

FCC Radio Test Report

FCC ID: 2ALZB-AG1103

Report No. : BTL-FCCP-2-2102T091A
Equipment : IEEE 802.11 2X2 MU-MIMO ac/a/b/g/n Wireless LAN +Bluetooth NGFF Module
Model Name : W8997-1216
Brand Name : Marvell
Applicant : SECO S.p.A
Address : Via Achille Grandi 20, 52100 Arezzo Italy

Radio Function : Bluetooth Low Energy 5.0

FCC Rule Part(s) : FCC CFR Title 47, Part 15, Subpart C (15.247)
Measurement Procedure(s) : ANSI C63.10-2013
FCC KDB 414788 D01 Radiated Test Site v01r01
FCC KDB 558074 D01 15.247 Meas Guidance v05r02

Date of Receipt : 2022/8/9
Date of Test : 2022/8/9 ~ 2023/1/18
Issued Date : 2023/2/1

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

Prepared by :

Eric Lee

Eric Lee, Engineer

Approved by :

Jerry Chuang

Jerry Chuang, Supervisor



BTL Inc.

No.18, Ln. 171, Sec. 2, Jiuzong Rd., Neihu Dist., Taipei City 114, Taiwan

Tel: +886-2-2657-3299 Fax: +886-2-2657-3331 Web: www.newbtl.com Service mail: btl_qa@newbtl.com

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.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

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.

CONTENTS

1	SUMMARY OF TEST RESULTS	5
1.1	TEST FACILITY	6
1.2	MEASUREMENT UNCERTAINTY	6
1.3	TEST ENVIRONMENT CONDITIONS	6
1.4	DUTY CYCLE	7
2	GENERAL INFORMATION	8
2.1	DESCRIPTION OF EUT	8
2.2	TEST MODES	10
2.3	BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	11
2.4	SUPPORT UNITS	12
3	AC POWER LINE CONDUCTED EMISSIONS TEST	13
3.1	LIMIT	13
3.2	TEST PROCEDURE	13
3.3	DEVIATION FROM TEST STANDARD	13
3.4	TEST SETUP	14
3.5	TEST RESULT	14
4	RADIATED EMISSIONS TEST	15
4.1	LIMIT	15
4.2	TEST PROCEDURE	16
4.3	DEVIATION FROM TEST STANDARD	16
4.4	TEST SETUP	17
4.5	EUT OPERATING CONDITIONS	19
4.6	TEST RESULT – BELOW 30 MHZ	19
4.7	TEST RESULT – 30 MHZ TO 1 GHZ	19
4.8	TEST RESULT – ABOVE 1 GHZ	19
5	LIST OF MEASURING EQUIPMENTS	20
6	EUT TEST PHOTO	21
7	EUT PHOTOS	21
APPENDIX A	AC POWER LINE CONDUCTED EMISSIONS	22
APPENDIX B	RADIATED EMISSIONS - 30 MHZ TO 1 GHZ	27
APPENDIX C	RADIATED EMISSIONS - ABOVE 1 GHZ	30

REVISION HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-2-2102T091A	R00	Original Report.	2022/11/23	Invalid
BTL-FCCP-2-2102T091A	R01	Revised report to address TCB's comments.	2022/12/14	Invalid
BTL-FCCP-2-2102T091A	R02	Revised report to address TCB's comments.	2023/1/11	Invalid
BTL-FCCP-2-2102T091A	R03	Revised report to address TAF Audit's comments.	2023/2/1	Valid

1 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	Pass	-----
15.247(b)(3)	Output Power	-----	Pass	NOTE(5)

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report.
- (2) The report format version is TP.1.1.1.
- (3) This test report is issued for the RF module (FCC ID: 2ALZB-AG1103) to be incorporated to the host device (Model number: Unity27), Product name: Display Unity 27").
Since the RF module has been certificated, after evaluation, above test items were criticized and reconfirmed in this report.
- (4) After spot check, this revision does not change original radio parameters.
- (5) After evaluated, the output power within the tune-up power tolerance.

1.1 TEST FACILITY

The test locations stated below are under the TAF Accreditation Number 0659.

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)

☒ C05 ☐ SR10 ☐ SR11

No. 68-2, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
(FCC DN: TW0659)

☒ SR05

No. 72, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
(FCC DN: TW0659)

☐ C06 ☒ CB21 ☐ CB22

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k = 2$, 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 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)
CB21	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
	1 GHz ~ 6 GHz	5.21
	6 GHz ~ 18 GHz	5.51
	18 GHz ~ 26 GHz	3.69
	26 GHz ~ 40 GHz	4.23

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

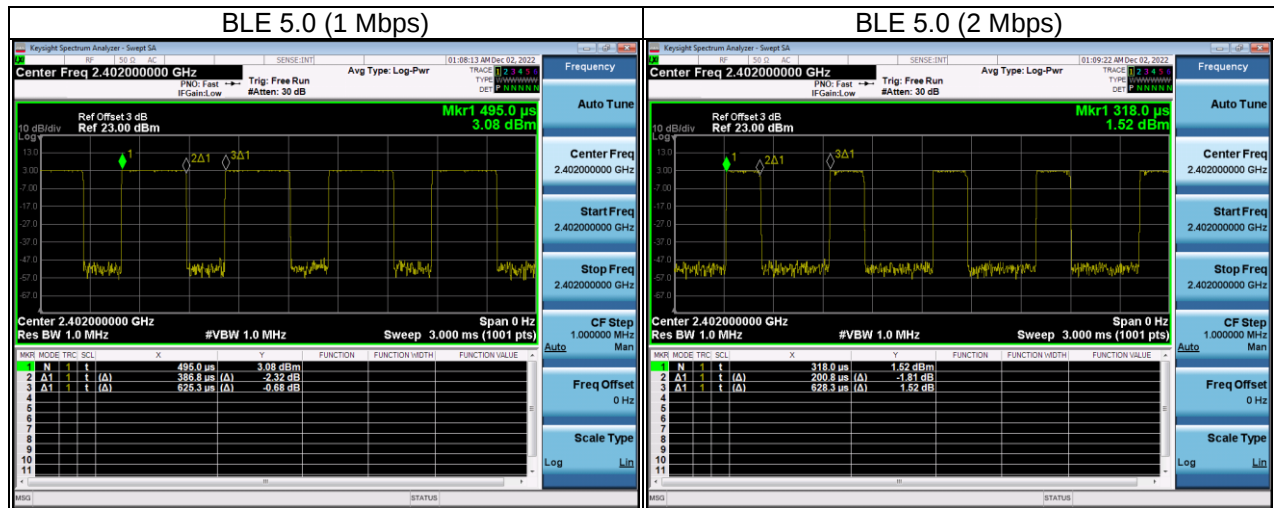
Test Item	Environment Condition	Test Voltage	Tested by
AC Power Line Conducted Emissions	21 °C, 51 %	AC 120V	Paul Shen
Radiated emissions below 1 GHz	Refer to data	AC 120V	Mark Wang
Radiated emissions above 1 GHz	Refer to data	AC 120V	Mark Wang

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 (ms)	Numbers (ON)	On Time (B) (ms)	Period (ON+OFF) (ms)	Duty Cycle (%)	Duty Factor (dB)
BLE 5.0 (1 Mbps)	0.387	1	0.387	0.625	61.86%	2.09
BLE 5.0 (2 Mbps)	0.201	1	0.201	0.628	31.96%	4.95



2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Equipment	IEEE 802.11 2X2 MU-MIMO ac/a/b/g/n Wireless LAN +Bluetooth NGFF Module
Model Name	W8997-1216
Brand Name	Marvell
Model Difference	N/A
Power Supply Rating	DC 3.3V from host equipment
Host device information	
Equipment	Display Unity 27"
Model Name	Unity27
Brand Name	SECO
Model Difference	Differ in product size.
Power Source	DC voltage supplied from AC/DC Adapter.
Power Rating	DC 12V
Products Covered	N/A
WIFI+BT Module	Marvell / W8997-1216
Operation Band	2400 MHz ~ 2483.5 MHz
Operation Frequency	2402 MHz ~ 2480 MHz
Test Model	Unity27
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.
- (2) Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

(3) Table for Filed Antenna:

Antenna	Manufacture	Part number	Type	Frequency Range (MHz)	Gain (dBi)
Main	dynaflex	616	Dipole	2400-2480	1.1
				5000-5800	2.5

- (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.

