PMBus™ Communications

This application note is applicable to the following products:

Model Number Number	Address	Standby Output	Airflow
D1U86G-W-460-12-HB4DC	ADDR_SEL (External resistor)	12Vdc	Back to Front
D1U86G-W-460-12-HB3DC			Front to Back

Standard PMBus™ 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 recommended for robust communications.

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

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

Note: PEC (Packet Error Checking) is not supported

Internal PSU Microprocessor and EEPROM Details

Power Module Internal Devices			
Vendor	Manufacturers Part Number	Package	Description
Microchip Technology Inc.	PIC24FJ16GA002T-I/SS	28-pin SSOP	(Primary) 16-bit PIC, 16K flash, 8K SRAM, -40C to 85C
Microchip Technology Inc.	PIC24FJ64GA306T-I/PT	64-pin TQFP	(Secondary) 16-bit PIC, 64K flash, 8K SRAM, -40C to 85C
Microchip Technology Inc.	24AA024T-I/MS	8 Pin MSOP	EEPROM - 2K Bit, 2.5-5.5V, 400KHz, 1.8-2.5V 100KHz, 85C

Device Addressing Methods

(See ACAN-65, Interface Card Application Note for Additional Details):

The method 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) is as follows:

Using the address signal pins (A0 pin S12; A1 pin S13and A2 pin S14) in digital mode either by:

a. Unterminated (leaving open circuit); this will set a default setting of "111" for the last three addressable bits (A0, A1 & A2) of the seven bit address byte.

b. Terminating the pin to RTN/ground (pin number S11); this method will set a default address of "000"for the last three addressable bits (A0, A1 & A2) of the address byte.

c. A combination of the above to create an address with eight (8) possible permutations:

Address Combinations by Analogue Address Pins				
A2 (Serial Address Bit#2)	A1 (Serial Address Bit#1)	A0 (Serial Address Bit#0)	Power Module Secondary Main Controller (Serial Slave Address)	Power Module EEPROM (Serial Slave Address)
LOW	LOW	LOW	0xB0	0xA0
LOW	LOW	HIGH	0xB2	0xA2
LOW	HIGH	LOW	0xB4	0xA4
LOW	HIGH	HIGH	0xB6	0xA6
HIGH	LOW	LOW	0xB8	0xA8
HIGH	LOW	HIGH	0xBA	0xAA
HIGH	HIGH	LOW	0xBC	0xAC
HIGH	HIGH	HIGH	0xBE	0xAE

PMBus™ Commands

Command Codes – "Page 0" Main Output (+12V)

Page Command is supported to allow the ability to control and monitor the dual outputs (the Main 12V output) and the V_{STANDBY} outputs. Each Command Code is annotated with either "All," "0" or "1" accordingly to identify which "page" is associated with the command.

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
00	PAGE	1	R/W	N/A		7:1		not used	NO
						0		0b0 = page 0, 0b1 = page 1	YES
01	OPERATION	1	R/W	0		7		Turn unit on/off in combination with PSON_L & PRESENT_L	YES
						6:0		not used	NO
02	ON_OFF_CONFIG	1	R	0		7:5 4:0		Reserved Unit on only if PS_ON_L is low, PRESENT_L is low and 0x01=0x80: Else Off	YES
03	CLEAR_FAULTS	1	W	All				Write only command clears all faults that have been set in all the STATUS_XXXX registers simultaneously. Send 0x03, 0x00	YES
10	WRITE_PROTECT	1	R/W	All		7		No writes allowed to any command	YES
						6		Only writes allowed are to the Write_Protect, Operation, Page commands	NO
						5		Same as above but with On_Off_Config and Vout commands added	NO
						4			NO
						3			NO
						2			NO
						1			NO
						0		Bits 7:0 = 0 . Allows writes to all commands	YES
19	CAPABILITY	1	R	All		7	PEC_SUPPORT	Single bit, 1= PEC supported, 0=PEC not supported	YES
						6	I2C_SPEED	Upper bit, Set to 0	YES
						5	I2C_SPEED	Lower bit, 0=100KHz, 1=400KHz	YES
						4	SMB_ALERT_SUPPORT	0=Not supported, 1=Supported	YES
						3	RESERVED	Not used	NO
						2	RESERVED	Not used	NO
						1	RESERVED	Not used	NO
						0	RESERVED	Not used	NO
20	VOUT_MODE	1	R	0		7	MODE_BIT_2	000 = Linear format, 001 = VID format, 010 = Direct format	YES
						6	MODE_BIT_1	see above	YES
						5	MODE_BIT_0	see above	YES
						4	MODE_PARAM_4	When in linear format bits 4:0 = "N" value	YES
						3	MODE_PARAM_3		YES
						2	MODE_PARAM_2		YES
						1	MODE_PARAM_1		YES
						0	MODE_PARAM_0		YES

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
31	POUT_MAX	2	R	0		b15:0		Read back the maximum allowed continuous output power that the unit can deliver without damage. Encoded in Linear format. Should read back as 460.0	YES
35	VIN_ON	2	R	0		b15:0		Read back the minimum voltage needed to turn unit on. Linear format encoding. Should = 88	YES
35	VIN_OFF	2	R	0		b15:0		Read back the maximum voltage needed to turn unit off. Linear format encoding. Should = 78	YES
3A	FAN_CONFIG_1_2	1	R	All		7	FAN_1_INSTALLATION	Asserted when fan is installed in position 1	YES
						6	FAN_1_SETTING_MODE	Asserted when fan is commanded in RPM (Clear when fan is commanded in Duty Cycle)	YES
						5	FAN_1_TACH_PULSES	Fan 1 Tachometer pulses per revolution (upper bit)	YES
						4	FAN_1_TACH_PULSES	Fan 1 Tachometer pulses per revolution (lower bit)	YES
						3	FAN_2_INSTALLATION	Asserted when fan is installed in position 2	NO
						2	FAN_2_SETTING_MODE	Asserted when fan is commanded in RPM (Clear when fan is commanded in Duty Cycle)	NO
						1	FAN_2_TACH_PULSES	Fan 2 Tachometer pulses per revolution (upper bit)	NO
						0	FAN_2_TACH_PULSES	Fan 2 Tachometer pulses per revolution (lower bit)	NO
3B	FAN_COMMAND_1	2	R/W	All		b6:0		Manual fan override command fan speed value in % duty cycle	YES
								Command speed formatted as % of full scale. 0x0064 = max speed, 0x0000 = min speed	
40	VOUT_OV_FAULT_LIMIT	2	R	0		b15:0		Read back the output voltage level that constitutes an OV fault. Read only. Value = 13.004 VDC	YES
3A	VOUT_OV_FAULT_RESPONSE	1	R	0		7	Response Type Bit 1	Response Type = 0b10 = Shuts Down for Retry times	YES
						6	Response Type Bit 0		YES
						5	Retry Setting 2	Retry Setting = 0b000 = No Retry attempted	YES
						4	Retry Setting 1		YES
						3	Retry Setting 0		NO
						2	Delay Time 2	Delay Time = 0b000 = Zero Delay Units	NO
						1	Delay Time 1		NO
						0	Delay Time 0		NO
42	VOUT_OV_WARN_LIMIT	2	R	0		b15:0		Read back the output voltage level that constitutes an OV warning Read only. Value = 12.512 VDC	YES
43	VOUT_UV_WARN_LIMIT	2	R	0		b15:0		Read back the output voltage level that constitutes an UV warning Read only. Value = 11.848 VDC	YES

