1YN M.2 Module (EAR00389) Datasheet

- Wi-Fi 4, 802.11 b/g/n
- Bluetooth 5.2 BR/EDR/LE
- SDIO 3.0 interface, SDR25@50MHz
- Chipset: Infineon/Cypress CYW43439

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Table of Contents

1 Document Information

This document applies to the following products.

Product Name	*Type Number*	*Murata Module*	*Chipset*	*Product Status*
1YN M.2 Module, rev A	EAR00389	LBEE5KL1YN-814	CYW43439	Initial Production

1.1 Revision History

Revision	*Date*	*Description*
PA1	2021-10-05	First version.
PA2	2024-12-11	Added note about using 1YN with the iMX93 uCOM board.

2 Introduction

This document is a datasheet that specifies and describes the *1YN M.2 module* mainly from a hardware point of view.

The main component in the design is Murata's 1YN module (full part number: LBEE5KL1YN-814), which in turn is based on the Infineon/Cypress CYW43439 chipset. The 1YN module enables Wi-Fi, Bluetooth and Bluetooth Low Energy (LE) communication.

There are multiple application areas for the 1YN M.2 Module:

- Industrial and building automation
- Asset management
- IoT applications
- Smart home: Voice assist device, smart printer, smart speaker, home automation gateway, and IP camera
- Retail/POS
- Healthcare and medical devices
- Smart city

2.1 Benefits of Using an M.2 Module to get Wi-Fi/BT Connectivity

There are several benefits to use an *M.2 module* to add connectivity to an embedded design:

- Drop-in, certified solution!
- Modular and flexible approaches to evaluate different Wi-Fi/BT solutions - with different trade-offs around performance, cost, power consumption, longevity, etc.
- Access to maintained software drivers (Linux and SDK) with responsive support from Murata.
- Supported by Embedded Artists' Developer's Kits for i.MX RT/6/7/8 development, including advanced debugging support on carrier boards
- One component to buy, instead of 40+
- No RF expertise is required
- Developed in close collaboration with Murata and NXP

2.2 More M.2 Related Information

For more information about the M.2 standard and Embedded Artists' adaptation, see: M.2 Primer

For more general information about the M.2 standard, see: https://en.wikipedia.org/wiki/M.2

The official M.2 specification (PCI Express M.2 Specification) is available from: www.pcisig.com

2.3 ESD Precaution and Handling

Please note that the M.2 module come without any case/box and all components are exposed for finger touches – and therefore extra attention must be paid to ESD (electrostatic discharge) precaution, for example use of static-free workstation and grounding strap. Only qualified personnel should handle the product.

Make it a habit always to first touch the mounting hole (which is grounded) for a few seconds with both hands before touching any other parts of the

boards. That way, you will have the same potential as the board and therefore minimize the risk for ESD.

In general touch as little as possible on the boards to minimize the risk of ESD damage. The only reasons to touch the board are when mounting/unmounting it on a carrier board.

Note that Embedded Artists does not replace modules that have been damaged by ESD.

2.4 Product Compliance

Visit Embedded Artists' website at http://www.embeddedartists.com/product_compliance for up-to-date information about product compliances such as CE, RoHS2, Conflict Minerals, REACH, etc.

3 Specification

This chapter lists some of the more important characteristics of the M.2 module, but it is not a full specification of performance and timing. The main component in the design is Murata's 1YN module (full part number: LBEE5KL1YN), which in turn is based around Infineon's CYW43439 chipset.

For a full specification, see Murata's 1YN Module (LBEE5KL1YN) product page: https://www.murata.com/products/connectivitymodule/wi-fi-bluetooth/overview/lineup/type1yn and the LBEE5KL1YN datasheet: https://wireless.murata.com/datasheet?/RFM/data/type1YN.pdf

Module / Chipset	
Murata module	LBEE5KL1YN -814
Chipset	Infineon CYW43439

Wi-Fi	
Standards	802.11b/g/n, Wi-Fi 4
Network	uAP and STA dual mode
Frequency	2.4GHz
Data rates	11, 54, 65 Mbps
Host interface	SDIO 3.0, SDR12@24MHz, SDR25@50MHz, DDR50@50MHz

Bluetooth	
Standards	5.2 BR/EDR/LE, 3Mbps PHY
Power Class	Class 1
Host interface	4-wire UART@4MBaud
Audio interface	PCM for audio

Powering			
Supply voltage to M.2 module **Note: Do not exceed minimum or maximum voltage. Module will be permanently damaged above this limit!**	**Min** 0.0V minimum 3.0V operating 3.2V RF specification	**Typ** 3.3V	**Max** 3.5V **Note** that LBEE5KL1YN module specification has higher maximum voltage (4.2V), but other components on the M.2 module limit the maximum voltage.
Peak current	TBD max		The power supply must be designed for this peak current, which typically happens during the startup calibration process.
Receive mode current (WLAN)	47 mA typical max		Note that current consumption varies widely between different operational modes.

Transmit mode current (WLAN)	320 mA typical max	Note that current consumption varies widely between different operational modes.

Environmental Specification	
Operational Temperature	-30 to +70 degrees Celsius
Specification Temperature	-10 to +55 degrees Celsius
Storage Temperature	-40 to +85 degrees Celsius
Relative Humidity (RH), operating and storage	10 - 90% non-condensing

3.1 Power Up Sequence

The supply voltage shall not rise (10 - 90%) faster than 40 microseconds and not slower than 100 milliseconds.

Chipset signals WL_REG_ON (M.2 signal W_DISABLE1#) and BT_REG_ON (M.2 signal W_DISABLE2#) must be held low for at least 700 microseconds after supply voltage has reached specification level before pulled high. 2 clock cycles of the 32.678kHz clock must also have passed before any of the signals is pulled high. These clock cycles will typically occur during the 700 microseconds but if the clock signal has a long delay during power-up, the 700 microsecond period can be extended.

3.2 External Sleep Clock

The sleep clock signals can be applied to a powered and unpowered M.2 module.

Clock Specification	
Frequency	32.768 kHz
Frequency accuracy	±200 ppm including initial tolerance, aging, temperature, etc.
Duty cycle	30 - 70%
Clock jitter	10 000 ppm max (during initial start-up)
Voltage level	3.3V logic, according to M.2 standard

3.3 Mechanical Dimensions

The M.2 module is of type: 2230-S3-E according to the M.2 nomenclature. This means width 22 mm, length 30mm (without trace antenna), top side component height 1.5 mm and key-E connector. The table below lists the different dimensions and weight.

M.2 Module Dimension	Value (±0.15 mm)	Unit
Width	22	mm
Height, with pcb trace antenna Height, without pcb trace antenna	44 30	mm mm
PCB thickness	0.8	mm
Maximum component height on top side	1.5	mm
Maximum component height on bottom side	0	mm
Ground hole diameter	3.5	mm
Plating around ground hole, diameter	5.5	mm
Module weight	1.5 ±0.5 gram	gram

Embedded Artists has added a non-standard feature to the 2230 M.2 modules designed together with Murata, NXP and Infineon (former Cypress). The pictures below illustrate the how the standard module size has been extended by 14 mm in the length direction in order to include a pcb trace antenna.

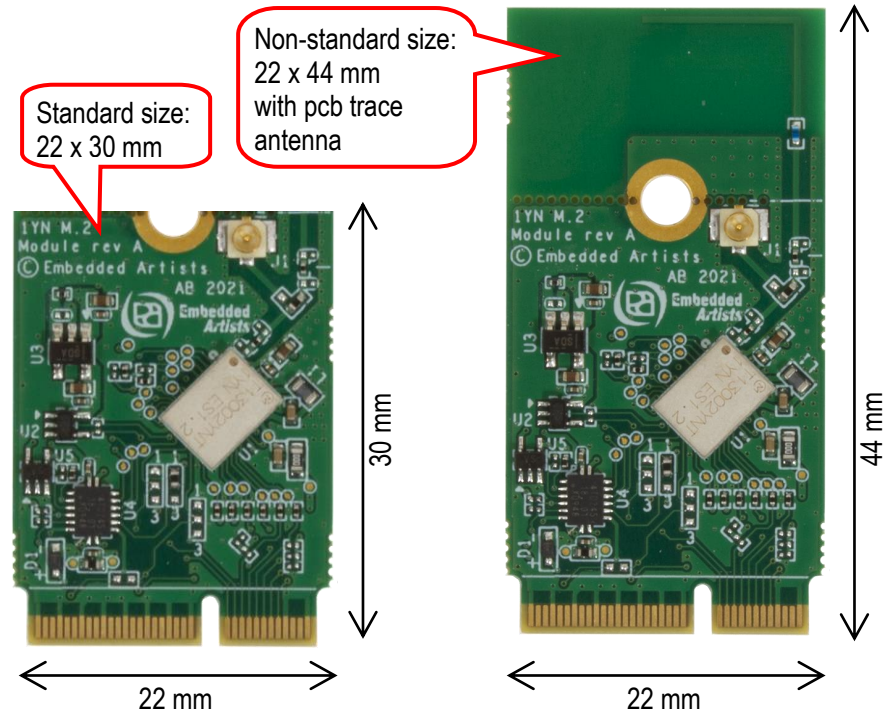


Figure 1 – M.2 Module with, and without, PCB Trace Antenna

The picture below gives dimensions for the grounded center (half) hole and the u.fl. antenna connector.

