

HR150 Single, Dual and Triple DC-DC Converters

**18 TO 36 VOLT INPUT - 15 TO 20 WATT
NOT RECOMMENDED FOR NEW DESIGNS**

FEATURES

- -40°C to +85°C operation
- 18 to 36 volt input
- Transient protection 50 volts for up to 50 ms
- Fully isolated
- Fixed frequency switching
- Output trim on single output models
- Inhibit function
- Indefinite short circuit protection
- Up to 86% efficiency, typical



MODELS		
OUTPUT VOLTAGE (V)		
SINGLE	DUAL	TRIPLE
5	±12	5 & ±12
12	±15	5 & ±15
15		

DESCRIPTION

The Interpoint® HR150 Series™ DC-DC converters have been designed to give industrial applications the same high reliability, small size, and high performance that Interpoint products have provided to military and aerospace programs since 1969.

HIGH RELIABILITY

HR150 converters are built using thick-film hybrid technology and are manufactured in our fully certified and qualified MIL-PRF-38534 Class H production facility. They are packaged in hermetically sealed steel cases and are ideal for use in programs requiring high reliability, small size, and high efficiency. HR150 converters use the same manufacturing procedures and quality controls that we apply to converters designed for commercial airliners, advanced fighter aircraft, and other high reliability applications. The cases are sealed in a dry nitrogen environment and are guaranteed a maximum leak rate of less than 10⁻³ atm-cc/sec. All devices are 100% electrically tested.

SMALL SIZE – LOW PROFILE

The HR150 Series manufacturing techniques provide extremely small size and low profile components. Each converter uses less than 2.7 square inches of board area. The overall power density is from 11 to 17 watts per cubic inch.

HIGH PERFORMANCE

The HR150 Series converters are high efficiency, low noise, pulse width modulated, forward mode switching regulators with a constant switching frequency of 125 kHz typical for single and dual output models and 250 kHz typical for triple output models. They achieve high isolation (500 volts, 100 megohm) through use of a transformer in the forward power circuit and an opto-coupler in the feedback control loop.

HR 150 Series input voltage range is 18 to 36 volts. Outputs are available as 5, 12, 15, ±12, ±15, +5 /±12, and +5 /±15 volts. The converters typically provide greater than 80% efficiency over the entire input range and from 25% to full load. Line regulation is typically within 0.1% and load regulation within 0.2%.

HR150 converters are designed to operate between -40°C and +85°C case and are short circuit protected up to a case temperature of 85°C. The combination of high conversion efficiency and heat dissipating metal enclosures minimizes heat sinking requirements. If additional dissipation is desired, heat conducting material (PCB, copper sheet, heat sink, etc.) may be brought into contact with the unit’s baseplate.

An inhibit function is provided for HR150 converters when the inhibit input pin is connected to the input common. The open circuit voltage of the inhibit input pin is 11 to 13 volts. The inhibit input pin must sink approximately 1 mA during the inhibit state. During inhibit, the converter’s output voltage drops to less than 1 volt and the input current is typically 8 mA.

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OUTPUT ADJUSTMENT RESISTORS HR151-2805 ONLY	
Resistor Pin 3 to 4	Output Voltage: Voltage Increase
∞	0
390 k	+1%
145 k	+2%
63 k	+3%
22 k	+4%
0	+5%

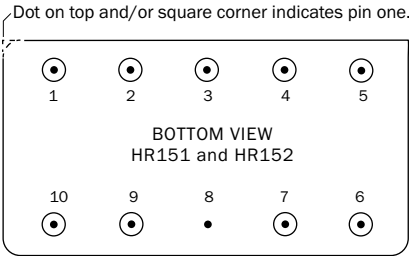
CAUTION: Do not exceed maximum power rating when trimming up.

Output adjustment for all single output models:
 The output can be adjusted upward by using the output adjust (pin 3). The resistance between output adjust (pin 3) and output common (pin 4) will determine the magnitude of the increase in the output. The table above is only applicable to HR151-2805.

