

0659



FCC Radio Test Report

FCC ID: 2ADQS-107001535

Report No. : BTL-FCCP-1-2311T124 Equipment : Portable Bluetooth Speaker

Model Name : Rockster Cross
Brand Name : Toufol

Applicant: Lautsprecher Teufel GmbH

Address : Budapester Strasse 44,10787 Berlin, Germany

Radio Function : Bluetooth

FCC Rule Part(s) : FCC CFR Title 47, Part 15, Subpart C (15.247)

Measurement : ANSI C63.10-2013

Procedure(s)

Date of Receipt : 2023/11/27

Date of Test : 2023/12/14 ~ 2023/12/18

Issued Date : 2024/1/31

The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

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, ,

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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BTL's laboratory quality assurance procedures are in compliance with the ISO/IEC 17025 requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REVISION HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-1-2311T124	R00	Original Report.	2024/1/31	Valid

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SUMMARY OF TEST RESULTS

Test procedures according to the technical standards.

Standard(s) Section	Description	Test Result	Judgement	Remark
15.207	AC Power Line Conducted Emissions	APPENDIX A	Pass	
15.205 15.209 15.247(d)	Radiated Emissions	APPENDIX B APPENDIX C APPENDIX D	Pass	
15.247 (a)(1)(iii)	Number of Hopping Frequency	APPENDIX E	Pass	
15.247 (a)(1)(iii)	Average Time of Occupancy	APPENDIX F	Pass	
15.247 (a)(1)	Hopping Channel Separation	APPENDIX G	Pass	
15.247 (a)(1)	Bandwidth	APPENDIX H	Pass	
15.247 (b)(1)	Output Power	APPENDIX I	Pass	
15.247(d)	Antenna conducted Spurious Emission	APPENDIX J	Pass	
15.203	Antenna Requirement		Pass	

(1) "N/A" denotes test is not applicable in this Test Report.(2) The report format version is TP.1.1.1.

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1.1 TEST FACILITY

Т	he	test	location	ons	stated	belo ¹	w are	unde	r the	TAF	Accre	editation	Number	0659.
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The test location(s) used to collect the test data in this report are:

No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

(FCC DN: TW0659)

 ☐ CB11

⊠ SR10

⊠ SR11

No. 72, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

(FCC DN: TW0659)

□ C06

□ CB22

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $\mathbf{y} \pm \mathbf{U}$, where expanded uncertainty \mathbf{U} is based on a standard uncertainty multiplied by a coverage factor of $\mathbf{k} = \mathbf{2}$, providing a level of confidence of approximately 95 %. The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 \mathbf{U}_{cispr} requirement.

A. AC power line conducted emissions test:

Test Site Method		Measurement Frequency Range	U (dB)
C05	CISPR	150 kHz ~ 30MHz	3.44

B. Radiated emissions test:

Test Site	Measurement Frequency Range	U,(dB)
	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
CB21	1 GHz ~ 6 GHz	5.21
CDZT	6 GHz ~ 18 GHz	5.51
	18 GHz ~ 26 GHz	3.69
	26 GHz ~ 40 GHz	4.23

C. Conducted test:

Test Item	U (dB)
Occupied Bandwidth	0.5338
Output power	0.3659
Conducted Spurious emissions	0.5416
Conducted Band edges	0.5348
Dwell time	0.6606
Channel separation	0.6606
Channel numbers	0.6606

NOTE:

Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Environment Condition	Test Voltage	Tested by
AC Power Line Conducted Emissions	18 °C, 44 %	AC 120V	Jerry Chuang
Radiated emissions below 1 GHz	Refer to data	AC 120V	Kevin Zhen
Radiated emissions above 1 GHz	Refer to data	AC 120V	Kevin Zhen
Number of Hopping Frequency	22 °C, 70 %	AC 120V	Jerry Chuang
Average Time of Occupancy	22 °C, 70 %	AC 120V	Jerry Chuang
Hopping Channel Separation	22 °C, 70 %	AC 120V	Jerry Chuang
Bandwidth	22 °C, 70 %	AC 120V	Jerry Chuang
Output Power	21.1 °C, 66 %	AC 120V	Jerry Chuang
Antenna conducted Spurious Emission	22 °C, 70 %	AC 120V	Jerry Chuang

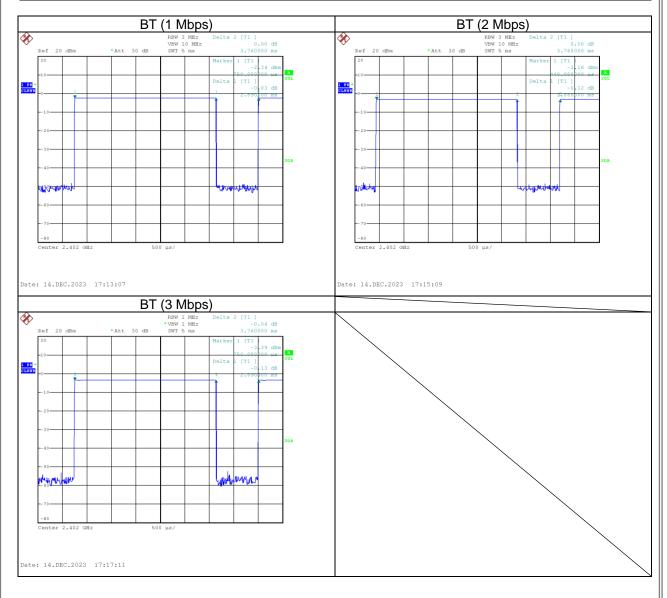
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1.4 DUTY CYCLE

If duty cycle is \geq 98 %, duty factor is not required. If duty cycle is < 98 %, duty factor shall be considered.

Remark	Delta 1			Delta 2	On Time/Period	10 log(1/Duty Cycle)
Mode	ON	Numbers	On Time (B)	Period (ON+OFF)	Duty Cycle	Duty Factor
Wode	(ms)	(ON)	(ms)	(ms)	(%)	(dB)
BT (1 Mbps)	2.890	1	2.890	3.760	76.86%	1.14
BT (2 Mbps)	2.880	1	2.880	3.760	76.60%	1.16
BT (3 Mbps)	2.890	1	2.890	3.760	76.86%	1.14





2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Equipment	Portable Bluetooth Speaker					
Model Name	Rockster Cross					
Brand Name	Teufel					
Model Difference	N/A					
Power Source	#1 DC Voltage supplied from AC/DC adapter. #2 DC Voltage supplied from battery.					
Power Rating	#1 I/P: 100-240Vac, 50/60Hz, 1.5A MAX, O/P: 20.0V==3.25A, 65.0W #2 DC 7.4V/5510mAh					
Products Covered	1 * Battery: Pow-Tech / C0417A1 1 * Adapter: DS / DYS865-200325W 2 * Power Cable (EU Plug and US Plug)					
Operation Band	2400 MHz ~ 2483.5 MHz					
Operation Frequency	2402 MHz ~ 2480 MHz					
Modulation Technology	FHSS					
Transfer Rate	1/2/3Mbps					
Maximum Output Power	1 Mbps: 9.26 dBm (0.0084 W) 2 Mbps: 8.42 dBm (0.0070 W) 3 Mbps: 8.46 dBm (0.0070 W)					
Test Software Version	BlueTest3					
Test Model	Rockster Cross					
Sample Status	Engineering Sample					
EUT Modification(s)	N/A					

NOTE:

(1) The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

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(2) Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

(3) Table for Filed Antenna:

١-	7 1000 10.1 11007 1110111101								
	Antenna	Manufacture	Model Name	Туре	Connector	Frequency Range (MHz)	Gain (dBi)		
	1	FIHONEST COMMUNICA CO.,LTD	Onkyo Ryoma SAS200	PCB printed antenna	N/A	2400-2500	-0.017		

(4) The above Antenna information are derived from the antenna data sheet provided by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

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2.2 TEST MODES

Test Items	Test mode	Channel	Note
AC power line conducted emissions	Normal/Idle	-	-
Transmitter Radiated Emissions (below 1GHz)	1 Mbps	39	-
Transmitter Radiated Emissions	1/3 Mbps	00/78	Bandedge
(above 1GHz)	1/3 Mbps	00/39/78	Harmonic
Transmitter Radiated Emissions (above 18GHz)	1 Mbps	39	-
Number of Hopping Frequency	1/3 Mbps	00~78	-
Average Time of Occupancy	1/3 Mbps	00/39/78	-
Hopping Channel Separation	1/3 Mbps	00/39/78	-
Bandwidth	1/3 Mbps	00/39/78	-
Output Power	1/2/3 Mbps	00/39/78	-
Antenna conducted Spurious Emission	1/3 Mbps	00/39/78	-

NOTE:

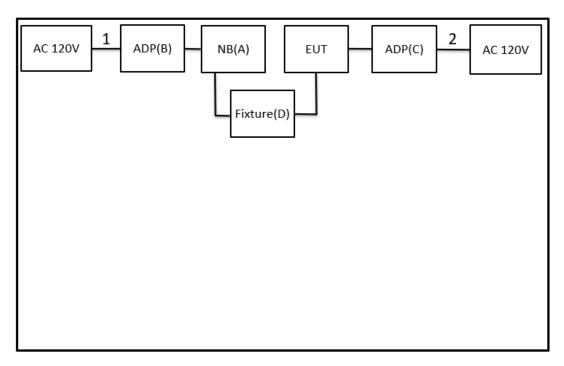
- (1) For radiated emission band edge test, both Vertical and Horizontal are evaluated, but only the worst case (Horizontal) is recorded.
- (2) All X, Y and Z axes are evaluated, but only the worst case (X axis) is recorded.



