FCC - TEST REPORT

Report Number	:	**68.930.22.0030.01**	Date of Issue:	February 13, 2023
Model	:	**YM503, YM401, YM402, YM403, YM501, YM502, YM504**		
Product Type	:	Fingertip Pulse Oximeter		
Applicant	:	Shenzhen Yimi Life Technology Co.,Ltd.		
Address	:	302 Building C, YouLiTong Industrial Plant, No.56 Qingsong Road, Longtian Street, Pingshan, 518118 Shenzhen, P.R.China		
Manufacturer	:	Shenzhen Yimi Life Technology Co.,Ltd.		
Address	:	302 Building C, YouLiTong Industrial Plant, No.56 Qingsong Road, Longtian Street, Pingshan, 518118 Shenzhen, P.R.China		
Test Result	:	■ **Positive**	☐ **Negative**	
Total pages including Appendices	:	**28**		

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1 Table of Contents

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen City, 518052, P. R. China
FCC Registration Number:	514049
FCC Designation Number:	CN5009
Telephone:	86 755 8828 6998
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3 Description of the Equipment under Test

Product:	Fingertip Pulse Oximeter
Model no.:	YM503
HMN:	NIL
FCC ID:	2A949-YM2022
Ratings:	3VDC (Supplied by 2x1.5V AAA batteries)
RF Transmission Frequency:	2402MHz-2480MHz
No. of Operated Channel:	40
Modulation:	GFSK
Antenna Type:	Integral Antenna
Antenna Gain:	0.2dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Fingertip Pulse Oximeter supports BLE functions.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-01-2021 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 15.247 Meas Guidance v05r02 Measurement Guidance and ANSI C63.10 (2013).

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5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Result	Test Site
§15.207	Conducted emission AC power port	--	N/A	--
§15.247(b)(1)	Conducted AV output power for FHSS	--	N/A	--
§15.247(b)(3)	Conducted peak output power for DTS	10	Pass	Site 1
§15.247(a)(2)	6dB bandwidth	12	Pass	Site 1
§15.247(e)	Power spectral density	14	Pass	Site 1
§15.247(a)(1)	20dB Occupied bandwidth	--	N/A	--
--	99% Occupied Bandwidth	--	N/A	--
§15.247(a)(1)	Carrier frequency separation	--	N/A	--
§15.247(a)(1)(iii)	Number of hopping frequencies	--	N/A	--
§15.247(a)(1)(iii)	Dwell Time	--	N/A	--
§15.247(d)	Spurious RF conducted emissions	16	Pass	Site 1
§15.247(d)	Band edge	20	Pass	Site 1
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	22	Pass	Site 1
§15.203	Antenna requirement	See note 2	Pass	--

Remark 1: N/A – Not Applicable.
Note 1: The EUT uses an Integrated Antenna 0.2dBi max. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2A949-YM2022 complies with Section 15.205, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

The difference among all the models was described in chapter 12. So, model YM503 was chosen as the representative model to perform full RF test, the other models were deemed to fulfill relevant RF requirements without further testing.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: November 1, 2022

Testing Start Date: November 2, 2022

Testing End Date: November 10, 2022

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:	Prepared by:	Tested by:
Trevor You	Ricky Yin	Louise Liu
EMC Project Manager	EMC Project Engineer	EMC Test Engineer

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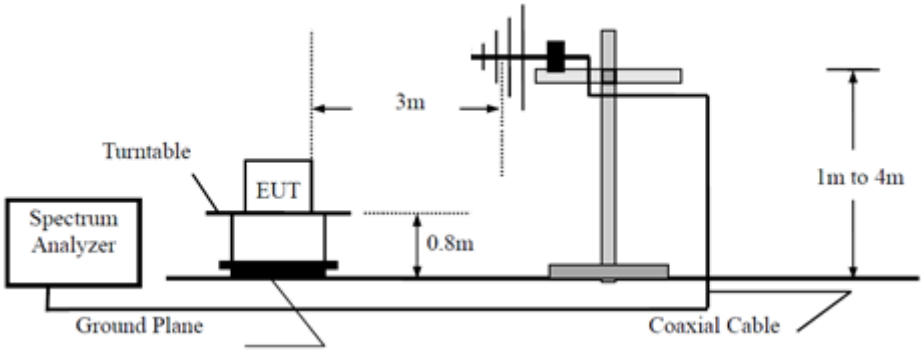
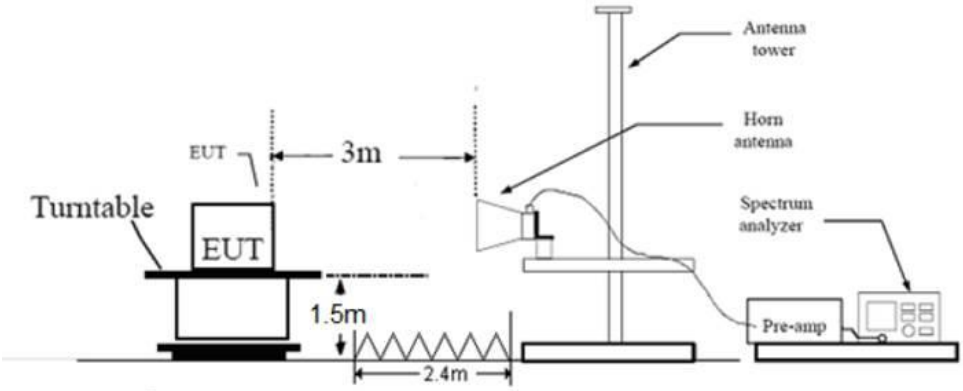
7 Test Setups

