

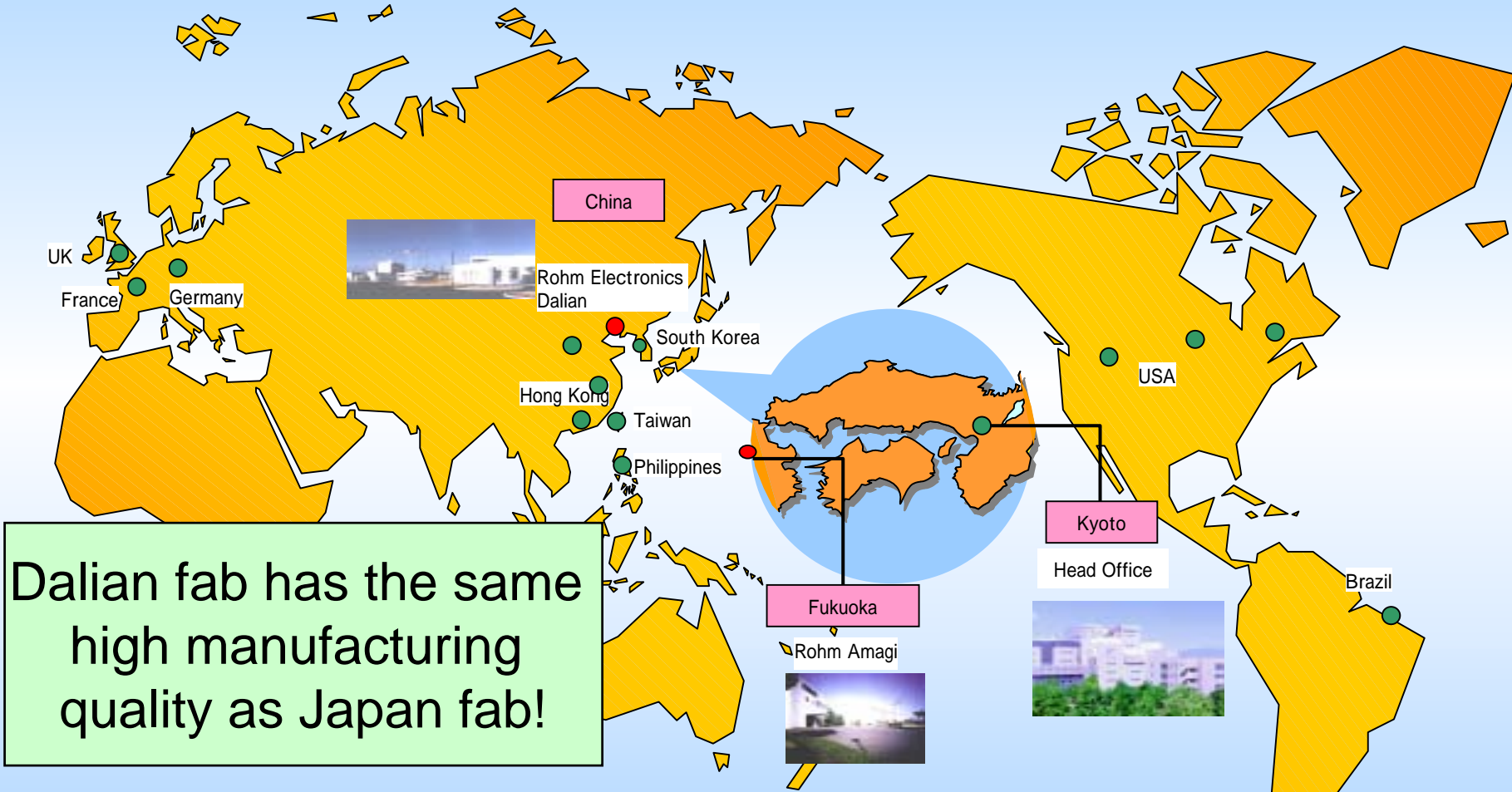
# Introduction of ROHM Power Modules



**ROHM**

May.2005  
Power module Div.

# Rohm Sales / Power Module Manufacturing Centers



- Manufacturing Facility
- Sales Facility

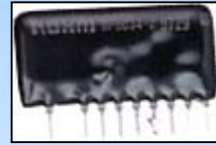


# Functional Module Products

## Major Fields of Application

Small and lightweight by eliminating transformer

AC/DC converters



High efficiency for energy conservation

DC/DC converters



Proven high quality

In-vehicle modules



Rohm's original flexible structure

Battery protection module



Ultra small size by COB technology

COB modules



High-density packaging to meet the needs

Custom modules



Electrical appliances

Electrical appliances, STB, OA, FA

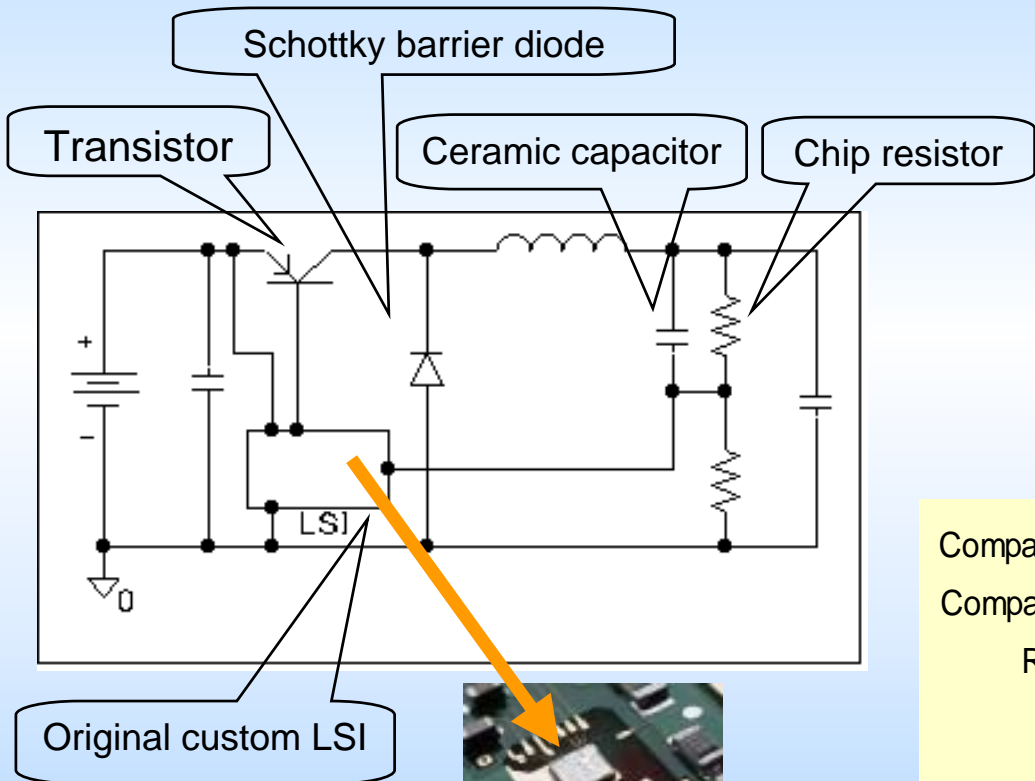
Automobiles

Telephones, PCs

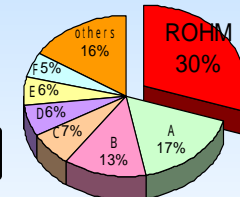
Telephones, AV, OA

Communications, industrial machinery, amusement

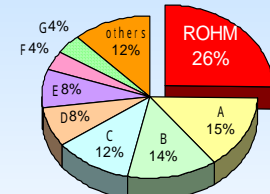
# Wide Variety of In-house Products!



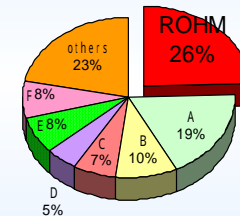
Surface mount transistor



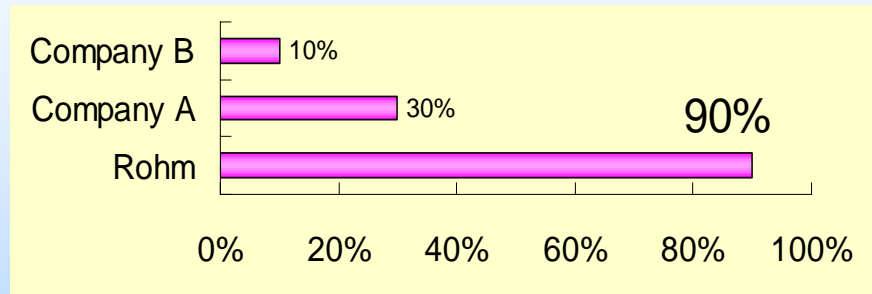
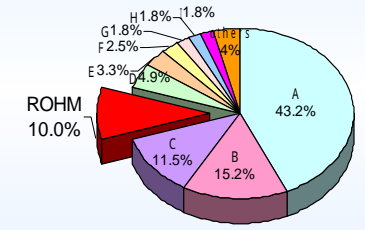
Diode



