TRACO POWER

DC/DC Converter

TRI 20 Series, 20 Watt

- **Reinforced I/O-isolation 4200 VAC rated for 1000 VAC working voltage**
- **Ultra-high isolation peak voltage 8000 VDC (1s)**
- **Common Mode Transient Immunity (dv/dt) 15 kV/µs**
- **Operating temperature range -40 to +76°C**
- **Low no-load power consumption 240 – 480 mW**
- **Internal EN 55032 class A filter**
- **High efficiency up to 90%**
- **2:1 input voltage range: 9-18, 18-36, 36-75 VDC**
- **Protection against overload, overvoltage and short circuit**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The new TRI 20 is a high isolation, regulated 20 Watt DC/DC converter series which comes in a compact 2”x1” package. The core characteristic of the TRI 20 series is a sophisticated reinforced isolation system which is able to withstand high test voltages (8000 VDC for 1s and 4200 VAC for 60s) and working voltages (1000 VACrms). Complementing this isolation characteristic is a high Common Mode Transient Immunity of 15 kV/µs. The new design allows to fully integrate an EN 55032 class A filter and greatly reduces the no-load power consumption. High efficiencies up to 90% allow safe operation from –40°C to +55°C without derating and up to +76°C with derating. All models have a wide 2:1 input voltage range and precisely regulated, isolated output voltages. With the latest IT safety certifications (IEC/EN/UL 62368-1) the TRI 20 series is the perfect choice for many demanding applications in the industrial, transportation and instrumentation sectors.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
TRI 20-1211	9 - 18 VDC (12 VDC nom.)	5.1 VDC	4'000 mA			85 %
TRI 20-1212		12 VDC	1'670 mA			88 %
TRI 20-1213		15 VDC	1'333 mA			88 %
TRI 20-1215		24 VDC	840 mA			89 %
TRI 20-1222		+12 VDC	840 mA	–12 VDC	840 mA	89 %
TRI 20-1223		+15 VDC	670 mA	–15 VDC	670 mA	89 %
TRI 20-2411	18 - 36 VDC (24 VDC nom.)	5.1 VDC	4'000 mA			87 %
TRI 20-2412		12 VDC	1'670 mA			88 %
TRI 20-2413		15 VDC	1'333 mA			89 %
TRI 20-2415		24 VDC	840 mA			90 %
TRI 20-2422		+12 VDC	840 mA	–12 VDC	840 mA	90 %
TRI 20-2423		+15 VDC	670 mA	–15 VDC	670 mA	90 %
TRI 20-4811	36 - 75 VDC (48 VDC nom.)	5.1 VDC	4'000 mA			87 %
TRI 20-4812		12 VDC	1'670 mA			88 %
TRI 20-4813		15 VDC	1'333 mA			90 %
TRI 20-4815		24 VDC	840 mA			89 %
TRI 20-4822		+12 VDC	840 mA	–12 VDC	840 mA	89 %
TRI 20-4823		+15 VDC	670 mA	–15 VDC	670 mA	90 %

Input Specifications

Input Current	- At no load	12 Vin models:	20 mA typ.
		24 Vin models:	15 mA typ.
		48 Vin models:	10 mA typ.
	- At full load	12 Vin models:	1'910 mA typ.
		24 Vin models:	945 mA typ.
		48 Vin models:	475 mA typ.
Surge Voltage		12 Vin models:	25 VDC max. (100 ms max.)
		24 Vin models:	50 VDC max. (100 ms max.)
		48 Vin models:	100 VDC max. (100 ms max.)
Under Voltage Lockout		12 Vin models:	7.5 VDC typ.
		24 Vin models:	15 VDC typ.
		48 Vin models:	33 VDC typ.
Reflected Ripple Current		12 Vin models:	100 mAp-p typ.
		24 Vin models:	50 mAp-p typ.
		48 Vin models:	30 mAp-p typ.
Recommended Input Fuse			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Pi-Type

Output Specifications

Voltage Set Accuracy			±1% max.
Regulation	- Input Variation (Vmin - Vmax)	single output models:	0.5% max.
		dual output models:	0.5% max.
	- Load Variation (0 - 100%)	single output models:	0.5% max.
		dual output models:	1% max. (Output 1)
			1% max. (Output 2)
	- Voltage Balance (symmetrical load)	dual output models:	2% max.
Ripple and Noise (20 MHz Bandwidth)	- single output	5.1 Vout models:	50 mVp-p typ. (w/ 4.7 µF MLCC)
		12 Vout models:	100 mVp-p typ. (w/ 4.7 µF MLCC)
		15 Vout models:	100 mVp-p typ. (w/ 4.7 µF MLCC)
		24 Vout models:	150 mVp-p typ. (w/ 4.7 µF MLCC)
	- dual output	12 / -12 Vout models:	100 / 100 mVp-p typ. (w/ 4.7 µF MLCC)
		15 / -15 Vout models:	100 / 100 mVp-p typ. (w/ 4.7 µF MLCC)
Capacitive Load	- single output	5.1 Vout models:	6'800 µF max.
		12 Vout models:	1'160 µF max.
		15 Vout models:	750 µF max.
		24 Vout models:	295 µF max.
	- dual output	12 / -12 Vout models:	590 / 590 µF max.
		15 / -15 Vout models:	380 / 380 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			30 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			150% typ. of Iout max.
Overvoltage Protection			120% typ. of Vout nom.
Transient Response	- Response Deviation		5% max. (75% to 100% Load Step)
	- Response Time		300 µs typ. (75% to 100% Load Step)

