FCC / ISED- TEST REPORT

Report Number	:	**64.790.23.00103.01**	Date of Issue:	2023-05-18
Model	:	**SK-Z101**		
Product Type	:	Smart Kit		
Applicant	:	GD Midea Air-Conditioning Equipment Co., Ltd.		
Address	:	Lingang Road, Beijiao, Shunde 528311 Foshan, Guangdong, China		
Manufacturer	:	GD Midea Air-Conditioning Equipment Co., Ltd.		
Address	:	Lingang Road, Beijiao, Shunde 528311 Foshan, Guangdong, China		
Production Facility	:	GD Midea Air-Conditioning Equipment Co., Ltd.		
Address	:	Lingang Road, Beijiao, Shunde 528311 Foshan, Guangdong, China		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**39**		

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1 Table of Contents

1 Table of Contents 2
2 Details about the Test Laboratory 3
3 Description of the Equipment under Test 4
4 Summary of Test Standards 5
5 Summary of Test Results 6
6 General Remarks 7
7 Test Setups 8
8 Systems test configuration 10
9 Technical Requirement 11
9.1 Conducted Emission 11
9.2 Conducted peak output power & EIRP 14
9.3 6dB bandwidth 17
9.4 99% bandwidth 20
9.5 Power spectral density 23
9.6 Spurious RF conducted emissions 26
9.7 Band edge 32
9.8 Spurious radiated emissions for transmitter 34
10 Test Equipment List 38
11 System Measurement Uncertainty 39

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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, Guankou Erlu, Nantou, Nanshan District, Shenzhen, 518052 China
FCC Registration Number:	514049
IC Registration Number:	10320A
Telephone:	86 755 8828 6998
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3 Description of the Equipment under Test

Product:	Smart Kit
PMN:	Smart Kit
Model no.:	SK-Z101
HVIN:	SK-Z101
FVIN:	N/A
FCC ID:	2ADQOMDNA24
IC:	12575A-MDNA24
Ratings:	DC 5V/300mA
RF Transmission Frequency:	2405MHz-2480MHz
No. of Operated Channel:	16
Modulation:	OQPSK
Antenna Type:	Copper tube antenna
Antenna Gain:	3.61 dBi Max.
Description of the EUT:	The Equipment Under Test is a Smart Kit which support 2.4G band Zigbee function.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2021 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5, April 2018 Amendment 1, March 2019 + Amendment 2, February 2021	General Requirements and Information for the Certification of Radio Apparatus
RSS-247 Issue 2 February 2017	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

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

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5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C 10-1-2021 Edition / RSS-247 Issue 2, February 2017/ RSS-Gen Issue 5, April 2018 Amendment 1, March 2019 + Amendment 2, February 2021			
Test Condition		Test Result	Test Site
§15.207 RSS-GEN 8.8	Conducted emission AC power port	Pass	Site 1
§15.247 (b) (3) & RSS-247 5.4(d)	Conducted output power	Pass	Site 1
RSS-247 5.4(d)	Equivalent Isotropic Radiated Power	Pass	Site 1
§15.247(e) RSS-247 5.2(b)	Power spectral density	Pass	Site 1
§15.247(a)(2) RSS-247 5.2(a) & RSS-GEN 6.7	6dB bandwidth	Pass	Site 1
§15.247(a)(1) RSS-247 5.1(b)	20dB Occupied bandwidth	N/A	--
RSS-GEN 6.7	99% Occupied Bandwidth	Pass	Site 1
§15.247(a)(1) RSS-247 5.1(b)	Carrier frequency separation	N/A	--
§15.247(a)(1)(iii) RSS-247 5.1(d)	Number of hopping frequencies	N/A	--
§15.247(a)(1)(iii) RSS-247 5.1(d)	Dwell Time	N/A	--
§15.247(d) RSS-247 5.5	Spurious RF conducted emissions	Pass	Site 1
§15.247(d) RSS-247 5.5	Band edge	Pass	Site 1
§15.247(d) & §15.209 & §15.205 RSS-247 5.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	Pass	Site 1
§15.203 RSS-Gen 6.8	Antenna requirement	Pass See note 1	--

Remark 1: N/A – Not Applicable.
Note 1: The EUT uses a copper tube antenna 3.61dBi 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: 2ADQOMDNA24 complies with Section 15.205, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

This submittal(s) (test report) is intended for IC: 12575A-MDNA24, complies with RSS-247 Issue 2, February 2017 and RSS-Gen Issue 5, Amendment 2, February 2021.

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: 2023-04-18

Testing Start Date: 2023-04-28

Testing End Date: 2023-05-16

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

Reviewed by:	Prepared by:	Tested by:
Jessie He	Myron Yu	Carry Cai
EMC Project Manager	EMC Project Engineer	EMC Test Engineer

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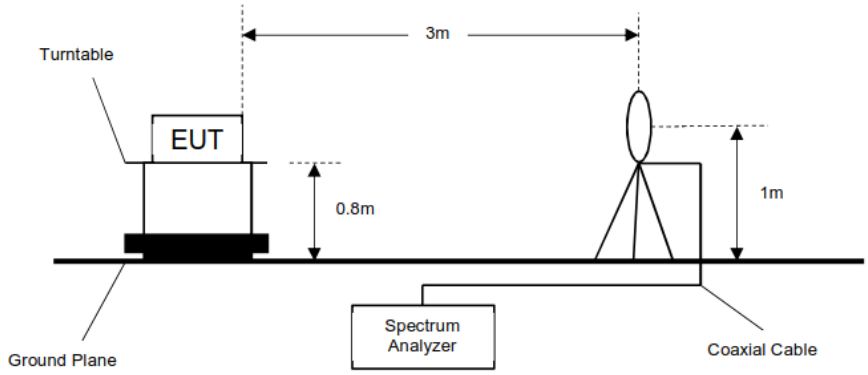
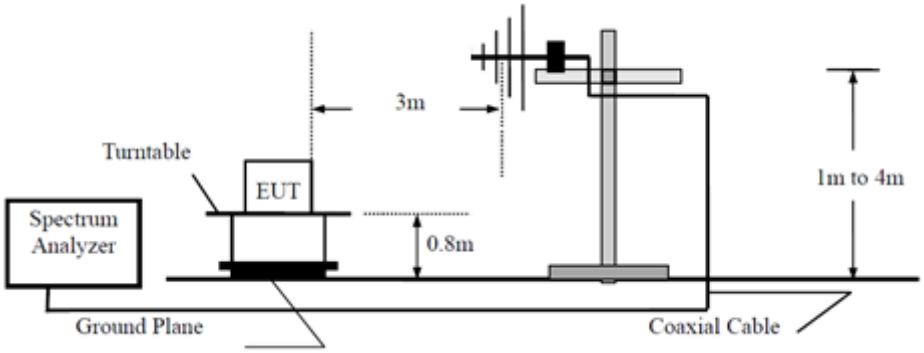
7 Test Setups

7.1 Radiated test setups

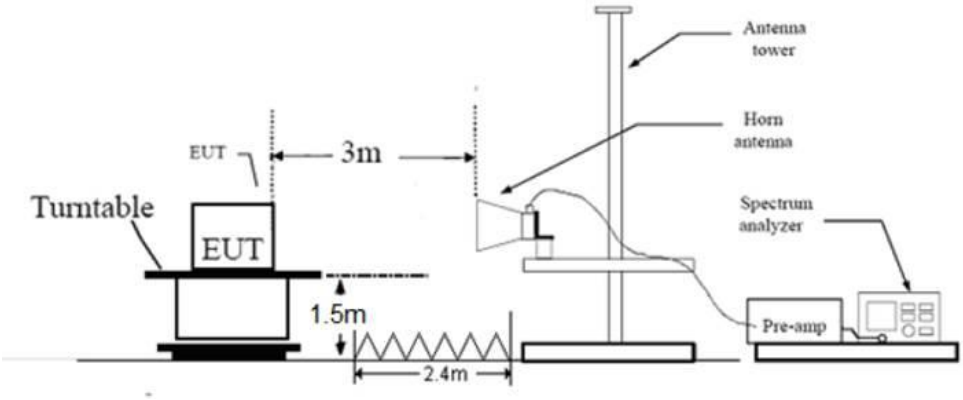
9kHz - 30MHz



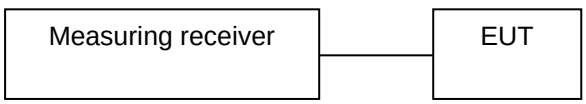
Below 1GHz



Above 1GHz



7.2 Conducted RF test setups



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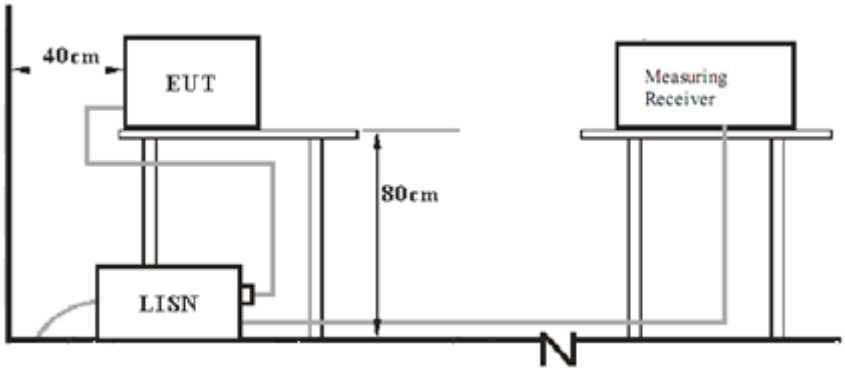
7.3 AC Power Line Conducted Emission test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

Description	Manufacturer	Model no.	S/N
COMPUTER	HP	HP PROBOOK 455 15.6 INCH G9 NOTEBOOK PC	5CD302CY5H
ADAPTOR	HP	TPN-CA16	L25298-002

Test software information:

Test Software Version	BouffaloLabDevCube-v1.8.2.101	
Modulation	Setting TX Power	Packet Type
OQPSK	17dBm	PRBS9

The system was configured to channel 11, 18, and 26 for the test.