Chip resistor

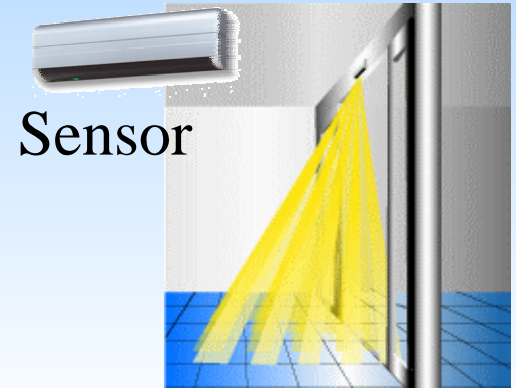


Multilayer ceramic capacitor



# AC/DC Converter Applications

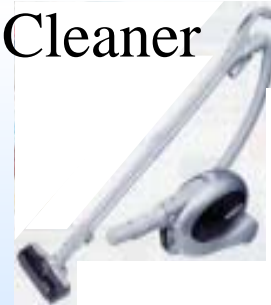
STB



Washing Machine



Cleaner

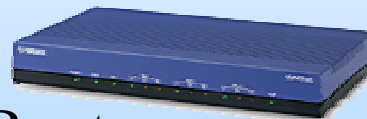


Air conditioner



- Air Conditioner
- Network Router
- Set Top Box
- Automatic-System Sensor
- Washing Machine
- Vacuum Cleaner
- Refrigerator
- Compressor
- Lighting equipment

Router



**ROHM**



# Non-isolation type AC/DC Converter Transformer-free

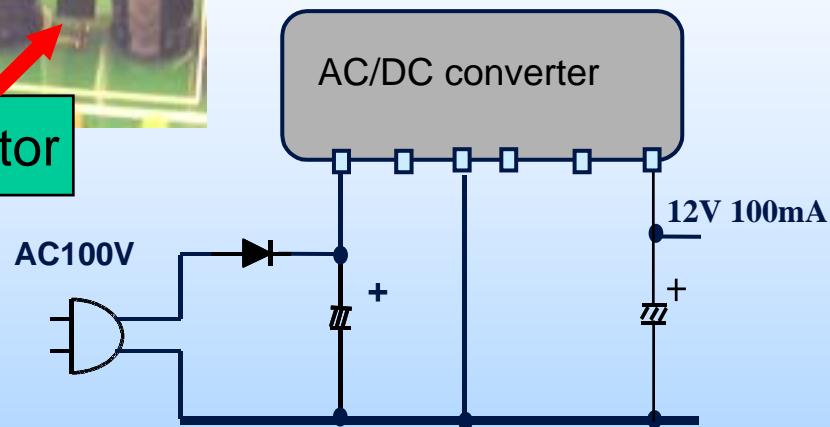
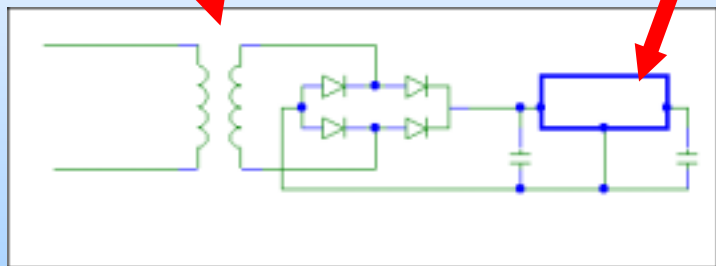
Conventional power supply

Power supply with transformer-less ACDC converter

Transformer

Three-terminal regulator

AC/DC converter

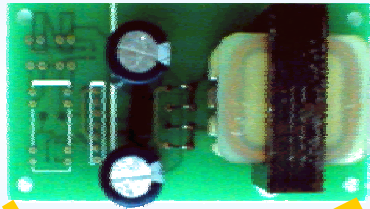


# Transformer-free, Compact, and Lightweight

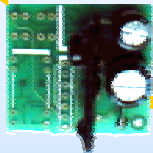
*Down-sizing*

Mounting space

Reduced to 1/3



Transformer



AC/DC Converter

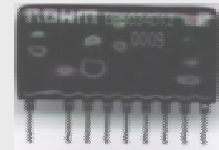
*Any solution for Water proof processing*

Smaller PCB

Urethane resin reduction



*Lightweight*



2g

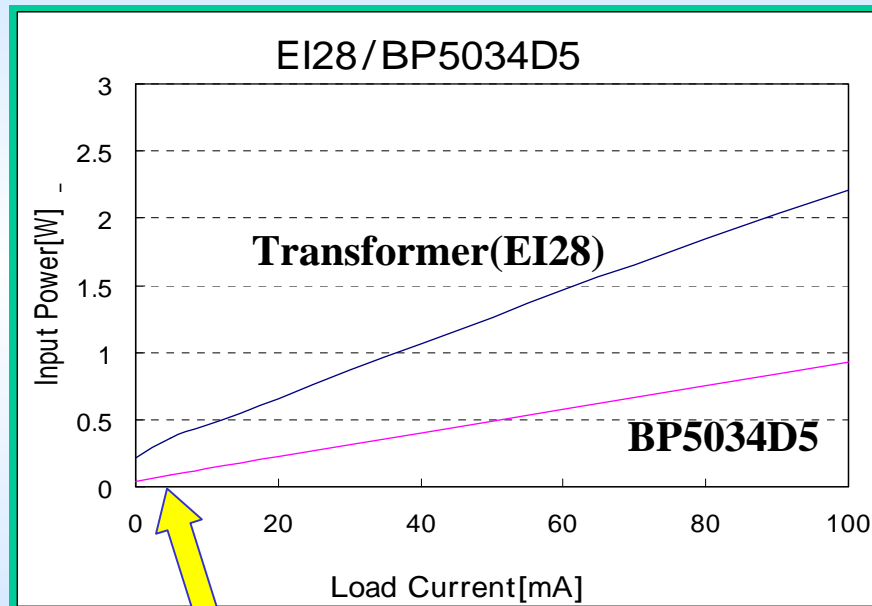




# Benefits of Transformer-free AC/DC Converter

*Effectively  
saves energy*

Comparison of input power characteristic



**Greatly reduces the standby  
power requirement**



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# Non-isolation type AC/DC Converter Line-up

	Output	Part No.	Current	Package	Dimension(mm)	
AC230V type	DC226V ~ DC390V	+5V	BP5041A5	100mA	SIP12	33x20x12
		+12V	BP5041A	100mA	SIP12	33x20x12
		+15V	BP5041 B 15	80mA	SIP12	33x20x12
	DC249V ~ DC358V	+12V	BP5048	300mA	SIP12	35x20x9
		+15V	BP5048-15	200mA	SIP12	35x20x9
		+15V	BP5042 A 15	500mA	SIP14	38x18x8
		+15V	BP5049-15	800mA	SIP7	22x20x10
		+24V	BP5048-24	200mA	SIP12	35x20x9
	DC226V ~ DC358V	+15V +5V	BP5085-15	80mA 350mA	SIP16	49x22x14
		DC-113V ~ DC-358V	-5V	BP5045A5	200mA	SIP10
			(under development)			
	-12V		BP5045A	200mA	SIP10	35x20x9

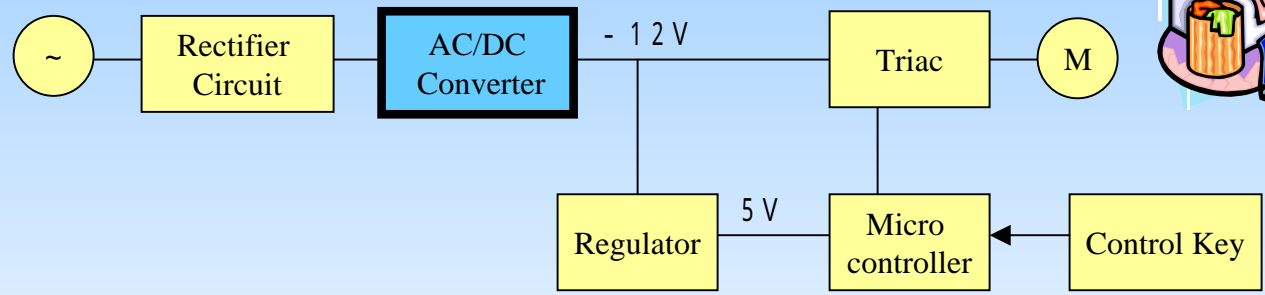


# Non-isolation AC/DC Converter Line-up

	Output	Part No.	Current	Package	Dimension(mm)	
AC120V type	DC113V ~ DC195V	5V	BP5034D5	100mA	SIP10	30x16x10
		12V	BP5034D12	100mA	SIP10	30x16x10
		15V	BP5034D15	80mA	SIP10	30x16x10
		20V	BP5034B20	80mA	SIP10	30x16x10
		24V	BP5034D24	50mA	SIP10	30x16x10
	DC113V ~ DC190V	+12V	BP5067-12	350mA	SIP12	35x22x10
		20V 4V	BP5086A20S	160mA 1mA	SIP11	31x18x10
	DC113V ~ DC186V	+15V	BP5067-15	350mA	SIP12	35x20x10
	DC-113V ~ DC-186V	-5V	BP5061-5	350mA	SIP12	35x22x9
			BP5062A5	500mA	SIP12	35x22x10
		-12V	BP5062A	500mA	SIP12	35x22x10



