

## 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 ( $\mu$ A), and (3) connected ultra-fast ( $\mu$ A)
- 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

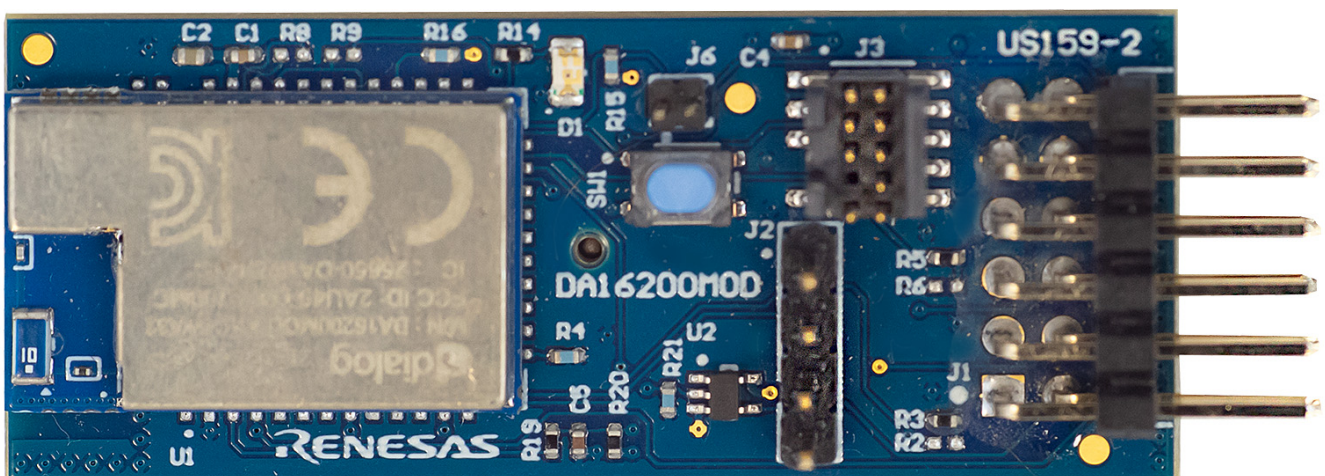


Figure 1. US159-DA16200MEVZ Pmod Board (XE Evaluation Board)

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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

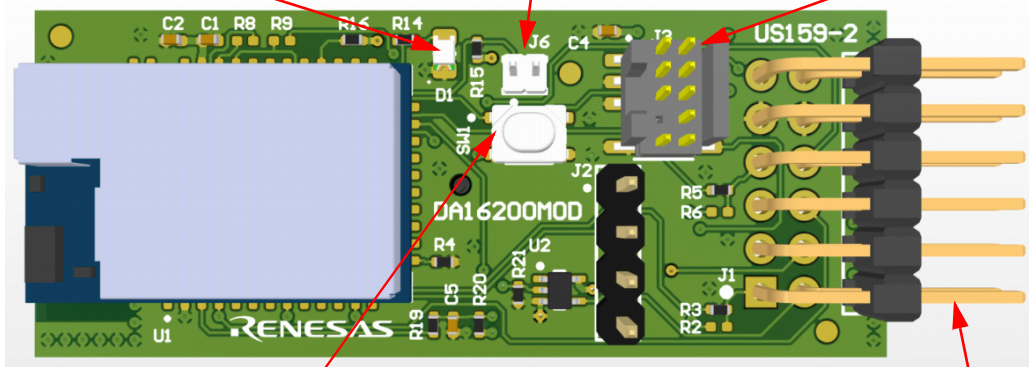
Follow these procedures to set up the kit as shown on [Figure 2](#).

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.

D1 – LED to aid in user software debug

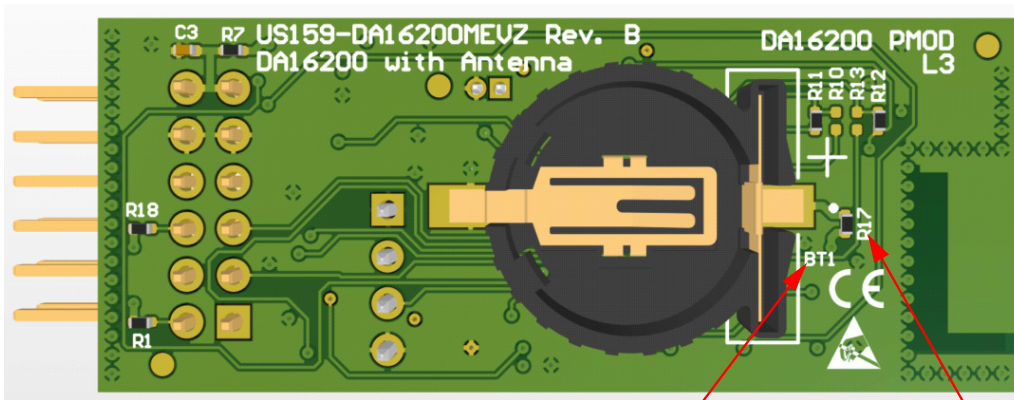
J6 – Install jumper to initiate factory reset

