Communication Guide

for

VITA 62 COMPLIANT VPX POWER SUPPLIES

Catalog

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1 Overview

The NetPower VPX power power supply has PMBus and IPMI interfaces complying with the VITA 46.11 specification to allow monitoring the voltage, current and power status. The VPX power supply automatically identifies which interface is being used without any additional configuration.

Both PMBus and IPMB are two wire communication protocols based on I^2C with a 7-bit address. The communication speed is 100 kHz.

2 Address

Since multiple VPX power supplys might be connected on the same bus, each should have its own address. The Geographical Addressing pins defined by VITA 46.11 are used to configure the address. GA[1:0]* pins have internal pull-up resistors (10 kΩ) to 3.3V, and the address assignment is shown in the below table.

Geographical Pins		PMBus Address	IPMI Address
GA1*	GA0*		
U	U	20h	40h
U	G	21h	42h
G	U	22h	44h
G	G	23h	46h

Notes:
U = Unconnected
G = Biased to Ground on the Backplane

Table I: Address Assignment Table

3 IPMI

The VPX power supply only supports Sensor/Event messages (netFn 04, 05).

3.1 IPMI Sensor

The VPX power supply allows users to use *Get Sensor Reading* command to retrieve voltage, current, power and temperature measurements of the power supply. The *Get Sensor Reading* command for a threshold-based sensor contains the present analog reading from the sensor.

The following table lists all the IPMI sensors available on the VPX power supply.

Sensor Number	Sensor Name	Sensor Type Code	Event/Reading Type Code	Description	Unit
7	Input Voltage	02h - Voltage	01h	Analog	Volts
8	+12V Voltage	02h - Voltage	01h	Analog	Volts
9	+3.3V Voltage Note1	02h - Voltage	01h	Analog	Volts
10	+5V Voltage	02h - Voltage	01h	Analog	Volts
11	+3.3Vaux Voltage	02h - Voltage	01h	Analog	Volts
12	+12Vaux Voltage	02h - Voltage	01h	Analog	Volts
13	-12Vaux Voltage	02h - Voltage	01h	Analog	Volts
14	Input Current	03h - Current	01h	Analog	Amperes
15	+12V Current	03h - Current	01h	Analog	Amperes
16	+3.3V Current Note1	03h - Current	01h	Analog	Amperes
17	+5V Current	03h - Current	01h	Analog	Amperes
18	Card Edge Temperature Towards Pin P6	01h - Temperature	01h	Analog	Kelvin
19	Card Edge Temperature Towards Pin P1	01h - Temperature	01h	Analog	Kelvin
20	Temperature at Middle of the Chassis	01h - Temperature	01h	Analog	Kelvin
21	Input Power Consumption	0Bh - Other Units-based Sensor	01h	Analog	Watts
22	+12V Power Consumption	0Bh - Other Units-based Sensor	01h	Analog	Watts
23	+3.3V Power Consumption Note1	0Bh - Other Units-based Sensor	01h	Analog	Watts
24	+5V Power Consumption	0Bh - Other Units-based Sensor	01h	Analog	Watts

Note1: Only supported in VPX 3U power supplys.

Table II: IPMI Supported Sensors

3.2 IPMI Sensor Reading Conversion

The following formula defined in IPMI specification should be used to convert the one byte “raw” sensor readings to real values in the desired units (e.g. Volts, Amps, Watts, degrees Celcius).

$$y = (Mx + B * 10^{K1}) * 10^{K2}$$

Where:

x, is one byte unsigned integer, received from the VPX power supply;

y, is the calculated, “real world” value in the appropriate units (A, V, W, °C);

M, is signed integer constant multiplier;

B, is signed additive offset;

K1, is signed “B” exponent;

K2, is signed *Result* “R” exponent;

The table below provides the coefficients used for IPMI analog sensor conversion.

Sensor	Conversion Coefficients				Valid y Range (calculated "real world" value)	Typical Examples	
	M	B	B exp. (K1)	R exp. (K2)		x	y
7: Input Voltage	20	90	1	-2	9 V – 60 V	95	28 V
8: +12V Voltage	20	90	2	-3	9 V – 14.1 V	150	12 V
9: +3.3V Voltage Note1	10	20	2	-3	2 V – 4.55 V	130	3.3 V
10: +5V Voltage	10	35	2	-3	3.5 V – 6.05 V	150	5 V
11: +3.3Vaux Voltage	10	20	2	-3	2 V – 4.55 V	130	3.3 V
12: +12Vaux Voltage	20	90	2	-3	9 V – 14.1 V	150	12 V
13: -12Vaux Voltage	-20	-90	2	-3	-9 V – -14.1 V	150	-12 V
14: Input Current	20	0	0	-2	0 – 51 A	150	30 A
15: +12V Current	20	0	0	-2	0 – 51 A	200	40 A
16: +3.3V Current Note1	20	0	0	-2	0 – 51 A	100	20 A
17: +5V Current	20	0	0	-2	0 – 51 A	150	30 A
18: Card Edge Temp towards P6	1	20	1	0	200 K – 455 K	150	350 K
19: Card Edge Temp towards P1	1	20	1	0	200 K – 455 K	150	350 K
20: Mid-chassis Temp	1	20	1	0	200 K – 455 K	150	350 K
21: Input Power Consumption	25	0	0	-1	0 – 637.5W	200	500 W
22: +12V Power Consumption	25	0	0	-1	0 – 637.5W	160	400 W
23: +3.3V Power Consumption Note1	4	0	0	-1	0 – 102W	125	50 W
24: +5V Power Consumption	10	0	0	-1	0 – 255W	150	150 W

Note1: Only supported in VPX 3U power supplys.