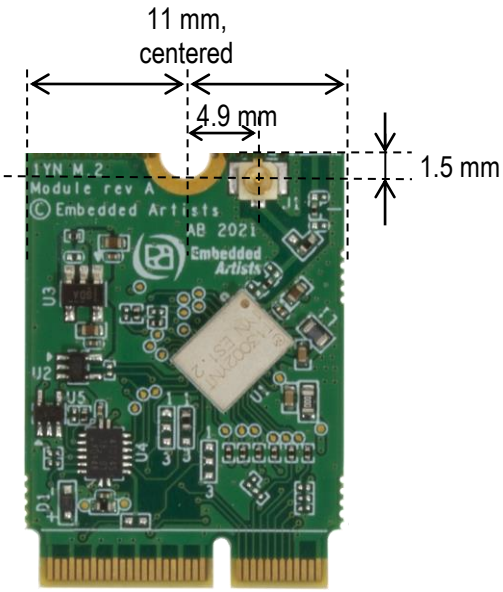


Figure 2 – M.2 Module Without Trace Antenna

3.4 M.2 Pinning

This section presents the pinning used for the M.2 module. It is essentially M.2 Key-E compliant with enhancements to support additional debug signals and 3.3V VDDIO override. The pin assignment for specific control and debug signals has been jointly defined by Embedded Artists, Murata, NXP and Infineon (former Cypress).

The picture below illustrates the edge pin numbering. It starts on the right edge and alternates between top and bottom side. The removed pads in the keying notch count (but are obviously non-existing).

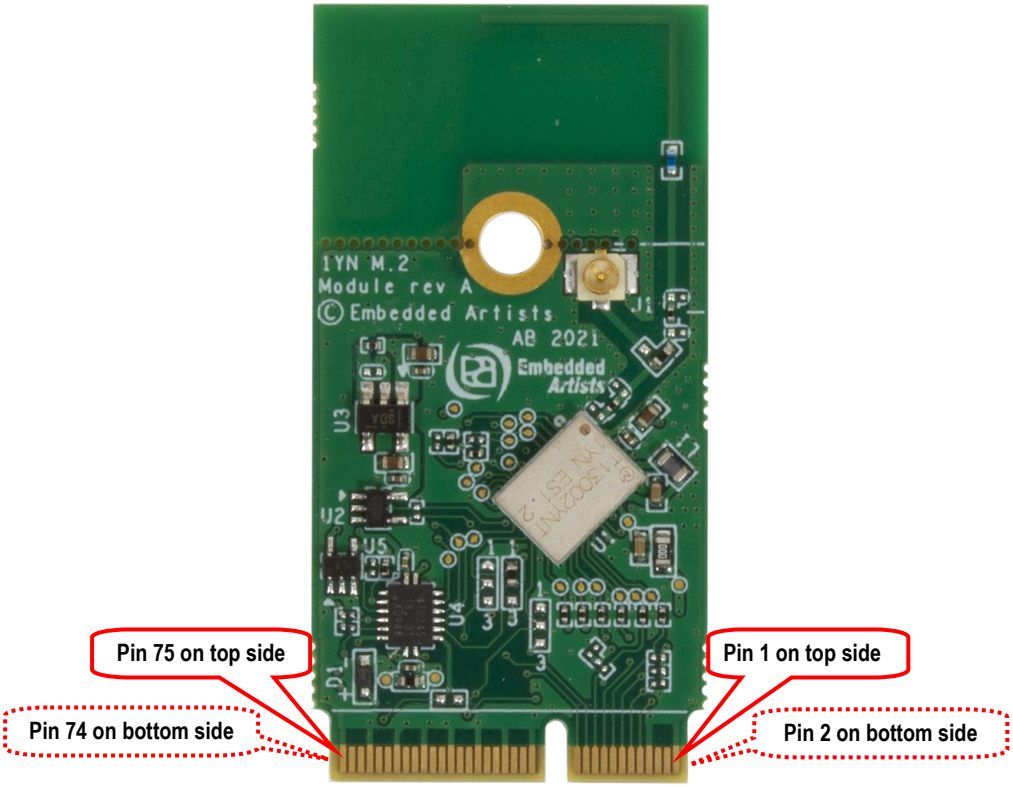


Figure 3 – M.2 Module Pin Numbering

The Wi-Fi interface use the SDIO or USB interface. The Bluetooth interface use the UART interface for control and PCM interface for audio. The table below lists the pin usage for the 1YN M.2 modules. The column "When is signal needed" signals four different categories:

- Always: These signals shall always be connected.
- Wi-Fi SDIO: These signals shall always be connected then the Wi-Fi interface is used via SDIO of the M.2 module.
- Bluetooth: These signals shall always be connected then the Bluetooth interface is used.
- Optional: These signals are optional to connect.

Pin #	Side of pcb	M.2 Name	Voltage Level and Signal Direction	When is signal needed	Note
1	Top	GND	GND	Always	Connect to ground
2	Bottom	3.3 V		Always	Power supply input. Connect to stable, low-noise 3.3V supply.
3	Top	USB_D+			Not connected.
4	Bottom	3.3 V		Always	Power supply input. Connect to stable, low-noise 3.3V supply.

5	Top	USB_D-			Not connected.
6	Bottom	LED_1#			Not connected.
7	Top	GND	GND	Always	Connect to ground.
8	Bottom	PCM_CLK	1.8V I/O	Bluetooth audio	For Bluetooth audio interface: BT_PCM_CLK Connected to 1YN module, signal BT_PCM_CLK, pin 11
9	Top	SDIO CLK	1.8V Input to M.2	Wi-Fi SDIO	For Wi-Fi SDIO interface: SDIO_CLK Connected to 2AE module, signal SDIO_CLK, pin 20
10	Bottom	PCM_SYNC	1.8V I/O	Bluetooth audio	For Bluetooth audio interface: BT_PCM_SYNC Connected to 1YN module, signal BT_PCM_SYNC, pin 8
11	Top	SDIO CMD	1.8V I/O	Wi-Fi SDIO	For Wi-Fi SDIO interface: SDIO_CMD Connected to 1YN module, signal SDIO_CMD, pin 22 Note: Require an external 10-100K ohm pullup
12	Bottom	PCM_OUT	1.8V output from M.2	Bluetooth audio	For Bluetooth audio interface: BT_PCM_OUT Connected to 1YN module, signal BT_PCM_OUT, pin 10
13	Top	SDIO DATA0	1.8V I/O	Wi-Fi SDIO	For Wi-Fi SDIO interface: SDIO_D0 Connected to 1YN module, signal SDIO_DAT0, pin 24 Note: Require an external 10-100K ohm pullup
14	Bottom	PCM_IN	1.8V input to M.2	Bluetooth audio	For Bluetooth audio interface: BT_PCM_IN Connected to 1YN module, signal BT_PCM_IN, pin 9
15	Top	SDIO DATA1	1.8V I/O	Wi-Fi SDIO	For Wi-Fi SDIO interface: SDIO_D1 Connected to 1YN module, signal SDIO_DAT1, pin 26 Note: Require an external 10-100K ohm pullup
16	Bottom	LED_2#			Not connected.
17	Top	SDIO DATA2	1.8V I/O	Wi-Fi SDIO	For Wi-Fi SDIO interface: SDIO_D2 Connected to 1YN module, signal SDIO_DAT2, pin 23 Note: Require an external 10-100K ohm pullup
18	Bottom	GND		Always	Connect to ground.
19	Top	SDIO DATA3	1.8V I/O	Wi-Fi SDIO	For Wi-Fi SDIO interface: SDIO_D3 Connected to 1YN module, signal SDIO_DAT3, pin 25 Note: Require an external 10-100K ohm pullup
20	Bottom	UART WAKE#	3.3V OD output from M.2	Bluetooth	For Bluetooth UART interface: BT_HOST_WAKE_L Connected to 1YN module, via open drain buffer, pin 38 Require an external 10K pullup resistor to 3.3V.
21	Top	SDIO WAKE#	1.8V OD output from M.2	Wi-Fi SDIO	For Wi-Fi SDIO interface WL_HOST_WAKE_L Connected to 1YN module, via open drain buffer, pin 27 Note: Require an external 10K pullup resistor to 1.8V
22	Bottom	UART TXD	1.8V output from M.2	Bluetooth	For Bluetooth UART interface: BT_UART_TXD Connected to 1YN module, pin 3
23	Top	SDIO RESET#			Not connected. The Wi-Fi SDIO interface is controlled by pin 56, W_DISABLE1#, which is a 3.3V logic level signal.
24	Key, non existing				
25	Key, non existing				
26	Key, non existing				