J3 – Arm Cortex-Debug connector



SW1 – Momentary pushbutton switch to initiate WPS

J1 – Pmod Connector to MCU Board



BT1 – Remove R17 before installing the CR1220 coin cell, and be careful to observe polarity (+ on cell facing upwards)

R17 – Be sure to remove before installing the coin cell

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

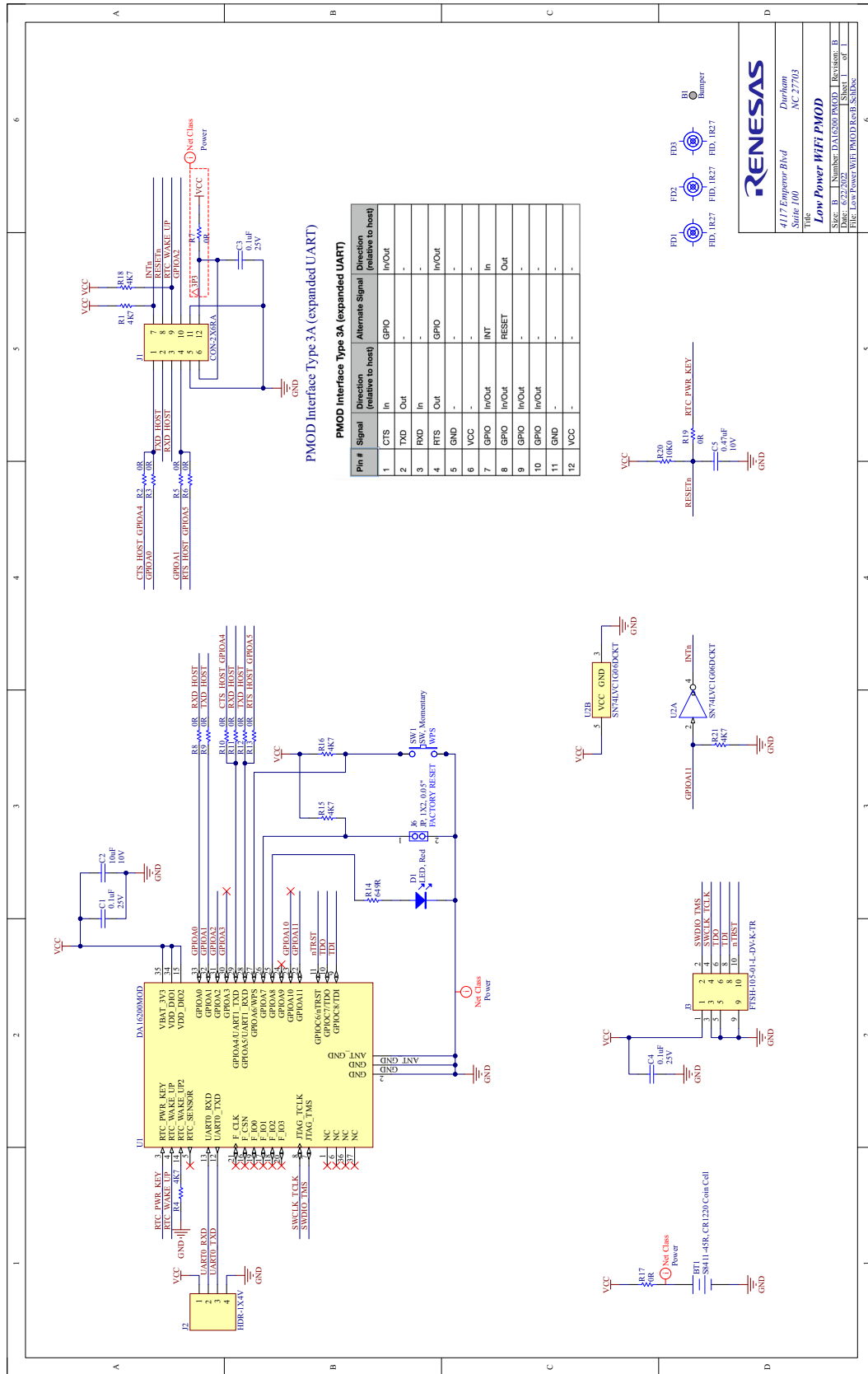


Figure 3. US159-DA16200MEVZ Application Schematic Diagram

## 5. Bill of Materials

Qty	Reference Designator	Description	Manufacturer	Manufacturer Part Number
1	B1	Bumper, Cylindrical, 0.375" D, 0.19" HSM	Bumper Specialties	BS35CL01X02RP
1	BT1	Battery Holder, 12mm Coin Cell, CR1220, SM, RoHS	Harwin	S8411-45R
3	C1, C3, C4	Capacitor, 0.1 $\mu$ F, 25V, SM 0402, Multilayer Ceramic, X7R, RoHS	Taiyo Yuden	TMK105B7104KVHF
1	C2	Capacitor, 10 $\mu$ F, 10V, SM 0603, Multilayer Ceramic, X5R, RoHS	Samsung Electro-Mechanics	CL05A106MP5NUNC
1	C5	Capacitor, 0.47 $\mu$ F, 10V, SM 0402, Multilayer Ceramic, X7R, RoHS	Kemet	C0402C474K8RACTU
1	D1	LED, Red, Clear, 0805, SM, RoHS	Würth Elektronik	150080RS75000
1	J1	Connector, 2 $\times$ 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 $\times$ 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, 4.7k $\Omega$ , 1/10W, 1%, 100ppm, SM, 50WV, 100OV, Thick Film, 0402, RoHS	KOA Speer	RK73H1ETTP4701F
7	R3, R5, R7, R11, R12, R17, R19	Resistor, 0 $\Omega$ , 1/10W, 1%, 100ppm, SM, 50WV, 100OV, Thick Film, 0402, RoHS	KOA Speer	RK73Z1ETTP
1	R14	Resistor, 649 $\Omega$ , 1/10W, 1%, 100ppm, SM, 50WV, 100OV, Thick Film, 0402, RoHS	KOA Speer	RK73H1ETTP6490F
1	R20	Resistor, 10k $\Omega$ , 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

