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MuRata LBEE5XV2EA Wi-Fi Plus Bluetooth Module



Specifications

Design Name: Type 2EA

• P/N: LBEE5XV2EA-802

• Chipset: Infineon CYW55573

• Wireless Standards: 802.11a/b/g/n/ac/ax 2×2 MIMO + Bluetooth 5.3

• Host Interfaces: PCIe 3.0 Gen2, SDIO 3.0 for WLAN; HCI UART, PCM, I2S for

Bluetooth

About This Document

Murata's Type 2EA is a small and high-performance module based on Infineon's CYW55573 combo chipset, supporting IEEE 802.11a/b/g/n/ac/ax 2×2 MIMO + Bluetooth 5.3 BR/EDR/LE. This application note provides RF and hardware design guidance.

Refer to Type 2EA Datasheet for module specification.

Audience & Purpose

Intended audience includes any customer looking to integrate this module into their

product. In particular, RF, hardware, systems, and software engineers.

Document Conventions

Table 1 describes the document conventions.

Table 1: Document Conventions

| Conventions | Description |
|---|--|
| | Warning Note Indicates very important note. Users are strongly recommended to review. |
| i | Info Note Intended for informational purposes. Users should review. |
| li. | Menu Reference Indicates menu navigation instructions. Example: Insert→Tables→Quick Tables→Save Selection to Gallery □ |
| □ ? | External Hyperlink This symbol indicates a hyperlink to an external document or website. Example: Murata 🗗 Click on the text to open the external link. |
| C _k | Internal Hyperlink This symbol indicates a hyperlink within the document. Example: Scope Click on the text to open the link. |
| Console input/output or code snippet | Console I/O or Code Snippet This text Style denotes console input/output or a code snippet. |
| # Console I/O comment // Code snippet comment | Console I/O or Code Snippet Comment This text Style denotes a console input/output or code snippet comment. Console I/O comment (preceded by "#") is for informational purposes only and does not denote actual console input/output. Code Snippet comment (preceded by "//") may exist in the original code. |

Scope

This application note provides detailed information on schematic/layout design, and references RF performance benchmarks. Refer to Type 2EA Datasheet for module specification.

Module Introduction

Type 2EA is a small and high-performance module based on Infineon CYW55573 combo chipset which supports IEEE 802.11a/b/g/n/ac/ax 2×2 MIMO + Bluetooth 5.3 up to 1.2 Gbps PHY data rate on Wi-Fi and 3 Mbps PHY data rate on Bluetooth.

The WLAN section supports PCIe 3.0 Gen2 interface, with optional support for SDIO 3.0. The Bluetooth section supports high-speed 4-wire UART interface and PCM for audio data.

The CYW55573 implements sophisticated enhanced collaborative coexistence hardware mechanisms and algorithms, which ensure that WLAN and Bluetooth is optimized for maximum performance.

In IEEE 802.11ax mode, the WLAN operation supports rates of MCS0 – MCS11 in 20 MHz and 40 MHz and 80 MHz channels for data rate up to 1.2 Gbps.

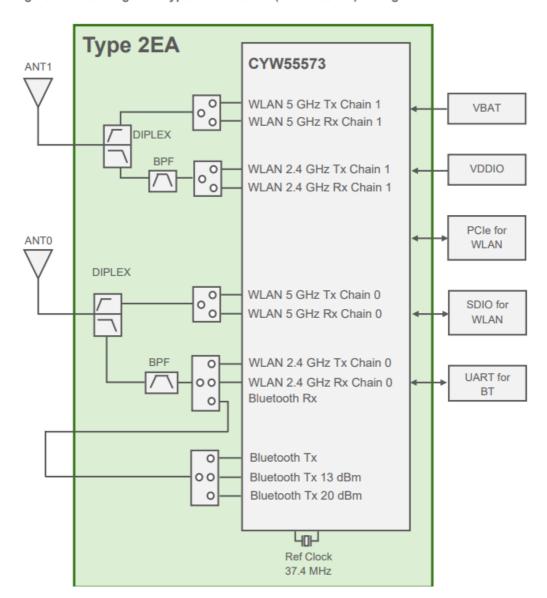
Features

- WLAN 802.11a/b/g/n/ac/ax 2×2 MIMO + Bluetooth Classic and Low Energy (Version 5.3) combo SMD module with Infineon CYW55573
- Small size LGA package with resin molding and metal shielding.
- Host interfaces: PCle 3.0 Gen2 and SDIO 3.0 for WLAN; HCI UART, PCM, and I2S for Bluetooth.
- WLAN MAC address and BD address are stored in OTP

Hardware Block Diagrams

This section shows the difference between the shared-antenna configuration and the dedicated-antenna configuration modules. The key difference is shown in Figure 2. The dedicated-antenna configuration has a dedicated Bluetooth antenna "ANT2". WLAN has its dedicated antenna "ANT0". By comparison, the shared-antenna configuration has a single shared WLAN-Bluetooth antenna" ANT0".