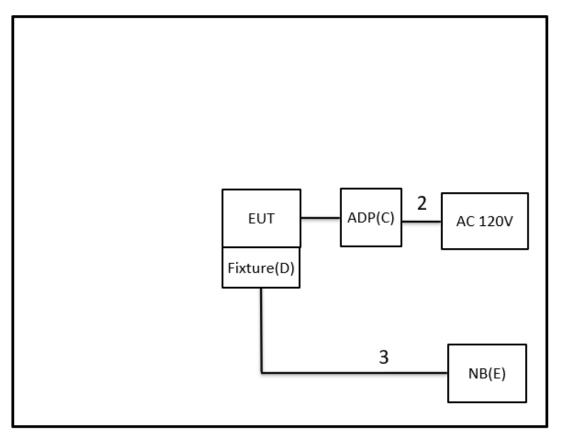
2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Equipment letters and Cable numbers refer to item numbers described in the tables of clause 2.4.

AC Power Line Conducted Emissions Test



Radiated Emissions Test



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2.4 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.	Remarks
Α	NB	HP	240 G5	N/A	Furnished by test lab.
В	ADP	HP	HSTNN-CA40	N/A	Furnished by test lab.
С	ADP	DS	DYS865-200325W	N/A	Supplied by test requester.
D	Fixture	N/A	N/A	N/A	Furnished by test lab.
Е	NB	HP	TPN-I119	N/A	Furnished by test lab.

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
1	N/A	N/A	1m	Power Cord	Furnished by test lab.
2	N/A	N/A	1m	Power Cord	Supplied by test requester.
3	N/A	N/A	1m	USB extension Cable	Furnished by test lab.



3 AC POWER LINE CONDUCTED EMISSIONS TEST

3.1 LIMIT

Frequency	Limit (dBµV)		
(MHz)	Quasi-peak	Average	
0.15 - 0.5	66 - 56 *	56 - 46 *	
0.50 - 5.0	56	46	
5.0 - 30.0	60	50	

NOTE:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- (3) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor (if use)

Margin Level = Measurement Value - Limit Value

Calculation example:

Reading Level (dBuV)		Correct Factor (dB)		Measurement Value (dBuV)
38.22	+	3.45	=	41.67

Measurement Value (dBuV)		Limit Value (dBuV)		Margin Level (dB)
41.67	-	60	=	-18.33

The following table is the setting of the receiver.

Receiver Parameter	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

3.2 TEST PROCEDURE

- a. The EUT was placed 0.8 m above the horizontal ground plane with the EUT being connected to the power mains through a line impedance stabilization network (LISN).
 - All other support equipment were powered from an additional LISN(s).
 - The LISN provides 50 Ohm/50uH of impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle to keep the cable above 40 cm.
- c. Excess I/O cables that are not connected to a peripheral shall be bundled in the center.
 - The end of the cable will be terminated, using the correct terminating impedance.
 - The overall length shall not exceed 1 m.
- d. The LISN is spaced at least 80 cm from the nearest part of the EUT chassis.
- e. For the actual test configuration, please refer to the related Item EUT TEST PHOTO.

NOTE:

- (1) In the results, each reading is marked as Peak, QP or AVG per the detector used. BW=9 kHz (6 dB Bandwidth)
- (2) All readings are Peak unless otherwise stated QP or AVG in column of Note. Both the QP and the AVG readings must be less than the limit for compliance.

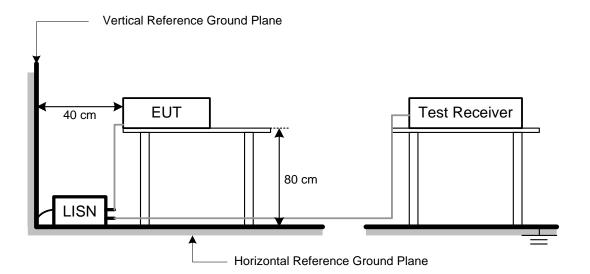
3.3 DEVIATION FROM TEST STANDARD

No deviation.

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3.4 TEST SETUP



3.5 TEST RESULT

Please refer to the APPENDIX A.



4 RADIATED EMISSIONS TEST

4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205, then the 15.209 limit in the table below has to be followed.

LIMITS OF RADIATED EMISSIONS MEASUREMENT (9 kHz to 1000 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSIONS MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	Radiated Emissions (dBuV/m)		Measurement Distance
(IVIIIZ)	Peak	Average	(meters)
Above 1000	74	54	3

NOTE:

- (1) The limit for radiated test was performed according to FCC Part 15, Subpart C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)

Margin Level = Measurement Value - Limit Value

Calculation example:

Reading Level (dBuV)		Correct Factor (dB)		Measurement Value (dBuV/m)
19.11	+	2.11	=	21.22

Measurement Value		Limit Value		Margin Level
(dBuV/m)		(dBuV/m)		(dB)
21.22	-	54	=	-32.78

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW	1MHz / 3MHz for Peak,
(Emission in restricted band)	1MHz / 1/T for Average

Spectrum Parameter	Setting	
Attenuation	Auto	
Start ~ Stop Frequency	9KHz~90KHz for PK/AVG detector	
Start ~ Stop Frequency	90KHz~110KHz for QP detector	
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector	
Start ~ Stop Frequency	490KHz~30MHz for QP detector	
Start ~ Stop Frequency	30MHz~1000MHz for QP detector	

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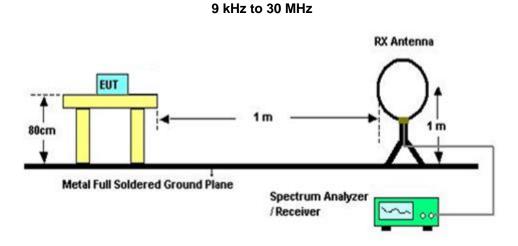
4.2 TEST PROCEDURE

- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- i. For the actual test configuration, please refer to the related Item EUT TEST PHOTO.

4.3 DEVIATION FROM TEST STANDARD

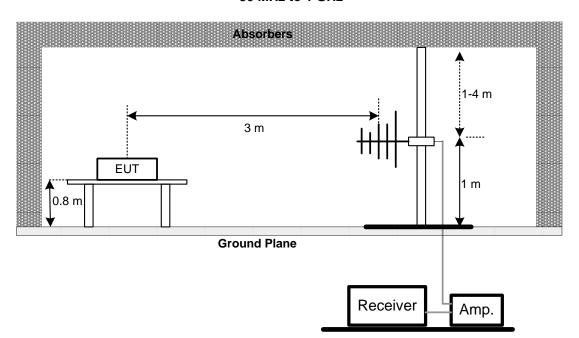
No deviation.

4.4 TEST SETUP

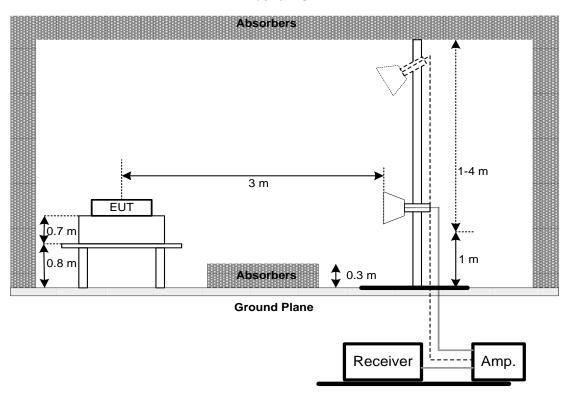




30 MHz to 1 GHz



Above 1 GHz







4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.6 TEST RESULT - BELOW 30 MHZ

Please refer to the APPENDIX B.

4.7 TEST RESULT - 30 MHZ TO 1 GHZ

Please refer to the APPENDIX C.

4.8 TEST RESULT - ABOVE 1 GHZ

Please refer to the APPENDIX D.

NOTE:

(1) No limit: This is fundamental signal, the judgment is not applicable. For fundamental signal judgment was referred to Peak output test.

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5 NUMBER OF HOPPING CHANNEL

5.1 APPLIED PROCEDURES

Section	Test Item	Frequency Range (MHz)	Result
15.247(a)(1)(iii)	Number of Hopping Channel	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RBW	100 KHz
VBW	100 KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW=100KHz, VBW=100KHz, Sweep time = Auto.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP

EUT	SPECTRUM
	ANALYZER

5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULTS

Please refer to the APPENDIX E.

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6 AVERAGE TIME OF OCCUPANCY

6.1 APPLIED PROCEDURES / LIMIT

Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

6.2 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyzer
- b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
- d. Sweep Time is more than once pulse time.
- e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- f. Measure the maximum time duration of one single pulse.
- g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
- h. Measure the maximum time duration of one single pulse.
- i. Measure the maximum time duration of one single pulse.

A Period Time = (channel number)*0.4

For Normal Mode (79 Channel):

DH1 Time Solt: Reading * (1600/2)*31.6/(channel number)

DH3 Time Solt: Reading * (1600/2)*31.6/(channel number)

DH5 Time Solt: Reading * (1600/2)*31.6/(channel number)

For AFH Mode (20 Channel):

DH1 Time Solt: Reading * (1600/2)*8/(channel number)

DH3 Time Solt: Reading * (1600/4)*8/(channel number)

DH5 Time Solt: Reading * (1600/6)*8/(channel number)

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP

EUT	SPECTRUM
	ANALYZER

6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

Please refer to the APPENDIX F.

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7 Hopping Channel Separation Measurement

7.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 KHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting	
Attenuation	Auto	
Span Frequency	> Measurement Bandwidth or Channel Separation	
RBW	30 KHz	
VBW	100 KHz	
Detector	Peak	
Trace	Max Hold	
Sweep Time	Auto	

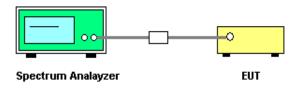
7.2 TEST PROCEDURE

- a. The EUT must have its hopping function enabled
- b. Span = wide enough to capture the peaks of two adjacent channels Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span Video (or Average) Bandwidth (VBW) ≥ RBW Sweep = Auto Detector function = Peak Trace = Max Hold

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 TEST RESULTS

Please refer to the APPENDIX G.

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8 BANDWIDTH TEST

8.1 APPLIED PROCEDURES

Section	Test Item	Frequency Range (MHz)	
15.247(a)(1)	Bandwidth	2400-2483.5	

Spectrum Parameter	Setting		
Attenuation	Auto		
Span Frequency	> Measurement Bandwidth or Channel Separation		
RBW	30 KHz (20dB Bandwidth) / 30 KHz (Channel Separation)		
VBW	100 KHz (20dB Bandwidth) / 100 KHz (Channel Separation)		
Detector	Peak		
Trace	Max Hold		
Sweep Time	Auto		

8.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep Time = Auto.

