



TEI0005 TRM

Revision: v.13

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1 Table of Contents

1	Table of Contents	2
2	Overview	3
2.1	Key Features	3
2.2	Block Diagram	3
3	Signals, Interfaces and Pins	4
3.1	Board to Board (B2B)	4
3.2	USB Interface	4
4	On-board Peripherals	5
4.1	FTDI FT2232H IC	5
4.2	On-board LEDs	5
5	Power	6
5.1	Power supply of the adapter board	6
5.2	Power Distribution Dependencies	6
5.3	Power Rails	6
6	Technical Specifications	7
6.1	Absolute Maximum Ratings	7
6.2	Recommended Operating Conditions	7
6.3	Physical Dimensions	7
7	Currently Offered Variants	8
8	Revision History	9
8.1	Hardware Revision History	9
8.2	Document Change History	9
9	Disclaimer	10
9.1	Data Privacy	10
9.2	Document Warranty	10
9.3	Limitation of Liability	10
9.4	Copyright Notice	10
9.5	Technology Licenses	10
9.6	Environmental Protection	10
9.7	REACH, RoHS and WEEE	10

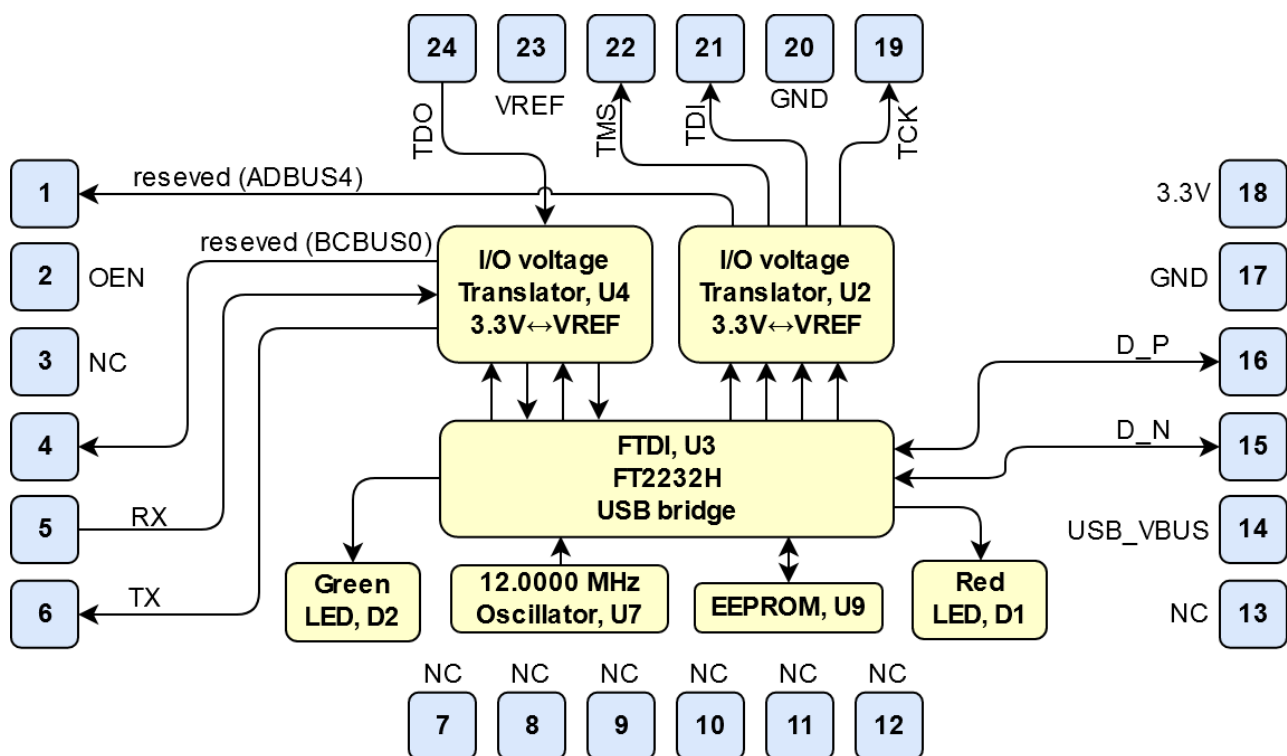
2 Overview

Arrow USB Programmer2 SMD module is a FT2232H based JTAG programmer supported by Intel Quartus. It's designed as Surface-mount module and have to be fitted on the target board in Surface Mount Technology. Furthermore, there is also an UART interface available and two I/O-pins reserved for future use.

