PowerGuard-D1000 Mil-Spec DC-DC Converter

Product Code: DCDC-1000-12-24

PowerGuard

D1000 Military DC-DC Converter

PowerGuard-D1000 is a high-reliability DC-DC power conversion unit developed by Tedeg Defence for demanding military and outdoor environments. It converts a nominal 12 VDC input (10–18 VDC range) to a regulated 24 VDC / 1 kW continuous output, sustaining full-load operation at +55 °C without derating. Its high-efficiency architecture, ruggedized design, and carefully engineered thermal path ensure stable performance during long-term, mission-critical operation.

The unit features a fully sealed, fanless aluminum enclosure designed for outdoor deployment under rain, dust, and vibration exposure. Heat dissipation is achieved through a conduction-cooled baseplate, transferring thermal energy directly to the host system or an external heatsink. The absence of moving parts provides silent operation and drastically reduces maintenance needs. Power and signal interfaces are realized through MIL-DTL-38999 Series III connectors, ensuring mechanical robustness, environmental sealing, and 360° EMI protection.

Optional communication interfaces such as Ethernet, CAN-Bus, or RS-485 can be integrated, enabling system-level monitoring, control, and diagnostics. For extended field operability, a Remote Commander Control Box is also available to provide remote on/off control, fault indication, and alarm reset.

Designed to meet with MIL-STD-810 environmental and MIL-STD-461 EMC requirements, the PowerGuard-D1000 delivers continuous, reliable power in military vehicles, field communication systems, and tactical power distribution units — wherever absolute reliability under extreme conditions is essential.

Application Areas

The PowerGuard-D1000 has been engineered for deployment in harsh, mission-critical environments where absolute reliability and continuous power delivery are essential.
Its rugged, sealed, and fanless architecture allows integration into a wide range of defense, tactical, and industrial platforms, including:

- **Military and Tactical Vehicles** – 12 V vehicle power conversion to stabilized 24 V bus for onboard electronics, communication, and weapon systems.
- **Mobile Command and Communication Units** – Power source for radio transceivers, radar, data routers, and network control systems.
- **Field Power Distribution Systems** – Integration into outdoor enclosures or shelters for powering surveillance and sensor networks.
- **Unmanned Platforms (UGV / UAV / USV)** – Compact, lightweight DC bus converter for autonomous or remotely operated systems.
- **Base Infrastructure and Ground Support Equipment** – Reliable 24 VDC supply for ground maintenance tools, lighting, and portable systems.
- **Industrial & Emergency Power Systems** – Where silent, fanless, sealed DC power is required for critical communication or monitoring operations.

Designed to meet the operational demands of continuous 24/7 duty, PowerGuard-D1000 ensures dependable power delivery in every mission profile — from armored vehicles and field stations to mobile tactical networks.

Advanced Features

Fanless & Fully Sealed Design

PowerGuard-D1000 is built with a completely sealed, fanless aluminum enclosure, enabling operation in outdoor and battlefield environments where dust, moisture, and rain exposure are unavoidable. The unit dissipates heat entirely through its conduction-cooled baseplate, eliminating moving parts and ensuring silent, maintenance-free performance.

Continuous 1 kW Operation Without Derating

The power stage and thermal architecture are designed to deliver a continuous 1 kW output at +55 °C ambient without derating. Advanced component selection, thermal path optimization, and strict design margins ensure stable long-term operation under 24/7 mission profiles.

Rugged Military Connectors (MIL-DTL-38999 SIII)

All power and signal interfaces use MIL-DTL-38999 Series III connectors with 360° EMI shielding and environmental sealing. Keyed connector configurations prevent mismating between input and output cables. These connectors maintain full performance under vibration, shock, and humidity exposure as defined in MIL-STD-810.

Modular Communication Interface (Optional)

The converter supports optional digital communication interfaces:

- CAN-Bus (ISO 11898 / J1939) for vehicle integration,
- RS-485 (Modbus/RTU) for industrial control networks,
- Ethernet (Modbus/TCP or REST) for advanced system monitoring and diagnostics.
- These interfaces allow remote configuration, performance monitoring, fault reporting, and firmware update capability.

