

Prüfbericht-Nr.: Test report no.:	CN25HMTL 001	Auftrags-Nr.: Order no.:	326061241	Seite 1 von 39 Page 1 of 39
Kunden-Referenz-Nr.: Client reference no.:	1288983	Auftragsdatum: Order date:	2024-11-04	
Auftraggeber: Client:	IKEA of Sweden AB Box 702, SE-343 81 Älmhult, Sweden			
Prüfgegenstand: Test item:	Door window sensor			
Bezeichnung / Typ-Nr.: Identification / Type no.:	E2492			
Auftrags-Inhalt: Order content:	Test Report			
Prüfgrundlage: Test specification:	FCC CFR47 Part 15, Subpart C Section 15.247 RSS-Gen Issue 5, Amendment 2, February 2021 RSS-247 Issue 3, August 2023 ANSI C63.10: 2013			
Wareneingangsdatum: Date of sample receipt:	2024-12-09	Refer to photo document.		
Prüfmuster-Nr.: Test sample no.:	A003883574-001			
Prüfzeitraum: Testing period:	2024-12-13 ~ 2024-12-19			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	<input checked="" type="checkbox"/> <u>Hongfei Wu</u>	genehmigt von: authorized by:	<input checked="" type="checkbox"/> <u>Yanli Fan</u>	
Datum: Date:	2025-07-15 <small>Signed by: Hongfei Wu</small>	Datum: Date:	2025-07-15 <small>Signed by: Yanli Fan</small>	
Stellung / Position:	Sachverständige(r)/Expert	Stellung / Position:	Sachverständige(r)/Expert	
Sonstiges / Other:	FCC ID: FHO-E2492 IC: 10912A-E2492 HVIN: E2492 PMN: MYGGBETT			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

Prüfbericht-Nr.: CN25HMTL 001
Test report no.:

Seite 2 von 39
Page 2 of 39

Anmerkungen
Remarks

- | | |
|---|--|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.
Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p> |
| 2 | <p>Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben. Informationen zur Verifizierung der Authentizität unserer Dokumente erhalten Sie auf folgender Webseite: go.tuv.com/digital-signature</p> <p><i>As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. For information on verifying the authenticity of our documents, please visit the following website: go.tuv.com/digital-signature</i></p> |
| 3 | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.
Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.
Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p> |
| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2023, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2023, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p> |

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT*RESULT: Pass***5.1.2 6dB & 99% BANDWIDTH***RESULT: Pass***5.1.3 OUTPUT POWER***RESULT: Pass***5.1.4 POWER SPECTRAL DENSITY***RESULT: Pass***5.1.5 CONDUCTED BAND EDGE AND OUT-OF BAND EMISSIONS***RESULT: Pass***5.2.1 CONDUCTED EMISSION***RESULT: N/A***5.3.1 RADIATED BAND-EDGE***RESULT: Pass***5.3.2 RADIATED SPURIOUS EMISSION***RESULT: Pass*

Contents

1.	GENERAL REMARKS	5
1.1	COMPLEMENTARY MATERIALS.....	5
2.	TEST SITES	6
2.1	TEST FACILITIES	6
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	7
2.3	TRACEABILITY	7
2.4	CALIBRATION	7
2.5	MEASUREMENT UNCERTAINTY	8
3.	GENERAL PRODUCT INFORMATION.....	9
3.1	PRODUCT FUNCTION AND INTENDED USE	9
3.2	RATINGS AND SYSTEM DETAILS.....	9
3.3	INDEPENDENT OPERATION MODES.....	9
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS	10
4.	TEST SET-UP AND OPERATION MODES.....	11
4.1	PRINCIPLE OF CONFIGURATION SELECTION	11
4.2	TEST OPERATION AND TEST SOFTWARE.....	11
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	11
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....	11
5.	TEST RESULTS	12
5.1	CONDUCTED TESTING AT ANTENNA PORT	12
5.1.1	<i>Antenna Requirement.....</i>	<i>12</i>
5.1.2	<i>6dB & 99% Bandwidth.....</i>	<i>14</i>
5.1.3	<i>Output Power</i>	<i>21</i>
5.1.4	<i>Power Spectral Density</i>	<i>22</i>
5.1.5	<i>Conducted Band Edge and out-of Band Emissions.....</i>	<i>26</i>
5.2	EMISSION IN THE FREQUENCY RANGE UP TO 30MHZ.....	28
5.2.1	<i>Conducted Emission.....</i>	<i>28</i>
5.3	EMISSION IN THE FREQUENCY RANGE ABOVE 30MHZ	29
5.3.1	<i>Radiated Band-Edge</i>	<i>29</i>
5.3.2	<i>Radiated Spurious Emission.....</i>	<i>32</i>
6.	LIST OF TABLES	39
7.	LIST OF FIGURES	39

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

2. Test Sites

2.1 Test Facilities

TÜV Rheinland (Shanghai) Co., Ltd.
Workshop14, North Half of Workshop 10 and Workshop 16, Pingqian (Taicang) Modern Industrial Park, No.525, Yuewang Lingang South Road, Shaxi, Taicang, Jiangsu, China

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 930979.

The Innovation, Science and Economic Development Canada has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance. The description of the test facility is listed under chambers filing number 33038.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equip.	Description	Model	Manufacturer	Due Date DD.MM.YYYY
G1811378	3m semi-anechoic chamber	SAC3	Frankonia	03.12.2028
G1811425	Bilog antenna	CBL 6112D	Teseq	20.04.2026
G1825371	Preamplifier	EMC051845SE	Taiwan EMCI	24.07.2025
G1825372	Preamplifier	EMC184045SE	Taiwan EMCI	24.07.2025
9059157	Double ridged broadband horn antenna	BBHA 9120 D	Schwarzbeck	16.03.2025
G1831065	Broadband horn antenna	BBHA 9170	Schwarzbeck	18.06.2028
G1822702	Spectrum analyser	FSV40	Rohde&Schwarz	15.07.2025
9053474	Signal generator	SMB100B (6 GHz)	Rohde & Schwarz	10.12.2025
9053476	Vector Signal generator	SMW200A	Rohde & Schwarz	10.12.2025
9053477	OSP	OSP-B157W8	Rohde & Schwarz	10.12.2025
9047770	Wireless connectivity tester	CMW270	Rohde & Schwarz	23.08.2025
G1811391	EMI test receiver	ESCI	Rohde&Schwarz	27.10.2025
software				
	EMC measurement software	EMC32 (Ver 10.60.20)	Rohde&Schwarz	NA
	EMC measurement software	EMC32 (Ver 11.40.00)	Rohde&Schwarz	NA

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

Table 2: Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	±0.39dB
	> 1GHz	±0.68dB
Conducted Emission	150kHz - 30MHz	±3.39dB
Radiated Emission	9kHz - 30MHz	±2.93dB
	30MHz - 1GHz	±5.34dB
	> 1GHz	±5.40dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a door window sensor and which support Bluetooth, Zigbee and Thread function.

The aim of this report is to evaluate RF character of Thread of the EUT.

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Description of EUT	
Product Name:	Door window sensor
Model No.:	E2492
Operation Voltage:	DC 1.5V (AAA battery)
RF Technical:	1) BLE 2) Zigbee 3) Thread
Technical Specification of Thread	
Frequency Range:	2405~2480MHz
Modulation Type:	OQPSK
Antenna Type:	PCB Antenna
Antenna Gain:	4.96 dBi (declared by client)

Table 4: Operation Channel List

RF Channel	Frequency [MHz]						
11	2405	15	2425	19	2445	23	2465
12	2410	16	2430	20	2450	24	2470
13	2415	17	2435	21	2455	25	2475
14	2420	18	2440	22	2460	26	2480

3.3 Independent Operation Modes

Test frequencies are lowest channel: 2405 MHz, middle channel: 2445 MHz and highest channel: 2480 MHz

The basic operation modes are:

A. Thread transmitting mode

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

Test Software: sscm 5.13.1

Table 5: Power parameter value

Mode	Power Parameter Setting Value
Thread	2 dBm

4.3 Special Accessories and Auxiliary Equipment

Table 6: Auxiliary Equipment

Equipment	Manufacturer	Model
Laptop	Lenovo	21AJ-S57N0J

4.4 Countermeasures to achieve EMC Compliance

Null.

