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Vesta Series IOT Gateways

The **Vesta Series** from Rigado is a line of powerful, highly flexible gateways based on the i.MX6 UltraLite Processor from NXP. With flexible memory options built around an ARM® Cortex™ A7 CPU, 10/100 Ethernet, 802.11n Wi-Fi, Bluetooth 4.2 (including Classic and LE), and Thread support, Rigado's **Vesta Series** gateways provide a complete IOT connectivity solution with edge compute capability.

Versatile mounting hardware and flexible power input options, including: 5V DC barrel jack and Power over Ethernet (PoE), makes for quick and easy installation.

The **Vesta Series** gateways are available in several pre-configured variants. See section 3 for details. For custom configurations, please contact Rigado at info@rigado.com.



1. Features

- Based on the Qualcomm / NXP i.MX6 UltraLite ARM® Cortex™-A7 32-bit Application Processor
- Complete RF solution with integrated antennas
- Dual Band (2.4 and 5GHz) 802.11a/b/g/n WiFi
- Bluetooth 4.2 (both Classic and Low Energy)
- 802.15.4 with Thread Support
- 10/100 Ethernet with 802.3af PoE
- USB 2.0 Host Connector
- 1 | 2 | 4 Gbit DDR3 @400MHz
- 16 | 32 | 64Mbyte Quad SPI NOR Flash
- eMMC | MicroSDHC Card Bulk Storage Options
- User Button – SW Definable
- Status LED – SW Definable
- System Reset – Hard & Soft Reset Capability
- 5VDC input
- 0°C to 60°C Operating Temperature Range
- Yocto Linux (SDK Provided)
- Drivers for Thread and BLE Interfaces
- Remote Router Management from Rigado DeviceOps Platform
- Internal Debug Port for Development
- Security Capability: Secure Boot, Tamper Detection, TRNG, Crypto Engine, OTF DRAM Encryption
- Dimensions: 127 x 127 x 30mm
- FCC/IC/CE/BT

2. Applications

- IOT Gateway
- Smart Appliances
- Home Energy Management
- Human-Machine Interface (HMI)
- Intelligent Industrial Control Systems



3. Ordering Information

Email info@rigado.com for quotes and custom orders, or visit www.rigado.com/products/iot-gateways

Standard Model Part #	DRAM	NOR Flash	Bulk Storage	Ethernet	WiFi	Low Power Wireless	PoE / USB	Accessories
Vesta-100B VG3-1E4-B0C0-US	128MB	None	4GB eMMC	Yes	No	BMD-300 BLE 4.2	USB	N/A
Vesta-200B VG3-2E4-WIB0C0-USA	256MB	None	4GB eMMC	Yes	Yes	BMD-300 BLE 4.2	USB	Wall Mount AC Adapter
Vesta-200R VG3-2E4-WITAC0-USA	256MB	None	4GB eMMC	Yes	Yes	R41Z BLE 4.2 + 802.15.4	USB	Wall Mount AC Adapter
Vesta-300B VG3-23E4-WIB0C0-ASA	256MB	32MB	4GB eMMC	Yes	Yes	BMD-300 BLE 4.2	PoE + USB	Wall Mount AC Adapter
Vesta-300R VG3-23E4-WITAC0-ASA	256MB	32MB	4GB eMMC	Yes	Yes	R41Z BLE 4.2 + 802.15.4	PoE + USB	Wall Mount AC Adapter

Table 1 – Ordering Part Numbers

3.1 In the Box

IOT Gateway

- **Vesta Series** Gateway (see standard models above in section 3)

Accessories

- 5V, 2A (10W) AC/DC Wall Adapter (Part#: 820-00029)
- Wall/Ceiling Mount Kit
 - Vesta mounting backer plate (Part#: 820-00022)
 - Vesta mounting hardware (Part#: 820-00027)
 - Drywall Anchor, #6-#8 Screw, 1-1/4" Length
 - M3 x 50 mm Length, Pan Head, Phillips #1, Machine Screw
 - Screw, Pan Head Phillips Sheet Metal #6/18x1.25"

3.2 Hardware Revision/Errata

Please visit developer.rigado.com for release notes and errata.

