

DP-PSU-7059

Power Distribution Module

KEY FEATURES AND BENEFITS

- 53 current limiter switches with ON/OFF control
- Programmable current limit with inrush current control timer
- 80 channels of ADC for voltage and current monitoring
- Command and control from OBC and Tele command modules
- Dual hardware redundant FPGAs for reliable operations

APPLICATIONS

- Power system for Low Earth Orbit (LEO) Satellites
- Micro/Nano satellite system bus
- Power system sequencer applications
- Various current monitoring and control applications



DESCRIPTION

The Power distribution module (PDM), controls the flow of power to spacecraft sub systems / instruments and is custom designed based on specific spacecraft power requirements. The regulated output voltage from EPS (Electrical Power System) is fed to the PDM where the supply voltages are switched through the current limiter MOSFET switches and made available to the sub systems. These individual switches are controlled through Tele command operation or on board autonomous operation for load management.

The PDM also monitors the output from battery, solar power sources and regulated bus voltages of EPS. In case of availability of two power sources in the satellite system, the module can be programmed to perform automatic switching between the main and redundant EPS systems based on the power availability and module health status. This module is equipped with 2 channels of I²C interface and 2 channel SPI (Serial Peripheral Interface) for easy integration with other sub systems like OBC, EPS and Tele command system. The base module contains 17 Latching current limiters. A pluggable daughter module is an expander module which offers additional 36 nos. of current limiter switches for flexible system integration.

BLOCK LEVEL EXPLANATION

CURRENT LIMIT SWITCH

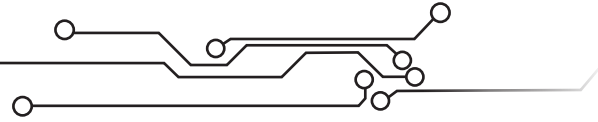
The PDM consists of 53 nos. of latching current limiters. The current limits can be programmed through hardware control. Each current limiter switch powers the individual subsystems in response to a telecommand. These switches shut off automatically in the event of an overload or short-cut condition and also limit the inrush current making these suitable for capacitive loads. An internal reverse-voltage detection comparator disables the power-switch to protect devices on the input side of the switch in the event that the output voltage is driven higher than the input.

ANALOG TO DIGITAL INTERFACE (ADC)

The PDM has 80 ADC channels to monitor the bus voltages, battery cell voltage and load current through each current limiter switches. The monitored ADC data in 10/ 12 bit resolution can be sent over telemetry for ground observation.

FIELD PROGRAMMABLE GATE ARRAY (FPGA)

The module consists of two programmable gate array devices, which operate in parallel as backup for each other. The parallel redundant system refers to resilience that ensures system availability in the event of component failure and continues to supply uninterrupted power to the critical loads. These FPGAs along with I/O expander are used to control the sub module ON /OFF operation based on telecommanding.



POWER DISTRIBUTION MODULE - EXPANDER



SPECIFICATIONS

Type : Power distribution module

INPUT AND OUTPUT SPECIFICATIONS

Input

Channel 1 : Input Supply : 3.3V to 12V at 4A max
 Channel 2 : Input Supply : 3.3V to 12V at 4A max
 Channel 3 : Input Supply : 3.3V to 12V at 4A max

Output

Channel 1 distribution : Main Board :5 nos switches
 Expander Board : 7nos

Channel 2 distribution : Main Board : 7 nos switches
 Expander Board : 9nos

Channel 3 distribution : Main Board : 5 nos switches
 Expander Board : 20nos

POWER

Power consumption : Less than or equal to 1W

COMMUNICATION INTERFACES

- Two SPI channels from each FPGA
- Two I²C slave channels from each FPGA

CONNECTORS

Input / Output connector : 84 Pin Nicomatic sub connector
 JTAG interface connector : 5X2 Header
 Board to board interface connector : 10X2 Samtec connector

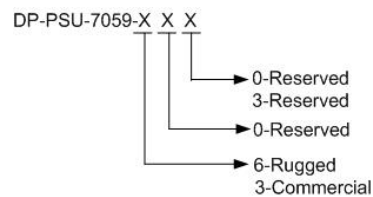
ENVIRONMENTAL

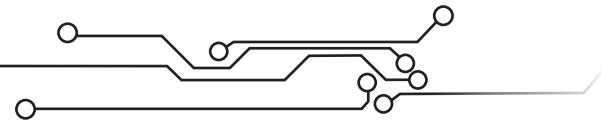
Operating temperature : -15°C to 55°C
 Storage temperature : - 40°C to 58°C
 Commercial or rugged : Rugged

