

Prüfbericht-Nr.: Test report no.:	CN22VKFE 001	Auftrags-Nr.: Order no.:	244461991	Seite 1 von 39 Page 1 of 39
Kunden-Referenz-Nr.: Client reference no.:	1288983	Auftragsdatum: Order date:	2022-11-14	
Auftraggeber: Client:	IKEA of Sweden AB Box 702, Almhult, Sweden			
Prüfgegenstand: Test item:	VALLHORN Motion Sensor			
Bezeichnung / Typ-Nr.: Identification / Type no.:	E2134 FCC ID: FHO-E2134 IC: 10912A-E2134			
Auftrags-Inhalt: Order content:	Complete test			
Prüfgrundlage: Test specification:	FCC CFR47 Part 15, Subpart C Section 15.247 RSS-Gen Issue 5, Amendment 2, February 2021 RSS-247 Issue 2, February 2017 ANSI C63.10: 2013			
Wareneingangsdatum: Date of sample receipt:	2022-11-13	Refer to photo document		
Prüfmuster-Nr.: Test sample no.:	A003370977-001			
Prüfzeitraum: Testing period:	Refer to test report			
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:	X <u>Hongfei Wu</u> Signed by: Hongfei Wu		genehmigt von: authorized by:	X <u>Elliot Zhang</u> Signed by: Elliot Zhang
Datum: Date:	2023-05-10		Ausstellungsdatum: Issue date:	2023-05-10
Stellung / Position:	PE		Stellung / Position:	Reviewer
Sonstiges / Other:	HVIN: E2134			
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. This test report only relates to the a. m. 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.				

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 6dB & 99% BANDWIDTH

RESULT: Pass

5.1.3 PEAK 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

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1. General Remarks

1.1 Complementary Materials

Null.

2. Test Sites

2.1 Test Facilities

TÜV Rheinland (Shanghai) Co., Ltd.

Shanghai TÜV Rheinland Building No. 177, 178 Lane 777, West Guangzhong Rd, Jing'an District, Shanghai, 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 958801.

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 2932F.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equip.	Description	Model	Manufacturer	Last Date DD.MM.YYYY	Due Date DD.MM.YYYY
G1811378	3m modified semi-anechoic chamber	SAC3	Frankonia	10.06.2021	10.06.2024
9042162	EMI test receiver	ESR7	Rohde&Schwarz	02.03.2022	02.03.2023
G1811425	Bilog antenna	CBL 6112D	Teseq	10.03.2020	10.03.2023
G1811417	Log periodic antenna	HL050	Rohde&Schwarz	10.03.2020	10.03.2023
G1822695	Spectrum analyser	FSP30	Rohde&Schwarz	16.08.2022	16.08.2024
G1825371	Preamplifier	EMC051845SE	Taiwan EMCI	14.05.2021	14.05.2023
G1825372	Preamplifier	EMC184045SE	Taiwan EMCI	14.05.2021	14.05.2023
G1831065	Broadband horn antenna	BBHA 9170	Schwarzbeck	10.07.2018	10.07.2023
G1822702	Spectrum analyser	FSV40	Rohde&Schwarz	04.11.2021	04.11.2023
EMC-C-304	OSP	OSP-B157W8	Rohde&Schwarz	14.10.2022	14.10.2023
9023229	EMI test receiver	ESR3	Rohde&Schwarz	11.08.2022	11.08.2023
G1811403	Artificial mains network	ENV216	Rohde&Schwarz	19.10.2022	19.10.2023

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
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 motion sensor which supports Zigbee.

For details refer to the User Manual and Circuit Diagram.

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Description of EUT	
Product Name:	VALLHORN Motion Sensor
Model No.:	E2134
Operating Voltage:	DC 3V (AAA battery*2)
Technical Specification of Zigbee	
Frequency Range:	2405 ~ 2480 MHz
Modulation Type:	OQPSK
Antenna Type:	PCB Antenna
Antenna Gain:	1.61 dBi

3.3 Independent Operation Modes

Table 4: Independent Operation Modes

Test Mode	Channel Number	Channel Frequency [MHz]
TM1	11	2405
TM2	19	2445
TM3	26	2480

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Circuit Diagram
- Instruction Manual
- Rating Label

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 used: UartAssist.exe

Table 5: Power parameter value

Channel Frequency [MHz]	Power Parameter Value
2405	3
2445	3
2480	3

4.3 Special Accessories and Auxiliary Equipment

Null.

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 PCB antenna, the directional gain of antenna is 1.61 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 6: 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	

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:	1.61 dBi

Verdict: PASS

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

Date of testing	:	2022-11-28
Ambient temperature	:	21.2°C
Relative humidity	:	45.2%
Atmospheric pressure	:	101kPa
Test requirement	:	FCC Part 15.247(a)(2) RSS-247 Issue 2, February 2017, Clause 5.2(a)
Test procedure	:	ANSI C63.10: 2013
Test voltage	:	DC 3V
Test modes applied	:	TM1 to TM3

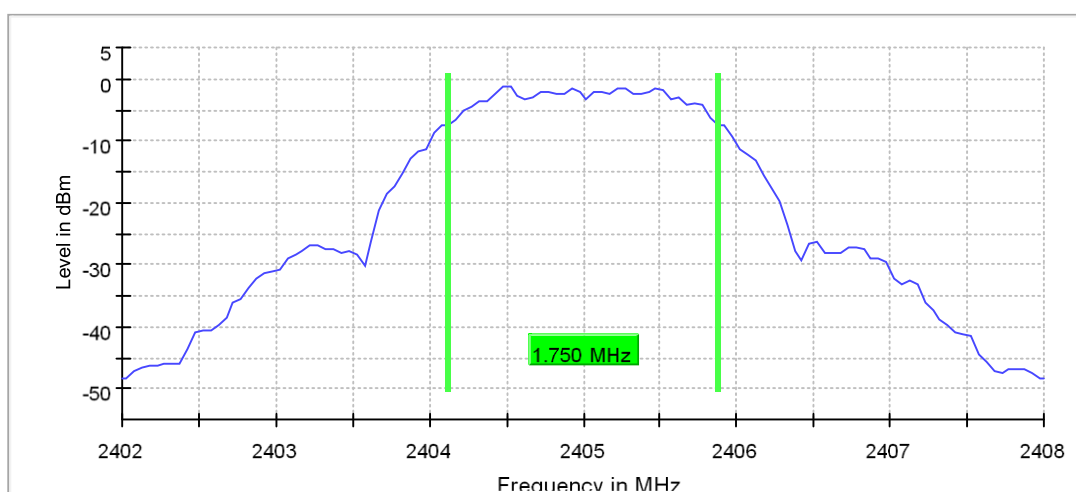
6dB Bandwidth, TM1, 2405MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2405.000000	1.750000	0.500000	---	2404.125000	2405.875000

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

DUT Frequency (MHz)	Max Level (dBm)	Result
2405.000000	-1.2	PASS

6 dB Bandwidth


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40200 GHz	2.40200 GHz
Stop Frequency	2.40800 GHz	2.40800 GHz
Span	6.000 MHz	6.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	120	~ 120
Sweeptime	18.984 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 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	14 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.46 dB	0.50 dB

