

M62221L/FP

3.0 V Fixed Output Voltage DC/DC Converter

REJ03D0847-0200

Rev.2.00

Jun 14, 2006

General Description

The M62221 is a general purpose DC/DC converter which provides a 3.0 V fixed output voltage.

It is possible to simplify the peripheral circuit and to design compact and low cost sets because this IC, housed in a small 5 or 8-pin package includes necessary peripheral components.

Especially this is most suitable for CD-ROM, Disk Drive sets and PDA as a converter from 5 V to 3.0 V.

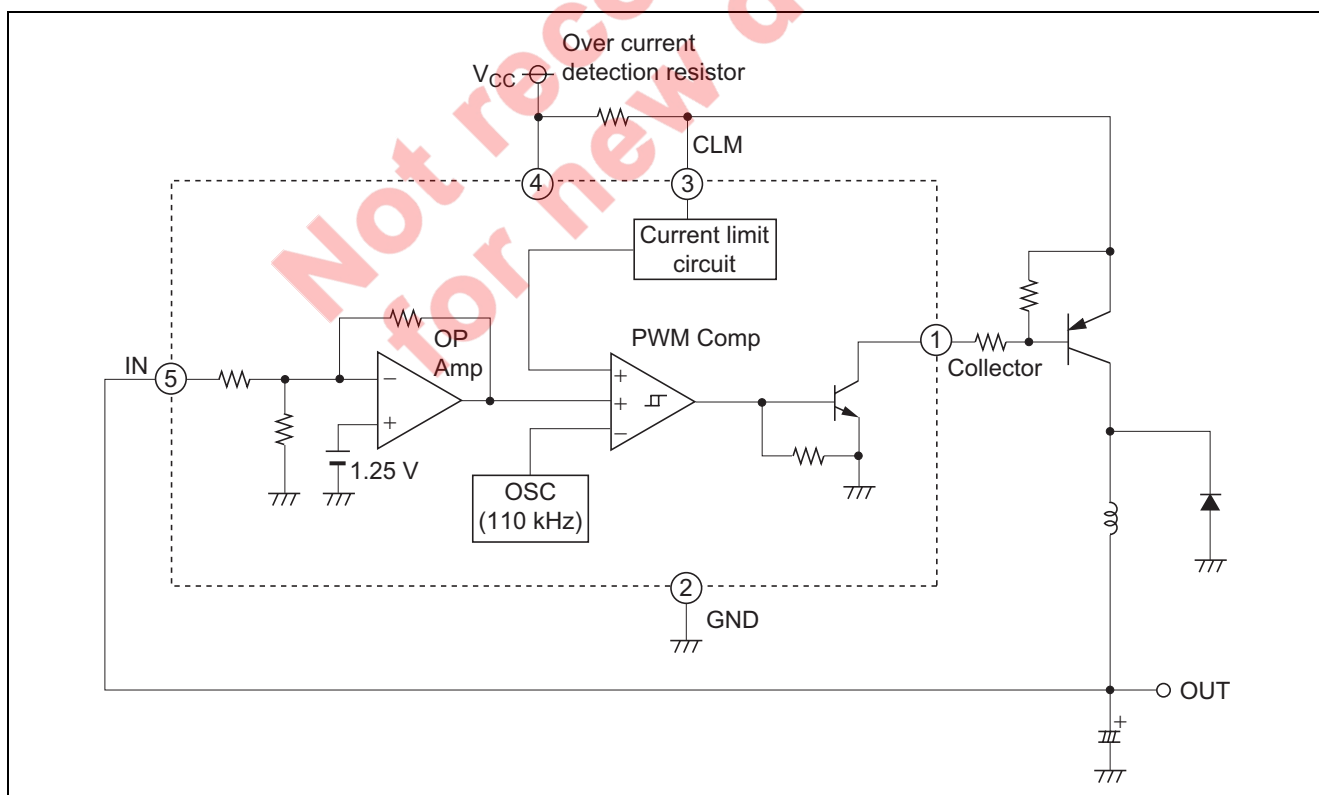
Features

- Wide operation supply voltage range.....4 to 15 V
- Low power consumption.....900 μ A (max.)
- Built-in oscillator without external components (110 kHz typ.)
- Built-in over current protection circuit
- Small size 5-pin SIP and 8-pin SOP packages