27	Key, non existing				
28	Key, non existing				
29	Key, non existing				
30	Key, non existing				
31	Key, non existing				
32	Bottom	UART_RXD	1.8V input to M.2	Bluetooth	For Bluetooth UART interface: BT_UART_RXD Connected to 1YN module, pin 2
33	Top	GND		Always	Connect to ground.
34	Bottom	UART_RTS	1.8V output from M.2	Bluetooth	For Bluetooth UART interface: BT_UART_RTS Connected to 1YN module, pin 5
35	Top	PERp0			Not connected.
36	Bottom	UART_CTS	1.8V input to M.2	Bluetooth	For Bluetooth UART interface: BT_UART_CTS Connected to 1YN module, pin 4
37	Top	PERn0			Not connected.
38	Bottom	VENDOR DEFINED	1.8V I/O	Optional	Connected to 1YN module, signal WL_GPIO_2, pin 17 Note: this pin must NOT be driven high during powerup. Since there is no special reason for connecting to WL_GPIO_2, leave this pin unconnected/open.
39	Top	GND		Always	Connect to ground.
40	Bottom	VENDOR DEFINED	1.8V I/O	Optional	Connected to 1YN module, signal WL_GPIO_1, pin 18 For Wi-Fi SDIO interface: with firmware and driver support this can be WL_DEV_WAKE_L Note: this pin must NOT be driven high during and shortly after a reset cycle (controlled by WL_REG_ON) because that can place the chipset in a special debug mode. It is recommended to have an external 1K ohm pull-down resistor to ground on this pin, just to make sure the signal is low during and shortly after a reset cycle.
41	Top	PETp0			Not connected.
42	Bottom	VENDOR DEFINED	1.8V input to M.2	Bluetooth	For Bluetooth UART interface: BT_DEV_WAKE_L Connected to 1YN module, pin 39
43	Top	PETn0			Not connected.
44	Bottom	COEX3			Not connected.
45	Top	GND		Always	Connect to ground.
46	Bottom	COEX_TXD			Not connected.
47	Top	REFCLKp0			Not connected.
48	Bottom	COEX_RXD			Not connected.
49	Top	REFCLKn0			Not connected.
50	Bottom	SUSCLK	3.3V input to M.2	Always	External sleep clock input (32.768kHz) Connected to 1YN module, via buffer, signal LPO_IN, pin 37
51	Top	GND		Always	Connect to ground.
52	Bottom	PERST0#			Not connected.
53	Top	CLKREQ0#			Not connected.
54	Bottom	W_DISABLE2#	3.3V input to M.2	Always	Connected to 1YN module, via buffer, signal BT_REG_ON, pin 14 BT_REG_ON, High = BT part of module enabled/internally powered, Low = BT disabled/powered down

55	Top	PEWAKE0#			Not connected.
56	Bottom	W_DISABLE1#	3.3V input to M.2	Always	Connected to 1YN module, via buffer, signal WL_REG_ON, pin 28 WL_REG_ON, High = Wi-Fi part of module enabled/internally powered, Low = Wi-Fi disabled/powered down
57	Top	GND		Always	Connect to ground.
58	Bottom	I2C_SDA			Not connected.
59	Top	Reserved			Not connected.
60	Bottom	I2C_CLK			Not connected.
61	Top	Reserved			Not connected.
62	Bottom	ALERT#			Not connected.
63	Top	GND		Always	Connect to ground.
64	Bottom	RESERVED		Optional	Optional supply voltage input for control and data signal voltage level. Apply a stable, low-noise, 3.3V / 100mA supply to set 3.3V voltage level on all signals.
65	Top	Reserved			Not connected.
66	Bottom	UIM_SWP			Not connected.
67	Top	Reserved			Not connected.
68	Bottom	UIM_POWER_ SNK			Not connected.
69	Top	GND		Always	Connect to ground.
70	Bottom	UIM_POWER_ SRC/GPIO_1			Not connected.
71	Top	Reserved			Not connected.
72	Bottom	3.3 V		Always	Power supply input. Connect to stable, low-noise 3.3V supply.
73	Top	Reserved			Not connected.
74	Bottom	3.3 V		Always	Power supply input. Connect to stable, low-noise 3.3V supply.
75	Top	GND		Always	Connect to ground.

3.5 VDDIO Override Feature

The M.2 standard specify 1.8V logic level on several of the data and control signals. It is possible to override the voltage level for the 1.8V signals via pin 64. Apply a 3.3V / 100 mA supply to pin 64 in order to get 3.3V voltage level on all data and control signals.

3.6 SDIO Interface

The SDIO interface conforms to the SDIO v3.0 specification, including the UHS-I modes, and is backward compatible with SDIO v2.0.

SDIO bus speed modes	Max SDIO clock frequency	Max bus speed	Signaling voltage according to M.2 specification	Supported in 3.3V VDDIO Override Mode
DS (Default speed)	25 MHz	12.5 MByte/s	1.8 V	Yes
HS (High speed)	50 MHz	25 MByte/s	1.8 V	Yes
SDR12	25 MHz	12.5 MByte/s	1.8 V	No
SDR25	50 MHz	25 MByte/s	1.8 V	No
DDR50	50 MHz	50 MByte/s	1.8 V	No

3.7 Test Points

There are some test points that can be of interest to probe for debugging purposes, as illustrated in the picture below.

