



# FCC RADIO TEST REPORT

FCC ID	:	HLZA24005
Equipment	:	Tablet PC
Brand Name	:	acer
Model Name	:	A24005
Marketing Name	:	Acer Iconia V11, V11-11
Applicant	:	Acer Incorporated
		8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22181, Taiwan (R.O.C)
Manufacturer	:	Acer Incorporated
		8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22181, Taiwan (R.O.C)
Standard	:	FCC Part 15 Subpart C §15.247

The product was received on Jul. 17, 2024 and testing was performed from Jul. 29, 2024 to Aug. 20, 2024. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory

No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)

Page Number: 1 of 26Issue Date: Sep. 12, 2024Report Version: 02



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## History of this test report

Report No.	Version	Description	Issue Date
FR471715B	01	Initial issue of report	Sep. 09, 2024
FR471715B	02	Revise Appendix C This report is an updated version, replacing the report issued on Sep. 09, 2024.	Sep. 12, 2024



## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(2)	6dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Pass	-
3.2	15.247(b)(3) 15.247(b)(4)	Output Power	Pass	-
3.3	15.247(e)	Power Spectral Density	Pass	-
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	Pass	-
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	Pass	6.74 dB under the limit at 30.97 MHz
3.6	15.207	AC Conducted Emission	Pass	15.28 dB under the limit at 0.50 MHz
3.7	15.203	Antenna Requirement	Pass	-

#### Conformity Assessment Condition:

 The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.

2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty".

#### Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

#### Reviewed by: Keven Cheng Report Producer: Rebecca Wu



## **1** General Description

## **1.1 Product Feature of Equipment Under Test**

Product Feature			
General Specs			
Bluetooth, Wi-Fi 2.4GHz 802.11b/g/	n/ac, Wi-Fi 5GHz 8	02.11a/n/ac, and GNSS.	
Antenna Type			
WLAN: FPC Antenna			
Bluetooth: FPC Antenna			
GPS / Glonass / BDS / Galileo: FPC Antenna			
Antenna information			
<b>2400 MHz ~ 2483.5 MHz</b> Peak Gain (dBi) 0.28			

**Remark:** The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.



	SKU List				
Model	SKU1 (6+128GB)	SKU2 (6+128GB) Second source			
CPU	G80 (MT8786) WiFi only	G80 (MT8786) WiFi only			
PCB	Wuzhu	Wuzhu			
PCB 2	Kingshine	Kingshine			
LCM	K&D KD110N09-51II-A002	K&D KD110N09-51II-A002			
LCM 2	STARRY 2082109QFH036011-50G	STARRY 2082109QFH036011-50G			
Memory	Longsys MLXC4006G 6GB LPDDR4X	CXMT CXDBCCCDM-MK-M			
eMMC	Longsys FEMDNN128G 128GB	UDStore UEMDGS63S0 128GB			
	UTL\Battery\Li-polymer\Pack\MG1011\U3189	UTL\Battery\Li-polymer\Pack\MG1011\U3189			
Battery	91PV-2P\8000mAh_30.4Wh\3.8V\177*93*3.2	91PV-2P\8000mAh_30.4Wh\3.8V\177*93*3.2			
	5mm\Connector 51146-5P\ACER	5mm\Connector 51146-5P\ACER			
Wifi /	MT6631N/A, 802.11 a/b/g/n/ac WIFI	MT6631N/A, 802.11 a/b/g/n/ac WIFI			
Bluetooth	(2.4G+5G)	(2.4G+5G)			
GPS	MT6631N/A, GPS BEIDOU,GLONASS,	MT6631N/A, GPS BEIDOU,GLONASS,			
613	Galileo	Galileo			
Front Camera	Zhuocheng ZE2140-MG1011_F-V1.0	Zhuocheng ZE2140-MG1011_F-V1.0			
Rear Camera Zhuocheng ZE2142-MG1011_B-V1.0 (8856)		Zhuocheng ZE2142-MG1011_B-V1.0 (8856)			
Speaker-R	Ming Tai Dian Sheng	Ming Tai Dian Sheng			
эреакег-к	S-1712C-8A-MG1011-R-BOX	S-1712C-8A-MG1011-R-BOX			
Speaker-L	Ming Tai Dian Sheng	Ming Tai Dian Sheng			
Speaker-L	S-1712C-8A-MG1011-L-BOX	S-1712C-8A-MG1011-L-BOX			
Wifi Antenna	Sward ST1821A-1B2-A	Sward ST1821A-1B2-A			
GPS Antenna	Sward ST1821A-1B2-A	Sward ST1821A-1B2-A			
	Aoda	Aoda			
	A829-120167C-AR1	A829-120167C-AR1			
Adapter 1	A829-120167C-US1	A829-120167C-US1			
Adapter	A829-120167C-EU1	A829-120167C-EU1			
	A829-120167C-TL1	A829-120167C-TL1			
	A829-120167C-UK1	A829-120167C-UK1			
	TEKA	ТЕКА			
	TEKA-SCC20EU	TEKA-SCC20EU			
Adapter 2	TEKA-SCC20BS	TEKA-SCC20BS			
	TEKA-SCC20US	TEKA-SCC20US			
	TEKA-SCC20AR	TEKA-SCC20AR			



	SKU List				
Model	SKU3 (6+256GB)	SKU4 (6+256GB) Second source			
CPU	G80 (MT8786) WiFi only	G80 (MT8786) WiFi only			
PCB	Wuzhu	Wuzhu			
PCB 2	Kingshine	Kingshine			
LCM	K&D KD110N09-51II-A002	K&D KD110N09-51II-A002			
LCM 2	STARRY 2082109QFH036011-50G	STARRY 2082109QFH036011-50G			
Memory	Longsys MLXC4006G 6GB LPDDR4X	CXMT CXDBCCCDM-MK-M			
eMMC	Longsys FEMDNN256G 256GB	Shichuangyi (SCY) E256CSAG4ABE00 256GB			
Battery	UTL\Battery\Li-polymer\Pack\MG1011\U3 18991PV-2P\8000mAh_30.4Wh\3.8V\177 *93*3.25mm\Connector 51146-5P\ACER	UTL\Battery\Li-polymer\Pack\MG1011\U318991PV- 2P\8000mAh_30.4Wh\3.8V\177*93*3.25mm\Conne ctor 51146-5P\ACER			
Wifi / Bluetooth	MT6631N/A, 802.11 a/b/g/n/ac WIFI (2.4G+5G)	MT6631N/A, 802.11 a/b/g/n/ac WIFI (2.4G+5G)			
GPS	MT6631N/A, GPS BEIDOU, GLONASS, Galileo	MT6631N/A, GPS BEIDOU, GLONASS, Galileo			
Front Camera	Zhuocheng ZE2140-MG1011_F-V1.0	Zhuocheng ZE2140-MG1011_F-V1.0			
Rear Camera	Zhuocheng ZE2142-MG1011_B-V1.0 (8856)	Zhuocheng ZE2142-MG1011_B-V1.0(8856)			
Speaker-R	Ming Tai Dian Sheng S-1712C-8A-MG1011-R-BOX	Ming Tai Dian Sheng S-1712C-8A-MG1011-R-BOX			
Speaker-L	Ming Tai Dian Sheng S-1712C-8A-MG1011-L-BOX	Ming Tai Dian Sheng S-1712C-8A-MG1011-L-BOX			
Wifi Antenna	Sward ST1821A-1B2-A	Sward ST1821A-1B2-A			
GPS Antenna	Sward ST1821A-1B2-A	Sward ST1821A-1B2-A			
Adapter 1	Aoda A829-120167C-AR1 A829-120167C-US1 A829-120167C-EU1 A829-120167C-TL1 A829-120167C-UK1	Aoda A829-120167C-AR1 A829-120167C-US1 A829-120167C-EU1 A829-120167C-TL1 A829-120167C-UK1			
TEKATEKA-SCC20EUAdapter 2TEKA-SCC20BSTEKA-SCC20USTEKA-SCC20USTEKA-SCC20AR		TEKA TEKA-SCC20EU TEKA-SCC20BS TEKA-SCC20US TEKA-SCC20AR			



## **1.2 Modification of EUT**

No modifications made to the EUT during the testing.

## **1.3 Testing Location**

Test Site	Sporton International Inc. Wensan Laboratory		
Test Site Location         No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)           TEL: +886-3-327-0868           FAX: +886-3-327-0855			
Test Site No.	Sporton Site No.		
Test Sile NO.	TH05-HY, CO07-HY, 03CH11-HY		

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW3786

## **1.4 Applicable Standards**

According to the specifications declared by the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

#### Remark:

- 1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
- 2. The TAF code is not including all the FCC KDB listed without accreditation.

