

PMBus™ Commands & Features

This application note is applicable for the following members of the D1U3CS-D-1600-12-HCxEC Series:

MPS#	Part Number	Serial Communication Slave Addressing	Airflow	Standby (Vdc)
TQ1809	D1U3CS-D-1600-12-HC4EC	Address Pins Selection (Pin Strapping)	back-to-front	3.3
M1831	D1U3CS-D-1600-12-HC3EC	Address Pins Selection (Pin Strapping)	front-to-back	3.3

Standard PMBus™ Commands

Data communicated over the PMBus™ interface shall not use PEC (Packet Error Checking) as defined by the standard for PMBus™ Power Systems Management Protocol Part 1 – General Requirements Rev 1.1.

Data parameters passed shall use either linear or direct formatting (see individual commands).

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 current command STOP and next command START) is recommended for robust communications.

Note: 100/400 KHz I²C communications is supported for the PMBus™ interface.

Note: The PMBus™ slave controller can “clock stretch” on ACK.

Device Details

Power Module Internal Devices

Vendor	Manufacturers Part Number	Package	Description
Microchip Technology Inc.	PIC24FJ32GA002T-I/SS	28 Pin	Primary Digital Signal Controller, 16-bit dsPIC, 32K flash, 8K SRAM, --40C to +85C
Microchip Technology Inc.	PIC24FJ164GA306T-I/PT	64 Pin	Secondary Digital Signal Controller, 16-bit dsPIC, 64K flash, 8K SRAM, -40C to +85C
Microchip Technology Inc.	24AA024T-IMS	8 Pin	2K Bit, 2.5-5.5V, 400KHz, 1.8-2.5V 100KHz, 85C

Device Addressing Methods

(See D1U3CS-12-CONC Interface Card; Application Note ACAN-41 for Additional Details):

The following details the method whereby the two 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; see the PMBus™ standard) is as follows:

1. Terminating the pin(s) to VSB GND (connector pin numbers A2/B6/C6/D6); this method will set a default address of “00” for the last two addressable bits (A0, A1) of the address byte.
2. Leaving these pins unterminated (“floating”) will set a default address of “11” for the last two addressable bits (A0, A1) of the address byte; these pins are pulled up (internally to +VSB) by a 10K ohm resistor.
3. Other combinations are possible to provide a maximum of 4 address permutations as follows:

HEX Address Combinations by Analogue Method; ADDR External Resistance Values

Address Pin A1 (Connector Pin D2)	Address Pin A0 (Connector Pin D1)	Power Module Secondary Main Controller (Serial Slave Address)	Power Module EEPROM (Serial Slave Address)
0	0	0xB0	0xA0
0	1	0xB2	0xA2
1	0	0xB4	0xA4
1	1	0xB6	0xA6

The D1U3CS-D-1600-12-HCxEC uses 7-bit Device “left shifted” addressing as follows (see example below for Secondary Main Micro Controller; the EEPROM addressing follows a similar convention) but commences at base address 0xA0) interrelationship:

Address Convention								
Device Address	Device Address Bits							Read/Write Bit
	7	6	5	4	3	2 (A1)	1 (A0)	“0” = “W” “1” = “R”
0xB0	1	0	1	1	0	0	0	“0”
0xB2	1	0	1	1	0	0	1	“0”
0xB4	1	0	1	0	0	1	0	“0”
0xB6	1	0	1	1	0	1	1	“0”

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

Command Code (Hex)	Command Name	Read/Write	Page	Format	Number of Bytes	Bit(s) Number	Bit Name	Definition	Supported
00	PAGE	R/W	All		1			Command to provide ability to configure, control & monitor multiple outputs	YES
01	OPERATION (See Relevant Table at the Rear of Document) #ComCodex01	R/W	All	Bit Flags	1	5:0		Set output margin high/low voltages	NO
						7:6		Turn the unit on/off in conjunction with digital input from PSON_L	YES
02	ON_OFF_CONFIG See Relevant Table at the Rear of Document) #ComCodex02	R	All	Bit Flags	1	0	ON_OFF_DELAY	Set when Turn off immediately (default) / 0 = Use delay @ turn-off	YES
						1	ON_OFF_POLARITY	Set when Power on processing is active high (default)	YES
						2	USE_CONTROL	Set when Use CONTROL pin for on/off power processing (default)	YES
						3	USE_OPERATION	Set when Use OPERATION command for on/off power processing (default)	YES
						4	USE_CNTL_AND_OP	Set when Use both CONTROL pin & OPERATION command (default)	YES
						5	RESERVED		NO
						6	RESERVED		NO
						7	RESERVED		NO
03	CLEAR_FAULTS	W	All		1			Write only command clears all faults that have been set in all the STATUS_XXXX registers simultaneously	YES
20	VOUT_MODE	R	0	Bit Flags	1			Single data byte sets the READ_VOUT sensor to linear mode data format and supplies required N"N exponent.	NO
								PMBus Spec - Part II - Revision 1.1 - Sections 8.1-8.3	
20	VSTBY_MODE	R	1	Bit Flags	1			Single data byte sets the READ_VOUT sensor to linear mode data format and supplies exponent "N" for translation to volts.	NO
								PMBus Spec - Part II - Revision 1.1 - Sections 8.1-8.3	
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_HIGH	R/W	0	Linear Data Format	2			Load the unit with the voltage to which the output is to be changed when the OPERATION command set to "Margin Low"	NO
26	VSTBY_MARGIN_LOW	R/W	1	Linear Data Format	2			Load the unit with the voltage to which the output is to be changed when the OPERATION command set to "Margin Low"	NO