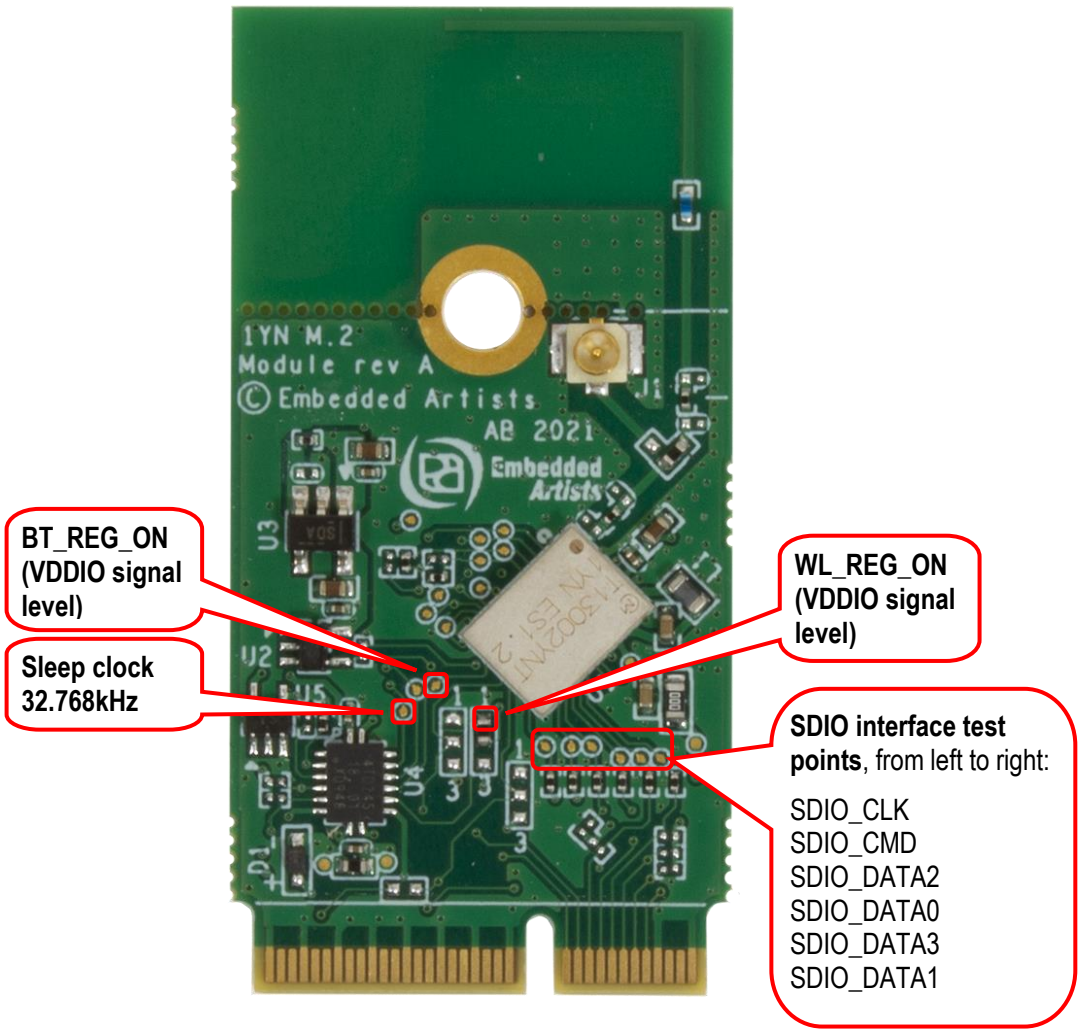


Figure 4 – 1YN M.2 Module Test Points

3.8 Current Consumption Measurements

It is possible to measure the currents of the power supplies to the 1YN module, VBAT and VDDIO. VBAT is the 3.3V the is supplied to the M.2 interface and VDDIO is an on-board generated 1.8V. VDDIO is generated from the supplied 3.3V. If the supply voltage (3.3V) to the M.2 module is measured it will be both the VBAT and VDDIO currents that is measured. By measuring currents at the illustrated points below it is possible to measure VBAT and VDDIO independently.

Note that zero ohm resistors are mounted by default. Select a series resistor with as low resistance as possible to keep the voltage drop to a minimum. Keep the drop below 100mV. VBAT can be up to 1 Amp in peak which means that maximum series resistance is 100 milliOhm for the VBAT resistor. For VDDIO the current is lower so a 1 ohm resistor can be a suitable value.

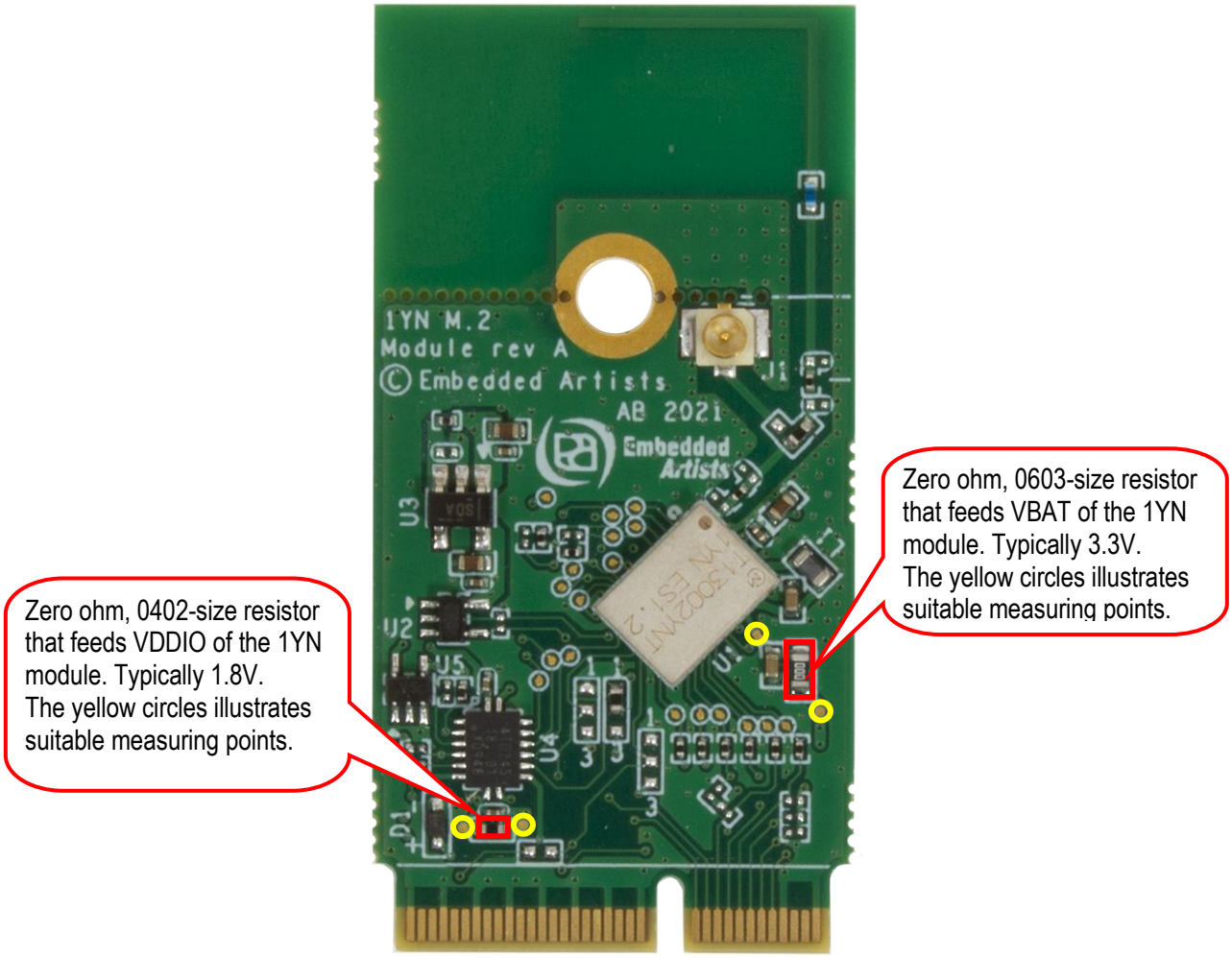


Figure 5 – Current Measurement

4 Antenna

This chapter addresses the antenna side of the module. There is an on-board, reference certified pcb trace antenna. This can be used for testing/evaluation purposes, but also for the final product. Also, for testing and evaluation purposes, it is possible to disconnect the on-board antenna and instead use an u.fl. connector to connect an external antenna.

4.1 Mounting and Clearance

Ideally, arrange the M.2 module so that the antenna is located at a corner of the product. Keep plastic case (i.e., non-metallic) away from the antenna area with at least 5 mm clearance (in all directions). Also keep any metal elements (e.g., connectors, battery, etc.) away from the antenna area with at least 5 mm clearance (in all directions). Keep a clearance area under and above the antenna area of at least 7.5mm , both under and over the PCB.

Human hands or body parts should be kept away (in the normal use case) from the antenna area.

The ground hole in the middle shall be grounded. Use a metal stand-off according to M.2 standard (height suitable for selected M.2 connector) and use metal screw to create a proper ground connection.

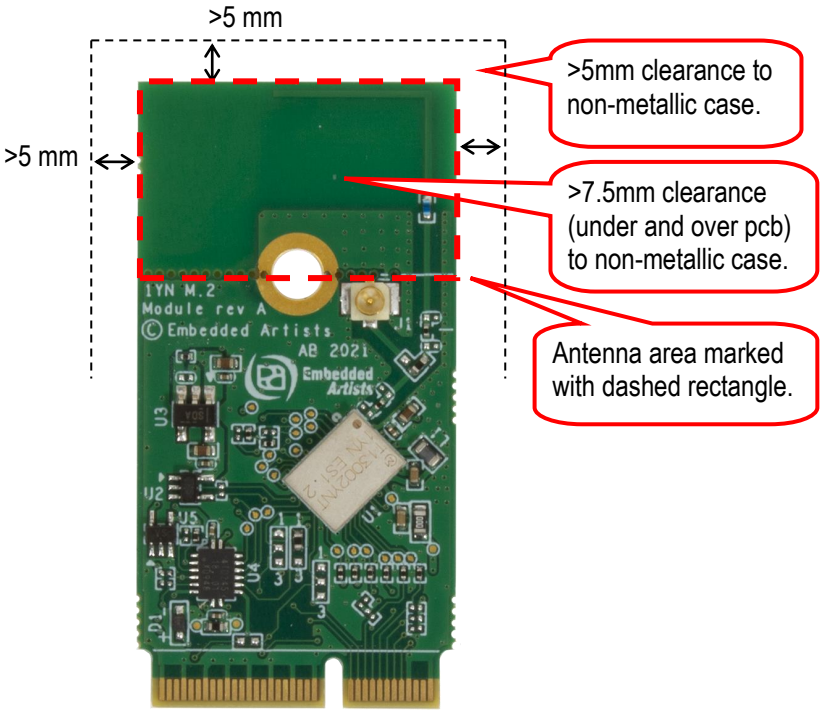


Figure 6 – M.2 Module Clearance Area

4.2 Antenna Connector

The M.2 standard specifies a 1.5 mm outer ring diameter male connector, which is compatible with the Murata MSC and IPEX MHF4 connector specifications. This connector is not used since our M.2 modules also targets industrial users, where the Hirose U.FL. connector standard is more commonly used. U.FL. is compatible with the IPEX MHF1 connector specification.

