

PQ7DV5

Variable Output Type, High Output Current (5A) Type Low Power-loss Voltage Regulators

■ Features

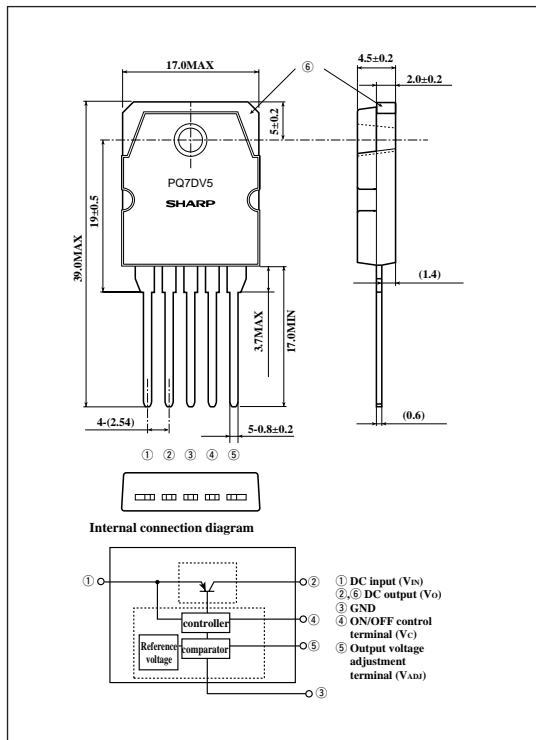
- TO-3P package
- Low power-loss (Dropout voltage:MAX. 0.5V at $I_o=5A$)
- Variable output type (1.5V to 7V)
- Minimum input voltage : 3.0V
- High output current type (5A)
- Reference voltage precision : $\pm 2.0\%$
- Built-in ON/OFF control function
- Built-in overcurrent protection, overheat protection function

■ Applications

- Power supplies for various electronic equipment such as personal computers

■ Outline Dimensions

(Unit : mm)



■ Absolute Maximum Ratings

($T_a=25^\circ C$)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V_{IN}	10	V
*1 ON/OFF control terminal voltage	V_C	10	V
*1 Output adjustment terminal voltage	V_{ADJ}	5	V
Output current	I_o	5.0	A
Power dissipation (No heat sink)	P_{D1}	2.2	W
Power dissipation (With infinite heat sink)	P_{D2}	60	W
*2 Junction temperature	T_j	150	$^\circ C$
Operating temperature	T_{opr}	-20 to +80	$^\circ C$
Storage temperature	T_{stg}	-40 to +150	$^\circ C$
Soldering temperature	T_{sol}	260 (For 10s)	$^\circ C$

*1 All are open except GND and applicable terminals.

*2 Overheat protection may operate at $125 < T_j < 150^\circ C$.

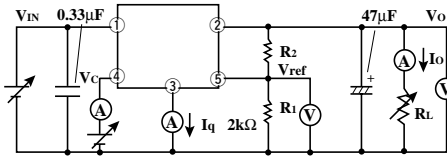
■ Electrical Characteristics

(Unless otherwise specified, conditions shall be $V_{IN}=5V$, $I_o=2.5A$, $V_o=3V$ [$R_l=2k\Omega$] $T_a=25^\circ C$)

Parameter	Symbol	Conditions	NIN.	TYP.	MAX.	Unit
Input voltage	V_{IN}	-	3	-	10	V
Output voltage	V_o	-	1.5	-	7	V
Reference voltage	V_{ref}	-	1.225	1.25	1.275	V
Load regulation	R_{egL}	$I_o=5mA$ to $5.0A$	-	0.5	2.0	%
Line regulation	R_{egI}	$V_{IN}=4$ to $10V$	-	0.5	2.5	%
Temperature coefficient of reference voltage	T_cV_o	$T_j=0$ to $125^\circ C$	-	± 0.01	-	%/°C
Ripple rejection	RR	-	45	55	-	dB
Dropout voltage	V_{i-o}	$V_{IN}=3V$, $I_o=5A$	-	-	0.5	V
^{*3} ON-state voltage for control	$V_{C(ON)}$	-	2.0	-	-	V
ON-state current for control	$I_{C(ON)}$	$V_c=2.7V$	-	-	20	μA
OFF-state voltage for control	$V_{C(OFF)}$	-	-	-	0.8	V
OFF-state current for control	$I_{C(OFF)}$	$V_c=0.4V$	-	-	-0.4	mA
Quiescent current	I_q	$I_o=0A$	-	-	17	mA

^{*3} In case of opening control terminal ④, output voltage turns on.

