C&D TECHNOLOGIES
Power Solutions

# NPH15S SERIES

## Isolated 15W Single Output DC-DC Converters


### FEATURES

- High Efficiency to 89%
- Power Density up to 2.4W/cm³ (39W/in³ )
- 1.5kV Input to Output Isolation
- Industry Standard Pinout
- UL 1950 Recognised
- Non Latching Current Limit
- Constant 350kHz Frequency
- Versatile Control Options
- Continuous Rating to 30W at 40°C Without Heatsink
- Operation to Zero Load
- Protected Against Load Faults
- Internal Over Temperature Protection
- Uses No Electrolytic Capacitors
- UL 94V-0 Package Materials

### DESCRIPTION

The NPH15S series of DC-DC Converters combines ease of application with versatility. The pin pattern is based on the popular industry standard, but two additional pins may optionally be fitted to provide a variety of features not commonly found on units of this type. High efficiency enables full rating to be achieved in a small package without heatsinking, and a high surge capability will provide for start-up and transient loads, whilst being thermally protected against sustained overload. Overload protection of the "constant current" type ensures start-up into complex load conditions. The copper case achieves efficient heat transfer and screening. The product range has been recognised by Underwriters Laboratory (UL) to UL 1950 for operational insulation, file number E179522 applies.

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UL 1950 RECOGNISED
File Number E179522.

**www.dc-dc.com**

### SELECTION GUIDE

| | Nominal Input Voltage | Output Voltage | Output Current | Current Limit | | Efficiency |
|---|---|---|---|---|---|---|
| Order Code[1] | (V) | (V) | (mA) | (A)Min | (A)Max | (%) |
| **NPH15S2403i** | 24 | 3.4 | 4.4 | 7.5 | 11.0 | 81 |
| **NPH15S2405i** | 24 | 5.1 | 3.0 | 5.0 | 7.5 | 84 |
| **NPH15S2412i** | 24 | 12.1 | 1.3 | 2.5 | 3.7 | 86 |
| **NPH15S2415i** | 24 | 15.1 | 1.0 | 2.0 | 3.0 | 87 |
| **NPH15S4803i** | 48 | 3.4 | 4.4 | 7.5 | 11.0 | 83 |
| **NPH15S4805i** | 48 | 5.1 | 3.0 | 5.0 | 7.5 | 85 |
| **NPH15S4812i** | 48 | 12.1 | 1.3 | 2.5 | 3.7 | 88 |
| **NPH15S4815i** | 48 | 15.1 | 1.0 | 2.0 | 3.0 | 89 |

### INPUT CHARACTERISTICS

| Parameter | Conditions | MIN | NOM | MAX | Units |
|---|---|---|---|---|---|
| Voltage Range | Continuous operation, 24V input types | 18 | 24 | 36 | V |
| | Continuous operation, 48V input types | 36 | 48 | 75 | |

### OUTPUT CHARACTERISTICS

| Parameter | Conditions | MIN | TYP | MAX | Units |
|---|---|---|---|---|---|
| Voltage Set Point Error | 50% load | | | 0.5 | % |
| Overall Voltage Error | Case temperature –40°C to 110°C<br>Load 0% - 100%<br>Input specified range | | | 2.5 | % |
| Temperature Coefficient of Output Voltage (slope) | | | | 250 | ppm°C |
| Deviation of Output Voltage | Temperature MIN-MAX | | 0.5 | 1 | % |
| Line Regulation | Operating voltage range, 50% load | | | 0.1 | % |
| Load Regulation | 0% - 100% rated load[2] | | | 0.5 | % |
| Ripple | rms | | 70 | | mV |

### CONTROL CHARACTERISTICS

| Parameter | Conditions | MIN | TYP | MAX | Units |
|---|---|---|---|---|---|
| Voltage Trimming Range | At rated load,<br>Trim control at either output | ±10 | | | % |
| Remote Switch Input[3] (voltage relative to input negative) | Not operating | -15 | 0 | 1.5 | V |
| | Operating, open circuit voltage | 9 | 10 | 11 | |
| Start Delay | Time from application of valid input voltage to output being in specification | | 25 | 50 | mS |
| Synchronisation[3] | Specified drive signal | 320 | | 440 | kHz |
| Switching Frequency | | 330 | 350 | 395 | kHz |

### ABSOLUTE MAXIMUM RATINGS

| | |
|---|---|
| Input voltage, 24V input types | –0.5V to 40V[4] |
| Input voltage, 48V input types | –0.5V to 80V[4] |
| Output Voltage | –0.3V to regulated voltage |
| Output trim control | –1V to +30V |
| Synchronisation/shutdown control | ±15V relative to input return |

### ISOLATION CHARACTERISTICS

| Parameter | Conditions | MIN | TYP | MAX | Units |
|---|---|---|---|---|---|
| Isolation Voltage | Flash tested for 1 second | 1500 | | | VDC |
| Resistance | Viso=500VDC | 1 | 4000 | | GΩ |

1 If optional pins ADJ and SS are required (as indicated in the pin connections diagram) prefix the ending "i" with an E when ordering, e.g. NPH15S4803Ei.
2 A minimum load of 10% of rating is recommended for typical applications.
3 Optional where fitted.
4 Absolute maximum value for 30 seconds. Prolonged operation may damage the product.