## 2 Test Configuration of Equipment Under Test

## 2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
2400-2483.5 MHz	10	2422	31	2464
	11	2424	32	2466
	12 13 14	2426	33	2468
		2428	34	2470
		2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17 18	2436	38	2478
		2438	39	2480
	19	2440	-	-
	20	2442	-	-

## 2.2 Test Mode

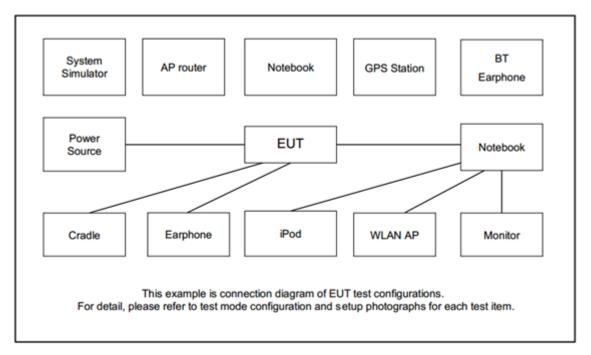
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz)radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and only the worst case emissions were reported in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

	Summary table of Test Cases				
Test Item	Data Rate / Modulation				
	Bluetooth – LE / GFSK				
	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps				
Conducted	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps				
Test Cases	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps				
	Mode 4: Bluetooth Tx CH01_2404 MHz_2Mbps				
	Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps				
	Mode 6: Bluetooth Tx CH38_2478 MHz_2Mbps				
	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps				
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps				
Radiated	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps				
Test Cases	Mode 4: Bluetooth Tx CH01_2404 MHz_2Mbps				
	Mode 5: Bluetooth Tx CH19_2440 MHz_2Mbps				
	Mode 6: Bluetooth Tx CH38_2478 MHz_2Mbps				
AC Conducted	Mode 1: WLAN (2.4GHz) Link + Bluetooth Link + MPEG4 + USB Cable (Charging				
Emission	from AC Adapter 2) + Earphone for SKU3 (6+256GB)				
Remark:					
	ed Test Cases, the tests were performed with AC Adapter 2 and SKU3 (6+256GB). on spurious emission, the modulation and the data rate picked for testing are				
	d by the Max. RF conducted power.				
	E 2Mbps does not support primary advertising channels; it does not support and channel 39.				

The following summary table is showing all test modes to demonstrate in compliance with the standard.



## 2.3 Connection Diagram of Test System



## 2.4 Support Unit used in test configuration and system

ltem	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
2.	WLAN AP	ASUS	RT-AC52	MSQ-RTAC4A00	N/A	Unshielded, 1.8 m
3.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
4.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Earphone + Mic	Samsung	Ecouteur	N/A	Unshielded 1.8m	N/A
6.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A



## 2.5 EUT Operation Test Setup

The RF test items, make the EUT (FW: 2023-12-15-160559) get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

## 2.6 Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)



## 3 Test Result

## 3.1 6dB and 99% Bandwidth Measurement

### 3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

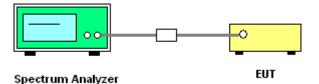
### 3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

### 3.1.3 Test Procedures

- 1. The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz.
- 5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW)  $\ge$  3 \* RBW.
- 6. Measure and record the results in the test report.

## 3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

## 3.1.6 Test Result of 99% Occupied Bandwidth



## 3.2 Output Power Measurement

### 3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5 MHz, the limit for output power is 30 dBm. If transmitting antenna of directional gain greater than 6 dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

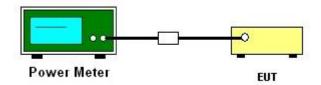
### 3.2.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

#### 3.2.3 Test Procedures

- 1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
- 2. The RF output of EUT is connected to the power meter by RF cable and attenuator.
- 3. The path loss is compensated to the results for each measurement.
- 4. Set the maximum power setting and enable the EUT to transmit continuously.
- 5. Measure the conducted output power and record the results in the test report.

### 3.2.4 Test Setup



## 3.2.5 Test Result of Average Output Power



## 3.3 Power Spectral Density Measurement

### 3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band at any time interval of continuous transmission.

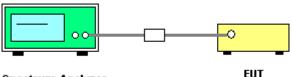
### 3.3.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

### 3.3.3 Test Procedures

- 1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz.
   Video bandwidth (VBW) = 10 kHz. In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6 dB BW)
- 5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
- 6. Measure and record the results in the test report.
- The Measured power density (dBm)/ 100 kHz is a reference level and is used as 20 dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

## 3.3.4 Test Setup



Spectrum Analyzer

## 3.3.5 Test Result of Power Spectral Density



## 3.4 Conducted Band Edges and Spurious Emission Measurement

### 3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 30 dB down from the highest emission level within the authorized band.

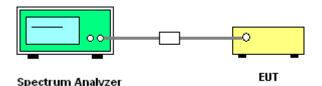
### **3.4.2 Measuring Instruments**

Please refer to the measuring equipment list in this test report.

### 3.4.3 Test Procedure

- 1. The testing follows the ANSI C63.10 Section 11.11.3 Emission level measurement.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- 4. Set RBW = 100 kHz, VBW = 300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
- 5. Measure and record the results in the test report.
- 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

## 3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges Plots

Please refer to Appendix A.

## 3.4.6 Test Result of Conducted Spurious Emission Plots

## 3.5 Radiated Band Edges and Spurious Emission Measurement

## 3.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(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
Above 960	500	3

### 3.5.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

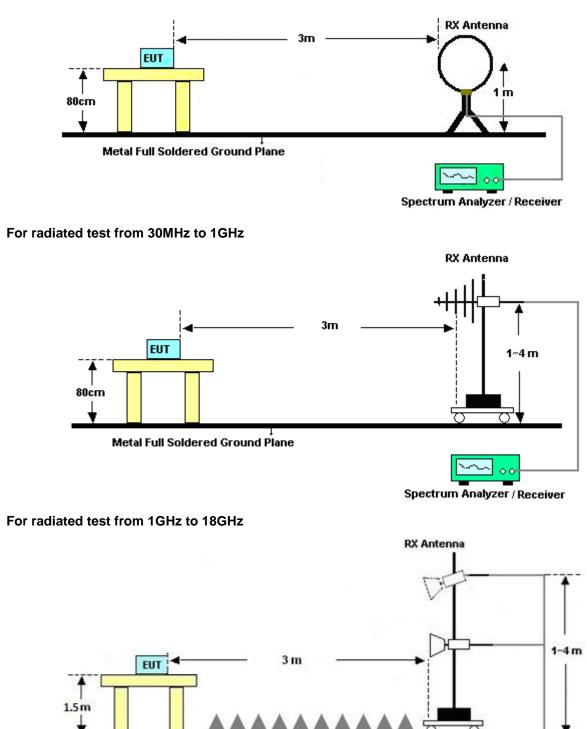
### 3.5.3 Test Procedures

- 1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
- 2. The EUT is arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
- 3. The EUT is placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
- 4. The EUT is set 3 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
- 5. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level
- 6. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as "-".
- 7. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as "-".
- 8. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW = 100 kHz for f < 1 GHz; VBW  $\ge$  RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW = 3 MHz for f  $\geq$  1 GHz for peak measurement. For average measurement:
    - VBW = 10 Hz, when duty cycle is no less than 98 percent.
    - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



## 3.5.4 Test Setup

For radiated test below 30MHz

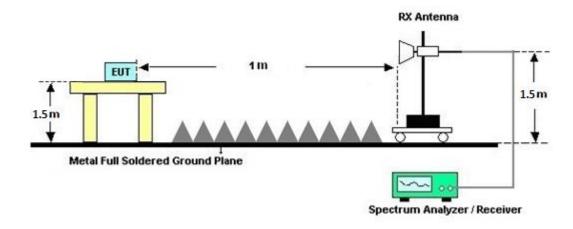


## Metal Full Soldered Ground Plane

Spectrum Analyzer / Receiver



#### For radiated test above 18GHz



### 3.5.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which starts from 9 kHz to 30 MHz, is pre-scanned and the result which is 20 dB lower than the limit line is not reported.

There is adequate comparison measurement of both open-field test site and alternative test site -

semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result comes out very similar.

### 3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

### 3.5.7 Duty Cycle

Please refer to Appendix D.

### 3.5.8 Test Result of Radiated Spurious Emission (30 MHz ~ 10th Harmonic)



## 3.6 AC Conducted Emission Measurement

### 3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBµV)					
Frequency of emission (MHZ)	Quasi-peak	Average				
0.15-0.5	66 to 56*	56 to 46*				
0.5-5	56	46				
5-30	60	50				

\*Decreases with the logarithm of the frequency.