4.3 Overriding on-board PCB Trace Antenna

Per default, the on-board PCB trace antenna is used for the Wi-Fi and Bluetooth interface. The antenna connection from the 1YN module can be redirected to the U.FL. connector by just moving one zero ohm 0402 series resistor, see illustration below. The on-board trace antenna can be left as-is, or the antenna part can be snapped-off.

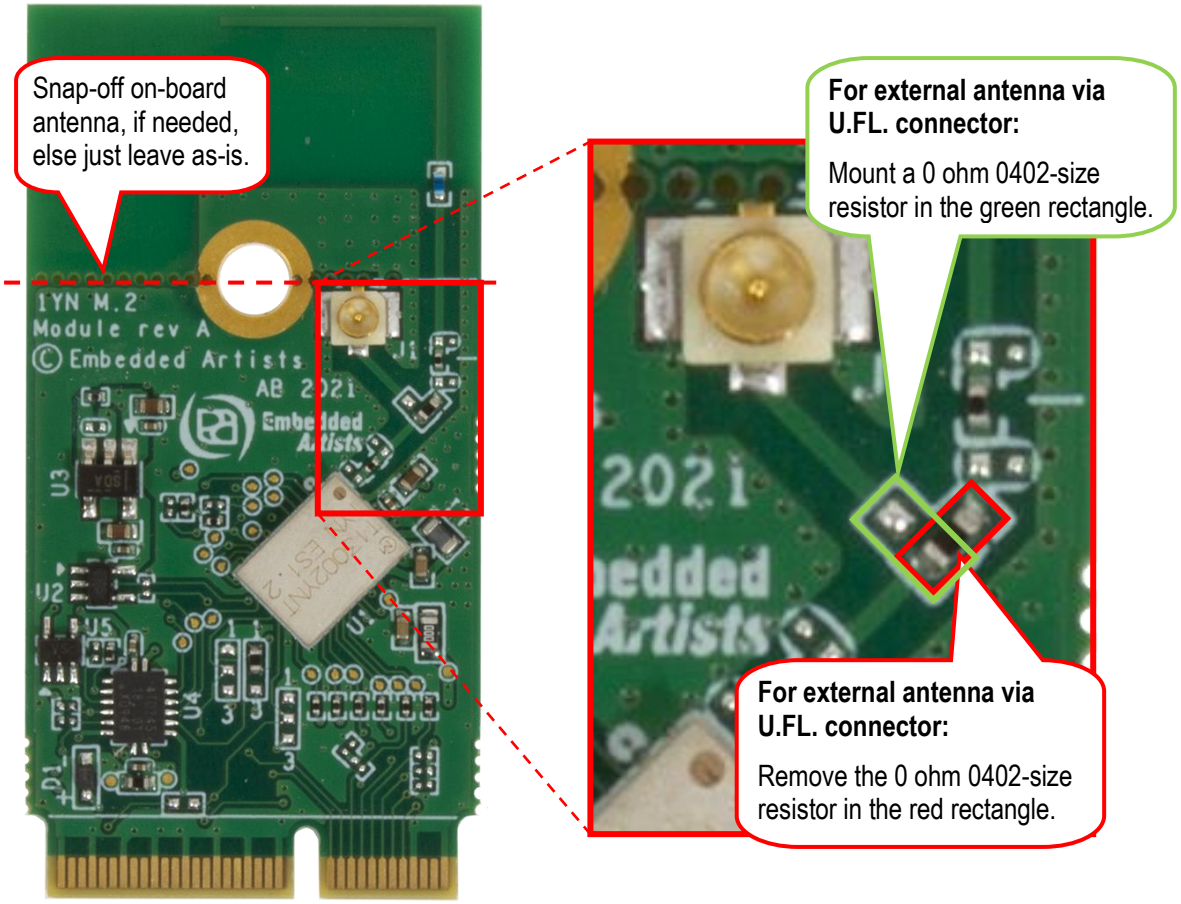


Figure 7 – Rework to Connect U.FL. Connector

4.4 On-board Trace Antenna Performance

The on-board pcb trace antenna type is monopole. The 1YN M.2 module has been measured both standalone and mounted on the iMX OEM Carrier Board (which is a typical carrier board design).

The table below lists total efficiency:

Condition	Frequency [MHz]			Average dB	Average %
	2400	2442	2484		
M.2 module mounted on reference carrier board	-2.5	-2.3	-2.2	-2.3	58.4
M.2 module standalone	-2.9	-2.8	-2.7	-2.8	52.3

The table below lists peak gain:

Condition	Frequency [MHz]			Max dBi
	2400	2442	2484	
M.2 module mounted on reference carrier board	0.0	-0.1	0.1	0.1
M.2 module standalone	-0.5	-0.1	0.2	0.2

4.4.1 1YN M.2 Module Mounted on iMX OEM Carrier Board

The 3D directivity measurements are presented below for the 2.4 GHz bands when the 1YN M.2 module is mounted on the iMX OEM Carrier Board.

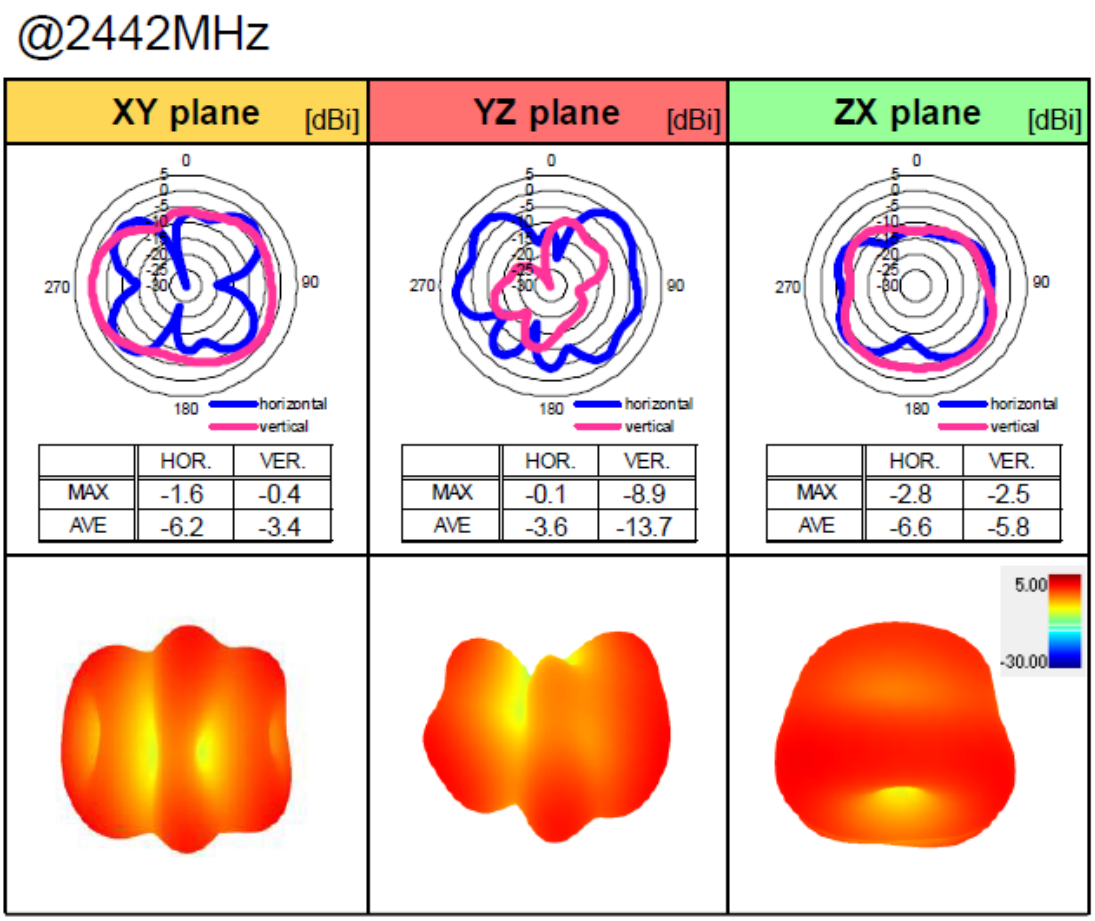


Figure 8 – 3D Directivity Measurements in 2.4 GHz Band (1YN M.2 Mounted on iMX OEM Carrier Board)