Figure 1: Block Diagram - Type 2EA for SANT (Two Antenna) Configuration



Type 2EA CYW55573 ANT1 00 WLAN 5 GHz Tx Chain 1 **VBAT** WLAN 5 GHz Rx Chain 1 DIPLEX 0 WLAN 2.4 GHz Tx Chain 1 **VDDIO** WLAN 2.4 GHz Rx Chain 1 PCIe for ANT0 WLAN **DIPLEX** 00 WLAN 5 GHz Tx Chain 0 SDIO for 0 WLAN 5 GHz Rx Chain 0 WLAN WLAN 2.4 GHz Tx Chain 0 **BPF** 0 ANT2 UART for 00 WLAN 2.4 GHz Rx Chain 0 ВТ 0 0 Bluetooth Tx/Rx 00 Bluetooth Tx 13 dBm 0 Bluetooth Tx 20 dBm ЦПЛ Ref Clock 37.4 MHz

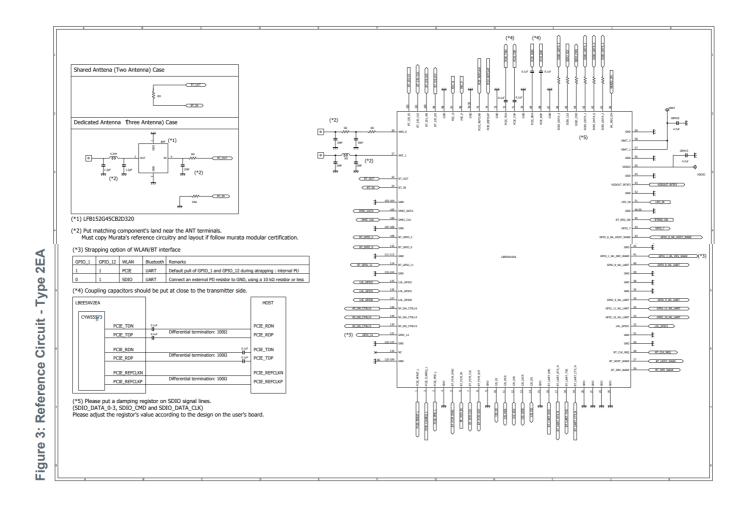
Figure 2: Block Diagram - Type 2EA for DANT (Three Antenna) Configuration

Reference Design

This section details reference schematics which the end user can leverage for designing their own hardware. You can find a detail description of each module pin in module data sheet.

Reference Circuit

Figure 3 shows the u.FL/MHF I connector for Type 2EA module.



Requirement for High-Speed Digital Signals

- SDIO: SDIO traces should be isometric zero delay routing with 50 Ω impedance.
- Pull-ups in the 10 k Ω to 100 k Ω range are required on the four DATA lines and the CMD line. This requirement must be met during all operating states either through the use of external pull-up resistors or through proper programming of the SDIO host's internal pull-ups.
- PCIe: TxP/N, RxP/N and CLKP/N signals should be differential 100 Ω impedance. DC blockers are necessary on TxP/N and RxP/N (these should be located very close to the transmission point).

Requirements for Unused Signals

If these signals are not used, no pull-up/down is necessary (floating) for all of GPIOs

3.4 Module Footprint Design

Refer to dimensions in the Type 2EA Datasheet \Box . The DXF File \Box of module footprint is provided via website.

Recommended Antenna

To use Murata's regulatory certification, any user must follow below instructions. The DXF File for the trace is provided via website.

PCB Type Di-pole Antenna with the Co-axial Connector

Users must use recommended antennas. However, user can use any equivalent type of antenna with less antenna gain than antenna gain of recommended antennas for US and EU under approval of Class I Permissive Change by Murata.

Table 2: Cable Options for Antenna Gains

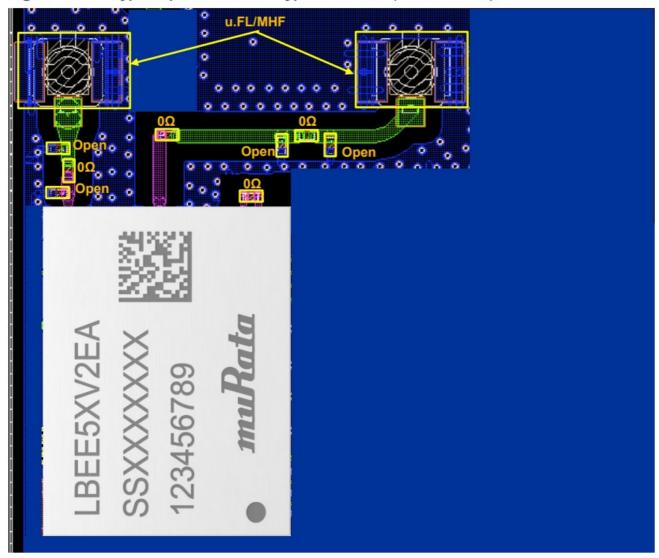
| P/N | Vend | Form fa | Тур | 2.4 G Hz G ain | 5 GH z Gain | 6 GH z Gain | Cable Options |
|---------------|--------------|---------------|-------------|----------------------|-------------------|-------------------|-------------------------------------|
| 219611 | Molex | u.FL/PC B | Di-p ole | 2.5 d Bi | 3.1 d Bi | 3.9dB i | 050, 100, 150, 200, 25 0 and 300 |
| WT32D1 -KX | Unictr | MHF I/P CB | Di-p ole | 3.0 d Bi | 4.0 d Bi | 4.0dB i | 119 |
| W24P-U | Inven tek | u.FL/PC B | Di-p ole | 3.2 d Bi | N/A | N/A | 90 |