### 3.6.2 Measuring Instruments

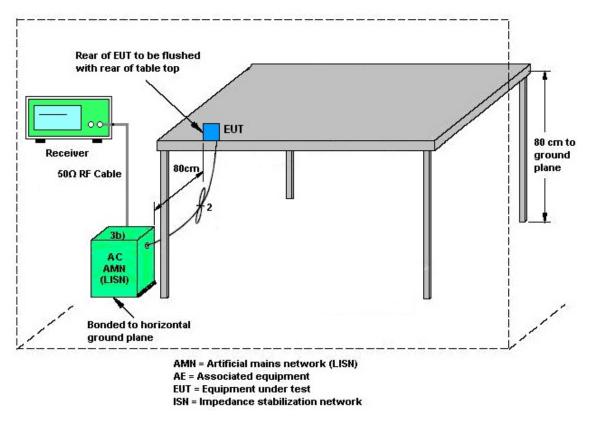
Please refer to the measuring equipment list in this test report.

#### 3.6.3 Test Procedures

- 1. The EUT is placed 0.4 meter away from the conducting wall of the shielding room, and is kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN shall be used.
- 6. Both Line and Neutral shall be tested in order to find out the maximum conducted emission.
- 7. The frequency range from 150 kHz to 30 MHz is scanned.
- Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9 kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.



## 3.6.4 Test Setup



## 3.6.5 Test Result of AC Conducted Emission



## 3.7 Antenna Requirements

## 3.7.1 Standard Applicable

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

## 3.7.2 Antenna Anti-Replacement Construction

Antenna permanently attached.



#### List of Measuring Equipment 4

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 07, 2023	Aug. 06, 2024~ Aug. 15, 2024	Oct. 06, 2024	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 12, 2023	Aug. 06, 2024~ Aug. 15, 2024	Sep. 11, 2024	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-01620	1GHz~18GHz	Aug. 17, 2023	Aug. 06, 2024~ Aug. 15, 2024	Aug. 16, 2024	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	00993	18GHz~40GHz	Nov. 24, 2023	Aug. 06, 2024~ Aug. 15, 2024	Nov. 23, 2024	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 08, 2023	Aug. 06, 2024~ Aug. 15, 2024	Dec. 07, 2024	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Mar. 25, 2024	Aug. 06, 2024~ Aug. 15, 2024	Mar. 24, 2025	Radiation (03CH11-HY)
Preamplifier	Jet-Power	JPA0118-55-30 3	17100018000 55007	1GHz~18GHz	Jun. 13, 2024	Aug. 06, 2024~ Aug. 15, 2024	Jun. 12, 2025	Radiation (03CH11-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 07, 2023	Aug. 06, 2024~ Aug. 15, 2024	Dec. 06, 2024	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 05, 2023	Aug. 06, 2024~ Aug. 15, 2024	Oct. 04, 2024	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20MHz~8.4GHz	Oct. 06, 2023	Aug. 06, 2024~ Aug. 15, 2024	Oct. 05, 2024	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Aug. 06, 2024~ Aug. 15, 2024	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Aug. 06, 2024~ Aug. 15, 2024	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Aug. 06, 2024~ Aug. 15, 2024	N/A	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	Aug. 06, 2024~ Aug. 15, 2024	N/A	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTM-303B	TP140325	N/A	Dec. 08, 2023	Aug. 06, 2024~ Aug. 15, 2024	Dec. 07, 2024	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	804013/2	30M~40G	May 23, 2024	Aug. 06, 2024~ Aug. 15, 2024	May 22, 2025	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz~40GHz	Mar. 06, 2024	Aug. 06, 2024~ Aug. 15, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	803951/2 9K~30M Mar. 06.		Mar. 06, 2024	Aug. 06, 2024~ Aug. 15, 2024 Mar. 05, 2025		Radiation (03CH11-HY)	
RF Cable	HUBER + SUHNER	HUBER + SUCOFLEX 803951/2 30M~4		30M~40G	Mar. 06, 2024	Aug. 06, 2024~ Aug. 15, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-2700 Wainwright -3000-18000-6 SN3 0SS		3GHz High Pass Filter	Sep. 11, 2023		Sep. 10, 2024	Radiation (03CH11-HY)
Filter	Wainwright	WLK4-1000-15 30-8000-40SS	SN11	1.53GHz Low Pass Filter	Sep. 11, 2023	Aug. 06, 2024~ Aug. 15, 2024	Sep. 10, 2024	Radiation (03CH11-HY)
Attenuator	HONOVA	5910 SMA-50-005	0028	N/A	Jul. 09, 2024	Aug. 06, 2024~ Aug. 15, 2024	Jul. 08, 2025	Radiation (03CH11-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 07, 2023	23 Jul. 29, 2024~ Aug. 20, 2024 Nov. 06, 2024		Conducted (TH05-HY)
Power Sensor	DARE	RE RPR3006W 17100015SNO 35 (NO:109) 10MHz~6GHz Jan. 15, 2024		Jan. 15, 2024	Jul. 29, 2024~ Aug. 20, 2024	Jan. 14, 2025	Conducted (TH05-HY)	
Signal Analyzer	Rohde & Schwarz         FSV40         101566         10Hz~40GHz         Aug. 23, 2023         Jul. 29, 2024~ Aug. 20, 2024		Aug. 22, 2024	Conducted (TH05-HY)				
Switch Control Mainframe	Burgeon	Burgeon ETF-058 EC1300484 (BOX3) N/A May 20		May 20, 2024	Jul. 29, 2024~ Aug. 20, 2024	May 19, 2025		
Software	Sporton	BTWIFI_Final_ version_24051 3	ersion_24051 N/A Other Test Item N/A		Jul. 29, 2024~ Aug. 20, 2024	N/A	Conducted (TH05-HY)	
AC Power Source	ACPOWER	AFC-11003G	F317040033	N/A	N/A	Aug. 02, 2024	N/A	Conduction (CO07-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Aug. 02, 2024	N/A	Conduction (CO07-HY)
Pulse Limiter	SCHWARZBE CK	VTSD 9561-F N	9561-F N00373	9kHz-200MHz	Oct. 20, 2023	Aug. 02, 2024	Oct. 19, 2024	Conduction (CO07-HY)
RF Cable	HUBER + SUHNER	RG 214/U	1358175	9kHz~30MHz	Mar. 14, 2024	Aug. 02, 2024	Mar. 13, 2025	Conduction (CO07-HY)
Two-Line V-Network	TESEQ	ESEQ NNB 51		N/A	Mar. 10, 2024	Aug. 02, 2024	Mar. 09, 2025	Conduction (CO07-HY)
Four-Line V-Network	TESEQ	NNB 52	36122	N/A	Mar. 07, 2024	Aug. 02, 2024	Mar. 06, 2025	Conduction (CO07-HY)
EMI Test Receiver	Rohde & ESR3		102317	9kHz~3.6GHz	Sep. 20, 2023	Aug. 02, 2024	Sep. 19, 2024	Conduction (CO07-HY)



## 5 Measurement Uncertainty

#### Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	3.44 dB
of 95% (U = 2Uc(y))	3.44 UB

#### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence	6 10 dP
of 95% (U = 2Uc(y))	6.10 dB

#### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence	4.30 dB
of 95% (U = 2Uc(y))	4.30 GB

#### Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence	4.30 dB
of 95% (U = 2Uc(y))	4.30 dB

#### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence	5.30 dB
of 95% (U = 2Uc(y))	5.30 UB

Report Number : FR471715B

## Appendix A. Test Result of Conducted Test Items

Test Engineer:	Hank Hsu	Temperature:	21~25	°C
Test Date:	2024/07/29 ~ 2024/08/20	Relative Humidity:	51~54	%

<u>TEST RESULTS DATA</u> 6dB and 99% Occupied Bandwidth									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail	
BLE	1Mbps	1	0	2402	1.033	0.681	0.50	Pass	
BLE	1Mbps	1	19	2440	1.034	0.680	0.50	Pass	
BLE	1Mbps	1	39	2480	1.031	0.679	0.50	Pass	

<u>TEST RESULTS DATA</u> <u>Average Power Table</u>										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	1Mbps	1	0	2402	5.00	30.00	0.28	5.28	36.00	Pass
BLE	1Mbps	1	19	2440	5.60	30.00	0.28	5.88	36.00	Pass
BLE	1Mbps	1	39	2480	6.20	30.00	0.28	6.48	36.00	Pass