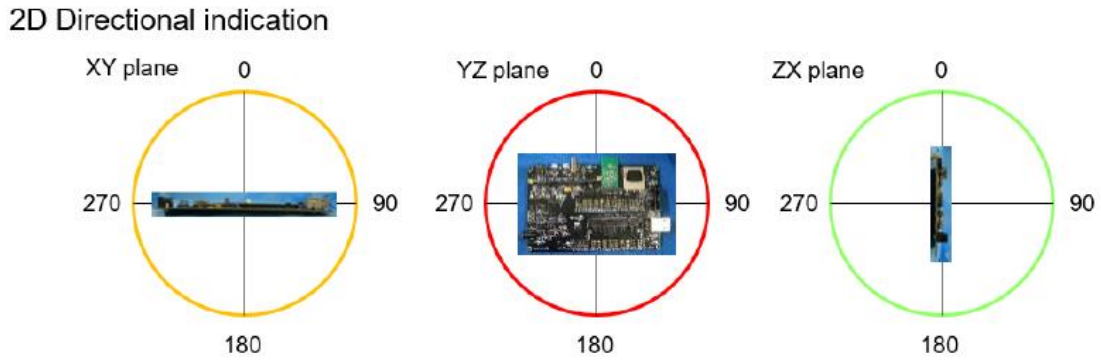


Figure 9 – 3D Directivity Measurements Plane Orientations

The pictures below illustrates the return loss, efficiency and directivity when the 1YN M.2 module is mounted on the iMX OEM Carrier Board.

<Return Loss>

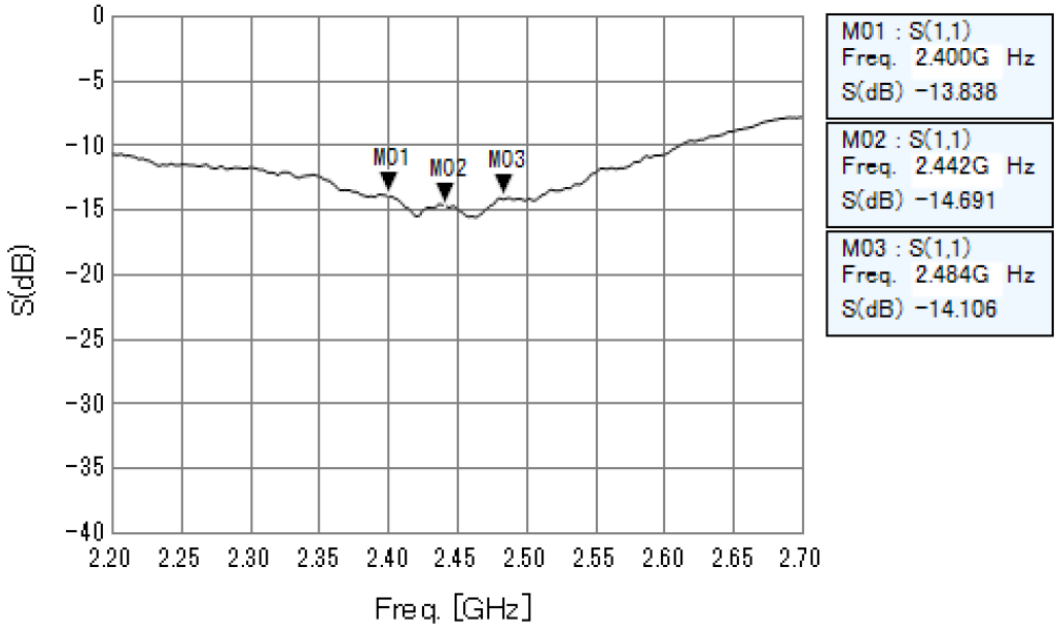


Figure 10 – Return Loss for 1YN M.2 Module Mounted on iMX OEM Carrier Board

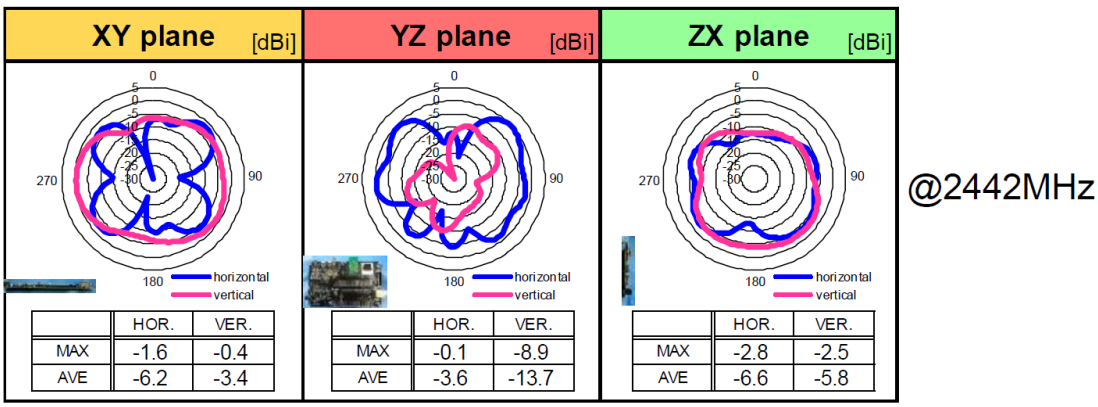
<Efficiency>

[dBi] [dB]

LINEAR POLARIZATION		XY-plane hor.	XY-plane ver.	YZ-plane hor.	YZ-plane ver.	ZX-plane hor.	ZX-plane ver.	Total Efficiency
2400 MHz	MAX.	-2.2	-0.2	0.0	-9.3	-3.2	-2.3	
	AVE.	-6.8	-3.2	-3.6	-13.8	-7.0	-5.6	-2.5
2442 MHz	**MAX.**	**-1.6**	**-0.4**	**-0.1**	**-8.9**	**-2.8**	**-2.5**	
	AVE.	**-6.2**	**-3.4**	**-3.6**	**-13.7**	**-6.6**	**-5.8**	**-2.3**
2484 MHz	MAX.	-1.2	-0.9	0.1	-8.7	-2.6	-2.6	
	AVE.	-5.8	-3.7	-3.6	-13.8	-6.3	-6.0	-2.2

Figure 11 – Efficiency for 1YN M.2 Module Mounted on iMX OEM Carrier Board

<Directivity>



@2442MHz

Figure 12 – Directivity for 1YN M.2 Module Mounted on iMX OEM Carrier Board

4.4.2 1YN M.2 Module Standalone

The 3D directivity measurements are presented below for the 2.4 GHz when the 1YN M.2 module is standalone.

