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RADIO TEST REPORT

REPORT NUMBER: M2111032-3

- TEST STANDARD: FCC PART 15 SUBPART C **SECTION 15.247 ISED RSS-247 SECTION 5.0**
 - CLIENT: AUTOMATIC TECHNOLOGY AUSTRALIA PTY.LTD.
 - **DEVICE: WIRELESS BASE STATION** MODULE

MODEL: GDL2V2

- FCC ID: X4K-GDWLABS01
 - IC: 8880A-GDWLABS01

DATE OF ISSUE: 17 MARCH 2022

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 client 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.



Accredited for compliance with ISO/IEC 17025 - Testing. The results of tests, calibration and/or measurements included in this document are traceable to Australian/national standards. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.





REVISION TABLE

Version	Sec/Para Changed	Change Made	Date
1		Initial issue of document	17/03/2022

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	TEST CERTIFICATE
Device: Model Number: Manufacturer: Address:	Wireless Base Station Module GDL2V2 Countermast Technology (Dalian) Co., Ltd. Building 7#, Zhongqing Industrial Park, Dalian Area of China Polit Free Trade Zone, Liaoning Province, China, 116600
Radio: FCC ID: IC:	2.4 GHz RF transceiver X4K-GDWLABS01 8880A-GDWLABS01
Tested for: Address: Phone Number: Contact: Email:	Automatic Technology Australia Pty.Ltd. 6-8 Fiveways Boulevard, Keysborough, Victoria 3173, Australia +61 3 9791 0275 Nikolai Klepikov Nikolai.Klepikov@ata-aust.com.au
Standard:	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 2, Section 5 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
Result:	The Wireless Base Station Module complied with the applicable requirements of the above standards. Refer to Report M2111032-3 for full details.
Test Date:	25 January 2022 - 17 February 2022
Issue Date:	17 March 2022
Test Engineer:	lan Paul Ng
Attestation:	I 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.
	Wilson XMAN
Authorised Signatory:	Wilson Xiao Lead Engineer - Radio
E-mail: <u>er</u>	Issued by: EMC Technologies Pty. Ltd., 176 Harrick Road, Keilor Park, VIC, 3042, Australia. Phone: +61 3 9365 1000 mc-general@emctech.com.au Web: www.emctech.com.au





RADIO TEST REPORT

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1 TEST SUMMARY

Sec.	Description	FCC	ISED	Result(s)
6.1	Antenna Requirement	§15.203	RSS-Gen 6.8	Complied
6.2	Restricted Bands of Operation	§15.205	RSS-Gen 8.10	Complied
6.3	Conducted Limits	§15.207	RSS-Gen 8.8	Not Applicable
6.4	Radiated emission limits; general requirements	§15.209	RSS-Gen 8.9	Complied
6.5	20 dB Bandwidth	§15.247(a)(1)	RSS-247 5.1(a)	Complied
6.6	Carrier Frequency Separation	§15.247(a)(1)	RSS-247 5.1(b)	Complied
6.7	Number of Hopping Frequencies	§15.247(a)(1)	RSS-247 5.1(d)	Complied
6.8	Average Time of Occupancy	§15.247(a)(1)	RSS-247 5.1(d)	Complied
6.9	Peak Output Power	§15.247(b)	RSS-247 5.4	Complied
6.10	Out-of-Band/Spurious Emissions	§15.247(d)	RSS-247 5.5	Complied
6.11	Band-Edge Emission Measurements	§15.247(d)	RSS-247 5.5	Complied
6.12	Maximum Permissible Exposure	§15.247(i)	RSS-102	Complied
6.13	Occupied Bandwidth – 99% power	§15.215	RSS-Gen 6.7	Complied

2 TEST FACILITY

2.1 General

EMC Technologies Pty Ltd is accredited by the FCC as a test laboratory able to perform compliance testing for the public. EMC Technologies Pty Ltd has also been designated as a Conformity Assessment Body (CAB) by Australian Communications and Media Authority (ACMA) under the APECTEL MRA and is designated to perform compliance testing on equipment subject to Declaration of Conformity (DoC) and Certification under Parts 15 and 18 of the FCC Commission's rules – **Registration Number 494713 & Designation number AU0001**.

EMC Technologies Pty Ltd is also an ISED Canada recognized testing laboratory – **ISED** company number: 3569B and CAB identifier number: AU0001.

2.2 Test Laboratory/Accreditations

NATA is the Australian National laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system similar to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A²LA).

All testing in this report has been conducted in accordance with EMC Technologies' scope of NATA accreditation to ISO 17025 for both testing and calibration and ISO 17020 for Inspection – **Accreditation Number 5292**.

The current full scope of accreditation can be found on the NATA website: <u>www.nata.com.au</u>





3 TEST EQUIPMENT CALIBRATION

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Keysight Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI) or in-house. All equipment calibration is traceable to Australian national standards at the National Measurements Institute.

