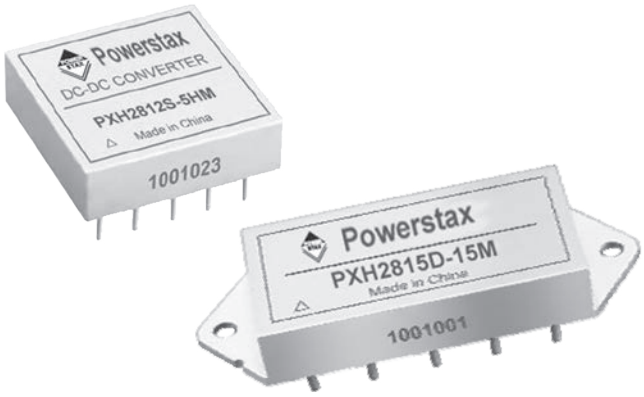
Powerstax

PXH Series

5W to 30W Single & Dual Output DC-DC Converters

PXH SERIES

- **High reliability, small size**
- **-55 to +105°C operation**
- **16-40VDC Input Range**
- **Fixed Frequency**
- **Inhibit**
- **Short circuit protection**
- **Hermetic DIP Package**



POWER SUPPLY DESIGN EXCELLENCE

The PXH Series of high frequency DC-DC converters offers single and dual output models from 5 watts to 30 watts output power over the full temperature range of -55 to +105°C with up to 84% efficiency.

The small size, low height, and hermetically sealed metal enclosures with 3 quality levels make these units ideal for use in military, aerospace and other high reliability applications. They are available with standard screening, and fully compliant class E/M screening.

The PXH Series offers a form, fit, function alternative to the Interpoint MSA Series.

	STANDARD MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT	OUTPUT POWER	EFFICIENCY MIN. / TYP.	INPUT VOLTAGE	INPUT CURRENT
5W Series	PXH2805S-5Hy	5.0V	1.000A	5W	71% / 75%	28VDC	238mA
	PXH285R2S-5Hy	5.2V	0.960A	5W	71% / 75%		238mA
	PXH2812S-5Hy	12.0V	0.417A	5W	73% / 77%		232mA
	PXH2815S-5Hy	15.0V	0.333A	5W	73% / 77%		232mA
	PXH2805D-5Hy	±5.0V	±0.500A	5W	71% / 76%		235mA
	PXH2812D-5Hy	±12.0V	±0.208A	5W	71% / 76%		235mA
	PXH2815D-5Hy	±15.0V	±0.167A	5W	73% / 78%		229mA
20W Series	PXH2805S-15xy	5.0V	3.000A	15W	73% / 78%	28VDC	700mA
	PXH2812S-20xy	12.0V	1.670A	20W	77% / 83%		750mA
	PXH2815S-20xy	15.0V	1.330A	20W	79% / 84%		850mA
	PXH2812D-15xy	±12.0V	±0.625A	15W	76% / 81%		880mA
	PXH2815D-15xy	±15.0V	±0.500A	15W	78% / 83%		860mA
30W Series	PXH283R3S-20xy	3.3V	6.060A	20W	72% / 76%	28VDC	940mA
	PXH2805S-25xy	5.0V	5.000A	25W	72% / 76%		1170mA
	PXH2812S-30xy	12.0V	2.500A	30W	80% / 83%		1300mA
	PXH2815S-30xy	15.0V	2.000A	30W	80% / 84%		1250mA
	PXH2812D-30xy	±12.0V	±1.250A	30W	78% / 81%		1340mA
	PXH2815D-30xy	±15.0V	±1.000A	30W	80% / 83%		1290mA

ORDERING GUIDE

PXH 28 uRu v - ww x y

- Series
- Nominal Input Voltage
- Nominal Output Voltage (R denotes decimal)
- S = Single Output; D = Dual Output
- Output power
- Case Style: H = no tabs, K = with tabs
- M = Military; E = High Reliability; I = Standard

