

RADIO TEST REPORT

Report No.: M2411035-4

TESTED FOR:

REDARC Technologies Pty Ltd
23 Brodie Rd, Lonsdale, SA 5160, Australia

Contact: Enrico Catahan

Email: ecatahan@redarc.com.au

Tel: +61 8 8322 4848

ISSUED BY:

EMC Technologies Pty. Ltd.

176 Harrick Road, Keilor Park, VIC 3042, Australia

Web: www.emctech.com.au

Tel: +61 3 9365 1000

Product Name: TOW-PRO LINK™ Dash Mounted Remote

Model: EBRHX-DMT-RH

PCB Version: PCB3851-5

FCC ID: 2BAH6-EBRHXDMTRH

IC: 30290-EBRHXDMTRH

Test Date(s): 16 - 17 January 2025; 20 January 2025

Issue Date: 30 January 2025

Standard: FCC PART 15, SUBPART C, SECTION 15.247

ISED RSS-247, Issue 3, SECTION 5.0

Result: *The test sample, complies with the standard/s listed above, provided the modifications mentioned in this test report are implemented.*

Test Engineer:



Ashish Nath

Authorized Signatory:



Ian Paul Ng, NCE

Senior Test Engineer

Radio & Wireless

Revision History

Version	Issue Date	Reason / Comments
1	30 January 2025	Initial issue

General Remarks

EMC Technologies Pty Ltd hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.

EMC Technologies Pty Ltd reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. EMC Technologies Pty Ltd shall have no liability for any deductions, inferences or generalisations drawn by the customer or others from EMC Technologies Pty Ltd issued reports. This report shall not be used to claim, constitute, or imply product endorsement by EMC Technologies Pty Ltd.

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1 Project Overview

1.1 Test Facility

Measurements were performed at the following location:

- ☒ Melbourne Laboratory 176 Harrick Road, Keilor Park, VIC 3042, Australia
- ☐ Sydney Laboratory Unit 3, 87 Station Road, Seven Hills, NSW 2147, Australia

EMC Technologies Pty. Ltd. is an independently owned Australian company that is NATA accredited to ISO 17025 for both testing and calibration and ISO 17020 for Inspection. – **Accreditation Number 5292.**

Country	Assessment Body	Lab Code / Member No.
Australia	NATA	Accreditation Number: 5292
Europe	European Union	Notified Body Number: 0819
USA	FCC	Designation Number: AU0001/AU0002
Canada	ISED Canada	CAB Identifier Number: AU0001/AU0002
Japan	VCCI	Company Number: 785
Taiwan	BSMI	Lab Code SL2-IN-E-5001R

1.2 Standards Applied

FCC PART 15, SUBPART C, SECTION 15.247

Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ISED RSS-247, Issue 3, SECTION 5.0

Standard specifications for frequency hopping systems and digital transmission systems operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

ANSI C63.10 - 2013

American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

ANSI C63.4 - 2014

American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

FCC KDB – 558074 D01 15.247 Meas Guidance v05r02

Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules

1.3 Results Summary

The test sample was provided by the customer. All results herein apply only to the test sample.

Sec.	Description	FCC	ISED	Results
3.1	Antenna Requirement	§15.203	RSS-Gen 6.8	Complied
3.2	Restricted Bands of Operation	§15.205	RSS-Gen 8.10	Complied
3.3	Conducted Limits	§15.207	RSS-Gen 8.8	Not Applicable
3.4	Radiated emission limits; general requirements	§15.209	RSS-Gen 8.9	Complied
3.5	6 dB Bandwidth	§15.247(a)(2)	RSS-247 5.2(a)	Complied
3.6	Peak Output Power	§15.247(b)(3)	RSS-247 5.4(d)	Complied
3.7	Out-of-Band/Spurious Emissions	§15.247(d)	RSS-247 5.5	Complied
3.8	Band-Edge Emission Measurements	§15.247(d)	RSS-247 5.5	Complied
3.9	Power spectral density	§15.247(e)	RSS-247 5.2(b)	Complied
3.10	Maximum Permissible Exposure	§15.247(i)	RSS-102	Complied
3.11	Occupied Bandwidth – 99%	§15.215	RSS-Gen 6.7	Complied

1.4 Measurement Uncertainty

EMC Technologies has evaluated the equipment and the methods used to perform the EMC testing. The estimated measurement uncertainties for the various tests shown within this report are as follows:

EMC Testing	Range	Value
Conducted Emission		
• Mains Port	9kHz to 30 MHz	± 3.2 dB
Radiated Emission	9 kHz to 30 MHz	± 4.1 dB
	30 MHz to 300 MHz	± 5.1 dB
	300 MHz to 1000 MHz	± 4.7 dB
	1 GHz to 18 GHz	± 4.6 dB
	18 GHz to 40 GHz	± 4.6 dB
Peak Output Power		± 1.5 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Application of measurement uncertainty for this report:

The referenced uncertainty standard specifies that determination of compliance shall be based on measurements without taking into account measurement uncertainty. However, the measurement uncertainty shall appear in the test report.

1.5 Test Equipment

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by a NATA accredited laboratory or the National Measurement Institute (NMI).

Conducted Emission						
Manufacturer	Model	Serial No.	Asset No.	Description	Cal. Date	Cal. Due
Huber+Suhner	Sucoflex 118	800175/118	C-537	RF Cable	03/06/2024	03/06/2025
Teseq	NNB 51	47439	L-077	LISN	04/09/2024	04/09/2025
Rohde & Schwarz	ESCI	101306	R-028	EMC Receiver	19/03/2024	19/03/2025

Radiated Emission						
Manufacturer	Model	Serial No.	Asset No.	Description	Cal. Date	Cal. Due
Frankonia	SAC-3-2	-	R-144	Room 13 3m SAC	25/03/2024	25/03/2027
Rohde & Schwarz	ESW26	101306	R-143	EMI Receiver	06/08/2024	06/08/2025
EMCO	6502	9311-2801	A-231	Active Loop Antenna	28/02/2023	28/02/2025
EMCO	6502	2021	A-310	Active Loop Antenna	19/09/2024	19/09/2026
SunAR	JB1	A052518	A-434	Broadband Hybrid Antenna	14/03/2023	14/03/2025
EMCO	3115	9501-4398	A-406	Horn Antenna	10/01/2025	10/01/2028
ETS-Lindgren	3160-09	66032	A-307	Horn Antenna	18/01/2024	18/01/2027
ETS-Lindgren	3160-10	64179	A-306	Horn Antenna	18/01/2024	18/01/2027
Huber+Suhner	Sucoflex 104A	503061/4A	CL131125	RF Cable	01/11/2024	01/11/2025
Huber+Suhner	Sucoflex 102	27319/2	C-273	RF Cable	22/01/2024	22/01/2025
EDS	SG18-B3015	1	A-288	Pre-Amp	27/11/2024	27/11/2025

2 Equipment Under Test

2.1 EUT Details

(EUT details are supplied by the customer)

EUT Transmitter Details	
Radio Module/Chip Manufacturer:	Nordic Semiconductor
Radio Module/Chip Model:	nRF52833, WLCSP package
Type:	Bluetooth Low Energy (BLE)
Frequency Band:	2400 – 2483.5 MHz
Number of Channels:	40
Operating Frequency:	Low Channel: 2402 MHz Middle Channel: 2440 MHz High Channel: 2480 MHz
Nominal Bandwidth:	2 MHz
Modulation:	GFSK
Data Rate:	2Mbit/s
Antenna Manufacturer:	TDK
Antenna Model:	ANT016008LCS2442MA2
Antenna Type:	Chip Antenna
Antenna Maximum Gain:	2.5 dBi

EUT Host Details	
Product Name:	TOW-PRO LINK™ Dash Mounted Remote
Model:	EBRHX-DMT-RH
PCB Version:	*PCB3851-5
	*Note: an embedded PCB with components added to the internal structures of the PCB
Sample No / Identification:	S02046 / 2412179999-6058, Radio test 0dBm 1.2nH
Power Rating:	12V DC
Description:	The EBRHX-DMT-RH Dash Mounted Remote wirelessly connects to and controls the Main Unit of the Tow-Pro Link electric brake controller. It is hard-wired and mounts permanently to the dashboard, to the centre console, or through a spare switch blank insert.

2.2 Test Configuration

Testing was performed with the EUT's Transceiver set to transmit continuously at Low Channel (2402 MHz), Middle Channel (2440 MHz) and High Channel (2480 MHz). The radiated sample (S02046) was provided by the manufacturer with a preset RF output power settings of **0 dBm (1mW)** for each channel. Only 1 sample was used for the entire test.

Test Mode	LED Colour	Channel	Frequency	RF Power Settings
1	Blue	High	2480	0 dBm (1mW)
2	Green	Middle	2440	0 dBm (1mW)
3	Cyan	Low	2402	0 dBm (1mW)

2.3 Modifications

The following modification were required to achieve compliance.

The RF output power settings was reduced to 0 dBm (1mW) to comply with the §15.205/ RSS-Gen 8.10/ RSS-247 3.3 requirements.

EMC Technologies takes no responsibility for any modifications made to the EUT specifically to achieve EMC compliance and hence these modifications may only be satisfactory for that purpose under the stated EUT test conditions. The customer must check that the proposed modifications meet all product design, functional, safety or other compliance requirements.

2.4 Additions to, Deviations and Exclusions from the Method/Standard

No additions to, deviations or exclusions from the method/standard were performed.

2.5 Reference Document

No.	Document Title	Issue No.
1	REDARC_EBRHX_DMT-RH_Test plan_FCC ISSED_v4	Ver 4
2	Nordic Semiconductor nRF52833 PS v1.7	Ver 1.7
3	rf_ant_ant016008lcs2442ma2_summary_en	Ver 7.1

3 Evaluation of Test Results

3.1 §15.203/ RSS-Gen 6.8 Antenna Requirement

The test sample's transceiver incorporates a Chip Antenna and cannot be replaced by another type.

Antenna Manufacturer: TDK

Antenna Model: ANT016008LCS2442MA2

Antenna Type: Chip Antenna

Antenna Maximum Gain: 2.5 dBi

Connector: Not Applicable

The above installation will prevent any unauthorized switching of antennas.

3.2 §15.205/ RSS-Gen 8.10/ RSS-247 3.3 Restricted Bands of Operation

The provisions of the §15.205/ RSS-Gen 8.10/ RSS-247 3.3 restricted bands of operation and §15.209 radiated emissions limits have been met, refer to section 3.7.

3.3 §15.207/ RSS-Gen 8.8 Conducted Limits

The device is battery/DC powered and does not connect directly or indirectly to the AC mains network. Test was not applicable.

3.4 §15.209/ RSS-Gen 8.9 Radiated Emission Limits; General Requirements

The provisions of the §15.205/ RSS-Gen 8.10/ RSS-247 3.3 restricted bands of operation and §15.209/ RSS-Gen 8.9 radiated emissions limits have been met, refer to section 3.7.

3.5 §15.247(a)(2)/ RSS-247 5.2(a) 6 dB bandwidth

3.5.1 Test Procedure

The tests were performed in accordance with ANSI C63.10: 2013 clause 11.8 DTS bandwidth.

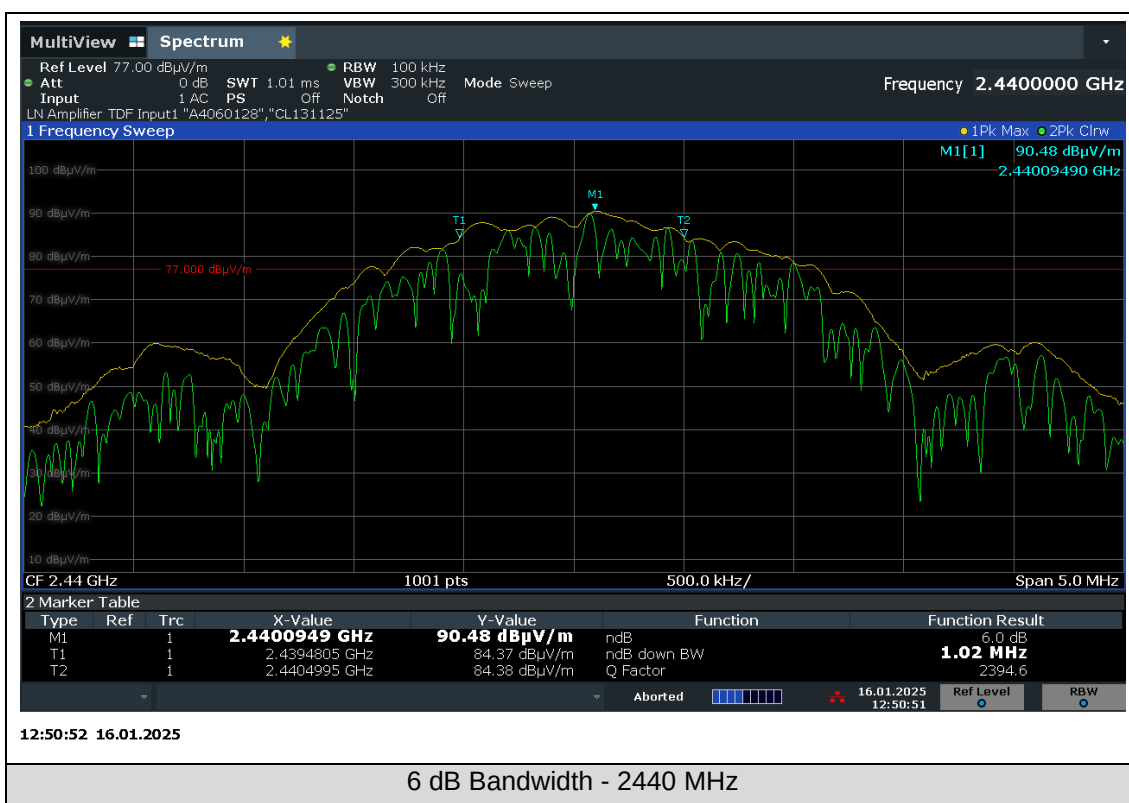
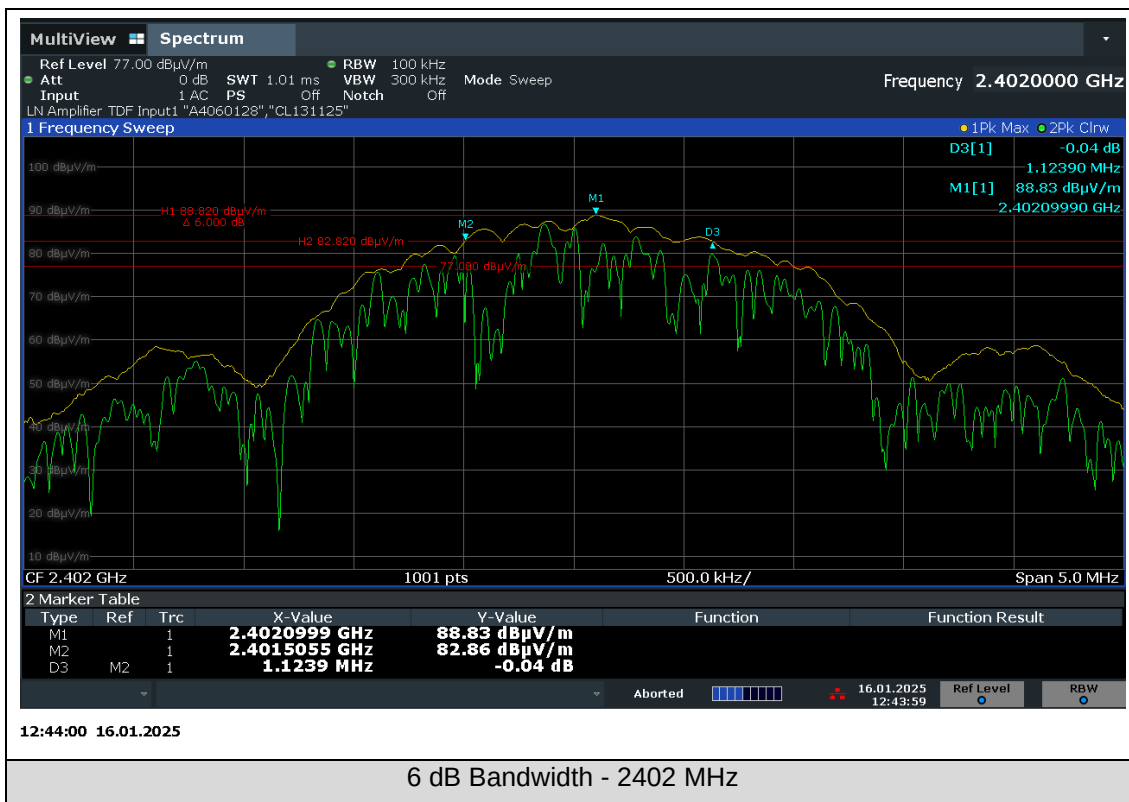
The 6 dB bandwidth was measured while the device was transmitting with typical modulation applied. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilized when measuring the bandwidth.

