

## Z-turn Lite

- 766MHz Xilinx XC7Z007S or XC7Z010 ARM Cortex-A9 Processor with Xilinx 7-series FPGA logic
- 512MB DDR3 SDRAM (2 x 256MB, 32-bit), 4GB eMMC Flash, 16MB QSPI Flash
- Micro USB2.0 OTG, 1 x 10/100/1000M Ethernet, TF, Debug UART, JTAG...
- Optional Camera Modules and IO Extension Cape
- Supports 7-inch LCD Module through Z-turn Lite IO Cape
- Minimal and compact system of Xilinx Zynq-7007S or Zynq-7010 SoC
- Ready-to-Run Linux Single Board Computer

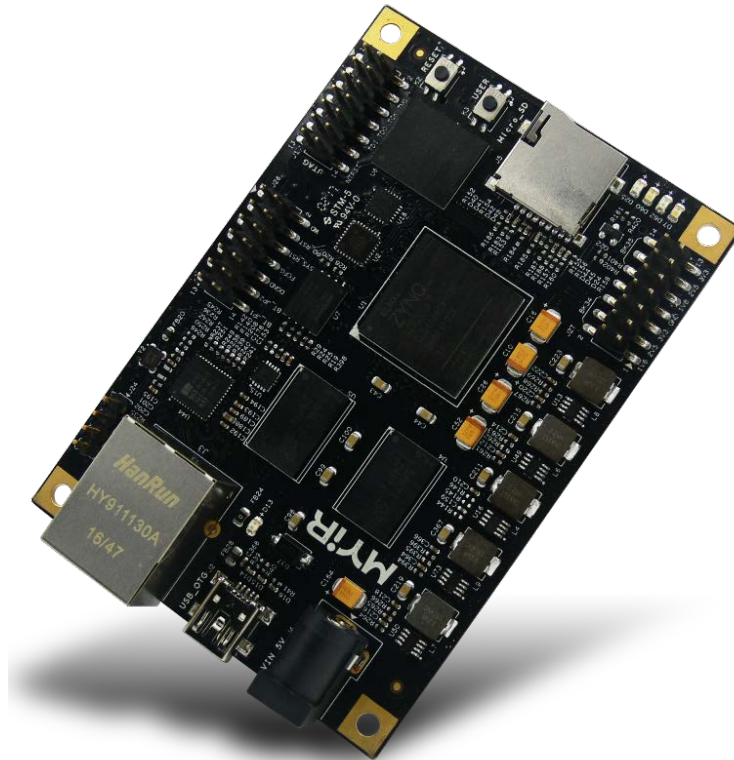


Figure 1-1 Z-turn Lite Board

The Z-turn Lite is an ultra-cost-effective lite version of MYIR's Z-turn board. It is built around Xilinx Zynq-7007S (Single-core) or Zynq-7010 (Dual-core) ARM Cortex-A9 MPCore processor and can work at up to 766MHz. It is a minimal and compact system of Xilinx Z-7007S or Z-7010 SoC and provide numerous pending configuration of PL resources.

The Z-turn Lite takes full features of the Zynq-7007S or Zynq-7010 SoC which leverages the 28nm scalable optimized programmable logic used in Xilinx's 7 series FPGAs. The board is equipped with 512MB DDR3, 4GB eMMC Flash, 16MB QSPI Flash and a set of peripherals on board including Micro USB OTG, 10/100/1000Mbps Ethernet, TF, JTAG, Debug UART, etc. Additionally, there is one 120-pin Expansion connector on the rear of the board to bring out as many as IO signals for user extensions.

The Z-turn Lite is capable of running Linux operating system and provided with Linux 3.15.0 SDK, the kernel and many drivers are in source code. The Z-turn Lite Kit is delivered with complete accessories including one micro USB cable, one Ethernet cable, one 4GB TF card, one USB-to-UART cable and one 5V power adapter and product disk which enables you to start the development quickly when getting the board out-of-the-box. It is an excellent reference design and evaluation board for development based on Xilinx Zynq-7000 series SoCs.

## Hardware Specification

The Zynq-7000 AP SoC leverages the 28nm scalable optimized programmable logic used in Xilinx’s 7 series FPGAs. It comprises single and dual ARM Cortex-A9 equipped devices, providing processor scalability across the platform Zynq-7000S and Zynq-7000.

