EB22HDRT-LM-0516

Software Defined SFP, 3G-SDI Dual Transmitter (HD-BNC), MSA

DESCRIPTION

The EB22HDRT-LM-0516 is a Software Defined SFP+, 3G-SDI Dual Transmitter (HD-BNC) designed to transmit two SDI signal up to 3Gbps over 75ohms coax as defined in ST424, ST292, ST259, DVB-ASI. The module is carefully designed to support SDI pathological test patterns. The EB22HDRT-LM-0516 contains two cable drives. The host interface is option dependant. This Software Defined SFP features a programmable processing unit providing highest achievable versatility.

The EB22HDRT-LM-0516 provides module identification information and diagnostic through a 2 wire serial interface and the module is controllable by the IP port. It is also hot pluggable/removable solution for in field system upgrade and maintenance. The EB22HDRT-LM-0516 is interchangeable with others MSA datacom pinout emSFP/emSFP+ improving product flexibility. The module is ST424, ST292, ST259, DVB-ASI compliant resulting in quick time-to-market and reduced development efforts and cost. The EB22HDRT-LM-0516 is Pb-free and RoHS compliant.

APPLICATIONS

- SDI Software Defined SFP

ORDERING INFORMATION

PART NUMBER	TYPE	PACKAGE	TEMPERATURE
EB22HDRT-LM-0516	RT	SFP/SFP+	-20C to 85C

This SFP platform must be order with at least one software option. The list of Options is documented on Embrionix web site (www.embrionix.com)

FEATURES

- ST424, ST292, ST259, DVB-ASI compliant
- HD-BNC connectors
- Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- Hot-pluggable
- Control & Monitoring via serial interface:
  - Alarm reports;
  - Voltage & Temperature monitoring;
  - Module Information
- Low Power Consumption – see options
- Pb-free and RoHS compliant
- Operating temperature range: -20C to 85C
- Mechanical compliant with SFF-8431 & SFF-8432
- Ganged Cages & Stacked Cages mounting supported

PICTURE

Figure 1. EB22HDRT-LM-0516 SFP

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1. FUNCTIONAL BLOCK DIAGRAM

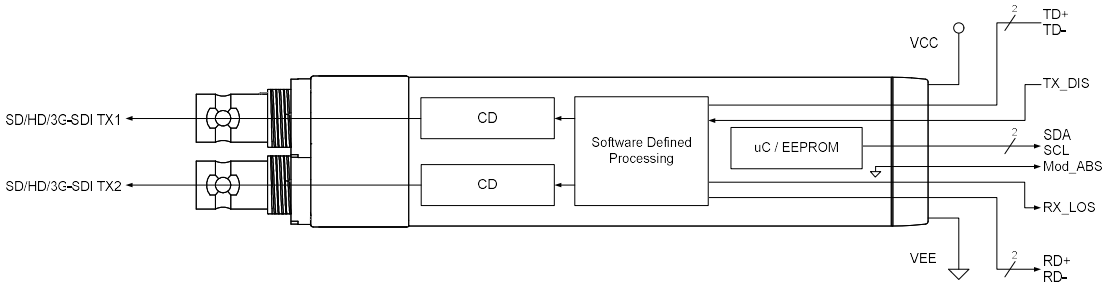

Figure 1-1. High level block diagram

2. PIN SPECIFICATION

2.1 HOST CONNECTOR PIN CONFIGURATION

The Figure 2-1 below shows the pin names and numbering for the connector block on the host board. The diagram is in the same relative orientation as the host board layout. The pin functions are described in Table 2-1 with accompanying notes. To minimize EMI emission, the signals to the 20-pin connector should be shut off when the module is removed.

