

## 20 Watts

- 4:1 Input range
- 2 x 1" Package
- Single and dual outputs
- Up to 91% efficiency
- -40 to 85°C Operation
- Remote on/off control
- 5 Year warranty



The HTE20 series of wide input DC-DC converters comes in both single and dual outputs. Inputs are available in 24 & 48V versions with 4:1 range and outputs from 3.3 to 15V single and dual. The units operate from -40 to +85°C. All models have a FIDUS 5 year warranty.

Dimensions:

2.00 x 1.00 x 0.40" (50.80 x 25.40 x 10.16mm)

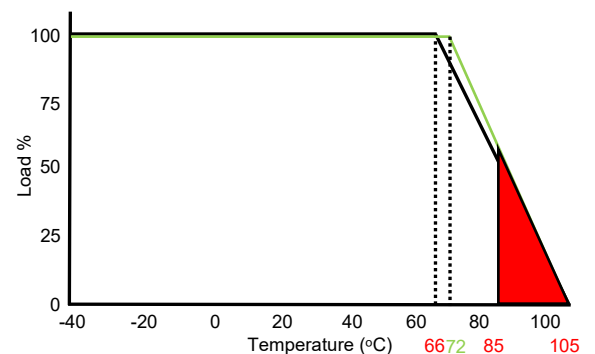
## Models & Ratings

Model Number	Input Voltage	Output Voltage	Output Current	Input Current [1]		Maximum Capacitive Load	Efficiency
				No Load	Full Load [2]		
HTE202403	9-36V	3.3V	5500mA	50mA	879mA	10000uF	89%
HTE202405		5V	4000mA	50mA	957mA	6800uF	91%
HTE202412		12V	1670mA	22mA	980mA	1000uF	89%
HTE202415		15V	1330mA	22mA	968mA	680uF	89%
HTE202405D		±5V	±2000mA	65mA	969mA	±2200uF	89%
HTE202412D		±12V	±835mA	25mA	980mA	±470uF	88%
HTE202415D		±15V	±665mA	25mA	980mA	±330uF	89%
HTE204803	18-75V	3.3V	5500mA	30mA	440mA	10000uF	89%
HTE204805		5V	4000mA	30mA	473mA	6800uF	91%
HTE204812		12V	1670mA	15mA	484mA	1000uF	89%
HTE204815		15V	1330mA	15mA	484mA	680uF	89%
HTE204805D		±5V	±2000mA	40mA	484mA	±2200uF	89%
HTE204812D		±12V	±835mA	15mA	490mA	±470uF	88%
HTE204815D		±15V	±665mA	15mA	490mA	±330uF	89%

## Notes

1. Input current specified at nominal 24 or 48V
2. For heatsink option with better thermal performance please contact sales
3. Do not operate continuously in the red area of the derating curve

## Derating curve



Input	
Parameter	Rating
Input voltage range	See table
Input reflected ripple current	20mA pk-pk through 12uH inductor
Input surge (100mS max)	24V Models 50V DC Max. 48V Models 100VDC Max.
Input filter	Pi type

## Output

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	3.3		15	VDC	See Model & Ratings table
Set point accuracy			±1	%	
Line regulation			±0.5	%	Low line to High line
Load regulation			±0.5	%	0 to 100%. Single output
			±1		0 to 100%. Dual output
Cross regulation			±5	%	On dual output models when one load is varied by 25 to 100% and the other is 100% load.
Ripple & Noise			75	mV pk-pk	All models measured with 1uF ceramic capacitor. 20 MHz bandwidth
Short circuit protection					Trip & restart (hiccup mode) auto recovery
Maximum capacitive load					See Model and Ratings table
Remote on/off	Module on 3.0 to 12.0 Vdc or open circuit. Module off short circuit pin 2 and 6 or 0 to 1.2 Vdc. Off input current 5mA typ.				

## General

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	88		91	%	See Model & Ratings table
Isolation			1600	VDC	Input to output
Isolation resistance	1000			M Ohm	
Isolation capacitance		1200		pF	
Switching frequency		330		KHz	
Power density			25	W/In <sup>3</sup>	
MTBF		>560		KHrs	As per MIL-HDBK-217F, 25°C GB

## Environmental

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-40		85	°C	See derating graph PG1
Storage temperature	-55		125	°C	
Case temperature			105	°C	
Cooling					Convection cooled
Humidity			95	% RH	Non-condensing
Thermal impedance		12		°C/W	10°C/W with heatsink option (Contact sales)
Temperature coefficient			±0.02	%/°C	