Equipment Type	Make/Model/Serial Number	Last Cal. dd/mm/yyyy	Due Date dd/mm/yyyy	Cal. Interval
Chamber	Frankonia SAC-3-2 (R-144)	10/08/2020	10/08/2023	3 Year ^{*1}
EMI Receiver	R&S ESW26 Sn: 101306 (R-143)	21/06/2021	21/06/2022	1 Year*2
	EMCO 6502 Active Loop Antenna Sn: 2021 (A-310)	31/08/2020	31/08/2022	2 Year ^{*2}
Antennas	SUNOL JB1 Sn. A052518 (A-434)	13/11/2020	13/11/2022	2 Year ^{*2}
	EMCO 3115 Horn Antenna Sn: 9501-4398 (A-406)	10/01/2022	10/01/2025	3 Year ^{*1}
	ETS-Lindgren 3160-09 Horn Antenna Sn:66032 (A307)	30/04/2021	30/04/2024	3 Year ^{*1}
	Huber & Suhner Sucoflex 104A Sn: 503055 (C-457)	26/11/2021	26/11/2022	1 Year ^{*1}
Cables* ³	Huber & Suhner Sucoflex 104A Sn: 800448 (C-520)	26/11/2021	26/11/2022	1 Year ^{*1}
	Huber & Suhner Sucoflex 104A Sn: 27319 (C-273)	29/06/2021	29/06/2022	1 Year ^{*1}

Note *1. Internal NATA calibration.

Note *2. External NATA / A2LA calibration.

Note *3. Cables are verified before measurements are taken.

4 MEASUREMENT UNCERTAINTY

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

Radiated Emissions:	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 <u>without</u> taking into account measurement instrumentation uncertainty. However, the measurement uncertainty shall appear in the test report.





5 Device Details

(Information supplied by the Client)

5.1 EUT (Transmitter) Details

Radio:	2.4 GHz RF transceiver
Frequency band:	2400 – 2483.5 MHz
Number of Channels:	16
Operating Frequency:	Low Channel: 2405 MHz Mid Channel: 2440 MHz High Channel: 2480 MHz
Modulation:	GFSK
Antenna:	$\ensuremath{^{1\!\!\!/}}\xspace$ wavelength monopole, soldered to PCB
Antenna gain:	-1.0 dBi

5.2 EUT (Host) Details

Test Sample:Wireless Base Station ModuleModel Number:GDL2V2

Supply Rating: 5VDC, 30mA

5.3 Test Configuration

Testing was performed with the EUT's Transceiver set to transmit continuously at Low Channel (2405 MHz), Mid Channel (2440 MHz) and High Channel (2480 MHz) or normal Hopping On mode.

5.4 Modifications

No modifications were required to achieve compliance.

5.5 Deviations from the Standard

No deviation from the standard.





6 **RESULTS**

6.1 §15.203/ RSS-Gen 6.8 Antenna Requirement

The test sample's radio module incorporates a ¼ wavelength monopole which is soldered to PCB and cannot be replaced by another type.

Antenna Type: ¼ wavelength monopole Antenna Peak Gain: -1.0 dBi Connector: N/A, soldered to PCB

The above installation will prevent any unauthorised switching of antennas.

6.2 §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 6.10.

6.3 §15.207/ RSS-Gen 8.8 Conducted Limits

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

6.4 §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 6.10.

6.5 §15.247(a)(1)/ RSS-247 5.1(a) 20 dB bandwidth

6.5.1 Test Procedure

The tests were performed in accordance with ANSI C63.10: 2013 Clause 6.9.

The 20 dB bandwidth was measured while the device was transmitting with typical modulation applied. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised when measuring the bandwidth.

6.5.2 Limits

In the band 2400-2483.5MHz, the maximum 20 dB Bandwidth is not specified.

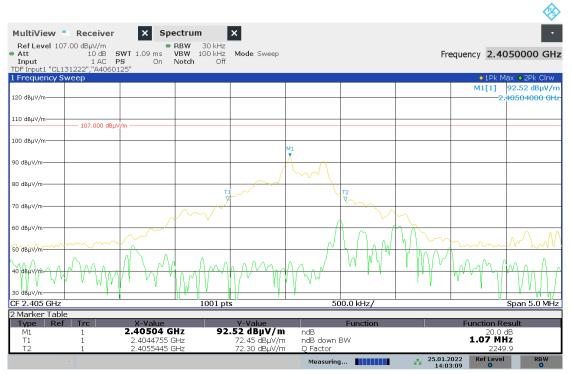
6.5.3 Results

Table 6-1: 20 dB Bandwidth

Frequency (MHz)	20 dB Bandwidth (MHz)
2405	1.07
2440	1.05
2480	1.06







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14:12:57 25.01.2022

Graph 6-2: 20 dB bandwidth, 2440 MHz





	Receiver	× Spectru		×					•
Ref Level 92 Att Input DF Input1 "CL1		WT 1.09 ms VBW G On Notch	30 kHz 100 kHz I Off	Mode Sweep			Fre	equency 2.4	800000 GH
Frequency S									lax O2Pk Clrw
то аврууш								M1[1]2	82.67 dBµ∀/ı .48004000 G⊦
00 dBµV/m───									
		m							
) dBµV/m───	. 92,000 uBHV/				M1				
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F 2.48 GHz			1001 pts		50	0.0 kHz/			Span 5.0 MH
Marker Tabl		X-Value		Y-Value		Function		Function R	ooult
M1	1	2.48004 GHz	82.	67 dBµV/m				20.0	dB
T1 T2	1	2.4794955 GHz 2.4805544 GHz		62.57 dBµV/m 62.54 dBµV/m		ЗW		1.06 MI 2342	
14		2.4000044 0112		02.04 000 97/11			25.01.2		

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Graph 6-3: 20 dB bandwidth, 2480 MHz

6.6 §15.247(a)(1)/ RSS-247 5.1(b) Carrier Frequency Separation

6.6.1 Test Procedure

The tests were performed in accordance to ANSI C63.10: 2013 clause 7.8.2.

