Prüfbericht-Nr.: *Test report no.:*	**CN25ZCEW 001**	**Auftrags-Nr.:** *Order no.:*	326067061	Seite 1 von 41 *Page 1 of 41*
Kunden-Referenz-Nr.: *Client reference no.:*	1288983	**Auftragsdatum:** *Order date:*	2024-12-05	
Auftraggeber: *Client:*	**IKEA of Sweden AB** Box 702, Almhult, Sweden			
Prüfgegenstand: *Test item:*	Self-ballasted LED lamps			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	LED2406G4NA			
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:*	2024-12-27	Refer to photo document.		
Prüfmuster-Nr.: *Test sample no:*	A003898074-001			
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 Hongfei Wu	**genehmigt von:** authorized by:	x Elliot Zhang	
Datum: *Date:* 2025-04-16	Signed by: Hongfei Wu	**Datum:** *Date:* 2025-04-16	Signed by: Elliot Zhang	
Stellung / *Position:*	Sachverständige(r)/Expert	**Stellung** / *Position:*	Sachverständige(r)/Expert	
Sonstiges / *Other:*	FCC ID: FHO-LED2406G4NA IC: 10912A-LED2406G4NA HVIN: LED2406G4NA PMN: KAJPLATS This report is for Zigbee.			
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 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.

Anmerkungen
Remarks

1	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. *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.*
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4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, 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 bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. *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 115:2021, 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.*

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: *Pass*

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

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	03.12.2026
G1811391	EMI test receiver	ESCI	Rohde & Schwarz	17.10.2025
G1811425	Bilog antenna	CBL 6112D	Teseq	20.04.2026
G1825371	Preamplifier	EMC051845SE	Taiwan EMCI	24.07.2025
G1822694	Double ridged broadband horn antenna	BBHA 9120 D	Schwarzbeck	24.03.2026
G1825372	Preamplifier	EMC184045SE	Taiwan EMCI	24.07.2025
G1831065	Broadband horn antenna	BBHA 9170	Schwarzbeck	18.06.2028
G1822702	Spectrum analyser	FSV40	Rohde & Schwarz	15.07.2025
9053477	OSP	OSP-B157W8	Rohde & Schwarz	10.12.2025
9053474	Signal generator	SMB100B (6 GHz)	Rohde & Schwarz	10.12.2025
9053476	Vector Signal generator	SMW200A	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
9061503	Shielded enclosure	10.055x3.605x3.000	Frankonia	08.11.2028
9023229	EMI test receiver	ESR3	Rohde & Schwarz	03.08.2025
G1830003	Artificial mains network	ENV432	Rohde & Schwarz	11.10.2025
G1824248	Dual display multimeter	F45	Fluke	28.06.2025
software				
	RF measurement software	WMS32-WB (11.40.00)	Rohde & Schwarz	NA
	EMI measurement software	EMC32-MEB (10.60.20)	Rohde & Schwarz	NA
	EMI measurement software	EMC32-E+ (10.60.20)	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 basics 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	±2.33dB
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 LED lamp which support Bluetooth, Zigbee and Thread.

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

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Description of EUT	
Product Name:	Self-ballasted LED lamps
Model No.:	LED2406G4NA
Operation Voltage:	AC 120V, 60Hz
Test Voltage:	DC 3.3V for RF conducted and radiated test AC 120V, 60Hz for conducted emission test
RF Technical:	1) BLE 2) Zigbee 3) Thread
Technical Specification of Zigbee	
Frequency Range:	2405~2480MHz
Modulation Type:	OQPSK
Antenna Type:	PCB Antenna
Antenna Gain:	-1.51 dBi (declared by client)

Table 4: Operation Channel List

RF Channel	Frequency [MHz]	RF Channel	Frequency [MHz]	RF Channel	Frequency [MHz]	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. Zigbee transmitting mode
B. Radio operating 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: sscom 5.13.1

Table 5: Power parameter value

Mode	Power Parameter Setting Value
Zigbee	10

4.3 Special Accessories and Auxiliary Equipment

Table 6: Auxiliary Equipment

Equipment	Manufacturer	Model
Laptop	Lenovo	21AJ-S57N0J
Mobile phone	Apple	iPhone 15
Loudspeaker	Apple	HomePod mini
Remote control	IKEA	E2489

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 -1.51 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

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:	-1.51 dBi
Verdict:	PASS	

5.1.2 6dB & 99% Bandwidth

RESULT: **Pass**

Date of testing	:	2025-02-13
Ambient temperature	:	24.2°C
Relative humidity	:	59.5%
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 3.3V
Test modes applied	:	A

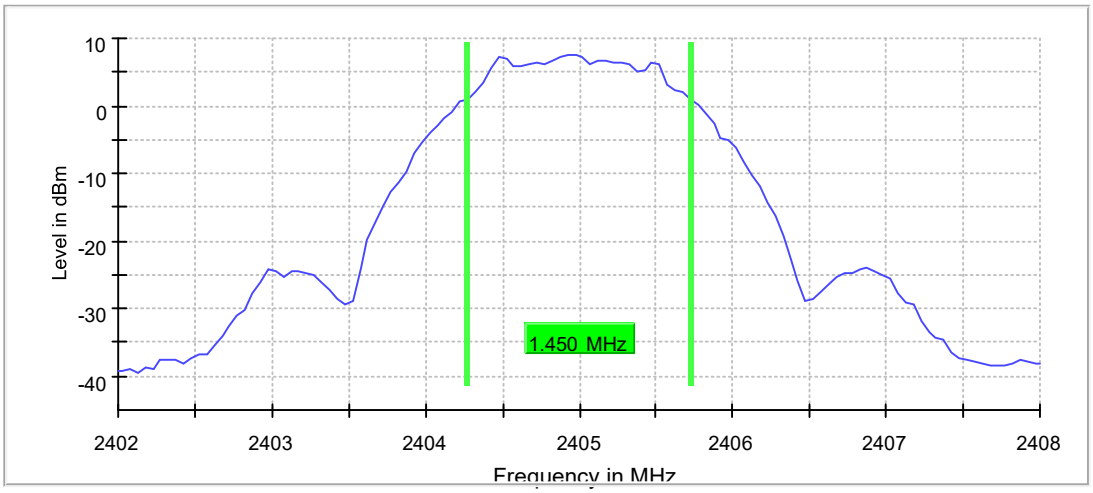
6dB Bandwidth, 2405MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2405.000000	1.450000	0.500000	---	2404.275000	2405.725000

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

DUT Frequency (MHz)	Max Level (dBm)	Result
2405.000000	7.6	PASS

6 dB Bandwidth



Measurement

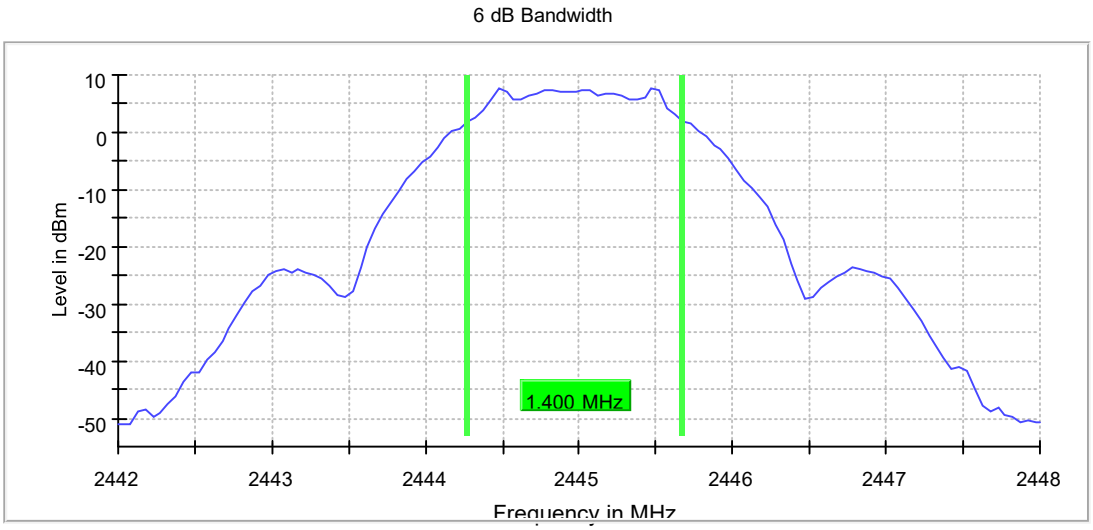
Setting	Instrument Value	Target Value
Start Frequency	2.40200 GHz	2.40200 GHz
Stop Frequency	2.40800 GHz	2.40800 GHz
Span	6.000 MHz	6.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	120	~ 120
Sweeptime	18.984 µs	AUTO
Reference Level	20.000 dBm	20.000 dBm
Attenuation	40.000 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	31 / 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	1.400000	0.500000	---	2444.275000	2445.675000

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

DUT Frequency (MHz)	Max Level (dBm)	Result
2445.000000	7.9	PASS



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	19 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.32 dB	0.50 dB