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
43	VOUT_UV_FAULT_LIMIT	2	R	0		b15:0		Read back the output voltage level that constitutes an UV failure. Read only. Value = 6.004 VDC	YES
45	VOUT_UV_FAULT_RESPONSE	1	R	0		7	Response Type Bit 1	Response Type = 0b10 = Shuts Down for Retry times	YES
						6	Response Type Bit 0		YES
						5	Retry Setting 2	Retry Setting = 0b000 = No Retry attempted	YES
						4	Retry Setting 1		YES
						3	Retry Setting 0		NO
						2	Delay Time 2	Delay Time = 0b000 = Zero Delay Units	NO
						1	Delay Time 1		NO
						0	Delay Time 0		NO
50	OT_FAULT_RESPONSE	1	R	0		7	Response Type Bit 1	Response Type = 0b10 = Shuts Down for Retry times	YES
						6	Response Type Bit 0		YES
						5	Retry Setting 2	Retry Setting = 0b111= Retry infinite number of times	YES
						4	Retry Setting 1		YES
						3	Retry Setting 0		NO
						2	Delay Time 2	Delay Time = 0b000 = Zero Delay Units	NO
						1	Delay Time 1		NO
						0	Delay Time 0		NO
51	OT_WARN_LIMIT	2	R	0		b15:0		Read back the warning temperature (internal). Read only. Value = 100°C	YES
55	VIN_OV_FAULT_LIMIT	2	R	0		b15:0		Read back the Input Voltage warning level in RMS volts. Level = 265	NO
56	VIN_OV_FAULT_RESPONSE	1	R	0		7	Response Type Bit 1	Response Type = 0b00 Continue with no interruption	YES
						6	Response Type Bit 0		YES
						5	Retry Setting 2	Retry Setting = 0b000 = No Retry attempted	YES
						4	Retry Setting 1		YES
						3	Retry Setting 0		NO
						2	Delay Time 2	Delay Time = 0b000 = Zero Delay Units	NO
						1	Delay Time 1		NO
						0	Delay Time 0		NO
57	VIN_OV_WARN_LIMIT	2	R	0		b15:0		Read back the Input Voltage warning level in RMS volts. Level = 265	YES
58	VIN_UV_WARN_LIMIT	2	R	0		b15:0		Read back the Input Voltage warning level in RMS volts. Level = 80	YES
78	STATUS_BYTE	1	R	0		7	BUSY	CPU is Busy and cannot respond or process	NO
						6	OFF	Unit OFF for one of several reasons, doesn't necessarily mean it is a failure	YES
						5	VOUT_OV	Output voltage fault has occurred since last fault clear	YES
						4	IOUT_OC	Output current fault has occurred since last fault clear	YES
						3	VIN_UV_FAULT	Input voltage too low, unit off?	NO
						2	TEMPERATURE	One or more temperature sensors are either too cold or too hot.	YES
						1	CML	There has been a command or data error since last fault clear command	YES
						0	NONE OF THE ABOVE	An unlisted fault has occurred, usually manufacturer specific.	YES

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
79	STATUS_WORD	2	R	All	STATUS_WORD (Upper byte of STATUS_WORD)	7	VOUT_F_W	Asserted when an output voltage fault or warning has occurred	YES
						6	IOUT_POUT_F_W	Asserted when an output current / output power fault or warning has occurred	YES
						5	INPUT_F_W	Asserted when an Input voltage/current/power fault or warning has occurred	YES
						4	MFG_SPECIFIC_F_W	Manufacturer specific fault or warning has occurred	NO
						3	POWER_GOOD_L	Asserted when the POWER_GOOD signal is negated	YES
						2	FANS_F_W	Asserted when a fan fault or warning has occurred	YES
						1	STATUS_OTHER_F_W	Asserted when a bit in command STATUS_OTHER set	NO
						0	UNKNOWN_F_W	Asserted when a fault not listed in [15:1] has occurred	NO
					STATUS_BYTE (Lower byte of STATUS_WORD)	7	BUSY_F	Asserted when device busy and unable to respond fault	NO
						6	UNIT_OFF	Asserted when unit not providing power to the output	YES
						5	OUTPUT_OV_F	Asserted when an output overvoltage fault has occurred	YES
						4	OUTPUT_OC_F	Asserted when an output overcurrent fault has occurred	YES
						3	INPUT_UV_F	Asserted when an input undervoltage fault has occurred	NO
						2	TEMPERATURE_F_W	Asserted when an overtemperature fault or warning has occurred	YES
						1	CML_F	Asserted when a communications, memory, or logic fault has occurred	YES
						0	NONE_F_W	Asserted when a fault not listed in [7:1] occurred	YES
7A	STATUS_VOUT	1	R	0		7	VOUT_OV_F	Asserted when an output overvoltage fault has occurred	YES
						6	VOUT_OV_W	Asserted when an output overvoltage warning has occurred	YES
						5	VOUT_UV_W	Asserted when an output undervotlage warning has occurred	YES
						4	VOUT_UV_F	Asserted when an output undervotlage fault has occurred	NO
						3	VOUT_MAX_F	Asserted when the output is set higher than the commanded VOUT_MAX limit	NO
						2	TON_MAX_F	Asserted when the output turn-on timing has exceeded the TON_MAX fault timing	NO
						1	TON_MAX_W	Asserted when the output turn-on timing has exceeded the TON_MAX warning timing	NO
						0	VOUT_TRACKING_E	Asserted when an error in the output voltage during power-up/down has occurred	NO