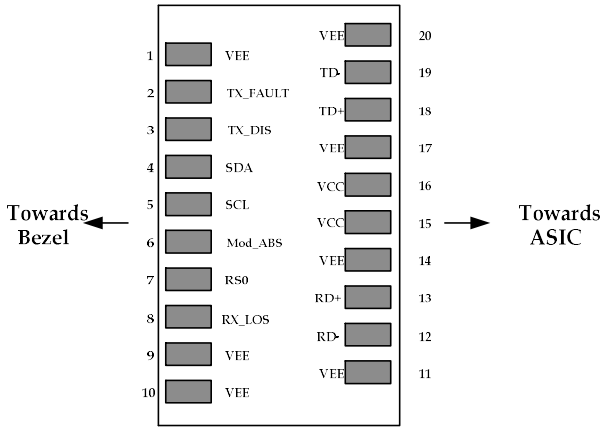

Figure 2-1. Host connector pin configuration

2.2 SFP PIN DEFINITION

Table 2-1. Pin Description

PIN#	NAME	FUNCTION	NOTES
1	VEE	Ground	
2	VEE	Ground	
3	TX_DIS	Transmitter disable	TX_DIS is an active high input that is used to shut down the transmitter. It is internally pulled up with a 4.7k to 10k resistor. Behavior may differ depending on programmed option. High/Open = Transmitter Disabled
4	SDA	Serial Data	Must be pulled up to VCC (4.7k-10k) on the host board (open drain)
5	SCL	Serial Clock	Must be pulled up to VCC (4.7k-10k) on the host board (open drain)
6	MOD_ABS	Module Absent	Connected to VEE in the module
7	RS0	Rate Select 0	Floating, Internally Not Connected
8	RX_LOS	Loss Of Signal	RX_LOS is an active high open-drain output that returns the loss of a valid signal. Behavior may differ depending on programmed option. High = Loss of signal
9	RS1	Rate Select 1	Floating, Internally Not Connected
10	VEE	Ground	
11	VEE	Ground	
12	RD-	Inv. Received Data	RD± are the differential receiver outputs. The AC coupling is done inside the module and is thus not required on the host board.
13	RD+	Received Data	
14	VEE	Ground	
15	VCC	+3.3V Supply	Defined as 3.3V±5% at the SFP connector pin. Recommended host board power filtering is shown in figure section 6.
16	VCC	+3.3V Supply	
17	VEE	Ground	
18	TD+	Transmit Data	TD± are the differential inputs of the transmitter. They are AC coupled differential lines with 100 ohms differential termination inside the module.
19	TD-	Inv. Transmit Data	
20	NC	Not Connected	Floating, Internally Not Connected

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3. SPECIFICATIONS

3.1 ABSOLUTE MAXIMUM RATINGS

Exceeding any of these ratings may permanently damage the module. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Table 3-1. Absolute maximum ratings

	SYMBOL	MIN	MAX	UNIT	NOTES
Supply Voltage	V_{CC_MAX}	0	3.6	V	
Operating Case Temperature*	T_{C_MAX}	-20	+85	C	
Storage Temperature	T_S	-40	+85	C	
Operating Relative Humidity		5	95	%	Non-condensing
ESD Rating			1	kV	HBM
*Measured on the top side of the module in the center					

3.2 RECOMMENDED OPERATING CONDITIONS

Unless otherwise specified, all specifications are valid under these conditions: VCC = 3.3±5%, TC=-20C to +85C. Specifications are guaranteed by design and characterization.

Table 3-2. Recommended operating conditions

	SYMBOL	MIN	TYP	MAX	UNIT	NOTES
Supply Voltage	V_{CC}	3.13	3.3	3.465	V	
Operating Case Temperature*	T_C	-20		+85	C	
Serial Data Rate SD	BR_{SD}		270		Mbps	ST259
Serial Data Rate HD	BR_{HD}		1483, 1485		Mbps	ST292
Serial Data Rate 3G	BR_{3G}		2967, 2970		Mbps	ST424
*Measured on the top side of the module in the center						
Note: 1) Host serial data rate depend on programmed option						

3.3 DC CHARACTERISTICS

Table 3-3. DC Characteristics

	SYMBOL	MIN	TYP	MAX	UNIT	NOTES
Power Supply Current	I_{CC}			606	mA	Note 1, 2
Total Power Consumption	P_D			2000	mW	Note 1, 2
Notes: 1) All power consumption characterized at 25C, V_{cc} = 3.3V 2) Power consumption will depend on the programmed option						

