For systems requiring a regulated 50 volt power bus a unique Battery Discharge Regulator (BDR) module can be provided. The BDR module consists of a power regulator and a cell balancing function. The design is targeted at Li-Ion battery systems.

On demand the BDR provides a regulated discharge power to the bus until the battery End Of Discharge (EOD) voltage is reached. At this level the battery discharging is terminated and cannot re-enter discharge mode before the battery has been recharged to a level safe above EOD.

The BDR module is designed to operate into one battery, with a Single Point Failure Free (SPFF) battery interface. The BDR modules can be paralleled for increased power capability and redundancy.

The BDR module provides a battery charge control function with programmable End of Charge (EOC) voltage setting which can be adjusted by telecommand to eight different levels. The charge control can be voted with parallel modules to provide a SPFF EOC regulation.

The module also provides the means to:

- Manage balancing of the battery having nine cell packages in series.
- Activate battery by-pass functions for each cell package.

The module forms an autonomy function having its own internal auxiliary supply and build-in fault detection / protection functions. The BDR function can be switched on / off by telecommands.

References:
- Four modules onboard each of the four Galileo IOV spacecrafts. The first two spacecrafts were launched in October 2011.
Specifications:
Dimensions (L x W x H) 193 x 150 x 24 [mm]
Mass 575 gram
Bus voltage range 50 volt
Battery voltage 22.5 - 39 volt
Output power capability > 600 Watt
Power dissipation @ BDR Pout = 600 W, Vbattery = 36 volt < 30 Watt
Auxiliary supply consumption < 2.7 Watt
Efficiency (100 W < Pout < 600 W, Vbattery = 36 volt) > 95 %
Cell pack EOC voltage programming, 8 levels 3.9 → 4.3 volt
Cell pack balancing current 0 to 120 mA
Current TM inaccuracy < 3 %
Voltage TM inaccuracy < 1 %
Input over-current protection ~ 30 Ampere

Battery Discharge Regulator Functional Schematic

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