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
7B	STATUS_IOUT	1	R	0		7	IOUT_OC_F	Asserted when an output overcurrent fault has occurred	YES
						6	IOUT_OC_SHUTDOWN	Asserted when an output overcurrent and low voltage shutdown fault has occurred	NO
						5	IOUT_OC_W	Asserted when an output overcurrent warning has occurred	NO
						4	IOUT_UC_W	Asserted when an output undercurrent fault has occurred	NO
						3	CURRENT_SHARE_F	Asserted when an output current share fault has occurred	NO
						2	POWER_LIMIT_MODE	Asserted when the unit has entered output power limiting mode	NO
						1	POUT_OP_F	Asserted when an output overpower fault has occurred	NO
						0	POUT_OP_W	Asserted when an output overpower warning has occurred	NO
7C	STATUS_INPUT	1	R	All		7	VIN_OV_F	Asserted when an input overvoltage fault has occurred	NO
						6	VIN_OV_W	Asserted when an input overvoltage warning has occurred	YES
						5	VIN_UV_W	Asserted when an input undervoltage warning has occurred	YES
						4	VIN_UV_F	Asserted when an input undervoltage fault has occurred	NO
						3	VIN_UV_OFF	Asserted when the Unit is OFF for insufficient input voltage	YES
						2	IIN_OC_F	Asserted when an input overcurrent fault has occurred	NO
						1	IIN_OC_W	Asserted when an input overcurrent warning has occurred	YES
						0	PIN_OP_W	Asserted when an input overpower warning has occurred	NO
7D	STATUS_TEMPERATURE	1	R	All		7	TEMPERATURE_OT_F	Asserted when an overtemperature fault has occurred	YES
						6	TEMPERATURE_OT_W	Asserted when an overtemperature warning has occurred	YES
						5	TEMPERATURE_UT_W	Asserted when an undertemperature warning has occurred	NO
						4	TEMPERATURE_UT_F	Asserted when an undertemperature fault has occurred	NO
						3	RESERVED	Reserved	NO
						2	RESERVED	Reserved	NO
						1	RESERVED	Reserved	NO
						0	RESERVED	Reserved	NO
7E	STATUS_CML	1	R	All		7	CML_COMMAND_E	Asserted when an invalid or unsupported command is received	YES
						6	CML_DATA_E	Asserted when invalid or unsupported data is received	YES
						5	CML_PEC_E	Asserted when a packet error checking (PEC) failed has occurred	YES
						4	CML_MEMORY_F	Asserted when a memory fault is detected (example: Checksum errors during bootload)	YES
						3	CML_PROCESSOR_F	Asserted when a processor fault is detected	NO
						2	RESERVED	Reserved	NO
						1	CML_NONE_F	Asserted when a communication fault not listed in [7:3] has occurred	NO
						0	CML_OTHER_F	Asserted when another memory or logic fault has occurred (example: UART error)	NO

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Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
81	STATUS_FANS_1_2	1	R	All		7	FAN_1_F	Fan 1 fault	YES
						6	FAN_2_F	Fan 2 fault	NO
						5	FAN_1_W	Fan 1 warning	NO
						4	FAN_2_W	Fan 2 warning	NO
						3	FAN_1_OVERRIDE	Fan 1 speed overridden	YES
						2	FAN_2_OVERRIDE	Fan 2 speed overridden	NO
						1	FAN_AIRFLOW_F	Airflow fault	NO
						0	FAN_AIRFLOW_W	Airflow warning	NO
88	READ_VIN	2	R	All				Input Voltage Sensor Reading in Vrms	YES
								PMBus Sensor Data Format: Linear (N = -1)	
								PMBus Sensor Resolution: 0.5Vrms	
								Sensor Full-scale: 283.4 Vrms (sinusoidal)	
								Accuracy: +/-2.5% of Sensor Full-scale at >= 20% scale else undefined	
89	READ_IIN	2	R	All				Input Current Sensor Reading in Arms	YES
								PMBus Sensor Data Format: Linear (N = -7)	
								PMBus Sensor Resolution: 0.0078125 Arms	
								Sensor Full-scale: **7.992** Arms (sinusoidal)	
								Accuracy: +/- 2.5% of Sensor Full-scale at >=20% scale, else undefined	
8B	READ_VOUT	2	R	0,1				Output Voltage Sensor Reading in Vdc	YES
								PMBus Sensor Data Format: Linear (N = -6) supplied by VOUT_MODE either PAGE	
								PMBus Sensor Resolution: 0.015625Vdc either PAGE	
								Sensor Full-scale: 14.79 Vdc either PAGE	
								Accuracy: +/-2.5% of Sensor Full-scale at >= 20% scale else undefined	
8C	READ_IOUT	2	R	0,1				Output Current Sensor Reading in Adc	YES
								PMBus Sensor Data Format: Linear (N = -4 PAGE 0) (N= -8 PAGE 1)	
								PMBus Sensor Resolution: 0.0625 Adc PAGE 0, 4ma PAGE 1	
								Sensor Full-scale: 86.07 Adc PAGE 0, 2.5A PAGE 1	
								Accuracy: +/-2.5% of Sensor Full-scale at >= 15% scale else undefined	
8D	READ_TEMPERATURE_1	2	R	0				Temperature Sensor reading in °C	YES
								PMBus Sensor Data Format: Linear (N = -2)	
								PMBus Sensor Resolution: 0.25°C	
								Sensor Range: -40°C to 150°C	
								Accuracy: +/-3°C	

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
8E	READ_TEMPERATURE_2	2	R	All				Temperature Sensor reading in °C	YES
								PMBus Sensor Data Format: Linear (N = -2)	
								PMBus Sensor Resolution: 0.25°C	
								Sensor Range: -40°C to 150°C	
								Accuracy: +/-3°C	
8F	READ_TEMPERATURE_3	2	R	All				Temperature Sensor reading in °C	YES
								PMBus Sensor Data Format: Linear (N = -2)	
								PMBus Sensor Resolution: 0.25°C	
								Sensor Range: -40°C to 150°C	
								Accuracy: +/-3°C	
90	READ_FAN_SPEED_1	2	R	All				Fan Speed Sensor reading in RPM	YES
								PMBus Sensor Data Format: Linear	
								PMBus Sensor Resolution: 32 RPM (N=5)	
								Sensor Full-scale: **18000 RPM**	
								Accuracy: +/- 60 RPM	
96	READ_POUT	2	R	0,1				Output Power Sensor reading in watts	YES
								PMBus Sensor Data Format: Linear (N = -1 PAGE 0) (N = -5 PAGE 1)	
								PMBus Sensor Resolution: 0.5 Watts for PAGE 0, 0.03125W PAGE 1	
								Sensor full-scale: 511.5W PAGE 0, 32W PAGE 2	
								Accuracy: +/-5% of full-scale	
97	READ_PIN	2	R	All				Input Power Sensor reading in watts	YES
								PMBus Sensor Data Format: Linear (N = 0)	
								PMBus Sensor Resolution: 1 Watts	
								Sensor full-scale: 1023W	
								Accuracy: +/-5% of full-scale	
98	PMBUS_REVISION	1	R	All				Reading of the PMBus revision to which the power supply is compliant	YES
								PMBus Spec - Part II - Revision 1.1 - Section 22.1	
99	MFR_ID	8	R	All	MFR_ID_CHAR 7			MFR_ID "M"	YES
					MFR_ID_CHAR 6			MFR_ID "U"	
					MFR_ID_CHAR 5			MFR_ID "R"	
					MFR_ID_CHAR 4			MFR_ID "A"	
					MFR_ID_CHAR 3			MFR_ID "T"	
					MFR_ID_CHAR 2			MFR_ID "A"	
					MFR_ID_CHAR 1			MFR_ID "P"	
					MFR_ID_CHAR 0			MFR_ID "S"	
9A	MFR_MODEL	5	R	All	MFR_MODEL_CHAR 4			MFR_MODEL "D"	YES
					MFR_MODEL_CHAR 3			MFR_MODEL "P"	
					MFR_MODEL_CHAR 2			MFR_MODEL "4"	
					MFR_MODEL_CHAR 1			MFR_MODEL "6"	
					MFR_MODEL_CHAR 0			MFR_MODEL "0"	