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4. Specifications

Processor		
i.MX6 UltraLite (G3)	528MHz ARM® Cortex™-A7	
Memory		
Memory (Volatile)	DDR3L SDRAM @ 400MHz, x16; 128MB (1Gbit) 256MB (2Gbit)	
Memory (Program Flash)	QSPI NOR FLASH; 16MB (128Mbit) 32MB (256Mbit)	
Memory (Bulk Storage)	eMMC (4GB) MicroSDHC (8GB)	
WiFi (802.11a/b/g/n)		
Frequency	2.412GHz - 2.484GHz; 5.180GHz – 5.925GHz	
Modulations	DSSS, FHSS OFDM	
Transmit Power	19 to 12.5dBm for 2.4GHz band, 17 to 10.5dBm for 5GHz band, see QCA6234 datasheet	
Receiver Sensitivity	-98 to -72dBm for 2.4GHz band, -92 to -68dBm for 5GHz band, depending on modulation	
Antenna	Integrated 2.4GHz and Integrated 5GHz	
Bluetooth	BMD-300 Module	R41Z Module
Bluetooth Version	4.2 (Bluetooth Low Energy)	4.2 (Bluetooth Low Energy)
LE Connections	Up to 20 connections	Two connections
Frequency	2.360 to 2.5 GHz	2.360GHz to 2.483GHz
Modulations	GFSK at 1Mbps, 2Mbps data rates	GFSK at 1Mbps
Transmit Power	4dBm	3.5dBm
Receiver Sensitivity	-96dBm	-95dBm
Thread (802.15.4)	R41Z configuration (only)	
Frequency	2.360GHz to 2.483GHz	
Modulations	OQPSK @ 250kbps	
Transmit Power	3.5dBm	
Receiver Sensitivity	-100dBm	
Ethernet		
10/100 Base-T RJ-45 connector with PoE Support		
USB		
USB 2.0, A-type Host connector		
Dimensions		
Vesta Enclosure	Length	127 mm
	Width	127 mm
	Height	30 mm
Hardware		
Power supply	4.5 to 5.5VDC (3A max for LTE, 2A otherwise) via Barrel Jack (5.5mm x 2.1mm)	36-57V (IEEE 802.3af) via Ethernet connector (RJ-45). PoE is optional.
Temperature Range	0 to +60°C	
Certifications		
FCC / IC / CE / BT		

Table 2 –Specifications

5. Hardware

The key interface features are described throughout this section, including power and data connectivity, as well as button and LED location and behavior.

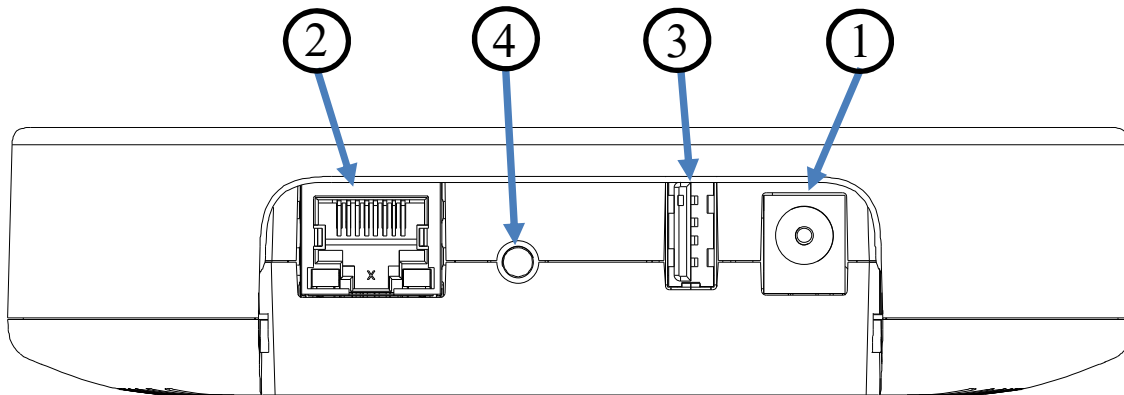


Figure 1 – Vesta Hardware – Back View

5.1 Power

5.1.1 Barrel Jack ①

All available configurations provide a 5.5mm x 2.1mm barrel jack for 5V DC input. The AC/DC wall adapter shipped with most gateway configurations is rated up to 2A. Please note that the actual current consumption is highly dependent upon the unit configuration and programmed software.