3.5.2 Limits

In the band 2400 – 2483.5 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.5.3 Results

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Limit
Low	2402	1123.9	≥ 500
Middle	2440	1020.0	≥ 500
High	2480	1123.9	≥ 500





3.6 §15.247(b)(3)/ RSS-247 5.4(d) Peak Output Power

3.6.1 Test Procedure

The maximum peak conducted output power was measured in accordance with ANSI C63.10: 2013 clause 11.9.1.1.

3.6.2 Limits

The maximum peak conducted output power at 2400 – 2483.5 MHz is 1 Watt or 30 dBm.

3.6.3 Results

The measured radiated field strength is converted to equivalent conducted output power for checking compliance (KDB 558074 D01 Section 3).

Frequency [MHz]	E-Field @ 3 m [dBμV/m]	EIRP [dBm]	Antenna Gain [dBi]	Equivalent Conducted Output Power [dBm]	Limit [dBm]	Results
2402	90.11	-5.12	2.5	-7.62	30	Complied
2440	91.64	-3.59	2.5	-6.09	30	Complied
2480	88.48	-6.75	2.5	-9.25	30	Complied





3.7 §15.247(d)/ RSS-247 5.5 Out-of-Band/Spurious Emissions

3.7.1 Test Procedure

Radiated out-of-band/spurious emissions measurements were performed in a semi-anechoic chamber compliant with ANSI C63.4: 2014.

The test frequency range was sub-divided into smaller bands with the defined resolution bandwidths to permit reliable display and identification of emissions.

Frequency range [MHz]	Measurement Bandwidth [kHz]	Measurement Distance [m]	Antenna
0.009 to 0.150	0.2	3	0.6 metre Loop antenna
0.150 to 30	9	3	
30 to 1000	120	3	Biconilog antenna
1000 to 18 000	1000	3	Standard gain or Broadband horn
18 000 to 40 000	1000	1	

EUT was set at a height of 0.8 m for measurements below 1000 MHz and set at a height of 1.5 m for measurements above 1000 MHz.

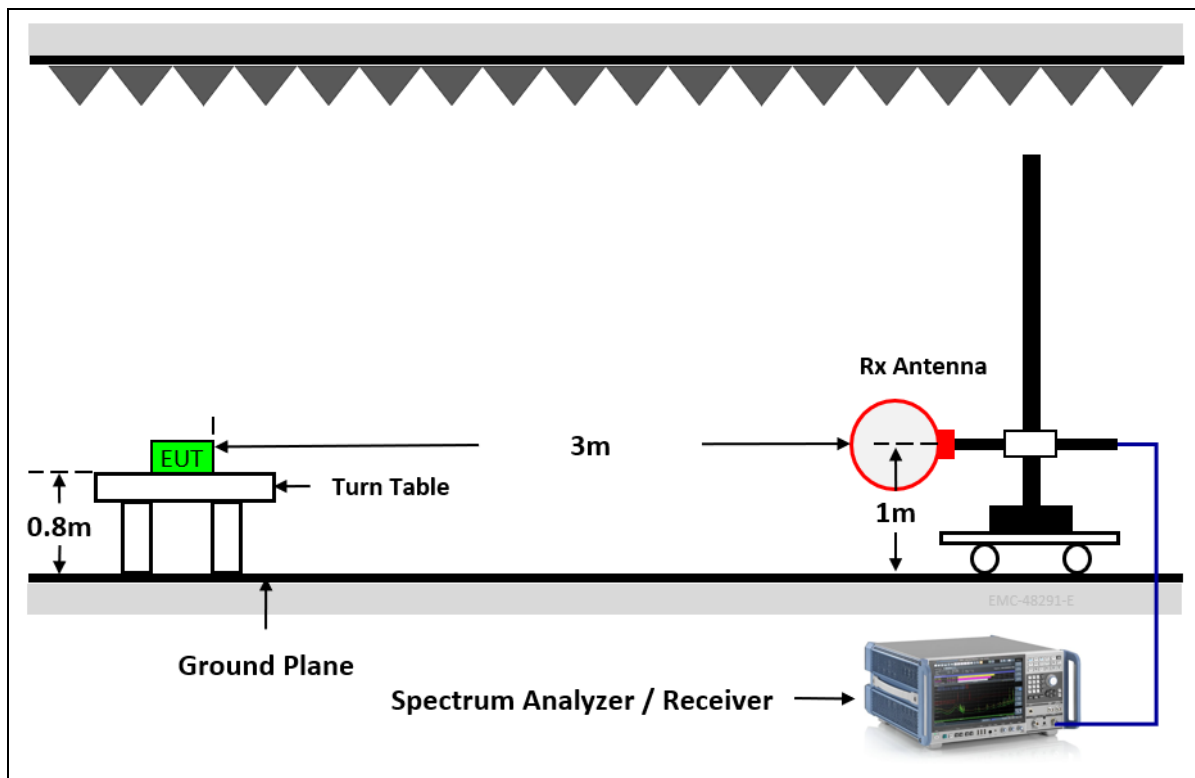
The EUT was slowly rotated with the Peak Detector set to Max-Hold. This was performed for at least two antenna heights. Each significant peak was then investigated and maximized with the Quasi-Peak detector for measurements below 1 GHz. Above 1 GHz, Average and Peak measurements were taken using linearly polarized horn antennas.

Measurements on the worst axis are presented.

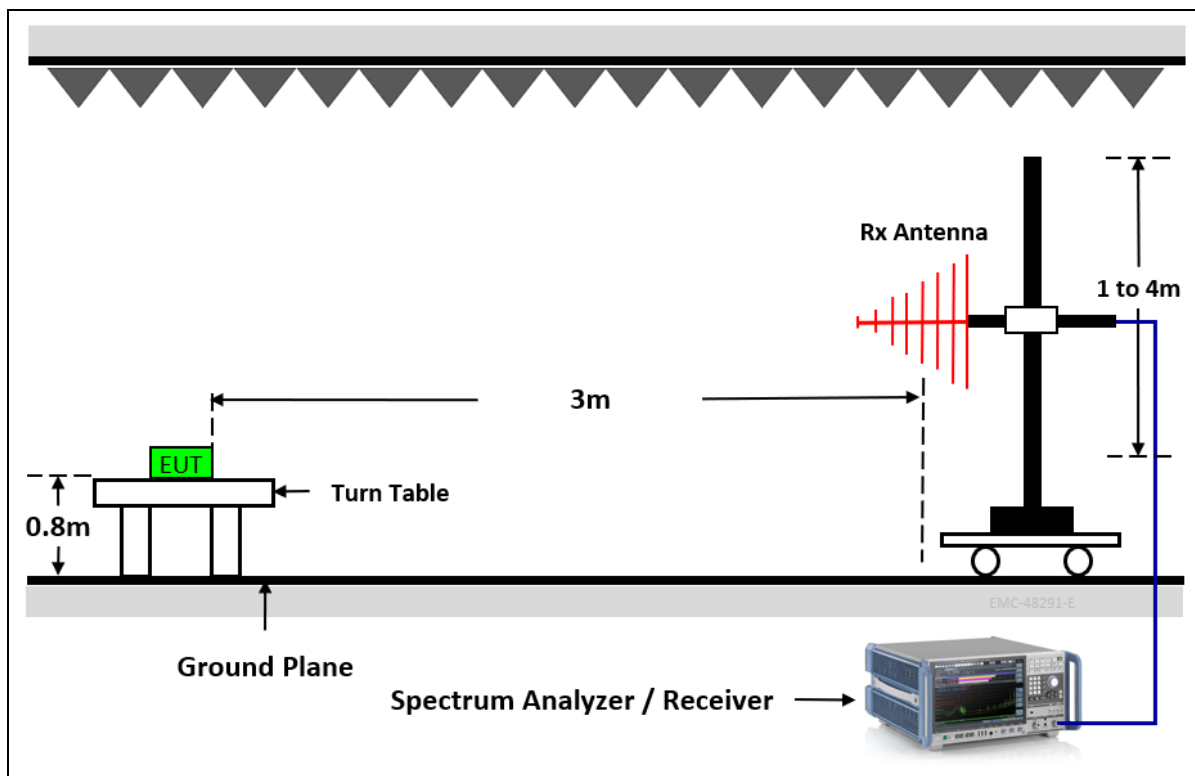
The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical polarisations of the measurement antenna.

3.7.2 Test Setup

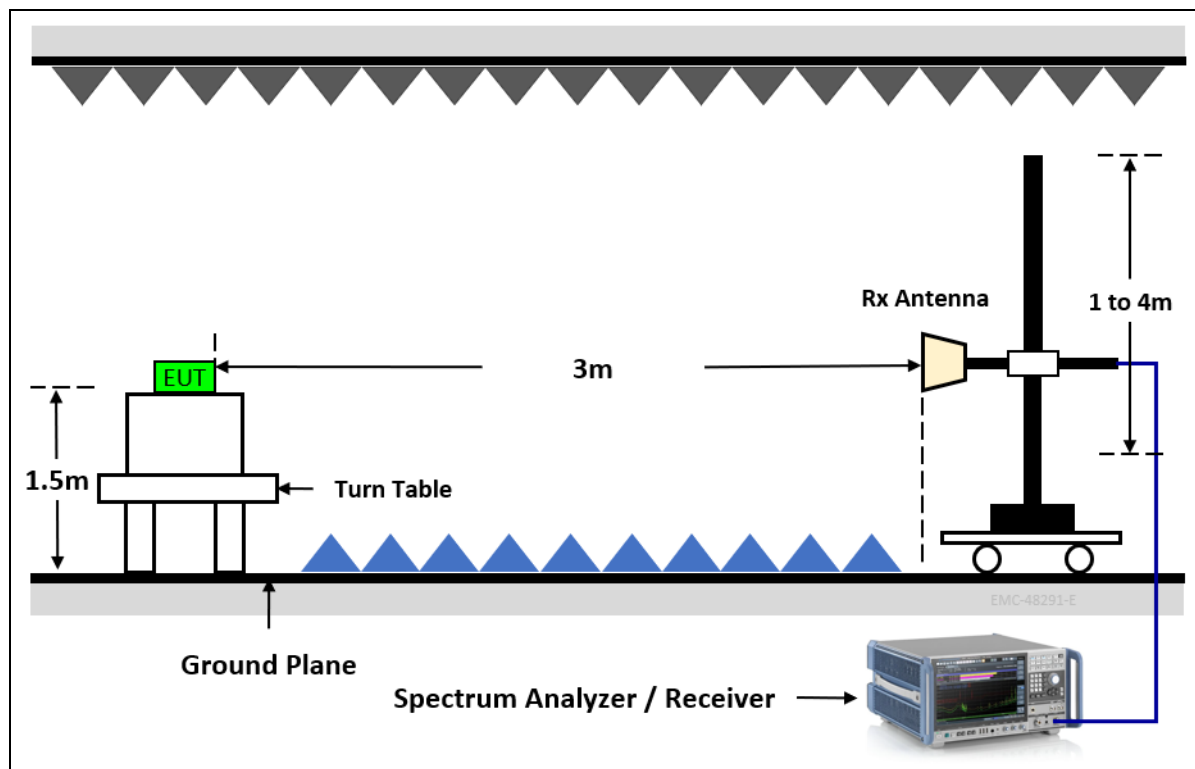
9 kHz to 30 MHz:



30 - 1000 MHz:



Above 1000 MHz:



3.7.3 Evaluation of field strength

Field strengths were calculated automatically by the software using pre-stored calibration data. The method of calculation is shown below:

$$E = V + AF - G + L$$

Where: E = Radiated Field Strength in dB μ V/m

V = EMI Receiver Voltage in dB μ V

AF = Antenna Factor in dB/m (stored as a data array)

G = Preamplifier Gain in dB (stored as a data array)

L = Cable loss in dB (stored as a data array of Insertion Loss versus frequency)

3.7.4 Limits

The limit applied is in accordance with the out-of-band/spurious emissions limit defined in §15.247(d).

