

# M62290L/FP

## 5.0 V Fixed Output Voltage DC/DC Converter

REJ03D0850-0300

Rev.3.00

Jun 15, 2007

### General Description

The M62290L/FP is a general purpose DC/DC converter which provides 5.0 V fixed output.

It is possible to simplify peripheral circuits and to design compact and low cost sets because this IC includes a lot of functions in small 5 or 8-pin packages.

Especially this is most suitable for a local voltage regulator of audio sets as a converter from 12 V to 5 V.

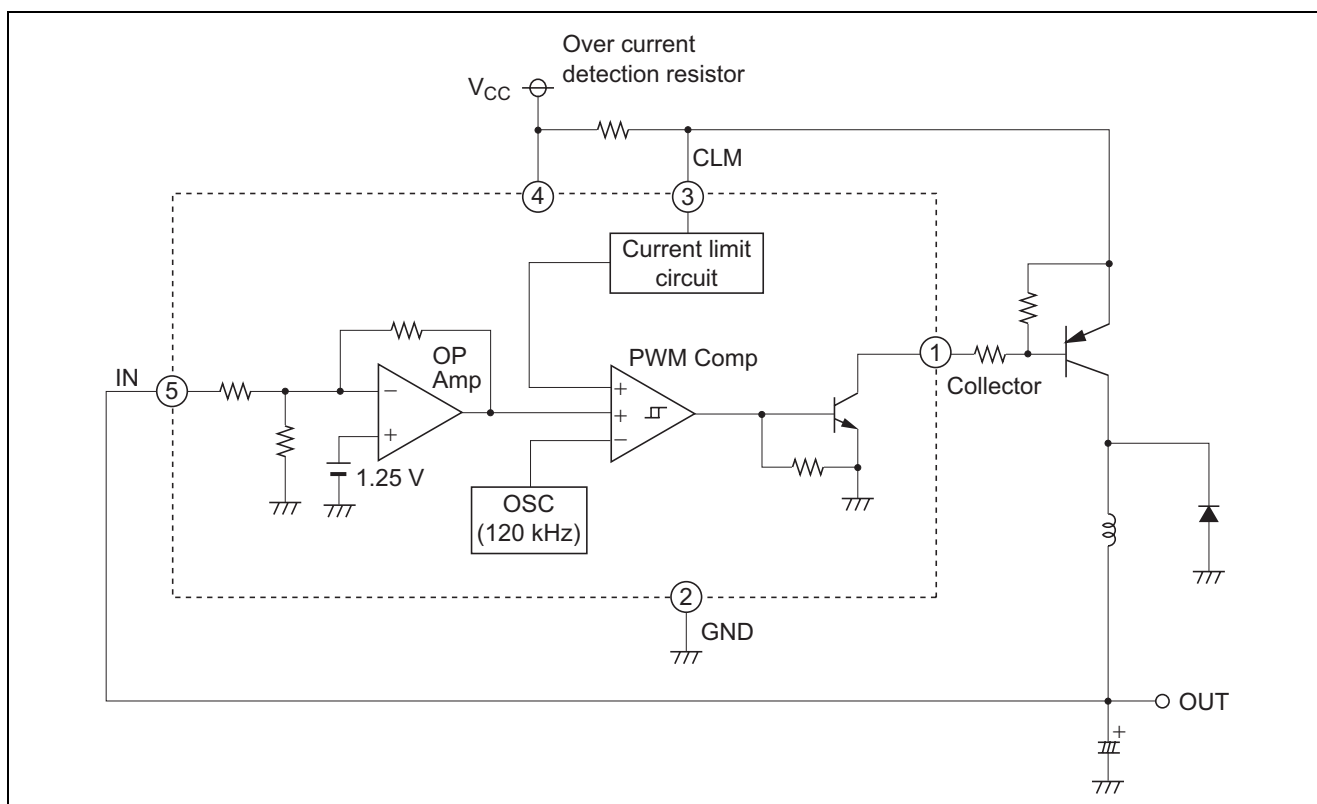
### Features

- Wide operation voltage range: 6 to 15 V (typ.  $V_{CC} = 12$  V)
- Low power dissipation: 1.1 mA (max.,  $V_{CC} = 12$  V)
- Built-in oscillator without peripheral devices (120 kHz typ.)
- Built-in over current protection circuit
- Small 5-pin SIP and 8-pin SOP packages

