FCC RADIO TEST REPORT

FCC ID	:	**2BFSB-DG100**
Equipment	:	**Quilt Dial**
Brand Name	:	**Quilt**
Model Name	:	**QD1**
Applicant	:	**Quilt Systems, Inc** **1800 Broadway St, Suite 2, Redwood City, CA 94063, United States**
Standard	:	**FCC 47 CFR Part 15.255**

The product was received on Apr. 19, 2024 and testing was performed from Apr. 22, 2024 to May 14, 2024. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures ANSI C63.10-2020 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.)

Table of Contents

History of this test report **3**

Summary of Test Result **4**

1 General Description **5**

1.1 Feature of Equipment Under Test 5
1.2 Modification of EUT 5
1.3 Testing Location 5
1.4 Applied Standards 5

2 Test Configuration of Equipment Under Test **6**

2.1 Test Mode 6
2.2 Connection Diagram of Test System 7
2.3 Support Unit used in test configuration and system 8
2.4 Far Field Condition for Frequency above 18GHz 8

3 Radiated Test Items **9**

3.1 Measuring Instruments 9
3.2 Test Setup 9
3.3 Test Result of Radiated Test 10
3.4 Duty Cycle 11
3.5 Emission Bandwidth 13
3.6 EIRP Power Measurement 17
3.7 Transmit Spurious Emission 19
3.8 Frequency Stability 50

4 AC conducted Emission Measurement **51**

4.1 Limit of AC Conducted Emission 51
4.2 Measuring Instruments 51
4.3 Test Procedures 51
4.4 Test Setup 52
4.5 Test Result of AC Conducted Emission 52

5 List of Measuring Equipment **53**

6 Measurement Uncertainty **56**

Appendix A. AC Conducted Emission Test Result

Appendix B. Setup Photographs

History of this test report

Report No.	Version	Description	Issue Date
FR432213	01	Initial issue of report	Jun. 12, 2024
FR432213	02	Revise Section 3.4 ~ 3.7 This report is an updated version, replacing the report issued on Jun. 12, 2024.	Jun. 19, 2024

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Limit	Result (PASS/FAIL)
3.4	§15.255(c)(2)(iii)(A)	Duty Cycle	25.5 ms off time per 33 ms	Pass
3.5	§15.215(c) §15.255(c)(2)(iii)	Emission Bandwidth	20dB bandwidth Within 57 ~ 64GHz	Pass
3.6	§15.255(c)(2)(iii)(A)	Peak EIRP Power	< 14dBm	Pass
3.7	§15.255(d)	Transmitter Spurious Emissions	Below 40GHz refer to 15.209 Above 40GHz: 90 pW/cm² @ 3 m	Pass
3.8	§15.255(f)	Frequency Stability for Temperature & Voltage	Within 57 ~ 64GHz	Pass
4	§15.207	AC Power Conducted Emission	§15.207	Pass

Conformity Assessment Condition:

1. 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: Alan Liu

Report Producer: Lucy Wu

1 General Description

1.1 Feature of Equipment Under Test

Product Feature
General Specs 60GHz **Antenna Type** 60GHz: Antenna in Chip

Remark:

1. The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.
2. All measurements were performed radiated and therefore additional antenna gain documentation is not required.

1.2 Modification of EUT

No modifications are made to the EUT during all test items.

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.**
	03CH11-HY, 03CH18-HY, CO07-HY

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

FCC designation No.: TW3786

1.4 Applied Standards

- FCC 47 CFR Part 2, 15.255
- KDB 364244 D01
- ANSI C63.10-2020

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

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.