Command Code (Hex)	Command Name	Read/Write	Page	Format	Number of Bytes	Bit(s) Number	Bit Name	Definition	Supported
3A	FAN_CONFIG_1_2	R	All	Bit Flags	1	0	FAN_2_TACH_PULSES	Fan 2 Tachometer pulses per revolution (lower bit)	NO
						1	FAN_2_TACH_PULSES	Fan 2 Tachometer pulses per revolution (upper bit)	NO
						2	FAN_2_SETTING_MODE	Set when fan is commanded in RPM (Clear when fan is commanded in Duty Cycle)	NO
						3	FAN_2_INSTALLATION	Set when fan is installed in position 2	NO
						4	FAN_1_TACH_PULSES	Fan 1 Tachometer pulses per revolution (lower bit)	YES
						5	FAN_1_TACH_PULSES	Fan 1 Tachometer pulses per revolution (upper bit)	YES
						6	FAN_1_SETTING_MODE	Set when fan is commanded in RPM (Clear when fan is commanded in Duty Cycle)	YES
						7	FAN_1_INSTALLATION	Set when fan is installed in position 1	YES
3B	FAN_COMMAND_1	R/W	All	R/W	2			Manual fan override command fan speed value in RPM Command speed formatted in Linear as per command 0x90 - READ_FAN_SPEED_1	YES
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			Main Output Undervoltage Warning Limit	YES
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2			Standby(Auxiliary) Output Undervoltage Warning Limit	YES
44	VOUT_UV_FAULT_LIMIT	R	0	Linear Data Format	2			Main Output Undervoltage Fault Limit	YES
44	VSTBY_UV_FAULT_LIMIT	R	1	Bit Flags	1			Standby(Auxiliary) Output Undervoltage Fault Limit	YES
45	VOUT_UV_FAULT_RESPONSE	R	0	Bit Flags	1			Main Output Undervoltage Fault Response Actions	YES
45	VSTBY_UV_FAULT_RESPONSE	R	1	Linear Data Format	2			Standby(Auxiliary) Output Undervoltage Fault Response Actions	YES
46	IOUT_OC_FAULT_LIMIT	R	0	Linear Data Format	2			Main Output Overcurrent Fault Limit - High line	YES
46	IOUT_OC_FAULT_LIMIT	R	1	Linear Data Format	2			Main Output Overcurrent Fault Limit - Low line	YES
46	ISTBY_OC_FAULT_LIMIT	R	2	Bit Flags	1			Standby(Auxiliary) Output Overvoltage Fault Limit	YES
47	IOUT_OC_FAULT_RESPONSE	R	0	Bit Flags	1			Main Output Overcurrent Fault Response Actions	YES
47	IOUT_OC_FAULT_RESPONSE	R	1	Bit Flags	1			Main Output Overcurrent Fault Response Actions	YES
47	ISTBY_OC_FAULT_RESPONSE	R	2	Linear Data Format	2			Standby(Auxiliary) Output Response Actions	YES
4A	IOUT_OC_WARN_LIMIT	R	0	Linear Data Format	2			Standby(Auxiliary) Output Overcurrent Fault Response Actions	YES
4A	IOUT_OC_WARN_LIMIT	R	1	Linear Data Format	2			Main Output Overcurrent Warning Limit - High line	YES
4A	ISTBY_OC_WARN_LIMIT	R	2	Linear Data Format	2			Main Output Overcurrent Warning Limit - Low line	YES
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	2	Linear Data Format	2			Airflow 1 Overtemperature Fault Limit	YES
4F	HOTSPOT_1_OT_FAULT_LIMIT	R	1	Linear Data Format	2			Hotspot 1 Overtemperature Fault Limit	YES
4F	AIRFLOW_2_OT_FAULT_LIMIT	R	2	Linear Data Format	2			Airflow 2 Overtemperature Fault Limit	YES
4F	HOTSPOT_2_OT_FAULT_LIMIT	R	3	Bit Flags	1			Hotspot 2 Overtemperature Fault Limit	YES

See Returned Data Tables for Individual Models
[#HC4ECcomcodex40](#)
[#HC3ECcomcodex40](#)

Command Code (Hex)	Command Name	Read/Write	Page	Format	Number of Bytes	Bit(s) Number	Bit Name	Definition	Supported
50	AIRFLOW_1_OT_FAULT_RESPONSE	R	0	Bit Flags	1	See Returned Data Tables for Individual Models #HC4ECcomcodex50 #HC3ECcomcodex50	Airflow 1 Overtemperature Fault Response Actions		YES
50	HOTSPOT_1_OT_FAULT_RESPONSE	R	1	Bit Flags	1		Hotspot 1 Overtemperature Fault Response Actions		YES
50	AIRFLOW_2_OT_FAULT_RESPONSE	R	2	Bit Flags	1		Airflow 2 Overtemperature Fault Response Actions		YES
50	HOTSPOT_2_OT_FAULT_RESPONSE	R	3	Bit Flags	2		Hotspot 2 Overtemperature Fault Response Actions		YES
51	AIRFLOW_1_OT_WARN_LIMIT	R	0	Linear Data Format	2		Airflow 1 Overtemperature Warning Limit		YES
51	HOTSPOT_1_OT_WARN_LIMIT	R	1	Linear Data Format	2		Hotspot 1 Overtemperature Warning Limit		YES
51	AIRFLOW_2_OT_WARN_LIMIT	R	2	Linear Data Format	2		Airflow 2 Overtemperature Warning Limit		YES
51	HOTSPOT_2_OT_WARN_LIMIT	R	3	Linear Data Format	2		Hotspot 2 Overtemperature Warning Limit		YES
55	VIN_OV_FAULT_LIMIT	R	0	Bit Flags	1		Input Overvoltage Fault Limit		YES
56	VIN_OV_FAULT_RESPONSE	R	0	Linear Data Format	2		Input Overvoltage Fault Response Actions		YES
57	VIN_OV_WARN_LIMIT	R	0	Linear Data Format	2		Input Overvoltage Warning Limit		YES
58	VIN_UV_WARN_LIMIT	R	0	Linear Data Format	2		Input Undervoltage Warning Limit		YES
59	VIN_UV_FAULT_LIMIT	R	0	Linear Data Format	1		Input Undervoltage Fault Limit		YES
5A	VIN_UV_FAULT_RESPONSE	R	0	Linear Data Format	2		Input Undervoltage Fault Response Actions		YES
5B	IIN_OC_FAULT_LIMIT	R	0	Bit Flags	1		Input Overcurrent Fault Limit		YES
5C	IIN_OC_FAULT_RESPONSE	R	0	Linear Data Format	2		Input Overcurrent Fault Response Actions		YES
5D	IIN_OC_WARN_LIMIT	R	0	Linear Data Format	2		Input Overcurrent Warning Limit		YES
5E	POWER_GOOD_ON	R	0	Linear Data Format	2		Power Good On Main Output Voltage Limit		YES
5F	POWER_GOOD_OFF	R	0	Linear Data Format	2		Power Good Off Main Output Voltage Limit		YES
68	POUT_OP_FAULT_LIMIT	R	0	Bit Flags	1		Output Overpower Fault Limit		YES
69	POUT_OP_FAULT_RESPONSE	R	0	Linear Data Format	2		Output Overpower Fault Response Actions		YES
6A	POUT_OP_WARN_LIMIT	R	0	Linear Data Format	2		Output Overpower Warning Limit - High line		YES
6A	POUT_OP_WARN_LIMIT	R	1	Linear Data Format	2		Output Overpower Warning Limit - Low line		YES
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2		Input Overpower Warning Limit - High line		YES
6B	PIN_OP_WARN_LIMIT	R	1	Linear Data Format	2		Input Overpower Warning Limit - Low line		YES
79	STATUS_BYTE	R	All	Bit Flags	1	0	NONE_F_W	Set when a fault not listed in [7:1] occurred	NO
						1	CML_F	Set when a communications, memory, or logic fault has occurred	YES
						2	TEMPERATURE_F_W	Set when an overtemperature fault or warning has occurred	YES
						3	INPUT_UV_F	Set when an input undervoltage fault has occurred	YES
						4	OUTPUT_OC_F	Set when an output overcurrent fault has occurred	YES
						5	OUTPUT_OV_F	Set when an output overvoltage fault has occurred	YES
						6	UNIT_OFF	Set when unit not providing power to the output	YES
						7	BUSY_F	Asserted when device busy and unable to respond fault	YES

