TEBT0782 TRM

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Overview

The Trenz Electronic TEBT0782 is a carrier for TE0782, TE0783 and TE0784 module.

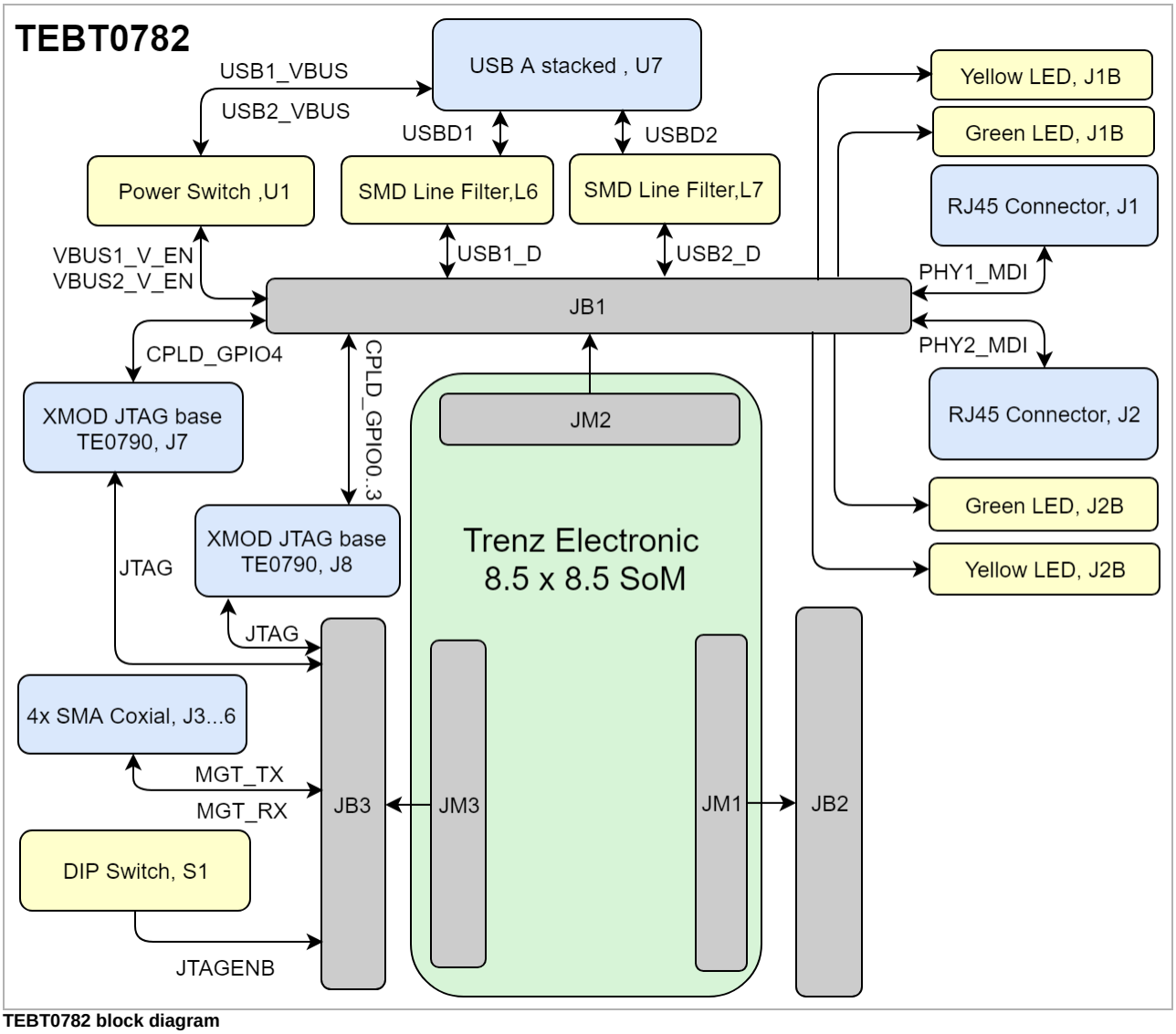
Refer to http://trenz.org/tebt0782-info for the current online version of this manual and other available documentation.