For transmitter spurious emissions

Test Configuration		
Mode 1	**60GHz FMCW mode**	**57.1 - 63.9GHz**
Mode 2	**60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)**	**57.1 - 63.9GHz**

For EIRP/99% OBW/6dB BW/20dB BW/DT/ Frequency Stability

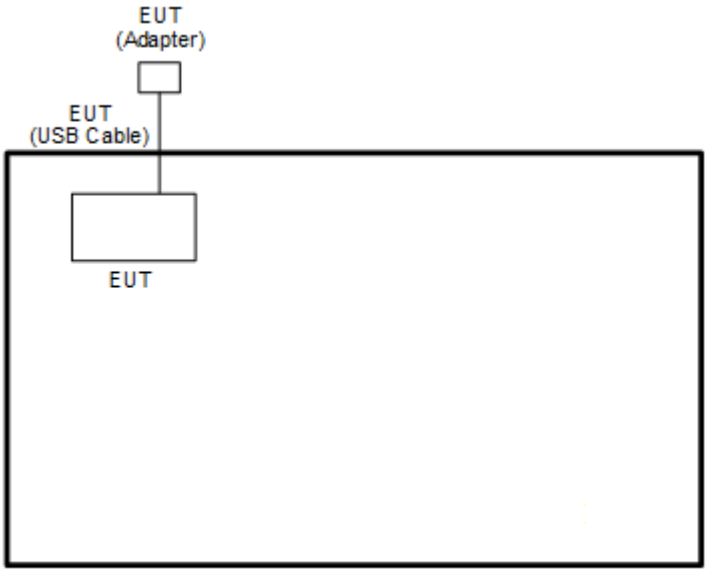
Test Configuration		
Mode 1	**60GHz FMCW mode**	**57.1 - 63.9GHz**

Note: The FMCW is used during test.

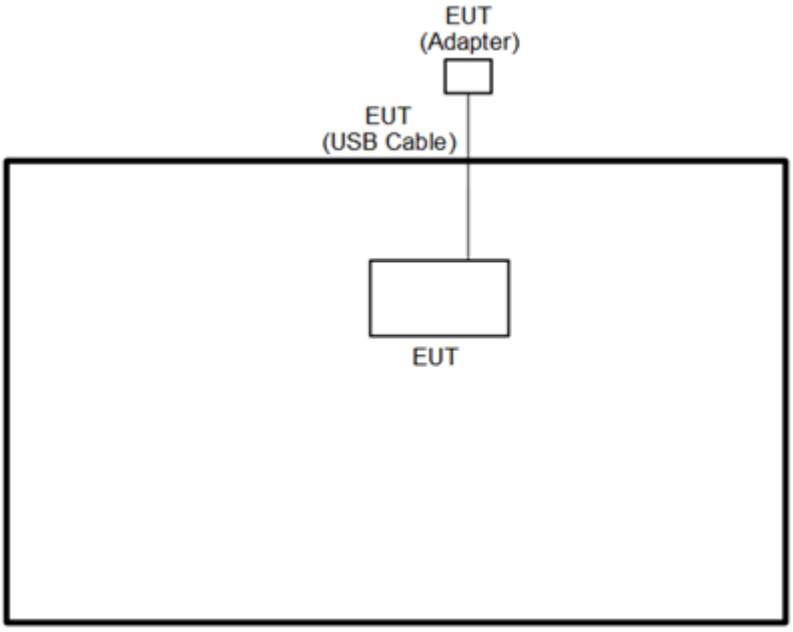
Test Cases	
AC Conducted Emission	Mode 1 : 60GHz Tx + Adapter

2.2 Connection Diagram of Test System

<AC Conducted Emission Mode>



<60GHz Tx Mode>



2.3 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Dell	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Notebook	HP	15s-du3004TX	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.4 Far Field Condition for Frequency above 18GHz

Horn Antenna	Frequency (GHz)	Antenna Dimension A (mm)	Wavelength (λ) (m)	Far field R (m) >= $2A^2/\lambda$	Measurement Distance (D) (m)
BBHA 9170	18	60	0.0167	0.43	1
	40	60	0.0075	0.96	
QWH-UPRR00	40	48	0.0075	0.61	0.87
	57	48	0.0053	0.87	
QWH-VPRR00	57	38	0.0053	0.54	0.62
	65	38	0.0046	0.62	
QWH-EPRR00	60	31	0.0050	0.38	0.6
	90	31	0.0033	0.6	
QWH-FPRR00	90	21	0.0033	0.26	0.43
	140	21	0.0021	0.42	
QWH-GPRR00	140	14	0.0021	0.18	0.27
	200	14	0.0015	0.26	

Note: The measurement distance may be far than the measurement distance above.