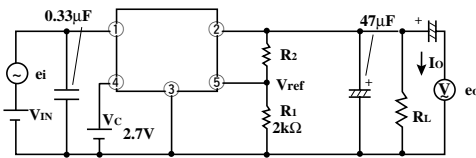
Fig.1 Test Circuit



$$V_o = V_{ref} \times (1 + R_2/R_1) \approx 1.25 \times (1 + R_2/R_1)$$

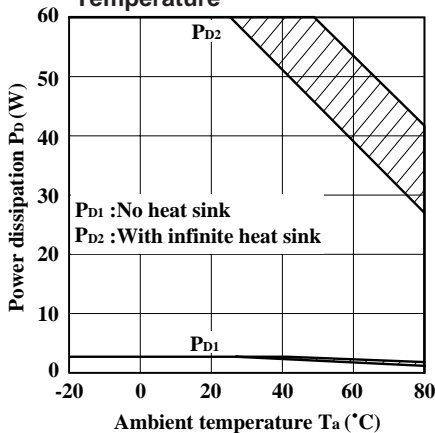
[$R_1=2k\Omega$, $V_{ref} \approx 1.25V$]

Fig.2 Test Circuit for Ripple Rejection



$f=120Hz$ (sine wave)
 $e_i=0.5V_{rms}$
 $V_{IN}=5V$
 $V_o=3V$ ($R_l=2k\Omega$)
 $I_o=0.5A$
 $RR=20 \log (e_i/e_o)$

Fig.3 Power Dissipation vs. Ambient Temperature



Note) Oblique line portion: Overheat protection may operate in this area.

Fig.4 Overcurrent Protection Characteristics (Typical Value)

