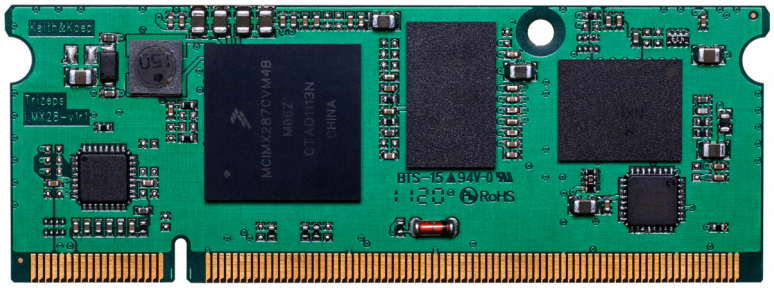
Trizeps-MX28

Documentation ver. 1.0 (Preliminary)



1.0 Introduction

The Trizeps-MX28 is a very compact entry-level product, based on Freescale™ i.MX28x CPU, 454MHz.

Features:

Processor	Low Power FreescaleTM i.MX287 CPU, 454MHz
RAM Memory	128 or 256 MByte DDR2-RAM
Flash Storage	Onboard 4 Bit wide uSD-Socket for cards up to 32 GByte 512 MByte onboard NAND-Flash (on request)
Display Interfaces	LCD 24 Bit RGB (WVGA: 800x480)
Interfaces	USB2.0 Host and OTG, 2x FlexCAN, RTC, SPDIF, Address-Data-Bus, 5x UARTs, 4x SSP, 2x I2C, 2x SPI, GPIOs, 2x PWMs
Ethernet	Onboard 10/100Mbit RMII PHY and second 10/100 Mbit interface
Audio Codec	i2S Audio Codec SGTL5000 with 4 wire resistive Touch 4x 32-bit timers and rotary decoder 8 GP 12-bit ADC channel and single 2 Msps ADC channel
Power	High-Eff. PMU with on-chip DC/DC, supports Li-Ion batteries incl. charging (on request)
SODIMM 200 Card Edge Connector	Pin compatible with Trizeps III, IV, IV-M, IV-WL, V and VI Modules
Operating Systems	Microsoft Windows Embedded CE 6.0 R3, Compact 7
Voltage Supply	+3V3 DC (+5V DC on request)
Operating Temperature	-40 °C ... +85 °C industrial (Temperature sensor for thermal protection)
Board Dimensions	67.6 mm x 25 mm 6.4 mm, 15 gr. (incl. uSD-Socket)
Environmental Standard	RoHS, REACH, WEEE
Availability	10 years form, fit, function (beginning at product life circle)

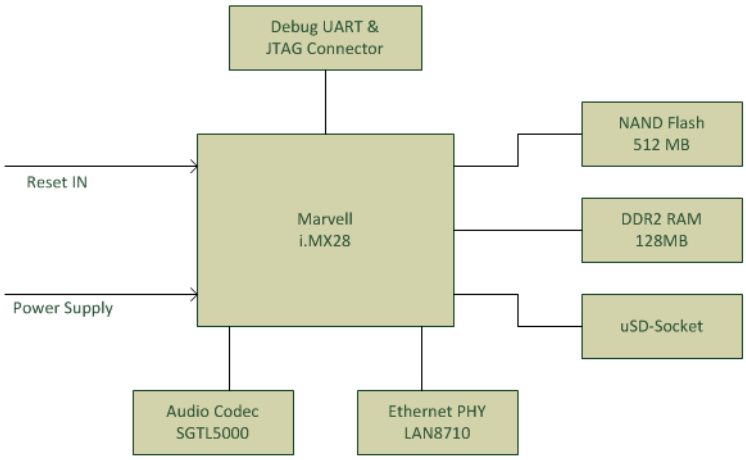
2.0 Functional description of the Trizeps-MX28 Module

In the following you'll find special information about the Trizeps-MX28 Module. For more information concerning the i.MX28 processor, the SGTL5000 audio-codec or the LAN8710 ethernet phy please refer to the manufacturers original manuals:

i.MX28 http://www.freescale.com/imx28
SGTL5000 http://www.freescale.com
LAN8710 http://www.smsc.com/lan8710

Components of the Trizeps-MX28 Module

Figure 1. Trizeps-MX28 Module



Components of the Trizeps-MX28 Module:

1. Freescale i.MX28 (microprocessor).
2. DDR2-400 RAM, 16bit wide.
3. NAND Flash (optional)
4. SMSC LAN8710 Ethernet Phy.
5. uSD socket.
6. Freescale SGTL5000 (single chip, stereo audio codec). [optional]

2.1 Interfaces of the i.MX28 on SODIMM socket

The Trizeps-MX28 Module offers the following interfaces:

2.1.1 Universal Asynchronous Receiver / Transmitter (UART) serial ports

The MX28 processor has five UARTs.

