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SFP/SFD I²C Interface Programming Manual

1 Scope

This document describes in detail the I²C communication interface of the SFP/SFD series. (SFP450-12BG, SFP650-12BG, SFD550-12BG) This includes the physical layer and the SW protocol.

2 SFP/SFD I²C Interface General Characteristic

SFP/SFD I²C interface	**slave**
I²C Device Addressing Format	**7bit**
Device Address Range	**AC_{Hex}...AF_{Hex}, $7F_{Hex}$,$7D_{Hex}$**
Max. SFP/SFD on one I²C Bus	**2**
Maximum I²C clock	**100kHz**
Maximum I²C clock without holding the SCL line down	**Serial EEPROM: 100kHz** **Status Port: 6.5kHz**
Pull-Up Voltage	**3.3…4V**
SDA/SCL internal series resistors	**100Ω**
Internal Pull-Up	**10kΩ**
Internal Pull-Up voltage	**3.3V**
Internal capacitance	**140pF**
Internal Pull-Up Address lines	**3.2kΩ**
Internal Pull-Up Address lines voltage	**3V**
Internal Pull-Up Write Protect	**4.7kΩ**
Recommended external Pull-Up for SDA and SCL	**1.2kΩ …2kΩ**
Data Organization	**-Serial EEPROM (256 x 8bit)** **-Status Port with commands**

Figure 2-1 Characteristic

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4 SFP/SFD I²C features

4.1 Dynamic data

The SFP/SFD series supports following monitoring features:

-Measured Output 1 voltage [V]
-Measured Output 1 current [A]
-Power Supply seated/not seated
-Input Voltage in range/out of range
-All Output Voltage in range/out of range
-Output 1 over current occurred true/false
-Output 1 and 2 under voltage occurred true/false
-Output 1 over voltage occurred true/false
-Fan OK/failure
-Over Temperature true/false

4.2 Static data

In the EEPROM are following static data stored:

-Power Supply Model
-Serial Number
-Power-One Revision
-MFG Year
-MFG Month
-MFG Day
-MFG Name
-MFG Location Code
-Specified Output 1 Voltage
-Specified Output 2 Voltage
-Specified Output 1 Current
-Specified Output 2 Current
-Specified Output Power
-Minimum Specified Input Voltage
-Maximum Specified Input Voltage
-22 Bytes in EEPROM for Customer use
-Spec Number
-Sequential Nr
-Checksum over static range

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5 General I²C HW configuration

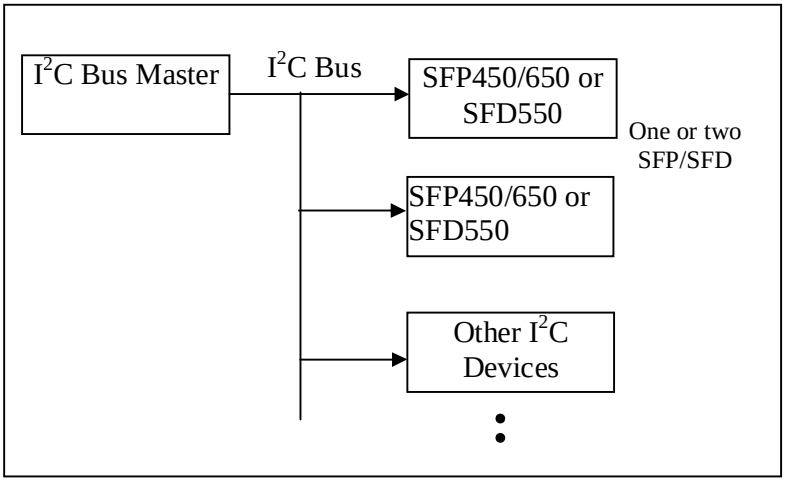

Figure 5-1 System Overview

5.1 Connecting the SFP/SFD to the I²C Bus

The following diagram shows how the SFP/SFD can be connected to the I²C Bus.

