# US159-DA16200MEVZ

DA16200 Pmod™ Board

The US159-DA16200MEVZ ultra-low power Wi-Fi Pmod module enables you to add Wi-Fi capability to any evaluation kit or MCU board equipped with a Pmod expansion capability. The board provides a standard Pmod Type 3A (expanded UART) connection for the on-board Wi-Fi module.

The US159-DA16200MEVZ features a Type 3A Pmod connector and incorporates the DA16200MOD Module, which is based on the DA16200 SoC. With a standard connector and software support, the US159-DA16200MEVZ is ideal for the Renesas Quick-Connect IoT to rapidly create an IoT system.

## Kit Contents

- US159-DA16200MEVZ Pmod Board

## Features

- DA16200MOD module
  - Integrated chip antenna
  - Cortex-M4F+ at 30MHz to 160MHz
  - 802.11b/g/n radio PHY, 2.4GHz
  - SoC runs full OS and TCP/IP stack
  - Memory: 256kB ROM, 512kB RAM, 8kB OTP, 48B retention memory and 32Mb SPI Flash
  - RF regulatory certifications: FCC, IC, CE, KC, TELEC, SRRC
  - Wi-Fi Alliance certifications: Wi-Fi CERTIFIED b/g/n, WPA, WPA2, and WPA3
  - 3.3V supply voltage
  - +20dBm range booster mode
  - -100dBm Rx sensitivity
  - Ultra-low power with 3 sleep modes: (1) unconnected (nA), (2) connected ultra-low (µA), and (3) connected ultra-fast (µA)
- Standardized Type 3A Pmod connector supports an expanded UART interface
- Optional battery operation with on-board CR1220 coin cell
- LED (D1) to aid in user software debug
- 10-pin 1.27mm pitch Arm Cortex-Debug connector (J2) for software development and debug support

**Figure 1. US159-DA16200MEVZ Pmod Board (XE Evaluation Board)**


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# 1. Functional Description

The US159-DA16200MEVZ functions as a Wi-Fi wireless building block to create a custom IoT system solution. This module adds Wi-Fi 802.11b/g/n 2.4GHz connectivity capability to any IoT system that supports Pmod expansion modules. Visit the Renesas website for more details on the DA16200 Wi-Fi SoC Module.

# 2. Setup

## 2.1 Required or Recommended User Equipment

The following additional lab equipment is recommended for using the board (and is sold separately):

- Any MCU board that supports Type 3A Pmod.

## 2.2 Software Installation and Usage

For the latest version of the e2 studio, use the Renesas website, and for the latest connectivity support and details on creating customized IoT system solutions, visit the Quick-Connect IoT site.

The Renesas Flexible Software Package (FSP) is an enhanced software package that provides easy-to-use, scalable, high-quality software for embedded system designs using the Renesas RA family of Arm Microcontrollers. With the support of a new Arm TrustZone and other advanced security features, FSP provides a quick and versatile way to build secure, connected IoT devices using production-ready drivers, Azure RTOS, FreeRTOS, and other middleware stacks.

The firmware for operating the module with a Renesas EK-RA6M4 evaluation kit is pre-loaded on the US159-DA16200MEVZ Pmod module.

| Firmware | |
|---|---|
| DA16200_v3.2.2.1 | Standard DA16200 SDK |

For more details on the application, see the guide, *Wi-Fi Enabled Cloud IoT Solution Kit Quick Start Guide*.

## 2.3 Kit Hardware Connections

Follow these procedures to set up the kit as shown on Figure 2.

1. Ensure the MCU evaluation kit being used has a Pmod connector set to Type 3A. (For help, refer to the kit hardware manual.)
2. Plug in the US159-DA16200MEVZ to the Pmod connector on the MCU evaluation kit, and be careful to align Pin 1 on the module to Pin 1 on the MCU kit.
3. The US159-DA16200MEVZ is now ready to be used in the system. Follow the MCU kit instructions for connecting and powering up the evaluation kit.

**Figure 2. Evaluation Kit Details**

# 3. Alternate Hardware Configurations

Referring to the schematic in the following section, there are a number of Do Not Fit (DNF) components that allow for alternate hardware configurations as detailed in Table 1:

**Table 1. Alternate Hardware Configurations**

| DA16200MOD Pin | Default Function | Alt Function | Alt Signal Name | Read Modifications for Alt Function |
|---|---|---|---|---|
| GPIOA0 | GPIO | UART1 TXD | UART1_TXD | Install R8 & R9 and remove R11 & R12 |
| GPIOA1 | GPIO | UART1 RXD | UART1_RXD | |
| GPIOA2 | GPIO | - | - | - |
| GPIOA3 | NC | - | - | - |
| GPIOA4/UART1_TXD | UART1_TXD | UART1 RTS | CTS_HOST_GPIOA4 | Install R2, R6, R8, R9, R10 & R13 and remove R3, R5, R11 & R12 |
| GPIOA5/UART1_RXD | UART1_RXD | UART1 CTS | RTS_HOST_GPIOA5 | |
| GPIOA6/WPS | WPS | - | - | - |
| GPIOA7 | Factory Reset | - | - | - |
| GPIOA8 | GPIO | - | - | - |
| GPIOA9 | GPIO | - | - | - |
| GPIOA10 | NC | - | - | - |
| GPIOA11 | GPIO | INTn | - | - |
| JTAG_TCLK | SWCLK_TCLK | JTAG | TCLK | - |
| JTAG_TMS | SWDIO_TMS | JTAG | TMS | - |
| UART0_TXD | UART0_TXD | - | - | - |
| UART0_RXD | UART0_RXD | - | - | - |
| GPIOC6/nTRST | GPIO | JTAG | nTRST | - |
| GPIOC7/TDO | GPIO | JTAG | TDO | - |
| GPIOC8/TDI | GPIO | JTAG | TDI | - |

# 4. Schematic Diagram

**Figure 3. US159-DA16200MEVZ Application Schematic Diagram**

# 5. Bill of Materials

| Qty | Reference Designator | Description | Manufacturer | Manufacturer Part Number |
|---|---|---|---|---|
| 1 | B1 | Bumper, Cylindrical, 0.375" D, 0.19" HSM | Bumper Specialities | BS35CL01X02RP |
| 1 | BT1 | Battery Holder, 12mm Coin Cell, CR1220, SM, RoHS | Harwin | S8411-45R |
| 3 | C1, C3, C4 | Capacitor, 0.1µF, 25V, SM 0402, Multilayer Ceramic, X7R, RoHS | Taiyo Yuden | TMK105B7104KVHF |
| 1 | C2 | Capacitor, 10µF, 10V, SM 0603, Multilayer Ceramic, X5R, RoHS | Samsung Electro-Mechanics | CL05A106MP5NUNC |
| 1 | C5 | Capacitor, 0.47uF, 10V, SM 0402, Multilayer Ceramic, X7R, RoHS | Kemet | C0402C474K8RACTU |
| 1 | D1 | LED, Red, Clear, 0805, SM, RoHS | Wurth Elektronik | 150080RS75000 |
| 1 | J1 | Connector, 2×6, 0.1", Pmod, Right Angle, Unshrouded, RoHS | Harwin | M20-9950645 |
| 1 | J2 | 4 Pin, 0.1", Single Row, Vertical, Header, RoHS | Sullins | PBC04SAAN |
| 1 | J3 | Connector, 2×5 Header, Vertical, 1.27mm Pitch, Pin 7, SM, RoHS | Samtec | FTSH-105-01-L-DV-007-K |
| 1 | J6 | 1X2 Pin, 0.05", Single Row, Vertical, Header, RoHS | Sullins | GRPB021VWVN-RC |
| 6 | R1, R4, R15, R16, R18, R21 | Resistor, 4.7kΩ, 1/10W, 1%, 100ppm, SM, 50WV, 100OV, Thick Film, 0402, RoHS | KOA Speer | RK73H1ETTP4701F |
| 7 | R3, R5, R7, R11, R12, R17, R19 | Resistor, 0Ω, 1/10W, 1%, 100ppm, SM, 50WV, 100OV, Thick Film, 0402, RoHS | KOA Speer | RK73Z1ETTP |
| 1 | R14 | Resistor, 649Ω, 1/10W, 1%, 100ppm, SM, 50WV, 100OV, Thick Film, 0402, RoHS | KOA Speer | RK73H1ETTP6490F |
| 1 | R20 | Resistor, 10kΩ, 1/10W, 1%, 100ppm, SM, 50WV, 100OV, Thick Film, 0402, RoHS | KOA Speer | RK73H1ETTP1002F |
| 1 | SW1 | Switch, Pushbutton, Top Actuated, SM, RoHS | C&K Components | PTS810 SJG 250 SMTR LFS |
| 1 | U1 | DA16200MOD, WiFi, 802.11b/g/n, Transceiver, 256kB ROM, 512kB RAM, 8 kB OTP, 48 kB NV Memory, 37-SMD Module, SM, RoHS | Dialog Semiconductor | DA16200MOD-AAC4WA32 |
| 1 | U2 | IC, Digital, Buffer, Inverting, Open Drain, SM, SC-70-5, RoHS | Diodes Inc. | 74LVC1G06SE-7 |

## 5.1 Board Layout

Figure 4. Silkscreen Top

Figure 5. Copper Top

Figure 6. Copper L1 Layer

Figure 7. Copper L2 Layer

Figure 8. Copper Bottom

Figure 9. Silkscreen Bottom

# 6. Ordering Information

| Part Number | Description |
|---|---|
| US159-DA16200MEVZ | DA16200 Pmod Board |

# 7. Revision History

| Revision | Date | Description |
|---|---|---|
| 1.01 | Sep 8, 2023 | Replaced Figure 1 with an updated image. |
| 1.00 | Jun 27, 2022 | Initial release |

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