

Testing Laborator



FCC Radio Test Report

FCC ID: 2ALZB-AG1103

Report No. : BTL-FCCP-1-2102T091

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 EDR

FCC Rule Part(s) : FCC Part15, Subpart C (15.247)

Measurement : ANSI C63.10-2013

Procedure(s) FCC KDB 414788 D01 Radiated Test Site v01r01

Date of Receipt : 2021/2/9

Date of Test : 2021/2/9 ~ 2021/8/25

Issued Date : 2021/10/1

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

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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.

Project No.: 2102T091 Page 2 of 46 Report Version: R04



17

17

17

17

17



LIMIT

TEST PROCEDURE

TEST SETUP

DEVIATION FROM STANDARD

EUT OPERATION CONDITIONS

5.1

5.2

5.35.4

5.5

1	SUMMARY OF TEST RESULTS	5
1.1	TEST FACILITY	6
1.2	MEASUREMENT UNCERTAINTY	6
1.3	TEST ENVIRONMENT CONDITIONS	6
1.4	TABLE OF PARAMETERS OF TEST SOFTWARE SETTING	6
2	GENERAL INFORMATION	7
2.1	DESCRIPTION OF EUT	7
2.2	TEST MODES	9
2.3	BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.4	SUPPORT UNITS	10
3	AC POWER LINE CONDUCTED EMISSIONS TEST	11
3.1	LIMIT	11
3.2	TEST PROCEDURE	11
3.3	DEVIATION FROM TEST STANDARD	11
3.4	TEST SETUP	12
3.5	TEST RESULT	12
4	RADIATED EMISSIONS TEST	13
4.1	LIMIT	13
4.2	TEST PROCEDURE	14
4.3	DEVIATION FROM TEST STANDARD	14
4.4	TEST SETUP	15
4.5	EUT OPERATING CONDITIONS	16
4.6	TEST RESULT – BELOW 30 MHZ	16
4.7	TEST RESULT – 30 MHZ TO 1 GHZ	16
4.8	TEST RESULT – ABOVE 1 GHZ	16
5	OUTPUT POWER TEST	17

CONTENTS

5.6	TES	ST RESULTS	17	
6	6 LIST OF MEASURING EQUIPMENTS			
7	EUT TE	EST PHOTO	19	
8	19			
APPEN	DIX A	AC POWER LINE CONDUCTED EMISSIONS	20	
APPEN	DIX B	RADIATED EMISSIONS - 30 MHZ TO 1 GHZ	25	
APPENDIX C RADIATED EMISSIONS - ABOVE 1 GHZ		28		
APPEN	DIX D	OUTPUT POWER	45	





REVISON HISTORY

Report No.	Version	Description	Issued Date
BTL-FCCP-1-2102T091	R00	Original Report.	2021/7/28
BTL-FCCP-1-2102T091	R01	Revised report to address TCB's comments.	2021/8/16
BTL-FCCP-1-2102T091	R02	Revised report to address TCB's comments.	2021/8/26
BTL-FCCP-1-2102T091	R03	Revised report to address TCB's comments.	2021/9/29
BTL-FCCP-1-2102T091	R04	Revised report to address TCB's comments.	2021/10/1

Project No.: 2102T091 Page 4 of 46 Report Version: R04





1 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards.

FCC Part 15, Subpart C (15.247)						
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)(1)	Output Power	APPENDIX D	Pass			

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: Unity22 / Unity32), Product name: Display Unity 22" / Display Unity 32"). 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.

Project No.: 2102T091 Page 5 of 46 Report Version: R04

□ CB16

1.1 TEST FACILITY

The test facilities used to collect the test data in this report:

No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan The test sites and facilities are covered under FCC RN: 674415 and DN: TW0659.

he test sites and facilities are covered under FCC RN: 674415 and DN: 1W0659. \square CB15 \square CB15

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:

orribororio toot i		
Test Site	Measurement Frequency Range	U,(dB)
	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
CB15	1 GHz ~ 6 GHz	5.21
CDIO	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)
Output Power	1.06

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	24 °C, 62 %	AC 120V	William Wei
Radiated emissions below 1 GHz	Refer to data	AC 120V	Hunter Chiang
Radiated emissions above 1 GHz	Refer to data	AC 120V	Hunter Chiang
Output Power	23.5 °C, 51 %	AC 120V	William Wei

1.4 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

Test Software	PuTTY Suite 0.63				
Modulation Mode	2402 MHz	2441 MHz	2480 MHz	Data Rate	
GFSK	4	4	4	1 Mbps	
π/4-DQPSK	4	4	4	2 Mbps	
8DPSK	4	4	4	3 Mbps	