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing line

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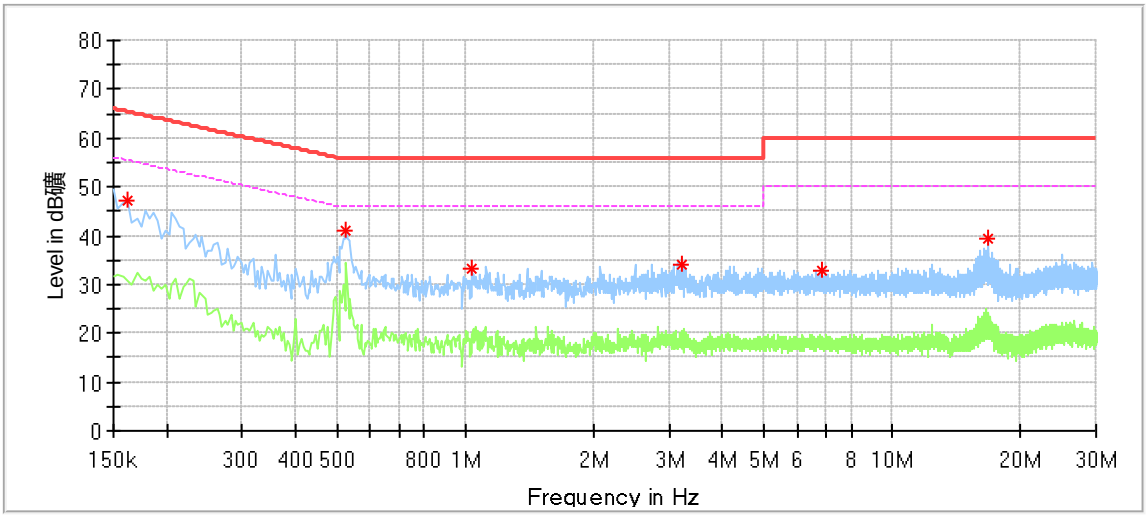
Conducted Emission

Product Type	:	Smart Kit
M/N	:	SK-Z101
Operating Condition	:	Transmitting
Test Specification	:	Power Line, Live
Comment	:	AC 120V/60Hz (External laptop adapter)



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.162000	47.37	---	65.36	17.99	L1	9.58
0.526000	40.85	---	56.00	15.15	L1	9.63
1.034000	33.20	---	56.00	22.80	L1	9.64
3.230000	33.94	---	56.00	22.06	L1	9.70
6.838000	32.76	---	60.00	27.24	L1	9.85
16.786000	39.20	---	60.00	20.80	L1	9.99

Remark:
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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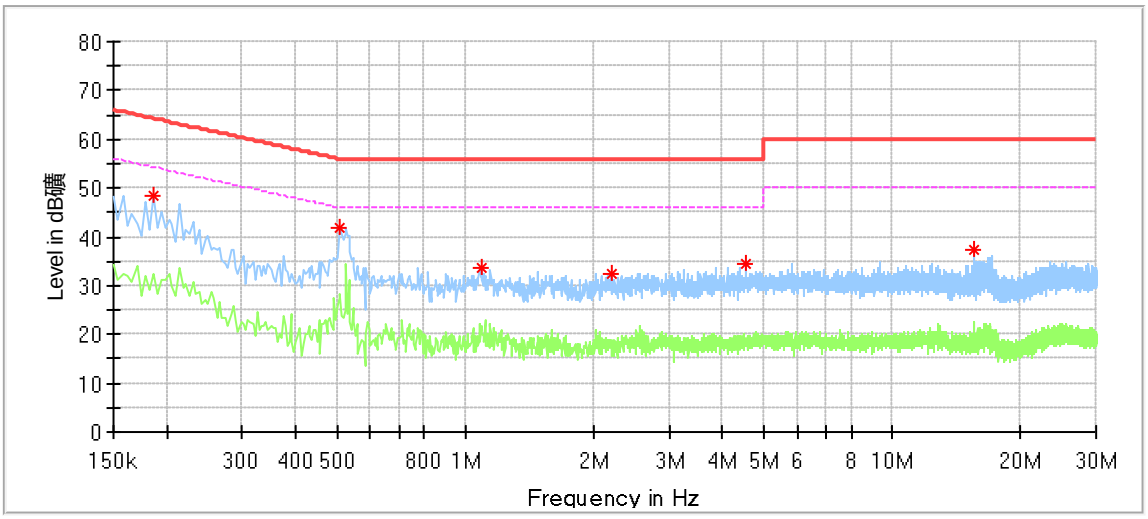
Conducted Emission

Product Type	:	Smart Kit
M/N	:	SK-Z101
Operating Condition	:	Transmitting
Test Specification	:	Power Line, Neutral
Comment	:	AC 120V/60Hz (External laptop adapter)



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.186000	48.31	---	64.21	15.90	N	9.58
0.510000	41.86	---	56.00	14.14	N	9.63
1.094000	33.55	---	56.00	22.45	N	9.64
2.194000	32.59	---	56.00	23.41	N	9.66
4.538000	34.60	---	56.00	21.40	N	9.75
15.586000	37.51	---	60.00	22.49	N	9.98

Remark:
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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9.2 Conducted peak output power & EIRP

Test Method

1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following test receiver settings:
   Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
   RBW > the 20dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power and record the results in the test report.
5. Repeat above procedures until all frequencies measured were complete.

Limits

According to §15.247 (b) (3), conducted peak output power limit as below:

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

According to & RSS-247 5.4(d), EIRP limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤4	≤36.2

Test Results

Test Mode	Channel (MHz)	Conducted Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Verdict
ZIGBEE	2405	16.69	3.61	20.30	PASS
ZIGBEE	2440	16.65	3.61	20.26	PASS
ZIGBEE	2480	16.33	3.61	19.94	PASS

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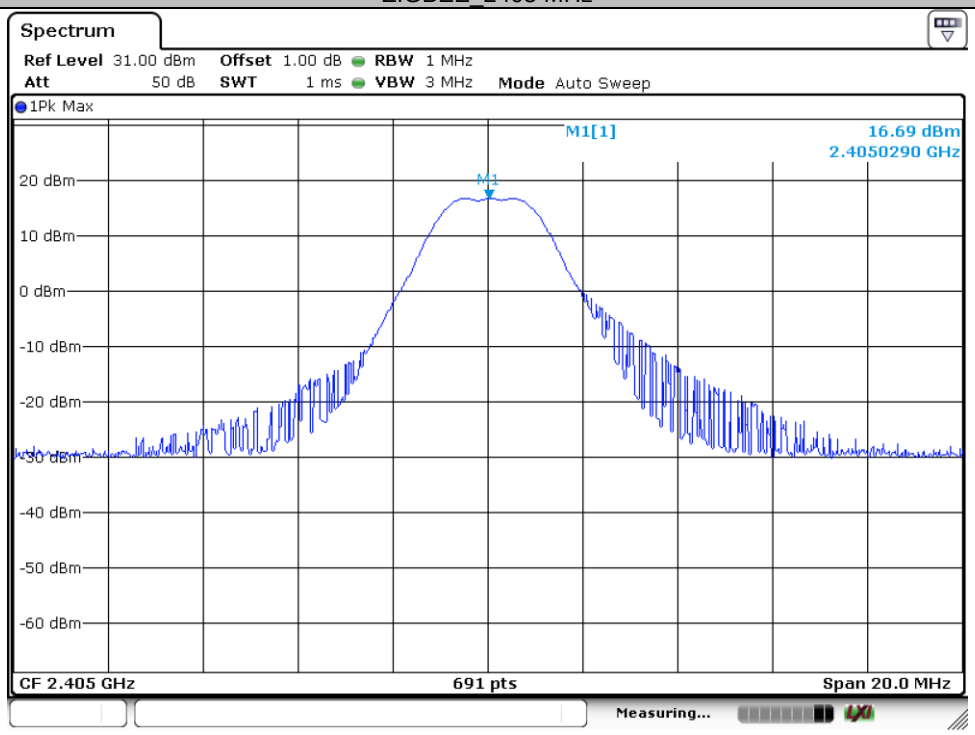
Test Graphs

ZIGBEE_2405 MHz



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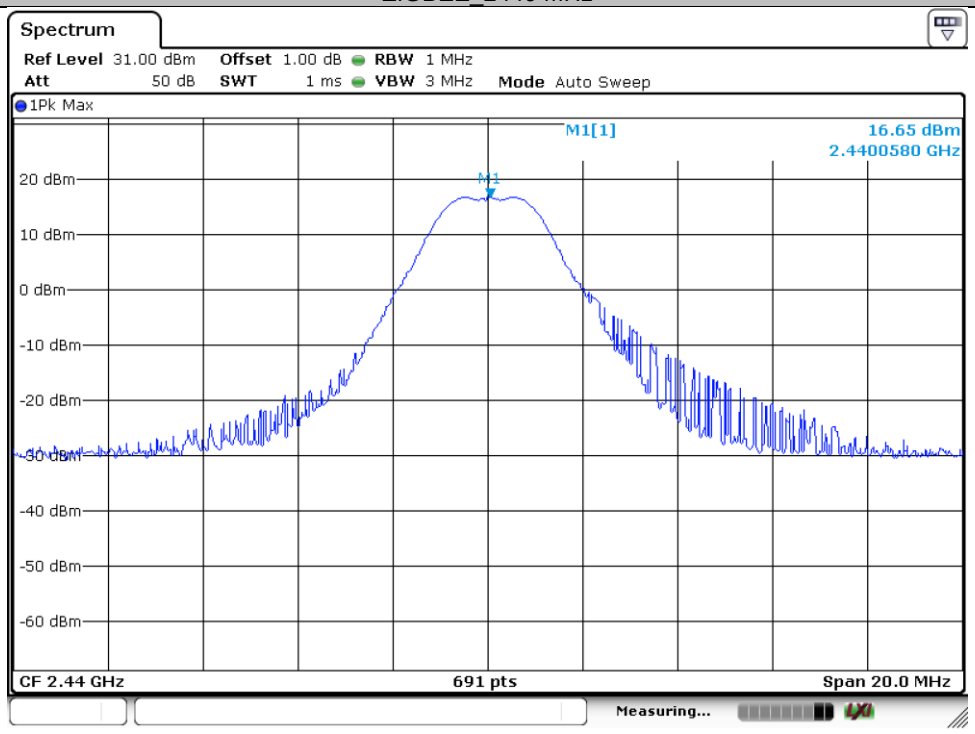
ZIGBEE_2440 MHz



