

# IC for Regulator+Reset Monolithic IC MM1481

July 16, 2002

## 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.

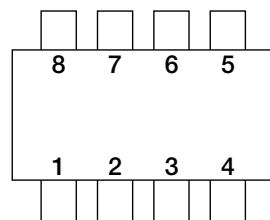
## Package

SOP-8D

## Applications

1. CD-ROM drive
2. Optical disc drives

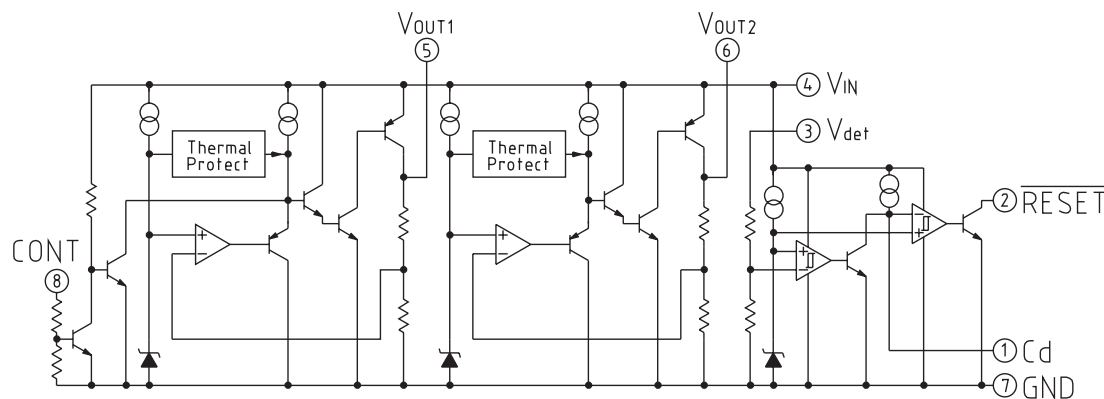
## Pin Assignment



SOP-8D  
(TOP VIEW)

1	Cd
2	RESET
3	V <sub>det</sub>
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	Delay time capacitor pin The delay time of RESET output can be set according to the capacity value connected with Cd $t_{PLH}=450000 \cdot C$ $t_{PLH}$ : Delay Time [s] C: Cd-capacitance [F]							
2	RESET	RESET -output pin RESET pin logic <table border="1" style="margin: 10px auto;"> <tr> <td></td> <td>RESET</td> </tr> <tr> <td>Vdet&lt;VS</td> <td>L</td> </tr> <tr> <td>Vdet&gt;VS</td> <td>H</td> </tr> </table> When the voltage of VIN decreases to 1.6V or less, it is likely to become "L" regardless of Vdet voltage.		RESET	Vdet<VS	L	Vdet>VS	H	
	RESET								
Vdet<VS	L								
Vdet>VS	H								
3	Vdet	Voltage-supply pin (reset)							
4	VIN	Voltage-supply pin							
5	VOUT1	Regulator output pin (150mA)							
6	VOUT2	Regulator output pin (100mA)							
7	GND	GND pin							
8	CONT	VOUT1 ON/OFF-control pin <table border="1" style="margin: 10px auto;"> <tr> <td>VCONT</td> <td>VOUT1</td> </tr> <tr> <td>L</td> <td>OFF</td> </tr> <tr> <td>H</td> <td>ON</td> </tr> </table> Connect cont-terminal with VIN, when it is not used.	VCONT	VOUT1	L	OFF	H	ON	
VCONT	VOUT1								
L	OFF								
H	ON								

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Storage temperature	TSTG	-40~+125	°C
Supply voltage	VIN	-0.3~+10	V
Output current 1	IOUT1	300	mA
Output current 2	IOUT2	200	mA
Power dissipation	Pd	550*	mW

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

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

Item	Symbol	Ratings	Unit
Operating temperature	TOP	-20~+85	°C
Output current 1	IOP1	0~150	mA
Output current 2	IOP2	0~100	mA
Operating voltage	VOP	0~10	V