Command Code (Hex)	Command Name	Read/Write	Page	Format	Number of Bytes	Bit(s) Number	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	MFG_SPECIFIC_F_W	Manufacturer specific fault or warning has occurred	YES
						13	INPUT_F_W	Set when an Input voltage/current/power fault or warning has occurred	YES
						14	IOUT_POUT_F_W	Set when an output current / output power fault or warning has occurred	YES
7A	STATUS_VOUT	R	0	Bit Flags	1	15	VOUT_F_W	Set when an output voltage fault or warning has occurred	YES
						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
7A	STATUS_VSTBY	R	1	Bit Flags	1	7	VOUT_OV_F	Set when an output overvoltage fault has occurred	YES
						0	VOUT_TRACKING_E	Set when an error in the output voltage during power-up/down has occurred	NO
						1	TON_MAX_W	Set when the output turn-on timing has exceeded the TON_MAX warning timing	NO
						2	TON_MAX_F	Set when the output turn-on timing has exceeded the TON_MAX fault timing	NO
						3	VOUT_MAX_F	Set when the output is set higher than the commanded VOUT_MAX limit	NO
						4	VOUT_UV_F	Set when an output undervoltage fault has occurred	YES
						5	VOUT_UV_W	Set when an output under-voltage warning has occurred	YES
						6	VOUT_OV_W	Set when an output overvoltage warning has occurred	YES
7A	STATUS_VSTBY	R	1	Bit Flags	1	7	VOUT_OV_F	Set when an output overvoltage fault has occurred	YES

Command Code (Hex)	Command Name	Read/Write	Page	Format	Number of Bytes	Bit(s) Number	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	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
7C	STATUS_INPUT	R	ALL	Bit Flags	1	0	PIN_OP_W	Set when an input overpower warning has occurred	YES
						1	IIN_OC_W	Set when an input overcurrent warning has occurred	YES
						2	IIN_OC_F	Set when an input overcurrent fault has occurred	YES
						3	VIN_UV_OFF	Set when the Unit is OFF for insufficient input voltage	NO
						4	VIN_UV_F	Set when an input undervoltage fault has occurred	YES
						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	CML_OTHER_F	Set when another memory or logic fault has occurred	YES
						1	CML_NONE_F	Set when a communication fault not listed in [7:3] has occurred (example: UART or SPI)	NO
						2	RESERVED	Reserved	NO
						3	CML_PROCESSOR_F	Set when a processor fault is detected	NO
						4	CML_MEMORY_F	Set when a memory fault is detected (example: Checksum errors during bootload)	NO
						5	CML_PEC_E	Set when a packet error checking (PEC) failed has occurred	YES
						6	CML_DATA_E	Set when invalid or unsupported data is received	YES
						7	CML_COMMAND_E	Set when an invalid or unsupported command is received	YES

Command Code (Hex)	Command Name	Read/Wri te	Page	Format	Number of Bytes	Bit(s) Number	Bit Name/Comment	Description	Supported
81	STATUS_FANS_1_2	R	All	Bit Flags	1	0	FAN_AIRFLOW_W	Airflow warning	NO
						1	FAN_AIRFLOW_F	Airflow fault	NO
						2	FAN_2_OVERRIDE	Fan 2 speed overridden	NO
						3	FAN_1_OVERRIDE	Fan 1 speed overridden	YES
						4	FAN_2_W	Fan 2 warning	NO
						5	FAN_1_W	Fan 1 warning	YES
						6	FAN_2_F	Fan 2 fault	NO
						7	FAN_1_F	Fan 1 fault	YES
88	READ_VIN	R	All	Linear Data Format	2	See Sensor Data Tables for All Models #SensorData88HC4EC #SensorData88HC3EC		Input Voltage Sensor Reading	YES
89	READ_IIN	R	All	Linear Data Format	2			Input Current Sensor Reading	YES
8B	READ_VOUT	R	0	Direct Data Format	2			Main Output Voltage Sensor Reading	YES
8B	READ_VSTBY	R	1	Direct Data Format	2			Standby(Auxiliary) Output Voltage Sensor Reading	YES
8C	READ_IOUT	R	0	Direct Data Format	2			Main Output Current Sensor Reading	YES
8C	READ_ISTBY	R	1	Direct Data Format	2			Standby(Auxiliary) Output Current Sensor Reading	YES
8D	READ_TEMPERATURE_1	R	0	Linear Data Format	2			Airflow 1 Temperature Sensor Reading	YES
8E	READ_TEMPERATURE_2	R	0	Direct 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			Hotspot 2 Temperature Sensor Reading	YES
90	READ_FAN_SPEED_1	R	0	Linear Data Format	2			Fan 1 Speed Sensor Reading	YES
91	READ_FAN_SPEED_2	R	0	Linear Data Format	2			Fan 2 Speed Sensor Reading	NO
96	READ_POUT	R	All	Linear Data Format	2			Output Power Sensor Reading	YES
97	READ_PIN	R	All	Linear Data Format	2			Input Power Sensor Reading	YES
98	PMBUS_REVISION	R	ALL	HEX	1			PMBus Specification Revision	YES
99	MFR_ID	R	All	Ascii Text Block	Variable		See MFR_ID at link: #ComCodex99	Power Supply Company Name	YES
9A	MFR_PART_NUMBER	R	All	Ascii Text Block	15		See MFR_PART_NUMBER at link: #ComCodex9AHC4EC #ComCodex9AHC3EC	Power Supply Firmware Revision	YES
9B	MFR_REVISION	R	All	Ascii Text Block	10		See MFR_REVISION at link: #ComCodex9B	Power Supply Model Number	YES
9C	MFR_LOCATION	R/W	All	Ascii Text Block	Variable		See MFR_LOCATION at link: #ComCodex9C	Power Supply Manufacture Location	YES
9D	MFR_DATE	R/W	All	Ascii Text Block	5		See MFR_DATE at link: ComCodex9D	Power Supply Manufacture Date	YES
9E	MFR_SERIAL	R/W	All	Ascii Text Block	2		See MFR_SERIAL at link: #ComCodex9E	Power Supply Serial Number	YES