2.1 Key Features

- Supported by Intel Quartus (JTAG Mode only)
- Designed as Surface-mount module
- Compatible to SMT Pick and Place Assembly Process
- Delivery Option in Standard JEDEC Tray
- 17 x 17 mm
- Based on FTDI FT2232H USB2 Interface
- Additional UART channel available
- Activity LEDs

2.2 Block Diagram



1 TEI0005 block diagram

3 Signals, Interfaces and Pins

3.1 Board to Board (B2B)

JTAG module pin assignment.

Pin	Signal	Module Direction
1	reserved for future use	out
2	OEN (enable data transmitting), low active	in
3	Do not connect (reserved for future use)	-
4	reserved for future use	out
5	UART RX	in
6	UART TX	out
7...13	Do not connect (reserved for future use)	-
14	USB-VBUS (USB Host supply voltage)	in
15	USB Data -	bidir
16	USB Data +	
17	GND	-
18	3.3V output voltage from module	out
19	TCK	out
20	GND	-
21	TDI	out
22	TMS	out
23	VREF (Reference I/O-voltage from target board for JTAG and UART)	in
24	TDO	in

1 B2B connectors information

3.2 USB Interface

The USB interface is provided by the FTDI FT232H IC. The entire USB protocol is handled on chip and compatible to USB 2.0 High Speed (480 MBps) and Full Speed (12 MBps).

4 On-board Peripherals

4.1 FTDI FT2232H IC

FTDI FT2232H IC (U3) is used in MPPSE Mode for JTAG, Channel B is available as UART. FT2232H EEPROM is programmed with Arrow Programmer2 Identifier to be recognized by the support library for Quartus.

4.2 On-board LEDs

On-board LEDs indicating UART and JTAG activity:

Designator	Color	Connected to	Active Level	Note
D2	Green	U3-48; U3-49	low	UART activity (BCBUS3 and BCBUS4)
D1	Red	U3-20	low	JTAG activity (ADBUS7)

2 On-board LEDs

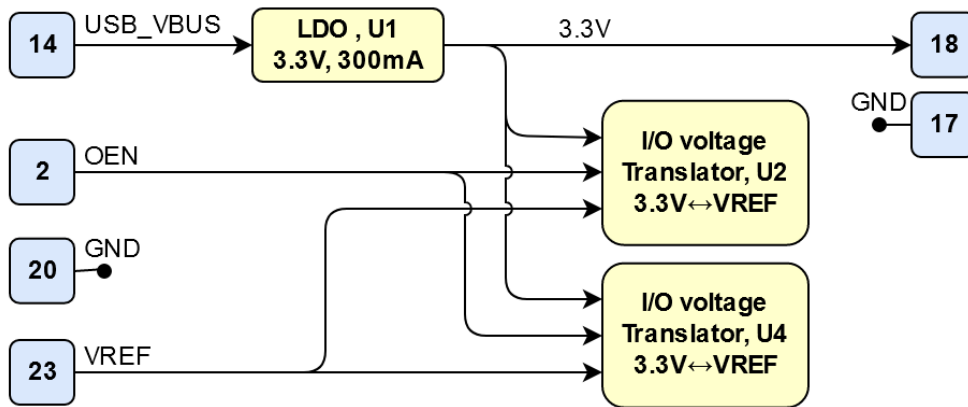
5 Power

5.1 Power supply of the adapter board

Arrow Programmer2 is powered via USB_VBUS rail.

