

# PHxxXG-xxxxE/Z2:1(H30)LF PHxxXG-xxxxE/Z4:1(H30)LF



## PHN-SERIES

Rev.03-2009

- ✓ 23 - 40 Watt
- ✓ 2:1 / 4:1 (Ultra) Wide Input
- ✓ Reg. Single, Dual Output
- ✓ 2" x 2" Case
- ✓ 1.5 up to 3 kV DC I/O Isolation
- ✓ Over Voltage / SC Protection
- ✓ Soft Start and Remote Ctrl.

The PHN series is a family of cost effective 26 - 40 W, single and dual output DC/DC converters with a (ultra-) wide 2:1 or 4:1 Input. These converters are encapsulated in nickel coated copper 2" x 2" case with high performance technology like 1.5 up to 3 kV I/O isolation, high efficiency operation, remote on/off control, short circuit protection, thermal shutdown, UVLO/OVLO shutdown, soft start and output voltage accuracy of  $\pm 2\%$

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified

### Input Specifications

Voltage Range	2:1 / 4:1 (Ultra) Wide Input (see table)
Input Filter	PI Type

### Output Specifications

Voltage Accuracy	$\pm 2\%$
Short Circuit Protection	Continuous (Hiccup, Automatic Recovery)
Over Load Protection	$\geq 110\%$ of Full Load
Line Regulation	$\pm 0.5\%$
Load Regulation (25% - 100%)	$\pm 0.5\%$ (Single), $\pm 2\%$ (Dual)
Ripple and Noise (20Mhz bandwidth)	80 mV pk-pk (3.3V, 5V); 1% of Vout (others)
Temperature Coefficient	$\pm 0.05\%$ / °C
Transient Response Recovery Time	280us, max. (50% Load Step Change)

### General Specifications

Efficiency	See Table
I/O Isolation Voltage (3 sec.)	1500 VDC (3000 VDC optional*)
I/O Isolation Resistance	$\geq 1000$ M Ohm (500 VDC)
Switching Frequency	250 kHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF (MIL-HDBK-217F)	> 0.5 Mhrs

### Physical Specifications

Case Material	Nickel Coated Copper
Potting Material	Epoxy (UL94V-0 rated)
Weight	~ 65g, typ.

### Environment Specifications

Operating Temperature	- 40 to +71 °C (ambient, max.)
Maximum Case Temperature	95 °C
Storage Temperature	- 55 to +115 °C
Cooling	Free Air Convection
RoHS Conform	Soldering 260 °C, max. (1.5mm from case 10s.)

# Selection Guide

## 2:1 and 4:1 Input / Single and Dual Output 1.5kV

Order #	Power (Watt)	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Efficiency (%)
<b>SINGLE OUTPUT 2:1</b>					
PH26XG-123R3E2:1LF	26	9 - 18	3.3	8000	85
PH40XG-1205E2:1LF	40	9 - 18	5	8000	85
PH40XG-1212E2:1LF	40	9 - 18	12	3300	85
PH40XG-1215E2:1LF	40	9 - 18	15	2600	85
PH40XG-1224E2:1LF	40	9 - 18	24	1600	85
PH26XG-243R3E2:1LF	26	18 - 36	3.3	8000	86
PH40XG-2405E2:1LF	40	18 - 36	5	8000	86
PH40XG-2412E2:1LF	40	18 - 36	12	3300	86
PH40XG-2415E2:1LF	40	18 - 36	15	2600	86
PH40XG-2424E2:1LF	40	18 - 36	24	1600	86
PH26XG-483R3E2:1LF	26	36 - 72	3.3	8000	86
PH40XG-4805E2:1LF	40	36 - 72	5	8000	86
PH40XG-4812E2:1LF	40	36 - 72	12	3300	87
PH40XG-4815E2:1LF	40	36 - 72	15	2600	87
PH40XG-4824E2:1LF	40	36 - 72	24	1600	87