TABLE 1: OUTPUT ADJUSTMENT RESISTORS FOR HR151-2805

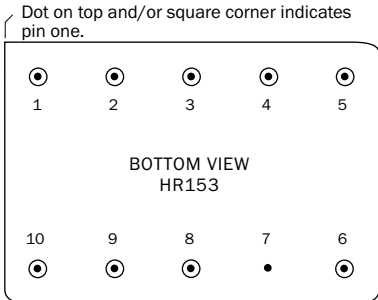
PIN OUT			
Pin	Single Output	Dual Output	Triple Output
1	Positive Input	Positive Input	Positive Input
2	Inhibit	Inhibit	Main (+5) Output
3	Output Adjust	Positive Output	Output Common
4	Output Common	Output Common	Negative Aux. Output
5	Positive Output	Negative Output	Positive Aux. Output
6	No Connection	No Connection	No Connection
7	No Connection	No Connection	Case Ground
8	Case Ground	Case Ground	Inhibit
9	No Connection	No Connection	No Connection
10	Input Common	Input Common	Input Common

TABLE 2: PIN OUT



See Figure 4 on page 7 for dimensions.

FIGURE 1: PIN OUT



See Figure 5 on page 8 for dimensions.

FIGURE 2: PIN OUT

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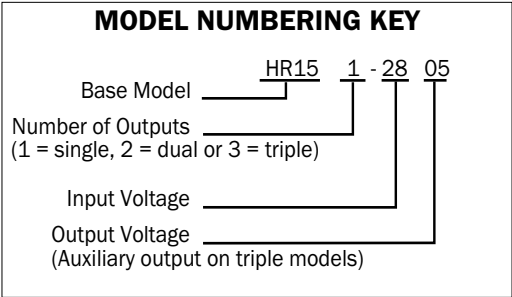


FIGURE 3: MODEL NUMBERING KEY

MODEL NUMBER OPTIONS		
TO DETERMINE THE MODEL NUMBER ENTER ONE OPTION FROM EACH CATEGORY IN THE FORM BELOW.		
CATEGORY	Base Model and Input Voltage	Output Voltage ¹
OPTIONS	HR15	1-2805, 1-2812, 1-2815
		2-2812, 2-2815
		3-2812, 3-2815 ²
FILL IN FOR MODEL # ³	HR15	_____
<small>Notes</small> 1. Number of Outputs: 151 is a single output, 152 is a dual output and 153 is a triple output. 2. Both triple output models' main voltage is 5 volts. The model number indicate the ± auxiliary voltages. 3. If ordering by model number add a "-Q" to request solder dipped leads (HR151-2812-Q).		

TABLE 3: MODEL NUMBER OPTIONS

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TABLE 4: OPERATING CONDITIONS, ALL MODELS, 25 °C CASE, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED.

HR150 SERIES		ALL MODELS			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	
LEAD SOLDERING TEMPERATURE ¹	10 SECONDS MAX.	–	–	300	°C
STORAGE TEMPERATURE ¹		-55	–	+125	°C
CASE OPERATING TEMPERATURE	FULL POWER	-40	–	+85	°C
	ABSOLUTE	-40	–	+105	
DERATING OUTPUT POWER/CURRENT LINEARLY ¹	SINGLE AND DUAL OUTPUT	From 100% at 85 °C to 0% at 105 °C			
	TRIPLE OUTPUT	From 100% at 85 °C to 0% at 115 °C			
ISOLATION: INPUT TO OUTPUT, INPUT TO CASE, OUTPUT TO CASE ²	500 VDC AT 25 °C	100	–	–	Megohms
INPUT TO OUTPUT CAPACITANCE ¹		–	60	–	pF
SWITCHING FREQUENCY	SINGLE AND DUAL OUTPUT	–	125	–	kHz
	TRIPLE OUTPUT	–	250	–	
INHIBIT ACTIVE LOW (OUTPUT DISABLED) Do not apply a voltage to the inhibit pin ⁴	INHIBIT PIN PULLED LOW ³	–	–	0.8	V
	INHIBIT PIN SOURCE CURRENT ¹	–	1	–	mA
	REFERENCED TO	INPUT COMMON			
INHIBIT ACTIVE HIGH (OUTPUT ENABLED) Do not apply a voltage to the inhibit pin ⁴	INHIBIT PIN CONDITION	OPEN COLLECTOR OR UNCONNECTED			
	OPEN PIN VOLTAGE ¹	11	–	13	V