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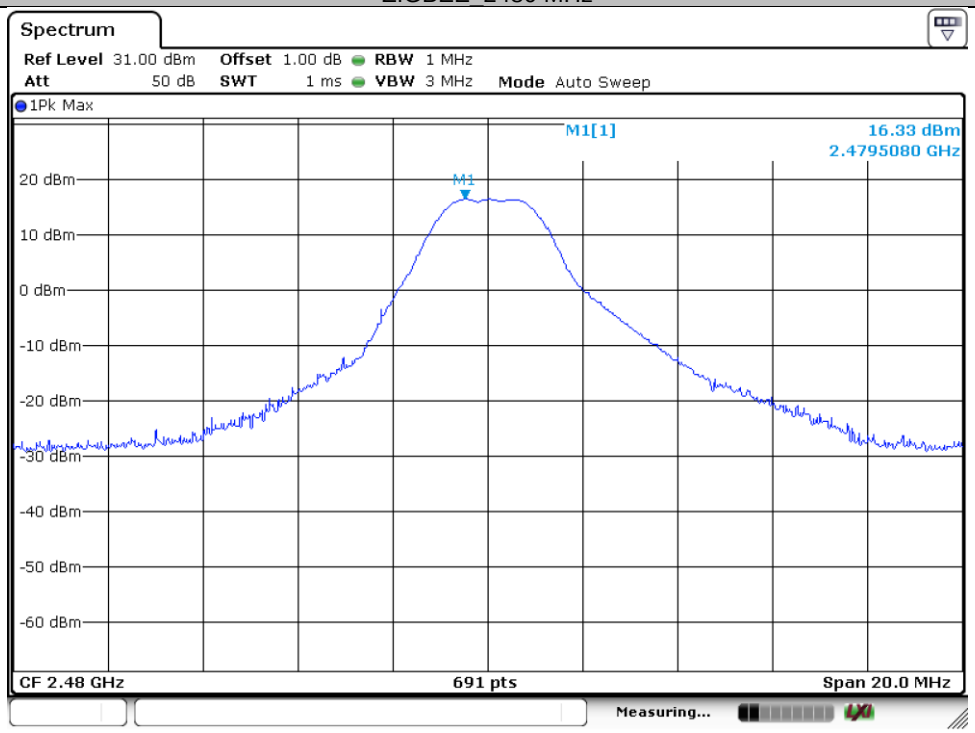
ZIGBEE_2480 MHz



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9.3 6dB bandwidth

Test Method

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
   RBW=100KHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Use the automatic bandwidth measurement capability of an instrument, use the X dB bandwidth mode with X set to 6 dB.
5. Allow the trace to stabilize, record the 6 dB Bandwidth value.

Limit

Limit [kHz]
≥500

Test Results

Test Mode	Channel (MHz)	Result (MHz)	Limit (kHz)	Verdict
ZIGBEE	2405	1.580	≥500	PASS
ZIGBEE	2440	1.580	≥500	PASS
ZIGBEE	2480	1.590	≥500	PASS

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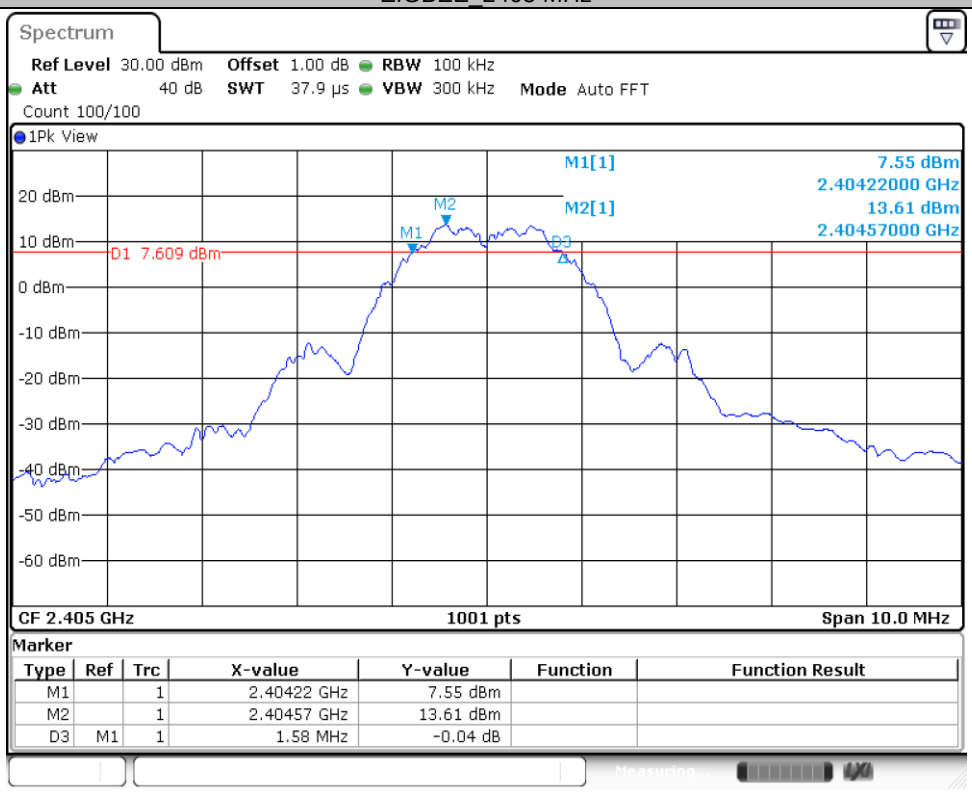
Test Graphs

ZIGBEE_2405 MHz



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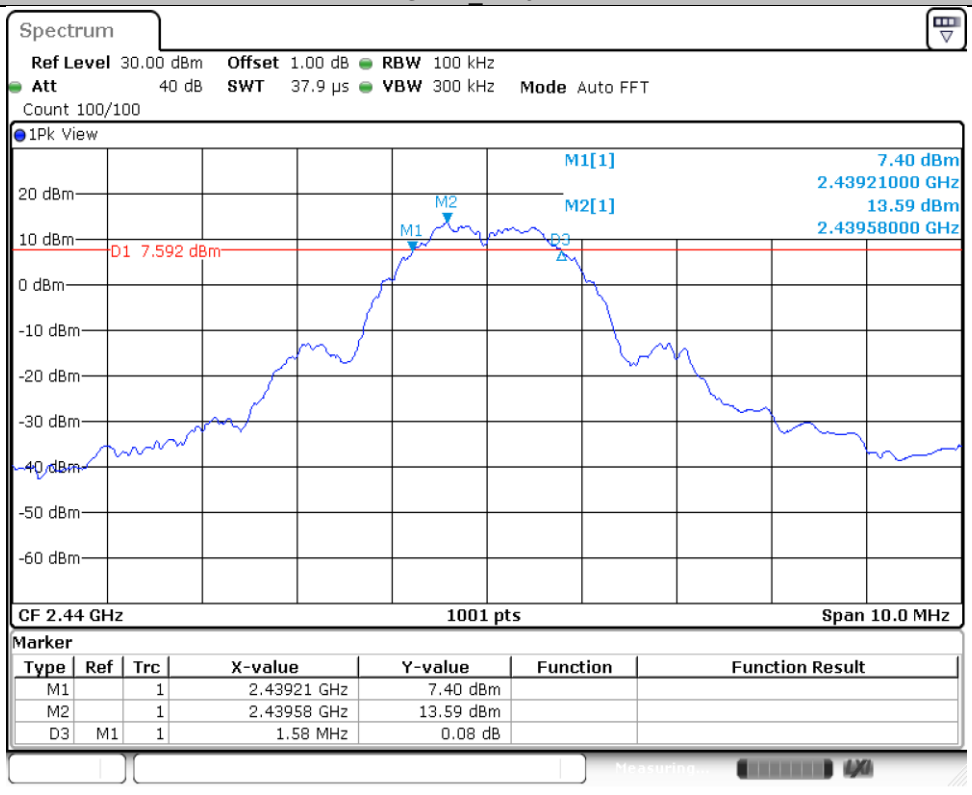
ZIGBEE_2440 MHz



Date: 19.MAY.2023 19:01:15

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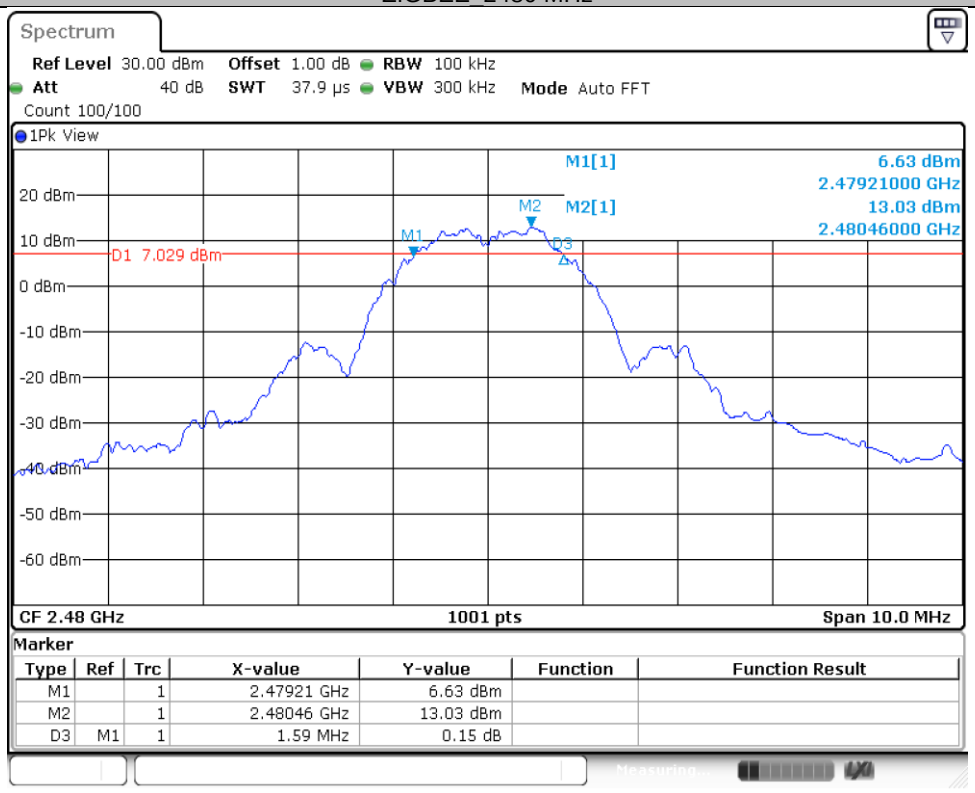
ZIGBEE_2480 MHz



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9.4 99% bandwidth

Test Method

1. Connect EUT test port to spectrum analyzer.
2. Use the following spectrum analyzer settings:
   RBW=1% to 5% of the actual occupied, VBW≥3RBW, Sweep = auto,
   Detector function = peak, Trace = max hold
3. Use the occupied bandwidth measurement capability of test receiver.
4. Allow the trace to stabilize, record the occupied bandwidth value.