The UARTs share the following features:

- Functionally compatible with the 16550

- Ability to add or delete standard asynchronous communications bits (start, stop and parity) in the serial data
- Independently controlled transmit, receive, line status, and data set interrupts
- Programmable baud rate generator that allows the internal clock to be divided by 1 to (2^{16}-1) to generate an internal 16X clock
- Modem control pins that allow flow control through software

UART 0: The signals TxD, RxD, CTS, RTS and DCD are accessible on the SODIMM socket (Pins 35, 33, 25, 27 and 31)

UART 1: The signals TxD, RxD, CTS and RTS are accessible on the SODIMM socket (Pins 38, 36, 32 and 34)

UART 2: The signals TxD, RxD, CTS and RTS are accessible on the SODIMM socket (Pins 21, 19, 29 and 23)

UART 3: The signals TxD and RxD are accessible on the SODIMM socket (Pins 63 and 61)

Debug UART: The signals TxD and RxD are accessible on the SODIMM socket (Pins 67 and 65)

2.1.2 Universal Serial Bus (USB) Host and OTG-Controller

The MX28 has one dedicated USB Host Port and one USB OTG Port. The OTG Port can function as host or device-port. Both ports support USB 2.0 High-Speed.

2.1.3 I²C Bus Interface Unit

The I²C bus was created by the Phillips Corporation and is a serial bus with a two-pin interface. The SDA data pin is used for input and output functions and the SCL clock pin is used to control and reference the I²C bus. The I²C bus unit allows the PXA16x to serve as a master and slave device that resides on the I²C bus.

The I²C-Bus Specification for complete details on I²C bus operation.

2.1.4 MultiMediaCard /SD /SDIO-Card Controller

The MX28 has one SD Host controller, supporting two SD-card sockets.

The MMC/SD/SDIO controller acts as a link between the software that accesses the MX28 processor and the MMC stack (a set of memory cards) and supports Multi-media Card, Secure Digital, and Secure Digital I/O communications protocols. The SD-Card controller features:

- SD 2.0 specification compliant with two-socket support
- High-speed mode supported with max clock frequeny of 48MHz SD/SDIO and 52MHz for MMC
- Two modes of operation: MMC/SD/SDIO mode and SPI mode. MMC/SD/SDIO mode supports MMC, SD, and SDIO communications protocols. SPI mode supports the SPI communications protocol.
- 1- and 4-bit data transfers are supported for SD and SDIO communications protocols.
- 1-bit/4-bit/8-bit MMC and CE-ATA
- Support for all valid MMC and SD/SDIO protocol data-transfer modes

- Using the MMC communications protocol, multiple MMC cards are supported.
- Using the SD or SDIO communications protocol, one SD or SDIO card per slot is supported.

2.2 Audio-Codec

The Trizeps MX28 Module can be equipped with a Freescale SGTL5000 audio-codec. This is connected through a I2S-interface to the i.MX28 processor.

Features:

- Stereo Line In
- Stereo Line Out
- Microphone Input
- Headphone Output (45mW max. into 16 ohm load)
- Integrated Digital Processing (Freescale surround, bass, tone control/parametic equalizer/graphic equalizer Clocking/Control)

Please see Freescale SGTL5000 datasheet for details.

2.3 Memory

The MX28 has three different memory spaces: DDR2-SDRAM, Static Memory and Card Memory.

2.3.1 SDRAM

The Trizeps-MX28 Module is either equipped with one 1Gbit DDR2 SDRAM Module which is organized as 64Mx16 or with one 2Gbit DDR2 SDRAM Module which is organized as 128Mx16. (see Ordering Information)

2.3.2 NAND-Flash

The Trizeps-MX28 Module can be optionally equipped with one 512MB NAND-Flash Module.

2.3.3 uSD Card

The Trizeps-MX28 Module is equipped with an uSD card.

2.4 Ethernet PHY

The i.MX28 has two RMII ethernet ports.

The first port is connected to a SMSC LAN8710 transceiver chip, which features:

- High-Performance 10/100MBit Ethernet Transceiver.
- HP Auto-MDIX support.
- flexPWR^{TM} -Technology.

The media device interface from the LAN8710 ethernet-phy is routed to the SODIMM connector and must be connected to magnetics before going to a standard RJ45-ethernet-connector.

The second RMII ethernet port is also available through the 200-pin SODIMM connector.

Please see Keith & Koep and SMSC reference designs for sample schematics.

2.5 CAN-Bus

The i.MX28 has got two CAN-Bus ports. (Controller Area Network), both are routed to the SODIMM connector. (CAN0 at Pins 95 and 93, CAN1 at Pins 105 and 107)

2.6 RTC

The i.MX28-processor got a built-in realtime clock, which is supplied as long the panel is powered by VCC_EXT or VCC_BATTERY.

2.7 Boot Options

The default for the Trizeps-MX28 is to boot from the internal SDIO or the NAND-Flash.

2.7.1 General Purpose Input/Output Pins (GPIO)

Most pins routed to the SODIMM-connector (see table 4 on page 8) are GPIOs.

GPIOs are pins that may be configured to different functions. This function could be a simple input, interrupt or output pin, or a special interface pin like UART_TXD.

If a pin is a GPIO, it number and commonly used alternate functions is noted in the pinout table.

2.7.2 Debug-UART

The dedicated Debug-UART port is routed to J17.