TEST RESULTS DATA
Peak Power Density

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail	
BLE	1Mbps	1	0	2402	4.68	-9.61	0.28	8.00	Pass	
BLE	1Mbps	1	19	2440	5.18	-9.12	0.28	8.00	Pass	
BLE	1Mbps	1	39	2480	5.75	-8.55	0.28	8.00	Pass	
lote: P	lote: PSD (dBm/ 100kHz) is a reference level used for Conducted Band Edges and Conducte									

Report Number : FR471715B

### TEST RESULTS DATA Average Power Table

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
BLE	2Mbps	1	1	2404	5.20	30.00	0.28	5.48	36.00	Pass
BLE	2Mbps	1	19	2440	5.70	30.00	0.28	5.98	36.00	Pass
BLE	2Mbps	1	38	2478	6.30	30.00	0.28	6.58	36.00	Pass

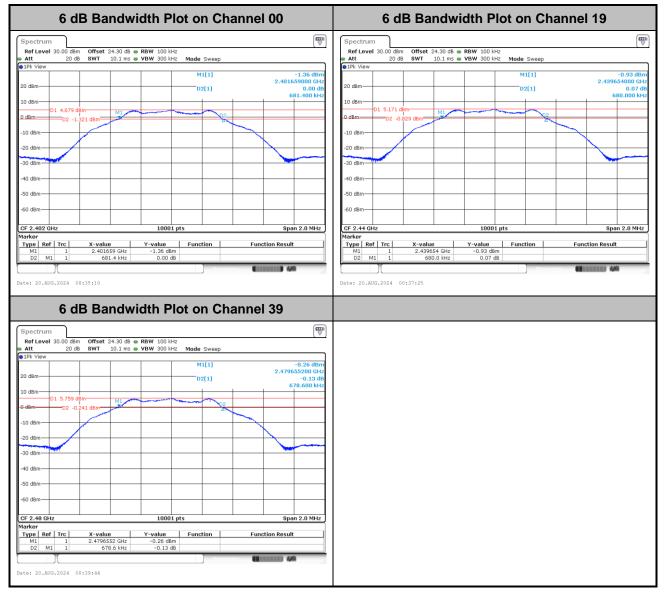
TEST RESULTS DATA	
Peak Power Density	

Mod.	Data Rate	Νт×	CH.	Freq. (MHz)	Peak PSD (dBm /100kHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail	
BLE	2Mbps	1	1	2404	4.77	-12.09	0.28	8.00	Pass	
BLE	2Mbps	1	19	2440	5.15	-11.68	0.28	8.00	Pass	
BLE	2Mbps	1	38	2478	5.87	-10.98	0.28	8.00	Pass	Ţ