Limit

Limit [kHz]
--

Test result

Test Mode	Channel (MHz)	Result (MHz)	Limit	Verdict
ZIGBEE	2405	2.238	---	PASS
	2440	2.288	---	PASS
	2480	2.268	---	PASS

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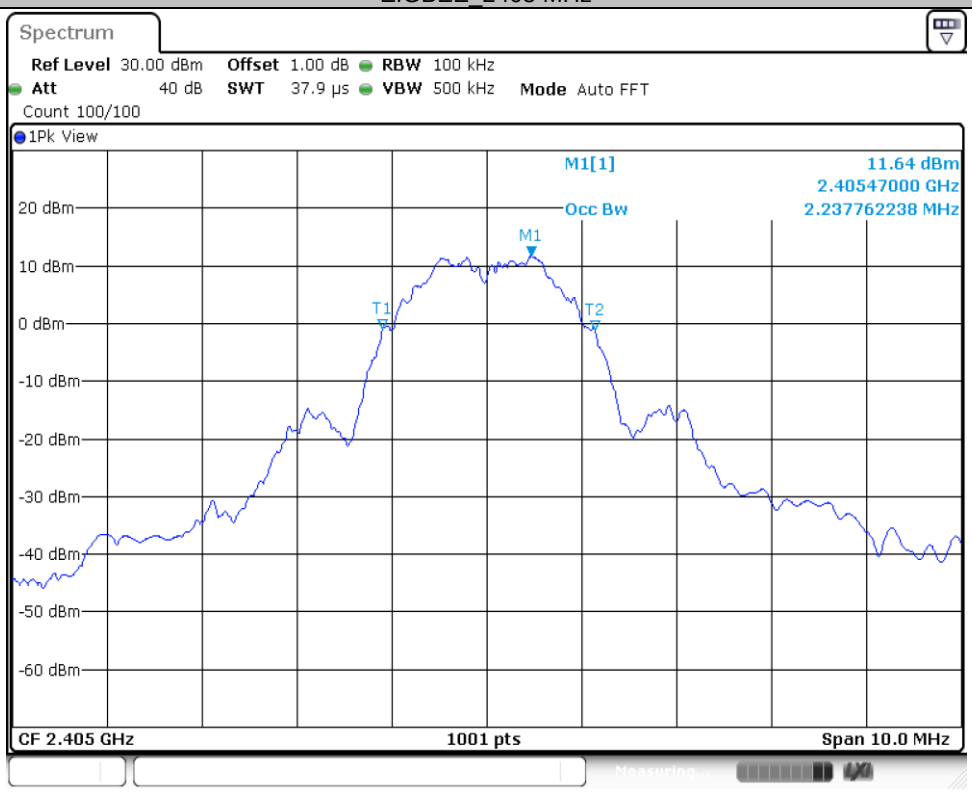
Test Graphs

ZIGBEE_2405 MHz



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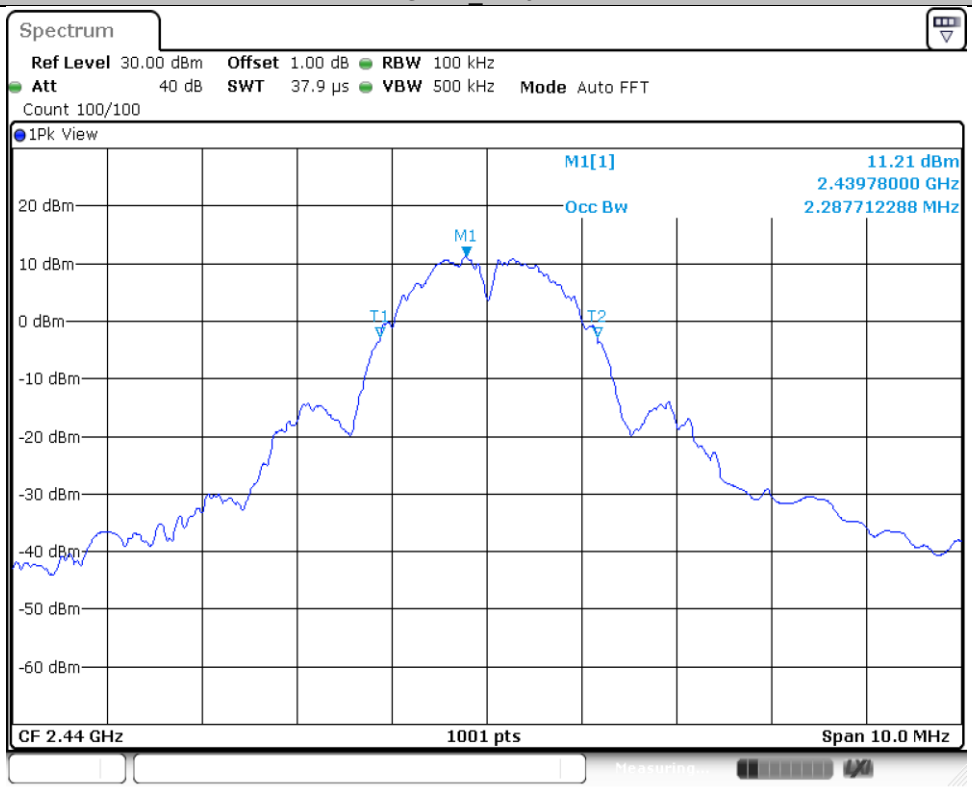
ZIGBEE_2440 MHz



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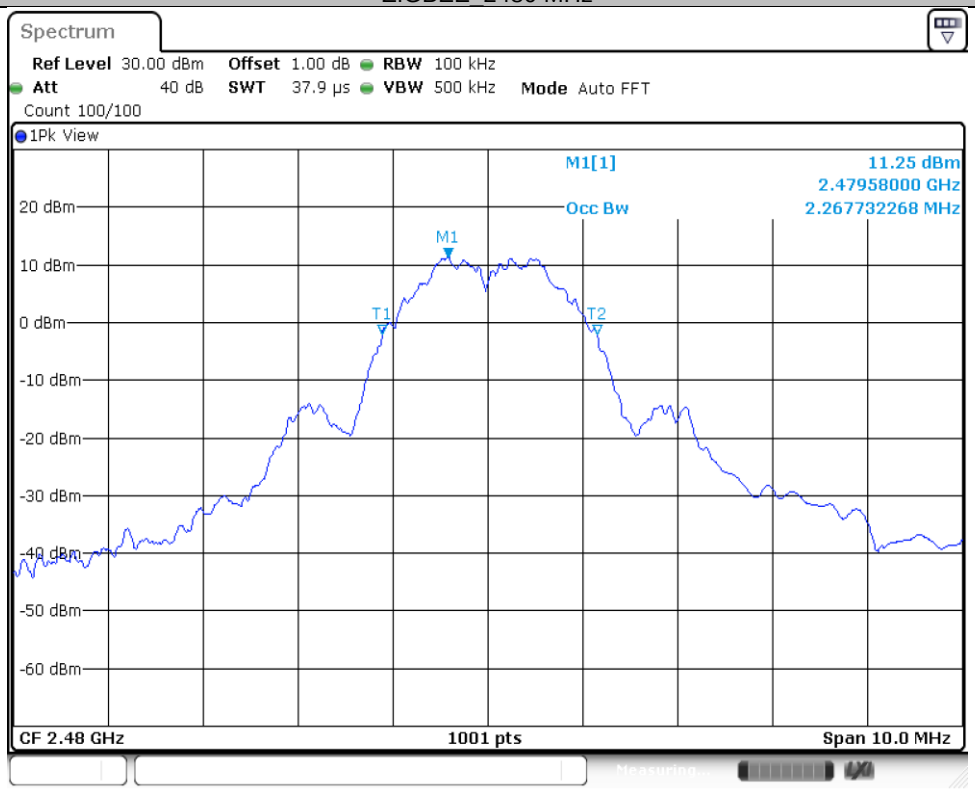
ZIGBEE_2480 MHz



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9.5 Power spectral density

Test Method

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

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
4. 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.
5. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
6. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3kHz]
≤8

Test Results

Test Mode	Channel [MHz]	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
ZIGBEE	2405	4.48	8	PASS
ZIGBEE	2440	4.41	8	PASS
ZIGBEE	2480	4.03	8	PASS

