

This application note describes the supported PMBus™ Digital Communications features of the following PSU models:

Model Number	Address	Standby Output	Airflow Direction
D1U54P-M-800-12-HB3BC	ADDR_SEL (External resistor see <a href="#">selection table</a> )	12Vdc	Front to Back (F-B)
D1U54P-M-800-12-HB4BC			Back to Front (B-F)

### Standard PMBus™ Introduction

- Complies with PMBus™ Power Systems Management Protocol Part 1 – General Requirements Rev 1.2 and Power System Mgmt. Protocol Specification – Part II, Revision 1.2. Refer to these documents for additional details.
- PEC is enabled; Ensure system/host PEC enabled to avoid registering CML errors when issuing write commands.
- [Linear data formatting](#) is used for all passed parameters.
- 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
- 400KHz I<sup>2</sup>C communications is supported for the PMBus™ interface.
- The PMBus™ slave controller does “clock stretch” on ACK or NAK.
- “Page” command is supported, generally, page “0” contains main output parameters and page “1” contains the standby output parameters. Page# is also used to organize the four hotspot/airflow temperature sensors

### Device Details

#### Power Supply Controllers

Vendor	MFG Part Number	Package	Description
Microchip Technology Inc.	DSPIC33FJ64GS606T-50I/PT	TQFP64	( Secondary) IC Dig SMT Microcontroller PIC33 TQFP64 64k 9kB 50MHz
Microchip Technology Inc.	DSPIC33FJ16GS504T-50I/PT	TQFP44	( Primary) IC Dig SMT Controller PWM Industrial PIC33 TQFP44 40MHz

#### Power Supply External EEPROM

Vendor	MFG Part Number	Package	Description
Microchip Technology Inc.	24AA024T-I/MS	MSOP8	IC Dig SMT EEPROM CMOS Serial I2C AT24CXX MSOP8 2kB

### Device Addressing Methods

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:

- Using the ADDR signal pin of the power supply in digital mode by either:
  - 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, resulting in PSU/EEPROM addresses of BEh & AEh respectively.
  - 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, resulting in PSU/EEPROM addresses of B0h & A0h respectively.
- Using the ADDR signal pin 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 address combinations listed:

HEX Address Combinations by Analogue Method; ADDR External Resistance Values		
ADDR <a href="#">External Resistance</a> 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 utilized where the addressing commences at base address A0 & B0) and the lowest order bit of the address denotes Read/Write. It is assumed that the Read Write bit is set to logic “0” (for addresses shown in the table above).

### PMBus™ Command List

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
00	PAGE	R/W	All		1			Command to provide ability to configure, control & monitor multiple outputs	YES
01	OPERATION	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_H	YES
02	ON_OFF_CONFIG	Send	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		0		Write only command clears all faults that have been set in all the STATUS_XXXX registers simultaneously	YES	
04	PHASE	R/W	All		1		Command to provide the ability to configure, control, and monitor multiple phases on one PMBus unit.	NO	
10	WRITE_PROTECT	R/W	All		1		Command to provide ability to configure, control & monitor multiple outputs	YES	
11	STORE_DEFAULT_ALL	Send	All		0		Command instructs PMBus device to copy contents of Operating Memory to matching NVM	NO	
12	RESTORE_DEFAULT_ALL	Send	All		0		Command instructs PMBus device to copy contents of NVM to matching Operating Memory	NO	
13	STORE_DEFAULT_CODE	W	All		1		Command instructs the PMBus device to copy the parameter whose Command Code matches value in the data byte, from Operating Memory to matching NVM	NO	
14	RESTORE_DEFAULT_CODE	W	All		1		Command instructs the PMBus device to copy the parameter whose Command Code matches value in the data byte, from NVM to matching Operating Memory	NO	
15	STORE_USER_ALL	Send	All		0		Command instructs the PMBus device to copy the entire contents of Operating Memory to matching NVM	NO	
16	RESTORE_USER_ALL	Send	All		0		Command instructs the PMBus device to copy the entire contents of NVM to matching Operating Memory	NO	
17	STORE_USER_CODE	W	All		1		Command instructs the PMBus device to copy the parameter whose Command Code matches value in the data byte from Operating Memory to matching NVM User Store memory	NO	
18	RESTORE_USER_CODE	W	All		1		Command instructs the PMBus device to copy the parameter whose Command Code matches value in the data byte from NVM to matching Operating Memory	NO	
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	NO
						7	PEC	Set when packet error checking is supported	YES

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
1A	QUERY	Block Write / Block Read Process Call	All	Bit Flags	1	1:0	RESERVED		NO
						4:2	DATA FORMAT	PMBus 1.2 Spec Section 11.13 Table 8.	NO
						5	READ_SUPPORT	1 = Supported ; 0 = Not Supported	NO
						6	WRITE_SUPPORT	1 = Supported ; 0 = Not Supported	NO
						7	COMMAND_SUPPORT	1 = Supported ; 0 = Not Supported	NO
20	<a href="#">VOUT_MODE_rtn</a>	R	0	Bit Flags	1			Single data byte sets the READ_VOUT sensor to linear mode data format and supplies N exponent for translation to volts PMBus Spec - Part II - Revision 1.2 - Sections 8.1-8.3	YES
20	VSTBY_MODE	R	1	Bit Flags	1			Single data byte sets the READ_VSTBY sensor to linear mode data format and supplies N exponent for translation to volts PMBus Spec - Part II - Revision 1.2 - Sections 8.1-8.3	YES
21	VOUT_COMMAND	R/W	0	Linear Data Format	2			Manual override main output setpoint command - Voltage range setting 11.5V - 12.75V Command speed formatted in Linear as per command 0x8B - VOUT_COMMAND	YES
21	VSTBY_COMMAND	R/W	1	Linear Data Format	2			Manual override standby output setpoint command - Voltage range setting x. Command speed formatted in Linear as per command 0x8B - VOUT_COMMAND	NO
22	VOUT_TRIM	R/W	0	Linear Data Format	2			Command used to apply a fixed offset voltage to the output voltage command value	NO
23	VSTBY_TRIM	R/W	1	Linear Data Format	2			Command used to apply a fixed offset voltage to the output voltage command value	NO
23	VOUT_CAL_OFFSET	R/W	0	Linear Data Format	2			Command used to apply a fixed offset voltage to the output voltage command value	NO
23	VSTBY_CAL_OFFSET	R/W	1	Linear Data Format	2			Command used to apply a fixed offset voltage to the output voltage command value	NO
24	VOUT_MAX	R/W	0	Linear Data Format	2			Command sets upper limit output voltage can be set regardless of other command/combination	NO
24	VSTBY_MAX	R/W	1	Linear Data Format	2			Command sets upper limit output voltage can be set regardless of other command/combination	NO
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
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_LOW	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_HIGH	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
27	VOUT_TRANSITION_RATE	R/W	0	Linear Data Format	2			Command sets the rate in mV/μs at which the output should change voltage	NO
27	VSTBY_TRANSITION_RATE	R/W	1	Linear Data Format	2			Command sets the rate in mV/μs at which the output should change voltage	NO

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
28	VOUT_DROOP	R/W	0	Linear Data Format	2			Command sets the rate (mV/A) which output voltage decreases (or increases) with increasing (or decreasing) output current (in Adaptive Voltage Positioning/passive current sharing)	NO
28	VSTBY_DROOP	R/W	1	Linear Data Format	2			Command sets the rate (mV/A) which output voltage decreases (or increases) with increasing (or decreasing) output current (in Adaptive Voltage Positioning/passive current sharing)	NO
29	VOUT_SCALE_LOOP	R/W	0	Linear Data Format	2			PMBus Spec - Part II - Revision 1.2 - Section 13.10	NO
29	VSTBY_SCALE_LOOP	R/W	1	Linear Data Format	2			PMBus Spec - Part II - Revision 1.2 - Section 13.10	NO
2A	VOUT_SCALE_MONITOR	R/W	0	Linear Data Format	2			PMBus Spec - Part II - Revision 1.2 - Section 13.11	NO
2A	VSTBY_SCALE_MONITOR	R/W	1	Linear Data Format	2			PMBus Spec - Part II - Revision 1.2 - Section 13.11	NO
30	COEFFICIENTS	Block Write / Block Read Process Call	All		5			Command used to retrieve the m, b and R coefficients needed by data in the DIRECT format	NO
31	POUT_MAX	R/W	All	Linear Data Format	2			Commands sets output power (watts) which unit starts regulating in constant power mode	NO
32	MAX_DUTY	R/W	All	Linear Data Format	2			Command sets maximum duty cycle (%) of the unit's power conversion stage	NO
33	FREQUENCY_SWITCH	R/W	All	Linear Data Format	2			Command sets switching frequency (kHz) of a PMBus device	NO
35	VIN_ON	R/W	All	Linear Data Format	2			Command sets value of input voltage (Vdc/Vrms) at which unit should start power conversion	NO
36	VIN_OFF	R/W	All	Linear Data Format	2			Command sets value of input voltage (Vdc/Vrms) at which unit should stop power conversion	NO
37	INTERLEAVE	R/W	All	Bit Flags	2			PMBus Spec - Part II - Revision 1.2 - Section 14.7	NO
38	IOUT_CAL_GAIN	R/W	All	Linear Data Format	2			Command used to set the ratio of the voltage at the current sense pins to the sensed current	NO
39	IOUT_CAL_OFFSET	R/W	All	Linear Data Format	2			Command used to null out any offsets in the output current sensing circuit	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	<a href="#">FAN_COMMAND_1</a>	R/W	All	Linear Data Format	2		Manual fan override command fan speed value in Duty Cycle Command speed formatted in Linear as per command 0x90 - READ_FAN_SPEED_1	YES	

