Corvid 250W Power Supply
CE1000

Datasheet

Description

The Corvid 250W power supply provides up to 250 Watts of on-board electrical power generation for small to medium-sized UAVs. A brushless DC (BLDC) motor is driven by the aircraft's primary power plant, or alternatively an auxiliary power unit. This is usually an internal combustion engine which can simultaneously provide both propulsion and on-board electrical power.

The power supply features an internal starter module which allows remote starting of the propulsion system.

Now with optional starter feature

The 250W power supply simplifies UAV power distribution by providing multiple power outputs, which are individually programmable for voltage as well as being battery-backed. Dual (redundant) battery support is also included as standard.

Features

- Buck-boost converter allows electrical power generation over 4:1 RPM range.
- Outputs are battery-backed and switchable (on/off) via hardware signal or remotely via command.
- Dual (redundant) battery support. The power supply includes two independent and identical battery chargers. Supported battery types include:
  - LiPo: 5S, 6S
  - LiS: 8S, 9S, 10S
  - LiFe: 6S, 7S
- Industry-standard 28 VDC output (available during power generation and when the power supply is connected to umbilical power).
- RS232 and CAN control and monitoring interfaces provide extensive monitoring and reporting of voltages, currents, battery charge status and temperatures.
- Engine starter may be activated locally via a momentary push-button switch, or remotely via RS232 or CAN interface to facilitate in-flight engine restarting

Electrical specifications

BLDC motor voltage	18 to 72 V_{PP} (4:1 RPM range)
Umbilical power	24 to 48 VDC
Battery voltage	20.0 to 25.2 VDC
Battery chargers	2 x 1.2 Amps, 60 Watts max.
Avionics output	12 to 21 VDC, 7.5 Amps continuous, 120 Watts max.
Payload output	12 to 21 VDC, 7.5 Amps continuous, 120 Watts max.
Servo output	5 to 12 VDC, 10 Amps continuous, 120 Watts max.
28VDC output	9.0 Amps continuous, 250 Watts max.

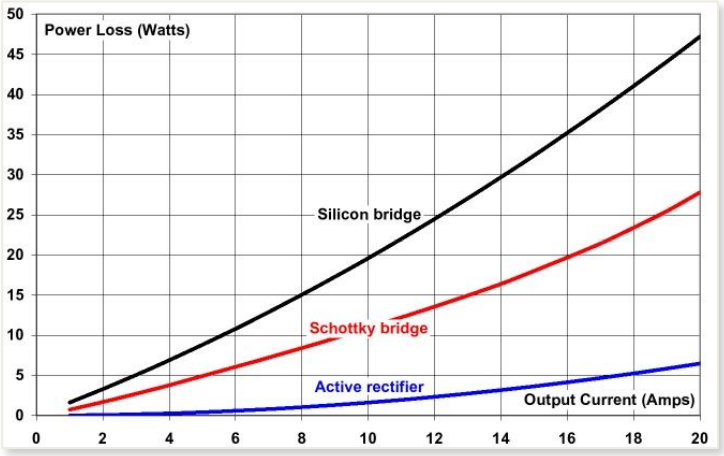
Miscellaneous specifications

Environmental protection class	IP50
Operating temperature range	-40°C to +85°C (-40°F to +185°F)
Altitude rating	10,000 m (32,808 feet)
Cooling	Integrated 28V fan
Enclosure	Lightweight custom-machined aluminium
Dimensions	124.4 mm x 85.0 mm x 32.5 mm (4.90” x 3.35” x 1.28”)
Weight	290 grams (excludes mating wiring harnesses) (0.64 lb)
Connectors	Harwin M80 (combined signal/power) with jackscrews
Communications protocols	RS232 (57600 8N1), CAN (1Mb/S)

Key Technology – active rectification

The first step in turning high-voltage AC into regulated DC is rectification. This process is traditionally performed using a diode bridge, which is an inefficient device that wastes some potentially useful power as heat. Active rectification replaces the diodes with FETs, which have lower loss than either Silicon or Schottky diodes.

As can be seen from Figure 2, there is up to 90% reduction in the power lost in the rectification process when an active rectifier is used. This translates into improved overall efficiency, particularly at low rpm where the diode drop is a significant fraction of the rectifier's total voltage.



For UAVs, active rectification means:

- reduced heating and heatsinking requirements and therefore smaller enclosed volume; and
- operation to lower rpm.

Key technology – polyphase switching converter

The various power outputs (Avionics, Servo, Payload, and Battery Chargers) are implemented using a custom 5-phase DC-DC switching converter. This has significant advantages over using 5 separate switching converters. Firstly, size is reduced. This is possible because the switching times of the converters are synchronised, each converter having its own unique phase offset. Input current demand is now evenly distributed over time, and so input capacitance sharing between converters can be realized, knowing that input currents can never be drawn simultaneously. Thus converter input capacitance volume can be reduced by almost a factor of 5 without incurring any performance penalty.
Secondly, the emitted noise spectrum is more predictable and can therefore be controlled more effectively. This is possible because the converters are all synchronized in time, thus ensuring that switching transients never sum unpredictably. This can be best appreciated by considering the system in the frequency domain and noting that we no longer have 5 impulse spectrums mixing, we have just one. This represents a far simpler problem to solve.

These benefits do not compromise the independence of the individual converters. A load fault on one (or more) of the outputs does not propagate to the others; unaffected outputs retain full voltage and current authority.

For UAVs, a polyphase switching converter means:

- reduced size and weight; and
- reduced EMI.

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