

- 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



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 typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
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: <a href="http://www.tracopower.com/products/tmp-mk2.pdf">www.tracopower.com/products/tmp-mk2.pdf</a>
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### Input Specifications

Input Current	- At no load - At full load	10 mA typ. 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) - Load Variation (0 - 100%) - Voltage Balance (symmetrical load) - Cross Regulation (25% / 100% asym. load)	single output models: 1% max. dual output models: 1% max. single output models: 1% max. dual output models: 1% max. (Output 1) 1% max. (Output 2) dual output models: 2% max. dual output models: 5% max.
Ripple and Noise (20 MHz Bandwidth)	- single output - dual 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. 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 - dual 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. 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 - Response Time	5% max. (75% to 100% Load Step) 250 µs typ. (75% to 100% Load Step)

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

### Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Certification Documents	<a href="http://www.tracopower.com/overview/tmdc60h">www.tracopower.com/overview/tmdc60h</a>
Pollution Degree		PD 3

### EMC Specifications

EMI Emissions	- Conducted Emissions	EN 55032 class A (internal filter) FCC Part 15 class A (internal filter)
	- Radiated Emissions	EN 55032 class A (internal filter) FCC Part 15 class A (internal filter)
EMS Immunity		EN 55024 (IT Equipment) EN 55035 (Multimedia)
	- Electrostatic Discharge	Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A
	- RF Electromagnetic Field	EN 61000-4-3, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 2$ kV, perf. criteria A
	- Conducted RF Disturbances - PF Magnetic Field	EN 61000-4-6, 10 Vrms, perf. criteria A Continuous: EN 61000-4-8, 100 A/m, perf. criteria A

### 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: <a href="http://www.tracopower.com/overview/tmdc60h">www.tracopower.com/overview/tmdc60h</a>
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	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 M $\Omega$ 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

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

Environmental Compliance - REACH Declaration

[www.tracopower.com/info/reach-declaration.pdf](http://www.tracopower.com/info/reach-declaration.pdf)

REACH SVHC list compliant

REACH Annex XVII compliant

- RoHS Declaration

[www.tracopower.com/info/rohs-declaration.pdf](http://www.tracopower.com/info/rohs-declaration.pdf)

Exemptions: 6c, 7a

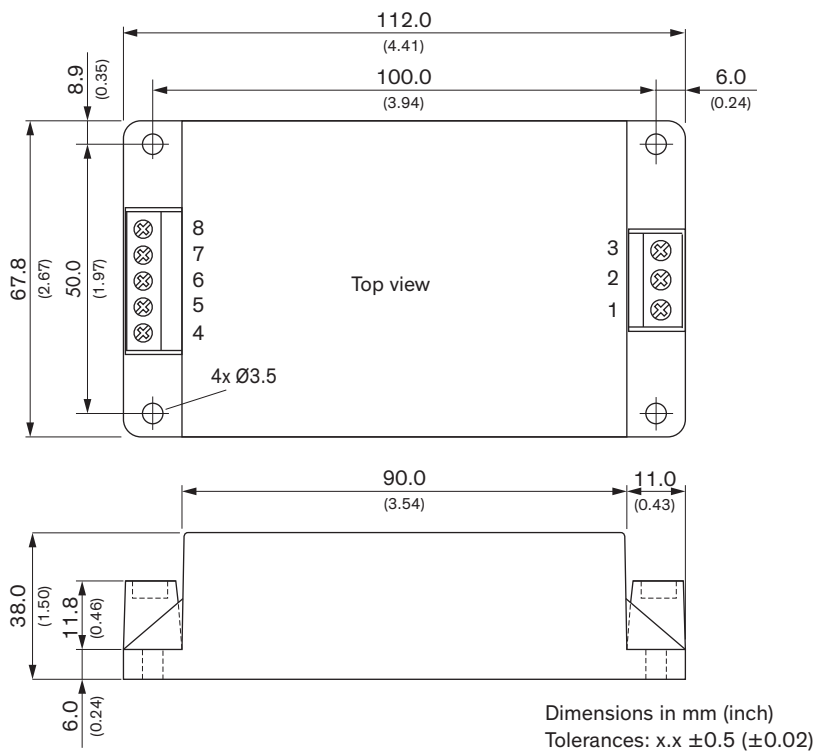
(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).  
The SCIP number is provided on request.)

### Supporting Documents

[Overview Link](#) (for additional Documents)

[www.tracopower.com/overview/tmdc60h](http://www.tracopower.com/overview/tmdc60h)

### Outline Dimensions



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

\* Wires 1.5 mm<sup>2</sup> max.