**Electrical Characteristics** (Except where noted otherwise, Ta=25°C, VCONT=1.6V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit
VIN Input Current 1	Iccq1	VIN=5V IOUT1=IOUT2=0mA		2.1	4.2	mA
VIN Input Current 2 (VOUT1-OFF)	Iccq2	VIN=5V VCONT=0.4V IOUT2=0mA		300	500	µA
Vdet Input Current 1	Iccq3	Vdet=5V		20	40	µA
<b>Regulator 1 (150mA output)</b>						
Output Voltage	VOUT1	VIN=5V IOUT1=30mA	3.52	3.60	3.68	V
Input-Output differential Voltage	ViO	VIN=3.4V IOUT1=70mA		0.13	0.26	V
Line Regulation	ΔV1	VIN=4.4V~5.5V IOUT1=30mA		1	20	mV
Load Regulation	ΔV2	VIN=5V IOUT1=0mA~150mA		20	120	mV
VOUT Temperature Coefficient *1	ΔVOUT/ΔT	Tj=-20~+80°C VIN=5V IOUT1=30mA		100		ppm/°C
Ripple Rejection *1	RR	VIN=5V f=120Hz VRIPPLE=1VP-P, IOUT1=30mA	50	80		dB
Output Noise Voltage *1	Vn	VIN=5V, f=20~80kHz IOUT1=30mA		100		µVrms
CONT Terminal Current when ON	ION	VCONT=1.6V		5	10	µA
HIGH Threshold Voltage	H		1.6		VIN+0.3	V
LOW Threshold Voltage	L		-0.3		0.4	V
<b>Regulator 2 (100mA output)</b>						
Output Voltage	VOUT2	VIN=5V IOUT2=20mA	3.52	3.60	3.68	V
Input-Output differential Voltage	ViO	VIN=3.4V IOUT2=20mA		0.07	0.14	V
Line Regulation	ΔV1	VIN=4.4V~5.5V IOUT2=20mA		10	20	mV
Load Regulation	ΔV2	VIN=5V IOUT2=0mA~100mA		20	120	mV
VOUT Temperature Coefficient *1	ΔVOUT/ΔT	Tj=-20~+80°C VIN=5V IOUT2=20mA		100		ppm/°C
Ripple Rejection *1	RR	VIN=5V f=120Hz VRIPPLE=1VP-P, IOUT2=20mA	50	60		dB
Output Noise Voltage *1	Vn	VIN=5V, f=20~80kHz IOUT2=20mA		150		µVrms

Note 1: design guaranteed

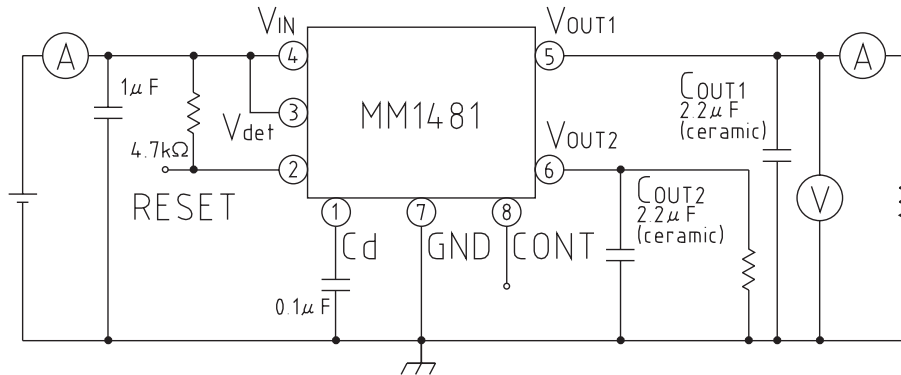
**Electrical Characteristics** (Typical model MM1481C) (Except where noted otherwise, Ta=25°C, VCONT=1.6V)  
 (Except where noted otherwise, resistance unit is Ω)

