TRACO POWER

DC/DC Converter

TMDC 60H Series, 60 Watt

- **Fully encapsulated chassis mount modules**
- **High 2:1 input voltage range: 80-160 VDC**
- **Reinforced I/O-isolation 3'000 VAC**
- **Harsh industrial EMC capabilities: Integrated filters for emission (EN 55032) & immunity (EN 55035)**
- **Operating temperature range -40 to +75°C without derating**
- **Protection against overload, undervoltage and short circuit**
- **DC-OK (LED) and Remote On/Off function**
- **IEC/EN/UL 62368-1 safety approvals**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The TMDC 60H series complements Traco Power's successful TMDC line of Industrial DC/DC off-board modules. All models provide a high 2:1 input voltage range from 80-160 VDC and a reinforced 3000 VAC isolation voltage as well as fully regulated outputs. Internal filters limit conducted and radiated emissions (EN 55032 class A) but also increase the modules EMC immunity (EN 55035). The modules come in fully encapsulated plastic packages and feature a high temperature range from –40° up to 75°C without derating. Latest IT safety certifications (UL 62368-1) and DC-OK and remote on/off functions complete the package to provide an ideal solution for many harsh industrial and 110 VDC battery applications in need of a reinforced isolation to provide a safe SELV output.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
TMDC 60-7211H	80 - 160 VDC (110 VDC nom.)	5.1 VDC	12'000 mA			88 %
TMDC 60-7212H		12 VDC	5'000 mA			89 %
TMDC 60-7213H		15 VDC	4'000 mA			89 %
TMDC 60-7215H		24 VDC	2'500 mA			88 %
TMDC 60-7218H		48 VDC	1'250 mA			88 %
TMDC 60-7222H		+12 VDC	2'500 mA	–12 VDC	2'500 mA	88 %
TMDC 60-7223H		+15 VDC	2'000 mA	–15 VDC	2'000 mA	88 %
TMDC 60-7225H		+24 VDC	1'250 mA	–24 VDC	1'250 mA	88 %

Options

TMP-MK2	- Optional DIN-Rail Mounting Kit: www.tracopower.com/overview/tmp-mk2

Input Specifications

Input Current	- At no load		10 mA typ.
	- At full load		620 mA typ.
Surge Voltage			170 VDC max. (100 ms max.)
Under Voltage Lockout			65 VDC min. / 70 VDC typ.
Recommended Input Fuse			2'500 mA (The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Pi-Type

Output Specifications

Voltage Set Accuracy			±2% max.
Regulation	- Input Variation (Vmin - Vmax)	single output models:	1% max.
		dual output models:	1% max.
	- Load Variation (0 - 100%)	single output models:	1% max.
		dual output models:	1% max. (Output 1)
			1% max. (Output 2)
	- Voltage Balance (symmetrical load)	dual output models:	2% max.
	- Cross Regulation (25% / 100% asym. load)	dual output models:	5% max.
Ripple and Noise (20 MHz Bandwidth)	- single output	5.1 Vout models:	100 mVp-p max.
		12 Vout models:	150 mVp-p max.
		15 Vout models:	150 mVp-p max.
		24 Vout models:	150 mVp-p max.
		48 Vout models:	200 mVp-p max.
	- dual output	12 / -12 Vout models:	150 / 150 mVp-p max.
		15 / -15 Vout models:	150 / 150 mVp-p max.
		24 / -24 Vout models:	200 / 200 mVp-p max.
Capacitive Load	- single output	5.1 Vout models:	20'400 µF max.
		12 Vout models:	3'540 µF max.
		15 Vout models:	2'200 µF max.
		24 Vout models:	890 µF max.
		48 Vout models:	220 µF max.
	- dual output	12 / -12 Vout models:	1'800 / 1'800 µF max.
		15 / -15 Vout models:	1'200 / 1'200 µF max.
		24 / -24 Vout models:	470 / 470 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			180% max. of Iout max. 150% typ. of Iout max.
Overvoltage Protection			120% typ. of Vout nom. (5.1, 15, ±15 Vout models) 125% typ. of Vout nom. (other models) (By Zener diode)
Transient Response	- Response Deviation		5% max. (75% to 100% Load Step)
	- Response Time		250 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/tmdc60h-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		PS2
Pollution Degree			PD 3
Over Voltage Category			Not mains connected