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULTS

Please refer to the APPENDIX H.

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9 OUTPUT POWER TEST

9.1 LIMIT

Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(1)	Maximum peak conducted output power	0.125 Watts (20.97 dBm)	2400-2483.5	PASS

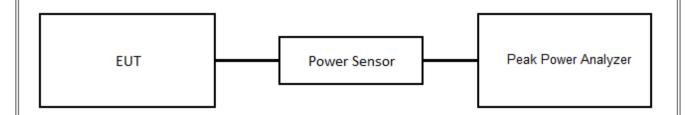
9.2 TEST PROCEDURE

- a. The EUT was directly connected to the Peak Power Analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 1/3MHz, VBW= 1/3MHz, Sweep time = Auto.

9.3 DEVIATION FROM STANDARD

No deviation.

9.4 TEST SETUP



9.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

9.6 TEST RESULTS

Please refer to the APPENDIX I.

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10 ANTENNA CONDUCTED SPURIOUS EMISSION

10.1 APPLIED PROCEDURES / LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

10.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW= 100KHz, VBW=100KHz, Sweep time = Auto.
- c. Offset=antenna gain+cable loss

10.3 DEVIATION FROM STANDARD

No deviation.

10.4 TEST SETUP

EUT SPECTRUM ANALYZER

10.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

10.6 TEST RESULTS

Please refer to the APPENDIX J.

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11 LIST OF MEASURING EQUIPMENTS

	AC Power Line Conducted Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until	
1	TWO-LINE V-NETWORK	R&S	ENV216	101521	2023/9/13	2024/9/12	
2	Test Cable	EMCI	EMCCFD300-BM -BMR-5000	220331	2023/3/30	2024/3/29	
3	EMI Test Receiver	R&S	ESR 7	101433	2023/11/10	2024/11/9	
4	Measurement Software	EZ	EZ_EMC (Version NB-03A1-01)	N/A	N/A	N/A	

	Radiated Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until	
1	Preamplifier	EMCI	EMC330N	980850	2023/9/6	2024/9/5	
2	Preamplifier	EMCI	EMC118A45SE	980819	2023/3/7	2024/3/6	
3	Pre-Amplifier	EMCI	EMC184045SE	980907	2023/9/21	2024/9/20	
4	Preamplifier	EMCI	EMC001340	980579	2023/9/6	2024/9/5	
5	Test Cable	EMCI	EMC104-SM-100 0	180809	2023/7/10	2024/7/9	
6	Test Cable	EMCI	EMC104-SM-SM- 3000	220322	2023/3/14	2024/3/13	
7	Test Cable	EMCI	EMC104-SM-SM- 7000	220324	2023/3/14	2024/3/13	
8	EXA Signal Analyzer	keysight	N9020B	MY57120120	2023/2/24	2024/2/23	
9	Loop Ant	Electro-Metrics	EMCI-LPA600	291	2023/9/12	2024/9/11	
10	Horn Antenna	RFSPIN	DRH18-E	211202A18EN	2023/5/12	2024/5/11	
11	Horn Ant	Schwarzbeck	BBHA 9170D	1136	2023/5/12	2024/5/11	
12	Log-bicon Antenna	Schwarzbeck	VULB9168	1369	2023/5/9	2024/5/8	
13	6dB Attenuator	EMCI	EMCI-N-6-06	AT-06001	2023/5/9	2024/5/8	
14	Test Cable	EMCI	EMC101G-KM-K M-3000	220329	2023/3/14	2024/3/13	
15	Test Cable	EMCI	EMC102-KM-KM- 1000	220327	2023/3/14	2024/3/13	
16	Measurement Software	EZ	EZ_EMC (Version NB-03A1-01)	N/A	N/A	N/A	

	Number of Hopping Frequency									
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until				
1	Spectrum Analyzer	R&S	FSP 40	101139	2023/3/9	2024/3/8				

	Average Time of Occupancy										
Item Kind of Equipment Manufacturer Type No. Serial No. Calibrated Date Calibrated Until											
1	Spectrum Analyzer	R&S	FSP 40	101139	2023/3/9	2024/3/8					



	Hopping Channel Separation										
Item Kind of Equipment Manufacturer Type No. Serial No. Calibrated Date Calibrated Until											
	1	Spectrum Analyzer	R&S	FSP 40	101139	2023/3/9	2024/3/8				

Bandwidth										
ItemKind of EquipmentManufacturerType No.Serial No.Calibrated DateCalibrated Until										
1	Spectrum Analyzer	R&S	FSP 40	101139	2023/3/9	2024/3/8				

	Output Power									
I I I I I I I I I I I I I I I I I I I						Calibrated Until				
1	Peak Power Analyzer	Keysight	8990B	MY51000517	2023/3/15	2024/3/14				
2	Power Sensor	Keysight	N1923A	MY58310005	2023/3/15	2024/3/14				

	Antenna conducted Spurious Emission									
ItemKind of EquipmentManufacturerType No.Serial No.Calibrated DateCalibrated Until										
1	Spectrum Analyzer	R&S	FSP 40	101139	2023/3/9	2024/3/8				

Remark: "N/A" denotes no model name, no serial no. or no calibration specified. All calibration period of equipment list is one year.

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42 FUT TEST BUOTO
12 EUT TEST PHOTO
Please refer to document Appendix No.: TP-2311T124-FCCP-1 (APPENDIX-TEST PHOTOS).
13 EUT PHOTOS
Please refer to document Appendix No.: EP-2311T124-1 (APPENDIX-EUT PHOTOS).

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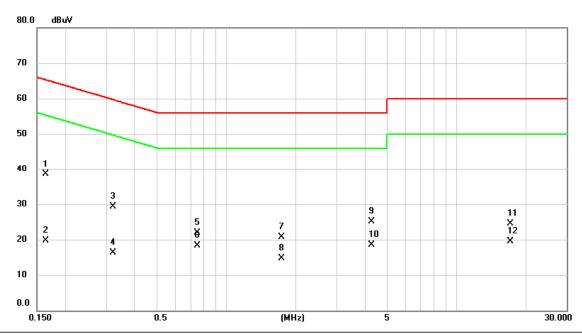


APPENDIX A	AC POWER LINE CONDUCTED EMISSIONS

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	Test Mode	Normal	Tested Date	2023/12/15
ŀ	Test Frequency	-	Phase	Line

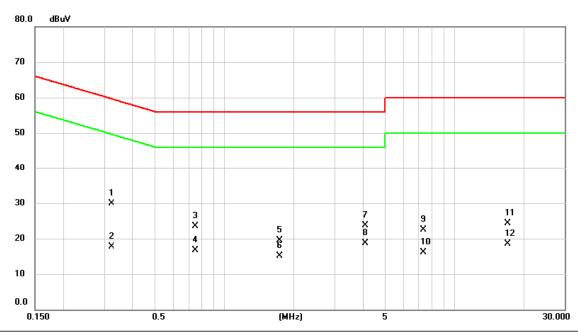


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBu∨	dB	dBu∨	dBu∨	dB	Detector	Comment
1	*	0.1635	28.94	9.60	38.54	65.28	-26.74	QР	
2		0.1635	10.18	9.60	19.78	55.28	-35.50	AVG	
3		0.3210	19.63	9.58	29.21	59.68	-30.47	QP	
4		0.3210	6.68	9.58	16.26	49.68	-33.42	AVG	
5		0.7462	12.40	9.59	21.99	56.00	-34.01	QP	
6		0.7462	8.72	9.59	18.31	46.00	-27.69	AVG	
7		1.7295	10.99	9.63	20.62	56.00	-35.38	QP	
8		1.7295	4.99	9.63	14.62	46.00	-31.38	AVG	
9		4.2585	15.50	9.64	25.14	56.00	-30.86	QP	
10		4.2585	8.85	9.64	18.49	46.00	-27.51	AVG	
11		17.0812	14.75	9.71	24.46	60.00	-35.54	QP	
12		17.0812	9.75	9.71	19.46	50.00	-30.54	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



Test Mode	Normal	Tested Date	2023/12/15
Test Frequency	-	Phase	Neutral

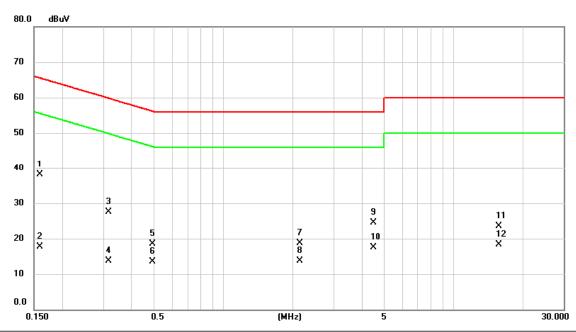


No. N	Иk. F	req.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	١	MHz	dBu∨	dB	dBu∨	dBu∨	dB	Detector	Comment
1	0.0	3232	20.32	9.57	29.89	59.62	-29.73	QР	
2	0.0	3232	8.14	9.57	17.71	49.62	-31.91	AVG	
3	0.	7462	13.96	9.58	23.54	56.00	-32.46	QP	
4	0.	7462	7.06	9.58	16.64	46.00	-29.36	AVG	
5	1.	7340	9.85	9.62	19.47	56.00	-36.53	QP	
6	1.	7340	5.48	9.62	15.10	46.00	-30.90	AVG	
7	4.0	0896	14.06	9.63	23.69	56.00	-32.31	QP	
8 *	* 4.0	0896	9.05	9.63	18.68	46.00	-27.32	AVG	
9	7.3	3387	12.90	9.69	22.59	60.00	-37.41	QP	
10	7.3	3387	6.49	9.69	16.18	50.00	-33.82	AVG	
11	17.0	0002	14.45	9.80	24.25	60.00	-35.75	QP	
12	17.0	0002	8.66	9.80	18.46	50.00	-31.54	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



