

DATA SHEET

Part No.	AN78L09M
Package Code No.	HSIP003-P-0000Q

Maintenance/Discontinued includes following lifecycle stage.
planned maintenance type
maintenance type
planned discontinued type
discontinued type
Please visit following URL about latest information.
<http://www.semicon.panasonic.co.jp/en/>

Contents

■ Overview	3
■ Features	3
■ Applications	3
■ Package	3
■ Type	3
■ Block Diagram	4
■ Pin Descriptions	5
■ Absolute Maximum Ratings	6
■ Electrical Characteristics	7
■ Electrical Characteristics (Reference values for design)	8
■ Technical Data	9

Maintenance/Discontinued includes following four Product lifecycle stage.
Discontinued type
planned maintenance type
maintenance type
planned discontinued type
discontinued type
Please visit following URL about latest information.
<http://www.semicon.panasonic.co.jp/en/>

AN78L09M

3-pin positive output voltage regulator (100 mA type)

■ Overview

The AN78LxxM series are 3-pin, fixed positive output type monolithic voltage regulators.

Stabilized fixed output voltage is obtained from unstable DC input voltage without using any external components.

12 types of fixed output voltage are available; 4 V, 5 V, 6 V, 7 V, 8 V, 9 V, 10 V, 12 V, 15 V, 18 V, 20 V and 24 V.

They can be used widely in power circuits with current capacity of up to 100 mA.

The AN78L09M is the 9 V output voltage type in these series.

■ Features

- No external components
- Output voltage: 9 V
- Built-in overcurrent limit circuit
- Built-in thermal overload protection circuit

■ Applications

- 3-pin positive output voltage regulator (100 mA type)