TABLE 1. Debug UART Connector J17

Pin	Name	Description
1	+3V3	Supply-voltage.
2	GND	Ground (0V).
3	n.c.	not connected.
4	n.c.	not connected.
5	DUART_TXD	Connect to RX (pin 2) of your serial connector (level-shifter needed; i.e. MAX232)
6	DUART_RXD	Connect to TX (pin 3) of your serial connector (level-shifter needed, i.e. MAX232)
7	n.c.	not connected.
8	n.c.	not connected.

USB to J17 adapter is available from Keith & Koep.

To view the Debug messages open a terminal window on a PC with the following adjustments:

Baud rate: 115.200; Data: 8 bit; Parity: none; Stop: 1 bit; Flow Control: none

2.7.3 Synchronous Serial Port (SSP)

The i.MX28 has got four Synchronous Serial Ports, from which three are availlable on the pin connectors. The SSP can be configured to support several different protocols & interfaces: SPI, MMC, SDIO, Triflash.

Features:

• Up to 52 MHz external SSP clock for SD/MMC mode

• 1-bit, 4-bit and 8-bit MMC/SD/SDIO modes

• Compliant with SDIO Rev. 2.0

• Support eMMC4.3 and eMMC4.4

• SPI with single, dual and quad modes

The suggested usage of SSP0 on the MXM-connector is as MMC/SD/SDIO port.

2.7.4 ADC

The i.MX28 got seven external Low-Resolution Analog-to-Digital-Converter-pins (LRADC) and one High-Speed ADC (HSADC). All ADCs have a resolution of 12bit and the HSADC (routed to SODIMM 200 Pin 2) is capable of 2Msps.

TABLE 2. LRADC Usage on Trizeps-Modul

LRADC	Description
0	Routed to SODIMM Pin 8
1	Routed to SODIMM Pin 6
2	Used for touch-screen (XR). (SODIMM Pin 14)
3	Used for touch-screen (YU). (SODIMM Pin 18)
4	Used for touch-screen (XL). (SODIMM Pin 16)
5	Used for touch-screen (YD). (SODIMM Pin 20)
6	Routed to SODIMM Pin 4

2.7.5 JTAG / Debug Port

The JTAG / Debug port consists of several shift registers, with the destination controlled by the TMS pin and data I/O with TDI / TDO. The JTAG / Debug port provides two different functionalities:

- JTAG Debugger
- Hardware-testing using boundary scan interface according to IEEE 1149.1

TABLE 3. JTAG Connector J9

Pin	Name	Description
1	+3V3	Supply-voltage.
2	GND	Ground (0V).
3	JTAG_TMS	JTAG Test Mode Select
4	JTAG_TRST	JTAG Reset
5	JTAG_TCK	JTAG Clock
6	JTAG_TDO	JTAG Serial Data Out
7	JTAG_TDI	JTAG Serial Data In
8	$\overline{\text{RESET\_IN}}$	Reset-Input (active low).

3.0 Ordering Information

The Trizeps-MX28 is available in the following options:

	Trizeps MX28
30 030	Trizeps MX28 /C454/R128/N0/2ETH/COD/RoHS (i.MX287, 454 MHz, 128 MB RAM, no NAND, 2 x Ethernet, Codec, µSD card socket)
30 060	Trizeps MX28 /C454/R256/N0/2ETH/COD/RoHS (i.MX287, 454 MHz, 256 MB RAM, no NAND, 2 x Ethernet, Codec, µSD card socket)

Other equipments on request.

4.0 Pinout information and description

All of the significant signals are accessible via the 200-pin SODIMM socket.

TABLE 4. Pinout information of the connector J5 of the Trizeps (200-pin SODIMM socket).

Pin	Name	Description
1	MIC_OUT	[SGTL5000] Microphone input.
2	HSADC	High-Speed 12Bit ADC with up to 12Msps. Pin B14 of processor
3	MIC_GND	[SGTL5000] Microphone Ground.
4	LRADC6	12bit ADC input. (channel 6) Pin C14 of processor
5	LINEIN_L	[SGTL5000] Left line in.
6	LRADC1	12bit ADC input. (channel 1) Pin C09 of processor
7	LINEIN_R	[SGTL5000] Right line in.
8	LRADC0	12bit ADC input. (channel 0) Pin C15 of processor
9	AUDIO_AGND	Analog Audio Ground (0V).
10	AUDIO_AVDD	Analog Audio +3V3 Supply.
11	AUDIO_AGND	Analog Audio Ground (0V).
12	AUDIO_AVDD	Analog Audio +3V3 Supply.
13	HEADPHONE_GND	[SGTL5000] Headphone virtual ground.
14	TOUCH_X+	Touch. Pin C08 of processor
15	HEADPHONE_L	[SGTL5000] Left headphone output.
16	TOUCH_X-	Touch. Pin D13 of processor
17	HEADPHONE_R	[SGTL5000] Right headphone output.
18	TOUCH_Y+	Touch. Pin D09 of processor
19	UART2_RXD GPIO3_8	Serial Port 2: Receive input. This pin is a GPIO, which can be set to different functions. Pin F06 of processor.
20	TOUCH_Y-	Touch. Pin D15 of processor
21	UART2_TXD GPIO3_9	Serial Port 2: Transmit output. This pin is a GPIO, which can be set to different functions. Pin F05 of processor.
22	LINEOUT_R	[SGTL5000] Right line out.
23	UART2_RTS GPIO3_11	Serial Port 2: Request to Send output. This pin is a GPIO, which can be set to different functions. Pin H07 of processor.