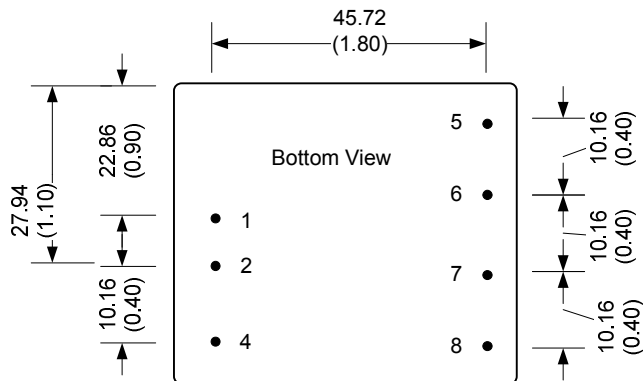
<b>SINGLE OUTPUT 4:1</b>					
PH23XG-243R3E4:1LF	23	9 - 36	3.3	7000	82
PH35XG-2405E4:1LF	35	9 - 36	5	7000	82
PH36XG-2412E4:1LF	36	9 - 36	12	3000	82
PH35XG-2415E4:1LF	35	9 - 36	15	2300	82
PH36XG-2424E4:1LF	36	9 - 36	24	1500	82
PH23XG-483R3E4:1LF	23	18 - 72	3.3	7000	83
PH35XG-4805E4:1LF	35	18 - 72	5	7000	83
PH36XG-4812E4:1LF	36	18 - 72	12	3000	83
PH35XG-4815E4:1LF	35	18 - 72	15	2300	83
PH36XG-4824E4:1LF	36	18 - 72	24	1500	83

<b>DUAL OUTPUT 2:1</b>					
PH40XG-1205Z2:1LF	40	9 - 18	± 5	± 4000	83
PH40XG-1212Z2:1LF	40	9 - 18	± 12	± 1600	83
PH40XG-1215Z2:1LF	40	9 - 18	± 15	± 1300	83
PH40XG-2405Z2:1LF	40	18 - 36	± 5	± 4000	83
PH40XG-2412Z2:1LF	40	18 - 36	± 12	± 1600	83
PH40XG-2415Z2:1LF	40	18 - 36	± 15	± 1300	83
PH40XG-4805Z2:1LF	40	36 - 72	± 5	± 4000	84
PH40XG-4812Z2:1LF	40	36 - 72	± 12	± 1600	84
PH40XG-4815Z2:1LF	40	36 - 72	± 15	± 1300	84

<b>DUAL OUTPUT 4:1</b>					
PH35XG-2405Z4:1LF	35	9 - 36	± 5	± 3500	80
PH36XG-2412Z4:1LF	36	9 - 36	± 12	± 1500	80
PH35XG-2415Z4:1LF	35	9 - 36	± 15	± 1150	80
PH35XG-4805Z4:1LF	35	18 - 72	± 5	± 3500	81
PH36XG-4812Z4:1LF	36	18 - 72	± 12	± 1500	81
PH35XG-4815Z4:1LF	35	18 - 72	± 15	± 1150	81

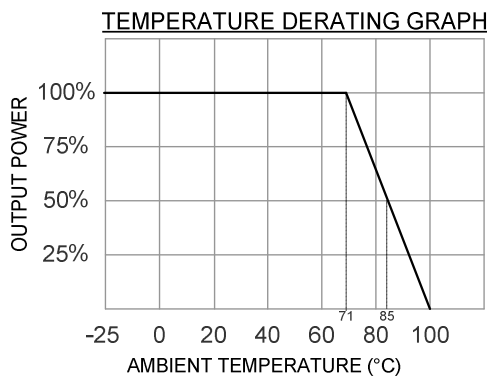
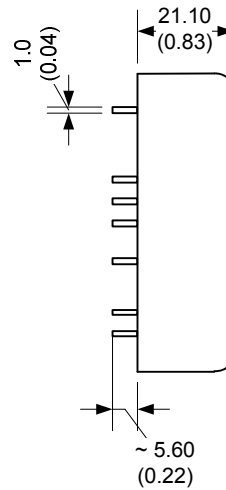
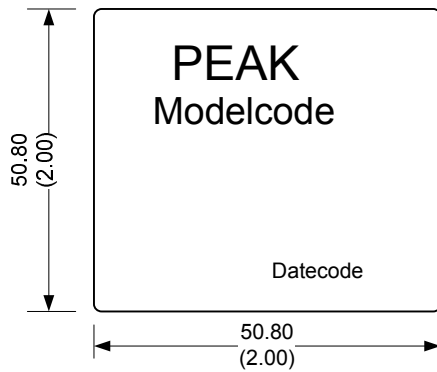
**For optional 3kV I/O Isolation, please add "H30" before "LF"**  
**For example: "PH40XG-1212Z2:1H30LF" for 3kV I/O Isolation**

# Package / Pinning / Derating



All dimensions are typical in millimeters (inches).  
 - Pin diameter: 1.0 +/-0.05 (0.04 +/-0.002)  
 - Pin pitch tolerance: +/-0.5 (+/-0.02)  
 - Case tolerance +/-0.5 (+/-0.02)  
 Specification may change without notice.