2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Model Name		
Brand Name Marvell Model Difference N/A Power Supply Rating DC 3.3V from host equipment Host device information Equipment Display Unity 22" / Display Unity 32" Model Name Unity22 / Unity32 Brand Name SECO Model Difference Differ in product size. Power Source DC voltage supplied from AC/DC Adapter. Power Rating DC 12V Products Covered 1 * Adapter: EDAC / EA1050A-120 WIFI+BT Module Marvell / W8997-1216 Operation Band 2400 MHz ~ 2483.5 MHz Operation Frequency 2402 MHz ~ 2480 MHz 1 Mbps: 5.00dBm (0.0032W) Maximum Output Power 2 Mbps: 7.02dBm (0.0050W) 3 Mbps: 7.01dBm (0.0050W)	quipment	IEEE 802.11 2X2 MU-MIMO ac/a/b/g/n Wireless LAN +Bluetooth NGFF Module
Model Difference Power Supply Rating Host device information Equipment Display Unity 22" / Display Unity 32" Model Name Unity22 / Unity32 Brand Name SECO Model Difference Differ in product size. Power Source DC voltage supplied from AC/DC Adapter. Power Rating DC 12V Products Covered 1 * Adapter: EDAC / EA1050A-120 WIFI+BT Module Marvell / W8997-1216 Operation Band 2400 MHz ~ 2483.5 MHz Operation Frequency 1 * Mbps: 5.00dBm (0.0032W) Maximum Output Power MyA DC 3.3V from host equipment Display Unity 22" / Display Unity 32" Model Name DC 402 V Host Adapter. DC 4240 MHz Adapter. DC 4240 MHz DC 4240	lodel Name	W8997-1216
Power Supply Rating Host device information Equipment Display Unity 22" / Display Unity 32" Model Name Unity22 / Unity32 Brand Name SECO Model Difference Differ in product size. Power Source DC voltage supplied from AC/DC Adapter. Power Rating DC 12V Products Covered 1 * Adapter: EDAC / EA1050A-120 WIFI+BT Module Marvell / W8997-1216 Operation Band 2400 MHz ~ 2483.5 MHz Operation Frequency 1 Mbps: 5.00dBm (0.0032W) 2 Mbps: 7.02dBm (0.0050W) 3 Mbps: 7.01dBm (0.0050W)	rand Name	Marvell
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Power Rating DC 12V Products Covered 1 * Adapter: EDAC / EA1050A-120 WIFI+BT Module Marvell / W8997-1216 Operation Band 2400 MHz ~ 2483.5 MHz Operation Frequency 2402 MHz ~ 2480 MHz 1 Mbps: 5.00dBm (0.0032W) 2 Mbps: 7.02dBm (0.0050W) 3 Mbps: 7.01dBm (0.0050W)	lodel Difference	Differ in product size.
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WIFI+BT Module Marvell / W8997-1216 Operation Band 2400 MHz ~ 2483.5 MHz Operation Frequency 2402 MHz ~ 2480 MHz 1 Mbps: 5.00dBm (0.0032W) Maximum Output Power 2 Mbps: 7.02dBm (0.0050W) 3 Mbps: 7.01dBm (0.0050W)	ower Rating	DC 12V
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Maximum Output Power 2 Mbps: 7.02dBm (0.0050W) 3 Mbps: 7.01dBm (0.0050W)	peration Frequency 2	2402 MHz ~ 2480 MHz
Tank Mardal	laximum Output Power 2	2 Mbps: 7.02dBm (0.0050W)
Test Model Unity22	est Model	Unity22
Sample Status Engineering Sample	ample Status	Engineering Sample
EUT Modification(s) N/A	UT Modification(s)	N/A

NOTE:

(1) For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

Project No.: 2102T091 Page 7 of 46 Report Version: R04



(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:

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



2.2 TEST MODES

Test Items	Test mode	Channel	Note
AC power line conducted emissions	Normal/Idle	-	-
Transmitter Radiated Emissions (below 1GHz)	3 Mbps	78	-
Transmitter Radiated Emissions	1/3 Mbps	00/78	Bandedge
(above 1GHz)	1/3 Mbps	00/39/78	Harmonic
Output Power	1/2/3 Mbps	00/39/78	-

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 (Horizontal) is recorded.
- (3) All X, Y and Z axes are evaluated, but only the worst case (X axis) is recorded.
- (4) After pretest, Host device Display Unity 22" / Unity22 is found to be the worst case and used for final test.

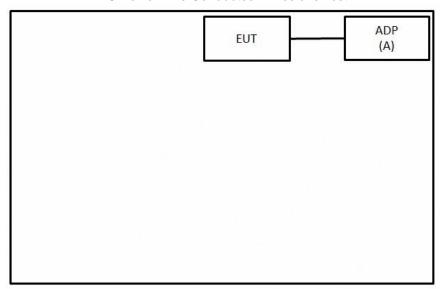
Project No.: 2102T091 Page 9 of 46 Report Version: R04



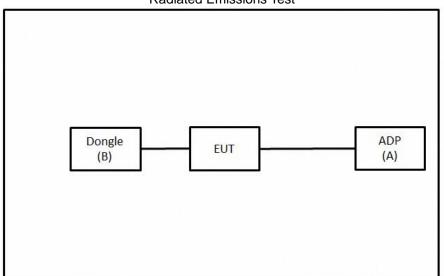
2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

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
Α	Adapter	EDAC	EA1050A-120	N/A	Supplied by test requester
В	Dongle	Transcend	JetFlash700	N/A	Supplied by test requester

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
-	-	-	-	-	-



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		Correct Factor		Measurement Value
38.22	+	3.45	=	41.67

Measurement Value		Limit Value		Margin Level
41.67	ı	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:

- 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.