Pin	Name	Description
24	LINEOUT_L	[SGTL5000] Left line out.
25	UART0_CTS GPIO3_2	Serial Port0: Clear to Send input. This pin is a GPIO, which can be set to different functions. Pin J06 of processor.
26	$\overline{\text{RESET\_IN}}$	Active low reset input.
27	UART0_RTS GPIO3_3	Serial Port0: Request to Send output. This pin is a GPIO, which can be set to different functions. Pin J07 of processor.
28	n.c.	Not connected.
29	UART2_CTS GPIO3_10	Serial Port 2: Clear to Send input. This pin is a GPIO, which can be set to different functions. Pin H06 of processor.
30	n.c.	Not connected.
31	UART0_DCD GPIO2_15	This pin is a GPIO, which can be set to different functions. Pin E01 of processor.
32	UART1_CTS GPIO3_6	Serial Port 1: Clear to Send input. This pin is a GPIO, which can be set to different functions. Pin K05 of processor.
33	UART0_RXD GPIO3_0	Serial Port 0: Receive input. This pin is a GPIO, which can be set to different functions. Pin G05 of processor.
34	UART1_RTS GPIO3_7	Serial Port 1: Request to Send output. This pin is a GPIO, which can be set to different functions. Pin J05 of processor.
35	UART0_TXD GPIO3_1	Serial Port0: Transmit output. This pin is a GPIO, which can be set to different functions. Pin H05 of processor.
36	UART1_RXD GPIO3_4	Serial Port 1: Receive input. This pin is a GPIO, which can be set to different functions. Pin L04 of processor.
37	GPIO1_30	This pin is a GPIO, which can be set to different functions. Pin N01 of processor.
38	UART1_TXD GPIO3_5	Serial Port 1: Transmit output. This pin is a GPIO, which can be set to different functions. Pin K04 of processor.
39	GND	Ground (0V)
40	VCC_SUPPLY	Power Supply (+3V3)
41	GND	Ground (0V)
42	VCC_SUPPLY	Power Supply (+3V3)
43	GPIO2_4	This pin is a GPIO, which can be set to different functions. Pin B05 of processor.
44	LCD_DE GPIO1_27	Display Enable signal This pin is a GPIO, which can be set to different functions. Pin P05 of processor.

Pin	Name	Description
45	GPIO2_5	This pin is a GPIO, which can be set to different functions. Pin C05 of processor.
46	LCD_D07 GPIO1_7	Display Dataline 7 This pin is a GPIO, which can be set to different functions. Pin P01 of processor.
47	SDIO_SCK GPIO2_10	Clock signal SD-Card This pin is a GPIO, which can be set to different functions. Pin A06 of processor.
48	LCD_D09 GPIO1_9	Display Dataline 9 This pin is a GPIO, which can be set to different functions. Pin P03 of processor.
49	SDIO_WP GPIO1_29	Write Protect signal SD-Card This pin is a GPIO, which can be set to different functions. Pin M01 of processor.
50	LCD_D11 GPIO1_11	Display Dataline 11 This pin is a GPIO, which can be set to different functions. Pin R02 of processor.
51	SDIO_DATA3 GPIO2_3	Data3 signal SD-Card This pin is a GPIO, which can be set to different functions. Pin A05 of processor.
52	LCD_D12 GPIO1_12	Display Dataline 12 This pin is a GPIO, which can be set to different functions. Pin T01 of processor.
53	SSP3_SS0 GPIO2_27	SPI signal This pin is a GPIO, which can be set to different functions. Pin D02 of processor.
54	LCD_D13 GPIO1_13	Display Dataline 13 This pin is a GPIO, which can be set to different functions. Pin T02 of processor.
55	UART3_CTS GPIO3_14	Serial Port 3: Clear to Send input. This pin is a GPIO, which can be set to different functions. Pin L06 of processor.
56	LCD_PCLK GPIO1_26	Display Pixelclock This pin is a GPIO, which can be set to different functions. Pin M04 of processor.
57	UART3_RTS GPIO3_15	Serial Port 3: Request to Send output. This pin is a GPIO, which can be set to different functions. Pin K06 of processor.
58	LCD_D03 GPIO1_3	Display Dataline 3 This pin is a GPIO, which can be set to different functions. Pin L03 of processor.
59	SDIO_CD GPIO2_9	Card Detect SD-Card This pin is a GPIO, which can be set to different functions. Pin D10 of processor.

