives. It combines two 3V system regulator lines and reset (monitors regulator input) with a built-in 4.2V detection delay circuit that responds to market needs.

## Features

- 1. Large output current 300mA max.
- 2. High ripple rejection rate regulator1: 80dB typ. regulator2: 60dB typ.
- 3. Internal thermal shutdown circuit.
- 4. Internal current-limiting circuit.
- 5. Adjustment-free reset detection voltage 4.2V typ.
- 6. Easy to set delay time from voltage detection to reset release.

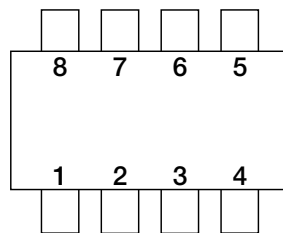
## Package

VSOP-8A

## Applications

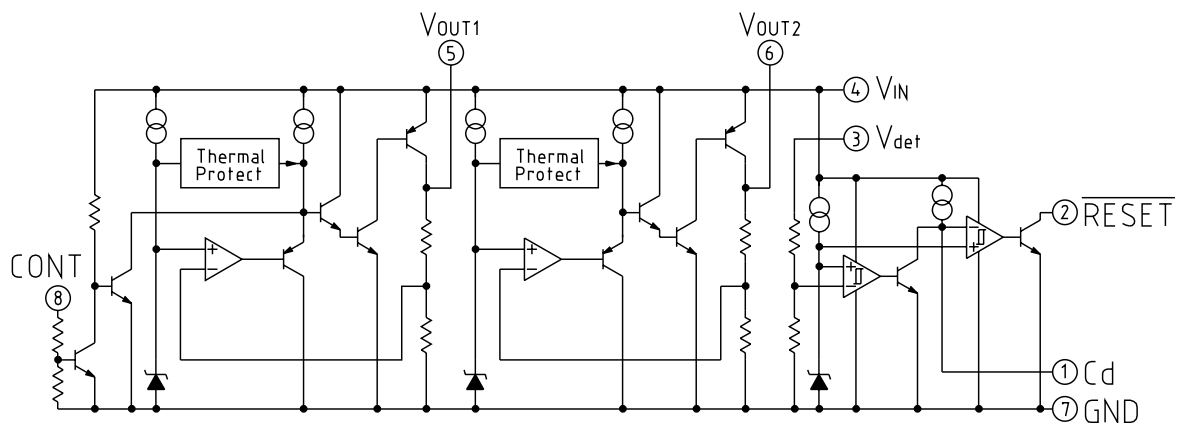
- 1. CD-ROM drive
- 2. Optical disc drives

## Pin Assignment



1	Cd
2	RESET
3	Vdet
4	V <sub>IN</sub>
5	V <sub>OUT1</sub>
6	V <sub>OUT2</sub>
7	GND
8	CONT

## Equivalent Circuit Diagram



**Pin Description**

Pin No.	Pin Name	Functions	Equivalent circuit diagram						
1	Cd	<p>Delay time capacitor pin</p> <p>The delay time of RESET output can be set according to the capacity value connected with Cd</p> <p><math>t_{PLH}=450000 \cdot C</math></p> <p><math>t_{PLH1}</math>: Delay Time [s]</p> <p>C: Cd-capacitance [F]</p>							
2	RESET	<p><math>\overline{\text{RESET}}</math> -output pin</p> <p><math>\overline{\text{RESET}}</math> pin logic</p> <table border="1"> <thead> <tr> <th></th> <th><math>\overline{\text{RESET}}</math></th> </tr> </thead> <tbody> <tr> <td>Vdet&lt;VS</td> <td>L</td> </tr> <tr> <td>Vdet&gt;VS</td> <td>H</td> </tr> </tbody> </table> <p>When the voltage of <math>V_{IN}</math> decreases to 1.6V or less, it is likely to become "L" regardless of Vdet voltagge.</p>		$\overline{\text{RESET}}$	Vdet<VS	L	Vdet>VS	H	
	$\overline{\text{RESET}}$								
Vdet<VS	L								
Vdet>VS	H								
3	Vdet	Voltage-supply pin (reset)							
4	$V_{IN}$	Voltage-supply pin							
5	$V_{OUT1}$	Regulator output pin (150mA)							
6	$V_{OUT2}$	Regulator output pin (100mA)							
7	GND	GND pin							
8	CONT	<p><math>V_{OUT1}</math> ON/OFF-control pin</p> <table border="1"> <thead> <tr> <th><math>V_{CONT}</math></th> <th><math>V_{OUT1}</math></th> </tr> </thead> <tbody> <tr> <td>L</td> <td>OFF</td> </tr> <tr> <td>H</td> <td>ON</td> </tr> </tbody> </table> <p>Connect cont-terminal with <math>V_{IN}</math>, when it is not used.</p>	$V_{CONT}$	$V_{OUT1}$	L	OFF	H	ON	
$V_{CONT}$	$V_{OUT1}$								
L	OFF								
H	ON								