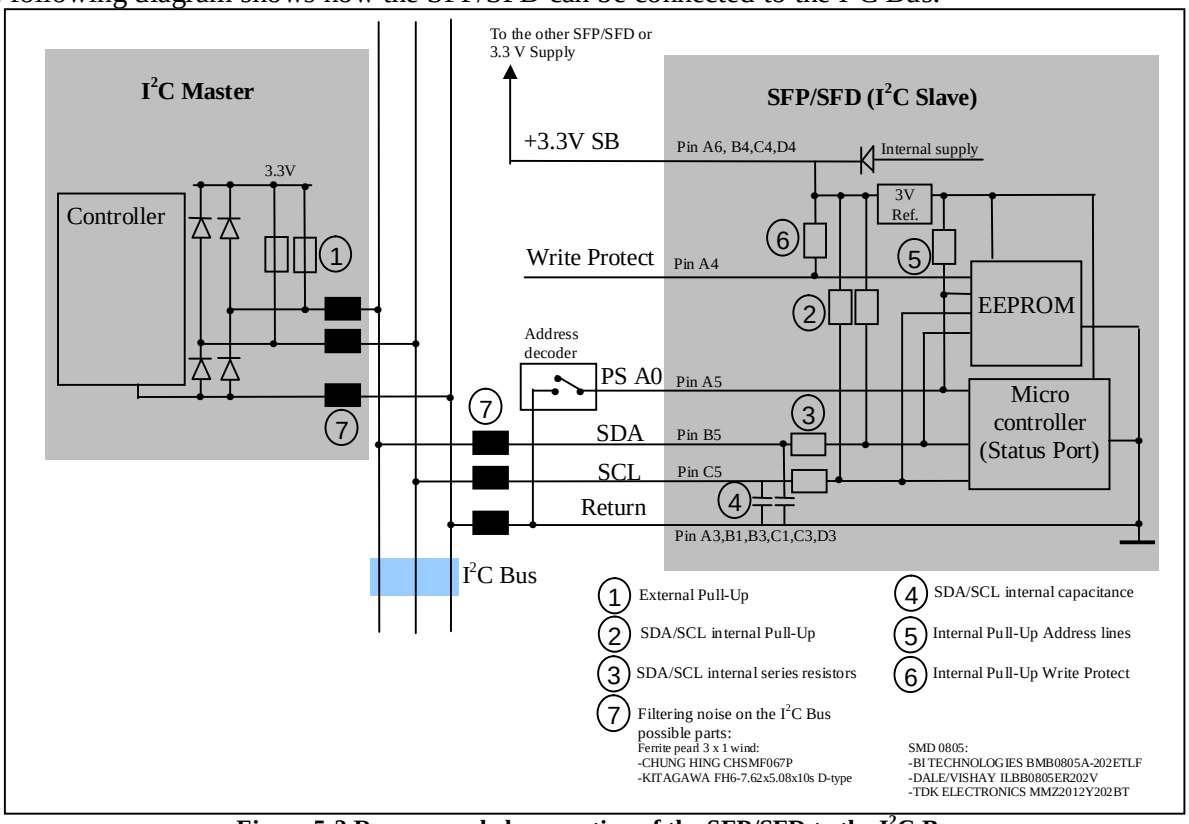

Figure 5-2 Recommended connecting of the SFP/SFD to the I²C Bus

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5.2 SFP/SFD I²C Supply (Slave)

The SFP/SFD Micro Controller/EEPROM is powered over the internal supply of the SFP/SFD. For redundancy in case of DC failure or SFP/SFD internal failure the SFP/SFD Micro Controller/EEPROM can be powered over the "+3.3VSB" (Pin A6, B4, C4 ,D4 ;3.3V). If there is no power for the SFP/SFD Micro Controller the entire I²C Bus is blocked.

5.3 Device Address

The first byte after the START condition on the Bus is the device address sent out by the Bus Master to determine which device is being selected. The I²C Bus allows 7-bit or 10-bit addressing. The SFP/SFD Interface uses a 7-bit address mode as defined in the Philips I²C specification. The SFP/SFD contains an EEPROM and a STATUS (microcontroller) device and each device on the I²C Bus has to be assigned to a unique address.

As shown below in Figure 5-3 Device Address the address byte is built up from three parts:
- Bit 2...7: These bits are always the same independent of any address line.
- Bit 1: This bit depends how the Address line A0 is connected on the backplane on the address decoder. These are logic 1 if open and logic 0 if wired to 0V (Return).

-Bit 0: This bit is the read/write bit (R=1/W=0) and determines the direction of the data from or to the Master.

		Device Hardware Address							Software Address Bit
		MSB							LSB
Bit		7	6	5	4	3	2	1	0
SFP/SFD EEPROM Device Address	Determined via	Fixed Per Device						addr. line	Read/Write Direction
	Address Value	1	0	1	0	1	1	PS A0	1 or 0
SFP/SFD STATUS Device Address	Determined via	Fixed Per Device						addr. line	Read/Write Direction
	Address Value	0	1	1	1	1	1	PS A0	1 or 0

Figure 5-3 Device Address

	Address Line PS A0	Read/ Write	Device Address [Bin]	Device Address [Hex]	Device Address [Dec]
SFP/SFD EEPROM Device address	open	read	1010'1111	AF	175
SFP/SFD EEPROM Device address	open	write	1010'1110	AE	174
SFP/SFD STATUS Device address	open	read	0111'1111	7F	127
SFP/SFD EEPROM Device address	0V	read	1010'1101	AD	173
SFP/SFD EEPROM Device address	0V	write	1010'1100	AC	172
SFP/SFD STATUS Device address	0V	read	0111'1101	7D	125

Figure 5-4 Device Address Table

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Example: On the backplane PS A0 is connected to 0V, you will have the following device address to read a byte from the SFP/SFD EEPROM:

	MSB							LSB
Bit	7	6	5	4	3	2	1	0
SFP/SFD EEPROM Device Address	**1**	**0**	**1**	**0**	**1**	**1**	**0**	**1**
	fixed	fixed	fixed	fixed	fixed	fixed	A0	R
->$1010'1101_{Bin}=AD_{Hex}=173_{Dec}$								

Figure 5-5 Device Address Example

5.4 I²C Bus Master and clock (SCL) speed

The I²C Bus Master controls communications between the Master and all I²C devices connected to the bus. If during an I²C communication cycle the SFP/SFD Status Port is interrupted by an internal service interrupt, the SFP/SFD will hold the SCL line low to force the master into a wait state. Data transfer will continue when the SFP/SFD releases the SCL line. Please note if the I²C bus is communicating with a clock frequency slower than 6.5kHz, the SCL line will not be held low. The SFP/SFD EERPOM is an ATMEL AT24C02 compatible device and is not holding down the SCL line.

5.5 Maximum and minimum values for Pull-Up resisters

For I²C-bus systems, the values of the Pull-Up resistors depend on the following parameters:

- Supply voltage
- Bus capacitance
- Number of connected devices (input current + leakage current).

The supply voltage limits the minimum value of the Pull-Up resistor due to the specified minimum sink current of 3mA. On a 3.3V supply, this makes $\mathbf{R_{min}=3.3V/3mA=1.1k\Omega}$.
The bus capacitance is the total capacitance of wire, connections and pins. This capacitance limits the maximum value of the Pull-Up resister due to the specified rise time. For a System with 380pF capacitance (two SFP/SFD and a wire capacitance of 100pf) $\mathbf{R_{max}=2.1k\Omega}$.

For further information concerning the Pull-Up resister, refer to:
I²C Bus specification, 16.1 Maximum and minimum values of resistors Rp and Rs for Standard-mode I²C-bus devices.

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6 SW Protocol

The static data are stored in a serial I^2C EEPROM and the dynamic data can be requested over the Status Port with three commands.

