Zynq®-7000 All Programmable SoC Systems Guide
From Concept to Production
Design it or Buy it?

Avnet’s ready-made SoC modules can shorten your development cycle

Today’s quick time-to-market demands are forcing you to rethink how you design, build and deploy your products. Sometimes it’s faster, less costly, and lower risk to incorporate an off-the-shelf solution instead of designing from the beginning. Avnet’s System-On-Module (SOM) and Single-Board Computer (SBC) solutions for the Xilinx Zynq®-7000 All Programmable SoC can reduce development times by more than four months, allowing you to focus your efforts on adding differentiating features and unique capabilities.

Avnet’s SoC Modules Offer the Following Benefits:

• Reduce risk by building your application upon a known working system
• Get running quickly with example designs, tutorials, and board support packages
• Start software development immediately
• Customize the module with Avnet Engineering Services (e-mail us at customize@avnet.com to explore the options)

With over ten years of experience building SOM products, we’ve helped many companies attain a jump start on their products and get to market faster. Contact us today to get started!

Avnet’s Zynq-7000 All Programmable SoC SOM Solutions

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1 - Resale based on 1k units (lowest temperature grade)
2 - Zynq PL IO / PS MIO
3 - PicoZed and PicoZed SDR use low-power DDR3L memory
4 - PicoZed SDR resale based on 100 unit purchase

Pmod is a registered trademark of Digilent
Wind River® Pulsar™ Linux

Now Included with MicroZed, PicoZed and Mini-ITX

To keep project deadlines, everything has to work seamlessly, and a COTS solution is not complete without software. Avnet Zynq SOM kits come prepackaged with Wind River® Pulsar™ Linux – a small, high-performance, secure, and manageable Linux distribution designed to simplify and speed up your embedded and Internet of Things (IoT) development projects.

Typically, you need hours or days to prepare your Linux platform before starting application development. With Pulsar Linux, you can shorten this time to minutes. Best of all, Pulsar Linux is available at no additional cost.

Pulsar Linux is a binary distribution certified on Avnet’s MicoZed, PicoZed, and Mini-ITX Zynq platforms and comes:

- Validated and prepackaged at no additional cost
- Integrated with Pulsar Security Shield to access regular bug and security fixes
- Connected to cloud tools for remote application development
- With a container-based architecture for application isolation and management

Pulsar Linux powers a wide range of IoT systems from gateways to sensor rich edge nodes. Visit pulsar.windriver.com for additional product documentation.
PicoZed™

PicoZed™ is a highly flexible, rugged SOM that is based on the Xilinx Zynq®-7000 All Programmable SoC. It offers designers the flexibility to migrate between the 7010, 7015, 7020, and 7030 Zynq-7000 All Programmable SoC devices in a pin-compatible footprint. The PicoZed module contains the common functions required to support the core of most SoC designs, including memory, configuration, Ethernet, USB, clocks, and power. It provides easy access to over 100 user I/O pins through three I/O connectors on the backside of the module. These connectors also support access to dedicated interfaces for Ethernet, USB, JTAG, power and other control signals, as well as the GTP/GTX transceivers on the 7015/7030 models. The transceiver based 7015 and 7030 versions of PicoZed are a superset of the 7010/7020 version, adding four high-speed serial transceiver ports to the I/O connectors. Designers can simply design their own carrier card, plug-in PicoZed, and start their application development with a proven Zynq-7000 All Programmable SoC sub-system.

**Key Features**

- **SoC options**
  - XC7Z010-1CLG400
  - XC7Z015-1CLG485
  - XC7Z020-1CLG400
  - XC7Z030-1SBG485

- **Memory**
  - 1 GB of DDR3L SDRAM
  - 256 Mb of QSPI Flash
  - 4 GB eMMC

- **Communications**
  - 10/100/1000 Ethernet PHY
  - USB 2.0 OTG PHY

- **User I/O (via three board-to-board connectors)**
  - 7Z010 Version
    - 113 User I/O (100 PL, 13 PS MIO)
    - PL I/O configurable as up to 48 LVDS pairs or 100 single-ended I/O
  - 7Z015 Version
    - 148 User I/O (135 PL, 13 PS MIO)
    - PL I/O configurable as up to 65 LVDS pairs or 135 single-ended I/O
    - 4 GTP Transceivers
  - 7Z020 Version
    - 138 User I/O (125 PL, 13 PS MIO)
    - PL I/O configurable as up to 60 LVDS pairs or 125 single-ended I/O
  - 7Z030 Version
    - 148 User I/O (135 PL, 13 PS MIO)
    - PL I/O configurable as up to 65 LVDS pairs or 135 single-ended I/O
    - 4 GTX Transceivers

- **Other**
  - JTAG configuration port accessible via I/O connectors
  - PS JTAG pins accessible via I/O connectors
  - 33.33 MHz oscillator

- **Software**
  - Linux BSP and reference design

- **Mechanical**
  - 4 inches x 2.25 inches (102 mm x 57 mm)

Industrial Temperature PicoZed SOMs are built with components supporting extended temperatures of -40 to +85°C. Due to the configurability of the Zynq device, the user must perform final temperature testing validation.