Zynq-7000S devices are the cost optimized entry point to the Zynq-7000 SoC platform. With a single-core ARM Cortex-A9 processor mated with 28nm Artix®-7 based programmable logic, Zynq-7000S devices are ideal for industrial IoT applications such as motor control and embedded vision.

Zynq-7000 devices are optimized for performance-per-watt and maximum design flexibility. Dual-core ARM Cortex-A9 processors are integrated with 7 series programmable logic to enable highly differentiated designs for a wide range of embedded applications.

### Zynq®-7000 All Programmable SoC Family

		Cost-Optimized Devices						Mid-Range Devices			
Device Name		Z-7007S	Z-7012S	Z-7014S	Z-7010	Z-7015	Z-7020	Z-7030	Z-7035	Z-7045	Z-7100
Part Number		XC7Z007S	XC7Z012S	XC7Z014S	XC7Z010	XC7Z015	XC7Z020	XC7Z030	XC7Z035	XC7Z045	XC7Z100
Processing System (PS)	Processor Core	Single-Core ARM® Cortex™-A9 MPCore™ Up to 766MHz			Dual-Core ARM Cortex-A9 MPCore Up to 866MHz			Dual-Core ARM Cortex-A9 MPCore Up to 1GHz <sup>(1)</sup>			
	Processor Extensions	NEON™ SIMD Engine and Single/Double Precision Floating Point Unit per processor									
	L1 Cache	32KB Instruction, 32KB Data per processor									
	L2 Cache	512KB									
	On-Chip Memory	256KB									
	External Memory Support <sup>(2)</sup>	DDR3, DDR3L, DDR2, LPDDR2									
	External Static Memory Support <sup>(2)</sup>	2x Quad-SPI, NAND, NOR									
	DMA Channels	8 (4 dedicated to PL)									
	Peripherals	2x UART, 2x CAN 2.0B, 2x I2C, 2x SPI, 4x 32b GPIO									
	Peripherals w/ built-in DMA <sup>(2)</sup>	2x USB 2.0 (OTG), 2x Tri-mode Gigabit Ethernet, 2x SD/SDIO									
Security <sup>(3)</sup>	RSA Authentication of First Stage Boot Loader, AES and SHA 256b Decryption and Authentication for Secure Boot										
Processing System to Programmable Logic Interface Ports (Primary Interfaces & Interrupts Only)		2x AXI 32b Master, 2x AXI 32b Slave 4x AXI 64b/32b Memory AXI 64b ACP 16 Interrupts									
Programmable Logic (PL)	7 Series PL Equivalent	Artix®-7	Artix-7	Artix-7	Artix-7	Artix-7	Artix-7	Kintex®-7	Kintex-7	Kintex-7	Kintex-7
	Logic Cells	23K	55K	65K	28K	74K	85K	125K	275K	350K	444K
	Look-Up Tables (LUTs)	14,400	34,400	40,600	17,600	46,200	53,200	78,600	171,900	218,600	277,400
	Flip-Flops	28,800	68,800	81,200	35,200	92,400	106,400	157,200	343,800	437,200	554,800
	Total Block RAM (# 36Kb Blocks)	1.8Mb (50)	2.5Mb (72)	3.8Mb (107)	2.1Mb (60)	3.3Mb (95)	4.9Mb (140)	9.3Mb (265)	17.6Mb (500)	19.1Mb (545)	26.5Mb (755)
	DSP Slices	66	120	170	80	160	220	400	900	900	2,020
	PCI Express®	—	Gen2 x4	—	—	Gen2 x4	—	Gen2 x4	Gen2 x8	Gen2 x8	Gen2 x8
	Analog Mixed Signal (AMS) / XADC <sup>(2)</sup>	2x 12 bit, MSPS ADCs with up to 17 Differential Inputs									
	Security <sup>(3)</sup>	AES & SHA 256b Decryption & Authentication for Secure Programmable Logic Config									
	Speed Grades	Commercial	-1			-1			-1		
	Extended	-2			-2,-3			-2,-3			-2
	Industrial	-1, -2			-1, -2, -1L			-1, -2, -2L			-1, -2, -2L

**Notes:**

- 1 GHz processor frequency is available only for -3 speed grades for devices in flip-chip packages. See [DS190](#), Zynq-7000 All Programmable SoC Overview for details.
2. Z-7007S and Z-7010 in CLG225 have restrictions on PS peripherals, memory interfaces, and I/Os. Please refer to [UG585](#), Zynq-7000 All Programmable SoC Technical Reference Manual for more details.
3. Security block is shared by the Processing System and the Programmable Logic.