Pin	Name	Description
60	LCD_D02 GPIO1_2	Display Dataline 2 This pin is a GPIO, which can be set to different functions. Pin L02 of processor.
61	UART3_RXD GPIO3_12	Serial Port 3: Receive input. This pin is a GPIO, which can be set to different functions. Pin M05 of processor.
62	LCD_D08 GPIO1_8	Display Dataline 8 This pin is a GPIO, which can be set to different functions. Pin P02 of processor.
63	UART3_TXD GPIO3_13	Serial Port 3: Transmit output. This pin is a GPIO, which can be set to different functions. Pin L05 of processor.
64	LCD_D15 GPIO1_15	Display Dataline 15 This pin is a GPIO, which can be set to different functions. Pin U03 of processor.
65	DUART_RXD GPIO3_16	Debug UART: Receive input This pin is a GPIO, which can be set to different functions. Pin K07 of processor.
66	LCD_D14 GPIO1_14	Display dataline 14 This pin is a GPIO, which can be set to different functions. Pin U02 of processor.
67	DUART_TXD GPIO3_17	Debug UART: Transmit output. This pin is a GPIO, which can be set to different functions. Pin L07 of processor.
68	LCD_HSYNC GPIO1_25	Display Horizontal sync This pin is a GPIO, which can be set to different functions. Pin K01 of processor.
69	PWM3 GPIO3_28	Pulse-width modulation signal 3 This pin is a GPIO, which can be set to different functions. Pin E09 of processor.
70	LCD_D01 GPIO1_1	Display Dataline 1 This pin is a GPIO, which can be set to different functions. Pin K03 of processor.
71	SSP3_SCK GPIO2_24	Synchronous serial port 3 clock signal This pin is a GPIO, which can be set to different functions. Pin A02 of processor.
72	LCD_D05 GPIO1_5	Display Dataline 5 This pin is a GPIO, which can be set to different functions. Pin M03 of processor.
73	SSP3_MISO GPIO2_26	Synchronous serial port 3 This pin is a GPIO, which can be set to different functions. Pin B02 of processor.
74	LCD_D10 GPIO1_10	Display Dataline 10 This pin is a GPIO, which can be set to different functions. Pin R01 of processor.

Pin	Name	Description
75	SSP3_MOSI GPIO2_25	Synchronous serial port 3 Synchronous serial port 3This pin is a GPIO, which can be set to different functions. Pin C02 of processor.
76	LCD_D00 GPIO1_0	Display Dataline 0 This pin is a GPIO, which can be set to different functions. Pin K02 of processor.
77	PWM4 GPIO3_29	Pulse-width modulation signal 4 This pin is a GPIO, which can be set to different functions. Pin E10 of processor.
78	LCD_D04 GPIO1_4	Display Dataline 4 This pin is a GPIO, which can be set to different functions. Pin M02 of processor.
79	NAND_$\overline{\text{RESET}}$ GPIO0_28	Reset signal for NAND-Flash (active low) This pin is a GPIO, which can be set to different functions. Pin L09 of processor.
80	LCD_D06 GPIO1_6	Display Dataline 6 This pin is a GPIO, which can be set to different functions. Pin N02 of processor.
81	SDIO_DATA1 GPIO2_1	SD-Card signal Dataline 1 This pin is a GPIO, which can be set to different functions. Pin C06 of processor.
82	LCD_VSYNC GPIO1_24	Display Dataline Vertical Sync This pin is a GPIO, which can be set to different functions. Pin P04 of processor.
83	GND	Ground (0V)
84	VCC_SUPPLY	Power Supply (+3V3)
85	SDIO_DATA2 GPIO2_2	SD-Card signal Dataline 2 This pin is a GPIO, which can be set to different functions. Pin D06 of processor.
86	SSP2_SS0 GPIO2_19	Synchronous Serial Port 2 This pin is a GPIO, which can be set to different functions. Pin C04 of processor.
87	$\overline{\text{RESET\_OUT}}$	[TLC7733] Reset out signal (active low)
88	SSP2_SCK GPIO2_16	Synchronous Serial Port 2 This pin is a GPIO, which can be set to different functions. Pin A03 of processor.
89	NAND_$\overline{\text{WE}}$ GPIO0_25	Write Enable of NAND-Flash (active low) This pin is a GPIO, which can be set to different functions. Pin P08 of processor.
90	SSP2_MISO GPIO2_18	Synchronous Serial Port 2 This pin is a GPIO, which can be set to different functions. Pin B03 of processor.
91	NAND_$\overline{\text{RE}}$ GPIO0_24	Read Enable of NAND-Flash (active low) This pin is a GPIO, which can be set to different functions. Pin R06 of processor.