Test Mode	Idle	Tested Date	2023/12/15
Test Frequency	-	Phase	Line

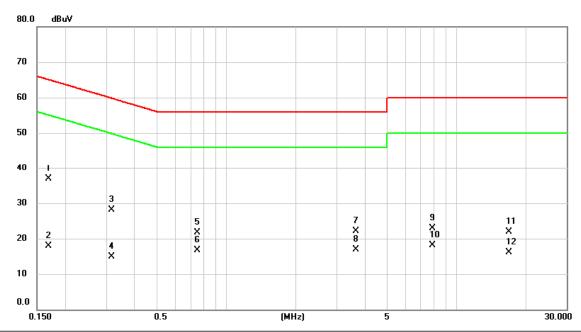


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBu∨	dB	dBu∨	dBu∨	dB	Detector	Comment
1	*	0.1590	28.56	9.60	38.16	65.52	-27.36	QP	
2		0.1590	8.05	9.60	17.65	55.52	-37.87	AVG	
3		0.3164	17.95	9.58	27.53	59.80	-32.27	QP	
4		0.3164	4.03	9.58	13.61	49.80	-36.19	AVG	
5		0.4920	8.96	9.58	18.54	56.13	-37.59	QP	
6		0.4920	4.02	9.58	13.60	46.13	-32.53	AVG	
7		2.1435	8.96	9.65	18.61	56.00	-37.39	QP	
8		2.1435	4.10	9.65	13.75	46.00	-32.25	AVG	
9		4.4700	14.88	9.64	24.52	56.00	-31.48	QP	
10		4.4700	7.85	9.64	17.49	46.00	-28.51	AVG	
11		15.7605	13.72	9.71	23.43	60.00	-36.57	QP	
12		15.7605	8.63	9.71	18.34	50.00	-31.66	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



Test Mode	Idle	Tested Date	2023/12/15
Test Frequency	-	Phase	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBu∨	dB	dBu∨	dBu∨	dB	Detector	Comment
1	*	0.1680	27.38	9.59	36.97	65.06	-28.09	QP	
2		0.1680	8.33	9.59	17.92	55.06	-37.14	AVG	
3		0.3164	18.60	9.57	28.17	59.80	-31.63	QP	
4		0.3164	5.33	9.57	14.90	49.80	-34.90	AVG	
5		0.7507	12.09	9.57	21.66	56.00	-34.34	QP	
6		0.7507	7.22	9.57	16.79	46.00	-29.21	AVG	
7		3.6307	12.48	9.63	22.11	56.00	-33.89	QP	
8		3.6307	7.33	9.63	16.96	46.00	-29.04	AVG	
9		7.8742	13.17	9.70	22.87	60.00	-37.13	QP	
10		7.8742	8.45	9.70	18.15	50.00	-31.85	AVG	
11		16.9215	12.19	9.80	21.99	60.00	-38.01	QP	
12		16.9215	6.31	9.80	16.11	50.00	-33.89	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



APPENDIX B	RADIATED EMISSIONS - 9 KHZ TO 30 MHZ

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Test Mode			BT (1	Mbps)		Test Date		2023	/12/19					
Test Frequency							1MHz				Vertical			
Temp			2	3°C	57	57%								
50.0 c	BuV/m									_				
	_													
40														
30										+				
20										-				
10														
00														
0										\dashv				
o										4				
o 📙	1 X													
	^													
										1				
0										\dashv				
o										4				
o														
0.0														
0.009	0.02	0.04	0.05	0.07	0.08 0.	09 0.11	0.12		0.15	_м				
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over							
			Level	Factor	ment									
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comm	ent				
1	*	0.0156	36.79	33.71	70.50	142.82	-72.32	AVG						

- (1) Measurement Value = Reading Level + Correct Factor.
 (2) Margin Level = Measurement Value Limit Value.



Test Mode				Mbps)		Test Date	-		2023/12/19 Vertical			
Test Frequency												
120.0 dE	Temp 0.0 dBuV/m			2	3°C		Hum.		51	/%		
1110 1000 90 80 1	2 3 X X 4	5 X	6 X									
20												
0.150	3.14	6.12		9.10	12.09	15.08 1	8.06 21.	.04 24.	03	30.00		
No.	Mk.	Freq		Reading Level	Correct Factor	Measure- ment	Limit	Over				
		MHz		dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comm	ent	
1	*	0.722		66.56	3.26	69.82	89.51	-19.69	QP			
2		1.685	3	60.04	-0.97	59.07	82.14	-23.07	QP			
3		2.205	7	60.40	-2.20	58.20	88.62	-30.42	QP			
4		3.339	0	53.33	-3.90	49.43	88.62	-39.19	QP			
5		4.415	5	53.29	-4.26	49.03	88.62	-39.59	QP			
6		6.826	5	44.20	-4.00	40.20	88.62	-48.42	QP			

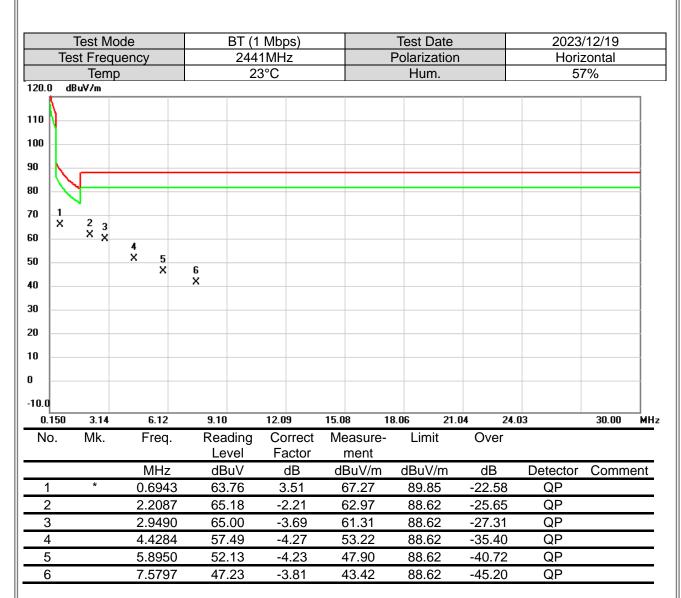
- (1) Measurement Value = Reading Level + Correct Factor.
 (2) Margin Level = Measurement Value Limit Value.



	Test Mod	de	BT (1	Mbps)		Test Date		2023	/12/19	
Te	st Frequ	ency	244	1MHz	ŀ	Polarization		Horiz	zontal	
	Temp		2	3°C		Hum.		57	7%	
50.0 d	BuV/m									_
40										
30										
20										_
10										
00										_
o										4
:0										4
'o	1 X									\parallel
0										-
50 -										+
io										+
10										+
20.0										
0.009	0.02	0.04	0.05	0.07		09 0.11	0.12		0.15	MI
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comm	ent
1	*	0.0156	36.35	33.71	70.06	142.82	-72.76	AVG		

- (1) Measurement Value = Reading Level + Correct Factor.
 (2) Margin Level = Measurement Value Limit Value.





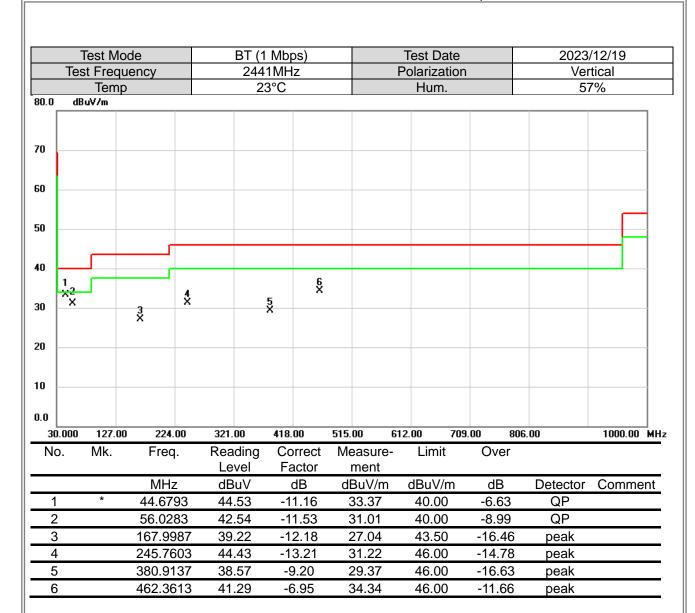
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



APPENDIX C	RADIATED EMISSIONS - 30 MHZ TO 1 GHZ

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- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



-	Test Mod	de		ВТ	(1 Mb)	os)			Test Da	ate		2023	/12/19	
Tes	st Frequ	ency			41MH	z			Polariza	tion			zontal	
	Temp				23°C				Hum			57	7%	
80.0 dB	uV/m													7
70														
60														
50														
40 T		2 X	3 *4 *				5		6 8					
30														
20														
10														-
0.0														
30.000	127.00	224.	00	321.00	418.	00	515.0	0 6	12.00	709.	00 806	5.00	1000.00	_мн
No.	Mk.	Freq	•	Readino Level		rrect actor		asure- nent	Limit	t	Over			
		MHz		dBuV		dB	dB	BuV/m	dBuV/	m	dB	Detector	Comme	ent
1	*	60.00		47.76	-1	1.73	3	6.03	40.00)	-3.97	QP		
2	!	167.99	87	50.77	-1	2.18	3	8.59	43.50)	-4.91	QP		
3		245.79		52.67		3.21		9.46	46.00		-6.54	peak		
4		258.04		49.22		2.79		6.43	46.00		-9.57	peak		
5		474.51	87	46.08	-(3.75	3	9.33	46.00)	-6.67	peak		
6		651.25	27	37.59	-3	3.18	3	4.41	46.00) _	-11.59	peak		

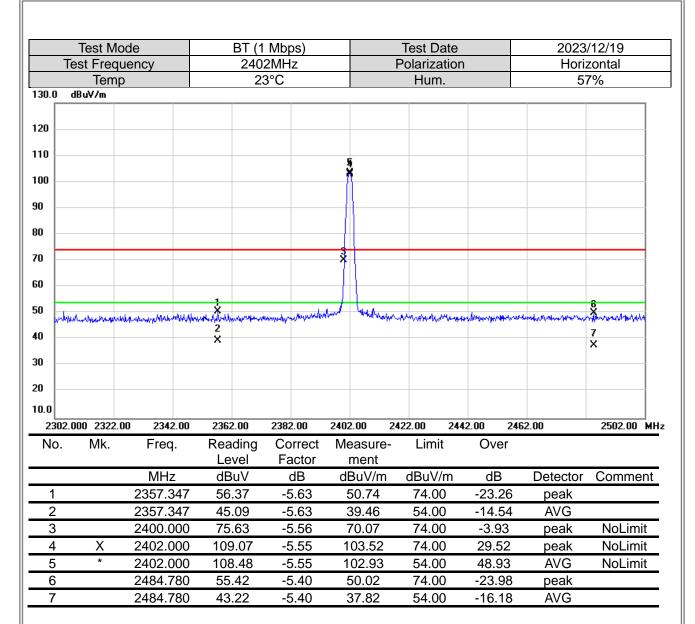
- (1) Measurement Value = Reading Level + Correct Factor.
 (2) Margin Level = Measurement Value Limit Value.



