



**DesignWare**  
**ARC EM Starter Kit 2.1**  
**Release Notes**

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# 1

## Introduction

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*This document describes features of the ARC EM Starter Kit. It also provides information about supported platforms, installation structure, and release change information.*

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## About This Release

This release contains the DesignWare ARC EM Starter Kit.

The following release summary is available for the ARC EM Starter Kit:

- [Supported Platforms](#)
- [Features](#)
- [Peripheral Drivers](#)
- [Bare-Metal Application Examples](#)
- [MQX Application Examples](#)
- [Installation Structure](#)
- [Documentation](#)
- [Release Change Information](#)

## Supported Platforms

The ARC EM Starter Kit implementation supports the following products and platforms:

- Microsoft Windows 7 64-bit
- DesignWare® ARC® MetaWare Lite J-2014.12
- DesignWare® ARC® MetaWare Development Toolkit J-2014.06 or later
- GNU Toolchain for DesignWare® ARC® Processors 2014.08 or later
- DesignWare® ARC® MQX RTOS 2.61c (provided with ARC EM Starter Kit)
- Digilent Adept driver 2.16.1 System (32/64-bit Windows) or later
- Xilinx LAB Tools <sup>1)</sup> 14.7

1) Only needed for firmware updates

## Features

The ARC EM Starter Kit supports the following features:

- Rapid system bring-up for early software development
- Ready to use out-of-the-box
- Based on Xilinx Spartan-6 LX150 128 MB DDR3
- Supports different configurations of DesignWare® ARC EM5D and ARC EM7D processors
- Flexible selection of UART, SPI, I2C and GPIO peripherals
- Six connectors for hardware extensions
- 2.5 MB available for application software
- Flash SD card for additional application software and data storage
- MQX real-time operating system including peripheral drivers
- Application examples

## Peripheral Drivers

[Table 1](#) on page 5 provides an overview of the available drivers for devices on the ARC EM Starter Kit board.

Table 1 Overview of ARC EMSK drivers

| Peripheral Controller | Bare-Metal | MQX |
|-----------------------|------------|-----|
| DW – SPI              | +          | +   |
| DW – UART             | +          | +   |
| DW – I <sup>2</sup> C | +          | +   |
| DW – GPIO             | +          | +   |
| SD Card <sup>1)</sup> | -          | +   |
| SPI Flash             | +          | -   |

1) SD card access through SPI.

## Bare-Metal Application Examples

Table 2 lists the available bare-metal application examples.

Table 2 List of Bare-Metal Application Examples

| Application Name | Supported Toolchain                                                                                        | Description                                                                                                                                                                   |
|------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| hello            | <ul style="list-style-type: none"> <li>ARC MetaWare Lite</li> <li>ARC MetaWare</li> </ul>                  | This example prints “hello world” in the debugger console.                                                                                                                    |
| hello_uart       | <ul style="list-style-type: none"> <li>ARC MetaWare Lite</li> <li>ARC MetaWare</li> <li>ARC GNU</li> </ul> | This example prints “hello world” in the UART console.                                                                                                                        |
| adc              | <ul style="list-style-type: none"> <li>ARC MetaWare Lite</li> <li>ARC MetaWare</li> <li>ARC GNU</li> </ul> | This application demonstrates reading data from an external ADC module PmodAD2 connected to the extension port Pmod2.                                                         |
| fibonacci        | <ul style="list-style-type: none"> <li>ARC MetaWare Lite</li> <li>ARC MetaWare</li> <li>ARC GNU</li> </ul> | This application is a simple math example. It calculates a Fibonacci sequence and returns 0 in case of getting correct result of calculation otherwise application returns 1. |
| leds             | <ul style="list-style-type: none"> <li>ARC MetaWare Lite</li> <li>ARC MetaWare</li> <li>ARC GNU</li> </ul> | This example flashes LEDs and prints status in UART console.                                                                                                                  |
| spi_rw           | <ul style="list-style-type: none"> <li>ARC MetaWare Lite</li> <li>ARC MetaWare</li> </ul>                  | This application demonstrates writing and reading a binary image to/from the on-board SPI flash memory.                                                                       |

| Application Name | Supported Toolchain                                          | Description                                                                                                                                                                                                                                                                                                                                                                |
|------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| temp_sensor      | <ul style="list-style-type: none"><li>ARC MetaWare</li></ul> | <p>This application demonstrates reading data from an external PmodTMP2 temperature sensor module connected to extension port Pmod2 and prints the current temperature on an external LCD display PmodCLS connected to Pmod6 and Pmod7.</p> <p><b>Note:</b> This application requires additional Pmod extension boards not included in the ARC EM Starter Kit package.</p> |

**Note**

All application examples (except “hello”) use a HyperTerminal connection from your PC to the ARC EM Starter Kit board. By default, the USB data-port debug channel is used.