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

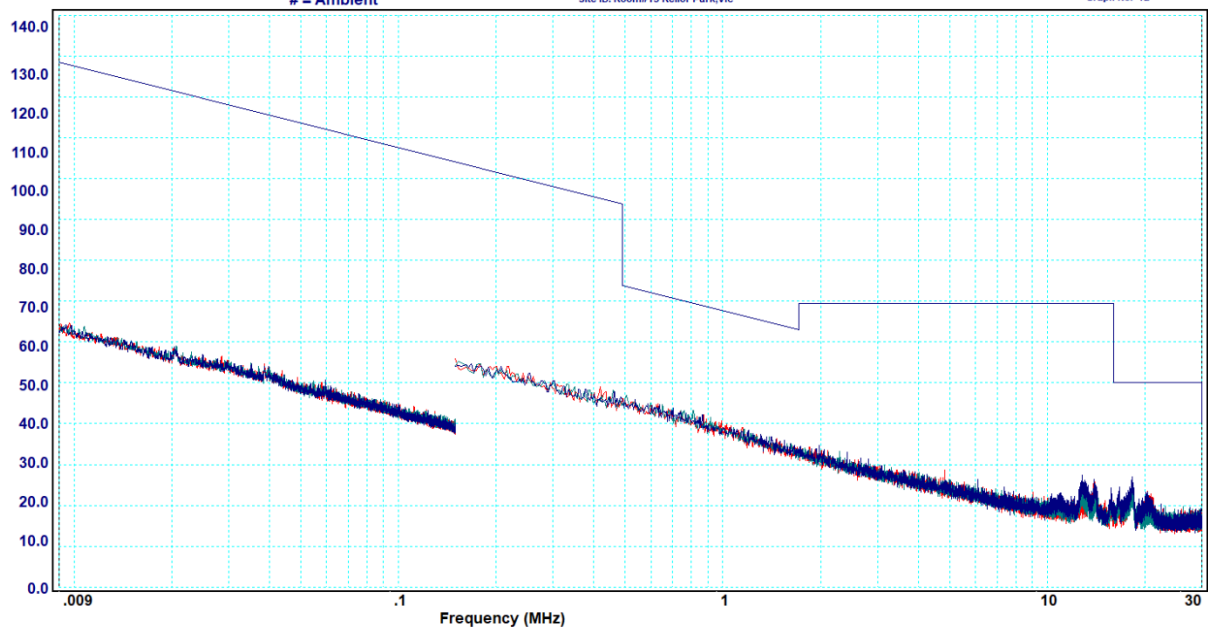
The in-band peak PSD in 100 kHz bandwidth were measured on all three channels. The maximum PSD level was used to establish the limit. However, the general limits of §15.209 apply for the restricted bands of operation defined in §15.205.

Frequency [MHz]	Peak at 3 m [dB μ V/m]	Established Limit @ 3 m [dB μ V/m]
2440	90.57	70.57

3.7.5 Transmitter Spurious Emissions – 9 kHz to 30 MHz

Operating Channel:	2402 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC Sample :S02046-0dBm 2402 MHz (Low Ch.)	Limit1: FCC15209 FCC PART 15.209 3mtr LMTS
Job No: M2411035 Test Date:	Trace 2: Perpendicular Trace 3: Parallel Trace 4: GND Test Officer: Plot date:23/01/2025 10:51:59 t:A3100924E c1:CL131124 c2:NONE c3:NONE p:NONE a:NONE IP:OFF Site ID: Room#13 Keller Park,Vic
Radiated Emissions (dBuV/m) # = Ambient	WintstRS:36.45-WpIt:164.77-Rx:R&S,ESW-26,1328.4100K26/101306.2. Room 13 below 30MHz Loop Antenna Graph No. 12



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	QP Limit [dBuV/m]	Margin [dB]
-	-	-	-	-	-

Comment: No peaks were measured within 10 dB of the limit.

Operating Channel:	2440 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC
Sample :S02046-0dBm
2440 MHz (Mid. Ch.)

Limit1: FCC15209

FCC PART 15.209 3mtr LMTS

Job No: M2411035
Test Date:

Trace 2: Perpendicular

Trace 3: Parallel

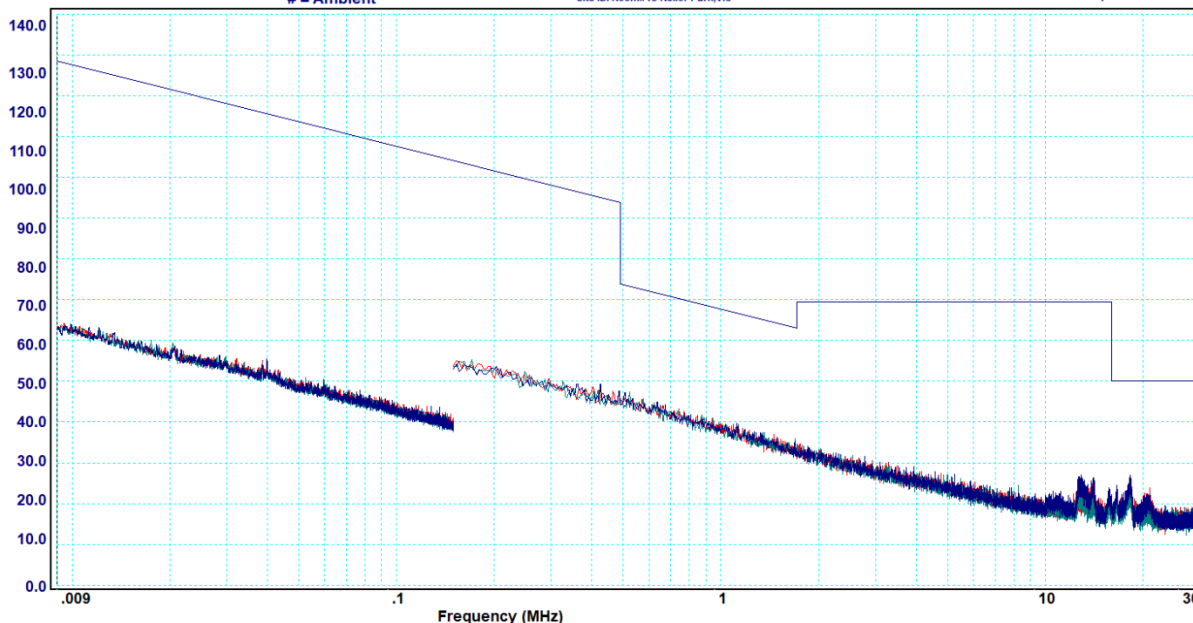
Trace 4: GND

Test Officer:-Plot date:23/01/2025 10:54:21
tA3100924E c1:CL131124 c2:NONE c3:NONE p:NONE a:NONE IP:OFF
Site ID: Room#13 Keller Park,Vic

WintSR5:36.45-WpIt:164.77-RxR&S:ESW-26,1328.4100K26/101306.2
Room 13 below 30MHz Loop Antenna
Graph No. 11

Radiated Emissions (dBuV/m)

= Ambient



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	QP Limit [dBuV/m]	Margin [dB]
-	-	-	-	-	-

Comment: No peaks were measured within 10 dB of the limit.

Operating Channel:	2480 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC
Sample :S02046-0dBm
2480 MHz (High Ch.)

Limit1: FCC15209

FCC PART 15.209 3mtr LMTS

Job No: M2411035
Test Date:

Trace 2: Perpendicular

Trace 3: Parallel

Trace 4: GND

Test Officer:-Plot date:23/01/2025 10:57:08

EA3100924E c1:CL131124 c2:NONE c3:NONE p:NONE a:NONE IP:OFF

Site ID: Room#13 Keller Park,Vic

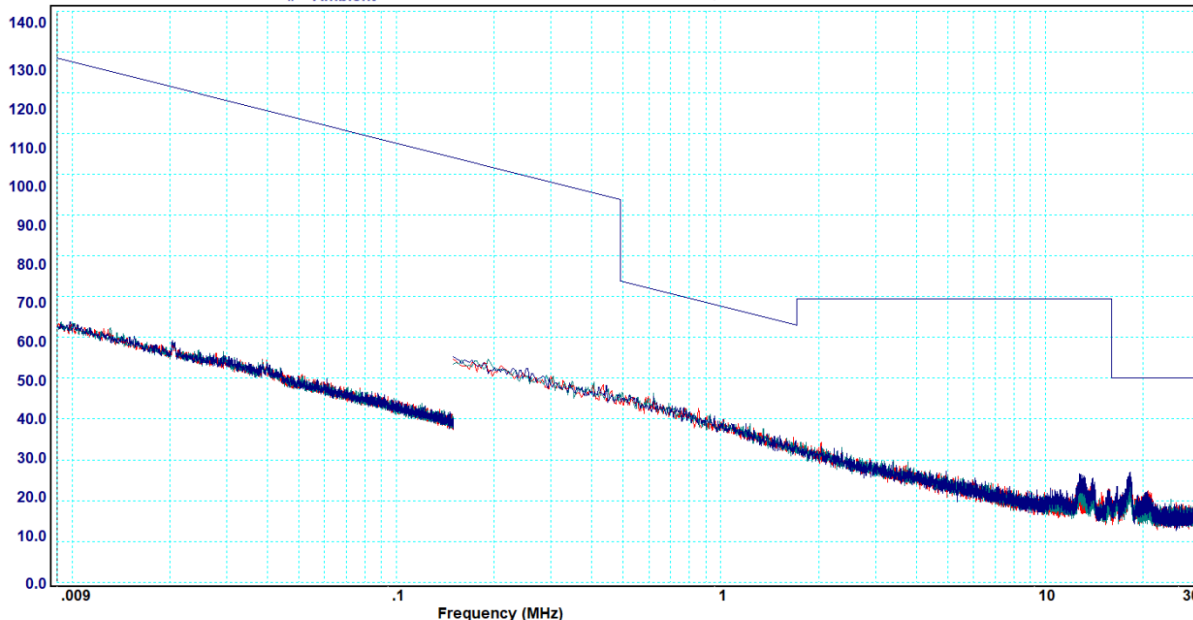
WintSR5:36.45-Wpit:164.77-RxR&S,ESW-26,1328.4100K26/101306.2

Room 13 below 30MHz Loop Antenna

Graph No. 10

Radiated Emissions (dBuV/m)

= Ambient



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	QP Limit [dBuV/m]	Margin [dB]
-	-	-	-	-	-

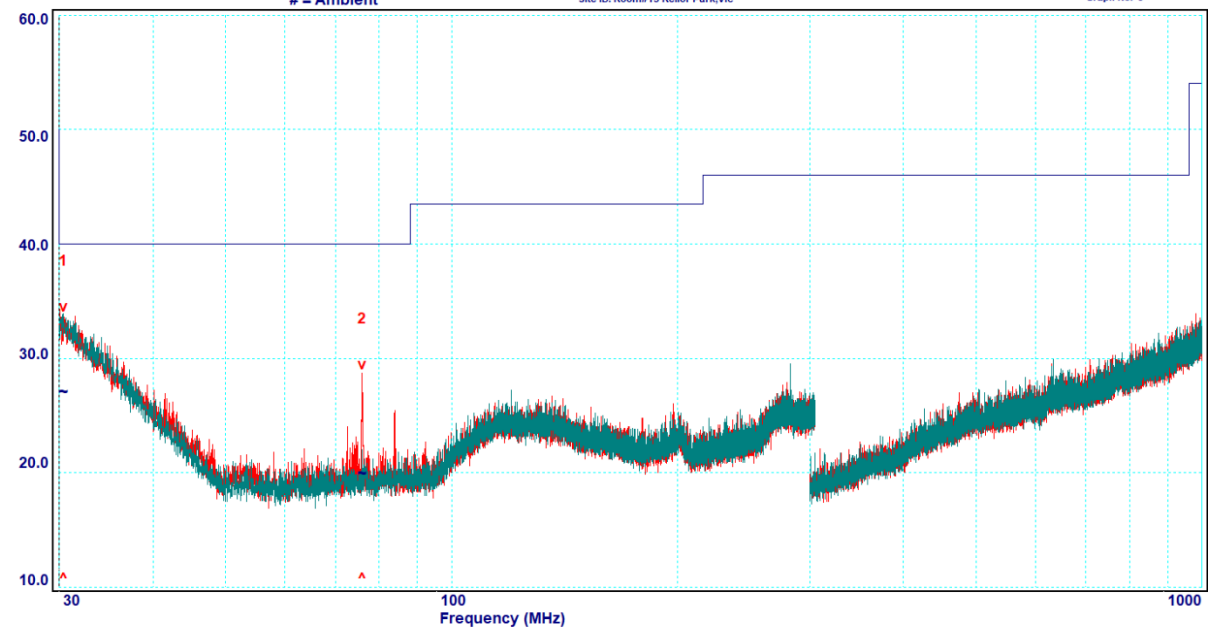
Comment: No peaks were measured within 10 dB of the limit.

3.7.6 Transmitter Spurious Emissions – 30 MHz to 1000 MHz

Operating Channel:	2402 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC Sample :S02046-0dBm 2402 MHz (Low Ch.)	Limit1: FCC15209 FCC PART 15.209 3mtr LMTS
Job No: M2411035 Test Date: 17/01/2025	Trace 2: Vertical Emissions Trace 3: Horizontal Emissions Test Officer:-Plot date:23/01/2025 11:02:26 t:A4340325 c:CL131125 c2:NONE c3:NONE p:NONE a:NONE IP:ON2 Site ID: Room#13 Keller Park,Vic WintstRS:36.45-WpIt:164.77-Rx:R&S,ESW-26,1328.4100K26/101306.2, below 1G Graph No. 9

Radiated Emissions (dBuV/m) # = Ambient



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	QP Limit [dBuV/m]	Margin [dB]
1	30.39	Vertical	27.5	40	-12.5
2	75.99	Vertical	20.4	40	-19.6

Comment: N/A

Operating Channel:	2440 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC
Sample :S02046-0dBm
2440 MHz (Mid Ch.)