7.1 Radiated test setups

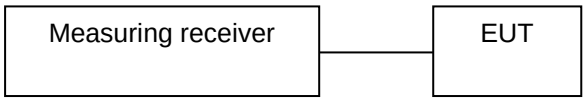
Below 1GHz



Above 1GHz



7.2 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

Description	Manufacturer	Model no.	S/N
Laptop	Lenovo	X240	L34015285
Serial interface board	--	--	--

Test software information:

Test Software Version	QA tool	
Modulation	Setting TX Power	Packet Type
GFSK	60	---

The system was configured to channel 0, 19, and 39 for the test.

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9 Technical Requirement

9.1 Conducted peak output power

Test Method

1. Connect the power meter to the EUT
   a) The EUT is configured to transmit continuously, or to transmit with a constant duty factor.
   b) At all times the EUT is transmitting at its maximum power control level.
   c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Adjust the measurement in dBm by adding 10log (1/x), where x is the duty cycle to the measurement result.

Limits

According to §15.247 (b) (1), conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Test result as below table

Frequency MHz	Conducted peak Output Power dBm	Result
Top channel 2402MHz	1.83	Pass
Middle channel 2440MHz	2.02	Pass
Bottom channel 2480MHz	1.62	Pass

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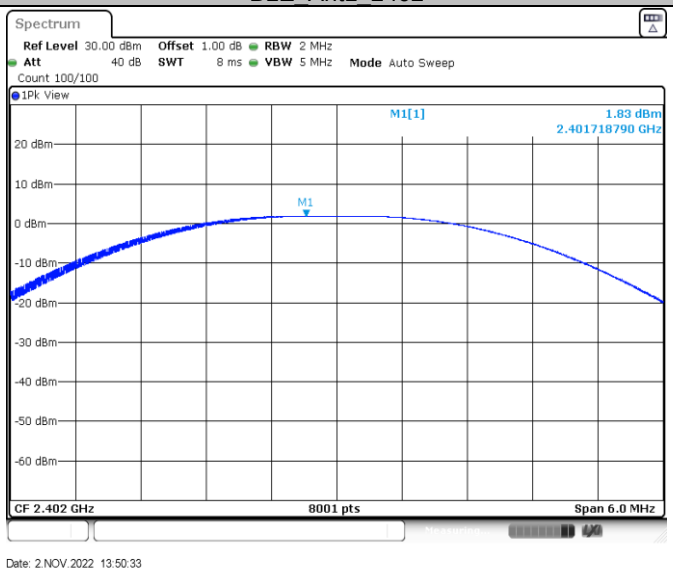
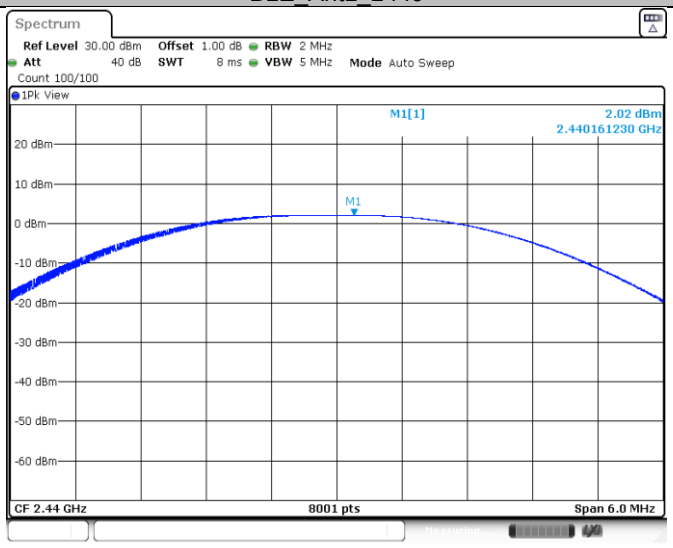
Test Graphs

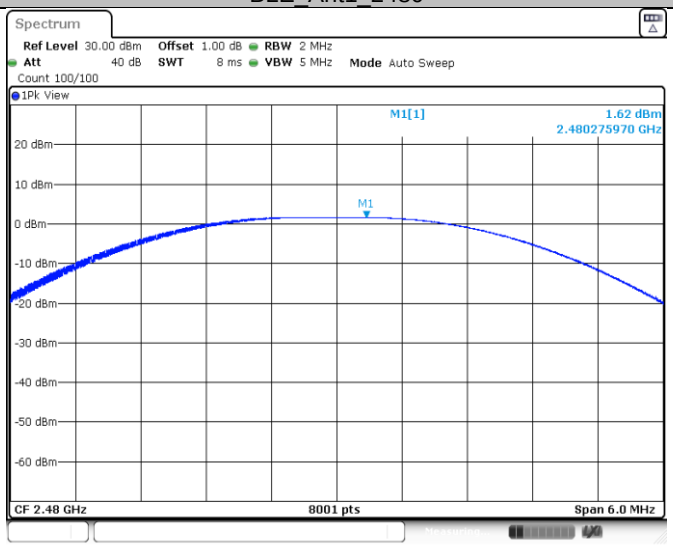
BLE_Ant1_2402



BLE_Ant1_2440



BLE_Ant1_2480



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9.2 6dB bandwidth

Test Method

1. Use the following spectrum analyzer settings:
   RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]
≥500

Test result

Test Mode	Channel (MHz)	Result (MHz)	Limit (KHz)	Verdict
BLE	2402	0.796	≥500	PASS
BLE	2440	0.804	≥500	PASS
BLE	2480	0.808	≥500	PASS