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
3C	FAN_COMMAND_2	R/W	All	Linear Data Format	2			Manual fan override command fan speed value in Duty Cycle Command speed formatted in Linear as per command 0x91 - READ_FAN_SPEED_2	NO
3D	FAN_CONFIG_3_4	R	All	Bit Flags	1	0	FAN_4_TACH_PULSES	Fan 4 Tachometer pulses per revolution (lower bit)	NO
						1	FAN_4_TACH_PULSES	Fan 4 Tachometer pulses per revolution (upper bit)	NO
						2	FAN_4_SETTING_MODE	Set when fan is commanded in RPM (Clear when fan is commanded in Duty Cycle)	NO
						3	FAN_4_INSTALLATION	Set when fan is installed in position 4	NO
						4	FAN_3_TACH_PULSES	Fan 3 Tachometer pulses per revolution (lower bit)	NO
						5	FAN_3_TACH_PULSES	Fan 3 Tachometer pulses per revolution (upper bit)	NO
						6	FAN_3_SETTING_MODE	Set when fan is commanded in RPM (Clear when fan is commanded in Duty Cycle)	NO
						7	FAN_3_INSTALLATION	Set when fan is installed in position 3	NO
3E	FAN_COMMAND_3	R/W	All	Linear Data Format	2			Manual fan override command fan speed value in Duty Cycle Command speed formatted in Linear as per command 0x92 - READ_FAN_SPEED_3	NO
3F	FAN_COMMAND_4	R/W	All	Linear Data Format	2			Manual fan override command fan speed value in Duty Cycle Command speed formatted in Linear as per command 0x93 - READ_FAN_SPEED_4	NO
40	VOUT_OV_FAULT_LIMIT	R	0	Linear Data Format	2			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		<b>Limits &amp; Response</b> HB3BC: <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>  HB4BC: <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>	Main Output Under voltage Warning Limit	YES
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2			Standby(Auxiliary) Output Under voltage Warning Limit	YES
44	VOUT_UV_FAULT_LIMIT	R	0	Linear Data Format	2			Main Output Under voltage Fault Limit	YES
44	VSTBY_UV_FAULT_LIMIT	R	1	Linear Data Format	2			Standby(Auxiliary) Output Under voltage Fault Limit	YES
45	VOUT_UV_FAULT_RESPONSE	R	0	Bit Flags	1			Main Output Under voltage Fault Response Actions	YES
45	VSTBY_UV_FAULT_RESPONSE	R	1	Bit Flags	1			Standby(Auxiliary) Output Under voltage Fault Response Actions	YES
46	IOUT_OC_FAULT_LIMIT	R	0	Linear Data Format	2			Main Output Overcurrent Fault Limit (Vin > 160Vrms)	YES
46	IOUT_OC_FAULT_LIMIT	R	1	Linear Data Format	2			Main Output Overcurrent Fault Limit (160Vrms > Vin > 100Vrms)	YES
46	IOUT_OC_FAULT_LIMIT	R	2	Linear Data Format	2			Main Output Overcurrent Fault Limit (Vin < 100Vrms)	YES

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
46	ISTBY_OC_FAULT_LIMIT	R	3	Linear Data Format	2			Standby(Auxiliary) Output Overcurrent 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	1	Bit Flags	1			Standby(Auxiliary) Output Overcurrent Fault Response Actions	YES
48	IOUT_OC_LV_FAULT_LIMIT	R	0	Linear Data Format	2			Main Output Overcurrent Foldback Fault Limit	NO
48	ISTBY_OC_LV_FAULT_LIMIT	R	1	Linear Data Format	2			Standby(Auxiliary) Output Overcurrent Foldback Fault Limit	NO
49	IOUT_OC_LV_FAULT_RESPONSE	R	0	Bit Flags	1			Main Output Overcurrent Foldback Fault Response Actions	NO
49	ISTBY_OC_LV_FAULT_RESPONSE	R	1	Bit Flags	1			Standby(Auxiliary) Output Overcurrent Foldback Fault Response Actions	NO
4A	IOUT_OC_WARN_LIMIT	R	0	Linear Data Format	2			Main Output Overcurrent Warning Limit (Vin > 160Vrms)	YES
4A	IOUT_OC_WARN_LIMIT	R	1	Linear Data Format	2			Main Output Overcurrent Warning Limit (160Vrms > Vin > 100Vrms)	YES
4A	IOUT_OC_WARN_LIMIT	R	2	Linear Data Format	2			Main Output Overcurrent Warning Limit (Vin < 100Vrms)	YES
4A	ISTBY_OC_WARN_LIMIT	R	3	Linear Data Format	2			Standby(Auxiliary) Output Overvoltage Warning Limit	YES
							<b>Limits &amp; Response</b>		
4B	IOUT_UC_FAULT_LIMIT	R	0	Linear Data Format	2		HB3BC: <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>	Main Output Undercurrent Fault Limit	NO
4B	ISTBY_UC_FAULT_LIMIT	R	1	Linear Data Format	2		HB4BC : <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>	Standby(Auxiliary) Output Undercurrent Fault Limit	NO
4C	IOUT_UC_FAULT_RESPONSE	R	0	Bit Flags	1			Main Output Undercurrent Fault Response Actions	NO
4C	ISTBY_UC_FAULT_RESPONSE	R	1	Bit Flags	1			Standby(Auxiliary) Output Undercurrent Fault Response Actions	NO
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	0	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	Linear Data Format	2			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	1			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	AIRFLOW_2_OT_WARN_LIMIT	R	1	Linear Data Format	2			Airflow 2 Overtemperature Warning Limit	YES

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
51	HOTSPOT_1_OT_WARN_LIMIT	R	2	Linear Data Format	2		<b>Limits &amp; Response</b> HB3BC: <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>  HB4BC: <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>	Hotspot 1 Overtemperature Warning Limit	YES
51	HOTSPOT_2_OT_WARN_LIMIT	R	3	Linear Data Format	2			Hotspot 2 Overtemperature Warning Limit	YES
52	AIRFLOW_1_UT_FAULT_LIMIT	R	0	Linear Data Format	2			Airflow 1 Undertemperature Fault Limit	NO
52	AIRFLOW_2_UT_FAULT_LIMIT	R	1	Linear Data Format	2			Airflow 2 Undertemperature Fault Limit	NO
52	HOTSPOT_1_UT_FAULT_LIMIT	R	2	Linear Data Format	2			Hotspot 1 Undertemperature Fault Limit	NO
52	HOTSPOT_2_UT_FAULT_LIMIT	R	3	Linear Data Format	2			Hotspot 2 Undertemperature Fault Limit	NO
53	AIRFLOW_1_UT_FAULT_RESPONSE	R	0	Bit Flags	1			Airflow 1 Undertemperature Fault Response Actions	NO
53	AIRFLOW_2_UT_FAULT_RESPONSE	R	1	Bit Flags	1			Airflow 2 Undertemperature Fault Response Actions	NO
53	HOTSPOT_1_UT_FAULT_RESPONSE	R	2	Bit Flags	1			Hotspot 1 Undertemperature Fault Response Actions	NO
53	HOTSPOT_2_UT_FAULT_RESPONSE	R	3	Bit Flags	1			Hotspot 2 Undertemperature Fault Response Actions	NO
55	VIN_OV_FAULT_LIMIT	R	All	Linear Data Format	2			Input Overvoltage Fault Limit	YES
56	VIN_OV_FAULT_RESPONSE	R	All	Bit Flags	1			Input Overvoltage Fault Response Actions	YES
57	VIN_OV_WARN_LIMIT	R	All	Linear Data Format	2			Input Overvoltage Warning Limit	YES
58	VIN_UV_WARN_LIMIT	R	All	Linear Data Format	2			Input Under voltage Warning Limit	YES
59	VIN_UV_FAULT_LIMIT	R	All	Linear Data Format	2			Input Under voltage Fault Limit	YES
5A	VIN_UV_FAULT_RESPONSE	R	All	Bit Flags	1			Input Under voltage Fault Response Actions	YES
5B	IIN_OC_FAULT_LIMIT	R	All	Linear Data Format	2			Input Overcurrent Fault Limit	YES
5C	IIN_OC_FAULT_RESPONSE	R	All	Bit Flags	1			Input Overcurrent Fault Response Actions	YES
5D	IIN_OC_WARN_LIMIT	R	All	Linear Data Format	2			Input Overcurrent Warning Limit	YES
5E	POWER_GOOD_ON	R	All	Linear Data Format	2		Power Good On Main Output Voltage Limit	YES	
5F	POWER_GOOD_OFF	R	All	Linear Data Format	2		Power Good Off Main Output Voltage Limit	YES	
60	TON_DELAY	R	All	Linear Data Format	2		Sets the time (mSec) from when a start condition is received (as programmed by the ON_OFF_CONFIG command) until the output voltage starts to rise	NO	
61	TON_RISE	R	All	Linear Data Format	2		Sets the time (mSec) from when the output starts to rise until the voltage has entered the regulation band.	NO	
62	TON_MAX_FAULT_LIMIT	R	All	Linear Data Format	2		Command sets an upper limit (mSec) on how long the unit can attempt to power up the output without reaching the output undervoltage fault limit	NO	

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?	
63	TON_MAX_FAULT_RESPONSE	R	All	Bit Flags	1			Command instructs the device on what action to take in response to a TON_MAX fault	NO	
64	TOFF_DELAY	R	All	Linear Data Format	2			Sets the time (mSec) from a stop condition is received (as programmed by the ON_OFF_CONFIG command) until the unit stops transferring energy to the output	NO	
65	TOFF_FALL	R	All	Linear Data Format	2			Sets the time (mSec) from the end of the turn-off delay time until the voltage is commanded to zero.	NO	
66	TOFF_MAX_WARN_LIMIT	R	All	Linear Data Format	2			Command sets an upper limit(mSec), on how long unit can attempt to power down output without reaching 12.5% of the output voltage programmed at the time the unit is turned off	NO	
68	POUT_OP_FAULT_LIMIT	R	0	Linear Data Format	2			Output Overpower Fault Limit (Vin > 160Vrms)	YES	
68	POUT_OP_FAULT_LIMIT	R	1	Linear Data Format	2		<b>Limits &amp; Response</b> HB3BC: <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>	Output Overpower Fault Limit (160Vrms > Vin > 100Vrms)	YES	
68	POUT_OP_FAULT_LIMIT	R	2	Linear Data Format	2			Output Overpower Fault Limit (Vin < 100Vrms)	YES	
69	POUT_OP_FAULT_RESPONSE	R	All	Bit Flags	1			HB3BC: <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>	Output Overpower Fault Response Actions	YES
6A	POUT_OP_WARN_LIMIT	R	0	Linear Data Format	2			Output Overpower Warning Limit (Vin > 160Vrms)	YES	
6A	POUT_OP_WARN_LIMIT	R	1	Linear Data Format	2			Output Overpower Warning Limit (160Vrms > Vin > 100Vrms)	YES	
6A	POUT_OP_WARN_LIMIT	R	2	Linear Data Format	2			Output Overpower Warning Limit (Vin < 100Vrms)	YES	
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2			Input Overpower Warning Limit (Vin > 160Vrms)	YES	
6B	PIN_OP_WARN_LIMIT	R	1	Linear Data Format	2			Input Overpower Warning Limit (160Vrms > Vin > 100Vrms)	YES	
6B	PIN_OP_WARN_LIMIT	R	2	Linear Data Format	2			Input Overpower Warning Limit (Vin < 100Vrms)	YES	
78	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	