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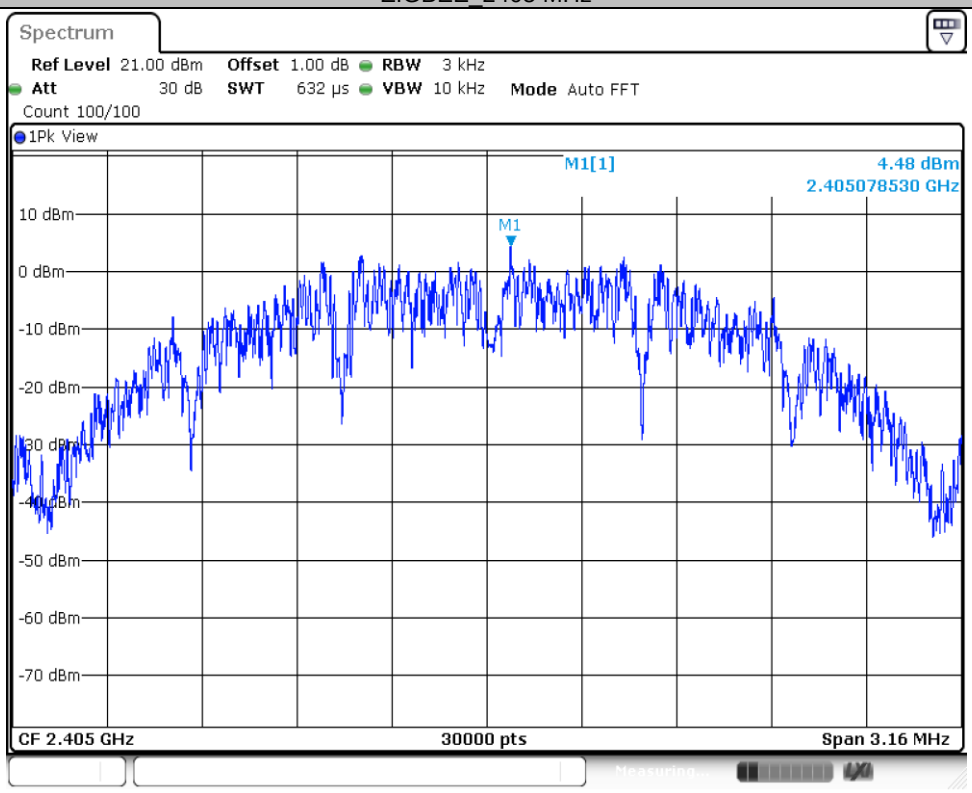
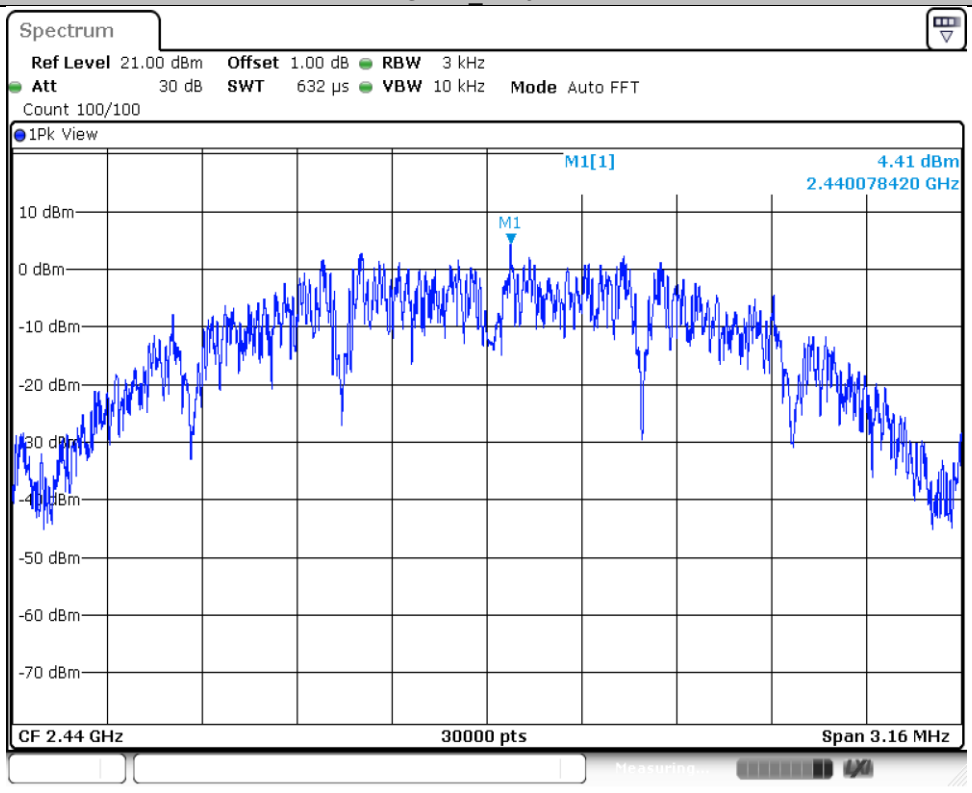
Test Graphs

ZIGBEE_2405 MHz



Date: 19.MAY.2023 19:00:36

ZIGBEE_2440 MHz



Date: 19.MAY.2023 19:01:27

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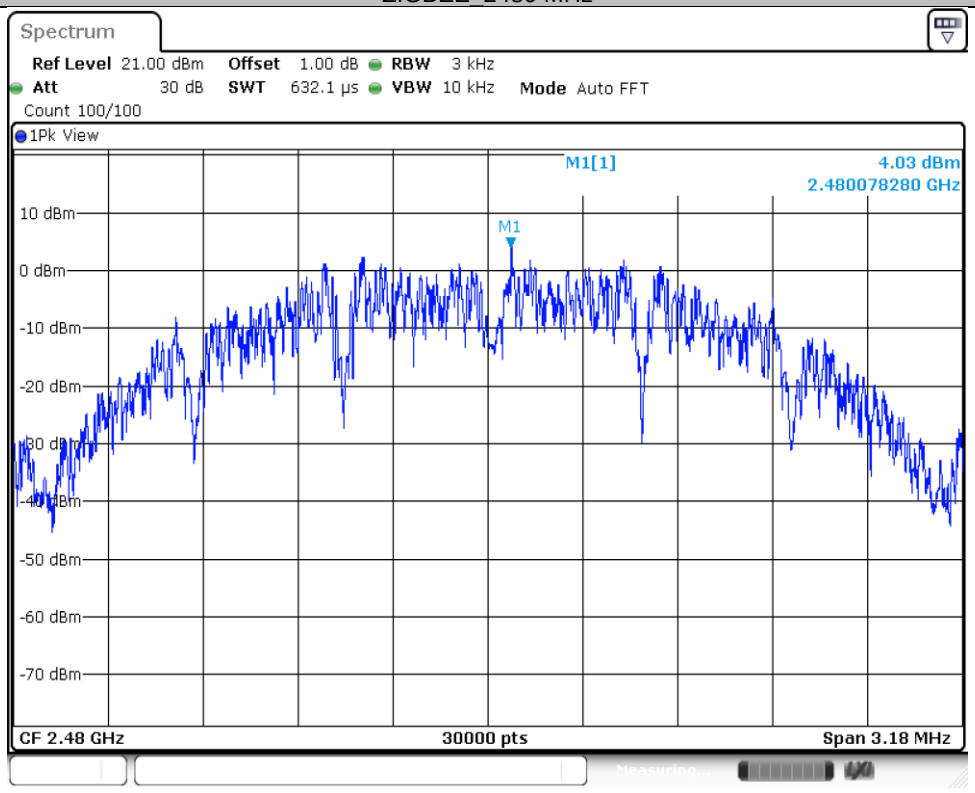
ZIGBEE_2480 MHz



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9.6 Spurious RF conducted emissions

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
3. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
4. The level displayed must comply with the limit specified in this Section. Submit these plots.
5. Repeat above procedures until all frequencies measured were complete.

Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under § 15.247(b)(3) and RSS 247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB.

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

Test Results

Test Mode	Antenna	Channel	Freq Range [MHz]	Ref Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
ZIGBEE	Ant1	2405	Reference	14.61	14.61	---	PASS
			30~1000	---	-68.37	<=-5.39	PASS
			1000~26500	---	-46.85	<=-5.39	PASS
		2440	Reference	14.24	14.24	---	PASS
			30~1000	---	-68.49	<=-5.76	PASS
			1000~26500	---	-52.62	<=-5.76	PASS
		2480	Reference	14.15	14.15	---	PASS
			30~1000	---	-67.83	<=-5.85	PASS
			1000~26500	---	-50.62	<=-5.85	PASS

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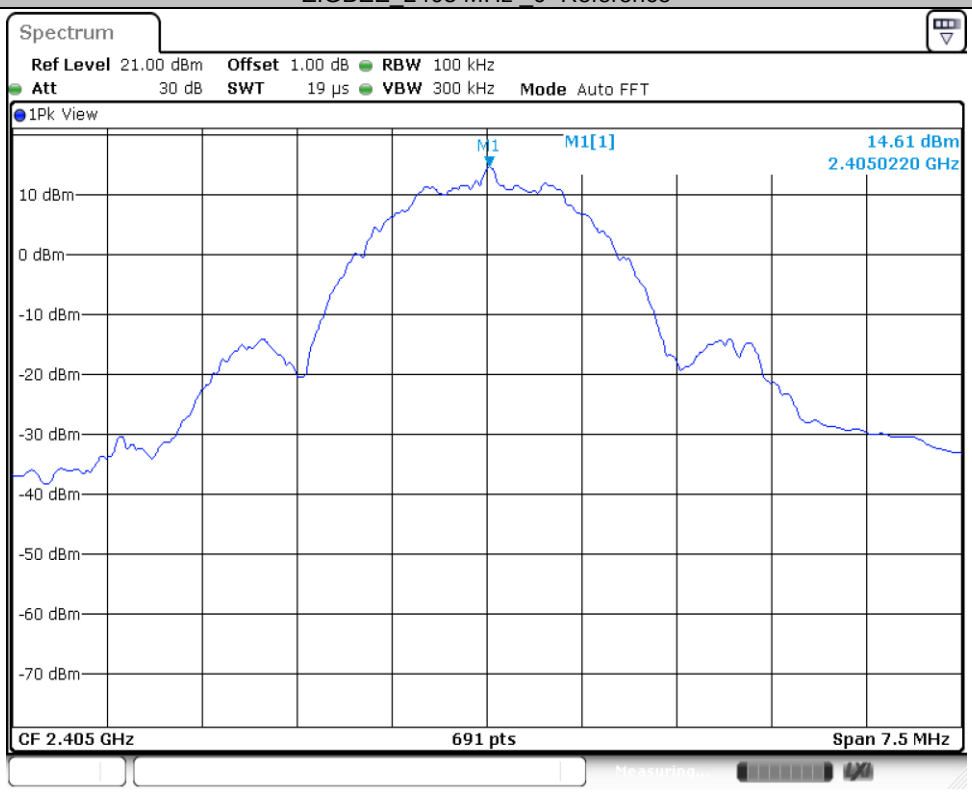
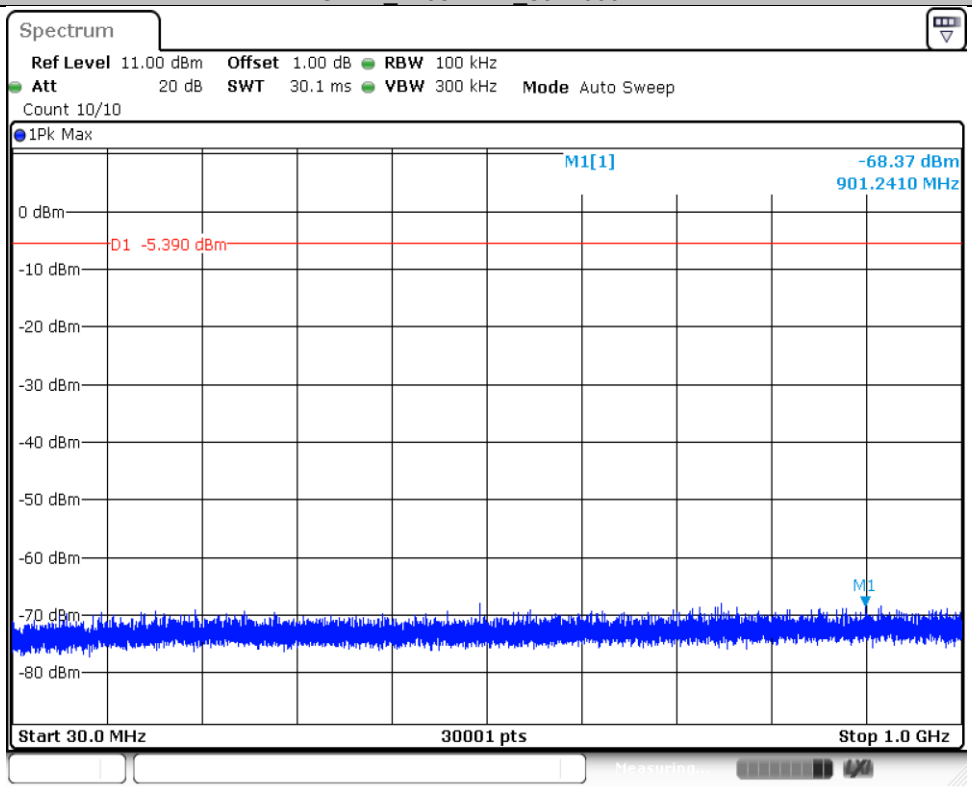
Test Graphs