5. Test Results

5.1 Conducted Testing at Antenna Port

5.1.1 Antenna Requirement

RESULT: **Pass**

According to the manufacturer declared, the EUT has one internal PCB antenna, the directional gain of antenna is 4.96 dBi and the antenna is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Table 7: Antenna Requirement

FCC 15.203 – Antenna Requirement 1

Requirement: No antenna other than that furnished by the responsible party shall be used with the device

Results: Antenna type: PCB antenna

Verdict: Pass

FCC 15.204 – Antenna Requirement 2

Requirement: An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.

Results: Only one PCB antenna can be used

Verdict: Pass

RSS-Gen 6.4 – External Control

Requirement: The device shall not have any external controls accessible to the user that enable it to be adjusted, selected or programmed to operate in violation of the regulatory requirements, including RSS-Gen and the applicable RSSs

Results: The device does not have any transmitter external controls accessible to the user that can be adjusted and operated in violation of the limits of this standard.

Verdict: PASS

Prüfbericht - Nr.: CN25HMTL 001
Test Report No.**Seite 13 von 39**
Page 13 of 39**RSS-Gen 6.8 – Antenna Requirement**

Requirement: When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

Results:

a) Antenna Type:	PCB Antenna
b) Manufacture:	N/A
c) Model No.:	N/A
d) Gain with reference to an isotropic radiator:	4.96 dBi

Verdict: **PASS**

5.1.2 6dB & 99% Bandwidth**RESULT:****Pass**

Date of testing : 2024-12-13
Ambient temperature : 21.5°C
Relative humidity : 51.9%
Atmospheric pressure : 101kPa
Test requirement : FCC Part 15.247(a)(2)
RSS-247 Issue 3, August 2023, Clause 5.2(a)
Test procedure : ANSI C63.10: 2013
Test voltage : DC 1.5V
Test modes applied : A

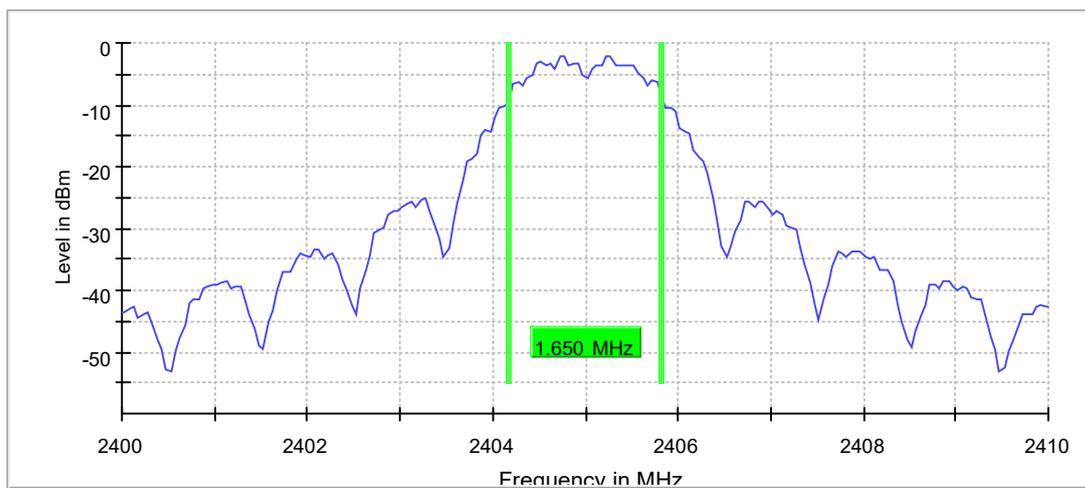
6dB Bandwidth, 2405MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2405.000000	1.650000	0.500000	---	2404.175000	2405.825000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2405.000000	-2.0	PASS

6 dB Bandwidth


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.41000 GHz	2.41000 GHz
Span	10.000 MHz	10.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	200	~ 200
Sweeptime	37.969 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	16 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.50 dB

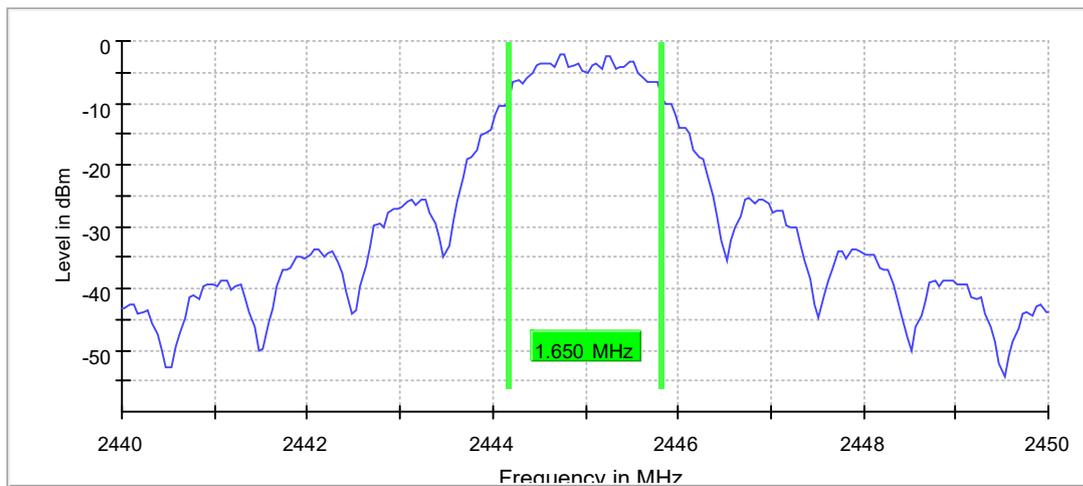
6dB Bandwidth, 2445MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2445.000000	1.650000	0.500000	---	2444.175000	2445.825000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2445.000000	-2.2	PASS

6 dB Bandwidth


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.44000 GHz	2.44000 GHz
Stop Frequency	2.45000 GHz	2.45000 GHz
Span	10.000 MHz	10.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	200	~ 200
Sweeptime	37.969 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	20 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.11 dB	0.50 dB

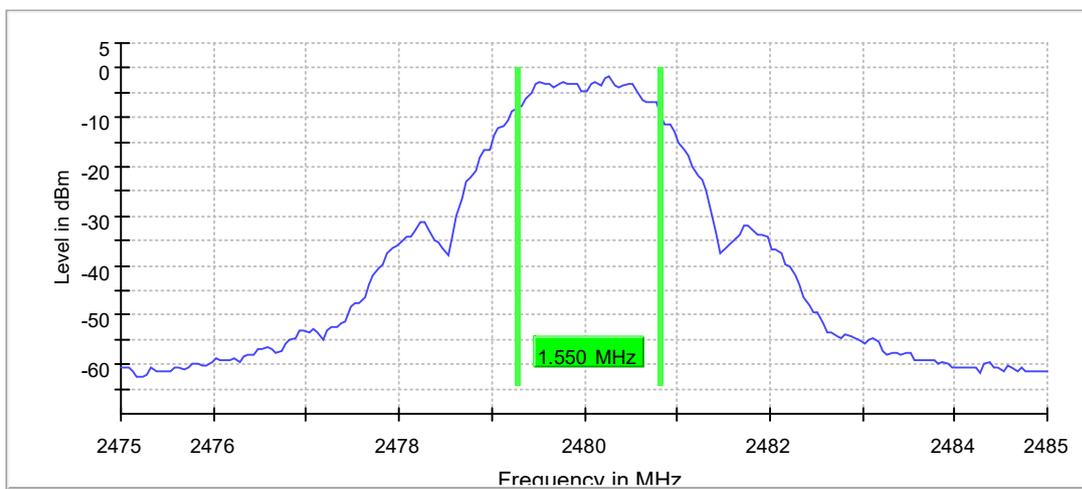
6dB Bandwidth, 2480MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.550000	0.500000	---	2479.275000	2480.825000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2480.000000	-1.8	PASS

6 dB Bandwidth


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47500 GHz	2.47500 GHz
Stop Frequency	2.48500 GHz	2.48500 GHz
Span	10.000 MHz	10.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	200	~ 200
Sweeptime	37.969 μ s	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	19 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.50 dB