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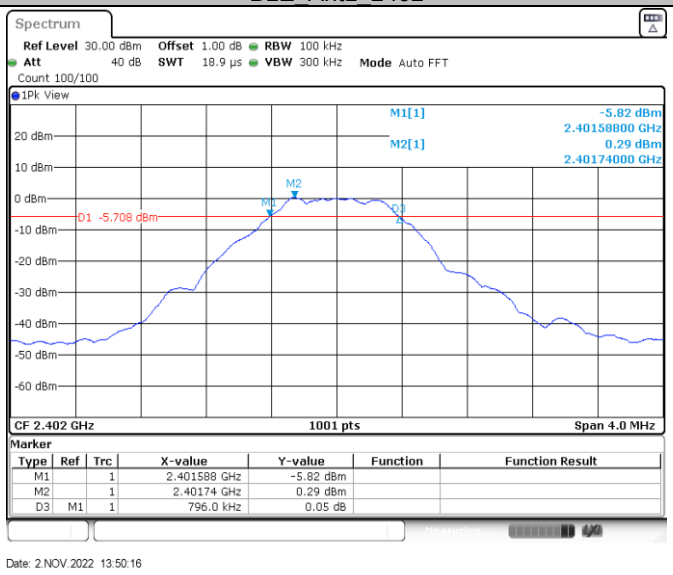
Test Graphs

BLE_Ant1_2402



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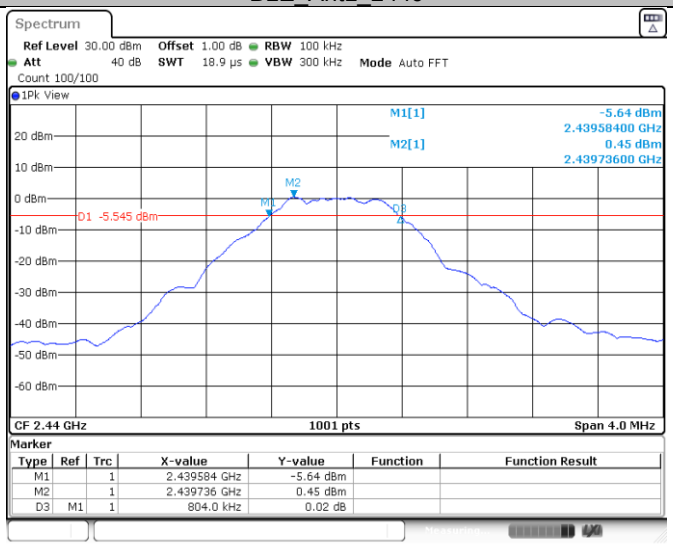
BLE_Ant1_2440



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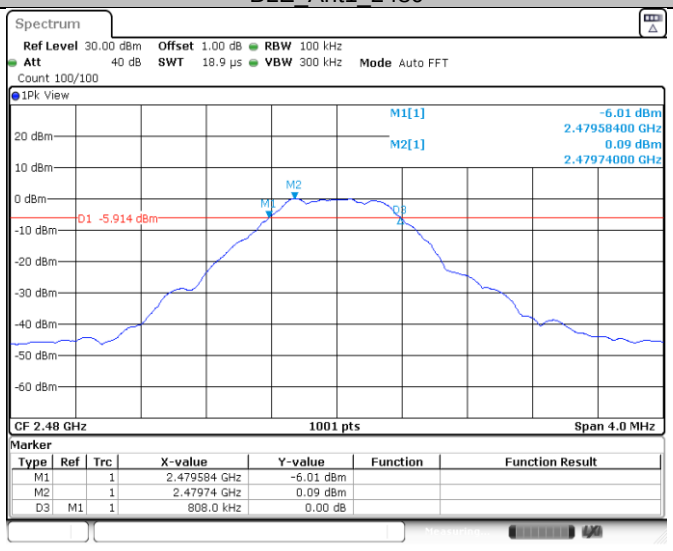
BLE_Ant1_2480



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9.3 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW≥3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3KHz]
≤8

Test result

Test Mode	Channel (MHz)	Result (dBm)	Limit	Verdict
BLE	2402	-14.72	8	PASS
BLE	2440	-14.59	8	PASS
BLE	2480	-14.97	8	PASS