Key Features

- 3 x Samtec ASP-122953-01 160-pin stackable, compatible with TE078x
- 2 mm MC LB2-A Soldered Connector for power supply (12V input)

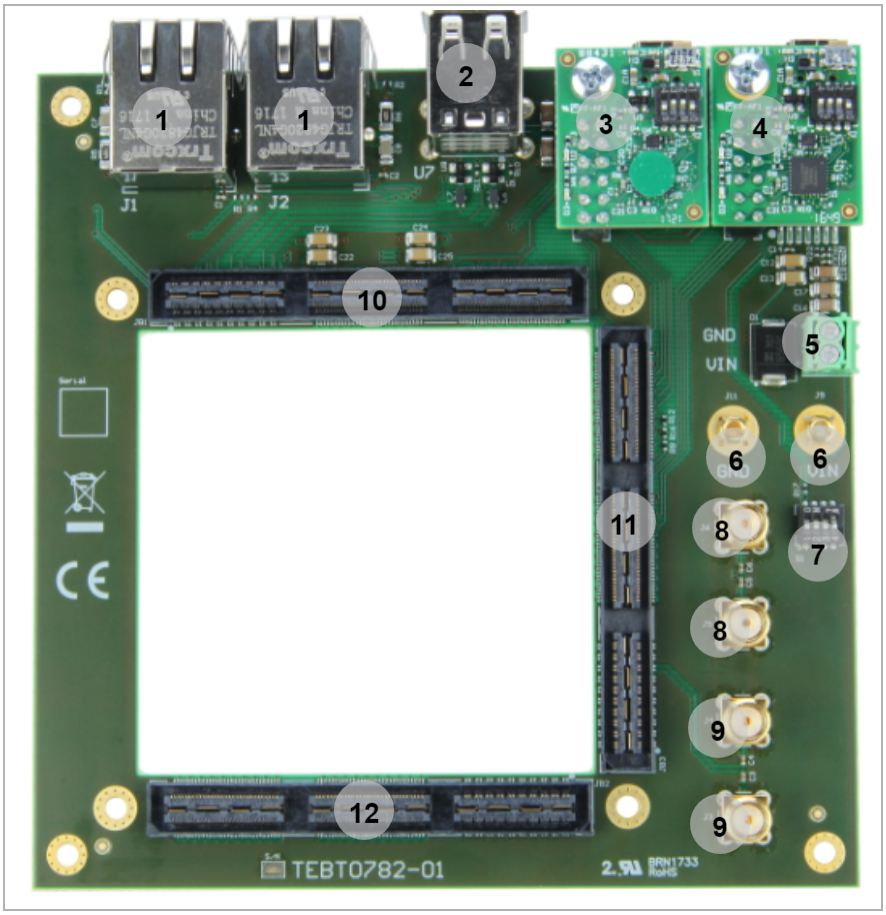
- 4 SMA connectors for MGT
- 2 x 12 pin headers for XMOD
- 1 x DIP switch for modules CPLD Access
- 2 x RJ45 Connector
- USB A Stacked Connector
- Equipped with two TE0790 XMOD FTDI JTAG adapters
- Voltage regulators
- Dimension: 115 x 115 mm

Block Diagram



TEBT0782 block diagram

Main Components



TEBT0782 main components

1. RJ45 Transceivers, J1-J2
2. USB A Stacked, U7
3. XMOD JTAG/UART Adapter, J7
4. JTAG CPLD Adapter -J8
5. 2 Line Common Mode Choke, J10
6. Non-isolated power jack (VIN), J9-J11
7. DIP Switch, S1
8. SMA Coxial Connectors (MGT_TX), J3-J4
9. SMA Coxial Connectors (MGT_RX), J5-J6
10. Board to Board Connector, JB1
11. Board to Board Connector, JB3
12. Board to Board Connector, JB2

Initial Delivery State

Storage device name	Content	Notes
-	-	-

Initial delivery state of programmable devices on the module

Configuration Signals

The general Reset is provided through button S1 on TE0790 XMOD J7.

Signal	B2B	Note
RESIN	JBC3-130	Board Reset

Reset process.