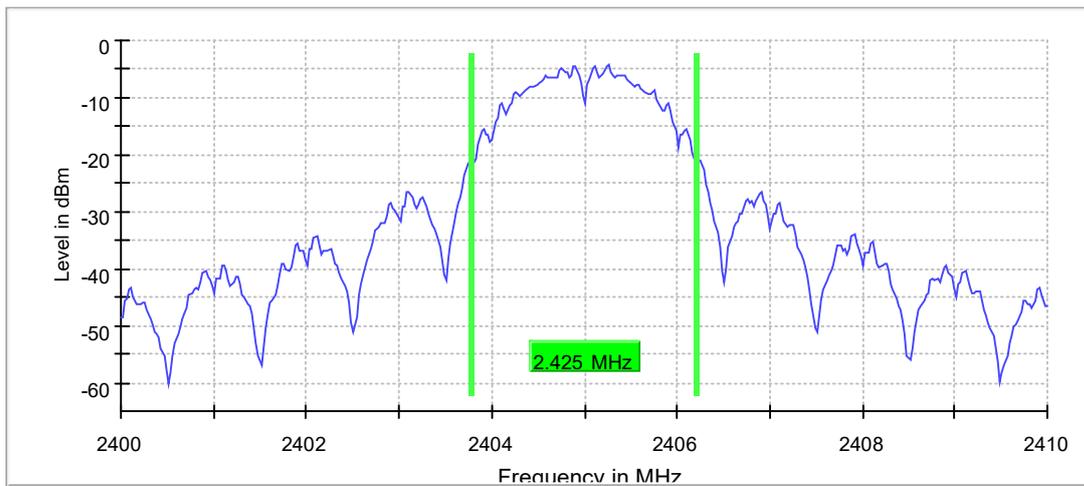
99% Occupied Channel Bandwidth, 2405MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2405.000000	2.425000	---	---	2403.787500	2406.212500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2405.000000	PASS

99 % Bandwidth


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.41000 GHz	2.41000 GHz
Span	10.000 MHz	10.000 MHz
RBW	50.000 kHz	>= 50.000 kHz
VBW	200.000 kHz	>= 150.000 kHz
SweepPoints	400	~ 400
Sweeptime	75.781 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	27 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.30 dB

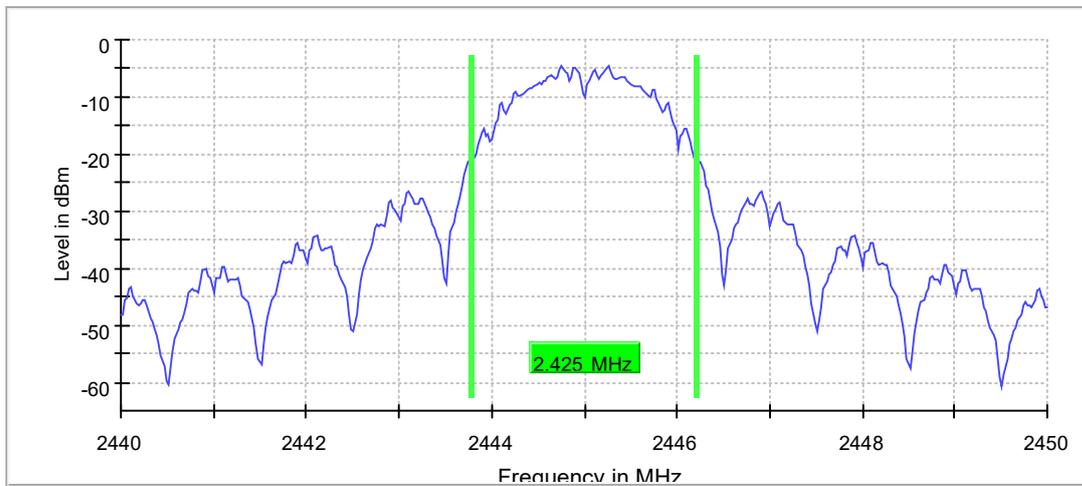
99% Occupied Channel Bandwidth, 2445MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2445.000000	2.425000	---	---	2443.787500	2446.212500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2445.000000	PASS

99 % Bandwidth


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.44000 GHz	2.44000 GHz
Stop Frequency	2.45000 GHz	2.45000 GHz
Span	10.000 MHz	10.000 MHz
RBW	50.000 kHz	>= 50.000 kHz
VBW	200.000 kHz	>= 150.000 kHz
SweepPoints	400	~ 400
Sweeptime	75.781 µs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	24 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.17 dB	0.30 dB

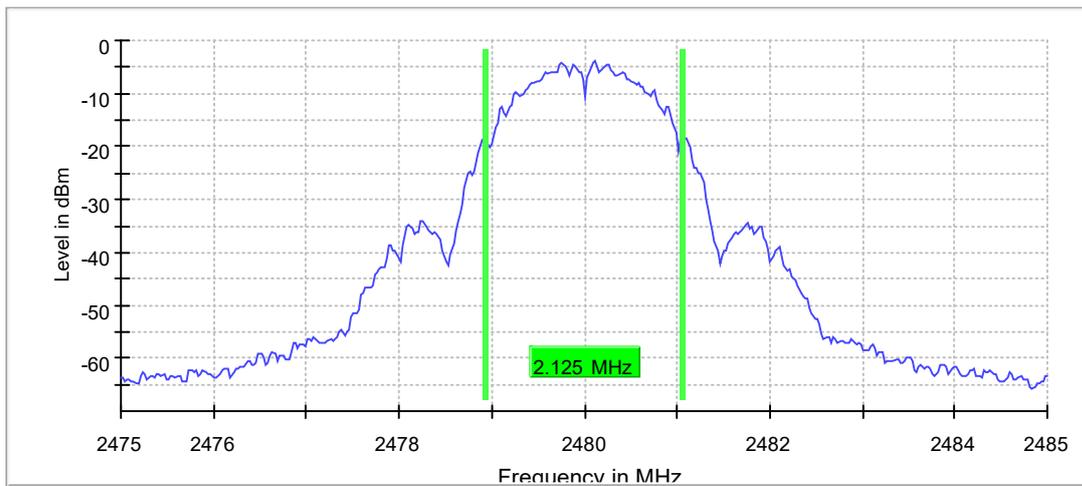
99% Occupied Channel Bandwidth, 2480MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	2.125000	---	---	2478.937500	2481.062500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2480.000000	PASS

99 % Bandwidth


Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.575000	-53.6	36.8	-16.8	PASS
2483.625000	-53.9	37.2	-16.8	PASS
2483.675000	-53.9	37.2	-16.8	PASS
2483.525000	-54.0	37.2	-16.8	PASS
2483.725000	-55.1	38.4	-16.8	PASS
2483.775000	-55.3	38.5	-16.8	PASS
2483.825000	-55.6	38.9	-16.8	PASS
2484.225000	-55.7	38.9	-16.8	PASS
2484.025000	-56.0	39.2	-16.8	PASS
2484.575000	-56.1	39.3	-16.8	PASS
2484.275000	-56.1	39.3	-16.8	PASS
2483.975000	-56.1	39.3	-16.8	PASS
2483.875000	-56.2	39.4	-16.8	PASS
2484.525000	-56.2	39.4	-16.8	PASS
2483.925000	-56.3	39.5	-16.8	PASS

5.1.4 Power Spectral Density

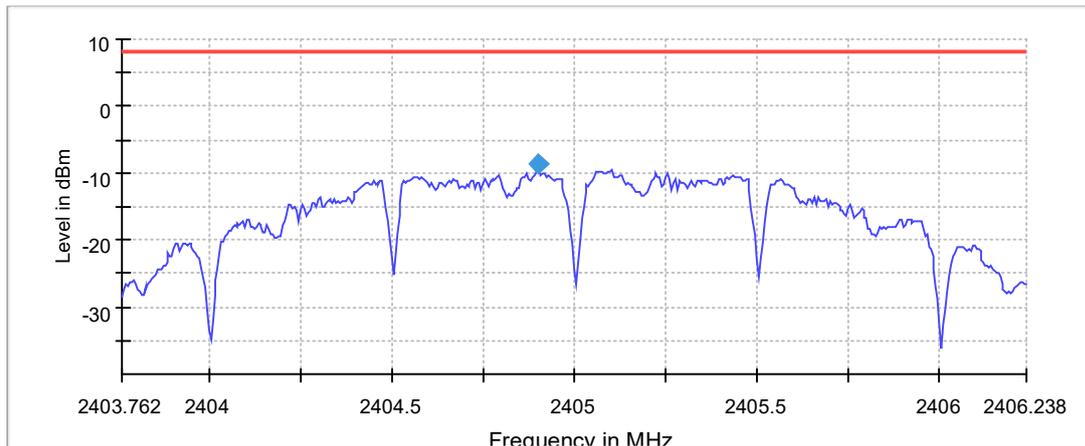
RESULT:**Pass**

Date of testing : 2024-12-13
Ambient temperature : 21.5°C
Relative humidity : 51.9%
Atmospheric pressure : 101kPa
Test requirement : FCC Part 15.247(e)
RSS-247 Issue 3, August 2023, Clause 5.2(b)
Test procedure : ANSI C63.10: 2013
Test voltage : DC 1.5V
Test modes applied : A