**Ordering Information**

<table>
<thead>
<tr>
<th>Description</th>
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<td>7010 PicoZed SOM</td>
<td>AES-Z7P2-7Z010-SOM-G</td>
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<td>7010 Ind. Temp PicoZed SOM</td>
<td>AES-Z7P2-7Z010-SOM-I-G</td>
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<td>7015 PicoZed SOM</td>
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<td>7030 PicoZed SOM</td>
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*contact your local Avnet sales office for pricing on higher quantities

Additional information and downloadable documentation for PicoZed can be obtained at [www.picozed.org](http://www.picozed.org).
Avnet’s PicoZed Software Defined Radio (SDR) 2x2 features the Xilinx Z7035 Zynq-7000 All Programmable SoC and Analog Devices AD9361 RF Agile Transceiver. In a handheld form-factor PicoZed SDR provides frequency-agile wideband 2x2 receive and transmit paths in the 70 MHz to 6.0 GHz range, making it ideal for a broad range of fixed and mobile SDR applications. Integrating the critical RF signal path and high-speed programmable logic in a fully-verified system-on-module (SOM), PicoZed SDR forms the RF-to-baseband signal processing core of a wireless communications system, allowing you to focus on the differentiating features of your product. With available carrier cards for fast prototype and supported by robust simulation and code generation tools that integrate seamlessly with Xilinx Vivado® Design Suite, PicoZed SDR enables dramatic reduction in design cycles of your software-defined radio products.

**Key Features**
- Fully-verified, low-power, rugged system-on-module (SOM) ready for end-product deployment
- Supported by MATLAB® and Simulink® for data streaming and Zynq targeting
- Industrial temperature rated production-ready SOM
- Conforms to MIL-STD 202G for thermal, vibration, and shock

**Digital Processing**
- Xilinx Zynq XC7Z035-L2FBG676I AP SoC
- 1GB DDR3L SDRAM
- 256Mb QSPI Flash
- microSD Card Interface
- 10/100/1000 Ethernet PHY
- USB 2.0 OTG PHY
- 209 User I/O + 4 GTX channels

**Radio Transceiver**
- Analog Devices AD9361-BBCZ integrated RF Agile Transceiver™
- RF 2 × 2 transceiver with integrated 12-bit DACs and ADCs
- Band: 70 MHz to 6.0 GHz
- TDO and FDD operation
- Tunable channel BW: <200 kHz to 56 MHz
- Supports MIMO radio: < 1 sample sync on both ADC and DAC
- Miniature RF connectors – 4 TX, 4 RX, 2 TX monitor
- Voltage regulation and sequencing with power-good failsafe circuits
- Power and signal interface through 4 micro header connectors
- Clock and frequency synthesis circuits
- Includes schematics, BOM, HDL, Linux drivers and application software

**Ordering Information**

<table>
<thead>
<tr>
<th>Description</th>
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<tr>
<td>PicoZed SDR 2x2 SOM with Xilinx Zynq Z7035 and Analog Devices AD9361</td>
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*Contact your local Avnet sales office for pricing on higher quantities.

Additional information and downloadable documentation for PicoZed can be obtained at www.picozed.org.
MicroZed™

MicroZed is a low-cost SOM that is based on the Xilinx Zynq®-7000 All Programmable SoC. In addition to the Zynq-7000 All Programmable SoC, the module contains the common functions and interfaces required to support the core of most SoC designs, including memory, configuration, Ethernet, USB, and clocks. On the bottom side of the module, MicroZed contains two 100-pin I/O headers that provide connection to two I/O banks on the programmable logic (PL) side of the Zynq-7000 All Programmable SoC device. When plugged onto a user designed baseboard or carrier card, these 100-pin connectors provide connectivity between the Zynq-7000 All Programmable SoC PL I/Os and the user circuits on the carrier card. MicroZed also includes onboard power regulation that supports 5 V input with an option to support 12 V input.