3.4 DIGITAL IO CHARACTERISTICS

Table 3-4. Digital IO characteristics

	SYMBOL	MIN	TYP	MAX	UNIT	NOTES
TX_DIS (Input)						
Input Voltage Low	V_{iL}			0.8	V	
Input Voltage High	V_{IH}	2.0			V	
	R_{PU}	4.7			kΩ	
RX_LOS (Output)						
Output Voltage Low	V_{OL}			0.1	V	I_{OL}= 10μA
				0.6	V	I_{OL}= 8.5mA
SDA (Output)						
Output Voltage Low	V_{OL}			0.1	V	I_{OL}= 10μA
				0.6	V	I_{OL}= 8.5mA
SCL & SDA (Input)						
Input Voltage Low	V_{iL}			0.8	V	Note 1
Input Voltage High	V_{IH}	2.0			V	Note 1

Note:
1) SCL & SDA must be pulled up to VCC with a 4.7-10kΩ on the host board

Table 3-5. Digital Receiver IO characteristics

	SYMBOL	MIN	TYP	MAX	UNIT	NOTES
RD± (Output)						
Single-ended Voltage Swing	V_{OP-P}	150		425	mV_{P-P}	Note 1,2
Differential Voltage Swing	$V_{ODIFF\ P-P}$	300		850	mV_{P-P}	Note 1,2
Differential Impedance	Z_{ODIFF}	90	100	110	Ω	Note 1,2
Rise Time, Fall Time	t_r,t_f		45		ps	20%-80%, Note 1,2

Notes:
1) RD± outputs are AC-coupled inside the module
2) 100Ω Load condition, 25C

Table 3-6. Digital Transmitter IO characteristics

	SYMBOL	MIN	TYP	MAX	UNIT	NOTES
TD± (Input)						
Single-ended Voltage Swing	V_{IP-P}	90		625	mV_{P-P}	Note 1
Differential Voltage Swing	$V_{IDIFF\ P-P}$	180		1250	mV_{P-P}	Note 1
Differential Impedance	Z_{ODIFF}	90	100	110	Ω	Note 1

Note:
1) TD± outputs are AC-coupled inside the module

3.5 ELECTRICAL TX1 & TX2 CHARACTERISTICS

Table 3-7. ELECTRICAL TX1 & TX2 SIGNAL

	SYMBOL	MIN	TYP	MAX	UNIT	NOTES
SDI TX1 & TX2 SIGNAL (Electrical Output)						
Output Voltage Swing	V_{SDo}	720	800	950	mV_{p-p}	
Output Return Loss	$ORL_{0-1.5G}$	15	19		dB	Bandwidth 0-1.5Ghz
	$ORL_{1.5-3G}$	10	14		dB	Bandwidth 1.5-3Ghz
Rise/Fall Time (20%-80%)	t_r-SD, t_f-SD	400		800	ps	
	t_r-HD, t_f-HD			135	ps	
	t_r-3G, t_f-3G			135	ps	
SD Rise/Fall Time Mismatch				125	ps	
HD/3G Rise/Fall Time Mismatch				30	ps	
Overshoot				10	%	

3.6 TIMING SPECIFICATION

Table 3-8. Timing specifications

	SYMBOL	MIN	TYP	MAX	UNIT	NOTES
SCL (Input)						
Clock Rate				400	kHz	Note 1
Processing						
Time to Initialize				300	ms	

Note:
1) If host does not support clock stretching, SCL clock rate should be set to 100Khz maximum.

4. FUNCTIONAL DESCRIPTION

The EB22HDRT-LM-0516 Software Defined SFP+, 3G-SDI Dual Transmitter (HD-BNC) is a Small Form Factor Pluggable (SFP) module with HD-BNC interface.

The EB22HDRT-LM-0516 Software Defined SFP+ output SDI signals conforming to the ST424, ST292, ST259, DVB-ASI depending on programmed option. This Software Defined SFP+ provides a programmable processing unit that can bi live updated to perform various process and conversion.

The EB22HDRT-LM-0516 Software Defined SFP+ has a serial interface through which an EEPROM containing the SERIAL IDENTIFICATION can be read. Through the same serial interface, diagnostic monitoring is provided via the SERIAL CONFIG INTERFACE giving the opportunity to read the temperature & the supply voltage.