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 (above 1GHz)	1 Mbps	00/39	Bandedge
	1 Mbps	00/19/39	Harmonic

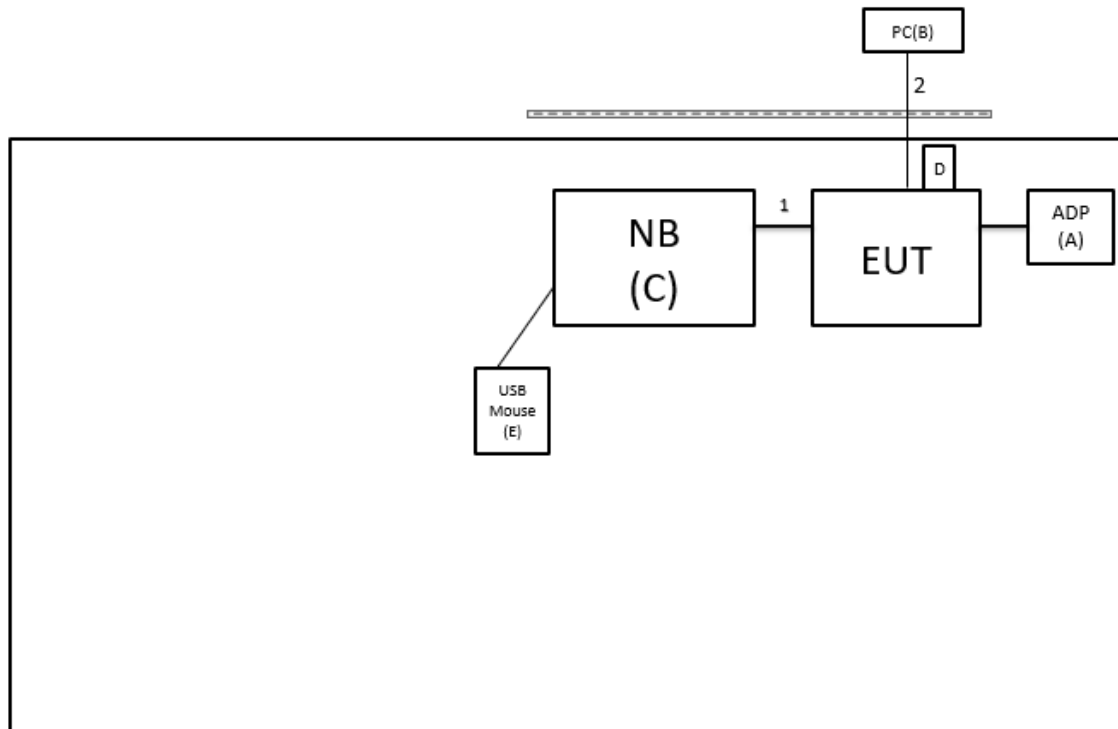
NOTE:

- (1) The Radiated emissions test was verified based on the worst conducted power and Bandwidth test results reported in the original report.
- (2) For radiated emission band edge test, both Vertical and Horizontal are evaluated, but only the worst case (Vertical) is recorded.
- (3) All X, Y and Z axes are evaluated, but only the worst case (Y axis) is recorded.

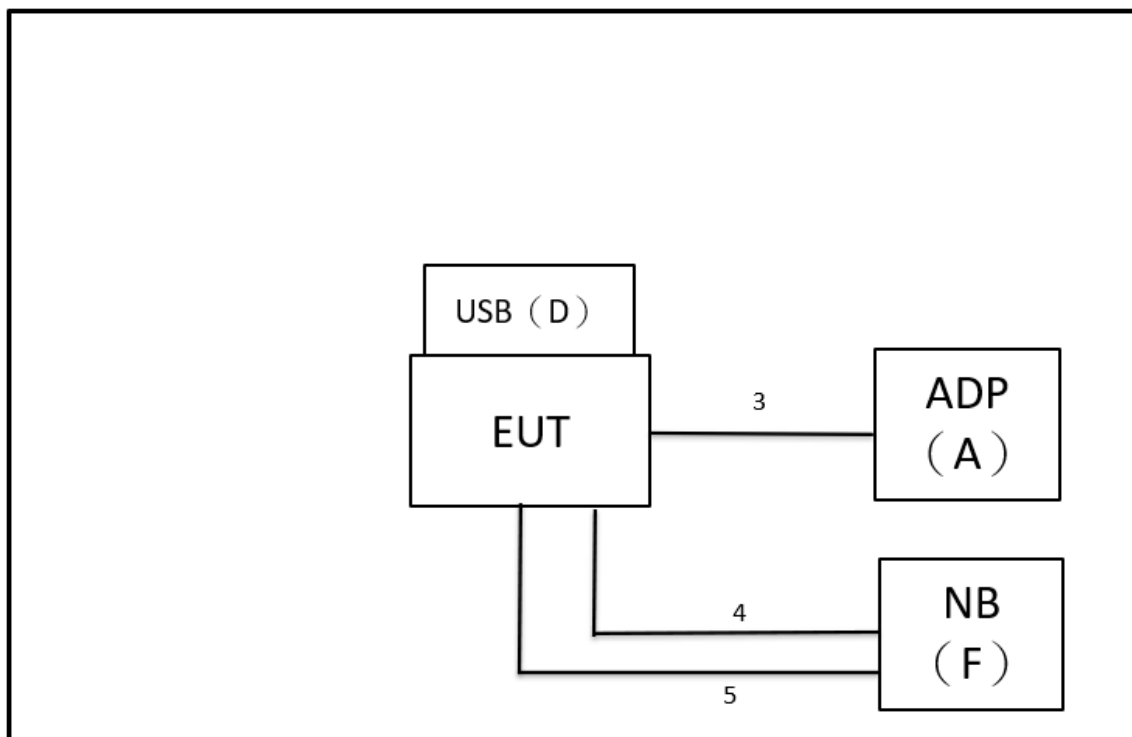
2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

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



2.4 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.	Remarks
A	Adapter	DELTA ELECTRONICS INC.	ADT-060A12AA	N/A	Supplied by test requester
B	PC	DELL	OptiPlex 790 MT	64NJVBX	Furnished by test lab.
C	NB	ASUS	X450J	N/A	Furnished by test lab.
D	USB	Transcend	JetFlash790	N/A	Supplied by test requester
E	USB Mouse	DELL	MOCZUL	CN-049TWY-PR C00-79E-01HA	Furnished by test lab.
F	NB	HP	TPN-I119	N/A	Furnished by test lab.

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
1	Yes	NO	1.7m	HDMI Cable	Furnished by test lab.
2	NO	NO	10m	RJ-45 Cable	Furnished by test lab.
3	NO	NO	1.5m	Power Cable	Supplied by test requester
4	NO	NO	1.8m	HDMI	Furnished by test lab.
5	NO	NO	1m	cable	Furnished by test lab.

3 AC POWER LINE CONDUCTED EMISSIONS TEST

3.1 LIMIT

Frequency (MHz)	Limit (dBμV)	
	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		Correct Factor		Measurement Value
38.22	+	3.45	=	41.67

Measurement Value		Limit Value		Margin Level
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.

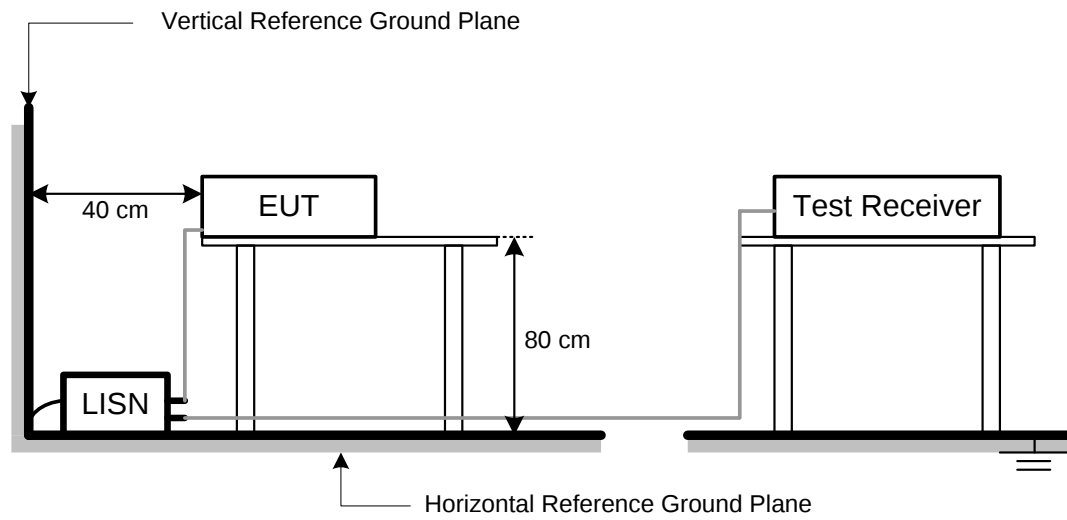
NOTE:

- (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.

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 (meters)
	Peak	Average	
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		Correct Factor		Measurement Value
19.11	+	2.11	=	21.22