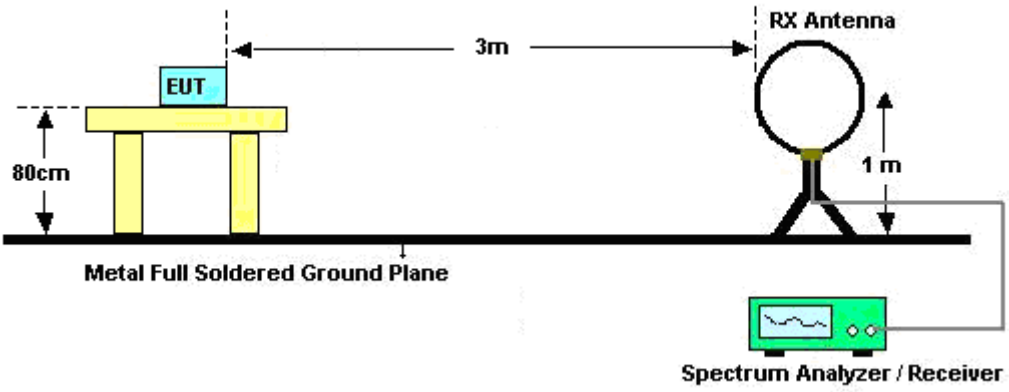
3 Radiated Test Items

3.1 Measuring Instruments

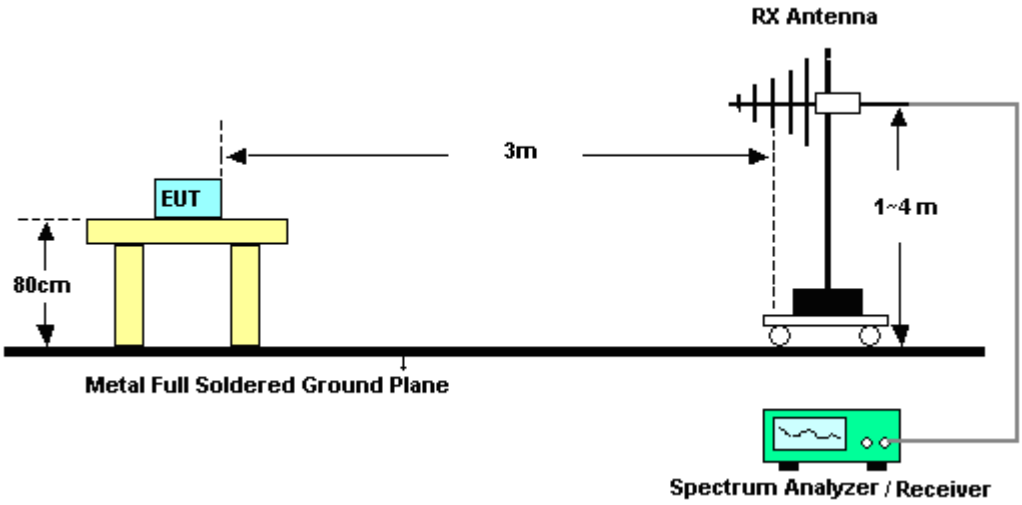
See list of measuring instruments of this test report.