Limit1: FCC15209

FCC PART 15.209 3mtr LMTS

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

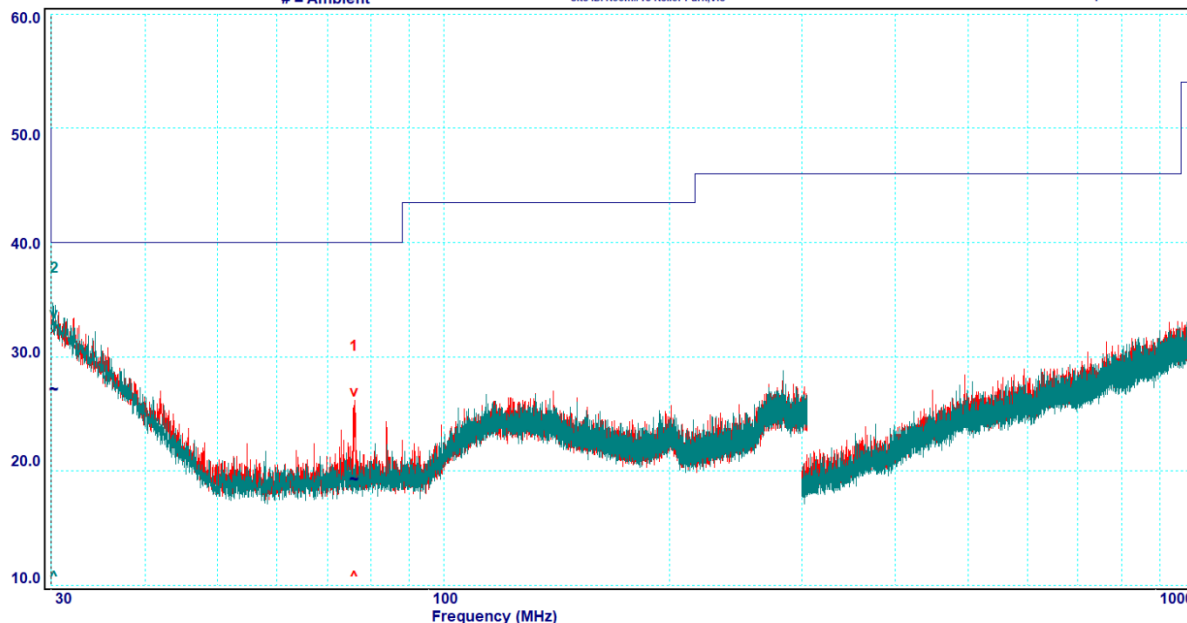
Job No: M2411035
Test Date: 17/01/2025

Test Officer:-Plot date:23/01/2025 11:09:27
tA4340325 c1:CL131125 c2:NONE c3:NONE p:NONE a:NONE IP:ONZ
Site ID: Room#13 Keller Park,Vic

WintstrS:36.45-WpIt:164.77-RxR&S,ESW-26,1328.4100K26/101306.2
below 1G Graph No. 8

Radiated Emissions (dBuV/m)

= Ambient



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	QP Limit [dBuV/m]	Margin [dB]
1	76.06	Vertical	19.8	40	-20.2
2	30.28	Horizontal	27.6	40	-12.4

Comment: N/A

Operating Channel:	2480 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC
Sample :S02046-0dBm
2480 MHz (High Ch.)

Limit1: FCC15209

FCC PART 15.209 3mtr LMTS

Job No: M2411035
Test Date: 17/01/2025

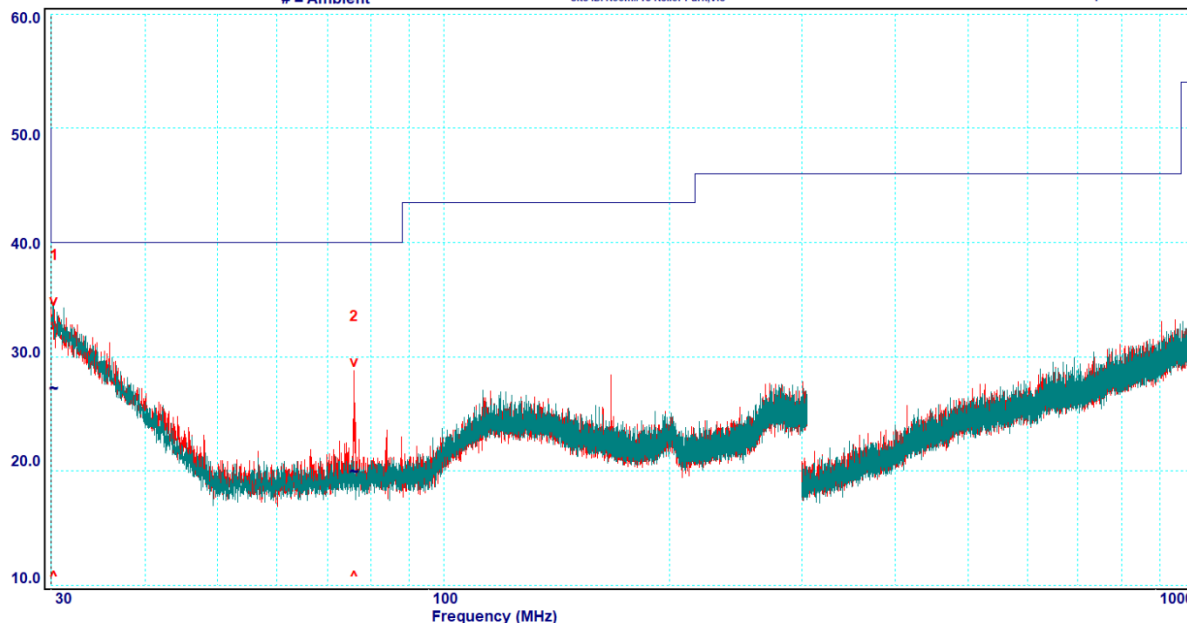
Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

Test Officer:-Plot date:23/01/2025 11:13:07
tA4340325 c1:CL131125 c2:NONE c3:NONE p:NONE a:NONE IP:ONZ
Site ID: Room#13 Keller Park,Vic

WintSRs:36.45-WpIt:164.77-RxR&S,ESW-26,1328.4100K26/101306,2
below 1G Graph No. 7

Radiated Emissions (dBuV/m)

= Ambient



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	QP Limit [dBuV/m]	Margin [dB]
1	30.28	Vertical	27.7	40	-12.3
2	75.99	Vertical	20.4	40	-19.6

Comment: N/A

3.7.7 Transmitter Spurious Emissions – 1 to 18 GHz

Operating Channel:	2402 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC Sample :S02046-0dBm 2402 MHz (Low Ch.) (Peak limit)	Limit1: FCC15209Pk FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr
Job No: M2411035 Test Date: 16/01/2025	Trace 2: Vertical Emissions Trace 3: Horizontal Emissions Test Officer:-Plot date:23/01/2025 11:17:38 t:A4060128 c:CL131125 c2:NONE c3:NONE p:A2881125 a:F0310126 IP:OFFICE102 Site ID: Room#13 Keller Park,Vic WintstRS:36.45-WpIt:164.77-Rx:R&S,ESW-26,1328.4100K26/101306.2 Graph No. 2

Radiated Emissions (dBuV/m) # = Ambient

Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	PEAK Limit [dBuV/m]	Margin [dB]
1*	2402	Vertical	N/A	N/A	N/A
2**	7204.78	Vertical	51.2	70.57	-19.37
3*	2402	Horizontal	N/A	N/A	N/A
4**	7204.85	Horizontal	56.3	70.57	-14.27

Comment:

*Peaks above the limit are the fundamental transmission and not subject to the spurious emissions limit of the standard.

** -20 dBc Peak limit applies for nonrestricted bands.

Operating Channel:	2402 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC
Sample :S02046-0dBm
2402 MHz (Low Ch.)
(Avg limit)

Limit1: FCC15209Av

FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

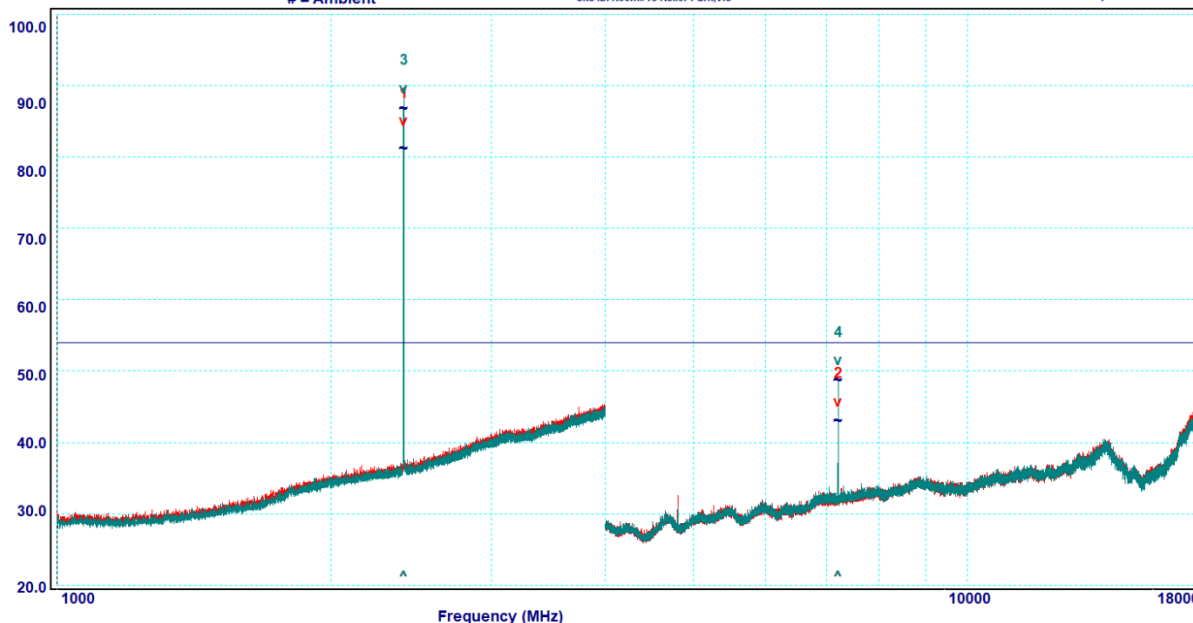
Radiated Emissions (dBuV/m)

Job No: M2411035
Test Date: 16/01/2025

Test Officer: Plot date: 23/01/2025 11:25:36
tA4060128 c1:CL131125 c2:NONE c3:NONE p:A2881125 a:F0310126 IP:OFFICE102
Site ID: Room#13 Keller Park,Vic

WintSR5:36.45-WpIt:164.77-RxR&S,ESW-26,1328.4100K26/101306.2

Graph No. 6



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	AVE Limit [dBuV/m]	Margin [dB]
1*	2402	Vertical	N/A	N/A	N/A
2**	7207.39	Vertical	N/A	N/A	N/A
3*	2402	Horizontal	N/A	N/A	N/A
4**	7207.29	Horizontal	N/A	N/A	N/A

Comment:

*Peaks above the limit are the fundamental transmission and not subject to the spurious emissions limit of the standard.

** -20 dBc Peak limit applies for nonrestricted bands.

Operating Channel:	2440 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC
Sample :S02046-0dBm
2440 MHz (Mid Ch.)
(Peak limit)

Limit1: FCC15209Pk

FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

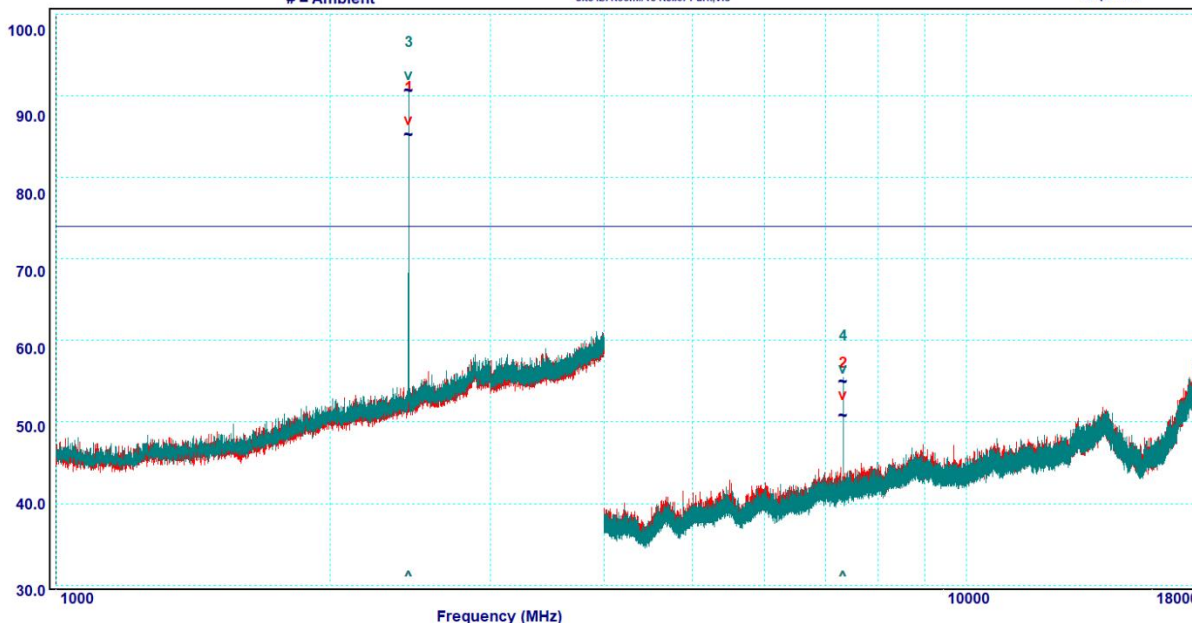
Radiated Emissions (dBuV/m)

Job No: M2411035
Test Date: 16/01/2025

Test Officer:-Plot date:22/01/2025 14:05:54
tA4060128 c1:CL131125 c2:NONE c3:NONE pA2881125 aF0310126 IP:OFFICE102
Site ID: Room#13 Keller Park,Vic

WintstrS:36.45-WpIt:164.77-RxR&S,ESW-26,1328.4100K26/101306.2

Graph No. 1



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	PEAK Limit [dBuV/m]	Margin [dB]
1*	2440	Vertical	N/A	N/A	N/A
2	7318.81	Vertical	51.2	74	-22.8
3*	2440	Horizontal	N/A	N/A	N/A
4	7321	Horizontal	55.4	74	-18.6

Comment:

*Peaks above the limit are the fundamental transmission and not subject to the spurious emissions limit of the standard.

