IC for Regulator+Reset
Monolithic IC MM1687 Series

Outline

This IC is a regulator + reset IC developed for optical disc drives such as DVD-ROM drives. The output voltage of the regulator and detection voltage of the reset are fixed, while the output voltage of the reset and detection voltage of the reset are programmable ranging from 1.5V to 5.0V, and 2.7V to 5.0V respectively upon request.

Features

1. Output voltage accuracy ±2%
2. Dropout voltage 0.12V typ. (Io=150mA)
3. Large output current 300mA max.
4. High ripple rejection 80dB typ.
5. Incorporates a thermal shutdown circuit
6. Incorporates a current limit circuit
7. Reset detection voltage 3.0 to 5.0V
8. Delay time from the voltage detection to the reset release can be easily programmed.

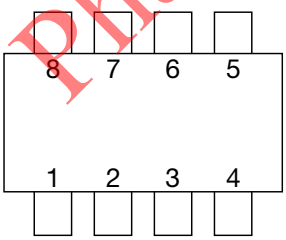
Package

SOP-8D

Applications

1. CD-ROM drive
2. Optical disc drivers

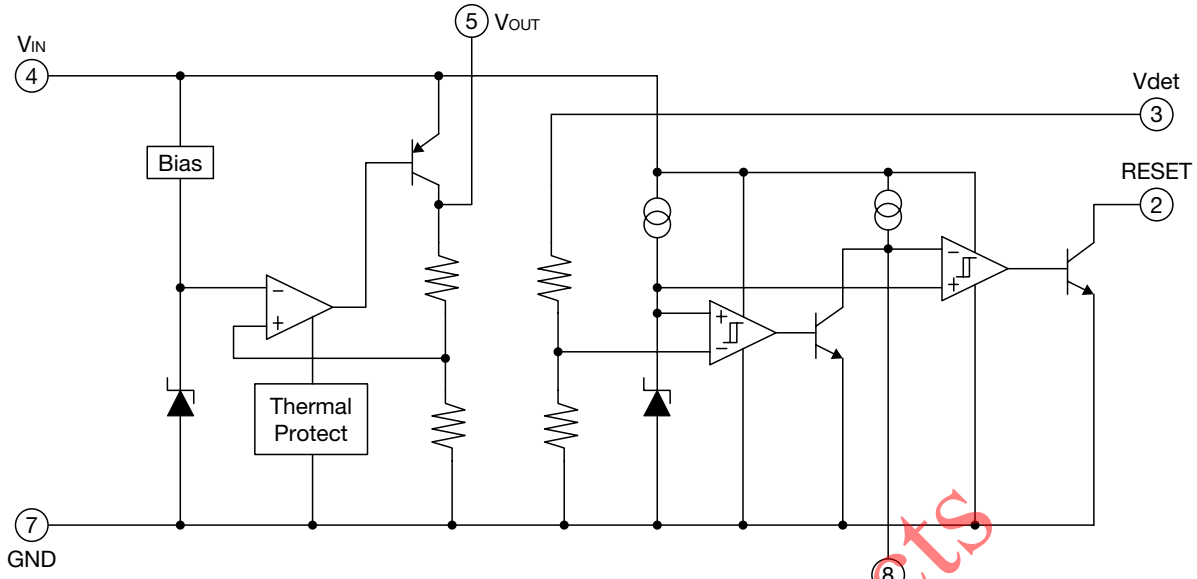
Pin Assignment



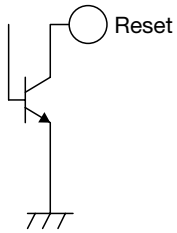
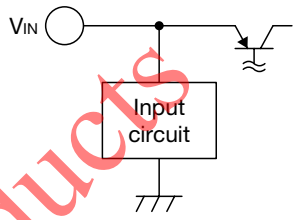
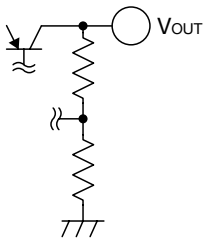
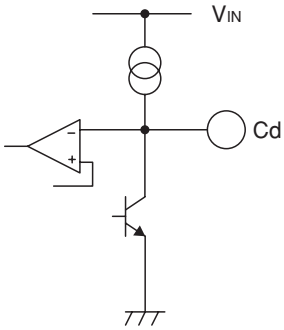
SOP-8D
(TOP VIEW)