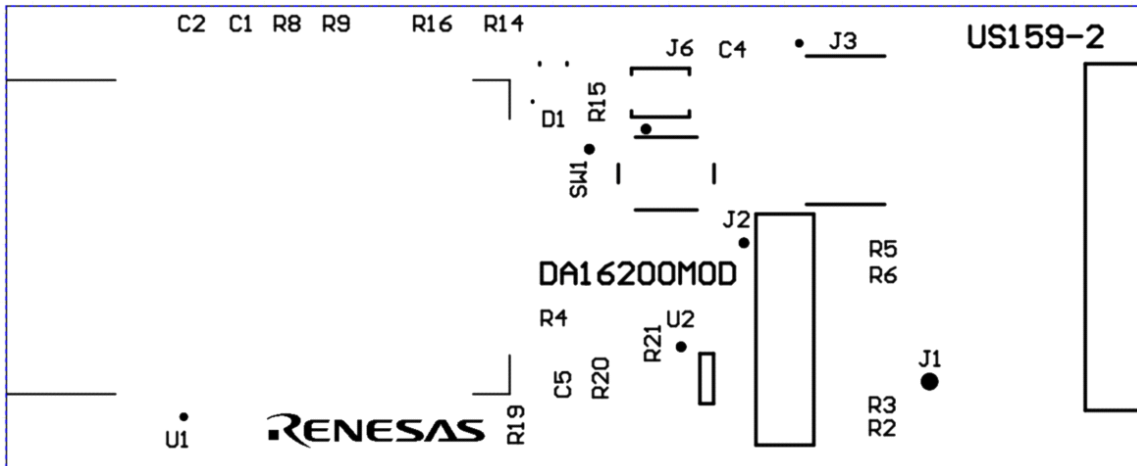


Figure 4. Silkscreen Top

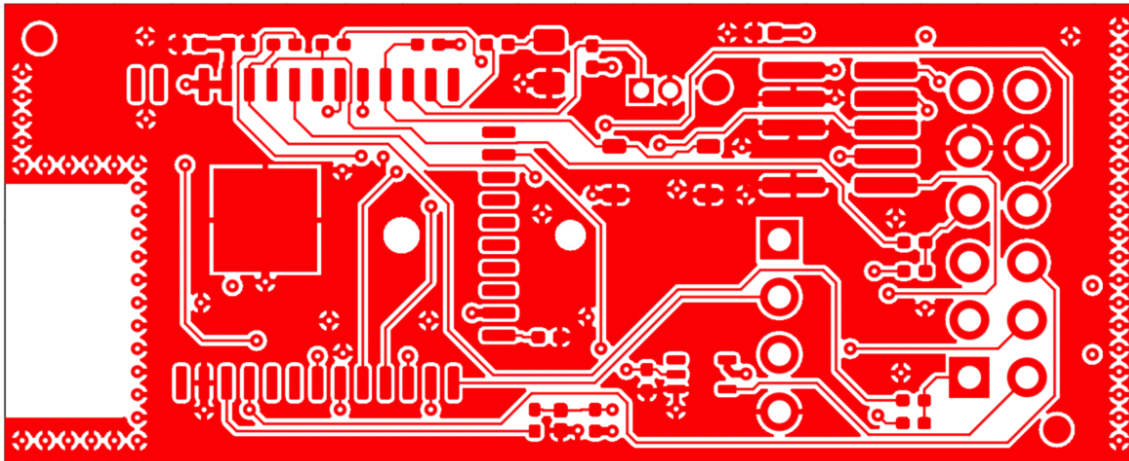


Figure 5. Copper Top

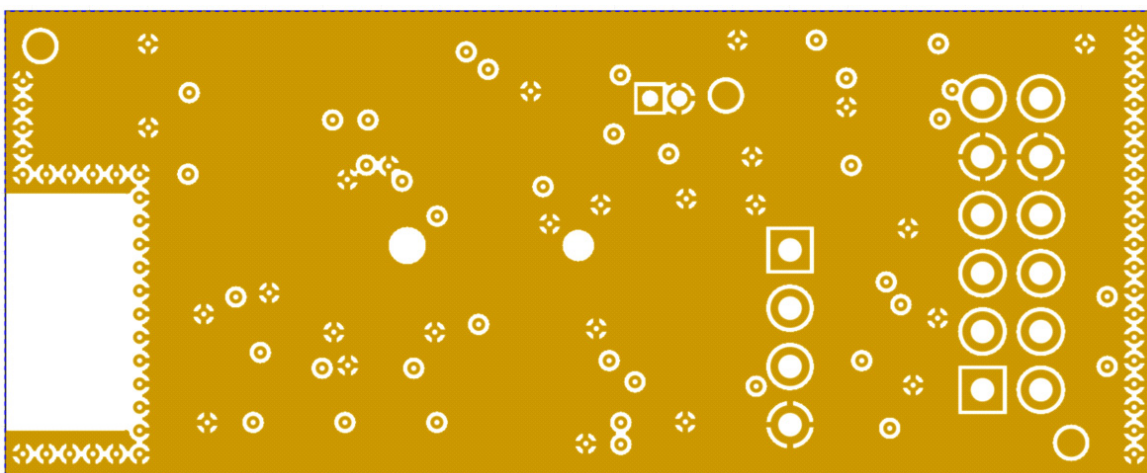


Figure 6. Copper L1 Layer



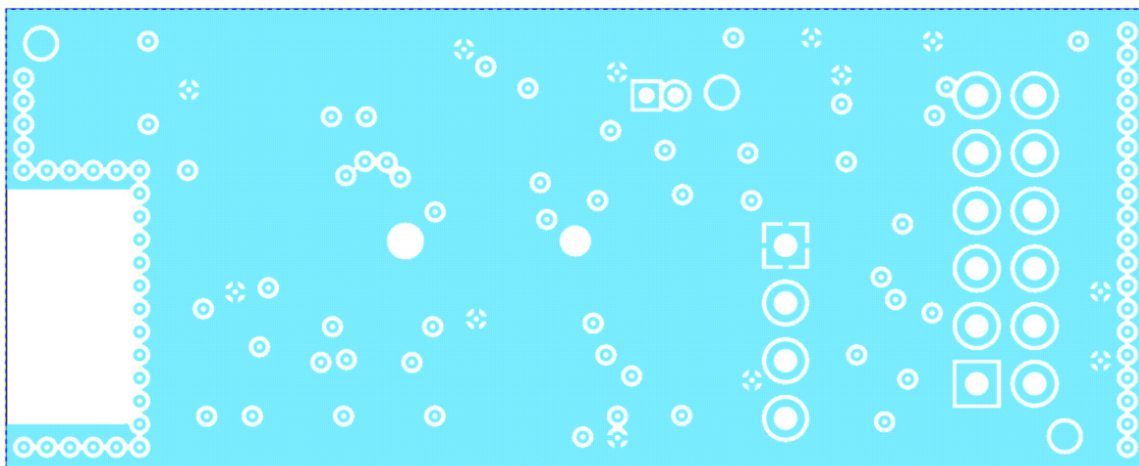