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	5W Series	20W Series	30W Series
INPUT SPECIFICATIONS			
Voltage Range	16-40VDC		
Voltage Transient	50V / 50ms		
Current - No Load Full Load Inhibited	30mA max. see model table 6ma max.	100mA max. see model table 15mA max.	100mA max. see model table 15mA max.
Ripple Current	50mA pk-pk max.: 28Vin, Full Load, 20MHz		
OUTPUT SPECIFICATIONS [1]			
Voltage Setting Tolerance	Vnom. ≤ ±1.0%	Vnom. ≤ ±1.5%	Vnom. ≤ ±2.0%
Maximum Current	see model table: Vin 16-40V		
Maximum Power	see model table: Vin 16-40V		
Line Reg. - 16-40Vin Min. - Max. Tc	≤30mV ≤50mV	≤50mV ≤180mV	≤90mV ≤150mV
Load Reg. - NL - FL Min. - Max. Tc	≤30mV ≤50mV	≤50mV ≤180mV	≤50mV max. ≤180mV max.
Cross Reg. - 20% to 80% FL 10% to 50% FL	5% max. 2% max.	5% max.: -Vo[2] 2% max.: -Vo[3]	8% max.: -Vo[2] 6% max.: -Vo[3]
Efficiency	see model table: 28Vin, Full Load		
Ripple[4] - 20MHz Min. - Max. Tc	≤50mV ≤100mV	≤80mV ≤120mV	≤90mV ≤120mV
Short Cct. - P. Dissipation Recovery Time	≤1W ≤10ms	≤12W ≤10ms	≤15W ≤10ms
Step Load[5] - Deviation Recovery Time	≤±300mV ≤300µs	≤±500mV ≤300µs	≤±500mV ≤300µs
Step Line[6] - Deviation Recovery Time	≤±200mV ≤300µs	≤±600mV ≤300µs	≤±600mV ≤300µs
Start-Up - Delay Overshoot	≤10ms ≤50mV	≤10ms ≤250mV	≤10ms ≤150mV FL, ≤750mV NL

1. Unless otherwise specified, ambient temperature is +25°C, input voltage is 28V, output full load.
2. -Pout 20%, +Pout 20% to 80%.
3. -Pout 10%, +Pout 10% to 50%.
4. Using tip and barrel measurement.
5. 50%-100%-50% step change. Recovery time measured from application of transient to point at which Vo <1% of final value, transition time >25µs.
6. 16V-40V-16V step change. Recovery time measured from application of transient to point at which Vo <1% of final value, transition time >25µs.

OTHER SPECIFICATIONS			
Switching Frequency	430kHz typical	265kHz typical	265kHz typical
Operating Temp. Range	Grade M: -55°C to +105°C Grades E & I: -40°C to +85°C		
Storage Temp. Range	-55°C to +125°C		
Insulation Resistance	500VDC, ≥100MΩ: Input-Output, Input-Case, Output-Case		
Pin Solder Temperature	300°C (10s)		
Isolation Capacitance	2200pF		
MTBF, Ground Fixed	936,000 hours: singles 843,000 hours: duals	960,000 hours: singles 820,000 hours: duals	823,000 hours: singles 742,000 hours: duals

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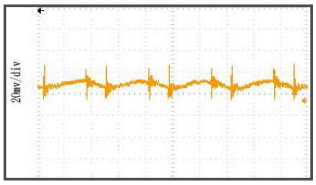
PXH SERIES

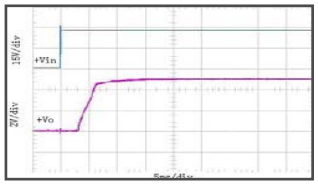
TYPICAL PERFORMANCE CURVES

5W SINGLE (PXH2805S-5)

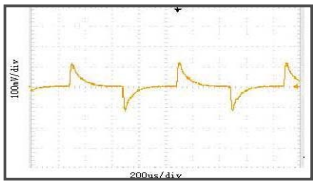
Output Ripple



Start-Up

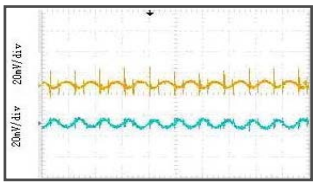


Step Load Response

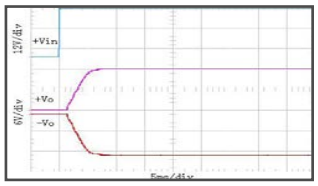


5W DUAL (PXH2812D-5)