Figure 1-2 ZYNQ-7000 Device Family

The Z-turn Lite is based on the Xilinx Zynq-7007S or Zynq-7010 SoC and the hardware specification is listed in following table1-1:

Item	Features
SoC	Xilinx XC7Z007S-1CLG400C (Zynq-7007S) or XC7Z010-1CLG400C (Zynq-7010) - ARM® Cortex™-A9 MPCore processor Up to 766MHz single-core processor (for XC7Z007S) 766MHz dual-core processor (up to 866MHz, for XC7Z010) - Integrated Artix-7 class FPGA subsystem with 23K logic cells, 14,400 LUTs, 66DSP slices (for XC7Z007S) with 28K logic cells, 17,600 LUTs, 80 DSP slices (for XC7Z010) - NEON™ & Single / Double Precision Floating Point for each processor - Supports a Variety of Static and Dynamic Memory Interfaces
Memory	512MB DDR3 SDRAM (2 x 256MB, 32-bit)
Storage	4GB eMMC Flash 16MB QSPI Flash TF card interface
Communications	1 x 10/100/1000M Ethernet 1 x Micro USB2.0 OTG
Input and Output	1 x 2.54mm pitch 14-pin JTAG interface 1 x 0.5mm pitch 120 Position Connector Socket for Expansion interface 1 x 2.54mm pitch 4-pin Debug UART interface
Others	2 x Buttons (1x Reset, 1 x User) 5 x LEDs - 1 x User LED - 1 x FPGA configuration indicator - 1 x FPGA initialization indicator - 1 x Power indicator - 1 x USB overcurrent indicator
Dimensions	91mm x 63mm (10-layer PCB design )
Power supply	DC 5V/2A
Temp.	0~70 Celsius
Power consumption	8W
OS Support	Linux 3.15.0
Target Applications	Evaluation and Prototyping for Zynq-7000 AP SoC Multi-Axis Motor Control Machine Vision Programmable Logic Controller Industrial Automation Test & measurement