ZIGBEE_2405 MHz _0~Reference



Date: 19.MAY.2023 18:53:33

ZIGBEE_2405 MHz _30~1000 MHz



Date: 19.MAY.2023 18:53:39

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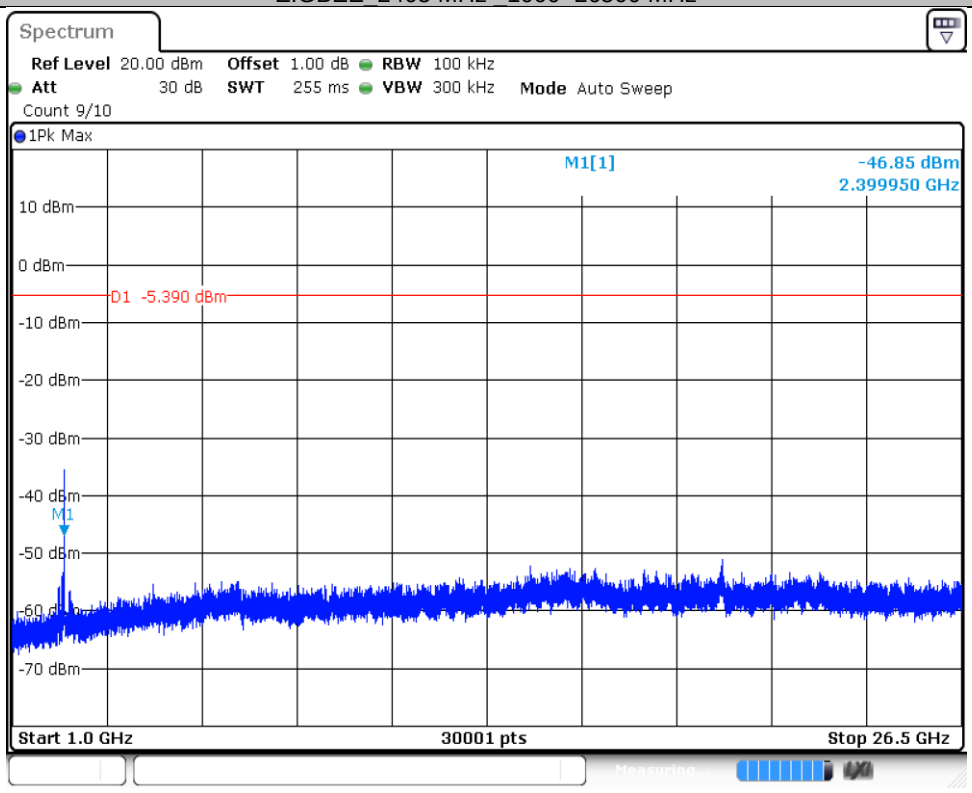
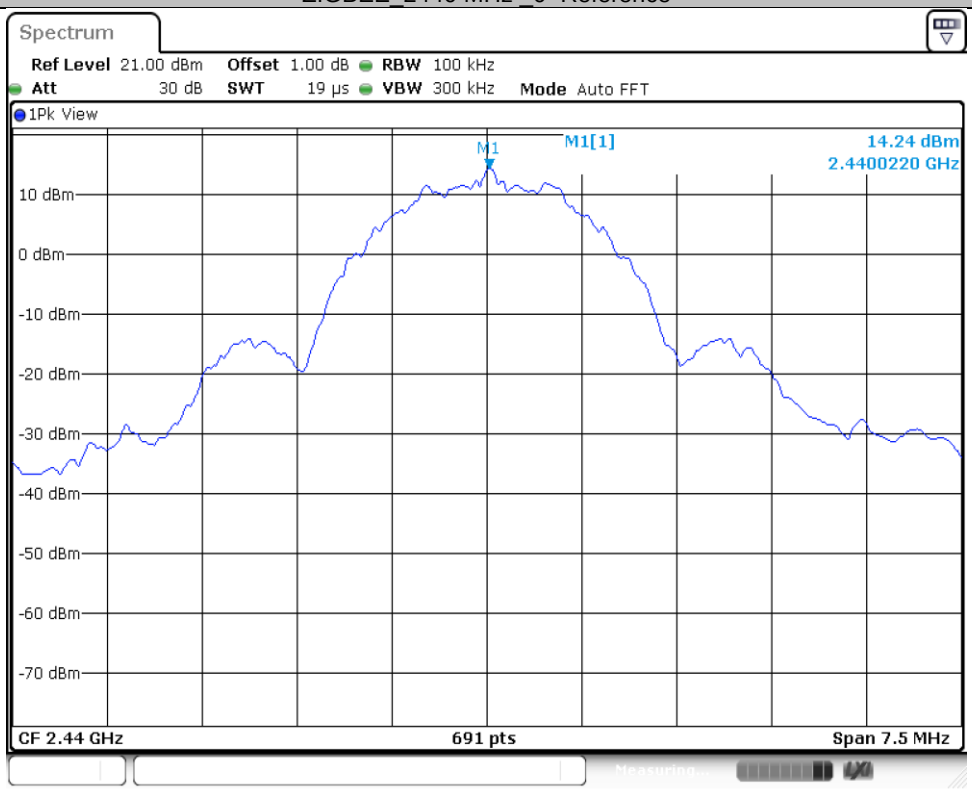
ZIGBEE_2405 MHz _1000~26500 MHz



Date: 19.MAY.2023 18:53:47

ZIGBEE_2440 MHz _0~Reference



Date: 19.MAY.2023 18:55:29

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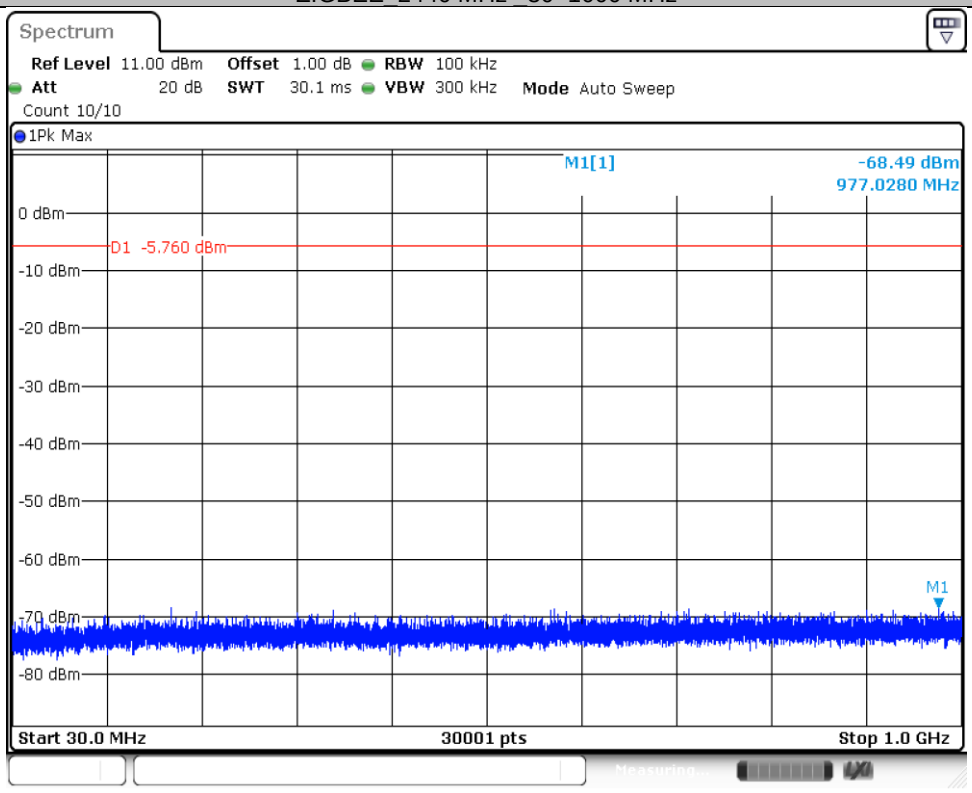
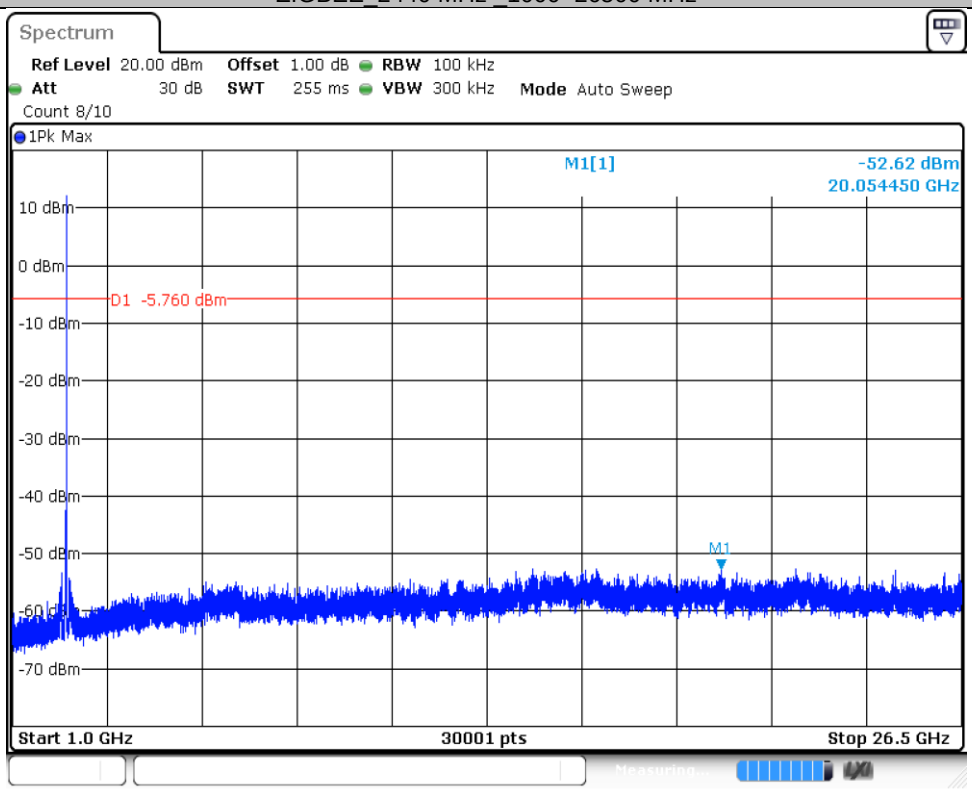
ZIGBEE_2440 MHz _30~1000 MHz