Signals, Interfaces and Pins

Board to Board (B2B) I/Os

FPGA bank number and number of I/O signals connected to the B2B connector:

B2B Connector	Interface	Number of I/O	Notes
JB1	RJ45, J1B-J1C	1 Differential pair, 2 Single Ended	Yellow, Green LEDs
	RJ45, J1A	4 Differential pair, 8 Single Ended	PHY1 MDIO
	RJ45, J2B-J2C	1 Differential pair, 2 Single Ended	Yellow, Green LEDs
	RJ45, J2A	4 Differential pair, 8 Single Ended	PHY2 MDIO
	TE0790 Base, J8	4 Single Ended	
	TE0790 Base, J7	1 Single Ended	
	USB A Stacked, U7	2 Single Ended	USB
	Power Switch, U1	2 Single Ended	
	SMD Line Filter, L6	1 Differential pair, 2 Single Ended	USB1_D
	SMD Line Filter, L7	1 Differential pair, 2 Single Ended	USB2_D
	ESD protection diode, U5	1 Single Ended	USB1_VBUS
	ESD protection diode, U8	1 Single Ended	USB2_VBUS
JB2	Module TE078x FPGA, Bank 111-112	16 Differential pair, 32 Single Ended	MGT_RX8...15, MGT_TX8...15
	Module TE078x FPGA, Bank 34	1 Differential pair, 2 Single Ended	J1_B34_VRP, J1_B34_VRN
	Module TE078x FPGA, Bank 34	1 Differential pair, 2 Single Ended	J1_B33_VRP, J1_B33_VRN
JB3	TE0790 Base, J8	4 Single Ended	M_TCK, M_TMS, M_TDO, M_TDI
	TE0790 Base, J7	4 Single Ended	TCK, TMS, TDO, TDI
		2 Single Ended	UART RX/TX
		1 Single Ended	RESIN
	DIP Switch, S1-A	1 Single Ended	JTAGENB
	SMA Coaxial, J3...6	2 Differential pair, 4 Single Ended	MGT_RX0, MGT_TX0
	Module TE0782...4 FPGA, Bank 109-110	16 Differential pair, 32 Single Ended	MGT_RX1...7, MGT_TX0...7

General I/O to B2B connectors information

XMOD Pin Header

JTAG/UART to Module SoC/FPGA

JTAG access to the TE078x SoM is available through B2B connector JB3. JTAG access is provided by TE0790 XMOD Adapter on Pin Header J7.

JTAG Interface Pins	Signal Name	B2B Connector	Notes
A	XMOD_A	JB3C-129	UART
B	XMOD_B	JB3C-135	UART
C	TCK	JB3C-141	JTAG
D	TDO	JB3C-148	JTAG
E	CPLD_GPIO4	JB1A-18	
F	TDI	JB3C-147	JTAG
G	RESIN	JB3C-130	General Reset
H	TMS	JB3C-142	JTAG
3.3V	3.3V_M	JB1- JB3	
VIO	3.3V_M	JB1- JB3	3.3V

JTAG pins connection

JTAG/ GPIO to Module CPLD

JTAG access to the System Controller CPLD is provided through B2B connector J3. JTAG access to CPLD is provided by TE0790 XMOD Adapter on Pin Header J8.

Pin 'JTAGENB' must be set high, using DIP Switch S1-A in order to program the System Controller CPLD via JTAG interaface.

JTAG Interface Pins	Signal Name	B2B Connector	Notes
A	CPLD_GPIO0	JB1A-10	
B	CPLD_GPIO1	JB1A-12	
C	M_TCK	JB3B-81	
D	M_TDO	JB3B-88	
E	CPLD_GPIO2	JB1A-14	
F	M_TDI	JB3B-87	
G	CPLD_GPIO3	JB1A-16	
H	M_TMS	JB3B-82	
3.3V	3.3V_CPLD	JB1- JB3	
VIO	3.3V_CPLD	JB1- JB3	3.3V

CPLD JTAG pins connection

DIP Switch S2 on TE0790 must be set and fixed like the following table.