Command Code (Hex)	Command Name	Read/Write	Page	Format	Number of Bytes	Bit(s) Number	Bit Name/Comment	Description	Supported
A0	MFR_VIN_MIN	R	All	Linear Data Format	2		See Manufacturers Data Tables ComCodexA0	Power Supply Input Voltage Minimum Specification	YES
A1	MFR_VIN_MAX	R	All	Linear Data Format	2			Power Supply Input Voltage Maximum Specification	YES
A2	MFR_IIN_MAX	R	All	Linear Data Format	2			Power Supply Input Current Maximum Specification	YES
A3	MFR_PIN_MAX	R	All	Linear Data Format	2			Power Supply Input Power Maximum Specification	YES
A4	MFR_VOUT_MIN	R	All	Linear Data Format	2			Power Supply Main Output Voltage Minimum Specification	YES
A5	MFR_VOUT_MAX	R	All	Linear Data Format	2			Power Supply Main Output Voltage Maximum Specification	YES
A6	MFR_IOUT_MAX	R	All	Linear Data Format	2			Power Supply Main Output Current Maximum Specification	YES
A7	MFR_POUT_MAX	R	All	Linear Data Format	2			Power Supply Output Power Maximum Specification	YES
A8	MFR_TAMBIENT_MAX	R	All	Linear Data Format	2			Power Supply Operating Ambient Temperature Maximum Specification	YES
A9	MFR_TAMBIENT_MIN	R	All	Linear Data Format	2			Power Supply Operating Ambient Temperature Minimum Specification	YES
AA	MFR_EFFICIENCY_LL	R	All	Linear Data Format	2			Power Supply High-Line Low Power Specification	YES
								Power Supply High-Line Low Power Efficiency Specification	YES
								Power Supply High-Line Medium Power Specification	YES
								Power Supply High-Line Medium Power Efficiency Specification	YES
								Power Supply High-Line High Power Specification	YES
								Power Supply High-Line Low Power Specification	YES
								Power Supply High-Line Low Power Efficiency Specification	YES
								Power Supply High-Line Input Voltage Specification	YES
AB	MFR_EFFICIENCY_HL	R	All	Linear Data Format	2			Power Supply High-Line Low Power Specification	YES
								Power Supply High-Line Low Power Efficiency Specification	YES
								Power Supply High-Line Medium Power Specification	YES
								Power Supply High-Line Medium Power Efficiency Specification	YES
								Power Supply High-Line High Power Specification	YES
E0	PS_STATUS	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	NO
						6	PS_ON	Set when the PS_ON logic set to enable the main output	YES
						7	POWER_GOOD	Set when main output power delivered by the unit is OK; mirrors the digital output signal	YES
						8	POWER_DOWN	Set when boot loader is taking control and the main output and PFC need to be shutdown	YES
						9	BOOTLOAD_COMPLETED	Set when the boot loader has completed and system reset needs to be Set	YES
						10	BOOTLOAD_MODE	Set when the bootloader is currently bootloading any of the microcontrollers in the power supply	YES
						11	UNUSED		NO
						12	UNUSED		NO
						13	UNUSED		NO
						14	WARNING	Set when power supply warning has occurred; tracks 'WARNING' status LED	YES
						15	FAULT	Set when power supply fault has occurred; tracks 'FAULT' status LED	YES

Command Code (Hex)	Command Name	Read/Write	Page	Format	Number of Bytes	Bit(s) Number	Bit Name/Comment	Description	Supported
E1	EEPROM_WP	R/W	All	Integer	1		See EEPROM FRU Data #EEPROMDATA	Write 0x9A to enable write protection to the external EEPROM. Write 0x56 to disable write protection to the external EEPROM	YES
E2	READ_HOURS_USED	R	All	Linear Data Format	3		See Sensor Data Tables for Individual Models ComCodexE2	Power Supply Accumulated Main Output Power-On Hours	YES
E5	READ_RESETS	R	All	Bit Flags	2			RCON register status flags for troubleshooting	YES
				Bit Flags	2			RCON2 register status flags for troubleshooting	YES
EB	MFR_FW_TYPE	R	All	Ascii Text Block	11		See MFR_FW_TYPE Data #ComCodexEB	Manufacturers specific F/W revision	YES
F8	BOOTLOAD_RESTART	R/W	All	HEX	1			Boot loader completion and application restart request command	NO
FA	BOOTLOADER_REQUEST	R/W	All	Ascii Text Block	6			Boot loader request command	NO
FB	BOOTLOADER-STATUS	R	All	Bit Flags	2	0	BOOTLOADING_PRI	Set when primary uC bootloading in process	YES
						1	BOOTLOADING_FLOAT	Set when floating uC bootloading in process	NO
						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	NO
						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	NO
						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

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

RETURNED RESULTS: D1U3CS-D-1600-12-HC4EC; Back to Front Airflow: 3.3VSB (TQ1809)