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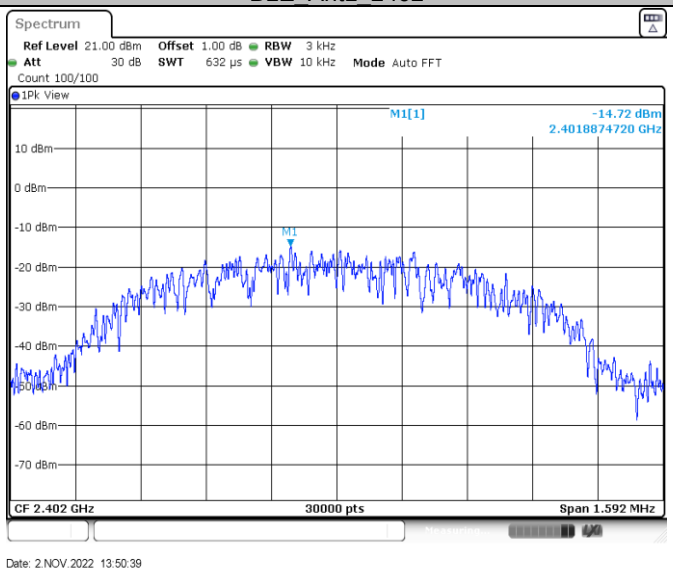
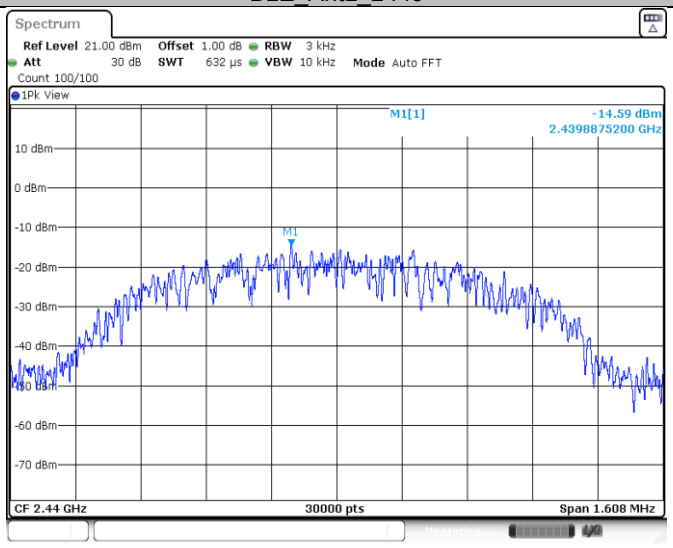
Test Graphs

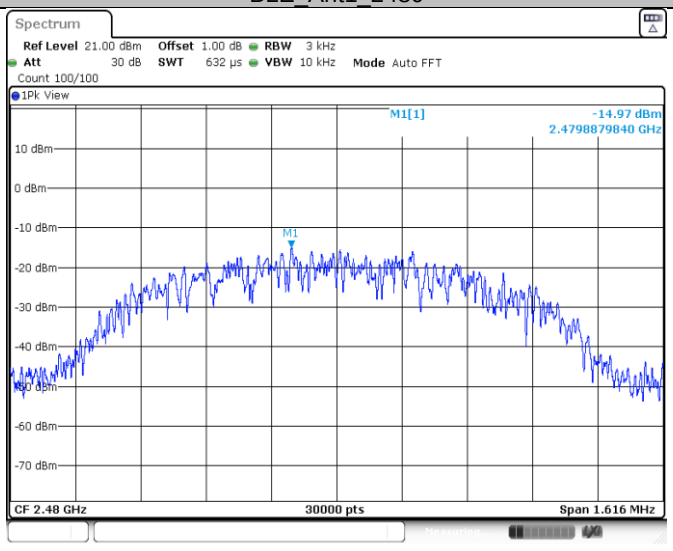
BLE_Ant1_2402



BLE_Ant1_2440



BLE_Ant1_2480



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9.4 Spurious RF conducted emissions

Test Method

1. Establish a reference level by using the following procedure:
   a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
   b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
   a. Set the center frequency and span to encompass frequency range to be measured.
   b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

Test Result

TestMode	Antenna	Channel	FreqRange	RefLevel	Result	Limit	Verdict
BLE	Ant1	2402	Reference	5.72	0.21	---	PASS
			30~1000	30~1000	-68.01	<=-19.79	PASS
			1000~26500	1000~26500	-48.94	<=-19.79	PASS
		2440	Reference	5.63	0.56	---	PASS
			30~1000	30~1000	-68.31	<=-19.44	PASS
			1000~26500	1000~26500	-52.5	<=-19.44	PASS
		2480	Reference	5.23	-0.08	---	PASS
			30~1000	30~1000	-68.25	<=-20.08	PASS
			1000~26500	1000~26500	-52.29	<=-20.08	PASS