Operating Channel:	2440 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC
Sample :S02046-0dBm
2440 MHz (Mid Ch.)
(Avg limit)

Limit1: FCC15209Av

FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

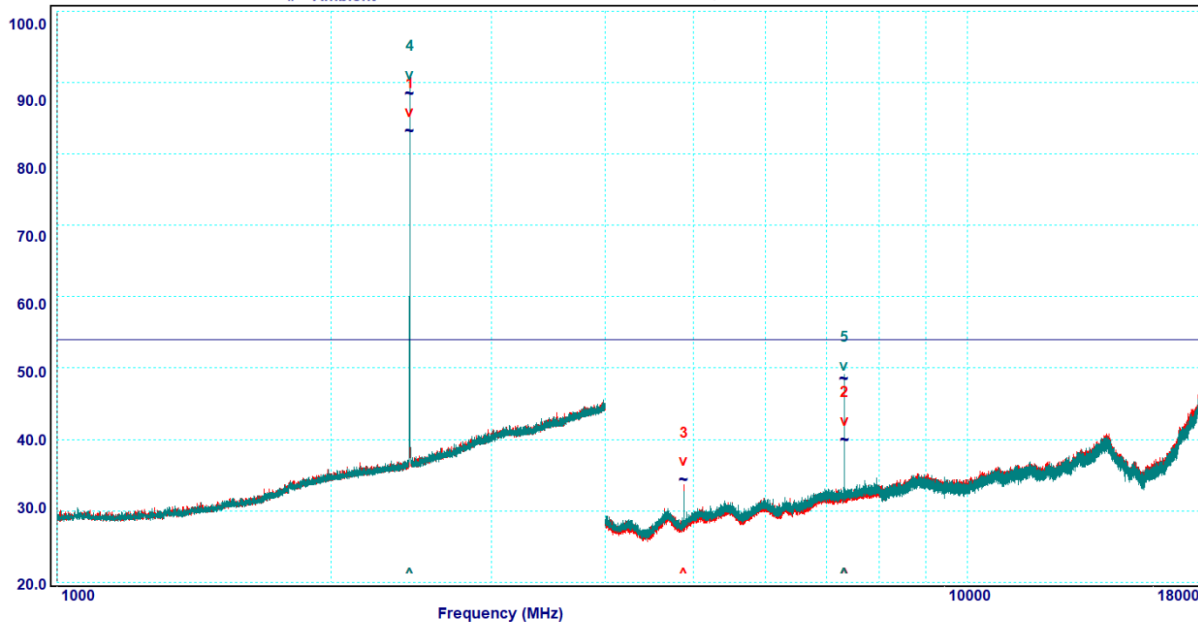
Radiated Emissions (dBuV/m)

Job No: M2411035
Test Date: 16/01/2025

Test Officer: Plot date: 22/01/2025 14:28:53
tA4060128 c1:CL131125 c2:NONE c3:NONE pA2881125 aF0310126 IP:OFFICE102
Site ID: Room#13 Keller Park,Vic

Wintstrs:36.45-Wpilt:164.77-RxcR&S,ESW-26,1328.4100K26/101306.2

Graph No. 5



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	AVE Limit [dBuV/m]	Margin [dB]
1*	2440	Vertical	N/A	N/A	N/A
2	7321.42	Vertical	40.4	54	-13.6
3	4880.09	Vertical	34.8	54	-19.2
4*	2440	Horizontal	N/A	N/A	N/A
5	7321	Horizontal	49	54	-5.0

Comment:

*Peaks above the limit are the fundamental transmission and not subject to the spurious emissions limit of the standard.

Operating Channel:	2480 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC
Sample :S02046-0dBm
2480 MHz (High Ch.)
(Peak limit)

Limit1: FCC15209Pk

FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

Radiated Emissions (dBuV/m)

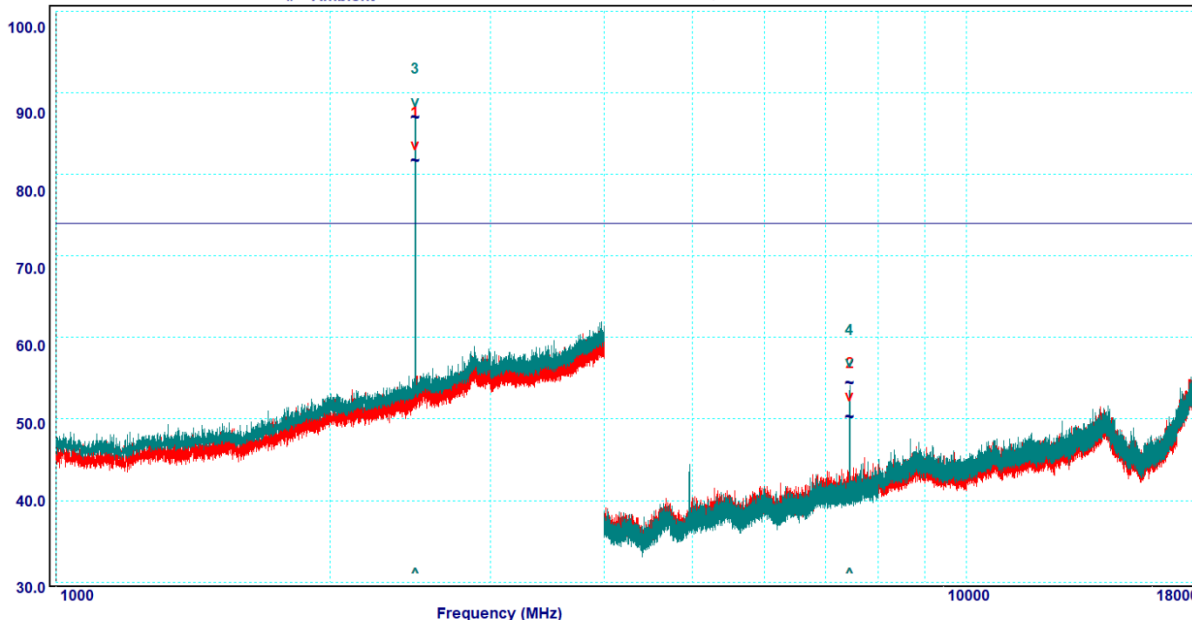
= Ambient

Job No: M2411035
Test Date: 16/01/2025

Test Officer: Plot date: 23/01/2025 11:34:53
tA4060128 c1:CL131125 c2:NONE c3:NONE pA2881125 aF0310126 IP:OFCE102
Site ID: Room#13 Keller Park,Vic

WintstrS:36.45-WpIt:164.77-RxR&S,ESW-26,1328.4100K26/101306.2

Graph No. 3



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	PEAK Limit [dBuV/m]	Margin [dB]
1*	2480	Vertical	N/A	N/A	N/A
2	7441.78	Horizontal	50.8	74	-23.2
3*	2480	Vertical	N/A	N/A	N/A
4	7438.86	Horizontal	54.8	74	-19.2

Comment:

*Peaks above the limit are the fundamental transmission and not subject to the spurious emissions limit of the standard.

Operating Channel:	2480 MHz	Test Date:	16/01/2025	17/01/2025
Power Input:	12V DC	Temperature:	22 °C	23.5 °C
Measurement Distance:	3 m	Humidity:	51%	49%
Test Standard:	FCC 15.247/RSS 247			

REDARC
Sample :S02046-0dBm
2480 MHz (High Ch.)
(Avg limit)

Limit1: FCC15209Av

FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

Job No: M2411035
Test Date: 16/01/2025

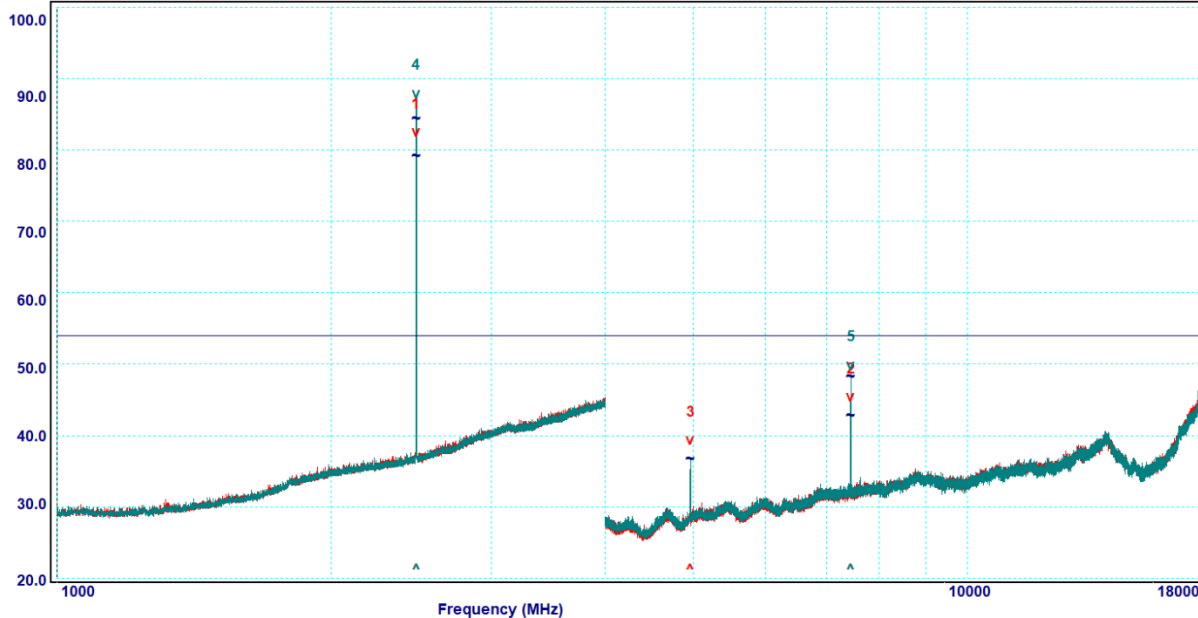
Test Officer: Plot date: 23/01/2025 11:39:50
tA4060128 c1:CL131125 c2:NONE c3:NONE pA2881125 aF0310126 IP:OFCE102
Site ID: Room#13 Keller Park,Vic

WintRS:36.45-WpIt:164.77-RxR&S,ESW-26,1328.4100K26/101306.2

Graph No. 4

Radiated Emissions (dBuV/m)

= Ambient

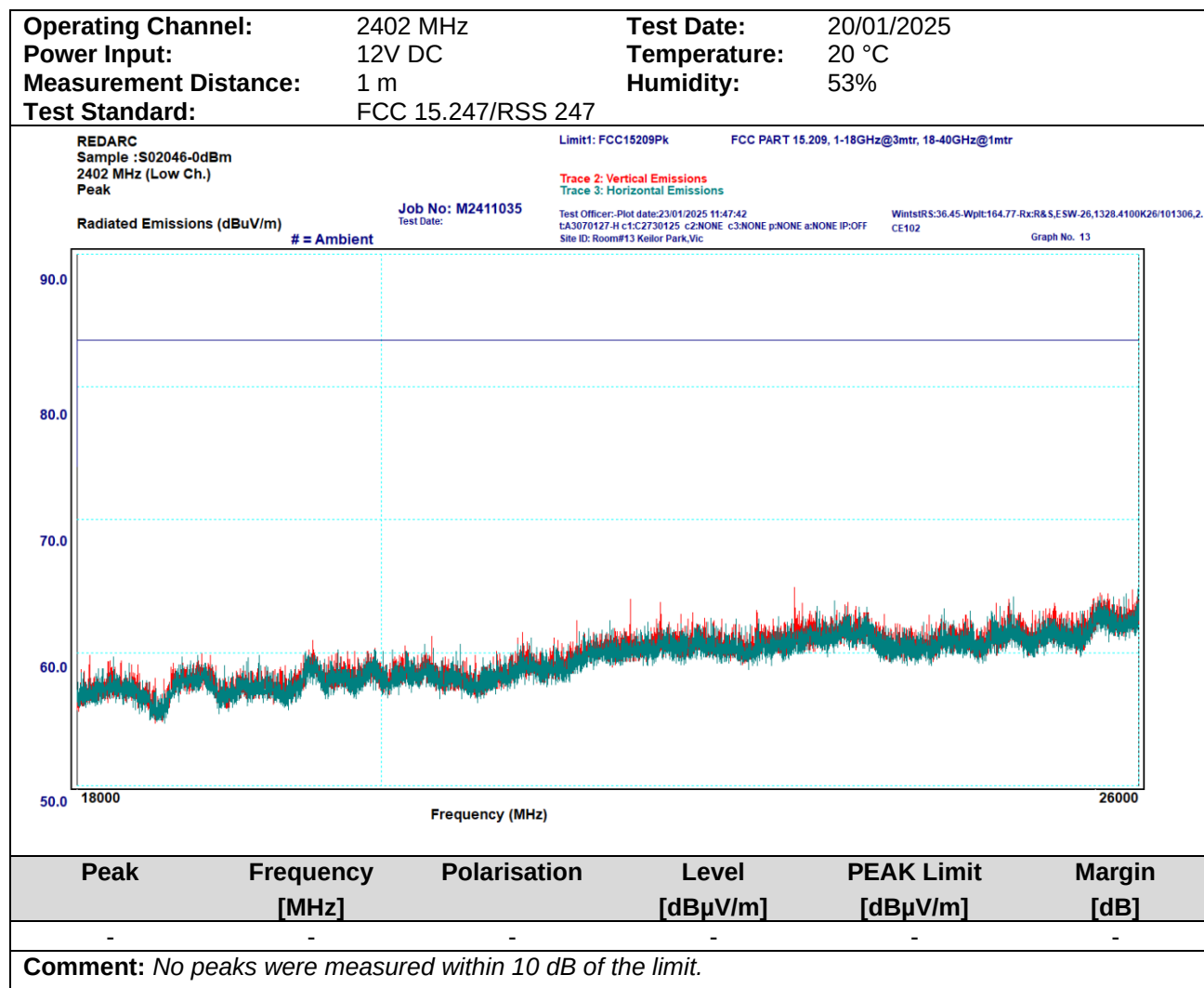


Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	AVE Limit [dBuV/m]	Margin [dB]
1*	2480	Vertical	N/A	N/A	N/A
2	7441.64	Vertical	43.2	54	-10.8
3	4961.09	Vertical	37.1	54	-16.9
4*	2480	Horizontal	N/A	N/A	N/A
5	7441.68	Horizontal	48.6	54	-5.4

Comment:

*Peaks above the limit are the fundamental transmission and not subject to the spurious emissions limit of the standard.

3.7.8 Transmitter Spurious Emissions – 18 to 26 GHz



Operating Channel:	2402 MHz	Test Date:	20/01/2025
Power Input:	12V DC	Temperature:	20 °C
Measurement Distance:	1 m	Humidity:	53%
Test Standard:	FCC 15.247/RSS 247		

REDARC
Sample :S02046-0dBm
2402 MHz (Low Ch.)
Avg.