3.2 Test Setup

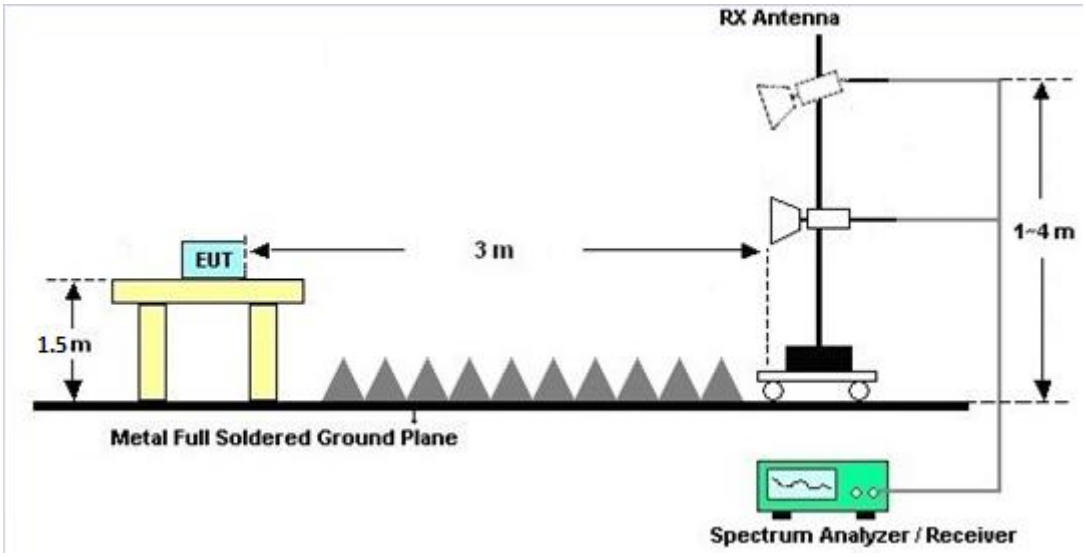
For radiated emissions from 9kHz to 30MHz



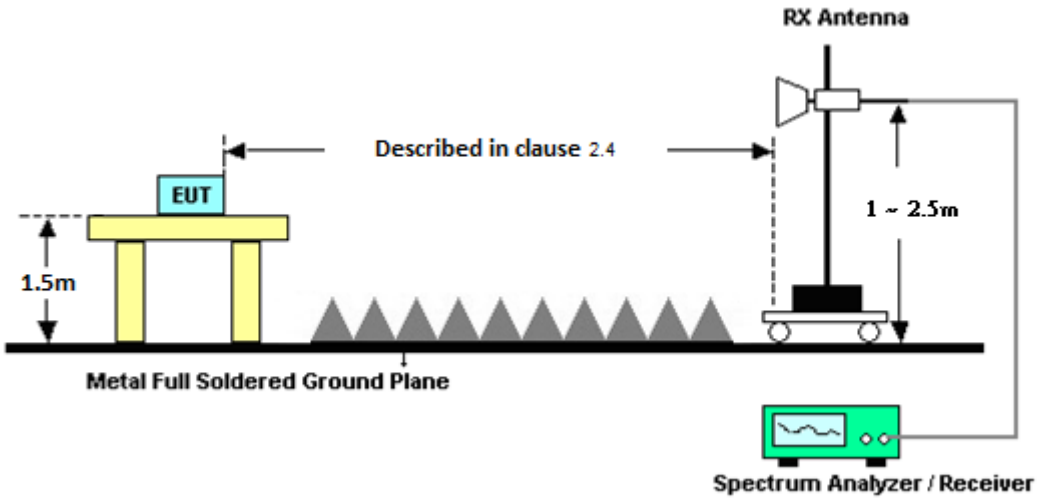
For radiated emissions from 30MHz to 1GHz



For radiated emissions 1GHz to 18GHz



For radiated emissions above 18GHz



3.3 Test Result of Radiated Test

Please refer to Clause 3.6.

3.4 Duty Cycle

3.4.1 Limit of Duty Cycle Measurement

Per Part 15.255(c)(2)(iii)(A) 57.0–64.0 GHz:

The peak EIRP shall not exceed 14 dBm, and the sum of continuous transmitter off-times of at least two milliseconds shall equal at least 25.5 milliseconds within any contiguous interval of 33 milliseconds, except as specific in paragraph (c)(2)(iii)(B) of this section.