Notes

- Guaranteed by characterization test and/or analysis. Not a production test.
- When testing isolation, input pins are tied together and output pins are tied together. They are tested against each other and against case. Discharge the pins before and after testing.
- Tested with inhibit pin connected to input common.
- An external inhibit interface should be used to pull the inhibit low or leave it floating. The inhibit pin can be left unconnected if not used.

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TABLE 5: ELECTRICAL CHARACTERISTIC 25 °C Tc, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED

SINGLE OUTPUT MODELS		HR151-2805			HR151-2812			HR151-2815			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE		4.95	5.00	5.05	11.88	12.00	12.12	14.85	15.00	15.15	V
OUTPUT CURRENT	NO LOAD	—	—	3.0	—	—	1.667	—	—	1.333	A
OUTPUT POWER		—	—	15	—	—	20	—	—	20	W
OUTPUT RIPPLE	10 kHz TO 2 MHz	—	30	60	—	40	80	—	40	80	mV p-p
LINE REGULATION	V _{IN} = MIN TO MAX	—	0.1	0.2	—	0.1	0.2	—	0.1	0.2	%
LOAD REGULATION	NO LOAD TO FULL	—	0.2	0.4	—	0.2	0.4	—	0.2	0.4	%
INPUT VOLTAGE	CONTINUOUS	18	28	36	18	28	36	18	28	36	V
	TRANSIENT, 50 ms ¹	—	—	50	—	—	50	—	—	50	
INPUT CURRENT	NO LOAD	—	—	20	—	—	30	—	—	30	mA
	INHIBITED	—	0.8	—	—	0.8	—	—	0.8	—	
INPUT RIPPLE CURRENT	10 kHz - 10 MHz	—	25	50	—	25	50	—	25	50	mA p-p
EFFICIENCY		75	81	—	76	82	—	77	83	—	%

Notes

1. Guaranteed by characterization test and/or analysis. Not a production test.

TABLE 6: ELECTRICAL CHARACTERISTIC 25 °C Tc, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED

DUAL OUTPUT MODELS		HR152-2812			HR152-2815			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE ¹		±11.88	±12.00	±12.12	±14.85	±15.00	±15.15	V
OUTPUT CURRENT ¹	NO LOAD	—	—	±625	—	—	±500	A
OUTPUT POWER		—	—	15	—	—	15	W
OUTPUT RIPPLE	10 kHz TO 2 MHz	—	30	50	—	30	50	mV p-p
LINE REGULATION	V _{IN} = MIN TO MAX	—	0.1	0.2	—	0.1	0.2	%
LOAD REGULATION	NO LOAD TO FULL	—	0.2	0.4	—	0.2	0.4	%
INPUT VOLTAGE	CONTINUOUS	18	28	36	18	28	36	V
	TRANSIENT, 50 ms ²	—	—	50	—	—	50	
INPUT CURRENT	NO LOAD	—	—	35	—	—	35	mA
	INHIBITED	—	0.8	—	—	0.8	—	
INPUT RIPPLE CURRENT	10 kHz - 10 MHz	—	25	50	—	25	50	mA p-p
EFFICIENCY		75	79	—	75	79	—	%

Notes

1. On dual output models at least 25% of the load should be on the positive output.

2. Guaranteed by characterization test and/or analysis. Not a production test.

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TABLE 7: ELECTRICAL CHARACTERISTIC 25 °C Tc, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED

