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TRACO POWER

DC/DC Medical Converter

THM 20 Series, 20 Watt

- **Wide 2:1 input voltage 20 W DC/DC converter in a 1.6 x 1 ” plastic case**
- **I/O isolation 5000 VAC rated for 250 VAC working voltage**
- **Certification according to IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP**
- **Risk management process according to ISO 14971 incl. risk management file**
- **Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3**
- **Low leakage current <2.5 µA**
- **Operating temperature –40°C to 80°C**
- **EMC compliance to IEC 60601-1-2 4th edition and EN55032 class A**
- **Operating up to 5000m altitude**
- **5-year product warranty**



2MOPP

Scheme

ES 60601-1 IEC 60601-1
UL 62368-1 IEC 62368-1

The THM 20 series is a range of medical 20 Watt DC/DC converters in 1.6” x 1.0” plastic package and with wide 2:1 input voltage range. They provide a reinforced isolation system for 5000 VAC isolation and a very low leakage current of less than 2.5 µA. The units are approved to IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP and come along with an ISO 14971 risk management file. Design and production conform to the quality management system ISO 13485. With a high efficiency of up to 89% and highest grade components the converters can reliably operate in an ambient temperature range of –40°C up to +80°C. They constitute a reliable solution not only for medical equipment but also for demanding ranges of application such as transportation, control & measurement or IGBT drivers.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
THM 20-1211	9 - 18 VDC (12 VDC nom.)	5 VDC	4'000 mA			89 %
THM 20-1212		12 VDC	1'670 mA			89 %
THM 20-1213		15 VDC	1'330 mA			89 %
THM 20-1215		24 VDC	833 mA			89 %
THM 20-1221		+5 VDC	2'000 mA	–5 VDC	2'000 mA	86 %
THM 20-1222		+12 VDC	833 mA	–12 VDC	833 mA	89 %
THM 20-1223		+15 VDC	667 mA	–15 VDC	667 mA	89 %
THM 20-2411	18 - 36 VDC (24 VDC nom.)	5 VDC	4'000 mA			90 %
THM 20-2412		12 VDC	1'670 mA			90 %
THM 20-2413		15 VDC	1'330 mA			90 %
THM 20-2415		24 VDC	833 mA			90 %
THM 20-2421		+5 VDC	2'000 mA	–5 VDC	2'000 mA	86 %
THM 20-2422		+12 VDC	833 mA	–12 VDC	833 mA	90 %
THM 20-2423		+15 VDC	667 mA	–15 VDC	667 mA	90 %
THM 20-4811	36 - 75 VDC (48 VDC nom.)	5 VDC	4'000 mA			90 %
THM 20-4812		12 VDC	1'670 mA			89 %
THM 20-4813		15 VDC	1'330 mA			89 %
THM 20-4815		24 VDC	833 mA			89 %
THM 20-4821		+5 VDC	2'000 mA	–5 VDC	2'000 mA	86 %
THM 20-4822		+12 VDC	833 mA	–12 VDC	833 mA	89 %
THM 20-4823		+15 VDC	667 mA	–15 VDC	667 mA	89 %

Options

on demand (backorder with MOQ non stocking item)	- Optional models with Remote On/Off function - Optional models with inverse Remote On/Off function (passive = off)

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Input Specifications

Input Current	- At no load	12 Vin models:	11 mA typ.
		24 Vin models:	9 mA typ.
		48 Vin models:	9 mA typ.
Surge Voltage		12 Vin models:	25 VDC max. (3 s max.)
		24 Vin models:	50 VDC max. (3 s max.)
		48 Vin models:	100 VDC max. (3 s max.)
Under Voltage Lockout		12 Vin models:	7.8 VDC min. / 8 VDC typ. / 8.6 VDC max.
		24 Vin models:	15.8 VDC min. / 16 VDC typ. / 17.4 VDC max.
		48 Vin models:	32 VDC min. / 33 VDC typ. / 34 VDC max.
Recommended Input Fuse		12 Vin models:	4'000 mA (slow blow)
		24 Vin models:	2'000 mA (slow blow)
		48 Vin models:	1'000 mA (slow blow)
			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Pi-Type