6.6.2 Limits

Hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

6.6.3 Results

Carrier Frequency Separation	Limit	Results
5.05 MHz	≥ 713 kHz	Complied





							
MultiView = Receiver	r 🗙 Spectrum	×					•
Input 1 AC TDF Input1 "A4060125","CL13			¢p		Fre		400000 GHz
2 Frequency Sweep						• 1Pk M D2[1]	lax • 2Pk Clrw -0,17 dB
120 dBµV/m						0.0[1]	5.0500 MHz
112.000 dB	lut/m						01.46 dBµV/m
110 dBµV/m	pp vym						2.4400600 GHz
D2			M1 V				
100 dBµV/m		~					
901000/m				~~~~			
'80 dBµV/m							
70 dBµV/m	بريم بالمستقبل مري	Withold and a second	a deed a	and the set	1 11 11 m	the second	
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30 dBµV/m							
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~	Instrument warmin		 Measuring 		27.01.2 09:42	022 Ref Level 7:19 O	RBW

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6.7 §15.247(a)(1)(iii)/ RSS-247 5.1(d) Number of Hopping Frequencies

6.7.1 Test Procedure

The tests were performed in accordance to ANSI C63.10: 2013 clause 7.8.3.

6.7.2 Limits

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

6.7.3 Results

Table 6-3: Number of Hopping Frequencies

Number of Hopping Frequencies	Limit	Results
16	≥ 15	Complied





lultiView	Receiver	× Spe	ctrum	×					
Ref Level 11 Att Input		WT 1.01 ms ' S On I	RBW 1MHz VBW 3MHz M Notch Off	Mode Auto Swee	p		Fre	equency 2.4	417500 GH
Frequency S							D2	● 1Pk № [1]	1ax • 2Pk Clrw 0.00 ¢
) dBµV/m									0
							M1	[1]	77.81 dBµV/ 2.4835000 G
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I dBµV/m									
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dBµV/m									
4 GHz	1		1001 pt	S	8.	35 MHz/	1	1	2.4835 G
	▽	Instrumer	nt warming up		 Measuring 		+ 27.01.2 09:48	022 Ref Level	RBW

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6.8 §15.247(a)(1)(iii)/ RSS-247 5.1(d) Average Time of Occupancy

6.8.1 Test Procedure

The tests were performed in accordance to ANSI C63.10: 2013 clause 7.8.4.

6.8.2 Limits

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

6.8.3 Results

Table 6-4: Average Time of Occupancy

Single Pulse (ms)	Number of hops in 0.2s period	Number of hops in 6.4s period*	Average Time of Occupancy (ms)	Limit (ms)	Results
0.344	26	832	286.208	≤ 400	Complied

***Note:** Number of hops in the period specified in the requirements = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)

Time of Occupancy = 832 × 0.344 ms = 286.208 ms





												
1ultiView	Receive	er 🗙	Spectrum		×							•
Ref Level 11: Att Input RG:VID TDF Inj	10 dB 1 AC		n Notch	Hz						Fre	equency 2.4	400000 GHz
Zero Span	Jaci A40001	20,001012									01Pk	∕lax ●2Pk Clrw
LO dBµV/m───											D2[1]-	-25.26 dB
												344.00 µs
00 dBµV/m											M1[1]	99.67 dBµV/m
o app 1711												0 s
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	~					~				27.01.2	022 Ref Leve	I RBW

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Graph 6-6: Single Pulse

Zero Span	out1 "A4060125","		Notch Off					o tek M	ax o2Pk Clrv
10 dBµV/m									
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) dBµV/m									
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) dBµV/m									
) dBµV/m									
5 dbp1/11									
) dBµ∨/m									
) dBµV/m									

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Graph 6-7: Number of hops in 0.2s period





6.9 §15.247(b)/ RSS-247 5.4 Peak Output Power

6.9.1 Test Procedure

The maximum peak conducted output power was measured in accordance to ANSI C63.10: 2013 clause 7.8.5

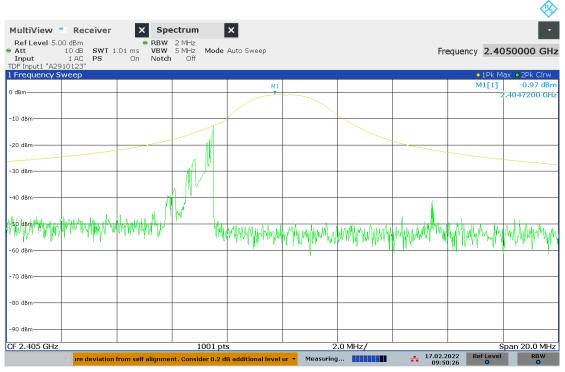
6.9.2 Limits

The maximum peak conducted output power at 2400-2483.5 MHz is 0.125 Watt.

6.9.3 Results

Table 6-5: Maximum Peak Power

Freq.	Conducted Ou		Desults	
(MHz)	(dBm)	(W)	Limit (W)	Results
2405	-0.97	0.000799	0.125	Complied
2440	-2.50	0.000562	0.125	Complied
2480	-4.70	0.000338	0.125	Complied



09:50:27 17.02.2022

Graph 6-8: Maximum Peak Power, 2405MHz



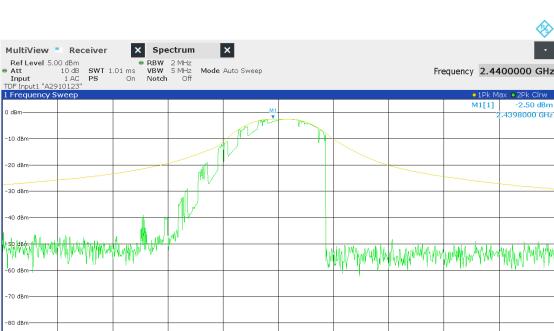
Span 20.0 MHz

. .

