

20 Watts

- EN50155 for Rail Applications
- EN50121-3-2 Class A Emissions for Rail Applications without Additional Components
- Single and Dual Outputs
- 3000VDC Isolation
- -40 to 100°C Operation
- Remote on/off and 10% Output Trim
- 3 Year warranty



The HTR20 series of DC/DC converters come in both single and dual outputs in a 1.09x1.09" package. Inputs are available in nominal 24 & 110V and outputs from 3.3 to 15V single and dual. They have both EN50155 and EN50121-3-2 approvals for rail applications. The units operate from -40 to +100°C and come complete with remote on/off function and output trim. All models have a FIDUS 3 year warranty.

Dimensions:

1.09 x 1.09 x 0.65" (27.6 x 27.6 x 16.4mm)

Models & Ratings

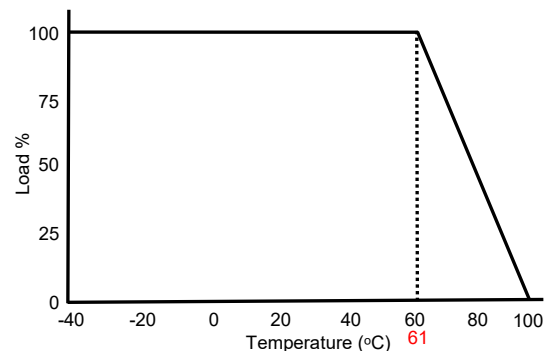
Model Number	Input Voltage	Output Voltage	Output Current	Input Current		Maximum Capacitive Load	Efficiency
				No Load	Full Load		
HTR202403SSK	13-70V	3.3V	4500mA	10mA	711.20mA	7000uF	87%
HTR202405SSK		5V	4000mA	10mA	946.96mA	5000uF	88%
HTR202412SSK		12V	1670mA	10mA	936.33mA	850uF	89%
HTR202415SSK		15V	1330mA	10mA	925.92mA	700uF	90%
HTR202405DSK		±5V	±2000mA	10mA	968.99mA	±1000uF	86%
HTR202412DSK		±12V	±833mA	10mA	925.92mA	±680uF	90%
HTR202415DSK	±15V	±666mA	10mA	925.92mA	±470uF	90%	
HTR2011003SSK	42-176V	3.3V	4500mA	10mA	156.97mA	7000uF	86%
HTR2011005SSK		5V	4000mA	10mA	206.61mA	5000uF	89%
HTR2011012SSK		12V	1670mA	10mA	211.41mA	850uF	86%
HTR2011015SSK		15V	1330mA	10mA	211.41mA	700uF	86%
HTR2011005DSK		±5V	±2000mA	10mA	216.45mA	±1000uF	84%
HTR2011012DSK		±12V	±833mA	10mA	208.98mA	±680uF	87%
HTR2011015DSK		±15V	±666mA	10mA	208.98mA	±470uF	87%

Notes

1. Under no load conditions the unit may not meet all specifications
2. Series diode or mosfet required for reverse polarity protection
3. The HTR20 is designed to meet EN62368-1 and EN60950-1

Input	
Parameter	Rating
Input voltage range	See table
Input reflected ripple current	20mA pk-pk through 26uH inductor and capacitor 33uF (ESR<1Ω at 100KHz)
Input surge (100mS max)	24V Models 100VDC Max. 110V Models 185VDC Max.
Input filter	Pi type
Undervoltage lockout	24V: ON/OFF 12.3Vdc/11.6Vdc 110V: ON/OFF 40.5Vdc/38.4Vdc

Derating curve



HTR20 Series

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	%	Single outputs. 0 to 100% load change
			±1		Dual outputs. 0 to 100% load change
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 10uF/25V electrolytic capacitor and 20MHz bandwidth
Overvoltage protection		140		%	
Overload protection		170		%	
Short circuit protection					Continuous with automatic recovery
Transient response	All models except single 3.3V: ±3 % max			% Deviation	For a 25% load change, at nominal Vin recovery to within 3/5% within 250uS typically.
	Single Output 3.3V: ±5 % max				
Remote on/off	Module on: 3.0 to 12.0 Vdc or open circuit. Module off: short circuit pin 2/3 or 0 to 1.2 Vdc. Off input current 3mA typ.				
Output voltage trim	See applications page 4				

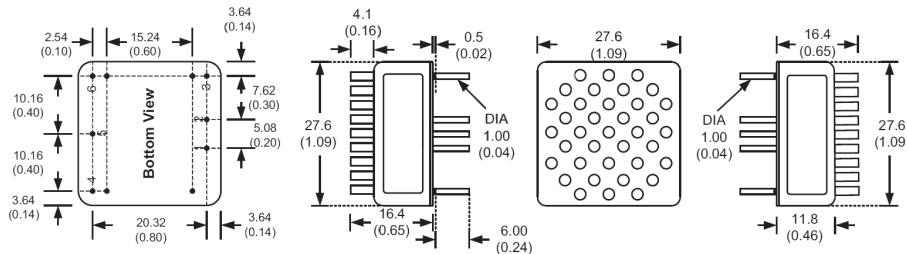
General					
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	84		90	%	See Model & Ratings table
Isolation	3000			VDC	Input to output
	1600				Case to Input / Output
Isolation resistance	1000			M Ohm	
Isolation capacitance			2000	pF	
Switching frequency		330		KHz	24V input models
		245			110V input models
Power density			25.9	W/In ³	
MTBF		>190		KHrs	As per MIL-HDBK-217F, 25°C GB

