



TEF0008 MAX10

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Online version of this manual and other related documents can be found at

2 Overview

TEF0008 design for MAX10 FPGA U2: 10M08SAU169C8G.

2.1 Feature Summary

- SFP Control
- I²C MUX
- level shifter
- LED Control

2.2 Firmware Revision and supported PCB Revision

See Document Change History.

3 Product Specification

3.1 Port Description

Name / opt. VHD Name	Direction	Pin	Description
PLL_SDA_io	Bidir	K2	I ² C Si5345A-B
PLL_SCL_o	Out	K1	I ² C Si5345A-B
LED	Out	C2	Status LED
A_LOS_i	In	H9	SFP A Signal Loss (HIGH indicates signal loss)
A_MDEF0_i	In	G9	SFP A Modul Absent (HIGH when module physically absent)
A_RS0_o	Out	J9	SFP A Rate Select RX (LOW for 1000BASE-SX, HIGH for 10GBASE-SR)
A_RS1_o	Out	H8	SFP A Rate Select TX (LOW for 1000BASE-SX, HIGH for 10GBASE-SR)
A_SCL_o	Out	K10	SFP A I ² C Clock
A_SDA_io	Bidir	K11	SFP A I ² C Data
A_TX_DIS_o	Out	H10	SFP A (HIGH disables transmitter)
A_TX_FAULT_i	In	L12	SFP A Laser Fault (HIGH indicates fault)
B_LOS_i	In	K12	SFP B Signal Loss (HIGH indicates signal loss)
B_MDEF0_i	In	J13	SFP B Modul Absent (HIGH when module physically absent)
B_RS0_o	Out	J12	SFP B Rate Select RX (LOW for 1000BASE-SX, HIGH for 10GBASE-SR)
B_RS1_o	Out	L13	SFP B Rate Select TX (LOW for 1000BASE-SX, HIGH for 10GBASE-SR)
B_SCL_o	Out	H13	SFP B I ² C Clock
B_SDA_io	Bidir	G10	SFP B I ² C Data
B_TX_DIS_o	Out	G13	SFP B (HIGH disables transmitter)
B_TX_FAULT_i	In	G12	SFP B Laser Fault (HIGH indicates fault)
C_LOS_i	In	F12	SFP C Signal Loss (HIGH indicates signal loss)
C_MDEF0_i	In	E12	SFP C Modul Absent (HIGH when module physically absent)
C_RS0_o	Out	F13	SFP C Rate Select RX (LOW for 1000BASE-SX, HIGH for 10GBASE-SR)
C_RS1_o	Out	F9	SFP C Rate Select TX (LOW for 1000BASE-SX, HIGH for 10GBASE-SR)
C_SCL_o	Out	E13	SFP C I ² C Clock
C_SDA_io	Bidir	D11	SFP C I ² C Data
C_TX_DIS_o	Out	D12	SFP C (HIGH disables transmitter)
C_TX_FAULT_i	In	C12	SFP C Laser Fault (HIGH indicates fault)

Name / opt. VHD Name	Direction	Pin	Description
D_LOS_i	In	B11	SFP D Signal Loss (HIGH indicates signal loss)
D_MDEF0_i	In	B12	SFP D Modul Absent (HIGH when module physically absent)
D_RS0_o	Out	B13	SFP D Rate Select RX (LOW for 1000BASE-SX, HIGH for 10GBASE-SR)
D_RS1_o	Out	C13	SFP D Rate Select TX (LOW for 1000BASE-SX, HIGH for 10GBASE-SR)
D_SCL_o	Out	A12	SFP D I ² C Clock
D_SDA_io	Bidir	F10	SFP D I ² C Data
D_TX_DIS_o	Out	E9	SFP D (HIGH disables transmitter)
D_TX_FAULT_i	In	D9	SFP D Laser Fault (HIGH indicates fault)
LA00_P	In	M9	SCL In
LA00_N	In	N5	SDA In
LA01_P	Out	L4	SDA Out
LA01_N	In	J5	I2C MUX 0: SEL[0]
LA02_P	In	M13	I2C MUX 1: SEL[1]
LA02_N	In	M12	I2C MUX 2: SEL[2]
LA03_N	In	N6	RS0
LA03_P	In	M5	TX_DISABLE
LA04_N	Out	K7	TX Fault A+B+C+D
LA04_P	In	J7	RS1
LA05_N	Out	L5	LOS A
LA05_P	Out	K5	DEF0 A, SFP A Inserted Flag
LA06_N	Out	J6	LOS B
LA06_P	Out	K6	DEF0 B, SFP B Inserted Flag
LA07_N	Out	M8	LOS C
LA07_P	Out	N8	DEF0 C, SFP C Inserted Flag
LA08_N	Out	M7	LOS D
LA08_P	Out	N7	DEF0 D, SFP D Inserted Flag
LA09_P	-	N4	/currently unused
LA09_N	-	M4	/currently unused