Safety Specifications

Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Certification Documents	www.tracopower.com/tri20-safety-cert
Energy Source	- Output, acc. to 62368-1	ES1

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

Power Source	- Output, acc. to 62368-1		PS3
Pollution Degree			PD 2
Over Voltage Category			Not mains connected

EMC Specifications

EMI (Emissions)	- Conducted Emissions		EN 55032 class A (internal filter)
			EN 55032 class B (with external filter)
			FCC 47 Part 15 class A (internal filter)
	- Radiated Emissions		EN 55032 class A (internal filter)
			FCC 47 Part 15 class A (internal filter)
		External filter proposal:	www.tracopower.com/tri20-emc-filter
EMS (Immunity)			EN 55024 (IT Equipment)
			EN 55035 (Multimedia)
	- 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, ±1 kV, perf. criteria A
		Ext. input component:	12 & 24 Vin models: KY 560 µF || V15P8-M3 48 Vin models: KY 560 µF || V15P10
	- 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
EMC / Environmental	- Certification Documents		www.tracopower.com/tri20-emc-cert

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +76°C
	- Case Temperature		+95°C max.
	- Storage Temperature		–50°C to +125°C
Power Derating	- High Temperature		Depending on model
		See application note:	www.tracopower.com/tri20-cc
Cooling System			Natural convection (20 LFM)
Altitude During Operation			5'000 m max.
Switching Frequency			285 kHz typ. (PWM)
Insulation System			Reinforced Insulation
Working Voltage (rated)			1'000 VAC
Isolation Test Voltage	- Input to Output, 60 s		4'200 VAC
	- Input to Output, 1 s		8'000 VDC
Isolation Resistance	- Input to Output, 500 VDC		10'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V		80 pF max.
Common Mode Transient Immunity			15 kV/µs min.
Reliability	- Calculated MTBF		1'087'000 h (MIL-HDBK-217F, ground benign)
Washing Process			According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Housing Material			Non-conductive Plastic (UL 94 V-0 rated)
Potting Material			Silicone (UL 94 V-0 rated)
Pin Material			Copper Alloy (C6801)
Pin Foundation Plating			Nickel (2 - 4 µm)
Pin Surface Plating			Tin (5 - 7 µm), matte
Housing Type			Plastic Case
Mounting Type			PCB Mount
Connection Type			THD (Through-Hole Device)
Footprint Type			2" x 1"
Soldering Profile			Lead-Free Wave Soldering 260°C / 10 s max.

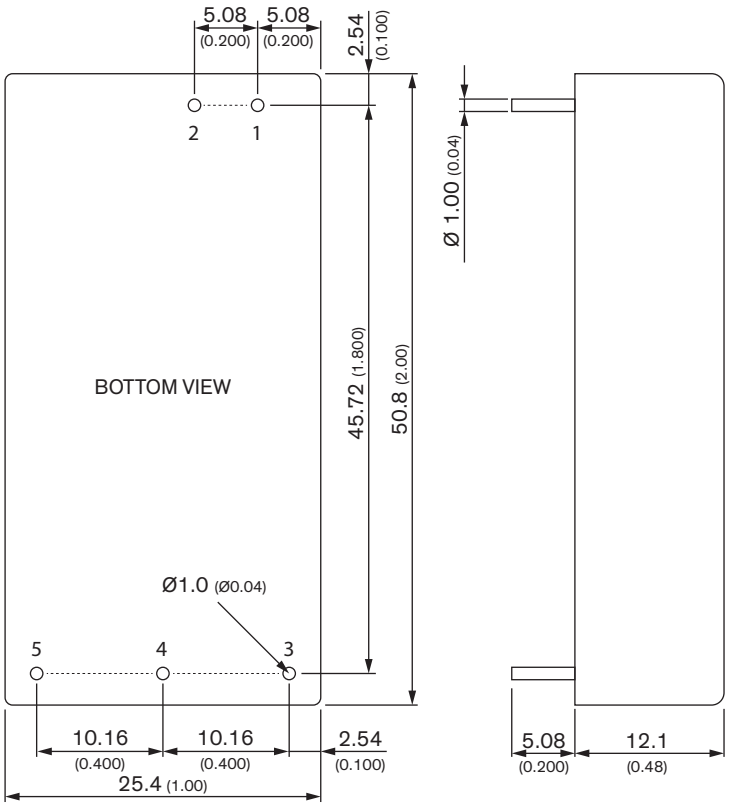
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Weight		30 g
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf
		REACH SVHC list compliant
		REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf
		Exemptions: 7(a)
		(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	72ece1c0-ea03-45ef-b838-5960e517047f

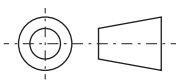
Additional Information

Supporting Documents	www.tracopower.com/overview/tri20
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf

Outline Dimensions



Dimensions in mm (inch)
Tolerances: x.x ±0.5 (x.xx ±0.02)
x.xx ±0.25 (x.xxx ±0.010)
Pin diameter tolerances: x.x ±0.05 (x.xx ±0.002)



Pinout

Pin	Single Output	Dual Output
1	+Vin (Vcc)	+Vin (Vcc)
2	–Vin (GND)	–Vin (GND)
3	+Vout	+Vout
4	No pin	Common
5	–Vout	–Vout

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