**Absolute Maximum Ratings**

Item	Symbol	Ratings	Unit
Storage temperature	$T_{STG}$	-40~+125	°C
Supply voltage	$V_{IN}$	-0.3~+10	V
Output current 1	$I_{OUT1}$	300	mA
Output current 2	$I_{OUT2}$	200	mA
Power dissipation	$P_d$	550*	mW

Note: \* When mounted on a (Copper foil area 80%, 100×100×1.6<sup>t</sup> mm) glass epoxy board.

**Recommended Operating Conditions** (Except where noted otherwise, Ta=25°C)

Item	Symbol	Ratings	Unit
Operating temperature	T <sub>OP</sub>	-20~+85	°C
Output current 1	I <sub>OP1</sub>	0~150	mA
Output current 2	I <sub>OP2</sub>	0~100	mA
Operating voltage	V <sub>OP</sub>	0~10	V

**Electrical Characteristics** (Except where noted otherwise, Ta=25°C, V<sub>CONT</sub>=1.6V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit
V <sub>IN</sub> Input Current 1	I <sub>CCQ1</sub>	V <sub>IN</sub> =5V I <sub>OUT1</sub> =I <sub>OUT2</sub> =0mA		2.1	4.2	mA
V <sub>IN</sub> Input Current 2 (V <sub>OUT1</sub> -OFF)	I <sub>CCQ2</sub>	V <sub>IN</sub> =5V V <sub>cont</sub> =0.4V I <sub>OUT2</sub> =0mA		300	500	μA
V <sub>det</sub> Input Current 1	I <sub>CCQ3</sub>	V <sub>det</sub> =5V		20	40	μA
<b>Regulator 1 (150mA output)</b>						
Output Voltage	V <sub>OUT1</sub>	V <sub>IN</sub> =5V I <sub>OUT1</sub> =30mA	3.52	3.60	3.68	V
Input-Output differential Voltage	V <sub>iO</sub>	V <sub>IN</sub> =3.4V I <sub>OUT1</sub> =70mA		0.13	0.26	V
Line Regulation	ΔV <sub>1</sub>	V <sub>IN</sub> =4.4V~5.5V I <sub>OUT1</sub> =30mA		1	20	mV
Load Regulation	ΔV <sub>2</sub>	V <sub>IN</sub> =5V I <sub>OUT1</sub> =0mA~150mA		20	120	mV
V <sub>OUT</sub> Temperature Coefficient *1	ΔV <sub>OUT</sub> /ΔT	T <sub>j</sub> =-20~+80°C V <sub>IN</sub> =5V I <sub>OUT1</sub> =30mA		100		ppm/°C
Ripple Rejection *1	RR	V <sub>IN</sub> =5V f=120Hz V <sub>RIPPLE</sub> =1V <sub>P-P</sub> , I <sub>OUT1</sub> =30mA	50	80		dB
Output Noise Voltage *1	V <sub>n</sub>	V <sub>IN</sub> =5V, f=20~80kHz I <sub>OUT1</sub> =30mA		100		μV <sub>rms</sub>
CONT Terminal Current when ON	I <sub>ON</sub>	V <sub>cont</sub> =1.6V		5	10	μA
HIGH Threshold Voltage	H		1.6		V <sub>IN</sub> +0.3	V
LOW Threshold Voltage	L		-0.3		0.4	V
<b>Regulator 2 (100mA output)</b>						
Output Voltage	V <sub>OUT2</sub>	V <sub>IN</sub> =5V I <sub>OUT2</sub> =20mA	3.52	3.60	3.68	V
Input-Output differential Voltage	V <sub>iO</sub>	V <sub>IN</sub> =3.4V I <sub>OUT2</sub> =20mA		0.07	0.14	V
Line Regulation	ΔV <sub>1</sub>	V <sub>IN</sub> =4.4V~5.5V I <sub>OUT2</sub> =20mA		10	20	mV
Load Regulation	ΔV <sub>2</sub>	V <sub>IN</sub> =5V I <sub>OUT2</sub> =0mA~100mA		20	120	mV
V <sub>OUT</sub> Temperature Coefficient *1	ΔV <sub>OUT</sub> /ΔT	T <sub>j</sub> =-20~+80°C V <sub>IN</sub> =5V I <sub>OUT2</sub> =20mA		100		ppm/°C
Ripple Rejection *1	RR	V <sub>IN</sub> =5V f=120Hz V <sub>RIPPLE</sub> =1V <sub>P-P</sub> , I <sub>OUT2</sub> =20mA	50	60		dB
Output Noise Voltage *1	V <sub>n</sub>	V <sub>IN</sub> =5V, f=20~80kHz I <sub>OUT2</sub> =20mA		150		μV <sub>rms</sub>