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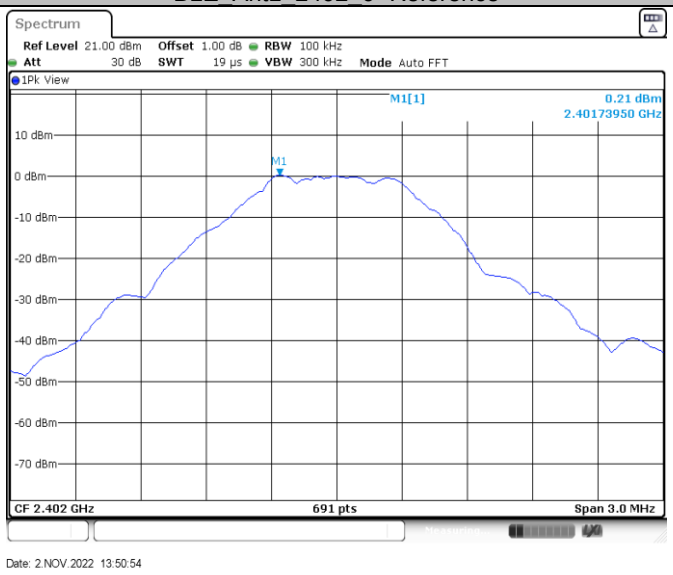
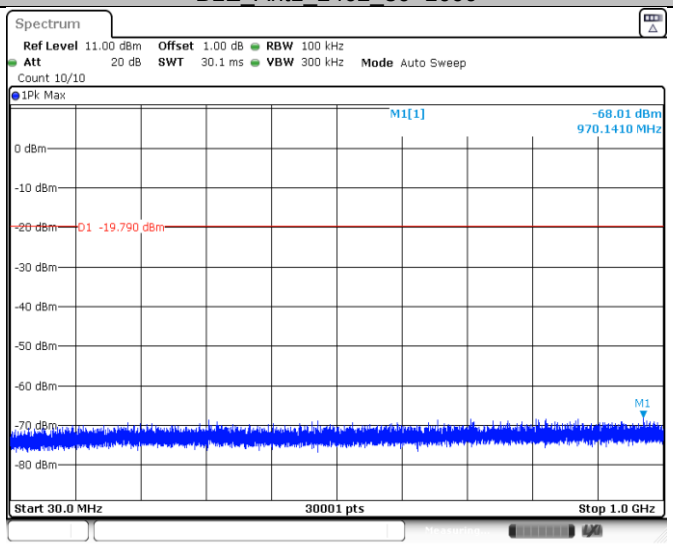
Test Graphs

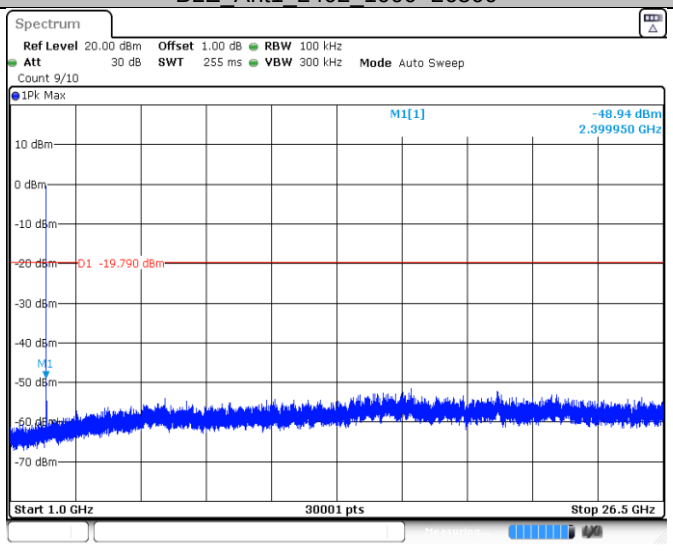
BLE_Ant1_2402_0~Reference



BLE_Ant1_2402_30~1000



BLE_Ant1_2402_1000~26500



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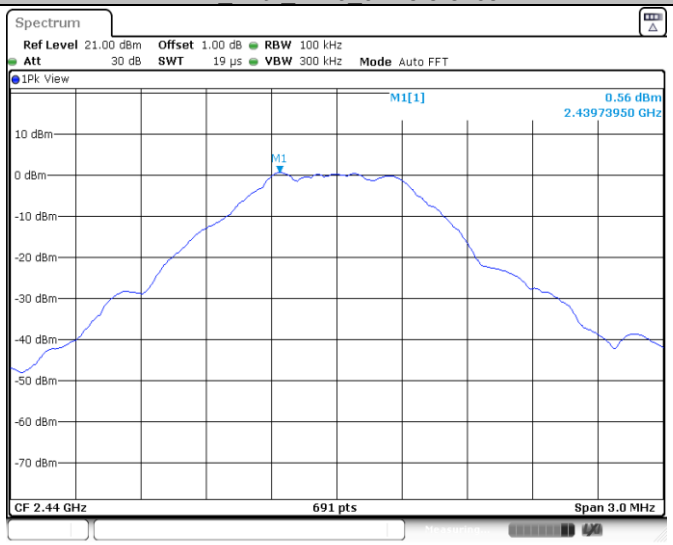
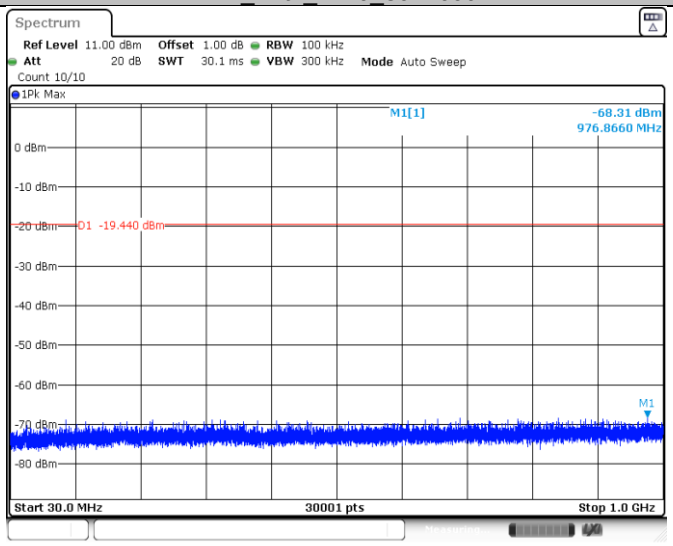
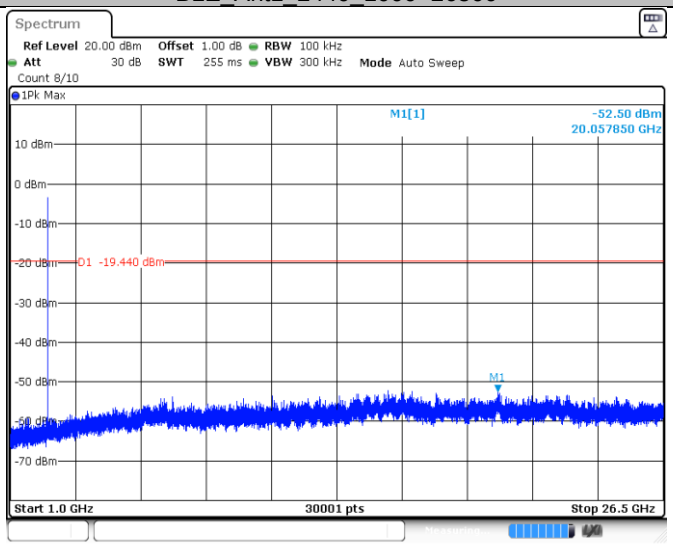
BLE_Ant1_2440_0~Reference