3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2020 Section 9.9.
2. Set the maximum power setting and enable the EUT to FMCW mode.
3. The EUT is placed on a turntable with 1.6 meter respectively above ground.
4. The EUT is set 0.62 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
5. Use 50-75 GHz receiver antenna, pre-amp and digital storage oscilloscope (DSO).
6. The EUT is arranged to its worst case and then tune the antenna tower and turntable (from 0 degree to 360 degrees) to find the maximum reading.
7. Digital storage oscilloscope (DSO) adjust the length of time appropriately and confirm burst period, chirp width and chirp numbers.

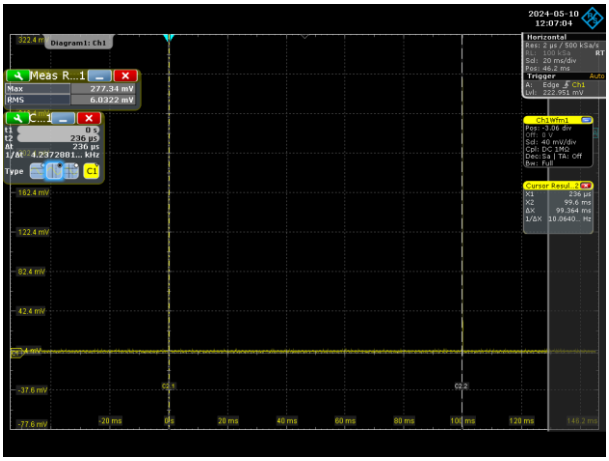
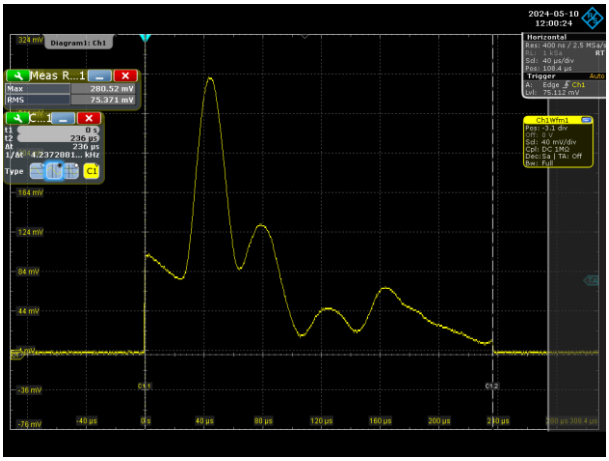
3.4.4 Test Results

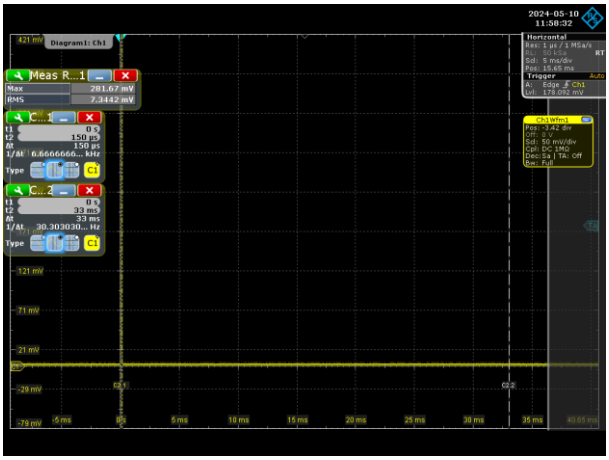
Chirp Width	Chirp numbers per 33 ms	On Time per 33 ms	Off Time per 33 ms	limit	Result
236µs	1	0.236ms	32.764ms	> 25.5ms	Pass

Note:

1. On time per 33ms = Chirp numbers (1) x Chirp Width (236µs)
2. Off time per 33ms = 33ms - On time per 33ms.

3.4.5 Test Plot

Burst Period	Chirp Width
	

Chirp Numbers: 1	-
	N/A

3.5 Emission Bandwidth

3.5.1 Limit of Emission Bandwidth Measurement

99% Occupied Bandwidth and 6dB Bandwidth are for reporting only.

Limit for 20 dB Bandwidth: Per Part 15.215(c), the device shall operate in the 57 - 64 GHz band.

