



TE0728 TRM

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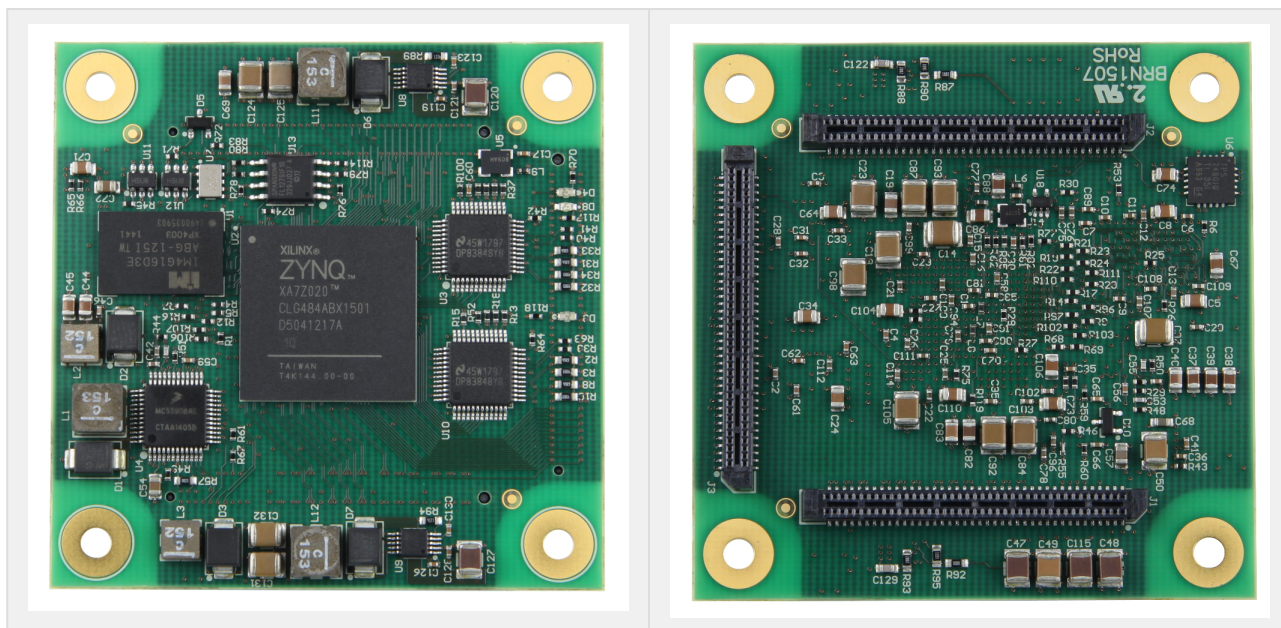
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The Trenz Electronic TE0728 is a SoC module integrating a Xilinx Automotive Zynq-7020, 512 MByte DDR3 SDRAM with 16-Bit width, 16 MByte Flash Memory for configuration and operation, two 100 Megabit Ethernet transceivers, and powerful switch-mode power supplies for all on-board voltages. A large number of configurable I/O's is provided via rugged high-speed stacking strips.

All this in a compact 6 x 6 cm form factor, at the most competitive price.

All parts are at least automotive temperature range up to +105°C. The module operating temperature range depends on customer design and cooling solution. Please contact us for options.



## 2 PS Peripherals (on-board)

Chip/Interface	IC	PS7 Peripheral	
SPI Flash	S25FL127SABMFV10	QSPI0	16 MByte Flash
I2C EEPROM	24xx64	I2C0	8 KByte EEPROM
RTC I2C	RV-3029	I2C0	
RTC Interrupt	RV-3029	GPIO - MIO0	
User LED		GPIO - MIO7	

Mapping table for on-board IC to PS7 Peripherals

MIO Pin	Mapped to	Pull up/down	Notes
0	GPIO	Up	RTC Interrupt
1	QSPI0		
2	QSPI0	Down	
3	QSPI0	Down	
4	QSPI0	Down	Override to up on base for bootmode change
5	QSPI0	Up	
6	QSPI0	Down	
7	GPIO	Down	On-board LED
8	CAN1 TXD	Down	CAN transceiver
9	CAN1 RXD		CAN transceiver
10	SPI1 MOSI		
11	SPI1 MISO		
12	SPI1 SCLK		
13	SPI1 SS0		
14	I2C0 SCL	Up	On-board RTC, and EEPROM
15	I2C0 SDA	Up	On-board RTC, and EEPROM

Recommended Peripheral mapping for MIO Voltage bank 0.