Measurement Value		Limit Value		Margin Level
21.22	-	54	=	-32.78

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

Mode	VBW(Hz)
BLE (1M)	2.7k

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

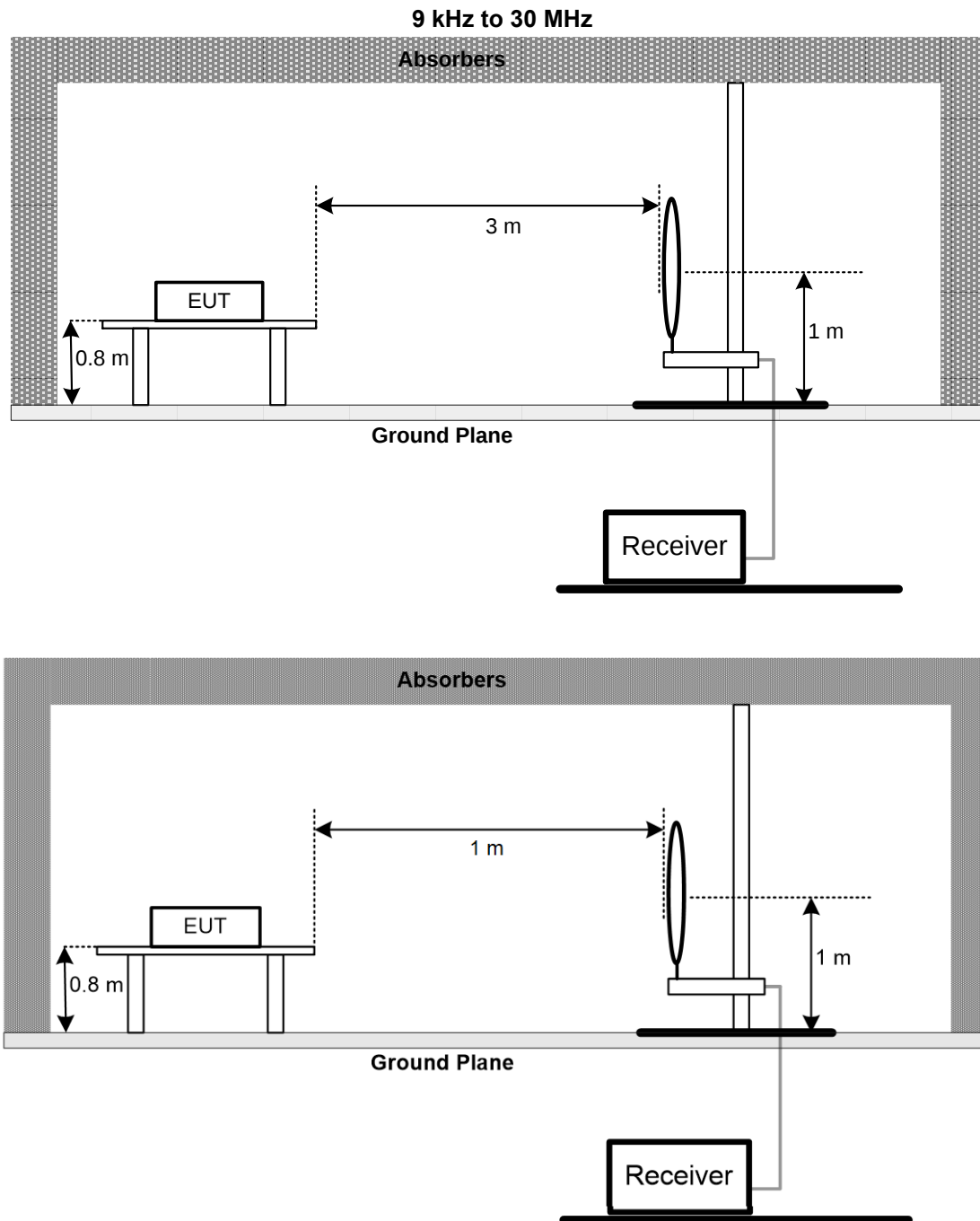
4.2 TEST PROCEDURE

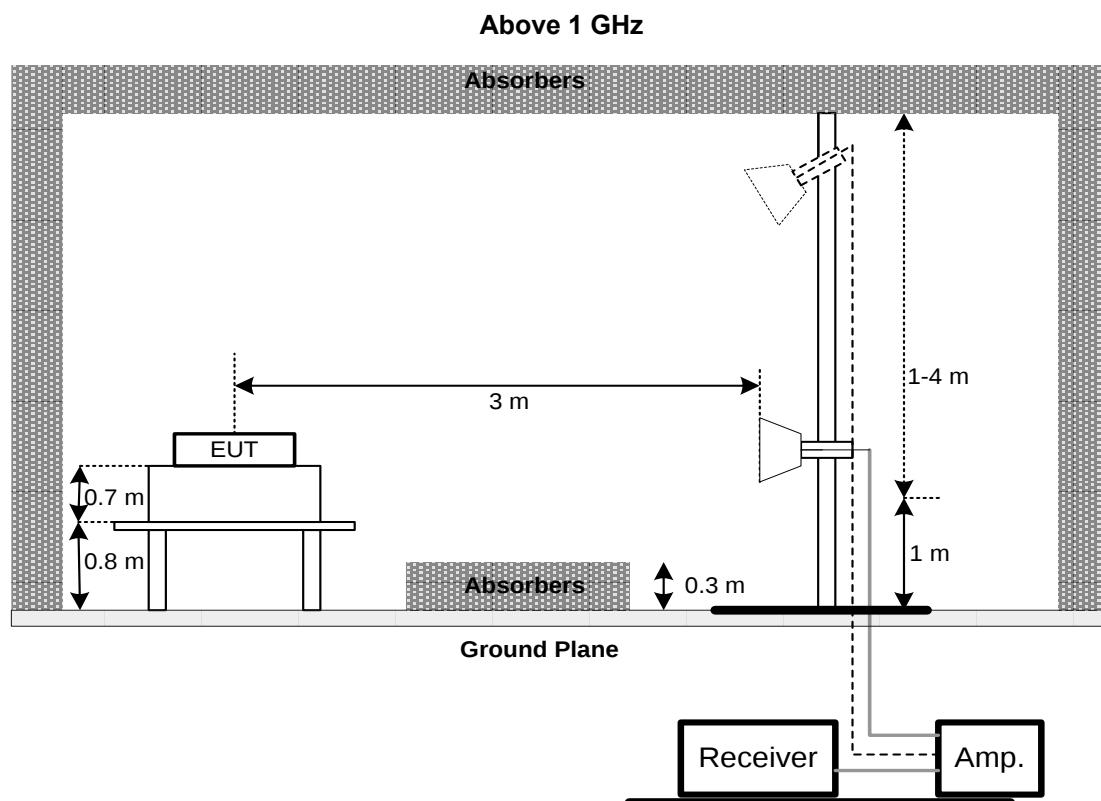
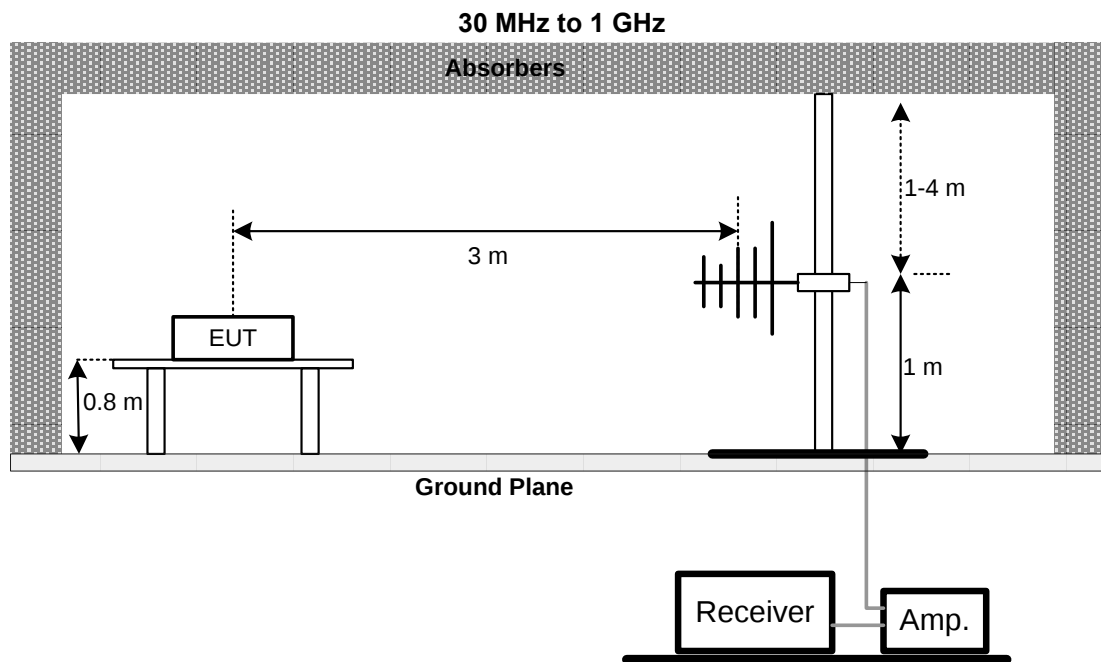
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance 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.
- j. For the radiated emission test sites for measurements from 9 kHz to 30 MHz, in accordance with FCC KDB 414788, an alternative test site may be used for the measurement. The open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result. Therefore the result from the semi-anechoic chamber tests is shown in this section of the test report.

4.3 DEVIATION FROM TEST STANDARD

No deviation.

4.4 TEST SETUP





4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.6 TEST RESULT – BELOW 30 MHZ

There were no emissions found below 30 MHz within 20 dB of the limit.

4.7 TEST RESULT – 30 MHZ TO 1 GHZ

Please refer to the APPENDIX B.

4.8 TEST RESULT – ABOVE 1 GHZ

Please refer to the APPENDIX C.