APPENDIX D RADIATED EMISSIONS - ABOVE 1 GHZ

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- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



-	Test Mod	de	BT (1	l Mbps)		Test Date			/12/19	
Tes	st Frequ	ency		0MHz	ı	Polarization	1		zontal	
	Temp		2	3°C		Hum.		57	7%	
130.0 dB	BuV/m									1
120										
10					- 3					ł
00										ļ
.					11)					
30										1
30										ł
70										
60 										ł
					7 1					
50 🗼				المسلمان والمسلمان	The state of the s	on hade the Market	al allo schale	1 didina and	46	
4	Marked John View	gans reststant of the second sections.	Maria de deservos de la constitución de la constitu	white out of the fire of	6 ×	ن مواده المالي من الماليون ال	rahman paraman daran	ch south of horses was	M. M. Mariana	1
	Mark Market Program	nones and the state of the stat	PMR Mediate and weekly le	wykonowy o progrady od wy	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	را در الماري و الماري	rally-will have pulpeden	ed participation in	all whole are sense	4
40 ×	Markety Mark	n,nov,metikuselind,novempeulijusel	PKANA distriction mander and and the	wykytenia po zpologodnoch	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	بالإرابين المتارك والمتاركة والمتارك	and provide description of the second	edjankt ff rygdyrauma	all has policy and sensor	V
40 4	Machinery	n, m, n stille stort, store open time t	Maridonal production of the	a formación períodos en	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	المراد المدالة والمعاونة المراد المرا	rakowalifektuarioherka	edypaddolfheryydysterionia	all described and several	
40 × 30 ×	that had gody again	n na naturalisati na naturalisa di naturalisa di naturalisa di naturalisa di naturalisa di naturalisa di natur	Maridonalphyddiaeth a gallan y	afferment of the street of the street	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Marilla Labelge At Labe Di	nskhowensk de west of the desired and the desi	id partition of the second	all the contract	
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40	00 2400.00	0 2420.00 Freq.	2440.00	2460.00	6 X X	500.00 252 Limit	20.00 254			
20 2380.00	00 2400.00	0 2420.00 Freq.	2440.00 Reading Level dBuV	2460.00 Correct	2480.00 25 Measure- ment dBuV/m	500.00 252 Limit dBuV/m	20.00 254 Over dB			MH
2380.00 No.	00 2400.00	D 2420.00 Freq. MHz 2383.633	2440.00 Reading Level dBuV 55.28	2460.00 Correct Factor dB -5.58	2480.00 25 Measure- ment dBuV/m 49.70	500.00 252 Limit dBuV/m 74.00	20.00 254 Over dB -24.30	Detector peak	2580.00	MH
0.0 2380.000 No.	00 2400.00 Mk.	D 2420.00 Freq. MHz 2383.633 2383.633	2440.00 Reading Level dBuV 55.28 45.10	2460.00 Correct Factor dB -5.58 -5.58	2480.00 25 Measure- ment dBuV/m 49.70 39.52	500.00 252 Limit dBuV/m 74.00 54.00	20.00 254 Over dB -24.30 -14.48	Detector peak AVG	2580.00 Comme	MH
2380.00 No.	00 2400.00 Mk.	0 2420.00 Freq. MHz 2383.633 2383.633 2480.000	2440.00 Reading Level dBuV 55.28 45.10 113.44	2460.00 Correct Factor dB -5.58 -5.58 -5.41	2480.00 25 Measure- ment dBuV/m 49.70 39.52 108.03	500.00 257 Limit dBuV/m 74.00 54.00 74.00	Over dB -24.30 -14.48 34.03	Detector peak AVG peak	2580.00 Comme	MI-
20 2380.00 No.	00 2400.00 Mk.	MHz 2383.633 2383.633 2480.000 2480.000	2440.00 Reading Level dBuV 55.28 45.10 113.44 113.13	2460.00 Correct Factor dB -5.58 -5.58 -5.41 -5.41	2480.00 25 Measure- ment dBuV/m 49.70 39.52 108.03 107.72	500.00 252 Limit dBuV/m 74.00 54.00 74.00 54.00	20.00 254 Over dB -24.30 -14.48 34.03 53.72	Detector peak AVG peak AVG	2580.00 Comme	MI-
20 2380.00 No.	00 2400.00 Mk.	0 2420.00 Freq. MHz 2383.633 2383.633 2480.000	2440.00 Reading Level dBuV 55.28 45.10 113.44	2460.00 Correct Factor dB -5.58 -5.58 -5.41	2480.00 25 Measure- ment dBuV/m 49.70 39.52 108.03	500.00 257 Limit dBuV/m 74.00 54.00 74.00	Over dB -24.30 -14.48 34.03	Detector peak AVG peak	2580.00 Comme	MH nt

- (1) Measurement Value = Reading Level + Correct Factor.
 (2) Margin Level = Measurement Value Limit Value.



	est Mo				3 Mbps)		Test Da			/12/19
Tes	t Frequ	ency			2MHz		Polarizat	ion		zontal
20.0	Temp			2	3°C		Hum.		57	7%
30.0 dB	uV/m									
120										
110						A				
100				-		Ä				
30										
30						3 X				
70						7				
50										
50			a 1 h. 10		1 4,~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	ward and	anta	water was and the company of the	hara ta da et la	<u>5</u>
10	Michelle Commenter of	Marker of the Africance of the	aboorabahk.vana.	MANAGE CO.	2 X		and a find the state of the last of	water and the same of the same	de la la descripción de la constitución de la const	7 X
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20										
-0										
10.0										
0.0 2302.000	0 2322.00			62.00	2382.00	2402.00			62.00	2502.00 M
0.0	0 2322.00 Mk.	23 4 2.0 Freq.	Re	ading evel	2382.00 Correct Factor			2442.00 24 Over	62.00	2502.00 M
0.0 2302.000			Re L	ading	Correct	Measure	e- Limit	Over	62.00 Detector	2502.00 M
0.0 2302.000		Freq.	Re L	ading evel	Correct Factor	Measure ment	e- Limit	Over		
0.0 2302.000 No.		Freq. MHz	Re <u>L</u> d 7 5	ading evel BuV	Correct Factor dB	Measure ment dBuV/n	e- Limit n dBuV/r	Over n dB	Detector	
0.0 2302.000 No.		Freq. MHz 2387.48	Re L d 7 59 7 49	ading evel BuV 5.50	Correct Factor dB -5.58	Measure ment dBuV/n 49.92	e- Limit n dBuV/r 74.00	Over n dB -24.08	Detector peak	
0.0 2302.000 No.	Mk.	Freq. MHz 2387.48 2387.48	Re L d 7 59 7 49 0 8	ading evel BuV 5.50 5.13	Correct Factor dB -5.58 -5.58	Measure ment dBuV/n 49.92 39.55	e- Limit n dBuV/r 74.00 54.00 74.00	Over n dB -24.08 -14.45	Detector peak AVG	Comment
2302.000 No.	Mk.	Freq. MHz 2387.48 2387.48 2400.00	Re L d 7 5: 7 4: 0 8 0 10	ading evel BuV 5.50 5.13	Correct Factor dB -5.58 -5.58 -5.56	Measure ment dBuV/n 49.92 39.55 76.38	e- Limit n dBuV/r 74.00 54.00 74.00 74.00	Over dB -24.08 -14.45 2.38	Detector peak AVG peak	Comment
0.0 2302.000 No. 1 2 3 4	Mk. X X	Freq. MHz 2387.48 2387.48 2400.00 2402.00	Re L dl 7 55 7 45 0 8 0 10	ading evel BuV 5.50 5.13 1.94	Correct Factor dB -5.58 -5.58 -5.56 -5.55	Measure ment dBuV/n 49.92 39.55 76.38 103.48	e- Limit n dBuV/r 74.00 54.00 74.00 74.00	Over dB -24.08 -14.45 2.38 29.48	Detector peak AVG peak peak	Comment NoLimit NoLimit

- (1) Measurement Value = Reading Level + Correct Factor.
 (2) Margin Level = Measurement Value Limit Value.