Power Spectral Density, 2405MHz

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2405.000000	2404.900000	-8.809	8.0	PASS

Peak Power Spectral Density



— Limit — Sum Level ◆ PSD

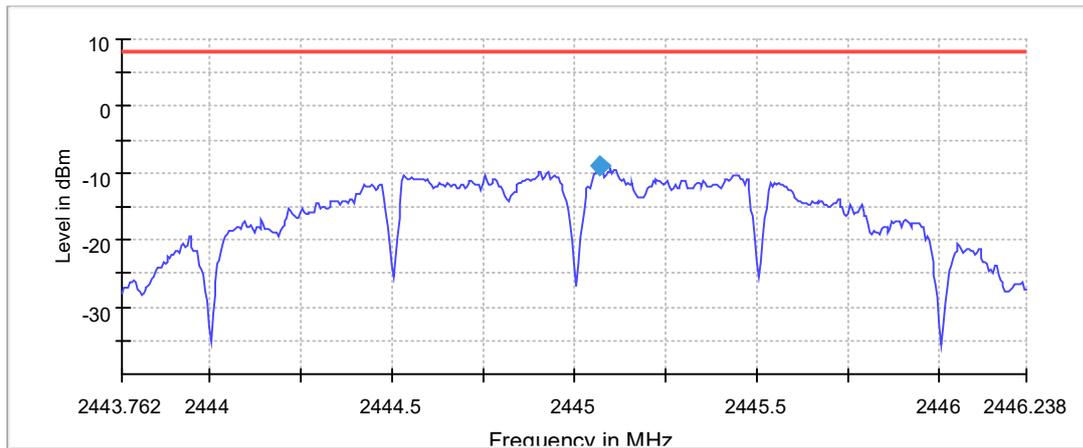
Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40376 GHz	2.40376 GHz
Stop Frequency	2.40624 GHz	2.40624 GHz
Span	2.475 MHz	2.475 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	495	~ 495
Sweeptime	2.480 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	44 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.13 dB	0.50 dB

Power Spectral Density, 2445MHz

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2445.000000	2445.070000	-9.039	8.0	PASS

Peak Power Spectral Density



— Limit
 — Sum Level
 ◆ PSD

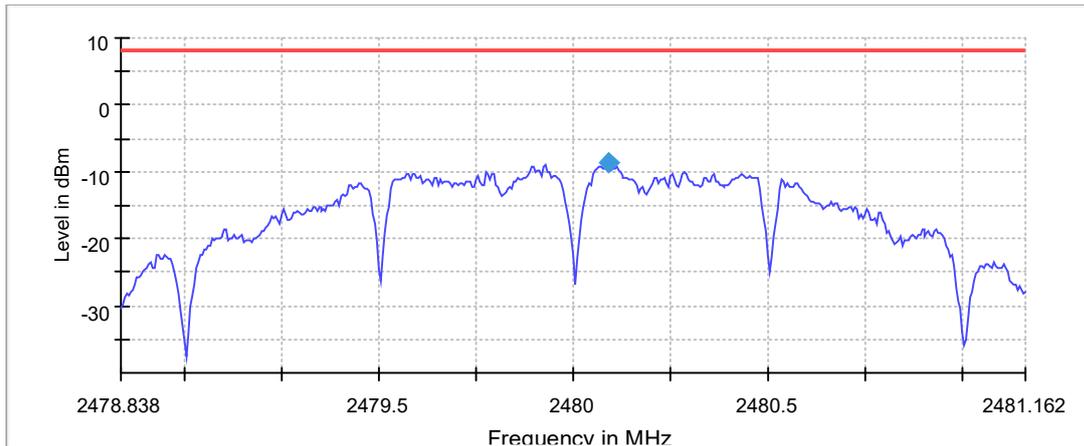
Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.44376 GHz	2.44376 GHz
Stop Frequency	2.44624 GHz	2.44624 GHz
Span	2.475 MHz	2.475 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	495	~ 495
Sweeptime	2.480 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	43 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.43 dB	0.50 dB

Power Spectral Density, 2480MHz

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2480.000000	2480.090000	-8.671	8.0	PASS

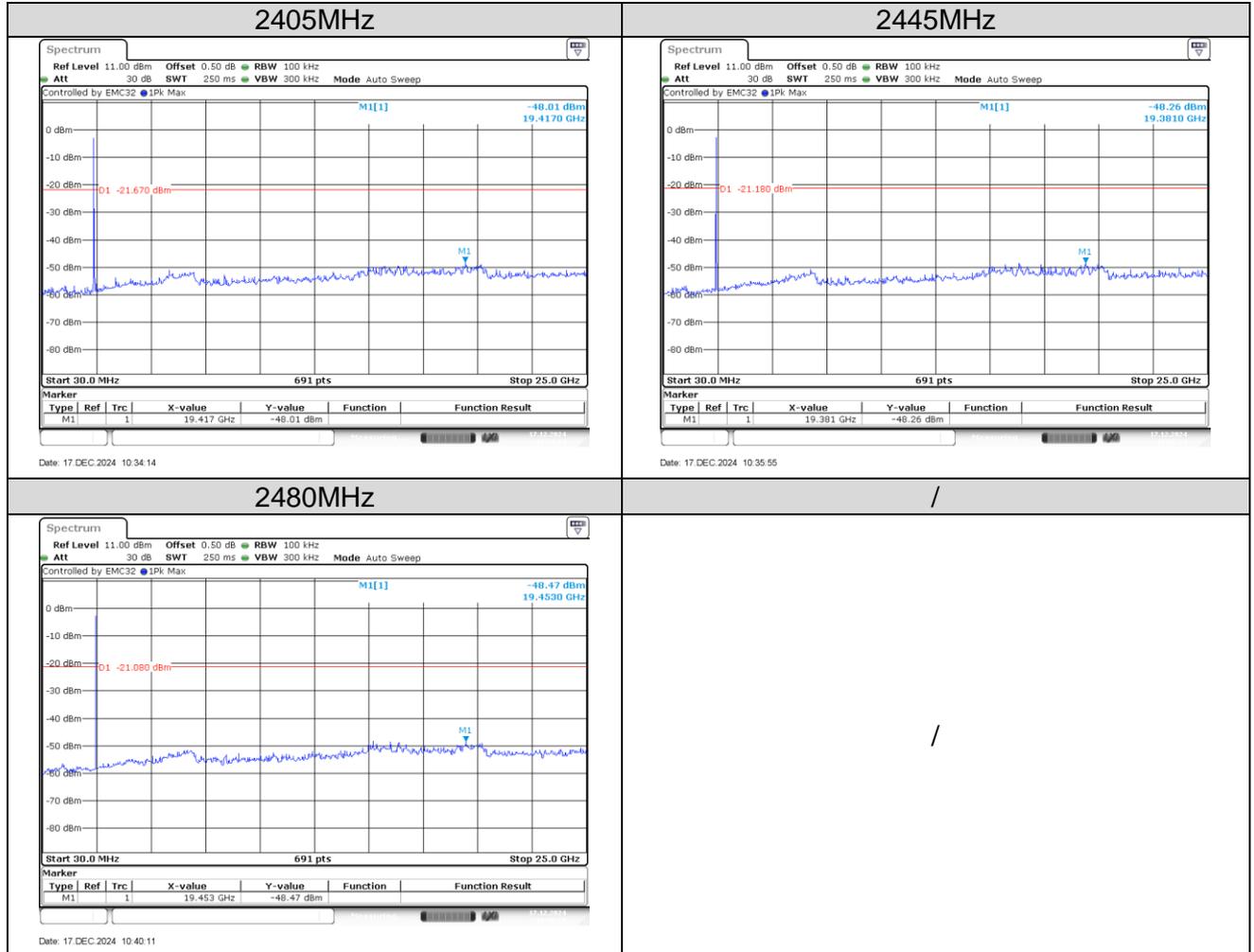
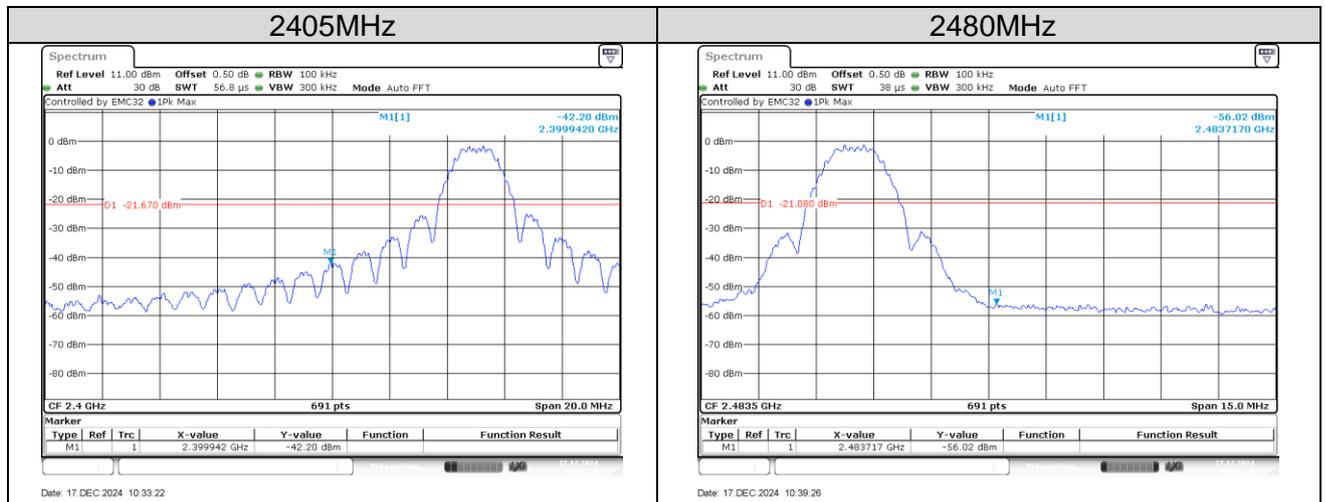
Peak Power Spectral Density