Note 1: design guaranteed

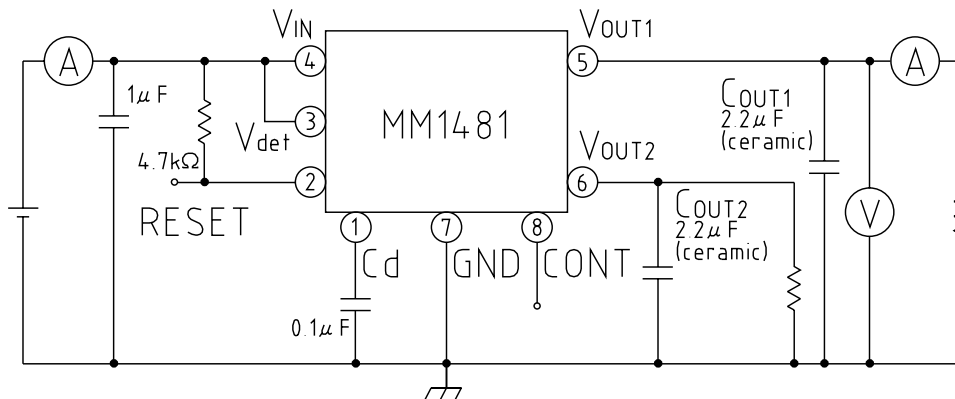
**Electrical Characteristics** (Typical model MM1481C) (Except where noted otherwise, Ta=25°C, VCONT=1.6V)  
 (Except where noted otherwise, resistance unit is Ω)

■ Part of RESET

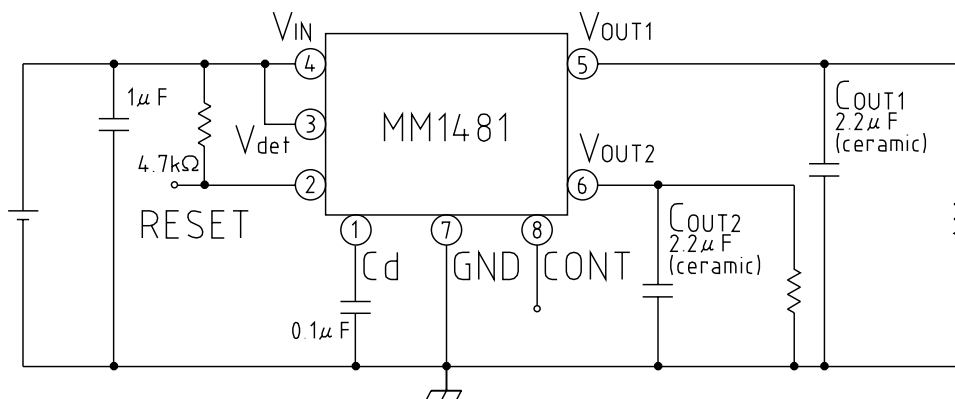
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit
Detecting Voltage	VS	Vdet=H→L	4.11	4.20	4.29	V
Vs temperature Coefficient *	$\Delta VS/\Delta T$	Ta=-20~+80°C		100		ppm/°C
Hysteresis Voltage	$\Delta VS$	Vdet=H→L→H	100		200	mV
Low-Level Output Voltage	VOL	Vdet=3.9V RL=4.7k		100	200	mV
Output Leakage Current	IOH	Vdet=5V			±0.1	μA
Output Current when ON 1	IO1	Vdet=3.9V, RL=0	5			mA
Output Current when ON 2 *	IO2	Vdet=3.9V, RL=0 Ta=-20~+80°C	3			mA
"H" Transmission Delay Time *	tPLH	Cd Pin open		30	90	μs
Reset Delay Time *	tPLH1	Vdet=4V→5V, Cd=0.22μF	5	10	15	ms
"L" Transmission Delay Time *	tPHL	Cd Pin open		30	90	μs
Threshold Operating Voltage	VOPL	VOL=0.4V		0.65	0.85	V

