

HSH1205D Dual Output DC/DC Converter

12 VOLT INPUT – 1.5 WATT

FEATURES

Operating temperature -40°C to +150°C

Input voltage range 8 to 20 VDC

- Fully isolated
- Magnetic feedback
- Variable operating frequency
- Inhibit function



| MODELS |
|------------|
| VDC OUTPUT |
| DUAL ±5 |

DESCRIPTION

With a miniature footprint of just 0.8 square inches, the HSH Series™ of DC/DC converters delivers 1.5 watts of output power while saving significant board real estate. The wide input voltage range of 8 to 20 VDC accepts the varying voltages of military, industrial, or battery 12 V bus power and tightly regulates output voltages to protect downstream components.

CONVERTER DESIGN

HSH Series DC/DC converters incorporate a flyback topology with a variable frequency, nominally 370 kHz. Output voltage is magnetically fed back to the input side of the PWM to regulate output voltage.

Up to 80% of the load may be on one output providing that the other output carries a minimum of 20% of the total load. This dual model can be used as a single output voltage by connecting the load between positive and negative outputs, leaving the common unconnected resulting in double the output voltage. (ex: HSH1205D can be used as a 10 VDC output.)

INHIBIT FUNCTION

When an active low is applied to the inhibit terminal, pin 7, the converter shuts down and lowers the output voltage to near zero and input current to as low 5 mA. Leaving the terminal open or applying an active high will enable the converter.

MIL-STD-461

Use Interpoint's FMSA-461 EMI filter to pass the CE03 requirements of MIL-STD-461C.

CONVENIENT PACKAGING

The HSH Series converters are packaged in hermetically sealed metal cases which provide EMI/RFI shielding and protection from the environment.

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OPERATING CONDITIONS AND CHARACTERISTICS

Input Voltage Range

- 8 to 20 VDC continuous, 0.6 W max
- 12 to 18 VDC continuous, 1.5 W max

Output Power

- 1.5 W

Lead Soldering Temperature (10 sec per lead)

- 00°C

Storage Temperature Range (Case)

- -65°C to +150°C

Case Operating Temperature (T_C)

- +125°C to +150°C 1 watt
- -55°C to +125°C 1.5 watts

Isolation

- 100 megohm minimum at 500 VDC
- Any pin to case except case pin

Output Voltage Temperature Coefficient

- 150 ppm/°C typical

Audio Rejection

- 40 dB typical

Conversion Frequency (kHz)

- 370 kHz nominal
- 80 min kHz with
 - $V_{in} = 6V$
 - $\pm I_{OUT} = 60 mA$
 - $T_C = -55$ to $+125^\circ C$

INHIBIT

Active low (output disabled)

- Referenced to input common

Active high (output enabled)

- Open collector, or leave unconnected
- Open pin voltage 7 to 8 V typical

MECHANICAL AND ENVIRONMENTAL

Size (maximum)

- 0.980 x 0.805 x 0.270 inches (24.89 x 20.45 x 6.86 mm).
- See case A2 for dimensions.

Weight (maximum)

- 12 grams maximum

Screening

- HSH Standard or HSH ES. See Screening Table 1 for more information, page 6.

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Electrical Characteristics: 14 VDC V_{in} , ± 100 mA load, unless otherwise specified.

| HSH1205D | | 25°C | | | +40°C | | | +150°C ¹ | | | UNITS |
|-----------------------------------|--|------------|-----------|------------|------------|-----------|------------|---------------------|-----------|------------|---------|
| PARAMETERS | CONDITIONS | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | |
| OUTPUT VOLTAGE ² | $V_{IN} = 6$, $I_{OUT} = \pm 60$ mA | ± 4.75 | ± 5 | ± 5.25 | ± 4.70 | ± 5 | ± 5.30 | ± 4.65 | ± 5 | ± 5.35 | VDC |
| | $V_{IN} = 16$, $I_{OUT} = \pm 60$ mA | ± 4.75 | ± 5 | ± 5.25 | ± 4.70 | ± 5 | ± 5.30 | ± 4.65 | ± 5 | ± 5.35 | |
| | $V_{IN} = 16$, $I_{OUT} = \pm 120$ mA | ± 4.75 | ± 5 | ± 5.25 | ± 4.70 | ± 5 | ± 5.30 | — | — | — | |
| | $V_{IN} = 16$, $I_{OUT} = \pm 100$ mA | — | — | — | — | — | — | ± 4.65 | ± 5 | ± 5.35 | |
| OUTPUT CURRENT ⁵ | $V_{IN} = 12$ TO 18 VDC | 0 | ± 150 | 240 | 0 | ± 150 | — | 0 | ± 100 | — | mA |
| | $V_{IN} = 8$ TO 20 VDC | 0 | ± 60 | 96 | 0 | ± 60 | — | 0 | ± 60 | — | |
| OUTPUT POWER | $V_{IN} = 12$ TO 18 VDC | 0 | — | 1.5 | 0 | — | 1.5 | 0 | — | 1.0 | W |
| | $V_{IN} = 8$ TO 20 VDC | 0 | — | 0.6 | 0 | — | 0.6 | 0 | — | 0.6 | |
| OUTPUT RIPPLE | 10 kHz - 2 MHz | — | 35 | 180 | — | 50 | 250 | — | 50 | 250 | mV p-p |
| INPUT VOLTAGE | NO LOAD TO 1.5 W | 12 | 14 | 18 | 12 | 14 | 18 | — | — | — | VDC |
| | NO LOAD TO 600 mW | 8 | 14 | 20 | 8 | 14 | 20 | 8 | 14 | 20 | |
| INPUT CURRENT | NO LOAD | — | 5 | 10 | — | 8 | 12 | — | 18 | 25 | mA |
| | INHIBITED ⁶ | — | 2.4 | — | — | 2.4 | — | — | 2.4 | — | |
| INPUT RIPPLE CURRENT ⁵ | 10 kHz - 10 MHz | — | — | 50 | — | — | 100 | — | — | 50 | mA p-p |
| EFFICIENCY | | 71 | 74 | — | 63 | 67 | — | 54 | — | — | % |
| START-UP | DELAY | — | 3 | 18 | — | 3 | 18 | — | 3 | 18 | μ s |
| | OVERSHOOT ¹ | — | 200 | — | — | 100 | — | — | 200 | — | mV pk |
| LOAD FAULT ^{1, 3, 4} | POWER DISSIPATION | — | — | 2.2 | — | — | 2.5 | — | — | 2.5 | W |