## MQX Application Examples

The pre-built MQX binary includes the application examples listed in [Table 3](#).

*Table 3 List of MQX application examples*

| Application Name                                     | Description                                                                                                                                         |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| dw_apb_led<br>dw_apb_button_led<br>dw_apb_switch_led | This application demonstrates how to configure and use onboard LEDs, buttons and switch indicators connected to the GPIO controller.                |
| dw_apb_uart                                          | This application demonstrates how to configure the DW APB UART for different parameters, such as baud rate, start bit, and stop bits.               |
| dw_spi_sd_card                                       | This application demonstrates basic operations with the SD card: initialization, getting the CID and CSD parameters, read and write blocks of data. |
| i2c_adc                                              | This application demonstrates reading ADC data from the PmodAD2 extension board, included in the ARC EM Starter Kit, using an I2C interface.        |

## Installation Structure

The ARC EM Starter Kit includes a set of packages. Documentation and software can be obtained from the ARC EMSK download webpage. You receive the corresponding URL during the purchase process.

Table 4 lists the downloadable packages. Unzip the documentation package and refer to the *User Guide* for instructions on getting started.

Table 4 Downloadable Packages

| Package Name                | Description                                                                                                                                                                                                                                                                                             |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| emsk_documentation_v2p1.zip | This package contains the complete documentation.                                                                                                                                                                                                                                                       |
| emsk_software_v2p1.zip      | Software package including <ul style="list-style-type: none"><li>• MQX 2.61c binary including peripheral drivers and application examples for all cores supported by ARC EM Starter kit.</li><li>• Bare-metal drivers and application examples for all cores supported by ARC EM Starter kit.</li></ul> |
| emsk_firmware_v2p1.zip      | This package contains the configuration files for the FPGA on the ARC EM Starter Kit board.<br>The firmware comes pre-installed.<br>This package may be needed for restoring factory settings.                                                                                                          |

## Documentation

The complete documentation in PDF format is provided at the ARC EMSK download webpage in the `emsk_documentation_v2p1.zip` package. You receive the corresponding URL during the purchase process.

A viewer, Acrobat Reader, can be obtained from <http://www.adobe.com/>.

The following documents are available for the ARC EM Starter Kit:

- *ARC EM Starter Kit board User Guide*
- *ARC EM Starter Kit Release Notes*

## Release Change Information

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*This chapter lists major changes from previous releases of the ARC EM Starter Kit.*

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### Release 2.1

- Added TCF files for `em4`, `em6`, and `em6fpu` configurations.
- Support MetaWare Lite J-2014.12.
- Improved the startup routine `crt0.s` for ARC GNU.
- Improved build environment for MetaWare and ARC GNU toolchains.
- Enabled DIV/REM radix2 option for all configurations.
- New version of bootloader fixed issue loading and running application on `em7d` and `em7dfpu` configurations.
- Improved documentation.

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### Release 2.0

- Support for ARC EM 2.0.
- Support for ARC EM-SEP (separate bitfile).
- DSP options for ARC EM
  - EM5D configuration
  - EM7D configuration
- Single-precision IEEE 754-compliant floating point support for ARC EM
  - EM7DFPU configuration
- DDR memory for all core configurations.
- New peripherals:
  - DesignWare WDT
  - DesignWare Timers
- Same peripherals available for all configurations.

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## Release 1.1

- Faster system clock frequencies for each configuration:
  - ARC\_EM4 and ARC\_EM4\_16CR cores – 35 MHz clock.
  - ARC\_EM6 and ARC\_EM6\_GP – 30 MHz clock.
- Decreased debounce clock frequency for GPIO.
- UART signal mappings are now programmable.
- Added ARC MetaWare Lite support.
- Added ARC GNU Toolchain and MetaWare IDE support.
- Added bare metal demo application for a temperature sensor PmodTmp2.
- *ARC EM Starter Kit Databook* renamed to *ARC EM Starter Kit User Guide*.

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## Release 1.0

Initial release.