5.2 Power Distribution Dependencies

TEI0005-02



2 Power Distribution

5.3 Power Rails

Power Rail Name	Pad	Direction	Notes
USB_VBUS	14	IN	
VREF	23	IN	
3.3V	18	OUT	LDO output generated from USB_VBUS. Do not supply this rail external

3 Module power rails.

6 Technical Specifications

6.1 Absolute Maximum Ratings

Parameter	Min	Max	Units	Reference Document
USB VBUS	4.75	5.25	V	USB 2.0 Specification
VREF	-0.5	4.6	V	Nexperia 74AVCH4T245 data sheet
Voltage on I/O pins	-0.5	4.6	V	Nexperia 74AVCH4T245 data sheet
Storage temperature	-55	+85	°C	LED LTST-C191KRKT

4 PS absolute maximum ratings

6.2 Recommended Operating Conditions

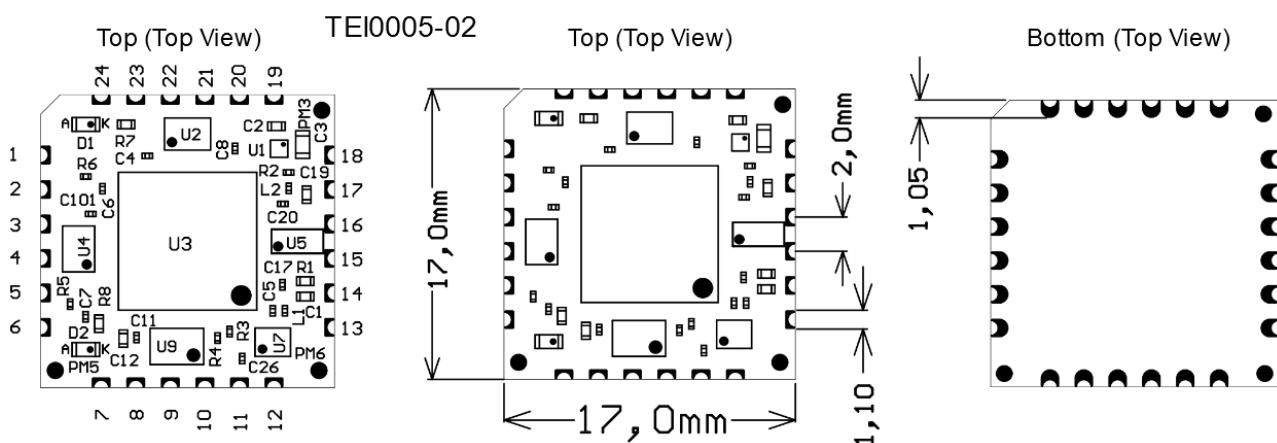
Parameter	Min	Max	Units	Reference Document
USB VBUS	4.75	5.25	V	USB 2.0 Specification
VREF	0.8	3.6	V	Nexperia 74AVCH4T245 data sheet (VCCB)
Voltage on I/O pins	0	VREF	V	Nexperia 74AVCH4T245 data sheet
Operating temperature	-40	+85	°C	FTDI FT2232H data sheet

5 Recommended operating conditions.

Arrow Programmer2 can be used within industrial temperature range.

6.3 Physical Dimensions

- Module size: 17.0mm × 17.0mm. Please download the assembly diagram for exact numbers.
- PCB thickness: ca. 1.2mm
- Highest part on the PCB is 1mm, the overall height of the module is up to 2.4mm max.



3 Physical Dimension

7 Currently Offered Variants

Trenz shop TE0728 overview page	
English page	German page

6 Trenz Electronic Shop Overview

8 Revision History

8.1 Hardware Revision History

Date	Revision	Changes	Documentation Link
-	01	-	TEI0005-01
2018-05-04	02	<ul style="list-style-type: none"> Reconnected D2 for RX TX indication Renamed SMD Pads 	TEI0005-02

Table 5: Hardware revision history.

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



4 Board hardware revision number.

8.2 Document Change History


Date	Revision	Contributors	Description
 2019-12-12	v.17	Martin Rohrmüller	<ul style="list-style-type: none"> update all to REV02 and new TRM template >2.0
2018-01-23	v.13	John Hartfiel	<ul style="list-style-type: none"> update "Recommended Operating condition"
2018-01-12	v.12	John Hartfiel	<ul style="list-style-type: none"> updated physical dimensions
2017-11-24	v.11	Ali Naseri	<ul style="list-style-type: none"> updated physical dimensions
2017-11-23	v.10	Ali Naseri	<ul style="list-style-type: none"> First TRM release

Table 6: Document change history.

9 Disclaimer

9.1 Data Privacy

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

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 2019-06-07