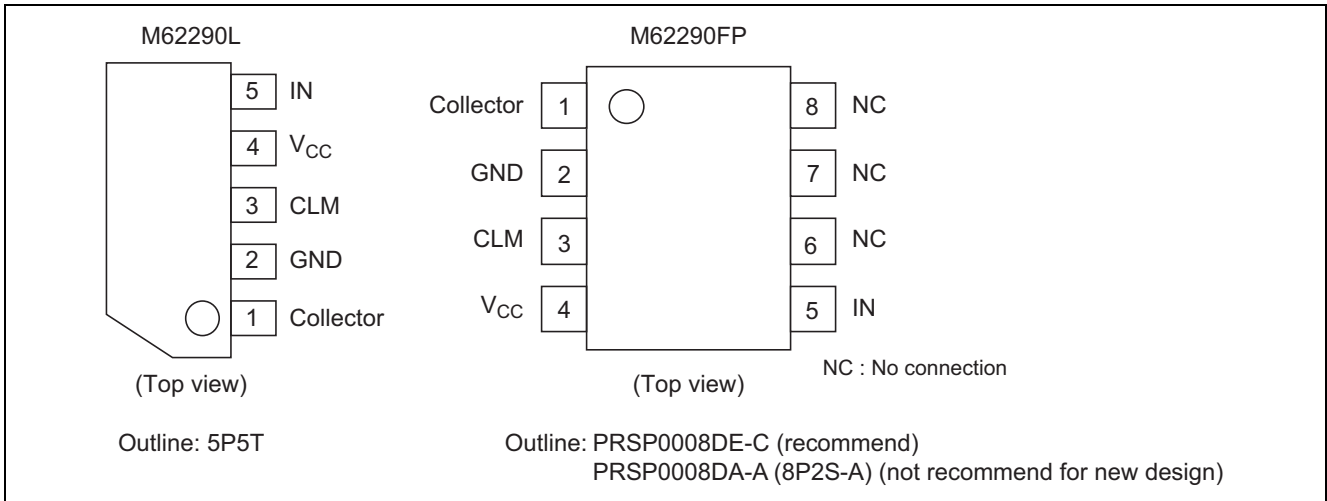
### Applications

Local voltage regulator of audio sets and general electric products

### Block Diagram



## Pin Arrangement



## Absolute Maximum Ratings

(Ta = 25°C, unless otherwise noted)

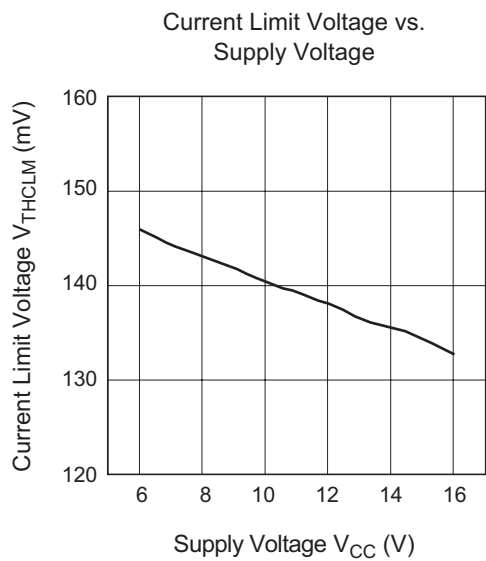
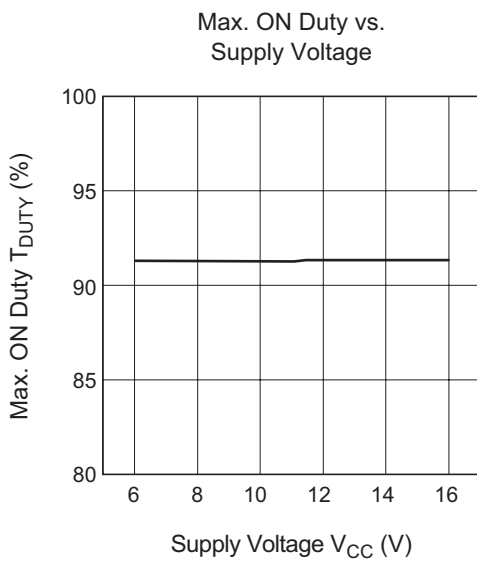
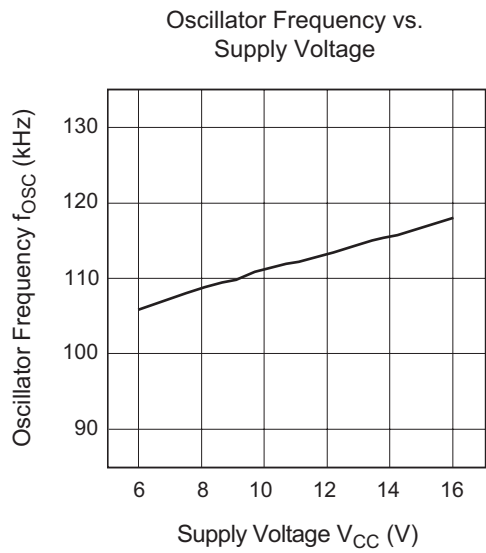
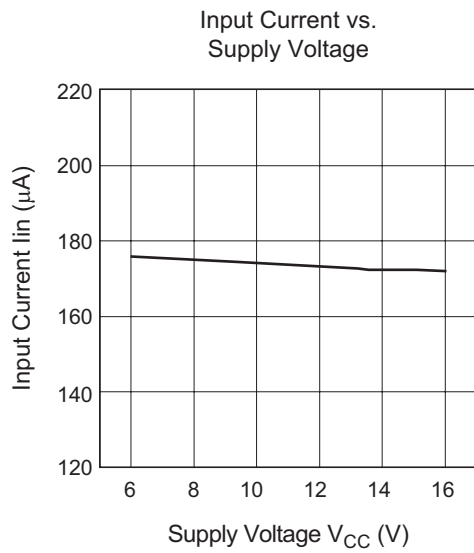
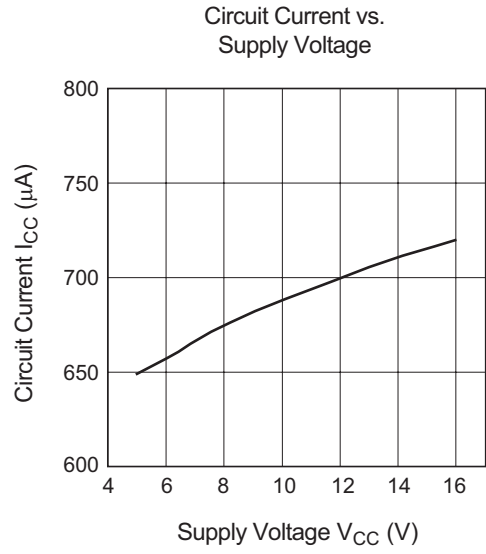
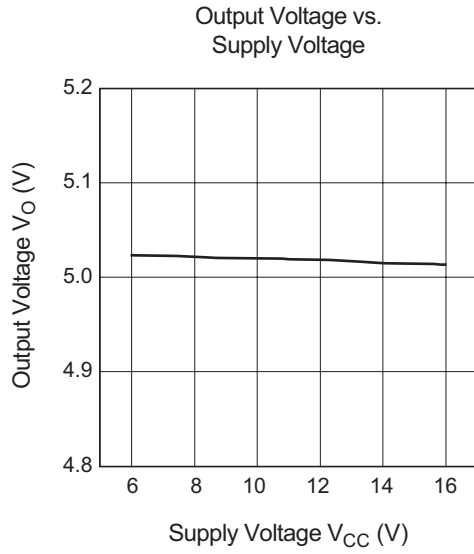
Item	Symbol	Ratings	Unit	Conditions	
Supply voltage	V <sub>CC</sub>	16	V		
Output current	I <sub>o</sub>	100	mA		
Power dissipation	P <sub>d</sub>	450	mW	Ta = 25°C	5-pin SIP
		440	mW		8-pin SOP
Thermal derating	K <sub>θ</sub>	4.5	mW/°C	Ta > 25°C	5-pin SIP
		4.4	mW/°C		8-pin SOP
Operating temperature	T <sub>opr</sub>	-20 to +85	°C		
Storage temperature	T <sub>stg</sub>	-40 to +125	°C		