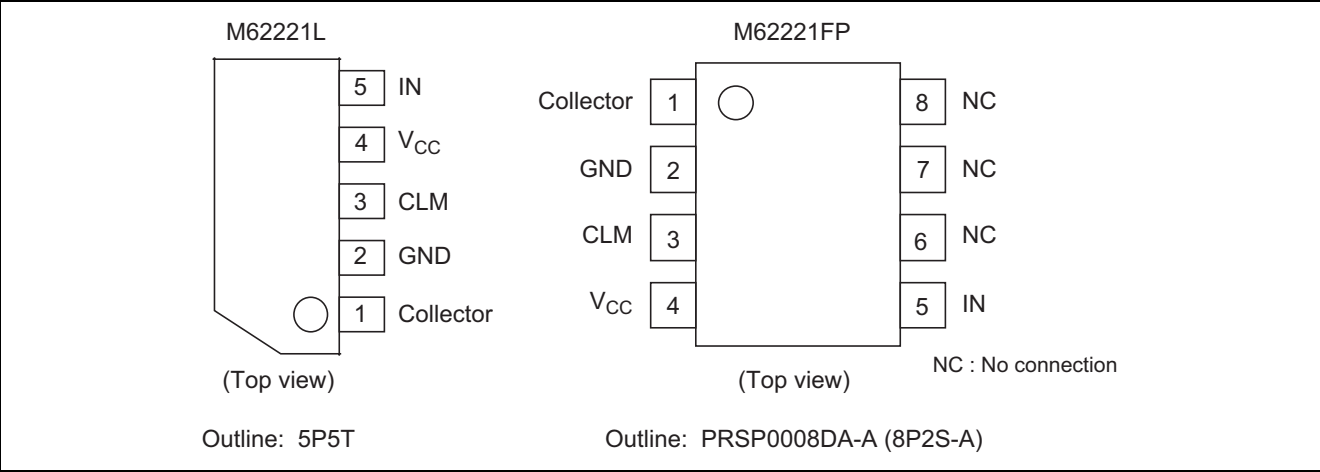
Applications

CD-ROM, PDA, general purpose electric products

Block Diagram



Pin Arrangement



Not recommend
for new design

Absolute Maximum Ratings

(Ta = 25°C, unless otherwise noted)

Item	Symbol	Ratings	Unit	Conditions	
Supply voltage	V _{CC}	16	V		
Output current	I _o	100	mA		
Power dissipation	P _d	450	mW	Ta = 25°C	5-pin SIP
		440	mW		8-pin SOP
Thermal derating	K _θ	4.5	mW/°C	Ta > 25°C	5-pin SIP
		4.4	mW/°C		8-pin SOP
Operating ambient temperature	T _{opr}	–20 to +85	°C		
Storage temperature	T _{stg}	–40 to +125	°C		

Electrical Characteristics

(Ta = 25°C, V_{CC} = 5 V, unless otherwise noted)

Block	Item	Symbol	Limits			Unit	Test Conditions
			Min	Typ	Max		
All block	Supply voltage	V _{CC}	4.0	—	15	V	
	Supply current	I _{CC}	—	660	900	μA	Without load
Error Amp.	Output voltage	V _o	2.85	3.00	3.15	V	
	REF line regulation	V _{reg-L}	—	5	15	mV	V _{CC} = 4 to 12 V
	IN input current	I _{in}	—	100	300	μA	
Oscillator	Oscillator frequency	f _{OSC}	65	110	155	kHz	
	Maximum on duty	T _{DUTY}	—	90	—	%	
CLM	Current limit voltage	V _{THCLM}	120	150	180	mV	V _{CC} – CLM
Output	Output leakage current	I _{CL}	–1	—	1	μA	V _{CC} = 12 V, V _C = 12 V
	Output saturation voltage	V _{sat}	—	0.4	0.7	V	I _o = 100 mA

Application Circuit (3.0 V Output DC/DC Converter)