If using an antenna vendor that is not listed (Antenova, Pulse, Taoglas, TE, etc.) with the Class I Permissive Change, please evaluate the antenna complies with the technical rules of the FCC KDB 178919 Permissive Change Policy .

- Users must copy RF trace to u.FL/MHF I connector from the trace layout file provided by Murata in adherence to the guidelines on:
- Trace width accuracy within +/- 0.25 mm.
- Stack height between GND layer and RF trace of 230 $^{\sim}$ 240 μm (Exclude inaccuracy of PCB).
- Passive component location matching Murata design.
- Necessary "Keep out" area around u.FL/MHF I connector.

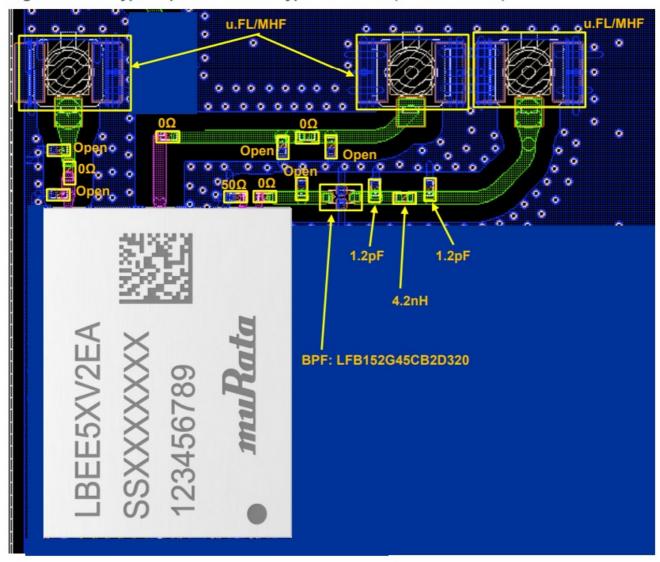
Figure 4 and Figure 5 shows the PCB type di-pole antennas for Type 2EA module.

Figure 4: PCB Type Di-pole Antenna - Type 2EA SANT (Two Antenna)



Size: 0603 LQP03 / GRM03 / Resistor

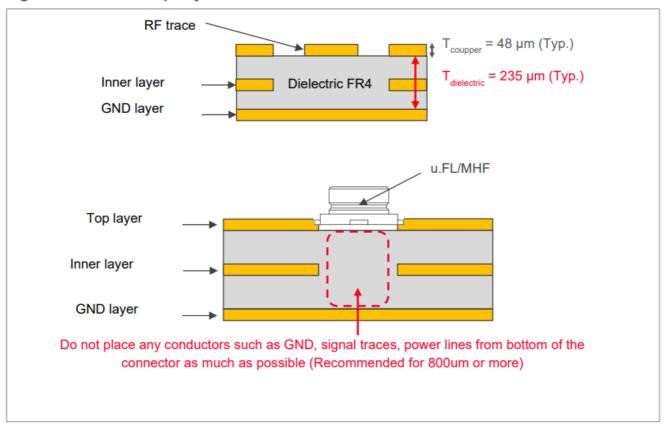
Figure 5: PCB Type Di-pole Antenna - Type 2EA DANT (Three Antenna)



PCB Stack-Up

Figure 6 shows the PCB stack-up layers.

Figure 6: PCB Stack-Up Layers



Setup Configuration Files

To enable Murata's regulatory certification, below configuration file shall be loaded initially. The transmit power files are hosted at Murata GitHub for Linux.

WLAN Configuration Files for Linux

The files listed in Table 3 shall be used to satisfy regulatory requirements if user wants to use Murata regulatory certification. For more regulatory information, refer to Section 11 of Linux User Guide.