## Electrical Characteristics

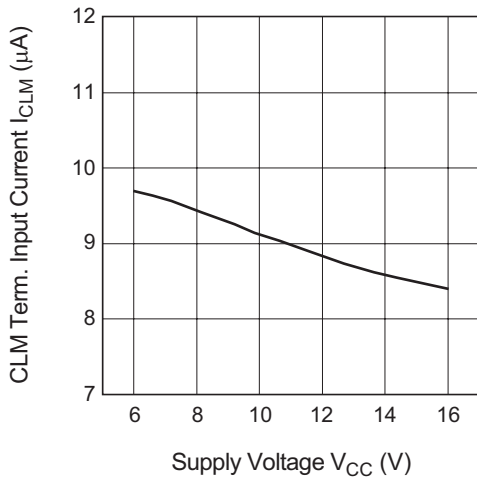
(Ta = 25°C, V<sub>CC</sub> = 12 V, unless otherwise noted)

Block	Item	Symbol	Limits			Unit	Test Conditions
			Min	Typ	Max		
All block	Supply voltage	V <sub>CC</sub>	6.0	—	15	V	
	Supply current	I <sub>CC</sub>	—	780	1100	μA	Without load
Error Amp.	Output voltage	V <sub>o</sub>	4.75	5.00	5.25	V	
	REF line regulation	V <sub>reg-L</sub>	—	5	30	mV	V <sub>CC</sub> = 6 to 15 V
	IN input current	I <sub>in</sub>	—	160	300	μA	
Oscillator	Oscillator frequency	f <sub>OSC</sub>	70	120	170	kHz	
	Maximum on duty	T <sub>DUTY</sub>	—	90	—	%	
CLM	Current limit voltage	V <sub>THCLM</sub>	110	140	170	mV	V <sub>CC</sub> – CLM
Output	Output leakage current	I <sub>CL</sub>	-1	—	1	μA	V <sub>CC</sub> = 15 V, V <sub>C</sub> = 15 V
	Output saturation voltage	V <sub>sat</sub>	—	0.1	0.3	V	I <sub>o</sub> = 100 mA

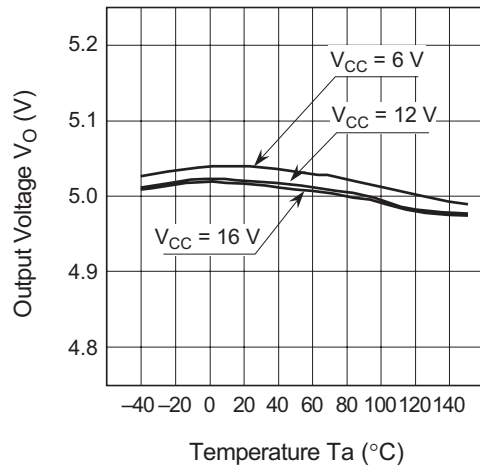
## Typical Characteristics



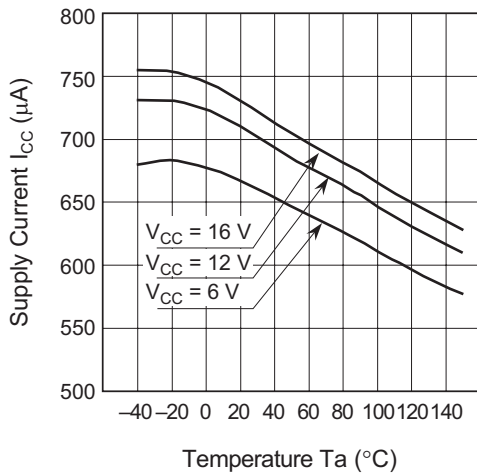
CLM Term. Input Current vs. Supply Voltage