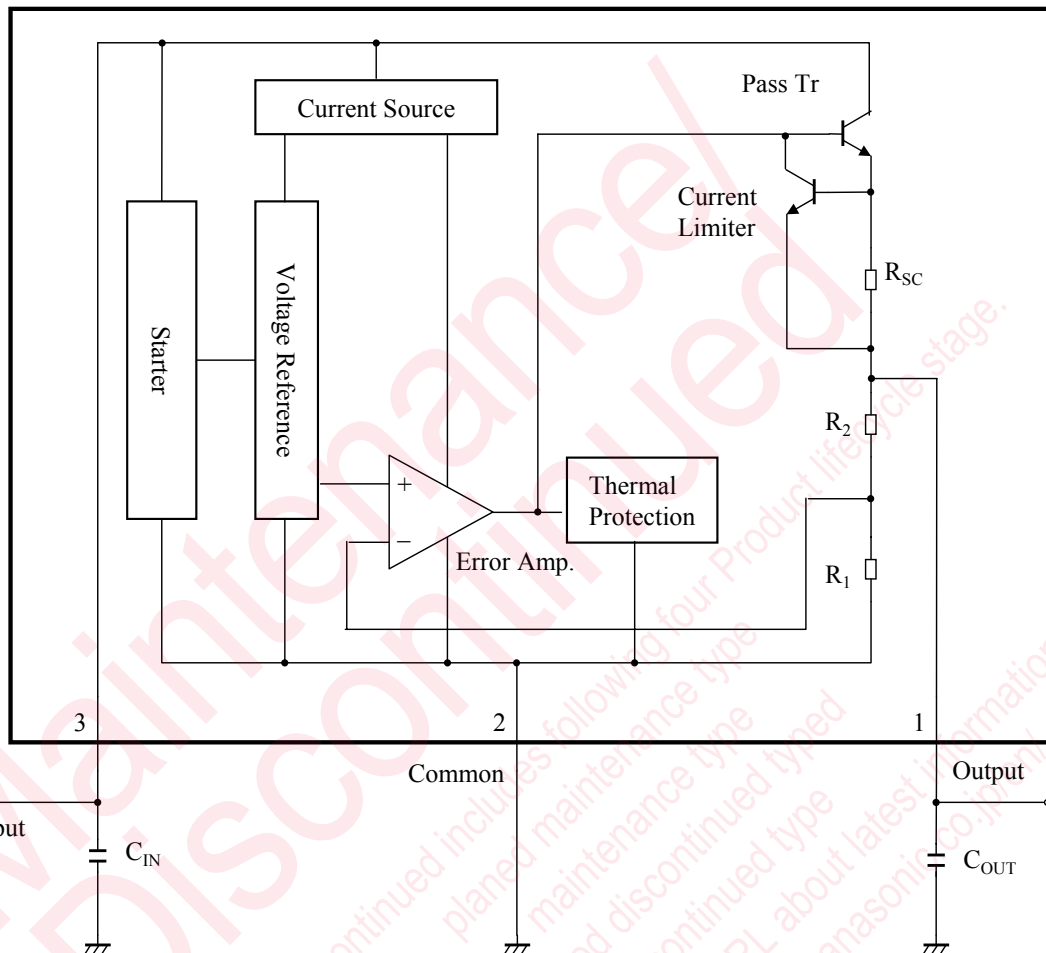
■ Package

- 3-pin plastic single inline package with heat sink (SIP type)

■ Type

- Silicon monolithic bipolar IC

■ Block Diagram



C_{IN} : 0.33 μ F
 C_{OUT} : 0.1 μ F
 R_1 : 4 k Ω
 R_2 : 5 k Ω

■ Pin Descriptions

Pin No.	Pin name	Type	Description
1	Output	Output	Regulated power output
2	Common	GND	Ground
3	Input	Input	Input supplies power to the internal circuitry

Maintenance/Discontinued includes following four Product lifecycle stage.
planned maintenance type
maintenance type
planned discontinued type
discontinued type
Please visit following URL about latest information.
<http://www.semicon.panasonic.co.jp/en/>

■ Absolute Maximum Ratings

A No.	Parameter	Symbol	Rating	Unit	Note
1	Input voltage	V_{IN}	35	V	*1
2	Supply current	I_{CC}	200	mA	*2
3	Power dissipation	P_D	270	mW	*3
4	Operating ambient temperature	T_{opr}	-30 to +80	°C	*4
5	Storage temperature	T_{stg}	-55 to +150	°C	*4

Note) *1: The values under the condition not exceeding the above absolute maximum ratings and the power dissipation.

*2: Since current limiting circuit is built in, current value never exceeds the limit.

*3: The power dissipation shown is the value at $T_a = 80^\circ\text{C}$.

When using this IC, refer to the $\bullet P_D - T_a$ diagram in the ■ Technical Data and use under the condition not exceeding the allowable value.
When T_j exceeds 150°C , the internal circuit cuts off the output.

*4: Except for the power dissipation, operating ambient temperature, and storage temperature, all ratings are for $T_a = 25^\circ\text{C}$.

■ Operating supply voltage range

Parameter	Symbol	Range	Unit	Note
Supply voltage range	V_{CC}	11.5 to 24	V	—

Note) The values under the condition not exceeding the above absolute maximum ratings and the power dissipation.

■ Electrical Characteristics

Note) Unless otherwise specified, $T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$, $V_{\text{IN}} = 15\text{ V}$, $I_{\text{OUT}} = 40\text{ mA}$, $C_{\text{IN}} = 0.33\ \mu\text{F}$ and $C_{\text{OUT}} = 0.1\ \mu\text{F}$, $T_j = 0^\circ\text{C}$ to 125°C