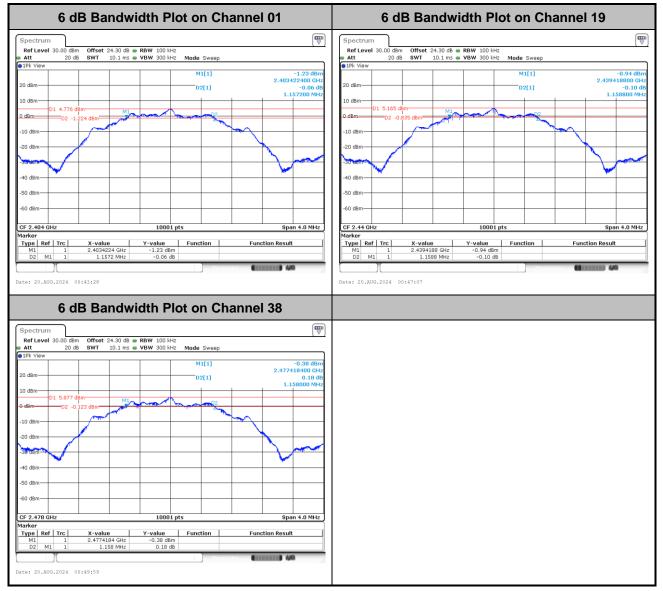
## 6dB Bandwidth

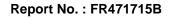
#### <1Mbps>





#### <2Mbps>







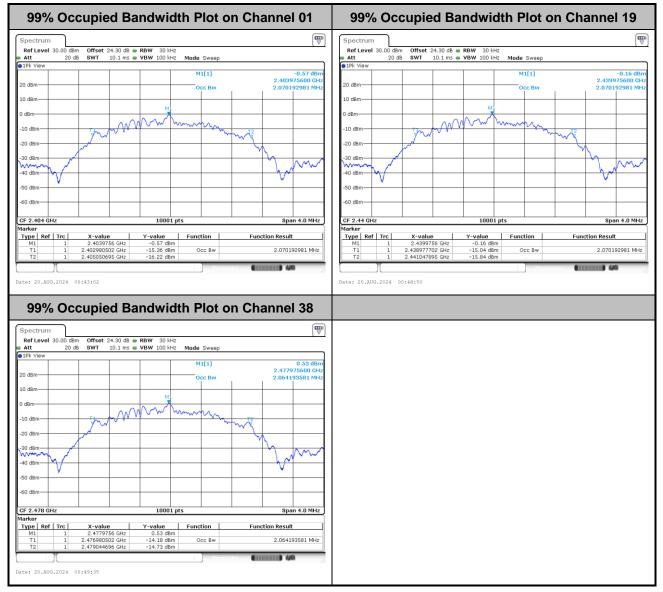
## 99% Occupied Bandwidth

#### <1Mbps>





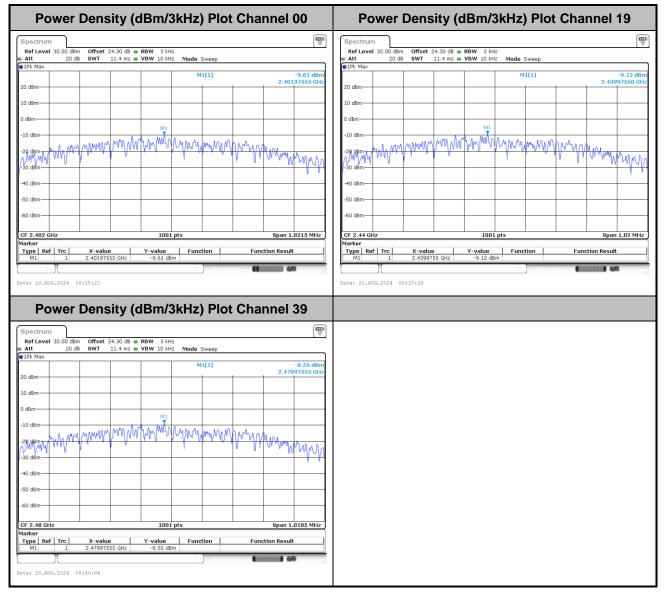
#### <2Mbps>





## Power Spectral Density (dBm/3kHz)

#### <1Mbps>





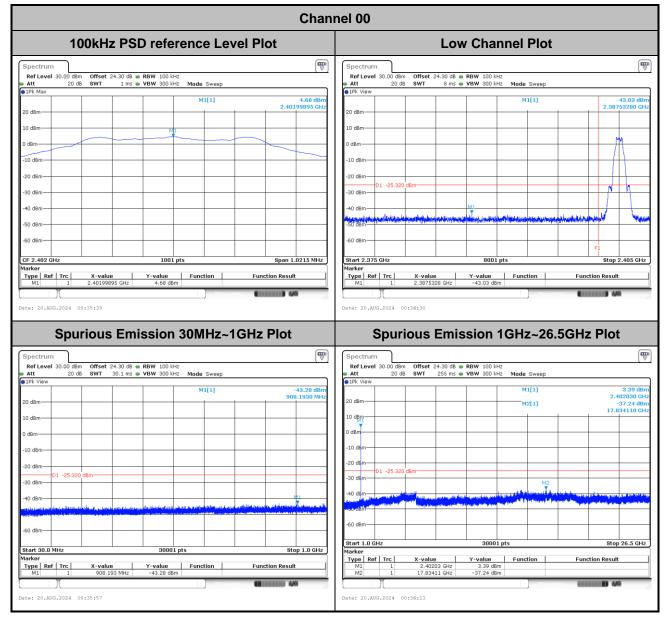
## <2Mbps>

Power Density (dBm/3kHz) Plot Channel 01	Power Density (dBm/3kHz) Plot Channel 19
Spectrum 🕎	[Spectrum] []
RefLevel 30.00 dBm Offset 24.30 dB ● RBW 3 kHz ● Att 20 dB SWT 19.3 ms ● VBW 10 kHz Mode Sweep	RefLevel         30.00 dBm         Offset         24.30 dB         RBW         3 kHz           Att         20 dB         SWT         19.4 ms         VBW         10 kHz         Mode         Sweep
PPk Max     M1[1] -12.09 dBm	1Pk Max     M1[1] -11.68 dBm
20 dBm	20 dBm 2.43995465 GHz
10 dBm	10 dBm
0 dBm	0 dBm
-10 dBm	-10 d8m
	29,990 a https://www.https://white.white.https://
	Hall offen Article Land Article Land Article Land Article Land Article Land Article Ar
-40 dBm-	-40 dBm-
-50 dBm	-50 dBm-
-60 dBm-	-60 dBm-
CF 2.404 GHz 1001 pts Span 1.7355 MHz	CF 2.44 GHz 1001 pts Span 1.7385 MHz
Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.40395495 GHz         -12.09 dBm	Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.43995485         GHz         -11.68         dBm
MI         I         2:40395495 GHZ         -12:09 Upm         Maximum         Maximum <th< td=""><td>M1 1 2.43995405 GH2 -11.00 UBM</td></th<>	M1 1 2.43995405 GH2 -11.00 UBM
Nate: 20.AUG.2024 00:43:44	Date: 20.AUG.2024 00:47:18
Power Density (dBm/3kHz) Plot Channel 38	
Ref Level         30.00 dBm         Offset         24.30 dB         RBW         3 kHz           Att         20 dB         SWT         19.3 ms         VBW         10 kHz         Mode Sweep	
• IPk Max  • IPk Max  • IPk Max  • Interview  • Interview	
20 dBm	
10 dBm	
0 dBm	
-10 dBm	
-20,48m, http://www.http://www	
-40 dBm	
-50 dBm	
-60 dBm	
CF 2.478 GHz 1001 pts Span 1.737 MHz	
Marker         Yope         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4779549         GHz         -10.98 dBm	
mail         A         a.+7/7979 GHz         -10.90 GBH         Massering.	
ate: 20.AUG.2024 00:50:24	