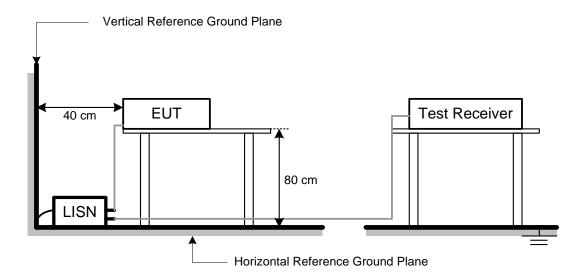
3.3 DEVIATION FROM TEST STANDARD

No deviation.

Project No.: 2102T091 Page 11 of 46 Report Version: R04



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		Emissions V/m)	Measurement Distance
(MHz)	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		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	1MHz / 3MHz for Peak,
(Emission in restricted band)	1MHz / 1/T for Average

Mode	VBW(Hz)
BT (1M)	360
BT (2M)	360
BT (3M)	360

Project No.: 2102T091 Page 13 of 46 Report Version: R04



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.

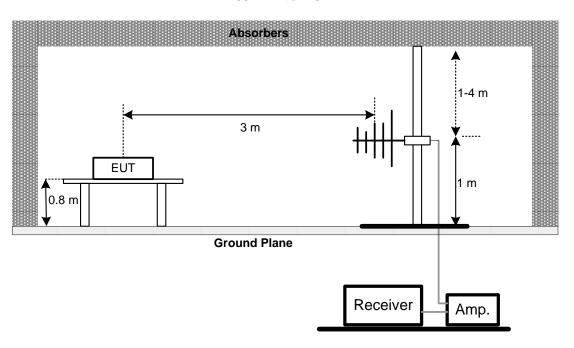
Project No.: 2102T091 Page 14 of 46 Report Version: R04



4.4 TEST SETUP

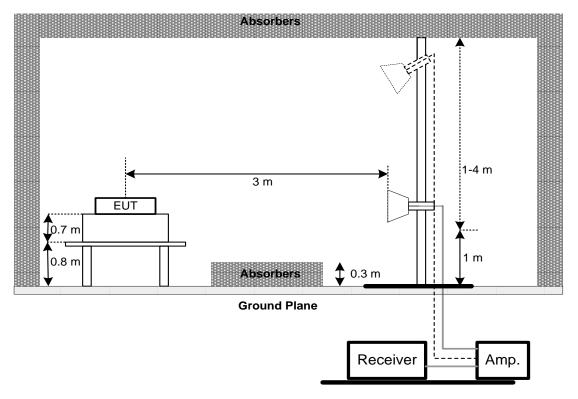
Absorbers Absorbers Ground Plane Receiver

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

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 OUTPUT POWER TEST

5.1 LIMIT

FCC Part15 (15.247) , Subpart C								
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				

5.2 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below.
- b. The maximum peak conducted output power was performed in accordance with method 9 b) of FCC KDB 558074 D01 Meas Guidance.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP

EUT	Power Meter
	1 Ower meter

5.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.6 TEST RESULTS

Please refer to the APPENDIX D.



6 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	101050	2020/6/11	2021/6/10			
2	Test Cable	EMCI	EMC400-BM-BM- 5000	170501	2020/6/8	2021/6/7			
3	EMI Test Receiver	R&S	ESCI	100080	2020/6/15	2021/6/14			
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.	Type No. Serial No.		Calibrated Until			
1	Preamplifier	EMCI	EMC02325B	980217	2021/4/8	2022/4/7			
2	Preamplifier	EMCI	EMC012645B	980267	2021/4/8	2022/4/7			
3	Preamplifier	EMCI	EMC001340	980555	2021/4/8	2022/4/7			
4	Test Cable	EMCI	EMC-SM-SM-100 0	180809	2021/4/8	2022/4/7			
5	Test Cable	EMCI	EMC104-SM-SM- 3000	151205	2021/4/8	2022/4/7			
6	Test Cable	EMCI	EMC-SM-SM-700 0	180408	2021/4/8	2022/4/7			
7	MXE EMI Receiver	Agilent	N9038A	MY554200087	2021/5/27	2022/5/26			
8	Signal Analyzer	Agilent	N9010A	MY52220990	2021/8/18	2022/8/17			
9	Loop Ant	Electro-Metrics	EMCI-LPA600	274	2021/6/1	2022/5/31			
10	Horn Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	2021/6/2	2022/6/1			
11	Horn Ant	Schwarzbeck	BBHA 9170	BBHA 9170340	2021/7/9	2022/7/8			
12	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	VULB 9168-352	2021/7/23	2022/7/22			
13	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0625	2021/7/23	2022/7/22			
14	Measurement		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	Anritsu	ML2487A	6K00004714	2020/9/3	2021/9/2			
2	Power Sensor	Anritsu	MA2491A	034138	2020/9/3	2021/9/2			

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



7 EUT TEST PHOTO
Please refer to document Appendix No.: TP-2102T091-FCCP-1 (APPENDIX-TEST PHOTOS).
8 EUT PHOTOS
Please refer to document Appendix No.: EP-2102T091-2 (APPENDIX-EUT PHOTOS).