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
9B	MFG_REVISON	5	R	All	NUMBER_OF_BYTES			Number of revision bytes to read	YES
					PRI_MAJOR_FW_REV			Primary Side Major Firmware Revision	
					PRI_MINOR_FW_REV			Primary Side Minor Firmware Revision	
					SEC_MAJOR_FW_REV			Secondary Side Major Firmware Revision	
					SEC_MINOR_FW_REV			Secondary Side Minor Firmware Revision	
A0	MFR_VIN_MIN	2	R	0		b15:0		Read back the recommended minimum input voltage for normal operation. Should equal 90	YES
A1	MFR_VIN_MAX	2	R	0		b15:0		Read back the recommended maximum input voltage for normal operation. Should equal 264	YES
A2	MFR_IIN_MAX	2	R	0		b15:0		Read back the recommended maximum input current for normal operation. Should equal 6.0	YES
A3	MFR_PIN_MAX	2	R	0		b15:0		Read back the recommended maximum input power for normal pulse operation. Should equal 600	YES
A4	MFR_VOUT_MIN	2	R	0		b15:0		Read back the minimum allowable output voltage for the main output. Should equal 11.84375	YES
A5	MFR_VOUT_MAX	2	R	0		b15:0		Read back the maximum allowable output voltage for the main output. Should equal 12.500	YES
A6	MFR_IOUT_MAX	2	R	0		b15:0		Read back the maximum allowable output current for the main output. Should equal 38.3125 Adc under normal operation	YES
A7	MFR_POUT_MAX	2	R	0		b15:0		Read back the maximum allowable output power under continuous normal operation. Should equal 460.0	YES
A8	MFR_TAMBIENT_MAX	2	R	0		b15:0		Read back the recommended maximum inlet temperature for normal operation. Should equal 60°C	YES
A9	MFR_TAMBIENT_MIN	2	R	0		b15:0		Read back the recommended minimum inlet temperature for normal operation. Should equal - 5°C	YES

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
E0	PS_STATUS	2	R	0	PS_STATUS	15	UNUSED	All bits = 0, not used at this time.	YES
						14	UNUSED	All bits = 0, not used at this time.	
						13	UNUSED	All bits = 0, not used at this time.	
						12	UNUSED	All bits = 0, not used at this time.	
						11	UNUSED	All bits = 0, not used at this time.	
						10	UNUSED	All bits = 0, not used at this time.	
						9	UNUSED	All bits = 0, not used at this time.	
						8	UNUSED	All bits = 0, not used at this time.	
						7	PS_KILL_H	If PSU is in system Chassis = 1, removed = 0	YES
						6	AC_OK_H	If Input AC is within normal operation range = 1	
						5	PS_ON_L	If main output is enabled = 1, disabled = 0	
						4	AC_RANGE	If Input AC is <160VRMS then = 0, else if >170VRMS = 1	
						3	UNUSED	All bits = 0, not used at this time.	
						2	UNUSED	All bits = 0, not used at this time.	
						1	UNUSED	All bits = 0, not used at this time.	
						0	UNUSED	All bits = 0, not used at this time.	
E1	EEPROM_WP	1	R/W	All				Byte to enable (write 0x56) or disable (write 0x9A) writes to the external EEPROM	YES
E3	READ_UART_P_S	Variable	R	All				Primary to secondary UART data	YES
E4	READ_UART_S_P	Variable	R	All				Secondary to primary UART data	YES
E5	READ_RESETS	4	R	All				Read RCON register to aid in troubleshooting	YES
E6	BOOTLOAD	Variable	R	All				Bootloading commands	YES

Command Codes – "Page 1" Standby/Auxiliary Output (+12V)

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
00	PAGE	1	R/W	N/A		7:1		not used	**NO**
						0		0b0 = page 0, 0b1 = page 1	**YES**
01	OPERATION	1	R/W	0		7		Turn unit on/off in combination with PSON_L & PRESENT_L	**YES**
						6:0		not used	**NO**
02	ON_OFF_CONFIG	1	R	0		7:5 4:0		Reserved Unit on only if PS_ON_L is low, PRESENT_L is low and 0x01=0x80: Else Off	**YES**
03	CLEAR_FAULTS	1	W	All				Write only command clears all faults that have been set in all the STATUS_XXXX registers simultaneously. Send 0x03, 0x00	**YES**
10	WRITE_PROTECT	1	R/W	All		7		No writes allowed to any command	**YES**
						6		Only writes allowed are to the Write_Protect, Operation, Page commands	**NO**
						5		Same as above but with On_Off_Config and Vout commands added	**NO**
						4			**NO**
						3			**NO**
						2			**NO**
						1			**NO**
						0		Bits 7:0 = 0 . Allows writes to all commands	**YES**
19	CAPABILITY	1	R	All		7	PEC_SUPPORT	Single bit, 1= PEC supported, 0=PEC not supported	**YES**
						6	I2C_SPEED	Upper bit, Set to 0	**YES**
						5	I2C_SPEED	Lower bit, 0=100KHz, 1=400KHz	**YES**
						4	SMB_ALERT_SUPPORT	0=Not supported, 1=Supported	**YES**
						3	RESERVED	Not used	**NO**
						2	RESERVED	Not used	**NO**
						1	RESERVED	Not used	**NO**
						0	RESERVED	Not used	**NO**
20	VOUT_MODE	1	R	0		7	MODE_BIT_2	000 = Linear format, 001 = VID format, 010 = Direct format	**YES**
						6	MODE_BIT_1	see above	**YES**
						5	MODE_BIT_0	see above	**YES**
						4	MODE_PARAM_4	When in linear format bits 4:0 = "N" value	**YES**
						3	MODE_PARAM_3		**YES**
						2	MODE_PARAM_2		**YES**
						1	MODE_PARAM_1		**YES**
						0	MODE_PARAM_0		**YES**
31	POUT_MAX	2	R	0		b15:0		Read back the maximum allowed continuous output power that the unit can deliver without damage. Encoded in Linear format. Should read back as 460.0	**YES**