BLE_Ant1_2440_30~1000



BLE_Ant1_2440_1000~26500



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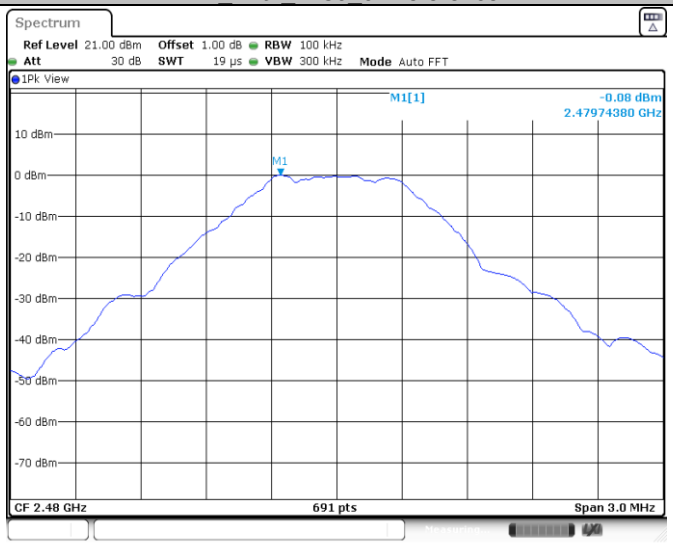
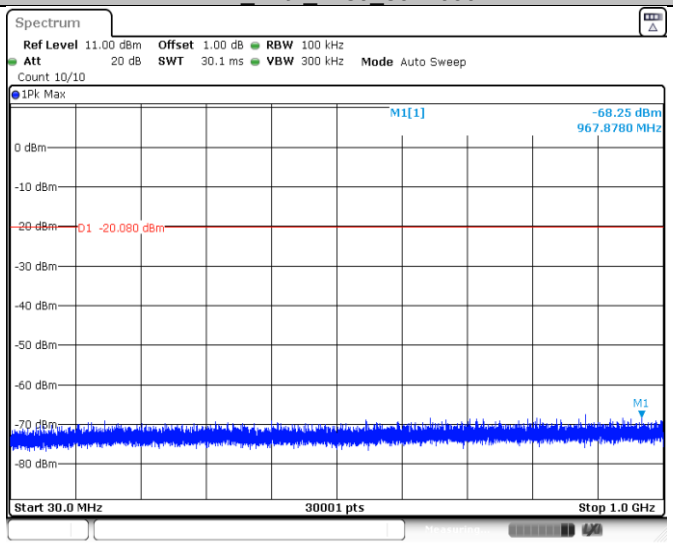
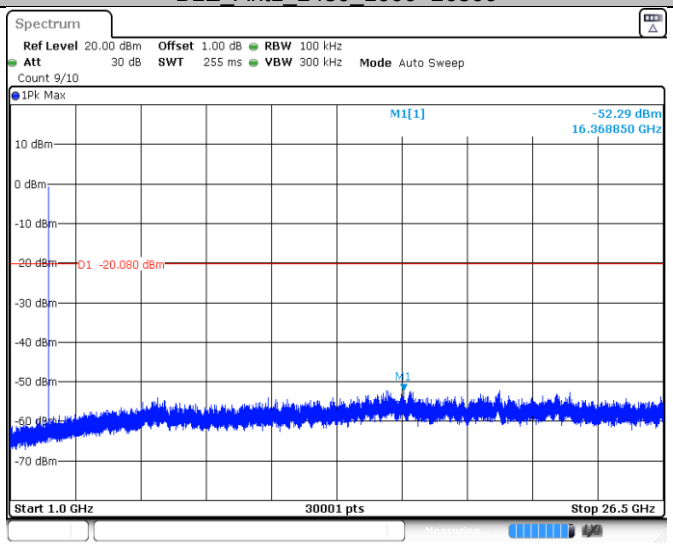
BLE_Ant1_2480_0~Reference



BLE_Ant1_2480_30~1000



BLE_Ant1_2480_1000~26500



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9.5 Band edge

Test Method

1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold.
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