Remote Commander Control Box (Optional)

For extended control flexibility, an external Remote Commander Control Box can be added. This rugged accessory enables remote enable/disable, status indication, and fault reset, ideal for installation in vehicle dashboards or field enclosures.

MIL-STD Compliance

PowerGuard-D1000 is engineered to comply with MIL-STD-810G (environmental durability: temperature, vibration, shock, humidity) and MIL-STD-461 (electromagnetic compatibility: conducted and radiated emissions). This ensures seamless integration in military platforms, mobile command systems, and tactical communication units.

Flexible System Integration

The unit can be mounted directly onto a vehicle frame or system heatsink using its conductive baseplate. Standard EMI filters and bonding points are provided for system-level compliance and ease of installation. Optional pre-terminated harness sets are available upon request.

Electrical Specifications

Parameter	Min	Typ	Max	Notes / Conditions
Input Voltage Range	10 VDC	12 VDC	18 VDC	Nominal vehicle battery range; cold crank & transient protection integrated
Input Current @ 12 VDC, full load	–	–	95 A	Continuous operation at 1 kW, η ⩾ 90%
Input Protection	–	–	–	Reverse polarity, surge suppression, input fuse
Output Voltage	23.8 V	24.0 V	24.5 V	Factory trimmed; remote sensing optional
Output Power (continuous)	–	**1000 W**	–	No derating up to +55 °C ambient
Output Current	–	41.7 A	45 A	Continuous rating; current limit ~110%
Voltage Regulation (line & load)	–	±1%	±2%	Over full input and load range
Ripple & Noise (20 MHz BW)	–	–	200 mVp-p	Measured with 0.1 µF + 47 µF caps
Efficiency	–	90%	–	Typical at 12 V input, full load, +25 °C
Hold-Up Time	–	5 ms	–	Internal capacitance; external bulk optional
Isolation (Input–Output)	–	**1500 VDC**	–	1 min, tested at factory
Startup Delay / Rise Time	–	500 ms	1000 ms	Typical cold start sequence
Protection Features	–	–	–	OVP, OCP, SCP, OTP, reverse polarity
Remote Control	–	–	–	Enable/disable via opto-isolated ON/OFF pin
Communication (optional)	–	–	–	Ethernet / CAN-Bus / RS-485 selectable
Power Good Signal	–	High	–	Indicates stable output within regulation
Operating Temperature	−32 °C	–	+55 °C	1000 W continuous, no derating
Storage Temperature	−40 °C	–	+71 °C	Non-operating condition

Input Characteristics

Parameter	Min	Typ	Max	Notes / Conditions
Input Voltage Range	10 VDC	12 VDC	18 VDC	Compatible with 12 V military vehicle bus (ISO 7637-2 profile)
Nominal Input Voltage	–	12 VDC	–	Rated operation point
Input Current @ 12 VDC, full load	–	–	95 A	Continuous at 1 kW output, η ≥ 90 %
Inrush Current	–	–	TBD	Soft-start circuitry integrated
Input Undervoltage Lockout (UVLO)	8.5 V	–	9.5 V	Hysteresis controlled
Reverse Polarity Protection	–	–	100%	Active electronic protection
Input Fuse	–	100 A	–	Fast-acting type, user-replaceable
Input Filter	–	–	–	Differential & common-mode EMI filters integrated
Surge Protection	–	–	–	TVS diodes and LC damping network

Output Characteristics

Parameter	Min	Typ	Max	Notes / Conditions
Output Voltage	23.8 V	24.0 V	24.5 V	Factory-set; trim optional ±5 %
Output Power (continuous)	–	**1000 W**	–	Full load @ +55 °C, no derating
Output Current	–	41.7 A	45 A	Nominal rating; limit ~110 %
Voltage Regulation (line/load)	–	±1 %	±2 %	Over full input & load range
Ripple & Noise (20 MHz BW)	–	–	200 mVp-p	Measured with 0.1 µF + 47 µF caps
Transient Response	–	–	TBD	50 % load step, recovery < 2 ms
Efficiency	–	90%	–	Typical @ 12 V in, full load, +25 °C
Output Isolation (Input–Output)	–	**1500 VDC**	–	1 minute test, factory verified
Load Sharing (Optional)	–	–	–	Parallel operation with current-share option (TBD)
Remote Sensing	–	–	±5 %	Optional sense lines available

Remote Controller (Optional)

Remote Commander Control Box (Optional)

The Remote Commander Control Box is an optional field accessory designed to provide remote monitoring and control of the PowerGuard-D1000 system.
It enables the operator to safely power the converter ON/OFF, monitor real-time operating status, and identify fault conditions without direct access to the main power unit.