Table 3: WLAN Configuration Files – Linux

| Names | Category | Configuration Files |
|-------------------------|--|--|
| WLAN configuration file | TBD | TBD |
| | STA Indoor cyfmac55572-pcie.clm_blob_STA | |
| | STA Outdoor | cyfmac55572-pcie.clm_blob_STAOutd oor |

| WLAN regulatory configuration file | AP Indoor | cyfmac55572-pcie.clm_blob_APIndoor |
|------------------------------------|------------|--------------------------------------|
| | AP Outdoor | cyfmac55572-pcie.clm_blob_APOutdo or |

The following country codes are defined in "WLAN regulatory configuration file "

• US: United States of America

• CA: Canada

DE: Europe

• JP: Japan

When you use these fille, please rename them as below.

- WLAN configuration file: "cyfmac55572-pcie.txt" or "cyfmac55572-sdio.txt"
- WLAN regulatory configuration file: "cyfmac55572-pcie.clm_blob" or ""cyfmac55572-sdio.clm_blob"

Bluetooth Configuration Files for Linux

Bluetooth Tx power configuration script files shall be loaded after Bluetooth device initialization. The files listed in Table 4 shall be used to satisfy regulatory requirements if user wants to use Murata regulatory certification.

Table 4: Bluetooth Configuration Files - Linux

| Country | Category | Configuration Files |
|--------------|--------------------------------|---|
| USA / Canada | Shared Bluetooth Ant enna | CYW55560A1_001.002.087.0269.0100.FC C.2EA.sAnt.hcd |
| USA / Canada | Dedicated Bluetooth Antenna | CYW55560A1_001.002.087.0269.0103.FC C.2EA.dAnt.hcd |

| Europe / Japan | Shared Bluetooth Ant enna | CYW55560A1_001.002.087.0269.0106.EU. JP.2EA.sAnt.hcd |
|----------------|--------------------------------|--|
| Europe / Japan | Dedicated Bluetooth Antenna | CYW55560A1_001.002.087.0269.0107.EU. JP.2EA.dAnt.hcd |

Reference Performance Data

This section describes the reference performance data.

Typical Rx Minimum Sensitivity Level at Module Antenna port

This section describes the Typical Rx Minimum Sensitivity Level at module antenna port for WLAN and Bluetooth.

WLAN

- Conditions
 - ∨BAT = 3.3V, VDDIO = 1.8V
 - FW version: 18.53.157.2

Table 5 describe the typical Rx minimum sensitivity level at module antenna port for WLAN at 2.4 GHz for 20 MHz bandwidth. Table 6, Table 7 and Table 8 describe the typical Rx minimum sensitivity level at module antenna port for WLAN at 5 GHz for 20 MHz, 40 MHz and 80 MHz bandwidth. Table 9, Table 10 and Table 11 describe the typical Rx minimum sensitivity level at module antenna port for WLAN 6GHz for 20 MHz, 40 MHz and 80 MHz bandwidth.

Table 5: Rx Minimum Sensitivity Level – WLAN at 2.4 GHz (20 MHz)

| Frequen | Rx Minimum Sensitivity Level [dBm] |
|---------|------------------------------------|
| су | |
| | |

| in MHz | 11b | | 11g | | 11n (H T 20) | | 11ax (H | E 20) |
|--------|-------|-------------|-------|-------------|-----------------|------|---------|-------|
| | 1 Mbp | 11 Mb ps | 6 Mbp | 54 Mb ps | MCS0 | MCS7 | MCS0 | MCS1 |
| 2412 | -97 | -89 | -94 | -76 | -93 | -75 | -93 | -63 |
| 2442 | -97 | -89 | -94 | -76 | -93 | -75 | -93 | -63 |
| 2472 | -97 | -89 | -94 | -76 | -93 | -75 | -93 | -63 |

Table 6: Rx Minimum Sensitivity Level – WLAN at 5 GHz (20 MHz)

| | Rx Minimum Sensitivity Level [dBm] | | | | | | | | | | |
|----------|------------------------------------|-------------|-------------|------|---------------|------|--------------|------|--|--|--|
| Frequen | 11a | | 11n (HT 20) | | 11ac (VHT 20) | | 11ax (HE 20) | | | | |
| cy in MH | 6 Mbp | 54 Mb ps | MCS0 | MCS7 | MCS0 | MCS8 | MCS0 | MCS1 | | | |
| 5180 | -93 | -75 | -93 | -73 | -93 | -69 | -93 | -62 | | | |
| 5500 | -93 | -75 | -93 | -73 | -93 | -69 | -93 | -62 | | | |
| 5825 | -93 | -75 | -93 | -73 | -93 | -69 | -93 | -62 | | | |

