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High-Efficiency Non-Isolated DC-DC **STEP UP** Converters

19" Rack mount | 32-Bit Microcontroller Controlled | Fanless Design

The **DC-DC RM STEP UP Series** is a family of high-power density, non-isolated, Digitally controlled synchronous DC-DC converters (no diodes for increased efficiency) designed for demanding Telecom applications. Managed by an advanced 32-bit microcontroller core, these units offer precise voltage regulation, intelligent thermal management, and robust electronic protection mechanisms. Featuring a multi-layer PCB layout optimized for low Electromagnetic Interference (EMI) and long-life industrial rated capacitors, the series guarantees true continuous output power without the need for active fan cooling.

1. ## Key Features

- **Advanced Control:** Integrated 32-bit microcontroller handles real-time telemetry, control, LED diagnostics, and ultra-fast fault response.
- **Thermal Management:** Purely fanless, convection-cooled design utilizing high-thermal-efficiency multi-layer PCB design to curb EMI and optimize heat dissipation.
- **Robust Reliability:** Built exclusively with premium, long-life industrial-grade capacitors for extended MTBF (Mean Time Between Failures) in harsh environments.
- **Status LED:** Output-side RGB status LED provides instant visual feedback on load conditions, input health, and fault diagnostics per output channel.
- **Protection:** Electronic Input **Polarity** protection, Input and output hardware current protection by ATO Blade fuse with easy replaceable fuse holders on board.
- **Advanced Protection:** Electronic Input under voltage / over voltage, output over voltage, over-current, short-circuit, and over-temperature safety micro processor cut-outs with automatic retry.

2. # Model specifics

Model Number	Input Voltage (Nominal)	Output Voltage x 2	Rated Continuous Current	Max Continuous Power	Efficiency (Typ.)
Model 24-22-48 RM	24 VDC	22 VDC	13.60 A	300 W	[97%]
		48 VDC	8.30 A	400 W	[96%]

Total Power output max 700W

Note - use large enough gauge wire on input - current can reach 29Amps @ 24V input with both output channels fully loaded to maximum output current.

24V input - Undervoltage lockout @ 21.0VDC - Recover @ 23.0VDC

24V Input - Over voltage protection - 32VDC for models with 24V inputs

3. ## Technical Specifications

Electrical Specifications

- **Topology:** Non-isolated Synchronous Boost Converter
- **Output Power:** True continuous rated output across full operational thermal range without fans
- **Line/Load Regulation:** $\leq \pm 1\%$

Environmental & Thermal Specifications

- **Cooling:** Natural convection / Fanless design
- **Maximum Internal Board Temperature:** 75°C (Shutdown threshold)
- **Storage Temperature:** -40°C to +85°C
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4. ## System Protection & LED Diagnostics

The converter features a front-facing RGB LED on the output side for each channel that communicates real-time operational status, current load profiles, and critical fault states.

Normal Operational States (Load Telemetry) - Both output channels

The LED monitors real-time output current draw and shifts color dynamically based on the percentage of the rated continuous current:

- **Solid Green:** Normal operation; load is between **0% and 60%** of rated capacity.
- **Solid Amber:** Moderate to high load; load is between **60% and 90%** of rated capacity.
- **Solid Red:** Heavy load condition; load is between **90% and 100%** of rated capacity.

Fault & Diagnostic States

If a fault condition triggers a protective shutdown, the microcontroller isolates the output and flags the issue via specific flashing sequences:

LED Behavior	System State	Description / Recovery Action
Solid Blue	Pre-Start Sequence	Microcontroller initialization and power-on self-test (POST).
Flashing Blue	Input VDC Problem	Input voltage is outside acceptable operating limits (Under-voltage / Over-voltage lockout).
Flashing Yellow	Over-Temperature	Internal board temperature has reached 75°C . Output is disabled until the board cools to a safe margin of 50°C .
Flashing Red	Over-Current / Short Circuit	Output exceeded 100% of rated current. Output trips instantly, flashes for 8 seconds , and then initiates an automatic re-start sequence.

5. ## Mechanical Specifications

- **Enclosure Type:** 1U 19" Rack mount
- **PCB Construction:** Multi-layer impedance-controlled FR4 with enhanced copper weight for optimal thermal performance and EMI mitigation.
- **Dimensions (L×W×H):** 480mm x 160mm x 45mm
- **Weight:** 1.4Kg (1400g)
- **Terminals:** Heavy-duty Barrier block screw terminals

6. ## Safety specifications

- Designed to meet electromagnetic compatibility standards (low-EMI multi-layer design).
- Input and Output hardware ATO (Blade fuse) protected
- Input and output electronic voltage and current protection with auto shutdown and auto retry