6.1 Static serial EEPROM data

Therefore each EEPROM address has defined data; this definition is documented in chapter 8 EEPROM Definitions:

	Dec		Hex
Address	0	static data	0
	1	static data	1
	251	static data	FB
	252	checksum	FC
	253	checksum	FD
	254	checksum	FE
	255	checksum	FF

Figure 6-1: Data Organization

There are three different message formats for the SFP/SFD Serial EEPROM:
-Read an EEPROM byte
-Read an EEPROM block
-Write an EEPROM byte

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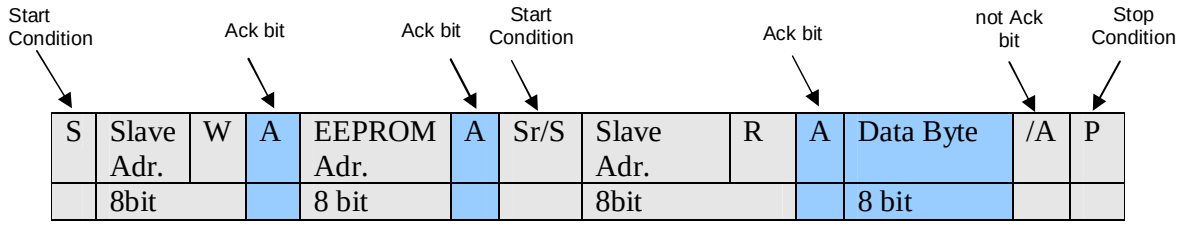
6.1.1 How to Read an EEPROM byte

1) "Start condition" from Master
2) Master sends "Device address" with "write attribute"
3) "Acknowledge" from Slave device (SFP/SFD)
4) Master sends "EEPROM address"
5) "Acknowledge" from Slave device (SFP/SFD)
6) "Repeated start" from Master (Sr/S)
7) Master sends "Device address" with "read attribute"
8) "Acknowledge" from Slave device (SFP/SFD)
9) Slave sends "Data byte"
10) "Not Acknowledge" from Master (power management system)
11) "Stop condition" from Master



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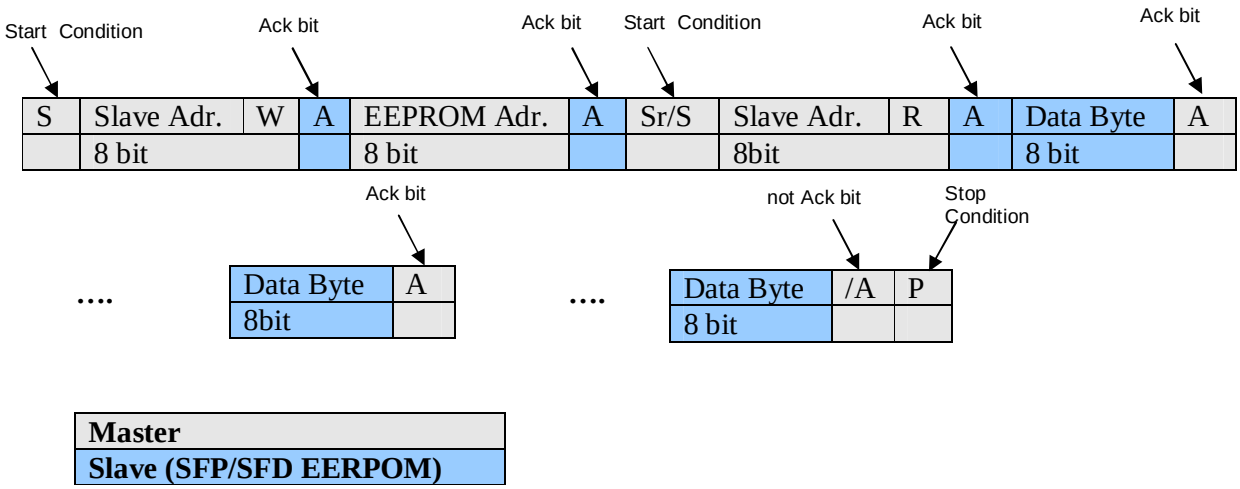
6.1.2 How to read an EEPROM data block

1) "Start condition" from Master
2) Master sends "Device address" with "write attribute"
3) "Acknowledge" from Slave device (SFP/SFD)
4) Master sends "EEPROM address"
5) "Acknowledge" from Slave device (SFP/SFD)
6) "Repeated start" from Master (Sr/S)
7) Master sends "Slave address" with "read attribute"
8) "Acknowledge" from Slave device (SFP/SFD)
9) Slave sends "Data byte"
10) "Acknowledge" from Master (power management system)

n-time repetition of step 9) and 10)

11) Slave sends "Data byte"
12) "Not Acknowledge" from Master (power management system)
13) "Stop condition" from Master



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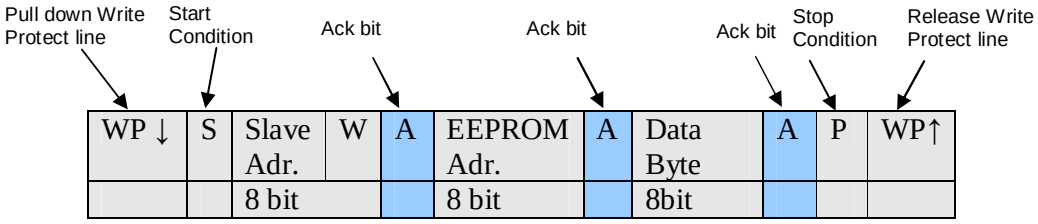
6.1.3 How to write an EEPROM byte

1) Pull down the Write Protect line (Pin A4)
2) "Start condition" from Master
3) Master sends "Slave address" with "write attribute"
4) "Acknowledge" from Slave device (SFP/SFD)
5) Master sends "EEPROM address"
6) "Acknowledge" from Slave device (SFP/SFD)
7) Master sends "Data byte"
8) "Acknowledge" from Slave device (SFP/SFD)
9) "Stop condition" from Master
10) Release the Write Protect line (Pin A4)
11) Wait 5ms for the next EEPROM communication (EEPROM write time)



Master
Slave (SFP/SFD EEPROM)

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6.2 Dynamic Status Port Data

The I^2C Master can read from the status port the status of the PS, the measured voltage and current. Three commands exist:
0x01: read status byte
0x02: read measured voltage
0x03: read measured current

