

- **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**



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 typ. |
|-------------|------------------------------|----------|------------------|----------|------------------|-----------------|
| | | Vnom | I _{max} | Vnom | I _{max} | |
| 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) | <ul style="list-style-type: none"> - Optional models with Remote On/Off function - Optional models with inverse Remote On/Off function (passive = off) |
|---|--|

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/overview/thm20 Output power must not exceed rated power! |
| Voltage Set Accuracy | | ±1% max. |
| Regulation | - Input Variation (Vmin - Vmax) - Load Variation (0 - 100%) - Cross Regulation (25% / 100% asym. load) | single output models: 0.2% max. dual output models: 0.5% max. single output models: 0.2% max. dual output models: 1% max. (Output 1) 1% max. (Output 2) dual output models: 5% max. |
| Ripple and Noise (20 MHz Bandwidth) | - single output - dual 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) 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 - dual 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. 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.

| | | |
|------------------------|-----------------|---|
| 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/overview/thm20 |
| Pollution Degree | | PD 2 |
| Over Voltage Category | | OVC II |

EMC Specifications

| | | |
|---------------------|-----------------------------|---|
| EMI (Emissions) | - Conducted Emissions | EN 60601-1-2 edition 4 (Medical Devices) 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/overview/thm20 |
| EMS (Immunity) | - Electrostatic Discharge | EN 60601-1-2 edition 4 (Medical Devices) 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/overview/thm20 |

General Specifications

| | | |
|--------------------|-------------------------|---------------------------|
| Relative Humidity | | 95% max. (non condensing) |
| Temperature Ranges | - Operating Temperature | -40°C to +80°C |
| | - Case Temperature | +105°C max. |
| | - Storage Temperature | -55°C to +125°C |

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

| | | |
|--|--|---|
| Power Derating | - High Temperature | 2 %/K above 55°C See application note: www.tracopower.com/overview/thm20 |
| Over Temperature Protection Switch Off | - Protection Mode - Measurement Point | 115°C max. (Automatic recovery) Case |
| Cooling System | | Natural convection (20 LFM) |
| Remote Control | - Voltage Controlled Remote (passive = on) - Off Idle Input Current - Remote Pin Input Current | On: 3.5 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin 2.5 mA typ. -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 - Input to Output, 1 s | 5'000 VAC 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. (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 - Thermal Shock | MIL-STD-810F 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 - RoHS Declaration - SCIP Reference Number | www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a, 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) e6fcf163-9888-4f03-9c5e-6783f37ee014 |

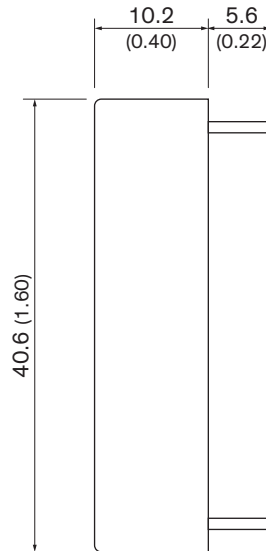
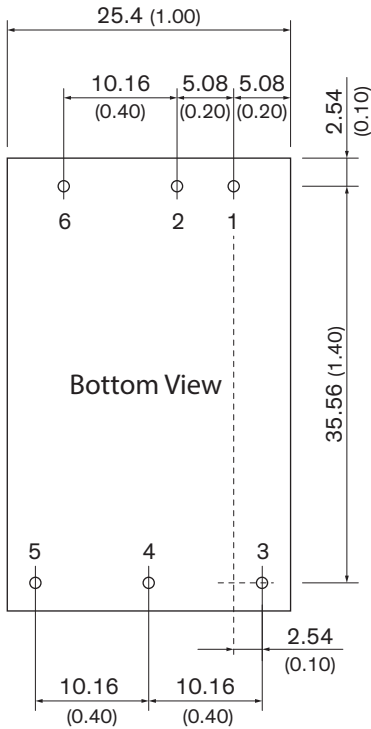
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/thm20

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

Outline Dimensions



Dimensions in mm (inch)
 Tolerances ± 0.5 (± 0.02)
 Pin \varnothing 1.0 ± 0.1 (0.039 ± 0.004)
 Pin pitch 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.