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
35	VIN_ON	2	R	0		b15:0		Read back the minimum voltage needed to turn unit on. Linear format encoding. Should = 88	YES
35	VIN_OFF	2	R	0		b15:0		Read back the maximum voltage needed to turn unit off. Linear format encoding. Should = 78	YES
3A	FAN_CONFIG_1_2	1	R	All		7	FAN_1_INSTALLATION	Asserted when fan is installed in position 1	YES
						6	FAN_1_SETTING_MODE	Asserted when fan is commanded in RPM (Clear when fan is commanded in Duty Cycle)	YES
						5	FAN_1_TACH_PULSES	Fan 1 Tachometer pulses per revolution (upper bit)	YES
						4	FAN_1_TACH_PULSES	Fan 1 Tachometer pulses per revolution (lower bit)	YES
						3	FAN_2_INSTALLATION	Asserted when fan is installed in position 2	NO
						2	FAN_2_SETTING_MODE	Asserted when fan is commanded in RPM (Clear when fan is commanded in Duty Cycle)	NO
						1	FAN_2_TACH_PULSES	Fan 2 Tachometer pulses per revolution (upper bit)	NO
						0	FAN_2_TACH_PULSES	Fan 2 Tachometer pulses per revolution (lower bit)	NO
3B	FAN_COMMAND_1	2	R/W	All		b6:0		Manual fan override command fan speed value in % duty cycle. Command speed formatted as % of full scale. 0x0064 = max speed, 0x0000 = min speed	YES
40	VOUT_OV_FAULT_LIMIT	2	R	0		b15:0		Read back the output voltage level that constitutes an OV fault. Read only. Value = 13.004 VDC	YES
3A	VOUT_OV_FAULT_RESPONSE	1	R	0		7	Response Type Bit 1	Response Type = 0b10 = Shuts Down for Retry times	YES
						6	Response Type Bit 0		YES
						5	Retry Setting 2	Retry Setting = 0b000 = No Retry attempted	YES
						4	Retry Setting 1		YES
						3	Retry Setting 0		NO
						2	Delay Time 2	Delay Time = 0b000 = Zero Delay Units	NO
						1	Delay Time 1		NO
						0	Delay Time 0		NO
42	VOUT_OV_WARN_LIMIT	2	R	0		b15:0		Read back the output voltage level that constitutes an OV warning Read only. Value = 12.512 VDC	YES
43	VOUT_UV_WARN_LIMIT	2	R	0		b15:0		Read back the output voltage level that constitutes an UV warning Read only. Value = 11.848 VDC	YES
43	VOUT_UV_FAULT_LIMIT	2	R	0		b15:0		Read back the output voltage level that constitutes an UV failure. Read only. Value = 6.004 VDC	YES
45	VOUT_UV_FAULT_RESPONSE	1	R	0		7	Response Type Bit 1	Response Type = 0b10 = Shuts Down for Retry times	YES
						6	Response Type Bit 0		YES
						5	Retry Setting 2	Retry Setting = 0b000 = No Retry attempted	YES
						4	Retry Setting 1		YES
						3	Retry Setting 0		NO
						2	Delay Time 2	Delay Time = 0b000 = Zero Delay Units	NO
						1	Delay Time 1		NO
						0	Delay Time 0		NO

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
50	OT_FAULT_RESPONSE	1	R	0		7	Response Type Bit 1	Response Type = 0b10 = Shuts Down for Retry times	YES
						6	Response Type Bit 0		YES
						5	Retry Setting 2	Retry Setting = 0b111= Retry infinite number of times	YES
						4	Retry Setting 1		YES
						3	Retry Setting 0		NO
						2	Delay Time 2	Delay Time = 0b000 = Zero Delay Units	NO
						1	Delay Time 1		NO
						0	Delay Time 0		NO
51	OT_WARN_LIMIT	2	R	0		b15:0		Read back the warning temperature (internal). Read only. Value = 100°C	YES
55	VIN_OV_FAULT_LIMIT	2	R	0		b15:0		Read back the Input Voltage warning level in RMS volts. Level = 265	NO
56	VIN_OV_FAULT_ RESPONSE	1	R	0		7	Response Type Bit 1	Response Type = 0b00 Continue with no interruption	YES
						6	Response Type Bit 0		YES
						5	Retry Setting 2	Retry Setting = 0b000 = No Retry attempted	YES
						4	Retry Setting 1		YES
						3	Retry Setting 0		NO
						2	Delay Time 2	Delay Time = 0b000 = Zero Delay Units	NO
						1	Delay Time 1		NO
						0	Delay Time 0		NO
57	VIN_OV_WARN_LIMIT	2	R	0		b15:0		Read back the Input Voltage warning level in RMS volts. Level = 265	YES
58	VIN_UV_WARN_LIMIT	2	R	0		b15:0		Read back the Input Voltage warning level in RMS volts. Level = 80	YES
78	STATUS_BYTE	1	R	0		7	BUSY	CPU is Busy and cannot respond or process	NO
						6	OFF	Unit OFF for one of several reasons, doesn't necessarily mean it is a failure	YES
						5	VOUT_OV	Output voltage fault has occurred since last fault clear	YES
						4	IOUT_OC	Output current fault has occurred since last fault clear	YES
						3	VIN_UV_FAULT	Input voltage too low, unit off?	NO
						2	TEMPERATURE	One or more temperature sensors are either too cold or too hot.	YES
						1	CML	There has been a command or data error since last fault clear command	YES
						0	NONE OF THE ABOVE	An unlisted fault has occurred, usually manufacturer specific.	YES

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
79	STATUS_WORD	2	R	All	STATUS_WORD (Upper byte of STATUS_WORD)	7	VOUT_F_W	Asserted when an output voltage fault or warning has occurred	**YES**
						6	IOUT_POUT_F_W	Asserted when an output current / output power fault or warning has occurred	**YES**
						5	INPUT_F_W	Asserted when an Input voltage/current/power fault or warning has occurred	**YES**
						4	MFG_SPECIFIC_F_W	Manufacturer specific fault or warning has occurred	**NO**
						3	POWER_GOOD_L	Asserted when the POWER_GOOD signal is negated	**YES**
						2	FANS_F_W	Asserted when a fan fault or warning has occurred	**YES**
						1	STATUS_OTHER_F_W	Asserted when a bit in command STATUS_OTHER set	**NO**
						0	UNKNOWN_F_W	Asserted when a fault not listed in [15:1] has occurred	**NO**
					STATUS_BYTE (Lower byte of STATUS_WORD)	7	BUSY_F	Asserted when device busy and unable to respond fault	**NO**
						6	UNIT_OFF	Asserted when unit not providing power to the output	**YES**
						5	OUTPUT_OV_F	Asserted when an output overvoltage fault has occurred	**YES**
						4	OUTPUT_OC_F	Asserted when an output overcurrent fault has occurred	**YES**
						3	INPUT_UV_F	Asserted when an input undervoltage fault has occurred	**NO**
						2	TEMPERATURE_F_W	Asserted when an overtemperature fault or warning has occurred	**YES**
						1	CML_F	Asserted when a communications, memory, or logic fault has occurred	**YES**
						0	NONE_F_W	Asserted when a fault not listed in [7:1] occurred	**YES**
7A	STATUS_VOUT	1	R	0		7	VOUT_OV_F	Asserted when an output overvoltage fault has occurred	**YES**
						6	VOUT_OV_W	Asserted when an output overvoltage warning has occurred	**YES**
						5	VOUT_UV_W	Asserted when an output undervotlage warning has occurred	**YES**
						4	VOUT_UV_F	Asserted when an output undervotlage fault has occurred	**NO**
						3	VOUT_MAX_F	Asserted when the output is set higher than the commanded VOUT_MAX limit	**NO**
						2	TON_MAX_F	Asserted when the output turn-on timing has exceeded the TON_MAX fault timing	**NO**
						1	TON_MAX_W	Asserted when the output turn-on timing has exceeded the TON_MAX warning timing	**NO**
						0	VOUT_TRACKING_E	Asserted when an error in the output voltage during power-up/down has occurred	**NO**