B No.	Parameter	Symbol	Conditions	Limits			Unit	Note
				Min	Typ	Max		
1	Output voltage	V_{OUT}	$T_j = 25^\circ\text{C}$	8.64	9.0	9.36	V	*1
2	Output voltage tolerance	V_{OUT}	$V_{\text{IN}} = 11.5\text{ V to }24\text{ V}$, $I_{\text{OUT}} = 1\text{ mA to }70\text{ mA}$	8.55	—	9.45	V	*1
3	Line regulation	REG_{IN}	$V_{\text{IN}} = 11.5\text{ V to }24\text{ V}$, $T_j = 25^\circ\text{C}$	—	90	190	mV	*1
			$V_{\text{IN}} = 12\text{ V to }24\text{ V}$, $T_j = 25^\circ\text{C}$	—	80	140		
4	Load regulation	REG_{L}	$I_{\text{OUT}} = 1\text{ mA to }100\text{ mA}$, $T_j = 25^\circ\text{C}$	—	16	85	mV	*1
			$I_{\text{OUT}} = 1\text{ mA to }40\text{ mA}$, $T_j = 25^\circ\text{C}$	—	8	45		
5	Bias current	I_{Bias}	$T_j = 25^\circ\text{C}$	—	2.0	3.0	mA	*1
6	Bias current fluctuation to input	$\Delta I_{\text{Bias(IN)}}$	$V_{\text{IN}} = 12\text{ V to }24\text{ V}$, $T_j = 25^\circ\text{C}$	—	—	1.0	mA	*1
7	Bias current fluctuation to load	$\Delta I_{\text{Bias(L)}}$	$I_{\text{OUT}} = 1\text{ mA to }40\text{ mA}$, $T_j = 25^\circ\text{C}$	—	—	0.1	mA	*1
8	Ripple rejection ratio	RR	$V_{\text{IN}} = 12\text{ V to }22\text{ V}$, $I_{\text{OUT}} = 40\text{ mA}$, $f = 120\text{ Hz}$	43	53	—	dB	—

Note) *1: The specified condition $T_j = 25^\circ\text{C}$ means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

■ Electrical Characteristics (Reference values for design)

Note) Unless otherwise specified, $T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$, $V_{\text{IN}} = 15\text{ V}$, $I_{\text{OUT}} = 40\text{ mA}$, $C_{\text{IN}} = 0.33\text{ }\mu\text{F}$ and $C_{\text{OUT}} = 0.1\text{ }\mu\text{F}$, $T_j = 0^\circ\text{C}$ to 125°C

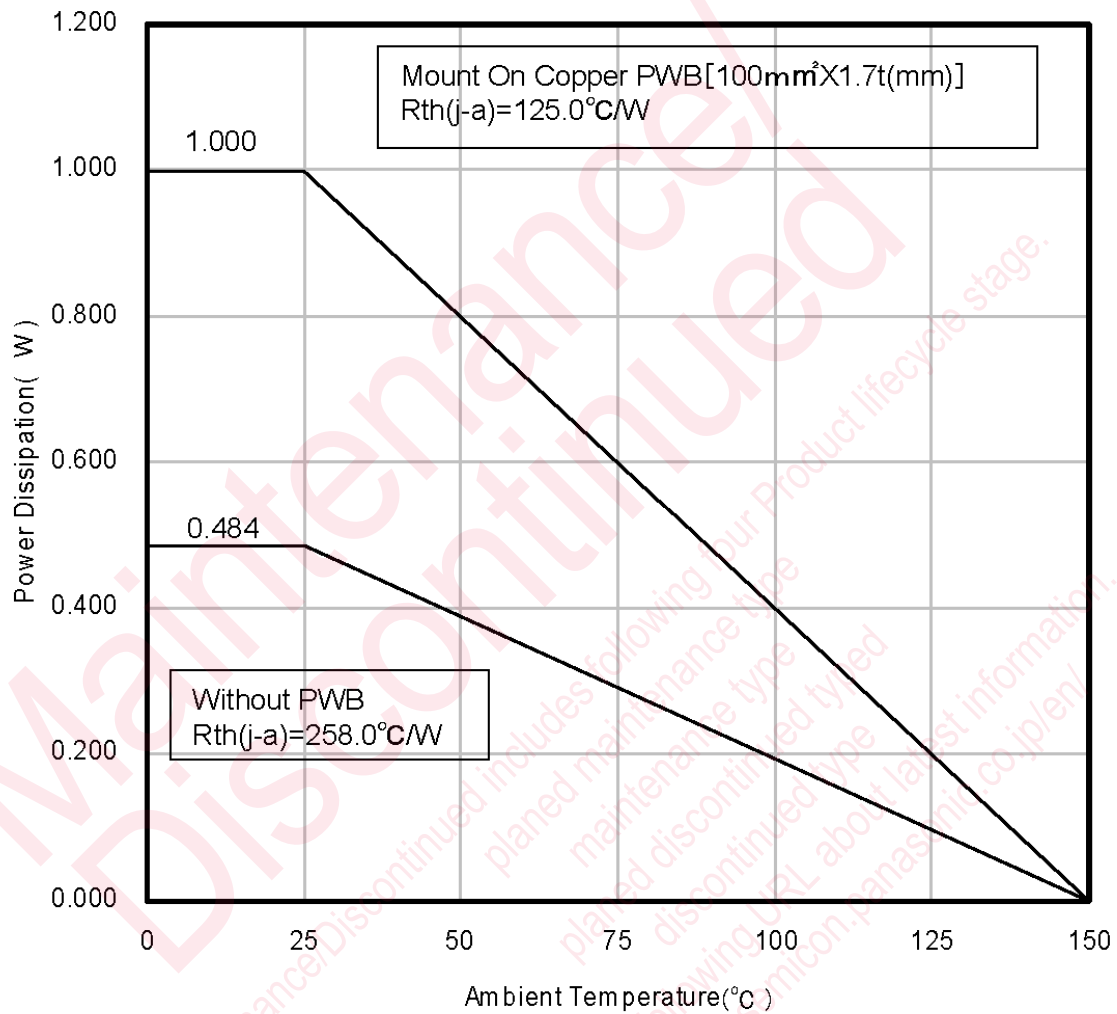
The characteristics listed below are reference values for design of the IC and are not guaranteed by inspection.