Key Features

- **SoC**
  - XC7Z010-1CLG400 or XC7Z020-1CLG400
- **Memory**
  - 1 GB of DDR3 SDRAM
  - 128 Mb of QSPI Flash
  - Micro SD card interface
- **Communications**
  - 10/100/1000 Ethernet
  - USB 2.0 OTG PHY
  - USB-UART
- **User I/O (via dual board-to-board connectors)**
  - 7Z010 Version
    - 108 User I/O (100 PL, 8 PS MIO)
    - PL I/O configurable as up to 48 LVDS pairs or 100 single-ended I/O
  - 7Z020 Version
    - 123 User I/O (115 PL, 8 PS MIO)
    - PL I/O configurable as up to 55 LVDS pairs or 115 single-ended I/O
- **Other**
  - 2x6 Digilent Pmod® compatible interface providing 8 PS MIO connections for user I/O
  - Xilinx PC4 JTAG configuration port
  - PS JTAG pins accessible via Pmod or I/O headers
  - 33.33 MHz oscillator
  - User LED and push switch
- **Software**
  - Linux BSP and reference design
- **Mechanical**
  - 4 inches x 2.25 inches (102 mm x 57 mm)

Ordering Information

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<tr>
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*contact your local Avnet sales office for pricing on higher quantities

Industrial Temperature MicroZed SOMs are built with components supporting extended temperatures of -40 to +85°C, with the exception of the use of the uSD card connector. Due to the configurability of the Zynq device, the user must perform final temperature testing validation.

Additional information and downloadable documentation for MicroZed can be obtained at [www.microzed.org](http://www.microzed.org).
Zynq Mini-Module Plus

The Mini-Module Plus (MMP) is a SOM based on the higher density Xilinx Zynq-7000 All Programmable SoCs. The module contains all the necessary functions and interfaces for a high-performance SoC system. The MMP features the two highest density 7045 or 7100 Zynq devices in a pin-compatible SOM, with support for eight GTX serial transceiver interfaces running up to 8.0 Gbps each. In addition to the serial transceivers, there are 132 PL based user I/O made available on the two high density board-to-board connectors located on the underside of the module.

Key Features

- **SoC**
  - XC7Z045-1FFG900C or XC7Z100-2FFG900I
- **Memory**
  - 1 GB of DDR3 SDRAM
  - 128 MB of parallel Flash
  - 256 Mb of QSPI Flash
  - 8 KB of I²C EEPROM
  - Micro SD card interface
- **Communications**
  - 10/100/1000 Ethernet
  - USB 2.0 OTG PHY
  - USB-UART
- **User I/O (via dual board-to-board connectors)**
  - 132 User I/O (66 per connector)
  - Configurable as up to 66 LVDS pairs
  - or 132 single-ended I/O
  - 8 GTX ports (4 per connector)
- **Other**
  - Real-time clock
  - Programmable GTX reference clock
  - 200 MHz LVDS oscillator
  - 33.33 MHz processor clock
  - Xilinx PC4 JTAG configuration port
  - Processor PJTAG header
- **Software**
  - Linux BSP and reference design
- **Mechanical**
  - 4 inches x 2.25 inches (102 mm x 57 mm)

Ordering Information

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*SOM versions do not include license voucher for Vivado® software.

Additional information and downloadable documentation for the Zynq Mini-Module Plus can be obtained at [www.zedboard.org/product/zyng-mmp](http://www.zedboard.org/product/zyng-mmp).
Zynq Mini-ITX

The Zynq®-7000 All Programmable SoC Mini-ITX platform provides an industry standard, motherboard form-factor for designers seeking a high performance platform based on the Xilinx Zynq-7000 All Programmable SoC. Available with either the 7Z045 or 7Z100 SoC, the Mini-ITX offers the unique mix of user configurability, expandability, and standard interfaces that designers are looking for.

Key Features

• SoC
  - XC7Z045-2FFG900 or XC7Z100-2FFG900

• Memory
  - 1 GB of DDR3 SDRAM (PS side)
  - 1 GB of DDR3 SDRAM (PL side)
  - 256 Mb of QSPI Flash
  - 8 KB of I2C EEPROM
  - Micro SD card interface

• Communications
  - 10/100/1000 Ethernet
  - SFP+ socket
  - 4-Port USB 2.0 hub
  - USB-UART
  - SATA-III interface (requires PL core)

• Expansion
  - PCIe Gen2 x4 electrical, x16 mechanical slot (Root Complex)
  - FMC slot (HPC)

• Other
  - HDMI output port
  - LVDS LCD panel interface
  - Audio input and output
  - Real-time clock
  - Programmable GTX reference clock
  - 200 MHz LVDS oscillator
  - 33.33 MHz processor clock
  - Xilinx PC4 JTAG configuration port
  - Processor PJTAG header
  - 8 User LEDs
  - Push and DIP switches
  - Standard ATX power connector input

• Software
  - Linux BSP and reference design

• Mechanical
  - 6.7 inches x 6.7 inches (170 mm x 170 mm)