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
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	MFR_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						
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	NO
						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

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
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	NO
						1	POUT_OP_F	Set when an output overpower fault has occurred	NO
						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
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	YES
						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 #	Bit Name	Definition	Supported?
7F	STATUS_OTHER	R	All	Bit Flags	1	0	RESERVED	Reserved	NO
						1	ORING_OUTPUT_F	Set when output ORing device fault occurs	NO
						2	ORING_INPUT_B_F	Set when input B ORing device fault occurs	NO
						3	ORING_INPUT_A_F	Set when input A ORing device fault occurs	NO
						4	FUSE_INPUT_B_F	Set when input B fuse/breaker fault occurs	NO
						5	FUSE_INPUT_A_F	Set when input A fuse/breaker fault occurs	NO
						6	RESERVED	Reserved	NO
						7	RESERVED	Reserved	NO
80	STATUS_MFR_SPECIFIC	R	All	Bit Flags	1	0	VINT_RANGE_F	Set when an internal voltage (VCC2, VCC4, or VDD) out-of-range fault has occurred	YES
						1	IIN_CH1_OC_F	Set when main output primary CH1 switch current OC fault detected	YES
						2	IIN_CH2_OC_F	Set when main output primary CH2 switch current OC fault detected	YES
						3	VBUS_SOFTSTART_F	Set when the primary boost output bus does not reach regulation in specified time	YES
						4	VBUS_UV_F	Set when the primary boost output bus undervoltage fault has occurred	NO
						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
82	STATUS_FANS_3_4	R	All	Bit Flags	1	0	FAN_AIRFLOW_W	Airflow warning	NO
						1	FAN_AIRFLOW_F	Airflow fault	NO
						2	FAN_4_OVERRIDE	Fan 4 speed overridden	NO
						3	FAN_3_OVERRIDE	Fan 3 speed overridden	NO
						4	FAN_4_W	Fan 4 warning	NO
						5	FAN_3_W	Fan 3 warning	NO
						6	FAN_4_F	Fan 4 fault	NO
						7	FAN_3_F	Fan 3 fault	NO
88	READ_VIN	R	All	Linear Data Format	2	<b>Sensor Characteristics</b> <b>Links:</b> HB3BC:		Input Voltage Sensor Reading	YES
89	READ_IIN	R	All	Linear Data Format	2	<a href="#">AC Input application</a> <a href="#">HVDC Input application</a>		Input Current Sensor Reading	YES
8A	READ_VCAP	R	All	Linear Data Format	2	HB4BC: <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>		PFC Output Voltage Sensor Reading	YES

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
8B	READ_VOUT	R	0	Linear Data Format	2			Main Output Voltage Sensor Reading	YES
8B	READ_VSTBY	R	1	Linear Data Format	2			Standby(Auxiliary) Output Voltage Sensor Reading	YES
8C	READ_IOUT	R	0	Linear Data Format	2			Main Output Current Sensor Reading	YES
8C	READ_ISTBY	R	1	Linear Data Format	2			Standby(Auxiliary) Output Current Sensor Reading	YES
8D	READ_TEMPERATURE_1	R	All	Linear Data Format	2			Airflow 1 Temperature Sensor Reading	YES
8E	READ_TEMPERATURE_2	R	All	Linear Data Format	2			Airflow 2 Temperature Sensor Reading	YES
8F	READ_TEMPERATURE_3	R	0	Linear Data Format	2			Hotspot 1 Temperature Sensor Reading	YES
8F	READ_TEMPERATURE_3	R	1	Linear Data Format	2		<b>Sensor Characteristics</b> <b>Links:</b> HB3BC: <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>	Hotspot 2 Temperature Sensor Reading	YES
90	READ_FAN_SPEED_1	R	All	Linear Data Format	2		HB4BC: <a href="#">AC Input application</a> <a href="#">HVDC Input application</a>	Fan 1 Speed Sensor Reading	YES
91	READ_FAN_SPEED_2	R	All	Linear Data Format	2			Fan 2 Speed Sensor Reading	NO
92	READ_FAN_SPEED_3	R	All	Linear Data Format	2			Fan 3 Speed Sensor Reading	NO
93	READ_FAN_SPEED_4	R	All	Linear Data Format	2			Fan 4 Speed Sensor Reading	NO
94	READ_DUTY CYCLE	R	All	Linear Data Format	2			Command returns the duty of the PMBus device's main power converter in percent	NO
95	READ_FREQUENCY	R	All	Linear Data Format	2			Command returns the switching frequency of PMBus device's main power converter in KHz	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
98	PMBUS_REVISION	R	All	HEX	1			PMBus Specification Revision	YES
99	MFR_ID	BLOCK READ	All	Ascii Text Block	10			Power Supply Company Name	YES
9A	MFR_MODEL	BLOCK READ / BLOCK WRITE	All	Ascii Text Block	32 Max		MFG Vital Data PMBus register contents: <a href="#">HB3BC</a> <a href="#">HB4BC</a>	Power Supply Model Number	YES
9B	MFR_REVISION	BLOCK READ	0	Ascii Text Block	17			Power Supply Firmware Revision	YES
9B	MFR_REVISION	BLOCK READ	1	Ascii Text Block	17			Power Supply Firmware Revision	YES

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
<b>9B</b>	MFR_REVISION	BLOCK READ	2	Ascii Text Block	17		Returned results MFG Vital Data: <a href="#">HB3BC</a> <a href="#">HB4BC</a>	Power Supply Firmware Revision	<b>NO</b>
<b>9C</b>	MFR_LOCATION	BLOCK READ / BLOCK WRITE	All	Ascii Text Block	16 Max			Power Supply Manufacture Location	<b>YES</b>
<b>9D</b>	MFR_DATE	BLOCK READ / BLOCK WRITE	All	Ascii Text Block	16 Max			Power Supply Manufacture Date	<b>YES</b>
<b>9E</b>	MFR_SERIAL	BLOCK READ / BLOCK WRITE	All	Ascii Text Block	16 Max			Power Supply Serial Number	<b>YES</b>
<b>A0</b>	MFR_VIN_MIN	R	All	Linear Data Format	2		MFG Parametric data: <a href="#">AC Input models</a> <a href="#">HVDC Models</a>	Power Supply Input Voltage Minimum Specification	<b>YES</b>
<b>A1</b>	MFR_VIN_MAX	R	All	Linear Data Format	2			Power Supply Input Voltage Maximum Specification	<b>YES</b>
<b>A2</b>	MFR_IIN_MAX	R	All	Linear Data Format	2			Power Supply Input Current Maximum Specification	<b>YES</b>
<b>A3</b>	MFR_PIN_MAX	R	All	Linear Data Format	2			Power Supply Input Power Maximum Specification	<b>YES</b>
<b>A4</b>	MFR_VOUT_MIN	R	All	Linear Data Format	2			Power Supply Main Output Voltage Minimum Specification	<b>YES</b>
<b>A5</b>	MFR_VOUT_MAX	R	All	Linear Data Format	2			Power Supply Main Output Voltage Maximum Specification	<b>YES</b>
<b>A6</b>	MFR_IOUT_MAX	R	All	Linear Data Format	2			Power Supply Main Output Current Maximum Specification	<b>YES</b>
<b>A7</b>	MFR_POUT_MAX	R	All	Linear Data Format	2			Power Supply Output Power Maximum Specification	<b>YES</b>
<b>A8</b>	MFR_TAMBIENT_MAX	R	All	Linear Data Format	2			Power Supply Operating Ambient Temperature Maximum Specification	<b>YES</b>
<b>A9</b>	MFR_TAMBIENT_MIN	R	All	Linear Data Format	2			Power Supply Operating Ambient Temperature Minimum Specification	<b>YES</b>
<b>AA</b>	MFR_EFFICIENCY_LL	R	All	Linear Data Format	2			Power Supply Low-Line Input Voltage Specification	<b>YES</b>
				Linear Data Format	2			Power Supply Low-Line Low Power Specification	<b>YES</b>
				Linear Data Format	2			Power Supply Low-Line Low Power Efficiency Specification	<b>YES</b>
				Linear Data Format	2		Power Supply Low-Line Medium Power Specification	<b>YES</b>	
				Linear Data Format	2		Power Supply Low-Line Medium Power Efficiency Specification	<b>YES</b>	
				Linear Data Format	2		Power Supply Low-Line High Power Specification	<b>YES</b>	
				Linear Data Format	2		Power Supply Low-Line High Power Efficiency Specification	<b>YES</b>	