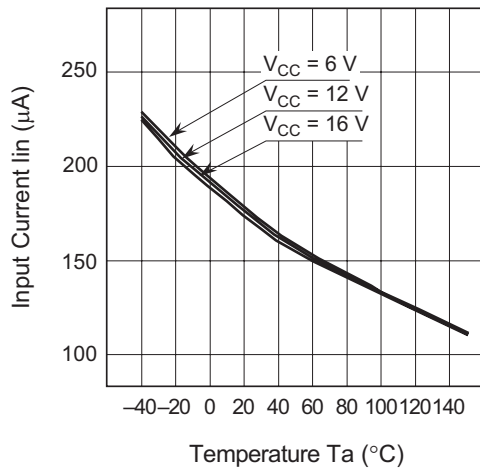
Output Voltage vs. Temperature



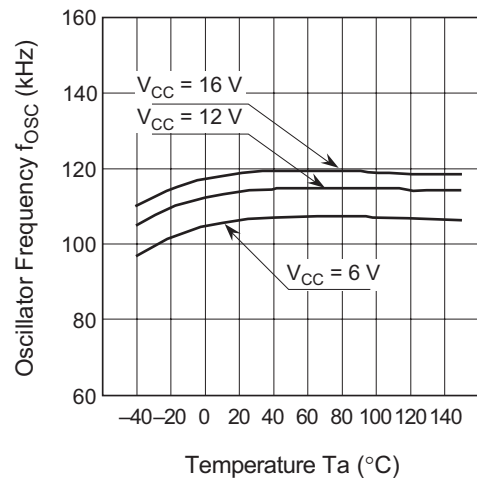
Supply Current vs. Temperature



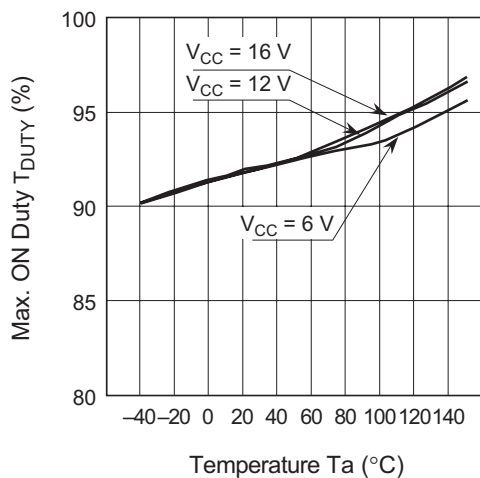
Input Current vs. Temperature

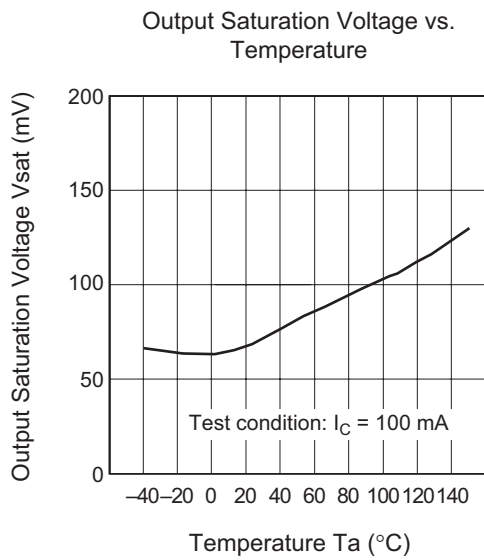
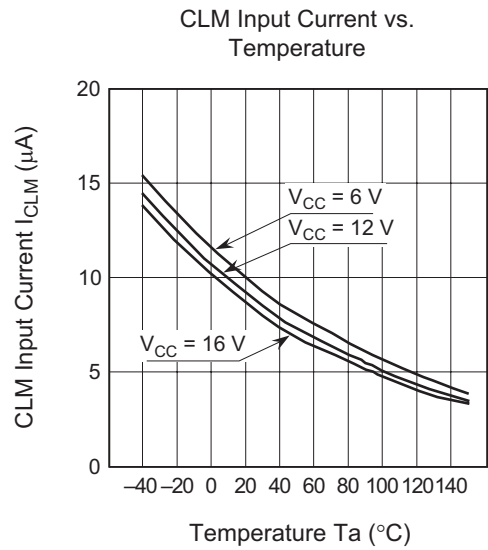
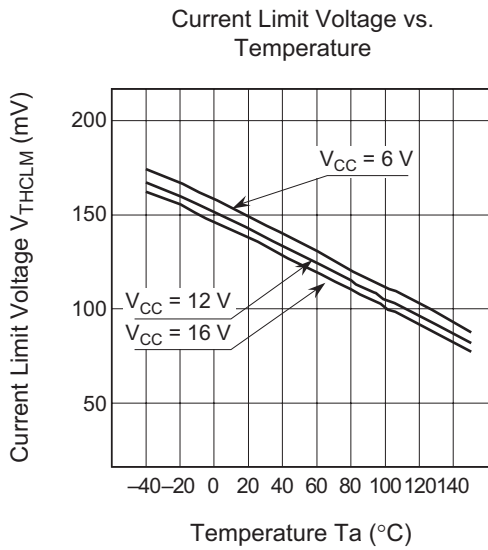