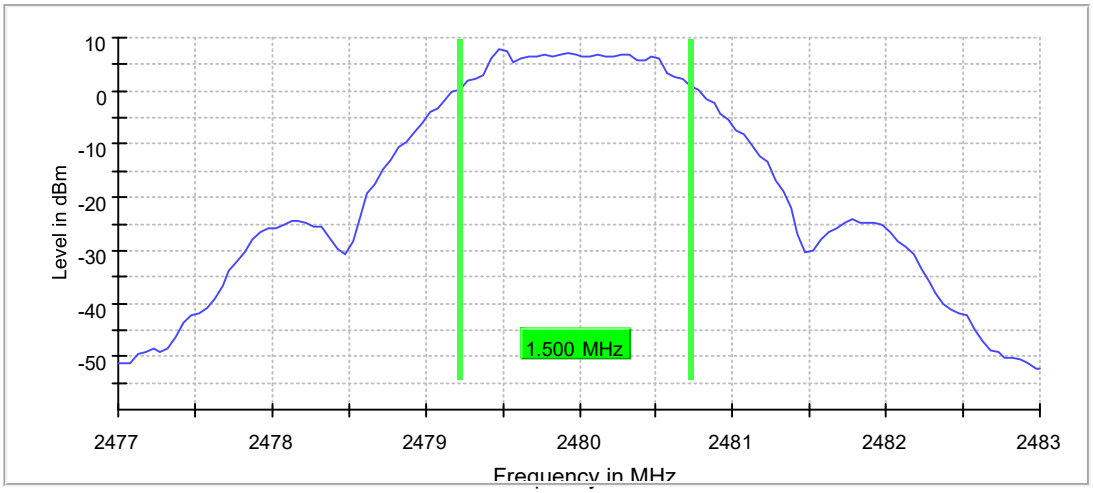
6dB Bandwidth, 2480MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.500000	0.500000	---	2479.225000	2480.725000

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

DUT Frequency (MHz)	Max Level (dBm)	Result
2480.000000	7.7	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	17 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.50 dB

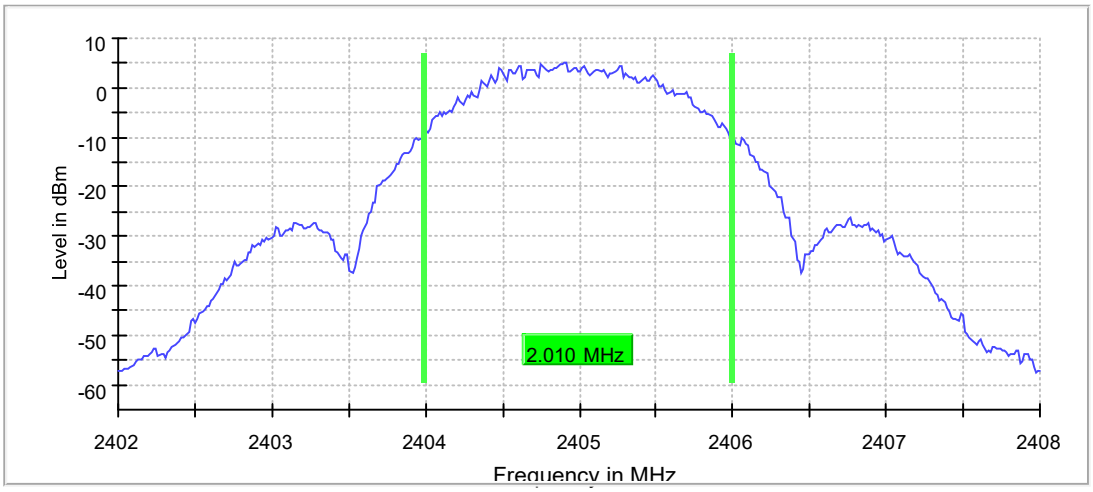
99% Occupied Channel Bandwidth, 2405MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2405.000000	2.010000	---	---	2403.987500	2405.997500

(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	24 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.30 dB

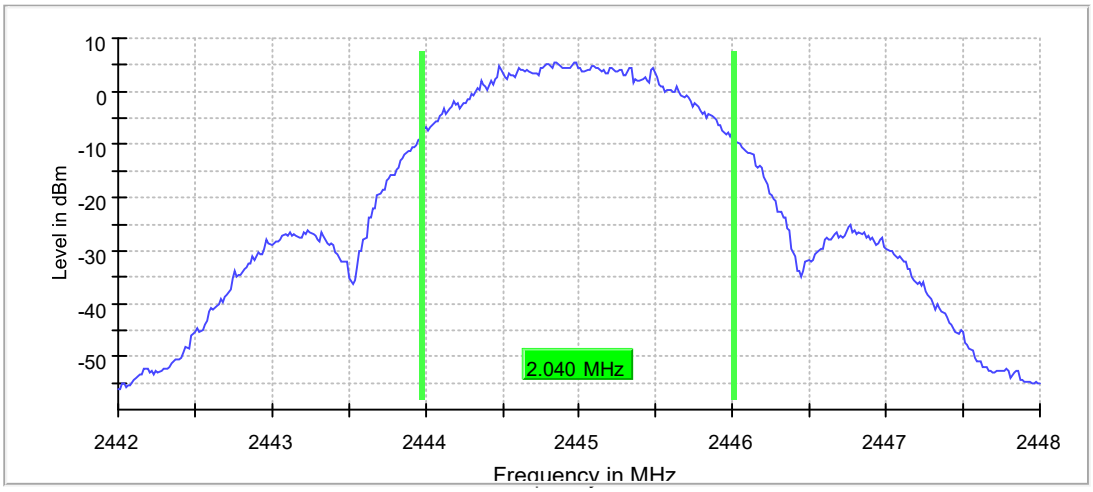
99% Occupied Channel Bandwidth, 2445MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2445.000000	2.040000	---	---	2443.972500	2446.012500

(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	51 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.30 dB

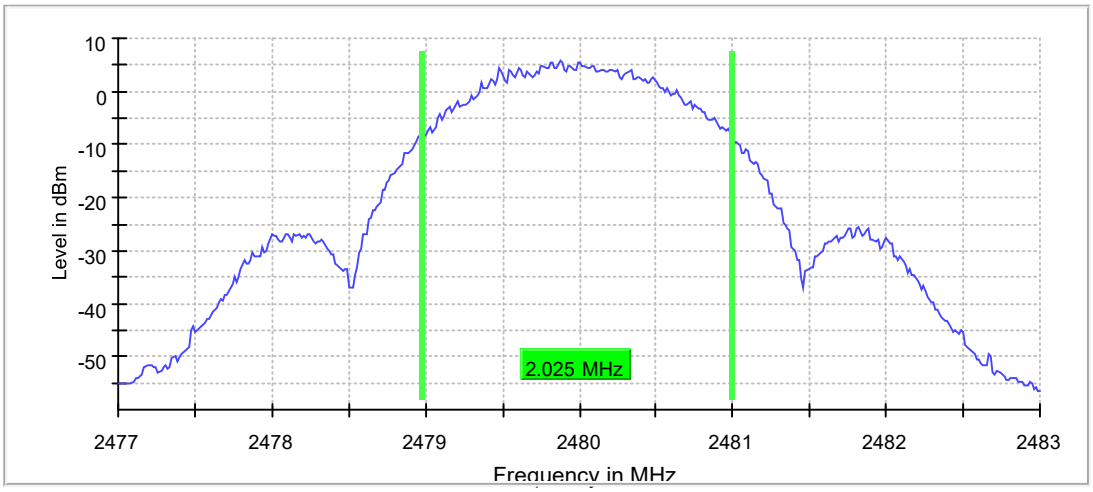
99% Occupied Channel Bandwidth, 2480MHz

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	2.025000	---	---	2478.972500	2480.997500

(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
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	49 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.30 dB

5.1.3 Output Power

RESULT: **Pass**

Date of testing	:	2025-02-13
Ambient temperature	:	24.2°C
Relative humidity	:	59.5%
Atmospheric pressure	:	101kPa
Test requirement	:	FCC Part 15.247(b)(3) RSS-247 Issue 3, August 2023, Clause 5.4(d)
Test procedure	:	ANSI C63.10: 2013
Test voltage	:	DC 3.3V
Test modes applied	:	A

Table 8: Peak Output Power

Frequency [MHz]	Peak Conducted Output Power [dBm]	Limit [dBm]
2405	9.6	30
2445	10.1	30
2480	9.8	30

Note:
1. The cable loss is taken into account in results.
2. EIRP=Conducted Output Power + Antenna Gain (-1.51dBi), which is far below the 4 W (36dBm).