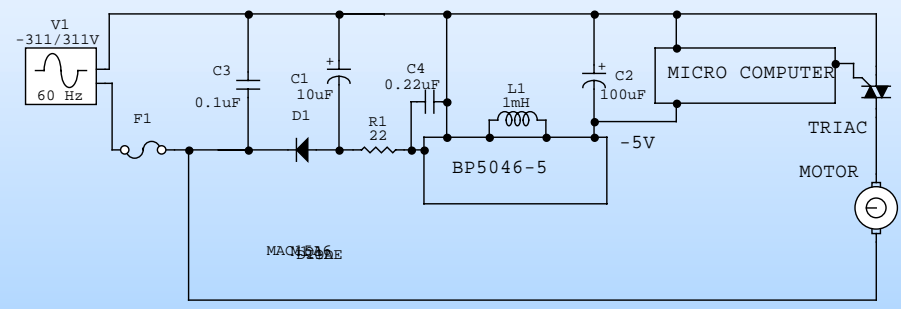
# Non-inverter Washing Machine



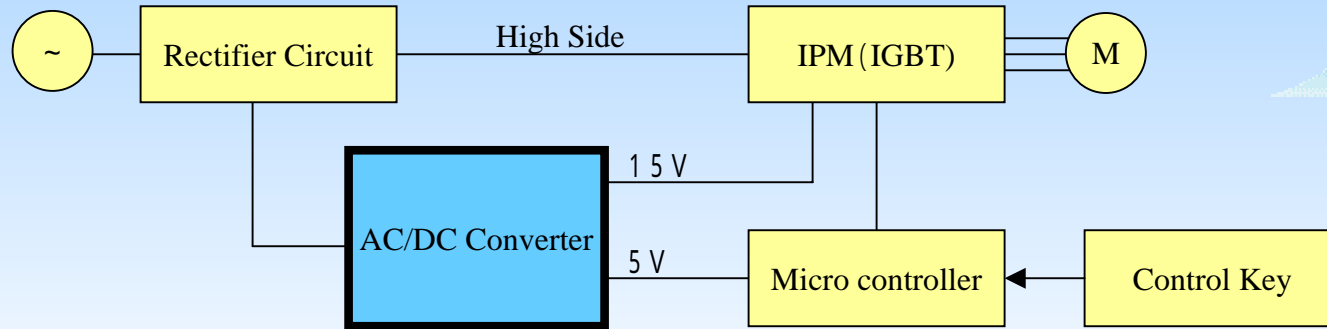
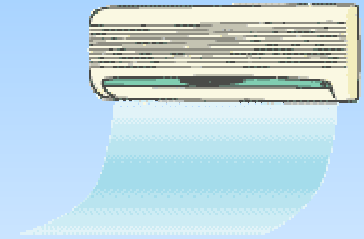
## Line-up

	BP5035A5	BP5062A5	BP5035A12	BP5045A5	BP5045A
Input voltage range	-113 ~ -170V	-113 ~ -170V	-113 ~ -170V	-113 ~ -390V	-113 ~ -390V
Output voltage	-5V	-5V	-12V	-5V	-12V
Output current	200mA	500mA	200mA	200mA	200mA
Package	SIP10	SIP12	SIP10	SIP10	SIP10
Isolation	×	×	×	×	×

Under Development



# Inverter Air Conditioner

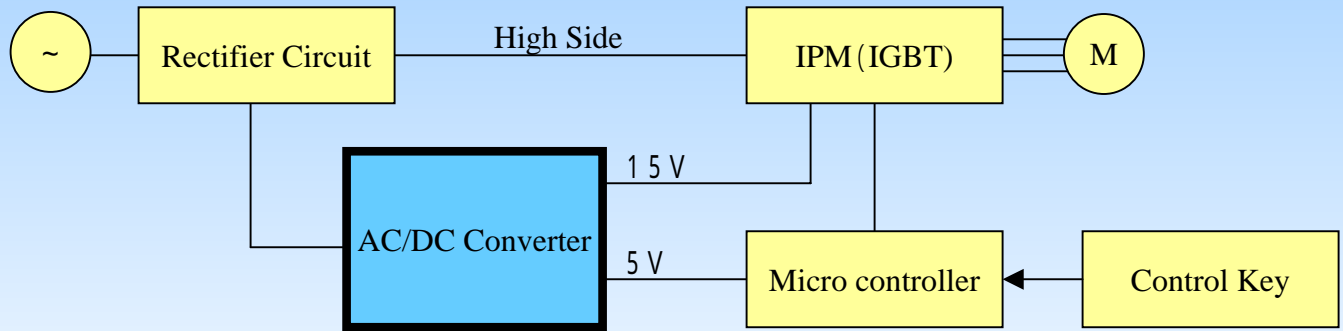


## Line-up

	BP5048-15	BP5041A15	BP5042-15	BP5085-15	BP5722-12
Input voltage range	249V ~ 358V	249V ~ 358V	226V ~ 390V	226V ~ 358V	240V ~ 374V
Output voltage	15V	15V	+15V	+15V/+5V	+12V
Output current	200mA	80mA	500mA	80mA/350mA	1A
Package	SIP12	SIP12	SIP14	SIP16	SIP10
Isolation	×	×	×	×	

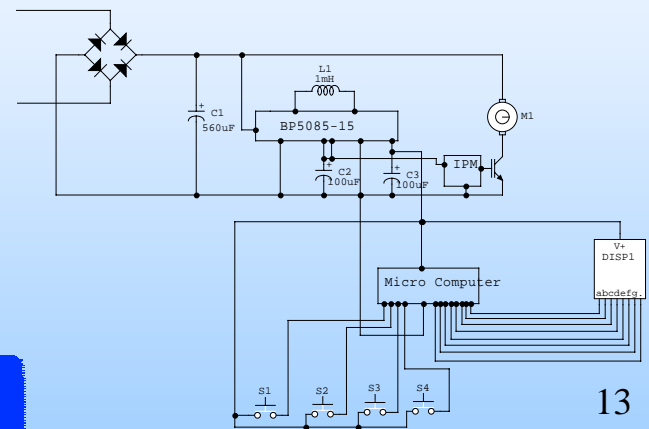
Under Development

# Inverter Washing Machine



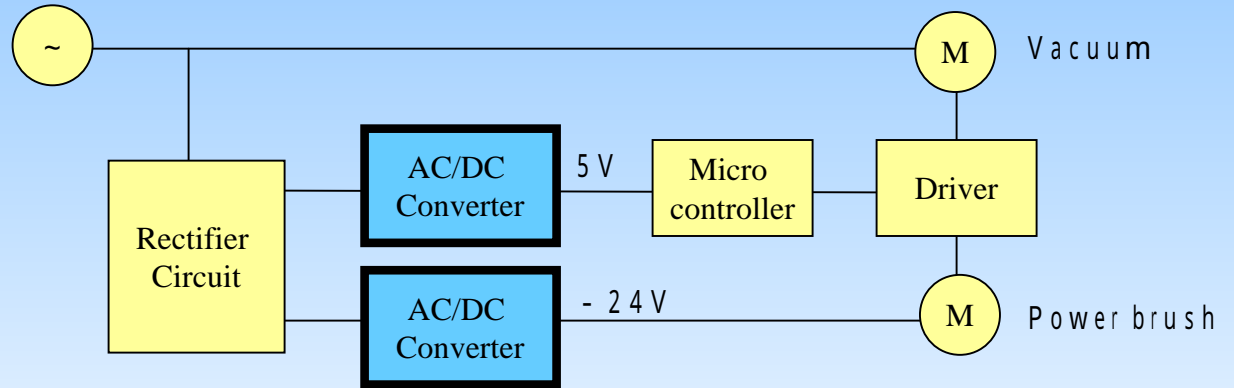
Line-up

	BP5067-15	BP5081A15	BP5049-15	BP5042A15	BP5085-15
Input voltage range	113 ~ 186V	113 ~ 170V	249 ~ 358V	248 ~ 390V	226 ~ 358V
Output voltage	+15V	+15V / +5V	+15V	+15V	+15V / +5V
Output current	300mA	80mA / 350mA	800mA	500mA	80mA / 350mA
Package	SIP12	SIP14	SIP 7	SIP14	SIP16
Isolation	×	×	×	×	×



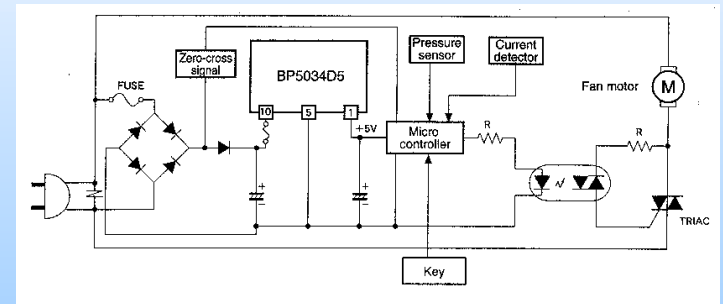
**ROHM**

# Vacuum Cleaner



## Line-up

	BP5034D5	BP5034D12	BP5068A24	BP5041A5	BP5041A
Input voltage range	113 ~ 195V	113 ~ 195V	-120 ~ -162V	226 ~ 390V	226 ~ 358V
Output voltage	+5V	+12V	-24V	+5V	+12V
Output current	100mA	100mA	600mA	100mA	100mA
Package	SIP10	SIP10	SIP12	SIP10	SIP10
Isolation	×	×	×	×	×



# Isolation type AC/DC Converter

SMPS Unit ?