Table 7: Rx Minimum Sensitivity Level – WLAN at 5 GHz (40 MHz)

| | Rx Minimum Sensitivity Level [dBm] | | | | | | | |
|----------|------------------------------------|------|---------------|------|--------------|-------|--|--|
| Frequen | 11n (HT 40) | | 11ac (VHT 40) | | 11ax (HE 40) | | | |
| cy in MH | MCS0 | MCS7 | MCS0 | MCS9 | MCS0 | MCS11 | | |
| 5190 | -90 | -70 | -90 | -64 | -91 | -59 | | |

| 5510 | -90 | -70 | -90 | -64 | -91 | -59 |
|------|-----|-----|-----|-----|-----|-----|
| 5795 | -90 | -70 | -90 | -64 | -91 | -59 |

Table 8: Rx Minimum Sensitivity Level – WLAN at 5 GHz (80 MHz)

| | Rx Minimum Sensitivity Level [dBm] | | | | | | | |
|----------|------------------------------------|------|--------------|-------|--|--|--|--|
| Frequen | 11ac (VHT 80) | | 11ax (HE 80) | | | | | |
| cy in MH | MCS0 | MCS9 | MCS0 | MCS11 | | | | |
| 5210 | -87 | -62 | -88 | -56 | | | | |
| 5530 | -87 | -62 | -88 | -56 | | | | |
| 5775 | -87 | -62 | -88 | -56 | | | | |

Table 9: Rx Minimum Sensitivity Level – WLAN at 6 GHz (20MHz)

| | Rx Minimum Sen | sitivity Level [dBm] | | | |
|---------------------|----------------|----------------------|-----|--|--|
| Frequ | | | | | |
| ency i n MH z | 6 Mbps | MCS0 MCS11 | | | |
| 5955 | -94 | -94 | -62 | | |
| 6515 | -92 | -92 | -61 | | |
| 7115 | -90 | -90 | -59 | | |

| Table 10: R | Minimum Sensitivity Level – WLAN at 6 GHz (40MHz) | | | | |
|---------------------|---|-------|--|--|--|
| | Rx Minimum Sensitivity Level [dBm] | 1 | | | |
| Frequ | 11ax (HE 40) | | | | |
| ency i n MH z | MCS0 | MCS11 | | | |
| 5965 | -92 -59 | | | | |
| 6525 | -90 -57 | | | | |
| 7085 | -89 -56 | | | | |
| Table 11: R x | Minimum Sensitivity Level – WLAN at 6 GHz (80MHz) | | | | |
| | Rx Minimum Sensitivity Level [dBm] | I | | | |
| Frequ | 11ax (HE 80) | | | | |
| ency i n MH z | MCS0 MCS11 | | | | |
| 5985 | -89 | -57 | | | |
| 6545 | -87 | -55 | | | |

| 7025 | -86 | -54 |
|------|-----|-----|
| | | |

Bluetooth

Conditions

• VBAT = 3.3V, VDDIO = 1.8V

Hcd file: CYW55560A1_001.002.087.0159.0008_wlcsp_iPA_sLNA.hcd

Table 12 describes the typical Rx minimum sensitivity level for Bluetooth.

Table 12: Rx Minimum Sensitivity Level – Bluetooth

| Frequen | Rx Minimum Sensitivity Level[dBm] | | | | | | | | |
|---------------|-----------------------------------|------|------|-------------|--------|-------|-------|--|--|
| cy in M Hz | DH5 | 2DH5 | 3DH5 | LE 125 K | LE 500 | LE 1M | LE 2M | | |
| 2402 | -91 | -94 | -88 | -108 | -102 | -96 | -93 | | |
| 2441 | -91 | -94 | -88 | -108 | -102 | -96 | -93 | | |
| 2480 | -91 | -94 | -88 | -108 | -102 | -96 | -93 | | |

Typical Tx/Rx Current Consumption

This section describes the typical Tx/Rx current consumption for WLAN and Bluetooth.

WLAN

Conditions

∨BAT = 3.3V, VDDIO = 1.8V

FW version: 18.53.157.2

Current definition

Figure 7: Typical Tx/Rx Current Consumption for WLAN

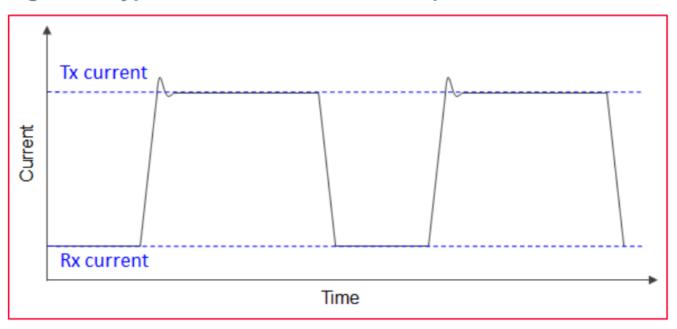


Table 13: Typical Tx/Rx Current Consumption – WLAN at 2.4 GHz (1SS)

| | | Setting T x Power [dBm] | Current [mA] | | |
|-----------------|---------------|--------------------------------|--------------|------|--|
| Mode | Data R ate | | Тх | Rx | |
| | | | VBAT | VBAT | |
| 11b | 1 Mbps | 18 | 290 | 40 | |
| 11g | 6 Mbps | 17 | 280 | 40 | |
| 11n (HT20 | MCS0 | 17 | 280 | 40 | |
| 11ax (HE2 0) | MCS0 | 14 | 230 | 40 | |