— Limit
 — Sum Level
 ◆ PSD

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47884 GHz	2.47884 GHz
Stop Frequency	2.48116 GHz	2.48116 GHz
Span	2.325 MHz	2.325 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	465	~ 465
Sweeptime	2.330 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	26 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.20 dB	0.50 dB

Figure 2: Conducted Spurious Emission

Figure 3: Conducted Band Edge


5.2 Emission in the Frequency Range up to 30MHz

5.2.1 Conducted Emission

RESULT:**N/A**

Date of testing : /
Ambient temperature : /
Relative humidity : /
Atmospheric pressure : /
Test requirement : FCC Part 15.207 (a)
RSS-Gen Issue 5, Amendment 2, February 2021, Clause
8.8
Test procedure : KDB 558074 D01v05r02
ANSI C63.10: 2013
Test voltage : /
Test modes applied : /

Note: This product is power by battery, so it is not applicable for this test.

5.3 Emission in the Frequency Range above 30MHz

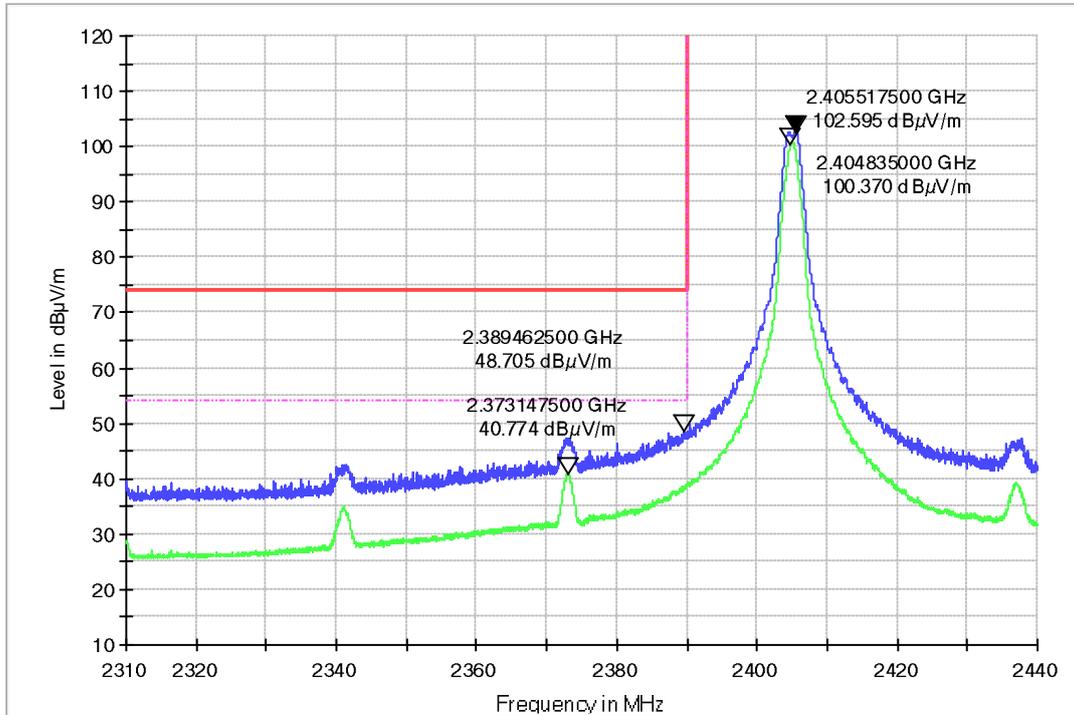
5.3.1 Radiated Band-Edge

RESULT:**Pass**

Date of testing	:	2024-12-19
Ambient temperature	:	21.7°C
Relative humidity	:	52.7%
Atmospheric pressure	:	101kPa
Test requirement	:	FCC Part 15.247(d) FCC Part 15.205(a) FCC Part 15.209(a) RSS-Gen Issue 5, Amendment 2, February 2021, Clause 8.9 RSS-Gen Issue 5, Amendment 2, February 2021, Clause 8.10 RSS-247 Issue 3, August 2023, Clause 5.5
Test procedure	:	ANSI C63.10: 2013
Test voltage	:	DC 1.5V
Test modes applied	:	A