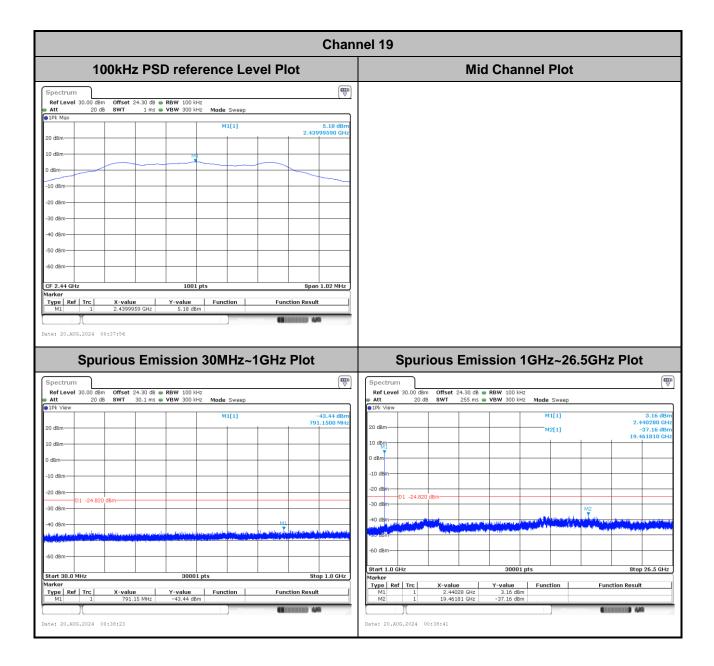


## **Band Edge and Conducted Spurious Emission**

#### <1Mbps>

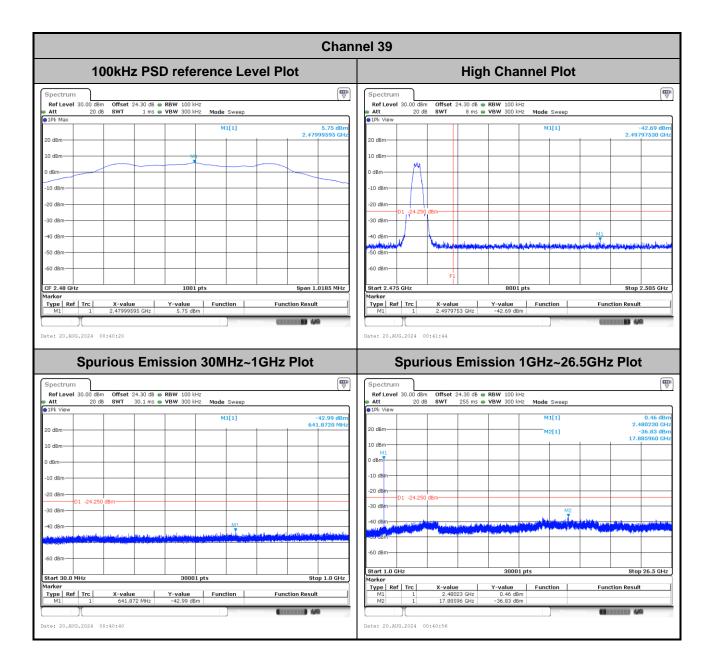






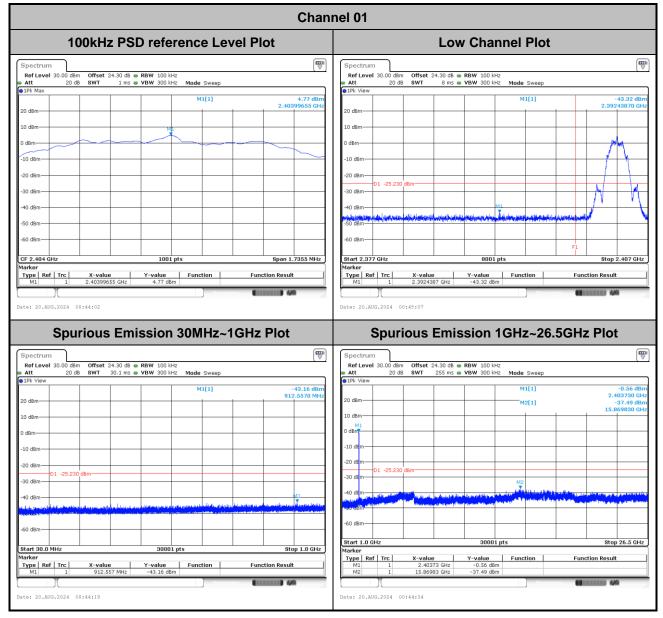




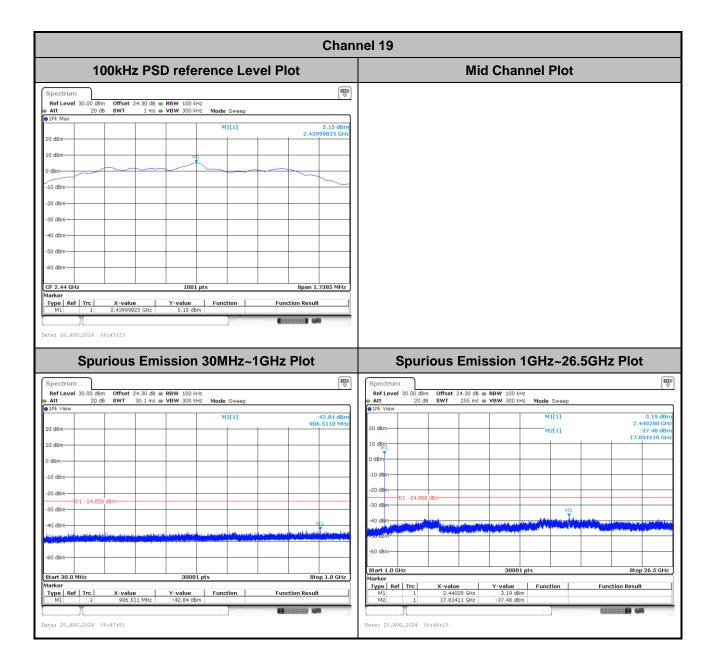


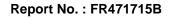


#### <2Mbps>

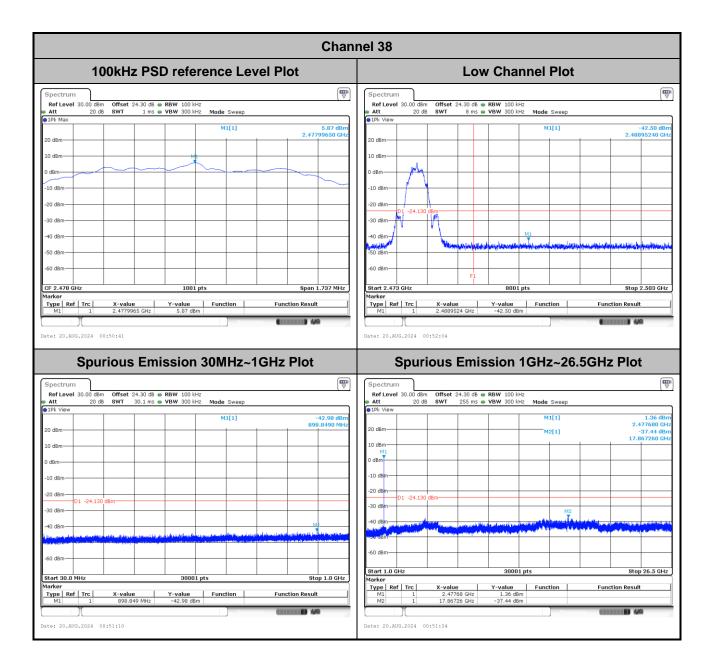












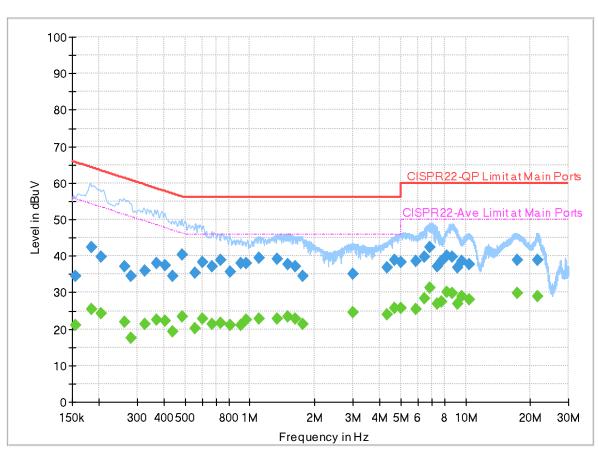


# Appendix B. AC Conducted Emission Test Results

Test Engineer :	Louio Chung	Temperature :	22.8~26.1°C
		Relative Humidity :	45.2~52.3%

#### **EUT Information**

Report NO : Test Mode : Test Voltage : Phase : 471715 Mode 1 120Vac/60Hz Line



FullSpectrum

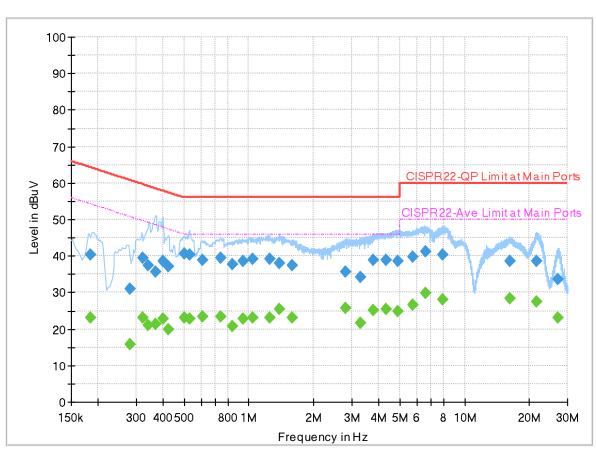
#### Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154500		21.16	55.75	34.59	L1	OFF	19.9
0.154500	34.37		65.75	31.38	L1	OFF	19.9
0.184110		25.31	54.30	28.99	L1	OFF	19.9
0.184110	42.34		64.30	21.96	L1	OFF	19.9
0.204000		24.23	53.45	29.22	L1	OFF	19.9
0.204000	39.74		63.45	23.71	L1	OFF	19.9
0.262410		22.02	51.36	29.34	L1	OFF	19.9
0.262410	37.06		61.36	24.30	L1	OFF	19.9
0.280320		17.67	50.81	33.14	L1	OFF	19.9
0.280320	34.38		60.81	26.43	L1	OFF	19.9
0.324600		21.37	49.59	28.22	L1	OFF	19.9
0.324600	36.01		59.59	23.58	L1	OFF	19.9
0.370590		22.40	48.49	26.09	L1	OFF	19.9
0.370590	38.04		58.49	20.45	L1	OFF	19.9
0.403710		22.22	47.78	25.56	L1	OFF	19.9
0.403710	37.57		57.78	20.21	L1	OFF	19.9
0.436200		19.41	47.13	27.72	L1	OFF	19.9
0.436200	34.60		57.13	22.53	L1	OFF	19.9
0.486690		23.41	46.22	22.81	L1	OFF	19.9