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
<b>AB</b>	MFR_EFFICIENCY_HL	R	All	Linear Data Format	2			Power Supply High-Line Input Voltage Specification	YES
				Linear Data Format	2			Power Supply High-Line Low Power Specification	YES
				Linear Data Format	2			Power Supply High-Line Low Power Efficiency Specification	YES
				Linear Data Format	2		MFG Parametric data: <a href="#">AC Input models</a> <a href="#">HVDC Models</a>	Power Supply High-Line Medium Power Specification	YES
				Linear Data Format	2			Power Supply High-Line Medium Power Efficiency Specification	YES
				Linear Data Format	2			Power Supply High-Line High Power Specification	YES
				Linear Data Format	2			Power Supply High-Line High Power Efficiency Specification	YES
<b>B0</b>	USER_DATA_00	R/W	All	Ascii Text Block	24			Customer text data block 00	NO
<b>B1</b>	USER_DATA_01	R/W	All	Ascii Text Block	24			Customer text data block 01	NO
<b>B2</b>	USER_DATA_02	R/W	All	Ascii Text Block	24			Customer text data block 02	NO
<b>B3</b>	USER_DATA_03	R/W	All	Ascii Text Block	24			Customer text data block 03	NO
<b>E0</b>	PS_STATUS	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 to unit is OK; mirrors the digital output signal	YES
						8	POWER_DOWN	Set when bootloader is taking control and the main output and PFC need to be shutdown	YES
						9	BOOTLOAD_COMPLETE	Set when the bootloader has completed and system reset needs to be Set	YES
						10	VIN_TYPE	<b>0 = universal AC input, 1 = HVDC input</b>	YES
						11	FAN_DIRECTION	<b>0 = back-to-front, 1 = front-to-back</b>	YES
						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						
<b>E1</b>	EEPROM_WP	R/W	All	Integer	1			Byte to enable (write 0x9A) or disable (write 0x56) writes to the external EEPROM	YES
<b>E2</b>	READ_HOURS_USED	BLOCK READ	All	Linear Data Format	3			Power Supply Accumulated Main Output Power-On Hours	YES

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Bit #	Bit Name	Definition	Supported?
EE	<a href="#">PMBUS_CONFIG</a>	R	All	Bit Flags	2	0	DATA_FORMAT	0 = Linear data format 1 = Direct data format	NO
						1	SMBALERT_L	0 = SMBALERT_L implemented & supported 1 = SMBALERT not implemented	YES
						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	NO
EF	<a href="#">LED_CONTROL</a>	R	All	Bit Flags	1	0:2	LED_MODE	LED mode change bits	YES
						3:6	RESERVED		NO
						7	LED_CONTROL	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		Bootloader completion and application restart request command	YES	
FA	BOOTLOAD_REQUEST	R/W	All	Ascii Text Block	6		Bootloader request command	YES	
FB	BOOTLOAD_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

RETURNED RESULTS: OPERATION SETTINGS

[Link back to: Commands list, CMD\\_01](#)

Bit # / Bit Description								Valid Values		Power Supply On/Off Mode
7	6	5	4	3	2	1	0	Dec	Hex	
On/off 1	On/off 0	Margin on/off/high/low 1	Margin on/off/high/low 0	Margin fault control 1	Margin fault control 0	not used	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

RETURNED RESULTS: ON\_OFF CONFIG

[Link back to: Commands list, CMD\\_02](#)

Bit # / Bit Description								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	CONTROL pin polarity	CONTROL pin 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 .
0	0	0	1	1	1	1	1	31	1F	Operation command and control pin ; active high polarity

Write Protect settings

[Link back to: Commands list, CMD\\_10](#)

Bit # / Bit Description								Valid Values		Power Supply On/Off Mode
7	6	5	4	3	2	1	0	Dec	Hex	
1	0	0	0	0	0	0	0	128	80	Write protection enabled
0	0	0	0	0	0	0	0	0	0	Write protection disabled – DEFAULT

The following tables define the PMBus reporting fault/warning limits of the operating parameter registers and response.

**Parameter Limits and Response results (HB3BC, AC Input application, F-B airflow):**

Link back to: [Commands List](#)

Command Code (Hex)	Command Name	Read / Write	Page	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					14	
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					13.5	
42	VSTBY_OV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					13.5	
43	VOUT_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					11.4	
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					11.3	
44	VOUT_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-6					10.9	
44	VSTBY_UV_FAULT_LIMIT	R	1	Linear Data Format	2	Vdc	-6					11.1	
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	-3					77.5	
46	ISTBY_OC_FAULT_LIMIT	R	3	Linear Data Format	2	Adc	-8					2.9	
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)

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
47	ISTBY_OC_FAULT_RESPONSE	R	2	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	-3					73.5	
4A	ISTBY_OC_WARN_LIMIT	R	3	Linear Data Format	2	Adc	-8					2.7	
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	0	Linear Data Format	2	°C	0					75	Secondary Airflow - Inlet
4F	AIRFLOW_2_OT_FAULT_LIMIT	R	1	Linear Data Format	2	°C	0					95	Primary Airflow - Outlet
4F	HOTSPOT_1_OT_FAULT_LIMIT	R	2	Linear Data Format	2	°C	0					130	Secondary Hotspot - Main output hotspot
4F	HOTSPOT_2_OT_FAULT_LIMIT	R	3	Linear Data Format	2	°C	0					125	Primary Hotspot - PFC
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	AIRFLOW_2_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	HOTSPOT_1_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
4F	AIRFLOW_1_OT_WARN_LIMIT	R	0	Linear Data Format	2	°C	0					70	Secondary Airflow - Inlet
4F	AIRFLOW_2_OT_WARN_LIMIT	R	1	Linear Data Format	2	°C	0					85	Primary Airflow - Outlet
4F	HOTSPOT_1_OT_WARN_LIMIT	R	2	Linear Data Format	2	°C	0					115	Secondary Hotspot - Main output hotspot
4F	HOTSPOT_2_OT_WARN_LIMIT	R	3	Linear Data Format	2	°C	0					120	Primary Hotspot - PFC
55	VIN_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vrms	-1					320	Recoverable

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
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	Vrms	-1					315	Recoverable
58	VIN_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vrms	-1					80	Recoverable
59	VIN_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vrms	-1					74	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	-5					12.9	(POUT_OP_FAULT_LIMIT / 0.85) / 85Vrms
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	-5					12.2	PIN_OP_WARN_LIMIT / 85Vrms
5E	POWER_GOOD_ON	R	0	Linear Data Format	2	Vdc	-6					10.9	
5F	POWER_GOOD_OFF	R	0	Linear Data Format	2	Vdc	-6					10.9	
68	POUT_OP_FAULT_LIMIT	R	0	Linear Data Format	2	Watts	0					930	IOUT_OC_FAULT_LIMIT * 12V
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					880	IOUT_OC_WARN_LIMIT * 12V
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2	Watts	1					1040	POUT_OP_WARN_LIMIT / 0.85

Parameter Limits and Response results (H3BC, HVDC Input application, F-B airflow):  
 Link back to: [Commands List](#)

Command Code (Hex)	Command Name	Read / Write	Page	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					14	
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					13.5	
42	VSTBY_OV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					13.5	
43	VOUT_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					11.4	
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					11.3	
44	VOUT_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-6					10.9	
44	VSTBY_UV_FAULT_LIMIT	R	1	Linear Data Format	2	Vdc	-6					11.1	
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	-3					77.5	
46	ISTBY_OC_FAULT_LIMIT	R	3	Linear Data Format	2	Adc	-8					2.9	
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)

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
47	ISTBY_OC_FAULT_RESPONSE	R	2	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	-3					73.5	
4A	ISTBY_OC_WARN_LIMIT	R	3	Linear Data Format	2	Adc	-8					2.7	
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	0	Linear Data Format	2	°C	0					75	Secondary Airflow - Inlet
4F	AIRFLOW_2_OT_FAULT_LIMIT	R	1	Linear Data Format	2	°C	0					95	Primary Airflow - Outlet
4F	HOTSPOT_1_OT_FAULT_LIMIT	R	2	Linear Data Format	2	°C	0					130	Secondary Hotspot - Main output hotspot
4F	HOTSPOT_2_OT_FAULT_LIMIT	R	3	Linear Data Format	2	°C	0					125	Primary Hotspot - PFC
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	AIRFLOW_2_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	HOTSPOT_1_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
4F	AIRFLOW_1_OT_WARN_LIMIT	R	0	Linear Data Format	2	°C	0					70	Secondary Airflow - Inlet
4F	AIRFLOW_2_OT_WARN_LIMIT	R	1	Linear Data Format	2	°C	0					85	Primary Airflow - Outlet
4F	HOTSPOT_1_OT_WARN_LIMIT	R	2	Linear Data Format	2	°C	0					115	Secondary Hotspot - Main output hotspot
4F	HOTSPOT_2_OT_WARN_LIMIT	R	3	Linear Data Format	2	°C	0					120	Primary Hotspot - PFC
55	VIN_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vrms	-1					425	Recoverable

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
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	Vrms	-1					420	Recoverable
58	VIN_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vrms	-1					249	Recoverable
59	VIN_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vrms	-1					245	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	-5					5.6	(POUT_OP_FAULT_LIMIT / 0.85) / 85Vrms
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	-5					5.3	PIN_OP_WARN_LIMIT / 85Vrms
5E	POWER_GOOD_ON	R	0	Linear Data Format	2	Vdc	-6					10.9	
5F	POWER_GOOD_OFF	R	0	Linear Data Format	2	Vdc	-6					10.9	
68	POUT_OP_FAULT_LIMIT	R	0	Linear Data Format	2	Watts	0					930	IOUT_OC_FAULT_LIMIT * 12V
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					880	IOUT_OC_WARN_LIMIT * 12V
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2	Watts	1					1040	POUT_OP_WARN_LIMIT / 0.85

Parameter Limits and Response results (HB4BC, AC Input application, F-B airflow):

Link back to: [Commands List](#)

Command Code (Hex)	Command Name	Read / Write	Page	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					14	
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					13.5	
42	VSTBY_OV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					13.5	
43	VOUT_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					11.4	
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					11.3	
44	VOUT_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-6					10.9	
44	VSTBY_UV_FAULT_LIMIT	R	1	Linear Data Format	2	Vdc	-6					11.1	
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	-3					77.5	
46	ISTBY_OC_FAULT_LIMIT	R	3	Linear Data Format	2	Adc	-8					2.9	
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)