Output Specifications

Output Voltage Adjustment			–10% to +20% (15 & 24 Vout models)
			±10% (other models)
			(single output models only)
			(By external trim resistor)
		See application note:	www.tracopower.com/thm20-adj/
			Output power must not exceed rated power!
Voltage Set Accuracy			±1% max.
Regulation	- Input Variation (Vmin - Vmax)	single output models:	0.2% max.
		dual output models:	0.5% max.
	- Load Variation (0 - 100%)	single output models:	0.2% max.
		dual output models:	1% max. (Output 1)
			1% max. (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models:	5% max.
Ripple and Noise (20 MHz Bandwidth)	- single output	5 Vout models:	50 mVp-p typ. (w/ 10 µF X7R)
		12 Vout models:	75 mVp-p typ. (w/ 10 µF X7R)
		15 Vout models:	75 mVp-p typ. (w/ 10 µF X7R)
		24 Vout models:	100 mVp-p typ. (w/ 4.7 µF X7R)
	- dual output	5 / -5 Vout models:	50 / 50 mVp-p typ. (w/ 10 µF X7R)
		12 / -12 Vout models:	75 / 75 mVp-p typ. (w/ 10 µF X7R)
		15 / -15 Vout models:	75 / 75 mVp-p typ. (w/ 10 µF X7R)
Capacitive Load	- single output	5 Vout models:	5'000 µF max.
		12 Vout models:	850 µF max.
		15 Vout models:	700 µF max.
		24 Vout models:	220 µF max.
	- dual output	5 / -5 Vout models:	2'500 / 2'500 µF max.
		12 / -12 Vout models:	500 / 500 µF max.
		15 / -15 Vout models:	350 / 350 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			30 ms typ. / 60 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			185% max. of Iout max.
			150% typ. of Iout max.

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

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Overvoltage Protection		125% typ. of Vout nom. (depending on model) 6.2 VDC typ. (5 VDC model) 15 VDC typ. (12 VDC model) 20 VDC typ. (15 VDC model) 30 VDC typ. (24 VDC model) 6.2 VDC typ. (±5 VDC model) 15 VDC typ (±12 VDC model) 20 VDC typ. (±15 VDC model)
Transient Response	- Response Time	250 µs typ. (25% Load Step)

Safety Specifications

Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Medical Equipment	EN 60601-1 IEC 60601-1 ANSI/AAMI ES 60601-1 2 x MOPP (Means Of Patient Protection)
	- Certification Documents	www.tracopower.com/thm20-safety-cert/
Energy Source	- Output, acc. to 62368-1	ES1
Power Source	- Output, acc. to 62368-1	PS2
Pollution Degree		PD 2
Over Voltage Category		Not mains connected

EMC Specifications

EMI (Emissions)			EN 60601-1-2 edition 4 (Medical Devices)
	- Conducted Emissions		EN 55011 class A (internal filter) EN 55011 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter) FCC 47 Part 18 class A (internal filter) FCC 47 Part 18 class B (with external filter)
	- Radiated Emissions		EN 55011 class A (internal filter) EN 55011 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter) FCC 47 Part 18 class A (internal filter) FCC 47 Part 18 class B (with external filter)
		External filter proposal:	www.tracopower.com/thm20-emc-filter/
EMS (Immunity)			EN 60601-1-2 edition 4 (Medical Devices)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±15 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±8 kV, perf. criteria A
	- RF Electromagnetic Field		EN 61000-4-3, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge		EN 61000-4-4, ±2 kV, perf. criteria A
			EN 61000-4-5, ±2 kV, perf. criteria A
		Ext. input component:	12 Vin models: 2 x KY 220 µF || TVS SMDJ36A 24 Vin models: 2 x KY 220 µF || TVS SMDJ58A 48 Vin models: 2 x KY 220 µF || TVS SMDJ120A
	- Conducted RF Disturbances		EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous:	EN 61000-4-8, 100 A/m, perf. criteria A
		1 s:	EN 61000-4-8, 1000 A/m, perf. criteria A
EMC / Environmental	- Certification Documents		www.tracopower.com/thm20-emc-cert/

General Specifications

Relative Humidity		95% max. (non condensing)