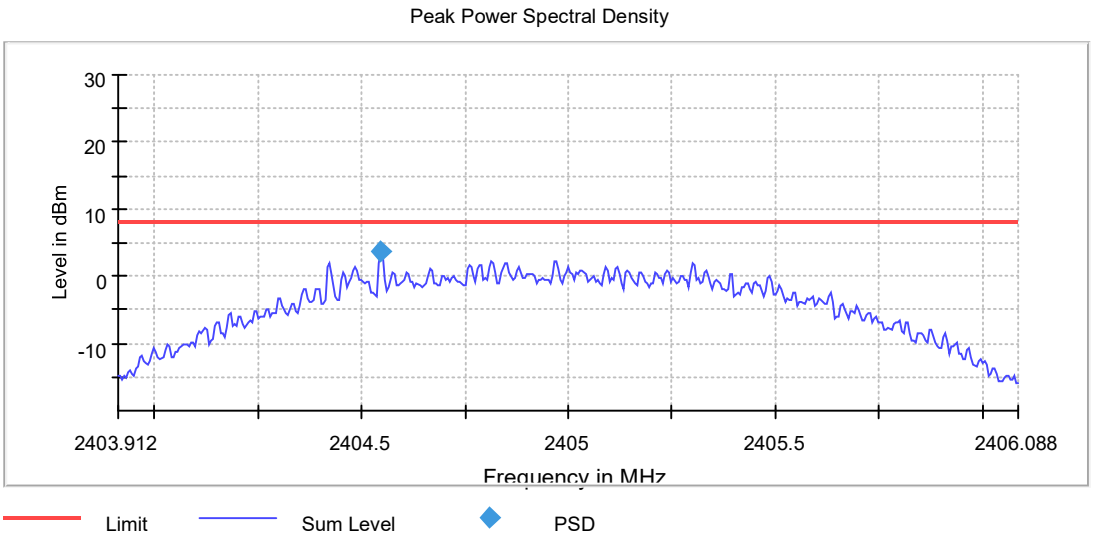
5.1.4 Power Spectral Density

RESULT: **Pass**

Date of testing	:	2025-02-13
Ambient temperature	:	24.2°C
Relative humidity	:	59.5%
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 3.3V
Test modes applied	:	A

Power Spectral Density, 2405MHz

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2405.000000	2404.545000	3.560	8.0	PASS

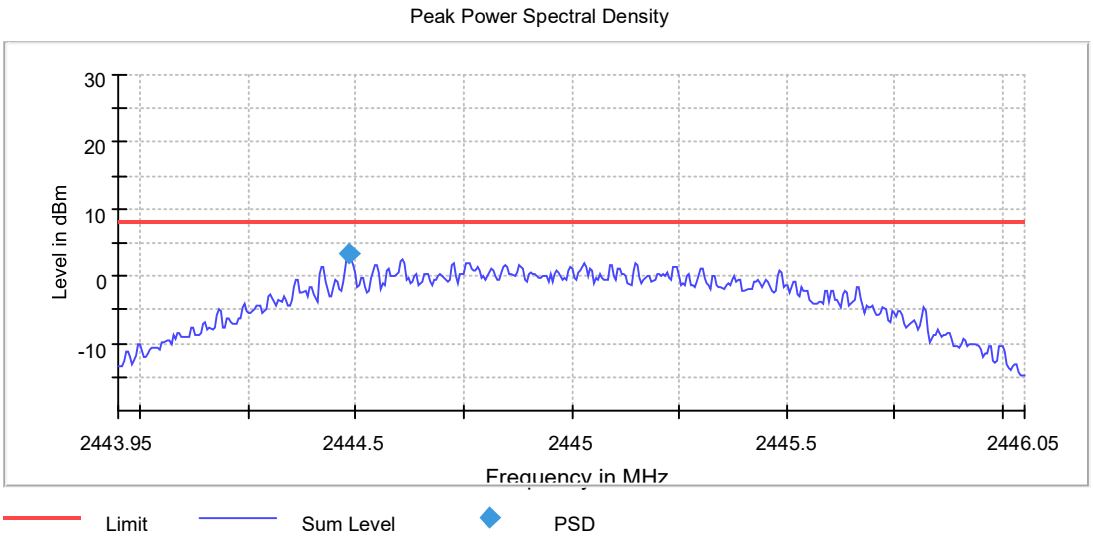


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40391 GHz	2.40391 GHz
Stop Frequency	2.40609 GHz	2.40609 GHz
Span	2.175 MHz	2.175 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	435	~ 435
Sweeptime	2.180 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	47 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.37 dB	0.50 dB

Power Spectral Density, 2445MHz

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2445.000000	2444.487500	3.378	8.0	PASS

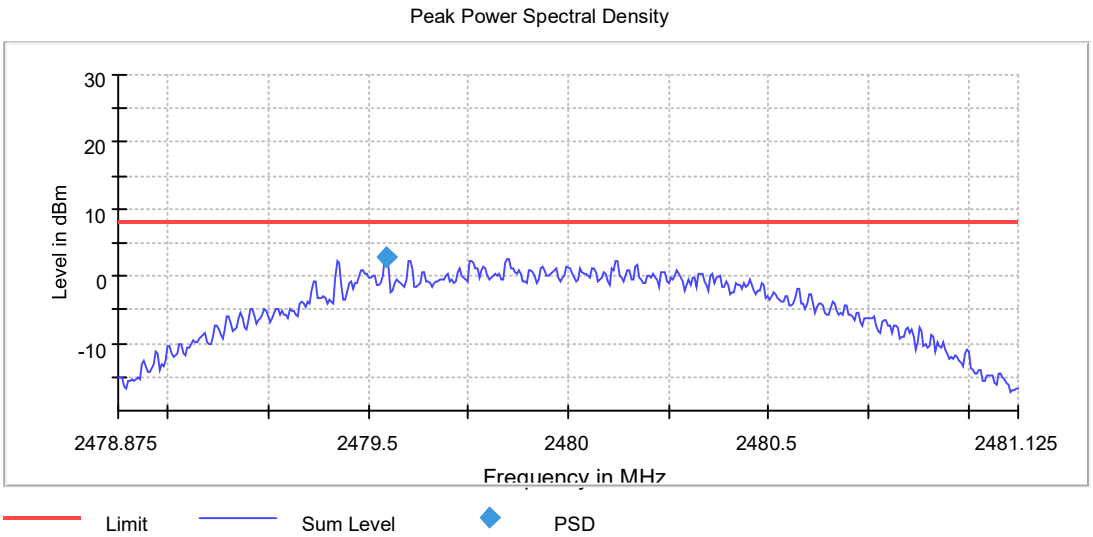


Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.44395 GHz	2.44395 GHz
Stop Frequency	2.44605 GHz	2.44605 GHz
Span	2.100 MHz	2.100 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	420	~ 420
Sweeptime	2.100 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	40 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.34 dB	0.50 dB

Power Spectral Density, 2480MHz

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2480.000000	2479.547500	2.929	8.0	PASS



Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47888 GHz	2.47888 GHz
Stop Frequency	2.48113 GHz	2.48113 GHz
Span	2.250 MHz	2.250 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	450	~ 450
Sweeptime	2.250 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	50 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.05 dB	0.50 dB

5.1.5 Conducted Band Edge and out-of Band Emissions

RESULT: **Pass**

Date of testing	:	2025-01-23
Ambient temperature	:	24.0°C
Relative humidity	:	56.5%
Atmospheric pressure	:	101kPa
Test requirement	:	FCC Part 15.247(d) RSS-247 Issue 3, August 2023, Clause 5.5
Test procedure	:	ANSI C63.10: 2013
Test voltage	:	DC 3.3V
Test modes applied	:	A

Figure 1: Reference level

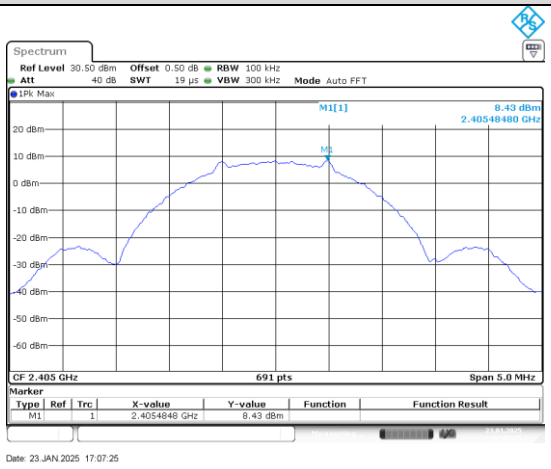
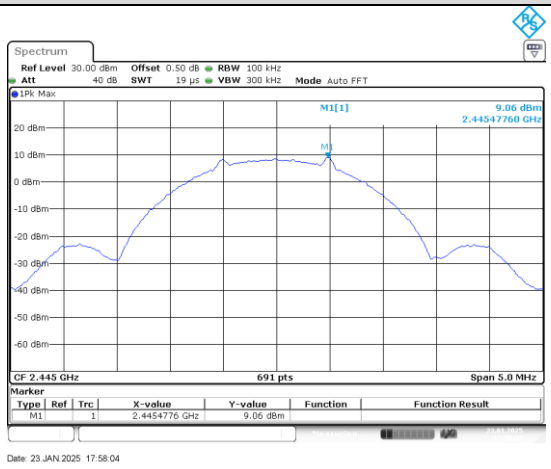
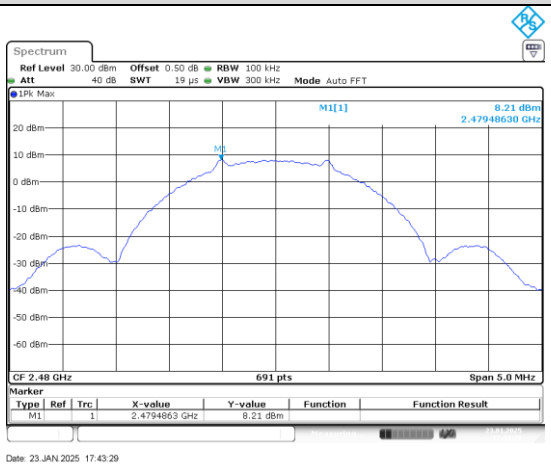
2405MHz	2445MHz
	