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
47	ISTBY_OC_FAULT_RESPONSE	R	2	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	-3					73.5	
4A	ISTBY_OC_WARN_LIMIT	R	3	Linear Data Format	2	Adc	-8					2.7	
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	0	Linear Data Format	2	°C	0					75	Primary Airflow - Inlet
4F	AIRFLOW_2_OT_FAULT_LIMIT	R	1	Linear Data Format	2	°C	0					95	Secondary Airflow - Outlet
4F	HOTSPOT_1_OT_FAULT_LIMIT	R	2	Linear Data Format	2	°C	0					130	Secondary Hotspot - Main output hotspot
4F	HOTSPOT_2_OT_FAULT_LIMIT	R	3	Linear Data Format	2	°C	0					125	Primary Hotspot - PFC
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	AIRFLOW_2_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	HOTSPOT_1_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
4F	AIRFLOW_1_OT_WARN_LIMIT	R	0	Linear Data Format	2	°C	0					70	Primary Airflow - Inlet
4F	AIRFLOW_2_OT_WARN_LIMIT	R	1	Linear Data Format	2	°C	0					85	Secondary Airflow - Outlet
4F	HOTSPOT_1_OT_WARN_LIMIT	R	2	Linear Data Format	2	°C	0					115	Secondary Hotspot - Main output hotspot
4F	HOTSPOT_2_OT_WARN_LIMIT	R	3	Linear Data Format	2	°C	0					120	Primary Hotspot - PFC
55	VIN_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vrms	-1					320	Recoverable

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
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	Vrms	-1					315	Recoverable
58	VIN_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vrms	-1					80	Recoverable
59	VIN_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vrms	-1					74	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	-5					12.9	(POUT_OP_FAULT_LIMIT / 0.85) / 85Vrms
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	-5					12.2	PIN_OP_WARN_LIMIT / 85Vrms
5E	POWER_GOOD_ON	R	0	Linear Data Format	2	Vdc	-6					10.9	
5F	POWER_GOOD_OFF	R	0	Linear Data Format	2	Vdc	-6					10.9	
68	POUT_OP_FAULT_LIMIT	R	0	Linear Data Format	2	Watts	0					930	IOUT_OC_FAULT_LIMIT * 12V
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					880	IOUT_OC_WARN_LIMIT * 12V
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2	Watts	1					1040	POUT_OP_WARN_LIMIT / 0.85

**Parameter Limits and Response results (HB4BC, HVDC Input application, F-B airflow):**

 Link back to: [Commands List](#)

Command Code (Hex)	Command Name	Read / Write	Page	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					14	
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					13.5	
42	VSTBY_OV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					13.5	
43	VOUT_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					11.4	
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-6					11.3	
44	VOUT_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-6					10.9	
44	VSTBY_UV_FAULT_LIMIT	R	1	Linear Data Format	2	Vdc	-6					11.1	
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	-3					77.5	
46	ISTBY_OC_FAULT_LIMIT	R	3	Linear Data Format	2	Adc	-8					2.9	
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)	

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
47	ISTBY_OC_FAULT_RESPONSE	R	2	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	-3					73.5	
4A	ISTBY_OC_WARN_LIMIT	R	3	Linear Data Format	2	Adc	-8					2.7	
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	0	Linear Data Format	2	°C	0					75	Primary Airflow - Inlet
4F	AIRFLOW_2_OT_FAULT_LIMIT	R	1	Linear Data Format	2	°C	0					95	Secondary Airflow - Outlet
4F	HOTSPOT_1_OT_FAULT_LIMIT	R	2	Linear Data Format	2	°C	0					130	Secondary Hotspot - Main output hotspot
4F	HOTSPOT_2_OT_FAULT_LIMIT	R	3	Linear Data Format	2	°C	0					125	Primary Hotspot - PFC
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	AIRFLOW_2_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	HOTSPOT_1_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
4F	AIRFLOW_1_OT_WARN_LIMIT	R	0	Linear Data Format	2	°C	0					70	Primary Airflow - Inlet
4F	AIRFLOW_2_OT_WARN_LIMIT	R	1	Linear Data Format	2	°C	0					85	Secondary Airflow - Outlet
4F	HOTSPOT_1_OT_WARN_LIMIT	R	2	Linear Data Format	2	°C	0					115	Secondary Hotspot - Main output hotspot
4F	HOTSPOT_2_OT_WARN_LIMIT	R	3	Linear Data Format	2	°C	0					120	Primary Hotspot - PFC
55	VIN_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vrms	-1					425	Recoverable

Command Code (Hex)	Command Name	Read / Write	Page	Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
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	Vrms	-1					420	Recoverable
58	VIN_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vrms	-1					249	Recoverable
59	VIN_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vrms	-1					245	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	-5					5.6	(POUT_OP_FAULT_LIMIT / 0.85) / 85Vrms
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	-5					5.3	PIN_OP_WARN_LIMIT / 85Vrms
5E	POWER_GOOD_ON	R	0	Linear Data Format	2	Vdc	-6					10.9	
5F	POWER_GOOD_OFF	R	0	Linear Data Format	2	Vdc	-6					10.9	
68	POUT_OP_FAULT_LIMIT	R	0	Linear Data Format	2	Watts	0					930	IOU_OC_FAULT_LIMIT * 12V
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					880	IOU_OC_WARN_LIMIT * 12V
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2	Watts	1					1040	POUT_OP_WARN_LIMIT / 0.85

The following tables contain the PMBus Reading Sensor Tolerance and Resolution

**SENSOR DATA AND RESOLUTION FOR MODEL (HB3BC, AC Input application, F-B airflow):**
[Link back to: Commands list CMD 88](#)

Command Code (Hex)	Command Name	Description	Page	Format	Units	Scaling Coefficients	Raw Sensor		PMBus Reporting Sensor		
						N	Full-scale / Range	Resolution	Full-scale / Range	Resolution	Accuracy
<b>88</b>	READ_VIN	Input Voltage Sensor Reading (AC Input)	All	Linear Data Format	Vrms	-1	359.5	0.3514	511.5	0.5000	+ / - 2% of Reporting Full-Scale
<b>89</b>	READ_IIN	Input Current Sensor Reading (AC Input)	All	Linear Data Format	Arms	-6	17.86	0.0175	15.98	0.0156	+ / - 5% of Reporting Full-Scale
<b>8A</b>	READ_VCAP	PFC Output Voltage Sensor Reading (Uncalibrated primary sensor)	All	Linear Data Format	Vdc	-1	508.4	0.497	511.5	0.5000	+ / - 5% of Reporting Full-Scale
<b>8B</b>	READ_VOUT	Main Output Voltage Sensor Reading	0	Linear Data Format	Vdc	-6	14.79	0.0145	15.98	0.0156	+ / - 2% of Reporting Full-Scale
<b>8B</b>	READ_VSTBY	Standby(Auxiliary) Output Voltage Sensor Reading	1	Linear Data Format	Vdc	-6	14.73	0.0144	15.98	0.0156	+ / - 2% of Reporting Full-Scale
<b>8C</b>	READ_IOUT	Main Output Current Sensor Reading	0	Linear Data Format	Adc	-3	87.1	0.0851	127.9	0.1250	+ / - 5% of Reporting Full-Scale
<b>8C</b>	READ_ISTBY	Standby(Auxiliary) Output Current Sensor Reading	1	Linear Data Format	Adc	-8	4.330	0.0042	3.996	0.0039	+ / - 5% of Reporting Full-Scale
<b>8D</b>	READ_TEMPERATURE_1	Temperature Sensor Reading - Inlet (Primary Side)	All	Linear Data Format	°C	0	-40 to 150		-40 to 150	1	+ / - 5°C
<b>8E</b>	READ_TEMPERATURE_2	Temperature Sensor Reading - Outlet (Secondary Side)	All	Linear Data Format	°C	0	-40 to 150		-40 to 150	1	+ / - 5°C
<b>8F</b>	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
<b>8F</b>	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
<b>90</b>	READ_FAN_SPEED_1	Fan 1 Speed Sensor Reading	All	Linear Data Format	RPM	5	24, 000		32736	32	+ / - 5% of Reporting Full-Scale
<b>96</b>	READ_POUT	Output Power Sensor Reading	All	Linear Data Format	Watts	0			1023	1	+ / - 5% of Reporting Full-Scale
<b>97</b>	READ_PIN	Input Power Sensor Reading	All	Linear Data Format	Watts	1			2046	2	+ / - 5% of Reporting Full-Scale
<b>E2</b>	READ_POWER_ON_HOURS	Accumulated Main Output Power-On Hours	All	Linear Data Format	Hours	0	~1,900 (Years)		~1,900 (Years)	1	+ / - 3%

**SENSOR DATA AND RESOLUTION FOR MODEL (HB3BC, HVDC Input application, F-B airflow):**
[Link back to: Commands list CMD 88](#)

Command Code (Hex)	Command Name	Description	Page	Format	Units	Scaling Coefficients	Raw Sensor		PMBus Reporting Sensor		
						N	Full-scale / Range	Resolution	Full-scale / Range	Resolution	Accuracy
<b>88</b>	READ_VIN	Input Voltage Sensor Reading (HVDC Input)	All	Linear Data Format	Vdc	-1	359.5	0.3514	511.5	0.5000	+ / - 2% of Reporting Full-Scale
<b>89</b>	READ_IIN	Input Current Sensor Reading (HVDC Input)	All	Linear Data Format	Adc	-6	17.86	0.0175	15.98	0.0156	+ / - 5% of Reporting Full-Scale
<b>8A</b>	READ_VCAP	PFC Output Voltage Sensor Reading (Uncalibrated primary sensor)	All	Linear Data Format	Vdc	-1	508.4	0.497	511.5	0.5000	+ / - 5% of Reporting Full-Scale
<b>8B</b>	READ_VOUT	Main Output Voltage Sensor Reading	0	Linear Data Format	Vdc	-6	14.79	0.0145	15.98	0.0156	+ / - 2% of Reporting Full-Scale
<b>8B</b>	READ_VSTBY	Standby(Auxiliary) Output Voltage Sensor Reading	1	Linear Data Format	Vdc	-6	14.73	0.0144	15.98	0.0156	+ / - 2% of Reporting Full-Scale
<b>8C</b>	READ_IOUT	Main Output Current Sensor Reading	0	Linear Data Format	Adc	-3	87.1	0.0851	127.9	0.1250	+ / - 5% of Reporting Full-Scale
<b>8C</b>	READ_ISTBY	Standby(Auxiliary) Output Current Sensor Reading	1	Linear Data Format	Adc	-8	4.330	0.0042	3.996	0.0039	+ / - 5% of Reporting Full-Scale
<b>8D</b>	READ_TEMPERATURE_1	Temperature Sensor Reading - Inlet (Primary Side)	All	Linear Data Format	°C	0	-40 to 150		-40 to 150	1	+ / - 5°C
<b>8E</b>	READ_TEMPERATURE_2	Temperature Sensor Reading - Outlet (Secondary Side)	All	Linear Data Format	°C	0	-40 to 150		-40 to 150	1	+ / - 5°C
<b>8F</b>	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