Test result

TestMode	Antenna	ChName	Channel	RefLevel	Result	Limit	Verdict
BLE	Ant1	Low	2402	1.69	-29.67	<=-18.31	PASS
		High	2480	1.43	-37.69	<=-18.57	PASS

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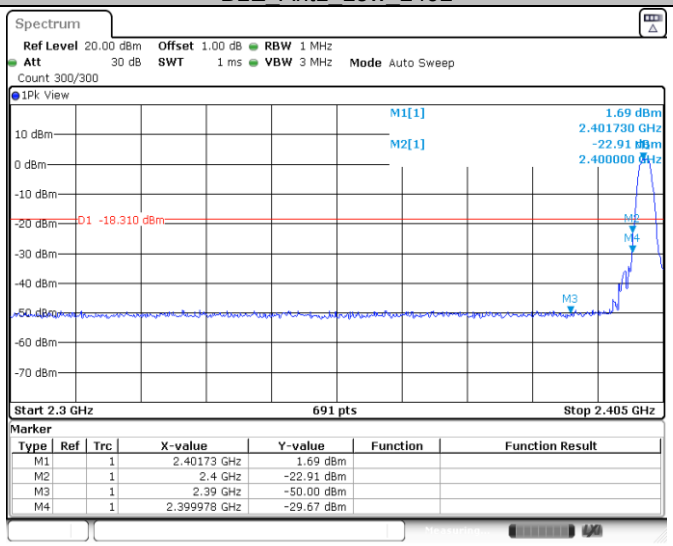
Test Graphs

BLE_Ant1_Low_2402



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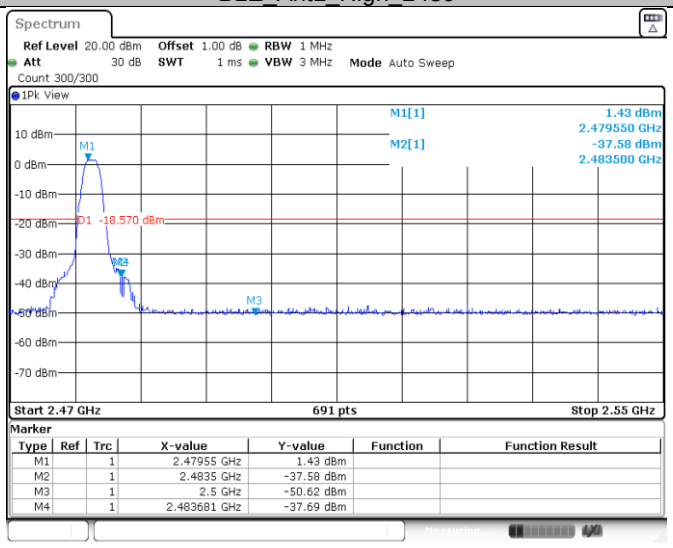
BLE_Ant1_High_2480



Date: 2.NOV.2022 14:02:39

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9.6 Spurious radiated emissions for transmitter

Test Method

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.

3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 1MHz, VBW≥RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.

2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.

3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle)).

4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

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Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

2402MHz (30MHz – 1GHz)

Frequency	Emission Level	Polarization	Limit	Margin	Detector	Corr.	Result
MHz	dBuV/m		dBµV/m	dB		dB	
906.502778	36.14	Horizontal	40.00	9.86	PK	31.83	Pass
945.626111	35.85	Vertical	46.00	10.15	PK	31.76	Pass

2402MHz (Above 1GHz)

Frequency	Emission Level	Polarization	Limit	Margin	Detector	Corr.	Result
MHz	dBuV/m		dBµV/m	dB		dB/m	
12032.500000*	48.62	Horizontal	74.00	25.38	PK	17.35	Pass
12723.500000*	49.40	Vertical	74.00	24.60	PK	17.61	Pass
24358.750000*	43.57	Horizontal	74.00	30.43	PK	1.1	Pass
23800.750000*	43.80	Vertical	74.00	30.20	PK	1.1	Pass

2440MHz (30MHz – 1GHz)

Frequency	Emission Level	Polarization	Limit	Margin	Detector	Corr.	Result
MHz	dBuV/m		dBµV/m	dB		dB	
--	--	Horizontal	--	--	PK	--	Pass
--	--	Vertical	--	--	PK	--	Pass

2440MHz (Above 1GHz)

Frequency	Emission Level	Polarization	Limit	Margin	Detector	Corr.	Result
MHz	dBuV/m		dBµV/m	dB		dB/m	
5773.000000*	49.75	Horizontal	74.00	24.25	PK	5.94	Pass
6000.000000*	52.28	Vertical	74.00	21.72	PK	8.42	Pass
24323.250000*	44.31	Horizontal	74.00	29.69	PK	1.1	Pass
23658.000000*	43.52	Vertical	74.00	30.48	PK	1.1	Pass

2480MHz (30MHz – 1GHz)

Frequency	Emission Level	Polarization	Limit	Margin	Detector	Corr.	Result
MHz	dBuV/m		dBµV/m	dB		dB	
--	--	Horizontal	--	--	QP	--	Pass
--	--	Vertical	--	--	QP	--	Pass

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2480MHz (Above 1GHz)

Frequency	Emission Level	Polarization	Limit	Margin	Detector	Corr.	Result
MHz	dBuV/m		dBµV/m	dB		dB/m	
5282.500000	50.06	Horizontal	74.00	23.94	PK	5.27	Pass
5168.500000	50.23	Vertical	74.00	23.77	PK	5.31	Pass
23756.250000	44.22	Horizontal	74.00	29.78	PK	1.1	Pass
24311.000000	43.36	Vertical	74.00	30.64	PK	1.1	Pass

Remark:

(1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

(2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.