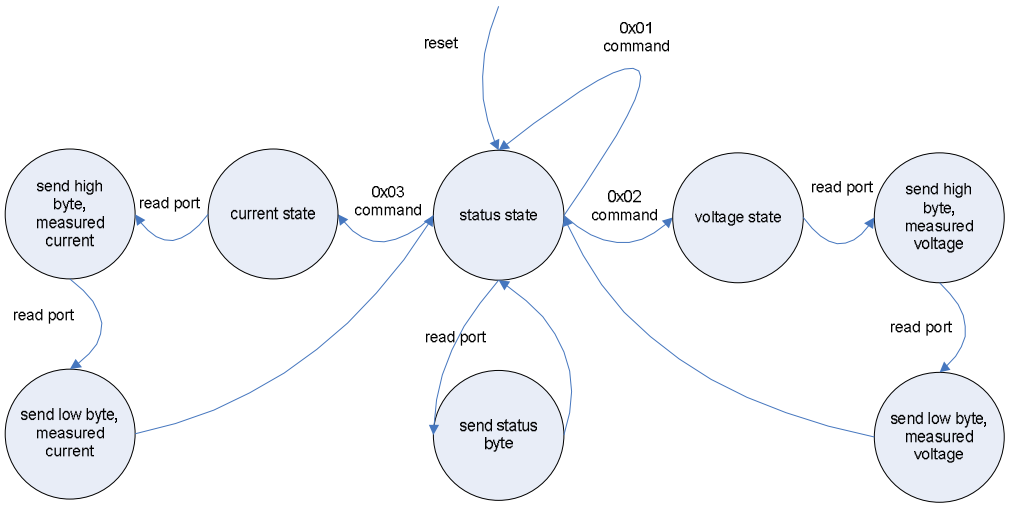

Figure 6-2 Software states for the Status port

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6.2.1 Status Byte definition

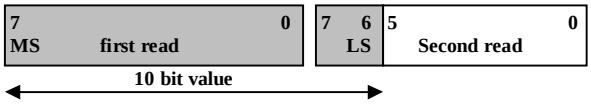
			Explanation
Bit 0	PS present = 0 (True)	False = 1	This Signal indicates that the PS is present.
Bit 1	PW OK = 1 (PS OK)	Fault = 0	Output Power Good, signalized that all outputs are valid.
Bit 2	AC OK = 0 (OK)	Fault = 1	AC in specified range.
Bit 3	OC +12V = 1 (PS OK)	Fault = 0	+12 V Over Current goes low when it exceeds the current rating. The output will be latched.*
Bit 4	UV+12V,UV+3V3SBY = 1 (PS OK)	Fault = 0	+12V Under Voltage goes low, when +12V dips under the specified voltage and shuts down the Unit. The Output will be latched.* Or the 3.3VSBY has an Under Voltage.
Bit 5	OV +12V = 1 (PS OK)	Fault = 0	+12V Over Voltage goes low, when +12V trips over the specified voltage and shuts down the unit. The Output will be latched. *
Bit 6	ALERT = 1 (PS OK)	Fault = 0	The Alert signal goes low, if one of the fans falls below a threshold speed value or an OTP occurs.
Bit 7	OTP = 1(PS OK)	Fault=0	The Over Temperature Protection circuit has shut down the unit.

Figure 6-3 Table for status information

*Latched states can only be cleared by recycling AC mains or toggling PS_ON.

6.2.2 Voltage/current data interpretation

The voltage and current monitor can be accessed with the commands 0x02 and 0x03. The values are returned in an unsigned 10bit number which is left justified.



Resolutions:

Unit	Voltage	Current
SFP450	20 mV/bit	50 mA/bit
SFD550	19.8 mV/bit	73.3 mA/bit
SFP650	20mV/bit	100mA/bit

Example of a voltage measuring:

Bit 7							Bit 0	Bit 7							Bit 0
1	0	0	1	0	1	1	0	0	0	x	x	x			x
First byte 1								Second byte							
This gives the value: $10'0101'1000_{BIN} = 258_{HEX} = 600_{DEC}$															
The measured voltage is 600_{DEC} *20mV/bit=**12000 mV**															

Figure 6-4 Voltage measuring example

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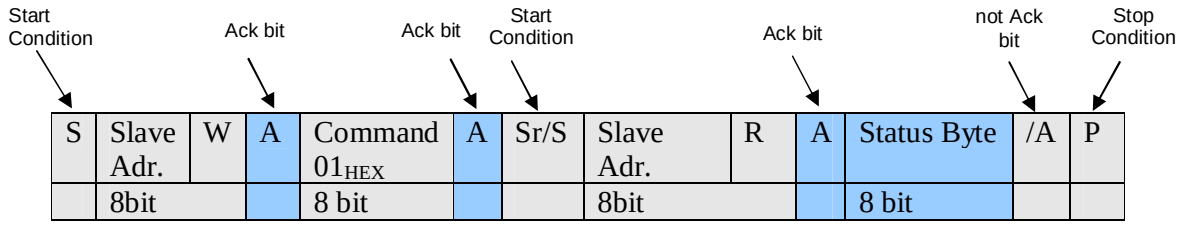
6.2.3 How to read the status byte from Status Port

To read the status byte, is like reading from a serial EEPROM at address 0x01.

1) "Start condition" from Master
2) Master sends "Status Port Device address" with "write attribute"
3) "Acknowledge" from Slave device (SFP/SFD Status Port)
4) Master sends "Status Port command address 01"
5) "Acknowledge" from Slave device (SFP/SFD Status Port)
6) "Repeated start" from Master (Sr/S)
7) Master sends "Status Port device address" with "read attribute"
8) "Acknowledge" from Slave device (SFP/SFD Status Port)
9) Slave sends "Status byte"
10) "Not Acknowledge" from Master (power management system)
11) "Stop condition" from Master



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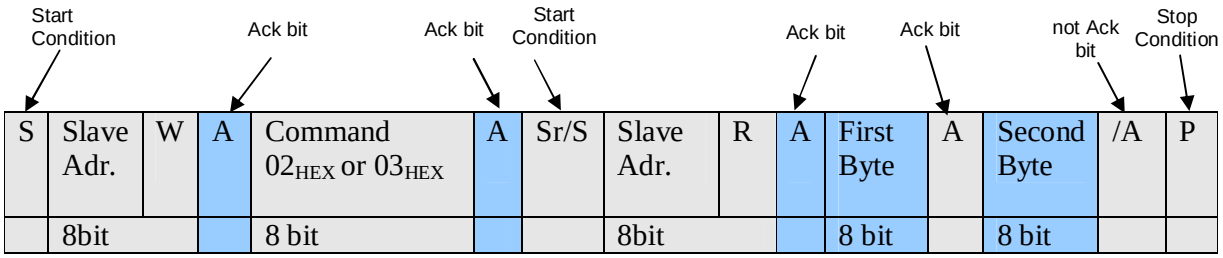
6.2.4 How to read the measured output Voltage/Current

1) "Start condition" from Master
2) Master sends "Status Port Device address" with "write attribute"
3) "Acknowledge" from Slave device (SFP/SFD Status Port)
4) Master sends "Command 02 (Voltage) or 03(Current)"
5) "Acknowledge" from Slave device (SFP/SFD Status Port)
6) "Repeated start" from Master (Sr/S)
7) Master sends "Status Port Device address" with "read attribute"
8) "Acknowledge" from Slave device (SFP/SFD Status Port)
9) Slave sends "first data Byte"
8) "Acknowledge" from Master (power management system)
9) Slave sends "second data Byte"
10) "Not Acknowledge" from Master (power management system)
11) "Stop condition" from Master



Master
Slave (SFP/SFD Status Port)

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7 Power-One I²C Interface tool

The Power-One I²C – Management Software (HZZ02002SW, www.power-one.com) demonstrates all the I²C interface features of the SFP/SFD.