4.1 MODULE INSTALLATION

The module is simply inserted, small end first, under manual pressure. Controlled hot plugging is ensured by design. The module housing makes initial contact with the host board EMI shield, mitigating potential damage due to Electrostatic Discharge (ESD).

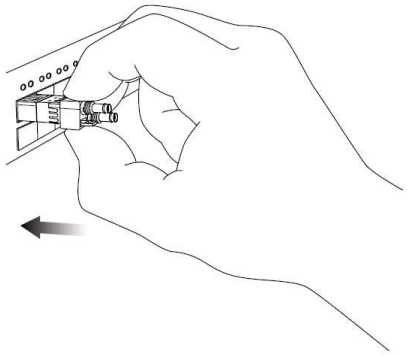

Figure 4-1. Module installation

4.2 SERIAL IDENTIFICATION (EEPROM)

The SFP 2-wire serial interface (SDA & SCL) provides access to the identification information describing SFP capabilities, interfaces, and associated information. The serial interface uses the 2-wire serial EEPROM protocol defined for the ATMEL AT24C02 family component. The memory is organized as a series of 8-bit data words that can be addressed individually or sequentially. The content of the SERIAL IDENTIFICATION (serial ID) device is write-protected. The 2-wire serial bus address 1010000X (A0h) is used for serial ID access.

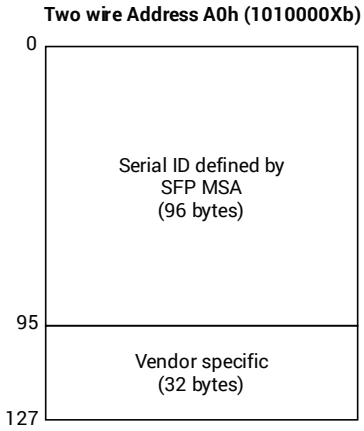

Figure 4-2. EEPROM Memory Mapping

For more information on the EEPROM memory mapping, please download it from EB22HDRT-LM-0516 page our website www.embrionix.com/product/EB22HDRT-LM-0516.

4.3 SERIAL CONFIG INTERFACE

The SFP 2-wire serial interface (SDA & SCL) provides also digital diagnostic monitoring via the SERIAL CONFIG INTERFACE. The serial interface uses the 2-wire serial EEPROM protocol defined for the ATMEL AT24C02 family component. The memory is organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial bus address 1010001X (A2h) is used for SERIAL CONFIG INTERFACE access of the first channel.

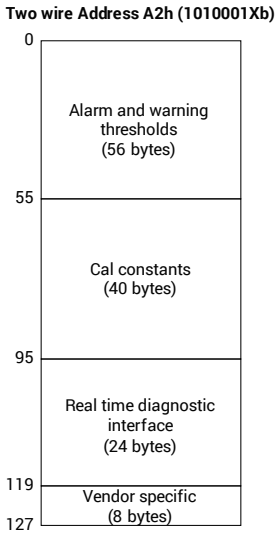

Figure 4-3. Serial Configuration Interface Memory Mapping

For more information on the configuration interface memory mapping, please download it from EB22HDRT-LM-0516 page our website www.embrionix.com/product/EB22HDRT-LM-0516.

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5. RECOMMENDED CIRCUIT SCHEMATIC

5.1 HOST BOARD RECOMMENDED CIRCUIT SCHEMATIC

Next figure shows an example of a complete SFP host board schematic with connections to SerDes/ASIC and protocol ICs.