RBW

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09:48:01 17.02.2022

-90 dBm

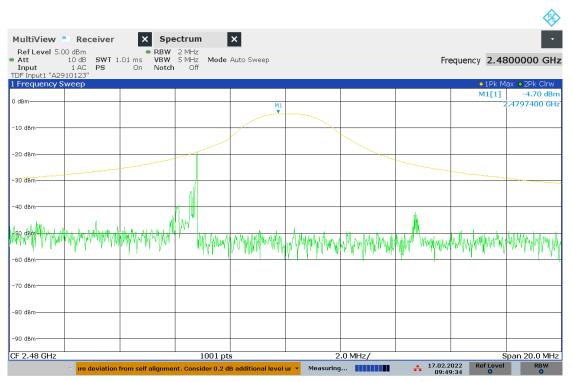
CF 2.44 GHz



2.0 MHz/

Measuring...

1001 pts



09:49:34 17.02.2022

Graph 6-10: Maximum Peak Power, 2480MHz





6.10 §15.247(d)/ RSS-247 5.5 Out-of-Band/Spurious Emission

6.10.1 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	0.6 metre loop antenna
30 to 1000	120	3	Biconilog hybrid
1000 to 18 000	1000	3	Standard gain or broadband
18 000 to 40 000	1000	1	horn

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 sample was slowly rotated with the spectrum analyser set to Max-Hold. This was performed for at least two antenna heights. When an emission was located, it was positively identified and its maximum level was found by rotating the automated turntable and by varying the antenna height. For below 1000 MHz the emissions were measured with a Quasi-Peak detector, and for above 1000 MHz the emissions were measured with Peak and Average detectors.

EUT was investigated on all three axes (x, y, and z). Only 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.

6.10.2 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: $E = \text{Radiated Field Strength in } dB\mu V/m$.

V = EMI Receiver Voltage in dBµV.

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).

6.10.3 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.

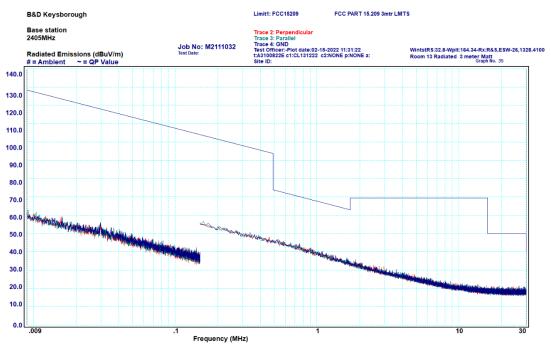
However, the general limits of §15.209 apply for the restricted bands of operation defined in §15.205.





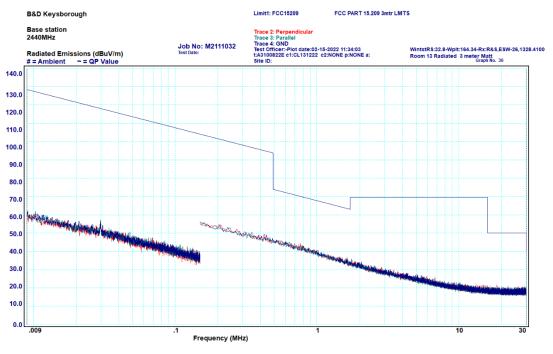
6.10.4 Transmitter Spurious Emissions: 9 kHz to 30 MHz

All emissions measured in the frequency band 9kHz - 30MHz complied with the requirements of the standard.



Graph 6-11: Transmitter Spurious Emissions, 9 kHz - 30 MHz, 2405 MHz

No peaks were measured within 10 dB of the limit.



Graph 6-12: Transmitter Spurious Emissions, 9 kHz - 30 MHz, 2440 MHz

No peaks were measured within 10 dB of the limit.

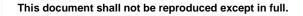
NATA

Accreditation No.5292

mⁿµµ

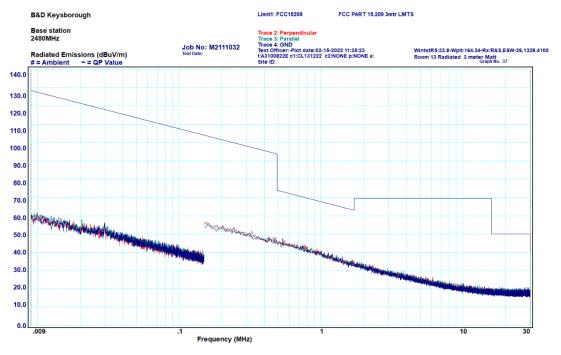
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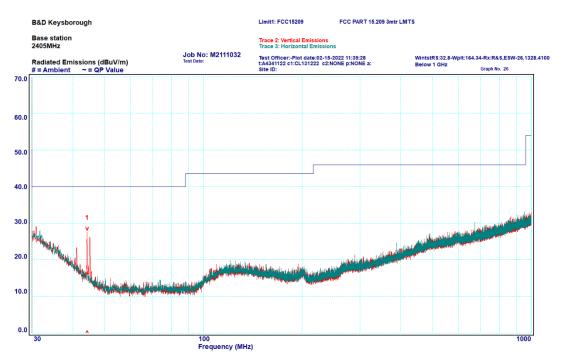


Graph 6-13: Transmitter Spurious Emissions, 9 kHz - 30 MHz, 2480 MHz

No peaks were measured within 10 dB of the limit.