Limit1: FCC15209Av

FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

Job No: M2411035
Test Date:

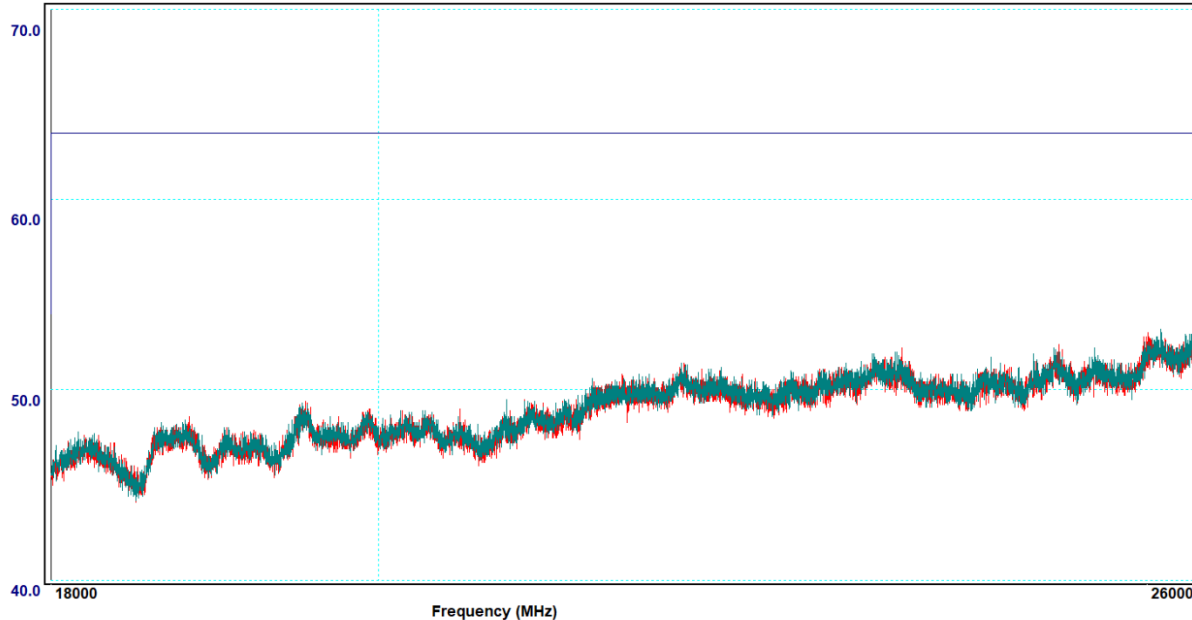
Test Officer:-Plot date:23/01/2025 11:50:07
EA3070127-H c1:C2730125 c2:NONE c3:NONE p:NONE a:NONE IP:OFF
Site ID: Room#13 Keller Park,Vic

WintstrS:36.45-WpIt:164.77-RxR&S,ESW-26,1328.4100K26/101306.2
CE102

Graph No. 14

Radiated Emissions (dBuV/m)

= Ambient



Peak	Frequency [MHz]	Polarisation	Level [dBµV/m]	AVE Limit [dBµV/m]	Margin [dB]
-	-	-	-	-	-
Comment: No peaks were measured within 10 dB of the limit.					

Operating Channel:	2440 MHz	Test Date:	20/01/2025
Power Input:	12V DC	Temperature:	20 °C
Measurement Distance:	1 m	Humidity:	53%
Test Standard:	FCC 15.247/RSS 247		

REDARC
Sample :S02046-0dBm
2440 MHz (Mid Ch.)
Peak

Limit1: FCC15209Pk

FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

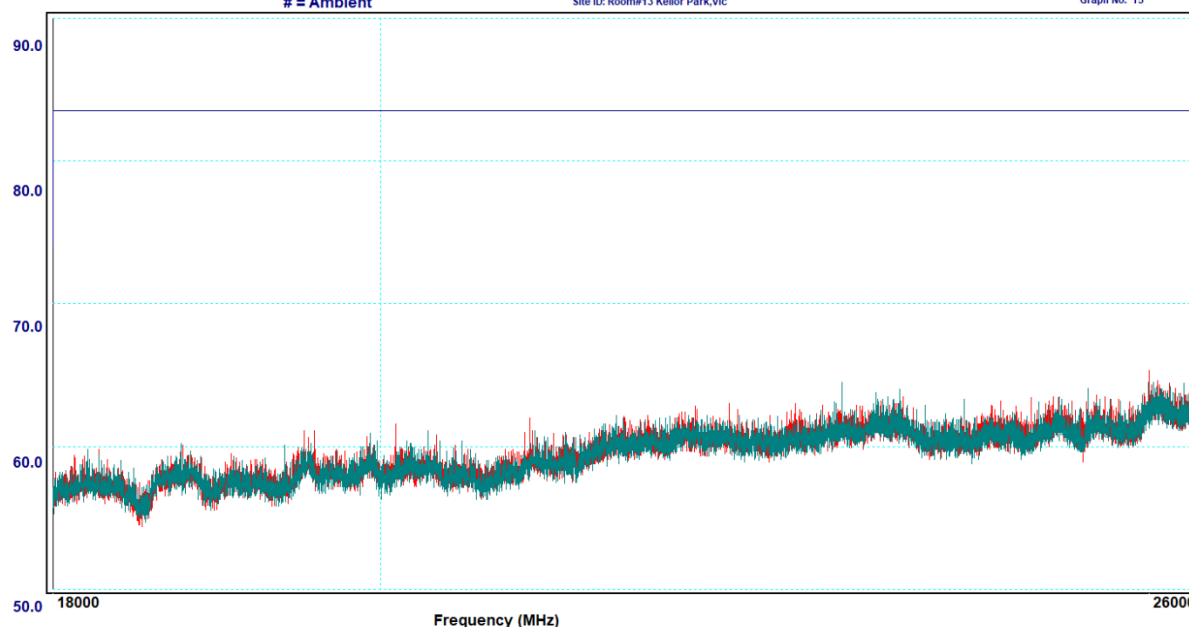
Radiated Emissions (dBuV/m)

Job No: M2411035
Test Date:

Test Officer:-Plot date:23/01/2025 11:51:26
tA3070127-H c1:C2730125 c2:NONE c3:NONE p:NONE a:NONE IP:OFF
Site ID: Room#13 Keller Park,Vic

Wintstrs:36.45-Wp1t:164.77-RxR&S,ESW-26,1328.4100K26/101306.2
CE102

Graph No. 15



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	PEAK Limit [dBuV/m]	Margin [dB]
-	-	-	-	-	-

Comment: No peaks were measured within 10 dB of the limit.

Operating Channel:	2440 MHz	Test Date:	20/01/2025
Power Input:	12V DC	Temperature:	20 °C
Measurement Distance:	1 m	Humidity:	53%
Test Standard:	FCC 15.247/RSS 247		

REDARC
Sample :S02046-0dBm
2440 MHz (Mid Ch.)
Avg.

Limit1: FCC15209Av

FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

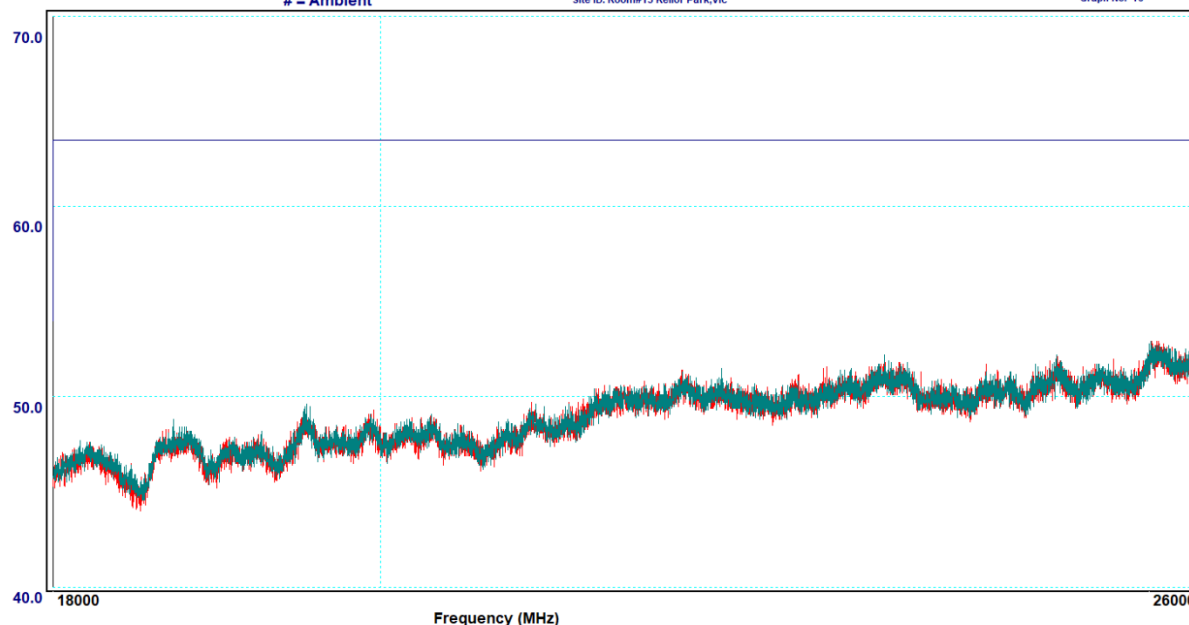
Radiated Emissions (dBuV/m)

Job No: M2411035
Test Date:

Test Officer:-Plot date:23/01/2025 11:53:34
EA3070127-H c1:C2730125 c2:NONE c3:NONE p:NONE a:NONE IP:OFF
Site ID: Room#13 Keller Park,Vic

Wintstrs:36.45-Wpilt:164.77-RxcR&S,ESW-26,1328.4100K26/101306.2
CE102

Graph No. 16



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	AVE Limit [dBuV/m]	Margin [dB]
-	-	-	-	-	-

Comment: No peaks were measured within 10 dB of the limit.

Operating Channel:	2480 MHz	Test Date:	20/01/2025
Power Input:	12V DC	Temperature:	20 °C
Measurement Distance:	1 m	Humidity:	53%
Test Standard:	FCC 15.247/RSS 247		

REDARC
Sample :S02046-0dBm
2480 MHz (High Ch.)
Peak

Limit1: FCC15209Pk

FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

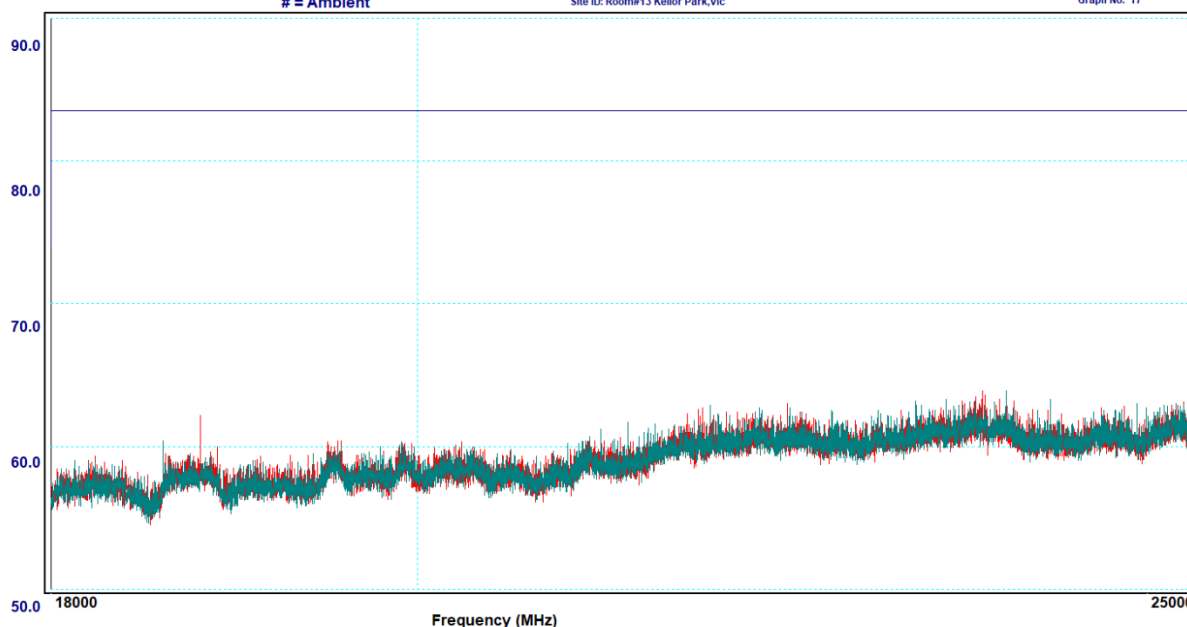
Radiated Emissions (dBuV/m)

Job No: M2411035
Test Date:

Test Officer:-Plot date:23/01/2025 11:54:32
tA3070127-H c1:C2730125 c2:NONE c3:NONE p:NONE a:NONE IP:OFF
Site ID: Room#13 Keller Park,Vic

Wintstrs:36.45-Wp1t:164.77-RxR&S,ESW-26,1328.4100K26/101306.2
CE102

Graph No. 17



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	PEAK Limit [dBuV/m]	Margin [dB]
-	-	-	-	-	-

Comment: No peaks were measured within 10 dB of the limit.

Operating Channel:	2480 MHz	Test Date:	20/01/2025
Power Input:	12V DC	Temperature:	20 °C
Measurement Distance:	1 m	Humidity:	53%
Test Standard:	FCC 15.247/RSS 247		

REDARC
Sample :S02046-0dBm
2480 MHz (High Ch.)
Avg.

Limit1: FCC15209Av

FCC PART 15.209, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions
Trace 3: Horizontal Emissions

Radiated Emissions (dBuV/m)

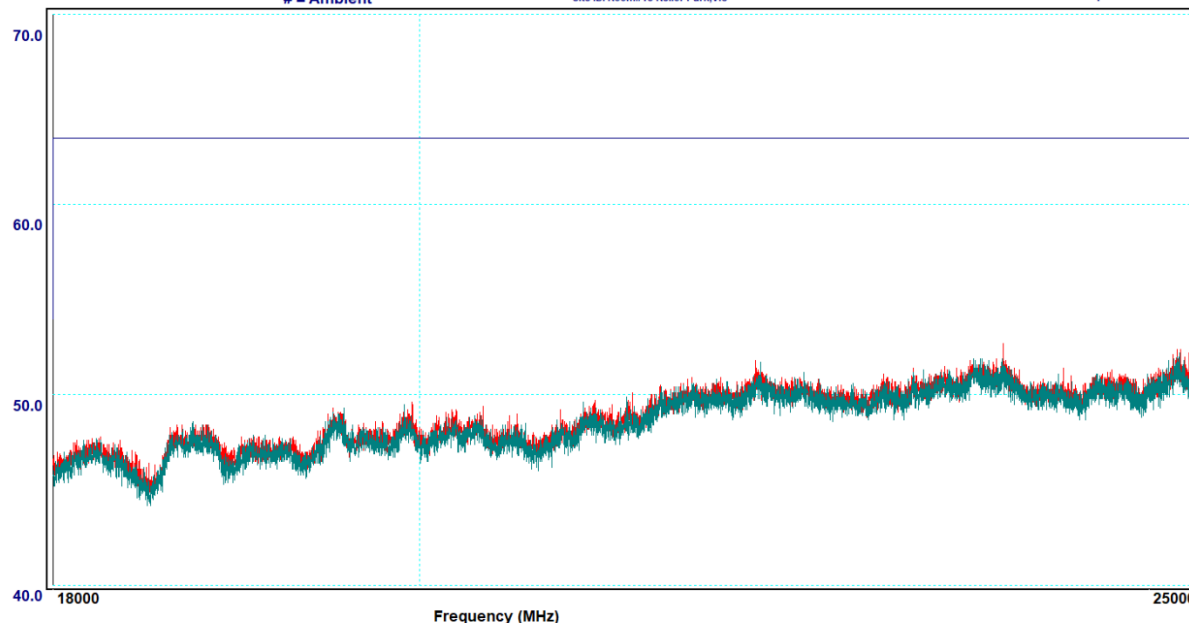
Job No: M2411035

Test Date:

Test Officer:-Plot date:23/01/2025 11:55:51
EA3070127-H c1:C2730125 c2:NONE c3:NONE p:NONE a:NONE IP:OFF
Site ID: Room#13 Keller Park,Vic

WintSR5:36.45-WpIt:164.77-RxR&S,ESW-26,1328.4100K26/101306.2
CE102

Graph No. 18



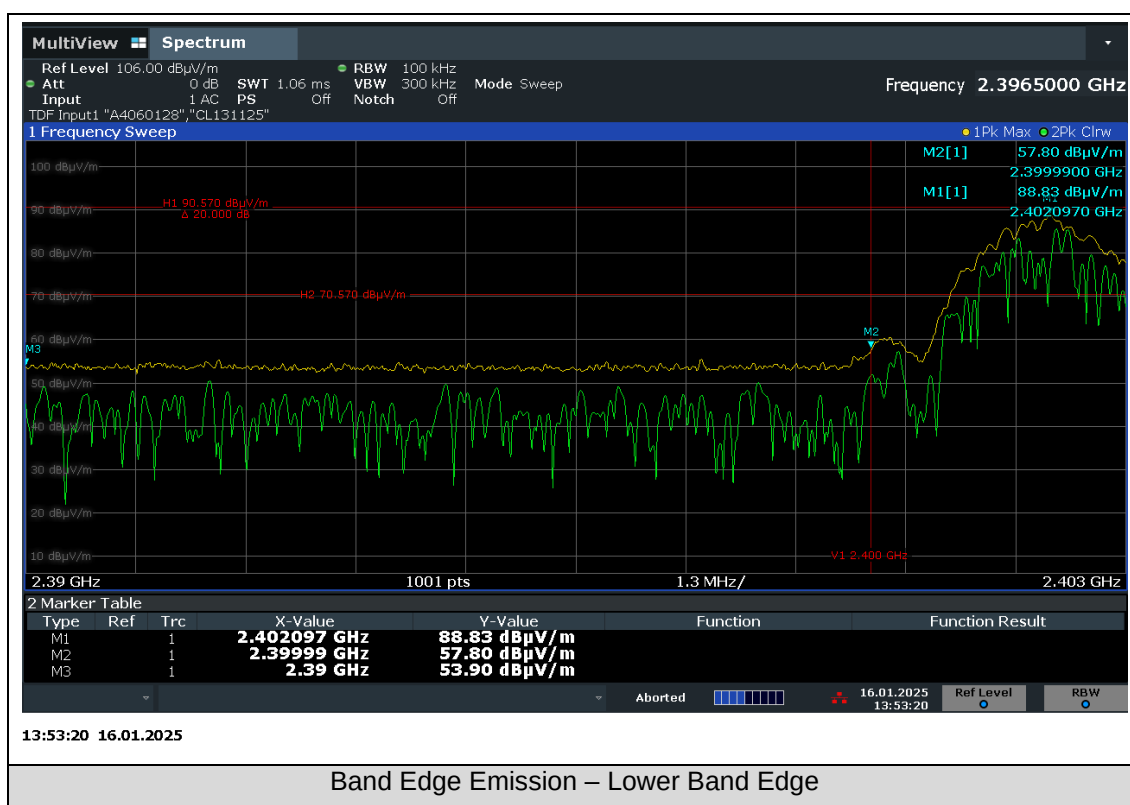
Peak	Frequency [MHz]	Polarisation	Level [dBµV/m]	AVE Limit [dBµV/m]	Margin [dB]
-	-	-	-	-	-
Comment: No peaks were measured within 10 dB of the limit.					

3.8 §15.247(d)/ RSS-247 5.5 Band Edge Emission Measurements

Band-edge radiated measurements were done in accordance with ANSI C63.10: 2013 clause 6.10. All emissions measured near the lower and higher band edge complied with the requirements of §15.247 / RSS-247.

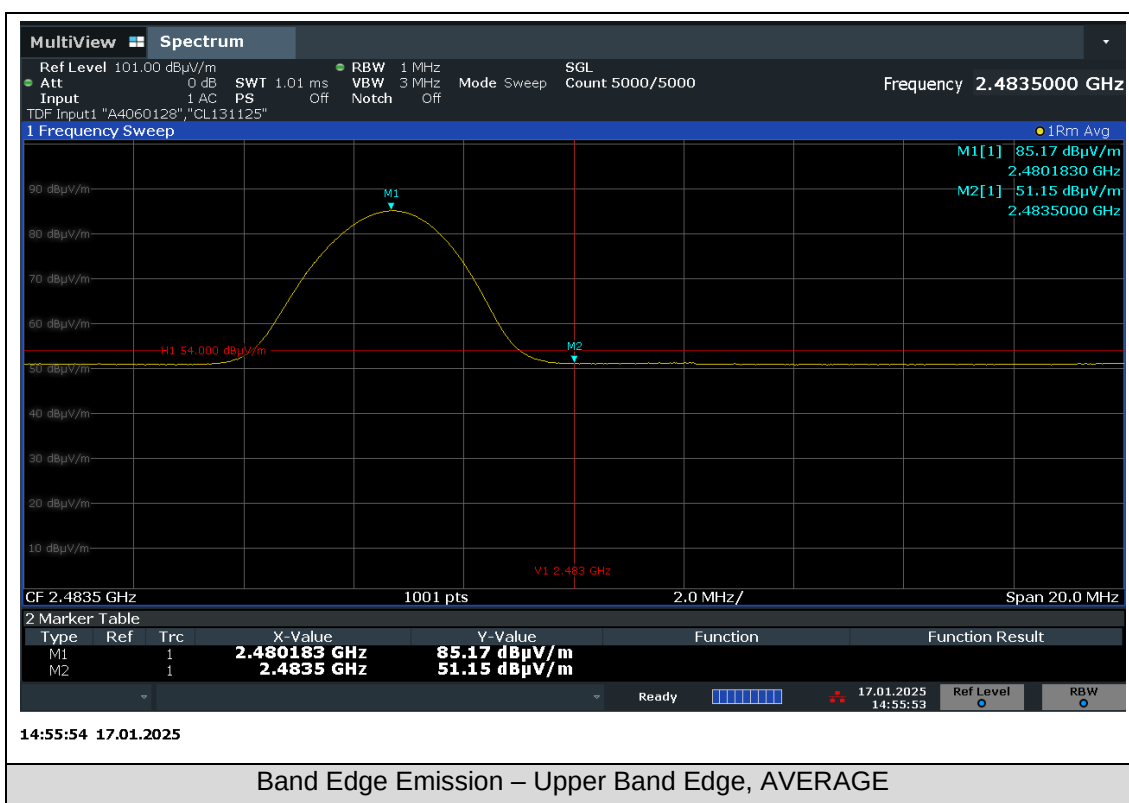
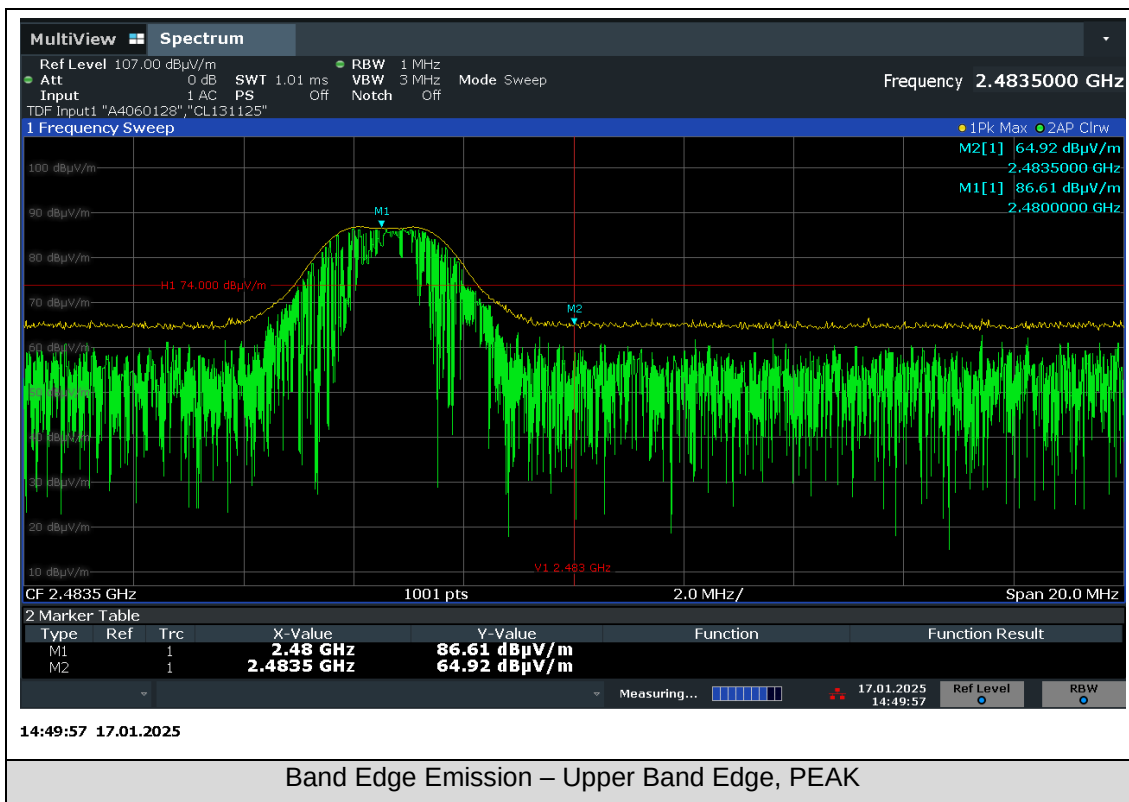
Lower Band Edge:

Marker	Measurement Type	Frequency [MHz]	Measurement [dB μ V/m]	Limit [dB μ V/m]	Result
M2	Peak	2399.99	57.8	70.57	Complied



Upper Band Edge:

Measurement Type	Frequency [MHz]	Measurement [dB μ V/m]	Limit [dB μ V/m]	Result
Peak	2483.5	64.92	74	Complied
Average	2483.5	51.15	54	Complied



3.9 §15.247(e)/ RSS-247 5.2(b) Power Spectral Density

3.9.1 Test Procedure

The maximum power spectral density in the fundamental emission was measured in accordance with ANSI C63.10: 2013 clause 11.10.