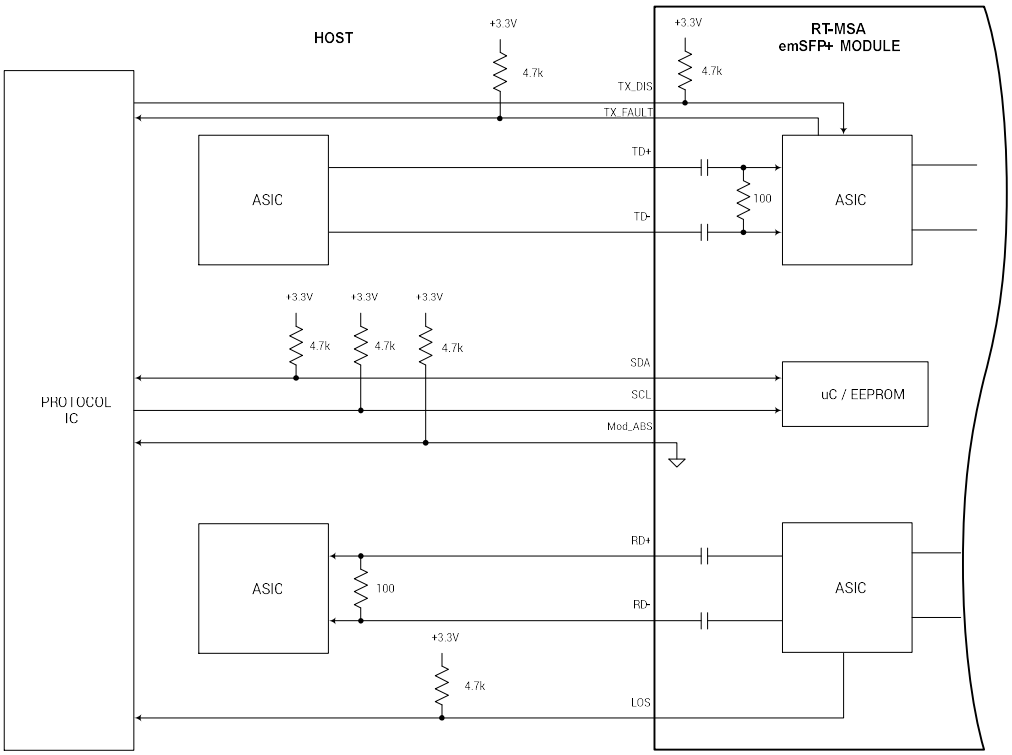

Figure 5-1. Recommended host schematic

5.2 HOST BOARD RECOMMENDED POWER SUPPLY

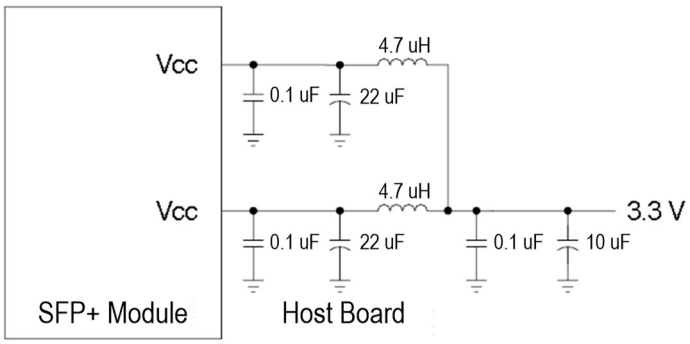

Figure 5-2. Recommended Host Power Supply

6. MECHANICAL SPECIFICATION

6.1 MECHANICAL FEATURES

This section provides a brief list of the EB22HDRT-LM-0516 mechanical features.

Table 6-1. Mechanical features

ITEM	DESCRIPTION
Connector Type	HD-BNC
Polish Type	NA
Ganged Cages	Ganged cages mounting supported
Stacked Cages	Stacked cages mounting supported
Mechanical release	Simple PULL UP mechanical release system to disengage the module from his cage

6.2 PACKAGE OUTLINE DRAWINGS

For more information on the mechanical drawing, please download it from EB22HDRT-LM-0516 page our website www.embrionix.com/product/EB22HDRT-LM-0516.

7. DOCUMENT REVISION HISTORY

Document revision history of the EB22HDRT-LM-0516 of ADVANCED SPECIFICATION

VERSION	DOC#	SUBJECT	RELEASE DATE
001	EB22HDRT-LM-0516-AS01	Initial Release	2017/06/01

8. NOTICE

The product and the ADVANCED SPECIFICATION are subject to change without notice. Embrionix reserves the right to remove the product at any time. Listing the product does not constitute an offer for sale.