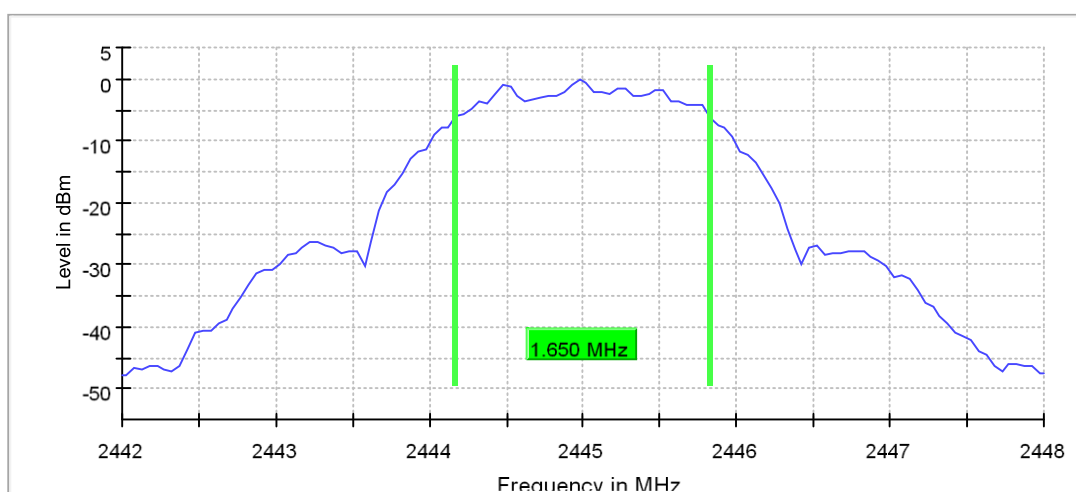
6dB Bandwidth, TM2, 2445MHz

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	0.1	PASS

6 dB Bandwidth


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.44200 GHz	2.44200 GHz
Stop Frequency	2.44800 GHz	2.44800 GHz
Span	6.000 MHz	6.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	120	~ 120
Sweeptime	18.984 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 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

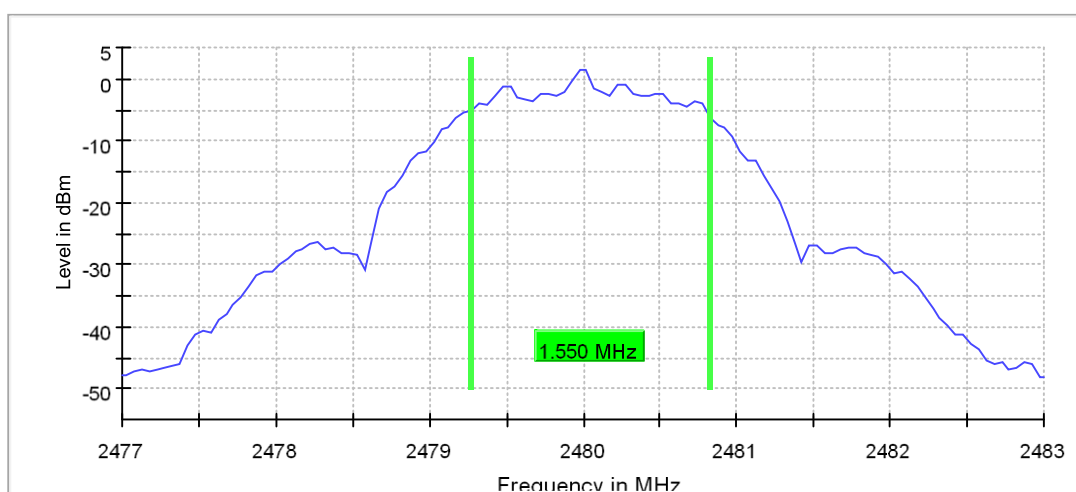
6dB Bandwidth, TM3, 2480MHz

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	1.5	PASS

6 dB Bandwidth


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47700 GHz	2.47700 GHz
Stop Frequency	2.48300 GHz	2.48300 GHz
Span	6.000 MHz	6.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	120	~ 120
Sweeptime	18.984 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 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	0.31 dB	0.50 dB

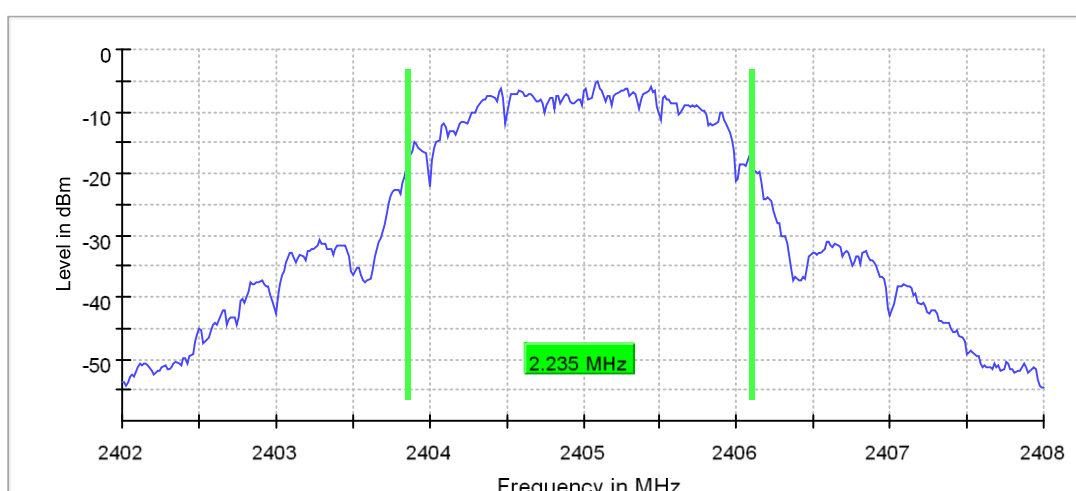
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99% Occupied Channel Bandwidth, TM1, 2405MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2405.000000	2.235000	---	---	2403.867500	2406.102500

(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	2.40200 GHz	2.40200 GHz
Stop Frequency	2.40800 GHz	2.40800 GHz
Span	6.000 MHz	6.000 MHz
RBW	30.000 kHz	>= 30.000 kHz
VBW	100.000 kHz	>= 90.000 kHz
SweepPoints	400	~ 400
Sweeptime	63.216 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 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	12 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.17 dB	0.30 dB

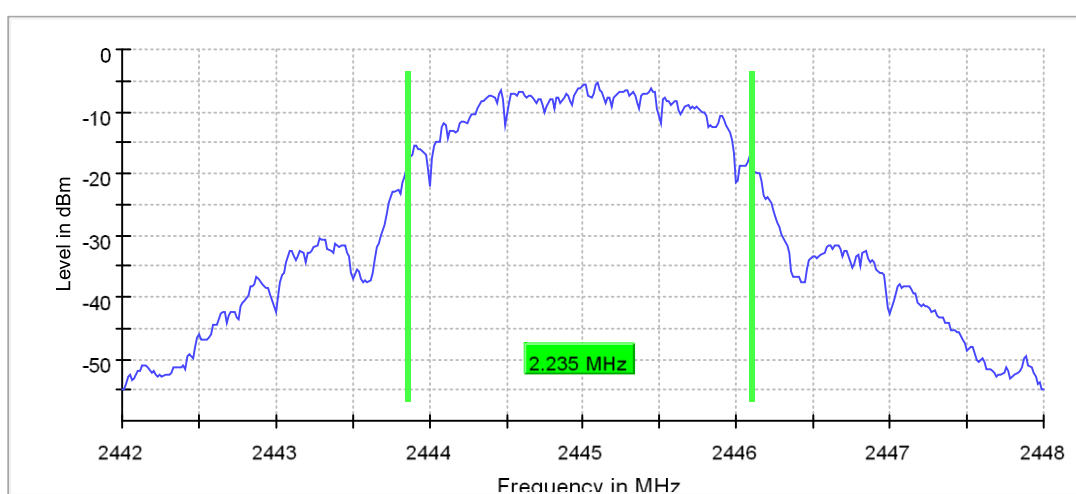
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99% Occupied Channel Bandwidth, TM2, 2445MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2445.000000	2.235000	---	---	2443.867500	2446.102500

(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	2.44200 GHz	2.44200 GHz
Stop Frequency	2.44800 GHz	2.44800 GHz
Span	6.000 MHz	6.000 MHz
RBW	30.000 kHz	>= 30.000 kHz
VBW	100.000 kHz	>= 90.000 kHz
SweepPoints	400	~ 400
Sweeptime	63.216 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 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	14 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.20 dB	0.30 dB