Oscillator Frequency vs. Temperature



Max. ON Duty vs. Temperature





## Application Circuit (5 V Output DC/DC Converter)

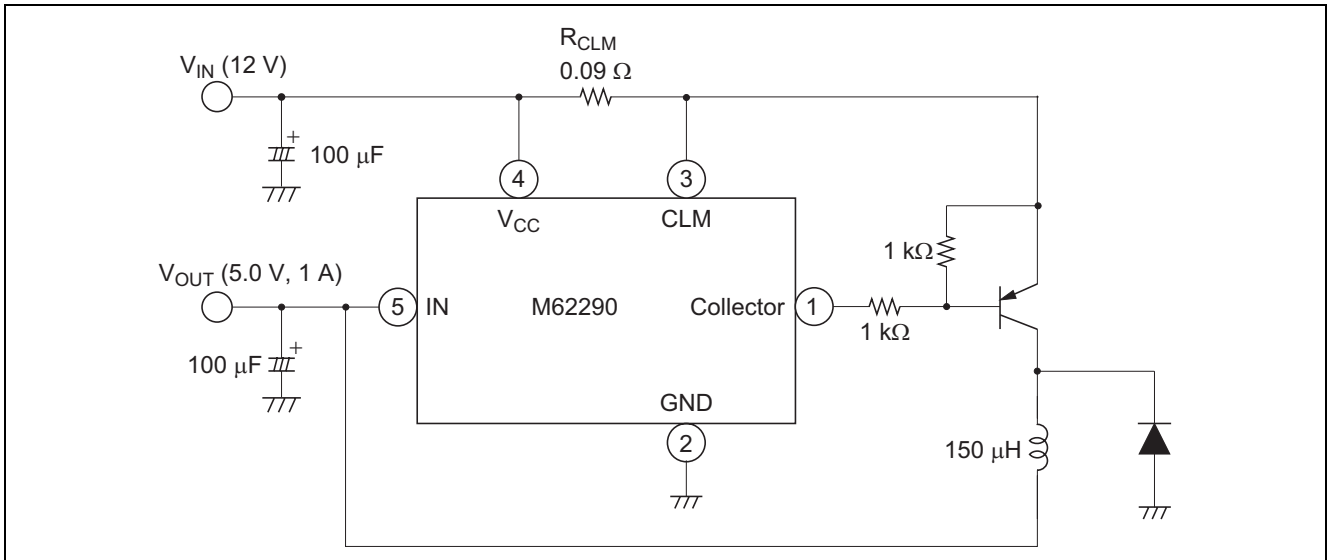


Figure 1 Example of Application Circuit of the M62290L/FP

- Current limit detection:  
When the voltage drop between pin 3 and pin 4 becomes more than 140 mV, the current limit detection circuit begins operating. The peak switch current "Ipk" is limited to  $140 \text{ mV}/R_{\text{CLM}}$ . In the example of application (Figure 1), the current is limited to 1.5 A.

### The Expression of Circuit Constants

Constants	Expressions
$\frac{T_{\text{ON}}}{T_{\text{OFF}}}$	$\frac{V_{\text{O}} + V_{\text{F}}}{V_{\text{IN}} - V_{\text{CE(sat)}} - V_{\text{O}}}$
$(T_{\text{ON}} + T_{\text{OFF}})_{\text{MAX}}$	$\frac{1}{f_{\text{OSC}}} f_{\text{OSC}}: 120 \text{ kHz } (V_{\text{CC}} = 12 \text{ V})$
$T_{\text{OFF(MIN)}}$	$(T_{\text{ON}} + T_{\text{OFF}}) / (1 + \frac{T_{\text{ON}}}{T_{\text{OFF}}})$
$T_{\text{ON(MAX)}}$	$\frac{1}{f_{\text{OSC}}} - T_{\text{OFF}}$
L (MIN)	$\frac{(V_{\text{IN}} - V_{\text{CE(sat)}} - V_{\text{O}}) \times T_{\text{ON(MAX)}}}{\Delta I_{\text{O}}}$
Ipk	$I_{\text{O}} + \frac{1}{2} \Delta I_{\text{O}}$
$R_{\text{CLM}}$	$\frac{0.14}{I_{\text{pk}}} \Delta V_{\text{CLM}}: 140 \text{ mV } (V_{\text{CC}} = 12 \text{ V})$