2480MHz	**/**
	/

Figure 2: Conducted Spurious Emission

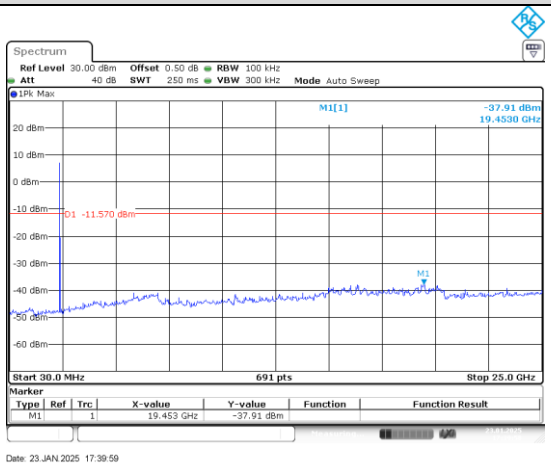
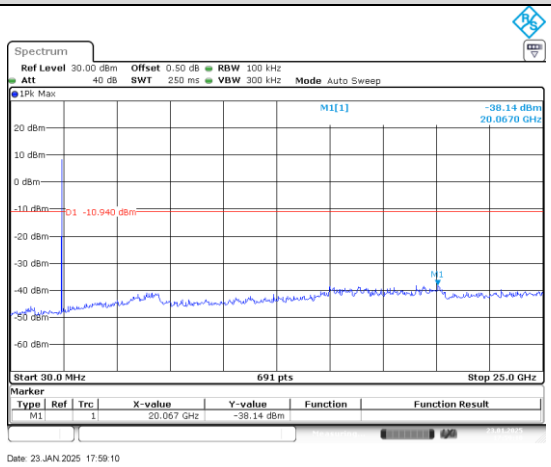
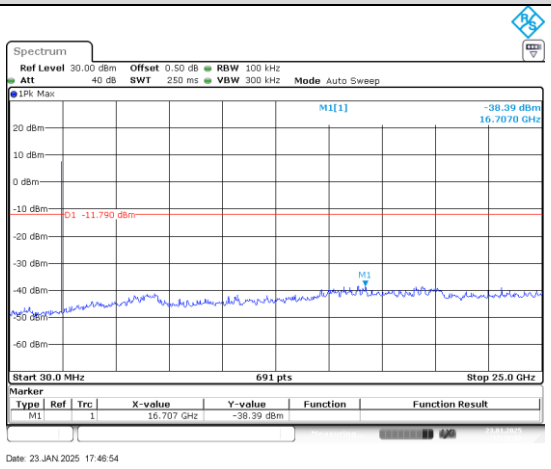
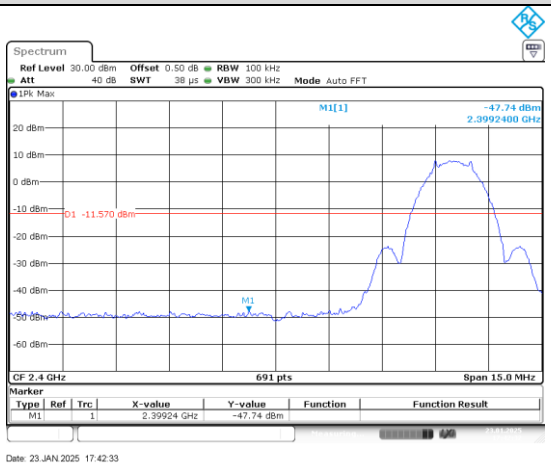
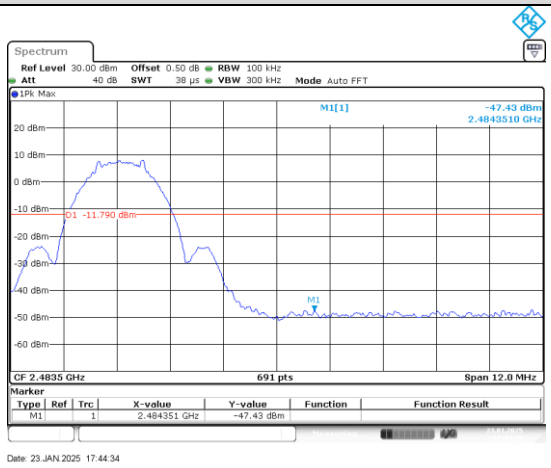
2405MHz	2445MHz
	
2480MHz	**/**
	/

Figure 3: Conducted Band Edge

2405MHz	2480MHz
	

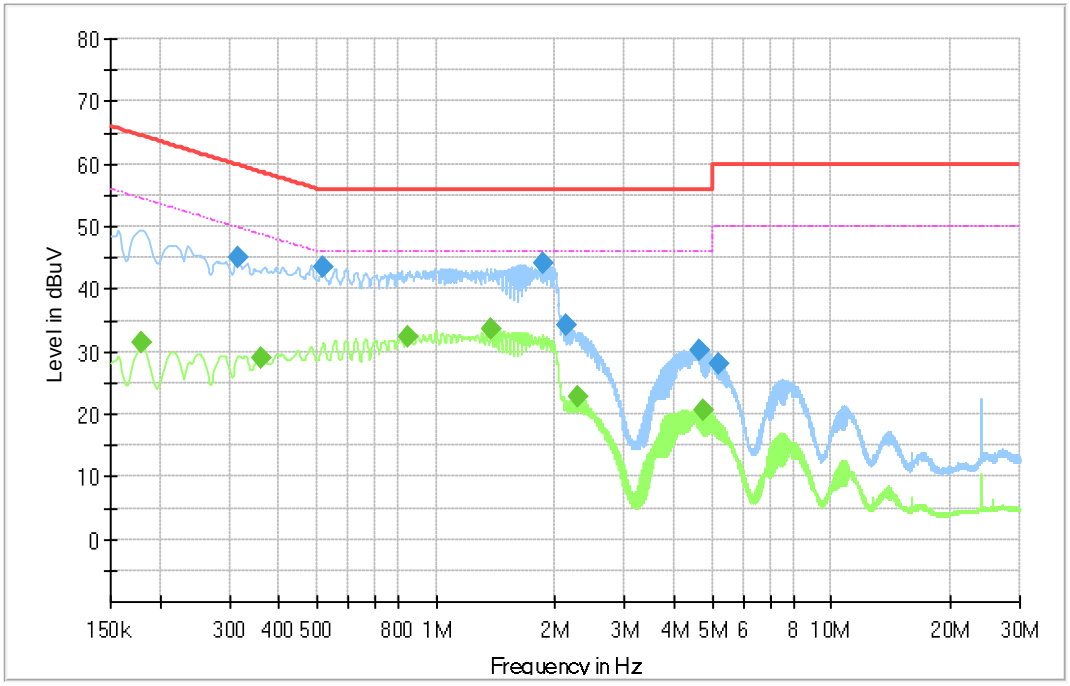
5.2 Emission in the Frequency Range up to 30MHz

5.2.1 Conducted Emission

RESULT: **Pass**

Date of testing	:	2025-01-20
Ambient temperature	:	22.0°C
Relative humidity	:	55.0%
Atmospheric pressure	:	101kPa
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	:	AC 120V, 60Hz
Test modes applied	:	B