Pin	Name	Description
92	SSP2_MOSI GPIO2_17	Synchronous Serial Port 2 This pin is a GPIO, which can be set to different functions. Pin C03 of processor.
93	CAN0_RX GPIO0_23	CAN 0 Receive input This pin is a GPIO, which can be set to different functions. Pin L08 of processor.
94	NAND_ALE GPIO0_26	NAND-Flash address latch enable output This pin is a GPIO, which can be set to different functions. Pin P06 of processor.
95	CAN0_TX GPIO0_22	CAN 0 Transmit output This pin is a GPIO, which can be set to different functions. Pin M08 of processor.
96	NAND_CLE GPIO0_27	NAND-Falsh clock latch enable This pin is a GPIO, which can be set to different functions. Pin P07 of processor.
97	GPIO2_12	This pin is a GPIO, which can be set to different functions. Pin B01 of processor.
98	n.c.	Not connected.
99	$\overline{\text{ENET\_INT}}$ GPIO4_5	Ethernet Interrupt pin (active low output) This pin is a GPIO, which can be set to different functions. Pin E03 of processor.
100	DISP_ON GPIO3_30	Enable Display pin (output) This pin is a GPIO, which can be set to different functions. Pin M06 of processor.
101	GPIO2_13	This pin is a GPIO, which can be set to different functions. Pin C01 of processor.
102	GPIO1_31	This pin is a GPIO, which can be set to different functions. Pin N05 of processor.
103	GPIO2_14	This pin is a GPIO, which can be set to different functions. Pin D01 of processor.
104	GPIO1_28	This pin is a GPIO, which can be set to different functions. Pin L01 of processor.
105	CAN1_TX GPIO0_18	CAN 1 Transmit output This pin is a GPIO, which can be set to different functions. Pin M07 of processor.
106	CAN_EN GPIO0_17	CAN enable pin (output) This pin is a GPIO, which can be set to different functions. Pin N09 of processor.
107	CAN1_RX GPIO0_19	CAN 1 Receive input This pin is a GPIO, which can be set to different functions. Pin M09 of processor.
108	VCC_SUPPLY	Power Supply (+3V3)
109	GND	Ground (0V)
110	nc	not connected
111	nc	not connected
112	nc	not connected

Pin	Name	Description
113	nc	not connected
114	nc	not connected
115	nc	not connected
116	nc	not connected
117	nc	not connected
118	nc	not connected
119	nc	not connected
120	nc	not connected
121	nc	not connected
122	nc	not connected
123	nc	not connected
124	nc	not connected
125	nc	not connected
126	nc	not connected
127	$\overline{\text{USB0\_EN}}$ GPIO2_6	USB port 0 enable signal (active low output) This pin is a GPIO, which can be set to different functions. Pin D05 of processor.
128	n.c.	Not connected.
129	$\overline{\text{USB1\_EN}}$ GPIO2_7	USB port 1 enable signal (active low output) This pin is a GPIO, which can be set to different functions. Pin B04 of processor.
130	n.c.	Not connected.
131	$\overline{\text{USB1\_OC}}$ GPIO2_20	USB port 1 over current detect (active low input) This pin is a GPIO, which can be set to different functions. Pin D03 of processor.
132	n.c.	Not connected.
133	$\overline{\text{USB0\_OC}}$ GPIO2_21	USB port 0 over current detect (active low input) This pin is a GPIO, which can be set to different functions. Pin D04 of processor.
134	n.c.	Not connected.
135	n.c.	Not connected.
136	n.c.	Not connected.
137	USB0_ID GPIO3_18	USB port 0 This pin is a GPIO, which can be set to different functions. Pin K08 of processor.
138	n.c.	Not connected.
139	USB0_DP	USB port 0 (Pin B10 of processor)
140	n.c.	Not connected.
141	USB0_DM	USB port 0 (Pin A10 of processor)
142	n.c.	Not connected.
143	USB1_DP	USB port 1 (Pin A08 of processor)
144	n.c.	Not connected.
145	USB1_DM	USB port 1 (Pin B08 of processor)

Pin	Name	Description
146	n.c.	Not connected.
147	GND	Ground (0V)
148	VCC_BATTERY	Power Supply (+3V3) (internally connected with VCC_SUPPLY)
149	NAND_D00 GPIO0_0	External Dataline 0 This pin is a GPIO, which can be set to different functions. Pin U08 of processor.
150	LCD_D16 GPIO1_16	Display Dataline 16 This pin is a GPIO, which can be set to different functions. Pin T03 of processor.
151	NAND_D01 GPIO0_1	External Dataline 1 This pin is a GPIO, which can be set to different functions. Pin T08 of processor.
152	LCD_D17 GPIO1_17	Display Dataline 17 This pin is a GPIO, which can be set to different functions. Pin R03 of processor.
153	NAND_D02 GPIO0_2	External Dataline 2 This pin is a GPIO, which can be set to different functions. Pin R08 of processor.
154	(+4V2)	Point to measure internal power (do not connect)
155	NAND_D03 GPIO0_3	External Dataline 3 This pin is a GPIO, which can be set to different functions. Pin U07 of processor.
156	(+1V8)	Point to measure internal power (do not connect)
157	NAND_D04 GPIO0_4	External Dataline 4 This pin is a GPIO, which can be set to different functions. Pin T07 of processor.
158	(+3V3)	Point to measure internal power (do not connect)
159	NAND_D05 GPIO0_5	External Dataline 5 This pin is a GPIO, which can be set to different functions. Pin R07 of processor.
160	(+3V3)	Point to measure internal power (do not connect)
161	NAND_D06 GPIO0_6	External Dataline 6 This pin is a GPIO, which can be set to different functions. Pin U06 of processor.
162	PSWITCH_E	Power Switch
163	NAND_D07 GPIO0_7	External Dataline 7 This pin is a GPIO, which can be set to different functions. Pin T06 of processor.
164	SPDIF GPIO3_27	Digital audio interface This pin is a GPIO, which can be set to different functions. Pin D07 of processor.
165	ENET1_TXD1 GPIO4_12	Ethernet 1 Transmit output This pin is a GPIO, which can be set to different functions. Pin G02 of processor.