1	NC
2	Reset
3	Vdet
4	V_{IN}
5	V_{OUT}
6	NC
7	GND
8	Cd

Block Diagram



Pin Description

Pin No.	Pin name	Function	Internal equivalent circuit diagram
1,6	NC		
2	Reset	Reset-output pin Reset logical table Vdet<Vs: L Vdet>Vs: H	
3	Vdet	Voltage-supply pin (RESET)	
4	V_{IN}	Input pin The capacitor is required to connect with the input pin more than 1μF.	
5	V_{OUT}	Output pin	
7	GND	Ground	
8	Cd	Delay time capacitor pin The delay time of reset output can be set according to the capacitor value connected with Cd. t_{PLH}=450000 · C t_{PLH1}: Delay time (s) C: capacitance (F)	

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T_{STG}	−55~+150	°C
Supply voltage	V_{IN}	−0.3~+10	V
Output current	I_{OUT}	500	mA
Power dissipation	Pd	950 (*1)	mW

Note1: *1 Glass epoxy attached on PC Board (192×142×1.2mm)

Recommended Operating Conditions (Ta=25°C)

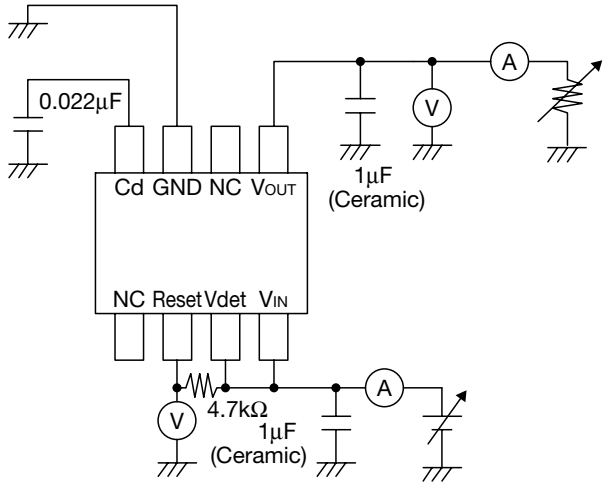
Item	Symbol	Ratings	Units
Operating temperature	T_{OP}	−40~+85	°C
Output current	I_{OUT}	0~400	mA
Operating voltage	V_{OP}	0~+10	V

Electrical Characteristics (Except where noted otherwise, Ta=25°C, V_{CONT}=1.6V)

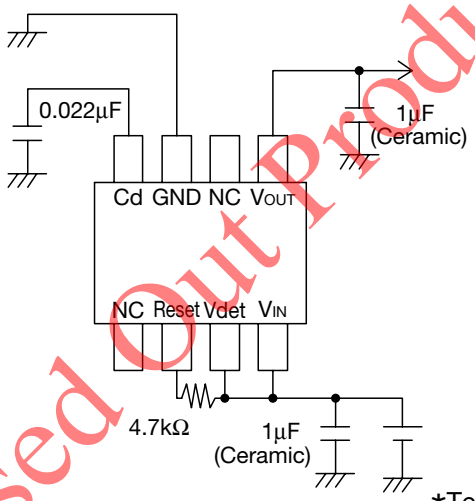
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
No-load Input current 1	Iccq1	V_{IN}=5V I_{OUT}=0mA		0.6	1.2	mA
Vdet pin current	Iccq3	Vdet=5V		20	40	µA
Regulator Block						
Output voltage	V_{OUT}	V_{IN}=5V I_{OUT}=30mA	3.234	3.30	3.366	V
Dropout voltage	Vio	V_{IN}=3.1V I_{OUT}=300mA		0.25	0.50	V
Line regulation	⊿V1	V_{IN}=4.5V~5.5V I_{OUT}=30mA		10	20	mV
Load regulation	⊿V2	V_{IN}=5V I_{OUT}=0mA~300mA		20	120	mV
V_{OUT} temperature coefficient *1	$\frac{\Delta V_{OUT}}{\Delta T}$	Tj=−40~+85°C V_{IN}=5V I_{OUT}=30mA		100		ppm/°C
Ripple rejection *1	RR	V_{IN}=5V f=1kHz V_{RIPPLE}=1V I_{OUT}=30mA	50	80		dB
Output noise voltage *1	Vn	V_{IN}=5V f=20~80kHz I_{OUT}=30mA		40	120	µVrms
Reset Block						
Detecting voltage	VS	V_{IN}=H→L	3.626	3.70	3.774	V
Vs temperature coefficient *1	⊿VS/⊿T	Tj=−40~+85°C		100		ppm/°C
Hysteresis voltage	⊿VS	V_{IN}=H→L→H	100		200	mV
Low level output voltage	V_{OL}	V_{IN}=Vdet=3.4V RL=4.7kΩ		100	200	mV
Output leakage current	I_{OH}	V_{IN}=Vdet=5V			±0.1	µA
Output current 1	I_{OL1}	V_{IN}=3.6V	5			mA
Output current 2 *1	I_{OL2}	V_{IN}=3.6V Ta=−20~+80℃	4			mA
H transmission delay time	t_{PLH}	Cd=OPEN		30	90	µs
Reset delay time *1	t_{PLH1}	Vdet=3.2→4.2V, V_{IN}=5V Cd=0.022µF	5	10	20	ms
L transmission delay time *1	t_{PHL}			30	90	µs
Threshold operating voltage	V_{OPL}	V_{OL}=0.4V		0.65	0.85	V