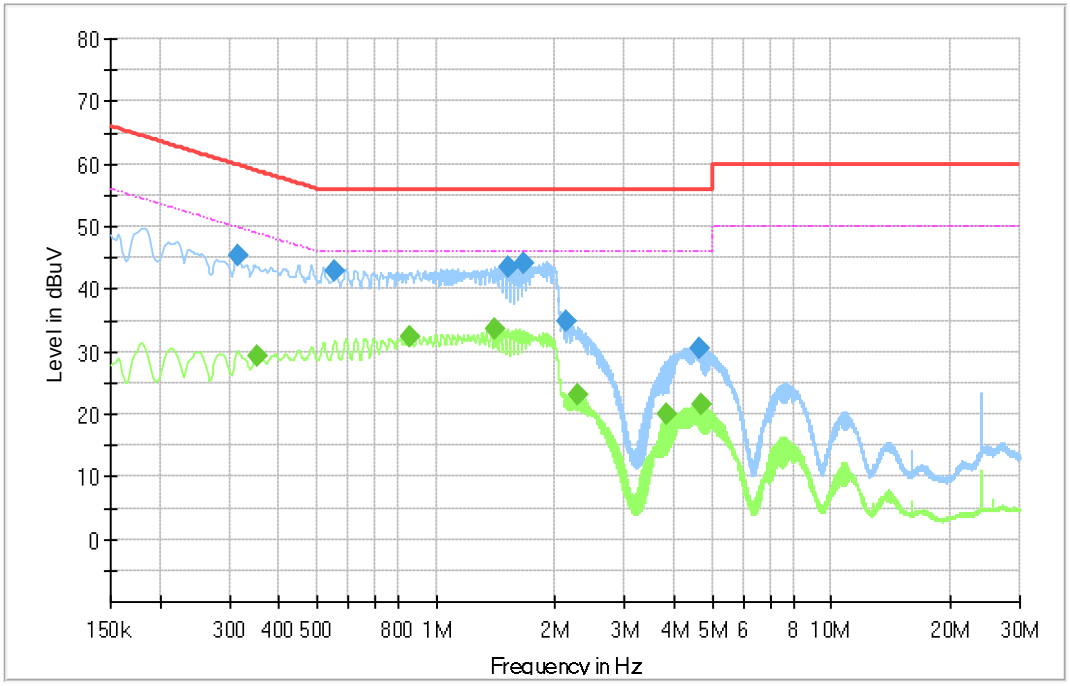
Figure 4: Conducted Emission, L



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.179250	---	31.51	54.52	23.01	1000.0	9.000	L1	10.3
0.314250	45.16	---	59.86	14.70	1000.0	9.000	L1	10.3
0.361500	---	29.08	48.69	19.61	1000.0	9.000	L1	10.3
0.519000	43.54	---	56.00	12.46	1000.0	9.000	L1	10.3
0.852000	---	32.48	46.00	13.52	1000.0	9.000	L1	10.5
1.378500	---	33.47	46.00	12.53	1000.0	9.000	L1	10.4
1.860000	44.05	---	56.00	11.95	1000.0	9.000	L1	10.1
2.136750	34.31	---	56.00	21.69	1000.0	9.000	L1	10.1
2.274000	---	22.74	46.00	23.26	1000.0	9.000	L1	10.1
4.652250	30.13	---	56.00	25.87	1000.0	9.000	L1	10.3
4.726500	---	20.77	46.00	25.23	1000.0	9.000	L1	10.3
5.160750	28.04	---	60.00	31.96	1000.0	9.000	L1	10.4

Figure 5: Conducted Emission, N



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.314250	45.35	---	59.86	14.51	1000.0	9.000	N	10.5
0.352500	---	29.28	48.90	19.62	1000.0	9.000	N	10.4
0.552750	42.90	---	56.00	13.10	1000.0	9.000	N	10.3
0.858750	---	32.28	46.00	13.72	1000.0	9.000	N	10.4
1.412250	---	33.57	46.00	12.43	1000.0	9.000	N	10.4
1.515750	43.61	---	56.00	12.39	1000.0	9.000	N	10.4
1.673250	44.19	---	56.00	11.81	1000.0	9.000	N	10.5
2.136750	34.80	---	56.00	21.20	1000.0	9.000	N	10.5
2.274000	---	23.06	46.00	22.94	1000.0	9.000	N	10.5
3.828750	---	20.03	46.00	25.97	1000.0	9.000	N	10.7
4.616250	30.39	---	56.00	25.61	1000.0	9.000	N	10.7
4.688250	---	21.50	46.00	24.50	1000.0	9.000	N	10.7

5.3 Emission in the Frequency Range above 30MHz

5.3.1 Radiated Band-Edge

RESULT: **Pass**

Date of testing	:	2025-01-15
Ambient temperature	:	22.8°C
Relative humidity	:	53.0%
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 3.3V
Test modes applied	:	A