Table 14: Typical Tx/Rx Current Consumption – WLAN at 2.4 GHz (2SS)

| | | Setting T | Current [mA] | |
|------|---------------|-----------|--------------|----|
| Mode | Data R ate | x Power [| Тх | Rx |

| | | dBm] | VBAT | VBAT |
|-----------------|------|------|------|------|
| 11n (HT20 | MCS8 | 13 | 370 | 55 |
| 11ax (HE2 0) | MCS0 | 11 | 330 | 55 |

Table 15 and Table 16 describes the typical Tx/Rx current consumption for WLAN at 5 GHz.

Table 15: Typical Tx/Rx Current Consumption – WLAN at 5 GHz (1SS)

| | | Setting T | Current [mA] | |
|------------------|---------------|-----------|--------------|------|
| Mode | Data R ate | x Power [| Тх | Rx |
| | | dBm] | VBAT | VBAT |
| 11a | 6 Mbps | 16 | 400 | 50 |
| 11n (HT20 | MCS0 | 14 | 360 | 50 |
| 11ac (VH T20) | MCS0 | 14 | 360 | 50 |
| 11ax (HE2 0) | MCS0 | 12 | 330 | 50 |
| 11n (HT40 | MCS0 | 14 | 380 | 55 |
| 11ac (VH T40) | MCS0 | 14 | 380 | 55 |

| 11ax (HE4 0) | MCS0 | 12 | 340 | 55 |
|------------------|------|----|-----|----|
| 11ac (VH T80) | MCS0 | 14 | 390 | 65 |
| 11ax (HE8 0) | MCS0 | 12 | 370 | 65 |

Table 16: Typical Tx/Rx Current Consumption – WLAN at 5 GHz (2SS)

| | | Setting T x Power [| Current [mA] | |
|------------------|---------------|---------------------|--------------|------|
| Mode | Data R ate | | Тх | Rx |
| | | dBm] | VBAT | VBAT |
| 11n (HT20 | MCS8 | 11 | 580 | 65 |
| 11ac (VH T20) | MCS0 | 11 | 580 | 65 |
| 11ax (HE2 0) | MCS0 | 9 | 520 | 65 |
| 11n (HT40 | MCS8 | 11 | 600 | 75 |
| 11ac (VH T40) | MCS0 | 11 | 560 | 75 |
| 11ax (HE4 0) | MCS0 | 9 | 540 | 75 |
| 11ac (VH T80) | MCS0 | 11 | 620 | 90 |

| 11ax (HE8 0) | MCS0 | 9 | 570 | 90 |
|-----------------|------|---|-----|----|
|-----------------|------|---|-----|----|

Table 17 and Table 18 describes the typical Tx/Rx current consumption for WLAN at 6 GHz.

Table 17: Typical Tx/Rx Current Consumption – WLAN at 6 GHz (1SS)

| | | Setting T | Current [mA] | |
|-----------------|---------------|-----------|--------------|------|
| Mode | Data R ate | x Power [| Тх | Rx |
| | | dBm] | VBAT | VBAT |
| 11a | 6Mbps | 12 | 240 | 45 |
| 11ax (HE2 0) | MCS0 | 12 | 350 | 45 |
| 11ax (HE4 0) | MCS0 | 12 | 350 | 55 |
| 11ax (HE8 0) | MCS0 | 12 | 360 | 60 |

Table 18: Typical Tx/Rx Current Consumption – WLAN at 6 GHz (2SS)

| Data R | | Setting T | Current [mA] | |
|-----------------|---------------|-------------------|--------------|------|
| Mode | Data R ate | ta R x Power [| Тх | Rx |
| | | dBm] | VBAT VBAT | VBAT |
| 11ax (HE2 0) | MCS0 | 9 | 530 | 65 |

| 11ax (HE4 0) | MCS0 | 9 | 540 | 80 |
|-----------------|------|---|-----|----|
| 11ax (HE8 0) | MCS0 | 9 | 550 | 90 |

Bluetooth

- Conditions
 - \circ VBAT = 3.3V, VDDIO = 1.8V
 - Hcd file: CYW55560A1_001.002.087.0159.0008_wlcsp_iPA_sLNA.hcd
 - Current definition

Figure 8: Typical Tx/Rx Current Consumption for Bluetooth

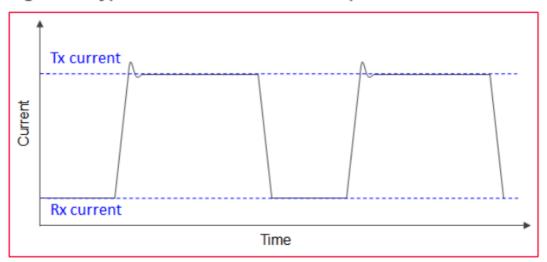


Table 19 describes the typical Tx/Rx current consumption for Bluetooth.