DIP Switch	Setting	Notes
S2-1	ON	JTAGENB (Enable/Disable module JTAG CPLD IOs)
S2-2	OFF	NC
S2-3	OFF	NC
S2-4	OFF	NC

XMOD DIP Switch Setting

RJ45 Connectors

Signal Name	RJ45-J1 Pin	RJ45-J2 Pin	Notes
	B2B		
PHY_MDI0_P	JB1A-23	JB1A-39	
PHY_MDI0_N	JB1A-21	JB1A-37	
PHY_MDI1_P	JB1A-19	JB1A-35	
PHY_MDI1_N	JB1A-17	JB1A-33	
PHY_MDI2_P	JB1A-15	JB1A-31	
PHY_MDI2_N	JB1A-13	JB1A-29	
PHY_MDI3_P	JB1A-11	JB1A-27	
PHY_MDI3_N	JB1A-9	JB1A-25	
J2_TX9_P	JB1A-95	-	LED Green/Yellow
J2_TX9_N	JB1A-97	-	LED Green/Yellow
J2_RX9_N	-	JB1A-96	LED Green/Yellow
J2_RX9_P	-	JB1A-98	LED Green/Yellow

RJ45s Connections to B2B Connectors

USB A Stacked Socket

The USB A Stacked (U7) is a dual port USB Socket which provides two USB ports.

Signal Name	Port A		Port B		Notes
	B2B	Connected to	B2B	Connected to	
USB_D_P	JB1A-28	SMD Line Filter, L7	JB1A-40	SMD Line Filter, L6	
USB_D_N	JB1A-26	SMD Line Filter, L7	JB1A-38	SMD Line Filter, L6	
USB_VBUS	JB1A-24	SMD Line Filter, L7	JB1A-36	SMD Line Filter, L6	
VBUS_V_EN	JB1A-30	Power Switch, U1	JB1A-32	Power Switch, U1	

Dual Port USB Connections

SMA Coaxial

The TEBT0782 carrier is equipped with 4x SMA Coaxial straight connectors.

Designator	Schematic	B2B	Notes
J3	MGT_TX0_N	JB3A-29	Transfer
J4	MGT_TX0_P	JB3A-31	Transfer
J5	MGT_RX0_N	JB3A-30	Receive
J6	MGT_RX0_P	JB3A-32	Receive

SMAs Connections

Test Points

Test Point	Signals	B2B Connector	Notes
TP 1	VBAT_I	JB3-124	
TP 2	OTG2_ID	JB1-22	
TP 3	OTG1_ID	JB1-34	
TP 4	USB1_VBUS	JB1-36	
TP 5	USB2_VBUS	JB1-24	
TP 6	M_TCK	JB3-81	
TP 7	M_TDO	JB3-88	
TP 8	M_TDI	JB3-87	
TP 9	M_TMS	JB3-82	
TP 10	TCK	JB3-141	
TP 11	TDO	JB3-148	
TP 12	TDI	JB3-147	
TP 13	TMS	JB3-142	
TP 14	VIN	JB1-165...168	
TP 15	5V	-	
TP 16	3.3V_CPLD	JB1-147...148	
TP 17-18	GND	-	

Test Points Information

On-board Peripherals

Chip/Interface	Designator	Notes
DIP Switch	S1	

On board peripherals

DIP Switch

Switch	Connected to	B2B	Notes
S1-A	JTABENB	JB3C-136	
S1-B...D	-	-	Not connected

DIP Switch Connections

Power and Power-On Sequence

Power Supply

Power supply with minimum current capability of 3A for system startup is recommended.

Power Consumption

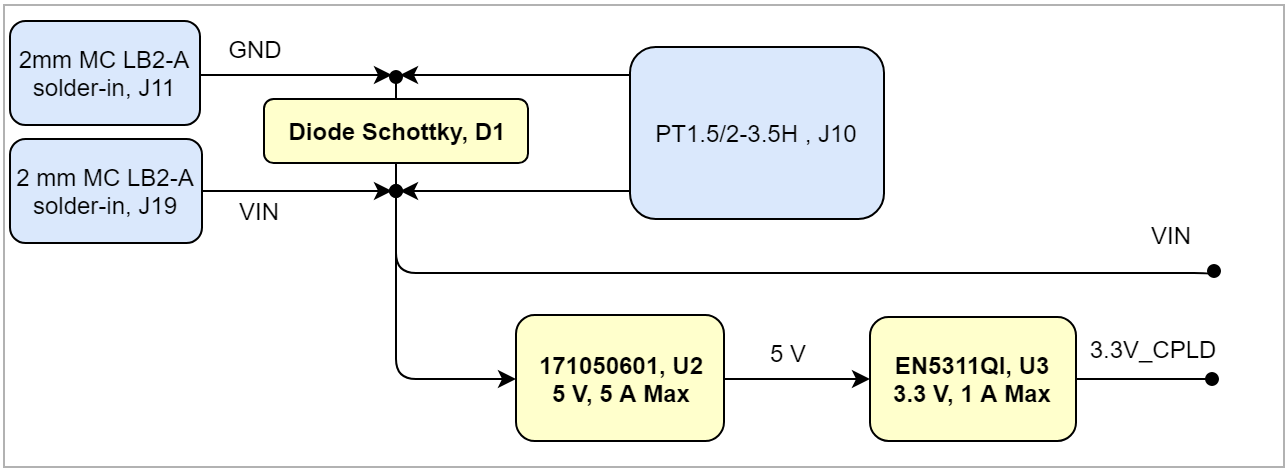
Power Input Pin	Typical Current
VIN	TBD*