Adaptor ?



Energy Saving



Compact

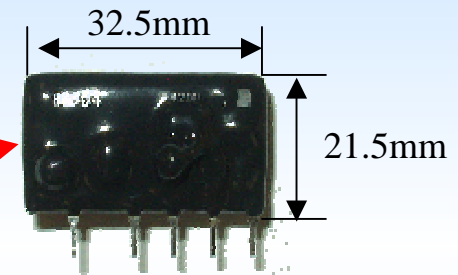
AC/DC Converter



# A C / D C Converter B P 5722 - 12

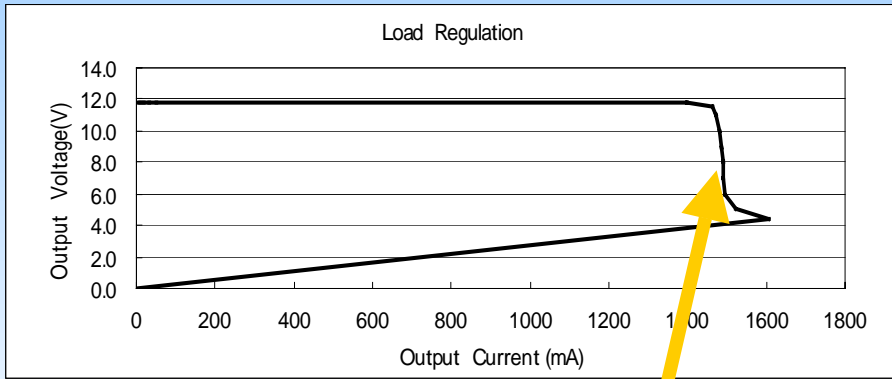
## Under Development

- 12V control isolation type switching regulator Module
- Primary side switching and secondary side control circuit are made one body
- Built in over current protection
- High efficiency 82%

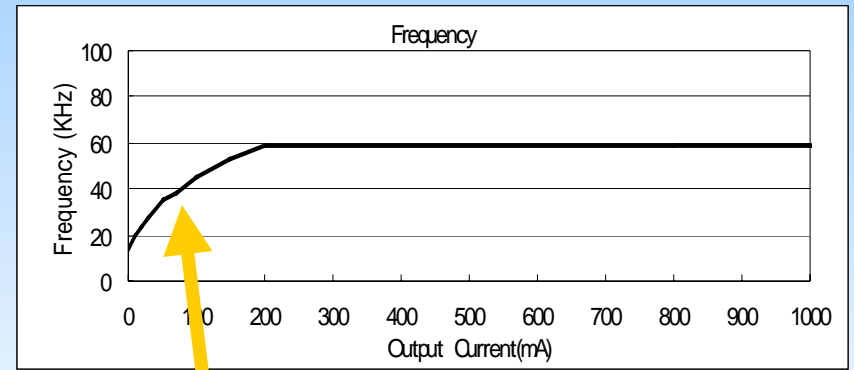


## Electrical Characteristics

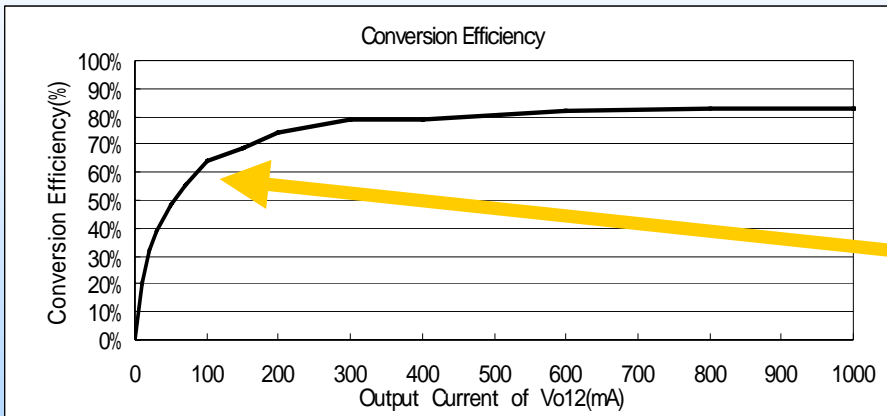
		MIN.	TYP.	MAX.	UNIT
Input Voltage	V <sub>in</sub>	240	311	374	V DC
Output Voltage	V <sub>o</sub>	11.4	12	12.6	V
Output Current	I <sub>o</sub>	-	-	1	A
Output Ripple Voltage	V <sub>p</sub>	-	0.2	0.5	V
Efficiency		75	82	-	%
Operating Temperature Range	Topr	-25	25	80	



Buitlin Over Current protection



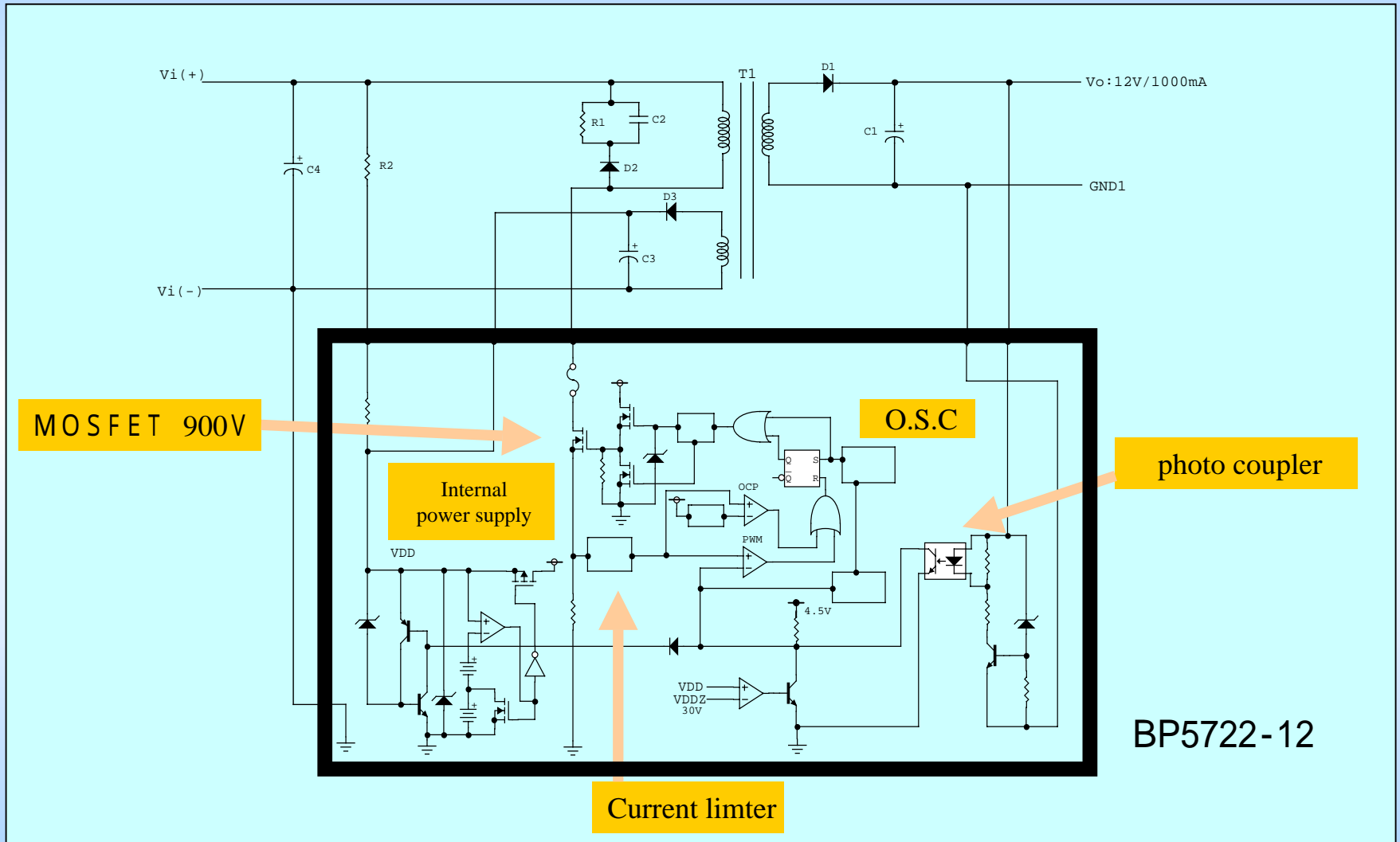
Linearly decreasing PWM frequency



High conversion Efficiency



# BP5722-12 Block Diagram



# Isolation type AC/DC Converter Line-up

## AC 100V to 120V Input

Parts No.	Output Voltage	Output Current	Sample	Mass Production
BP5718-12	12V	1.0A	OK	OK