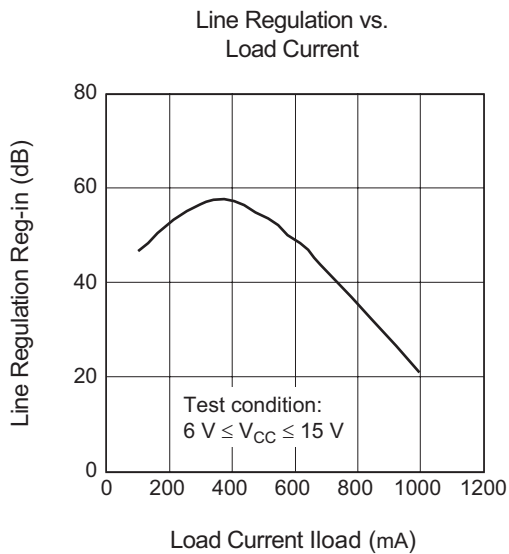
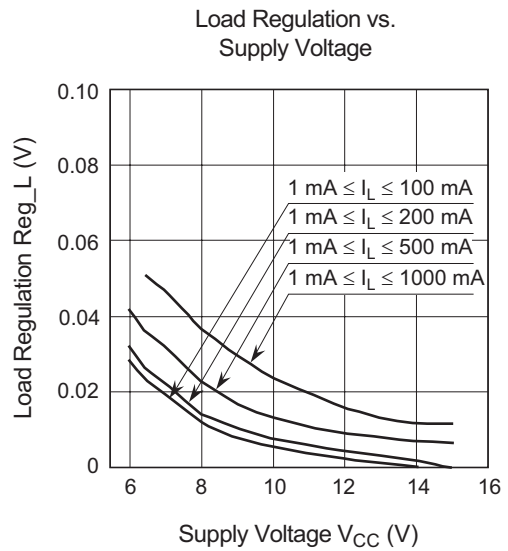
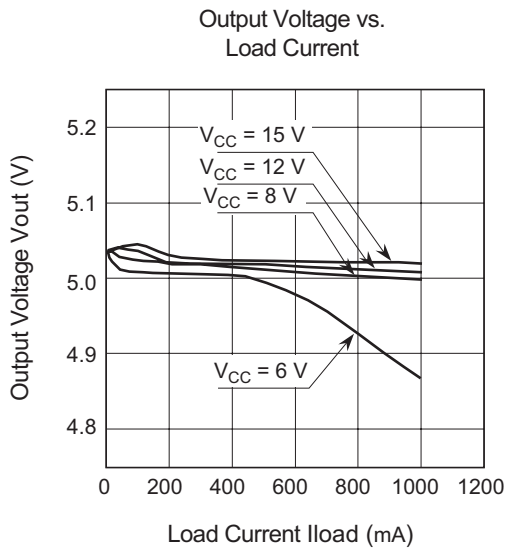
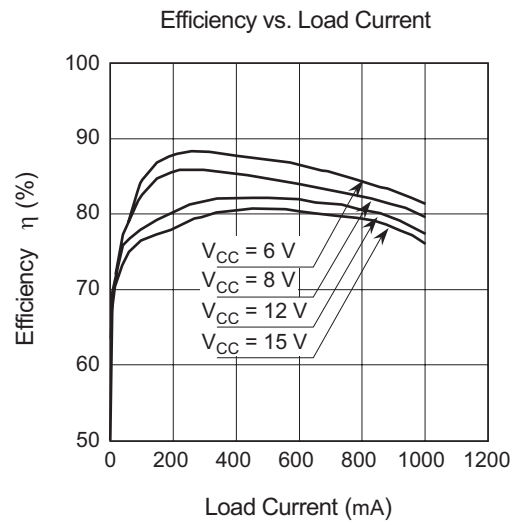
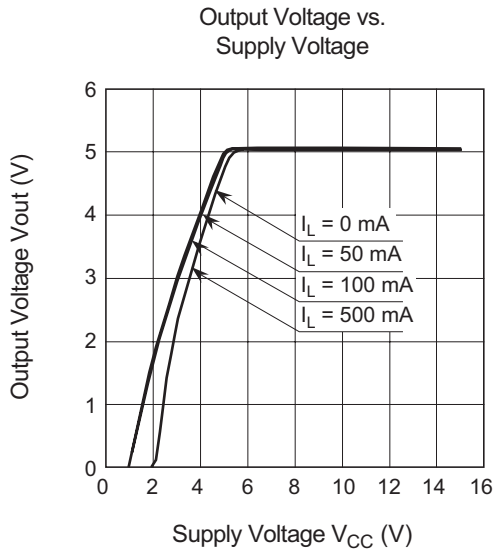
Note:  $V_{\text{F}}$ : Forward voltage drop of an external diode.

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

$\Delta I_{\text{O}}$ : Set between 1/3 and 1/5 of the maximum output current.

An external transistor, diode and inductor must have a peak current capability of approximately greater than "Ipk".