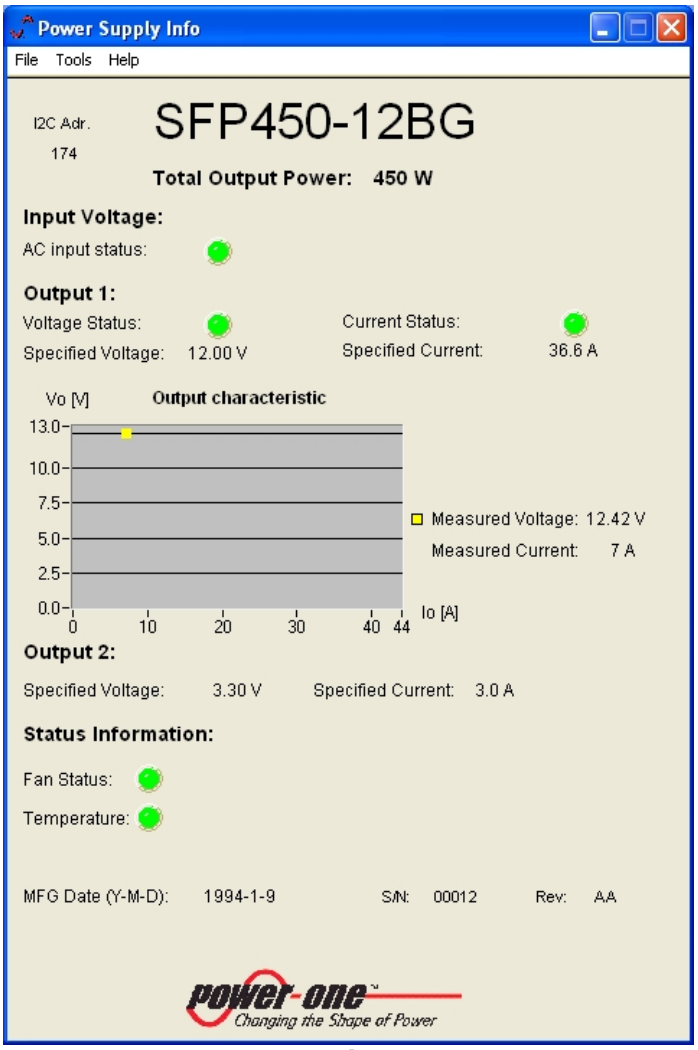

Figure 7-1 Screenshot SFP450-12BG

Power-One I²C – Management Software supports two I²C converters:

iPort MIIC-201 (Micro Computer Control)	HZZ02002G from Power-One

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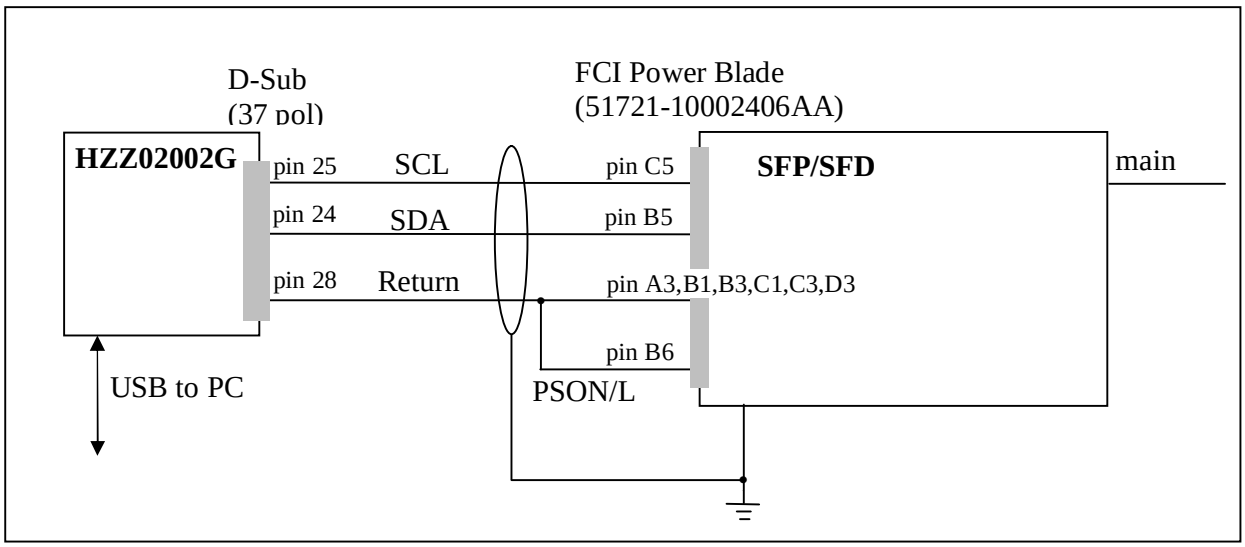

Figure 7-2 HZZ02002G to SFP/SFD cable

The HZZ02002G has the Pull-Up resisters connected to 5V and 3.3V compatible inputs. The SFP/SFD has an internal clamp circuit to 4V. Connect “SDA”(pin B5), “SCL”(pin C5) and “Return” (pin A3,B1,B3,C1,C3,D3) to the I^2C to USB converter. Connect “PSON/L” to “Return” to enable the SFP/SFD and plug the SFP/SFD to the mains.

The I^2C EEPROM device address: 175_{Dec} (read)
The I^2C Status Port device address: 127_{Dec} (read).

In your final application the I^2C master will be a Micro Computer or an FPGA with an I^2C interface. That makes it easy and inexpensive to use the interface.