*Table 1-1 Z-turn Lite Hardware Specification*

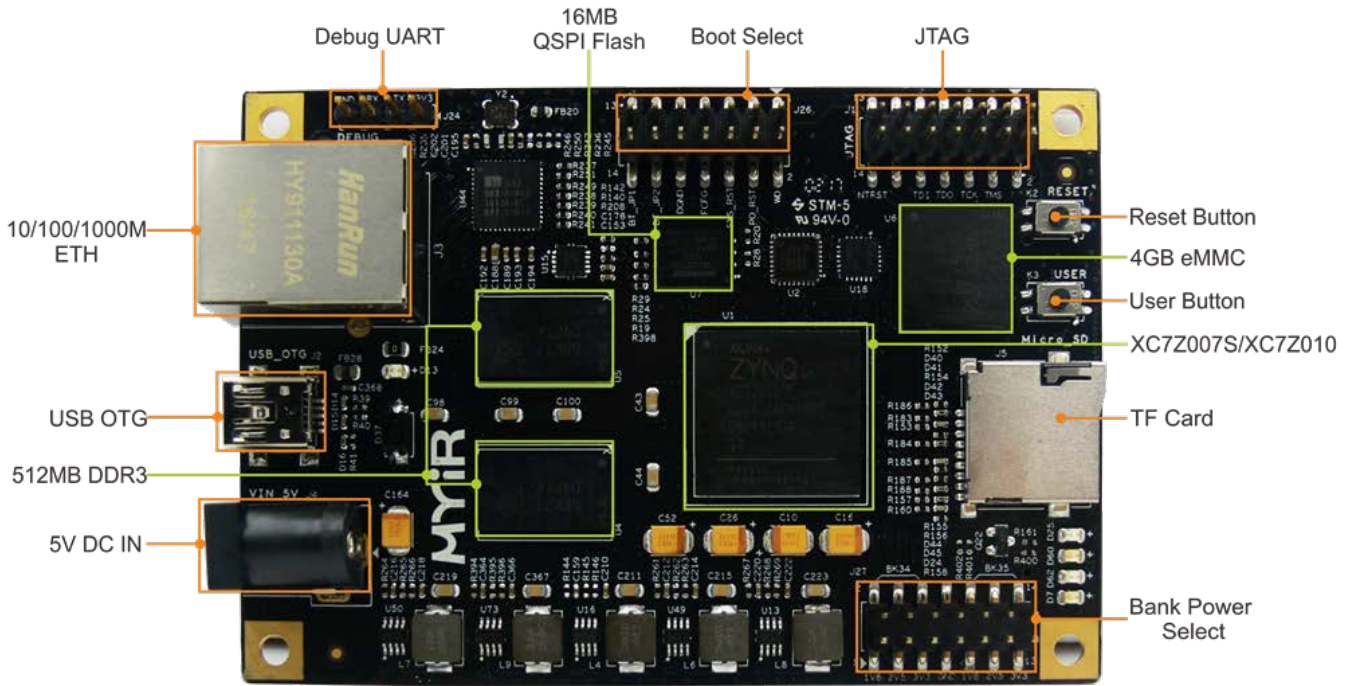


Figure 1-3 Z-turn Lite (Top-view)

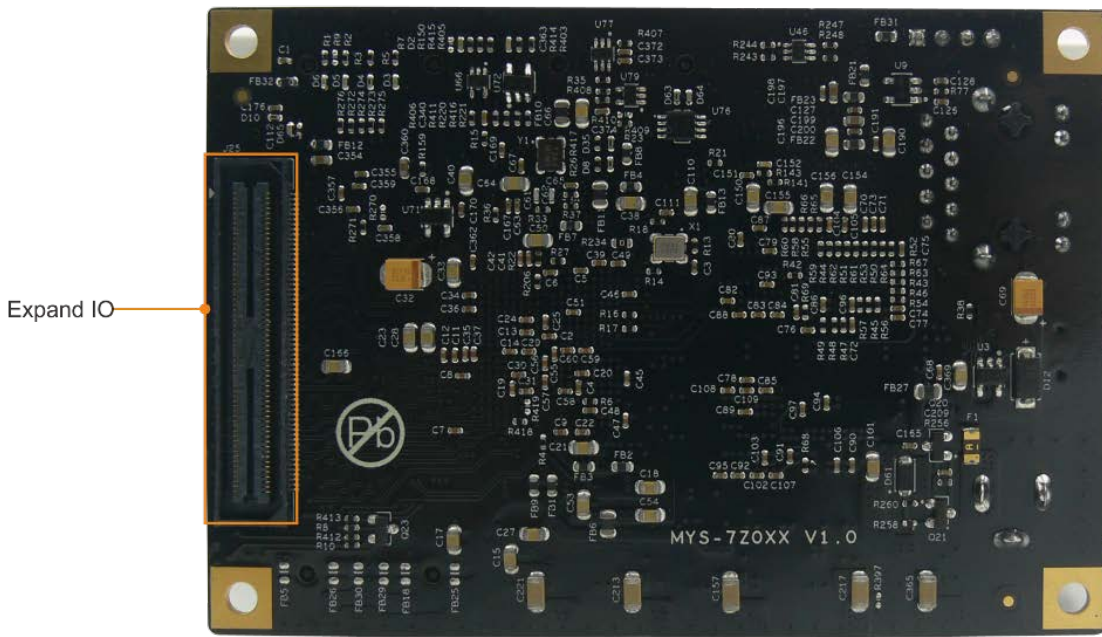


Figure 1-4 Z-turn Lite (Bottom-view)