Date: 19.MAY.2023 18:55:35

ZIGBEE_2440 MHz _1000~26500 MHz



Date: 19.MAY.2023 18:55:43

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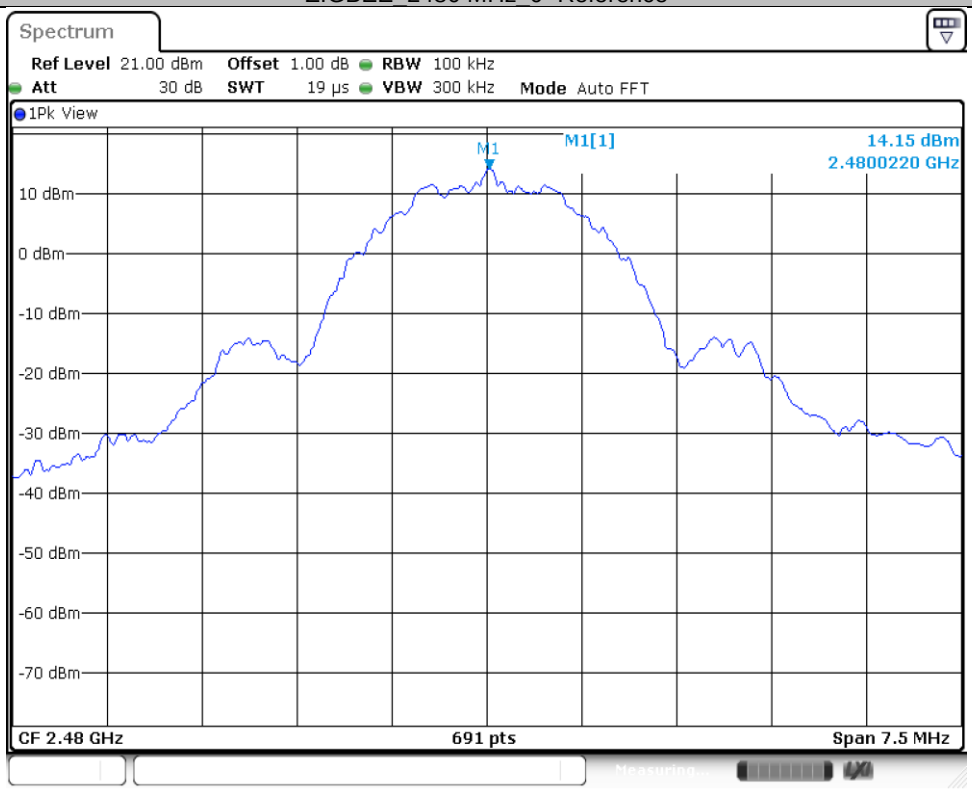
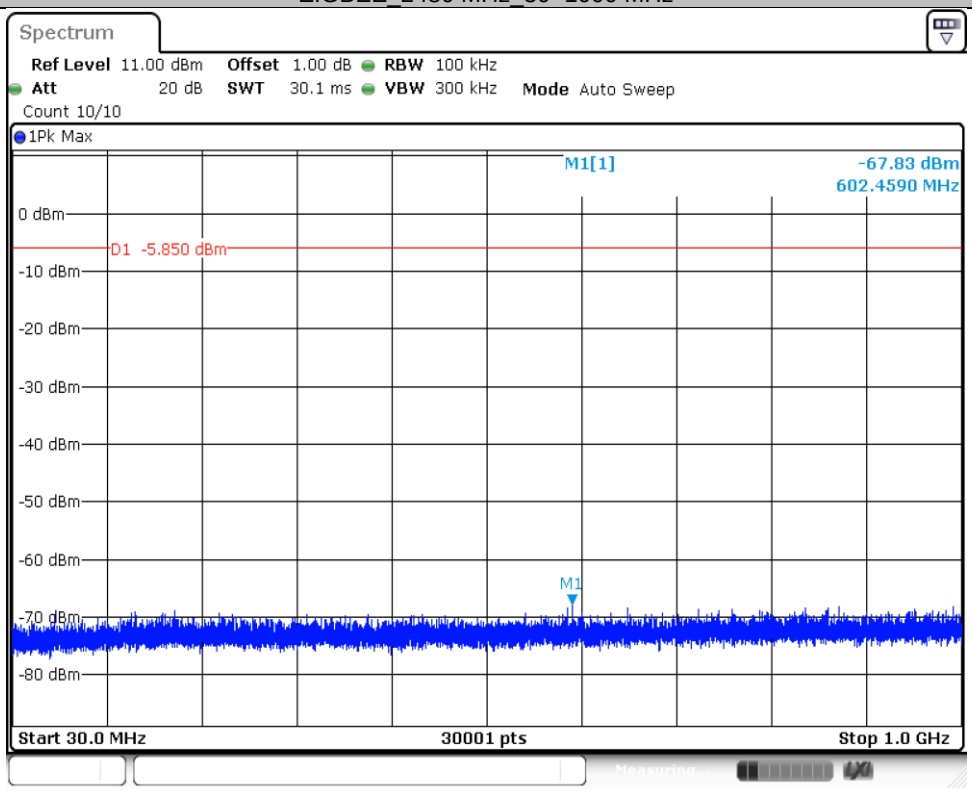
ZIGBEE_2480 MHz_0~Reference



Date: 19.MAY.2023 18:57:15

ZIGBEE_2480 MHz_30~1000 MHz



Date: 19.MAY.2023 18:57:21

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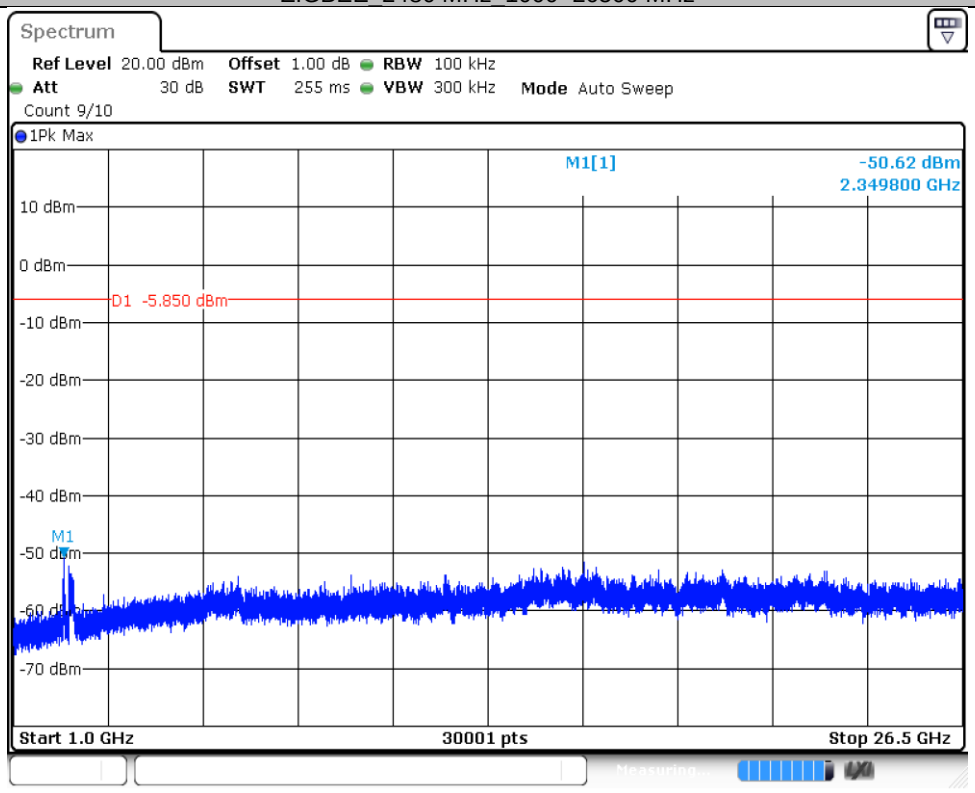
ZIGBEE_2480 MHz_1000~26500 MHz



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9.7 Band edge

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. 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
3. Allow the trace to stabilize, use the peak and delta measurement to record the result.
4. The level displayed must comply with the limit specified in this Section.
5. Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under § 15.247(b)(3) and RSS 247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB.