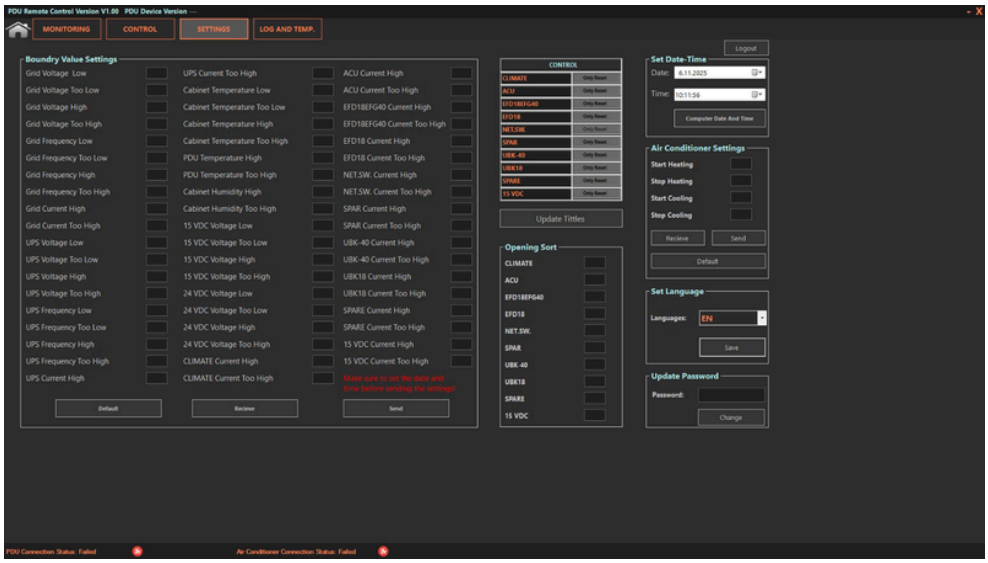
Key Functions:

1. ON/OFF Button – Activates or disables the converter output remotely.
2. CIT / Reset Button – Clears fault indications and resets alarms.
3. Blackout Button – Instantly disables all outputs in emergency situations.
4. Power LED – Indicates system power availability.
5. Grid Electricity LED – Shows connection to the main power input.
6. Battery LED – Displays battery connection and status.
7. Over Voltage LED – Alerts when output voltage exceeds safe limits.
8. Overcurrent LED – Indicates output overcurrent condition.
9. Battery Overheat LED – Signals excessive internal or battery temperature.
10. Blackout LED – Confirms emergency shutdown activation.

Features:

- Rugged aluminum front plate with mounting holes (suitable for dashboard or rack).
- Integrated digital display for Voltage (VDC) and Current (AMPER) monitoring.
- Compatible with PowerGuard-D1000 via dedicated RS-485 / CAN-Bus communication line.
- Protected against vibration and humidity; operational range –32 °C to +55 °C.
- Cable length customizable (standard 3 m, optional 5–10 m).

Remote Control & Software Interface (Optional)



Electrical Interface

Input		
D38999/24WE6PN	Cable	CN1
A	12 AWG	+
B	12 AWG	+
C	12 AWG	+
D	12 AWG	-
E	12 AWG	-
F	12 AWG	-

Output		
D38999/24WE6SN	Cable	CN2
A	12 AWG	+
B	12 AWG	+
C	12 AWG	+
D	12 AWG	-
E	12 AWG	-
F	12 AWG	-

Communication (Optional)		
PT02E10-6P	Cable	CN3
A	22 AWG	İnput
B	22 AWG	Ground
C	22 AWG	CanH/RS-485A
D	22 AWG	CanL/RS-485B
E	22 AWG	Can-Bus GND/RS-485GND
F	22 AWG	Spare

Mechanical Interface