■ Part of RESET

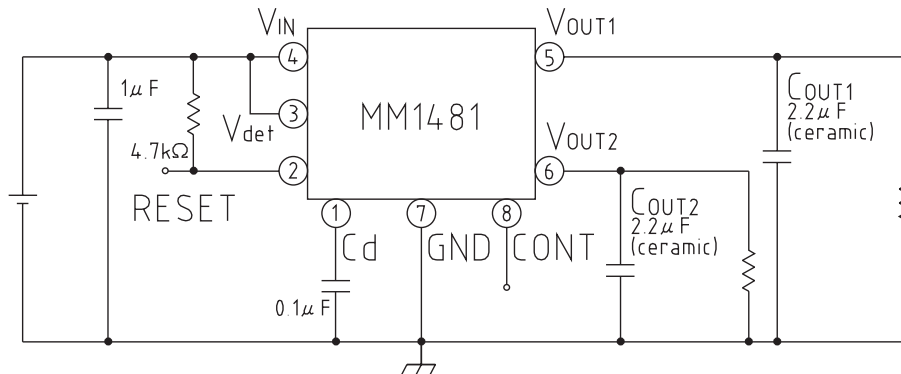
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit
Detecting Voltage	VS	Vdet=H→L	4.11	4.20	4.29	V
Vs temperature Coefficient *	$\Delta VS/\Delta T$	Ta=-20~+80°C		100		ppm/°C
Hysteresis Voltage	$\Delta VS$	Vdet=H→L→H	100		200	mV
Low-Level Output Voltage	VOL	Vdet=3.9V RL=4.7k		100	200	mV
Output Leakage 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**