Figure 4: Radiated Band-Edge, 2405MHz, H

Copy of 2310` 2410 BE 1-18GHz_HL050_FSV40_Pre


Figure 5: Radiated Band-Edge, 2405MHz, V

Copy of 2310` 2410 BE 1-18GHz_HL050_FSV40_Pre

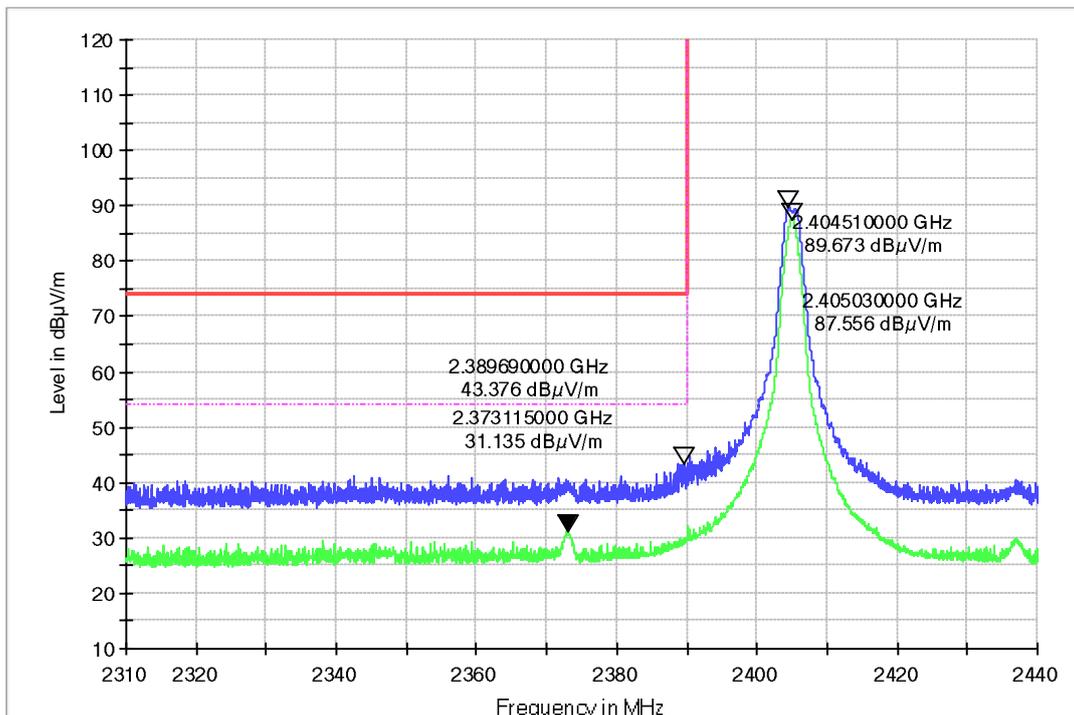
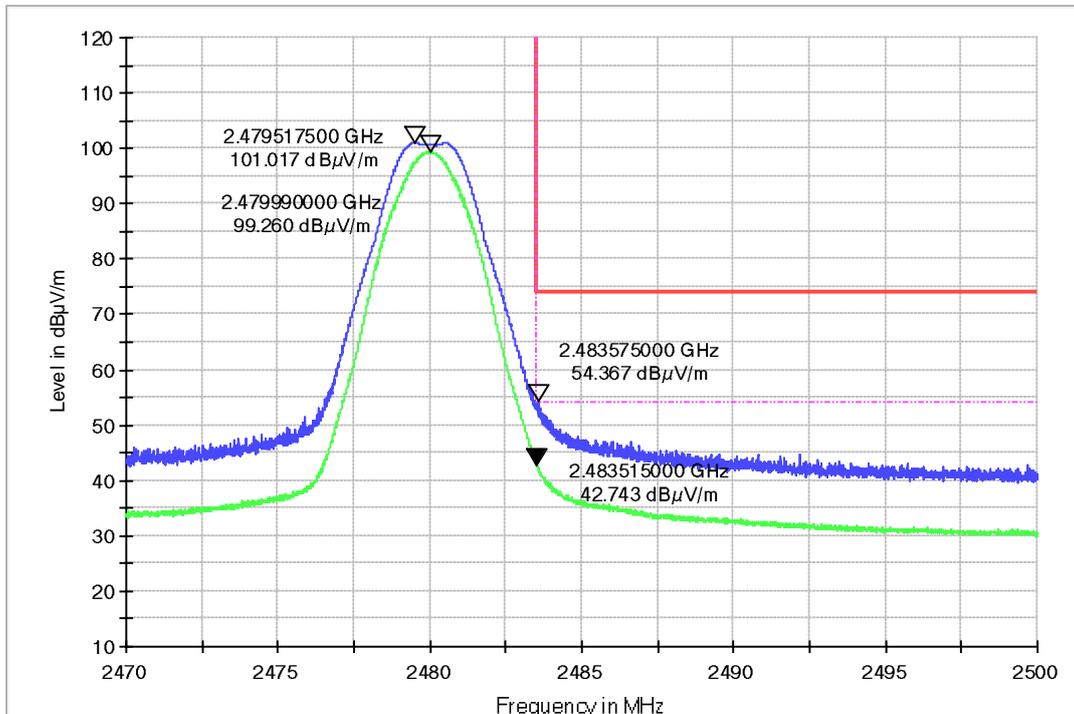
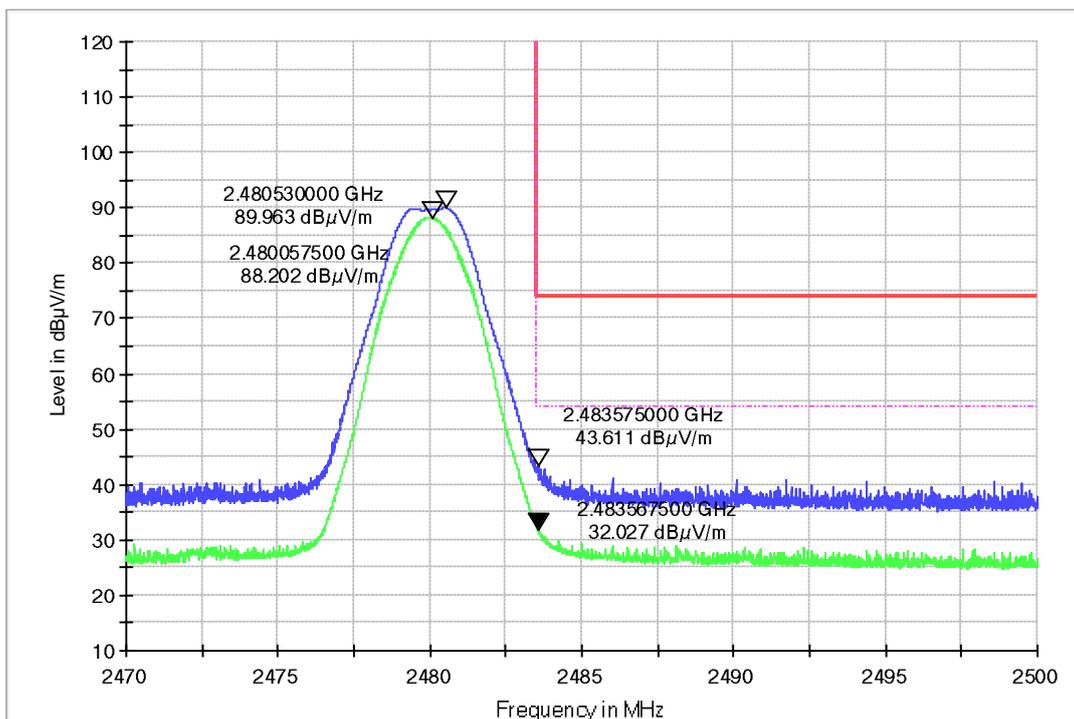