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8 EEPROM Definitions

Example of EEPROM table (blue marked cells are characteristic for model SFP450-12BG).

Byte Location	Data	Data Type	Description	Content (Interp.)		Content (HEX)	Content (DEC)
0	Number of Char.	HEX	Num. of characters in Model Num	**See Annex A**	**11**	0B	11
1	Power-One part nr.	ASCII	Supply Model Num.		**S**	53	83
2	Power-One part nr.	ASCII			**F**	46	70
3	Power-One part nr.	ASCII			**P**	50	80
4	Power-One part nr.	ASCII			**4**	34	52
5	Power-One part nr.	ASCII			**5**	35	53
6	Power-One part nr.	ASCII			**0**	30	48
7	Power-One part nr.	ASCII			**-**	2D	45
8	Power-One part nr.	ASCII			**1**	31	49
9	Power-One part nr.	ASCII			**2**	32	50
10	Power-One part nr.	ASCII			**B**	42	66
11	Power-One part nr.	ASCII			**G**	47	71
12	Power-One part nr.	ASCII				FF	255
13	Power-One part nr.	ASCII				FF	255
14	Power-One part nr.	ASCII				FF	255
15	Power-One part nr.	ASCII				FF	255
16	Power-One part nr.	ASCII				FF	255
17	Power-One part nr.	ASCII				FF	255
18	Number of Char.	HEX	Num. of characters in Serial Num	**12**		0C	12
19	Serial Number	ASCII	Serial number	**Y**		xx	xx
20	Serial Number	ASCII	YYDDDV-NNNNN	**Y**		xx	xx
21	Serial Number	ASCII		**D**		xx	xx
22	Serial Number	ASCII	YY - Year	**D**		xx	xx
23	Serial Number	ASCII	DDD-Median Day (001 to 365)	**D**		xx	xx
24	Serial Number	ASCII	V - Manf Location	**V**		xx	xx
25	Serial Number	ASCII	NNNNN - Sequential Number	**-**		xx	xx
26	Serial Number	ASCII		**N**		xx	xx
27	Serial Number	ASCII		**N**		xx	xx
28	Serial Number	ASCII		**N**		xx	xx
29	Serial Number	ASCII		**N**		xx	xx
30	Serial Number	ASCII		N		xx	xx
31	Number of Char.	HEX	Num. of characters in Revision	x		xx	xx
32	Set to 0	NUM	Per Top BOM Rev.	0		30	48
33	Revision Level	ASCII	(e.g. AA1)	xx		xx	xx
34	Revision Level	ASCII		xx		xx	xx
35	Revision Level	ASCII		xx		xx	xx
36	MFG Year	HEX	00-99	**YY**		xx	xx
37	MFG Month	HEX	1-12	**MM**		xx	xx
38	MFG Day	HEX	1-31	**DD**		xx	xx

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Byte Location	Data	Data Type	Description	Content (Interp.)		Content (HEX)	Content (DEC)
39	Number of Char.	HEX	Num. of characters in MFG Name	**9**		09	9
40	MFG Name	ASCII	Power-One	**P**		50	80
41	MFG Name	ASCII		**O**		4F	79
42	MFG Name	ASCII		**W**		57	87
43	MFG Name	ASCII		**E**		45	69
44	MFG Name	ASCII		**R**		52	82
45	MFG Name	ASCII		**-**		2D	45
46	MFG Name	ASCII		**O**		4F	79
47	MFG Name	ASCII		**N**		4E	78
48	MFG Name	ASCII		**E**		45	69
49	MFG Location Code	HEX	Power One Mfg Location Code	**See Annex B**	**xx**	xx	xx
50	Output 1 Voltage	NUM	Specified Output 1 Voltage 2 Byte number / (10^Scale) (In milliVolts)	12		00	00
51						0C	12
52	Output 1 Voltage Scale	NUM		3		03	03
53	Output 2 Voltage	NUM	Specified Output 2 Voltage 2 Byte number / (10^Scale) (In milliVolts)	33		00	00
54						21	33
55	Output 2 Voltage Scale	NUM		2		02	02
56	-	-	-			00	00
57						00	00
58	-	-				00	00
59	-	-	-			00	00
60						00	00
61	-	-				00	00
62	Output 1 Current	NUM	Specified Output 1 Current 2 Byte number / (10^Scale) (In milliAmps)	**See Annex C**	336	1	1
63		NUM				50	80
64	Output 1 Current Scale	NUM			2	02	02
65	Output 2 Current	NUM	Specified Output 2 Current 2 Byte number / (10^Scale) (In milliAmps)	**See Annex D**	3	00	00
66						03	03
67	Output 2 Current Scale	NUM			3	03	03
68	-	-	-			00	00
69						00	00
70	-	-				00	00
71	-	-	-			00	00
72						00	00
73	-	-				00	00
74	Total Output Power	NUM	Specified Total Output Power 2 Byte number, Watts	**See Annex E**	**450**	1	1
75						C2	194
76	Min Input Voltage	NUM	Minimum Specified Input Voltage 2 Byte number, Volts	**See Annex F**	**90**	00	0
77						5A	90
78	Max Input Voltage	NUM	Maximum Specified Input Voltage 2 Byte number, Volts	**See Annex G**	**264**	01	01
79						08	08

Title						
SFP/SFD I²C Interface Programming Manual				Issued	2006-05-19	SKI
				Modified	2009-01-22	Bo
				Eng. approved	2009-01-19	Br
				Marketing approved	2009-01-19	Fred Heath
				Mfg. approved		--
power-one® Changing the Shape of Power	www.power-one.com	Size	Scale	Sheet	Drawing No.	Revision
		A4		18/28	**BCA 20005-G**	**AD1**