## 2.1 PS7 UART

There is no fixed mapping for PS7 UART, if needed it can be mapped to free pins from MIO1 Bank or via EMIO to PL pins.

Recommended mapping for primary (console, debug) UART are MIO52, MIO53 for all cases when MIO1 is not used for off-board Gigabit ETH PHY.

## 2.2 PL Peripherals

Both Ethernet PHY IC's are connected to PL pins in Bank 34, all PHY IC pins are connected to FPGA pins, there is no sharing of signals for the two PHY's.

PUDC pin is connected with pull-up to 3.3V those pre-configuration pull-ups are disabled by default. Strapping resistor exist to change the PUDC mode.

## 3 PS and PL Banks

Bank	VCCIO	B2B I/O Pins	Notes
500	3.3V	0	
501	USER J2.4 B2B	36	MIO1 VREF is connected to resistor divider to support HSTL18
13	USER J1.39 B2B	48	Differential routing
33	3.3V	33	Single ended routing
34	3.3V	0	Ethernet PHY's
35	3.3V	42	Single ended routing
0	3.3V	4	JTAG, note 3 pins can be used as input only from PL Fabric

## 4 Clock sources

IC	Description	Frequency	Used as
U14	MEMS Oscillator	33.3333 MHz	PS7 PLL clock
U5	MEMS Oscillator	25 MHz	Ethernet PHY Clock
U7	RTC (internal oscillator)	32.768 KHz	Used by RTC, CLKOUT of RTC not connected

## 5 LED's

Designator	Color	Connected to	Active Level	IO Standard
D9	Green	DONE	Low	not applicable
D8	RED	MIO7	High	not applicable
D4	Green	PL pin V18	High	LVC MOS33



## 6 XADC Usage

XADC Pin	Connected to	Notes
AD0	B2B	
AD1	B2B	
AD3	B2B	
AD4	B2B	
AD5	B2B	
AD7P	B2B	
AD7N	<b>GND</b>	
AD8	B2B	
AD9	B2B	
AD10	B2B	
AD12	B2B	
AD13	B2B	
AD14	B2B	
AD15	B2B	

XADC is used with internal reference option.

Note the XADC capable pins are not routed differentially to the B2B connector. The performance and usability of the XADC must be evaluated.

## 7 Ethernet

There are two 100 MBit Extreme Temperature Ethernet PHY's DP83848YB on the board. Datasheet is available from TI, Literature number SNLS208H. Both PHY's are connected with all I/O Pins to FPGA Bank 34 (VCCIO = 3.3V). PHY Clock 25 MHz source is provided from MEMS Oscillator. All LED outputs have on-board pull-ups. Outputs to Magnetics have also required termination resistors on board.

Both PHY's must be operated in MII Mode, other modes are not supported. It is possible to use PS ENET0 or ENET1 via EMIO routing or Ethernet IP Cores implemented in PL Fabric.

	ETH1	ETH2	Pullup	Notes
CTREF	J3.57	J3.25		Magnetics center tap voltage
TD+	J3.58	J3.28	on-board	
TD-	J3.56	J3.26	on-board	
RD+	J3.52	J3.22	on-board	
RD-	J3.50	J3.20	on-board	
LED1	J3.55	J3.23	on-board	
LED2	J3.53	J3.21	on-board	
LED3	J3.51	J3.19	on-board	
POWERDOWN/INT	L21	R20	on-chip	It is recommended to configure FPGA I/O as input with Pullup or as output driving 1 if Interrupt not used.
RESET_N	M15	R16	on-chip	It is recommended to configure FPGA I/O as input with Pullup or as output (active low PHY Reset).

It is recommended to add IOB TRUE constraint for the MII Interface pins.

When connecting the PHY's to Zynq PS ETH0, ETH1 EMIO GMII Interfaces it is recommended to use GMII to MII Wrap IP Core. This IP core maps the EMIO GMII to external MII Interface.

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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.

Trenz Electronic is registered under WEEE-Reg.-Nr. DE97922676.

## 9 Document Change History

Date	Revision	Authors	Description
2015-05-10	0.1		Work in progress
	All	Antti Lukats	