NOTE:

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

5 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	101051	2022/6/15	2023/6/14
2	Test Cable	EMCI	EMCRG58-BM-B M-9000	210501	2022/5/2	2023/5/1
3	EMI Test Receiver	R&S	ESR 7	101433	2021/11/24	2022/11/23
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	2022/9/19	2023/9/18
2	Preamplifier	EMCI	EMC118A45SE	980819	2022/3/8	2023/3/7
3	Preamplifier	EMCI	EMC184045SE	980882	2022/2/9	2023/2/8
4	Preamplifier	EMCI	EMC001340	980555	2022/4/6	2023/4/5
5	Test Cable	EMCI	EMC104-SM-SM-1000	220319	2022/3/15	2023/3/14
6	Test Cable	EMCI	EMC104-SM-SM-3000	220322	2022/3/15	2023/3/14
7	Test Cable	EMCI	EMC104-SM-SM-7000	220324	2022/3/15	2023/3/14
8	EXA Signal Analyzer	keysight	N9020B	MY57120120	2022/3/7	2023/3/6
9	Loop Ant	Electro-Metrics	EMCI-LPA600	274	2022/6/16	2023/6/15
10	Horn Antenna	RFSPIN	DRH18-E	211202A18EN	2022/5/18	2023/5/17
11	Horn Ant	Schwarzbeck	BBHA 9170D	1136	2022/5/18	2023/5/17
12	Log-bicon Antenna	Schwarzbeck	VULB9168	1369	2022/5/20	2023/5/19
13	6dB Attenuator	EMCI	EMCI-N-6-06	AT-N0625	2022/5/20	2023/5/19
14	Measurement Software	EZ	EZ EMC (Version NB-03A1-01)	N/A	N/A	N/A

Output Power						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Power Meter	Keysight	8990B	MY51000517	2022/3/18	2023/3/17
2	Power Sensor	Keysight	N1923A	MY58310005	2022/3/18	2023/3/17

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

6 EUT TEST PHOTO

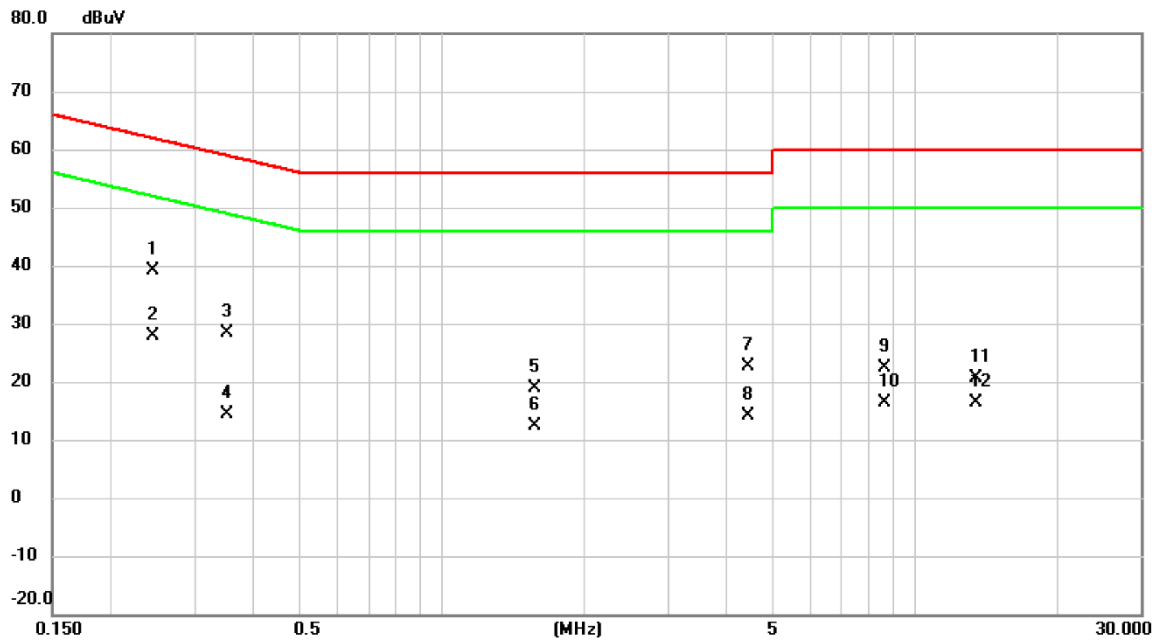
Please refer to document Appendix No.: TP-2102T091A-FCCP-1 (APPENDIX-TEST PHOTOS).

7 EUT PHOTOS

Please refer to document Appendix No.: EP-2102T091A-2 (APPENDIX-EUT PHOTOS).

APPENDIX A AC POWER LINE CONDUCTED EMISSIONS

Test Mode	Normal	Tested Date	2022/8/19
Test Frequency	-	Phase	Line



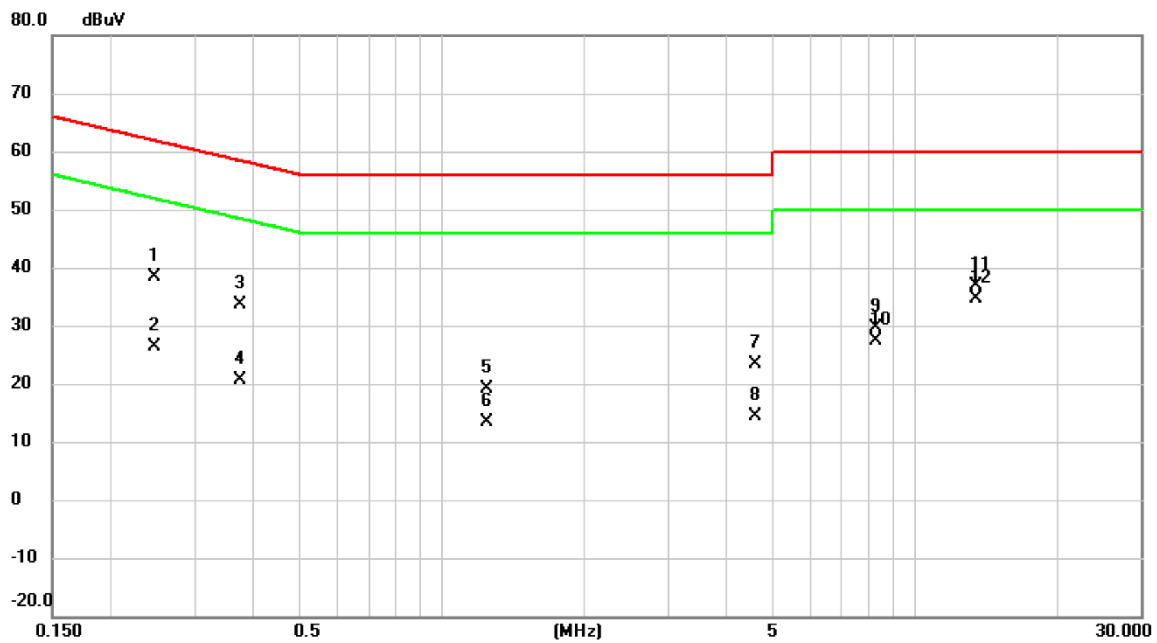
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.2445	29.39	9.63	39.02	61.94	-22.92	QP	
2		0.2445	18.24	9.63	27.87	51.94	-24.07	AVG	
3		0.3525	18.75	9.62	28.37	58.90	-30.53	QP	
4		0.3525	4.85	9.62	14.47	48.90	-34.43	AVG	
5		1.5743	9.14	9.68	18.82	56.00	-37.18	QP	
6		1.5743	2.76	9.68	12.44	46.00	-33.56	AVG	
7		4.4475	12.83	9.74	22.57	56.00	-33.43	QP	
8		4.4475	4.43	9.74	14.17	46.00	-31.83	AVG	
9		8.6145	12.49	9.82	22.31	60.00	-37.69	QP	
10		8.6145	6.49	9.82	16.31	50.00	-33.69	AVG	
11		13.4835	10.78	9.84	20.62	60.00	-39.38	QP	
12		13.4835	6.52	9.84	16.36	50.00	-33.64	AVG	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	Normal	Tested Date	2022/8/19
Test Frequency	-	Phase	Neutral



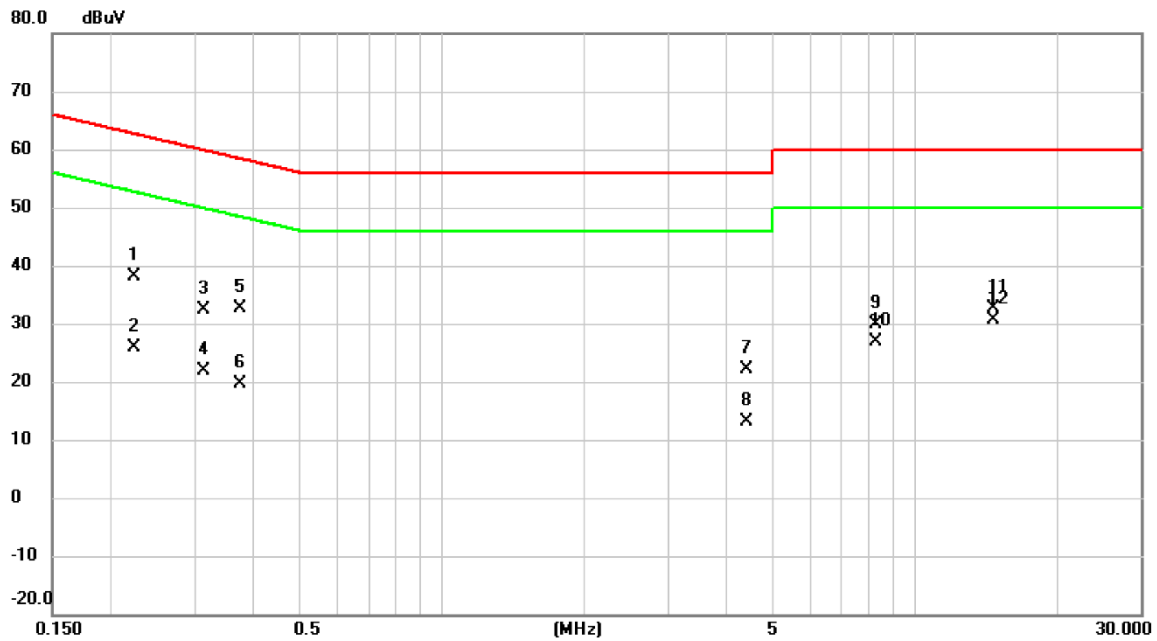
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.2468	28.86	9.62	38.48	61.86	-23.38	QP	
2		0.2468	16.72	9.62	26.34	51.86	-25.52	AVG	
3		0.3750	24.03	9.62	33.65	58.39	-24.74	QP	
4		0.3750	11.07	9.62	20.69	48.39	-27.70	AVG	
5		1.2480	9.54	9.66	19.20	56.00	-36.80	QP	
6		1.2480	3.74	9.66	13.40	46.00	-32.60	AVG	
7		4.6140	13.56	9.76	23.32	56.00	-32.68	QP	
8		4.6140	4.56	9.76	14.32	46.00	-31.68	AVG	
9		8.2388	19.71	9.84	29.55	60.00	-30.45	QP	
10		8.2388	17.63	9.84	27.47	50.00	-22.53	AVG	
11		13.4835	26.91	9.90	36.81	60.00	-23.19	QP	
12	*	13.4835	24.83	9.90	34.73	50.00	-15.27	AVG	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	Idle	Tested Date	2022/8/19
Test Frequency	-	Phase	Line