Command Code Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
40	VOUT_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-6					13	
40	VSTBY_OV_FAULT_LIMIT	R	1	Linear Data Format	2	Vdc	-7					3.8	
41	VOUT_OV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
41	VSTBY_OV_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
42	VOUT_OV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					12.5	
42	VSTBY_OV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-7					3.7	
43	VOUT_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					11.5	
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-7					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	-7					2.8	
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	-2					145	
46	ISTBY_OC_FAULT_LIMIT	R	1	Linear Data Format	2	Adc	-7					7.5	
47	IOUT_OC_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	7	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Continuous restart (self-recovery)
47	ISTBY_OC_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	7	Response - Continuous restart (self-recovery)
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
4A	IOUT_OC_WARN_LIMIT	R	0	Linear Data Format	2	Adc	-2					140	
4A	ISTBY_OC_WARN_LIMIT	R	1	Linear Data Format	2	Adc	-7					6.5	
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	0	Linear Data Format	2	°C	0					95	Primary
4F	HOTSPOT_1_OT_FAULT_LIMIT	R	1	Linear Data Format	2	°C	0					125	Primary
4F	HOTSPOT_2_OT_FAULT_LIMIT	R	2	Linear Data Format	2	°C	0					125	Primary
4F	AIRFLOW_2_OT_FAULT_LIMIT	R	3	Linear Data Format	2	°C	0					75	Secondary
4F	HOTSPOT_OT_FAULT_LIMIT	R	4	Linear Data Format	2	°C	0					125	Secondary

[#Backtox40](#)

D1U3CS-D-1600-12-HC4EC; Back to Front Airflow: 3.3VSB (TQ1809)

Command Code Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
50	AIRFLOW_1_OT_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
50	HOTSPOT_1_OT_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
50	AIRFLOW_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
51	AIRFLOW_1_OT_WARN_LIMIT	R	0	Linear Data Format	2	°C	0					85	Primary
51	HOTSPOT_1_OT_WARN_LIMIT	R	1	Linear Data Format	2	°C	0					100	Primary
51	HOTSPOT_2_OT_WARN_LIMIT	R	2	Linear Data Format	2	°C	0					100	Primary
51	AIRFLOW_2_OT_WARN_LIMIT	R	3	Linear Data Format	2	°C	0					70	Secondary
51	HOTSPOT_OT_WARN_LIMIT	R	4	Linear Data Format								110	Secondary
55	VIN_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-3					76	
56	VIN_OV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
57	VIN_OV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-3					73	
58	VIN_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-3					40	
59	VIN_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-3					36	
5A	VIN_UV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
5B	IIN_OC_FAULT_LIMIT	R	0	Linear Data Format	2	Adc	-4					50	
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	8	Response - Output disabled while fault is present & remains disabled until fault cleared
5D	IIN_OC_WARN_LIMIT	R	0	Linear Data Format	2	Adc	-4					40.8	
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	1					1730	
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	1					1680	
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2	Watts	1					1910	

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Murata Power Solutions

D1U3CS-D-1600-12-HCxEC

PMBus™ Communications Protocol

ACAN57 Application Note

D1U3CS-D-1600-12-HC3EC; Back to Front Airflow: 3.3VSB (M1831)

Command Code Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
40	VOUT_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-6					13	
40	VSTBY_OV_FAULT_LIMIT	R	1	Linear Data Format	2	Vdc	-7					3.8	
41	VOUT_OV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
41	VSTBY_OV_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
42	VOUT_OV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					12.5	
42	VSTBY_OV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-7					3.7	
43	VOUT_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-6					11.5	
43	VSTBY_UV_WARN_LIMIT	R	1	Linear Data Format	2	Vdc	-7					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	-7					2.8	
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	-2					145	
46	ISTBY_OC_FAULT_LIMIT	R	1	Linear Data Format	2	Adc	-7					7.5	
47	IOUT_OC_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	7	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Continuous restart (self-recovery)
47	ISTBY_OC_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	7	Response - Continuous restart (self-recovery)
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
4A	IOUT_OC_WARN_LIMIT	R	0	Linear Data Format	2	Adc	-2					140	
4A	ISTBY_OC_WARN_LIMIT	R	1	Linear Data Format	2	Adc	-7					6.5	
4F	AIRFLOW_1_OT_FAULT_LIMIT	R	0	Linear Data Format	2	°C	0					95	Secondary
4F	HOTSPOT_1_OT_FAULT_LIMIT	R	1	Linear Data Format	2	°C	0					125	Secondary
4F	HOTSPOT_2_OT_FAULT_LIMIT	R	2	Linear Data Format	2	°C	0					125	Secondary
4F	AIRFLOW_2_OT_FAULT_LIMIT	R	3	Linear Data Format	2	°C	0					75	Primary
4F	HOTSPOT_OT_FAULT_LIMIT	R	4	Linear Data Format	2	°C	0					125	Primary

[#Backtox40](#)

D1U3CS-D-1600-12-HC3EC; Back to Front Airflow: 3.3VSB (M1831)

Command Code Hex)	Command Name	Read/Write	Page	Data Format	# of Bytes	Units	Scaling Coefficients				Bit #	Reading	Comments
							N	m	R	b			
50	AIRFLOW_1_OT_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
50	HOTSPOT_1_OT_FAULT_RESPONSE	R	1	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
50	AIRFLOW_2_OT_FAULT_RESPONSE	R	2	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
50	HOTSPOT_2_OT_FAULT_RESPONSE	R	3	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
51	AIRFLOW_1_OT_WARN_LIMIT	R	0	Linear Data Format	2	°C	0					85	Primary
51	HOTSPOT_1_OT_WARN_LIMIT	R	1	Linear Data Format	2	°C	0					100	Primary
51	HOTSPOT_2_OT_WARN_LIMIT	R	2	Linear Data Format	2	°C	0					100	Primary
51	AIRFLOW_2_OT_WARN_LIMIT	R	3	Linear Data Format	2	°C	0					70	Primary
51	HOTSPOT_OT_WARN_LIMIT	R	4	Linear Data Format								110	Primary
55	VIN_OV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-3					76	
56	VIN_OV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
57	VIN_OV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-3					73	
58	VIN_UV_WARN_LIMIT	R	0	Linear Data Format	2	Vdc	-3					40	
59	VIN_UV_FAULT_LIMIT	R	0	Linear Data Format	2	Vdc	-3					36	
5A	VIN_UV_FAULT_RESPONSE	R	0	Bit Flags	1						2:0	0	Delay Time - None
											5:3	0	Retry Setting - Unit does not attempt to restart & output remains disabled until fault clear
											7:6	3	Response - Output disabled while fault is present & remains disabled until fault cleared
5B	IIN_OC_FAULT_LIMIT	R	0	Linear Data Format	2	Adc	-4					50	
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	8	Response - Output disabled while fault is present & remains disabled until fault cleared
5D	IIN_OC_WARN_LIMIT	R	0	Linear Data Format	2	Adc	-4					40.8	
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	1					1730	
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	1					1680	
6B	PIN_OP_WARN_LIMIT	R	0	Linear Data Format	2	Watts	1					1910	