Table 19: Typical Tx/Rx Current Consumption – Bluetooth at 2.4 GHz

| | Setting Tx Power [dB | Current [mA] | | |
|----------|----------------------|--------------|------|--|
| Mode | | Тх | Rx | |
| m] | | VBAT | VBAT | |
| BR (1DH5 | 8 | 25 | 11 | |

| EDR (3DH 5) | 4 | 25 | 11 |
|-------------|---|----|----|
| LE 125K | 8 | 25 | 11 |
| LE 500K | 8 | 25 | 11 |
| LE 1M | 8 | 25 | 11 |
| LE 2M | 8 | 25 | 11 |

Typical Sleep Current Consumption

This section describes the typical sleep current consumption for Wi-Fi and Bluetooth.

WLAN

Conditions

 \circ VBAT = 3.3V, VDDIO = 1.8V

• WL_REG_ON: ON, BT_REG_ON: OFF

Platform: BRIX

o Combo FW: 18.53.180.7

WLAN I/F: PCIe

∘ Beacon Interval = 100 ms

Table 20 describes the typical sleep current consumption for WLAN.

Table 20: Typical Sleep Current Consumption – WLAN

| Band | Mode | Current consumption VBAT [mA] |
|---------|------------------------|-------------------------------|
| _ | Chip deep sleep (L1.2) | 0.1 |
| | IEEE Power Save: DTIM1 | 2.28 |
| 2.4 GHz | IEEE Power Save: DTIM3 | 0.85 |
| | | |

| | IEEE Power Save: DTIM5 | 0.55 |
|-------|------------------------|------|
| | IEEE Power Save: DTIM1 | 1.15 |
| 5 GHz | IEEE Power Save: DTIM3 | 0.45 |
| | IEEE Power Save: DTIM5 | 0.31 |
| | IEEE Power Save: DTIM1 | 1.15 |
| 6 GHz | IEEE Power Save: DTIM3 | 0.44 |
| | IEEE Power Save: DTIM5 | 0.30 |

Bluetooth

Conditions

 \circ VBAT = 3.3V, VDDIO = 1.8V

。 WL_REG_ON: OFF, BT_REG_ON: ON

o Platform: Windows PC/CyBluetool

Hcd file:

CYW55560A1_001.002.087.0159.0017_wlcsp_iPA_dLNA_Murata_Type2EA.hcd

Bluetooth I/F: UART

Table 21 describes the typical sleep current consumption for Bluetooth.

Table 21: Typical Sleep Current Consumption – Bluetooth

| Mode | Current consumption VBAT [uA] |
|-------------------------------|-------------------------------|
| Deep Sleep (BT Only) | 37 |
| BT Page Scan 1.28 s | 112 |
| BT Page & Inquiry Scan 1.28 s | 146 |
| BT Master Sniff mode 500 ms | 70 |

| Advertise 1.28 s | 45 |
|--------------------|-----|
| BLE Scan 1.28 s | 108 |
| LE Link Master 1 s | 58 |

Throughput

This section describes the typical and concurrent throughput communications.

Typical Throughput PCIe Interface

The typical throughput test configurations are:

VBAT = 3.3V, VDDIO = 1.8V

Platform: Embedded Artists iMX8M Mini uCOM

• Combo FW: 18.53.212.8

• WLAN I/F: PCIe

Access Point: AXE11000 (NETGEAR)

• Distance between Access Point and the Target is around 3 ft.

 UDP commands Bit rate was set at more than 20% of observed corresponding TCP throughput.

Sample UDP command:

• iperf3 <server-ip-addr> -u -b <20%-of-TCP>M -P1 -t 60

Table 22 shows the typical throughput data for the modules.

Table 22: WLAN Typical Throughput Data - PCle

| Mode | TCP Throughput in Mbps | | UDP Throughput in Mbps | |
|----------------------------|------------------------|-----|------------------------|-----|
| Wode | Тх | Rx | Тх | Rx |
| 2.4 GHz 11ax HE2 0 MIMO | 237 | 235 | 250 | 251 |

| 5 GHz 11ax HE80 MIMO | 787 | 638 | 800 | 919 |
|-------------------------|-----|-----|-----|-----|
| 6 GHz 11ax HE80 MIMO | 747 | 600 | 836 | 891 |

Typical Throughput SDIO Interface

The typical throughput test configurations are:

• VBAT = 3.3V, VDDIO = 1.8V

Platform: NXP IMX8M-EVKB

• Combo FW: 18.53.212.8

• WLAN I/F: SDIO

• Access Point: AXE11000 (NETGEAR)

• Distance between Access Point and the Target is around 3 ft.