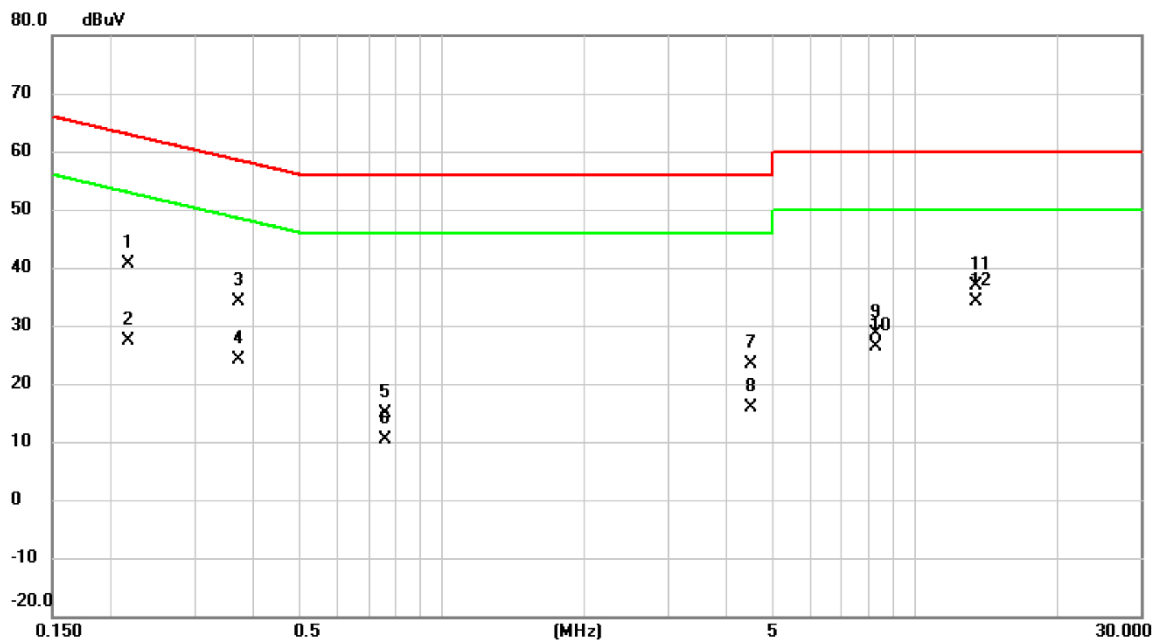


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.2243	28.52	9.63	38.15	62.66	-24.51	QP	
2		0.2243	16.36	9.63	25.99	52.66	-26.67	AVG	
3		0.3141	22.69	9.62	32.31	59.86	-27.55	QP	
4		0.3141	12.34	9.62	21.96	49.86	-27.90	AVG	
5		0.3750	22.91	9.62	32.53	58.39	-25.86	QP	
6		0.3750	10.06	9.62	19.68	48.39	-28.71	AVG	
7		4.4160	12.29	9.74	22.03	56.00	-33.97	QP	
8		4.4160	3.50	9.74	13.24	46.00	-32.76	AVG	
9		8.2410	20.01	9.82	29.83	60.00	-30.17	QP	
10		8.2410	17.03	9.82	26.85	50.00	-23.15	AVG	
11		14.6085	22.75	9.83	32.58	60.00	-27.42	QP	
12	*	14.6085	20.80	9.83	30.63	50.00	-19.37	AVG	

REMARKS:

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

Test Mode	Idle	Tested Date	2022/8/19
Test Frequency	-	Phase	Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.2175	30.89	9.62	40.51	62.91	-22.40	QP	
2		0.2175	17.74	9.62	27.36	52.91	-25.55	AVG	
3		0.3727	24.54	9.62	34.16	58.44	-24.28	QP	
4		0.3727	14.49	9.62	24.11	48.44	-24.33	AVG	
5		0.7597	5.34	9.65	14.99	56.00	-41.01	QP	
6		0.7597	0.76	9.65	10.41	46.00	-35.59	AVG	
7		4.4947	13.74	9.74	23.48	56.00	-32.52	QP	
8		4.4947	6.13	9.74	15.87	46.00	-30.13	AVG	
9		8.2388	18.84	9.84	28.68	60.00	-31.32	QP	
10		8.2388	16.60	9.84	26.44	50.00	-23.56	AVG	
11		13.4835	26.90	9.90	36.80	60.00	-23.20	QP	
12	*	13.4835	24.23	9.90	34.13	50.00	-15.87	AVG	

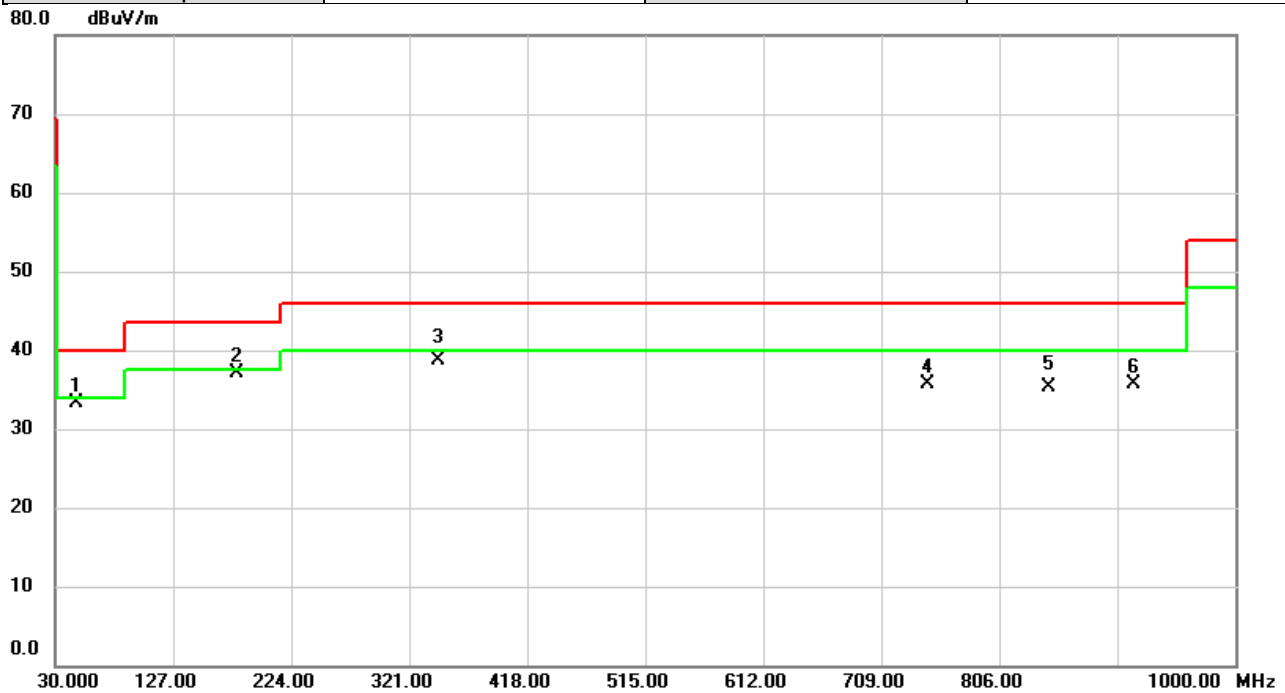
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

APPENDIX B RADIATED EMISSIONS - 30 MHZ TO 1 GHZ

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2023/1/18
Test Frequency	2480MHz	Polarization	Vertical
Temp	23°C	Hum.	59%