## AC 200V to 240V Input

Under Development

Parts No.	Output Voltage	Output Current	Sample	Mass Production
BP5722-12	12V	1.0A	OK	

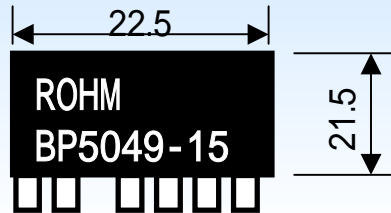
## AC 100V to 240V Input

Parts No.	Output Voltage	Output Current	Sample	Mass Production
BP5723-33	3.3V	3.5A	OK	OK

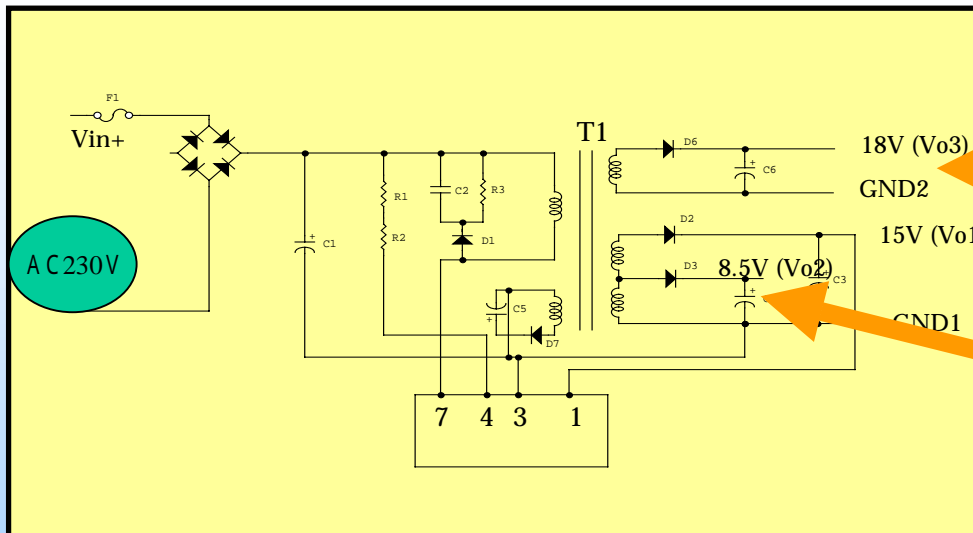
# New Products

- B P 5049-15 (15V0.8A)

SIP 7



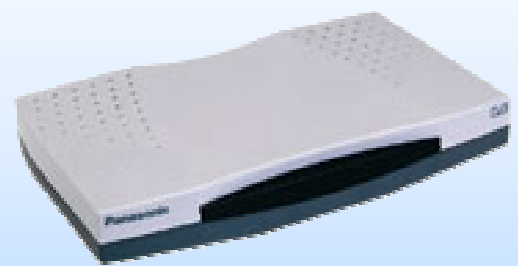
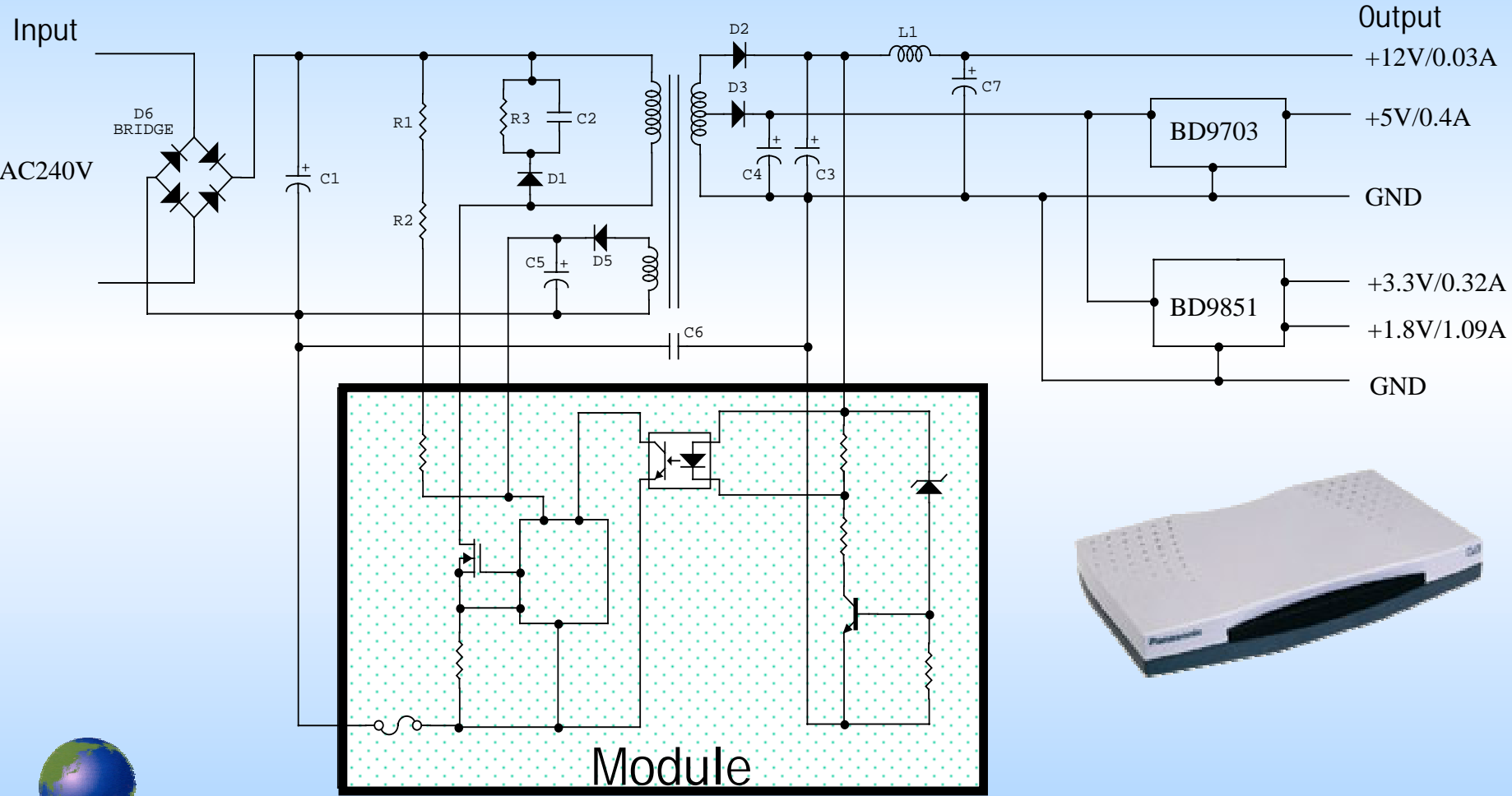
- Inverter air conditioner
- Refrigerator
- Compressor
- Washing Machine



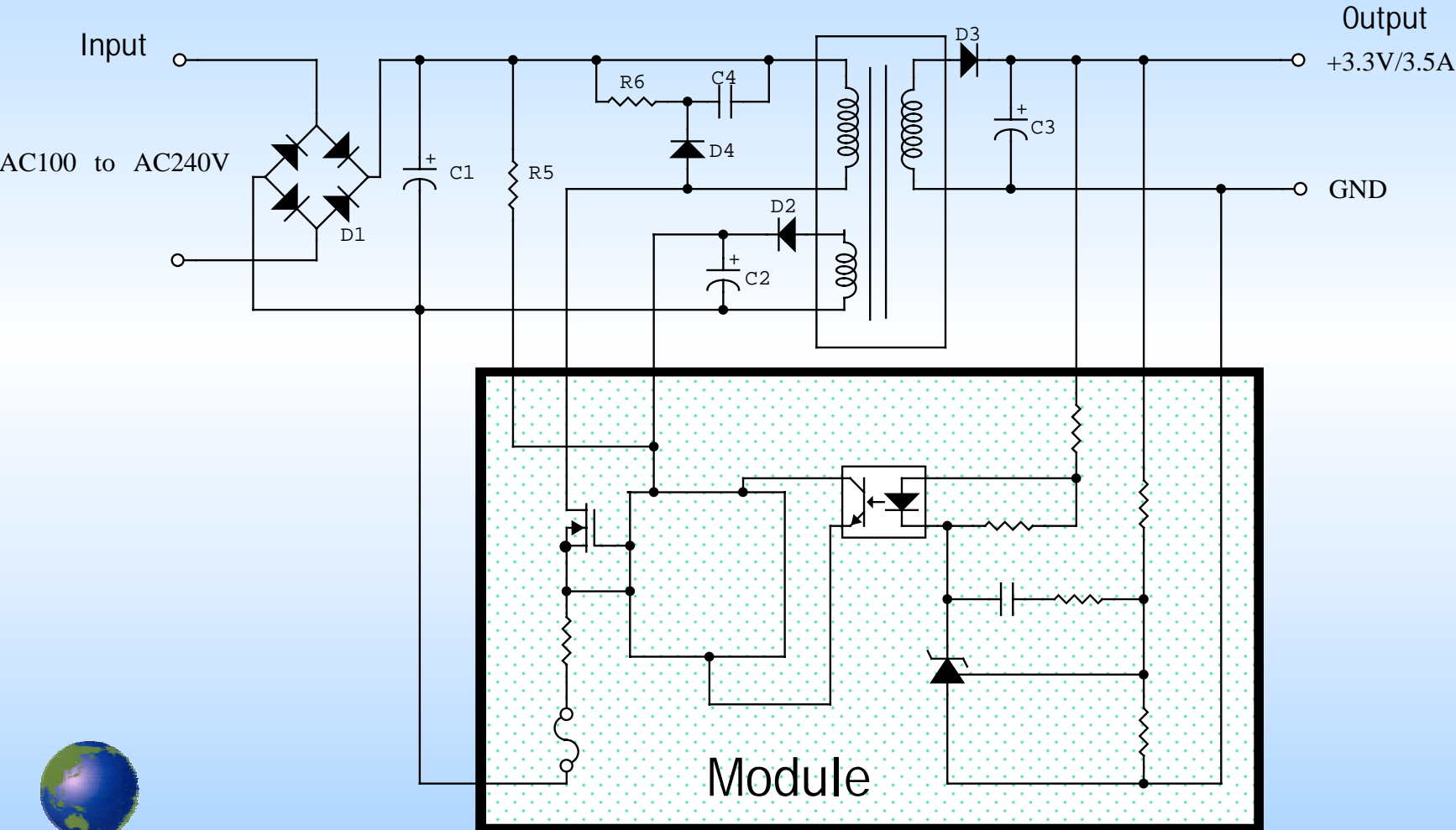
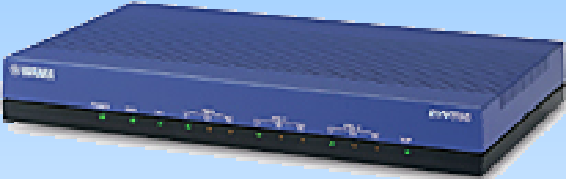
Isolation