TRIPLE OUTPUT MODEL - HR153-2812		5 (MAIN)			±12 (AUXILIARIES)			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	FULL LOAD	4.95	5.00	5.05	±11.88	±12.00	12.12	V
OUTPUT CURRENT ¹	V _{IN} = 18 TO 36	100	—	2000	—	—	±208	mA
OUTPUT POWER		—	—	10	—	—	±2.5	W
	TOTAL ALL OUTPUTS	—	—	15	—	—	—	
OUTPUT RIPPLE	10 kHz TO 2 MHz	—	40	80	—	20	40	mV p-p
LINE REGULATION	V _{IN} = MIN TO MAX	—	0.1	0.2	—	0.1	0.2	%
LOAD REGULATION	NO LOAD TO FULL	—	0.2	0.4	—	0.2	0.4	%
INPUT VOLTAGE	CONTINUOUS	18	28	36	—	—	—	V
	TRANSIENT 50 ms ²	—	—	50	—	—	—	
INPUT CURRENT	NO LOAD	—	—	50	—	—	—	mA
	INHIBITED	—	0.8	—	—	—	—	
INPUT RIPPLE CURRENT	10 kHz - 10 MHz	—	40	80	—	—	—	mA p-p
EFFICIENCY ²		75	79	—	—	—	—	%

Notes

1. Minimum load required for full output capability on auxiliary outputs. Minimum current can be reduced when dual outputs are used at reduced loads.
2. Guaranteed by characterization test and/or analysis. Not a production test.

TABLE 8: ELECTRICAL CHARACTERISTIC 25 °C Tc, 28 VIN, 100% LOAD, UNLESS OTHERWISE SPECIFIED

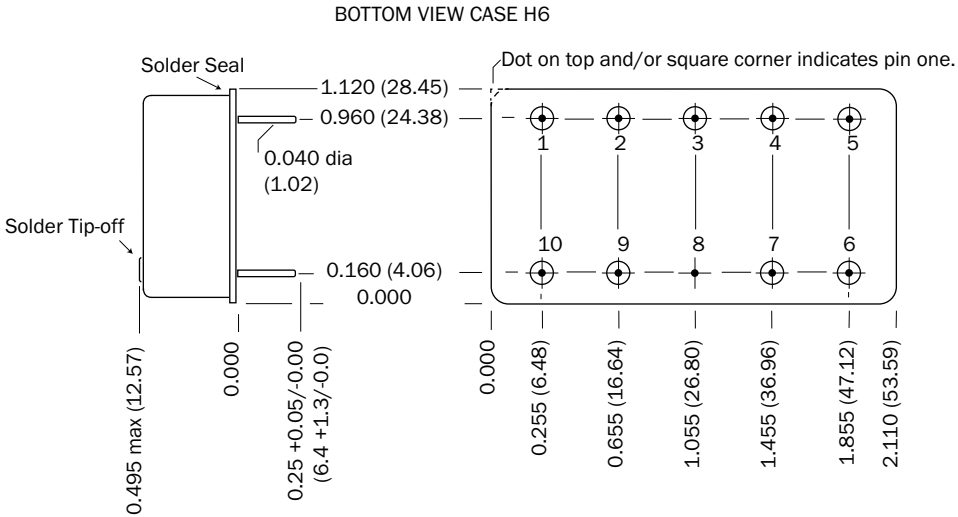
TRIPLE OUTPUT MODEL - HR153-2815		5 (MAIN)			±15 (AUXILIARIES)			UNITS
PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	FULL LOAD	4.95	5.00	5.05	±14.85	±15.00	15.15	V
OUTPUT CURRENT ¹	V _{IN} = 18 TO 36	100	—	2000	—	—	±167	mA
OUTPUT POWER		—	—	10	—	—	±2.5	W
	TOTAL ALL OUTPUTS	—	—	15	—	—	—	
OUTPUT RIPPLE	10 kHz TO 2 MHz	—	40	80	—	20	40	mV p-p
LINE REGULATION	V _{IN} = MIN TO MAX	—	0.1	0.2	—	0.1	0.2	%
LOAD REGULATION	NO LOAD TO FULL	—	0.2	0.4	—	0.2	0.4	%
INPUT VOLTAGE	CONTINUOUS	18	28	36	—	—	—	V
	TRANSIENT 50 ms ²	—	—	50	—	—	—	
INPUT CURRENT	NO LOAD	—	—	50	—	—	—	mA
	INHIBITED	—	0.8	—	—	—	—	
INPUT RIPPLE CURRENT	10 kHz - 10 MHz	—	40	80	—	—	—	mA p-p
EFFICIENCY ²		75	79	—	—	—	—	%

