

## PMBus™ Commands & Features

This application note describes the digital communications protocol for the D1U54-D-800-12-HBxBC-xxx Series:

Model Number	Serial Communication Slave Addressing	Airflow	Standby (Vdc)
D1U54-D-800-12-HB3BC	ADDR_Select (External Resistor)	Front to Back	12
D1U54-D-800-12-HB4BC		Back to Front	

## Standard PMBus™ Commands

All data communicated over the PMBus™ interface uses PEC (Packet Error Checking) as defined by the standard for PMBus™ Power Systems Management Protocol Part 1 – General Requirements Rev 1.1. The system/host must be “PEC enabled” in order to successfully issue any write commands and avoid triggering CML errors.

Linear data formatting is used for all passed parameters. It is strongly recommended to fully utilize the PEC byte to validate all transactions and to repeat if not validated. Block reads (where the loose byte received denotes the remaining byte to be clocked out) are not supported on this product series.

A minimum of 300µs delay between transactions (between the STOP of one command and the START of the next command) is recommended for robust communications.

Note: 100/400 KHz I<sup>2</sup>C communications is supported for the PMBus™ interface.

Note: The PMBus™ slave controller does “clock stretch” on ACK or NAK.

## Device Details

### Power Module Internal Devices

Vendor	Manufacturers Part Number	Package	Description
Microchip Technology Inc.	DSPIC33FJ16GS504T-50I/PT	44 Pin	Primary Digital Signal Controller, 16-bit dsPIC, 32K flash, 2K SRAM, --40C to +85C
Microchip Technology Inc.	DSPIC33FJ64GS606T-50I/PT	64 Pin	Secondary Digital Signal Controller, 16-bit dsPIC, 64K flash, 9K SRAM, -40C to +85C
Microchip Technology Inc.	24AA024T- I /MS	8 Pin	2K Bit, 2.5-5.5V, 400KHz, 1.8-2.5V 100KHz, -40C to +85C

## Device Addressing Methods

(See D1U54P-12-CONC Interface Card; Application Note ACAN-64 for Additional Details):

There are two methods whereby the three lower order address bits of the seven bit address structure of the internal addressable devices can be assigned (for the secondary microcontroller and the EEPROM device A0, A1 & A2; see the PMBus™ standard). These are as follows:

1. Using the ADDR signal pin (Pin# A3) in digital mode by either:
  - a. Un-terminating (leaving open circuit); this will set a default setting of “111” for the last three addressable bits (A0, A1 & A2) of the seven bit address byte.
  - b. Terminating the pin to RTN/ground (Pin numbers A2/B2); this method will set a default address of “000” for the last three addressable bits (A0, A1 & A2) of the address byte.
2. Using the ADDR signal pin (Pin# A3) in analogue mode by connection of an external resistance to RTN/ground (pin numbers A2/B2). For the possible external resistance values this will result in the following address combinations:

HEX Address Combinations by Analogue Method; ADDR External Resistance Values		
ADDR External Resistance to RTN/Ground (KΩ; ±5% Tolerance)	Power Module Secondary Main Controller (Serial Slave Address)	Power Module EEPROM (Serial Slave Address)*
0.82	0xB0	0xA0
2.7	0xB2	0xA2
5.6	0xB4	0xA4
8.2	0xB6	0xA6
15	0xB8	0xA8
27	0xBA	0xAA
56	0xBC	0xAC
180	0xBE	0xAE

A 7-bit “left shifted” device addressing is adapted; the EEPROM addressing follows a similar convention (commences at base address 0xA0); the lowest order bit of the address is the Read/Write bit. It is assumed that the Read Write bit is set to logic “0” (for addresses shown in the table above).

**PMBus™ Commands**

**Command Codes**

Page Command is supported to allow the ability to control and monitor the dual outputs (the Main 1 output and VSTANDBY outputs). Each Command Code is annotated with either “All”, “0”, “1”, “2” or “3” accordingly to identify which “page” is associated with the command.

Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) Number	Bit Name	Definition	Supported
00	PAGE	R/W	All		1			Command to provide ability to configure, control & monitor multiple outputs	YES
01	OPERATION (See Relevant Table at the Rear of Document)	R/W	All	Bit Flags	1	5:0		Set output margin high/low voltages	NO
						7:6		Turn the unit on/off in conjunction with digital input from PSON_L	YES
02	ON_OFF_CONFIG See Relevant Table at the Rear of Document)	R	All	Bit Flags	1	0	ON_OFF_DELAY	Set when Turn off immediately (default) / 0 = Use delay @ turn-off	YES
						1	ON_OFF_POLARITY	Set when Power on processing is active high (default)	YES
						2	USE_CONTROL	Set when Use CONTROL pin for on/off power processing (default)	YES
						3	USE_OPERATION	Set when Use OPERATION command for on/off power processing (default)	YES
						4	USE_CNTL_AND_OP	Set when Use both CONTROL pin & OPERATION command (default)	YES
						5	RESERVED		NO
						6	RESERVED		NO
						7	RESERVED		NO
03	CLEAR_FAULTS	W	All		1		Write only command clears all faults that have been set in all the STATUS_XXXX registers simultaneously	YES	
19	CAPABILITY	R	All	Bit Flags	1	0:3	RESERVED		NO
						4	SMBALERT_L	Set when device has SMBALERT_L pin which supports the SMBus Alert Response protocol	YES
						6:5	MAX_BUS_SPEED	01 = Max supported bus speed = 400kHz; 00 Max supported bus speed = 100kHz	YES
						7	PEC	Set when packet error checking is supported	YES
20	VOUT_MODE	R	0	Bit Flags	1		Single data byte sets the READ_VOUT sensor to linear mode data format and supplies required N exponent. To translation to volts. PMBus Spec - Part II - Revision 1.1 - Sections 8.1-8.3	YES	
20	VSTBY_MODE	R	1	Bit Flags	1		Single data byte sets the READ_VOUT sensor to linear mode data format and supplies exponent “N” for translation to volts. PMBus Spec - Part II - Revision 1.1 - Sections 8.1-8.3	YES	
21	VOUT_COMMAND	R/W	All	Linear Data Format	2		Manual override main output set point command - Voltage range setting 11.5V - 12.75V Command formatted in Linear as per command 0x8B – READ_VOUT	YES	
25	VOUT_MARGIN_HIGH	R/W	0	Linear Data Format	2		Load the unit with the voltage to which the output is to be changed when the OPERATION command set to "Margin High"	NO	

Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) Number	Bit Name	Definition	Supported
25	VSTBY_MARGIN_LOW	R/W	1	Linear Data Format	2			Load the unit with the voltage to which the output is to be changed when the OPERATION command set to "Margin High"	NO
26	VOUT_MARGIN_HIGH	R/W	0	Linear Data Format	2			Load the unit with the voltage to which the output is to be changed when the OPERATION command set to "Margin Low"	NO
26	VSTBY_MARGIN_LOW	R/W	1	Linear Data Format	2			Load the unit with the voltage to which the output is to be changed when the OPERATION command set to "Margin Low"	NO
3A	FAN_CONFIG_1_2	R	All	Bit Flags	1	0	FAN_2_TACH_PULSES	Fan 2 Tachometer pulses per revolution (lower bit)	NO
						1	FAN_2_TACH_PULSES	Fan 2 Tachometer pulses per revolution (upper bit)	NO
						2	FAN_2_SETTING_MODE	Set when fan is commanded in RPM (Clear when fan is commanded in Duty Cycle)	NO
						3	FAN_2_INSTALLATION	Set when fan is installed in position 2	NO
						4	FAN_1_TACH_PULSES	Fan 1 Tachometer pulses per revolution (lower bit)	YES
						5	FAN_1_TACH_PULSES	Fan 1 Tachometer pulses per revolution (upper bit)	YES
						6	FAN_1_SETTING_MODE	Set when fan is commanded in RPM (Clear when fan is commanded in Duty Cycle)	YES
						7	FAN_1_INSTALLATION	Set when fan is installed in position 1	YES
3B	FAN_COMMAND_1	R/W	All	Linear Data Format	2		Manual fan override command fan speed value by duty cycle Command speed formatted in Linear as per command 0x90 - READ_FAN_SPEED_1	YES	
3C	FAN_COMMAND_2	R/W	All	Linear Data Format	2		Manual fan override command fan speed value by duty cycle Command speed formatted in Linear as per command 0x90 - READ_FAN_SPEED_2	NO	
40	VOUT_OV_FAULT_LIMIT	R	0	Linear Data Format	2	See limit values for Individual Models <a href="#">HB3BC</a> <a href="#">HB4BC</a>	Main Output Overvoltage Fault Limit	YES	
40	VSTBY_OV_FAULT_LIMIT	R	1	Linear Data Format	2		Standby(Auxiliary) Output Overvoltage Fault Limit	YES	
41	VOUT_OV_FAULT_RESPONSE	R	0	Bit Flags	1		Main Output Overvoltage Fault Response Actions	YES	
41	VSTBY_OV_FAULT_RESPONSE	R	1	Bit Flags	1		Standby(Auxiliary) Output Overvoltage Fault Response Actions	YES	
42	VOUT_OV_WARN_LIMIT	R	0	Linear Data Format	2		Main Output Overvoltage Warning Limit	YES	
42	VSTBY_OV_WARN_LIMIT	R	1	Linear Data Format	2		Standby(Auxiliary) Output Overvoltage Warning Limit	YES	
43	VOUT_UV_WARN_LIMIT	R	0	Linear Data Format	2		Main Output Undervoltage Warning Limit	YES	
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2		Standby(Auxiliary) Output Undervoltage Warning Limit	YES	
44	VOUT_UV_FAULT_LIMIT	R	0	Linear Data Format	2		Main Output Undervoltage Fault Limit	YES	
44	VSTBY_UV_FAULT_LIMIT	R	1	Bit Flags	1		Standby(Auxiliary) Output Undervoltage Fault Limit	YES	
45	VOUT_UV_FAULT_RESPONSE	R	0	Bit Flags	1		Main Output Undervoltage Fault Response Actions	YES	
45	VSTBY_UV_FAULT_RESPONSE	R	1	Linear Data Format	2		Standby(Auxiliary) Output Undervoltage Fault Response Actions	YES	

Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) Number	Bit Name	Definition	Supported
46	IOUT_OC_FAULT_LIMIT	R	0	Linear Data Format	2			Main Output Overcurrent Fault Limit - High line	YES
46	ISTBY_OC_FAULT_LIMIT	R	2	Bit Flags	1			Standby(Auxiliary) Output Overvoltage Fault Limit	YES
47	IOUT_OC_FAULT_RESPONSE	R	0	Bit Flags	1			Main Output Overcurrent Fault Response Actions	YES
47	ISTBY_OC_FAULT_RESPONSE	R	2	Linear Data Format	2			Standby(Auxiliary) Output Response Actions	YES
4A	IOUT_OC_WARN_LIMIT	R	0	Linear Data Format	2			Standby(Auxiliary) Output Overcurrent Fault Response Actions	YES
4A	IOUT_OC_WARN_LIMIT	R	1	Linear Data Format	2			Main Output Overcurrent Warning Limit - High line	YES
4A	ISTBY_OC_WARN_LIMIT	R	2	Linear Data Format	2			Main Output Overcurrent Warning Limit - Low line	YES
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	2	Linear Data Format	2			Airflow 1 Overtemperature Fault Limit	YES
4F	HOTSPOT_1_OT_FAULT_LIMIT	R	1	Linear Data Format	2			Hotspot 1 Overtemperature Fault Limit	YES
4F	AIRFLOW_2_OT_FAULT_LIMIT	R	2	Linear Data Format	2			Airflow 2 Overtemperature Fault Limit	YES
4F	HOTSPOT_2_OT_FAULT_LIMIT	R	3	Bit Flags	1			Hotspot 2 Overtemperature Fault Limit	YES
50	AIRFLOW_1_OT_FAULT_RESPONSE	R	0	Bit Flags	1			Airflow 1 Overtemperature Fault Response Actions	YES
50	HOTSPOT_1_OT_FAULT_RESPONSE	R	1	Bit Flags	1			Hotspot 1 Overtemperature Fault Response Actions	YES
50	AIRFLOW_2_OT_FAULT_RESPONSE	R	2	Bit Flags	1			Airflow 2 Overtemperature Fault Response Actions	YES
50	HOTSPOT_2_OT_FAULT_RESPONSE	R	3	Bit Flags	2			Hotspot 2 Overtemperature Fault Response Actions	YES
51	AIRFLOW_1_OT_WARN_LIMIT	R	0	Linear Data Format	2			Airflow 1 Overtemperature Warning Limit	YES
51	HOTSPOT_1_OT_WARN_LIMIT	R	1	Linear Data Format	2			Hotspot 1 Overtemperature Warning Limit	YES
51	AIRFLOW_2_OT_WARN_LIMIT	R	2	Linear Data Format	2			Airflow 2 Overtemperature Warning Limit	YES
51	HOTSPOT_2_OT_WARN_LIMIT	R	3	Linear Data Format	2			Hotspot 2 Overtemperature Warning Limit	YES
55	VIN_OV_FAULT_LIMIT	R	0	Bit Flags	1			Input Overvoltage Fault Limit	YES
56	VIN_OV_FAULT_RESPONSE	R	0	Linear Data Format	2			Input Overvoltage Fault Response Actions	YES
57	VIN_OV_WARN_LIMIT	R	0	Linear Data Format	2			Input Overvoltage Warning Limit	YES
58	VIN_UV_WARN_LIMIT	R	0	Linear Data Format	2			Input Undervoltage Warning Limit	YES
59	VIN_UV_FAULT_LIMIT	R	0	Linear Data Format	1			Input Undervoltage Fault Limit	YES
5A	VIN_UV_FAULT_RESPONSE	R	0	Linear Data Format	2			Input Undervoltage Fault Response Actions	YES
5B	IIN_OC_FAULT_LIMIT	R	0	Bit Flags	1			Input Overcurrent Fault Limit	YES
5C	IIN_OC_FAULT_RESPONSE	R	0	Linear Data Format	2			Input Overcurrent Fault Response Actions	YES
5D	IIN_OC_WARN_LIMIT	R	0	Linear Data Format	2			Input Overcurrent Warning Limit	YES
5E	POWER_GOOD_ON	R	0	Linear Data Format	2			Power Good On Main Output Voltage Limit	YES
5F	POWER_GOOD_OFF	R	0	Linear Data Format	2			Power Good Off Main Output Voltage Limit	YES
68	POUT_OP_FAULT_LIMIT	R	0	Bit Flags	1			Output Overpower Fault Limit	YES
69	POUT_OP_FAULT_RESPONSE	R	0	Linear Data Format	2			Output Overpower Fault Response Actions	NO
6A	POUT_OP_WARN_LIMIT	R	1	Linear Data Format	2			Output Overpower Warning Limit - Low line	YES

Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) #	Bit Name	Definition	Supported
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2			Input Overpower Warning Limit - High line	YES
79	STATUS_BYTE	R	All	Bit Flags	1	0	NONE_F_W	Set when a fault not listed in [7:1] occurred	NO
						1	CML_F	Set when a communications, memory, or logic fault has occurred	YES
						2	TEMPERATURE_F_W	Set when an overtemperature fault or warning has occurred	YES
						3	INPUT_UV_F	Set when an input undervoltage fault has occurred	YES
						4	OUTPUT_OC_F	Set when an output overcurrent fault has occurred	YES
						5	OUTPUT_OV_F	Set when an output overvoltage fault has occurred	YES
						6	UNIT_OFF	Set when unit not providing power to the output	YES
						7	BUSY_F	Asserted when device busy and unable to respond fault	YES
79	STATUS_WORD	R	All	Bit Flags	2	0	NONE_F_W	Set when a fault not listed in [7:1] occurred	NO
						1	CML_F	Set when a communications, memory, or logic fault has occurred	YES
						2	TEMPERATURE_F_W	Set when an overtemperature fault or warning has occurred	YES
						3	INPUT_UV_F	Set when an input undervoltage fault has occurred	YES
						4	OUTPUT_OC_F	Set when an output overcurrent fault has occurred	YES
						5	OUTPUT_OV_F	Set when an output overvoltage fault has occurred	YES
						6	UNIT_OFF	Set when unit not providing power to the output	YES
						7	BUSY_F	Asserted when device busy and unable to respond fault	YES
						8	UNKNOWN_F_W	Set when a fault not listed in [15:1] has occurred	NO
						9	STATUS_OTHER_F_W	Set when a bit in command STATUS_OTHER set	NO
						10	FANS_F_W	Set when a fan fault or warning has occurred	YES
						11	POWER_GOOD_L	Set when the POWER_GOOD signal is negated	YES
						12	MFG_SPECIFIC_F_W	Manufacturer specific fault or warning has occurred	YES
						13	INPUT_F_W	Set when an Input voltage/current/power fault or warning has occurred	YES
						14	IOUT_POUT_F_W	Set when an output current / output power fault or warning has occurred	YES
15	VOUT_F_W	Set when an output voltage fault or warning has occurred	YES						

Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) #	Bit Name	Definition	Supported
7A	STATUS_VOUT	R	0	Bit Flags	1	0	VOUT_TRACKING_E	Set when an error in the output voltage during power-up/down has occurred	NO
						1	TON_MAX_W	Set when the output turn-on timing has exceeded the TON_MAX warning timing	NO
						2	TON_MAX_F	Set when the output turn-on timing has exceeded the TON_MAX fault timing	NO
						3	VOUT_MAX_F	Set when the output is set higher than the commanded VOUT_MAX limit	NO
						4	VOUT_UV_F	Set when an output undervoltage fault has occurred	YES
						5	VOUT_UV_W	Set when an output undervoltage warning has occurred	YES
						6	VOUT_OV_W	Set when an output overvoltage warning has occurred	YES
						7	VOUT_OV_F	Set when an output overvoltage fault has occurred	YES
7A	STATUS_VSTBY	R	1	Bit Flags	1	0	VOUT_TRACKING_E	Set when an error in the output voltage during power-up/down has occurred	NO
						1	TON_MAX_W	Set when the output turn-on timing has exceeded the TON_MAX warning timing	NO
						2	TON_MAX_F	Set when the output turn-on timing has exceeded the TON_MAX fault timing	NO
						3	VOUT_MAX_F	Set when the output is set higher than the commanded VOUT_MAX limit	NO
						4	VOUT_UV_F	Set when an output undervoltage fault has occurred	YES
						5	VOUT_UV_W	Set when an output under-voltage warning has occurred	YES
						6	VOUT_OV_W	Set when an output overvoltage warning has occurred	YES
						7	VOUT_OV_F	Set when an output overvoltage fault has occurred	YES
7B	STATUS_IOUT	R	0	Bit Flags	1	0	POUT_OP_W	Set when an output overpower warning has occurred	YES
						1	POUT_OP_F	Set when an output overpower fault has occurred	YES
						2	POWER_LIMIT_MODE	Set when the unit has entered output power limiting mode	NO
						3	CURRENT_SHARE_F	Set when an output current share fault has occurred	NO
						4	IOUT_UC_W	Set when an output undercurrent fault has occurred	NO
						5	IOUT_OC_W	Set when an output overcurrent warning has occurred	YES
						6	IOUT_OC_SHUTDOWN	Set when an output overcurrent and low voltage shutdown fault has occurred	YES
						7	IOUT_OC_F	Set when an output overcurrent fault has occurred	YES
7B	STATUS_ISTBY	R	1	Bit Flags	1	0	POUT_OP_W	Set when an output overpower warning has occurred	YES
						1	POUT_OP_F	Set when an output overpower fault has occurred	YES
						2	POWER_LIMIT_MODE	Set when the unit has entered output power limiting mode	NO
						3	CURRENT_SHARE_F	Set when an output current share fault has occurred	NO
						4	IOUT_UC_W	Set when an output undercurrent fault has occurred	NO
						5	IOUT_OC_W	Set when an output overcurrent warning has occurred	YES
						6	IOUT_OC_SHUTDOWN	Set when an output overcurrent and low voltage shutdown fault has occurred	YES
						7	IOUT_OC_F	Set when an output overcurrent fault has occurred	YES

Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) #	Bit Name	Definition	Supported
7C	STATUS_INPUT	R	ALL	Bit Flags	1	0	PIN_OP_W	Set when an input overpower warning has occurred	YES
						1	IIN_OC_W	Set when an input overcurrent warning has occurred	YES
						2	IIN_OC_F	Set when an input overcurrent fault has occurred	YES
						3	VIN_UV_OFF	Set when the Unit is OFF for insufficient input voltage	NO
						4	VIN_UV_F	Set when an input undervoltage fault has occurred	NO
						5	VIN_UV_W	Set when an input undervoltage warning has occurred	YES
						6	VIN_OV_W	Set when an input overvoltage warning has occurred	YES
						7	VIN_OV_F	Set when an input overvoltage fault has occurred	YES
7D	STATUS-TEMPERATURE	R	ALL	Bit Flags	1	0	RESERVED	Reserved	NO
						1	RESERVED	Reserved	NO
						2	RESERVED	Reserved	NO
						3	RESERVED	Reserved	NO
						4	TEMPERATURE_UT_F	Set when an undertemperature fault has occurred	NO
						5	TEMPERATURE_UT_W	Set when an undertemperature warning has occurred	NO
						6	TEMPERATURE_OT_W	Set when an overtemperature warning has occurred	YES
						7	TEMPERATURE_OT_F	Set when an overtemperature fault has occurred	YES
7E	STATUS_CML	R	All	Bit Flags	1	0	OTHER_MEMORY_F	Set when another memory or logic fault has occurred	NO
						1	OTHER_COMM_F	Set when a communication fault not listed in [7:3] has occurred (example: UART or SPI)	YES
						2	RESERVED	Reserved	NO
						3	PROCESSOR_F	Set when a processor fault is detected	NO
						4	MEMORY_F	Set when a memory fault is detected (example: Checksum errors during bootload)	NO
						5	PEC_ERROR_F	Set when a packet error checking (PEC) failed has occurred	YES
						6	DATA_ERROR_F	Set when invalid or unsupported data is received	YES
						7	COMMAND_ERROR_F	Set when an invalid or unsupported command is received	YES



Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) Number	Bit Name/Comment	Description	Supported
80	STATUS_MFR_SPECIFIC	R	All	Bit Flags	1	0	RESERVED	Reserved	NO
						1	RESERVED	Reserved	NO
						2	VINT_RANGE_W	Set when an internal voltage (VCC2, VCC4, or VDD) out-of-range warning has occurred	NO
						3	VINT_RANGE_F	Set when an internal voltage (VCC2, VCC4, or VDD) out-of-range fault has occurred	YES
						4	VBUS_UV_F	Set when the primary boost output bus undervoltage fault has occurred	YES
						5	VBUS_UV_W	Set when the primary boost output bus undervoltage warning has occurred	YES
						6	VBUS_OV_W	Set when the primary boost output bus overvoltage warning has occurred	YES
						7	VBUS_OV_F	Set when the primary boost output bus overvoltage fault has occurred	YES
81	STATUS_FANS_1_2	R	All	Bit Flags	1	0	FAN_AIRFLOW_W	Airflow warning	NO
						1	FAN_AIRFLOW_F	Airflow fault	NO
						2	FAN_2_OVERRIDE	Fan 2 speed overridden	NO
						3	FAN_1_OVERRIDE	Fan 1 speed overridden	YES
						4	FAN_2_W	Fan 2 warning	NO
						5	FAN_1_W	Fan 1 warning	YES
						6	FAN_2_F	Fan 2 fault	NO
						7	FAN_1_F	Fan 1 fault	YES
88	READ_VIN	R	All	Linear Data Format	2	See <a href="#">Sensor Details</a>	Input Voltage Sensor Reading	YES	
89	READ_IIN	R	All	Linear Data Format	2		Input Current Sensor Reading	YES	
8B	READ_VOUT	R	0	Direct Data Format	2		Main Output Voltage Sensor Reading	YES	
8B	READ_VSTBY	R	1	Direct Data Format	2		Standby(Auxiliary) Output Voltage Sensor Reading	YES	
8C	READ_IOUT	R	0	Direct Data Format	2		Main Output Current Sensor Reading	YES	
8C	READ_ISTBY	R	1	Direct Data Format	2		Standby(Auxiliary) Output Current Sensor Reading	YES	
8D	READ_TEMPERATURE_1	R	0	Linear Data Format	2		Temperature Sensor Reading - Inlet	YES	
8E	READ_TEMPERATURE_2	R	0	Direct Data Format	2		Temperature Sensor Reading - Outlet (Primary Side)	YES	
8F	READ_TEMPERATURE_3	R	0	Linear Data Format	2		Temperature Sensor Reading - Main Output Hotspot (Secondary Side)	YES	
8F	READ_TEMPERATURE_3	R	1	Linear Data Format	2		Temperature Sensor Reading - PFC Hotspot (Primary Side)	YES	
90	READ_FAN_SPEED_1	R	0	Linear Data Format	2		Fan 1 Speed Sensor Reading	YES	
91	READ_FAN_SPEED_2	R	0	Linear Data Format	2		Fan 2 Speed Sensor Reading	NO	
96	READ_POUT	R	All	Linear Data Format	2		Output Power Sensor Reading	YES	
97	READ_PIN	R	All	Linear Data Format	2		Input Power Sensor Reading	YES	



Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) #	Bit Name	Definition	Supported
98	PMBUS_REVISION	R	ALL	HEX	1			PMBus Specification, this series is 11(h)	YES
99	MFR_ID	R	All	Ascii Text Block	9			Example: Murata-PS	YES
9A	MFR_PART_NUMBER	R	All	Ascii Text Block	15			<a href="#">D1U54-D-800-12-HB3BC</a> <a href="#">D1U54-D-800-12-HB4BC</a>	YES
9B	MFR_REVISION	R	All	Ascii Text Block	10			Link to <a href="#">Example</a>	YES
9C	MFR_LOCATION	R/W	All	Ascii Text Block	Variable			Example: China =	YES
9D	MFR_DATE	R/W	All	Ascii Text Block	5			Example: 1750P	YES
9E	MFR_SERIAL	R/W	All	Ascii Text Block	2			Example: ZV1750RC0245	YES
A0	MFR_VIN_MIN	R	All	Linear Data Format	2			Power Supply Input Voltage Minimum Specification	YES
A1	MFR_VIN_MAX	R	All	Linear Data Format	2			Power Supply Input Voltage Maximum Specification	YES
A2	MFR_IIN_MAX	R	All	Linear Data Format	2			Power Supply Input Current Maximum Specification	YES
A3	MFR_PIN_MAX	R	All	Linear Data Format	2			Power Supply Input Power Maximum Specification	YES
A4	MFR_VOUT_MIN	R	All	Linear Data Format	2			Power Supply Main Output Voltage Minimum Specification	YES
A5	MFR_VOUT_MAX	R	All	Linear Data Format	2			Power Supply Main Output Voltage Maximum Specification	YES
A6	MFR_IOUT_MAX	R	All	Linear Data Format	2			Power Supply Main Output Current Maximum Specification	YES
A7	MFR_POUT_MAX	R	All	Linear Data Format	2			Power Supply Output Power Maximum Specification	YES
A8	MFR_TAMBIENT_MAX	R	All	Linear Data Format	2		<a href="#">Link to MFG parametric data</a>	Power Supply Operating Ambient Temperature Maximum Specification	YES
A9	MFR_TAMBIENT_MIN	R	All	Linear Data Format	2			Power Supply Operating Ambient Temperature Minimum Specification	YES
AA	MFR_EFFICIENCY_LL	R	All	Linear Data Format	2 x 7			Power Supply High-Line Low vin	YES
								Power Supply High-Line Low Pout1	YES
								Power Supply High-Line Medium Power Specification	YES
								Power Supply High-Line Medium Power Efficiency Specification	YES
								Power Supply High-Line High Power Specification	YES
								Power Supply High-Line Low Power Specification	YES
								Power Supply High-Line Low Power Efficiency Specification	YES

Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) #	Bit Name	Definition	Supported
AB	MFR_EFFICIENCY_HL	R	All	Linear Data Format	2x7			Power Supply High-Line Input Voltage Specification	YES
								Power Supply High-Line Low Power Specification	YES
								Power Supply High-Line Low Power Efficiency Specification	YES
								Power Supply High-Line Medium Power Specification	YES
								Power Supply High-Line Medium Power Efficiency Specification	YES
								Power Supply High-Line High Power Specification	YES
E0	PS_STATUS (Non-sticky <sup>1</sup> Power Supply Status Bits)	R	All	Bit Flags	2	0	CALIBRATION	Set when the unit is in Calibration mode	YES
						1	VSTBY_SELECT	Set when Vstby set to 5V; de-set when Vstby set to 3.3V	NO
						2	PS_KILL	Set when the PS_KILL pin is defeated and the unit is properly seated in the chassis	YES
						3	VIN_OK	Set when the input voltage is within operating specification	YES
						4	VIN_RANGE	Set when input voltage range is high; de-set when input voltage range is low	YES
						5	PFC_BUS	Set when the PFC Bus is within operating specification	YES
						6	PS_ON	Set when the PS_ON logic set to enable the main output	YES
						7	POWER_GOOD	Set when main output power delivered by the unit is OK; mirrors the digital output signal	YES
						8	POWER_DOWN	Set when boot loader is taking control and the main output and PFC need to be shutdown	YES
						9	BOOTLOAD_COMPLETE D	Set when the boot loader has completed and system reset needs to be Set	YES
						10	UNUSED		NO
						11	UNUSED		NO
						12	UNUSED		NO
						13	UNUSED		NO
						14	WARNING	Set when power supply warning has occurred; tracks 'WARNING' status LED	YES
						15	FAULT	Set when power supply fault has occurred; tracks 'FAULT' status LED	YES

Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) Number	Bit Name/Comment	Description	Supported
E1	EEPROM_WP	R/W	All	Integer	1		See EEPROM FRU Data <a href="#">EEPROMDATAHB4C</a> <a href="#">EEPROMDATAHB3C</a>	Write 0x9A to enable write protection to the external EEPROM. Write 0x56 to disable write protection to the external EEPROM	YES
E2	READ_HOURS_USED	R	All	Linear Data Format	3		See Sensor Data Tables for Individual Models <a href="#">ComCodexE2HB4xCxxx</a> <a href="#">ComCodexE2HB3xCxxx</a>	Power Supply Accumulated Main Output Power-On Hours	YES
E5	READ_RESETS	R	All	Bit Flags	2			RCON register status flags for troubleshooting	YES
				Bit Flags	2	RCON2 register status flags for troubleshooting		YES	
EE	PMBUS_CONFIG <a href="#">PMBUSCONFIG</a>	R	All	Bit Flags	2	0	DATA_FORMAT	0 = Linear data format 1 = Direct data format	YES
						1	SMBALERT_L	0 = SMBALERT_L implemented & supported 1 = SMBALERT not implemented	NO
						2	MAX_BUS_SPEED	0 = 100kHz 1 = 400kHz	NO
						3	PEC	0 = PEC not supported 1 = PEC supported	YES
						4:7	RESERVED		NO
						8:15	CMD_KEY	Command activation/verification key = 0x5A	YES
EF	LED_CONTROL	R	All	Bit Flags	1	0:2	LED_MODE	LED mode change bits	YES
						3:6	RESERVED		NO
						7	LED_CONTROL <a href="#">ComCodexEF</a>	LED manual/auto control toggle bit	NO
F0	READ_RESETS	R	All	Bit Flags	2		RCON register status flags for troubleshooting	YES	
				Bit Flags	2	RCON2 register status flags for troubleshooting			
F8	BOOTLOAD_RESTART	R/W	All	HEX	1		Boot loader completion and application restart request command	YES	
FA	BOOTLOADER_REQUEST	R/W	All	Ascii Text Block	6		Boot loader request command	YES	

Command Code (Hex)	Command Name	Read/Write	Page	Format	# of Bytes	Bit(s) #	Bit Name	Definition	Supported
FB	BOOTLOADER-STATUS	R	All	Bit Flags	2	0	BOOTLOADING_PRI	Set when primary uC bootloading in process	YES
						1	BOOTLOADING_FLOAT	Set when floating uC bootloading in process	YES
						2	BOOTLOADING_SEC	Set when secondary uC bootloading in process	YES
						3	BOOTLOADED_PRI	Set when primary uC bootloading completed; reset required	YES
						4	BOOTLOADED_FLOAT	Set when floating uC bootloading completed; reset required	YES
						5	BOOTLOADED_SEC	Set when secondary uC bootloading completed; reset required	YES
						6	RESET_PRI	Set when primary uC reset	YES
						7	RESET_FLOAT	Set when floating uC reset	YES
						8	RESET_SEC	Set when secondary uC reset	YES
						9	RESERVED		NO
						10	RESERVED		NO
						11	RESERVED		NO
						12	RESERVED		NO
						13	RESERVED		NO
						14	RESERVED		NO
15	RESERVED		NO						

**Limits and Response returned values for Models containing HB3BC:**

**NOTE:** I2C sensor tolerance details can be found [here](#).

[Link back to: Commands List](#)

The following tables represents typical results/responses returned from respective Command Code entries and is provided as an illustration of what should be expected.

Command Code (Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments	
							N	m	R	b				
40	VOUT_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-6					13		
40	VSTBY_OV_FAULT_LIMIT	R	1	Linear Data Format	2	Vdc	-6					14		
41	VOUT_OV_FAULT_RESPONSE	R	0	Bit Flags	1							2:0	0	Delay Time - None
												5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
												7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
41	VSTBY_OV_FAULT_RESPONSE	R	1	Bit Flags	1							2:0	0	Delay Time - None
												5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
												7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
42	VOUT_OV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					12.85		
42	VSTBY_OV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					12.5		



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Command Code Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
43	VOUT_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					11.41	
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					11.5	
44	VOUT_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-6					10.91	
44	VSTBY_UV_FAULT_LIMIT	R	1	Linear Data Format	2	Vdc	-6					10.91	
45	VOUT_UV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
45	VSTBY_UV_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
46	IOUT_OC_FAULT_LIMIT	R	0	Linear Data Format	2	Adc	-4					77.5	
46	ISTBY_OC_FAULT_LIMIT	R	1	Linear Data Format	2	Adc	-8					2.3	
47	IOUT_OC_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	7	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
47	ISTBY_OC_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	7	Response - Continuous restart (self-recovery)
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
4A	IOUT_OC_WARN_LIMIT	R	0	Linear Data Format	2	Adc	-4					75	
4A	ISTBY_OC_WARN_LIMIT	R	1	Linear Data Format	2	Adc	-8					2.2	
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	0	Linear Data Format	2	°C	0					85	Primary Airflow – Intke
4F	HOTSPOT_1_OT_FAULT_LIMIT	R	1	Linear Data Format	2	°C	0					125	Primary Hotspot - PFC
4F	AIRFLOW_2_OT_FAULT_LIMIT	R	2	Linear Data Format	2	°C	0					125	Secondary Airflow – outlet
4F	HOTSPOT_2_OT_FAULT_LIMIT	R	3	Linear Data Format	2	°C	0					105	Secondary Hotspot – Main Transformer
50	AIRFLOW_1_OT_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
50	HOTSPOT_1_OT_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared

Command Code Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
50	AIRFLOW_2_OT_FAULT_RESPONSE	R	2	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
50	HOTSPOT_2_OT_FAULT_RESPONSE	R	3	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
51	AIRFLOW_1_OT_WARN_LIMIT	R	0	Linear Data Format	2	°C	0					80	Primary Airflow – Inlet
51	HOTSPOT_1_OT_WARN_LIMIT	R	1	Linear Data Format	2	°C	0					100	Primary Hotspot
51	AIRFLOW_2_OT_WARN_LIMIT	R	2	Linear Data Format	2	°C	0					115	Secondary Airflow - Outet
51	HOTSPOT_2_OT_WARN_LIMIT	R	3	Linear Data Format	2	°C	0					100	Secondary Hotspot - Main output hotspot
55	VIN_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vs	-1					76	Recoverable
56	VIN_OV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
57	VIN_OV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-1					74	
58	VIN_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-1					40	
59	VIN_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-1					38	
5A	VIN_UV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
5B	IIN_OC_FAULT_LIMIT	R	0	Linear Data Format	2	Adc	-6					27.5	
5C	IIN_OC_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
5D	IIN_OC_WARN_LIMIT	R	0	Linear Data Format	2	Adc	-6					40	
5E	POWER_GOOD_ON	R	0	Linear Data Format	2	Vdc	-6					10.91	
5F	POWER_GOOD_OFF	R	0	Linear Data Format	2	Vdc	-6					10.91	
68	POUT_OP_FAULT_LIMIT	R	0	Linear Data Format	2	Watts	0					930	

Command Code Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
69	POUT_OP_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
6A	POUT_OP_WARN_LIMIT	R	0	Linear Data Format	2	Watts	0					900	
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2	Watts	0					1060	

[Back to command list](#)

Limits and Response returned values for Models containing HB4BC:

NOTE: I2C sensor tolerance details can be found [here](#).