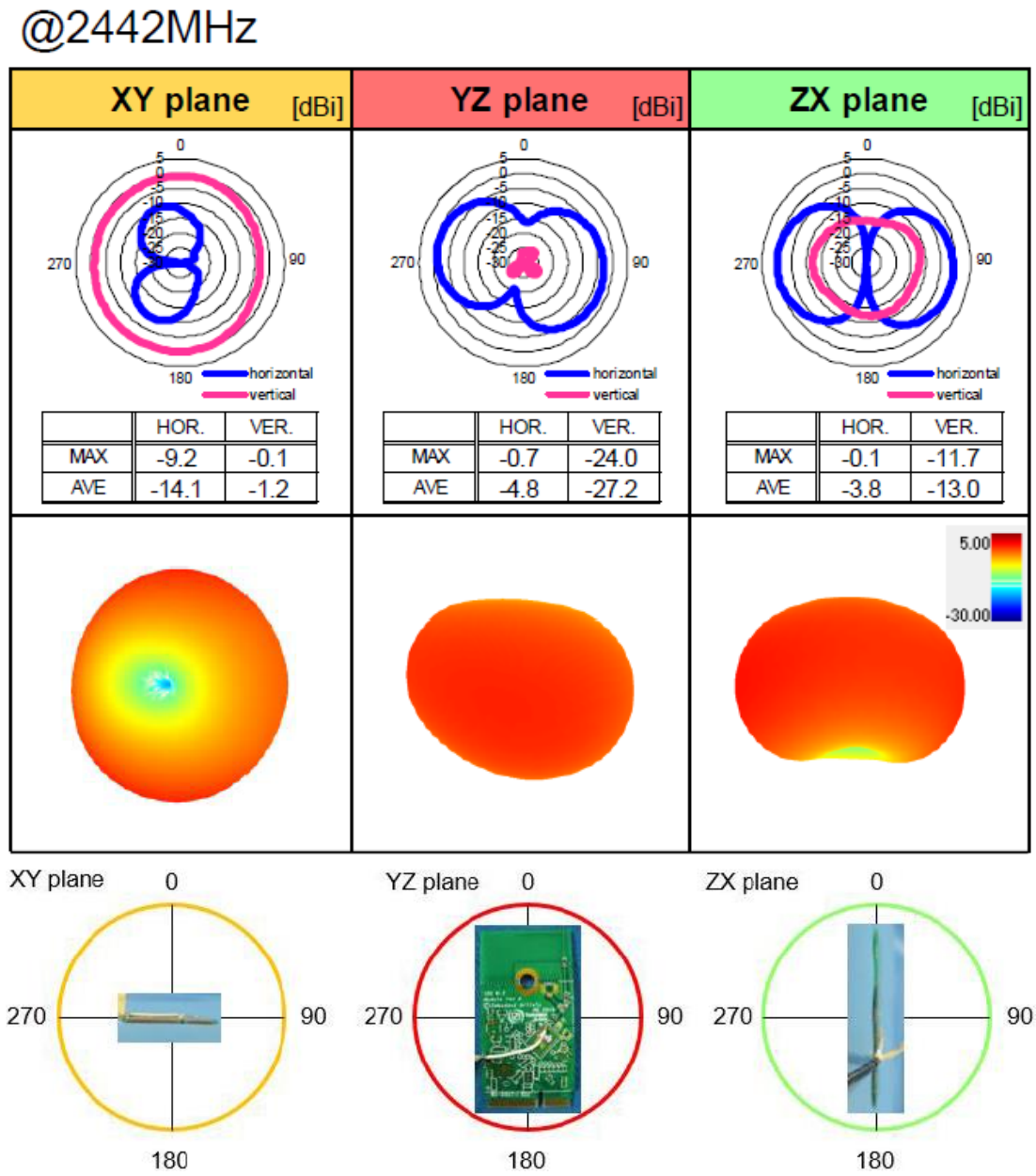


Figure 13 – 3D Directivity Measurements Plane Orientations

The pictures below illustrates the return loss, efficiency and directivity when the 1YN M.2 module is standalone.

<Return Loss>

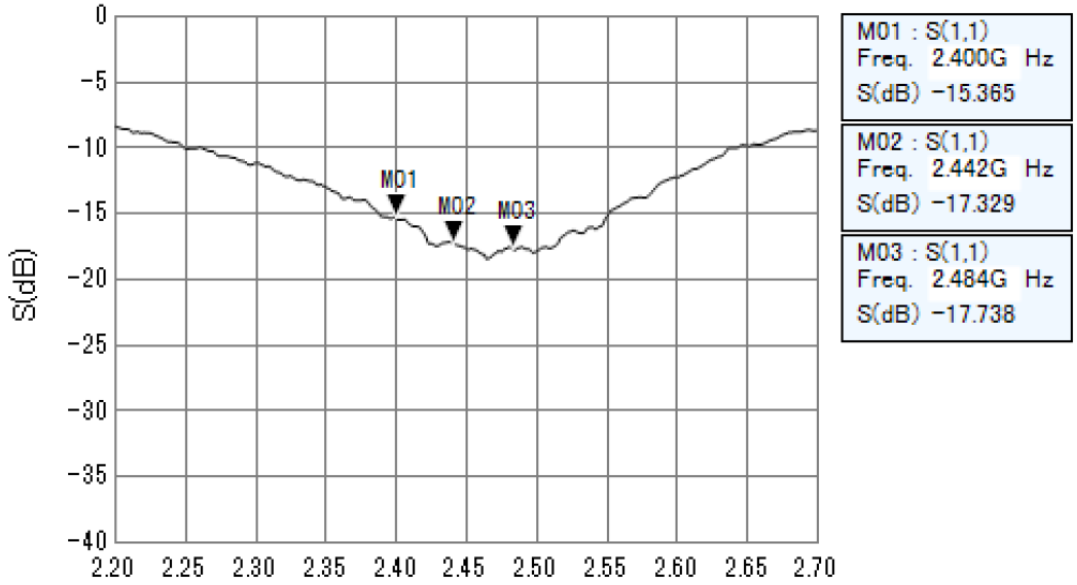


Figure 14 – Return Loss for 1YN M.2 Module Standalone

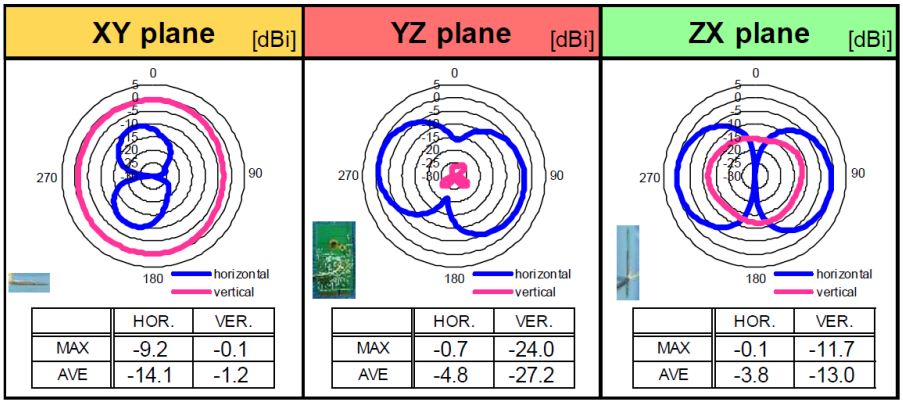
<Efficiency>

[dBi] [dB]

LINEAR POLARIZATION		XY-plane hor.	XY-plane ver.	YZ-plane hor.	YZ-plane ver.	ZX-plane hor.	ZX-plane ver.	Total Efficiency
2400 MHz	MAX.	-9.5	-0.5	-0.7	-23.5	-0.5	-11.4	
	AVE.	-14.2	-1.3	-4.7	-27.7	-4.0	-12.9	-2.9
2442 MHz	**MAX.**	**-9.2**	**-0.1**	**-0.7**	**-24.0**	**-0.1**	**-11.7**	
	AVE.	**-14.1**	**-1.2**	**-4.8**	**-27.2**	**-3.8**	**-13.0**	**-2.8**
2484 MHz	MAX.	-9.4	0.2	-0.4	-23.6	-0.2	-11.9	
	AVE.	-14.3	-1.0	-4.8	-27.4	-3.7	-13.1	-2.7

Figure 15 – Efficiency for 1YN M.2 Module Standalone

<Directivity>



@2442MHz

Figure 16 – Directivity for 1YN M.2 Module Standalone

5 Software and Support

This chapter contains information about software and support.

5.1 Software Driver

The CYW43439 chipset do not contain any persistent software. A firmware image must be downloaded by the host at start-up. This is the responsibility of the operating system driver.

There are three different cases, depending on which host processor is used:

1. **Embedded Artists' Computer-on-Modules, (u)COM, as host processor**
   Embedded Artists' Linux BSPs and SDKs for the different (u)COM board contains all drivers available and pre-configured. Everything has been tested and works out-of-the-box on the different iMX Developer's Kits.

iMX Developer's Kit	1YN M.2 support
iMX93 uCOM	EA Linux BSP v6.6.23 and later **Note**: See section 7.1 for special operation notes.
iMX8M Mini uCOM	EA Linux BSP v5.10.35 and later
iMX8M Nano uCOM	EA Linux BSP v5.10.35 and later
iMX8M COM	EA Linux BSP v5.10.35 and later
iMX7 Dual COM	EA Linux BSP v5.10.35 and later
iMX7 Dual uCOM	EA Linux BSP v5.10.35 and later
iMX7ULP uCOM	No
iMX 6 Quad COM	EA Linux BSP v5.10.35 and later
iMX 6 DualLite COM	EA Linux BSP v5.10.35 and later
iMX 6 SoloX COM	EA Linux BSP v5.10.35 and later
iMX 6 UltraLite/ULL COM	EA Linux BSP v5.10.35 and later
iMX RT1176 uCOM	Not yet available
iMX RT1166 uCOM	Not yet available
iMX RT1064 uCOM	Not yet available
iMX RT1062 OEM	Not yet available

2. **Other i.MX based, for example NXP's EVKs**
   Murata has created documentation how to compile the Linux kernel for the NXP EVKs https://wireless.murata.com/products/rf-modules-1/wi-fi-bluetooth-for-nxp-i-mx.html#Linux

3. **Non-i.MX host processor**
   There is no ready-to-go driver exist. Contact Murata to check driver availability on the hardware platform used.

5.2 Support

Embedded Artists supports customers that use our M.2 module in combination with Embedded Artists' Computer-on-Modules, (u)COM, based on NXP's i.MX RT/6/7/8 families.