Project No.: 2102T091 Page 19 of 46 Report Version: R04

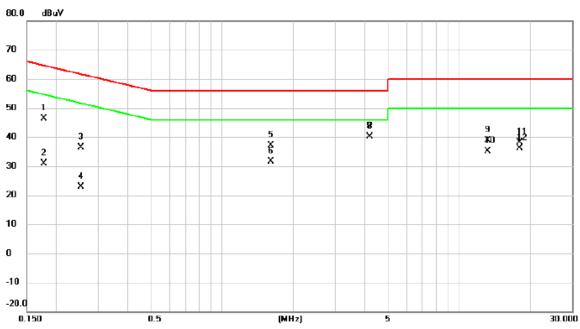


APPENDIX A	AC POWER LINE CONDUCTED EMISSIONS

Project No.: 2102T091 Page 20 of 46 Report Version: R04



Test Mode	Normal	Tested Date	2021/4/23
Test Frequency	-	Phase	Line

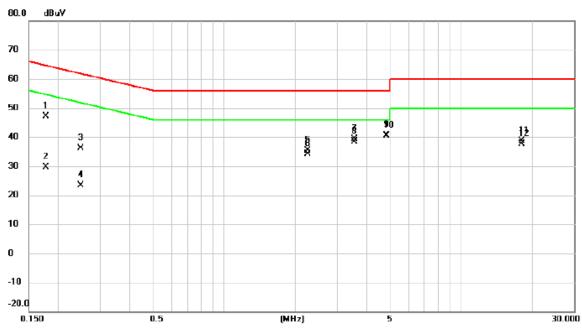


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1770	36.66	9.67	46.33	64.63	-18.30	QP	
2		0.1770	21.20	9.67	30.87	54.63	-23.76	AVG	
3		0.2535	26.75	9.68	36.43	61.64	-25.21	QP	
4		0.2535	13.08	9.68	22.76	51.64	-28.88	AVG	
5		1.6080	27.39	9.72	37.11	56.00	-18.89	QP	
6		1.6080	21.82	9.72	31.54	46.00	-14.46	AVG	
7		4.1820	30.44	9.80	40.24	56.00	-15.76	QP	
8	*	4.1820	30.22	9.80	40.02	46.00	-5.98	AVG	
9		13.1888	29.00	9.94	38.94	60.00	-21.06	QP	
10		13.1888	25.16	9.94	35.10	50.00	-14.90	AVG	
11		18.0173	28.17	9.96	38.13	60.00	-21.87	QP	
12		18.0173	26.29	9.96	36.25	50.00	-13.75	AVG	

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



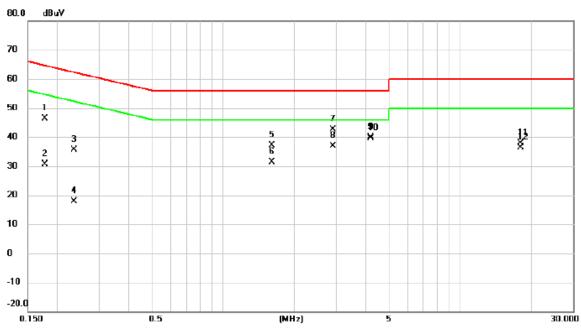
Test Mode	Normal	Tested Date	2021/4/23
Test Frequency	-	Phase	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1770	37.54	9.67	47.21	64.63	-17.42	QP	
2		0.1770	20.06	9.67	29.73	54.63	-24.90	AVG	
3		0.2490	26.55	9.68	36.23	61.79	-25.56	QP	
4		0.2490	13.65	9.68	23.33	51.79	-28.46	AVG	
5		2.2515	25.74	9.74	35.48	56.00	-20.52	QP	
6		2.2515	24.39	9.74	34.13	46.00	-11.87	AVG	
7		3.5385	29.50	9.78	39.28	56.00	-16.72	QP	
8		3.5385	28.64	9.78	38.42	46.00	-7.58	AVG	
9		4.8255	30.71	9.83	40.54	56.00	-15.46	QP	
10	*	4.8255	30.48	9.83	40.31	46.00	-5.69	AVG	
11		18.0150	28.69	9.96	38.65	60.00	-21.35	QP	
12		18.0150	27.63	9.96	37.59	50.00	-12.41	AVG	

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

Test Mode	Idle	Tested Date	2021/4/23
Test Frequency	-	Phase	Line

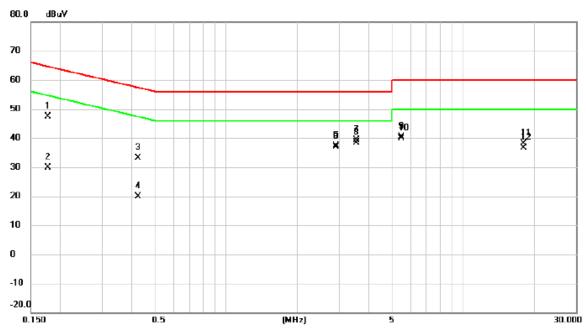


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1770	36.72	9.67	46.39	64.63	-18.24	QP	
2		0.1770	20.90	9.67	30.57	54.63	-24.06	AVG	
3		0.2355	25.95	9.68	35.63	62.25	-26.62	QP	
4		0.2355	8.32	9.68	18.00	52.25	-34.25	AVG	
5		1.6080	27.43	9.72	37.15	56.00	-18.85	QP	
6		1.6080	21.74	9.72	31.46	46.00	-14.54	AVG	
7		2.8950	32.97	9.76	42.73	56.00	-13.27	QP	
8		2.8950	27.00	9.76	36.76	46.00	-9.24	AVG	
9		4.1820	30.00	9.80	39.80	56.00	-16.20	QP	
10	*	4.1820	29.72	9.80	39.52	46.00	-6.48	AVG	
11		18.0128	27.81	9.96	37.77	60.00	-22.23	QP	
12		18.0128	26.43	9.96	36.39	50.00	-13.61	AVG	