Command Code (Hex)	Command Name	Description	Page	Format	Units	Scaling Coefficients	Raw Sensor		PMBus Reporting Sensor		
						N	Full-scale / Range	Resolution	Full-scale / Range	Resolution	Accuracy
<b>8F</b>	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
<b>90</b>	READ_FAN_SPEED_1	Fan 1 Speed Sensor Reading	All	Linear Data Format	RPM	5	24, 000		32736	32	+ / - 5% of Reporting Full-Scale
<b>96</b>	READ_POUT	Output Power Sensor Reading	All	Linear Data Format	Watts	0			1023	1	+ / - 5% of Reporting Full-Scale
<b>97</b>	READ_PIN	Input Power Sensor Reading	All	Linear Data Format	Watts	1			2046	2	+ / - 5% of Reporting Full-Scale
<b>E2</b>	READ_POWER_ON_HOURS	Accumulated Main Output Power-On Hours	All	Linear Data Format	Hours	0	~1,900 (Years)		~1,900 (Years)	1	+ / - 3%

**SENSOR DATA AND RESOLUTION FOR MODEL (HB4BC, AC Input application, F-B airflow):**

 Link back to: [Commands list CMD 88](#)

Command Code (Hex)	Command Name	Description	Page	Format	Units	Scaling Coefficients	Raw Sensor		PMBus Reporting Sensor		
						N	Full-scale / Range	Resolution	Full-scale / Range	Resolution	Accuracy
<b>88</b>	READ_VIN	Input Voltage Sensor Reading (AC Input)	All	Linear Data Format	Vrms	-1	359.5	0.3514	511.5	0.5000	+ / - 2% of Reporting Full-Scale
<b>89</b>	READ_IIN	Input Current Sensor Reading (AC Input)	All	Linear Data Format	Arms	-6	17.86	0.0175	15.98	0.0156	+ / - 5% of Reporting Full-Scale
<b>8A</b>	READ_VCAP	PFC Output Voltage Sensor Reading (Uncalibrated primary sensor)	All	Linear Data Format	Vdc	-1	508.4	0.497	511.5	0.5000	+ / - 5% of Reporting Full-Scale
<b>8B</b>	READ_VOUT	Main Output Voltage Sensor Reading	0	Linear Data Format	Vdc	-6	14.79	0.0145	15.98	0.0156	+ / - 2% of Reporting Full-Scale
<b>8B</b>	READ_VSTBY	Standby(Auxiliary) Output Voltage Sensor Reading	1	Linear Data Format	Vdc	-6	14.73	0.0144	15.98	0.0156	+ / - 2% of Reporting Full-Scale
<b>8C</b>	READ_IOUT	Main Output Current Sensor Reading	0	Linear Data Format	Adc	-3	87.1	0.0851	127.9	0.1250	+ / - 5% of Reporting Full-Scale
<b>8C</b>	READ_ISTBY	Standby(Auxiliary) Output Current Sensor Reading	1	Linear Data Format	Adc	-8	4.330	0.0042	3.996	0.0039	+ / - 5% of Reporting Full-Scale
<b>8D</b>	READ_TEMPERATURE_1	Temperature Sensor Reading - Inlet (Secondary Side)	All	Linear Data Format	°C	0	-40 to 150		-40 to 150	1	+ / - 5°C
<b>8E</b>	READ_TEMPERATURE_2	Temperature Sensor Reading - Outlet (Primary Side)	All	Linear Data Format	°C	0	-40 to 150		-40 to 150	1	+ / - 5°C
<b>8F</b>	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
<b>8F</b>	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
<b>90</b>	READ_FAN_SPEED_1	Fan 1 Speed Sensor Reading	All	Linear Data Format	RPM	5	24, 000		32736	32	+ / - 5% of Reporting Full-Scale
<b>96</b>	READ_POUT	Output Power Sensor Reading	All	Linear Data Format	Watts	0			1023	1	+ / - 5% of Reporting Full-Scale
<b>97</b>	READ_PIN	Input Power Sensor Reading	All	Linear Data Format	Watts	1			2046	2	+ / - 5% of Reporting Full-Scale
<b>E2</b>	READ_POWER_ON_HOURS	Accumulated Main Output Power-On Hours	All	Linear Data Format	Hours	0	~1,900 (Years)		~1,900 (Years)	1	+ / - 3%

**SENSOR DATA AND RESOLUTION FOR MODEL (HB4BC, HVDC Input application, F-B airflow):**

 Link back to: [Commands list CMD 88](#)
[www.murata-ps-com/support](http://www.murata-ps-com/support)

Command Code (Hex)	Command Name	Description	Page	Format	Units	Scaling Coefficients	Raw Sensor		PMBus Reporting Sensor		
						N	Full-scale / Range	Resolution	Full-scale / Range	Resolution	Accuracy
<b>88</b>	READ_VIN	Input Voltage Sensor Reading (HVDC Input)	All	Linear Data Format	Vdc	-1	359.5	0.3514	511.5	0.5000	+ / - 2% of Reporting Full-Scale
<b>89</b>	READ_IIN	Input Current Sensor Reading (HVDC Input)	All	Linear Data Format	Adc	-6	17.86	0.0175	15.98	0.0156	+ / - 5% of Reporting Full-Scale
<b>8A</b>	READ_VCAP	PFC Output Voltage Sensor Reading (Uncalibrated primary sensor)	All	Linear Data Format	Vdc	-1	508.4	0.497	511.5	0.5000	+ / - 5% of Reporting Full-Scale
<b>8B</b>	READ_VOUT	Main Output Voltage Sensor Reading	0	Linear Data Format	Vdc	-6	14.79	0.0145	15.98	0.0156	+ / - 2% of Reporting Full-Scale
<b>8B</b>	READ_VSTBY	Standby(Auxiliary) Output Voltage Sensor Reading	1	Linear Data Format	Vdc	-6	14.73	0.0144	15.98	0.0156	+ / - 2% of Reporting Full-Scale
<b>8C</b>	READ_IOUT	Main Output Current Sensor Reading	0	Linear Data Format	Adc	-3	87.1	0.0851	127.9	0.1250	+ / - 5% of Reporting Full-Scale
<b>8C</b>	READ_ISTBY	Standby(Auxiliary) Output Current Sensor Reading	1	Linear Data Format	Adc	-8	4.330	0.0042	3.996	0.0039	+ / - 5% of Reporting Full-Scale
<b>8D</b>	READ_TEMPERATURE_1	Temperature Sensor Reading - Inlet (Secondary Side)	All	Linear Data Format	°C	0	-40 to 150		-40 to 150	1	+ / - 5°C
<b>8E</b>	READ_TEMPERATURE_2	Temperature Sensor Reading - Outlet (Primary Side)	All	Linear Data Format	°C	0	-40 to 150		-40 to 150	1	+ / - 5°C
<b>8F</b>	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
<b>8F</b>	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
<b>90</b>	READ_FAN_SPEED_1	Fan 1 Speed Sensor Reading	All	Linear Data Format	RPM	5	24, 000		32736	32	+ / - 5% of Reporting Full-Scale
<b>96</b>	READ_POUT	Output Power Sensor Reading	All	Linear Data Format	Watts	0			1023	1	+ / - 5% of Reporting Full-Scale
<b>97</b>	READ_PIN	Input Power Sensor Reading	All	Linear Data Format	Watts	1			2046	2	+ / - 5% of Reporting Full-Scale
<b>E2</b>	READ_POWER_ON_HOURS	Accumulated Main Output Power-On Hours	All	Linear Data Format	Hours	0	~1,900 (Years)		~1,900 (Years)	1	+ / - 3%

### MANUFACTURER'S GENERAL PARAMETRIC DATA, (AC Input models)

[Link back to: Commands list](#)

Command Code (Hex)	Command Name	Value	Units	N	Value (dec)
<b>A0</b>	MFR_VIN_MIN	90	V	-1	180
<b>A1</b>	MFR_VIN_MAX	305	V	-1	610
<b>A2</b>	MFR_IIN_MAX	11	A	-6	704
<b>A3</b>	MFR_PIN_MAX	950	W	1	475
<b>A4</b>	MFR_VOUT_MIN	11.76	V	-6	753
<b>A5</b>	MFR_VOUT_MAX	12.24	V	-6	783
<b>A6</b>	MFR_IOUT_MAX	66.7	A	-3	534
<b>A4</b>	MFR_VSTBY_MIN	11.42	V	-6	731
<b>A5</b>	MFR_VSTBY_MAX	12.58	V	-6	805
<b>A6</b>	MFR_ISTBY_MAX	2	A	-8	512
<b>A7</b>	MFR_POUT_MAX	800	W	0	800
<b>A8</b>	MFR_TAMBIENT_MAX	50	C	0	50
<b>A9</b>	MFR_TAMBIENT_MIN	0	C	0	0

Command Code (Hex)	Command Name	Value	Units	N	Value (dec)
<b>AA</b>	MFR_EFFICIENCY_LL_LENGTH	14			
	MFR_EFFICIENCY_LL_VIN	115	V	-1	230
	MFR_EFFICIENCY_LL_POUT1	160	W	0	160
	MFR_EFFICIENCY_LL_EFF1	0.9		-10	922
	MFR_EFFICIENCY_LL_POUT2	400	W	0	400
	MFR_EFFICIENCY_LL_EFF2	0.92		-10	942
	MFR_EFFICIENCY_LL_POUT3	800	W	0	800
	MFR_EFFICIENCY_LL_EFF3	0.89		-10	911
	<b>AB</b>	MFR_EFFICIENCY_HL_LENGTH	14		
MFR_EFFICIENCY_HL_VIN		230	V	-1	460
MFR_EFFICIENCY_HL_POUT1		160	W	0	160
MFR_EFFICIENCY_HL_EFF1		0.9		-10	922
MFR_EFFICIENCY_HL_POUT2		400	W	0	400
MFR_EFFICIENCY_HL_EFF2		0.94		-10	963
MFR_EFFICIENCY_HL_POUT3		800	W	0	800
MFR_EFFICIENCY_HL_EFF3		0.91		-10	932