Table III: IPMI Coefficients Table

3.3 IPMI Commands

The following table provides a list of supported IPMI commands by the NetPower VPX power supply.

Command Name	NetFn	CMD
Get Sensor Reading	Sensor/Event	2Dh

Table IV: IPMI Commands Table

4 PMBus Interface

4.1 PMBus Data Format

Measurement data transmitted on the PMBus uses DIRECT data format defined by the PMBus specification. DIRECT format data is a two byte, two's complement binary integer. Low byte is transmitted first.

The table below provides the conversion coefficients and some examples.

Parameter	Conversion Coefficients			Examples			Note
	m	b	R	X	Y		
					Decimal	Hex	
Voltage	100	0	0	12 V	1200	04B0h	10 mV/bit
				-12 V	-1200	FB50h	
Current	100	0	0	30 A	3000	0BB8h	10 mA/bit
Power	1	0	0	500 W	500	01F4h	1 W/bit
Temperature	10	0	0	85 °C	850	0352h	0.1 °C/bit
				-40 °C	-400	FE70h	

Table V: PMBus Coefficients Table

4.2 PMBus Commands

The following table provides a list of supported PMBus commands.

Command Code	Command Name	Type	Number of Data Bytes	Description
00h	PAGE	R/W Byte	1	Allows user to set or read the page for any commands that require page
88h	READ_VIN	Read Word	2	Read input voltage.
89h	READ_IIN	Read Word	2	Read input current.
8Bh	READ_VOUT	Read Word	2	Read output voltage for the selected page. Page number between 01h – 06h
8Ch	READ_IOUT	Read Word	2	Read output current for the selected page. Page number between 01h – 03h
8Dh	READ_TEMPERATURE_1	Read Word	2	Read temperature at card edge towards pin P6.
8Eh	READ_TEMPERATURE_2	Read Word	2	Read temperature at card edge towards pin P1.
8Fh	READ_TEMPERATURE_3	Read Word	2	Read temperature at middle of the chassis.
96h	READ_POUT	Read Word	2	Read output power for the selected page. Page number between 01h – 03h
97h	READ_PIN	Read Word	2	Read input power.
D0	READ_TIMER	Block Read	6	OEM command – read power supply operating time.

D1	READ_FIRMWARE	Read Word	7	Read firmware information.
FEh	COMMAND_EXT	Extended Command	1	OEM extended write byte command.

Table VI: PMBus Supported Commands

4.2.1 PAGE

The write PAGE command allows the user to select a specific output to query. When a read command is transmitted to the VPX power supply such as READ_VOUT and READ_IOUT, the VPX power supply will return the measurement information based on the selected page. The power supply will return FFFFh if a valid page is not selected or if the command is not supported by the current page. The user could also use read PAGE command to retrieve the current page information. The page description of the VPX power supply power supply is shown below.

PAGE	Description
00h	Not used, default value on power on
01h	VS1 (+12V) voltage, current, power
02h	VS2 (+3.3V) voltage, current, power Note1 VS2(+12V) voltage, current, power Note2
03h	VS3 (+5V) voltage, current, power
04h	+3.3V auxiliary voltage
05h	+12V auxiliary voltage
06h	-12V auxiliary voltage
07h – FFh	Not used

Note1: Only supported in VPX 3U power supplys.

Note2: Only supported in VPX 6U power supplys.

Table VII: PMBus Page Description

4.2.2 READ_TIMER

READ_TIMER command allows the user to retrieve a timer value that shows how long the power supply has been operating. This is a volatile time that increments when input voltage is applied, regardless of whether outputs are enabled or not. It will be reset upon removing of the input voltage.

Upon receiving this command, the VPX power supply will transmit six data bytes followed by PEC. The data description and an example of 1 Day, 6 Hours, 32 Minutes, 22 Seconds in operation are shown below.

Data Byte	Example	Description
1	05h	The first data byte will always be 05h, indicating there are five data bytes following
2	16h	Seconds, a value between 0 and 59 will be shown here
3	20h	Minutes, a value between 0 and 59 will be shown here
4	06h	Hours, a value between 0 and 23 will be shown here
5	01h	Low data byte of Days
6	00h	High data byte of Days

Table VIII: READ_TIMER Command

4.2.3 READ_FIRMWARE

READ_FIRMWARE command allows the user to retrieve the VPX power supply firmware information. Upon receiving this command, the VPX power supply will transmit data bytes following below table.

Data Byte	Example	Description
1	06h	06h indicates there are six data bytes following
2 - 7	31h 31h 41h 31h 30h 30h	Firmware version is 11A100

Table IX: READ_FIRMWARE Command

4.2.4 COMMAND_EXT

The command code following the COMMAND_EXT (FEh) is the command to be executed by the VPX power supply, such as 01h. The supported OEM commands are listed below.

Command	Action	Description
01h	Latch Off	The user can issue a latch-off command to the VPX power supply. Upon receiving this command, the VPX power supply will permanently disable all the output voltages until either input voltage is removed and re-applied.

Table X: NetPower Extended Command