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



Test Mode	Idle	Tested Date	2021/4/23
Test Frequency	-	Phase	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1770	37.63	9.67	47.30	64.63	-17.33	QP	
2		0.1770	20.16	9.67	29.83	54.63	-24.80	AVG	
3		0.4245	23.57	9.68	33.25	57.36	-24.11	QP	
4		0.4245	10.17	9.68	19.85	47.36	-27.51	AVG	
5		2.8950	27.62	9.76	37.38	56.00	-18.62	QP	
6		2.8950	27.05	9.76	36.81	46.00	-9.19	AVG	
7		3.5385	29.60	9.78	39.38	56.00	-16.62	QP	
8	*	3.5385	28.71	9.78	38.49	46.00	-7.51	AVG	
9		5.4668	30.51	9.84	40.35	60.00	-19.65	QP	
10		5.4668	30.11	9.84	39.95	50.00	-10.05	AVG	
11		18.0105	28.07	9.96	38.03	60.00	-21.97	QP	
12		18.0105	26.62	9.96	36.58	50.00	-13.42	AVG	

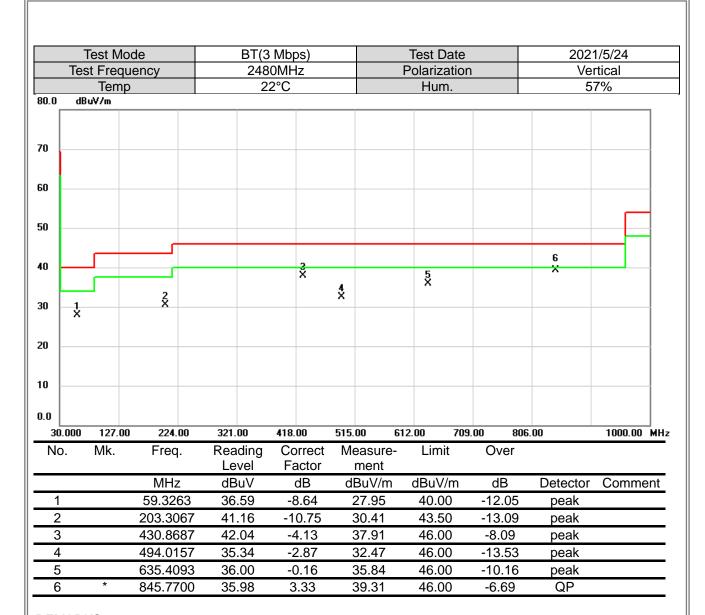
- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



APPENDIX B	RADIATED EMISSIONS - 30 MHZ TO 1 GHZ

Project No.: 2102T091 Page 25 of 46 Report Version: R04





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

-	Test Mo	de	BT(3	3 Mbps)		Test Date		202	1/5/24	
Tes	st Frequ			80MHz		Polarizatio	n	Horizontal		
	Temp		2	2°C		Hum.		5	7%	
80.0 dB	uV/m									
70										
60										
50										1
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30	*		×			×				
20										
10										
0.0										
30.000	127.00	224.00	321.00	418.00	515.00 6		9.00 806	.00	1000.00	MHz
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comme	ent
1		94.5050	44.12	-14.13	29.99	43.50	-13.51	peak		
2	*	203.2743	47.68	-10.75	36.93	43.50	-6.57	peak		
3		366.4930	38.76	-5.70	33.06	46.00	-12.94	peak		
4		423.5613	38.91	-4.29	34.62	46.00	-11.38	peak		
5		640.3240 854.6940	34.35 34.11	-0.09 3.48	34.26	46.00	-11.74	peak		
6					37.59	46.00	-8.41	peak		

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



APPENDIX C RADIATED EMISSIONS - ABOVE 1 GHZ

Project No.: 2102T091 Page 28 of 46 Report Version: R04

	Test Mo				(Mbps			Test Da			1/4/16	
Te	st Frequ				2MHz			Polariza			zontal	
	Temp)		2	2°C			Hum	-	6	1%	
30.0 di	BuV/m											7
20												
20												
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	00 2322.0	00 2342.0			2382.00	2402.		422.00		62.00	2502.00	MH
No.	Mk.	Freq.		ding	Correct		asure-	Limit	Over			
				vel	Factor		nent	ID 1//		D ()		-
4		MHz		BuV	dB		uV/m	dBuV/i		Detector	Comme	ent
<u>1</u> 2		2368.987		.82 09	30.70		7.52	74.00		peak		
3	Х	2368.987		.37	30.70 30.84		5.79 9.21	54.00	-18.21	AVG		
4	*	2402.000		.3 <i>1</i> .97	30.84		9.21 8.81			peak AVG		
5		2486.427		.97 .49	31.17		7.66	74.00	-16.34	peak		
6		2486.42		.49 80	31.17		6.97	54.00		AVG		