For other platforms, support is provided by Murata via their Community Support Forum:
https://community.murata.com/s/topic/0TO5F0000002TLWWA2/connectivity-modules

6 Regulatory

The Murata 1YN module is reference certified. See the LBEE5KL1YN datasheet from Murata for details.

6.1 European Union Regulatory Compliance

EUROPEAN DECLARATION OF CONFORMITY (Simplified DoC per Article 10.9 of the Radio Equipment Directive 2014/53/EU)

This apparatus, namely 1YN M.2 module (pn EAR00389) conforms to the Radio Equipment Directive (RED) 2014/53/EU. The full EU Declaration of Conformity for this apparatus can be found at this location: https://www.embeddedartists.com/products/1xk-m-2-module/, see document *1YN M.2 module Declaration of Conformity*.

The following information is provided per Article 10.8 of the Radio Equipment Directive 2014/53/EU:

(a) Frequency bands in which the equipment operates.

(b) The maximum RF power transmitted.

PN	RF Technology	(a) Frequency Ranges (EU)	(b) Max Transmitted Power
EAR00389	Bluetooth BR/EDR/LE	2400 MHz – 2484 MHz	0.2 dBm
EAR00389	Wi-Fi IEEE 802.11b/g/n	2400 MHz – 2484 MHz	0.2 dBm

The 1YN M.2 module complies with the Directive 2011/65/EU (EU RoHS 2) and its amendment Directive (EU) 2015/863 (EU RoHS 3).

7 Notes

This chapter contains information about special notes about the operation of the 1YN M.2 board.

7.1 1YN M.2 and iMX93 uCOM Issue

Due to voltage translator circuits on the iMX93 uCOM board, there are unintentional interactions with default 1YM pin states during reset cycles and other voltage translator circuits on the uCOM Carrier Board. To get the 1YN M.2 and iMX93 uCOM board from Embedded Artists working together, two smaller reworks are needed.

Step #1: mount a 1 Kohm 04-02 resistor on the 1YN M.2 board, in the location illustrated in the picture below.

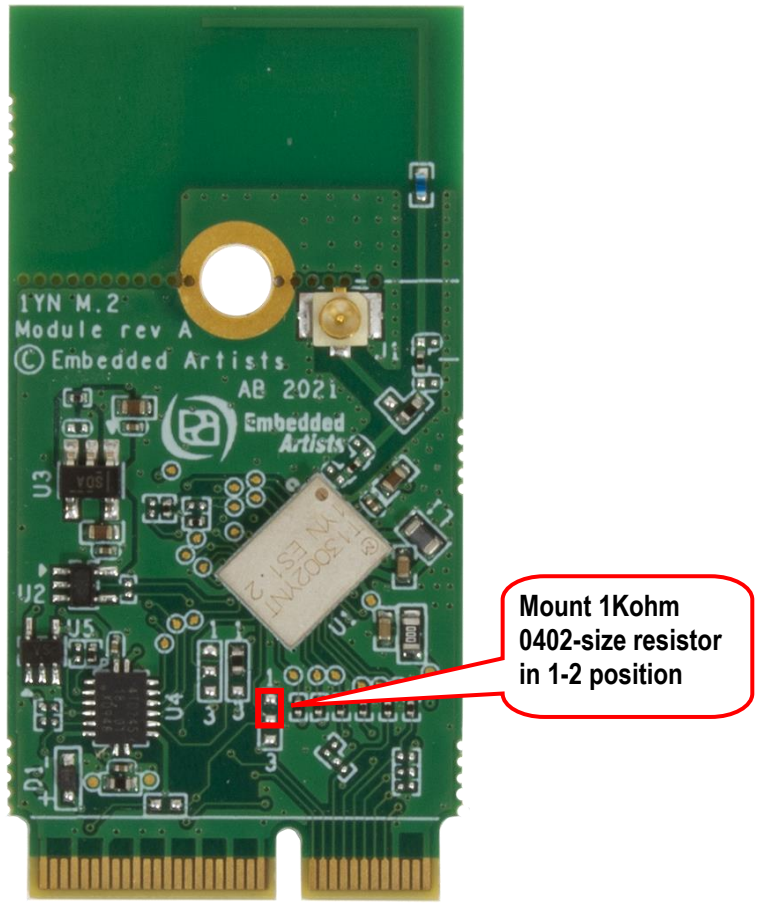


Figure 17 – 1YN M.2 Board Rework

Step #2:

Two resistors on the uCOM Carrier Board must be replaced. Note that only uCOM Carrier Boards that are rev B, B1, C, and C1 can be used. Earlier boards om the rev A generation are not compatible and cannot be used.

R22 and R23 are located on the bottom side of the uCOM Carrier Board right under the M.2 connector. The picture below illustrates where to find R22 and R23 on the rev C board. The other board revisions looks very similar and the resistors can be found in about the same location on these boards.

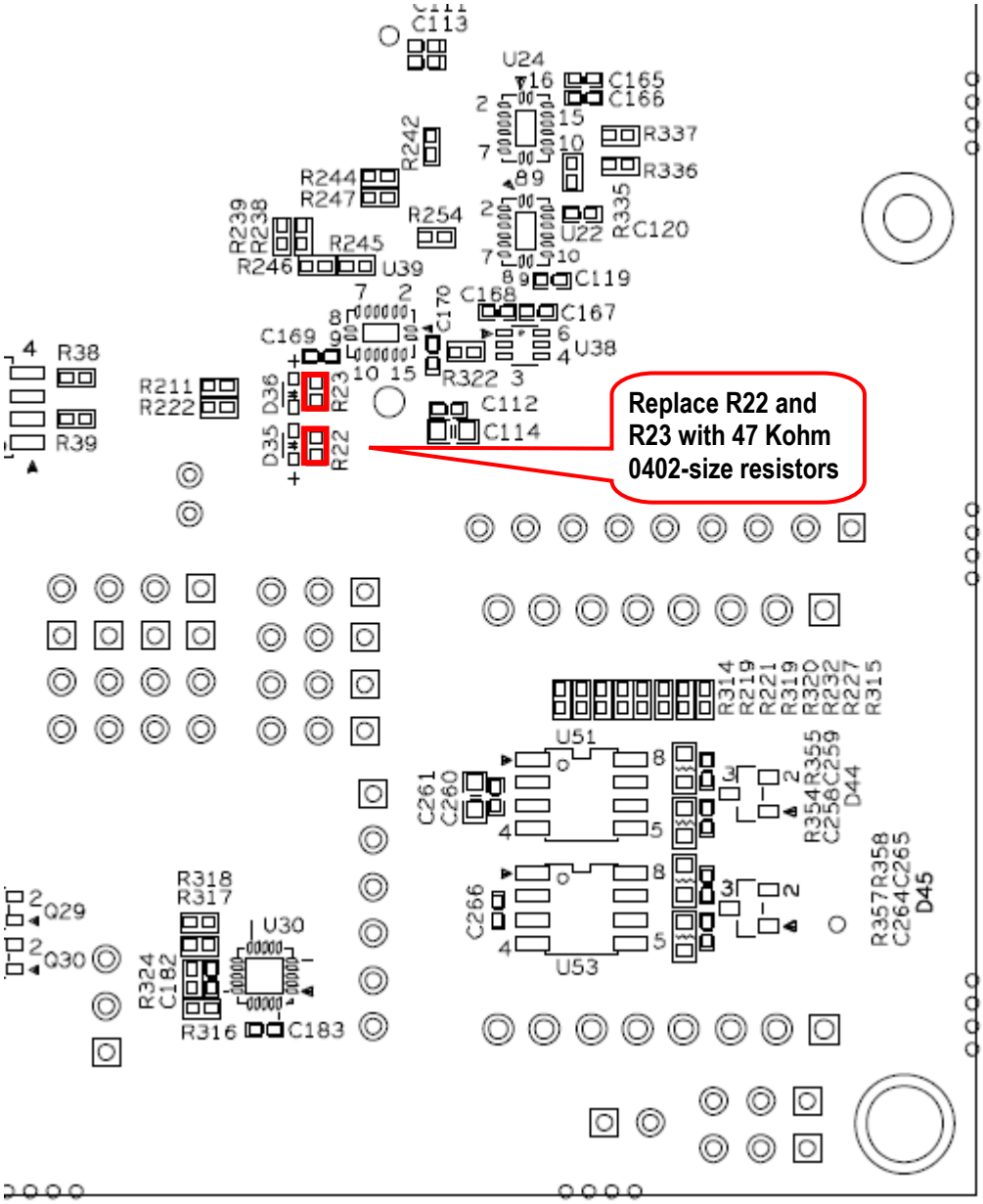


Figure 18 – uCOM Carrier Board Rework on Bottom Side

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