For IPM

# Set Top Box

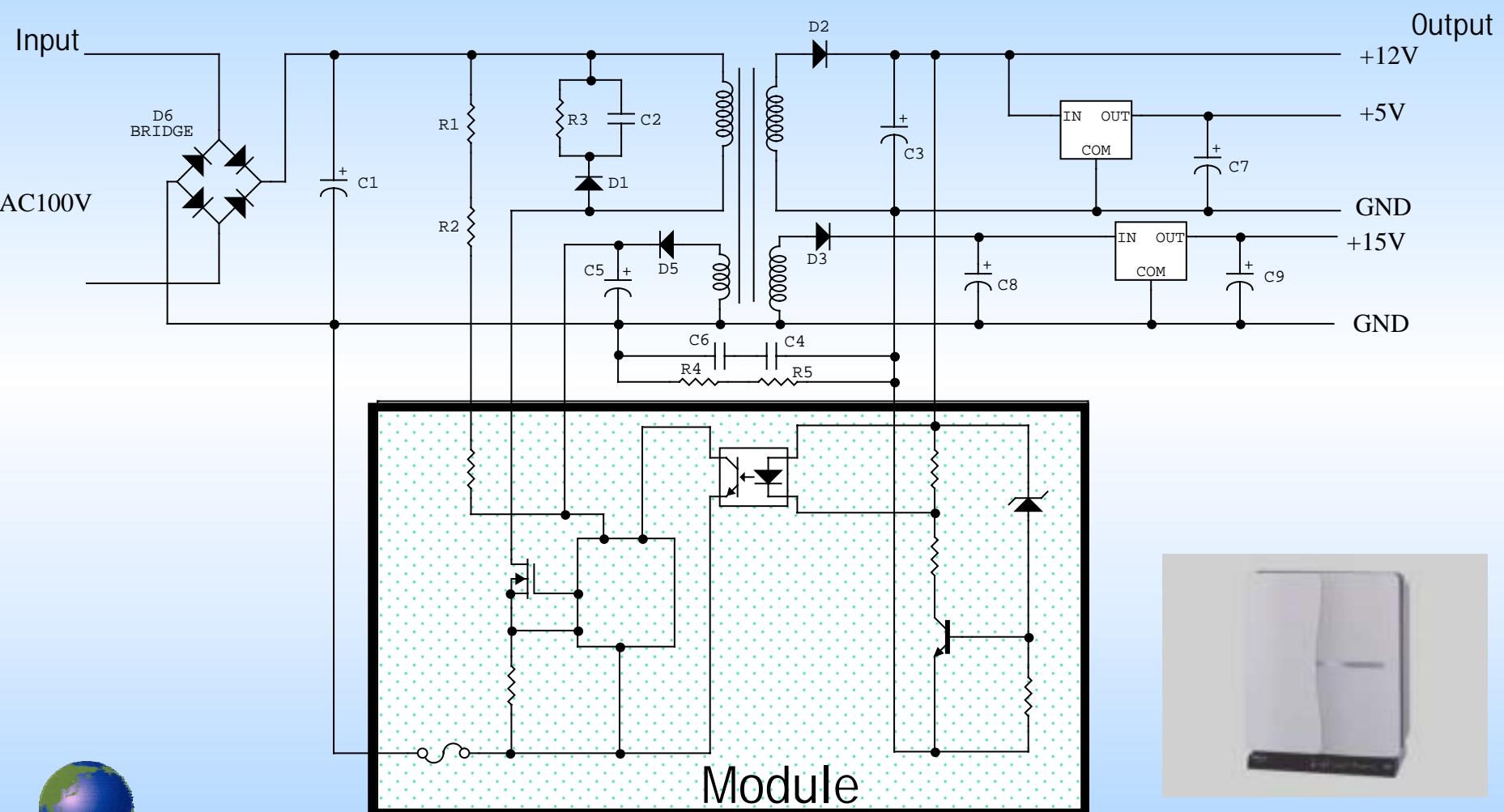


# Router





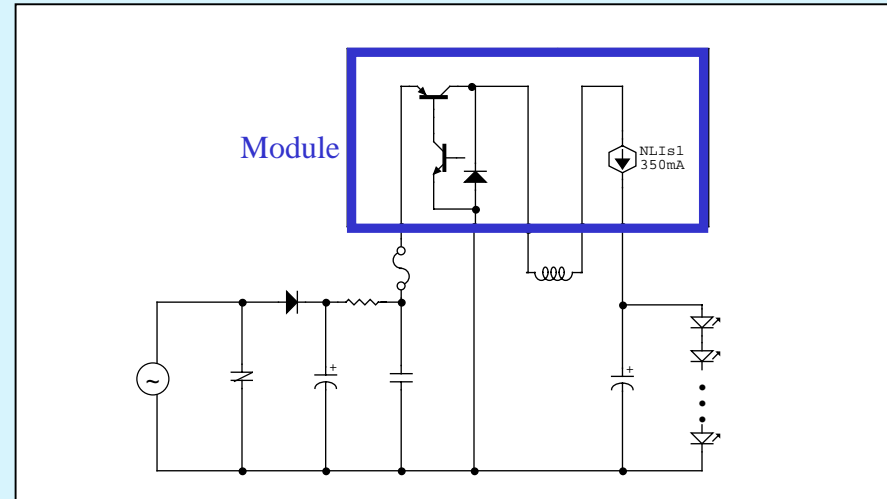
# Air Purifier



# AC/DC converter for LED Lighting BP50XX

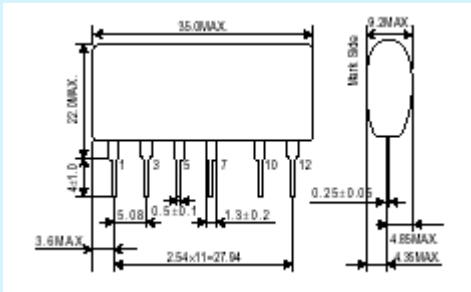
Under Development

	BP50XX
Input Voltage	226 to 358 VDC
Output Voltage	32 V MAX
Output Current	350 mA



## Features

- Elimination of a transformer enables compact, lightweight of power supply boards.
- The conversion efficiency can reduce standby state power for a switching power supply.
- Wide input voltage range. (160 to 253 Vrms for AC voltage conversion)
- Output 350mA
- Built-in short-circuit protection



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# EMI DATA of Rohm Power Modules