[#Backto50](#)

Command Code (Hex)	Command Name	Description	Page	Data Format	Units	Scaling Coefficient				Raw Sensor		PMBus Reporting Sensor		
						N	m	R	b	Full-scale / Range	Resolution	Full-scale / Range	Resolution	Accuracy
88	READ_VIN	Input Voltage Sensor Reading	All	Linear Data Format	Vdc	-3				106.68	0.104	127.875	0.125	+ / - 2% of Reporting Full-Scale
89	READ_IIN	Input Current Sensor Reading	All	Linear Data Format	Adc	-4				66	0.0645	63.94	0.0625	+ / - 5% of Reporting Full-Scale
8B	READ_VOUT	Main Output Voltage Sensor Reading	0	Direct Data Format	Vdc	-6	1	2	0	15.28	0.0149	15.98	0.0156	+ / - 2% of Reporting Full-Scale
8B	READ_VSTBY	Standby(Auxiliary) Output Voltage Sensor Reading	1	Direct Data Format	Vdc	-7	1	2	0	4.05	0.00395	7.992	0.00781	+ / - 2% of Reporting Full-Scale
8C	READ_IOUT	Main Output Current Sensor Reading	0	Direct Data Format	Adc	-2	1	2	0	170	0.169	255.75	0.250	+ / - 2% of Reporting Full-Scale
8C	READ_ISTBY	Standby(Auxiliary) Output Current Sensor Reading	1	Direct Data Format	Adc	-7	1	2	0	8.11	0.00792	7.992	0.00781	+ / - 2% of Reporting Full-Scale
8D	READ_TEMPERATURE_1	Temperature Sensor Reading - Outlet (Primary Side)	0	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
8E	READ_TEMPERATURE_2	Temperature Sensor Reading - Outlet (Secondary Side)	0	Direct Data Format	°C	0	1	2	0	-40 to 150		-40 to 150	1	+ / - 5°C
8F	READ_TEMPERATURE_3	Temperature Sensor Reading - Main Output Hotspot (Secondary Side)	0	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
8F	READ_TEMPERATURE_3	Temperature Sensor Reading - Bridge Hotspot (Primary Side)	1	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
8F	READ_TEMPERATURE_3	Temperature Sensor Reading - Boost Hotspot (Primary Side)	2	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
90	READ_FAN_SPEED_1	Fan 1 Speed Sensor Reading	All	Linear Data Format	RPM	5				24,000		32736	32	+ / - 5% of Reporting Full-Scale
96	READ_POUT	Output Power Sensor Reading	All	Linear Data Format	Watts	1						2046	2	+ / - 5% of Reporting Full-Scale
97	READ_PIN	Input Power Sensor Reading	All	Linear Data Format	Watts	1						2046	2	+ / - 5% of Reporting Full-Scale
#BacktoxE2 #BacktoxE2	READ_POWER_ON_HOURS	Accumulated Main Output Power-On Hours	All	Linear Data Format	Hours	0				~1900 (Years)		~1900 (Years)	1	+ / - 3%

SENSOR DATA: D1U3CS-D-1600-12-HC3EC; 3.3VSB (Front to Back Airflow; M1831)

Command Code (Hex)	Command Name	Description	Page	Data Format	Units	Scaling Coefficient				Raw Sensor		PMBus Reporting Sensor		
						N	m	R	b	Full-scale / Range	Resolution	Full-scale / Range	Resolution	Accuracy
88	READ_VIN	Input Voltage Sensor Reading	All	Linear Data Format	Vdc	-3				106.68	0.104	127.875	0.125	+ / - 2% of Reporting Full-Scale
89	READ_IIN	Input Current Sensor Reading	All	Linear Data Format	Adc	-4				66	0.0645	63.94	0.0625	+ / - 5% of Reporting Full-Scale
8B	READ_VOUT	Main Output Voltage Sensor Reading	0	Direct Data Format	Vdc	-6	1	2	0	15.28	0.0149	15.98	0.0156	+ / - 2% of Reporting Full-Scale
8B	READ_VSTBY	Standby(Auxiliary) Output Voltage Sensor Reading	1	Direct Data Format	Vdc	-7	1	2	0	4.05	0.00395	7.992	0.00781	+ / - 2% of Reporting Full-Scale
8C	READ_IOUT	Main Output Current Sensor Reading	0	Direct Data Format	Adc	-2	1	2	0	170	0.169	255.75	0.250	+ / - 2% of Reporting Full-Scale
8C	READ_ISTBY	Standby(Auxiliary) Output Current Sensor Reading	1	Direct Data Format	Adc	-7	1	2	0	8.11	0.00792	7.992	0.00781	+ / - 2% of Reporting Full-Scale
8D	READ_TEMPERATURE_1	Temperature Sensor Reading - Outlet (Secondary Side)	0	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
8E	READ_TEMPERATURE_2	Temperature Sensor Reading - Inlet (Primary Side)	0	Direct Data Format	°C	0	1	2	0	-40 to 150		-40 to 150	1	+ / - 5°C
8F	READ_TEMPERATURE_3	Temperature Sensor Reading - Main Output Hotspot (Secondary Side)	0	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
8F	READ_TEMPERATURE_3	Temperature Sensor Reading - Bridge Hotspot (Primary Side)	1	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
8F	READ_TEMPERATURE_3	Temperature Sensor Reading - Boost Hotspot (Primary Side)	2	Linear Data Format	°C	0				-40 to 150		-40 to 150	1	+ / - 5°C
90	READ_FAN_SPEED_1	Fan 1 Speed Sensor Reading	All	Linear Data Format	RPM	5				24,000		32736	32	+ / - 5% of Reporting Full-Scale
96	READ_POUT	Output Power Sensor Reading	All	Linear Data Format	Watts	1						2046	2	+ / - 5% of Reporting Full-Scale
97	READ_PIN	Input Power Sensor Reading	All	Linear Data Format	Watts	1						2046	2	+ / - 5% of Reporting Full-Scale
#BacktoxE2 #BacktoxE2	READ_POWER_ON_HOURS	Accumulated Main Output Power-On Hours	All	Linear Data Format	Hours	0				~1900 (Years)		~1900 (Years)	1	+ / - 3%

