PANTHER™ 760 & 380

MICROTCA™ POWER MODULE

The Panther 760 and 380 power modules, compliant with the MicroTCA spec, are Full-Size/Single-Width form factor and fully enclosed for electrical protection. The design is based on state of the art FPGA and advanced technologies for energy management and remote monitoring, diagnostics, software updating and reconfiguration.

Panther power modules provide full **monitoring capability with only SMP** (Standby Mgmt Power) so input cable detection and input and output voltage monitoring is possible without input power.

Each unit provides 16 pairs of management power and payload power outputs that are digitally monitored for over or under voltage and over current. Each output channel is individually configurable as primary, backup or disabled. This provides the µTCA form of **shared power**, i.e. redundant power modules can be configured so that they each power about the half the load on a per channel basis.

Payload power channels can be individually **programmed current limits** with load specific values. This enables improved MTBFs of the power system, more tightly managed power budgeting and the ability to determine an accurate history power consumption of each component of the system.

Hot swappable and fully redundant operation coupled with extremely high efficiency and wide temperature range operation make Panther power modules ideally suited for all air cooled MicroTCA™ applications.

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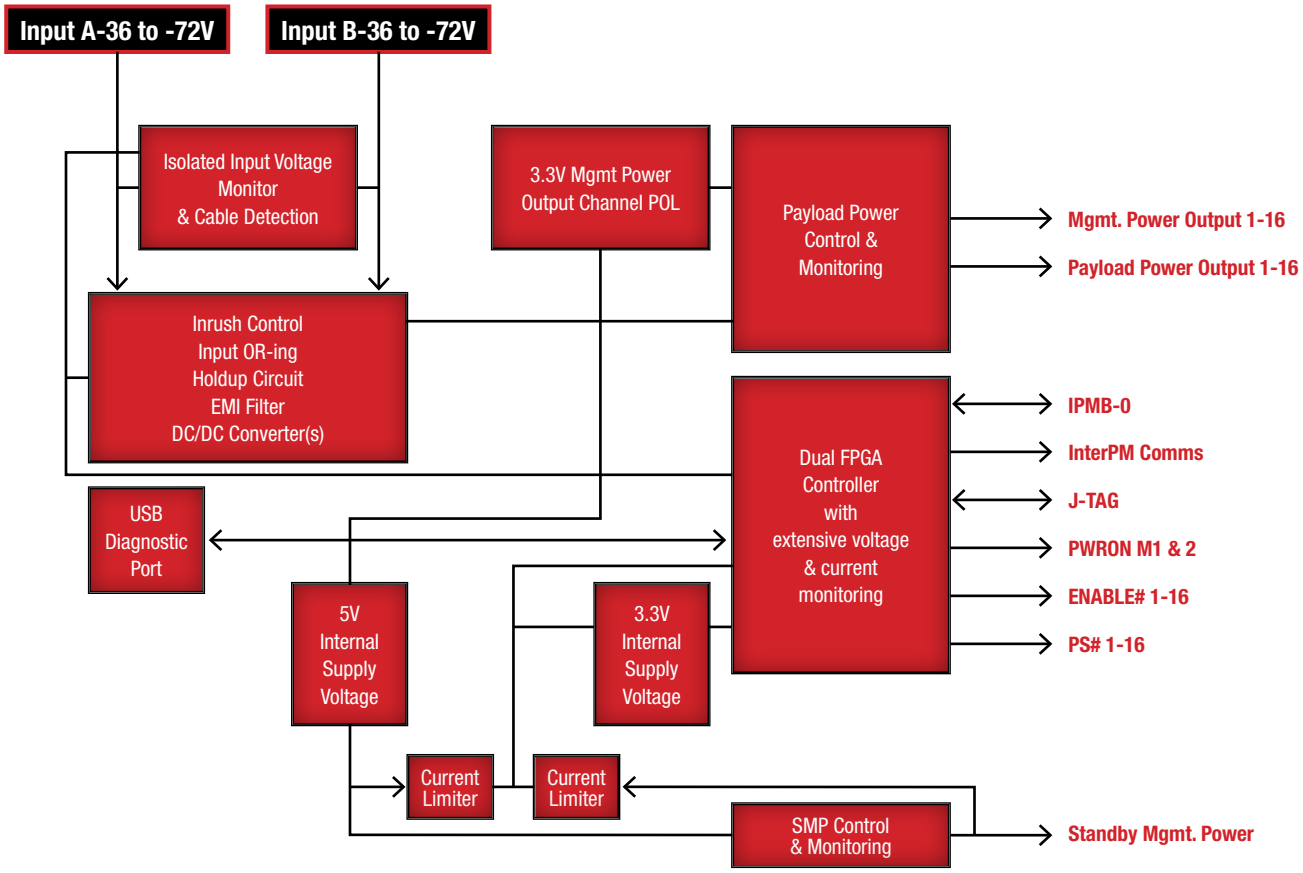
PANTHER™ 760 & 380 MICROTCA™ POWER MODULE