Notes:

1. Guaranteed by design, not tested.

2. Tested with an external input inductor and capacitor: $L_{IN} = 6 \mu$ H, $C_{IN} = 80 \mu$ F. C_{IN} is directly across the power supply output to the HSH converter, then followed by the inductor (L_{IN}) which connects to the input of the HSH converter.

3. Maximum duration of short circuit at 25°C is 90 seconds, and the maximum duration at +150°C is 5 seconds.

4. Load fault is a short circuit (<50 mohms). Recovery is into resistive full load.

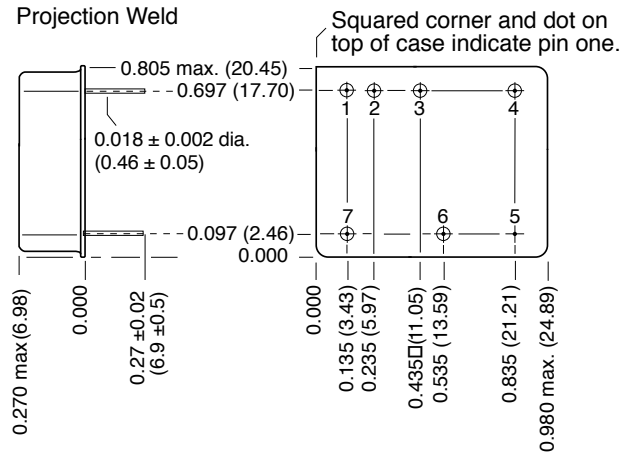
5. At 25°C the maximum spec indicates 80% of the converter's total power, which is available from either output providing the other output carries a minimum of 20% of the total load.

6. Voltage applied to the inhibit pin during inhibit at temperatures lower than 0°C must be less than 0.23 V.

HSH1205D Dual Output DC/DC Converter Cases

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BOTTOM VIEW CASE A2



Case dimensions in inches (mm)

Tolerance ± 0.005 (0.13) for three decimal places
 ± 0.01 (0.3) for two decimal places
 unless otherwise specified

CAUTION

Heat from reflow or wave soldering may damage the device.
 Solder pins individually with heat application not exceeding 300°C for 10 seconds per pin

Materials

Header Kovar/Nickel/Gold
 Cover Kovar/Nickel
 Pins Kovar/Nickel/Gold matched glass seal
 Seal hole: 0.056 ± 0.002 (1.42 \pm 0.05)

Case A2, Rev E, 20100805
 Please refer to the numerical dimensions for accuracy.

FIGURE 2: CASE A2

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SH STANDARD AND /ES (NON-QML) ENVIRONMENTAL SCREENING

| TEST PERFORMED | SH STANDARD ¹ | SH /ES ¹ |
|--|--------------------------|---------------------|
| Pre-cap Inspection Method 2017, 2032 | yes | yes |
| Temperature Cycle (10 times) Method 1010, Cond. B, -55°C to 125°C | no | yes |
| Constant Acceleration Method 2001, 500 g | no | yes |
| Burn-in 24 hours at 150°C case (typical) 96 hours at 150°C case (typical) | yes no | no yes |
| Final Electrical Test MIL-PRF-38534, Group A Subgroups 1, 2, 4, 5: +25°C, +125°C | yes | yes |
| Hermeticity Test Fine Leak, Method 1014, Cond. A Gross Leak, Method 1014, Cond. C Gross Leak, Dip (1 x 10 ⁻³) | no no yes | yes yes no |
| Final visual inspection Method 2009 | yes | yes |

Test methods are referenced to MIL-STD-883 as determined by MIL-PRF-38534.

Notes:

1. Standard and /ES, non-QML products, do not meet all of the requirements of MIL-PRF-38534.

SCREENING TABLE 1: ENVIRONMENTAL SCREENING