EMC Specifications

EMI (Emissions)	- Conducted Emissions		EN 55032 class A (internal 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)
EMS (Immunity)			EN 55024 (IT Equipment) EN 55035 (Multimedia)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±8 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±6 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
	- 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/tmdc60h-emc-cert/

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +90°C
	- Case Temperature		+105°C max.
	- Storage Temperature		–50°C to +125°C
Power Derating	- High Temperature		2.9 %/K above 70°C (5.1 Vout model) 3.3 %/K above 75°C (other models)
		See application note:	www.tracopower.com/tmdc60h-cc/
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		3 mA typ.
	- Remote Pin Input Current		-0.5 to 0.5 mA
Altitude During Operation			5'000 m max.
Switching Frequency			160 - 220 kHz (PWM) (5.1 Vout model) 187 - 253 kHz (PWM) (other models)
Insulation System			Reinforced Insulation
Working Voltage (rated)			1'000 VAC
Isolation Test Voltage	- Input to Output, 60 s		3'000 VAC
Isolation Resistance	- Input to Output, 500 VDC		1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V		3'000 pF max.
Reliability	- Calculated MTBF		218'000 h (MIL-HDBK-217F, ground benign)
Housing Material			Plastic resin (UL 94 V-0 rated)
Potting Material			Silicone (UL 94 V-0 rated)
Housing Type			Plastic Case
Mounting Type			Chassis Mount
Connection Type			Screw Terminal
Weight			300 g

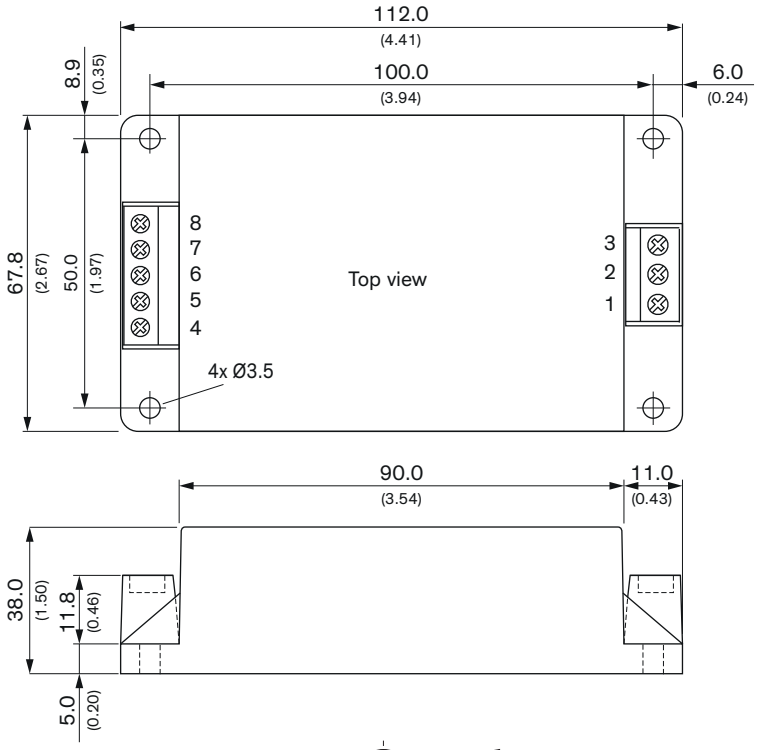
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Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf
		REACH SVHC list compliant
		REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf
		Exemptions: 6(c), 7(a)
		(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	0dfe6b43-84be-4ec8-9b12-7ff8f4519780

Additional Information

Supporting Documents	www.tracopower.com/overview/tmdc60h
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf
Service Portal	www.tracoserviceportal.com

Outline Dimensions



Dimensions in mm (inch)
Tolerances: x.x ±0.5 (±0.02)

Mounting screw locked torque: 0.49 Nm (5.0 kgfcm)

Pinout		
Pin*	**Single Output**	**Dual Output**
1	Remote	Remote
2	–Vin (GND)	–Vin (GND)
3	+Vin (Vcc)	+Vin (Vcc)
4	NC	+Vout
5	+Vout	NC
6	NC	Common
7	–Vout	NC
8	NC	–Vout

NC: Not connected

Terminal screw locked torque: 0.5 Nm max.

Wire dimension: 1.5 mm^2 max.

Note: The size of the wires has to be assessed in the final application.

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