Command Code (Hex)	Command Name	Value	Units	ID Length/Bit#ID/ASCII Text
99 #Backtox99	MFR_ID	Murata-PS	N/A	MFR_ID_LENGTH 9
				MFR_ID_0 'M'
				MFR_ID_1 'u'
				MFR_ID_2 'r'
				MFR_ID_3 'a'
				MFR_ID_4 't'
				MFR_ID_5 'a'
				MFR_ID_6 'L'
				MFR_ID_7 'P'
				MFR_ID_8 'S'

Command Code 9A HEX; (MFR_MODEL) D1U3CS-D-1600-12-HC4EC DC Input Variant; Back to Front Airflow (TQ1809)

Command Code (Hex)	Command Name	Value	Units	ID Length/Bit#ID/ASCII Text
9A #Backtox9A	MFR_MODEL	D1U3CS-D-1600-12-HC4EC	N/A	MFR_MODEL_LENGTH = 22
				MFR_MODEL_0 'D'
				MFR_MODEL_1 '1'
				MFR_MODEL_2 'U'
				MFR_MODEL_3 '3'
				MFR_MODEL_4 'C'
				MFR_MODEL_5 'S'
				MFR_MODEL_6 'L'
				MFR_MODEL_7 'D'
				MFR_MODEL_8 'L'
				MFR_MODEL_10 '1'
				MFR_MODEL_11 '6'
				MFR_MODEL_12 '0'
				MFR_MODEL_13 '0'
				MFR_MODEL_14 'L'
				MFR_MODEL_15 '1'
				MFR_MODEL_16 '2'
				MFR_MODEL_17 'L'
				MFR_MODEL_18 'H'
				MFR_MODEL_19 'C'
				MFR_MODEL_20 '4'
				MFR_MODEL_21 'E'
				MFR_MODEL_22 'C'

Command Code 9A HEX; (MAN_MODEL) D1U3CS-D-1600-12-HC3EC DC Input Variant; Front to Back Airflow (M1831)

Command Code (Hex)	Command Name	Value	Units	ID Length/Bit#ID/ASCII Text		
9A #Backtox9A	MFR_MODEL	D1U3CS-D-1600-12-HC3EC	N/A	MFR_MODEL_LENGTH = 22		
				MFR_MODEL_0	'D'	
				MFR_MODEL_1	'1'	
				MFR_MODEL_2	'U'	
				MFR_MODEL_3	'3'	
				MFR_MODEL_4	'C'	
				MFR_MODEL_5	'S'	
				MFR_MODEL_6	'.'	
				MFR_MODEL_7	'D'	
				MFR_MODEL_8	'.'	
				MFR_MODEL_10	'1'	
				MFR_MODEL_11	'6'	
				MFR_MODEL_12	'0'	
				MFR_MODEL_13	'0'	
				MFR_MODEL_14	'.'	
				MFR_MODEL_15	'1'	
				MFR_MODEL_16	'2'	
				MFR_MODEL_17	'.'	
				MFR_MODEL_18	'H'	
				MFR_MODEL_19	'C'	
				MFR_MODEL_20	'3'	
				MFR_MODEL_21	'E'	
				MFR_MODEL_22	'C'	

Command Code 9B HEX; (MFR_REVISION)

Command Code (Hex)	Command Name	Value	Units	ID Length/Bit#ID/ASCII Text		
9B #Backtox9B	MFR_MODEL	0001-0001-0000	N/A	MFR_MODEL_LENGTH = 14		
				MFR_MODEL_0	'0'	
				MFR_MODEL_1	'0'	
				MFR_MODEL_2	'0'	
				MFR_MODEL_3	'1'	
				MFR_MODEL_4	'.'	
				MFR_MODEL_5	'0'	
				MFR_MODEL_6	'0'	
				MFR_MODEL_7	'0'	
				MFR_MODEL_8	'1'	
				MFR_MODEL_9	'.'	
				MFR_MODEL_10	'0'	
				MFR_MODEL_11	'0'	
				MFR_MODEL_12	'0'	
				MFR_MODEL_13	'0'	

Command Code (Hex)	Command Name	Value	ID Length/Bit#ID/ASCII Text
9C #Backtox9C	MFR_LOCATION	China	MFR_LOCATION_LENGTH = 5
			MFR_LOCATION_0 'C'
			MFR_LOCATION_1 'h'
			MFR_LOCATION_2 'i'
			MFR_LOCATION_3 'n'
			MFR_LOCATION_4 'a'
			MFR_LOCATION_5 0
			MFR_LOCATION_6 0
			MFR_LOCATION_7 0
			MFR_LOCATION_8 0
			MFR_LOCATION_9 0
			MFR_LOCATION_10 0
			MFR_LOCATION_11 0
			MFR_LOCATION_12 0
			MFR_LOCATION_13 0
			MFR_LOCATION_14 0
			MFR_LOCATION_15 0
			MFR_LOCATION_16 0
			MFR_LOCATION_17 0
			MFR_LOCATION_18 0

Command Code 9D HEX (MFR_DATE)

Command Code (Hex)	Command Name	Value	ID Length/Bit#ID/ASCII Text
9D #Backtox9D	MFR_DATE	1400	MFR_DATE_LENGTH = 4
			MFR_DATE_0 '1'
			MFR_DATE_1 '4'
			MFR_DATE_2 '0'
			MFR_DATE_3 '0'

Command Code 9E HEX (MFR_SERIAL)