1. B P 5722-12 (Isolation type)

2. B P 5041 B 15 (Non Isolation type)



# BP5722-12 EMI

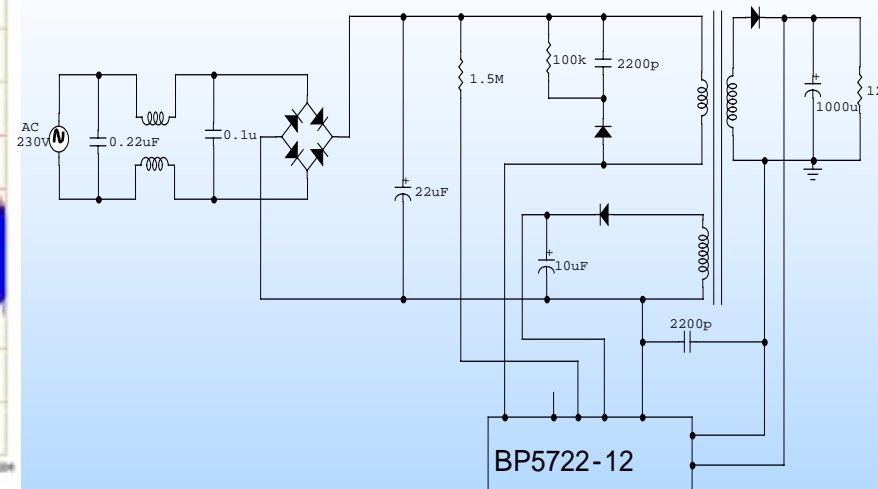
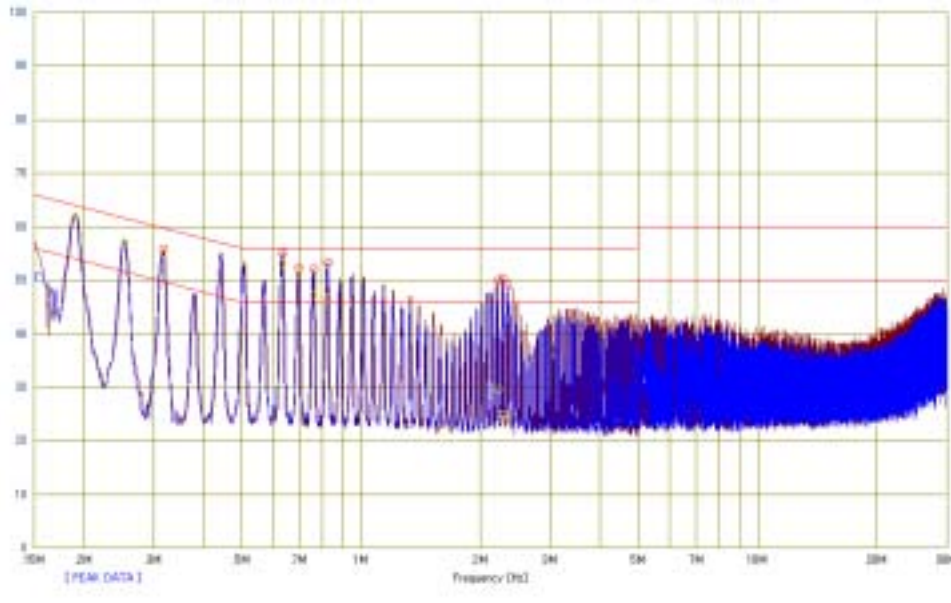
Limit CISPR Pub 22 Class B

Power Supply AC230V 50Hz

Temp/Humi 24 40%

[dB  $\mu$ V] <<PEAK DATA>>

Test Circuit



# B P 5041 B 15 E M I

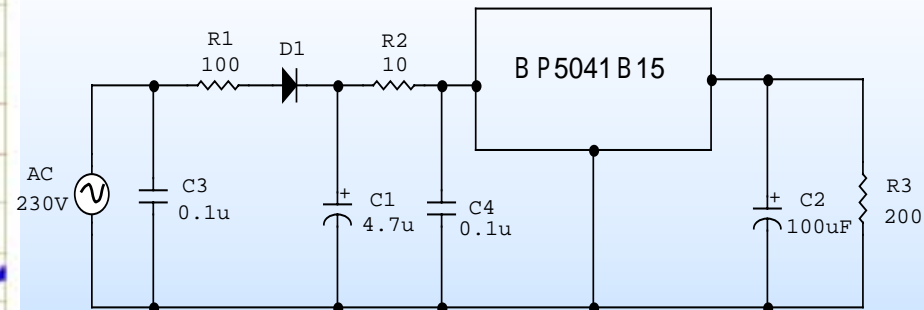
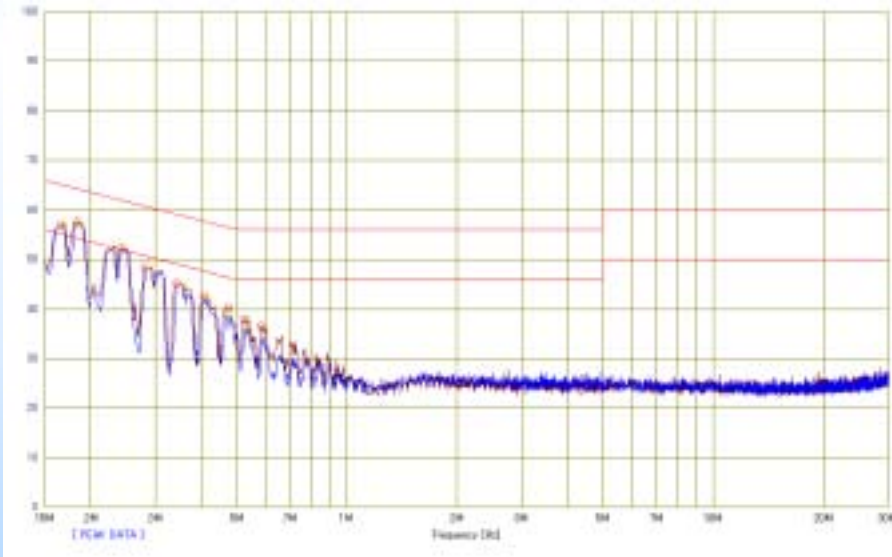
Limit CISPR Pub 22 Class B

Power Supply AC 230V 50Hz

Temp/Humi 24 40%

[dB  $\mu$  V] <<PEAK DATA>>

Test Circuit



# BP5043 EMI

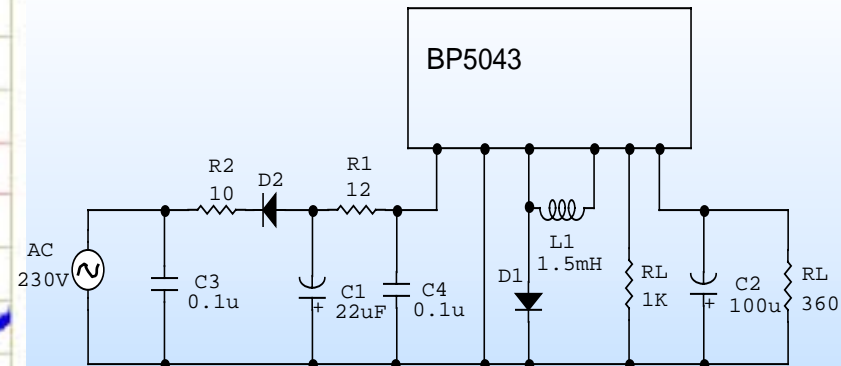
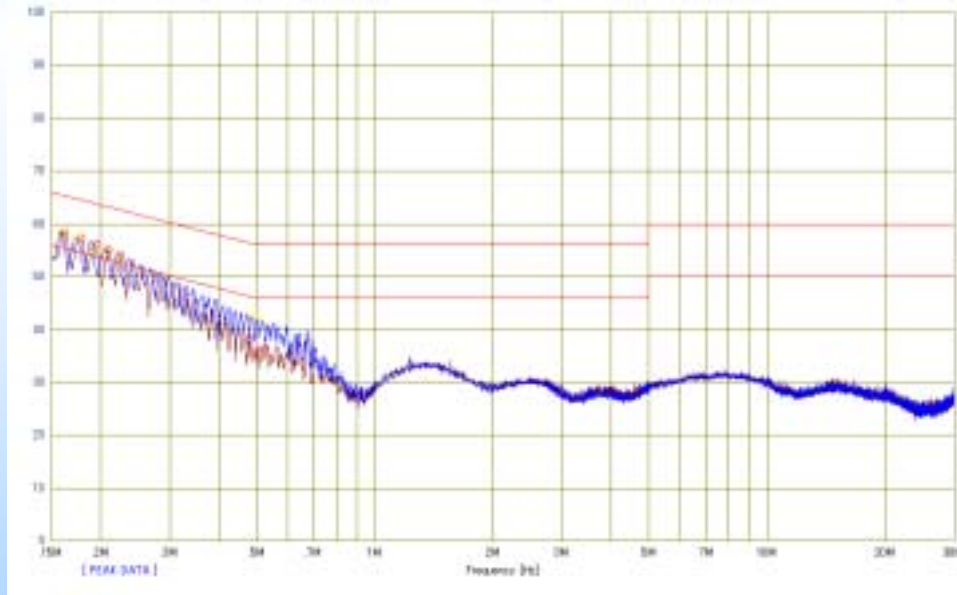
Limit CISPR Pub 22 Class B

Power Supply AC 230V 50Hz

Temp/Humi 24 40%

[dB  $\mu$ V] <<PEAK DATA>>

Test Circuit



# DC/DC Converter Applications

- Refrigerator
- Air Conditioner
- IP TEL
- Set top box
- Terminal adaptor
- Handy Terminal
- Digital Still Camera
- Printer
- Audio components
- Amusement machine