3.2 Functional Description

3.2.1 SFP Control

- Input Signal LA03_N sets all four SFP RX modes (LOW for 1000BASE-SX, HIGH for 10GBASE-SR)¹
- Input Signal LA04_P sets all four SFP TX modes (LOW for 1000BASE-SX, HIGH for 10GBASE-SR)¹
- Output Signals LA05_N, LA06_N, LA07_N and LA08_N indicate signal loss of SFP A, B, C and D respectively (HIGH indicates signal loss).
- Output Signals LA05_P, LA06_P, LA07_P and LA08_P indicate SFP A, B, C and D module absent (HIGH when module physically absent).
- Output Signal LA04_N is HIGH when at least one of the four SFPs indicate Laser fault.
- Input LA03_P HIGH sets for all SFPs where the module is physically available (MDEF0_i is LOW) the TX_DIS signal to LOW.²

¹SFP Control and I²C register writes of RX/TX modes are coupled with a logical or. If at least one of them indicates HIGH the 10GBASE-SR is activated.

²Inverted control as we can not enable weak pulldown in MAX10, we use weak pullup. TX are all ENABLED at default power up, so the card is working with no FMC LA pin driven.

3.2.2 I²C

- LA00_P, LA00_N and LA01_P form a "three wire I²C" bus with separate data in and output.
- LA01_N, LA02_P and LA02_N are used as selector for the MUX.

SEL	I ² C device
000	SFP A
001	SFP B
010	SFP C
011	SFP D
100	Si5345 Clock Generator

For I2C addresses see TEF0008 TRM.

3.2.3 LED

LED is used as Status LED and is on if at least one SFP is connected.

3.2.4 JTAG


MAX10 JTAG for programming is always enabled and accessible via the FMC connector, pin header J3 and testpoints.

4 Appx. A: Change History and Legal Notices

4.1 Document Change History

To get content of older revision go to "Change History" of this page and select older document revision number.

4.2 Revision Changes

Date	Document Revision	CPLD Firmware Revision	Supported PCB Revision	Authors	Description
2021-08-16	 2021-08-16 <small>Unknown macro: 'metadata'</small>	REV01	REV01, REV02	@ Martin Rohrmüller	<ul style="list-style-type: none"> Added Legal Notices some typos small rearrangments
2018-08-07	v.03	REV01	REV01	John Hartfiel	<ul style="list-style-type: none"> small style update
2018-06-07	v.01	REV01	REV01	Martin Rohrmüller	<ul style="list-style-type: none"> initial document
	All			@ John Hartfiel , Martin Rohrmüller	

4.3 Legal Notices

4.4 Data Privacy

Please also note our data protection declaration at <https://www.trenz-electronic.de/en/Data-protection-Privacy>

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REACH

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RoHS


Trenz Electronic GmbH herewith declares that all its products are developed, manufactured and distributed RoHS compliant.

WEEE

Information for users within the European Union in accordance with Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE).

Users of electrical and electronic equipment in private households are required not to dispose of waste electrical and electronic equipment as unsorted municipal waste and to collect such waste electrical and electronic equipment separately. By the 13 August 2005, Member States shall have ensured that systems are set up allowing final holders and distributors to return waste electrical and electronic equipment at least free of charge. Member States shall ensure the availability and accessibility of the necessary collection facilities. Separate collection is the precondition to ensure specific treatment and recycling of waste electrical and electronic equipment and is necessary to achieve the chosen level of protection of human health and the environment in the European Union. Consumers have to actively contribute to the success of such collection and the return of waste electrical and electronic equipment. Presence of hazardous substances in electrical and electronic equipment results in potential effects on the environment and human health. The symbol consisting of the crossed-out wheeled bin indicates separate collection for waste electrical and electronic equipment.

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