Figure 6: Radiated Band-Edge, 2480MHz, H

Copy of 2470` 2500 BE_1-18GHz_HL050_FSV40_Pre


Figure 7: Radiated Band-Edge, 2480MHz, V

Copy of 2470` 2500 BE_1-18GHz_HL050_FSV40_Pre



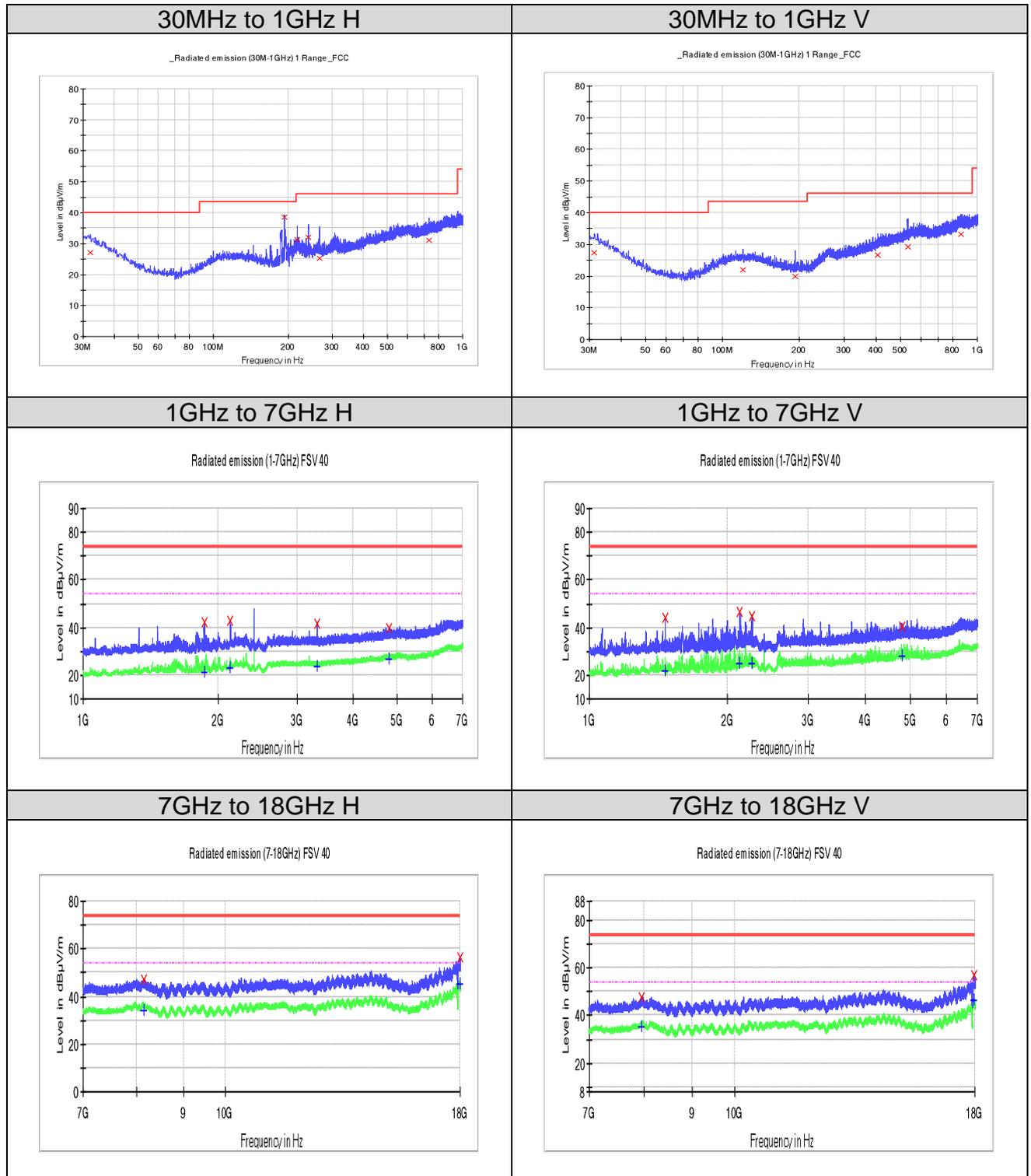
5.3.2 Radiated Spurious Emission

RESULT:**Pass**

Date of testing	:	2024-12-19
Ambient temperature	:	21.7°C
Relative humidity	:	52.7%
Atmospheric pressure	:	101kPa
Test requirement	:	FCC Part 15.247(d) FCC Part 15.209(a) RSS-Gen Issue 5, Amendment 2, February 2021, Clause 8.9 RSS-247 Issue 3, August 2023, Clause 5.5
Test procedure	:	ANSI C63.10: 2013
Test voltage	:	DC 1.5V
Test modes applied	:	A

Note:

For the frequency range from 18GHz to 25GHz, no emission was found.

Figure 8: Radiated Spurious Emission, 2405MHz


Limit and Margin
QP

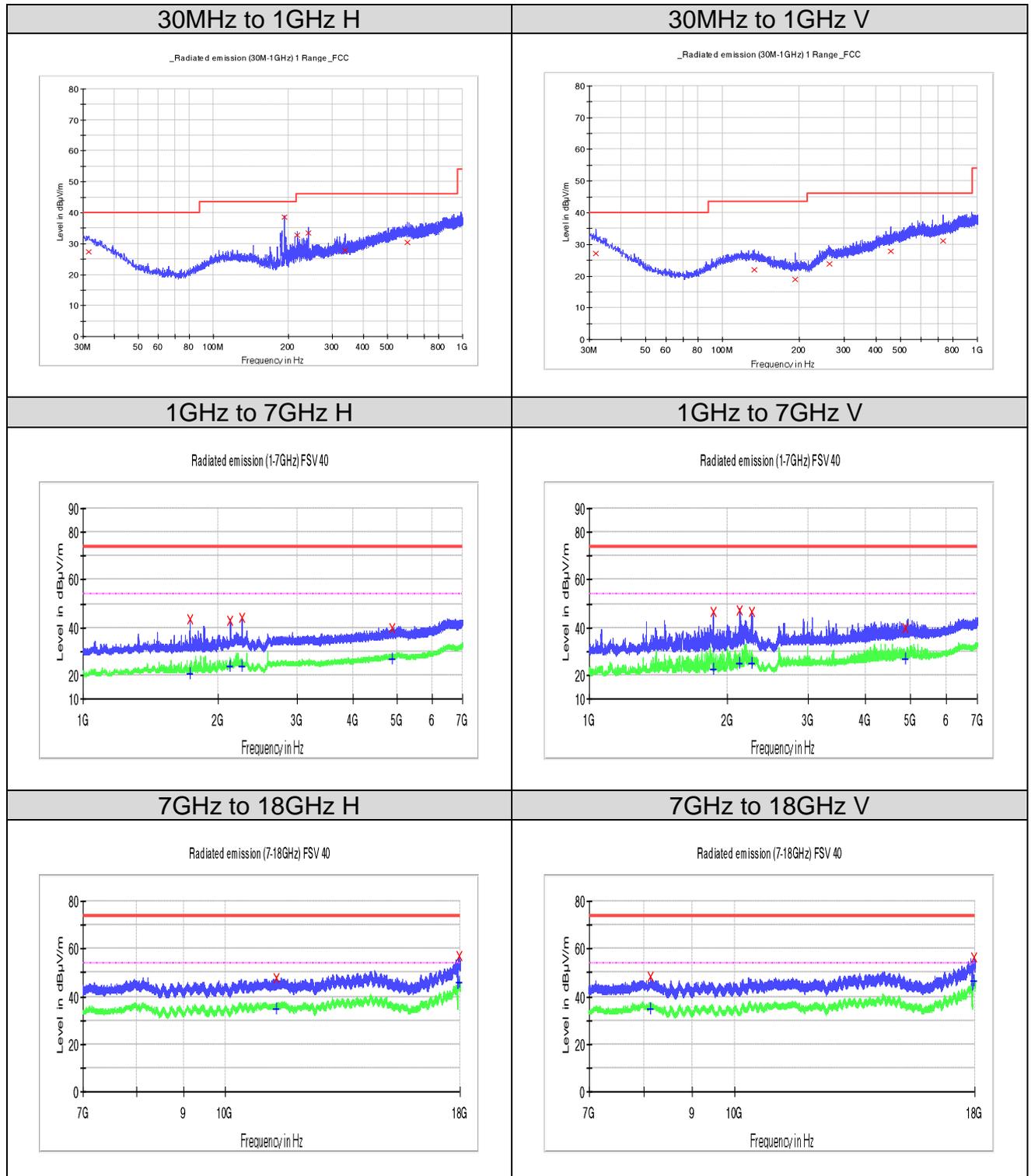
Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.061250	27.1	H	23.8	12.9	40.0
192.596250	38.5	H	15.9	5.0	43.5
216.846250	31.2	H	16.0	14.8	46.0
240.975000	32.1	H	18.5	13.9	46.0
265.952500	25.2	H	20.6	20.8	46.0
732.280000	31.1	H	27.5	14.9	46.0
31.455000	27.4	V	24.1	12.6	40.0
119.967500	21.9	V	18.9	21.6	43.5
192.596250	20.0	V	15.9	23.5	43.5
407.815000	26.7	V	23.5	19.3	46.0
533.308750	29.3	V	25.9	16.7	46.0
863.472500	33.3	V	28.8	12.7	46.0

PK

Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1861.300000	42.1	H	-18.4	31.9	74.0
2125.900000	42.7	H	-16.6	31.3	74.0
3325.900000	41.6	H	-15.0	32.4	74.0
4810.300000	39.6	H	-11.3	34.4	74.0
8154.656250	47.0	H	-4.4	27.0	74.0
17984.187500	56.2	H	12.1	17.8	74.0
1465.000000	44.4	V	-18.7	29.6	74.0
2125.300000	46.8	V	-16.6	27.2	74.0
2255.800000	44.7	V	-15.6	29.3	74.0
4810.600000	40.4	V	-11.3	33.6	74.0
7954.593750	47.8	V	-3.6	26.2	74.0
17971.125000	57.0	V	11.9	17.0	74.0

AV

Frequency (MHz)	Average (dBµV/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1861.300000	21.5	H	-18.4	32.6	54.0
2125.900000	23.1	H	-16.6	30.9	54.0
3325.900000	23.7	H	-15.0	30.3	54.0
4810.300000	27.0	H	-11.3	27.1	54.0
8154.656250	34.2	H	-4.4	19.8	54.0
17984.187500	45.5	H	12.1	8.6	54.0
1465.000000	21.5	V	-18.7	32.5	54.0
2125.300000	24.8	V	-16.6	29.2	54.0
2255.800000	25.0	V	-15.6	29.0	54.0
4810.600000	27.8	V	-11.3	26.2	54.0
7954.593750	35.1	V	-3.6	19.0	54.0
17971.125000	46.4	V	11.9	7.6	54.0