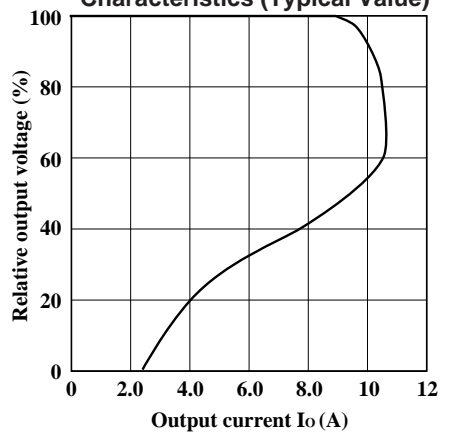


Fig.5 Reference Voltage Deviation vs. Junction Temperature

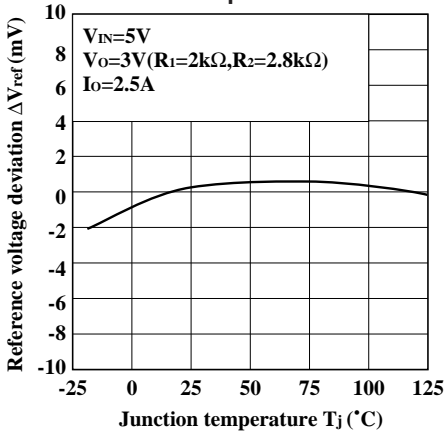


Fig.6 Output Voltage vs. Input Voltage

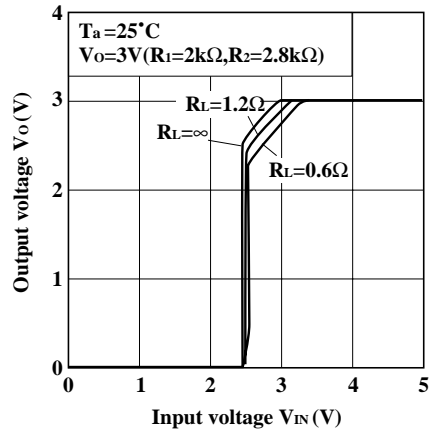


Fig.7 Circuit Operating Current vs. Input Voltage

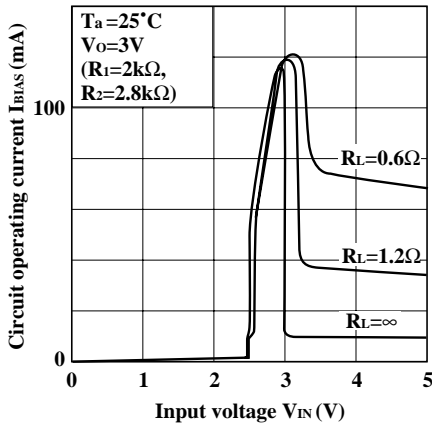


Fig.8 Dropout Voltage vs. Junction Temperature

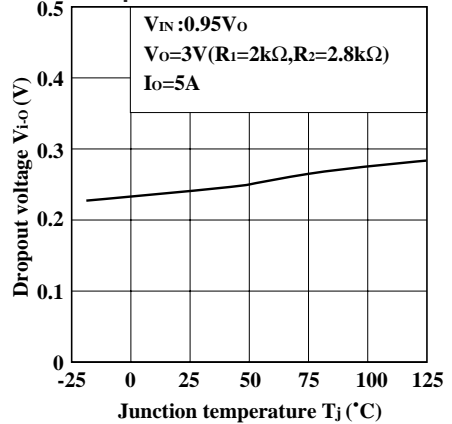


Fig.9 Quiescent Current vs. Junction Temperature

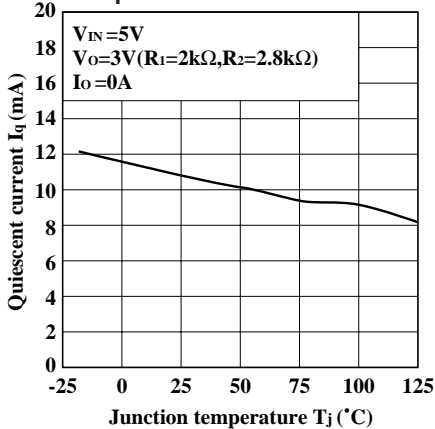


Fig.10 Ripple Rejection vs. Input Ripple Frequency

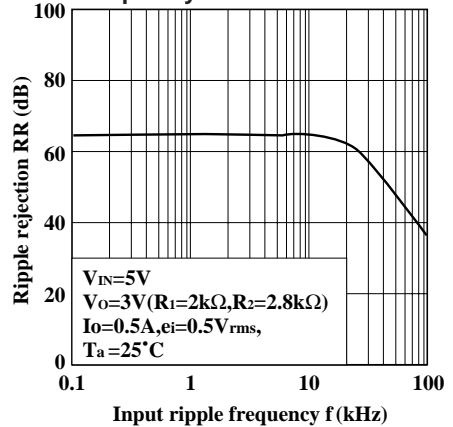
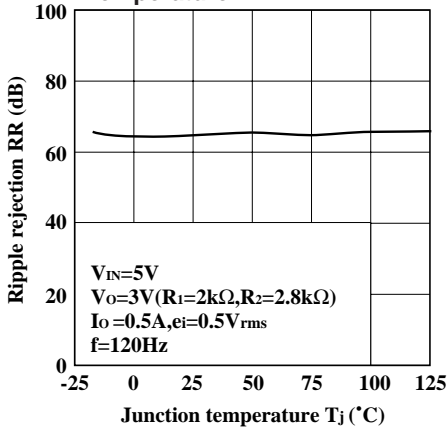
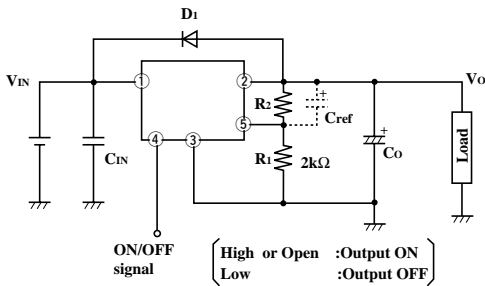


Fig.11 Ripple Rejection vs. Junction Temperature



■ Standard Connection



D1 : This device is necessary to protect the element from damage when reverse voltage may be applied to the regulator in case of input short-circuiting.

Cref : This device is necessary when it is required to enhance the ripple rejection or to delay the output start-up time*. Otherwise, it is not necessary.

(Care must be taken since Cref may raise the gain, facilitating oscillation.)

* The output start-up time proportional to Cref X R2.

CIN, CO : Be sure to mount the devices CIN and Co as close to the device terminal as possible so as to prevent oscillation.

The standard specification of CIN= 0.33μF ,Co= 47μF, respectively. However, adjust them as necessary after checking.

R1, R2 : These devices are necessary to set the output voltage. The output voltage VO is given by the following formula:

$$V_O = V_{ref} \times (1 + R_2/R_1)$$

(Vref is 1.25V TYP)

The standard value of R1 is 2Ω. But value up to 10kΩ.

NOTICE

- The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.
- Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.
- Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:
 - (i) The devices in this publication are designed for use in general electronic equipment designs such as:
 - Personal computers
 - Office automation equipment
 - Telecommunication equipment [terminal]
 - Test and measurement equipment
 - Industrial control
 - Audio visual equipment
 - Consumer electronics
 - (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
 - Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
 - Traffic signals
 - Gas leakage sensor breakers
 - Alarm equipment
 - Various safety devices, etc.
 - (iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
 - Space applications
 - Telecommunication equipment [trunk lines]
 - Nuclear power control equipment
 - Medical and other life support equipment (e.g., scuba).
- Contact a SHARP representative in advance when intending to use SHARP devices for any "specific" applications other than those recommended by SHARP or when it is unclear which category mentioned above controls the intended use.
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Control Law of Japan, it is necessary to obtain approval to export such SHARP devices.
- This publication is the proprietary product of SHARP and is copyrighted, with all rights reserved. Under the copyright laws, no part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of SHARP. Express written permission is also required before any use of this publication may be made by a third party.
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.