Power Consumption

* TBD - To Be Determined

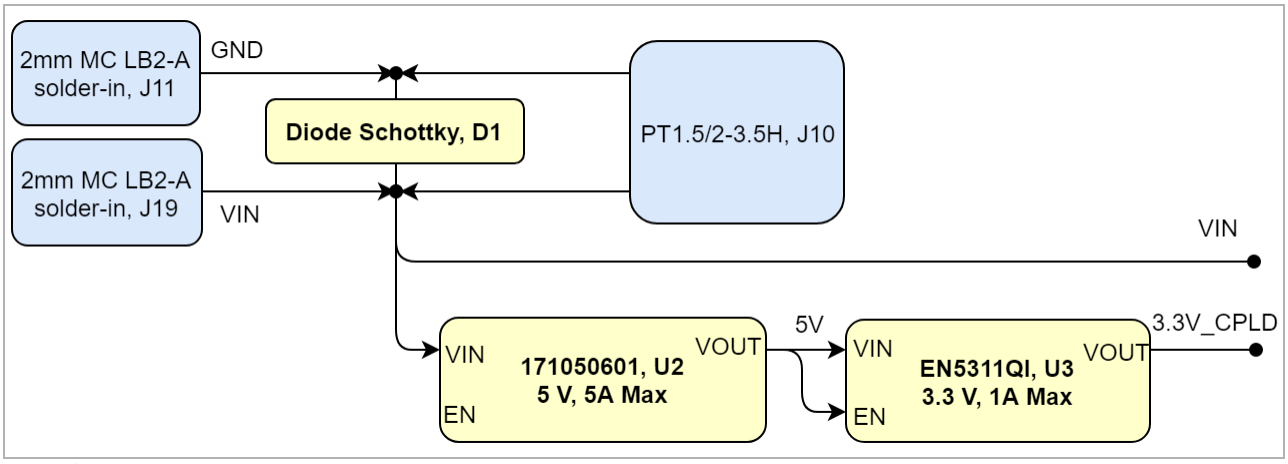
Power Distribution Dependencies

12V power supply (VIN) on J9/J11 (2 mm MC LB2-A solder-in) or on J10 (TE1.5/2-3.5H).



Power Distribution

Power-On Sequence



Power Sequency

Power Rails

Power Rail Name	B2B JB1 Pin	B2B JB2 Pin	B2B JB3 Pin	Direction	Notes
VIN	165, 166, 167, 168	-	-	Input/Output	Directly to module
3.3V_M	99, 100, 111,112, 123, 124, 135, 136, 159, 160, 169, 170, 171, 172	-	99, 100, 159, 160	Input/Output	160, 169, 170, 171, 172 are output other ones input for IO Banks
3.3V_CPLD	147,148	-	-	Output	Directly to module
1.8V_M	-	99,100, 159, 160, 169, 170, 171, 172	124	Input/Output	169, 170, 171, 172 are output other ones input for IO Banks
VBAT_IN					

Module power rails.

Board to Board Connectors

8.5 x 8.5 SoMs have three Samtec Q Strip Socket on the bottom side.

- Module use 3 x ASP-122952-01 (QTH–090–01–L–D–A) , (180 pins, "60" per bank)
- Carrier use 3 x ASP-122953-01 (QSH–090–01–F–D-A), (180 pins, "60" per bank)

Connector Specifications	Value
Insulator material	Black Liquid Crystal Polymer
Stacking height	5 mm
Contact material	Phosphor-bronze
Plating	Au or Sn over 50 µ" (1.27 µm) Ni
Current rating	2 A per pin (2 pins powered)
Operating temperature range	-55 °C to +125 °C
RoHS compliant	Yes

Connector specifications.