5.1.2 Power over Ethernet ②

For configurations supporting PoE (802.3af), the Vesta Gateway will operate when powered by either a PoE switch (end-span) or injector (mid-span).

5.2 Ethernet ②

All available configurations provide a single 10/100 Base-T Ethernet connector.

5.3 USB ③

A USB 2.0 Type-A connector on the Vesta Gateway board provides access to a High Speed (up to 480Mbps) USB host. This connector is also used for downloading a boot image with the NXP MFGTool in Serial Download Mode. See developer.rigado.com for more information on the update process.

5.4 Reset ④

The reset button provides both soft and hard reset capabilities, depending on the length of the press. The soft reset behavior is firmware dependent. The hardware timing is described in the following table:

Reset Action	Time	Behavior
Quick Press	Momentary	FW dependent
Short Press	< 5 seconds	FW dependent
Long Press	6-9 seconds (7.5sec +/- 20%)	System Reset (power cycle)
Very Long Press	> 40 seconds (9sec + boot time)	FW dependent

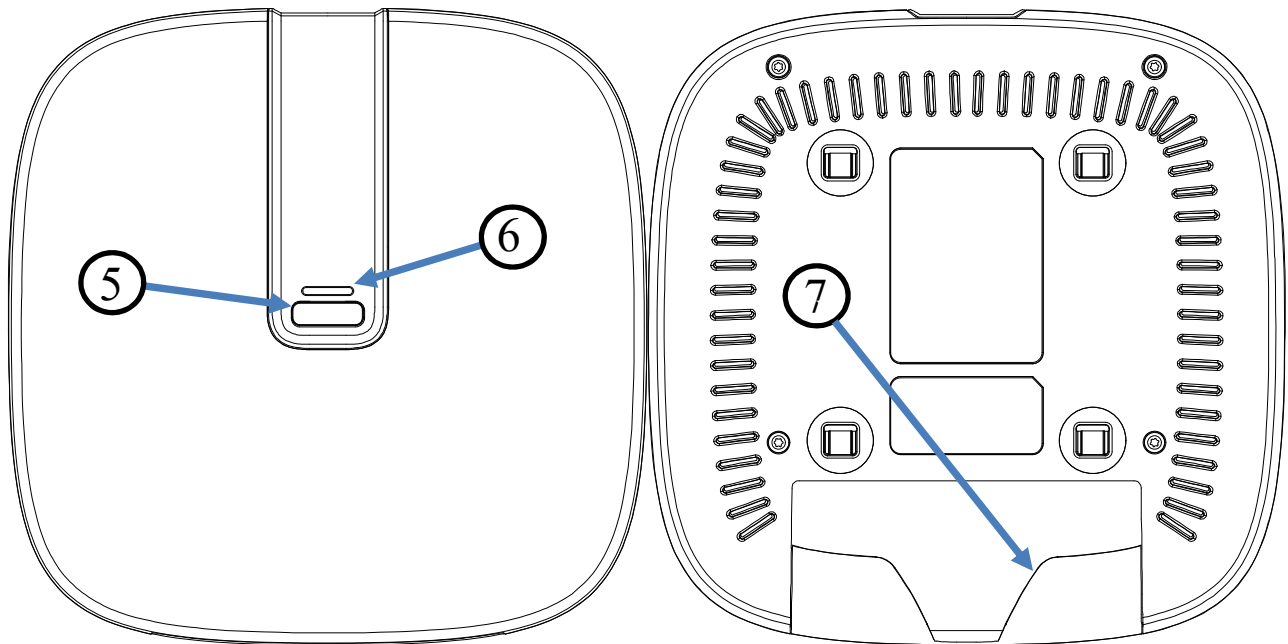


Figure 2 – Vesta Hardware – Top and Bottom View

5.5 User Button ⑤

A momentary user button is available as a software defined user input. Depending on the boot configuration, this button can also enable Serial Download mode if it is held down during a reset. See developer.rigado.com for more information on the update process.