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
7B	STATUS_IOUT	1	R	0		7	IOUT_OC_F	Asserted when an output overcurrent fault has occurred	YES
						6	IOUT_OC_SHUTDOWN	Asserted when an output overcurrent and low voltage shutdown fault has occurred	NO
						5	IOUT_OC_W	Asserted when an output overcurrent warning has occurred	NO
						4	IOUT_UC_W	Asserted when an output undercurrent fault has occurred	NO
						3	CURRENT_SHARE_F	Asserted when an output current share fault has occurred	NO
						2	POWER_LIMIT_MODE	Asserted when the unit has entered output power limiting mode	NO
						1	POUT_OP_F	Asserted when an output overpower fault has occurred	NO
						0	POUT_OP_W	Asserted when an output overpower warning has occurred	NO
7C	STATUS_INPUT	1	R	All		7	VIN_OV_F	Asserted when an input overvoltage fault has occurred	NO
						6	VIN_OV_W	Asserted when an input overvoltage warning has occurred	YES
						5	VIN_UV_W	Asserted when an input undervoltage warning has occurred	YES
						4	VIN_UV_F	Asserted when an input undervoltage fault has occurred	NO
						3	VIN_UV_OFF	Asserted when the Unit is OFF for insufficient input voltage	YES
						2	IIN_OC_F	Asserted when an input overcurrent fault has occurred	NO
						1	IIN_OC_W	Asserted when an input overcurrent warning has occurred	YES
						0	PIN_OP_W	Asserted when an input overpower warning has occurred	NO
7D	STATUS_TEMPERATURE	1	R	All		7	TEMPERATURE_OT_F	Asserted when an overtemperature fault has occurred	YES
						6	TEMPERATURE_OT_W	Asserted when an overtemperature warning has occurred	YES
						5	TEMPERATURE_UT_W	Asserted when an undertemperature warning has occurred	NO
						4	TEMPERATURE_UT_F	Asserted when an undertemperature fault has occurred	NO
						3	RESERVED	Reserved	NO
						2	RESERVED	Reserved	NO
						1	RESERVED	Reserved	NO
						0	RESERVED	Reserved	NO

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
7E	STATUS_CML	1	R	All		7	CML_COMMAND_E	Asserted when an invalid or unsupported command is received	**YES**
						6	CML_DATA_E	Asserted when invalid or unsupported data is received	**YES**
						5	CML_PEC_E	Asserted when a packet error checking (PEC) failed has occurred	**YES**
						4	CML_MEMORY_F	Asserted when a memory fault is detected (example: Checksum errors during bootload)	**YES**
						3	CML_PROCESSOR_F	Asserted when a processor fault is detected	**NO**
						2	RESERVED	Reserved	**NO**
						1	CML_NONE_F	Asserted when a communication fault not listed in [7:3] has occurred	**NO**
						0	CML_OTHER_F	Asserted when another memory or logic fault has occurred (example: UART error)	**NO**
81	STATUS_FANS_1_2	1	R	All		7	FAN_1_F	Fan 1 fault	**YES**
						6	FAN_2_F	Fan 2 fault	**NO**
						5	FAN_1_W	Fan 1 warning	**NO**
						4	FAN_2_W	Fan 2 warning	**NO**
						3	FAN_1_OVERRIDE	Fan 1 speed overridden	**YES**
						2	FAN_2_OVERRIDE	Fan 2 speed overridden	**NO**
						1	FAN_AIRFLOW_F	Airflow fault	**NO**
						0	FAN_AIRFLOW_W	Airflow warning	**NO**
88	READ_VIN	2	R	All				Input Voltage Sensor Reading in Vrms. PMBus Sensor Data Format: Linear (N = -1). PMBus Sensor Resolution: 0.5Vrms. Sensor Full-scale: 283.4 Vrms (sinusoidal). Accuracy: +/-2.5% of Sensor Full-scale at >= 20% scale else undefined	**YES**
89	READ_IIN	2	R	All				Input Current Sensor Reading in Arms. PMBus Sensor Data Format: Linear (N = -7). PMBus Sensor Resolution: 0.0078125 Arms. Sensor Full-scale: **7.992** Arms (sinusoidal). Accuracy: +/- 2.5% of Sensor Full-scale at >=20% scale, else undefined	**YES**

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
8B	READ_VOUT	2	R	0,1				Output Voltage Sensor Reading in Vdc	YES
								PMBus Sensor Data Format: Linear (N = -6) supplied by VOUT_MODE either PAGE	
								PMBus Sensor Resolution: 0.015625Vdc either PAGE	
								Sensor Full-scale: 14.79 Vdc either PAGE	
								Accuracy: +/-2.5% of Sensor Full-scale at >= 20% scale else undefined	
8C	READ_IOUT	2	R	0,1				Output Current Sensor Reading in Adc	YES
								PMBus Sensor Data Format: Linear (N = -4 PAGE 0) (N= -8 PAGE 1)	
								PMBus Sensor Resolution: 0.0625 Adc PAGE 0, 4ma PAGE 1	
								Sensor Full-scale: 86.07 Adc PAGE 0, 2.5A PAGE 1	
								Accuracy: +/-2.5% of Sensor Full-scale at >= 15% scale else undefined	
8D	READ_TEMPERATURE_1	2	R	0				Temperature Sensor reading in °C	YES
								PMBus Sensor Data Format: Linear (N = -2)	
								PMBus Sensor Resolution: 0.25°C	
								Sensor Range: -40°C to 150°C	
								Accuracy: +/-3°C	
8E	READ_TEMPERATURE_2	2	R	All				Temperature Sensor reading in °C	YES
								PMBus Sensor Data Format: Linear (N = -2)	
								PMBus Sensor Resolution: 0.25°C	
								Sensor Range: -40°C to 150°C	
								Accuracy: +/-3°C	
8F	READ_TEMPERATURE_3	2	R	All				Temperature Sensor reading in °C	YES
								PMBus Sensor Data Format: Linear (N = -2)	
								PMBus Sensor Resolution: 0.25°C	
								Sensor Range: -40°C to 150°C	
								Accuracy: +/-3°C	
90	READ_FAN_SPEED_1	2	R	All				Fan Speed Sensor reading in RPM	YES
								PMBus Sensor Data Format: Linear	
								PMBus Sensor Resolution: 32 RPM (N=5)	
								Sensor Full-scale: **18000 RPM**	
								Accuracy: +/- 60 RPM	