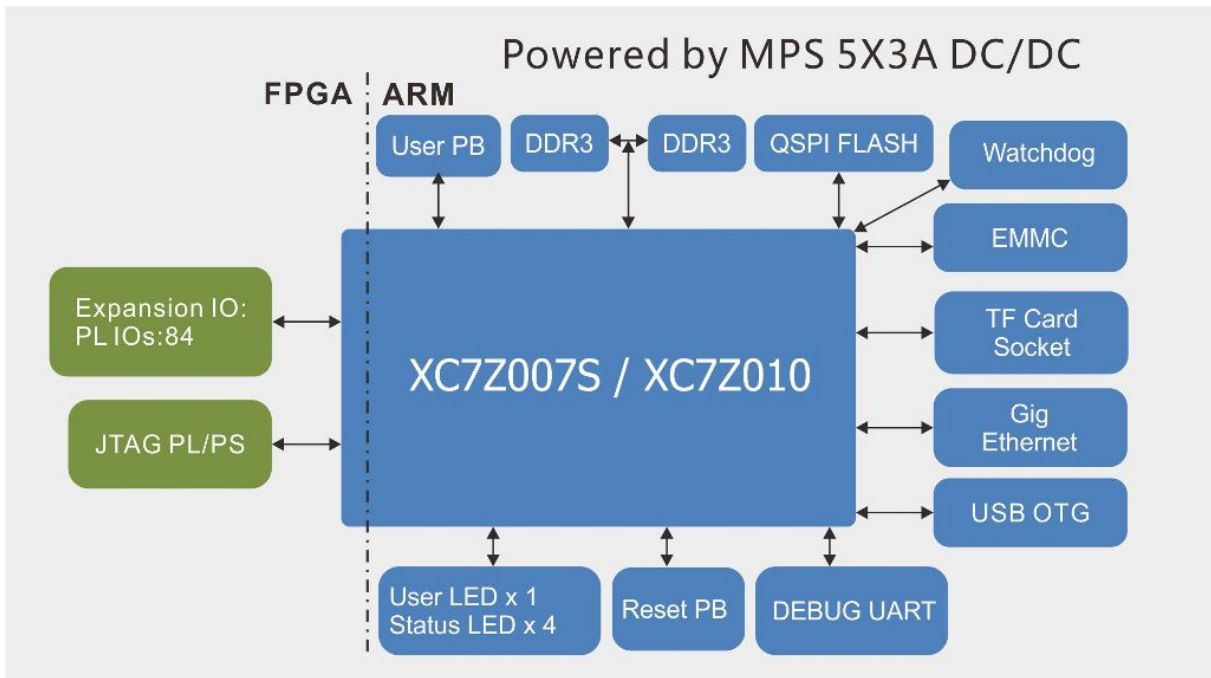


Figure 1-5 Z-turn Lite Function Block Diagram

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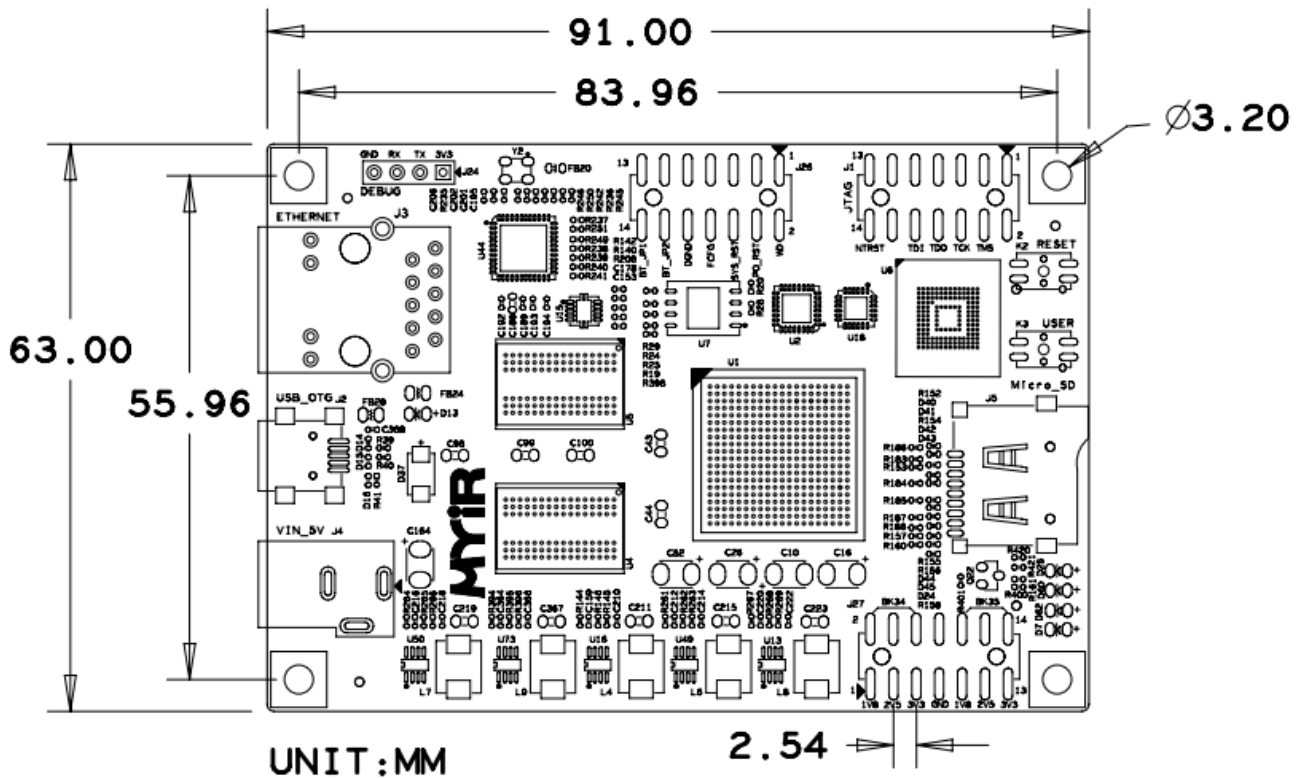