Supersedes: -

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Byte Location	Data	Data Type	Description	Content (Interp.)	Content (HEX)	Content (DEC)
80	Number of Char.	HEX	Num. of characters in Customer Specific	**0**	0	0
81	Customer Specific Data	-	-		FF	255
82	Customer Specific Data	-	-		FF	255
83	Customer Specific Data	-	-		FF	255
84	Customer Specific Data	-	-		FF	255
85	Customer Specific Data	-	-		FF	255
86	Customer Specific Data	-	-		FF	255
87	Customer Specific Data	-	-		FF	255
88	Customer Specific Data	-	-		FF	255
89	Customer Specific Data	-	-		FF	255
90	Customer Specific Data	-	-		FF	255
91	Customer Specific Data	-	-		FF	255
92	Customer Specific Data	-	-		FF	255
93	Customer Specific Data	-	-		FF	255
94	Customer Specific Data	-	-		FF	255
95	Customer Specific Data	-	-		FF	255
96	Customer Specific Data	-	-		FF	255
97	Customer Specific Data	-	-		FF	255
98	Customer Specific Data	-	-		FF	255
99	Customer Specific Data	-	-		FF	255
100	Customer Specific Data	-	-		FF	255
101	Customer Specific Data	-	-		FF	255
102	Customer Specific Data	-	-		FF	255
103	Checksum Byte	NUM	Checksum 32 from 0 to 102 (MSB)	**xxxxxxxx**	xx	xx
104	Set to 0	-	-		00	00
105	Set to 0	-	-		00	00
106	Set to 0	-	-		00	00
107	Set to 0	-	-		00	00
108	Set to 0	-	-		00	00
109	Set to 0	-	-		00	00
110	Set to 0	-	-		00	00
111	Set to 0	-	-		00	00
112	Set to 0	-	-		00	00
113	Set to 0	-	-		00	00
114	Set to 0	-	-		00	00
115	Set to 0	-	-		00	00
116	Set to 0	-	-		00	00
117	Set to 0	-	-		00	00
118	Set to 0	-	-		00	00
119	Set to 0	-	-		00	00
120	Set to 0	-	-		00	00
121	Set to 0	-	-		00	00
122	Set to 0	-	-		00	00
123	Set to 0	-	-		00	00
124	Set to 0	-	-		00	00
125	Set to 0	-	-		00	00
126	Set to 0	-	-		00	00
127	Set to 0	-	-		00	0

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Byte Location	Data	Data Type	Description	Content (Interp.)	Content (HEX)	Content (DEC)
128	Set to 0	-	-		00	00
129	Set to 0	-	-		00	00
130	Set to 0	-	-		00	00
131	Set to 0	-	-		00	00
132	Set to 0	-	-		00	00
133	Set to 0	-	-		00	00
134	Set to 0	-	-		00	00
135	Set to 0	-	-		00	00
136	Set to 0	-	-		00	00
137	Set to 0	-	-		00	00
138	Set to 0	-	-		00	00
139	Set to 0	-	-		00	00
140	Set to 0	-	-		00	00
141	Set to 0	-	-		00	00
142	Set to 0	-	-		00	00
143	Set to 0	-	-		00	00
144	Set to 0	-	-		00	00
145	Set to 0	-	-		00	00
146	Set to 0	-	-		00	00
147	Set to 0	-	-		00	00
148	Set to 0	-	-		00	00
149	Set to 0	-	-		00	00
150	Set to 0	-	-		00	00
151	Set to 0	-	-		00	00
152	Set to 0	-	-		00	00
153	Set to 0	-	-		00	00
154	Set to 0	-	-		00	00
155	Set to 0	-	-		00	00
156	Set to 0	-	-		00	00
157	Set to 0	-	-		00	00
158	Set to 0	-	-		00	00
159	Set to 0	-	-		00	00
160	Set to 0	-	-		00	00
161	Set to 0	-	-		00	00
162	Set to 0	-	-		00	00
163	Set to 0	-	-		00	00
164	Set to 0	-	-		00	00
165	Set to 0	-	-		00	00
166	Set to 0	-	-		00	00
167	Set to 0	-	-		00	00
168	Set to 0	-	-		00	00
169	Set to 0	-	-		00	00
170	Set to 0	-	-		00	00
171	Set to 0	-	-		00	00
172	Set to 0	-	-		00	00
173	Set to 0	-	-		00	00
174	Set to 0	-	-		00	00
175	Set to 0	-	-		00	0

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Byte Location	Data	Data Type	Description	Content (Interp.)		Content (HEX)	Content (DEC)
176	Set to 0	-	-			00	00
177	Set to 0	-	-			00	00
178	Set to 0	-	-			00	00
179	Set to 0	-	-			00	00
180	Set to 0	-	-			00	00
181	Set to 0	-	-			00	00
182	Set to 0	-	-			00	00
183	Set to 0	-	-			00	00
184	Set to 0	-	-			00	00
185	Set to 0	-	-			00	00
186	Set to 0	-	-			00	00
187	Set to 0	-	-			00	00
188	Set to 0	-	-			00	00
189	Set to 0	-	-			00	00
190	Set to 0	-	-			00	00
191	Set to 0	-	-			00	00
192	Set to 0	-	-			00	00
193	Set to 0	-	-			00	00
194	Set to 0	-	-			00	00
195	Set to 0	-	-			00	00
196	Set to 0	-	-			00	00
197	Set to 0	-	-			00	00
198	Set to 0	-	-			00	00
199	Set to 0	-	-			00	00
200	Set to 0	-	-			00	00
201	Set to 0	-	-			00	00
202	Set to 0	-	-			00	00
203	Set to 0	-	-			00	00
204	Set to 0	-	-			00	00
205	Set to 0	-	-			00	00
206	Set to 0	-	-			00	00
207	Information	ASCII	Product Spec Number	**See Annex H**	1	31	49
208	Information	ASCII	Product Spec Number		0	30	48
209	Information	ASCII	Product Spec Number		4	34	52
210	Information	ASCII	Product Spec Number		7	37	55
211	Information	ASCII	Product Spec Number		**2**	32	50
212	Information	ASCII	Product Spec Number		**6**	36	54
213	Information	ASCII	Product Spec Revision		**A**	41	65
214	Information	ASCII	Product Spec Revision		**A**	41	65
215	Information	ASCII	Product Spec Revision		**0**	0	0
216	Information	ASCII	Model Rev number	**See Annex I**	x	xx	xx
217	Information	ASCII	Model Rev number		x	xx	xx
218	Information	ASCII	Model Rev number		x	xx	xx
219	Set to 0	-	-			00	00
220	Set to 0	-	-			00	00
221	Set to 0	-	-			00	00
222	Set to 0	-	-			00	00
223	Set to 0	-	-			00	00