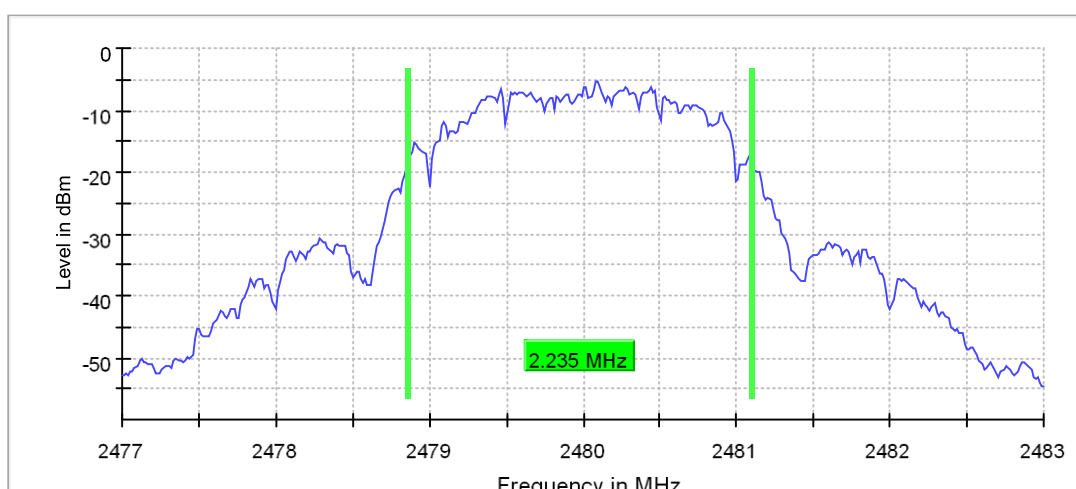
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99% Occupied Channel Bandwidth, TM3, 2480MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	2.235000	---	---	2478.867500	2481.102500

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

DUT Frequency (MHz)	Result
2480.000000	PASS

99 % Bandwidth


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47700 GHz	2.47700 GHz
Stop Frequency	2.48300 GHz	2.48300 GHz
Span	6.000 MHz	6.000 MHz
RBW	30.000 kHz	>= 30.000 kHz
VBW	100.000 kHz	>= 90.000 kHz
SweepPoints	400	~ 400
Sweptime	63.216 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 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	19 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.17 dB	0.30 dB

5.1.3 Peak Output Power

RESULT:

Pass

Date of testing	: 2022-11-28
Ambient temperature	: 21.2°C
Relative humidity	: 45.2%
Atmospheric pressure	: 101kPa
Test requirement	: FCC Part 15.247(b)(3) RSS-247 Issue 2, February 2017, Clause 5.4(d)
Test procedure	: ANSI C63.10: 2013
Test voltage	: DC 3V
Test modes applied	: TM1 to TM3

Table 7: Peak Output Power

Mode	Antenna Gain [dBi]	CH.	Freq. [MHz]	Maximum Peak Conducted Output Power [dBm]	Peak Conducted Output Power Limit [dBm]	Maximum EIRP [dBm]	EIRP Limit [dBm]
TM1	1.61	11	2405	3.1	30	4.71	36
TM2		19	2445	2.9	30	4.51	36
TM3		26	2480	2.8	30	4.41	36

Note:

EIRP=Peak Conducted Output Power + Antenna Gain

The cable loss=1dB was provided by the client, and was factored in the result Peak Conducted Output Power

5.1.4 Power Spectral Density

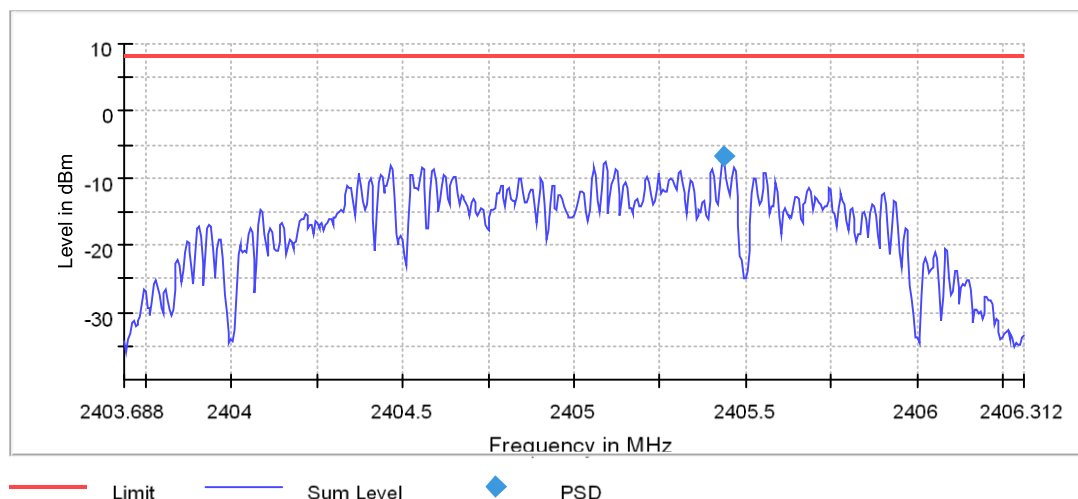
RESULT:**Pass**

Date of testing	:	2022-11-28
Ambient temperature	:	21.2°C
Relative humidity	:	45.2%
Atmospheric pressure	:	101kPa
Test requirement	:	FCC Part 15.247(e) RSS-247 Issue 2, February 2017, Clause 5.2(b)
Test procedure	:	ANSI C63.10: 2013
Test voltage	:	DC 3.3V
Test modes applied	:	TM1 to TM3

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Power Spectral Density, TM1, 2405MHz

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2405.000000	2405.435000	-6.810	8.0	PASS

Peak Power Spectral Density

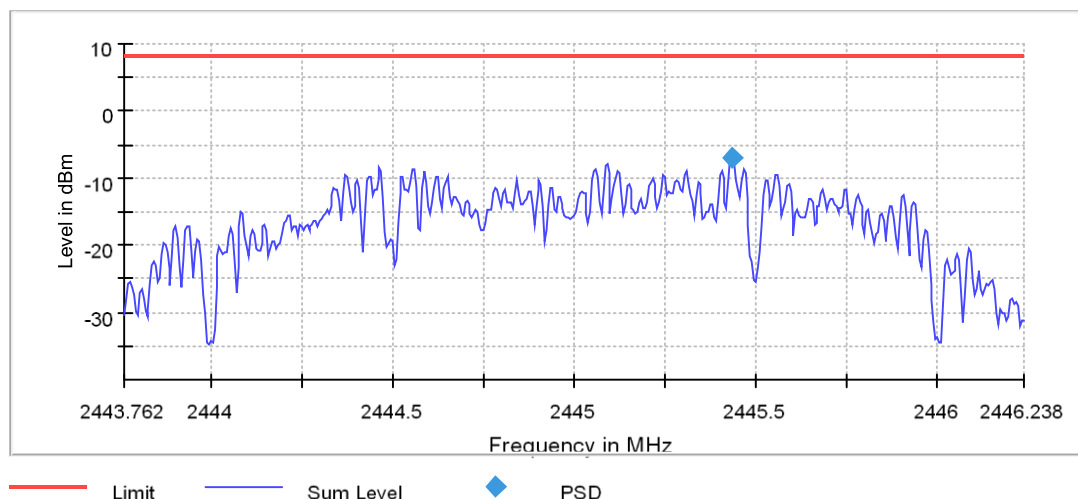

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40369 GHz	2.40369 GHz
Stop Frequency	2.40631 GHz	2.40631 GHz
Span	2.625 MHz	2.625 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	525	~ 525
Sweeptime	2.630 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 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	7 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.25 dB	0.50 dB

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Power Spectral Density, TM2, 2445MHz

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2445.000000	2445.435000	-7.053	8.0	PASS