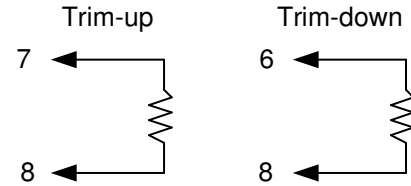
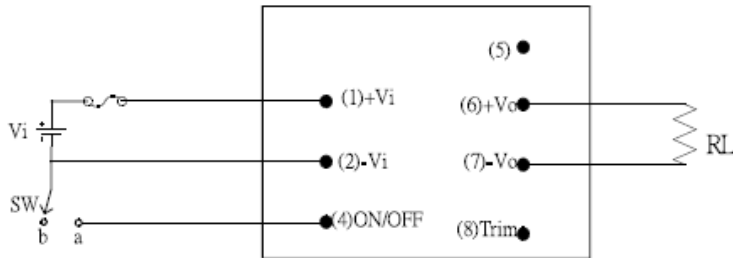
## 2.0" x 2.0" – METAL CASE



PIN CONNECTIONS		
#	SINGLE	DUAL
1	+Vin	+Vin
2	- Vin	- Vin
4	Ctrl.	Ctrl.
5	Omitted	+Vout
6	+Vout	Common
7	- Vout	- Vout
8	Trim	Trim

# App Notes

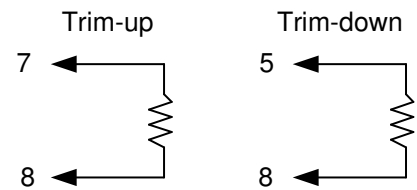
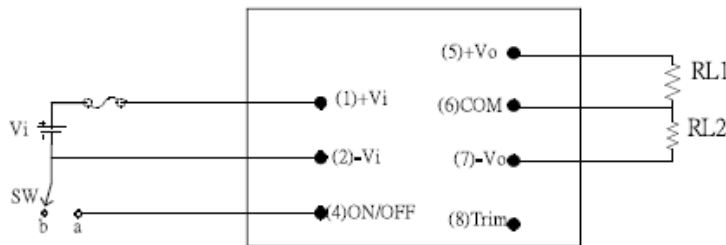
## Single Output:



### External Output Trimming

Output can be externally trimmed.  
(Resistor between Pin 7and8 / 6and8)

## Dual Output:



### External Output Trimming

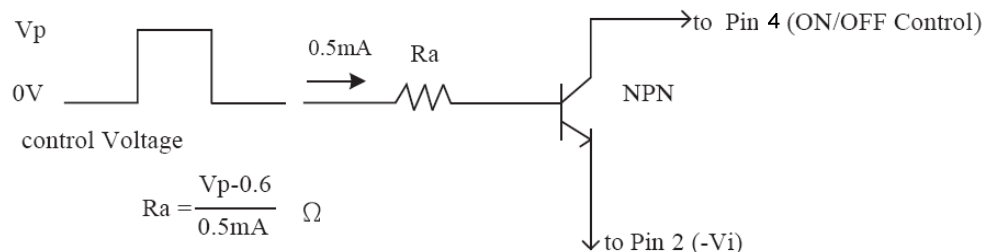
Output can be externally trimmed.  
(Resistor between Pin 7and8 / 5and8)

## Remote Control (ON/OFF)

You can switch OFF the converter by connecting SW to position “a”.

The converter operates when SW is connected to position “b”

The SW can be replaced by a NPN transistor:

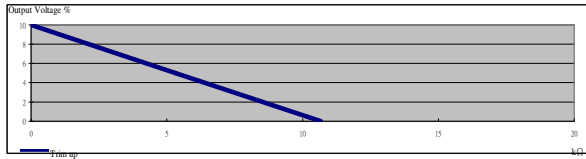


Note: The control voltage is referenced to negative input (-Vi )