Command Code (Hex)	Command Name	Value	ID Length/Bit#ID/ASCII Text
9E #Backtox9E	MFR_SERIAL	QEyywwR1xxxx	MFR_SERIAL_LENGTH = 12
			MFR_SERIAL_0 'Q'
			MFR_SERIAL_1 'E'
			MFR_SERIAL_2 'y'
			MFR_SERIAL_3 'y'
			MFR_SERIAL_4 'w'
			MFR_SERIAL_5 'w'
			MFR_SERIAL_6 'R'
			MFR_SERIAL_7 '1'
			MFR_SERIAL_8 'x'
			MFR_SERIAL_9 'x'
			MFR_SERIAL_10 'x'
			MFR_SERIAL_11 'x'
			MFR_SERIAL_12 0
			MFR_SERIAL_13 0
			MFR_SERIAL_14 0
			MFR_SERIAL_15 0
			MFR_SERIAL_16 0
			MFR_SERIAL_17 0
			MFR_SERIAL_18 0

Command Code EB HEX (MFR-FW-TYPE)

Command Code (Hex)	Command Name	Value	ID Length/Bit#ID/ASCII Text
EB #BacktoxEB	MFR_FW_TYPE	1XY-7XY-4XY	MFR_REVISION_LENGTH = 11
			MFR_PART_NUMBER_0 '1' Location (Primary)
			MFR_PART_NUMBER_1 'X' Revision, baseline = "0"
			MFR_PART_NUMBER_2 'Y' F/W Type
			MFR_PART_NUMBER_3 '-'
			MFR_PART_NUMBER_4 '7' Location (Secondary)
			MFR_PART_NUMBER_5 'X' Revision, baseline = "0"
			MFR_PART_NUMBER_6 'Y' F/W Type
			MFR_PART_NUMBER_7 '-'
			MFR_PART_NUMBER_8 '0'
			MFR_PART_NUMBER_9 '0'
			MFR_PART_NUMBER_10 '0'

MANUFACTURERS GENERAL PARAMETRIC DATA

Command Code (Hex)	Command Name	Value	Units	Scaling Coefficients				Read Value (Decimal)	
				N	m	R	b		
A0	MFR_VIN_MIN	40	Vdc	-3				320	#BacktoxA0toAB
A1	MFR_VIN_MAX	72	Vdc	-3				576	
A2	MFR_IIN_MAX	50	Adc					800	
A3	MFR_PIN_MAX	1818	W	1				909	
A4	MFR_VOUT_MIN	11.64	Vdc	-6				745	
A5	MFR_VOUT_MAX	12.36	Vdc	-6				791	
A6	MFR_IOUT_MAX	133	Adc	-2				532	
A7	MFR_POUT_MAX	1600	W	1				800	
A8	MFR_TAMBIENT_MAX	50	C	0				50	
A9	MFR_TAMBIENT_MIN	0	C	0				0	
AA	MFR_EFFICIENCY_LL_VIN	N/A	Vdc	N/A				N/A	
	MFR_EFFICIENCY_LL_POUT1	N/A	W	N/A				N/A	
	MFR_EFFICIENCY_LL_EFF1	N/A		N/A				N/A	
	MFR_EFFICIENCY_LL_POUT2	N/A	W	N/A				N/A	
	MFR_EFFICIENCY_LL_EFF2	N/A		N/A				N/A	
	MFR_EFFICIENCY_LL_POUT3	N/A	W	N/A				N/A	
AB	MFR_EFFICIENCY_LL_EFF3	N/A		N/A				N/A	
	MFR_EFFICIENCY_HL_VIN	N/A	Vdc	N/A				N/A	
	MFR_EFFICIENCY_HL_POUT1	N/A	W	N/A				N/A	
	MFR_EFFICIENCY_HL_EFF1	N/A		N/A				N/A	
	MFR_EFFICIENCY_HL_POUT2	N/A	W	N/A				N/A	
	MFR_EFFICIENCY_HL_EFF2	N/A		N/A				N/A	
	MFR_EFFICIENCY_HL_POUT3	N/A	W	N/A				N/A	
	MFR_EFFICIENCY_HL_EFF3	N/A		N/A				N/A	

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

[#Backtox01](#)
ON/OFF COMMAND CODE 02 HEX

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

[#Backtox02](#)
EEPROM DATA

Address (HEX)	Data Length	Register Contents (Hexadecimal Format) Order = Low Address -> High Address Dynamic Data Byte = "xx"	Register Name	Static or Dynamic Register? (S/D)	R/W	Protected? (Y/N)	Data Type	Description
00 - 0A	11	01 00 00 00 01 00 00 FE 01 08 19	Header	S		N	HEX	
0B - 14	10	C9 4D 75 72 61 74 61 2D 50 53	Manufacturer Bytes	S		N	TEXT	Reads as "Murata-PS"
15 - 1A	7	C5 54 51 31 38 30 39	Product Name	S		N	TEXT	Reads as "TQ1809"
	6	C5 4D 31 38 30 31						Reads as "M1831"
1B - 31 (Data Model Specific)	23	D5 44 31 55 33 43 53 2D 44 2D 31 36 30 30 2D 31 32 2D 48 43 34 45 43	Part Number	S		N	TEXT	Reads as "D1U3CS-D-1600-12-HC4EC"
		D5 44 31 55 33 43 53 2D 44 2D 31 36 30 30 2D 31 32 2D 48 43 33 45 43						Reads as "D1U3CS-D-1600-12-HC3EC"
32	1	C0	Product Version Length	S		N	HEX	Product version, length =0
33-3F	13	CC pp pp yy yy ww rr rr XX XX XX XX	Product Serial Number	D		N	TEXT	CC = HEX 0xCC length identifier pp = Product Code yy = Serial Number Year ww = Serial Number Week rr = Serial Number Revision Level XX = Serial Number
40-45	6	C0 C0 C0 C0 C0 C0	Custom data	S		N	HEX	Asset tag, Custom data, FRU ID
46	1	C1	END	S		N	HEX	Signifies end of information
47	1	XX	Checksum	D		N	HEX	XX = 2's complement checksum from 0x08 - 0x46
48-FF	184	00 00 00 ... 00 00 00	UNUSED EEPROM	S		N	HEX	Fill all unused memory locations with 0x00

[#Backtox01](#)