Peak Power Spectral Density

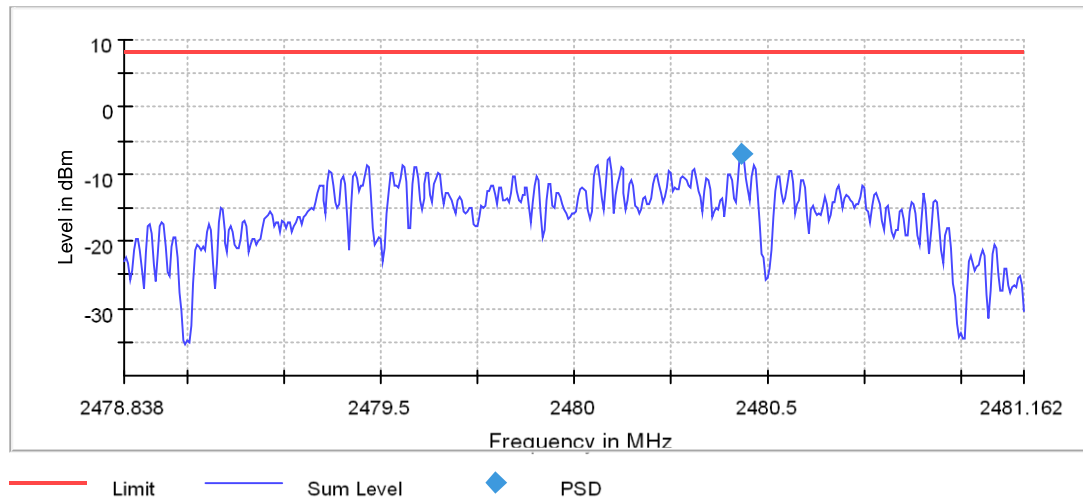

Measurement

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	0.000 dBm	0.000 dBm
Attenuation	20.000 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	6 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.25 dB	0.50 dB

Power Spectral Density, TM3, 2480MHz

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2480.000000	2480.435000	-7.152	8.0	PASS

Peak Power Spectral Density


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	0.000 dBm	0.000 dBm