Notes

1. Minimum load required for full output capability on auxiliary outputs. Minimum current can be reduced when dual outputs are used at reduced loads.
2. Guaranteed by characterization test and/or analysis. Not a production test.

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Weight: 50 grams typical

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.

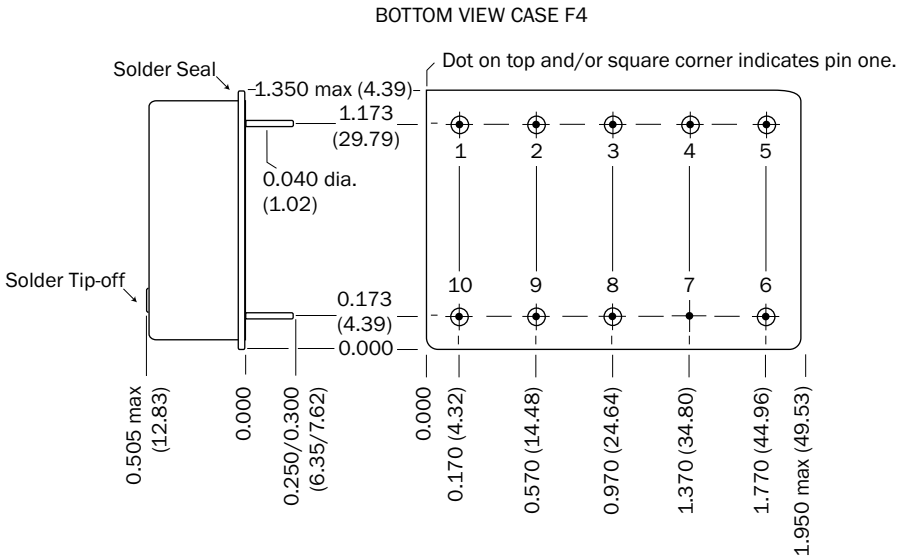
Materials
Header Cold Rolled Steel/Nickel/Tin
Cover Cold Rolled Steel/Nickel/Tin
Pins #52 alloy, compression glass seal or ceramic seal

Please refer to the numerical dimensions for accuracy.

FIGURE 4: CASE H6 – HR151 AND HR152

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Weight: 53 grams typical

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 Cold Rolled Steel/Nickel/Tin
Cover Cold Rolled Steel/Nickel/Tin
Pins #52 alloy, compression glass seal or ceramic seal
Seal hole: 0.083 ±0.003 (2.11 ±0.08)

Please refer to the numerical dimensions for accuracy.

FIGURE 5: CASE F4 - HR153

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ENVIRONMENTAL SCREENING INDUSTRIAL DC-DC CONVERTERS AND EMI FILTERS STANDARD ¹

TEST PERFORMED	INDUSTRIAL STANDARD
Pre-cap Inspection Method 2017, 2032	■
Final Electrical Test MIL-PRF-38534, Group A Subgroups 1 and 4: +25 °C case	■
Hermeticity Test, Method 1014 Gross Leak, Dip	■
Final visual inspection Method 2009	■

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

Notes

1. Industrial standard products may not meet all of the requirements of MIL-PRF-38534.

TABLE 9: ENVIRONMENTAL SCREENING