Figure 6: Radiated Band-Edge, 2405MHz, H

2310~ 2410 BE 1-18GHz_HL050_FSV40_Pre

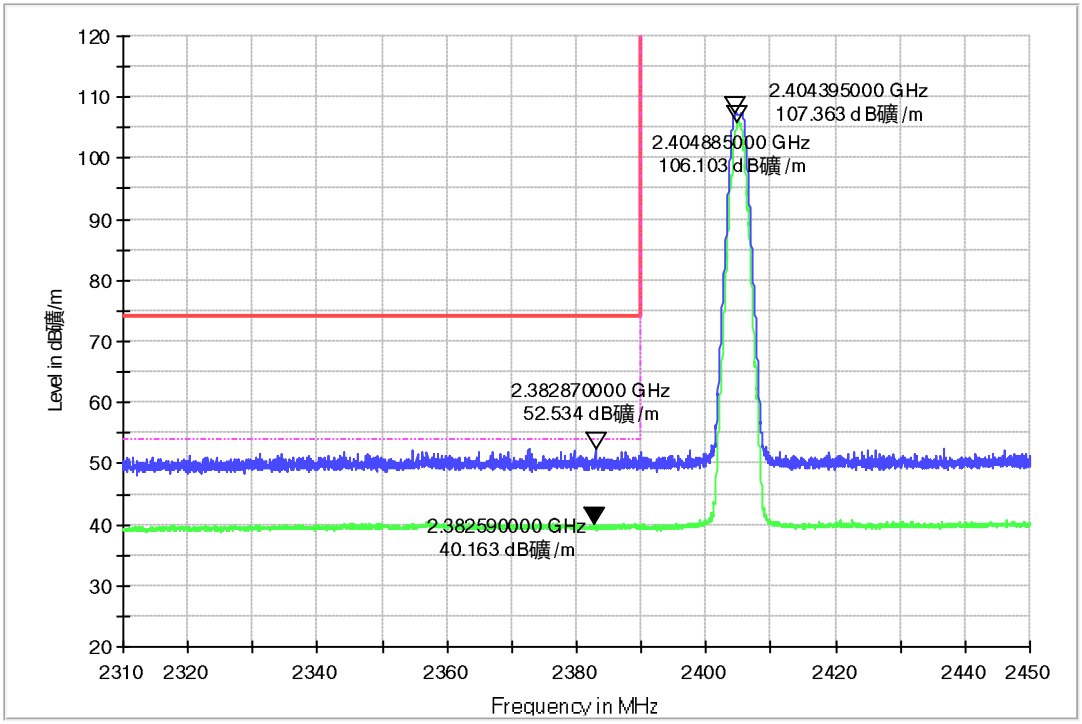


Figure 7: Radiated Band-Edge, 2405MHz, V

2310~ 2410 BE 1-18GHz_HL050_FSV40_Pre

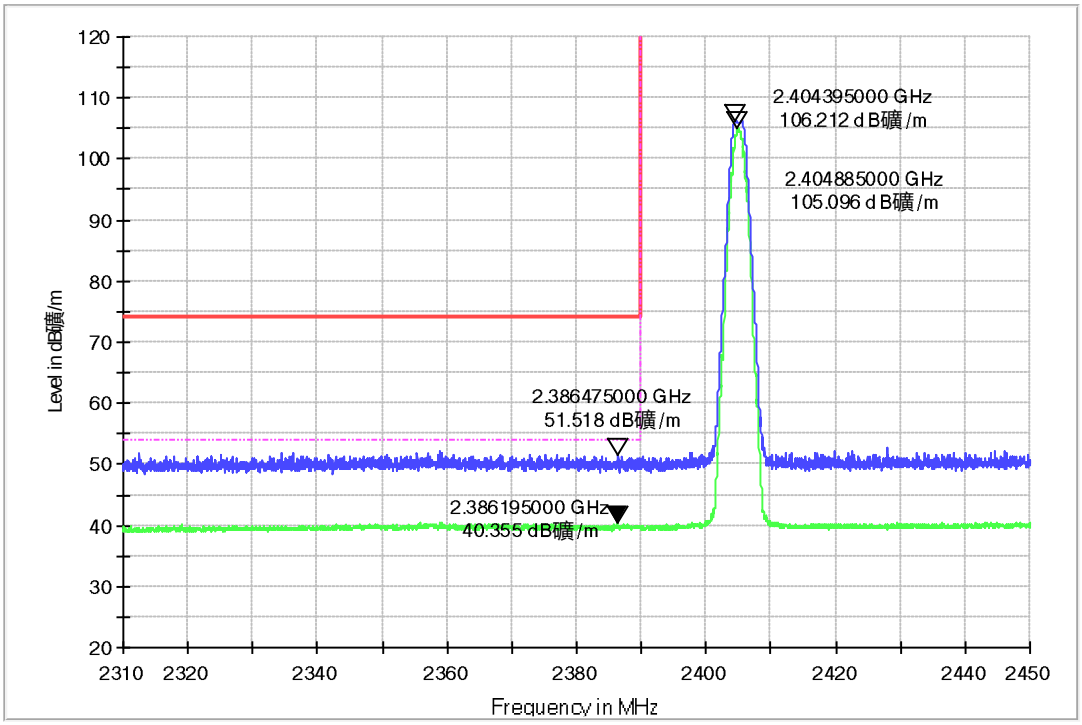


Figure 8: Radiated Band-Edge, 2480MHz, H

2470˜ 2500 BE_1-18GHz_HL050_FSV40_Pre

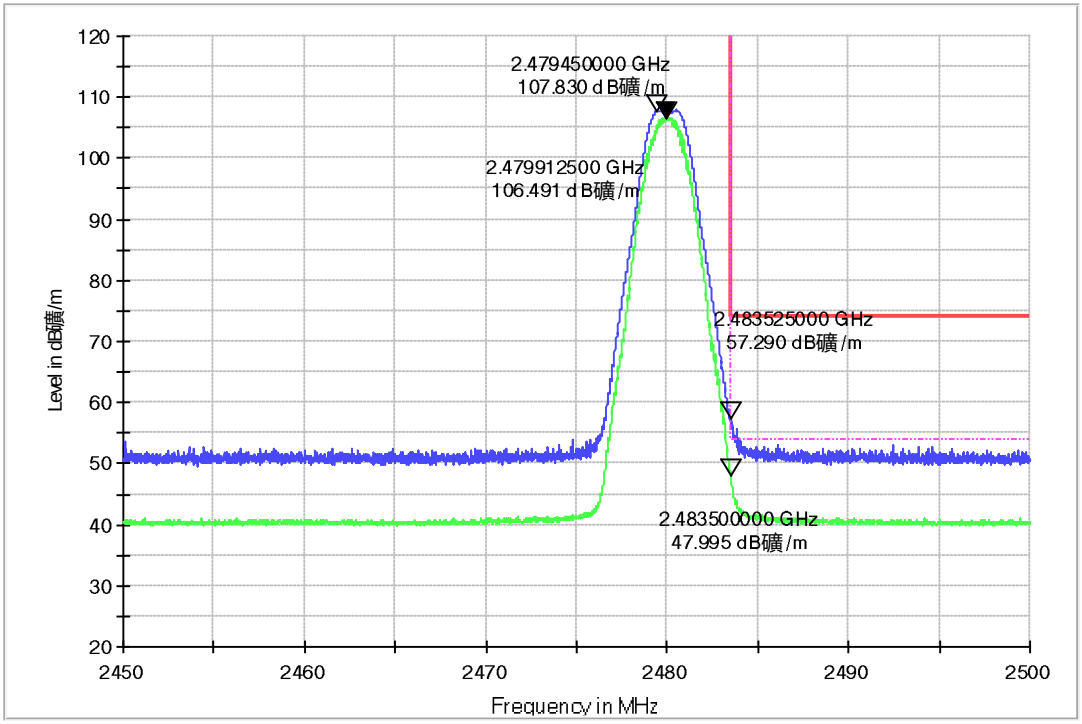
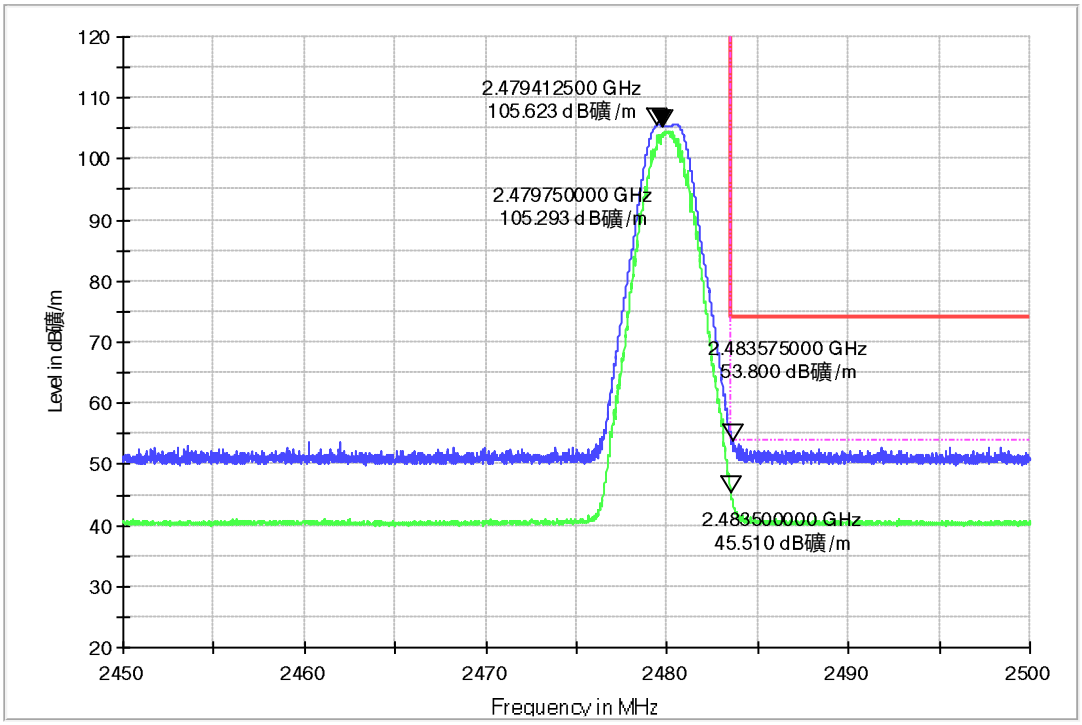


Figure 9: Radiated Band-Edge, 2480MHz, V

2470˜ 2500 BE_1-18GHz_HL050_FSV40_Pre



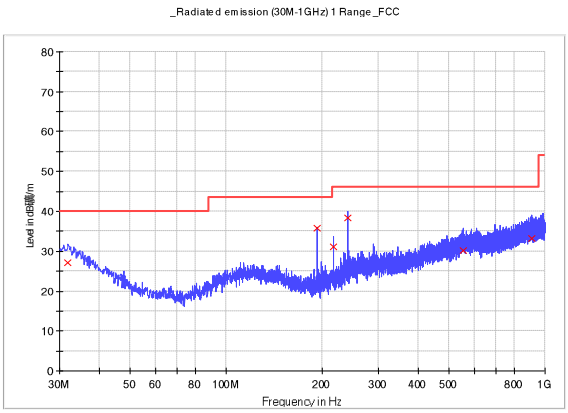
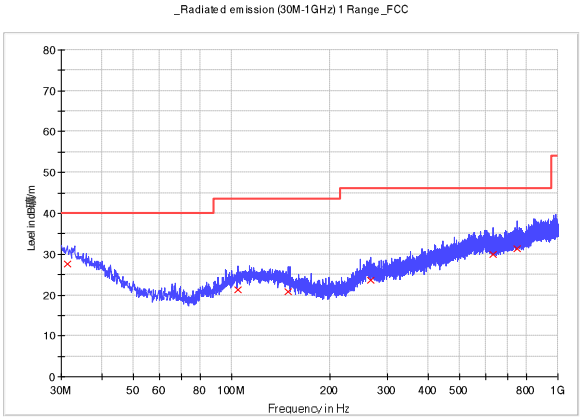
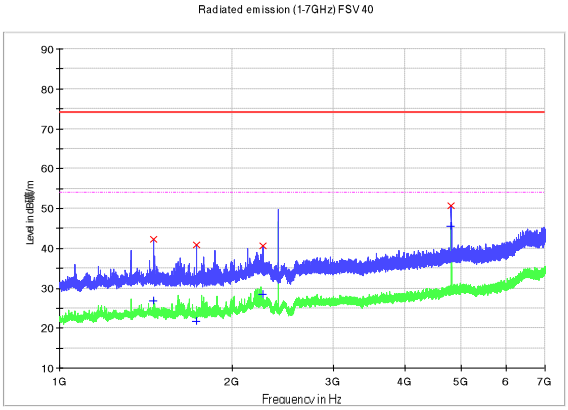
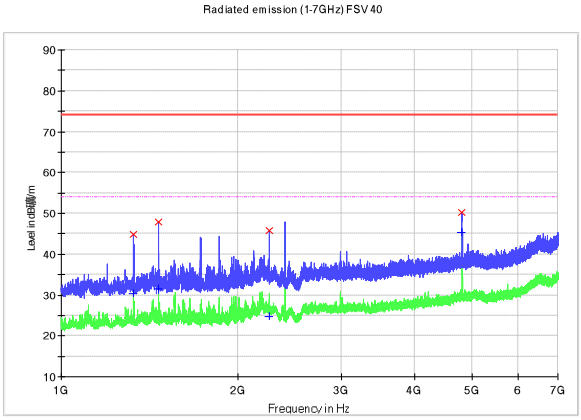
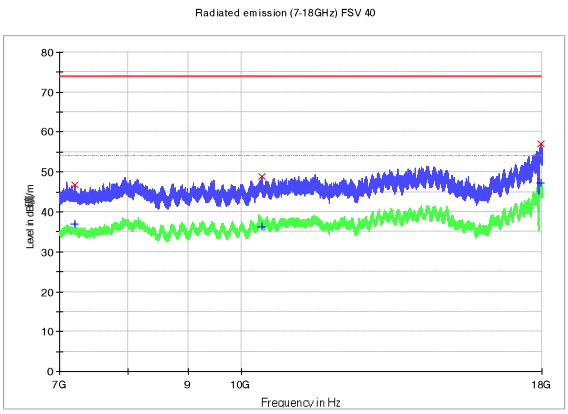
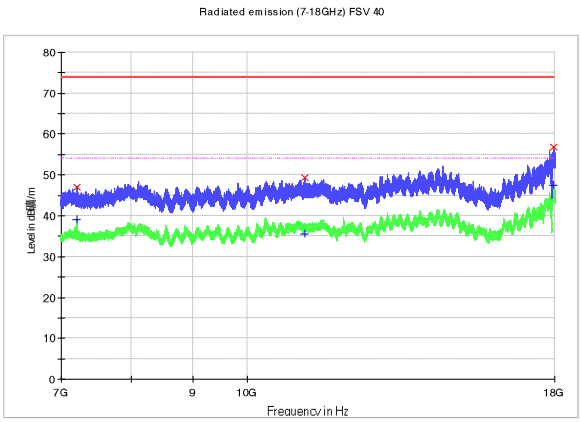
5.3.2 Radiated Spurious Emission