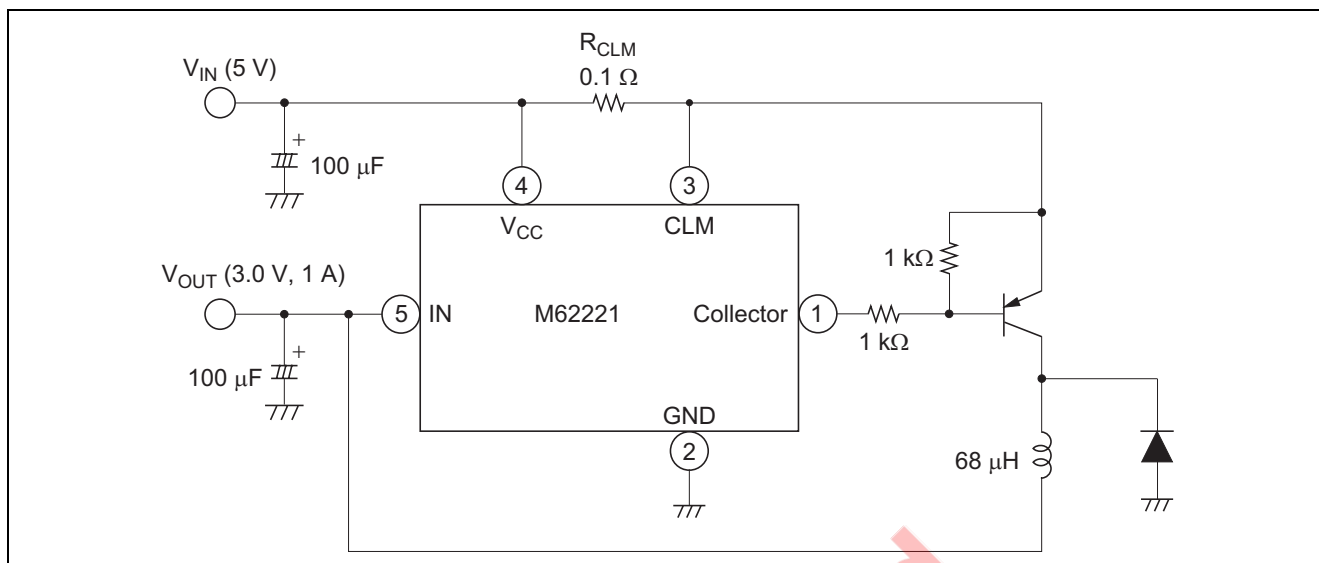


Figure 1 Example of the M62221L/FP Application Circuit

- Current limit detection:

When the voltage drop between pin 3 and pin 4 becomes more than 150 mV, the current limit detection circuit begins operating. The peak switch current "I_{pk}" is limited to 150 mV/R_{CLM}. In the example of application (Figure 1), the current is limited to 1.5 A.

The Expression of Circuit Constants

Constants	Expressions
$\frac{T_{ON}}{T_{OFF}}$	$\frac{V_O + V_F}{V_{IN} - V_{CE(sat)} - V_O}$
$(T_{ON} + T_{OFF})_{MAX}$	$\frac{1}{f_{OSC}} f_{OSC}: 110 \text{ kHz } (V_{CC} = 5 \text{ V})$
$T_{OFF(MIN)}$	$(T_{ON} + T_{OFF}) / (1 + \frac{T_{ON}}{T_{OFF}})$
$T_{ON(MAX)}$	$\frac{1}{f_{OSC}} - T_{OFF}$
$L_{(MIN)}$	$\frac{(V_{IN} - V_{CE(sat)} - V_O) \times T_{ON(MAX)}}{\Delta I_O}$
I_{pk}	$I_O + \frac{1}{2} \Delta I_O$
R_{CLM}	$\frac{0.15}{I_{pk}} \Delta V_{CLM}: 150 \text{ mV } (V_{CC} = 5 \text{ V})$

Note: V_F : Forward voltage drop of an external diode.

V_{sat} : Output saturation voltage of an external switching transistor.