Attenuation	20.000 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	5 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.20 dB	0.50 dB

5.1.5 Conducted Band Edge and out-of Band Emissions

RESULT:

Pass

Date of testing	: 2023-04-27
Ambient temperature	: 21.8°C
Relative humidity	: 52.0%
Atmospheric pressure	: 101kPa
Test requirement	: FCC Part 15.247(d) RSS-247 Issue 2, February 2017, Clause 5.5
Test procedure	: ANSI C63.10: 2013
Test voltage	: DC 3.3V
Test modes applied	: TM1 to TM3

Figure 1: Reference level

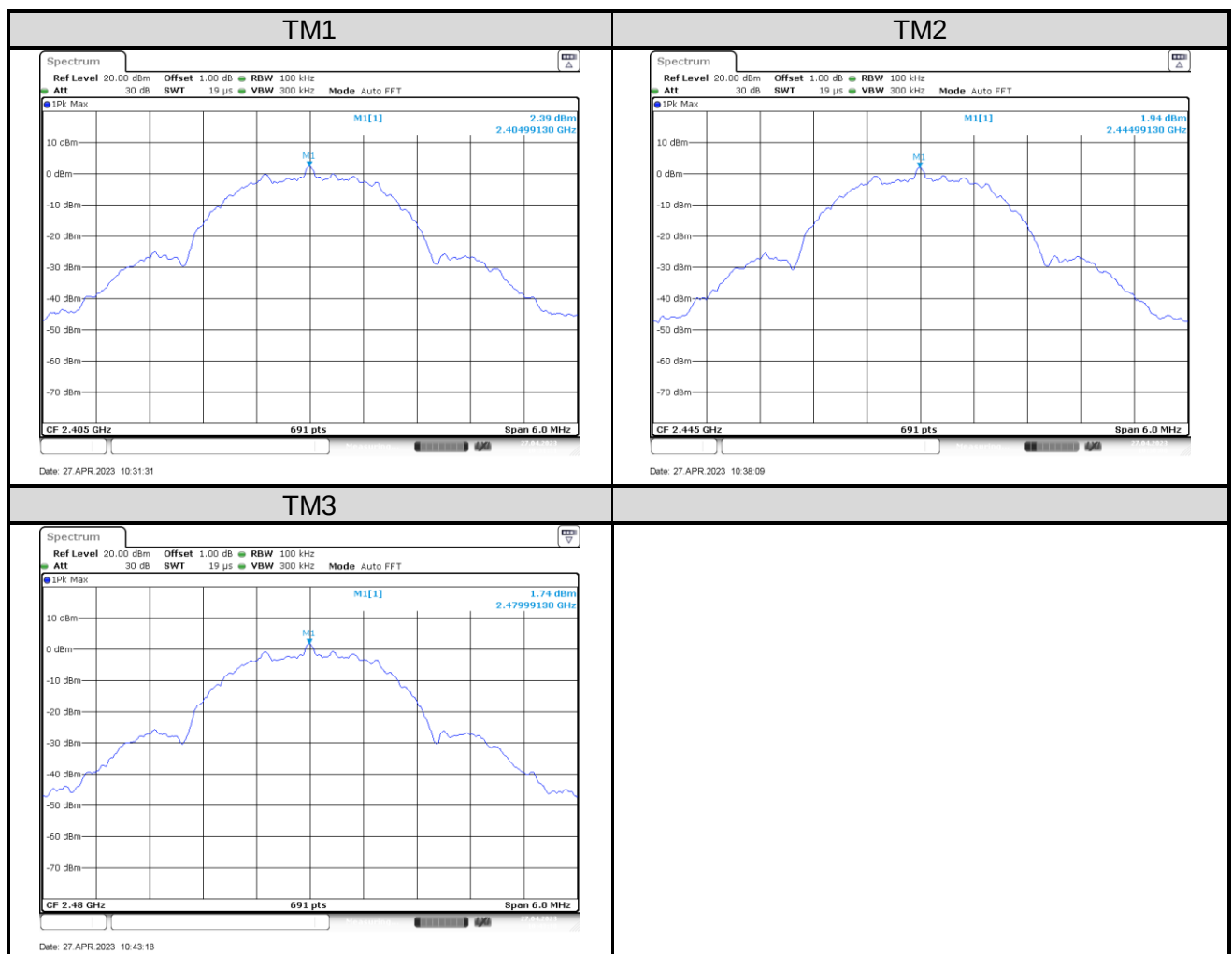
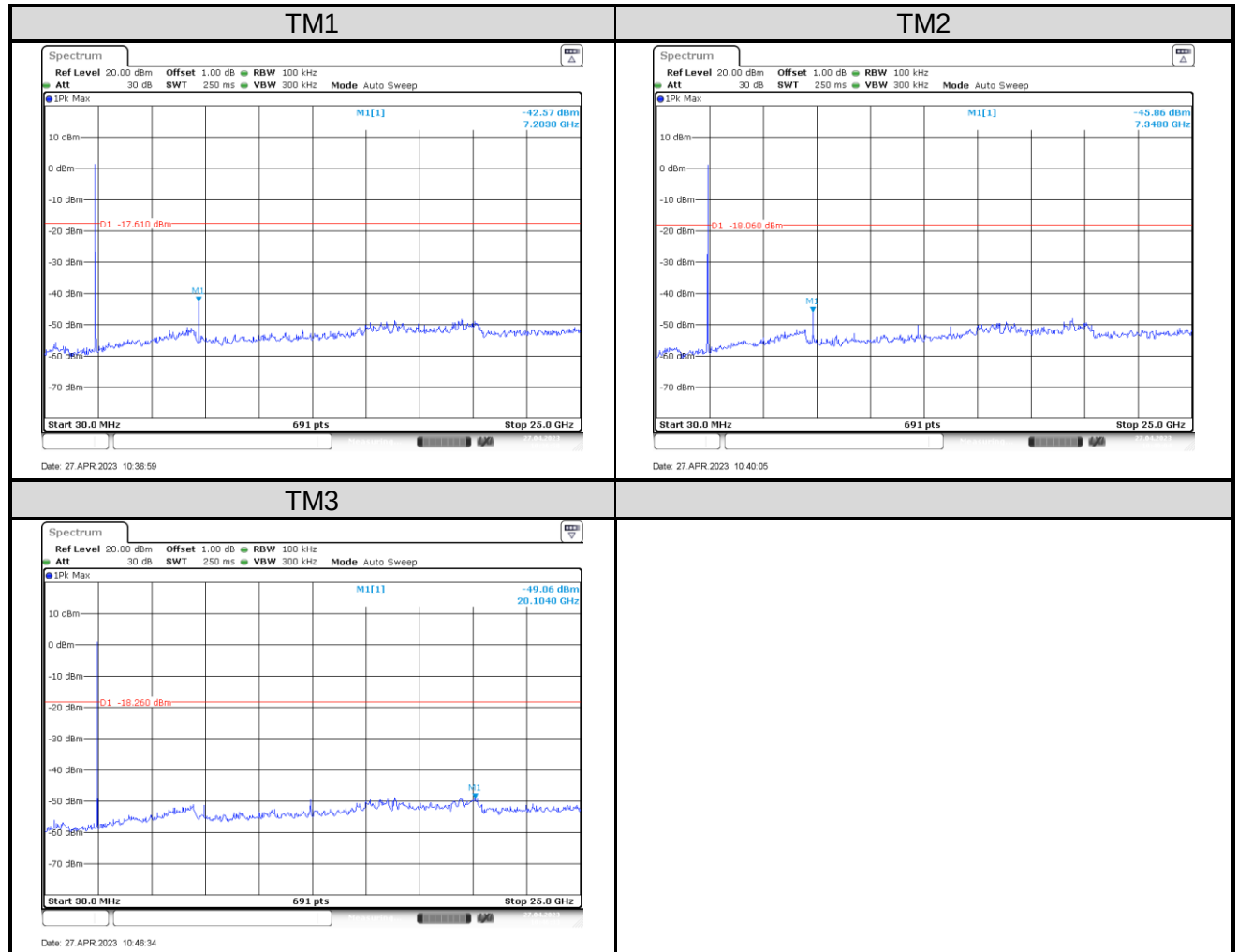
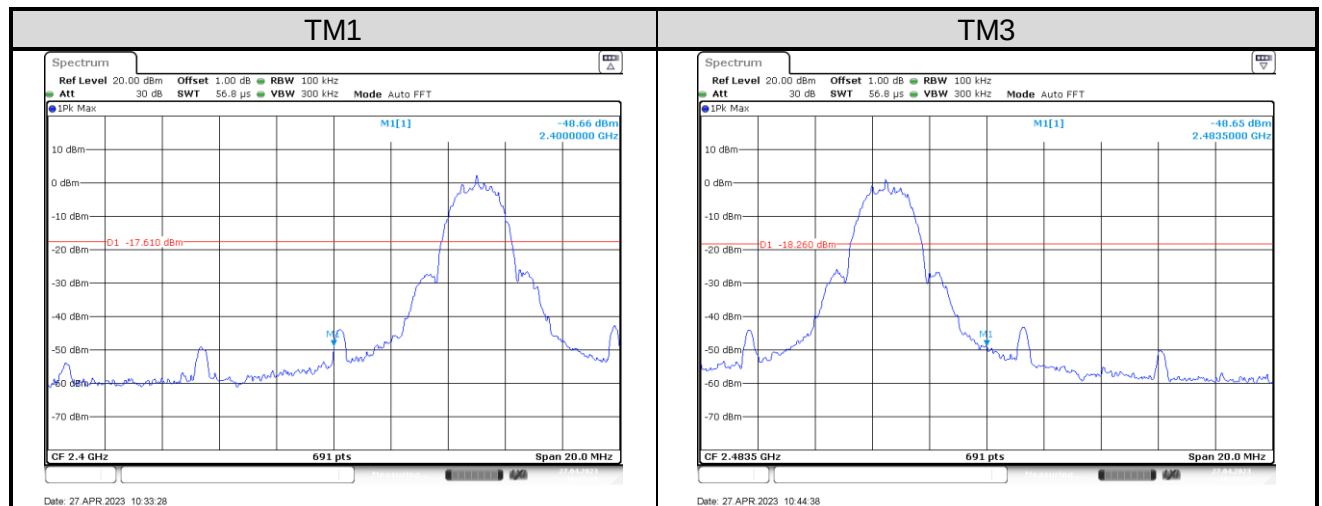