5.6 Multi-color LED ⑥

A multi-color (red/green/blue) LED located near the button provides a configurable means of visual indication for the user. The red and green LEDs are controlled by the processor, while the blue LED is connected to whichever wireless module is populated (BMD-300 or R41z, depending on the configuration).

For more information regarding default LED behavior, please refer to developer.rigado.com.

5.7 Cable Cover ⑦

The back of the unit has a snap-in cover for improved cable management. This allows for hidden cable routing when the unit is installed on a wall or ceiling. The cable cover is removable.

6. Electrical Specifications

6.1 Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Unit
V _{AUX_MAX}	Voltage at barrel jack	-5	12	V
V _{POE_MAX}	Voltage at Ethernet connector (for PoE)	-0.3	60	V
T _S	Storage temperature	-20	70	°C

Table 3 – Absolute Maximum Ratings

6.2 Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
V _{AUX}	Operating supply voltage at barrel jack	4.5	5.0	5.5	V
V _{POE}	Operating supply voltage at Ethernet connector (PoE)	36	48	57	V
T _A	Operating ambient temperature	0	25	60	°C

Table 4 – Operating Conditions

6.3 USB Connector Power

Symbol	Parameter	Min.	Typ.	Max.	Unit
V _{USB}	Operating output voltage at USB connector for loads up to 500mA ¹	4.5	5.0	5.5	V

Table 5 – USB Connector Power

1. USB is an output only – the unit will not run from power supplied to the USB port

6.4 Power Consumption

Symbol	Parameter	Min.	Typ.	Max.	Unit
P _{5V}	Power consumption ¹ referenced at 5V input (5V_IN)		1	10	W

Table 6 – Operating Conditions

1. Power consumption is very dependent upon the unit configuration (SKU) and the application. Max power for units without cellular connectivity or a USB load is about 3W (600mA@5V in).

7. Module Connectivity

To facilitate use of the wireless modules on the gateway, the following section provides detail regarding pin mapping and connectivity.

The table below summarizes connections between the low power, wireless modules, and the rest of the system. Please note that for each Vesta gateway configuration, only one module is present.

BMD Pin	R41Z Pin	Signal Description	Schematic Signal Name	Target
P0.11	PTA18	Active low control for Blue color in main user LED	BTLE_LED_N	Blue LED next to the user button (in the same light-pipe as the red/green LED connected to the AP)
P0.02	PTB2	Coexistence signal from WiFi	BTLE_SUPPRESS	WiFi module
P0.23	PTC1	Coexistence signal to WiFi	BTLE_RF_ACTIVE	
P0.00/XL1	PTB16	32.768kHz slow clock	XL1	32.768 kHz crystal
P0.01/XL2	PTB17	32.768kHz slow clock	XL2	
P0.13	PTC19	Active low flash chip select	BFLASH_CS_N	NOR Flash Memory (U1002), pin 1
P0.15	PTC18	Flash data out	BFLASH_DO	NOR Flash Memory (U1002), pin 2
P0.16	PTC17	Flash data in	BFLASH_DI	NOR Flash Memory (U1002), pin 5
P0.17	PTC16	Flash clock	BFLASH_CLK	NOR Flash Memory (U1002), pin 6
P0.18	-	Debug trace output from module	BTLE_SWO	Programming header (J1001), pin 6
SWDIO	PTA0/ SWDIO	Programming/debug data signal	SWDIO	Programming header (J1001), pin 2 Applications Processor (GPIO3_IO13), pin B11
SWCLK	PTA1/ SWCLK	Programming/debug clock signal	SWCLK	Programming header (J1001), pin 4 Applications Processor (GPIO3_IO14), pin A11
P0.06	PTC7	UART data to the AP	BTLE_UART_TX	Applications Processor (UART3_RX), pin H16
P0.08	PTC6	UART data from the AP	BTLE_UART_RX	Applications Processor (UART3_TX), pin H17
P0.07	PTC4	UART signal from the AP	BTLE_UART_CTS	Applications Processor (UART3_CTS), pin H15
P0.05	PTC5	UART signal to the AP	BTLE_UART_RTS	Applications Processor (UART3_RTS), pin G14
P0.19	PTC2	GPIO to/from AP	BTLE_GPIO	Applications Processor (GPIO_IO23), pin E2
RESET/ P0.21	RESET	Active low module reset	BTLE_RST_N	Applications Processor (GPIO_IO24), pin E1

The following figures show schematic snippets of the low power, wireless module connectivity for Vesta designs.