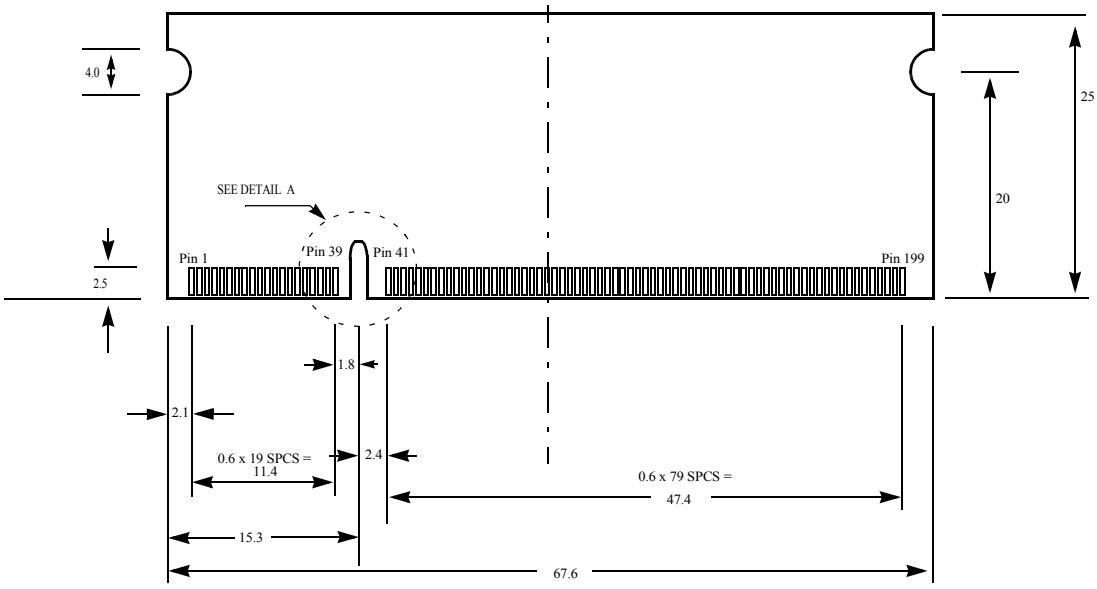
Pin	Name	Description
166	ENET_MDC GPIO4_0	Ethernet MDC This pin is a GPIO, which can be set to different functions. Pin G04 of processor.
167	ENET1_TXD0 GPIO4_11	Ethernet 1 Transmit output This pin is a GPIO, which can be set to different functions. Pin G01 of processor.
168	ENET_MDIO GPIO4_1	Ethernet MDIO This pin is a GPIO, which can be set to different functions. Pin H04 of processor.
169	ENET1_TX_EN GPIO4_14	Ethernet 1 transmit enable This pin is a GPIO, which can be set to different functions. Pin J04 of processor.
170	LCD_D21 GPIO1_21	Display Dataline 21 This pin is a GPIO, which can be set to different functions. Pin U05 of processor.
171	ENET_RESET GPIO4_14	Ethernet Reset This pin is a GPIO, which can be set to different functions. Pin F03 of processor.
172	LCD_D20 GPIO1_20	Display Dataline 20 This pin is a GPIO, which can be set to different functions. Pin R04 of processor.
173	ENET1_RX_EN GPIO4_15	Ethernet 1 Receive enable This pin is a GPIO, which can be set to different functions. Pin J03 of processor.
174	LCD_D19 GPIO1_19	Display Dataline 19 This pin is a GPIO, which can be set to different functions. Pin T04 of processor.
175	ENET1_RXD0 GPIO4_9	Ethernet 1 Receive input This pin is a GPIO, which can be set to different functions. Pin J01 of processor.
176	LCD_D18 GPIO1_18	Display Dataline 18 This pin is a GPIO, which can be set to different functions. Pin U04 of processor.
177	ENET1_RXD1 GPIO4_10	Ethernet 1 Receive input This pin is a GPIO, which can be set to different functions. Pin J02 of processor.
178	LCD_D23 GPIO1_23	Display Dataline 23 This pin is a GPIO, which can be set to different functions. Pin R05 of processor.
179	ENET_CLK GPIO4_16	Ethernet clock This pin is a GPIO, which can be set to different functions. Pin E02 of processor.
180	LCD_D22 GPIO1_22	Display Dataline 22 This pin is a GPIO, which can be set to different functions. Pin T05 of processor.