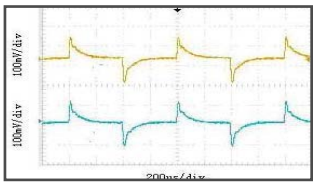
Output Ripple



Start-Up

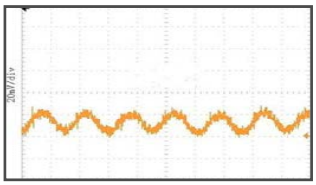


Step Load Response

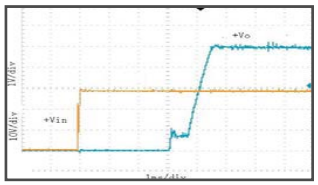


20W SINGLE (PXH2805S-15)

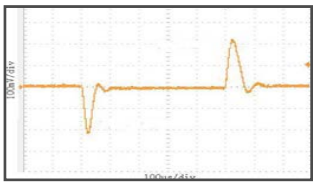
Output Ripple



Start-Up

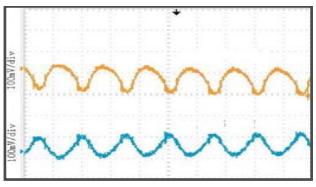


Step Load Response

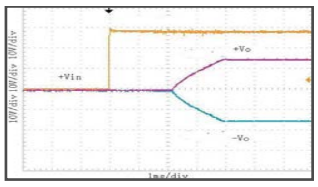


20W DUAL (PXH2815D-15)

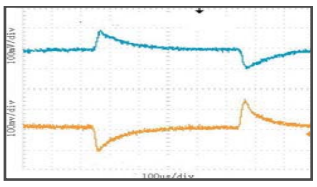
Output Ripple



Start-Up

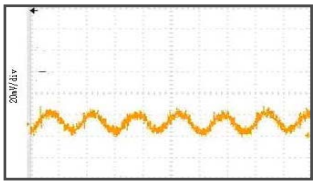


Step Load Response

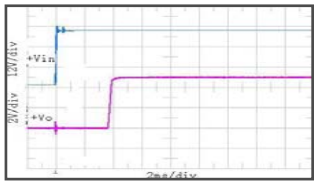


30W SINGLE (PXH2805-25)

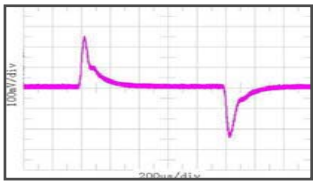
Output Ripple



Start-Up

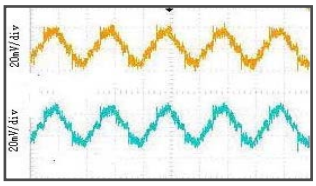


Step Load Response

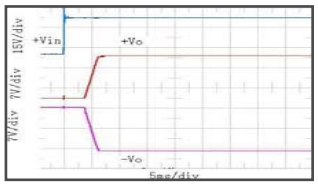


30W DUAL (PXH2815D-30)

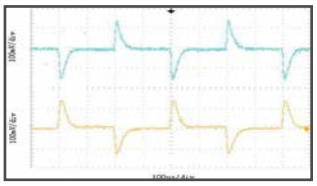
Output Ripple



Start-Up



Step Load Response



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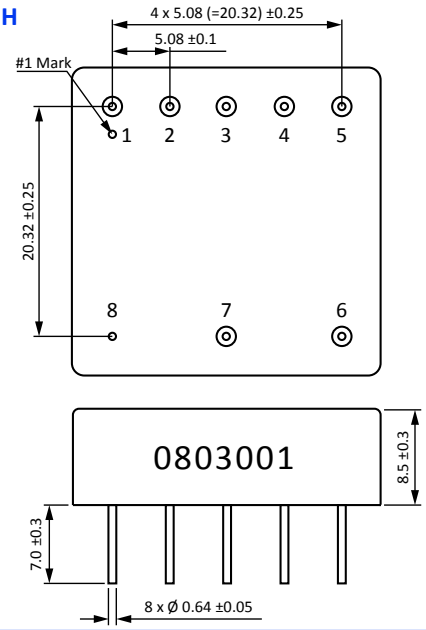
ENVIRONMENTAL SCREENING