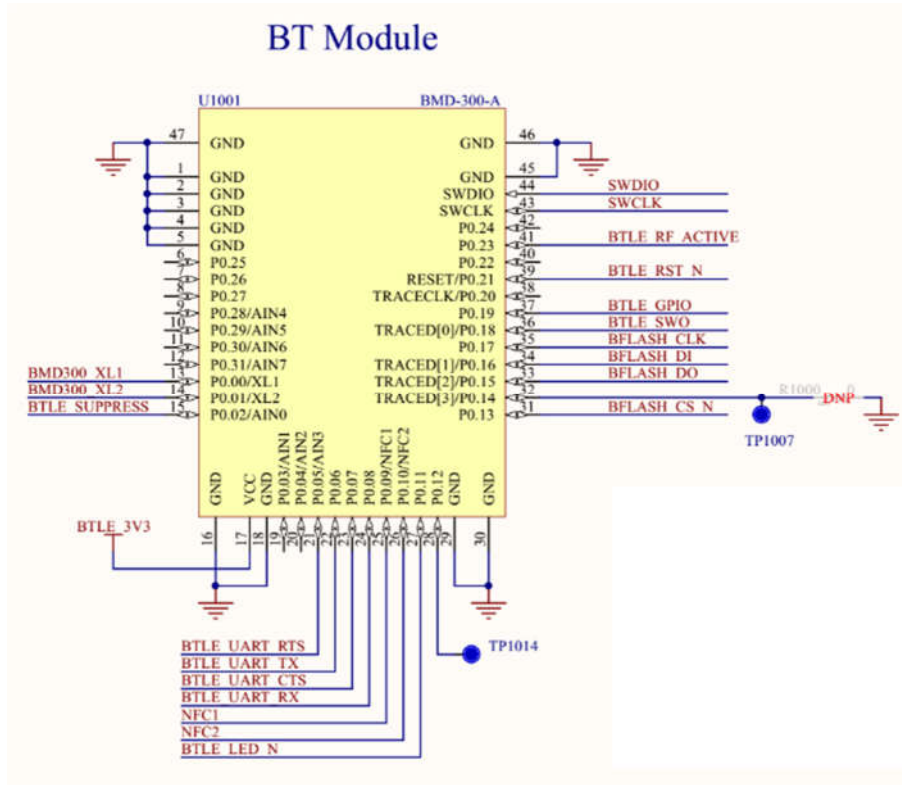


Figure 3 – Module Connectivity – BMD-300

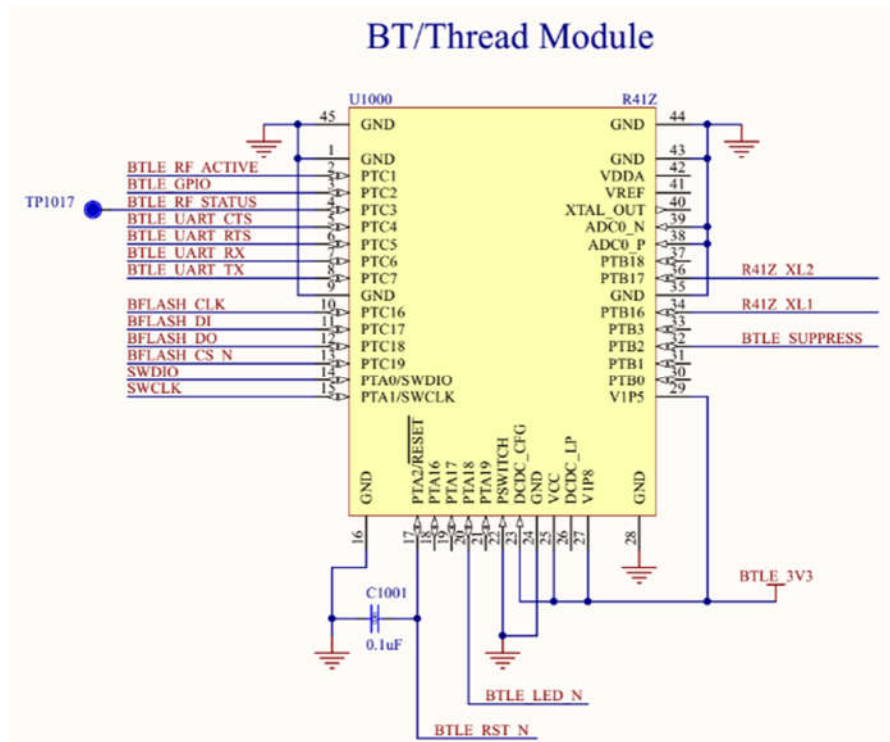


Figure 4 – Module Connectivity – R41Z

32kHz Crystal

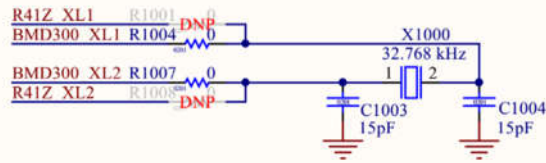


Figure 5 – Module Connectivity – 32kHz Crystal

Programming

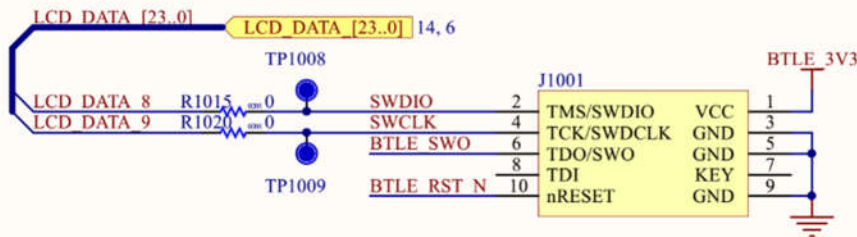


Figure 6 – Module Connectivity – Programming Connector

Memory - FLASH

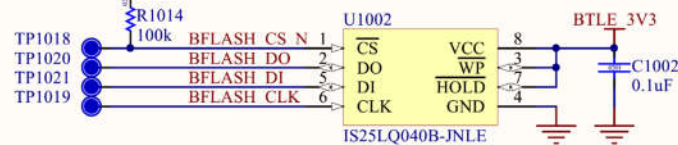


Figure 7 – Module Connectivity – NOR Flash

8. Mechanical Data

8.1 Vesta Dimensions

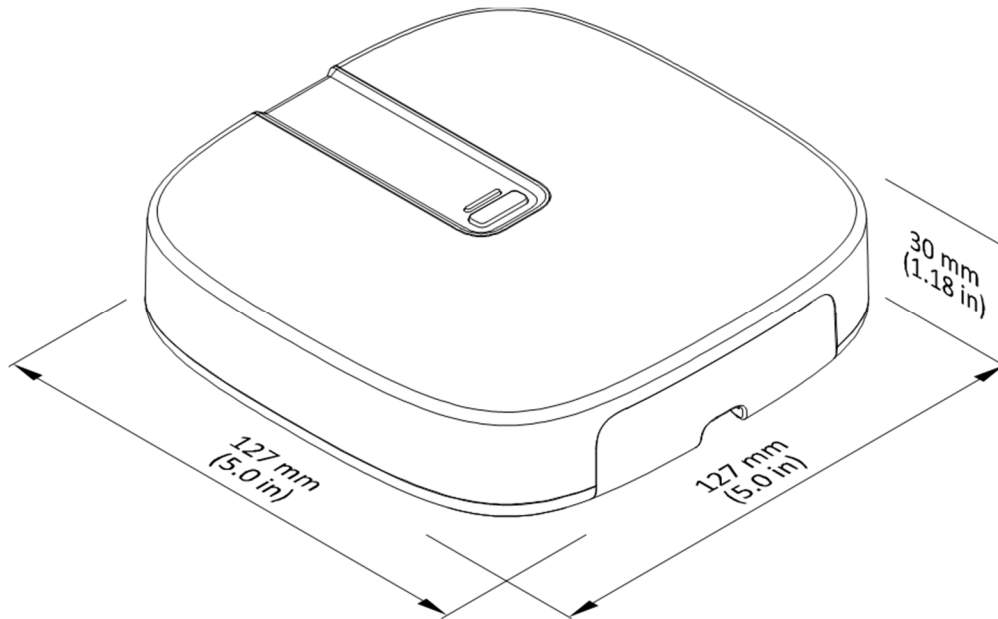
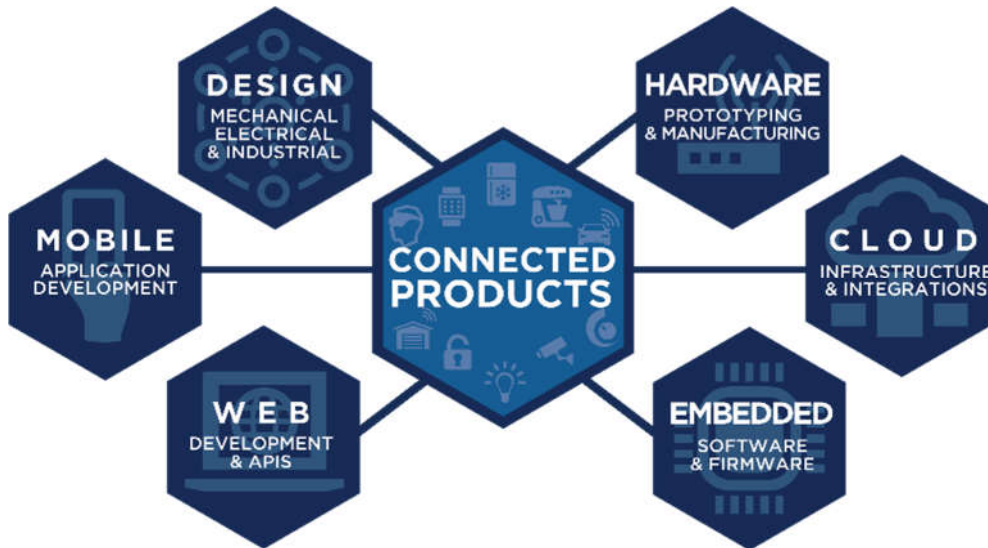


Figure 8 – Vesta Gateway Dimensions

9. Custom Development

Rigado is a full-service design house offering end-to-end product development from concept to manufacturing. We can provide custom modules and gateways through electrical and mechanical design, firmware, mobile development, and web and cloud integration. Please contact Rigado at info@rigado.com or 1-866-6-RIGADO for custom engineering options and fees.