The Panther µTCA power module provides two power inputs with a common VRTN. These power inputs include all of the typical features: input protection, input isolation, inrush current control, input OR-ing, EMI filtering, holdup circuit and high efficiency power conversion. The input voltage is continuously digitized and monitored with 0.1V accuracy.

The power module provides up to 12 Watts of management power so that if all 16 management power channels are running at the maximum current there is no possible interaction due to current limiting of the 3.3V Mgmt Power Output Channel POL. Each management channel is individually digitized and monitored for under or over voltage. Each MP output has over current monitoring with individual channel indicators.

Each payload channel voltage and current is digitized and monitored. The readings are compared to digital references to detect under-voltage, over-voltage, transient over-current and average over-current. Detection of any of these conditions results in disabling of that specific primary channel. In redundant operation if the backup output detects a channel voltage less than the Under_Voltage_On threshold then the backup output is enabled. There is a diode conduction path that prevents the failed channel voltage from collapsing below 10 Volts.

For redundancy purposes all payload and management power outputs are designed for parallel connections to other power modules. Inflow currents are not permitted for these outputs. However the SMP channel does permit inflow current up to 150ma.

A standard USB port is provided for system development, monitoring and integration purposes. Mounted on the face plate is a bicolor LED labeled HSMA (Hardware System Management Activity) this LED flashes yellow with each IPMB-A message and green with each IPMB-B message. If it appears yellow or green rather than amber it indicates that one of the channels is inactive. The µTCA spec indicators are present, green for ready, red for out of service and blue for hot swap.

The Panther utilizes a microprocessor which provides an EMMC (Enhanced Module Management Controller), per the µTCA spec, for hardware platform management interface to MCH and for control of the power module. An important Panther feature is that the power module does not rely on the microprocessor for any system critical functions such as current limiting or channel failover control. All such functions are designed into the FPGA gates and will fully function with the microprocessor halted.

REDUNDANCY

Power modules should be installed and removed with the input power disconnected. However the Panther is hot swappable with or without input power connected. As already mentioned the power module will power the control circuitry from the SMP input if it is active, otherwise the power module remains in a quiescence state (check for IPMB-0 short circuit) until input power is connected. When the control circuitry does power up it recognizes that it is not the “startup PM” and waits for MCH control messaging before enabling any outputs.

Input

The power module is designed for use in –48V or -60V DC systems and uses µTCA spec power input connector and pin-out.

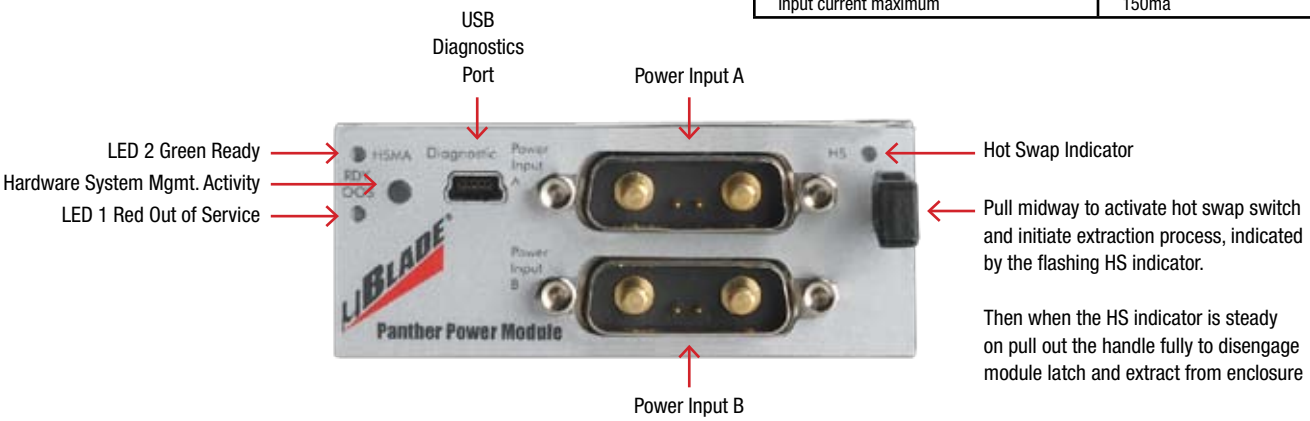
The face plate supports the PCB, power input connectors, EMC gaskets, and the power module latch /retention mechanism.