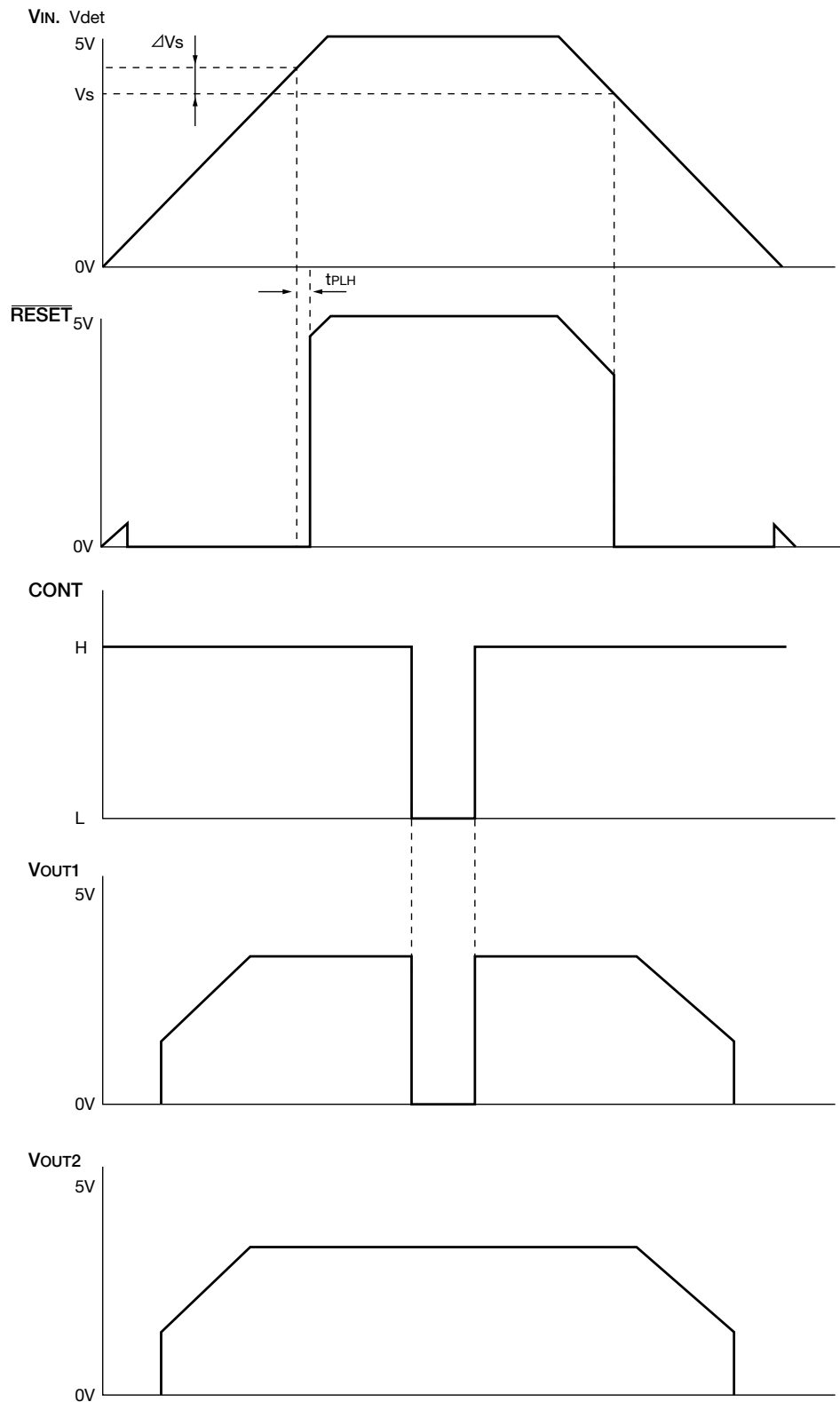
**Application Circuit**



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

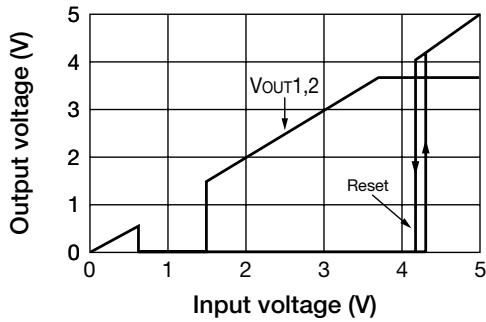
Note 2 : Please be careful with regard to set wiring and temperature-related capacitor changes that may cause oscillation.

Timing Chart

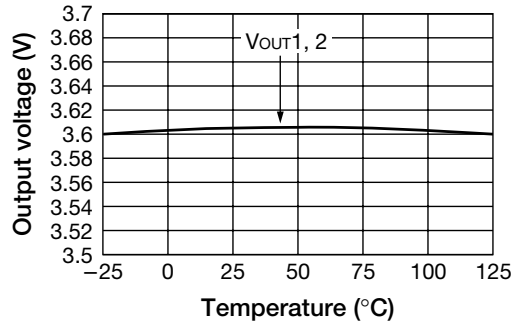


Characteristics

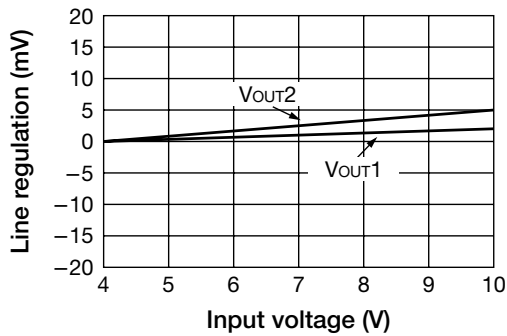
■ Detection voltage ( $I_{OUT}=0mA$ )



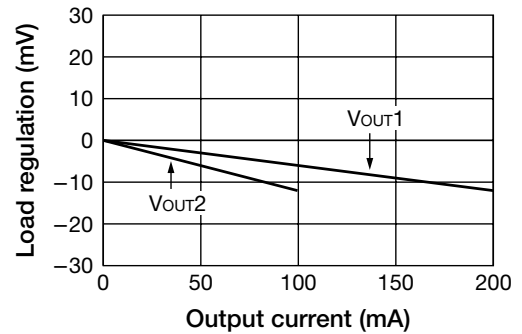
■ Output voltage vs temperature



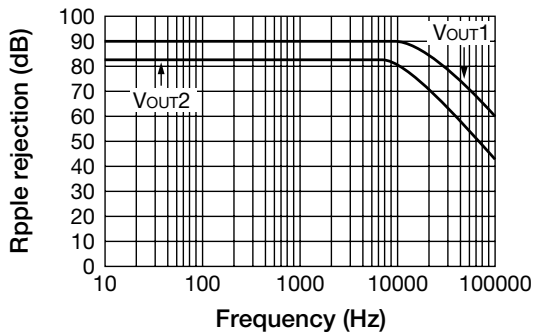
■ Line regulation



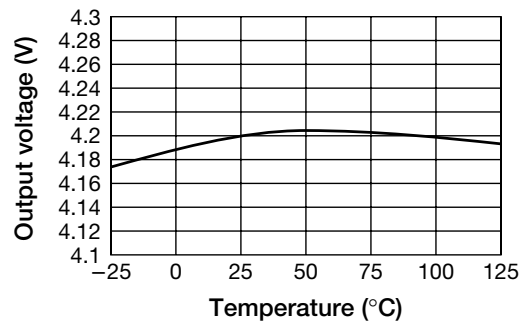
■ Load regulation



■ Ripple rejection



■ Detecting voltage vs temperature



■ Allowable loss