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

	Te	st Mo	ode		BT(1Mbps)			Test Date		2021	1/4/16	
	Test	Frequ	uency		248	30MHz		F	Polarizatio	n	Hori	rizontal	
		Temp)		2	2°C			Hum.		6	1%	
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No.		Mk.	Freq.		Reading	Correct	Meas		Limit	Over			
					Level	Factor	me	ent					
			MHz		dBuV	dB	dBu'		dBuV/m	dB	Detector	Comme	ent
1			2383.3		27.03	30.76	57.		74.00	-16.21	peak		
		V	2383.3		3.44	30.76	34.		54.00	-19.80	AVG		
2		Χ	2480.00	JU	70.49	31.15	101	.04			peak		
3		*		20	70.20	21 15	101	11			$\Lambda \setminus C$		
			2480.00 2527.4		70.29 27.22	31.15 31.35	101 58.		74.00	-15.43	AVG peak		

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



Т	est Mo	de		BT(3	BMbps)		Test Date	;	2021	1/4/16	
Tes	t Frequ	ency		240	2MHz		Polarizatio	n	Horizontal		
	Temp			2	2°C		Hum.		61%		
130.0 dB	uV/m										_
120											-
110						3					\parallel
100						*					\parallel
90						-					+
80											
70											
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40			2 X							6 X	1
30											1
20											1
10.0	0 2322.00	D 2342.	00	2362.00	2382.00	2402.00	2422.00 24	42.00 246	62.00	2502.00	١
No.	Mk.	Freq.		Reading Level	Correct Factor	Measure ment		Over	52.00	2302.00	mı
		MHz		dBuV	dB	dBuV/m		dB	Detector	Comm	ent
1		2351.88		26.67	30.64	57.31	74.00	-16.69	peak		
2		2351.88		4.31	30.64	34.95	54.00	-19.05	AVG		
3	Χ	2402.00		70.55	30.84	101.39			peak		
4	*	2402.00		66.92	30.84	97.76			AVG		
5 6		2492.78		26.99 5.79	31.21	58.20 37.00	74.00	-15.80 -17.00	peak AVG		
		2492.78			31.21		54.00				

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



	Test N	Лode			BT(3	BMbps)			Test Dat	te	202	1/4/16	
•	Test Fre	quenc	у			0MHz			Polarizati	arization Horizon			
	Ter	np			2	2°C			Hum.		6	1%	
130.0	dBuV/m												_
120													1
110 📙													4
100								Š					
100							j	1					1
90													-
80							- 1						
00													
70							-+						7
60								5					
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	0.000 240	0.00	2420.00	2440	1.00	2460.00	248	0.00 2	2500.00 2	2520.00 25	540.00	2580.00	_ MHa
No.			Freq.		ding	Correc		easure-	Limit	Over			
			- 1		vel	Factor		ment					
			MHz	dB	uV	dB	d	BuV/m	dBuV/m	n dB	Detector	Comm	ent
1		23	84.800	25	.06	30.77		55.83	74.00	-18.17	peak		
2		23	84.800	3.	54	30.77		34.31	54.00	-19.69	AVG		
3	Χ	24	180.000	72	.58	31.15	1	03.73			peak		
					4-7	04.45	-	00.60			A) (O		
4	*	24	180.000	69	.47	31.15		00.62			AVG		
	*		180.000 183.740	27		31.15 31.16 31.16	,	58.69 39.38	74.00 54.00	-15.31 -14.62	peak AVG		_

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

т.	Test Mo			Mbps)		Test Date			1/4/16
16	est Frequ Temp			2MHz 2°C		Polarization Hum.	n		tical 1%
30.0 d	BuV/m	,		2 0		Huin.			1 70
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	00 3550.0		8650.00	11200.00				00.00	26500.00 MH
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4804.000	55.84	-10.03	45.81	74.00	-28.19	peak	
2	*	4804.000	50.26	-10.03	40.23	54.00	-13.77	AVG	

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



	Test M	ode			BT(1	(Mbps)				Test Da	ate		20	21/4/16
Te	est Freq	uency			240	2MHz				F	Polariza	tion		Н	rizontal
	Tem	р			2	2°C					Hum.				61%
130.0	dBuV/m														
120															
110															
100															
90 —															
30															
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10.0 1000 (000 3550.	.00 6100	1 00	8650.	nn	11200.	nn	1375	n nn	163	300.00	18850	1 00 2	1400.00	26500.00 MF
No.	Mk.	Freq		Read		Corr			easure		Limit		Over		20000.00 MI
				Lev		Fac			ment						
		MHz		dΒι		dE			3uV/m)	dBuV/r		dB	Detecto	or Comment
1		4804.0		52.0	07	-10.	03		12.04		74.00)	-31.96		
2	*	4804.0	000	48.3	33	-10.	03	3	38.30		54.00)	-15.70	AVG	