Ordering Information

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*contact your local Avnet sales office for pricing on higher quantities

Additional information and downloadable documentation for the Zynq Mini-ITX can be obtained at www.zedboard.org/product/mini-itx.
# Additional SoC Development Kits, Carrier Cards, and Accessories

## PicoZed

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<tr>
<td>PicoZed Carrier Card V2</td>
<td>AES-PZCC-FMC-V2-G</td>
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<tr>
<td>PicoZed Smart Vision Kit</td>
<td>AES-Z7PZ-SVDK-G</td>
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<td><a href="http://www.picozed.org">www.picozed.org</a></td>
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<td>PicoZed SDR Breakout Carrier</td>
<td>AES-PZSDRCC-BRK-G</td>
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<td>PicoZed SDR FMC Carrier</td>
<td>AES-PZSDRCC-FMC-G</td>
<td>$595</td>
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## MicroZed

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<td>MicroZed Evaluation Kit</td>
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<td>MicroZed Industrial IoT Upgrade Kit</td>
<td>AES-Z7MB-IIOT-UP-G</td>
<td>$129</td>
<td><a href="http://www.microzed.org">www.microzed.org</a></td>
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<td>JTAG HS3 Programming Cable</td>
<td>210-299P-KIT</td>
<td>$55</td>
<td><a href="http://www.em.avnet.com/jtaghs3">www.em.avnet.com/jtaghs3</a></td>
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## Zynq Mini-Module Plus

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<td>GE Energy Power Module</td>
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<td>$300</td>
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<td>Panasonic Power Module</td>
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<td>Rohm Power Module</td>
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*Contact Avnet for volume pricing on Power Modules*

## Mini-ITX

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<th>Kit Name</th>
<th>Part Number</th>
<th>Resale</th>
<th>Website</th>
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<tbody>
<tr>
<td>Z7045 Mini-ITX Base Kit</td>
<td>AES-MINI-ITX-7Z045-BAS-G</td>
<td>$1,995</td>
<td><a href="http://www.zedboard.org">www.zedboard.org</a></td>
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<tr>
<td>Z7100 Mini-ITX Base Kit</td>
<td>AES-MINI-ITX-7Z100-BAS-G</td>
<td>$2,195</td>
<td><a href="http://www.zedboard.org">www.zedboard.org</a></td>
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<td>Z7045 Mini-ITX System Kit</td>
<td>AES-MINI-ITX-7Z045-SYS-G</td>
<td>$2,295</td>
<td><a href="http://www.zedboard.org">www.zedboard.org</a></td>
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<tr>
<td>Z7100 Mini-ITX System Kit</td>
<td>AES-MINI-ITX-7Z100-SYS-G</td>
<td>$2,495</td>
<td><a href="http://www.zedboard.org">www.zedboard.org</a></td>
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## Other Kits

<table>
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<th>Kit Name</th>
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<tr>
<td>ZedBoard</td>
<td>AES-Z7EV-7Z020-G</td>
<td>$475</td>
<td><a href="http://www.zedboard.org">www.zedboard.org</a></td>
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<td>ZC702 Evaluation Kit</td>
<td>EK-Z7-ZC702-G</td>
<td>$895</td>
<td><a href="http://www.em.avnet.com/ZC702">www.em.avnet.com/ZC702</a></td>
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<tr>
<td>ZC706 Evaluation Kit</td>
<td>EK-Z7-ZC706-G</td>
<td>$2,495</td>
<td><a href="http://www.em.avnet.com/ZC706">www.em.avnet.com/ZC706</a></td>
</tr>
</tbody>
</table>
System-on-Module Carrier Cards

**PicoZed™**

**Key Features**

- USB card socket
- x1 PCIe Gen 2
- SFP+ cage
- SMA port for GTX/GTP
- 10/100/1000 Ethernet connector
- USB 2.0 connector
- LPC FMC Expansion

**MicroZed™**

**Key Features**

**Breakout Carrier Card**

- Two 60-pin (2x30) 0.1" footprints

**FMC Carrier Card**

- LPC FMC expansion connector
- Up to 4 Pmod™ expansion connectors

**I/O Carrier Card**

- Up to 12 Pmod™ expansion connectors

**Embedded Vision Carrier Card**

- Camera interface
- HDMI Input/Output
  (based on ADI ADV7511/7611)
- Power-over-Ethernet via
  2nd Ethernet 10/100/1000 port

**Mini-Module Plus**

**Key Features**

- One Mini-Module Plus Slot
- One FMC LPC slot
  (2.5 or 3.3 V VADJ)
- PCIe x4 edge connector
- One SFP socket
- DisplayPort output
- Two PMOD headers
- Micro SD card interface

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