6.10.5 Transmitter Spurious Emissions: 30 - 1000 MHz

All emissions measured in the frequency band 30 - 1000 MHz complied with the requirements of the standard.



Graph 6-14: Transmitter Spurious Emissions, 30 - 1000 MHz, 2405 MHz



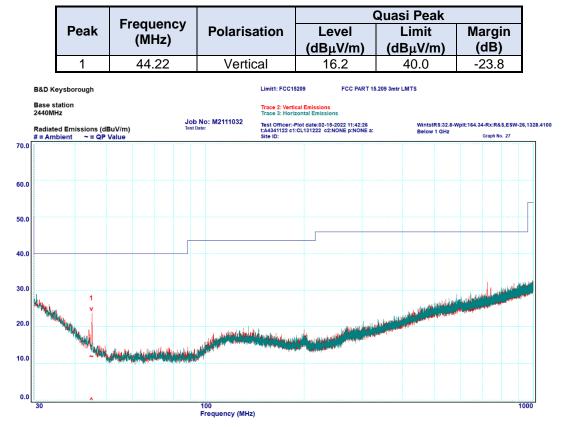


Table 6-6: Transmitter Spurious Emissions, 30 – 1000 MHz, 2405 MHz

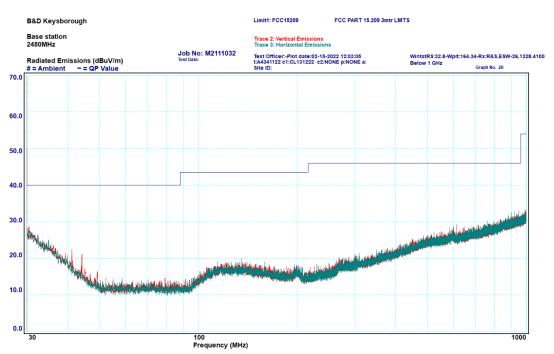


Table 6-7: Transmitter Spurious Emissions, 30 – 1000 MHz, 2440 MHz

Peak	Frequency		(Quasi Peak	
	Frequency (MHz)	Polarisation	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	44.95	Vertical	11.9	40.0	-28.1







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Graph 6-16: Transmitter Spurious Emissions, 30 – 1000 MHz, 2480 MHz

No peaks were measured within 10 dB of the limit.

6.10.6 Transmitter Spurious Emissions: 1 - 18 GHz

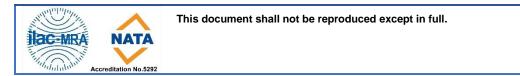
All emissions measured in the frequency band 1 - 18 GHz complied with the requirements of the standard.



Peak Measurement:

Frequency (MHz)

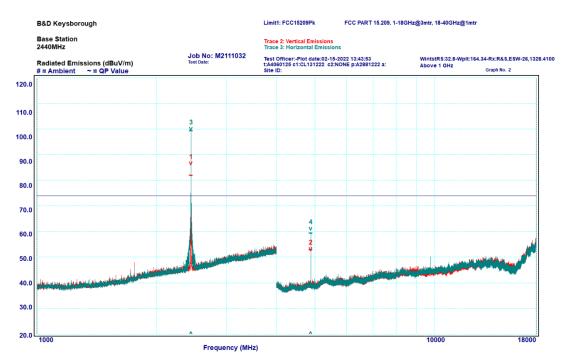






Γ		Fraguanay			Peak	
	Peak	Frequency (MHz)	Polarisation	Level (dBµV/m)	Margin (dB)	
	*1	2405.06	Vertical			
	2	4810.09	Vertical	54.4	74.0	-19.6
	*3	2405.04	Horizontal			

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



Graph 6-18: Transmitter Spurious Emissions, 1 – 18 GHz, 2440 MHz, Peak

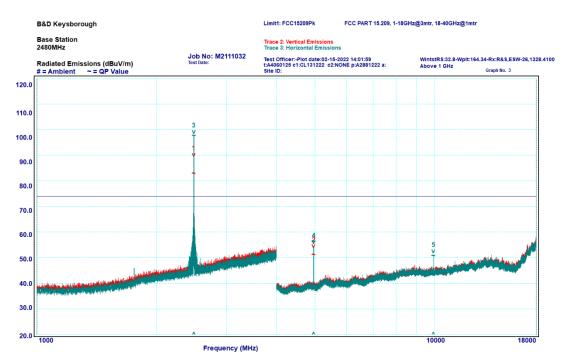
Table 6-9: Transmitter Spurious Emissions,	s, 1– 18 GHz, 2440 MHz, Peak
--	------------------------------

	Frequency			Peak	
Peak	Frequency (MHz)	Polarisation	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
*1	2440.04	Vertical			
2	4880.11	Vertical	52.7	74.0	-21.3
*3	2440.04	Horizontal			
4	4880.28	Horizontal	59.3	74.0	-14.7

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







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Graph 6-19: Transmitter Spurious Emissions, 1 – 18 GHz, 2480 MHz, Peak

	Frequency			Peak	
Peak	Frequency (MHz)	Polarisation	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
*1	2480.05	Vertical			
2	4960.11	Vertical	51.1	74.0	-22.9
*3	2480.08	Horizontal			
4	4960.14	Horizontal	56.2	74.0	-17.8
5	9921.38	Horizontal	50.8	74.0	-23.2

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





Average Measurement:



Graph 6-20: Transmitter Spurious Emissions, 1 – 18 GHz, 2405 MHz, Average

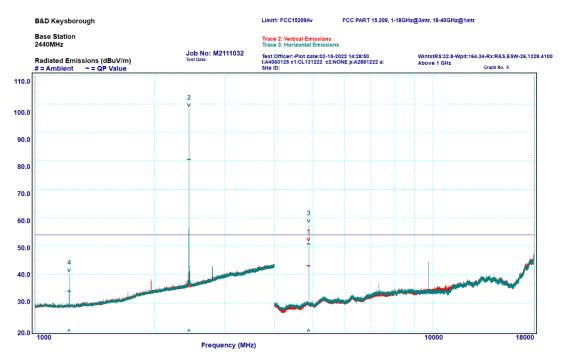
Table 6-11: Transmitter Spurious Emissions, 1 – 18 GHz, 2405 MHz, Average

	Frequency			Average	
Peak	Frequency (MHz)	Polarisation	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	4810.36	Vertical	42.2	54.0	-11.8
*2	2405.21	Horizontal			
3	4810.44	Horizontal	51.8	54.0	-2.2
4	1202.62	Horizontal	35.2	54.0	-18.8

*Note: Peak 2 is the fundamental transmission and not subject to the spurious emissions limit of the standard







Graph 6-21: Transmitter Spurious Emissions, 1 – 18 GHz, 2440 MHz, Average

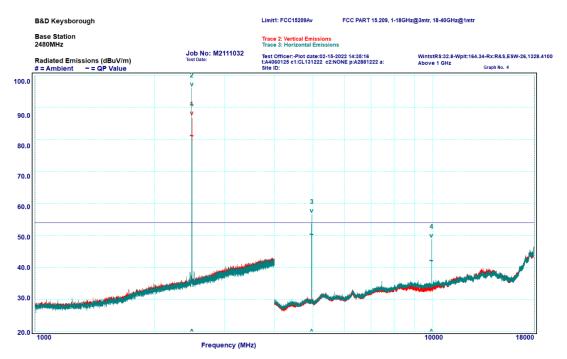
Table 6-12: Transmitte	r Spurious Emi	ssions, 1 – 18 GHz	, 2440 MHz, Average
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	Frequency			Average	
Peak	Frequency (MHz)	Polarisation	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	4880.37	Vertical	43.0	54.0	-11.0
*2	2440.21	Horizontal			
3	4880.36	Horizontal	50.6	54.0	-3.4
4	1220.12	Horizontal	33.9	54.0	-20.1

*Note: Peak 2 is the fundamental transmission and not subject to the spurious emissions limit of the standard.







Graph 6-22: Transmitter Spurious Emissions, 1 – 18 GHz, 2480 MHz, Average

Table 6-13: Transmitter Spurio	us Emissions, 1 –	18 GHz, 2480 MHz, Average
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	Frequency			Average	
Peak	Frequency (MHz)	Polarisation	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
*1	2480.23	Vertical			
*2	2480.22	Horizontal			
3	4960.45	Horizontal	50.2	54.0	-3.8
4	9921.40	Horizontal	42.0	54.0	-12.0

*Note: Peaks 1 and 2 are the fundamental transmission and not subject to the spurious emissions limit of the standard

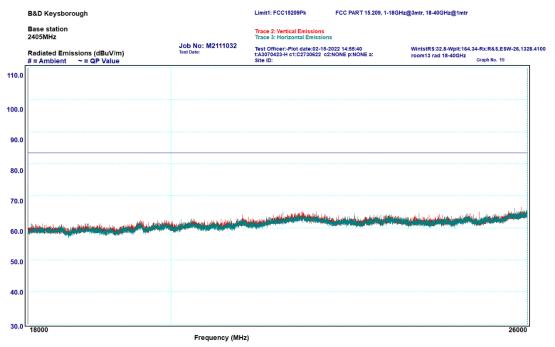




6.10.7 Transmitter Spurious Emissions: 18 – 26 GHz

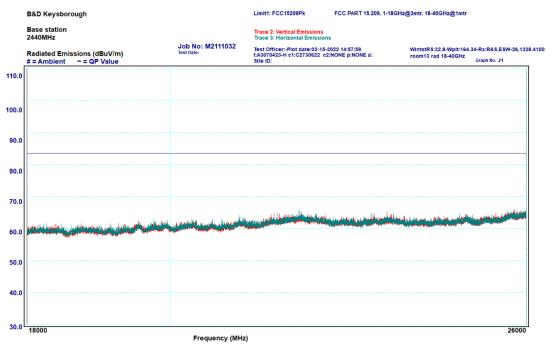
All emissions measured in the frequency band 18 - 26 GHz complied with the requirements of the standard.

Peak Measurement:



Graph 6-23: Transmitter Spurious Emissions, 18 – 26 GHz, 2405 MHz, Peak

No peaks were measured within 10 dB of the limit.



Graph 6-24: Transmitter Spurious Emissions, 18 – 26 GHz, 2440 MHz, Peak

No peaks were measured within 10 dB of the limit.