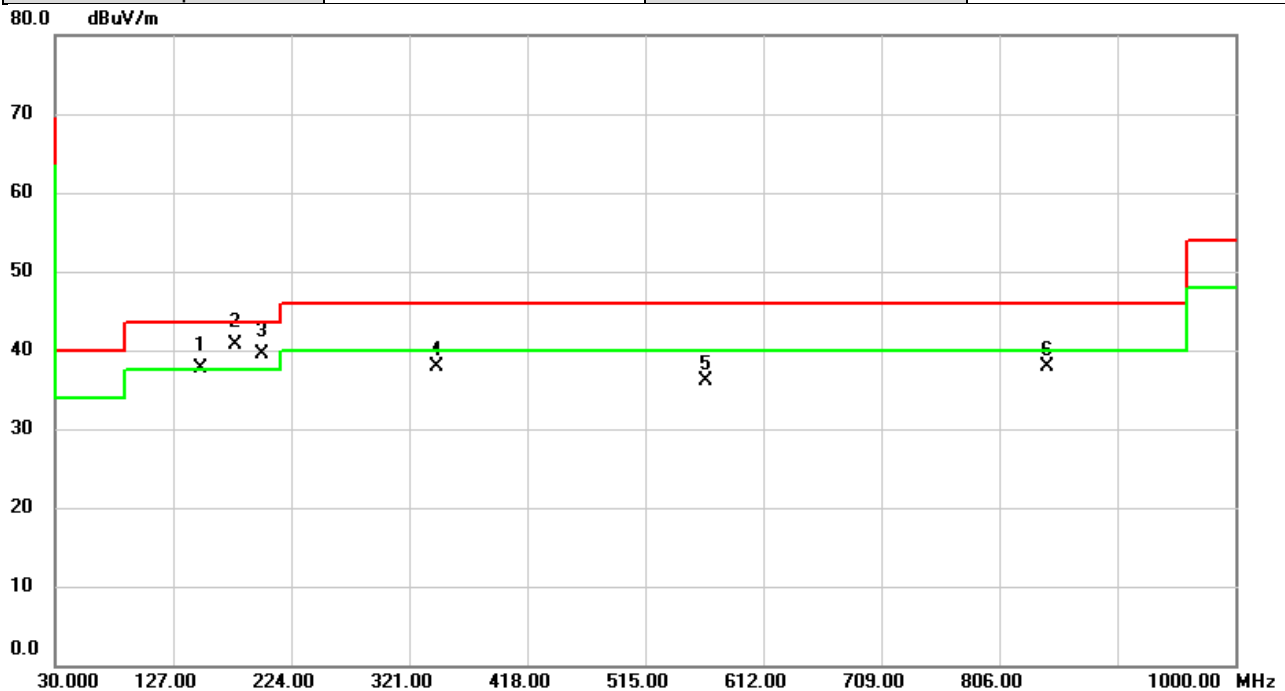
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		47.8480	44.54	-11.20	33.34	40.00	-6.66	peak	
2	*	178.9920	50.39	-13.30	37.09	43.50	-6.41	peak	
3		345.4117	49.23	-10.46	38.77	46.00	-7.23	QP	
4		746.7007	37.33	-1.63	35.70	46.00	-10.30	peak	
5		846.8693	35.83	-0.47	35.36	46.00	-10.64	QP	
6		917.0003	35.38	0.33	35.71	46.00	-10.29	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2023/1/18
Test Frequency	2480MHz	Polarization	Horizontal
Temp	23°C	Hum.	59%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	!	150.0213	49.42	-11.80	37.62	43.50	-5.88	QP	
2	*	178.7332	54.04	-13.27	40.77	43.50	-2.73	QP	
3	!	199.9763	54.55	-15.13	39.42	43.50	-4.08	QP	
4		343.9243	48.38	-10.49	37.89	46.00	-8.11	peak	
5		564.3407	41.30	-5.19	36.11	46.00	-9.89	peak	
6		845.9963	38.45	-0.48	37.97	46.00	-8.03	peak	

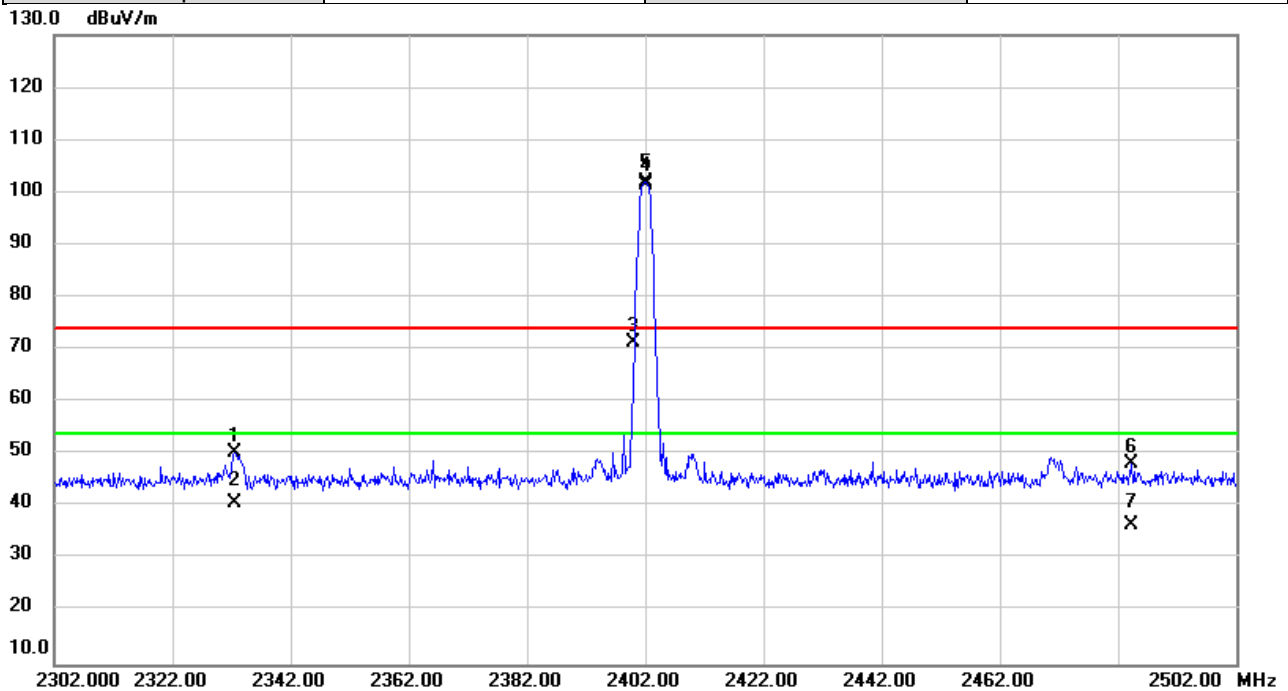
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

APPENDIX C RADIATED EMISSIONS - ABOVE 1 GHZ

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2022/8/23
Test Frequency	2402MHz	Polarization	Vertical
Temp	28°C	Hum.	62%

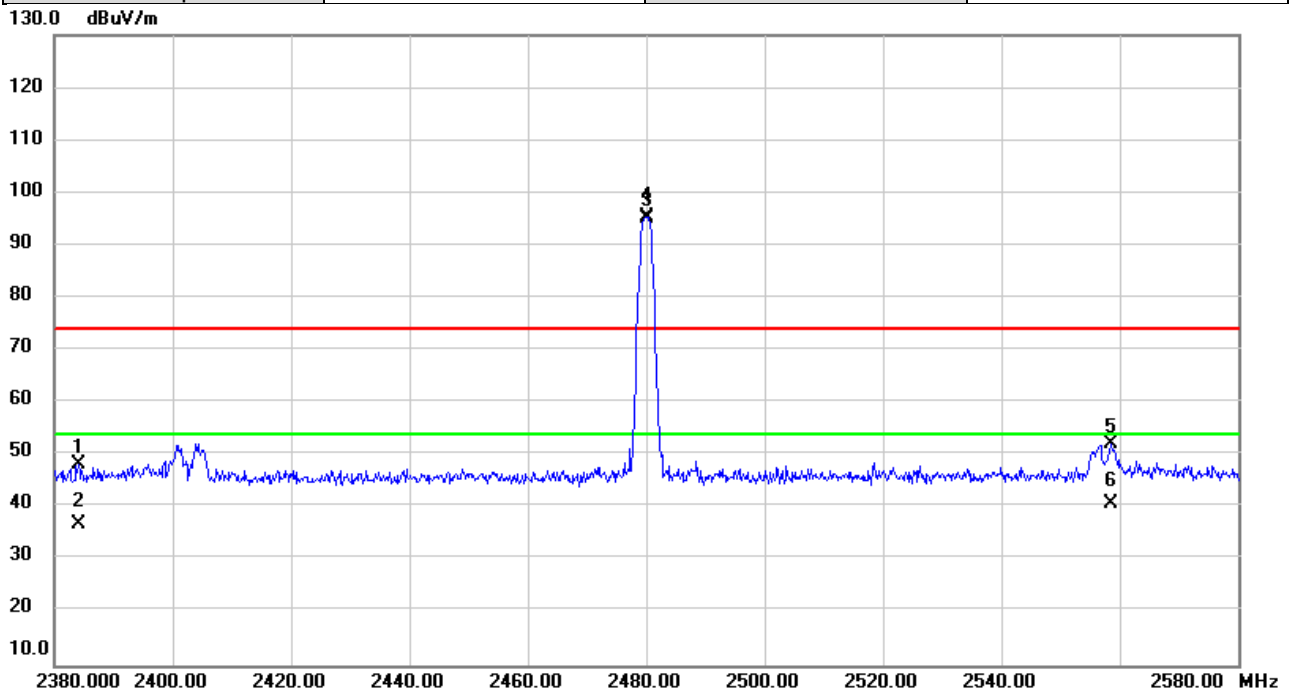


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2332.460	56.11	-5.85	50.26	74.00	-23.74	peak	
2		2332.460	46.65	-5.85	40.80	54.00	-13.20	AVG	
3		2400.000	77.14	-5.76	71.38			peak	
4	X	2402.000	107.76	-5.75	102.01			peak	
5	*	2402.000	107.22	-5.75	101.47			AVG	
6		2484.367	53.91	-5.65	48.26	74.00	-25.74	peak	
7		2484.367	42.08	-5.65	36.43	54.00	-17.57	AVG	

REMARKS:

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

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2022/10/28
Test Frequency	2480MHz	Polarization	Vertical
Temp	23°C	Hum.	59%