RESULT: **Pass**

Date of testing	:	2025-02-13
Ambient temperature	:	22.9°C
Relative humidity	:	56.8%
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 3.3V
Test modes applied	:	A

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

Figure 10: Radiated Spurious Emission, 2405MHz

30MHz to 1GHz H	30MHz to 1GHz V
	
1GHz to 7GHz H	**1GHz to 7GHz V**
	
7GHz to 18GHz H	**7GHz to 18GHz V**
	

Limit and Margin

QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.940000	27.2	H	23.9	12.8	40.0
192.596250	35.7	H	15.9	7.8	43.5
216.725000	31.1	H	16.0	14.9	46.0
240.853750	38.4	H	18.5	7.6	46.0
554.891250	30.3	H	26.7	15.7	46.0
911.245000	33.2	H	28.8	12.8	46.0
31.333750	27.5	V	24.2	12.5	40.0
104.083750	21.2	V	18.2	22.3	43.5
148.703750	20.9	V	17.6	22.6	43.5
266.073750	23.6	V	20.6	22.4	46.0
630.915000	30.1	V	26.5	16.0	46.0
750.103750	31.4	V	27.8	14.6	46.0

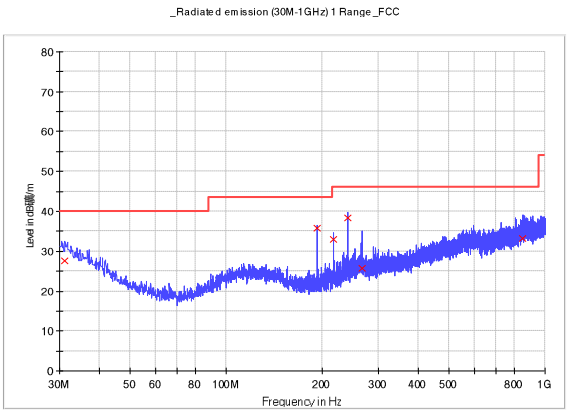
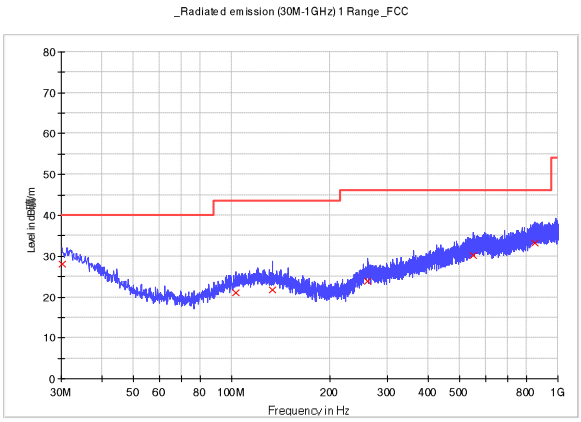
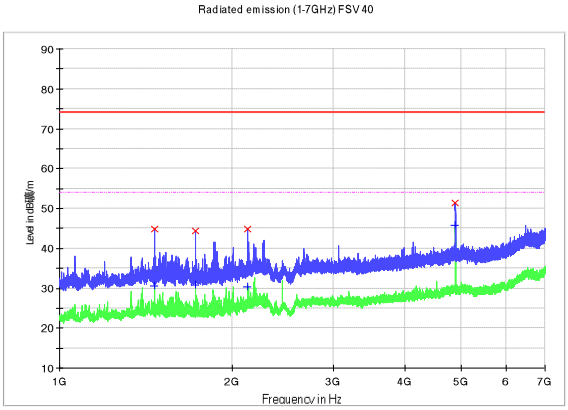
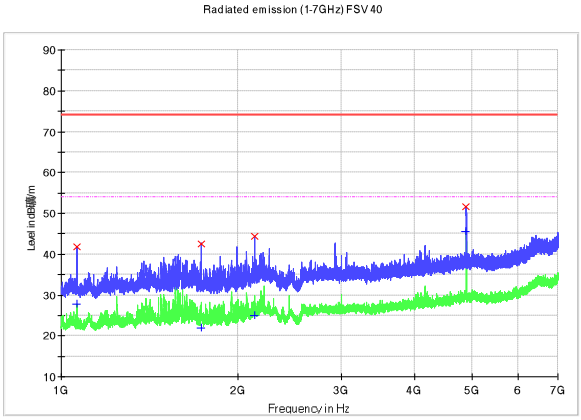
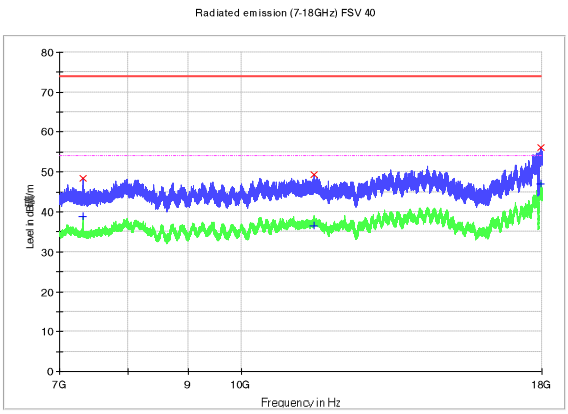
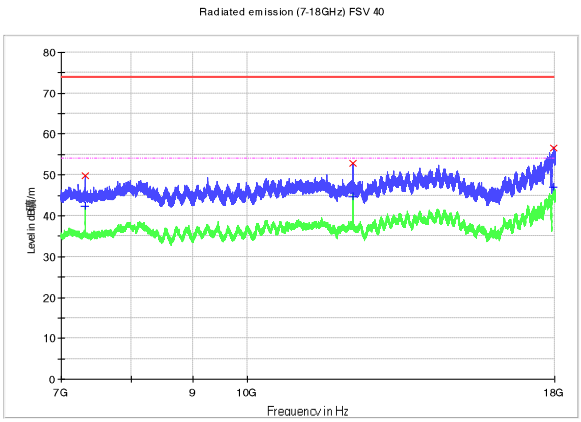
PK

Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1459.900000	42.2	H	-18.7	31.8	74.0
1728.400000	41.0	H	-18.9	33.0	74.0
2256.700000	40.6	H	-15.6	33.4	74.0
4809.100000	50.8	H	-11.4	23.2	74.0
7213.125000	46.8		-6.1	27.2	74.0
10396.937500	48.9	H	-2.7	25.1	74.0
17952.218750	57.1	H	11.5	16.9	74.0
1328.200000	44.8	V	-18.9	29.2	74.0
1461.700000	47.8	V	-18.7	26.2	74.0
2263.000000	45.8	V	-15.7	28.2	74.0
4808.800000	50.3	V	-11.4	23.7	74.0
7213.812500	46.9	V	-6.2	27.1	74.0
11155.250000	49.3		-2.8	24.7	74.0
17965.281250	56.8	V	11.8	17.2	74.0

AV

Frequency (MHz)	Average (dBµV/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1459.900000	26.9	H	-18.7	27.1	54.0
1728.400000	21.6	H	-18.9	32.4	54.0
2256.700000	28.4	H	-15.6	25.6	54.0
4809.100000	45.5	H	-11.4	8.5	54.0
7213.125000	37.0	H	-6.1	17.0	54.0
10396.937500	36.3	H	-2.7	17.7	54.0
17952.218750	47.3	H	11.5	6.7	54.0
1328.200000	30.5	V	-18.9	23.6	54.0
1461.700000	31.6	V	-18.7	22.4	54.0
2263.000000	24.6	V	-15.7	29.4	54.0
4808.800000	45.4	V	-11.4	8.6	54.0
7213.812500	39.2	V	-6.2	14.9	54.0
11155.250000	35.6	V	-2.8	18.4	54.0
17965.281250	47.5	V	11.8	6.5	54.0

Figure 11: Radiated Spurious Emission, 2445MHz

30MHz to 1GHz H	30MHz to 1GHz V
	
1GHz to 7GHz H	**1GHz to 7GHz V**
	
7GHz to 18GHz H	**7GHz to 18GHz V**
	

Limit and Margin

QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.212500	27.6	H	24.3	12.5	40.0
192.596250	35.7	H	15.9	7.8	43.5
216.603750	32.9	H	16.0	13.1	46.0
240.732500	38.4	H	18.5	7.6	46.0
266.558750	25.8	H	20.5	20.2	46.0
852.560000	33.3	H	29.0	12.7	46.0
30.121250	28.0	V	24.7	12.0	40.0
102.992500	21.1	V	18.0	22.5	43.5
132.941250	21.8	V	18.5	21.7	43.5
260.617500	23.9	V	20.8	22.1	46.0
550.405000	30.2	V	26.7	15.8	46.0
847.952500	33.2	V	28.9	12.8	46.0