### Application Circuit Characteristics

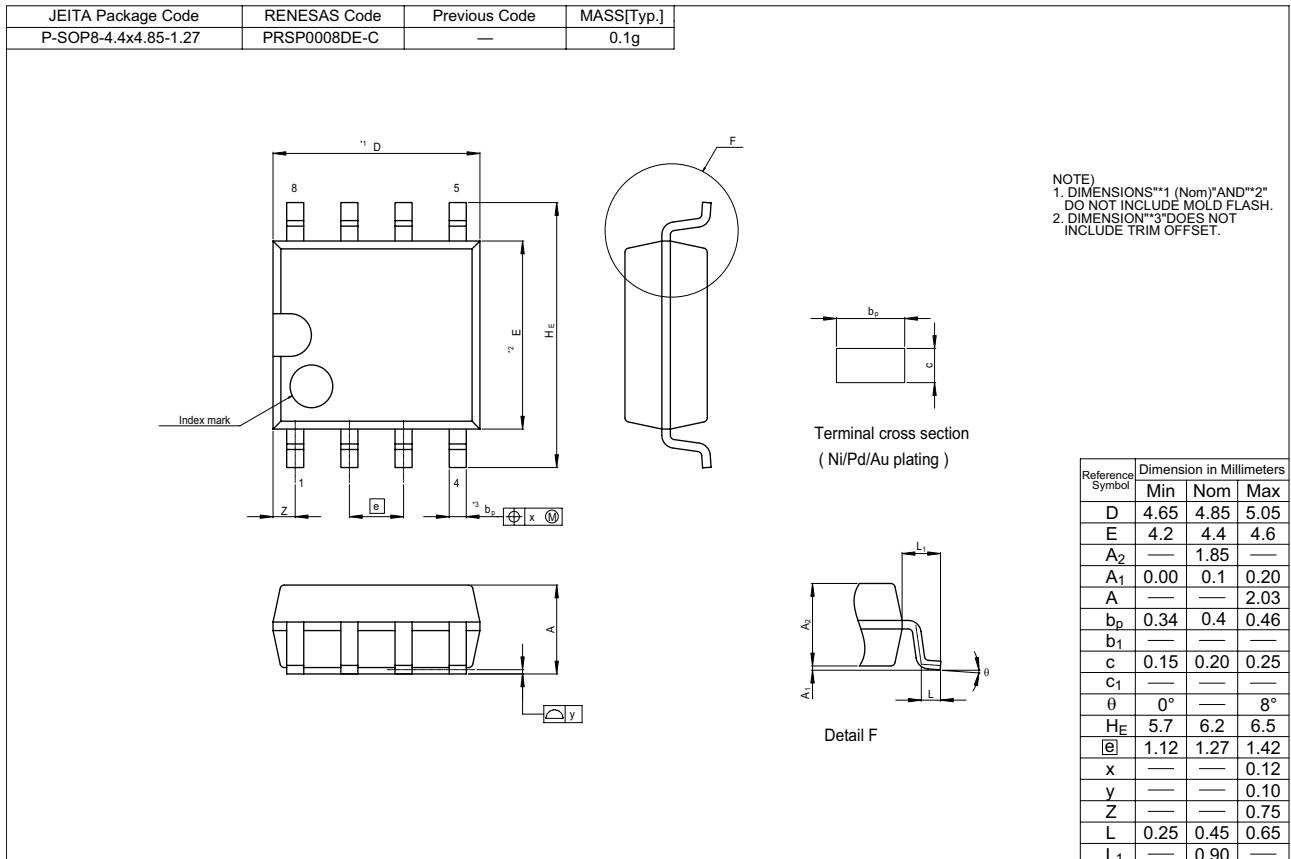
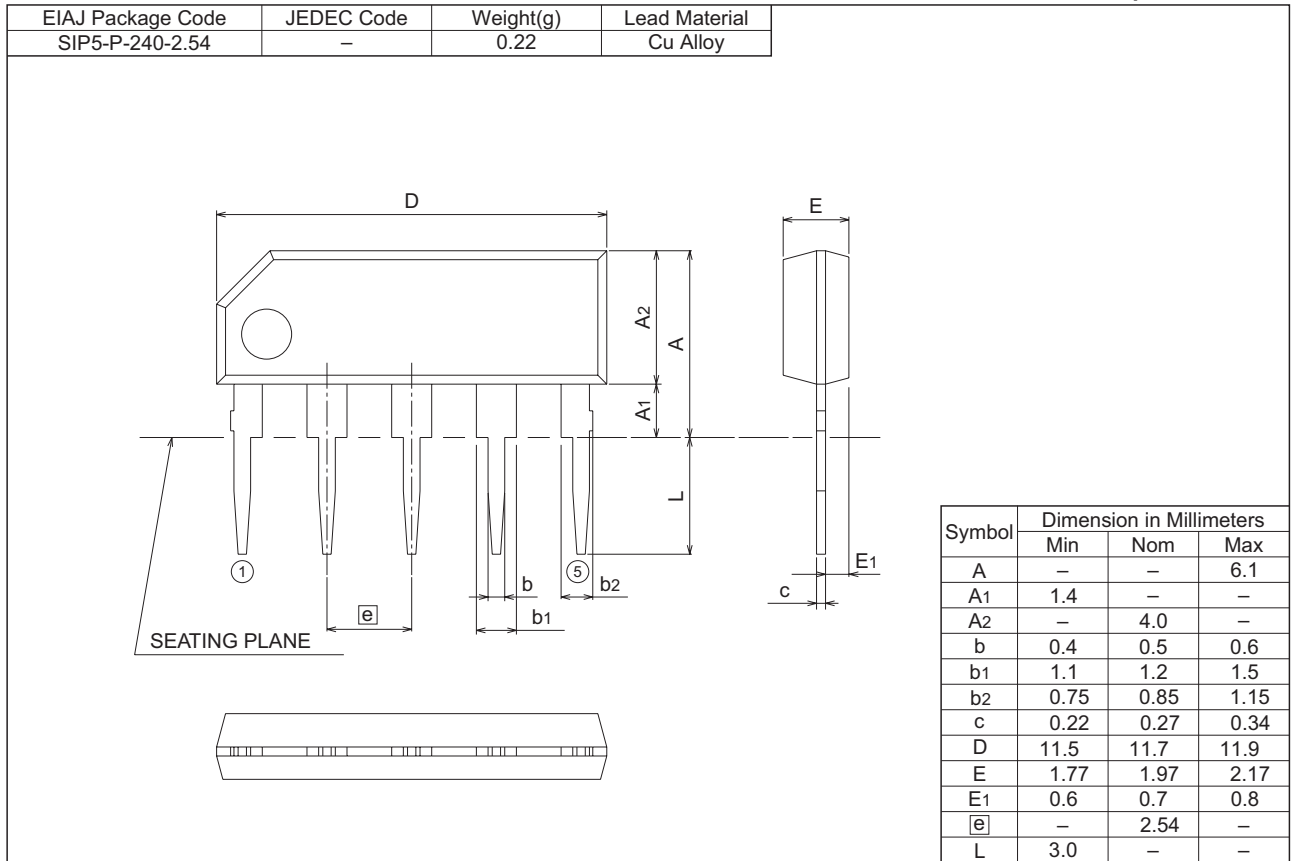