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
96	READ_POUT	2	R	0,1				Output Power Sensor reading in watts	YES
								PMBus Sensor Data Format: Linear (N = -1 PAGE 0) (N = -5 PAGE 1)	
								PMBus Sensor Resolution: 0.5 Watts for PAGE 0, 0.03125W PAGE 1	
								Sensor full-scale: 511.5W PAGE 0, 32W PAGE 2	
								Accuracy: +/-5% of full-scale	
97	READ_PIN	2	R	All				Input Power Sensor reading in watts	YES
								PMBus Sensor Data Format: Linear (N = 0)	
								PMBus Sensor Resolution: 1 Watts	
								Sensor full-scale: 1023W	
								Accuracy: +/-5% of full-scale	
98	PMBUS_REVISION	1	R	All				Reading of the PMBus revision to which the power supply is compliant	YES
								PMBus Spec - Part II - Revision 1.1 - Section 22.1	
99	MFR_ID	8	R	All	MFR_ID_CHAR 7			MFR_ID "M"	YES
					MFR_ID_CHAR 6			MFR_ID "U"	
					MFR_ID_CHAR 5			MFR_ID "R"	
					MFR_ID_CHAR 4			MFR_ID "A"	
					MFR_ID_CHAR 3			MFR_ID "T"	
					MFR_ID_CHAR 2			MFR_ID "A"	
					MFR_ID_CHAR 1			MFR_ID "P"	
					MFR_ID_CHAR 0			MFR_ID "S"	
9A	MFR_MODEL	5	R	All	MFR_MODEL_CHAR 4			MFR_MODEL "D"	YES
					MFR_MODEL_CHAR 3			MFR_MODEL "P"	
					MFR_MODEL_CHAR 2			MFR_MODEL "4"	
					MFR_MODEL_CHAR 1			MFR_MODEL "6"	
					MFR_MODEL_CHAR 0			MFR_MODEL "0"	
9B	MFG_REVISON	5	R	All	NUMBER_OF_BYTES			Number of revision bytes to read	YES
					PRI_MAJOR_FW_REV			Primary Side Major Firmware Revision	
					PRI_MINOR_FW_REV			Primary Side Minor Firmware Revision	
					SEC_MAJOR_FW_REV			Secondary Side Major Firmware Revision	
					SEC_MINOR_FW_REV			Secondary Side Minor Firmware Revision	

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
A0	MFR_VIN_MIN	2	R	0		b15:0		Read back the recommended minimum input voltage for normal operation. Should equal 90	YES
A1	MFR_VIN_MAX	2	R	0		b15:0		Read back the recommended maximum input voltage for normal operation. Should equal 264	YES
A2	MFR_IIN_MAX	2	R	0		b15:0		Read back the recommended maximum input current for normal operation. Should equal 6.0	YES
A3	MFR_PIN_MAX	2	R	0		b15:0		Read back the recommended maximum input power for normal pulse operation. Should equal 600	YES
A4	MFR_VOUT_MIN	2	R	0		b15:0		Read back the minimum allowable output voltage for the main output. Should equal 11.84375	YES
A5	MFR_VOUT_MAX	2	R	0		b15:0		Read back the maximum allowable output voltage for the main output. Should equal 12.500	YES
A6	MFR_IOUT_MAX	2	R	0		b15:0		Read back the maximum allowable output current for the main output. Should equal 38.3125 Adc under normal operation	YES
A7	MFR_POUT_MAX	2	R	0		b15:0		Read back the maximum allowable output power under continuous normal operation. Should equal 460.0	YES
A8	MFR_TAMBIENT_MAX	2	R	0		b15:0		Read back the recommended maximum inlet temperature for normal operation. Should equal 60°C	YES
A9	MFR_TAMBIENT_MIN	2	R	0		b15:0		Read back the recommended minimum inlet temperature for normal operation. Should equal - 5°C	YES
E0	PS_STATUS	2	R	0	PS_STATUS	15	UNUSED	All bits = 0, not used at this time.	YES
						14	UNUSED	All bits = 0, not used at this time.	
						13	UNUSED	All bits = 0, not used at this time.	
						12	UNUSED	All bits = 0, not used at this time.	
						11	UNUSED	All bits = 0, not used at this time.	
						10	UNUSED	All bits = 0, not used at this time.	
						9	UNUSED	All bits = 0, not used at this time.	
						8	UNUSED	All bits = 0, not used at this time.	
						7	PS_KILL_H	If PSU is in system Chassis = 1, removed = 0	
						6	AC_OK_H	If Input AC is within normal operation range = 1	
						5	PS_ON_L	If main output is enabled = 1, disabled = 0	
						4	AC_RANGE	If Input AC is <160VRMS then = 0, else if >170VRMS = 1	YES
						3	UNUSED	All bits = 0, not used at this time.	
						2	UNUSED	All bits = 0, not used at this time.	
						1	UNUSED	All bits = 0, not used at this time.	
						0	UNUSED	All bits = 0, not used at this time.	

Command Code	Command Name	Number of Bytes	Read / Write	Access Page	Byte Name	Bit(s) Number	Bit Name	Definition	Supported
E1	EEPROM_WP	1	R/W	All				Byte to enable (write 0x56) or disable (write 0x9A) writes to the external EEPROM	YES
E3	READ_UART_P_S	Variable	R	All				Primary to secondary UART data	YES
E4	READ_UART_S_P	Variable	R	All				Secondary to primary UART data	YES
E5	READ_RESETS	4	R	All				Read RCON register to aid in troubleshooting	YES
E6	BOOTLOAD	Variable	R	All				Bootloading commands	YES

Manufacturer's Vital Data (EEPROM)

D1U86G-W-460-12-HB4DC, back – front airflow:

FRU (EEPROM) Data:

The FRU (Field Replaceable Unit) data format compliant with the Intel IPMI v1.0 specification. The DP1746 uses 1 page of EEPROM for FRU purpose. A page of EEPROM contains up to 256 byte-sized data locations.

Where:

OFFSET   - The OFFSET denotes the address in decimal format of a particular data byte within DP1746 EEPROM.
VALUE   - The VALUE details data written to a particular memory location of the EEPROM.
DEFINITION - The contents DEFINITION refers to the definition of a particular data byte.

OFFSET (DEC)	OFFSET (HEX)	DEFINITION (REMARKS)	SPEC VALUE (DEC)	SPEC VALUE (HEX)
COMMON HEADER, 8 BYTES				
0	00	**FORMAT VERSION NUMBER** (Common Header) 7:4 - Reserved, write as 0000b 3:0 - Format Version Number = 1h for this specification	1	01
1	01	**INTERNAL USE AREA OFFSET** (In multiples of 8 bytes)	00	00
2	02	**CHASSIS INFO AREA OFFSET** (In multiples of 8 bytes)	00	00
3	03	**BOARD INFO AREA OFFSET** (In multiples of 8 bytes)	00	00
4	04	**PRODUCT INFO AREA OFFSET** (In multiples of 8 bytes)	01	01
5	05	**MULTI RECORD AREA OFFSET** (In multiples of 8 bytes)	00	00
6	06	**PAD** (reserved – always 00H)	00	00
7	07	**ZERO CHECK SUM** (256 – (Sum of bytes 0 to 6))	254	FE
		CHASSIS INFO AREA(Not Used 0 BYTES) This area will be filled by the Mfg. Diag. or by the OS if used		
		PRODUCT INFORMATION AREA, 72 BYTES		
8	08	**FORMAT VERSION NUMBER** (Product Info Area) 7:4 - Reserved, write as 0000b 3:0 - Format Version Number = 1h for this specification	1	01
9	09	**PRODUCT INFO AREA LENGTH** (In multiples of 8 bytes)	9	09
10	A	**Language (English)**	25	19
11	0B	**MANUFACTURER NAME TYPE / LENGTH** (0C9H) 7-6: (11)b, 8-Bit ASCII + Latin 1 5-0: (001001)b, 9-Byte Allocation	201	C9