(3) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain.

(4) Below 1GHz: Corrector factor = Antenna Factor + Cable Loss.

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10 Test Equipment List

Radiated Emission 2# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	1	2023-5-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9162	68-4-80-19-003	284	1	2023-1-17
Wave Guide Antenna	ETS	3117	68-4-80-19-001	00218954	1	2023-5-9
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-001	100745	1	2023-5-28
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-002	100746	1	2023-5-28
Sideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	12827	1	2023-7-12
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	1	2023-7-27
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-002	15542	1	2023-5-27
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	2	2023-5-28

Conducted Emission 2# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-19-002	102590	1	2023-5-27
LISN	Rohde & Schwarz	ENV216	68-4-87-19-001	102472	1	2023-5-27
ISN	Rohde & Schwarz	ENY81	68-4-87-14-003	100177	1	2023-5-27
ISN	Rohde & Schwarz	ENY81-CA6	68-4-87-14-004	101664	1	2023-5-27
High Voltage Probe	Schwarzbeck	TK9420(VT9420)	68-4-27-14-001	9420-584	1	2023-5-27
RF Current Probe	Rohde & Schwarz	EZ-17	68-4-27-14-002	100816	1	2023-5-31
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	1	2023-5-27
Test software	Rohde & Schwarz	EMC32	68-4-90-19-005-A01	Version10.35.02	N/A	N/A
Shielding Room	TDK	CSR #2	68-4-90-19-005	----	3	2025-10-15

RF Conducted Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
Signal Generator	Rohde & Schwarz	SMB100A	68-4-48-14-001	108272	1	2023-5-27
Vector Signal Generator	Rohde & Schwarz	SMBV100A	68-4-48-18-001	262825	1	2023-5-27
Communication Synthetical Test Instrument	Rohde & Schwarz	CMW 270	68-4-48-18-003	101251	1	2023-5-27
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	1	2023-5-27
Vector Signal Generator	Rohde & Schwarz	SMU 200A	68-4-48-14-003	105324	1	2023-5-27
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	68-4-93-14-003	101226/100851	1	2023-5-27
Power Splitter	Weinschel	1580	68-4-85-14-001	SC319	1	2023-5-28
10dB Attenuator	Weinschel	4M-10	68-4-81-14-003	43152	1	2023-5-28
10dB Attenuator	R&S	DNF	68-4-81-14-004	DNF-001	1	2023-5-27
10dB Attenuator	R&S	DNF	68-4-81-14-005	DNF-002	1	2023-5-27
10dB Attenuator	R&S	DNF	68-4-81-14-006	DNF-003	1	2023-5-27
10dB Attenuator	R&S	DNF	68-4-81-14-007	DNF-004	1	2023-5-27
Test software	Rohde & Schwarz	EMC32	68-4-48-14-003-A10	Version 10.60.10	N/A	N/A
Test software	Tonscend	System for BT/WIFI	68-4-74-14-006-A13	Version 2.6.77.0518	N/A	N/A
Shielding Room	TDK	TS8997	68-4-90-19-003	----	3	2025-10-15

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11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

System Measurement Uncertainty	
Items	**Extended Uncertainty**
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.33dB; Vertical: 4.41dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.27dB; Vertical: 4.26dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 4.52dB; Vertical: 4.51dB;
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.31dB Frequency test involved: 0.6×10^{-8} or 1%
Uncertainty for Conducted Emission in new shielding 150kHz-30MHz (for test using AMN ENV216)	3.20dB

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2021, clause 4.4.3 and 4.5.1.

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12 General product information

The pulse oximeter is a reusable device and intended for spot-checking of oxygen saturation and pulse rate for use with the finger of adult or child patients in healthcare environments.

The equipment is internally powered 3.0V DC (2*AAA battery), The probe is treated as type BF applied part.

Model YM503, YM401, YM402, YM403, , YM501, YM502 and YM504 have same critical components, shape, schematic, PCB layout and construction. The difference between these models is display screen only.
Refer to the below table for more details:

Model	YM503	YM401	YM402	YM403
Product Picture				
Size	63*36*37mm	62*34*35mm	62*34*35mm	62*34*35mm
Schematic	Different with YM101	Same with YM503	Same with YM503	Same with YM503
PCB layout	Different with YM101	Same with YM503	Same with YM503	Same with YM503
Display Screen	1.3" OLED	0.96" OLED	0.96" TFT	1.14" TFT
Dual emitter	Same	Same	Same	Same
Light receiving tube	Same	Same	Same	Same
Bluetooth function	with	with	with	with

Model	YM501	YM502	YM504
Product Picture			
Size	63*36*37 mm	63*36*37mm	63*36*37mm
Schematic	Same with YM503	Same with YM503	Same with YM503
PCB layout	Same with YM503	Same with YM503	Same with YM503
Display Screen	0.96" OLED	0.96" TFT	1.14" TFT
Dual emitter	Same	Same	Same
Light receiving tube	Same	Same	Same
Bluetooth function	with	with	with

--- END OF TEST REPORT ---

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