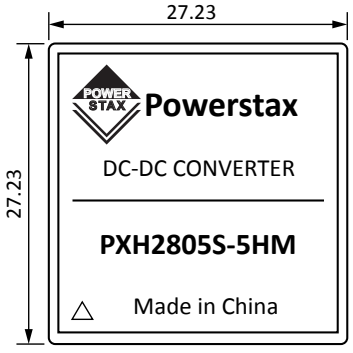
TEST OR INSPECTION		CLASS I	CLASS E	CLASS M
Internal Inspection	MIL-STD-883 Method 2017	✓	✓	✓
High Temperature Storage	125°C,48 hours	✗	✗	✓
Temperature Cycling	MIL-STD-883 Method 1010 Condition B, (x10)	✗	✓	✓
Constant Acceleration	MIL-STD-883 Method 2001, 3000G, Y1, 1Min.	✗	✓	✓
Intermediate Electrical Test	Tc :+25°C	✗	✓	✓
Burn-in	Tc: +105°C, ≥160H Tc: +85°C, ≥96H Tc: +85°C, ≥48H	✗ ✗ ✓	✗ ✓ ✗	✓ ✗ ✗
Final Electrical Test	Tc : -55°C,+25°C,+105°C Tc : -40°C,+25°C,+85°C	✗ ✓	✗ ✓	✓ ✗
Seal	MIL-STD-883 Method 1014 Condition A1 MIL-STD-883 Method 1014 Condition A1	✗ ✓	✓ ✓	✓ ✓
External Inspection	MIL-STD-883 Method 2009	✓	✓	✓

PXH SERIES

MECHANICALS - 5W

CASE H





Tolerance: ±0.2
Units: mm

Volume: 6.3cm³
Weight: <25g
Shell Material: Cold Rolled Steel

Connections					
Pin	**Single Output**	**Dual Output**	**Pin**	**Single Output**	**Dual Output**
1	Positive Output	Positive Output	5	Inhibit	Inhibit
2	Output Common	Output Common	6	Input Positive	Input Positive
3	n/c	Negative Output	7	Input Common	Input Common
4	n/c	n/c	8	Case Gnd	Case Gnd

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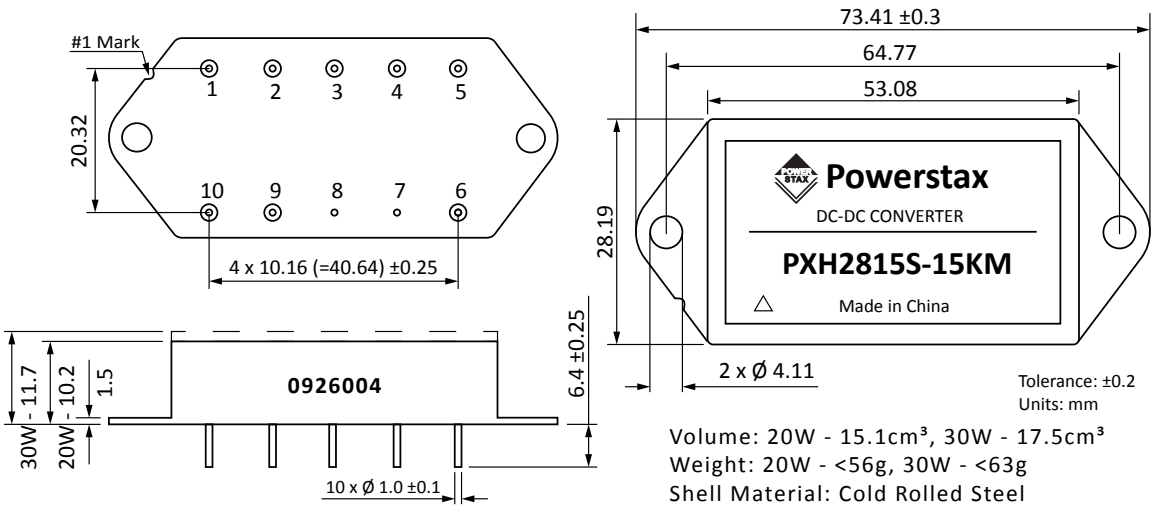
MECHANICALS - 20W & 30W