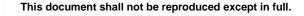
NATA

Accreditation No.5292

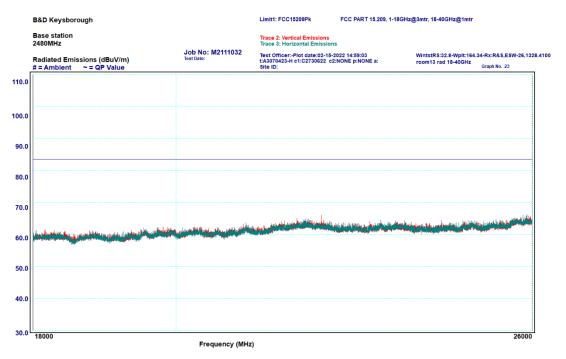
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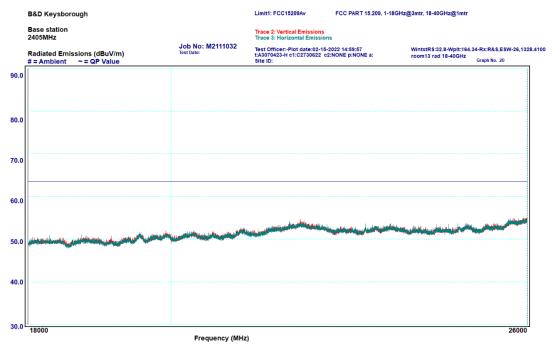




Graph 6-25: Transmitter Spurious Emissions, 18 – 26 GHz, 2480 MHz, Peak

No peaks were measured within 10 dB of the limit.

Average Measurement:

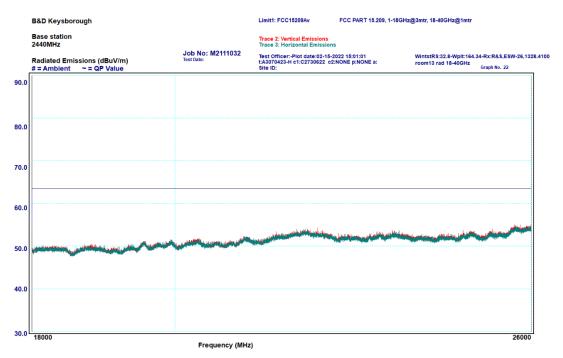


Graph 6-26: Transmitter Spurious Emissions, 18 – 26 GHz, 2405 MHz, Average

No peaks were measured within 10 dB of the limit.







Graph 6-27: Transmitter Spurious Emissions, 18 – 26 GHz, 2440 MHz, Average

No peaks were measured within 10 dB of the limit.



Graph 6-28: Transmitter Spurious Emissions, 18 – 26 GHz, 2480 MHz, Average

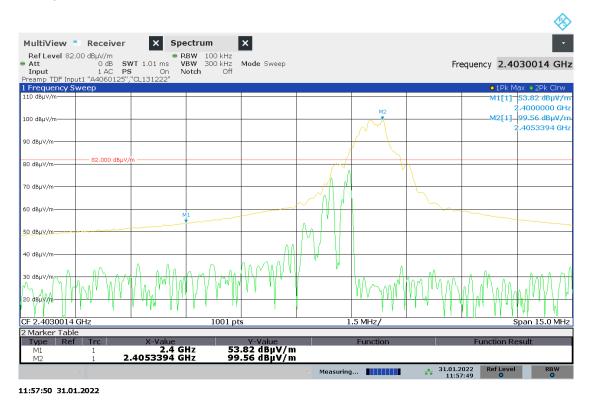
No peaks were measured within 10 dB of the limit.



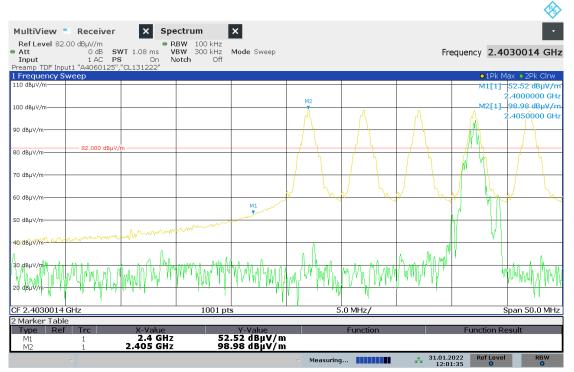


6.11 §15.247(d)/ §RSS-247 5.5 Band Edge Emission Measurements

Band-edge measurements were done using radiated in accordance to ANSI C63.10 clause 6.10. All emissions measured near the lower and higher band edge complied with the requirements of §15.247/ RSS-247 5.0.







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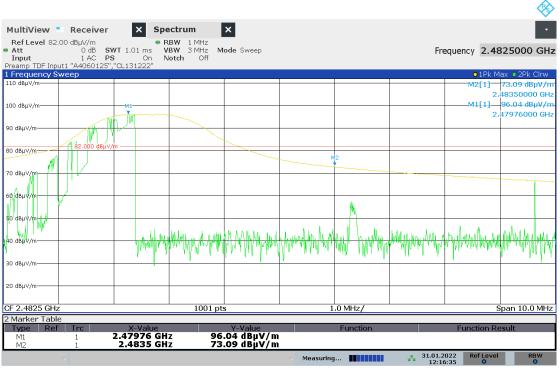
Graph 6-30: Band Edge Emission, Lower Band-edge, Hopping on



 Table 6-14: Band Edge Emission, Lower Band-edge

 Measurement
 Freg
 Measurement
 Limit

Operating Mode	Measurement Type	Freq (MHz)	Measurement (dBµV/m)	Limit (dBµV/m)	Result
Hopping off	Peak	2400	53.82	74	Complied
Hopping on	Peak	2400	52.52	74	Complied