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

Test Results

Test Mode	Antenna	Ch Name	Channel [MHz]	Ref Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
ZIGBEE	Ant1	Low	2405	9.51	-47.49	<=-10.49	PASS
		High	2480	12.42	-34.10	<=-7.58	PASS

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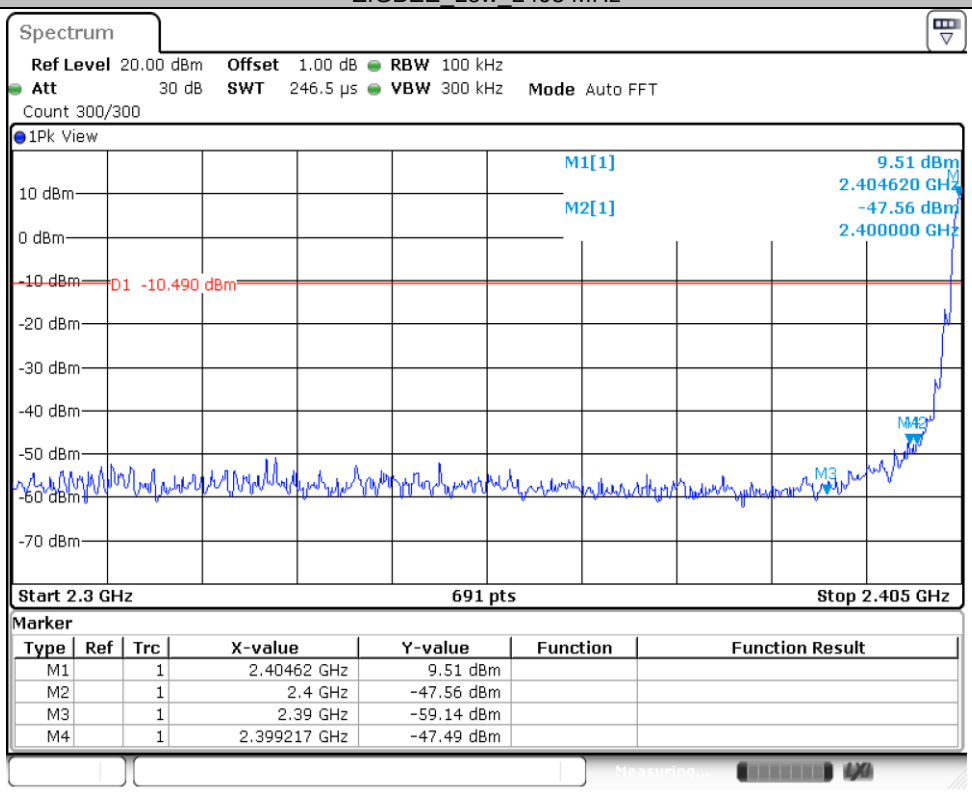
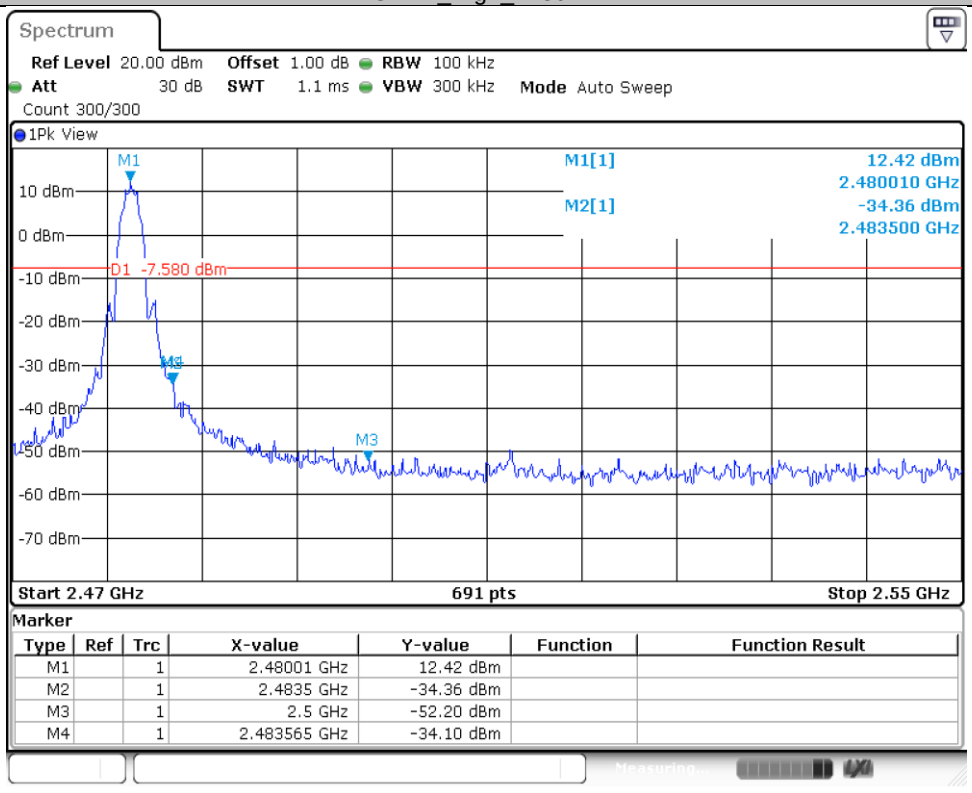
Test Graphs

ZIGBEE_Low_2405 MHz



Date: 5.MAY.2023 18:49:14

ZIGBEE_High_2480 MHz



Date: 5.MAY.2023 18:53:46

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9.8 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 3 meter 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 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 to 120kHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions 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, Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz

a) RBW = 1MHz.
b) VBW \ [3 × RBW].
c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
e) Sweep time = auto.
f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.
2) If linear voltage averaging mode was used in the preceding step e), then the correction

factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under § 15.247(b)(3) and RSS 247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in § 15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§ 15.205(a) and RSS-Gen scetion8.9, must also comply with the radiated emission limits specified in § 15.209(a) and RSS-Gen section 8.10.

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:

2405MHz (30MHz – 1GHz)(worst case)

Emission Type	Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBµV/m	Margin dB	Detector	Corr. dB/m	Result
Spurious	155.992222	29.16	Horizontal	43.50	14.34	QP	13.23	Pass
Spurious	242.968889	33.42	Horizontal	46.00	12.58	QP	17.60	Pass
Spurious	480.026111	36.49	Horizontal	46.00	9.51	QP	22.84	Pass
Spurious	44.927222	28.87	Vertical	40.00	11.13	QP	18.01	Pass
Spurious	83.996667	27.62	Vertical	40.00	12.38	QP	11.72	Pass
Spurious	480.080000	32.22	Vertical	46.00	13.78	QP	22.84	Pass

2405MHz (Above 1GHz)

Emission Type	Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBµV/m	Margin dB	Detector	Corr. dB/m	Result
Spurious	2322.000000	53.00	Horizontal	74.00	21.00	Peak	-5.27	Pass
Harmonic	4809.000000	52.49	Horizontal	74.00	21.51	Peak	5.49	Pass
Harmonic	14427.500000	55.50	Horizontal	74.00	18.50	Peak	18.02	Pass
Harmonic	14427.500000	50.45	Horizontal	54.00	3.55	AVG	18.02	Pass
Harmonic	14427.500000	58.81	Vertical	74.00	15.19	Peak	18.02	Pass
Harmonic	16832.000000	53.86	Vertical	74.00	20.14	Peak	23.92	Pass
Harmonic	14427.500000	51.49	Vertical	54.00	2.51	AVG	18.02	Pass
Harmonic	16832.000000	51.79	Vertical	54.00	2.21	AVG	23.92	Pass

2440MHz (Above 1GHz)

Emission Type	Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBµV/m	Margin dB	Detector	Corr. dB/m	Result
Spurious	2355.500000	53.87	Horizontal	74.00	20.13	Peak	-4.87	Pass
Harmonic	4881.000000	56.50	Horizontal	74.00	17.50	Peak	6.07	Pass
Spurious	14972.500000	48.02	Horizontal	74.00	25.98	Peak	19.31	Pass
Harmonic	4881.000000	47.40	Horizontal	54.00	6.60	AVG	6.07	Pass
Spurious	2310.500000	49.21	Vertical	74.00	24.79	Peak	-5.38	Pass
Spurious	9090.000000	43.62	Vertical	74.00	30.38	Peak	12.39	Pass
Harmonic	14643.500000	52.68	Vertical	74.00	21.32	Peak	18.81	Pass
Harmonic	14643.500000	50.23	Vertical	54.00	3.77	AVG	18.81	Pass

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2480MHz (Above 1GHz)

Emission Type	Frequency	Emission Level	Polarization	Limit	Margin	Detector	Corr.	Result
	MHz	dBuV/m		dBµV/m	dB		dB/m	
Harmonic	4959.000000	55.92	Horizontal	74.00	18.08	Peak	6.25	Pass
Harmonic	14883.000000	51.94	Horizontal	74.00	22.06	Peak	19.21	Pass
Harmonic	4959.000000	49.10	Horizontal	54.00	4.90	AVG	6.25	Pass
Harmonic	14883.000000	50.34	Horizontal	54.00	3.66	AVG	19.21	Pass
Spurious	2340.000000	49.45	Vertical	74.00	24.55	Peak	-5.04	Pass
Harmonic	4960.000000	51.91	Vertical	74.00	22.09	Peak	6.25	Pass
Harmonic	14877.000000	49.60	Vertical	74.00	24.40	Peak	19.19	Pass
Harmonic	4960.000000	48.74	Vertical	54.00	5.26	AVG	6.25	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 frequency range 9kHz-30MHz,18-26GHz are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so test data does not present in this report.
(3) 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.
(4) Level=Reading Level + Correction Factor
Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)

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10 Test Equipment List

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
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

Radiated Emission, SAC-3 #2

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	2024-3-5
Horn Antenna	Rohde & Schwarz	HF907	68-4-80-14-005	102294	1	2023-6-19
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	1	2023-8-17
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
Test software	Rohde & Schwarz	EMC32	68-4-90-19-006-A01	Version10.35.02	N/A	N/A

RF Conducted Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	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	
Items	**Extended Uncertainty**
Uncertainty for Conducted Emission in new shielding room (68-4-90-19-005) 150kHz-30MHz (for test using AMN ENV216)	3.33dB
Uncertainty for Radiated Emission in 3m chamber (68-4-90-14-001) 9kHz-30MHz	4.70dB
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) 30MHz-1000MHz	Horizontal: 4.59dB; Vertical: 4.75dB;
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) 1000MHz-18000MHz	Horizontal: 5.08dB; Vertical: 5.09dB;
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) above 18000MHz	Horizontal: 3.14dB; Vertical: 3.12dB
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.31dB Frequency test involved: 0.6×10^{-8} or 1%

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.

---END OF TEST REPORT---

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