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$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.486690	40.40		56.22	15.82	L1	OFF	19.9
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.556800		20.23	46.00	25.77	L1	OFF	19.9
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.556800	35.47		56.00	20.53	L1	OFF	19.9
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	0.604950		22.85	46.00	23.15	L1	OFF	19.9
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.604950	38.16		56.00	17.84	L1	OFF	19.9
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.668040		21.44	46.00	24.56	L1	OFF	19.9
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0.668040	37.13		56.00	18.87	L1	OFF	19.9
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0.735090		21.73	46.00	24.27	L1	OFF	19.9
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	0.735090	38.83		56.00	17.17	L1	OFF	19.9
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.806010		20.98	46.00	25.02	L1	OFF	19.9
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	0.806010	35.77		56.00	20.23	L1	OFF	19.9
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.905640		21.09	46.00	24.91	L1	OFF	19.9
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.905640	38.05		56.00	17.95	L1	OFF	19.9
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.964500		22.55	46.00	23.45	L1	OFF	19.9
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0.964500	38.02				L1		19.9
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			22.83					19.9
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		39.37						19.9
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$								20.0
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$								20.0
5.001000          25.74         50.00         24.26         L1         OFF         24           5.001000         38.21          60.00         21.79         L1         OFF         24           5.896410          25.51         50.00         24.49         L1         OFF         24           5.896410         38.51          60.00         21.49         L1         OFF         24           6.423270          28.49         50.00         21.51         L1         OFF         24           6.423270         39.91          60.00         20.09         L1         OFF         24           6.423270         39.91          60.00         20.09         L1         OFF         24           6.423270         39.91          60.00         20.99         L1         OFF         24           6.423270         39.91          60.00         23.20         L1         OFF         24           6.852750          26.80         50.00         22.91         L1         OFF         24           7.35250         37.09        <								20.0
5.001000         38.21          60.00         21.79         L1         OFF         24           5.896410          25.51         50.00         24.49         L1         OFF         24           5.896410         38.51          60.00         21.49         L1         OFF         24           6.423270          28.49         50.00         21.51         L1         OFF         24           6.423270         39.91          60.00         20.09         L1         OFF         24           6.423270         39.91          60.00         20.09         L1         OFF         24           6.423270         39.91          60.00         21.51         L1         OFF         24           6.423270         39.91          60.00         20.99         L1         OFF         24           6.852750         42.38          60.00         23.20         L1         OFF         24           7.352250         37.09          60.00         22.91         L1         OFF         24           7.725750         38.70								20.0
5.896410          25.51         50.00         24.49         L1         OFF         22           5.896410         38.51          60.00         21.49         L1         OFF         22           6.423270          28.49         50.00         21.51         L1         OFF         22           6.423270         39.91          60.00         20.09         L1         OFF         22           6.852750          31.15         50.00         18.85         L1         OFF         22           6.852750         42.38          60.00         17.62         L1         OFF         22           7.352250          26.80         50.00         23.20         L1         OFF         22           7.352250         37.09          60.00         22.91         L1         OFF         22           7.725750         38.70          60.00         21.30         L1         OFF         22           8.195820          29.99         50.00         20.01         L1         OFF         22           8.630250          29.82								20.0
5.896410         38.51          60.00         21.49         L1         OFF         24           6.423270          28.49         50.00         21.51         L1         OFF         24           6.423270         39.91          60.00         20.09         L1         OFF         24           6.423270         39.91          60.00         20.09         L1         OFF         24           6.852750          31.15         50.00         18.85         L1         OFF         24           6.852750         42.38          60.00         17.62         L1         OFF         24           7.352250          26.80         50.00         23.20         L1         OFF         24           7.725750         37.09          60.00         22.91         L1         OFF         24           7.725750         38.70          60.00         21.30         L1         OFF         24           8.195820          29.99         50.00         20.01         L1         OFF         24           8.630250          29.82							-	20.0
6.423270          28.49         50.00         21.51         L1         OFF         22           6.423270         39.91          60.00         20.09         L1         OFF         22           6.852750          31.15         50.00         18.85         L1         OFF         22           6.852750         42.38          60.00         17.62         L1         OFF         22           7.352250          26.80         50.00         23.20         L1         OFF         22           7.352250          27.36         50.00         22.64         L1         OFF         22           7.725750          27.36         50.00         20.01         L1         OFF         22           7.725750         38.70          60.00         21.30         L1         OFF         22           8.195820          29.99         50.00         20.01         L1         OFF         22           8.630250          29.82         50.00         20.18         L1         OFF         24           9.168000          26.97		38 51						20.0
6.423270         39.91          60.00         20.09         L1         OFF         22           6.852750          31.15         50.00         18.85         L1         OFF         22           6.852750         42.38          60.00         17.62         L1         OFF         22           7.352250          26.80         50.00         23.20         L1         OFF         22           7.352250         37.09          60.00         22.91         L1         OFF         22           7.725750          27.36         50.00         22.64         L1         OFF         22           7.725750         38.70          60.00         21.30         L1         OFF         22           8.195820          29.99         50.00         20.01         L1         OFF         22           8.630250          29.82         50.00         20.18         L1         OFF         22           9.168000          26.97         50.00         23.03         L1         OFF         24           9.579570          28.92								20.0
6.852750          31.15         50.00         18.85         L1         OFF         22           6.852750         42.38          60.00         17.62         L1         OFF         22           7.352250          26.80         50.00         23.20         L1         OFF         22           7.352250         37.09          60.00         22.91         L1         OFF         22           7.725750          27.36         50.00         22.64         L1         OFF         22           7.725750         38.70          60.00         21.30         L1         OFF         22           8.195820          29.99         50.00         20.01         L1         OFF         22           8.630250          29.82         50.00         20.18         L1         OFF         22           9.168000          26.97         50.00         23.03         L1         OFF         22           9.579570          28.92         50.00         23.03         L1         OFF         24           9.579570         38.64		30 01					-	20.0
6.852750         42.38          60.00         17.62         L1         OFF         22           7.352250          26.80         50.00         23.20         L1         OFF         22           7.352250         37.09          60.00         22.91         L1         OFF         22           7.725750          27.36         50.00         22.64         L1         OFF         22           7.725750         38.70          60.00         21.30         L1         OFF         22           8.195820          29.99         50.00         20.01         L1         OFF         22           8.195820         40.08          60.00         19.92         L1         OFF         22           8.630250          29.82         50.00         20.18         L1         OFF         22           9.168000          26.97         50.00         23.03         L1         OFF         22           9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570         38.64								20.0
7.352250        26.80       50.00       23.20       L1       OFF       22         7.352250       37.09        60.00       22.91       L1       OFF       22         7.725750        27.36       50.00       22.64       L1       OFF       22         7.725750       38.70        60.00       21.30       L1       OFF       22         8.195820        29.99       50.00       20.01       L1       OFF       22         8.195820        29.99       50.00       20.01       L1       OFF       22         8.630250        29.82       50.00       20.18       L1       OFF       22         8.630250       39.82        60.00       20.18       L1       OFF       24         9.168000        26.97       50.00       23.03       L1       OFF       24         9.168000       36.75        60.00       23.25       L1       OFF       24         9.579570        28.92       50.00       21.08       L1       OFF       24         9.579570       38.64								20.0
7.352250       37.09        60.00       22.91       L1       OFF       22         7.725750        27.36       50.00       22.64       L1       OFF       22         7.725750       38.70        60.00       21.30       L1       OFF       22         8.195820        29.99       50.00       20.01       L1       OFF       22         8.195820       40.08        60.00       19.92       L1       OFF       22         8.630250        29.82       50.00       20.18       L1       OFF       22         8.630250       39.82        60.00       20.18       L1       OFF       22         9.168000        26.97       50.00       23.03       L1       OFF       24         9.168000       36.75        60.00       23.25       L1       OFF       24         9.579570        28.92       50.00       21.08       L1       OFF       24         9.579570       38.64        60.00       21.36       L1       OFF       24         10.431510       37.69 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>20.0</td>							-	20.0
7.725750          27.36         50.00         22.64         L1         OFF         22           7.725750         38.70          60.00         21.30         L1         OFF         22           8.195820          29.99         50.00         20.01         L1         OFF         22           8.195820         40.08          60.00         19.92         L1         OFF         22           8.630250          29.82         50.00         20.18         L1         OFF         22           8.630250         39.82          60.00         20.18         L1         OFF         22           9.168000          26.97         50.00         23.03         L1         OFF         22           9.168000         36.75          60.00         23.25         L1         OFF         24           9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570         38.64          60.00         21.36         L1         OFF         24           10.431510         37.69		37 00						20.0
7.725750       38.70        60.00       21.30       L1       OFF       24         8.195820        29.99       50.00       20.01       L1       OFF       24         8.195820       40.08        60.00       19.92       L1       OFF       24         8.630250        29.82       50.00       20.18       L1       OFF       24         8.630250       39.82        60.00       20.18       L1       OFF       24         9.168000        26.97       50.00       23.03       L1       OFF       24         9.168000       36.75        60.00       23.25       L1       OFF       24         9.579570        28.92       50.00       21.08       L1       OFF       24         9.579570       38.64        60.00       21.36       L1       OFF       24         10.431510        28.20       50.00       21.80       L1       OFF       24         10.431510       37.69        60.00       22.31       L1       OFF       24         17.300220 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>20.0</td>								20.0
8.195820          29.99         50.00         20.01         L1         OFF         22           8.195820         40.08          60.00         19.92         L1         OFF         22           8.630250          29.82         50.00         20.18         L1         OFF         22           8.630250         39.82          60.00         20.18         L1         OFF         22           9.168000          26.97         50.00         23.03         L1         OFF         22           9.168000         36.75          60.00         23.25         L1         OFF         24           9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570         38.64          60.00         21.36         L1         OFF         24           10.431510          28.20         50.00         21.80         L1         OFF         24           10.431510         37.69							-	20.0
8.195820         40.08          60.00         19.92         L1         OFF         24           8.630250          29.82         50.00         20.18         L1         OFF         24           8.630250         39.82          60.00         20.18         L1         OFF         24           9.168000          26.97         50.00         23.03         L1         OFF         24           9.168000         36.75          60.00         23.25         L1         OFF         24           9.168000         36.75          60.00         23.25         L1         OFF         24           9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570         38.64          60.00         21.36         L1         OFF         24           10.431510          28.20         50.00         21.80         L1         OFF         24           10.431510         37.69          60.00         22.31         L1         OFF         24           17.300220          29.73								20.0
8.630250          29.82         50.00         20.18         L1         OFF         24           8.630250         39.82          60.00         20.18         L1         OFF         24           9.168000          26.97         50.00         23.03         L1         OFF         24           9.168000         36.75          60.00         23.25         L1         OFF         24           9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570          28.92         50.00         21.36         L1         OFF         24           9.579570         38.64          60.00         21.36         L1         OFF         24           10.431510          28.20         50.00         21.80         L1         OFF         24           10.431510         37.69          60.00         22.31         L1         OFF         24           17.300220          29.73         50.00         20.27         L1         OFF         24								20.1
8.630250         39.82          60.00         20.18         L1         OFF         24           9.168000          26.97         50.00         23.03         L1         OFF         24           9.168000         36.75          60.00         23.25         L1         OFF         24           9.168000         36.75          60.00         23.25         L1         OFF         24           9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570         38.64          60.00         21.36         L1         OFF         24           10.431510          28.20         50.00         21.80         L1         OFF         24           10.431510         37.69          60.00         22.31         L1         OFF         24           17.300220          29.73         50.00         20.27         L1         OFF         24	0.000050	40.00		50.00	00.40			00.4
9.168000          26.97         50.00         23.03         L1         OFF         24           9.168000         36.75          60.00         23.25         L1         OFF         24           9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570         38.64          60.00         21.36         L1         OFF         24           10.431510          28.20         50.00         21.80         L1         OFF         24           10.431510         37.69          60.00         22.31         L1         OFF         24           17.300220          29.73         50.00         20.27         L1         OFF         24		30 83						20.1
9.168000         36.75          60.00         23.25         L1         OFF         24           9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570         38.64          60.00         21.36         L1         OFF         24           9.579570         38.64          60.00         21.36         L1         OFF         24           10.431510          28.20         50.00         21.80         L1         OFF         24           10.431510         37.69          60.00         22.31         L1         OFF         24           17.300220          29.73         50.00         20.27         L1         OFF         24		55.02						20.1
9.579570          28.92         50.00         21.08         L1         OFF         24           9.579570         38.64          60.00         21.36         L1         OFF         24           10.431510          28.20         50.00         21.80         L1         OFF         24           10.431510         37.69          60.00         22.31         L1         OFF         24           17.300220          29.73         50.00         20.27         L1         OFF         24		36 75						20.1
9.579570         38.64          60.00         21.36         L1         OFF         24           10.431510          28.20         50.00         21.80         L1         OFF         24           10.431510          28.20         50.00         21.80         L1         OFF         24           10.431510         37.69          60.00         22.31         L1         OFF         24           17.300220          29.73         50.00         20.27         L1         OFF         24								20.1
10.431510          28.20         50.00         21.80         L1         OFF         24           10.431510         37.69          60.00         22.31         L1         OFF         24           17.300220          29.73         50.00         20.27         L1         OFF         24		38 64						20.1
10.431510         37.69          60.00         22.31         L1         OFF         20           17.300220          29.73         50.00         20.27         L1         OFF         20		30.04						20.1
17.300220 29.73 50.00 20.27 L1 OFF 20		37 60						20.1
								20.1
	17.300220	38.95	23.13	60.00	20.27	L1	OFF	20.1
			20 04					20.1
								20.1
21.737000 30.02 00.00 21.10 L1 UFF 2	21.434000	J0.0Z		00.00	21.10			20.1