Figure 2: Conducted Spurious Emission

Figure 3: Conducted Band Edge


5.2 Emission in the Frequency Range up to 30MHz

5.2.1 Conducted Emission

RESULT:**N/A**

Test requirement : FCC Part 15.207 (a)
RSS-Gen Issue 5, Amendment 2, February 2021, Clause
8.8

Test procedure : ANSI C63.10: 2013

Note: This product is powered by battery, so this test is not applicable

5.3 Emission in the Frequency Range above 30MHz

5.3.1 Radiated Band-Edge

RESULT:**Pass**

Date of testing	:	2022-11-30
Ambient temperature	:	20.3°C
Relative humidity	:	47.6%
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 2, February 2017, Clause 5.5
Test procedure	:	ANSI C63.10: 2013
Test voltage	:	DC 3V
Test modes applied	:	TM1, TM3

Figure 4: Radiated Band-Edge, TM1, H

2310 ~ 2410 BE 1-18GHz_HL050_FSV40_Pre

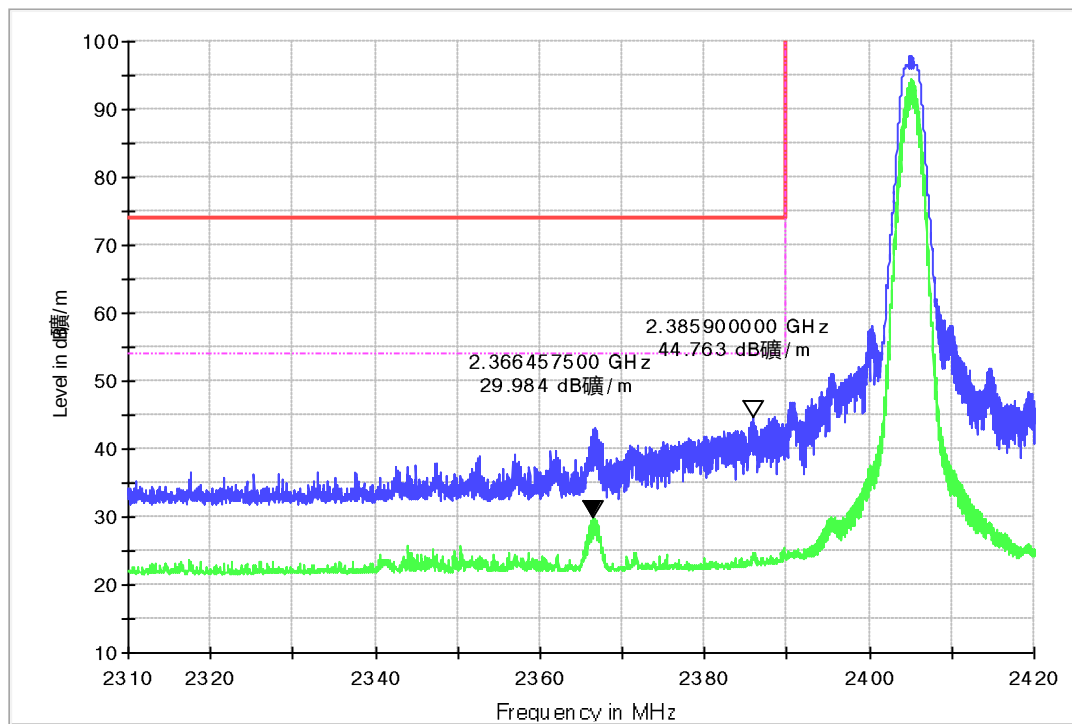


Figure 5: Radiated Band-Edge, TM1, V

2310 ~ 2410 BE 1-18GHz_HL050_FSV40_Pre

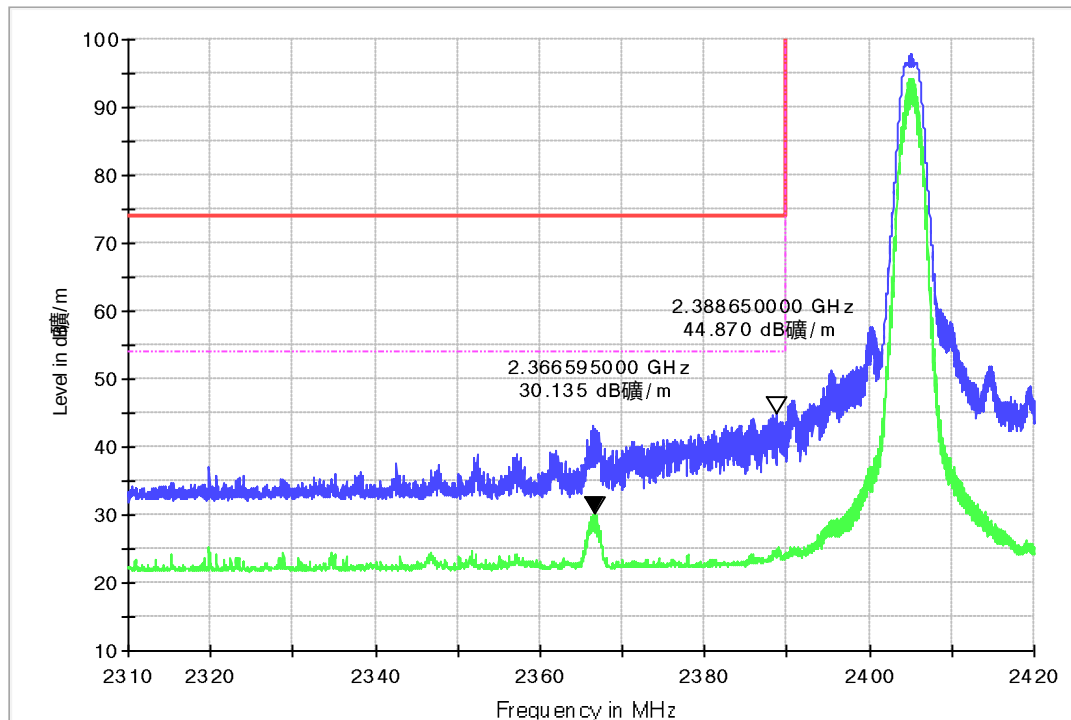


Figure 6: Radiated Band-Edge, TM3, H

2470 ~ 2500 BE_1-18GHz_HL050_FSV40_Pre

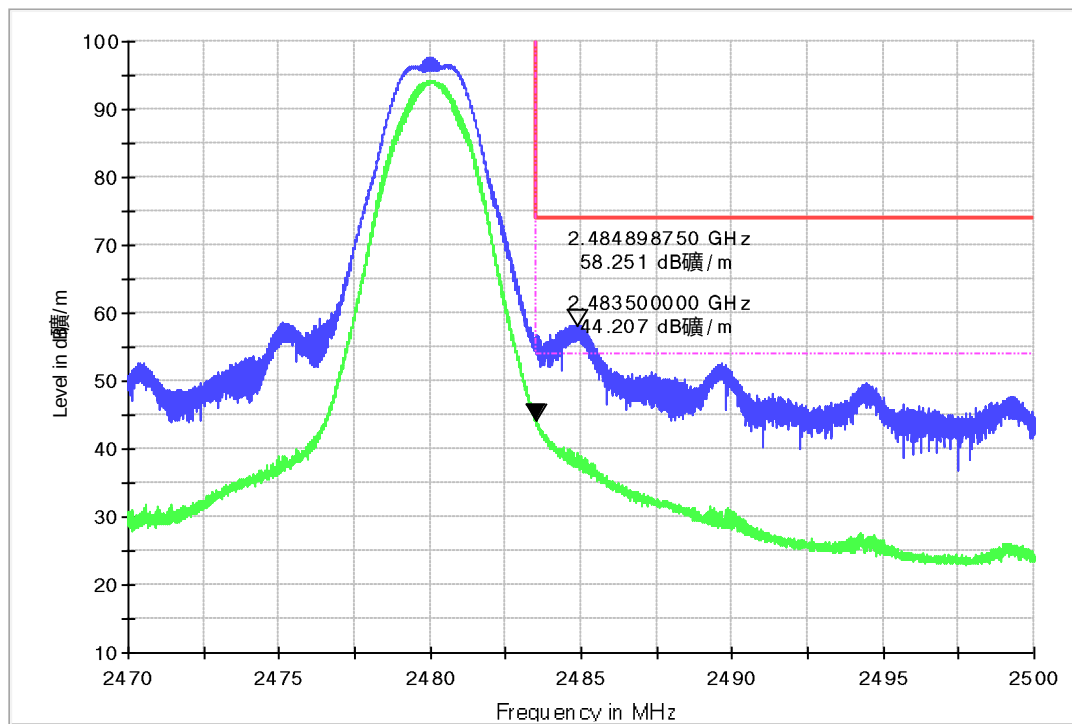
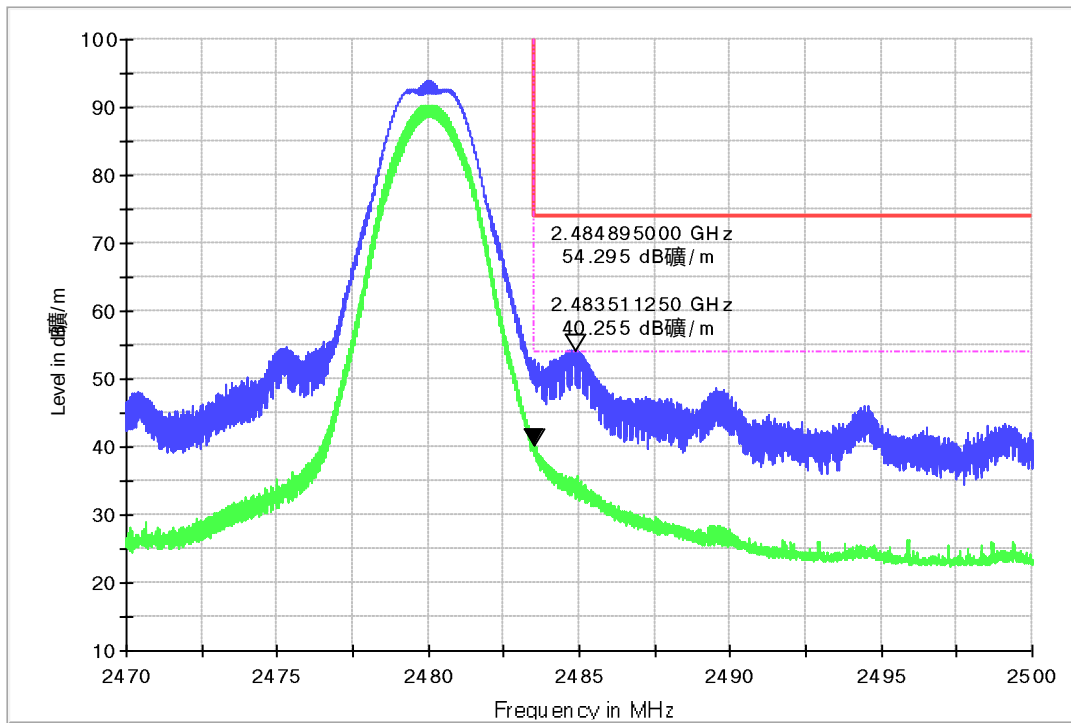