[Link back to: Commands List](#)

The following tables represents typical results/responses returned from respective Command Code entries and is provided as an illustration of what should be expected.

Command Code Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
40	VOUT_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-6					13	
40	VSTBY_OV_FAULT_LIMIT	R	1	Linear Data Format	2	Vdc	-6					13	
41	VOUT_OV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
41	VSTBY_OV_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
42	VOUT_OV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					12.84	
42	VSTBY_OV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					12.5	
43	VOUT_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					11.41	
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					11.5	
44	VOUT_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-6					10.91	
44	VSTBY_UV_FAULT_LIMIT	R	1	Linear Data Format	2	Vdc	-6					10.91	
45	VOUT_UV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared



Command Code Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
45	VSTBY_UV_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
46	IOUT_OC_FAULT_LIMIT	R	0	Linear Data Format	2	Adc	-4					77.5	
46	ISTBY_OC_FAULT_LIMIT	R	1	Linear Data Format	2	Adc	-8					2.3	
47	IOUT_OC_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	7	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Continuous restart (self-recovery)
47	ISTBY_OC_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	7	Response - Continuous restart (self-recovery)
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
4A	IOUT_OC_WARN_LIMIT	R	0	Linear Data Format	2	Adc	-4					75	
4A	ISTBY_OC_WARN_LIMIT	R	1	Linear Data Format	2	Adc	-8					2.2	
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	0	Linear Data Format	2	°C	0					125	Primary Airflow – Outlet (exhaust)
4F	HOTSPOT_1_OT_FAULT_LIMIT	R	1	Linear Data Format	2	°C	0					125	Primary Hotspot - PFC
4F	AIRFLOW_2_OT_FAULT_LIMIT	R	2	Linear Data Format	2	°C	0					85	Secondary Airflow – inlet (Intake)
4F	HOTSPOT_2_OT_FAULT_LIMIT	R	3	Linear Data Format	2	°C	0					100	Secondary Hotspot - Main output hotspot
50	AIRFLOW_1_OT_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
50	HOTSPOT_1_OT_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
50	AIRFLOW_2_OT_FAULT_RESPONSE	R	2	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
50	HOTSPOT_2_OT_FAULT_RESPONSE	R	3	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared

Command Code Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
51	AIRFLOW_1_OT_WARN_LIMIT	R	0	Linear Data Format	2	°C	0					115	Primary Airflow – Outlet (Exhaust)
51	HOTSPOT_1_OT_WARN_LIMIT	R	1	Linear Data Format	2	°C	0					100	Primary Hotspot – PFC
51	AIRFLOW_2_OT_WARN_LIMIT	R	2	Linear Data Format	2	°C	0					80	Secondary Airflow – Inlet (Intake)
51	HOTSPOT_2_OT_WARN_LIMIT	R	3	Linear Data Format	2	°C	0					100	Secondary Hotspot - Main output hotspot
55	VIN_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-1					76	Recoverable
56	VIN_OV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
57	VIN_OV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-1					74	Recoverable
58	VIN_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-1					40	Recoverable
59	VIN_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-1					38	Recoverable
5A	VIN_UV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
5B	IIN_OC_FAULT_LIMIT	R	0	Linear Data Format	2	Arms	-6					27.5	
5C	IIN_OC_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
5D	IIN_OC_WARN_LIMIT	R	0	Linear Data Format	2	Arms	-6					26.5	
5E	POWER_GOOD_ON	R	0	Linear Data Format	2	Vdc	-6					10.91	
5F	POWER_GOOD_OFF	R	0	Linear Data Format	2	Vdc	-6					10.91	
68	POUT_OP_FAULT_LIMIT	R	0	Linear Data Format	2	Watts	0					930	
69	POUT_OP_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
6A	POUT_OP_WARN_LIMIT	R	0	Linear Data Format	2	Watts	0					900	
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2	Watts	0					1060	

[Link back to: Commands List](#)

**SENSOR DATA AND RESOLUTION**

[Return to Limits and Response returned tables](#)

Command Code (Hex)	Command Name	Description	Page	Data Format	Units	Scaling Coefficient				Raw Sensor		PMBus Reporting Sensor		
						N	m	R	b	Full-scale / Range	Resolution	Full-scale / Range	Resolution	Accuracy
88	READ_VIN	Input Voltage Sensor Reading	All	Linear Data Format	Vrms	-1				327.93	0.3206	511.5	0.5	+ / - 2% of Reporting Full-Scale
89	READ_IIN	Input Current Sensor Reading	All	Linear Data Format	Arms	-6				17.86	0.0175	15.98	0.0156	+ / - 5% of Reporting Full-Scale
8B	READ_VOUT	Main Output Voltage Sensor Reading	0	Direct Data Format	Vdc	-6				14.79	0.0145	15.98	0.0156	+ / - 2% of Reporting Full-Scale
8B	READ_VSTBY	Standby(Auxiliary) Output Voltage Sensor Reading	1	Direct Data Format	Vdc	-6				14.73	0.0144	15.984	0.01563	+ / - 2% of Reporting Full-Scale
8C	READ_IOUT	Main Output Current Sensor Reading	0	Direct Data Format	Adc	-4				70.77	0.0692	63.94	0.063	+ / - 2% of Reporting Full-Scale
8C	READ_ISTBY	Standby(Auxiliary) Output Current Sensor Reading	1	Direct Data Format	Adc	-8				4.33	0.0042	3.996	0.00391	+ / - 2% of Reporting Full-Scale
8D	READ_TEMPERATURE_1	Temperature Sensor Reading - Inlet (Secondary Side)	0	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
8E	READ_TEMPERATURE_2	Temperature Sensor Reading - Outlet (Primary Side)	0	Direct Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
8F	READ_TEMPERATURE_3	Temperature Sensor Reading - Main Output Hotspot (Secondary Side)	0	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
8F	READ_TEMPERATURE_3	Temperature Sensor Reading - PFC Hotspot (Primary Side)	1	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
90	READ_FAN_SPEED_1	Fan 1 Speed Sensor Reading	All	Linear Data Format	RPM	5				24,000		32736	32	+ / - 5% of Reporting Full-Scale
96	READ_POUT	Output Power Sensor Reading	All	Linear Data Format	Watts	0						1023	1	+ / - 5% of Reporting Full-Scale
97	READ_PIN	Input Power Sensor Reading	All	Linear Data Format	Watts	0						1023	1	+ / - 5% of Reporting Full-Scale
E2	READ_POWER_ON_HOURS	Input Voltage Sensor Reading	All	Linear Data Format	Hours	0				~1,900 (Years)		~1,900 (Years)	1	+ / - 3%