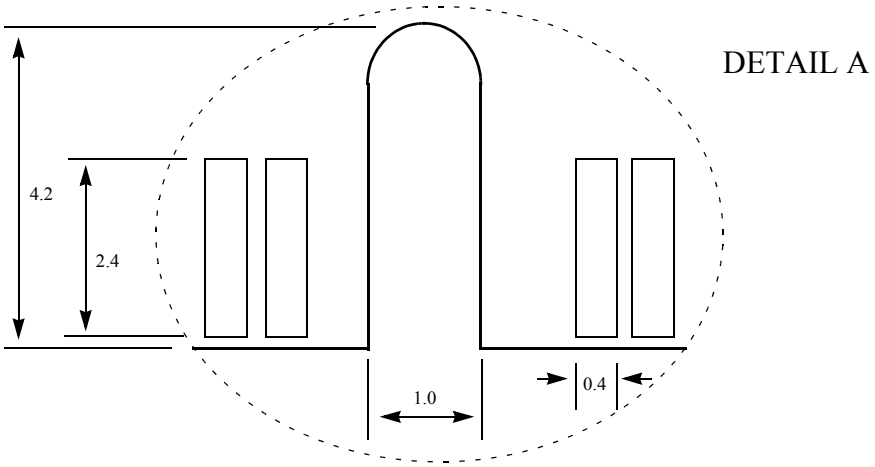
Pin	Name	Description
181	GND	Ground (0V)
182	VCC_BATTERY	Power Supply (+3V3) (internally connected with VCC_SUPPLY)
183	ENET0_LINK	[LAN8710] Ethernet 0 Link
184	n.c.	Not connected.
185	ENET0_SPEED	[LAN8710] Ethernet 0 Speed
186	n.c.	Not connected.
187	ENET0_TXN	[LAN8710] Ethernet 0 transmit output
188	n.c.	Not connected.
189	ENET0_TXP	[LAN8710] Ethernet 0 transmit output
190	SDIO_CMD GPIO2_8	SD-Card command pin This pin is a GPIO, which can be set to different functions. Pin A04 of processor.
191	ENET0_AGND	[LAN8710] Ethernet 0 Ground
192	SDIO_DATA0 GPIO2_0	SD-Card Dataline 0 This pin is a GPIO, which can be set to different functions. Pin B06 of processor.
193	ENET0_RXN	[LAN8710] Ethernet 0 receive input
194	I2C_DATA GPIO3_25	I²C dataline This pin is a GPIO, which can be set to different functions. Pin D08 of processor.
195	ENET0_RXP	[LAN8710] Ethernet 0 receive input
196	I2C_CLK GPIO3_24	I²C clockline This pin is a GPIO, which can be set to different functions. Pin C07 of processor.
197	GND	Ground (0V)
198	VCC_BATTERY	Power Supply (+3V3) (internally connected with VCC_SUPPLY)
199	GND	Ground (0V)
200	VCC_BATTERY	Power Supply (+3V3) (internally connected with VCC_SUPPLY)

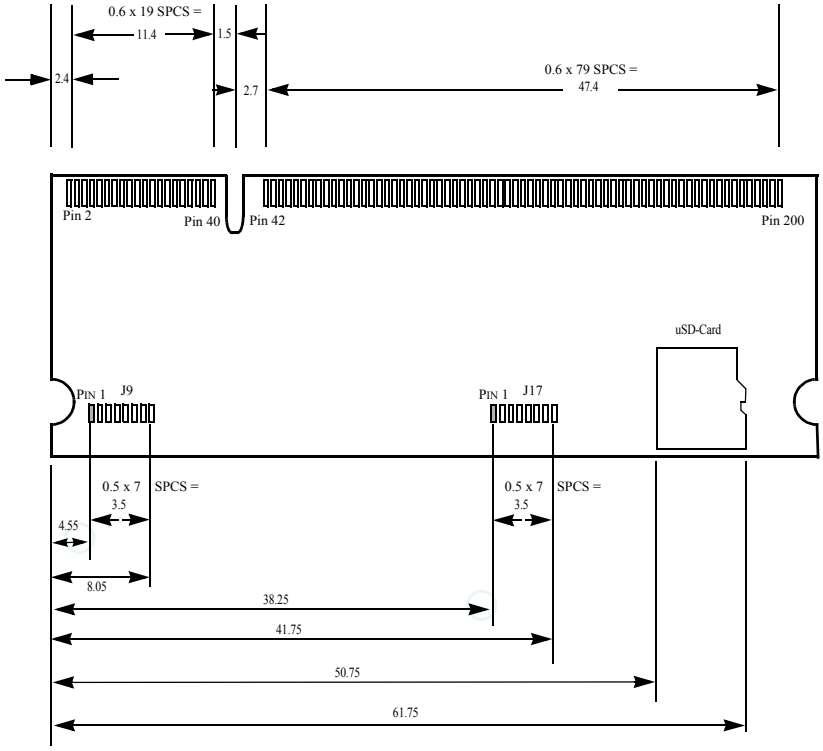
Appendix

5.0 Dimensions of the Trizeps MX28 Module

Figure 2. Dimensions of the Trizeps-MX






0.6 x 19 SPCS =
11.4
1.5
2.4
2.7
0.6 x 79 SPCS =
47.4
Pin 2
Pin 40
Pin 42
Pin 200
uSD-Card
PIN 1
J9
PIN 1
J17
0.5 x 7
SPCS =
3.5
4.55
8.05
0.5 x 7
SPCS =
3.5
38.25
41.75
50.75
61.75

Revision

Board: Trizeps-MX28

Revision	PCB no.	Date		Changes
1.0		26.08.2014	VoB	Initial Version