Figure 7. Copper L2 Layer

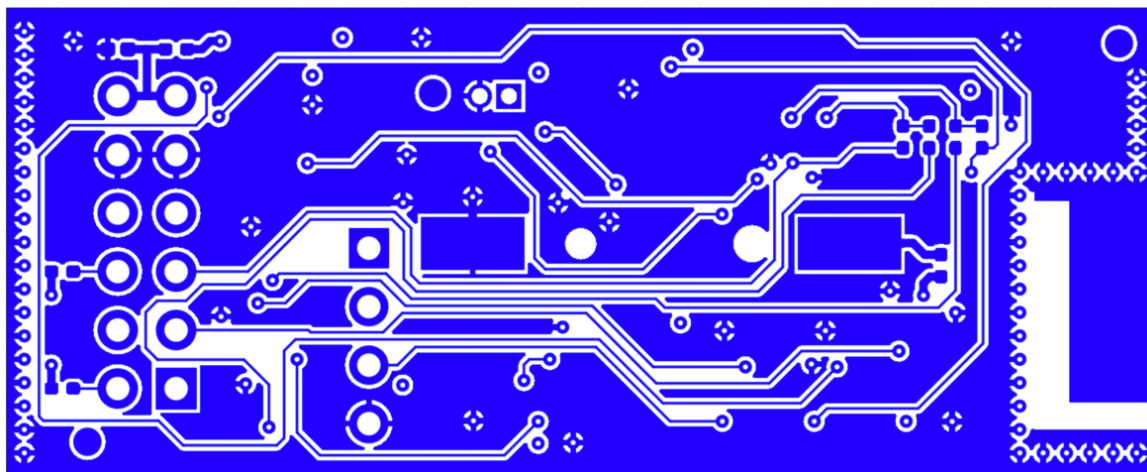


Figure 8. Copper Bottom

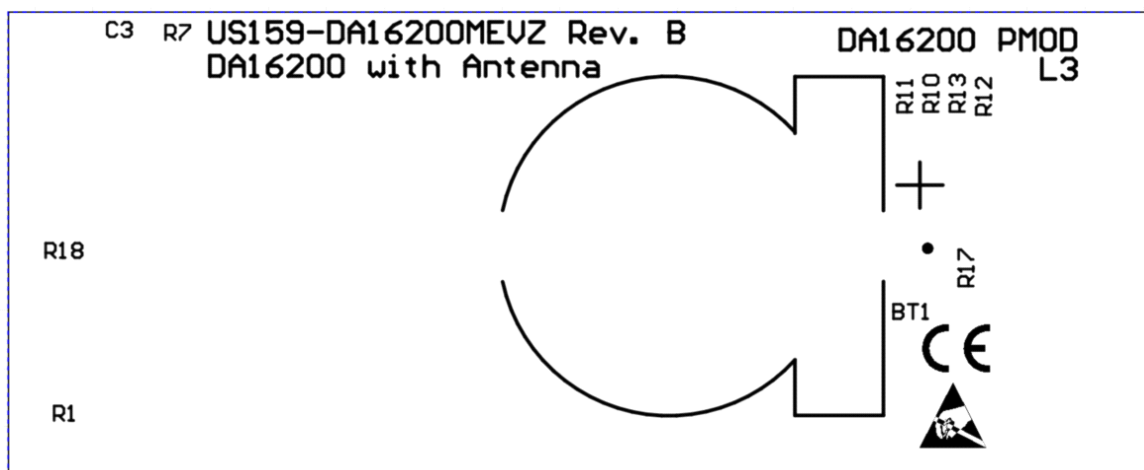


Figure 9. Silkscreen Bottom

## 6. Ordering Information

Part Number	Description
US159-DA16200MEVZ	DA16200 Pmod Board

## 7. Revision History

Revision	Date	Description
1.01	Sep 8, 2023	Replaced <a href="#">Figure 1</a> with an updated image.
1.00	Jun 27, 2022	Initial release

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