### MANUFACTURER'S GENERAL PARAMETRIC DATA, (HVDC input models)

[Link back to: Commands list](#)

Command Code (Hex)	Command Name	Value	Units	N	Value (dec)
<b>A0</b>	MFR_VIN_MIN	260	V	-1	520
<b>A1</b>	MFR_VIN_MAX	400	V	-1	800
<b>A2</b>	MFR_IIN_MAX	11	A	-6	704
<b>A3</b>	MFR_PIN_MAX	950	W	1	475
<b>A4</b>	MFR_VOUT_MIN	11.76	V	-6	753
<b>A5</b>	MFR_VOUT_MAX	12.24	V	-6	783
<b>A6</b>	MFR_IOUT_MAX	66.7	A	-3	534
<b>A4</b>	MFR_VSTBY_MIN	11.42	V	-6	731
<b>A5</b>	MFR_VSTBY_MAX	12.58	V	-6	805
<b>A6</b>	MFR_ISTBY_MAX	2	A	-8	512
<b>A7</b>	MFR_POUT_MAX	800	W	0	800
<b>A8</b>	MFR_TAMBIENT_MAX	50	C	0	50
<b>A9</b>	MFR_TAMBIENT_MIN	0	C	0	0

Command Code (Hex)	Command Name	Value	Units	N	Value (dec)
<b>AA</b>	MFR_EFFICIENCY_LL_LENGTH	14			
	MFR_EFFICIENCY_LL_VIN	260	V	-1	520
	MFR_EFFICIENCY_LL_POUT1	160	W	0	160
	MFR_EFFICIENCY_LL_EFF1	0.9		-10	922
	MFR_EFFICIENCY_LL_POUT2	400	W	0	400
	MFR_EFFICIENCY_LL_EFF2	0.92		-10	942
	MFR_EFFICIENCY_LL_POUT3	800	W	0	800
	MFR_EFFICIENCY_LL_EFF3	0.89		-10	911
	<b>AB</b>	MFR_EFFICIENCY_HL_LENGTH	14		
MFR_EFFICIENCY_HL_VIN		400	V	-1	800
MFR_EFFICIENCY_HL_POUT1		160	W	0	160
MFR_EFFICIENCY_HL_EFF1		0.9		-10	922
MFR_EFFICIENCY_HL_POUT2		400	W	0	400
MFR_EFFICIENCY_HL_EFF2		0.94		-10	963
MFR_EFFICIENCY_HL_POUT3		800	W	0	800
MFR_EFFICIENCY_HL_EFF3		0.91		-10	932

### RETURNED RESULTS : PMBUS Configuration Command Code EEh

Link back to: [Command List EEh](#)

Bit # / Bit Description																Read / Write	PMBus Configuration			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
CMD Key Bit 7	CMD Key Bit 6	CMD Key Bit 5	CMD Key Bit 4	CMD Key Bit 3	CMD Key Bit 2	CMD Key Bit 1	CMD Key Bit 0	reserved	reserved	reserved	reserved	PEC	Bus Speed	SMBALERT	Data Format					
0	1	0	1	1	0	1	0	X	X	X	X	0	0	0	0	Read	1.NO PEC Support	2.100kHz	3. SMBALERT supported	4. Linear Data format
0	1	0	1	1	0	1	0	X	X	X	X	0	0	0	0	Read	1.NO PEC Support	2.100kHz	3. SMBALERT supported	4. Direct Data format
0	1	0	1	1	0	1	0	X	X	X	X	0	0	0	1	Read	1.NO PEC Support	2.100kHz	3. NO SMBALERT support	4. Linear Data format
0	1	0	1	1	0	1	0	X	X	X	X	0	0	0	1	Read	1.NO PEC Support	2.100kHz	3. NO SMBALERT support	4. Direct Data format
0	1	0	1	1	0	1	0	X	X	X	X	0	1	0	0	Read	1.NO PEC Support	2.400kHz	3. SMBALERT supported	4. Linear Data format
0	1	0	1	1	0	1	0	X	X	X	X	0	1	0	1	Read	1.NO PEC Support	2.400kHz	3. SMBALERT supported	4. Direct Data format
0	1	0	1	1	0	1	0	X	X	X	X	0	1	1	0	Read	1.NO PEC Support	2.400kHz	3. NO SMBALERT support	4. Linear Data format
0	1	0	1	1	0	1	0	X	X	X	X	0	1	1	1	Read	1.NO PEC Support	2.400kHz	3. NO SMBALERT support	4. Direct Data format
0	1	0	1	1	0	1	0	X	X	X	X	1	0	0	0	Read	1.PEC supported	2.100kHz	3. SMBALERT supported	4. Linear Data format
0	1	0	1	1	0	1	0	X	X	X	X	1	0	0	1	Read	1.PEC supported	2.100kHz	3. SMBALERT supported	4. Direct Data format
0	1	0	1	1	0	1	0	X	X	X	X	1	0	0	1	Read	1.PEC supported	2.100kHz	3. NO SMBALERT support	4. Linear Data format
0	1	0	1	1	0	1	0	X	X	X	X	1	1	0	0	Read	1.PEC supported	2.100kHz	3. NO SMBALERT support	4. Direct Data format
0	1	0	1	1	0	1	0	X	X	X	X	1	1	0	1	Read	1.PEC supported	2.100kHz	3. SMBALERT supported	4. Linear Data format
0	1	0	1	1	0	1	0	X	X	X	X	1	1	1	0	Read	1.PEC supported	2.100kHz	3. SMBALERT supported	4. Direct Data format
0	1	0	1	1	0	1	0	X	X	X	X	1	1	1	1	Read	1.PEC supported	2.400kHz	3. SMBALERT supported	4. Linear Data format
0	1	0	1	1	0	1	0	X	X	X	X	1	1	1	0	Read	1.PEC supported	2.400kHz	3. SMBALERT supported	4. Direct Data format
0	1	0	1	1	0	1	0	X	X	X	X	1	1	1	1	Read	1.PEC supported	2.400kHz	3. NO SMBALERT support	4. Linear Data format
0	1	0	1	1	0	1	0	X	X	X	X	1	1	1	1	Read	1.PEC supported	2.400kHz	3. NO SMBALERT support	4. Direct Data format

█ = Default

### PMBus CONFIGURATION BITS

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	

### RETURNED RESULTS : LED CONTROL

Command Code EFh

Link back to: [Commands list CMD EF](#)

Bit # / Bit Description								Valid Values		Read / Write	LED Status & Control	Notes
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					
<b>Page 0 - INPUT LED</b>												
0	0	0	0	0	0	0	0	0	0	Read	Auto - LED off	DEFAULT
0	0	0	0	0	0	0	1	1	1	Read	Auto - LED solid green	
0	0	0	0	0	0	1	0	2	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	
<b>Page 1 - OUTPUT LED</b>												
0	0	0	0	0	0	0	0	0	0	Read	Auto - LED off	DEFAULT
0	0	0	0	0	0	0	1	1	1	Read	Auto - LED solid green	
0	0	0	0	0	0	1	0	2	2	Read	Auto - LED blinking green	
0	0	0	0	0	0	1	1	3	3	Read	Auto - LED solid red (default - not used)	
0	0	0	0	0	1	0	0	4	4	Read	Auto - LED blinking red (default - not used)	
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	

The following tables describe the data contents that can be expected from reading the External EEPROM and Vital MFG data and is for illustration purposes. Actual product content may vary.

### Manufacturer's Vital Data, HB3BC

Link back to: [Commands list CMD 99](#)

PMBus Register Name	PMBus Register Number	Register Contents	Static or Dynamic Register? (S/D)	Label Markings	Label Part Number
MFR_ID	0x99	Murata-PS	S	MPS Logo	
MFR_MODEL	0x9A	D1U54P-M-800-12-HB3BC	D	D1U54P-M-800-12-HB3BC	D979-083-2002-1
MFR_REVISION	0x9B (paged)	9151001961-vv-rr (page 0) 9157002001-vv-rr (page 1) 915400xxxx-vv-rr (page 2)	S	n/a	n/a
MFR_LOCATION	0x9C	China / Canada	D	MADE IN xxxxxx	D979-083-2002-1
MFR_DATE	0x9D	YYWW	D	Chars 3-6 of serial number	D97667500001
MFR_SERIAL	0x9E	SSYYWRRxxxx	D	SSYYWRRxxxx	D97667500001
<b>Reference:</b>	<b>PMBus Specification Part II Rev 1.2 2010-09-06</b> <a href="http://pmbus.org/Specifications/OlderSpecifications">http://pmbus.org/Specifications/OlderSpecifications</a>				

### EEPROM contents, HB3BC

Product Info Area Field Name	Product Info Area Field Contents	Static or Dynamic Register? (S/D)	Description	Label Markings	Label Part Number
Manufacturer name	Murata-PS	S	Manufacturer name	MPS Logo	
Model name	M2002	S	Product / project number (Mxxxx)	n/a	n/a
Part/product number	D1U54P-M-800-12-HB3BC	D	Marketing / customer p/n (D1U54P...)	D1U54P-M-800-12-HB3BC	D979-083-2002-1
Version		N/A	Not used	n/a	n/a
Serial number	SSYYWRRxxxx	D	MPS 12-digit serial number	SSYYWRRxxxx	D97667500001
Asset tag		N/A	Not used	n/a	n/a
FRU File ID		N/A	Not used	n/a	n/a
Custom field 1		N/A	Not used	n/a	n/a
Custom field 2		N/A	Not used	n/a	n/a
Custom field 3		N/A	Not used	n/a	n/a
Custom field 4		N/A	Not used	n/a	n/a

Fill unused space with 0x00

Reference:

**IPMI Platform Management FRU Information Storage Definition v1.0**  
<http://www.intel.com/content/www/us/en/servers/ipmi/information-storage-definition.html>

Manufacturer's Vital Data, HB4BC

Link back to: [Commands list CMD 99](#)