10. Bluetooth Qualification

The Bluetooth modules are qualified as a Bluetooth Component (tested) for RF-PHY. This allows customers to use different Bluetooth stacks that have been qualified by Nordic or NXP without the need to complete additional RF-PHY testing. To achieve Bluetooth End Product qualification, the Rigado RF-PHY QDID can be combined with Nordic or NXP QDIDs used when filing on the Bluetooth SIG website. The only testing required is for the Bluetooth profiles supported by the Gateway's applications. Applications with only custom profiles do not require any additional testing.

- BMD-300: RF-PHY v4.2 Component(Tested) Declaration ID **D030629** / QDID **81876**
- R41Z-T RF-PHY v4.2 Component(Tested): Declaration ID **D035037** / QDID **95459**

11. Regulatory Statements

11.1 FCC Statement:

This device has been tested and found to comply with part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Operation is subjected to the following two conditions: (1) This device may no cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Note: Modification to this product will void the user's authority to operate this equipment.

Note: Modification to this product will void the users' authority to operate this equipment.

11.2 IC Statement:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF exposure warning: The equipment complies with RF exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Avertissement d'exposition RF: L'équipement est conforme aux limites d'exposition aux RF établies pour un environnement incontrôlé. L'antenne (s) utilisée pour ce transmetteur ne doit pas être co-localisée ou fonctionner en conjonction avec toute autre antenne ou transmetteur .