CASE K

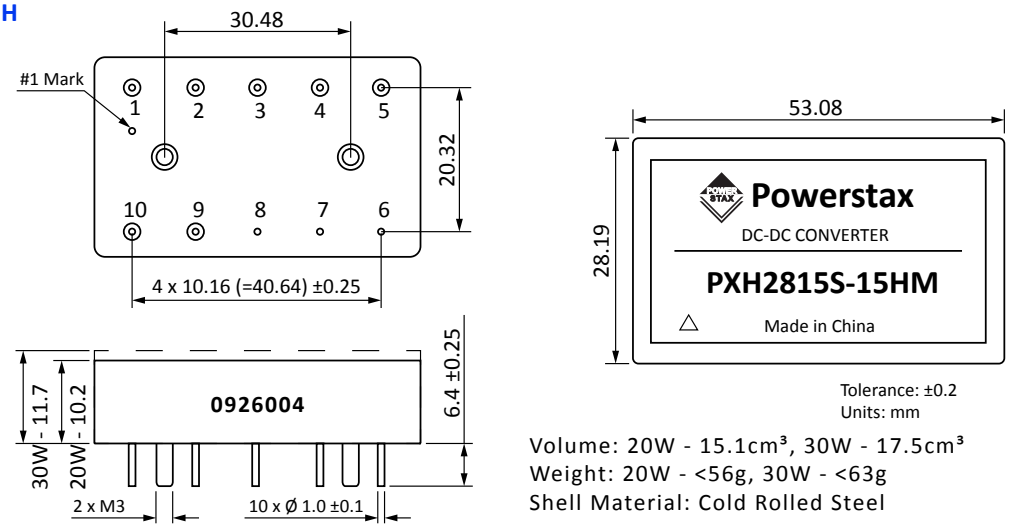
Dimensions in mm [±0.2]



Tolerance: ±0.2
Units: mm

Volume: 20W - 15.1cm³, 30W - 17.5cm³
Weight: 20W - <56g, 30W - <63g
Shell Material: Cold Rolled Steel

CASE H



Tolerance: ±0.2
Units: mm

Volume: 20W - 15.1cm³, 30W - 17.5cm³
Weight: 20W - <56g, 30W - <63g
Shell Material: Cold Rolled Steel

Connections					
Pin	**Single Output**	**Dual Output**	**Pin**	**Single Output**	**Dual Output**
1	Input Positive	Input Positive	6	Case Gnd / + Sense	Case Gnd
2	Inhibit	Inhibit	7	Case Gnd	Case Gnd
3	n/c / - Sense	Positive Output	8	Case Gnd	Case Gnd
4	Output Common	Output Common	9	Sync	Sync
5	Positive Output	Negative Output	10	Input Common	Input Common