Figure 7: Radiated Band-Edge, TM3, V

2470 ~ 2500 BE_1-18GHz_HL050_FSV40_Pre

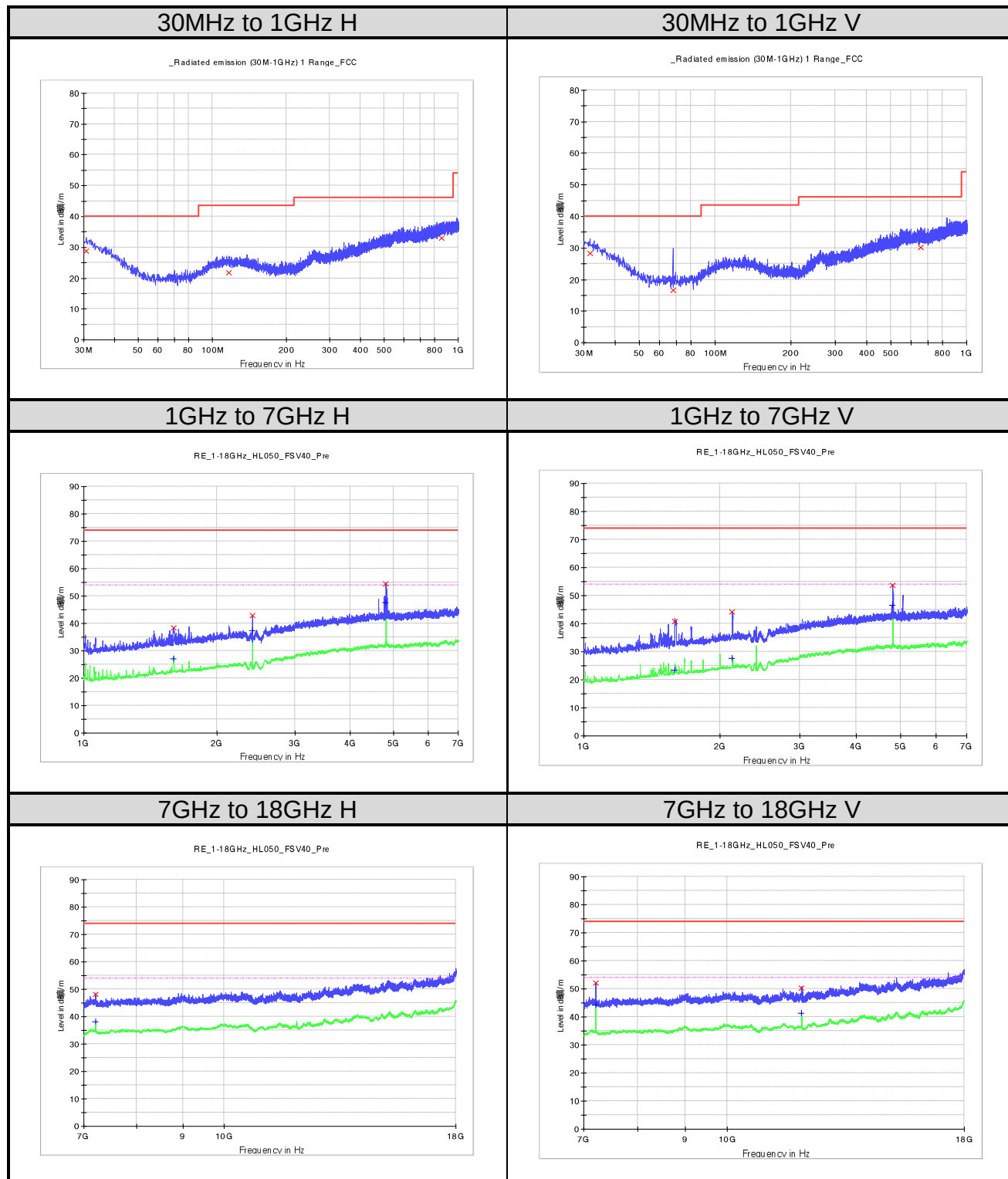


5.3.2 Radiated Spurious Emission**RESULT:****Pass**

Date of testing	:	2022-11-30~2022-12-12
Ambient temperature	:	20.3~21.0°C
Relative humidity	:	47.6~49.9%
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 2, February 2017, Clause 5.5
Test procedure	:	ANSI C63.10: 2013
Test voltage	:	DC 3V
Test modes applied	:	TM1 to TM3

Note:

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

Figure 8: Radiated Spurious Emission, TM1


Limit and Margin
QP

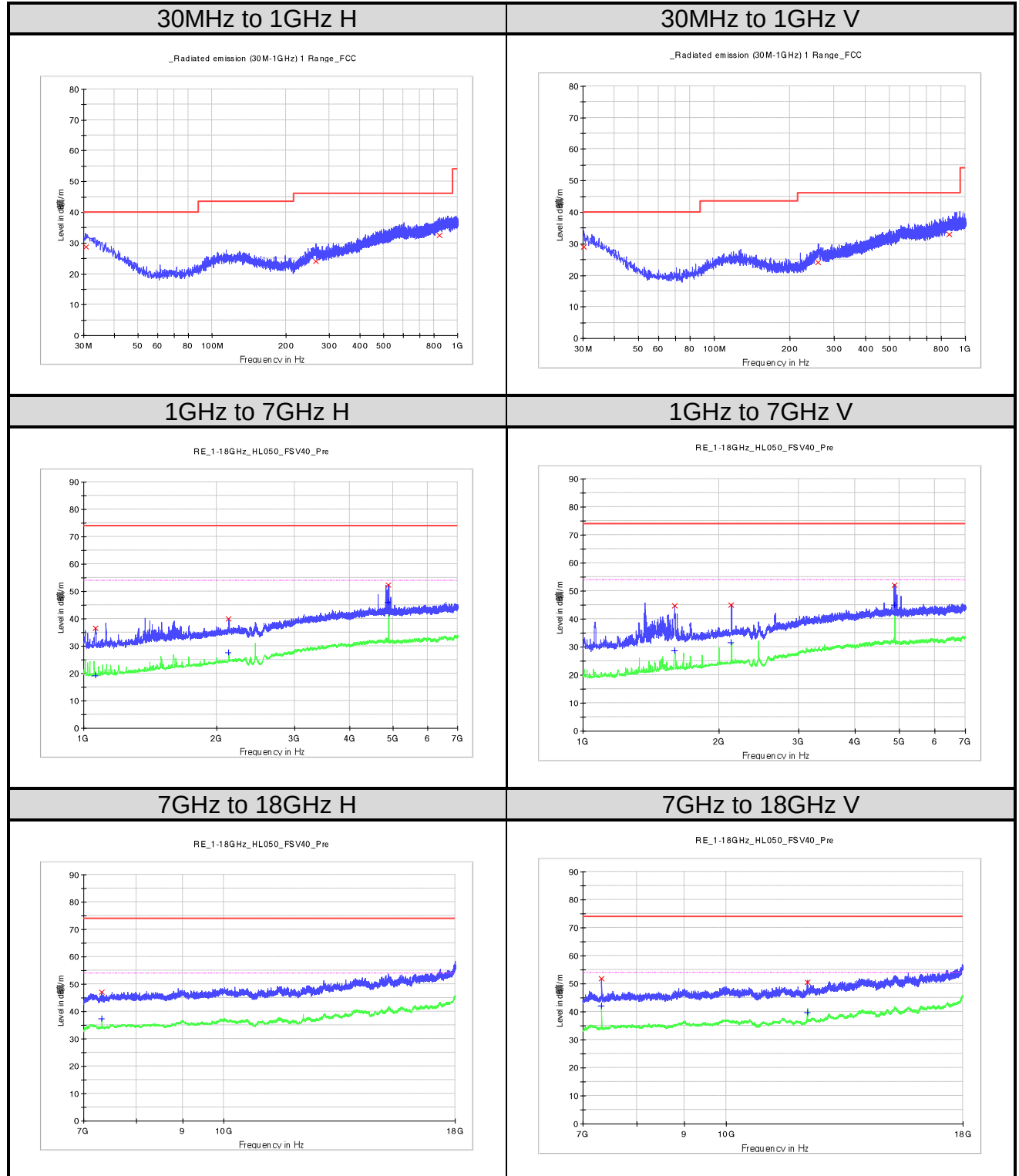
Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.727500	28.7	H	25.0	11.3	40.0
116.815000	21.8	H	18.5	21.7	43.5
857.773750	32.9	H	28.0	13.1	46.0
31.818750	28.3	V	24.6	11.7	40.0
67.830000	16.7	V	13.0	23.3	40.0
656.135000	30.1	V	26.2	15.9	46.0