1	Test Mod	de		BT (3	Mbps)			Test Date		2023	/12/19	
Tes	st Frequ	ency			0MHz			Polarization	1	Horiz	zontal	
	Temp			2	3°C			Hum.		57	7%	
130.0 dB	uV/m											_
20												1
10						4						-
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30												1
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60							5					1
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50 ¥	البطوري والإستان والمتارك	washin rayin	lgl end ^a lvannoden	dynastral	mprayathay sample and the same same same same same same same sam	Angel	6	-bot-septolery, decret-septol	t-growth the south that	مجاهر بمدار المواسية الإنجاز الإنجاب بعادياً	ara-aguar-muu aa	4
50 ¥	البطادية بالمراجعة المتعادية	washerson ponyelle	oppend Marine Marine	Myrapotory	mprajahaya-upaplaanashan) year	Mary Mary Mary	-holografinites/holischinites/high	jogurus on john och	ng/kynolykelagshyildferarky).	ara ayaran ay	4
50 X 40 2 X	taphaning and the taphan	usenhasan sanyaWa	ogendensmoder.	dynastry	hywydding o wyr gleddiaddiodd yr	provide	6	-dark-pepthology, darker k-aging	proportion of the second	ng Paynon North agriculture parts	are or endown on the	4
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2 × 80 0.0							6 X					
50	0 2400.00	0 2420.00) 244	40.00	2460.00	2480	6 X	500.00 253	20.00 254	**************************************	2580.00	
50 2 40 2 × 80 20) 244 Re:	10.00 ading	2460.00 Correct	2480 Me	6 X					
60 X 2 X 80 0 0.0 2380.000	0 2400.00	0 2420.00 Freq.) 244 Re: L(40.00 ading evel	2460.00 Correct Factor	2480 Me	6 X	500.00 252 Limit	20.00 254 Over	0.00	2580.00	MH
60 X 2 X 80 0 0.0 2380.000	0 2400.00	2420.00 Freq. MHz	244 Re Lo	40.00 ading evel BuV	2460.00 Correct Factor dB	2480 Me r	6 X 0.00 2 easure- ment BuV/m	500.00 252 Limit dBuV/m	20.00 254 Over dB	0.00 Detector		MI
0.0 2 × 0.0 0.0 2380.000 No.	0 2400.00	2420.00 Freq. MHz 2382.660	244 Re L(dl	ading evel BuV	2460.00 Correct Factor dB -5.58	2480 Me r dE	6 X 0.00 2 easure-ment BuV/m 19.73	500.00 252 Limit	20.00 254 Over dB -24.27	0.00	2580.00	MI
0 2 X X X X X X X X X X X X X X X X X X	0 2400.00 Mk.	2420.00 Freq. MHz 2382.660 2382.660	244 Re- Lu dl) 555	40.00 ading evel BuV 5.31 3.03	2460.00 Correct Factor dB -5.58 -5.58	2480 Me r dE 4	6 X 0.00 2 easure- ment BuV/m	500.00 253 Limit dBuV/m 74.00	20.00 254 Over dB -24.27 -16.55	Detector peak AVG	2580.00	MI
60 2 80 2 80 0.0 2380.000 No.	0 2400.00	2420.00 Freq. MHz 2382.660	Re. Ludl) 55) 43	ading evel BuV	2460.00 Correct Factor dB -5.58	2480 Me r dE 4	6 X easure- ment 3uV/m 19.73	500.00 255 Limit dBuV/m 74.00 54.00	20.00 254 Over dB -24.27	Detector peak	2580.00 Comme	MI-
50	0 2400.00 Mk.	0 2420.00 Freq. MHz 2382.660 2480.000	244 Re- Lo dl 0) 559 0) 43	ading evel BuV 5.31 3.03 0.08	2460.00 Correct Factor dB -5.58 -5.58 -5.41	2480 Me r dE 4	6 X 2.00 2 2.00 2 2.00 2 2.00 2 2.00 2 2.00 2 2.00 3 3.00	500.00 25: Limit dBuV/m 74.00 54.00 74.00	20.00 254 Over dB -24.27 -16.55 30.67	Detector peak AVG peak	2580.00 Comme	MH ent

- (1) Measurement Value = Reading Level + Correct Factor.
 (2) Margin Level = Measurement Value Limit Value.



	Test M				Mbps)		Test Date			/12/19
Te	est Freq				2MHz		Polarizatio	n		rtical
	Tem	p		2	3°C		Hum.		57	7%
130.0	BuV/m						1			
120										
110										
100										
90										
80										
70										
60										
50			ž X							
40										
30										
20										
10.0										
	000 2700.			6100.00	7800.00	9500.00			500.00	18000.00 MHz
No.	Mk.	Freq	•	Reading Level	Correct Factor	Measure ment	- Limit	Over		
		MHz		dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.0	00	50.66	0.50	51.16	74.00	-22.84	peak	
2	*	4804.0	00	44.83	0.50	45.33	54.00	-8.67	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mo	nde		RT	11	Mbps)			Т	est Dat	·A		2023	/12/19
T	est Frequ					MHz				larizati				zontal
	Temp				23					Hum.				7%
130.0	dBuV/m													
120														
110 -														
100														
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20														
10.0														
1000.	000 2700.0	00 4400	.00	6100.00)	7800.00	9500).00	1120	0.00	12900.00	146	500.00	18000.00 MH
No.	Mk.	Freq		Readir Leve		Correct Factor		easure- ment	•	Limit	Ov	er		
		MHz		dBu√		dB		BuV/m	(dBuV/m	n d	В	Detector	Comment
1		4804.0		49.10		0.50		19.60		74.00	-24		peak	
2	*	4804.0	00	43.44	1	0.50		13.94		54.00	-10	.06	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mo	ode				Mbps)			est Da			2023	/12/19
Te	st Frequ					1MHz		Po	olarizat				tical
	Temp)			23	3°C			Hum.			57	7%
130.0 d	BuV/m												
120													
10													
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0 —													
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0.0													
	00 2700.0			6100.		7800.00				12900		00.00	18000.00 M
No.	Mk.	Freq.		Read Lev		Correc Factor	easure ment	-	Limit		Over		
		MHz		dΒι		dB	BuV/m		dBuV/r	m	dB	Detector	Comment
1		4882.00		48.		0.74	49.48		74.00)	-24.52	peak	
2	*	4882.00	OC	44.0	61	0.74	45.35		54.00)	-8.65	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mo	ode		BT (1	Mbps)			Test Da	ate	2023	/12/19
To	est Frequ				1MHz			Polariza			zontal
	Temp)		23	3°C			Hum.		5	7%
130.0	dBuV/m										
120											
110											
100											
90											
80											
70											
60											
50			1								
40			1 8 ×								
30											
20											
10.0											
	000 2700.0				7800.00	9500.00		200.00	12900.00	14600.00	18000.00 MHz
No.	Mk.	Freq.		iding evel	Correct Factor	Meas me		Limit	Ove	r	
		MHz	dE	₿uV	dB	dBu\		dBuV/ı	m dB	Detector	Comment
1		4882.000	0 43	.52	0.74	44.2	26	74.00	-29.7	'4 peak	
2	*	4882.000	0 39	.09	0.74	39.8	33	54.00	-14.1	7 AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mo	ode				Mbps))				Test Da					/12/19	
Te	st Frequ					0MHz				Р	olariza					rtical	
	Temp)			2	3°C					Hum				5	7%	
130.0 di	BuV/m																_
120																	4
110																	4
100																	-
90 -																	-
30																	-
o																	
io																	-
io			1 2 X														
0			X														\dashv
:0																	+
20																	4
0.0																	
	00 2700.0			6100		7800.00		9500			00.00			14600.00		18000.	DO MI
No.	Mk.	Freq		Rea Le	ding vel	Corre Fact			easure ment)-	Limit	t	Ove	r			
		MHz		dB		dB		dl	3uV/m	1	dBuV/	m	dB	De	tector	Comm	ent
1		4960.0		46.		0.99		4	17.08		74.00)	-26.9		eak		
2	*	4960.0	00	39.	.83	0.99	9	4	10.82		54.00) _	-13.1	8 7	NG		

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



		Test Mode st Frequency				Mbps)				Test Da				/12/19	
Te			<u> </u>			0MHz			F	Polarizat	ion			zontal	
	Tem	ıp			2	3°C				Hum.			57	7%	
130.0	dBuV/m														1
120															
110															
100															
90															
80															
70															
60															
50				1											
40				1 2 X											
30															
20															
10.0															
	000 2700		4400.00		00.00	7800.00		00.00			12900.00		SOO. OO	18000.00	MHz
No.	Mk.	F	req.	Re L	eading Level	Corre Facto		leasur ment	e-	Limit	O\	/er			
		1	ИНz		lBuV	dB	(dBuV/n	n	dBuV/r	n d	В	Detector	Commer	∩t
1		496	60.000	۷	3.41	0.99		44.40		74.00	-29	.60	peak		_
2	*	496	60.000	3	6.51	0.99		37.50		54.00	-16	5.50	AVG		

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mo	ode		BT (3 Mbps)		Test Date		2023	/12/19
Te	est Frequ	uency		24	02MHz		Polarizatio	n		tical
	Temp)		2	23°C		Hum.		57	7%
30.0	dBuV/m									
20										
10										
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	000 2700.0			6100.00	7800.00				600.00	18000.00 MH
No.	Mk.	Freq		Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz		dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.0	00	48.24	0.50	48.74	74.00	-25.26	peak	
2	*	4804.0	00	44.78	0.50	45.28	54.00	-8.72	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mo	ode	BT (3	3 Mbps)		Test Date		2023	/12/19
To	est Frequ			2MHz		Polarization)		zontal
	Temp)	2	3°C		Hum.		57	7%
130.0	dBuV/m								
120									
110									
100									
90									
80									
70									
60									
50		1 ½ X							
40		X							
30									
20									
10.0									
	000 2700.0			7800.00				00.00	18000.00 MHz
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	46.89	0.50	47.39	74.00	-26.61	peak	
2	*	4804.000	41.64	0.50	42.14	54.00	-11.86	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mo			Mbps)		Test Date			/12/19
T	est Frequ			1MHz		Polarization	1		tical
	Temp	1	23	3°C		Hum.		57	7%
130.0	dBuV/m								
120									
110									
100									
90									
80									
70									
60									
50		1 X 2							
40		x							
30									
20									
10.0									
	000 2700.0		6100.00	7800.00				00.00	18000.00 MHz
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4882.000	49.25	0.74	49.99	74.00	-24.01	peak	
2	*	4882.000	42.25	0.74	42.99	54.00	-11.01	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mo	ode				Mbps))				Test Da					/12/19	
Te	st Frequ					1MHz				Р	olariza					zontal	
	Temp)			2	3°C					Hum				5	7%	
130.0 di	BuV/m																_
120																	4
110																	-
100																	4
10																	-
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0																	
0																	\dashv
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0			1 X 2 X														\dashv
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0.0																	
	00 2700.0			6100		7800.00		9500			00.00			14600.00)	18000.	00 MI
No.	Mk.	Freq	•	Rea Le	ding vel	Corre Fact			easure ment) -	Limit	t	Ove	٢			
		MHz		dB	uV	dB		dE	3uV/m)	dBuV/	m	dB	De	etector	Comm	ent
1		4882.0		45.		0.74		4	16.60		74.00)	-27.4		oeak		
2	*	4882.0	00	37.	93	0.74	4	3	38.67		54.00)	-15.3	3	AVG		