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

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Temperature Ranges	- Operating Temperature	–40°C to +80°C
	- Case Temperature	+105°C max.
	- Storage Temperature	–55°C to +125°C
Power Derating	- High Temperature	2.0 %/K above 55°C
	See application note:	www.tracopower.com/thm20-cc/
Over Temperature Protection Switch Off	- Protection Mode	115°C max. (Automatic recovery)
	- Measurement Point	Case
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote (passive = on)	On: 3.5 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current	2.5 mA typ.
	- Remote Pin Input Current	-0.5 to 1.0 mA (Optional models with inverse Remote On/Off function (passive = off))
Altitude During Operation		5'000 m max.
Switching Frequency		225 - 285 kHz (PWM) 250 kHz typ. (PWM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		250 VAC
Isolation Test Voltage	- Input to Output, 60 s	5'000 VAC
	- Input to Output, 1 s	10'000 VDC
Creepage	- Input to Output	8 mm min.
Clearance	- Input to Output	8 mm min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	20 pF typ.
Leakage Current	- Touch Current	2.5 µA max. (at 240 VAC / 60 Hz)
Reliability	- Calculated MTBF	1'712'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration	MIL-STD-810F
	- Thermal Shock	MIL-STD-810F
Housing Material		Non-conductive Plastic (UL 94 V-0 rated)
Base Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Copper
Pin Foundation Plating		Nickel (2 - 3 µm)
Pin Surface Plating		Tin (3 - 5 µm), matte
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		1.6" x 1"
Soldering Profile		Lead-Free Wave Soldering 265°C / 10 s max.
Weight		24 g
Thermal Impedance	- Case to Ambient	14.4 K/W typ.
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7(a), 7(c)-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	e6fcf163-9888-4f03-9c5e-6783f37ee014

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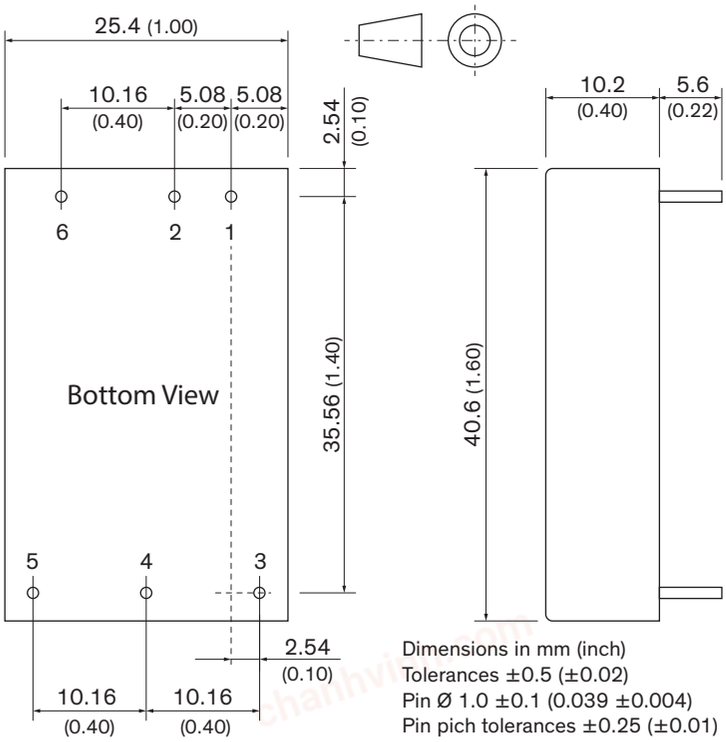
Additional Information

Supporting Documents	www.tracopower.com/overview/thm20
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf
Service Portal	www.tracoserviceportal.com
Product Notification Subscription	www.tracopower.com/pcn-sub/thm20

Outline Dimensions



Dimensions in mm (inch)
Tolerances ±0.5 (±0.02)
Pin Ø 1.0 ±0.1 (0.039 ±0.004)
Pin pich tolerances ±0.25 (±0.01)

Pinout		
Pin	**Single Output**	**Dual Output**
1	+Vin (Vcc)	+Vin (Vcc)
2	–Vin (GND)	–Vin (GND)
3	+Vout	+Vout
4	–Vout	Common
5	Trim	–Vout
6	No pin*/Remote	No pin*/Remote

*If remote is not selected there will be no pin.

Avoid routing PCB traces under the converter.

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