PMBus Register Name	PMBus Register Number	Register Contents	Static or Dynamic Register? (S/D)	Label Markings	Label Part Number
MFR_ID	0x99	Murata-PS	S	MPS Logo	
MFR_MODEL	0x9A	D1U54P-M-800-12-HB4BC	D	D1U54P-M-800-12-HB4BC	D979-082-2001-1
MFR_REVISION	0x9B (paged)	9151001961-vv-rr (page 0) 9157002001-vv-rr (page 1) 915400xxx-vv-rr (page 2)	S	n/a	n/a
MFR_LOCATION	0x9C	China / Canada	D	MADE IN xxxxxx	D979-082-2001-1
MFR_DATE	0x9D	YYWW	D	Chars 3-6 of serial number	D97667500001
MFR_SERIAL	0x9E	SSYYWRRxxxx	D	SSYYWRRxxxx	D97667500001
<b>Reference:</b>	<b>PMBus Specification Part II Rev 1.2 2010-09-06</b> <a href="http://pmbus.org/Specifications/OlderSpecifications">http://pmbus.org/Specifications/OlderSpecifications</a>				

EEPROM contents, HB4BC

Product Info Area Field Name	Product Info Area Field Contents	Static or Dynamic Register? (S/D)	Description	Label Markings	Label Part Number
Manufacturer name	Murata-PS	S	Manufacturer name	MPS Logo	
Model name	M2001	S	Product / project number (Mxxxx)	n/a	
Part/product number	D1U54P-M-800-12-HB4BC	D	Marketing / customer p/n (D1U54P...)	D1U54P-M-800-12-HB4BC	D979-082-2001-1
Version		N/A	Not used	n/a	n/a
Serial number	SSYYWRRxxxx	D	MPS 12-digit serial number	SSYYWRRxxxx	D97667500001
Asset tag		N/A	Not used	n/a	n/a
FRU File ID		N/A	Not used	n/a	n/a
Custom field 1		N/A	Not used	n/a	n/a
Custom field 2		N/A	Not used	n/a	n/a
Custom field 3		N/A	Not used	n/a	n/a
Custom field 4		N/A	Not used	n/a	n/a
<b>Fill unused space with 0x00</b>					
<b>Reference:</b>	<b>IPMI Platform Management FRU Information Storage Definition v1.0</b> <a href="http://www.intel.com/content/www/us/en/servers/ipmi/information-storage-definition.html">http://www.intel.com/content/www/us/en/servers/ipmi/information-storage-definition.html</a>				

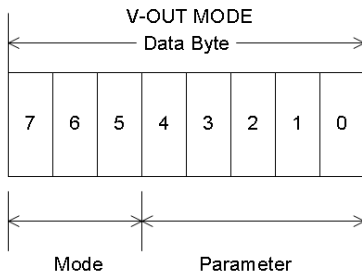
**Command Code 20h (V-OUT MODE) returned results:**

Link back to [CMD\\_20 list](#)

V-OUT Mode Protocol:

Commanding and/or reading output voltage related parameters requires two steps and applies to this product except as noted:

- 1) CMD\_20 (V-OUT MODE) defines which of the three formats (LINEAR, VID OR DIRECT) is used:



Mode definition			Returned results for CMD_20h				
Mode	Bits (7:5)	Bits (4:0) (Parameter)	Command Code (Hex)	Command Name	Value	Bit#	Value
Linear (Default)	000b	Five bit two's complement exponent for the mantissa delivered as the data bytes for an output voltage command.  Bits 4:0 returned= 11010b = N=-6 (Default)	20	VOUT_MODE	1Ah	Bit 7	0
						Bit 6	0
						Bit 5	0
						Bit 4	1
						Bit 3	1
						Bit 2	0
						Bit 1	1
						Bit 0	0

- 2) The Command Bytes, or mantissa can then be used to calculate real world values for the output voltage commands and parameters:

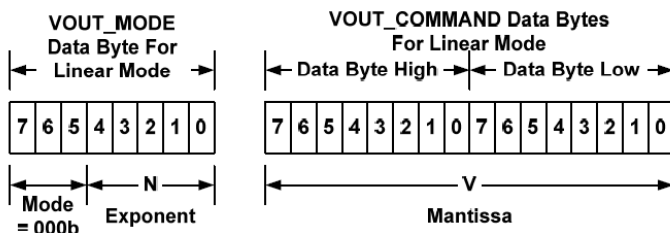


Figure 6. Linear Format Data Bytes

The Mode bits are set to 000b.

The Voltage, in volts, is calculated from the equation:

$$Voltage = V \cdot 2^N$$

Where:

Voltage is the parameter of interest in volts;

V is a 16 bit unsigned binary integer; and

N is a 5 bit two's complement binary integer.

V-OUT Mode Protocol cont'd:

All other primates and commands use Linear mode and associated real world values are calculated as follows:

Link back to [introductory notes](#)

**Linear Data Format**

The Linear Data Format is typically used for commanding and reporting the parameters such as (but not only) the following:

- Output Current,
- Input Voltage,
- Input Current,
- Operating Temperatures,
- Time (durations), and
- Energy Storage Capacitor Voltage.

The Linear Data Format is a two byte value with:

- An 11 bit, two's complement mantissa and
- A 5 bit, two's complement exponent (scaling factor).

The format of the two data bytes is illustrated in Figure 4.

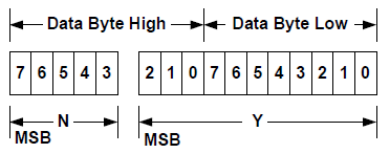


Figure 4. Linear Data Format Data Bytes

The relation between Y, N and the "real world" value is:

$$X = Y \cdot 2^N$$

Where, as described above:

X is the "real world" value;

Y is an 11 bit, two's complement integer; and

N is a 5 bit, two's complement integer.

Devices that use the Linear format must accept and be able to process any value of N.

**Manual Override Fan speed Control** :Command Code 3Bh (**FAN\_COMMAND\_1**) [Link Back to Commands List: CMD\\_3B](#)

Manual fan speed control via PMBus™ is a linear data mode two byte command, speed expressed as fan duty cycle. This table below contains the manual fan speed command data in 1% increments, for illustration purposes.

The power supply automatically cancels manual fan speed control and enters automatic fan speed control by any of the following conditions or methods:

- 1) Writing the command “03h”(CLEAR\_FAULTS).
- 2) Any overtemperature fault or warning (manual fan speed control mode can be resumed after the faults and warnings have ended)
- 3) Recycling of AC input voltage
- 4) Toggling PS\_ON signal
- 5) Issuing a fan command that is outside the normal maximum limits, i.e., writing a fan speed of 110% duty cycle.

CMD 3B(h)	“Fan_COMMAND_1” (2 bytes)			CMD 3B(h)	“Fan_COMMAND_1” (2 bytes)			CMD 3B(h)	“Fan_COMMAND_1” (2 bytes)			CMD 3B(h)	“Fan_COMMAND_1” (2 bytes)		
	% Duty Cycle	MSB(h)	LSB(h)		n(d)	% Duty Cycle	MSB(h)		LSB(h)	n(d)	% Duty Cycle		MSB(h)	LSB(h)	n(d)
0	B0	0	-10	26	B1	A	-10	51	B2	A	-10	76	B2	9	-10
1	B0	A	-10	27	B1	14	-10	52	B2	14	-10	77	B2	14	-10
2	B0	14	-10	28	B1	E1	-10	53	B2	1E	-10	78	B2	1E	-10
3	B0	1F	-10	29	B1	29	-10	54	B2	28	-10	79	B2	28	-10
4	B0	29	-10	30	B1	33	-10	55	B2	33	-10	80	B3	32	-10
5	B0	33	-10	31	B1	3D	-10	56	B2	3D	-10	81	B3	3D	-10
6	B0	3D	-10	32	B1	47	-10	57	B2	47	-10	82	B3	47	-10
7	B0	48	-10	33	B1	52	-10	58	B2	51	-10	83	B3	51	-10
8	B0	52	-10	34	B1	5C	-10	59	B2	5C	-10	84	B3	5B	-10
9	B0	5C	-10	35	B1	66	-10	60	B2	66	-10	85	B3	66	-10
10	B0	66	-10	36	B1	70	-10	61	B2	70	-10	86	B3	70	-10
11	B0	71	-10	37	B1	7B	-10	62	B2	7A	-10	87	B3	7A	-10
12	B0	7B	-10	38	B1	85	-10	63	B2	84	-10	88	B3	84	-10
13	B0	85	-10	39	B1	8F	-10	64	B2	8F	-10	89	B3	8E	-10
14	B0	8F	-10	40	B1	99	-10	65	B2	99	-10	90	B3	99	-10
15	B0	99	-10	41	B1	A3	-10	66	B2	A3	-10	91	B3	A3	-10
16	B0	A4	-10	42	B1	AE	-10	67	B2	AD	-10	92	B3	AD	-10
17	B0	AE	-10	43	B1	B8	-10	68	B2	B8	-10	93	B3	B7	-10
18	B0	B8	-10	44	B1	C2	-10	9	B2	C2	-10	94	B3	C2	-10
19	B0	C2	-10	45	B1	CC	-10	70	B2	CC	-10	95	B3	CC	-10
20	B0	CD	-10	46	B1	D7	-10	71	B2	D6	-10	96	B3	D6	-10
21	B0	D7	-10	47	B1	E1	-10	72	B2	E1	-10	97	B3	E0	-10
22	B0	E1	-10	48	B1	EB	-10	73	B2	EB	-10	98	B3	EB	-10
23	B0	EB	-10	49	B1	F5	-10	74	B2	F5	-10	99	B3	F5	-10
24	B0	F6	-10	50	B2	0	-10	75	B2	FF	-10	100	B3	FF	-10
25	B1	0	-10												

Murata Power Solutions, Inc.  
ISO 9001 and 14001 REGISTERED

Murata Power Solutions, Inc.  
129 Flanders Rd. Westborough,

**This product is subject to the following  
operating requirements and the Life and  
Safety Critical Application Sales Policy:**

**Refer to: [http://www.murata-  
ps.com/requirements/](http://www.murata-ps.com/requirements/)**

Murata Power Solutions, Inc. makes no representation that the use of its products in the circuits described herein, or the use of other technical information contained herein, will not infringe upon existing or future patent rights. The descriptions contained herein do not imply the granting of licenses to make, use, or sell equipment constructed in accordance therewith. Specifications are subject to change without notice. ©  
2018 Murata Power Solutions, Inc.