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mo			Mbps)		Test Date			/12/19
l	Test Frequ			0MHz		Polarization	1		tical
130.0	Temp dBuV/m)	23	3°C		Hum.		5	7%
130.0	qRnA/w								
120									
110 —									
100									
90									
80									
70									
60									
50		1 *							
40		2 X							
30									
20									
10.0									
	.000 2700.0		6100.00	7800.00				00.00	18000.00 MH
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	- Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	46.25	0.99	47.24	74.00	-26.76	peak	
2	*	4960.000	36.69	0.99	37.68	54.00	-16.32	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mo	ode		BT (3	Mbps)		Test Date	Э	2023	/12/19
Te	est Frequ				0MHz		Polarization	on		zontal
	Temp)		2	3°C		Hum.		57	7%
130.0	dBuV/m									
120										
110										
100										
90										
80										
70										
60										
50			1							
40			1 X 2 X							
30			^							
20										
10.0										
	000 2700.0			6100.00	7800.00	9500.00			00.00	18000.00 MHz
No.	Mk.	Freq.	ļ	Reading Level	Correct Factor	Measure ment	e- Limit	Over		
		MHz		dBuV	dB	dBuV/m	n dBuV/m	dB	Detector	Comment
1		4960.00	0	43.86	0.99	44.85	74.00	-29.15	peak	
2	*	4960.00	0	35.79	0.99	36.78	54.00	-17.22	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mod			1 Mbps)		Test Date			/12/19
Te	est Frequ	ency		11MHz		Polarization	n		tical
	Temp		2	23°C		Hum.		57	7%
130.0	dBuV/m								
120									
110 🕌									
100 📖									
90									
80									
70									
60									
50	1 X								
1 0	2								
30	X								
20									
10									
0.0									
	0.000 20200.0	0 22400.00	24600.00	26800.00	29000.00	31200.00 33	400.00 356	500.00	40000.00 MH:
No.	Mk.	Freq.	Reading		Measure	- Limit	Over		
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m		dB	Detector	Comment
1		19528.00	54.30	-7.63	46.67	74.00	-27.33	peak	
2	*	19528.00	44.13	-7.63	36.50	54.00	-17.50	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



	Test Mod			Mbps)		Test Date			/12/19
Te	est Freque	ency		1MHz		Polarization)		zontal
130.0	Temp dBuV/m		2	3°C		Hum.		57	7%
130.0	agna/w								
120									
110									
100 📖									
90									
80									
70									
60									
50									
40 L	X X								
30	2 X								
20									
10									
0.0									
	0.000 20200.0	0 22400.00	24600.00	26800.00	29000.00	31200.00 334	400.00 356	00.00	40000.00 MH
No.	Mk.	Freq.	Reading	Correct	Measure-		Over		
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		19528.00	54.30	-7.63	46.67	74.00	-27.33	peak	
2	*	19528.00	43.29	-7.63	35.66	54.00	-18.34	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



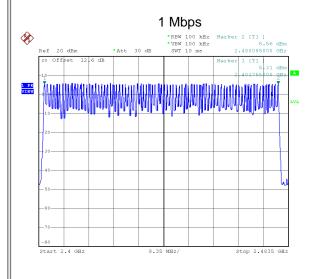
	Report No.: BTL-FCCF-1-23111124
APPENDIX E	NUMBER OF HOPPING CHANNEL

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Test Mode	1/3Mbps
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Test Mode	Number of Hopping Channel	≥ Limit	Test Result
1 Mbps	79	15	Pass
3 Mbps	79	15	Pass





Date: 18.DEC.2023 17:55:01 Date: 18.DEC.2023 18:04:52



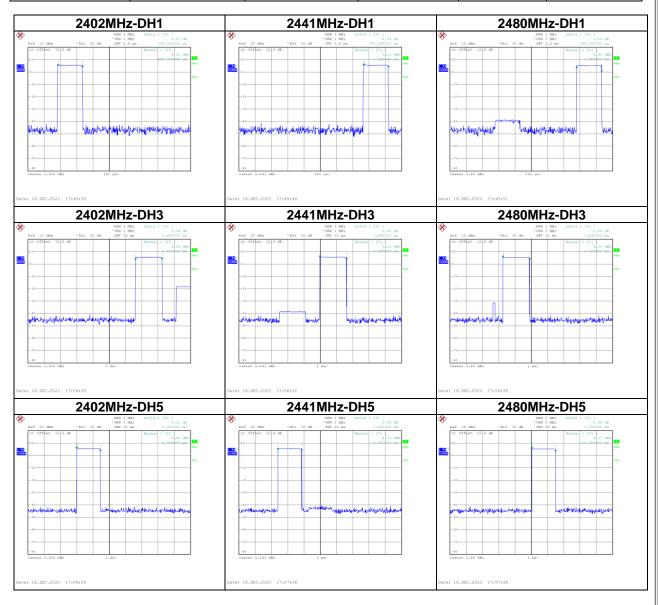
APPENDIX F AVERAGE TIME OF OCCUPANCY

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Test Mode: 1Mbps

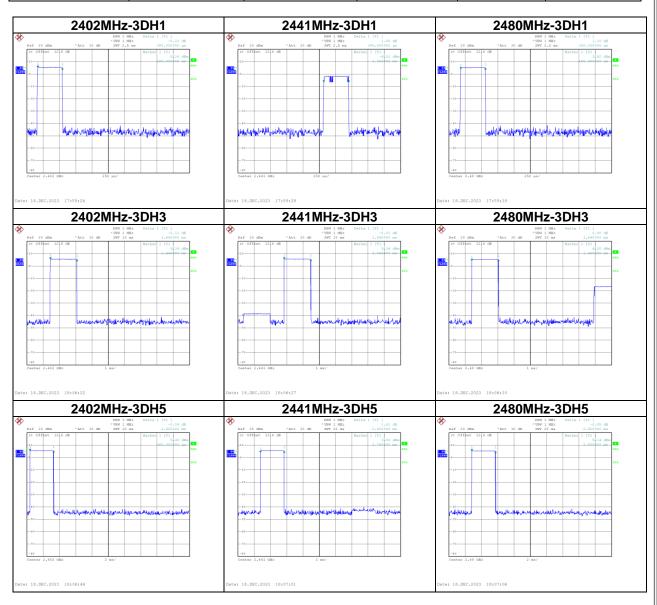
Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Result
DH5	2402	2.9200	0.3115	0.4000	Pass
DH3	2402	1.6400	0.2624	0.4000	Pass
DH1	2402	0.3800	0.1216	0.4000	Pass
DH5	2441	2.9200	0.3115	0.4000	Pass
DH3	2441	1.6400	0.2624	0.4000	Pass
DH1	2441	0.3800	0.1216	0.4000	Pass
DH5	2480	2.9200	0.3115	0.4000	Pass
DH3	2480	1.6400	0.2624	0.4000	Pass
DH1	2480	0.3850	0.1232	0.4000	Pass



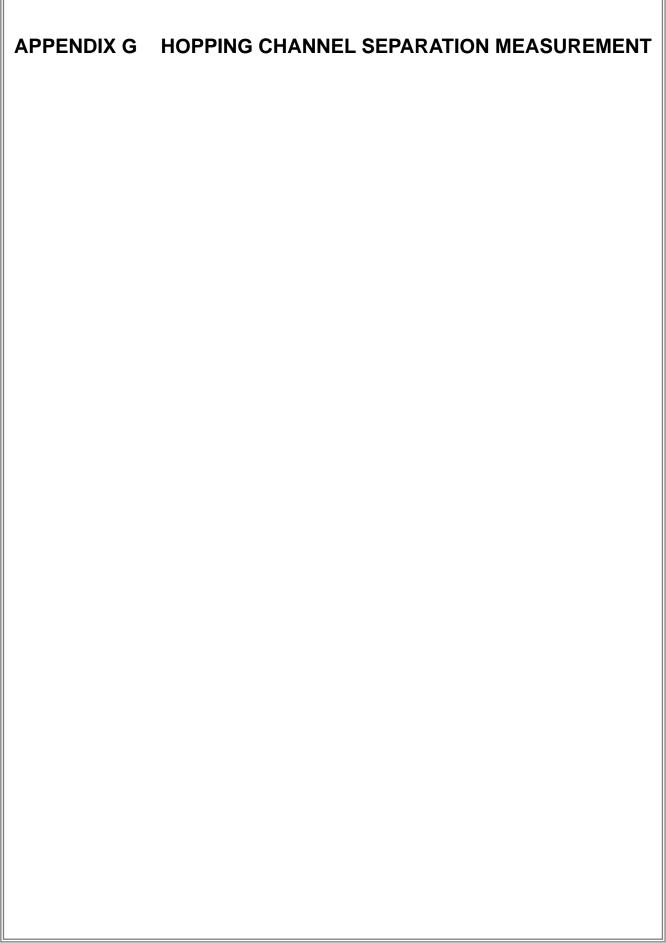


Test Mode : 3Mbps

Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)	Test Result
3DH5	2402	2.9200	0.3115	0.4000	Pass
3DH3	2402	1.6400	0.2624	0.4000	Pass
3DH1	2402	0.3800	0.1216	0.4000	Pass
3DH5	2441	2.9200	0.3115	0.4000	Pass
3DH3	2441	1.6400	0.2624	0.4000	Pass
3DH1	2441	0.3850	0.1232	0.4000	Pass
3DH5	2480	2.9200	0.3115	0.4000	Pass
3DH3	2480	1.6400	0.2624	0.4000	Pass
3DH1	2480	0.3800	0.1216	0.4000	Pass