### **EUT Information**

Report NO : Test Mode : Test Voltage : Phase : 471715 Mode 1 120Vac/60Hz Neutral



Full Spectrum

#### Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.184110		23.24	54.30	31.06	Ν	OFF	19.9
0.184110	40.29		64.30	24.01	Ν	OFF	19.9
0.280500		15.85	50.80	34.95	Ν	OFF	19.9
0.280500	30.92		60.80	29.88	Ν	OFF	19.9
0.322620		23.08	49.64	26.56	Ν	OFF	19.9
0.322620	39.35		59.64	20.29	Ν	OFF	19.9
0.341250		21.19	49.17	27.98	Ν	OFF	19.9
0.341250	37.57		59.17	21.60	Ν	OFF	19.9
0.368790		21.48	48.53	27.05	Ν	OFF	19.9
0.368790	35.81		58.53	22.72	Ν	OFF	19.9
0.400470		22.73	47.84	25.11	Ν	OFF	19.9
0.400470	38.49		57.84	19.35	Ν	OFF	19.9
0.422250		19.91	47.40	27.49	Ν	OFF	19.9
0.422250	37.09		57.40	20.31	Ν	OFF	19.9
0.503160		23.12	46.00	22.88	Ν	OFF	19.9
0.503160	40.72		56.00	15.28	Ν	OFF	19.9
0.530790		22.78	46.00	23.22	Ν	OFF	19.9
0.530790	40.44		56.00	15.56	Ν	OFF	19.9
0.611250		23.49	46.00	22.51	Ν	OFF	19.9

0.611250	38.77		56.00	17.23	Ν	OFF	19.9
0.739950		23.38	46.00	22.62	Ν	OFF	19.9
0.739950	39.57		56.00	16.43	Ν	OFF	19.9
0.836250		20.62	46.00	25.38	Ν	OFF	19.9
0.836250	37.66		56.00	18.34	Ν	OFF	19.9
0.935250		22.68	46.00	23.32	Ν	OFF	19.9
0.935250	38.70		56.00	17.30	Ν	OFF	19.9
1.036230		23.04	46.00	22.96	Ν	OFF	19.9
1.036230	39.13		56.00	16.87	Ν	OFF	19.9
1.244850		23.21	46.00	22.79	Ν	OFF	19.9
1.244850	39.04		56.00	16.96	Ν	OFF	19.9
1.386240		25.47	46.00	20.53	Ν	OFF	19.9
1.386240	38.06		56.00	17.94	Ν	OFF	19.9
1.593420		23.07	46.00	22.93	Ν	OFF	19.9
1.593420	37.31		56.00	18.69	Ν	OFF	19.9
2.795460		25.85	46.00	20.15	Ν	OFF	20.0
2.795460	35.74		56.00	20.26	Ν	OFF	20.0
3.300000		21.61	46.00	24.39	Ν	OFF	20.0
3.300000	34.22		56.00	21.78	Ν	OFF	20.0
3.776280		25.27	46.00	20.73	Ν	OFF	20.0
3.776280	38.78		56.00	17.22	Ν	OFF	20.0
4.321230		25.39	46.00	20.61	Ν	OFF	20.0
4.321230	38.81		56.00	17.19	Ν	OFF	20.0
4.881030		24.95	46.00	21.05	Ν	OFF	20.0
4.881030	38.59		56.00	17.41	Ν	OFF	20.0
5.723250		26.61	50.00	23.39	Ν	OFF	20.0
5.723250	39.89		60.00	20.11	Ν	OFF	20.0
6.576090		29.76	50.00	20.24	Ν	OFF	20.0
6.576090	41.36		60.00	18.64	Ν	OFF	20.0
7.908000		28.10	50.00	21.90	Ν	OFF	20.1
7.908000	40.26		60.00	19.74	Ν	OFF	20.1
16.179000		28.45	50.00	21.55	Ν	OFF	20.2
16.179000	38.56		60.00	21.44	Ν	OFF	20.2
21.563250		27.60	50.00	22.40	Ν	OFF	20.2
21.563250	38.69		60.00	21.31	Ν	OFF	20.2
27.206880		23.01	50.00	26.99	Ν	OFF	20.2
27.206880	33.56		60.00	26.44	Ν	OFF	20.2
	*						•



# Appendix C. Radiated Spurious Emission Test Data

Test Engineer :	Dapiel Loo, Fu Chan, and Trave Heigh	Temperature :	20.1~21.8°C
lest Engineer .	Daniel Lee, Fu Chen, and Troye Hsieh	Relative Humidity :	52.9~69.9%

#### Note symbol

-L	Low channel location
-R	High channel location

### C1. Radiated Spurious Emission Test Modes

Mode	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 5	2400-2483.5	1	Bluetooth-LE_GSFK	00	2402	1Mbps	-	-
Mode 6	2400-2483.5	1	Bluetooth-LE_GSFK	19	2440	1Mbps	-	-
Mode 7	2400-2483.5	1	Bluetooth-LE_GSFK	39	2480	1Mbps	-	-
Mode 8	2400-2483.5	1	Bluetooth-LE_GSFK	01	2402	2Mbps	-	-
Mode 9	2400-2483.5	1	Bluetooth-LE_GSFK	19	2440	2Mbps	-	-
Mode 10	2400-2483.5	1	Bluetooth-LE_GSFK	38	2478	2Mbps	-	-
Mode 11	2400-2483.5	1	Bluetooth-LE_GSFK	01	2402	2Mbps	-	LF
Mode 28	2400-2483.5	1	Bluetooth-LE_GSFK	01	2402	2Mbps	-	SHF



### C2. Summary of each worse mode

Mada	Madulation	01	Freq.	Level	Limit	Margin	Del	Peak	Desult	БШ	Demente
Mode	Modulation	Ch.	(MHz)	(dBuV/m)	(dBuV/m)	(dB)	Pol.	Avg.	Result	RU	Remark
5	Bluetooth-LE_GSFK	00	2354.25	43.60	54.00	-10.40	V	Avg.	Pass	-	Band Edge
5	Bluetooth-LE_GSFK	00	4804.00	41.17	74.00	-32.83	V	Peak	Pass	-	Harmonic
6	Bluetooth-LE_GSFK	19	2495.62	44.14	54.00	-9.86	н	Avg.	Pass	-	Band Edge
0	Bluetooth-LE_GSFK	19	7320.00	44.20	74.00	-29.80	н	Peak	Pass	-	Harmonic
7	Bluetooth-LE_GSFK	39	2483.68	44.66	54.00	-9.34	н	Avg.	Pass	-	Band Edge
1	Bluetooth-LE_GSFK	39	7440.00	44.67	74.00	-29.33	V	Peak	Pass	-	Harmonic
8	Bluetooth-LE_GSFK	01	2404.00	101.96	54.00	47.96	н	Avg.	Fail	-	Band Edge
0	Bluetooth-LE_GSFK	01	4808.00	40.50	74.00	-33.50	н	Peak	Pass	-	Harmonic
9	Bluetooth-LE_GSFK	19	2486.86	44.95	54.00	-9.05	V	Avg.	Pass	-	Band Edge
9	Bluetooth-LE_GSFK	19	7320.00	44.58	74.00	-29.42	V	Peak	Pass	-	Harmonic
10	Bluetooth-LE_GSFK	38	2485.50	45.13	54.00	-8.87	н	Avg.	Pass	-	Band Edge
10	Bluetooth-LE_GSFK	38	7434.00	44.06	74.00	-29.94	V	Peak	Pass	-	Harmonic
11	LF	01	30.97	33.26	40.00	-6.74	н	Peak	Pass	-	LF
28	SHF	01	24962.32	40.66	74.00	-33.34	V	Peak	Pass	-	SHF