PK

Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1597.000000	38.4	H	-18.3	35.6	74.0
2404.750000	42.9	H	-14.4	31.1	74.0
4810.000000	54.4	H	-6.5	19.6	74.0
7215.875000	48.2	H	-3.9	25.8	74.0
1590.250000	40.9	V	-18.4	33.1	74.0
2124.250000	44.3	V	-15.8	29.7	74.0
4811.500000	53.6	V	-6.5	20.4	74.0
7215.875000	52.0	V	-3.9	22.0	74.0
12027.000000	50.3	V	1.0	23.7	74.0

AV

Frequency (MHz)	Average (dBµV/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1597.000000	27.1	H	-18.3	26.9	54.0
2404.750000	37.5	H	-14.4	16.5	54.0
4810.000000	47.6	H	-6.5	6.4	54.0
7215.875000	38.2	H	-3.9	15.8	54.0
1590.250000	23.4	V	-18.4	30.6	54.0
2124.250000	27.6	V	-15.8	26.4	54.0
4811.500000	46.5	V	-6.5	7.5	54.0
7215.875000	44.2	V	-3.9	9.8	54.0
12027.000000	41.3	V	1.0	12.7	54.0

Figure 9: Radiated Spurious Emission, TM2


Limit and Margin
QP

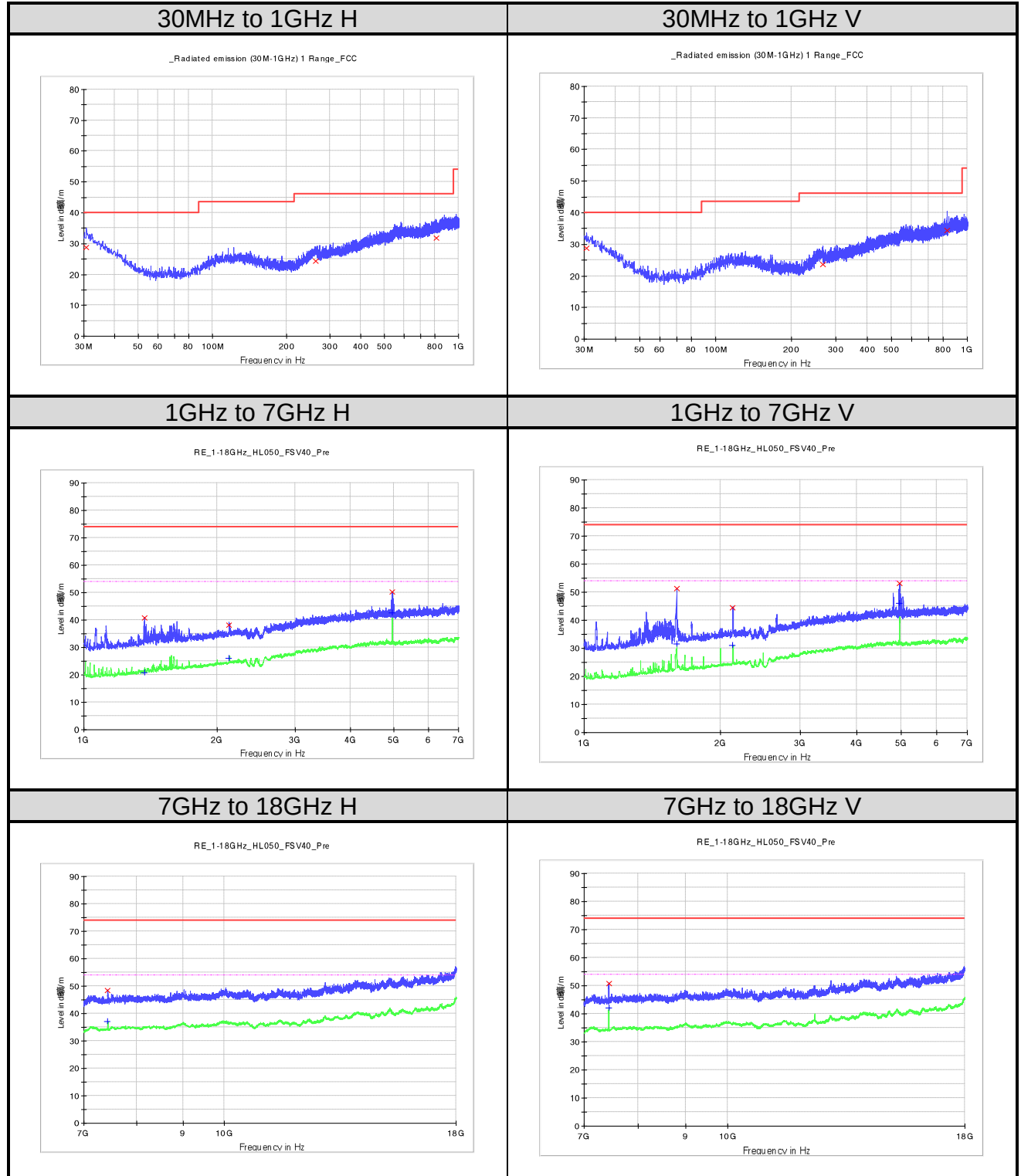
Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.727500	28.7	H	25.0	11.3	40.0
265.225000	24.1	H	20.7	21.9	46.0
844.193750	32.6	H	27.7	13.4	46.0
30.242500	29.0	H	25.3	11.0	40.0
258.677500	24.0	H	20.5	22.0	46.0
859.835000	33.0	H	28.0	13.0	46.0

PK

Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1061.500000	36.6	H	-22.1	37.4	74.0
2125.000000	40.0	H	-15.8	34.0	74.0
4891.000000	52.3	H	-6.6	21.7	74.0
7332.750000	47.1	H	-3.9	26.9	74.0
1597.000000	44.7	V	-18.3	29.3	74.0
2125.000000	45.0	V	-15.8	29.0	74.0
4891.000000	52.2	V	-6.6	21.8	74.0
7332.750000	51.8	V	-180.0	22.2	74.0
12227.750000	50.5	V	-180.0	23.5	74.0

AV

Frequency (MHz)	Average (dBµV/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1061.500000	19.3	H	-22.1	34.7	54.0
2125.000000	27.6	H	-15.8	26.4	54.0
4891.000000	46.1	H	-6.6	7.9	54.0
7332.750000	37.4	H	-3.9	16.6	54.0
1597.000000	28.8	V	-18.3	25.2	54.0
2125.000000	31.5	V	-15.8	22.5	54.0
4891.000000	45.1	V	-6.6	8.9	54.0
7332.750000	42.2	V	-3.9	11.8	54.0
12227.750000	39.7	V	1.7	14.3	54.0

Figure 10: Radiated Spurious Emission, TM3


Limit and Margin
QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.727500	28.7	H	25.0	11.3	40.0
263.406250	24.4	H	20.7	21.6	46.0
813.275000	31.9	H	27.5	14.1	46.0
30.727500	28.7	V	25.0	11.3	40.0
267.650000	23.5	V	20.2	22.5	46.0
833.038750	34.4	V	27.5	11.6	46.0

PK

Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1368.250000	40.9	H	-19.9	33.1	74.0
2125.750000	38.2	H	-15.8	35.8	74.0
4961.500000	50.2	H	-6.6	23.8	74.0
7440.000000	48.5	H	-3.1	25.5	74.0
1603.750000	51.4	V	-18.3	22.6	74.0
2122.750000	44.4	V	-15.8	29.6	74.0
4959.250000	53.2	V	-6.6	20.8	74.0
7441.375000	50.9	V	-3.1	23.1	74.0

AV

Frequency (MHz)	Average (dBµV/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1368.250000	20.8	H	-19.9	33.2	54.0
2125.750000	26.0	H	-15.8	28.0	54.0
4961.500000	42.6	H	-6.6	11.4	54.0
7440.000000	37.1	H	-3.1	16.9	54.0
1603.750000	31.6	V	-18.3	22.4	54.0
2122.750000	31.0	V	-15.8	23.0	54.0
4959.250000	45.9	V	-6.6	8.1	54.0
7441.375000	42.2	V	-3.1	11.8	54.0

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