Connector Mating height

When using the same type on baseboard, the mating height is 5mm. Other mating heights are possible by using connectors with a different height

Order number	Connector on baseboard	compatible to	Mating height
	ASP-122953-01	QTH–090–01–L–D–A	5 mm
	ASP-122952-01	QSH–090–01–F–D-A	5 mm

Connectors.

The module can be manufactured using other connectors upon request.

Connector Speed Ratings

The Q Strip connector speed rating depends on the stacking height; please see the following table:

Stacking height	Speed rating
5 mm, Single-Ended	9.5 GHz
8 mm, Single-Ended	8.5 GHz
11 mm, Single-Ended	6 GHz
16 mm, Single-Ended	5.5 GHz
20 mm, Single-Ended	3.5 GHz
30 mm, Single-Ended	3 GHz
5 mm, Differential	10.5 GHz / 25Gbit/s
8 mm, Differential	8 GHz
11 mm, Differential	5 GHz
16 mm, Differential	6 GHz
20 mm, Differential	8.5 GHz
30 mm, Differential	1.5 GHz

Speed rating.

Current Rating

Current rating of Samtec Q Strip Socket B2B connectors is 2A per pin (2 adjacent pins powered).

Connector Mechanical Ratings

- Shock: 50 G, 11 ms half Sine
- Vibration: 7.3G random, 2 hours per axis, 3 axes total

Manufacturer Documentation

File	Modified
PDF File qsh.pdf	23 07, 2019 by Pedram Babakhani
PDF File qsh-xxx-01-x-d-xx-footprint.pdf	24 07, 2019 by Pedram Babakhani
PDF File qsh-xxx-01-x-d-xxx-mkt.pdf	24 07, 2019 by Pedram Babakhani
PDF File qth.pdf	23 07, 2019 by Pedram Babakhani
PDF File qth-xxx-xx-x-d-xxx-footprint.pdf	24 07, 2019 by Pedram Babakhani
PDF File qth-xxx-xx-x-d-xxx-mkt.pdf	24 07, 2019 by Pedram Babakhani

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Technical Specifications

Absolute Maximum Ratings

Symbols	Description	Min	Max	Unit	Note
VIN	Input supply voltage	--	--	V	Attention: Depends on connected module! 171050601 of the TEBT0782 (-0,3V - 40V)
T_STG	Storage Temperature	-40	+85	°C	DIP Switch S1

PS absolute maximum ratings

Recommended Operating Conditions

Operating temperature range depends also on customer design and cooling solution. Please contact us for options.