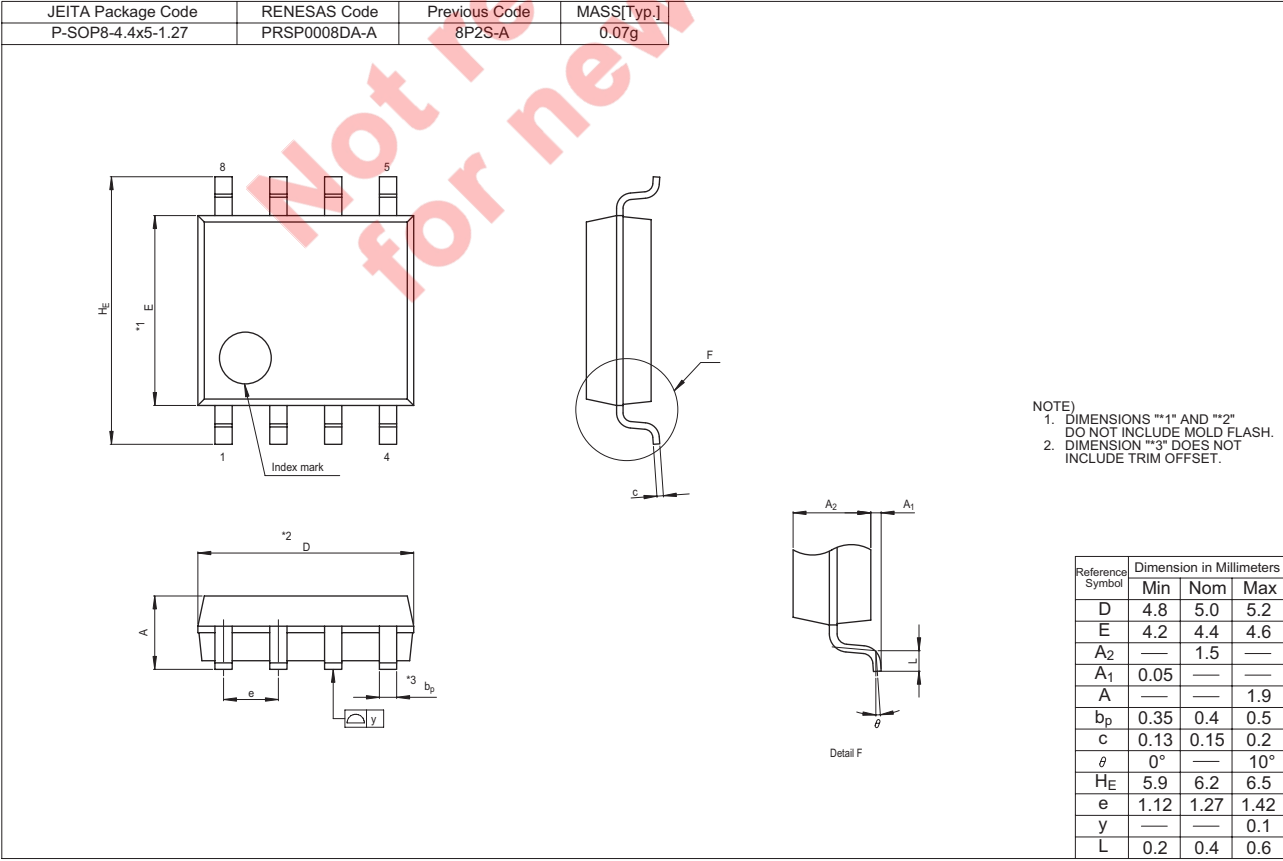
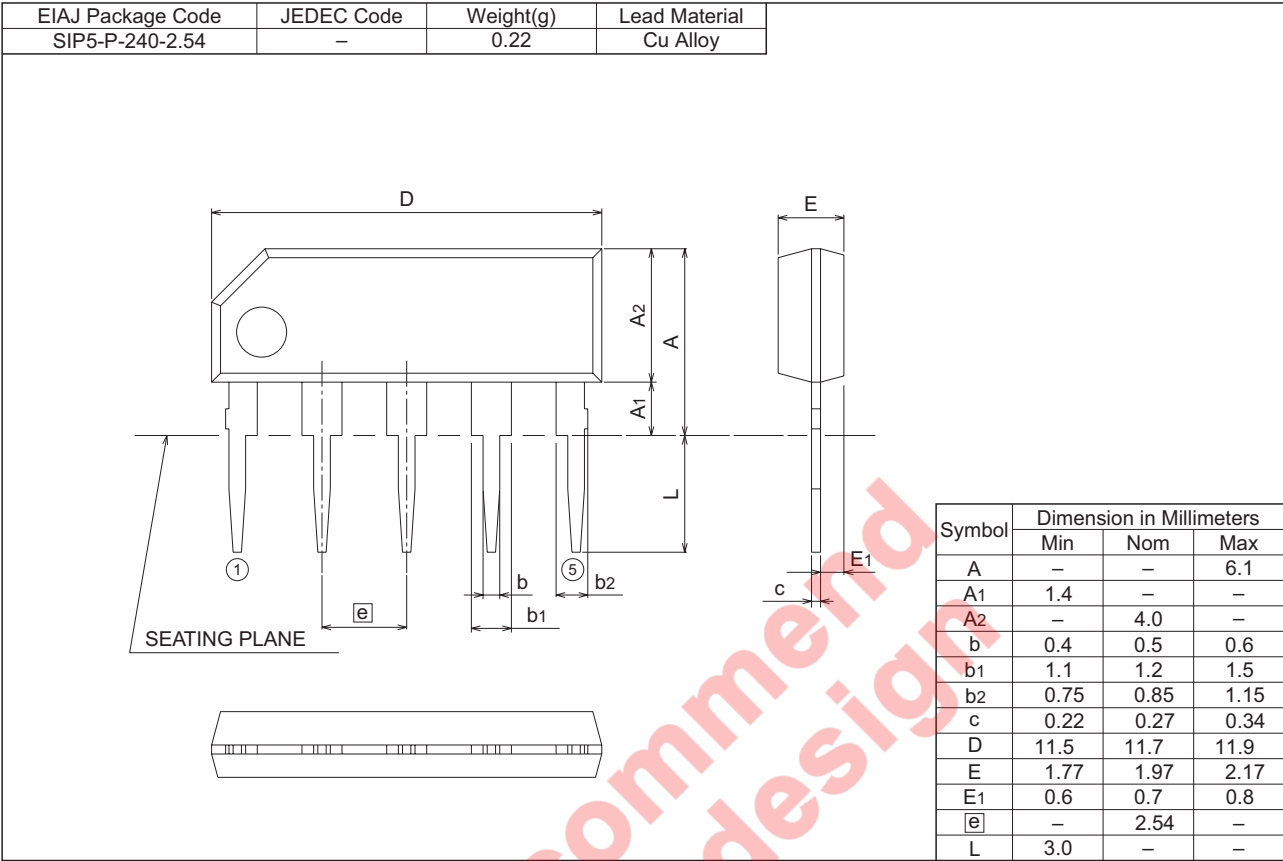
ΔI_O : It should be set between 1/3 and 1/5 of maximum output current.

An external transistor, diode and inductor should have a peak current capability of greater than "I_{pk}".

Package Dimensions

5P5T

Plastic 5pin 240mil SIP



Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Keep safety first in your circuit designs!

1. Renesas Technology Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corp. product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corp. or a third party.
2. Renesas Technology Corp. assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corp. without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor for the latest product information before purchasing a product listed herein.
The information described here may contain technical inaccuracies or typographical errors.
Renesas Technology Corp. assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.
Please also pay attention to information published by Renesas Technology Corp. by various means, including the Renesas Technology Corp. Semiconductor home page (<http://www.renesas.com>).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corp. assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corp. semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corp. is necessary to reprint or reproduce in whole or in part these materials.
7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
8. Please contact Renesas Technology Corp. for further details on these materials or the products contained therein.



RENESAS SALES OFFICES

<http://www.renesas.com>

Refer to "<http://www.renesas.com/en/network>" for the latest and detailed information.

Renesas Technology America, Inc.

450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology (Shanghai) Co., Ltd.

Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7898

Renesas Technology Hong Kong Ltd.

7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.

10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology Singapore Pte. Ltd.

1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.

Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

Renesas Technology Malaysia Sdn. Bhd

Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510