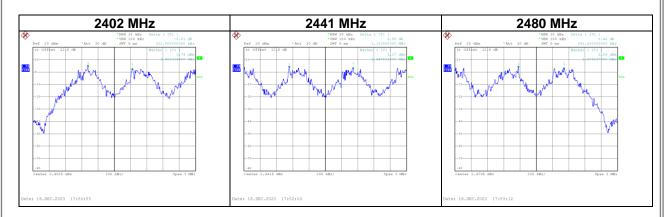


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Test Mode :	Hopping on _	1Mbps
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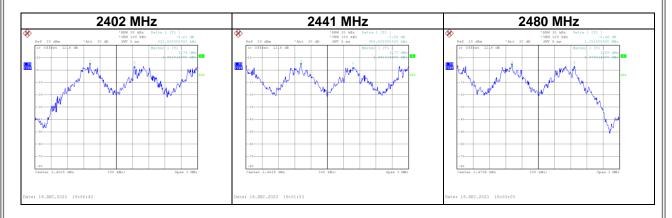
Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	0.822	0.639	Pass
2441	1.184	0.634	Pass
2480	0.843	0.640	Pass





Test Mode: Hopping on _3Mbps

Frequency (MHz)	Channel Separation (MHz)	2/3 of 20dB Bandwidth (MHz)	Test Result
2402	0.822	0.389	Pass
2441	0.959	0.444	Pass
2480	1.151	0.439	Pass







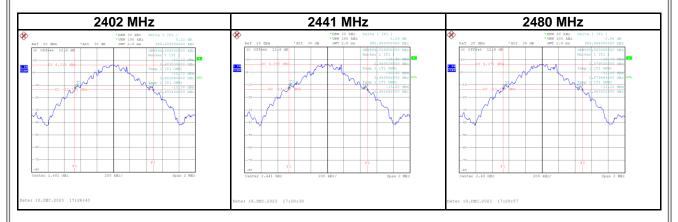
		Report No., BTL-FCCF-1-23111124
	APPENDIX H	BANDWIDTH
I		

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Test Mode :	1Mbps
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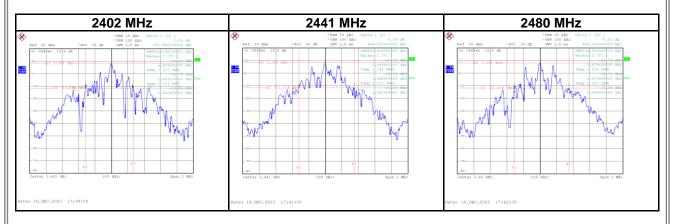
Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.958	0.884	Pass
2441	0.951	0.884	Pass
2480	0.960	0.868	Pass





Test Mode :	3Mbps

Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Test Result
2402	0.584	0.920	Pass
2441	0.666	0.800	Pass
2480	0.658	0.744	Pass





Report No.: BTL-FCCP-1-2311T124 APPENDIX I OUTPUT POWER

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Report No.: BTL-FCCP-1-2311T124

Test Mode :	BT(1 Mbps)	Tested Date	2023/12/15
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	9.26	0.0084	20.97	0.1250	Pass
2441	9.19	0.0083	20.97	0.1250	Pass
2480	9.10	0.0081	20.97	0.1250	Pass

Test Mode :	BT(2 Mbps)	Tested Date	2023/12/15
TOST IVIOUG .	D1 (2 1/10p3)	resieu Daie	2020/12/10

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	8.42	0.0070	20.97	0.1250	Pass
2441	8.33	0.0068	20.97	0.1250	Pass
2480	8.04	0.0064	20.97	0.1250	Pass

Test Mode :	BT(3 Mbps)	Tested Date	2023/12/15
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	8.40	0.0069	20.97	0.1250	Pass
2441	8.46	0.0070	20.97	0.1250	Pass
2480	8.19	0.0066	20.97	0.1250	Pass

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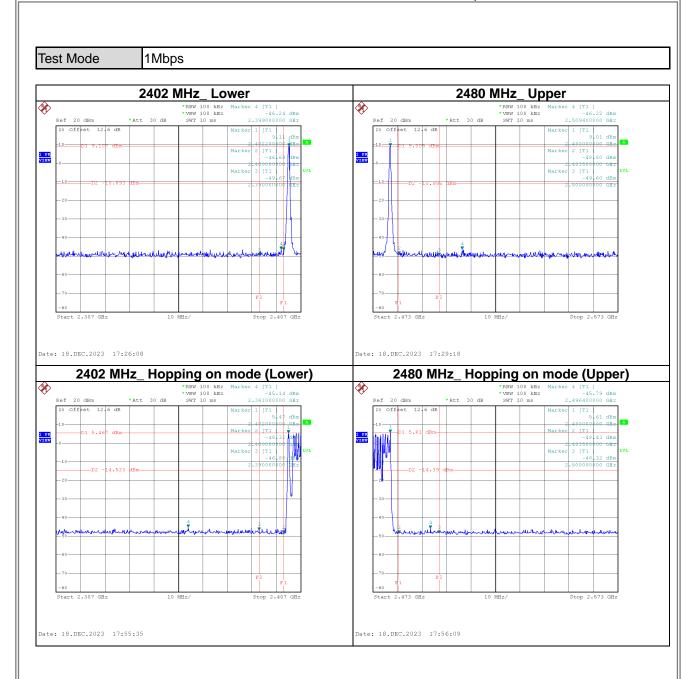


APPENDIX J	ANTENNA CONDUCTED SPURIOUS EMISSION

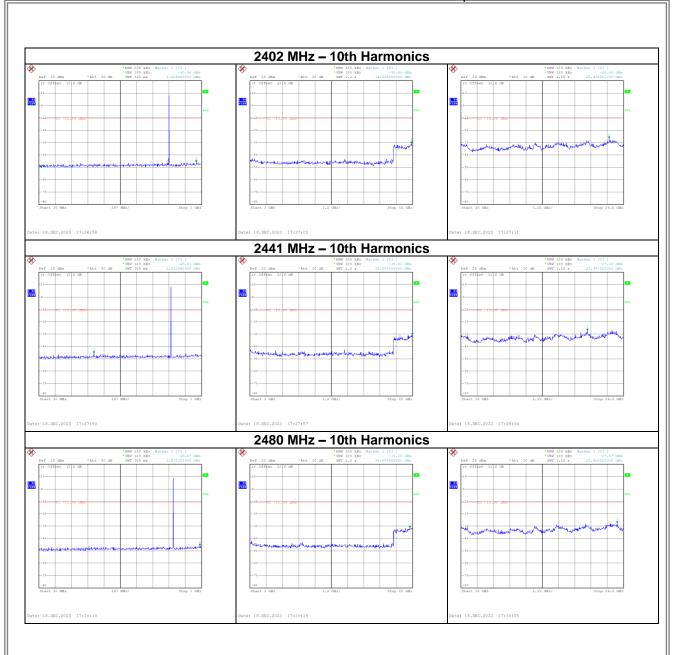
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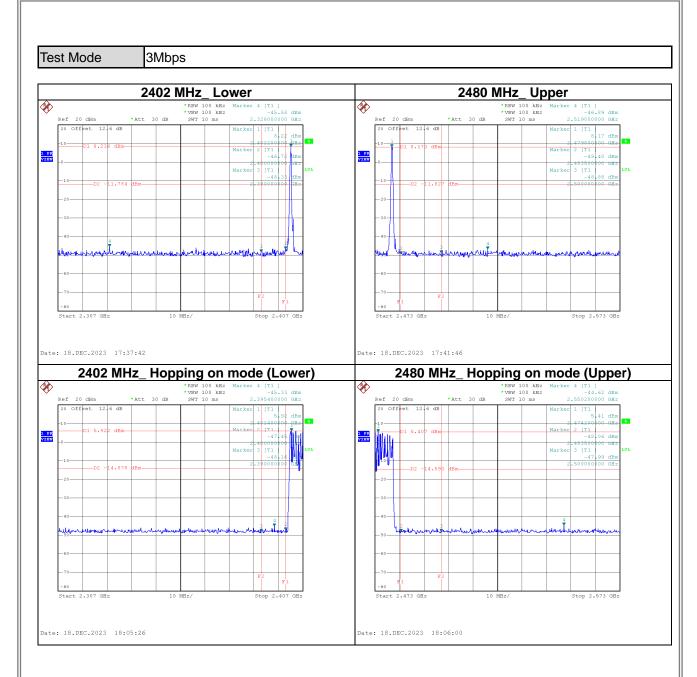




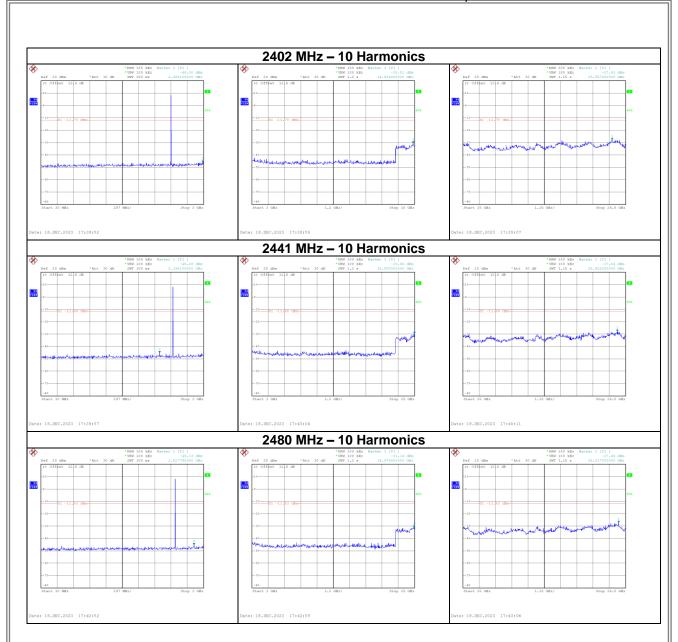












End of Test Report