Note 1: *1 The parameter is guaranteed by design.

Measuring Circuit



Application Circuit

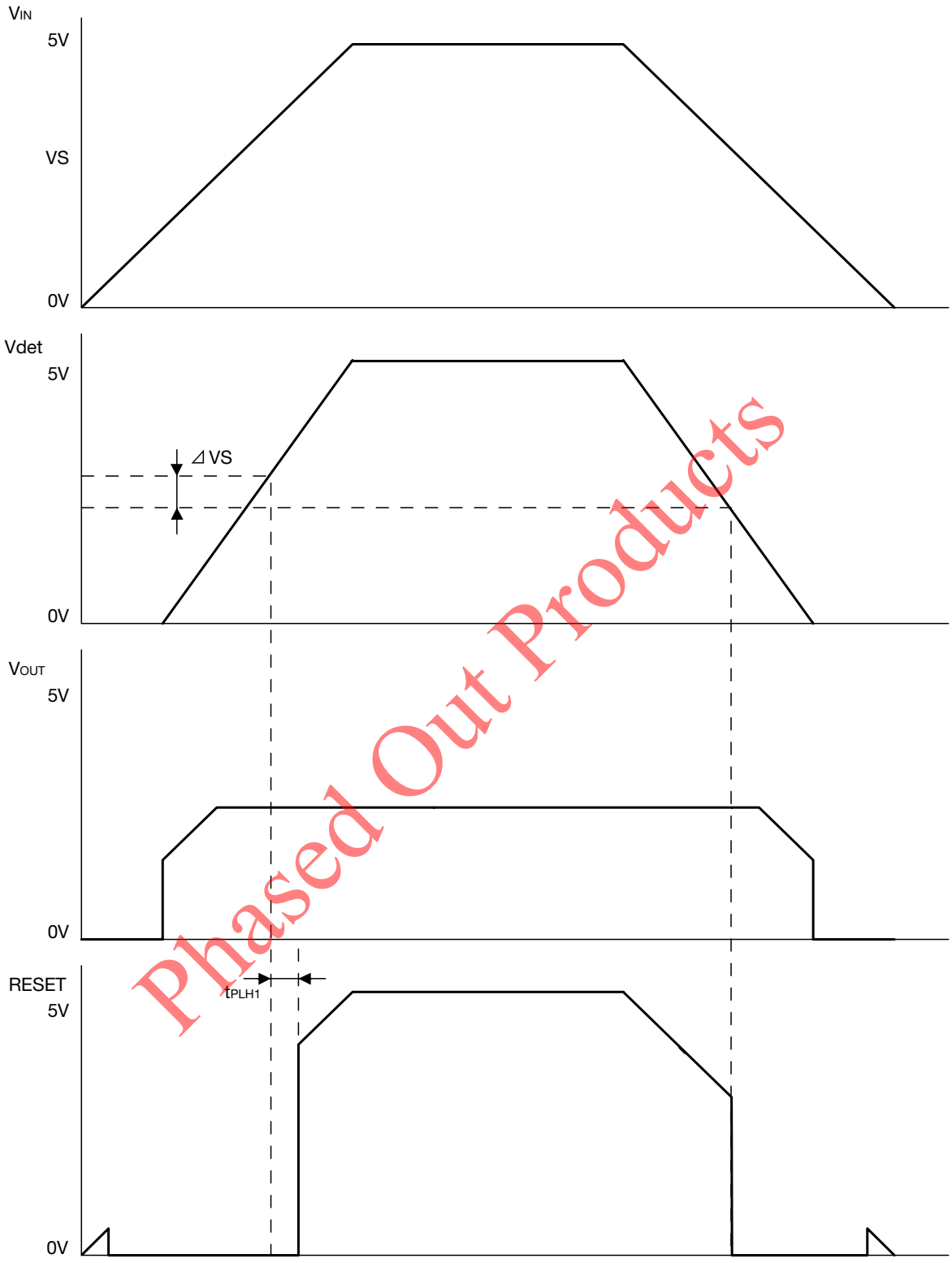


*Temperature Characteristics: B Type

Note

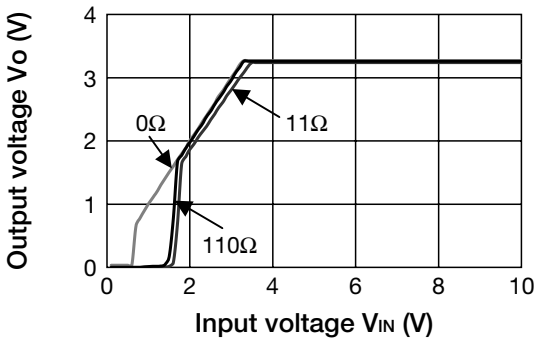
1. The output capacitor is required between output and GND to prevent the oscillation.
2. The ESR of capacitor must be defined in ESR stability area.
   It is possible to use a ceramic capacitor without ESR resistance for output.
   The ceramic capacitor must be used more than 1µF and B type temperature characteristics.
3. The wire of V_{CC} and GND is required to print full ground plane for noise and stability.
4. The input capacitor must be connected in 1cm from the input pin.
5. In case the output voltage is above the input voltage, the overcurrent flow by internal parasitic diode from output to input. In such application, the external bypass diode must be connected between output and input pin.

Timing Chart

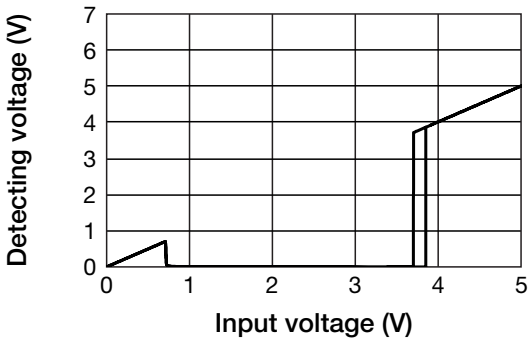


Characteristics (Except where noted otherwise, Ta=25°C, V_{IN}=5V, C_{IN}=1µF, Co=1µF, Cd=0.022µF)