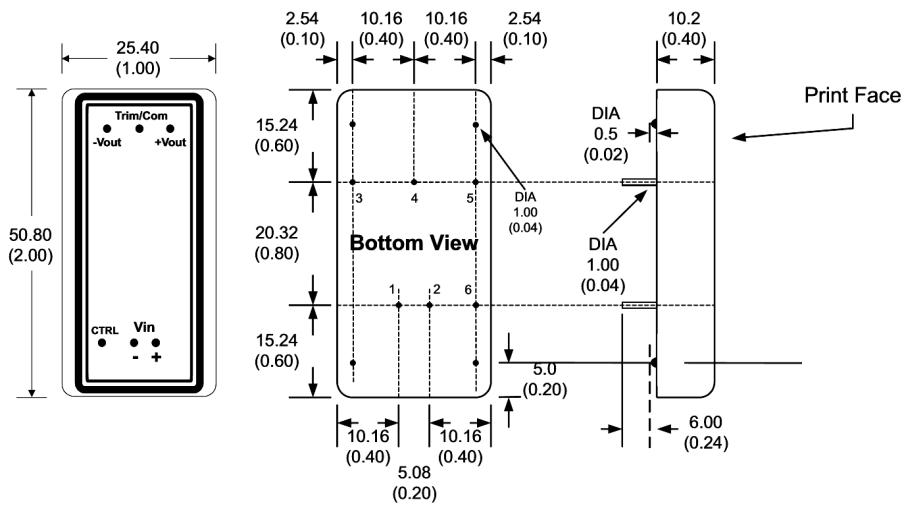
## EMC: Emissions

	Standard	Test level	Notes & Conditions
Conducted	EN55022	Class A	See application notes PG3
Radiated	EN55022	Class A	

## EMC: Immunity

	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	8KV Air, 6KV contact	A	
Radiated	EN61000-4-3	10V/m	A	80~1000 MHz, 80% AM (1kHz)
EFT/Burst	EN61000-4-4	3	A	2KV. A 220uF/100V capacitor required
Surges	EN61000-4-5	Installation class 3	A	A 220uF/100V capacitor required. Line to line : 1.0kV
Conducted	EN61000-4-6	10Vrms	A	0.15 ~ 80 MHz, 80% AM (1kHz)
Power frequency magnetic fields	EN61000-4-8	1A/m	A	50Hz

## Mechanical Details



Pin	Pin Connections	
	Standard	
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	0V
5	-Vout	-Vout
6	Remote On/Off	Remote On/Off

### Notes

1. All dimensions shown in millimetres (inches)
2. Pin diameter 1.00 ± 0.05 (0.04 ± 0.002)
3. Case tolerance ± 0.5 (± 0.002)

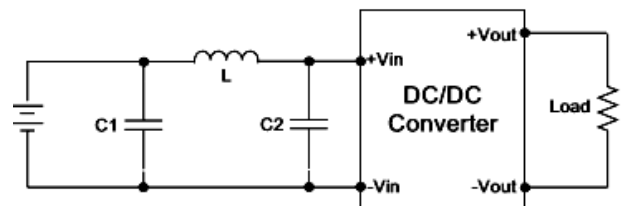
## Physical

Parameter	Rating
Case material	Nickel coated copper
Pin material	1.00mm brass solder coated
Potting material	Epoxy (UL94V-0)
Weight	31g
Dimensions	2.00 x 1.00 x 0.40"
Soldering temperature	1.5mm from case, 10s and 260°C max.

## Application notes

### EMI Filter

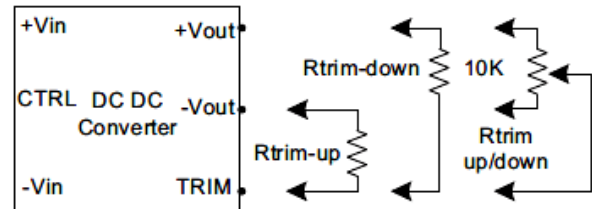
The input filter components C1, L and C2 can be fitted to help meet conducted emission requirements for the system. They should be mounted as close as possible to the module. Lead lengths should be minimized and where possible avoid running input and output tracks under the module as part of good design practice for best EMC performance. If the module is embedded in a system running from a AC/DC converter, this will have its own additional immunity protection and EMI filtering that will impact the overall system EMI performance.



Model number	C1	L	C2
HTE2024XX	1210, 2.2uF/100V	12uH	1210, 2.2uF/100V
HTE2048XX	1210, 2.2uF/100V	12uH	1210, 2.2uF/100V

## Trim Tables

Output voltage trim function allows the user to increase or decrease the output voltage set point. The module may be connected with an external resistor (Rtrim) between TRIM pin and either +Vout or -Vout. By adjusting Rtrim, the output voltage can be changed by  $\pm 10\%$  of nominal the output voltage.



### HTE20XX03

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.970	Volts
Rtrim-down	315.932	172.257	112.528	79.806	59.153	44.930	34.539	26.616	20.374	15.330	KOhms
Trim up	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	%
Vout=	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630	Volts
Rtrim-up	544.612	184.034	103.305	67.715	47.676	34.824	25.880	19.297	14.249	10.255	KOhms

### HTE20XX05

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500	Volts
Rtrim-down	230.566	106.182	64.301	43.281	30.647	22.207	16.177	11.651	8.129	5.310	KOhms
Trim up	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	%
Vout=	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500	Volts
Rtrim-up	244.547	113.776	70.631	49.142	36.274	27.707	21.592	17.010	13.447	10.598	KOhms

### HTE20XX12

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800	Volts
Rtrim-down	327.351	142.100	83.928	55.470	38.591	27.418	19.477	13.542	8.939	5.264	KOhms
Trim up	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	%
Vout=	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200	Volts
Rtrim-up	371.425	183.645	117.623	83.929	63.489	49.767	39.919	32.508	26.728	22.094	KOhms

### HTE20XX15

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500	Volts
Rtrim-down	433.811	174.916	100.946	65.907	45.468	32.077	22.625	15.596	10.165	5.842	KOhms
Trim up	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	%
Vout=	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500	Volts
Rtrim-up	347.293	178.523	115.235	82.084	61.683	47.863	37.882	30.336	24.430	19.682	KOhms