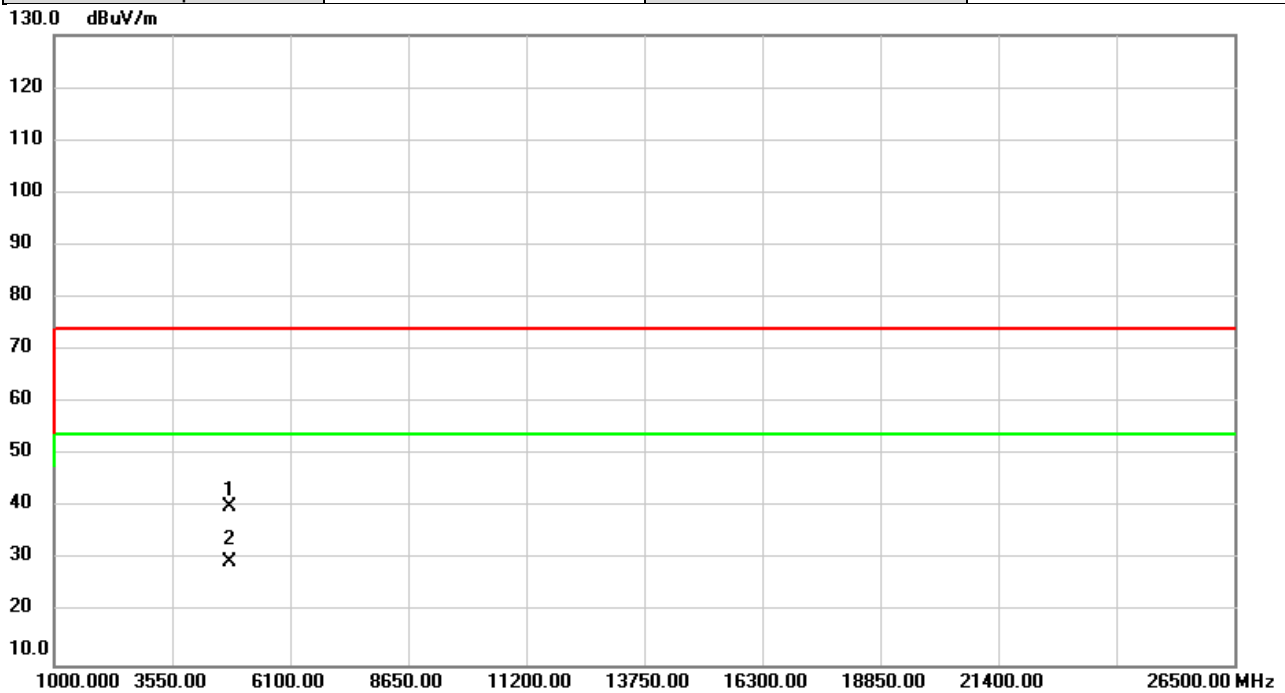


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2384.013	53.92	-5.78	48.14	74.00	-25.86	peak	
2		2384.013	42.57	-5.78	36.79	54.00	-17.21	AVG	
3	X	2480.000	101.11	-5.65	95.46			peak	
4	*	2480.000	100.55	-5.65	94.90			AVG	
5		2558.540	57.61	-5.38	52.23	74.00	-21.77	peak	
6		2558.540	46.11	-5.38	40.73	54.00	-13.27	AVG	

REMARKS:

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

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2022/10/28
Test Frequency	2402MHz	Polarization	Vertical
Temp	23°C	Hum.	59%

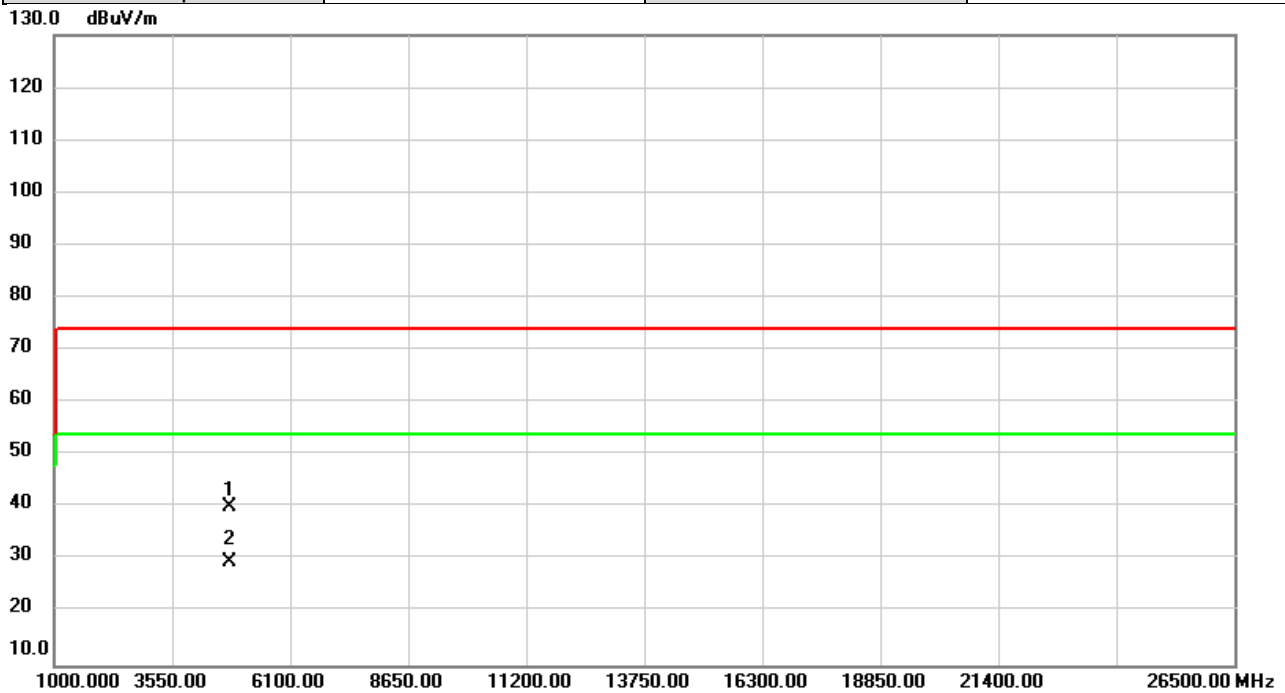


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4804.000	39.39	0.65	40.04	74.00	-33.96	peak	
2	*	4804.000	29.08	0.65	29.73	54.00	-24.27	AVG	

REMARKS:

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

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2022/10/28
Test Frequency	2402MHz	Polarization	Horizontal
Temp	23°C	Hum.	59%



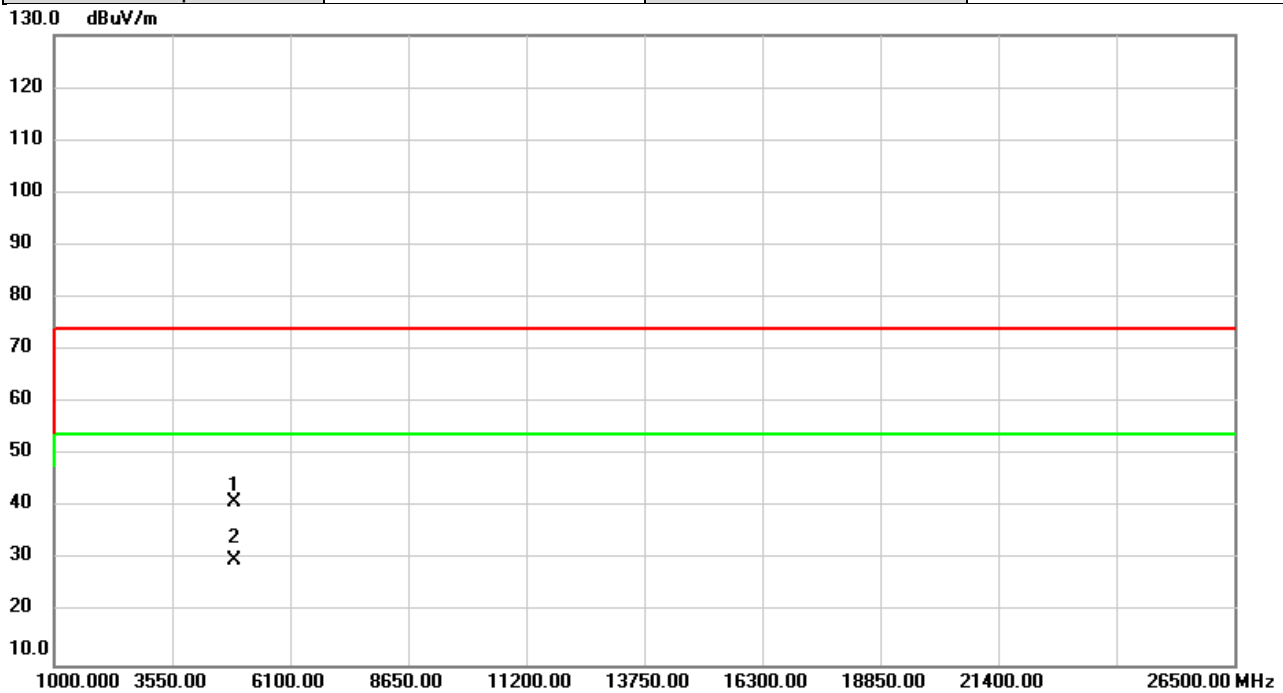
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4804.000	39.64	0.65	40.29	74.00	-33.71	peak	
2	*	4804.000	29.15	0.65	29.80	54.00	-24.20	AVG	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2022/10/28
Test Frequency	2440MHz	Polarization	Vertical
Temp	23°C	Hum.	59%