Figure 9: Radiated Spurious Emission, 2445MHz


Limit and Margin
QP

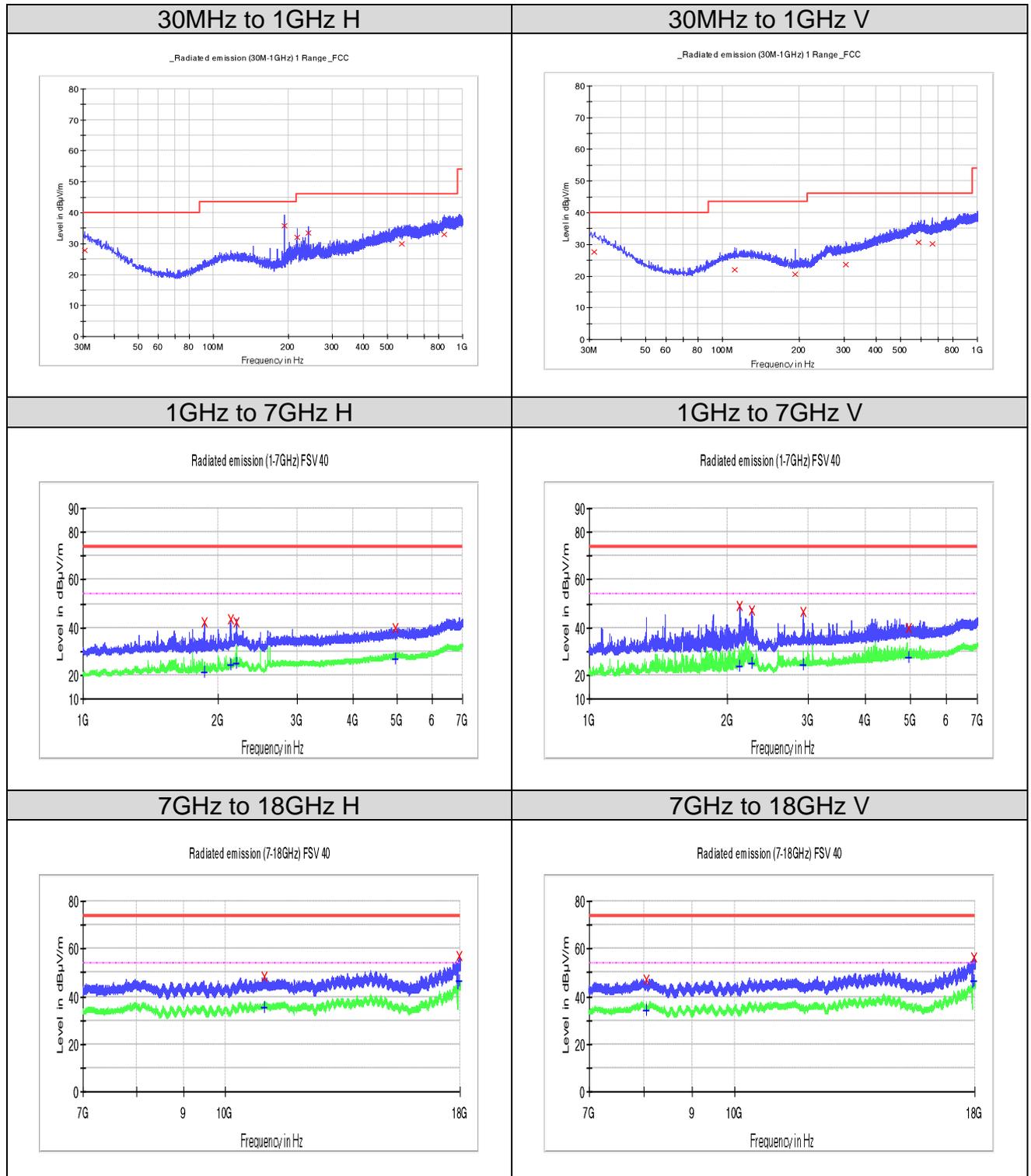
Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.697500	27.3	H	24.0	12.7	40.0
192.717500	38.6	H	15.9	4.9	43.5
216.725000	32.8	H	16.0	13.3	46.0
240.853750	33.5	H	18.5	12.5	46.0
337.247500	27.8	H	21.2	18.2	46.0
601.815000	30.4	H	27.0	15.6	46.0
31.940000	27.2	V	23.9	12.8	40.0
132.820000	22.0	V	18.5	21.5	43.5
192.475000	19.0	V	15.9	24.5	43.5
262.557500	23.8	V	20.9	22.2	46.0
457.648750	27.7	V	24.4	18.3	46.0
731.310000	31.1	V	27.5	14.9	46.0

PK

Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1730.800000	43.3	H	-18.9	30.7	74.0
2125.000000	42.9	H	-16.6	31.1	74.0
2258.800000	43.8	H	-15.6	30.2	74.0
4890.700000	39.7	H	-11.3	34.3	74.0
11367.343750	48.0	H	-2.4	26.0	74.0
17978.000000	57.1	H	12.0	16.9	74.0
1860.700000	46.5	V	-18.4	27.5	74.0
2125.000000	47.5	V	-16.6	26.6	74.0
2260.300000	46.5	V	-15.6	27.5	74.0
4890.400000	40.0	V	-11.3	34.0	74.0
8128.531250	48.2	V	-4.2	25.8	74.0
17974.562500	56.6	V	11.9	17.4	74.0

AV

Frequency (MHz)	Average (dBµV/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1730.800000	20.4	H	-18.9	33.6	54.0
2125.000000	23.5	H	-16.6	30.5	54.0
2258.800000	23.4	H	-15.6	30.6	54.0
4890.700000	26.8	H	-11.3	27.2	54.0
11367.343750	34.9	H	-2.4	19.1	54.0
17978.000000	46.1	H	12.0	7.9	54.0
1860.700000	22.6	V	-18.4	31.4	54.0
2125.000000	24.9	V	-16.6	29.1	54.0
2260.300000	25.0	V	-15.6	29.0	54.0
4890.400000	26.9	V	-11.3	27.1	54.0
8128.531250	34.6	V	-4.2	19.5	54.0
17974.562500	46.2	V	11.9	7.8	54.0

Figure 10: Radiated Spurious Emission, 2480MHz


Limit and Margin
QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.363750	27.9	H	24.6	12.1	40.0
192.475000	35.9	H	15.9	7.6	43.5
216.846250	31.9	H	16.0	14.1	46.0
240.853750	33.4	H	18.5	12.6	46.0
570.168750	30.0	H	26.4	16.0	46.0
843.102500	33.1	H	28.9	12.9	46.0
31.333750	27.5	V	24.2	12.5	40.0
111.722500	22.1	V	18.7	21.4	43.5
192.596250	20.5	V	15.9	23.0	43.5
304.510000	23.7	V	20.3	22.3	46.0
589.205000	30.6	V	26.7	15.4	46.0
663.895000	30.1	V	26.3	15.9	46.0

PK

Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1864.000000	42.4	H	-18.4	31.6	74.0
2129.500000	43.4	H	-16.6	30.6	74.0
2199.400000	42.5	H	-15.8	31.5	74.0
4960.900000	39.7	H	-11.1	34.3	74.0
11015.687500	48.5	H	-2.2	25.5	74.0
17968.718750	57.1	H	11.8	16.9	74.0
2125.600000	48.9	V	-16.6	25.1	74.0
2263.300000	47.5	V	-15.7	26.5	74.0
2926.600000	46.5	V	-15.1	27.5	74.0
4959.400000	40.0	V	-11.2	34.1	74.0
8046.031250	47.1	V	-3.7	26.9	74.0
17970.437500	56.3	V	11.9	17.7	74.0

AV

Frequency (MHz)	Average (dBµV/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1864.000000	20.9	H	-18.4	33.1	54.0
2129.500000	24.0	H	-16.6	30.0	54.0
2199.400000	24.9	H	-15.8	29.1	54.0
4960.900000	26.6	H	-11.1	27.4	54.0
11015.687500	35.1	H	-2.2	18.9	54.0
17968.718750	46.4	H	11.8	7.6	54.0
2125.600000	23.6	V	-16.6	30.4	54.0
2263.300000	24.9	V	-15.7	29.1	54.0
2926.600000	24.4	V	-15.1	29.6	54.0
4959.400000	27.3	V	-11.2	26.7	54.0
8046.031250	34.4	V	-3.7	19.6	54.0
17970.437500	46.3	V	11.9	7.7	54.0

6. List of Tables

Table 1: List of Test and Measurement Equipment	7
Table 2: Measurement Uncertainty	8
Table 3: Technical Specification of EUT	9
Table 4: Operation Channel List	9
Table 5: Power parameter value.....	11
Table 6: Auxiliary Equipment.....	11
Table 7: Antenna Requirement.....	12
Table 8: Peak Output Power	21

7. List of Figures

Figure 1: Reference level	26
Figure 2: Conducted Spurious Emission.....	27
Figure 3: Conducted Band Edge	27
Figure 4: Radiated Band-Edge, 2405MHz, H.....	30
Figure 5: Radiated Band-Edge, 2405MHz, V	30
Figure 6: Radiated Band-Edge, 2480MHz, H.....	31
Figure 7: Radiated Band-Edge, 2480MHz, V	31
Figure 8: Radiated Spurious Emission, 2405MHz	33
Figure 9: Radiated Spurious Emission, 2445MHz	35
Figure 10: Radiated Spurious Emission, 2480MHz	37