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



	Test I						Mbps					Test D					1/4/16	
Te	est Fre		ency				0MHz	<u> </u>				Polariz)			rtical	
		mp				2	2°C					Hun	<u>n. </u>			6	1%	
130.0	dBuV/m																	
120																		
110 -																		
100 -																		
90																		
80																		
o 🗀																		
0 —																		
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20																		
0.0																		
1000.0	000 355	0.00	6100	0.00	8650	0.00	11200).00	1375	50.00	16	300.00	188	50.00	2140	00.00	26500.00 N	4H
No.	Mk.		Freq			ding vel		rect ctor		easur ment		Lim	it	Ove	er		_	
			MHz			uV		В	dl	BuV/ı	m	dBuV	/m	dE	3	Detector	Commen	nt
1			4880.0	00	53	.02	-9	.77	4	43.25	5	74.0	0	-30.	75	peak		
2	*		4880.0	000	45	.54	-9	.77	(35.77	,	54.0	0	-18.	23	AVG		

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



	Test I						Mbp					Test D					1/4/16	
T	Test Fre		ency				0MH	Z			F	Polariza					zontal	
	Ter	mp				2	2°C					Hun	า.			6	1%	
30.0	dBuV/m																	7
20																		-
10																		-
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eo																		-
0.0																		
	.000 355				8650		1120			50.00		300.00		50.00		0.00	26500.00	D MH
No.	Mk.		Freq	·	Rea Le	ding vel		rrect ctor		easur ment	e-	Limi	τ	Ove	er 			
			MHz	-	dB	uV	(dΒ	dl	BuV/r	n	dBuV	/m	dB	3	Detector	Comme	ent
1			4880.0	00	56	.36	-6	.77	-	46.59		74.0	0	-27.4	41	peak		
2	*		4880.0	00	51.	16	_Ç	.77		41.39		54.0	0	-12.6	61	AVG		

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

٦	est Mo	de		•	BT(Mbps)				Test D	ate			202	1/4/16	
Tes	t Frequ					0MHz				F	Polariza	atior)			rtical	
	Temp				2	2°C					Hum	า.			6	1%	
30.0 dB	uV/m																7
20																	-
10																	-
00																	-
o																	$\frac{1}{1}$
:0																	$\frac{1}{1}$
0																	1
0																	$\frac{1}{1}$
0																	1
o		1 2 X															-
0		×															-
o																	-
0.0																	
	0 3550.0	0 6100	0.00	8650		11200			0.00		300.00		50.00		00.00	26500.0	O MI
No.	Mk.	Freq			ding vel	Cor Fac			easur ment	e-	Limi	t	Ov	er			
		MHz	<u> </u>	dB	uV	dl	В	dl	3uV/r	n	dBuV/	/m	dE	3	Detector	Comme	ent
1		4960.0			.60	-9.			43.11		74.0		-30.		peak		
2	*	4960.0	000	45	.98	-9.	49	(36.49		54.0	0	-17.	51	AVG	<u></u>	_

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



	Test Mo	ode		Γ(1Mbps)		Test Date	!	202	1/4/16
T	est Frequ		2	480MHz		Polarizatio	n		zontal
	Temp)		22°C		Hum.		6	1%
130.0	dBuV/m								
120									
110									
100									
90									
80									
70									
60									
50		1 2 X							
40		X							
30									
20									
10.0									
	000 3550.0			11200.00				00.00	26500.00 MHz
No.	Mk.	Freq.	Readin Level	g Correct Factor	Measure ment	- Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4960.000	57.56	-9.49	48.07	74.00	-25.93	peak	
2	*	4960.000	50.91	-9.49	41.42	54.00	-12.58	AVG	

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

	Test Mo					Mbps)			Test Da			1/4/16
Te	st Frequ	uency				2MHz			Polarizat	tion	Ve	rtical
	Temp)			2	2°C			Hum.		6	1%
30.0 dl	BuV/m											
20												
10												
00												
0												
0												
0												
0												
0		1										
0		1 2 X										
0												
0												
0.0	00 0550 0	0 0100	00	0050	00	11200 00	1075	200 1	200 00	10050.00 01	100.00	20500 00 141
No.	00 3550.0 Mk.	00 6100 Freq.		8650. Read		11200.00 Correct	13750 Ma	asure-	6300.00 Limit	18850.00 21 Over	4 00.00	26500.00 MI
110.	IVIIV.	1 164.		Lev		Factor		nent	LIIIII			
		MHz		dBu		dB	dB	BuV/m	dBuV/r	n dB	Detector	Comment
1		4804.0	00	54.5		-10.03		4.54	74.00		peak	
2	*	4804.0	00	47.6	86	-10.03	3	7.65	54.00	-16.35	AVG	

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



	Test M	ode			BT(3	3Mbps)				Test Da	ate		202	21/4/16
Te	est Freq	uency			240	2MHz				F	Polariza	tion			rizontal
	Tem	р			2	2°C					Hum			(61%
130.0	dBuV/m														
120															
110															
100															
90															
во															
70 🗀															
60 <u> </u>															
50															
40		k ×													
30															
20 10.0															
	000 3550.	00 6100).00	8650.	.00	11200	.00	1375	50.00	16	300.00	18850	0.00 21	1400.00	26500.00 MH
No.	Mk.	Freq	•	Read		Cor Fac	rect		easure ment	9-	Limit		Over		
		MHz	<u>'</u>	dBı		d			BuV/n	า	dBuV/ı	m	dB	Detector	Comment
1		4804.0	000	53.	16	-10	.03	4	43.13		74.00)	-30.87	peak	
2	*	4804.0	000	49.	55	-10	.03	3	39.52		54.00)	-14.48	AVG	