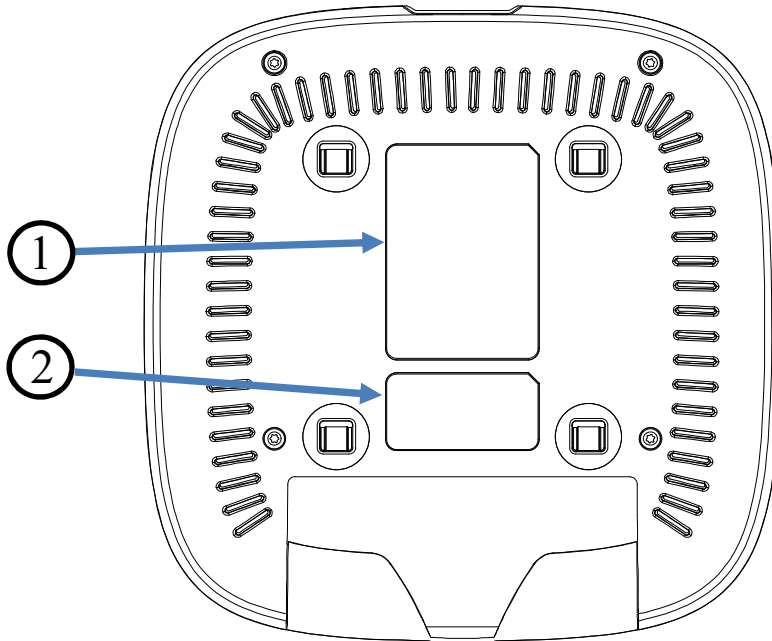
11.3 CE Regulatory

The Vesta Series IoT Gateways are tested and compliant against the following standards.

- EN 60950-1: 2006 + A11: 2009 + A1: 2010 + A12: 2011*
- ETSI EN 300 328 V 2.1.1
- ETSI EN 300 440 V 2.1.1
- ETSI EN 301 489-1 V 2.1.1
- ETSI EN 301 489-3 V 2.1.1
- ETSI EN 301 489-17 V 3.1.1
- ETSI EN 301 893 V 2.1.1
- EN 55024: 2010 + A1: 2015
- EN 55032: 2015
- EN 61000-3-2: 2014
- EN 61000-3-3: 2013

Declarations of Conformity and supporting test reports are available at www.rigado.com.

11.4 Unit Labeling



① The larger label on the bottom side of the unit contains relevant certification markings and ID numbers. Example label:

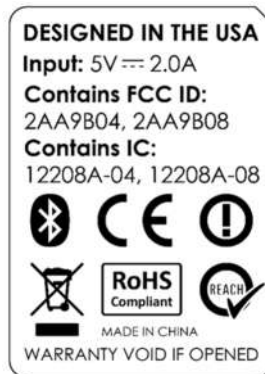


Figure 9 – Example Certification Label

② The smaller label on the bottom side of the unit contains product numbers including model number, part number, and serial number. Example label:



Figure 10 – Example Serial Number Label

For a list of standard model configurations, please refer to section 3.

11.1 Box Labeling

The box label also contains product numbering information, including model number, part number, and serial number. Example label:



Figure 11 – Example Box Label

12. Warranty

Rigado offers a 1-year limited warranty for all Vesta Series products.

IMPORTANT NOTE: Warranty is void if the unit enclosure is opened for any reason.

13. Cautions

- 1) The guidelines of this document should be followed to ensure proper performance of the product.
- 2) This product is for use in office, business, and residential applications.
- 3) Supply voltage to the product should not be higher than the specified inputs or reversed. Additionally, it should not contain noise, spikes, or AC ripple voltage.
- 4) Do not open the product enclosure.
- 5) This product should be kept away from direct heat, both during storage and after installation.
- 6) Do not drop or physically shock the product.
- 7) Do not damage the interface surfaces of the product.
- 8) The product should not be mechanically stressed at any time (storage, handling, installation).
- 9) Do not expose this product to:
 - Humid or salty air conditions
 - High concentrations of corrosive gasses.
 - Temperatures lower than -20°C or higher than 70°C.

14. Life Support Policy

This product is not designed to be used in a life support device or system, or in applications where there is potential for a failure or malfunction to, directly or indirectly, cause significant injury. By using this product in an application that poses these risks, such as described above, the customer is agreeing to indemnify Rigado for any damages that result.

15. Document History

Revision	Date	Changes / Notes
1.0	2017-8-11	Initial release
1.1	2017-10-13	Correct part numbers in Table 1

16. Related Documents

Please refer to developer.rigado.com for additional information.