IP TEL



Air conditioner

Refrigerator



STB



Copy



Audio

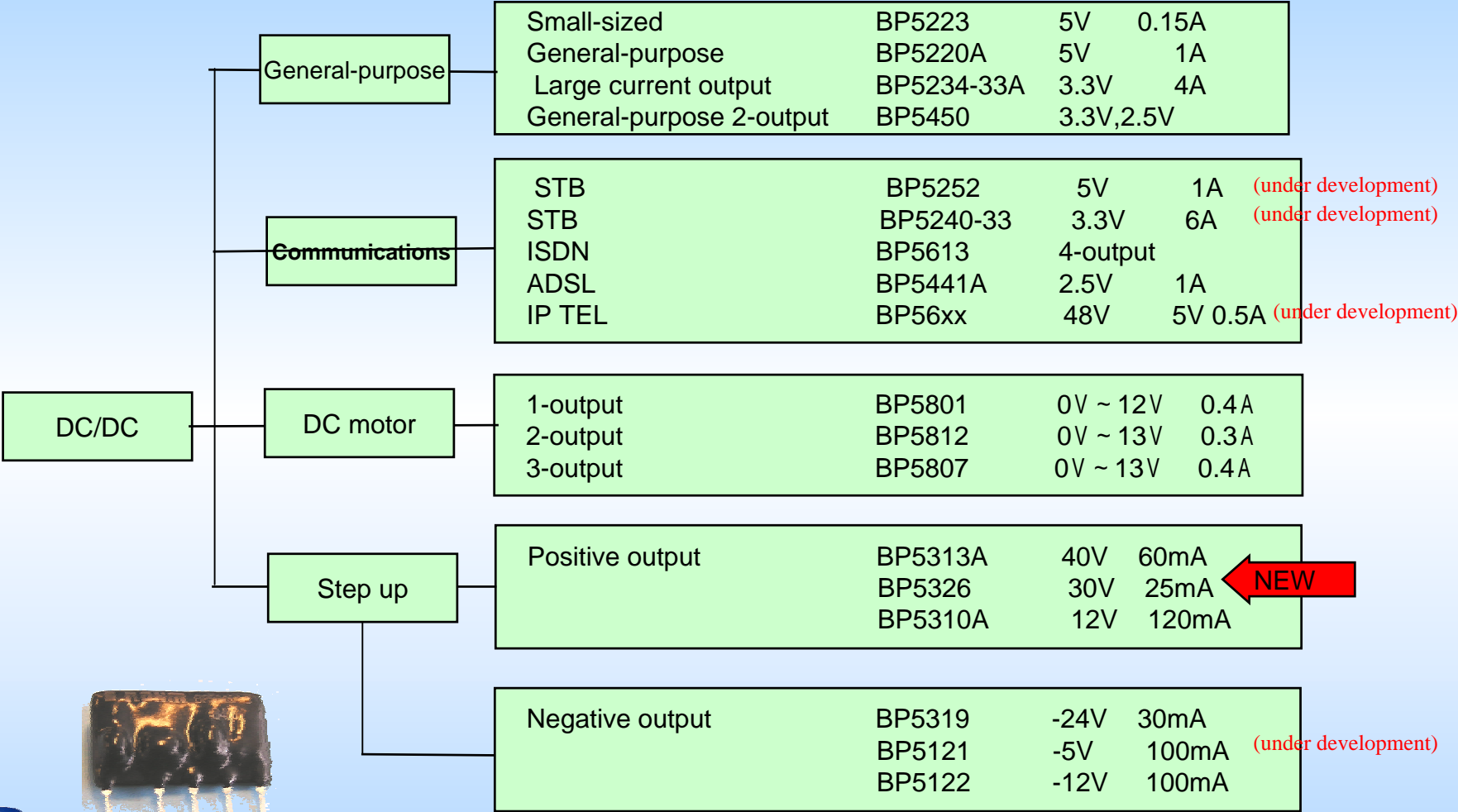


TA



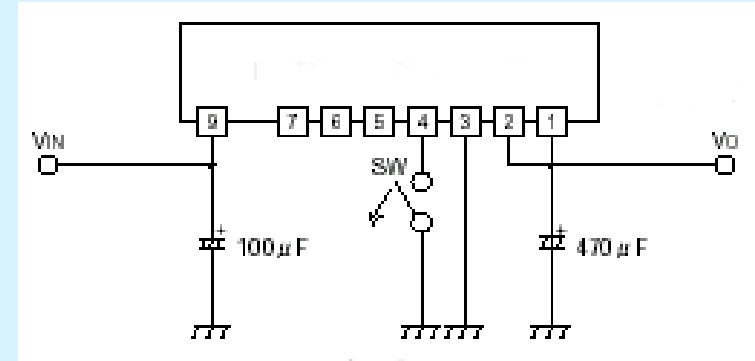


# High Efficiency DC/DC Converter Product Line



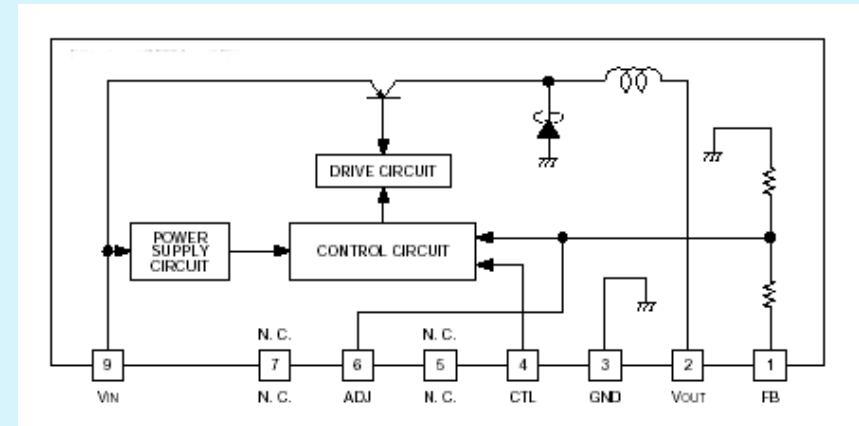
# BP5220A/BP5221A/BP5222A

	BP5220A	BP5221A	BP5222A
Input Voltage	8 to 38 V	8 to 38 V	15 to 38 V
Output Voltage	5V	5V	12V
Output Current	1A	0.5A	0.5A
Efficiency	85% Vin=15V	84% Vin=15V	90% Vin=20V



## Features

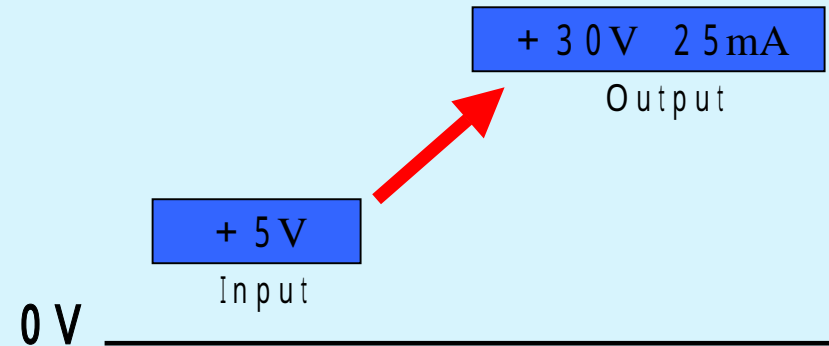
- Wide range of input voltage
- High power conversion efficiency
- Small number of external components required
- Built-in output ON/OFF switch
- Heat sink unnecessary
- Compact SIP 9-pin package



**ROHM**

# Step-up type DC/DC converter BP5326

	BP5326
Input Voltage	4.5 to 5.5 V
Output Voltage	30 V
Output Current	25 mA
Efficiency	77%
	$V_{in}=5V$

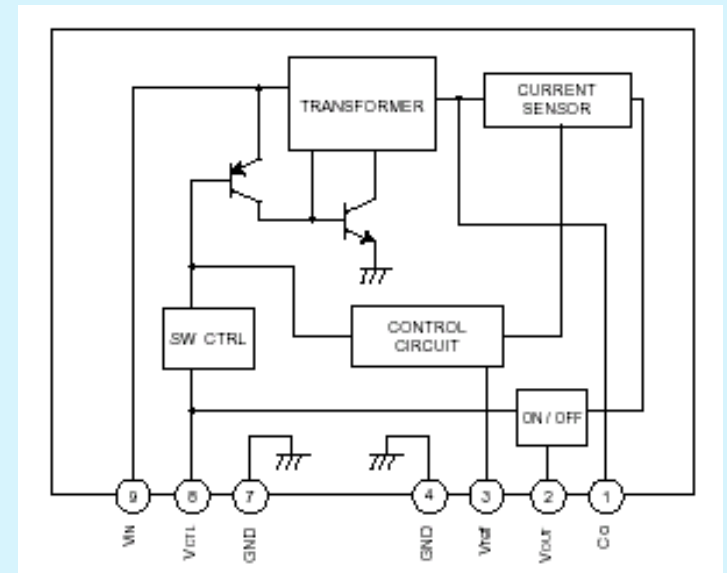


## Features

- High conversion efficiency
- Built-in ON/OFF switch
- Built-in short-circuit protection
- Dimensions 26 × 15 × 6.4mm



L C D



**ROHM**