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Byte Location	Data	Data Type	Description	Content (Interp.)	Content (HEX)	Content (DEC)
224	Set to 0	-	-		00	00
225	Set to 0	-	-		00	00
226	Set to 0	-	-		00	00
227	Set to 0	-	-		00	00
228	Set to 0	-	-		00	00
229	Set to 0	-	-		00	00
230	Set to 0	-	-		00	00
231	Sequential Nr	ASCII	NNNNN - Sequential Number	N	xx	xx
232	Sequential Nr	-	-	N	xx	xx
233	Sequential Nr	-	-	N	xx	xx
234	Sequential Nr	-	-	N	xx	xx
235	Sequential Nr	-	-	N	xx	xx
236	Set to 0	-	-		00	00
237	Vendor Name	NUM	Power-One Jedec ID		05	05
238	Vendor Name	NUM	Power-One Jedec ID		25	37
239	Set to 0	-	-		00	00
240	Set to 0	-	-		00	00
241	Set to 0	-	-		00	00
242	Set to 0	-	-		00	00
243	Set to 0	-	-		00	00
244	Set to 0	-	-		00	00
245	Set to 0	-	-		00	00
246	Set to 0	-	-		00	00
247	Set to 0	-	-		00	00
248	Set to 0	-	-		00	00
249	Set to 0	-	-		00	00
250	Set to 0	-	-		00	00
251	Set to 0	-	-		00	00
252	CheckSum 64	NUM	Check Sum 32 from 104 to 251 (MSB)	xx	xx	xx
253	CheckSum 64	NUM	Check Sum 32 from 104 to 251	xx	xx	xx
254	CheckSum 64	NUM	Check Sum 32 from 104 to 251	xx	xx	xx
255	CheckSum 64	NUM	Check Sum 32 from 104 to 251 (LSB)	xx	xx	xx

Figure 8-1 EEPROM table

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8.1 Annex A: Supply Model Name

Byte Location	SFP450 -12BG			SFP650 -12BG			SFD550-12BG		
	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)
0	11	0B	11	11	0B	11	11	0B	11
1	S	53	83	S	53	83	S	53	83
2	F	46	70	F	46	70	F	46	70
3	P	50	80	P	50	80	D	44	68
4	4	34	52	6	36	54	5	35	53
5	5	35	53	5	35	53	5	35	53
6	0	30	48	0	30	48	0	30	48
7	-	2D	45	-	2D	45	-	2D	45
8	1	31	49	1	31	49	1	31	49
9	2	32	50	2	32	50	2	32	50
10	B	42	66	B	42	66	B	42	66
11	G	47	71	G	47	71	G	47	71
12		FF	255		FF	255		FF	255
13		FF	255		FF	255		FF	255
14		FF	255		FF	255		FF	255
15		FF	255		FF	255		FF	255
16		FF	255		FF	255		FF	255
17		FF	255		FF	255		FF	255

Figure 8-2 Table of Supply Model Name

8.2 Annex B: MFG Location Code @ Byte 49

Value [DEC]	Location
01	Power-One Camarillo
02	Power-One Dominican Republic
03	Tiger Power China
04	Power-One Slovakia
05	Power-One BaoAn China

Figure 8-3 Table for Location Code

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8.3 Annex C: Output 1 Current

Byte Location	SFP450 -12BG			SFP650 -12BG			SFD550-12BG		
	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)
62	336	01	01	533	02	02	450	01	01
63		50	80		15	21		C2	194
64	2	02	02	2	02	02	2	02	02

Figure 8-4 Output 1 current

8.4 Annex D: Output 2 Current

Byte Location	SFP450 -12BG			SFP650 -12BG			SFD550-12BG		
	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)
62	3	00	00	3	00	00	31	00	00
63		03	03		03	03		1F	31
64	3	03	03	3	03	03	2	02	02

Figure 8-5 Output 2 current

8.5 Annex E: Total Output Power

Byte Location	SFP450 -12BG			SFP650 -12BG			SFD550-12BG		
	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)
74	450	01	01	650	02	02	550	02	02
75		C2	194		8A	138		26	38

Figure 8-6 Total output power

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8.6 Annex F: Minimum Specified Input Voltage

Byte Location	SFP450-12BG AC			SFP650-12BG AC			SFD550-12BG DC		
	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)
76	90	00	00	90	00	00	40	00	00
77		5A	90		5A	90		28	40

Figure 8-7 Total output power

8.7 Annex G: Maximum Specified Input Voltage

Byte Location	SFP450-12BG AC			SFP650-12BG AC			SFD550-12BG DC		
	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)
78	264	01	01	264	01	01	75	00	00
79		08	08		08	08		4B	75

Figure 8-8 Total output power

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8.8 Annex H: Product Specific Number

Byte Location	SFP450 -12BG			SFP650 -12BG			SFD550-12BG		
	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)	Content (Interp.)	Content (HEX)	Content (DEC)
207	1	31	49	1	31	49	1	31	49
208	0	30	48	0	30	48	0	30	48
209	4	34	52	4	34	52	5	35	53
210	7	37	55	7	37	55	3	33	51
211	2	32	50	5	35	53	5	35	53
212	6	36	54	3	33	51	0	30	48
213	X	XX	XX	X	XX	XX	X	XX	XX
214	X	XX	XX	X	XX	XX	X	XX	XX
215	X	XX	XX	X	XX	XX	X	XX	XX

Figure 8-9 Product Specific Number

Note: Rows 213…215 representing actual version of Product specification.

8.9 Annex I: Power-One Version

Byte location	Function	Example
216, 217,218	Power-One model revision (same as on the power supply label)	AB1

Figure 8-10 Table for revision number

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-Power-One, SFP450-12BG AC-DC Front-End Data Sheet 12V Output, 450 Watts
-Power-One, SFP650-12BG AC-DC Front-End Data Sheet 12V Output, 650 Watts
-Power-One, SFD550-12BG Front-End Preliminary Data Sheet DC Input, 12V Output, 550 Watts

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11 Glossary

µC	Micro Controller
Bin	Value in binary number system
Dec	Value in decimal number system
EEPROM	Electrically Erasable Programmable Read Only Memory
Hex	Value in hexadecimal number system
I^2C Bus	Inter-Integrated Circuit Bus
kHz	kilohertz
LSB	Least significant bit
MFG	Manufacturing
MSB	Most significant bit
pF	picofarad
SCL	serial clock line
SDA	serial data line