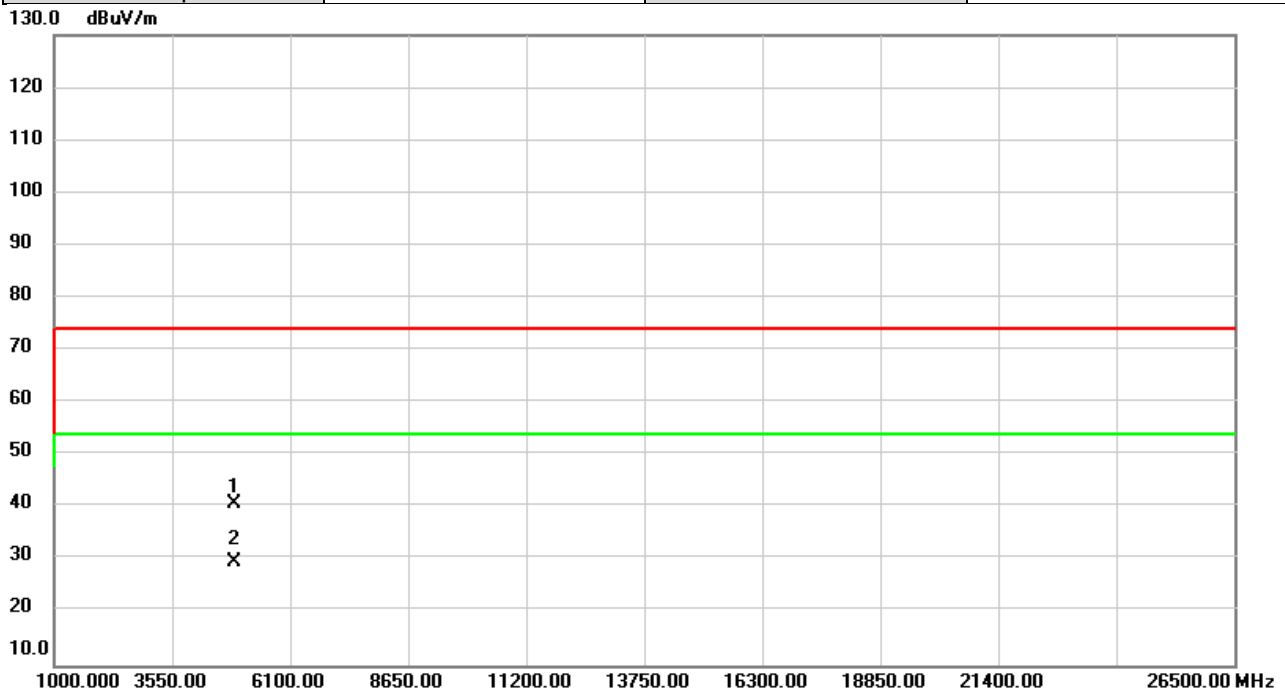


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4880.000	40.24	0.92	41.16	74.00	-32.84	peak	
2	*	4880.000	29.17	0.92	30.09	54.00	-23.91	AVG	

REMARKS:

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

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2022/10/28
Test Frequency	2440MHz	Polarization	Horizontal
Temp	23°C	Hum.	59%

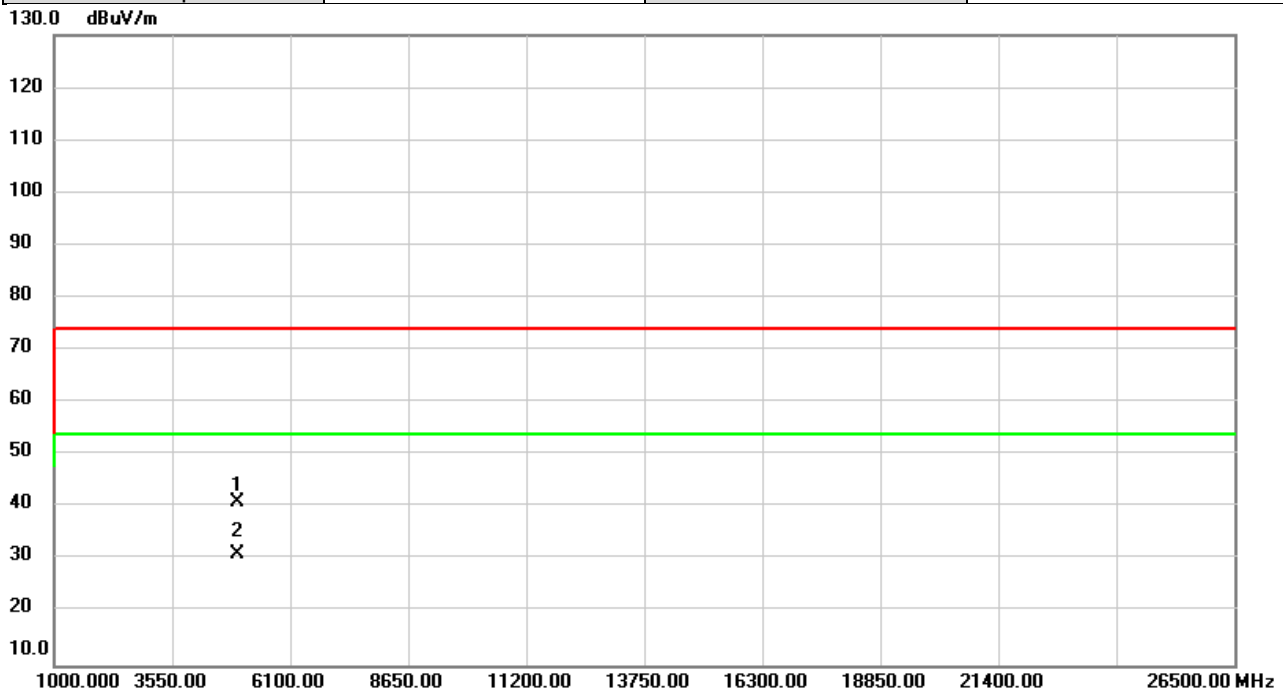


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4880.000	39.91	0.92	40.83	74.00	-33.17	peak	
2	*	4880.000	28.74	0.92	29.66	54.00	-24.34	AVG	

REMARKS:

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

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2022/10/28
Test Frequency	2480MHz	Polarization	Vertical
Temp	23°C	Hum.	59%



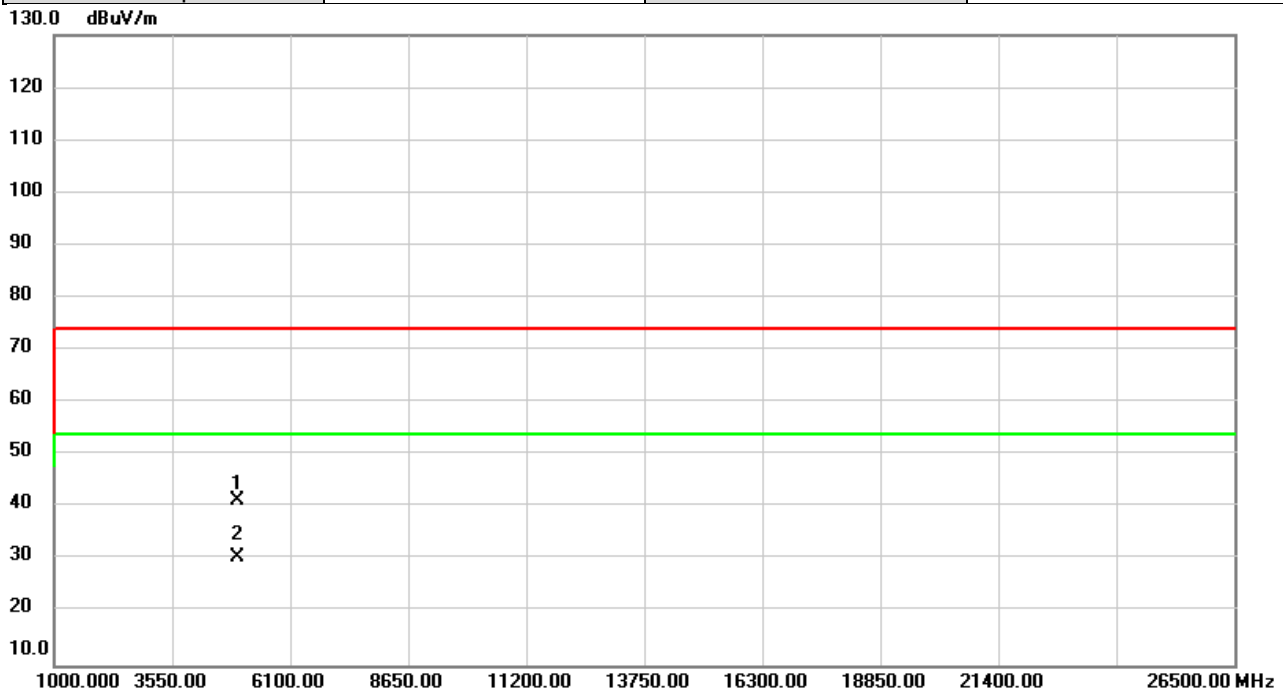
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4960.000	39.77	1.18	40.95	74.00	-33.05	peak	
2	*	4960.000	29.86	1.18	31.04	54.00	-22.96	AVG	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	BLE 5.0 (1 Mbps)	Test Date	2022/10/28
Test Frequency	2480MHz	Polarization	Horizontal
Temp	23°C	Hum.	59%



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4960.000	40.22	1.18	41.40	74.00	-32.60	peak	
2	*	4960.000	29.24	1.18	30.42	54.00	-23.58	AVG	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

End of Test Report