The input OR-ing circuit will automatically select either input, whichever has the more negative voltage. This can be over-ridden by software which can disable either input.

INPUT POWER	
Max input power Panther 380	395W @ 365W Output Power
Max input power Panther 760	790W @ 725W Output Power
Nominal voltage	-48V or -60V
Normal voltage (full performance)	-40.5V to -72.0V
Abnormal voltage (non-destruction)	0V to -40.5V; -72V to -75V
Conducted emission	Class A or B?
* Hold-up, VIN = 50V, 100% load	8.40ms Panther 380
	4.25ms Panther 760
Burst	4kV

* The µTCA spec requirement is expected to be revised to 5ms, as 10ms is under a double fault condition.

SMP (STANDBY POWER MODE) INPUT	
Input voltage	5V ±0.5V
Input current typical	125ma
Input current maximum	150ma



Output

OUTPUT SPECIFICATIONS			
	PANTHER 760 PAYLOAD POWER	PANTHER 380 PAYLOAD POWER	PANTHER 380 & 760 MGMT POWER
Output Power	740 Watts Typical	365 Watts Typical	12W
Output Voltage	11.9V (12.0V to 10.75V)		3.3V (3.43V to 3.17V)
Primary failover switch off voltage	10.65V ±125mv programmable		3.15V ±32mv programmable
Backup switch on voltage	10.4V ±125mv programmable		3.10V ±32mv programmable
Output current limit 400µs average Transient ≤100µs	Average 0 to 10.2A programmable 7.6A default configuration Transient 0 to 10.2A programmable 9.4A default configuration		Minimum 100 ma Maximum 225ma
Output current limit accuracy	± 40ma or ±LSB		na
Current limit response time	3µs to 90µs		2µs
Outrush current control	1600µF in 25ms		150µF in 25ms
Output channel resistance	14.6mΩ typical		145mΩ maximum
Output ripple 5Hz to 20MHz	<200mv		<100mv
Efficiency @20°C, 72V Input	94%		na
Operation temperature	-5 to 55°C with 2m/s	-5 to 55°C with 2m/s	na
SMP (STANDBY POWER MANAGEMENT) OUTPUT MODE			
Output voltage	5V ±3%		
Output current limit	500ma min to 750ma max		

Other I/O

JTAG

The Panther power module supports JTAG diagnostics and be software or firmware (VHDL) upgraded from the JTAG port. The JTAG signals are buffered to insure good signal integrity and fault free operation.

USB DIAGNOSTIC PORT

This is a true USB port which is powered only by the terminal device. This port can be used to monitor power module boot sequencing and IPMI messaging. In addition this port is also an interface to the µBlade Dashboard (an MS Excel application) which shows the detailed operating status of the Panther power module.

The Panther Power Module supports the Hardware Platform Management Interface HPMI. The on-board microprocessor provides the EMMC functionality as required by the µTCA spec.

This microprocessor is also used to control the power module. This is done in conjunction with a hardware implemented state machine which manages all system critical functions.

The µTCA spec provides some mandatory and numerous optional commands. Below is a list of all supported IPMI commands.

In addition the spec provides for some required sensor data records and allows products to define additional sensor data records (SDRs). as needed. We currently provide 48 such sensor data records. We plan to add, in a future software update, the additional 16 SDRs.