Note 1: design guaranteed

**Measuring Circuit**



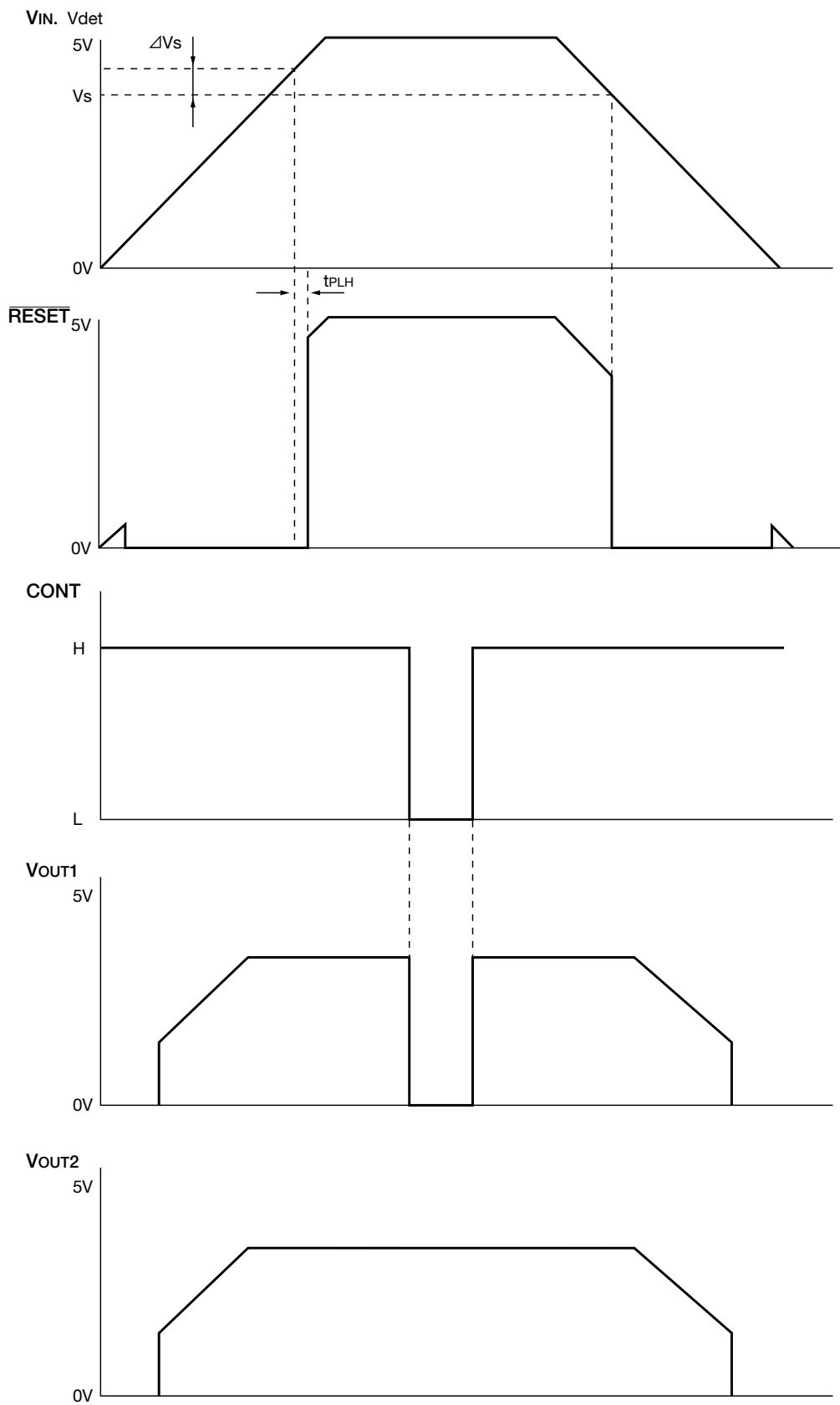
**Application Circuit**



Note 1 : This regulator is not internally compensated and thus requires an external output-capacitor (Cout) for stability.