• UDP commands Bit rate was set at more than 20% of observed corresponding TCP throughput.

Sample UDP command:

iperf3 <server-ip-addr> -u -b <20%-of-TCP>M -P1 -t 60

Table 23 shows the typical throughput data for the modules.

Table 23: WLAN Typical Throughput Data - SDIO

| Mode | TCP Throughput in Mbps | | UDP Throughput in Mbps | |
|----------------------------|------------------------|-----|------------------------|-----|
| Mode | Тх | Rx | Тх | Rx |
| 2.4 GHz 11ax HE2 0 MIMO | 227 | 218 | 236 | 235 |
| 5 GHz 11ax HE80 MIMO | 389 | 366 | 493 | 503 |

| 6 GHz 11ax HE80 MIMO 389 370 493 500 |
|--------------------------------------|
|--------------------------------------|

References

Table 24 reviews all the key reference documents that the user may like to refer to.

Table 24: Reference Table

| Support Site | Notes | | |
|---|--|--|--|
| Murata Type 2EA Module Datashe et | Murata Type 2EA module datasheet (TYPE2EA. pdf) | | |
| Murata Type 2EA Module Footprint —— | Murata Type 2EA module footprint (type2ea-mo dule-footprint- topview.dxf) | | |
| Murata Type 2EA PCB Type Di-pol e Antenna | Murata Type 2EA module trace antenna (type2E A_Di-pole-and- Trace-Antenna.dxf) | | |
| Linux WLAN Configuration | Murata GitHub link for Linux NVRAM file for 2E | | |
| Linux WLAN Regulatory Configurat ion | Murata GitHub link for Linux CLM_BLOB file for 2EA | | |
| Linux Bluetooth Configuration | Murata GitHub link for Linux HCD files for 2EA | | |
| Linux User Guide | Murata Linux User Guide for Infineon modules (Murata Wi-Fi & BT (IFX) Solution for i.MX Linux User Guide.pdf). Murata website to be updated soon. | | |

In case Murata website does not have the updated document, please refer to the Connectivity Module page on the Murata Community Forum. This contains a pinned post with all the updated documents.

Technical Support Contacts

Table 25 lists all the support resources available for the Murata Wi-Fi/BT solution.

Table 25: List of Support Resources

| Support Site | Notes |
|---|---|
| Murata Community Forum | Primary support point for technical queries. Thi s is an open forum for all customers. Registration is required. |
| Murata i.MX Landing Page | No login credentials required. Murata documentation covering hardware, software, testing, etc. is provided here. |
| Murata uSD-M.2 Adapter Landi ng Page | Landing page for uSD-M.2 Adapter. In conjunction with Murata i.MX Landing Page, this should provide the user with comprehensive getting started docum entation. |
| Murata Module Landing Page | No login credentials required. Murata documentation covering all Infineon-based Wi-Fi/BT modules is provided here. |

Revision History

| Revisio n | Date | Change | Change Description |
|--------------|------------------|------------------------|---|
| 1.0 | Jul 26, 20 23 | First Issue | |
| 2.0 | Mar 27, 2 025 | 3.1 Reference Ci rcuit | Added a damping resistor on SDIO lines. |

| | 3.5.1 PCB Type Di-pole Antenna with the Co- axial Connector | Modified Table2 Form factor Removed 206 994 Added 50ohm on BT_IN line at Figure 5 |
|--|---|---|
| | 3.5.3 PCB Stack- Up | Modify the wording: Underneath of u.FL/M HF connector. |
| | 4.1 WLAN Confi guration Files for Linux | Added WLAN regulatory configuration file |
| | 4.2 Bluetooth co nfiguration files | Added Bluetooth configuration files. |
| | 6. Reference | Added a link for module footprint / Antenna / Configuration files / Linux / Linux User Gui de |

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- Mar 27, 2025
- E2B-09-1413
- Rev. 2.0
- www.murata.com

FAQ

• Q: What is the purpose of the Type 2EA module?

A: The Type 2EA module is designed for customers looking to integrate Wi-Fi and Bluetooth connectivity into their products.

Q: What are the host interfaces supported by the module?

A: The module supports PCle 3.0 Gen2, SDIO 3.0 for WLAN; HCI UART, PCM, and I2S for Bluetooth.

Documents / Resources



MuRata LBEE5XV2EA Wi-Fi Plus Bluetooth Module [pdf] User Guide LBEE5XV2EA Wi-Fi Plus Bluetooth Module, LBEE5XV2EA, Wi-Fi Plus Bluetooth Module, Plus Bluetooth Module, Bluetooth Module

References

- User Manual
- muRata
- ➡ Bluetooth Module, LBEE5XV2EA, LBEE5XV2EA Wi-Fi Plus Bluetooth Module, muRata, Plus Bluetooth Module, Wi-Fi Plus Bluetooth Module

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