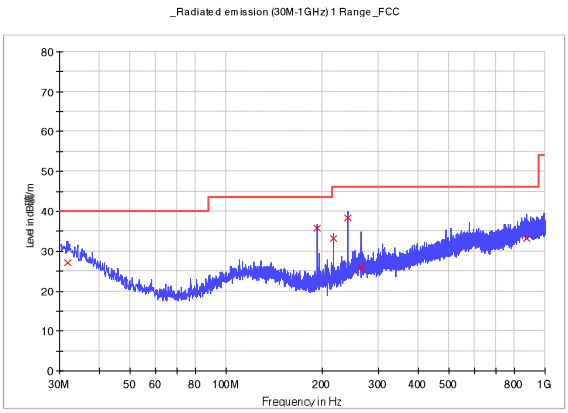
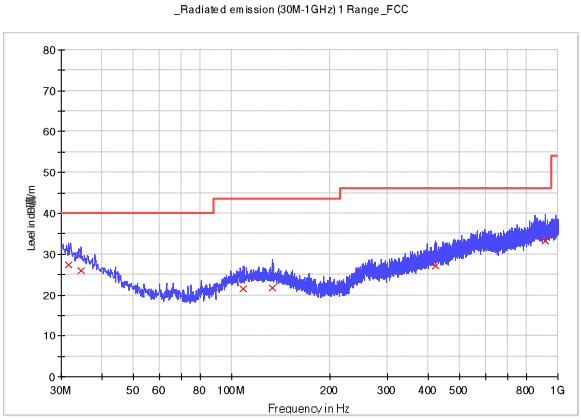
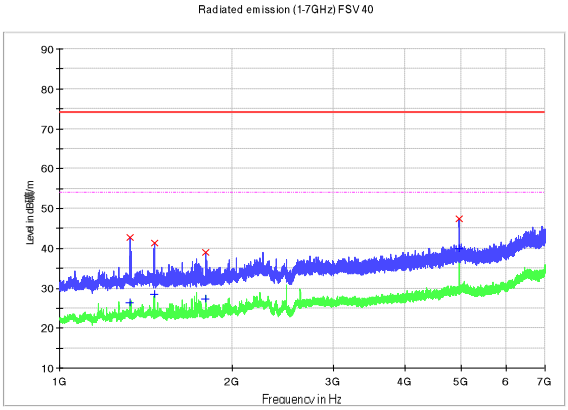
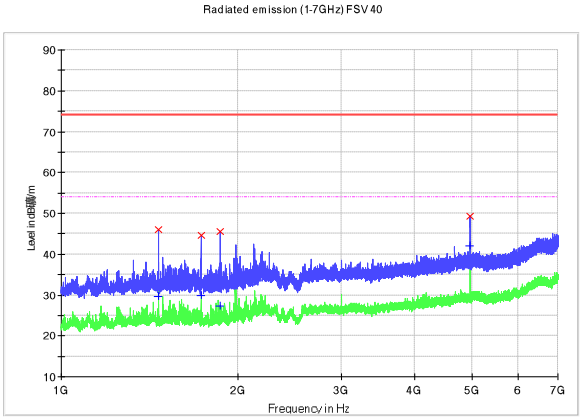
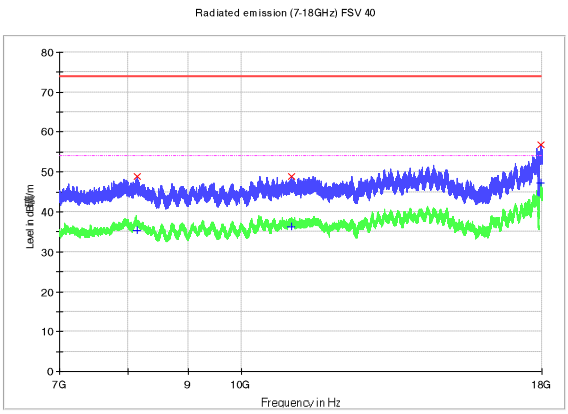
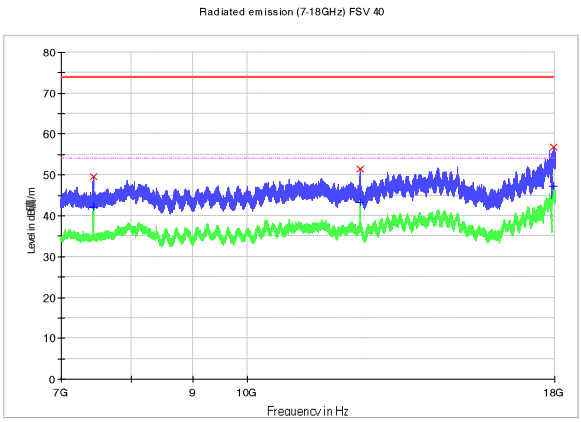
PK

Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1465.000000	44.8	H	-18.7	29.2	74.0
1725.700000	44.3	H	-18.9	29.7	74.0
2128.300000	44.8	H	-16.6	29.2	74.0
4891.000000	51.5	H	-11.3	22.5	74.0
7336.187500	48.4	H	-6.5	25.6	74.0
11530.281250	49.3	H	-1.7	24.7	74.0
17950.843750	56.2	H	11.5	17.8	74.0
1063.900000	41.8	V	-20.1	32.2	74.0
1730.800000	42.6	V	-18.9	31.4	74.0
2129.800000	44.3	V	-16.6	29.7	74.0
4889.200000	51.6	V	-11.3	22.4	74.0
7336.531250	49.8	V	-6.5	24.2	74.0
12222.593750	52.8	V	-1.9	21.2	74.0
17959.093750	56.7	V	11.7	17.3	74.0

AV

Frequency (MHz)	Average (dBµV/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1465.000000	30.7	H	-18.7	23.4	54.0
1725.700000	30.9	H	-18.9	23.1	54.0
2128.300000	30.3	H	-16.6	23.7	54.0
4891.000000	45.7	H	-11.3	8.3	54.0
7336.187500	38.9	H	-6.5	15.1	54.0
11530.281250	36.6	H	-1.7	17.4	54.0
17950.843750	47.0	H	11.5	7.1	54.0
1063.900000	27.7	V	-20.1	26.3	54.0
1730.800000	21.9	V	-18.9	32.2	54.0
2129.800000	24.9	V	-16.6	29.1	54.0
4889.200000	45.6	V	-11.3	8.4	54.0
7336.531250	42.4	V	-6.5	11.6	54.0
12222.593750	44.7	V	-1.9	9.3	54.0
17959.093750	47.0	V	11.7	7.0	54.0

Figure 12: Radiated Spurious Emission, 2480MHz

30MHz to 1GHz H	30MHz to 1GHz V
	
1GHz to 7GHz H	**1GHz to 7GHz V**
	
7GHz to 18GHz H	**7GHz to 18GHz V**
	

Limit and Margin

QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.940000	27.2	H	23.9	12.8	40.0
192.596250	35.7	H	15.9	7.8	43.5
216.603750	33.3	H	16.0	12.7	46.0
240.853750	38.4	H	18.5	7.6	46.0
265.588750	26.1	H	20.6	19.9	46.0
875.840000	33.3	H	28.6	12.7	46.0
31.697500	27.3	V	24.0	12.7	40.0
34.486250	26.0	V	22.7	14.1	40.0
108.691250	21.5	V	18.5	22.0	43.5
132.820000	21.8	V	18.5	21.7	43.5
422.001250	27.2	V	23.9	18.8	46.0
913.791250	33.2	V	28.8	12.9	46.0

PK

Frequency (MHz)	MaxPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1327.000000	42.8	H	-18.9	31.2	74.0
1461.100000	41.3	H	-18.7	32.7	74.0
1795.900000	38.9	H	-18.8	35.1	74.0
4960.600000	47.4	H	-11.1	26.6	74.0
8142.281250	48.8	H	-4.3	25.2	74.0
11030.812500	49.0	H	-2.3	25.0	74.0
17971.000000	57.0	H	11.9	17.1	74.0
1466.200000	46.0	V	-18.7	28.0	74.0
1728.100000	44.7	V	-18.9	29.3	74.0
1863.100000	45.5	V	-18.4	28.5	74.0
4959.000000	49.2	V	-11.2	24.8	74.0
7441.375000	49.5	V	-6.0	24.5	74.0
12402.375000	51.4	V	-2.4	22.7	74.0
17961.156250	56.9	V	11.7	17.1	74.0

AV

Frequency (MHz)	Average (dBµV/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1327.000000	26.5	H	-18.9	27.5	54.0
1461.100000	28.5	H	-18.7	25.6	54.0
1795.900000	27.3	H	-18.8	26.7	54.0
4960.600000	39.9	H	-11.1	14.1	54.0
8142.281250	35.3	H	-4.3	18.7	54.0
11030.812500	36.3	H	-2.3	17.8	54.0
17971.000000	47.2	H	11.9	6.8	54.0
1466.200000	29.7	V	-18.7	24.3	54.0
1728.100000	29.9	V	-18.9	24.1	54.0
1863.100000	27.4	V	-18.4	26.6	54.0
4959.000000	42.2	V	-11.2	11.8	54.0
7441.375000	42.1	V	-6.0	11.9	54.0
12402.375000	43.4	V	-2.4	10.6	54.0
17961.156250	47.3	V	11.7	6.7	54.0

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