OFFSET		DEFINITION	SPEC VALUE	
(DEC)	(HEX)	(REMARKS)	(DEC)	(HEX)
		MANUFACTURER'S NAME 9 byte sequence		
12	0C	"M"= 4Dh	77	4D
13	0D	"U"= 55h	85	55
14	0E	"R"= 52h	82	52
15	0F	"A"= 41h	65	41
16	10	"T"= 54h	84	54
17	11	"A"=41h	65	41
18	12	"-"= 2Dh	45	2D
19	13	"P"=50h	80	50
20	14	"S"=53h	83	53
21	15	**PRODUCT NAME** Type/Length (**C6 h**) 198 d 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (000110)b, 6-Byte Allocation	198	C6
		PRODUCT NAME		
22	16	"D" = 44h	68	44
23	17	"P" = 50h	80	50
24	18	"1" = 31h	49	31
25	19	"7" = 37h	55	37
2627	1A	"4" = 34h	52	34
	1B	"6" = 36h	54	36
28	1C	**PRODUCT PART # / LENGTH (D5 h)** 213 d 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (010101)b, 21-Byte Allocation	213	D5
		PART #		
29	1D	"D" = 44h	68	44
30	1E	"1" = 31h	49	31
31	1F	"U" = 55h	85	55
32	20	"8" = 38h	56	38
33	21	"6" = 36h	64	36
34	22	"G" = 47h	71	47
35	23	"-" = 2Dh	45	2D
36	24	"W"= 57h	87	57
37	25	"-" = 2Dh	45	2D
38	26	"4" = 34h	52	34
39	27	"6" = 36h	54	36
40	28	"0" = 30h	48	30
41	29	"-" = 2Dh	45	2D
42	2A	"1" = 31h	49	31
43	2B	"2" = 32h	50	32
44	2C	"-" = 2Dh	45	2D
45	2D	"H" = 48h	72	48
46	2E	"B" = 42h	66	42
47	2F	"4" = 34h	52	34
47	30	"D" = 44h	68	44
49	31	"C" = 43h	67	43

Manufacturer's Vital Data (EEPROM) cont'd

D1U86G-W-460-12-HB3DC, front to back airflow:

OFFSET (DEC)	OFFSET (HEX)	DEFINITION (REMARKS)	SPEC VALUE (DEC)	SPEC VALUE (HEX)
		MANUFACTURER'S NAME 9 byte sequence		
12	0C	"M"= 4Dh	77	4D
13	0D	"U"= 55h	85	55
14	0E	"R"= 52h	82	52
15	0F	"A"= 41h	65	41
16	10	"T"= 54h	84	54
17	11	"A"=41h	65	41
18	12	"-"= 2Dh	45	2D
19	13	"P"=50h	80	50
20	14	"S"=53h	83	53
21	15	**PRODUCT NAME** Type/Length (**C6 h**) 198 d 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (000110)b, 6-Byte Allocation	198	C6
		PRODUCT NAME		
22	16	"T" = 54h	84	54
23	17	"P" = 50h	80	50
24	18	"1" = 31h	49	31
25	19	"7" = 37h	55	37
262	1A	"5" = 35h	53	35
7	1B	"5" = 35h	53	35
28	1C	**PRODUCT PART # / LENGTH (D5 h)** 213 d 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (010101)b, 21-Byte Allocation	213	D5
		PART #		
29	1D	"D" = 44h	68	44
30	1E	"1" = 31h	49	31
31	1F	"U" = 55h	85	55
32	20	"8" = 38h	56	38
33	21	"6" = 36h	64	36
34	22	"G" = 47h	71	47
35	23	"-" = 2Dh	45	2D
36	24	"W"= 57h	87	57
37	25	"-" = 2Dh	45	2D
38	26	"4" = 34h	52	34
39	27	"6" = 36h	54	36
40	28	"0" = 30h	48	30
41	29	"-" = 2Dh	45	2D
42	2A	"1" = 31h	49	31
43	2B	"2" = 32h	50	32
44	2C	"-" = 2Dh	45	2D
45	2D	"H" = 48h	72	48
46	2E	"B" = 42h	66	42
47	2F	"3" = 33h	51	33
47	30	"D" = 44h	68	44
49	31	"C" = 43h	67	43

OFFSET		DEFINITION	SPEC VALUE	
(DEC)	(HEX)	(REMARKS)	(DEC)	(HEX)
50	32	**PRODUCT VERSION NUMBER TYPE / LENGTH (0C2H)** 194 d 7-6: (11)b, 8-Bit ASCII + Latin1, 5-0: (000010)b, 2-Byte Allocation	194	C2
51 52	33 34	**PRODUCT VERSION NUMBER / AUTO REV** "3" = 33H "1" = 31H SHOULD TRACK MODEL REVISION indicated on IPS	51 49	33 31
53	35	**PRODUCT SERIAL NUMBER TYPE / LENGTH (CB h)** 203d *PRODUCT SERIAL NUMBER IS BASED ON Murata SERIAL NUMBER FORMAT 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (001110)b, 12-Byte Allocation	204	CC
		P/N: BHyywwS1xxxx **PW = Murata Product Code** **yy = serial # year** **ww = serial # week** **pp= Murata Product Factory Control Rev** **xxxx = serial #** **EXAMPLE: PW1318P10001** **PRODUCT SERIAL NUMBER:** MODEL ID + MANUFACTURING YEAR & WEEK CODE + UNIQUE		
54	36	"B" = 42H	66	42
55	37	"H" = 48H	72	48
56	38	"1" = 31H	49	31
57	39	"3" = 33H	51	33
58	3A	"1" = 31H	49	31
59	3B	"8" = 38H	56	38
60	3C	"S" = 53H	83	53
61	3D	"1" = 31H	49	31
62	3E	"0" = 30H	48	30
63	3F	"0" = 30H	48	30
64	40	"0" = 30H	48	30
65	41	"1" = 31H	49	31
66	42	**NO ASSET TAG (C0 h) 192 b** 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (000000)b, No allocation	192	C0
67	43	**NO FRU ID (C0 h) 192 b** 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (000000)b, No allocation	192	C0

OFFSET		DEFINITION	SPEC VALUE	
(DEC)	(HEX)	(REMARKS)	(DEC)	(HEX)
68	44	**NO CUSTOM DATA (C0 h) 192 b** 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (000000)b, No allocation	192	C0
69	45	**NO CUSTOM DATA (C0 h) 192 b** 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (000000)b, No allocation	192	C0
70	46	**NO CUSTOM DATA (C0 h) 192 b** 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (000000)b, No allocation	192	C0
71	47	**NO CUSTOM DATA (C0 h) 192 b** 7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (000000)b, No allocation	192	C0
72	48	7-6: (11)b, 8-Bit ASCII + Latin 1, 5-0: (000001)b, END **END OF FIELD MARKER (C1 h) 192 b**	193	C1
73-78	49-4E	Un used Locations **UN USED EEPROM** **Unused EEPROM (Locations 48 to 4E Fill with 00)** **(00 H)……(00 H) 00 b …..00 b**	00-00	00-00
79	4F	XX = 2's Complement check sum from 08h – 04Eh **CHECKSUM (XX h) xxx b**	xxx	XX
80-255	50-FF	Un Used Memory (Fill with 00) **Unused EEPROM (Locations 50 to FF Fill with 00)** **(00 H)……(00 H) 00 b …..00 b**	00-00	00-00