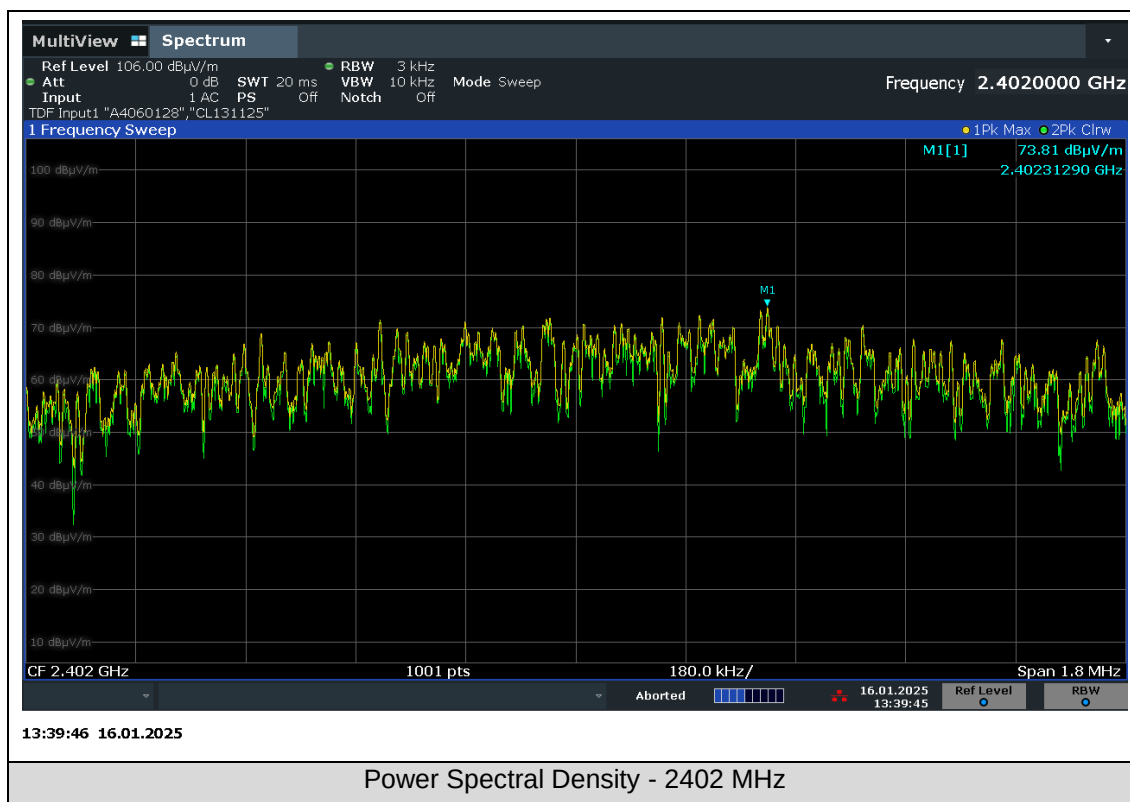
3.9.2 Limits

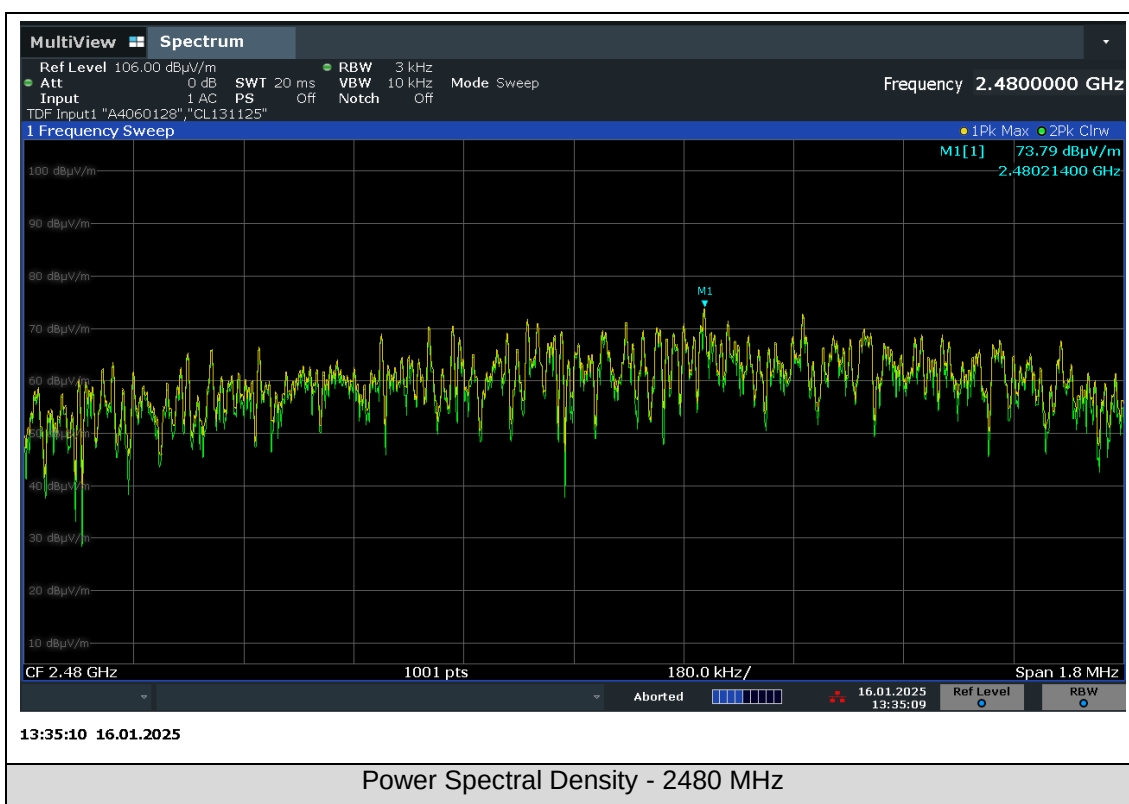
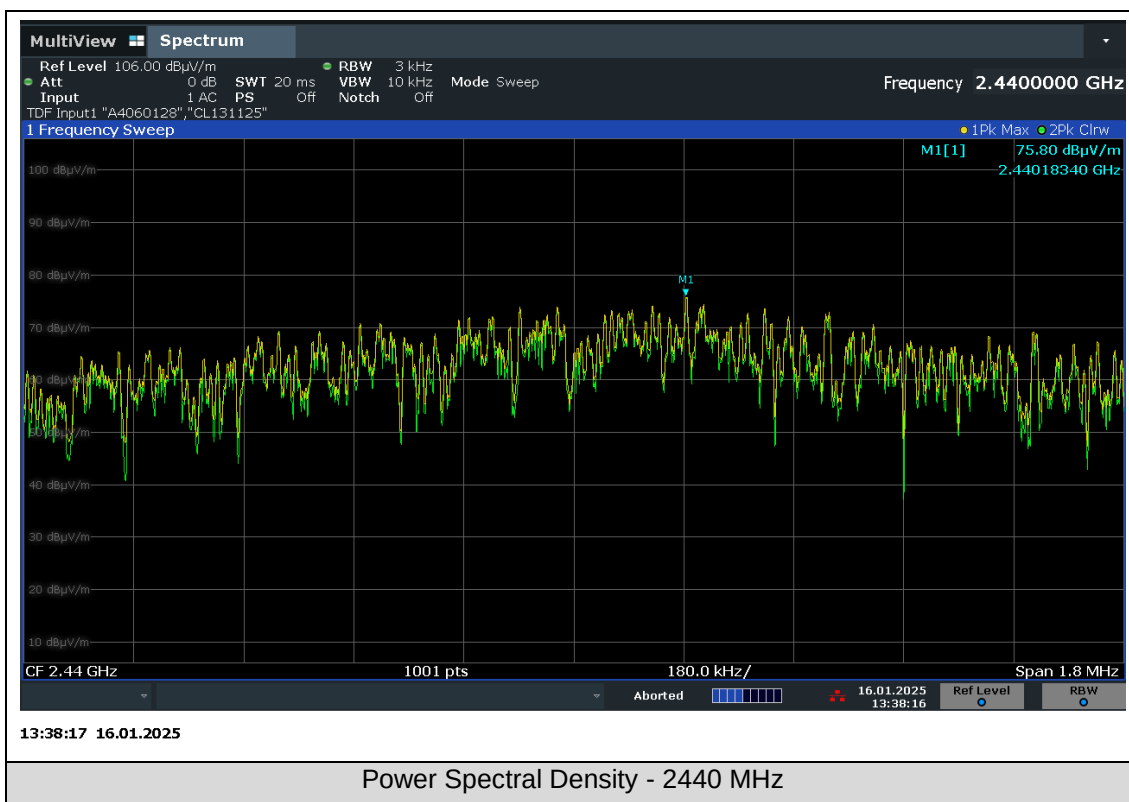
The maximum peak conducted power spectral density (PSD) is 8 dBm per 3 kHz.

3.9.3 Results

The measured radiated field strength is converted to equivalent conducted output power for checking compliance (KDB 558074 D01 Section 3).

Frequency (MHz)	E-Field @ 3 m (dB μ V/m)	EIRP (dBm)	Antenna Gain (dBi)	Equivalent Conducted Output PSD (dBm)	Limit (dBm)	Results
2402	73.81	-21.42	2.5	-23.92	8	Complied
2440	75.80	-19.43	2.5	-21.93	8	Complied
2480	73.79	-21.44	2.5	-23.94	8	Complied





3.10 §15.247(i)/ RSS-Gen 3.4/RSS-102 Maximum Permissible Exposure

The EUT complied with the applicable maximum permissible exposure levels. Refer to EMC Technologies report M2411035-2 and M2411035-3.

3.11 §15.215/ RSS-Gen 6.7 Occupied Bandwidth – 99%

3.11.1 Test Procedure

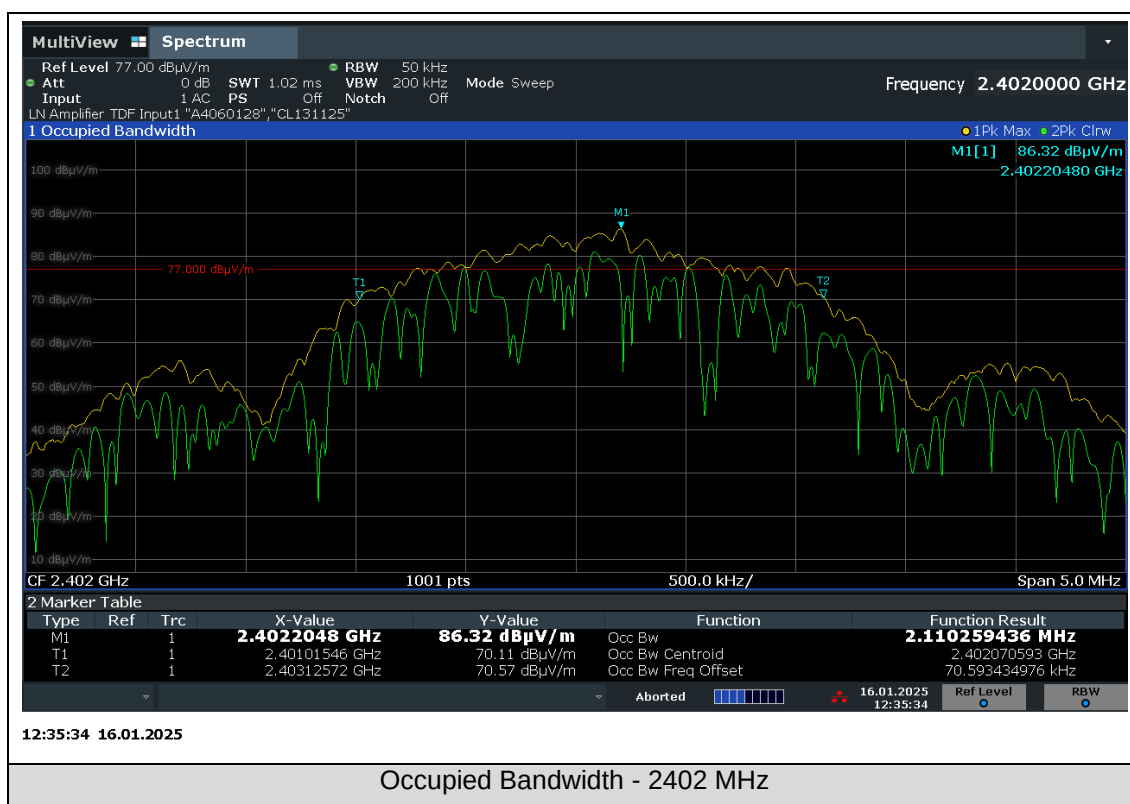
The bandwidth containing 99% of the total transmitted power of the fundamental emission was measured in accordance with ANSI C63.10: 2013 clause 6.9.

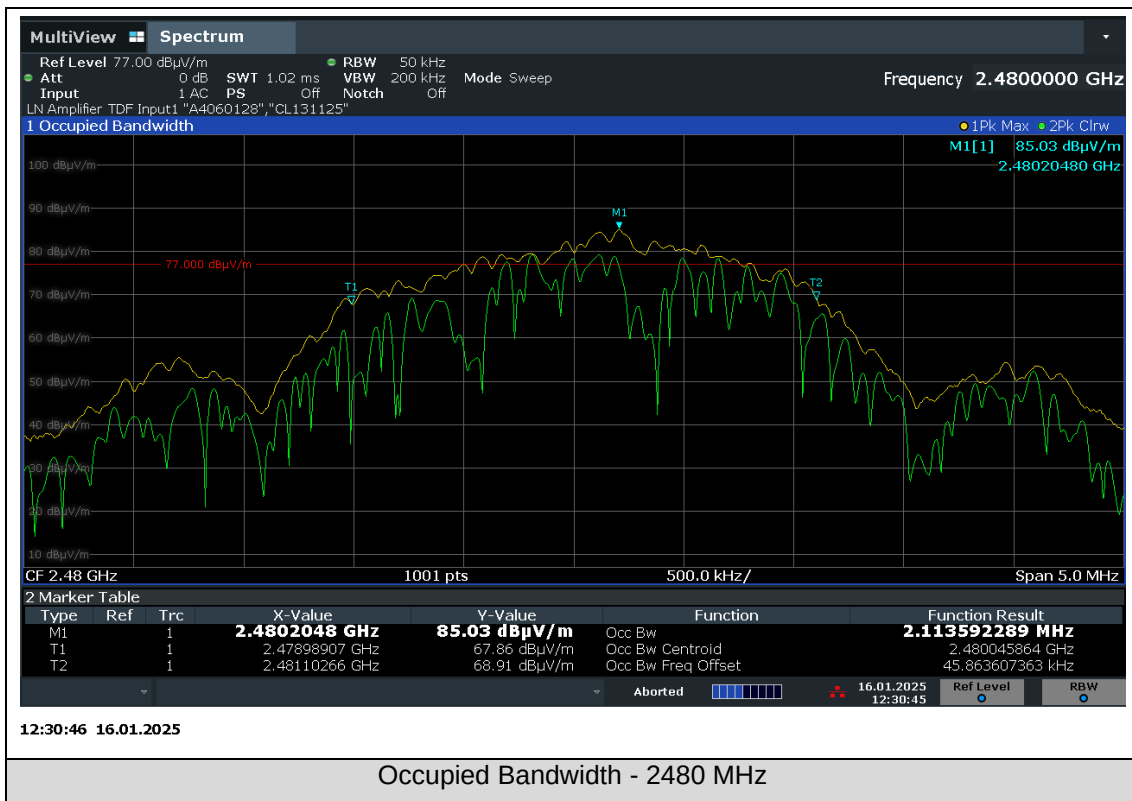
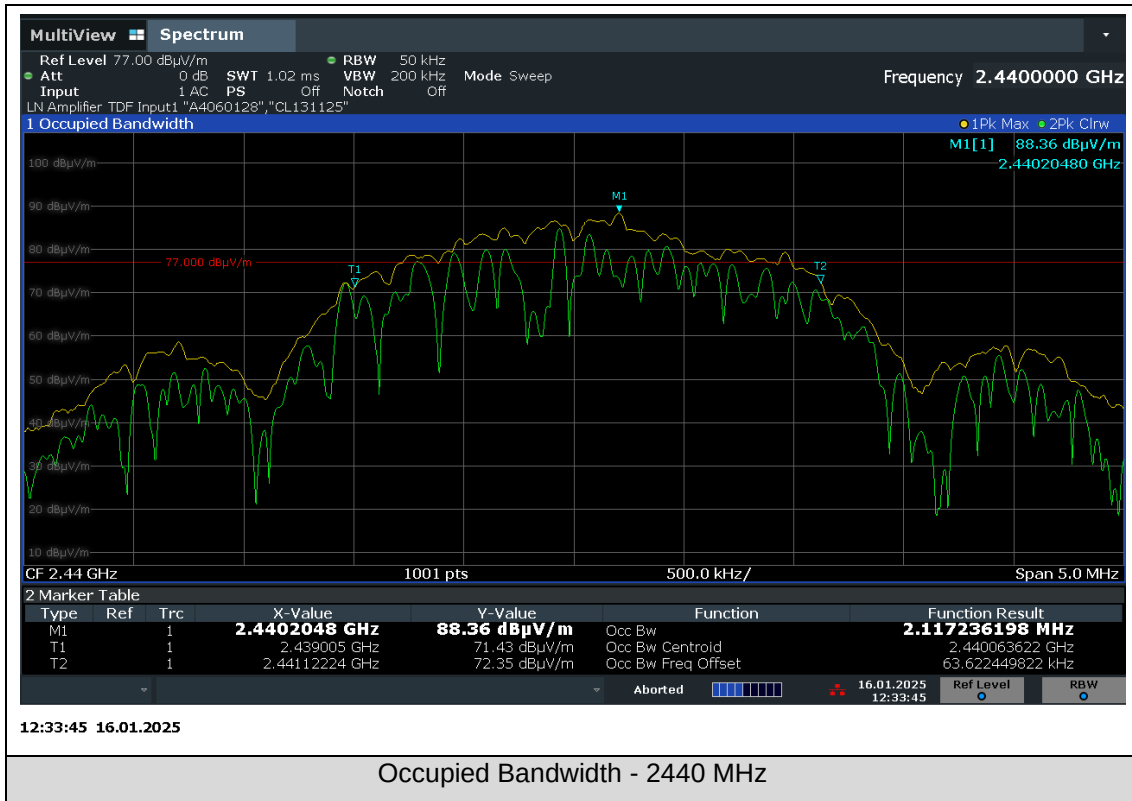
3.11.2 Limits

The 99% emission bandwidth should be contained within the frequency band 2400 – 2483.5 MHz.

3.11.3 Results

Frequency [MHz]	99% Bandwidth [MHz]	Lower Frequency [MHz]	Upper Frequency [MHz]	Result
2402	2.1102	2401.015	2403.125	Complied
2440	2.1172	2439.005	2441.122	Complied
2480	2.1135	2478.989	2481.102	Complied





-- End of Report --