**MANUFACTURERS VITAL PRODUCT DATA**

The following tables are examples of the ASCII / Hex and text that can be expected when reading commands 99 through 9E returned

**Command Code 99 HEX (MAN\_ID) [back to command list](#)**

Command Code (Hex)	Command Name	Value	Units	ID Length/Bit#ID/ASCII Text
99	MFR_ID	Murata-PS	N/A	MFR_ID_LENGTH 9
				MFR_ID_0 'M'
				MFR_ID_1 'u'
				MFR_ID_2 'r'
				MFR_ID_3 'a'
				MFR_ID_4 't'
				MFR_ID_5 'a'
				MFR_ID_6 '-'
				MFR_ID_7 'P'
MFR_ID_8 'S'				

Command Code 9A HEX; (MAN\_MODEL) D1U54-D-800-12-HB3BC

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Command Code (Hex)	Command Name	Value	Format	ID Length/Bit#ID/ASCII Text		
9A	MFR_MODEL	D1U54-D-800-12-HB3BC	ASCII coded Hex	MFR_MODEL_LENGTH = 25	ASCII Text	Hex
				MFR_MODEL_0	'D'	44
				MFR_MODEL_1	'1'	31
				MFR_MODEL_2	'U'	55
				MFR_MODEL_3	'5'	35
				MFR_MODEL_4	'4'	34
				MFR_MODEL_5	'-'	2D
				MFR_MODEL_6	'D'	44
				MFR_MODEL_7	'-'	2D
				MFR_MODEL_8	'8'	38
				MFR_MODEL_10	'0'	30
				MFR_MODEL_11	'0'	30
				MFR_MODEL_12	'-'	2D
				MFR_MODEL_13	'1'	31
				MFR_MODEL_14	'2'	32
				MFR_MODEL_15	'-'	2D
				MFR_MODEL_16	'H'	48
				MFR_MODEL_17	'B'	42
				MFR_MODEL_18	'3'	33
				MFR_MODEL_19	'B'	44
				MFR_MODEL_20	'C'	43

Command Code 9A HEX; (MAN\_MODEL) D1U54-D-800-12-HB4BC

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Command Code (Hex)	Command Name	Value	Format	ID Length/Bit#ID/ASCII Text		
9A	MFR_MODEL	D1U54-D-W-800-12-HB4BC	ASCII Coded Text	MFR_MODEL_LENGTH = 21	ASCII Text	Hex
				MFR_MODEL_0	'D'	44
				MFR_MODEL_1	'1'	31
				MFR_MODEL_2	'U'	55
				MFR_MODEL_3	'5'	35
				MFR_MODEL_4	'4'	34
				MFR_MODEL_5	'-'	2D
				MFR_MODEL_6	'D'	44
				MFR_MODEL_7	'-'	2D
				MFR_MODEL_8	'8'	38
				MFR_MODEL_10	'0'	30
				MFR_MODEL_11	'0'	30
				MFR_MODEL_12	'-'	2D
				MFR_MODEL_13	'1'	31
				MFR_MODEL_14	'2'	32
				MFR_MODEL_15	'-'	2D
				MFR_MODEL_16	'H'	48
				MFR_MODEL_17	'B'	42
				MFR_MODEL_18	'4'	34
				MFR_MODEL_19	'B'	44
				MFR_MODEL_20	'C'	43

Command Code 9B HEX; (MFR\_REVISION)Pg.1 “Primary Firmware Revision”

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Command Code (Hex)	Command Name	Value	Format	ID Length/Bit#ID/ASCII Text		
9B	MFR_REVISION	0000-0101-0000	ASCII Coded Hex	MFR_MODEL_LENGTH = 18	ASCII	Hex
				MFR_MODEL_0	'9'	10
				MFR_MODEL_1	'1'	39
				MFR_MODEL_2	'5'	31
				MFR_MODEL_3	'1'	35
				MFR_MODEL_4	'0'	31
				MFR_MODEL_5	'0'	30
				MFR_MODEL_6	'1'	30
				MFR_MODEL_7	'9'	31
				MFR_MODEL_8	'7'	39
				MFR_MODEL_9	'0'	37
				MFR_MODEL_10	'-'	30
				MFR_MODEL_11	'0'	2D
				MFR_MODEL_12	'2'	30
				MFR_MODEL_13	'-'	32
				MFR_MODEL_14	'0'	2d
MFR_MODEL_15	'1'					

**Command Code 9C HEX (MFR\_LOCATION)**

Command Code (Hex)	Command Name	Value	ID Length/Bit#ID/ASCII Text	
9C	MFR_LOCATION	China	MFR_LOCATION_LENGTH = 5	
			MFR_LOCATION_0	'C'
			MFR_LOCATION_1	'h'
			MFR_LOCATION_2	'i'
			MFR_LOCATION_3	'n'
			MFR_LOCATION_4	'a'

**Command Code 9D HEX (MFR\_DATE)**

Command Code (Hex)	Command Name	Value	ID Length/Bit#ID/ASCII Text	
9D	MFR_DATE	1400	MFR_DATE_LENGTH = 4	
			MFR_DATE_0	'1'
			MFR_DATE_1	'4'
			MFR_DATE_2	'0'
			MFR_DATE_3	'0'

**Command Code 9E HEX (MFR\_SERIAL)**

Command Code (Hex)	Command Name	Value	ID Length/Bit#ID/ASCII Text	
9E	MFR_SERIAL	QEyywwR1xxxx	MFR_SERIAL_LENGTH = 12	
			MFR_SERIAL_0	'Q'
			MFR_SERIAL_1	'E'
			MFR_SERIAL_2	'y'
			MFR_SERIAL_3	'y'
			MFR_SERIAL_4	'w'
			MFR_SERIAL_5	'w'
			MFR_SERIAL_6	'R'
			MFR_SERIAL_7	'1'
			MFR_SERIAL_8	'x'
			MFR_SERIAL_9	'x'
			MFR_SERIAL_10	'x'
			MFR_SERIAL_11	'x'

**MANUFACTURERS GENERAL PARAMETRIC DATA**

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Command Code (Hex)	Command Name	Value	Units	Scaling Coefficients			
				N	m	R	b
A0	MFR_VIN_MIN	40	Vdc	-1			
A1	MFR_VIN_MAX	72	Vdc	-1			
A2	MFR_IIN_MAX	20.5	Adc	-6			
A3	MFR_PIN_MAX	984	W	0			
A4	MFR_VOUT_MIN	11.41	Vdc	-6			
A5	MFR_VOUT_MAX	12.59	Vdc	-6			
A6	MFR_IOUT_MAX	66.75	Adc	-4			
A7	MFR_POUT_MAX	800	W	0			
A8	MFR_TAMBIENT_MAX	55	C	0			
A9	MFR_TAMBIENT_MIN	5	C	0			
AA	MFR_EFFICIENCY_LL_VIN	40	Vdc	-1			
	MFR_EFFICIENCY_LL_POUT1	160	W	0			
	MFR_EFFICIENCY_LL_EFF1	0.89		-			
				10			
	MFR_EFFICIENCY_LL_POUT2	400	W	0			
	MFR_EFFICIENCY_LL_EFF2	0.91		-			
				10			
	MFR_EFFICIENCY_LL_POUT3	800	W	0			
AB	MFR_EFFICIENCY_LL_EFF3	0.89		-			
				10			
	MFR_EFFICIENCY_HL_VIN	72	Vdc	-1			
	MFR_EFFICIENCY_HL_POUT1	160	W	0			
	MFR_EFFICIENCY_HL_EFF1	0.9		-			
				10			
	MFR_EFFICIENCY_HL_POUT2	400	W	0			
	MFR_EFFICIENCY_HL_EFF2	0.93		-			
			10				
MFR_EFFICIENCY_HL_POUT3	800	W	0				
MFR_EFFICIENCY_HL_EFF3	0.92		-				
			10				