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



		st Mo					Mbps					Test D					1/4/16
<u> </u>		-requ Temp	iency				0MHz 2°C				<u> </u>	Polariza Hum					rtical 1%
30.0	dBuV						20					Hull	I.			0	1 /0
120																	
10																	
00 _																	
90																	
80																	
o																	
0 _																	
io																	
10			1 X 2 X														
:o			×														
20																	
0.0																	
		3550.0			8650		11200		1375			300.00		50.00		00.00	26500.00 M
No.	N	Лk.	Freq	•	Rea Le			rect ctor		easur ment	e-	Limi	t	Ove	er		
			MHz		dB	uV	d	В	dl	3uV/r	n	dBuV	/m	dE	3	Detector	Commen
1			4880.0	00	53.	52	-9.	77		13.75		74.0	0	-30.	25	peak	
2		*	4880.0	00	45.	79	-9.	77	3	36.02		54.0	0	-17.	98	AVG	

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



		st Mo					Mbps					Test D					1/4/16
		-requ Temp	ency				0MHz 2°C	<u>′</u>			- 1	Polariza Hun		1			zontal 1%
30.0	dBuV.						20					HIUH	11.			0	1 /0
20																	
10																	
00																	
10																	
:0																	
o																	
:0																	
io			_														
10			1 ½ X														
:o																	
20																	
0.0																	
		3550.0			8650		11200		1375			300.00		50.00		00.00	26500.00 M
No.	Λ	Λk.	Freq		Rea Le			rect ctor		easur ment	e-	Limi	ıt	Ove	er		
			MHz	,	dB	uV	d	В	dl	3uV/r	n	dBuV.	/m	dE	3	Detector	Comment
1			4880.0	00	53.	48	-9.	77		13.71		74.0	0	-30.	29	peak	
2		*	4880.0	000	48	73	-9	.77	3	38.96		54.0	0	-15.	04	AVG	

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

	Test Mo st Frequ				248	3Mbps) 0MHz				Test Polar	Date izatio				1/4/16 rtical
	Temp				2	2°C				Нι	ım.			6	1%
130.0 dB	uV/m														
120															
110															
100															
30															
30															
70 <u> </u>															
so															
50															
40 L		1 X 2 X													
:0		×													
20															
0.0															
1000.00	0 3550.0	00 6100	0.00	8650	.00	11200.0	0	13750.0	0 1	6300.00	18	850.00	2140	00.00	26500.00 MH
No.	Mk.	Freq		Rea Le	ding vel	Corre		Meas me		Lir	nit	Ove	er		
		MHz	<u> </u>	dB		dB		dBu'		dBu	V/m	dE	3	Detector	Comment
1		4960.0	00	53.	99	-9.4	9	44.		74		-29.	50	peak	
2	*	4960.0	00	46.		-9.4	9	37.	4 8	54	$\Omega\Omega$	-16.	52	AVG	

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



	Test N						3Mbp					Test D					1/4/16	
Т	est Fre		су				<u>om</u> H	Z			F	Polariza					zontal	
20.0	Ter	np				2	2°C					Hum	٦.			6	1%	
30.0	dBuV/m																	٦
20																		
10																		-
00																		-
10																		-
:0																		-
o 🗀																		-
0																		
0			1															1
0			½ ×															-
0 _																		
0																		
0.0																		
	.000 355	0.00	6100		8650		1120			0.00		300.00		50.00	2140	0.00	26500.00	MH
No.	Mk.		Freq		Rea Le	ding vel		rrect ctor		easur ment	e-	Limi	t	Ove	er			
			MHz		dB	uV	(dΒ	dl	3uV/r	n	dBuV	/m	dB)	Detector	Comme	ent
1		4	960.0	00	54	.54	-9	.49		15.05		74.0	0	-28.9	95	peak		
2	*	4	960.0	00	48	.69	_0	.49	•	39.20		54.0	n	-14.8	30	AVG		

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



APPENDIX D	OUTPUT POWER	

Project No.: 2102T091 Page 45 of 46 Report Version: R04



Test Mode: BT(1 Mbps) Tested Date 2021/5
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	5.00	0.0032	20.97	0.1250	Pass
2441	4.35	0.0027	20.97	0.1250	Pass
2480	4.22	0.0026	20.97	0.1250	Pass

Test Mode:	BT(2 Mbps)	Tested Date	2021/5/29
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	7.02	0.0050	20.97	0.1250	Pass
2441	6.54	0.0045	20.97	0.1250	Pass
2480	6.37	0.0043	20.97	0.1250	Pass

Test Mode :	BT(3 Mbps)	Tested Date	2021/5/29
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Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	7.01	0.0050	20.97	0.1250	Pass
2441	6.54	0.0045	20.97	0.1250	Pass
2480	6.30	0.0043	20.97	0.1250	Pass

NOTE: The output power reported some are 0.1-0.52dBm higher than the original filing which are still within the tune up range and not cause purposely and should be considered as measurement uncertainty.

End of Test Report