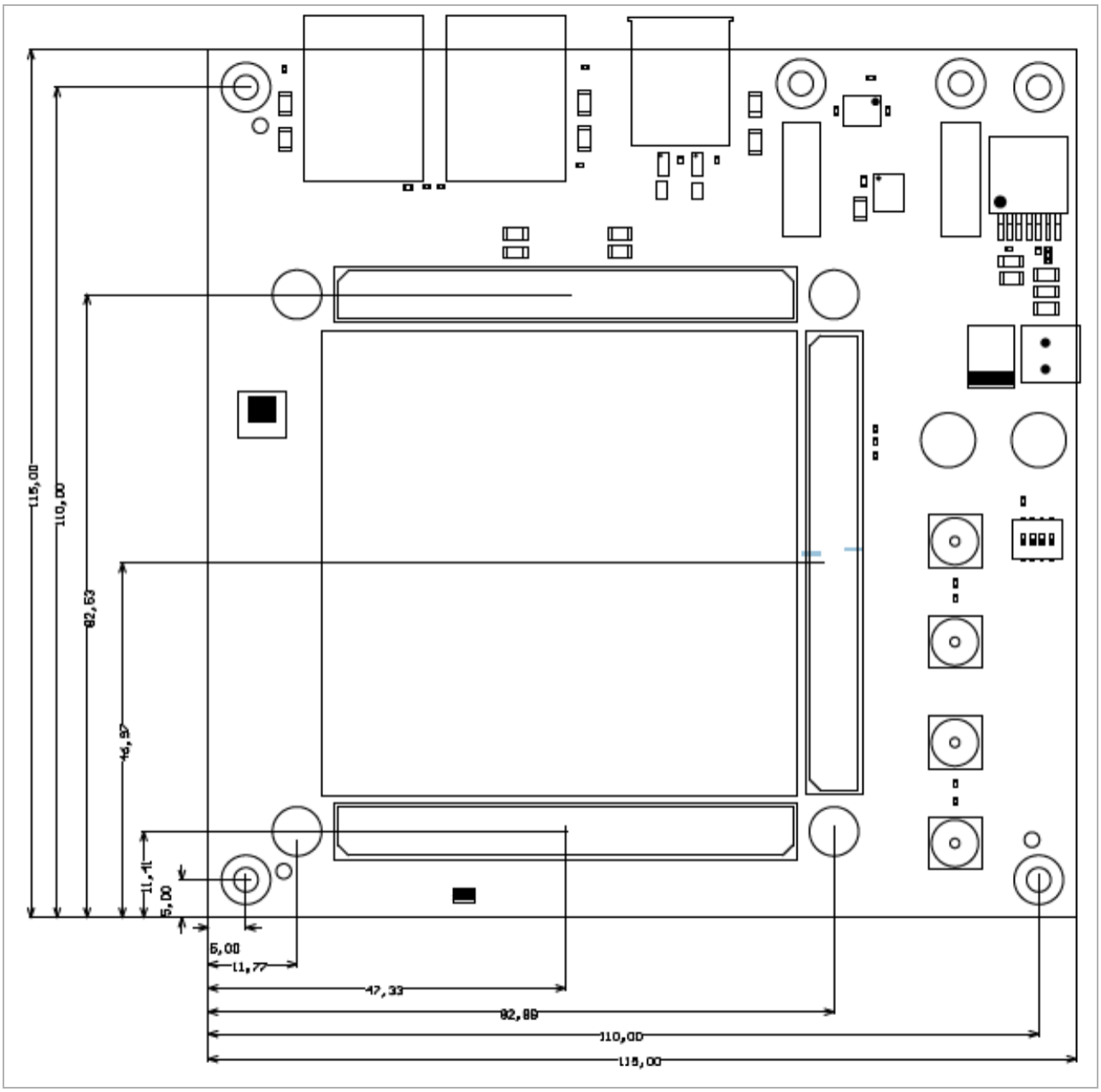
Parameter	Min	Max	Units	Reference Document
VIN	11.4	12.6	V	Attention: Depends on connected module! See TE078x TRMs, recommended normally 12V Without module: 171050601 of the TEBT0782 (6V - 36V)
T_OPT	-40	+85	°C	

Recommended operating conditions.

Physical Dimensions

- Module size: 116 mm × 116 mm. Please download the assembly diagram for exact numbers.
- Mating height with standard connectors: 5 mm.

PCB thickness: 1.6 mm.



Physical Dimension

Currently Offered Variants

Trenz shop TEBT0728 overview page	
English page	German page

Trenz Electronic Shop Overview

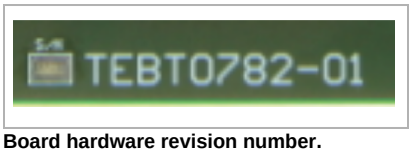
Revision History

Hardware Revision History

Date	Revision	Changes	Documentation Link
2016-11-05	01	Initial Release	REV01

Hardware Revision History

Hardware revision number can be found on the PCB board together with the module model number separated by the dash.



Board hardware revision number.

Document Change History

Date	Revision	Contributor	Description

Error rendering macro 'page-info' Ambiguous method overloading for method jdk.proxy241.$Proxy3496#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]	**Error rendering macro 'page-info'** Ambiguous method overloading for method jdk.proxy241.$Proxy3496#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]	**Error rendering macro 'page-info'** Ambiguous method overloading for method jdk.proxy241.$Proxy3496#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]	• update power section
2019-10-8	v.45	John Hartfiel	• update power section • XMOD section
2019-10-16	v.44	Pedram Babakhani	• Initial Release

--	all	**Error rendering macro 'page-info'** Ambiguous method overloading for method jdk.proxy241.$Proxy3496#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]	• --

Document change history.

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

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REACH, RoHS and WEEE

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