Environmental					
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-40		100	°C	Max. 61°C at 100% load. See de-rating curve p1
Storage temperature	-55		125	°C	
Max Case temperature			105	°C	
Cooling					Convection cooled
Humidity			95	% RH	Non-condensing

EMC: Emissions		
	Standard	Notes & Conditions
Conducted	EN50121-3-2	To meet 79dBuV from 0.15-0.5MHz and 73dBuV from 0.5-30MHz (EN55032) EMI filter required see p3
Radiated	EN50121-3-2	

EMC: Immunity			
	Standard	Criteria	Notes & Conditions
ESD	EN50121-3-2	A	Air ±8KV, Contact ±6KV
Radiated	EN50121-3-2	A	20V/m
EFT/Burst	EN50121-3-2	A	2KV: External input capacitor required: 330uF/100V models HTR2024XX, 2x in parallel 100uF/250V models HTR20110XX
Surges	EN50121-3-2	A	2KV: External input capacitor required: 330uF/100V models HTR2024XX, 2x in parallel 100uF/250V models HTR20110XX
Conducted	EN50121-3-2	A	10V
Magnetic fields	EN61000-4-8	A	100A/m

Mechanical Details



Pin Connections		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	+Vout	+Vout
5	Trim	Com
6	-Vout	-Vout

Notes

1. All dimensions shown in millimetres (inches)
2. Pin diameter 1.0 ±0.05 (0.04 ±0.002)
3. Case tolerance ±0.5 (±0.002)
4. Stand-off tolerance ±0.1 (±0.004)
5. Pin pitch tolerance ±0.35 (±0.014)

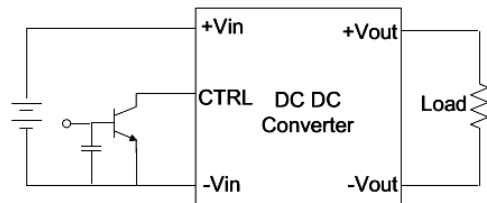
Physical

Parameter	Rating
Case material	Aluminum
Pin material	1.0mm Brass solder coated
Potting material	Epoxy (UL94V-0)
Weight	22.7g
Dimensions	1.09 x 1.09 x 0.65"
Soldering temperature	1.5mm from case, 10s and 260°C max.

Application notes

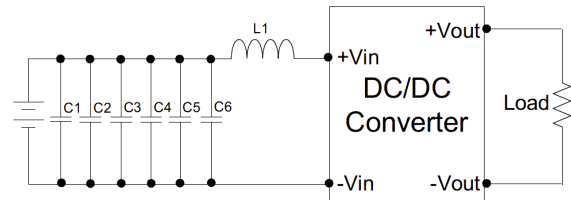
Remote ON/OFF

The HTR20 series output can be turned on and off using the remote on/off function. If Pin 1 is left open circuit or 3-12VDC then the unit is ON. Module off: short circuit pin 1 and 2 or 0 to 1.2 Vdc. Off input current 5mA typ.



EMI Filter

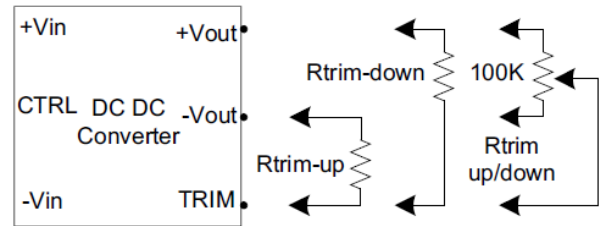
The input filter components C1 to 6 can be fitted to help meet conducted emission requirements for EN5032 Level A. They should be mounted as close as possible to the module. Lead lengths should be minimized and where possible avoid running input and output tracks under the module as part of good design practice for best EMC performance.



Model number	C1-6	L1
HTR2024XX	None	None
HTR20110XX	1812, 1uF, 250V	12uH

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.



HTR20XXX03SSK

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	2.97	Volts
Rtrim-down	817.535	362.230	215.448	142.957	99.747	71.057	50.622	35.326	23.448	13.957	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630	Volts
Rtrim-up	567.584	263.172	158.473	105.497	73.508	52.096	36.760	25.235	16.257	9.066	KOhms

HTR20XXX05SSK

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	117.886	61.634	38.388	25.688	17.684	12.179	8.159	5.096	2.683	0.735	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500	Volts
Rtrim-up	616.020	221.402	131.336	91.426	68.900	54.432	44.353	36.930	31.235	26.727	KOhms

HTR20XXX12SSK

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	345.033	164.830	98.862	64.647	43.707	29.571	19.386	11.699	5.692	0.867	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200	Volts
Rtrim-up	1015.590	448.881	280.558	199.789	152.361	121.162	99.078	82.625	69.892	59.745	KOhms

HTR20XXX15SSK

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	174.366	91.104	56.589	37.706	25.796	17.598	11.611	7.047	3.453	0.548	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500	Volts
Rtrim-up	661.510	231.250	134.015	91.042	66.818	51.270	40.445	32.475	26.362	21.524	KOhms