All specifications typical at $T_A$=25°C, nominal input voltage and rated output current unless otherwise specified.

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## ENVIRONMENTAL

| Parameter | Conditions | MIN | TYP | MAX | Units |
|---|---|---|---|---|---|
| Case Temperature | Full load | –40 | | 110 | °C |
| Storage | Absolute MAX internal temperature | –40 | | 125 | °C |
| Relative Humidity | Non condensing 85°C | | | 85 | % |
| Thermal Protection | Operates at case temperature | 110 | | | °C |

## THERMAL CHARACTERISTICS

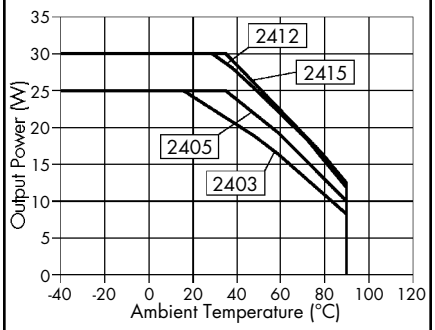
**UL 1950 recognition** -
MAX permissible loads for a given ambient temperature for any NPH15S model

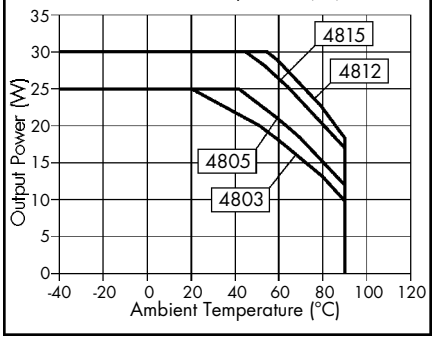
| Temperature (°C) | Power (W) | Temperature (°C) | Power (W) |
|---|---|---|---|
| 40 | 15.0 | 80 | 9.8 |
| 50 | 15.0 | 85 | 8.8 |
| 60 | 13.7 | 90 | 7.8 |
| 70 | 11.7 | | |

**MAX power rating** with case temperature maintained by external means
(eg forced air cooling)

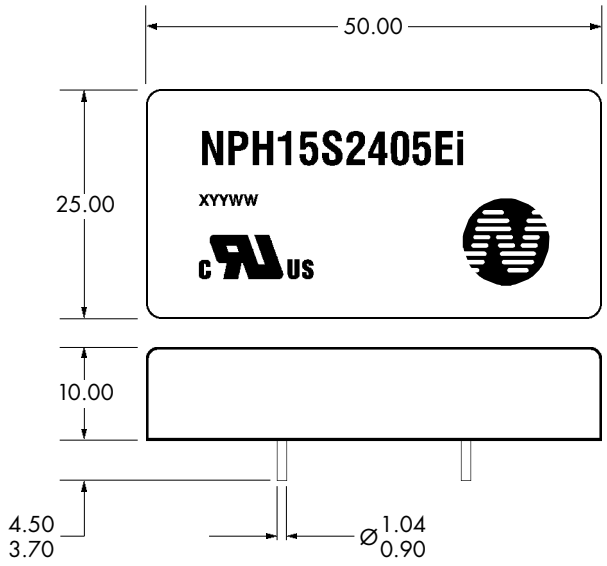
| | Case Temperature | | | |
|---|---|---|---|---|
| Part Number | 100°C | 105°C | 110°C | Units |
| **NPH15S2403** | 19 | 16 | 12 | W |
| **NPH15S2405** | 22 | 19 | 15 | |
| **NPH15S2412** | 25 | 22 | 19 | |
| **NPH15S2415** | 26 | 24 | 21 | |
| **NPH15S4803** | 20 | 17 | 13 | W |
| **NPH15S4805** | 23 | 20 | 16 | |
| **NPH15S4812** | 28 | 26 | 23 | |
| **NPH15S4815** | 30 | 28 | 25 | |

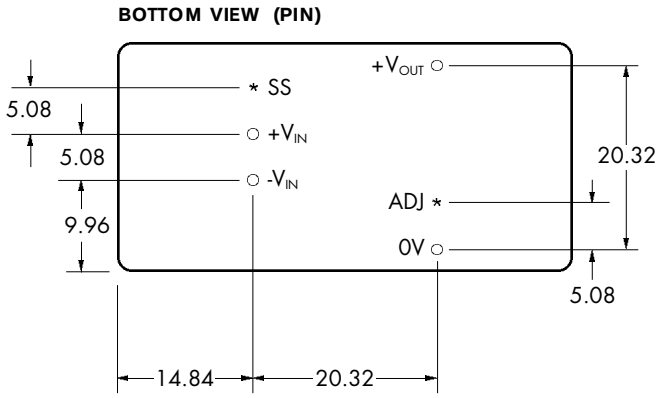
## THERMAL PERFORMANCE




## MECHANICAL DIMENSIONS




Weight: 36g
All dimensions in mm ±0.25mm
All pins on a 2.54mm pitch and within ±0.25mm of true position

C&D Technologies (NCL) Limited reserve the right to alter or improve the specification, internal design or manufacturing process at any time, without notice. Please check with your supplier or visit our web site to ensure that you have the current and complete specification for your product before use. For information and instructions on use, please consult the NPH SERIES APPLICATION NOTES.

 NDC NPH15S.4



Instructions for use are available from www.dc-dc.com

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