If a problem does occur related to these characteristics, Panasonic will respond in good faith to user concerns.

B No.	Parameter	Symbol	Conditions	Reference values			Unit	Note
				Min	Typ	Max		
1	Output noise voltage	V_{no}	$f = 10\text{ Hz}$ to 100 kHz	—	65	—	μV	—
2	Minimum input/output voltage difference	$V_{\text{DIF(min)}}$	$T_j = 25^\circ\text{C}$	—	1.7	—	V	*1
3	Output short-circuit current	$I_{\text{O(Short)}}$	$T_j = 25^\circ\text{C}$	—	140	—	mA	*1
4	Output voltage temperature coefficient	$\frac{\Delta V_{\text{OUT}}}{T_a}$	$I_{\text{OUT}} = 5\text{ mA}$, $T_j = 0^\circ\text{C}$ to 125°C	—	-0.85	—	$\text{mV}/^\circ\text{C}$	—

Note) *1: The specified condition $T_j = 25^\circ\text{C}$ means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

- Technical Data
- $P_D - T_a$ diagram



utions in using the technical information and scribed in this book

book is to be exported or provided to non-residents, the laws and
d to security export control, must be observed.

y to show the main characteristics and application circuit examples
property right or other right owned by Panasonic Corporation or any
company as to the infringement upon any such right owned by any
information described in this book.

standard applications or general electronic equipment (such as office
and household appliances).

g applications:

obiles, traffic control equipment, combustion equipment, life support
reliability are required, or if the failure or malfunction of the prod-

are subject to change without notice for modification and/or im-
se of the products, therefore, ask for the most up-to-date Product
atisfy your requirements.

bsolute maximum rating and the guaranteed operating conditions
) . Especially, please be careful not to exceed the range of absolute
r-off and mode-switching. Otherwise, we will not be liable for any



take into the consideration of incidence of break down and failure
n the systems such as redundant design, arresting the spread of fire
al injury, fire, social damages, for example, by using the products.

own and characteristics change due to external factors (ESD, EOS,
mounting or at customer's process. When using products for which
elf life and the elapsed time since first opening the packages.

partially, without the prior written permission of our company.

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View AN78L09M on WIN SOURCE](#)
-  [Panasonic Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management