	SPEC SECTION	NetFn	CMD
IPM Device "Global" Commands			
Get Device ID	17.1	App	01h
Get Self Test Results	17.4	App	04h
Broadcast "Get Device ID"[1]	17.9	App	01h
Event Commands			
Set Event Receiver	23.1	S/E	00h
Get Event Receiver	23.2	S/E	01h
Platform Event (a.k.a. "Event Message")	23.3	S/E	02h
Sensor Device Commands			
Get Device SDR Info	29.2	S/E	20h
Get Device SDR	29.3	S/E	21h
Reserve Device SDR Repository	29.4	S/E	22h
Get Sensor Reading	29.14	S/E	2Dh
FRU Device Commands			
Get FRU Inventory Area Info	28.1	Storage	10h
Read FRU Data	28.2	Storage	11h
Write FRU Data	28.3	Storage	12h
AdvancedTCA			
Get PICMG Properties	3-10	PICMG	00h
FRU Control	3-25	PICMG	04h
Get FRU LED Properties	3-27	PICMG	05h
Get LED Color Capabilities	3-28	PICMG	06h
Set FRU LED State	3-29	PICMG	07h
Get FRU LED State	3-30	PICMG	08h
Get Device Locator Record ID	3-29	PICMG	0Dh
AdvancedMC			
Set AMC Port State	3-27	PICMG	19h
Get AMC Port State	3-28	PICMG	1Ah
MicroTCA			
Power Channel Control	3-28	PICMG	24h
Get Power Channel Status	3-29	PICMG	25h
PM Reset	3-31	PICMG	26h
Get PM Status	3-32	PICMG	27h
PM Heartbeat	3-33	PICMG	28h

PANTHER PM SENSOR DATA RECORDS		
NAME	DESCRIPTION	MNEMONIC
HS		SdrHotSwap,
PS		SdrPmPresence,
MBD		SdrMicroBladeDevice
FRU		SdrFru
IVA	Input A Voltage	SdrVoltInputA
IVB	Input B Voltage	SdrVoltInputB
IAT	Inlet Air Temp	SdrTempIAT
HPT	Hot Part Temp	SdrTempPBT
PBV	12V Brick Voltage	SdrVoltPBV
MBV	5V Internal Supply Voltage	SdrVoltMBV
V3P3	3.3V Controller Voltage	SdrVoltCV5P
CV5P	5V Controller Voltage	SdrVoltV3P3
H1P5V	Host Core Voltage	Host1P5V
C1P5V	Client Core Voltage	Client1P5V
MPSV3P3	Mgmt Power Source Voltage	SdrVoltMpocV3P3
SMP	Standby Mgmt Voltage	SdrVoltSMP
PV1	Payload Output 1 Voltage	SdrVoltPyld01
PV2	Payload Output 2 Voltage	SdrVoltPyld02
PV3	Payload Output 3 Voltage	SdrVoltPyld03
PV4	Payload Output 4 Voltage	SdrVoltPyld04
PV5	Payload Output 5 Voltage	SdrVoltPyld05
PV6	Payload Output 6 Voltage	SdrVoltPyld06
PV7	Payload Output 7 Voltage	SdrVoltPyld07
PV8	Payload Output 8 Voltage	SdrVoltPyld08
PV9	Payload Output 9 Voltage	SdrVoltPyld09
PV10	Payload Output 10 Voltage	SdrVoltPyld10
PV11	Payload Output 11 Voltage	SdrVoltPyld11
PV12	Payload Output 12 Voltage	SdrVoltPyld12
PV13	Payload Output 13 Voltage	SdrVoltPyld13
PV14	Payload Output 14 Voltage	SdrVoltPyld14
PV15	Payload Output 15 Voltage	SdrVoltPyld15
PV16	Payload Output 16 Voltage	SdrVoltPyld16
PC1	Payload Output 1 Current	SdrCurrPyld01
PC2	Payload Output 2 Current	SdrCurrPyld02
PC3	Payload Output 3 Current	SdrCurrPyld03
PC4	Payload Output 4 Current	SdrCurrPyld04
PC5	Payload Output 5 Current	SdrCurrPyld05
PC6	Payload Output 6 Current	SdrCurrPyld06
PC7	Payload Output 7 Current	SdrCurrPyld07
PC8	Payload Output 8 Current	SdrCurrPyld08
PC9	Payload Output 9 Current	SdrCurrPyld09
PC10	Payload Output 10 Current	SdrCurrPyld10
PC11	Payload Output 11 Current	SdrCurrPyld11
PC12	Payload Output 12 Current	SdrCurrPyld12
PC13	Payload Output 13 Current	SdrCurrPyld13
PC14	Payload Output 14 Current	SdrCurrPyld14
PC15	Payload Output 15 Current	SdrCurrPyld15
PC16	Payload Output 16 Current	SdrCurrPyld16
NOTE: The addition MP Voltage SDRs is planned in future software update		

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