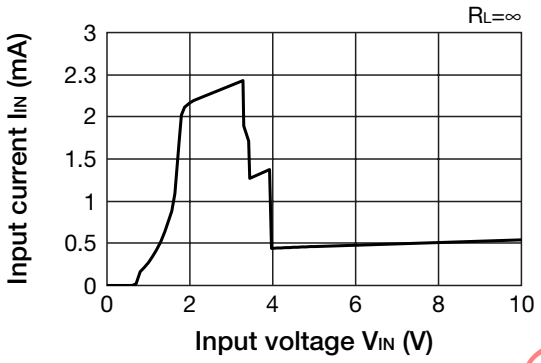
Output Voltage-Input Voltage



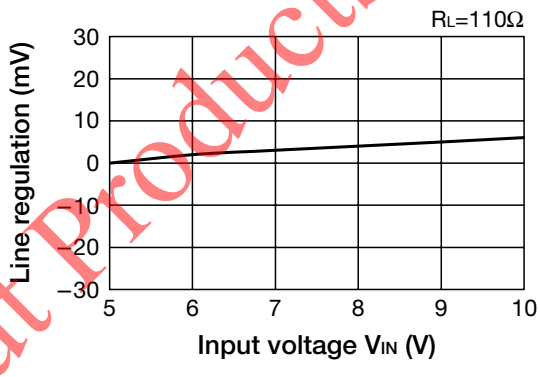
Detecting Voltage



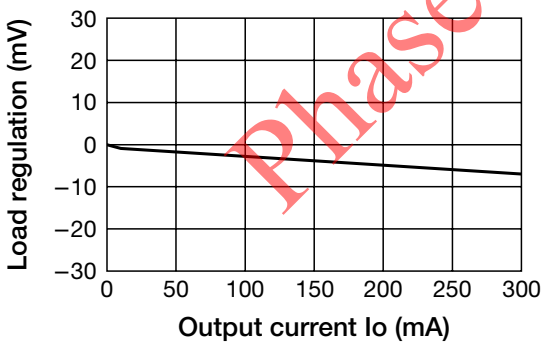
Input current-Input Voltage



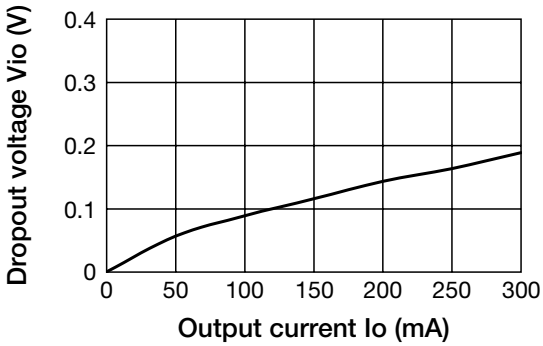
Line Regulation Vo



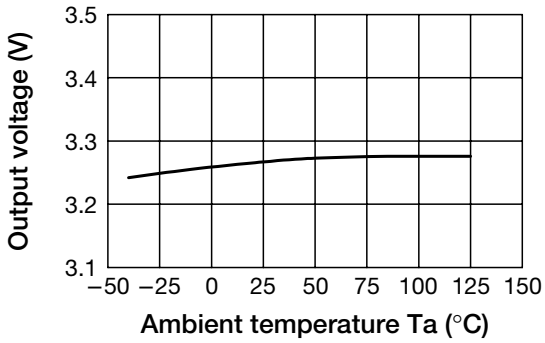
Load Regulation Vo



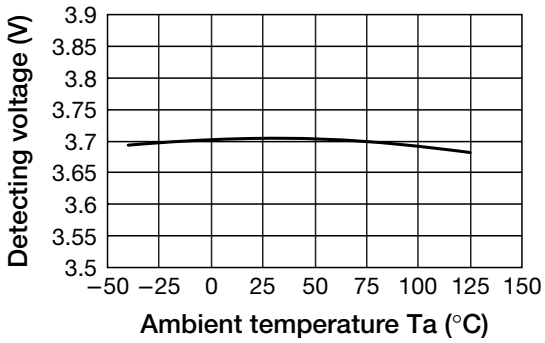
Dropout Voltage Vo-Output Current



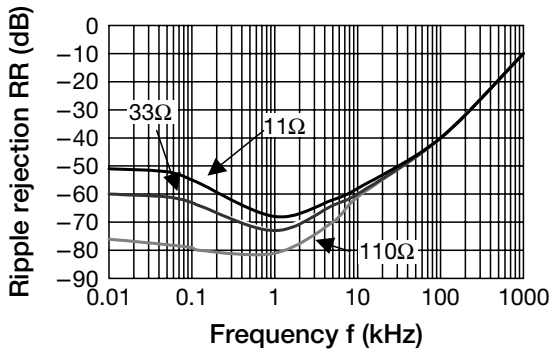
Output Voltage-Ambient Temperature



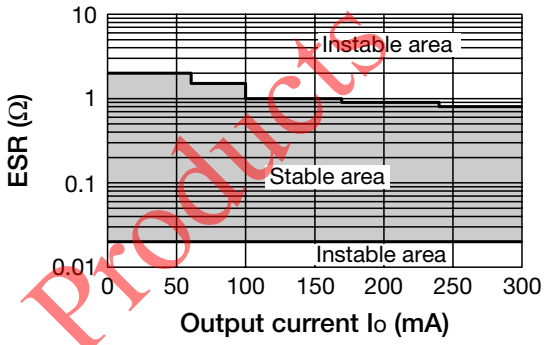
Detecting Voltage-Ambient Temperature



Ripple Rejection



ESR Stable Area



Load transient response (Io=0→300mA)