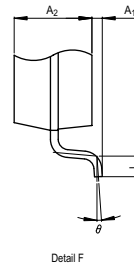
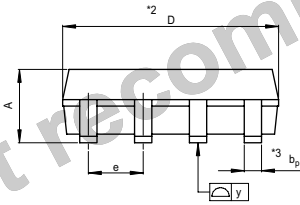
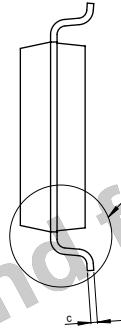
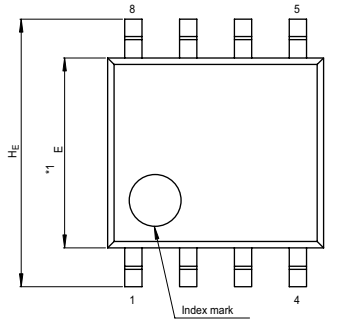
# Package Dimensions

## 5P5T

Plastic 5pin 240mil SIP



JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x5-1.27	PRSP0008DA-A	8P2S-A	0.07g



NOTE)  
 1. DIMENSIONS  $*1$  AND  $*2$   
 DO NOT INCLUDE MOLD FLASH.  
 2. DIMENSION  $*3$  DOES NOT  
 INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	4.8	5.0	5.2
E	4.2	4.4	4.6
$A_2$	—	1.5	—
$A_1$	0.05	—	—
A	—	—	1.9
$b_p$	0.35	0.4	0.5
c	0.13	0.15	0.2
$\theta$	0°	—	10°
$H_E$	5.9	6.2	6.5
e	1.12	1.27	1.42
y	—	—	0.1
L	0.2	0.4	0.6

Notes:

1. This document is provided for reference purposes only so that Renesas customers may select the appropriate Renesas products for their use. Renesas neither makes warranties or representations with respect to the accuracy or completeness of the information contained in this document nor grants any license to any intellectual property rights or any other rights of Renesas or any third party with respect to the information in this document.
2. Renesas shall have no liability for damages or infringement of any intellectual property or other rights arising out of the use of any information in this document, including, but not limited to, product data, diagrams, charts, programs, algorithms, and application circuit examples.
3. You should not use the products or the technology described in this document for the purpose of military applications such as the development of weapons of mass destruction or for the purpose of any other military use. When exporting the products or technology described herein, you should follow the applicable export control laws and regulations, and procedures required by such laws and regulations.
4. All information included in this document such as product data, diagrams, charts, programs, algorithms, and application circuit examples, is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas products listed in this document, please confirm the latest product information with a Renesas sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas such as that disclosed through our website. (<http://www.renesas.com>)
5. Renesas has used reasonable care in compiling the information included in this document, but Renesas assumes no liability whatsoever for any damages incurred as a result of errors or omissions in the information included in this document.
6. When using or otherwise relying on the information in this document, you should evaluate the information in light of the total system before deciding about the applicability of such information to the intended application. Renesas makes no representations, warranties or guaranties regarding the suitability of its products for any particular application and specifically disclaims any liability arising out of the application and use of the information in this document or Renesas products.
7. With the exception of products specified by Renesas as suitable for automobile applications, Renesas products are not designed, manufactured or tested for applications or otherwise in systems the failure or malfunction of which may cause a direct threat to human life or create a risk of human injury or which require especially high quality and reliability such as safety systems, or equipment or systems for transportation and traffic, healthcare, combustion control, aerospace and aeronautics, nuclear power, or undersea communication transmission. If you are considering the use of our products for such purposes, please contact a Renesas sales office beforehand. Renesas shall have no liability for damages arising out of the uses set forth above.
8. Notwithstanding the preceding paragraph, you should not use Renesas products for the purposes listed below:
  - (1) artificial life support devices or systems
  - (2) surgical implantations
  - (3) healthcare intervention (e.g., excision, administration of medication, etc.)
  - (4) any other purposes that pose a direct threat to human lifeRenesas shall have no liability for damages arising out of the uses set forth in the above and purchasers who elect to use Renesas products in any of the foregoing applications shall indemnify and hold harmless Renesas Technology Corp., its affiliated companies and their officers, directors, and employees against any and all damages arising out of such applications.
9. You should use the products described herein within the range specified by Renesas, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas shall have no liability for malfunctions or damages arising out of the use of Renesas products beyond such specified ranges.
10. Although Renesas endeavors to improve the quality and reliability of its products, IC products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Please be sure to implement safety measures to guard against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other applicable measures. Among others, since the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
11. In case Renesas products listed in this document are detached from the products to which the Renesas products are attached or affixed, the risk of accident such as swallowing by infants and small children is very high. You should implement safety measures so that Renesas products may not be easily detached from your products. Renesas shall have no liability for damages arising out of such detachment.
12. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written approval from Renesas.
13. Please contact a Renesas sales office if you have any questions regarding the information contained in this document, Renesas semiconductor products, or if you have any other inquiries.



**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, AZIACenter, 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