**OPERATION COMMAND CODE 01 HEX**

Power Module On/Off Mode: Bit # / Bit Description (Command Code 01 HEX)								Valid Values		Power Module Status
7	6	5	4	3	2	1	0	Dec	Hex	
On/off Bit	On/off Bit	Margin on/off/high/low Bits		Margin Fault Control Bits		Bit	Bit			
1	0	1	0	1	0	Not Used				
0	0	x	x	x	x	x	x	0 - 63	0 - 3F	Disable power supply when OPERATION command supported
1	0	x	x	x	x	x	x	128 - 191	80 - BF	Enable power supply when OPERATION command supported – DEFAULT setting

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**ON/OFF COMMAND CODE 02 HEX**

Power Module On/Off Configuration: Bit # / Bit Description (Command Code 02 HEX)								Valid Values		Power Supply On/Off Mode
7	6	5	4	3	2	1	0	Dec	Hex	
reserved	reserved	reserved	CONTROL pin / OPERATION command PS on/off	OPERATION command on/off	CONTROL PIN					
					On/Off	Polarity	Action			
0	0	0	1	0	1	0	1	21	15	Control pin only ; active low polarity
0	0	0	1	0	1	1	1	23	17	Control pin only ; active high polarity
0	0	0	1	1	0	x	1	25 or 27	19 or 1B	Operation command only
0	0	0	1	1	1	0	1	29	1D	Operation command and control pin ; active low polarity; DEFAULT setting
0	0	0	1	1	1	1	1	31	1F	Operation command and control pin ; active high polarity

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**EEPROM DATA**

The following tables illustrate the type of data and format of the power supply's EEPROM contents and generally complies with Intel IPMI standard. Since the exact contents vary unit to unit, the contents need to be read for exact content values.

**D1U54-D-800-12-HB3BC:**

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Product Info Area Field Name	Product Info Area Field Contents	Static or Dynamic Register? (S/D)	Data Type	Description	Label Markings
Manufacturer name	Murata-PS	S	ASCII	Manufacturer name	Murata Power Solutions
Model name	M1970	S	ASCII	Product / project number (M1970)	M1970
Part/product number	D1U54-D-800-12-HB3BC	S	ASCII	Marketing / customer p/n (D1U54-D-800-12-HB3BC )	D1U54-D-800-12-HB3BC
Version		N/A	N/A	Not used	
Serial number	SSYYWRRXXXX	D	ASCII	MPS 12-digit serial number	SN: SSYYWRRXXXX
Asset tag		N/A	N/A	Not used	
FRU File ID		N/A	N/A	Not used	
Custom field 1		N/A	N/A	Not used	
Custom field 2		N/A	N/A	Not used	
Custom field 3		N/A	N/A	Not used	
Custom field 4		N/A	N/A	Not used	



D1U54-D-800-12-HB4BC:

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Product Info Area Field Name	Product Info Area Field Contents	Static or Dynamic Register? (S/D)	Data Type	Description	Label Markings
Manufacturer name	Murata-PS	S	ASCII	Manufacturer name	Murata Power Solutions
Model name	M1971	S	ASCII	Product / project number (M1971)	M1971
Part/product number	D1U54-D-800-12-HB4BC	S	ASCII	Marketing / customer p/n (D1U54-D-800-12-HB4BC )	D1U54-D-800-12-HB4BC
Version		N/A	N/A	Not used	
Serial number	SSYYWRRRXXX	D	ASCII	MPS 12-digit serial number	SN: SSYYWRRRXXX
Asset tag		N/A	N/A	Not used	
FRU File ID		N/A	N/A	Not used	
Custom field 1		N/A	N/A	Not used	
Custom field 2		N/A	N/A	Not used	
Custom field 3		N/A	N/A	Not used	
Custom field 4		N/A	N/A	Not used	

**PMBUS Configurable Bits**

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Parameter	Bit#	Bit	Function	
Data Format	Bit 0	1	Direct Data Format	
		0	Linear Data Format	Default
SMBALERT	Bit 1	1	PS does not have SMBALERT pin or does not support SMBus alert protocol	
		0	PS does have SMBALERT pin and supports SMBus alert protocol	Default
Bus Speed	Bit 2	1	Maximum supported bus speed = 400kHz	Default
		0	Maximum supported bus speed = 100kHz	
PEC support	Bit 3	1	Packed error checking supported	Default
		0	Packed error checking not supported	



Murata Power Solutions

LED CONTROL; All Variants.

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Bit # / Bit Description								Valid Values		Read / Write	LED Status & Control
7	6	5	4	3	2	1	0	Dec	Hex		
CONTROL Bit	Reserved	Reserved	Reserved	Reserved	LED Mode Bit 2	LED Mode Bit 1	LED Mode Bit 0				
Page 0 - INPUT LED											
0	0	0	0	0	0	0	0	0	0	Read	Auto - LED off
0	0	0	0	0	0	0	0	1	1	Read	Auto - LED solid green
0	0	0	0	0	0	0	1	0	2	Read	Auto - LED blinking green
0	X	X	X	X	X	X	X	0 - 127	0 - 7F	Write	Set to Auto LED control
1	0	0	0	0	0	0	0	128	80	Read / Write	Set to Manual - LED off
1	0	0	0	0	0	0	1	129	81	Read / Write	Set to Manual - LED solid green
1	0	0	0	0	0	1	0	130	82	Read / Write	Set to Manual - LED blinking green
Page 1 - OUTPUT LED											
0	0	0	0	0	0	0	0	0	0	Read	Auto - LED off
0	0	0	0	0	0	0	1	1	1	Read	Auto - LED solid green
0	0	0	0	0	0	0	1	0	2	Read	Auto - LED blinking green
0	0	0	0	0	0	0	1	1	3	Read	Auto - LED solid red
0	0	0	0	0	1	0	0	4	4	Read	Auto - LED blinking red
0	0	0	0	0	1	0	1	5	5	Read	Auto - LED solid yellow
0	0	0	0	0	1	1	0	6	6	Read	Auto - LED blinking yellow
0	X	X	X	X	X	X	X	0 - 127	0 - 7F	Write	Set to Auto LED control
1	0	0	0	0	0	0	0	128	80	Read / Write	Set to Manual - LED off
1	0	0	0	0	0	0	1	129	81	Read / Write	Set to Manual - LED solid green
1	0	0	0	0	0	1	0	130	82	Read / Write	Set to Manual - LED blinking green
1	0	0	0	0	0	1	1	131	83	Read / Write	Set to Manual - LED solid red
1	0	0	0	0	1	0	0	132	84	Read / Write	Set to Manual - LED blinking red
1	0	0	0	0	1	0	1	133	85	Read / Write	Set to Manual - LED solid yellow
1	0	0	0	0	1	1	0	134	86	Read / Write	Set to Manual - LED blinking yellow

= Default Settings