Note: The Remote Sense function only available on the 30W Series models

PXH SERIES

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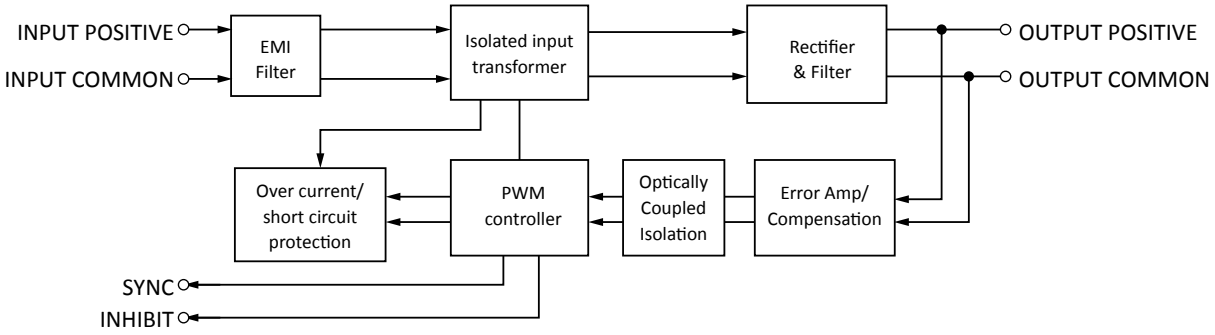
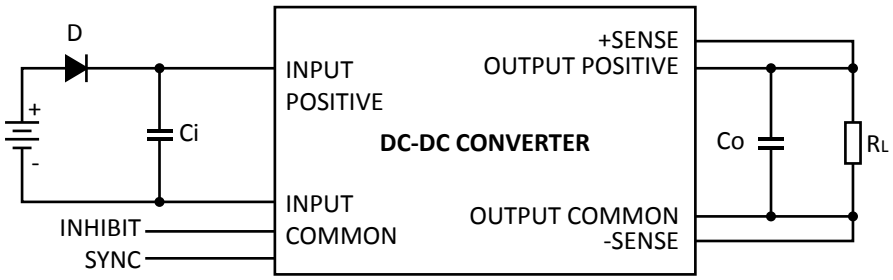
BLOCK DIAGRAM



APPLICATION NOTES

DC-DC Converter Typical Connection Shown As Below



Note: Sense connections are available only on 30W single output models. SYNC not available on 5W models.

Inhibit Function

The INHIBIT pin can be used as an external shut down for applications requiring remote on/off control.

- A logic pulled low (0 to 0.3V) disables the converter.
- No connection enables the converter.

Over Current/Short Circuit Protection

The PXH series of DC-DC converters has over current/short circuit protection. When operating under a load fault condition, the converter will automatically activate the over current/short circuit protection. It will automatically recover when the fault is removed.

Caution: The duration of the over current/short circuit must be less than 10s, and the case temperature lower than 105°C, Otherwise, the module may be damaged.

Ripple Voltage Suppress

Use a tip and barrel measurement to test the output ripple voltage, with a maximum bandwidth of 20MHz.

If the output voltage ripple required cannot be met in a particular application, it can be improved by adding capacitors between the output positive/negative and common pins. The recommended capacitors are film capacitors or ceramic capacitors. Larger capacitance can be accomplished by connecting several capacitors in parallel.

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Synchronization (Not available on 5W Series Models)

A synchronization feature is included in the 20W and 30W version of the PXH Series. This allows the user to match the switching frequency of the converter to the frequency of the system clock.

The external synchronization feature allows the user to adjust the nominal frequency within the range of 200KHz to 300 KHz at a level from -0.3V to 10V. The sync control operates with a square signal at any duty cycle between 40% and 60%.

In a master/slave configuration, the master module will source ±3mA current and the slave will sink ±0.5mA maximum. The sync pin should be unconnected when not in use.

Remote Sensing (Available On Single Output 30W Series Models Only)

Remote sense allows the user to compensate for voltage drop between the output of the converter and the point of regulation. The total voltage which may be compensated for is 0.5V in both leads (+) and (-). Make the connection to the regulation point within 1.2 meters of the converter output terminal.

To use remote sense, connect pin 3 to pin 4 and pin 6 to pin 5, otherwise the output voltage will increase.

The converter will be permanently damaged if the positive remote sense is shorted to ground. Damage may also result if the output common or positive output is disconnected from the load with the remote sense leads connected to the load.

Reverse Polarity Protection

To protect against input reverse connection, it is advised to connect a diode in series with the input pin of the converter as shown in the diagram on the previous page.

Connecting Outputs in Series

Any of the dual output converters can be configured to produce an output of 24V (+/-12 output models) or 30V (+/-15 output models) by connecting the load across the output (+) with either output grounded, and leaving the common pin floating.

INSTALLATION NOTES

1 Ensure proper connection of converter pins to the PCB following instructions of part's specification.
2. To prevent pins being stressed, causing glass insulators to crack and the module to leak, install the module with fixed flanges or screws prior to soldering the pins. Avoid bending the pins.
3. The bottom of the module should be tightly fitted to the heat sink. If necessary, thermal washers and shockproof gaskets can be employed.

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