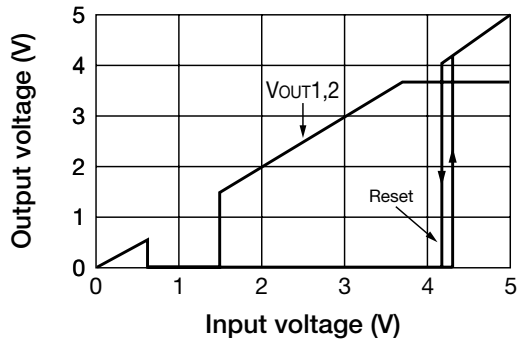
Note 2 : Please be careful with regard to set wiring and temperature-related capacitor changes that may cause oscillation.

Timing Chart

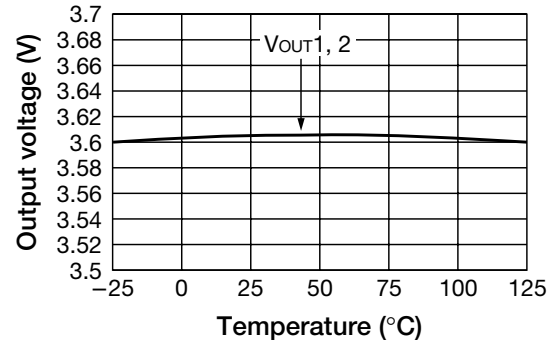


## Characteristics

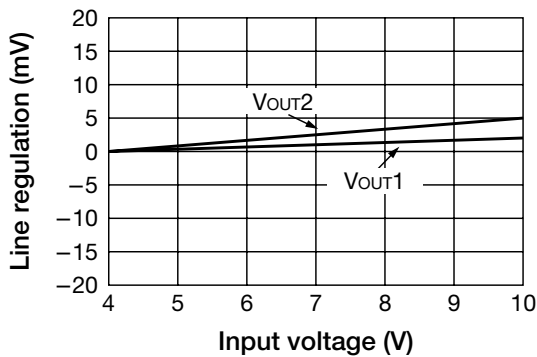
### Detection voltage ( $I_{OUT}=0mA$ )



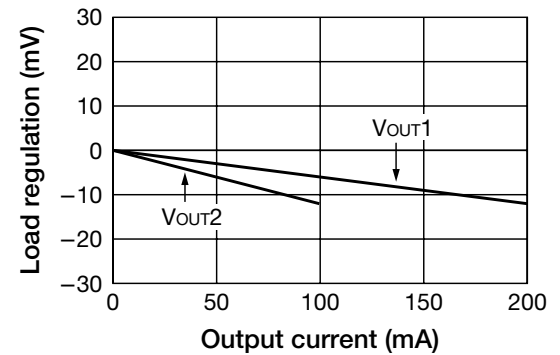
### Output voltage vs temperature



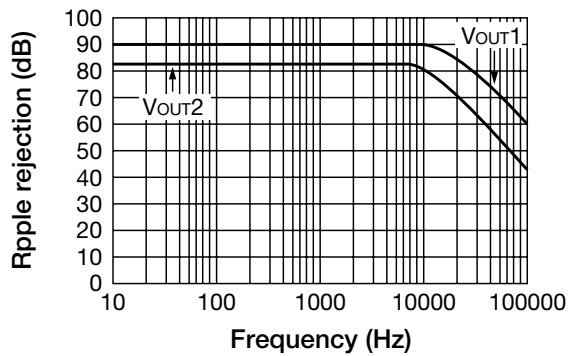
### Line regulation



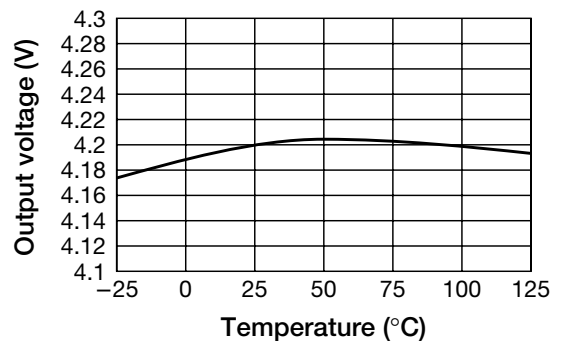
### Load regulation



### Ripple rejection



### Detecting voltage vs temperature



### Allowable loss