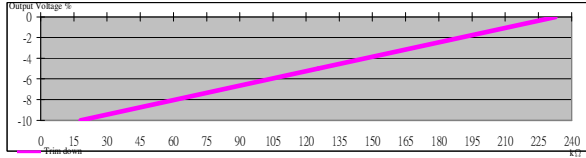
# App Notes

## Single 3.3Vout

Trim up

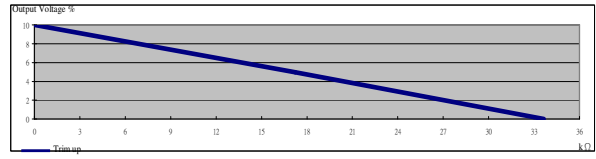


Trim down

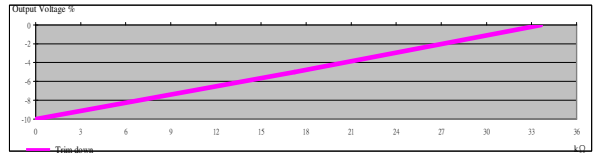


## Single 5V

Trim up

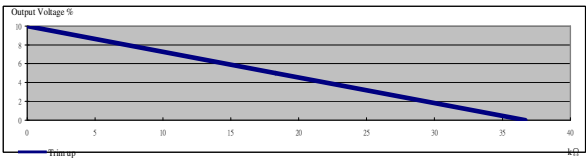


Trim down

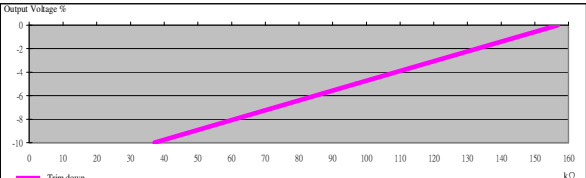


## Single 12V

Trim up

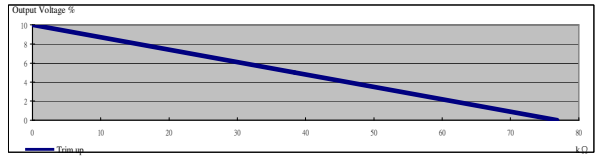


Trim down

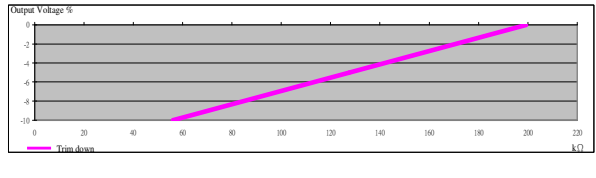


## Single 15V

Trim up

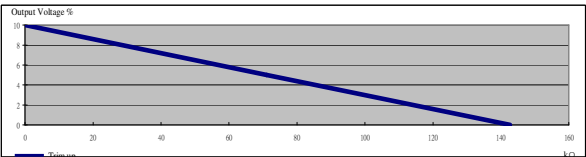


Trim down

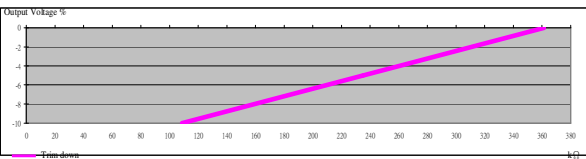


## Single 24V

Trim up

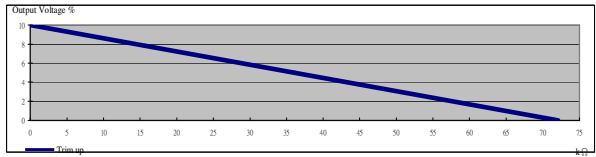


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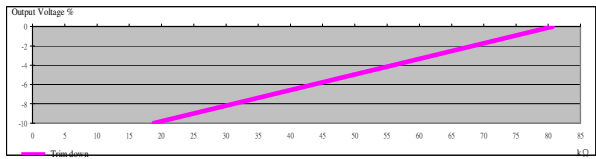


## Dual 5Vout

Trim up

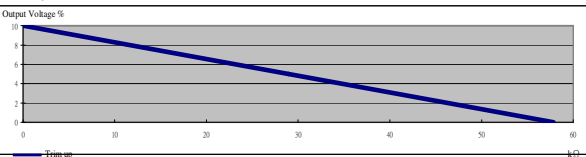


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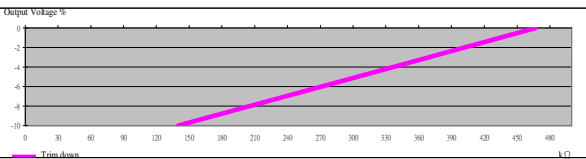


## Dual 12Vout

Trim up

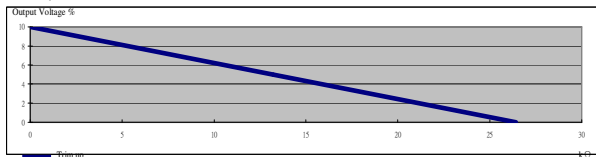


Trim down



## Dual 15Vout

Trim up



Trim down