Figure 1-6 Z-turn Lite Dimension Chart

**Software Features**

Item	Features	Description	Remark
Cross compiler	gcc 4.6.1	gcc version 4.6.1 (Sourcery CodeBench Lite 2011.09-50)	
Boot program	BOOT.BIN	First boot program including FSBL, bitstream and u-boot	Source code provided
Linux Kernel	Linux 3.15.0	Customized kernel for Z-turn Lite	Source code provided
Drivers	USB OTG	USB OTG driver	Source code provided
	Ethernet	Gigabit Ethernet driver	Source code provided
	MMC/SD/TF	MMC/SD/TF card driver	Source code provided
	Button	Button driver	Source code provided
	UART	UART driver	Source code provided
	LED	LED driver	Source code provided
	GPIO	GPIO driver	Source code provided
	Watchdog	Watchdog driver	Source code provided
File System	Ramdisk	Ramdisk system image	

*Table 1-2 Software Features of Z-turn Lite*

**Order Information**

Item	Part No.	Packing List
Z-turn Lite	MYS-7Z007S-C-S	<ul style="list-style-type: none"> <li>➤ One Z-turn Lite (for Zynq-7007S)</li> <li>➤ One product disk</li> </ul>
	MYS-7Z010-L-C-S	<ul style="list-style-type: none"> <li>➤ One Z-turn Lite (for Zynq-7010)</li> <li>➤ One product disk</li> </ul>
Z-turn Lite Kit	MYS-7Z007S-C	<ul style="list-style-type: none"> <li>➤ One Z-turn Lite (for Zynq-7007S)</li> <li>➤ One 1.5m cross Ethernet cable</li> <li>➤ One 1.2m Micro USB2.0 cable</li> <li>➤ One MY-UART012U USB-to-UART cable</li> <li>➤ One 4GB TF card</li> <li>➤ One 5V/2A Power adapter</li> <li>➤ One product disk (including user manual, schematic in PDF format, datasheets and software package)</li> </ul>
	MYS-7Z010-L-C	<ul style="list-style-type: none"> <li>➤ One Z-turn Lite Board (for Zynq-7010)</li> <li>➤ One 1.5m cross Ethernet cable</li> <li>➤ One 1.2m Micro USB2.0 cable</li> <li>➤ One MY-UART012U USB-to-UART cable</li> <li>➤ One 4GB TF card</li> <li>➤ One 5V/2A Power adapter</li> <li>➤ One product disk (including user manual, schematic in PDF format, datasheets and software package)</li> </ul>
Z-turn Lite IO Cape	MY-CAPE002	Optional IO Expansion Board
USB Camera Module	MY-CAM002U	Optional USB Camera Module
MY-LCD70TP-C	MY-TFT070CV2	7-inch LCD Module with Capacitive Touch Screen


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