12:16:35 31.01.2022

Graph 6-31: Band Edge Emission, Upper Band-edge, Peak, Hopping off





MultiView	Receiver	X Spe	ctrum	×					
Ref Level 82. Att Input Preamp TDF Inpu	0 dB SV 1 AC PS ut1 "A4060125",	• R /T 1.01 ms V 0 N	BW 1 MHz	ode Sweep			Fre		300000 GHz
1 Frequency Sv	weep								lax o 2Pk Clrw
110 dBµV/m									72.01 dBµV/m
								:	2.4835000 GHz
100 dBµV/m				M	1			M1[1]_	94.47 dBµV/m
					1			:	2.4800000 GHz
90 dBµV/m					\sim				
so dop v/m					N I				
80 dBµV/m	—— <mark>82.000 ф</mark> ВµV/I	n <u> </u>							
	\sim		\sim		M2				
70 dBµV/m									
						Jun - may			
60 dBµV/m				n /	Νh		the ball of the stand	Jun mary	Warman www.
50 dBµV/m									<u> </u>
+bildeux/hh-ft+ift	riter Made & land		a. duala		here	a . him died	Mate in all		allowed it is not
	MANAMA San	ANNAAA Amaaa		WW 11	1 albert	Ant will all	<u>Ald Duddad</u>	Alton All Al	Maria Madda, ana
30 dBµV/m		1 1	111111				1 1		· 1
20 dBµV/m									
 CF 2,48 GHz			1001 pts		5	.0 MHz/		<u> </u>	pan 50.0 MHz
2 Marker Table			1001 pts	,	5				ppart 30.0 MHZ
Type Ref		X-Value		Y-Value		Function		Function R	acult
M1		2.48 GHz	94.	.47 dBµV/m		Tuncaun		TUNCTOTIK	suit
M2		2.4835 GHz	72	01 dBµV/m					
	~				Measuring		31.01.2		
					measaring		12:0	5:45 0	0

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12:05:45 31.01.2022



MultiView =	Receiver	X Spe	ectrum	×					
Ref Level 102 Att Input	2.00 dBµV/m 0 dB S 1 AC P 60125","CL1312	WT 1.01 ms S On	RBW 1 MHz	Mode Auto Sweep	SGL Count 2000	/2000	Fre	equency 2.4	826000 GH
Frequency Sv						1	l		●1Rm Avg
L20 dBµV/m								M2[1]	9 3.33 dBµV/r 2.48025000 GH
								M1[1]	1
.10 dBµV/m									2.48350000 GH
	100 000 10 11								
.00 dBµV/m	—— 102.000 dBµV								
		M2							
90 dBµV/m			<u> </u>						
30 dBµV/m									
	and the second sec								
70 dBµV/m	Part and a second								
50 dBµV/m									
and the second second				When a	м1				
50 dBµV/m				1		Muthinghour	who man	hampentheme	-
40 dBµV/m									
30 dBµV/m									
LF 2.4826 GHz			1001 pt	s	1	.0 MHz/	I		Span 10.0 MH
	~				Ready		31.01.2		el RBW

11:47:00 31.01.2022

Graph 6-33: Band Edge Emission, Upper Band-edge, Average, Hopping off





									
1ultiView	Receiver	× Spe	ectrum	×					-
Ref Level 82.4 Att Input		/T 1.01 ms V On N	BW 1 MHz BW 3 MHz M otch Off		3GL Count 5000/5000)	Fre	quency 2.48	:00000 GH:
Frequency Sv		OLIVILL							o1Rm Avg
O dBµV/m───								M2[1]	37.78 dBµV∕n
								2	.4835000 GH
) dBµV/m								M1[1]	78.27 dBµV/r
								2	.4800000 GH
dBµV/m									
dBµV/m-	—— 82.000 dBµV/i	m			-M1				
uspv/m					Λ				
/			$ \lambda = 1$	$ \lambda = 1$	(1)				
dBµV/m	\rightarrow /	\uparrow							
$\lambda = I = I$			$ \rangle \rangle$						
I dBµV/m					+ +				
				$ \rangle $					
dBµV/m	V				M2				
dBµ∨∕m					herrow	u			
dBµV/m									
dBµV/m									
2.48 GHz		I	1001 pt	S	5	.0 MHz/		S	pan 50.0 MH
Marker Table	2								
Type Ref		X-Value		Y-Value		Function		Function Re	sult
M1 M2	1	2.48 GHz 2.4835 GHz	78 37	.27 dBµV/1 .78 dBµV/1	m m				
	~				Ready		31.01.20	022 Ref Level	RBW
					Keady		12:07	:22 0	0

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12:07:23 31.01.2022

Hopping off

Hopping on

Graph 6-34: Band Edge Emission, Upper Band-edge, Average, Hopping on

Table 6-15: Band Edge Emission, Upper Band-edge							
Operating Mode	Measurement Type	Freq (MHz)	Measurement (dBμV/m)	Limit (dBµV/m)	Result		
Hopping off	Peak	2483.5	73.09	74	Complied		
Hopping on	Peak	2483.5	72.01	74	Complied		

2483.5

2483.5

Average

Average

Table 6-15: Band Edge Emission, Upper Band-edge

48.37

37.78

54

54

Complied

Complied

6.12 §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 M2111032-7 and M2111032-8.





6.13 §15.215/ RSS-Gen 6.7 Occupied Bandwidth – 99% power

6.13.1 Test procedure

The bandwidth containing 99% power of the transmitted signal was measured using the procedure from ANSI C63.10 section 6.9.

6.13.2 Limits

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

6.13.3 Results

Table	6-16:	Occupied	Bandwidth
-------	-------	----------	-----------

Freq. (MHz)	99% Bandwidth (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Result
2405	1.60	2404.2	2405.8	Complied
2440	1.61	2439.2	2440.8	Complied
2480	1.65	2479.1	2480.8	Complied



14:41:42 25.01.2022

Graph 6-35: Occupied bandwidth, 2405 MHz







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14:42:58 25.01.2022





14:40:30 25.01.2022

Graph 6-37: Occupied bandwidth, 2480 MHz

END OF REPORT