MECHANICAL

Dimension in mm (LXBXH) : 96 x 90x 16
 Weight in grams : <90

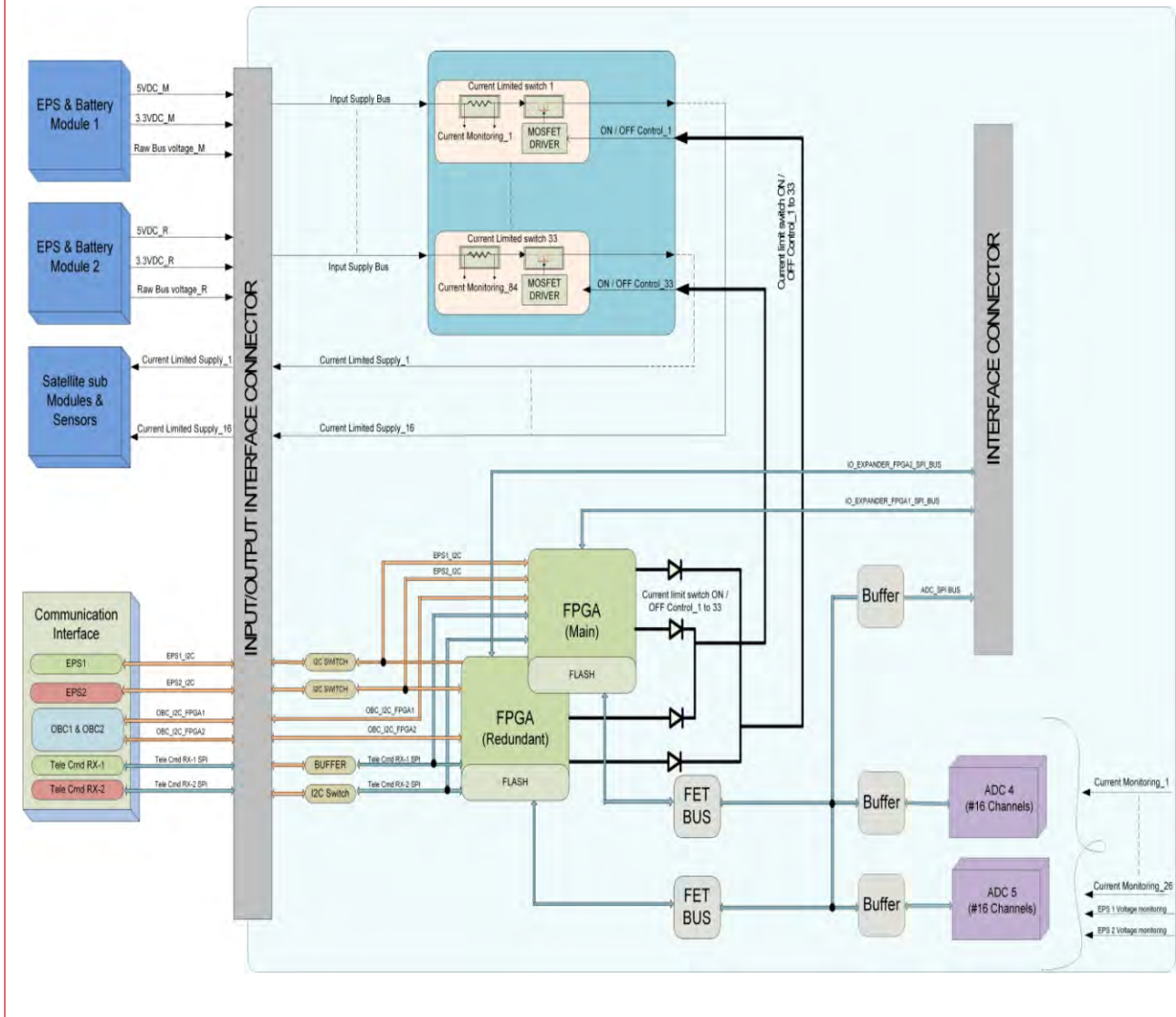
ORDERING INFORMATION





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BLOCK DIAGRAM OF DP-PSU-7059



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