The emission bandwidth (EBW) is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least the specified amount below the maximum level of the modulated carrier.

3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

1. The testing follows ANSI C63.10-2020 Section 9.3 and 9.4.
2. Set the maximum power setting and enable the EUT to FMCW mode.
3. The EUT is placed on a turntable with 1.6 meter respectively above ground.
4. The EUT is set 0.62 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
5. Use 50-75 GHz receiver antenna, mixer and spectrum analyzer.
6. The EUT is arranged to its worst case and then tune the antenna tower and turntable (from 0 degree to 360 degrees) to find the maximum reading.
7. For 20dB and 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and Video bandwidth (VBW) is set 3MHz.
8. For 6dB Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 100kHz and Video bandwidth (VBW) is set 300kHz
9. Measure and record the results in the test report.

3.5.4 Test Results

Temperature	20~25℃	Relative Humidity	50~60%
Test Engineer	Eric Jeng and Yu Wang		

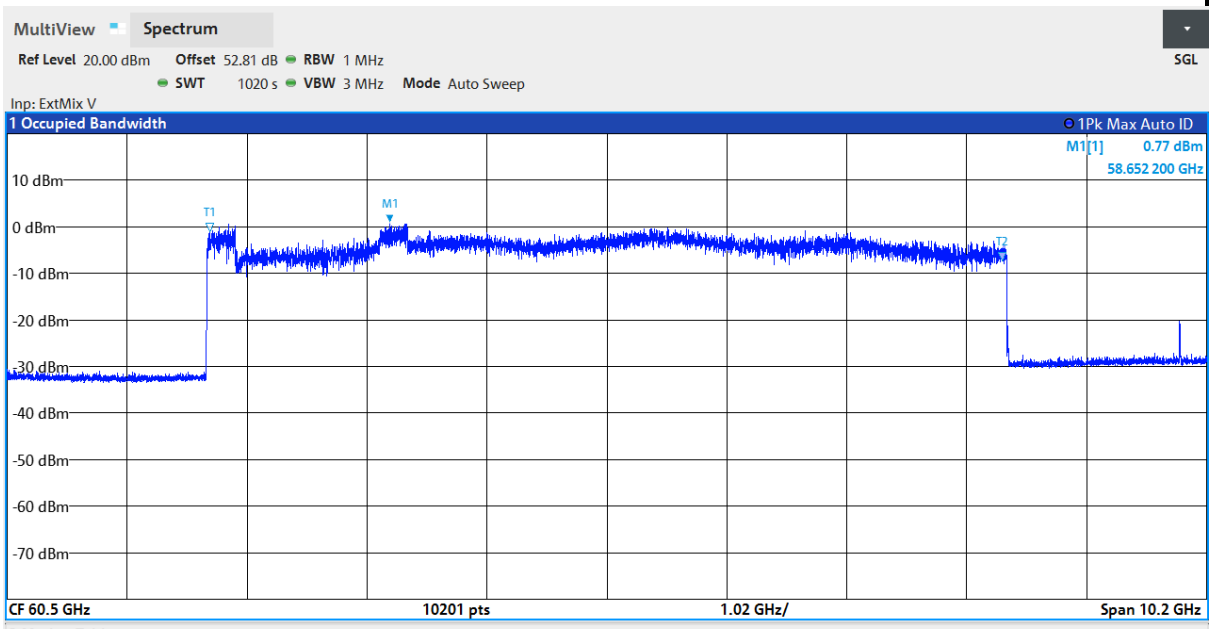
99% Occupied Bandwidth (GHz)	Limit (GHz)
6.7330	Report Only

6dB Bandwidth (GHz)	Limit (GHz)
6.7973	Report Only

20dB Bandwidth Measurement				
Bandwidth (GHz)	Low Frequency (GHz)	High Frequency (GHz)	Limit	Result
6.8053	57.0932	63.8985	Within 57 ~ 64GHz	Pass

3.5.5 Test Plots

99% Occupied Bandwidth

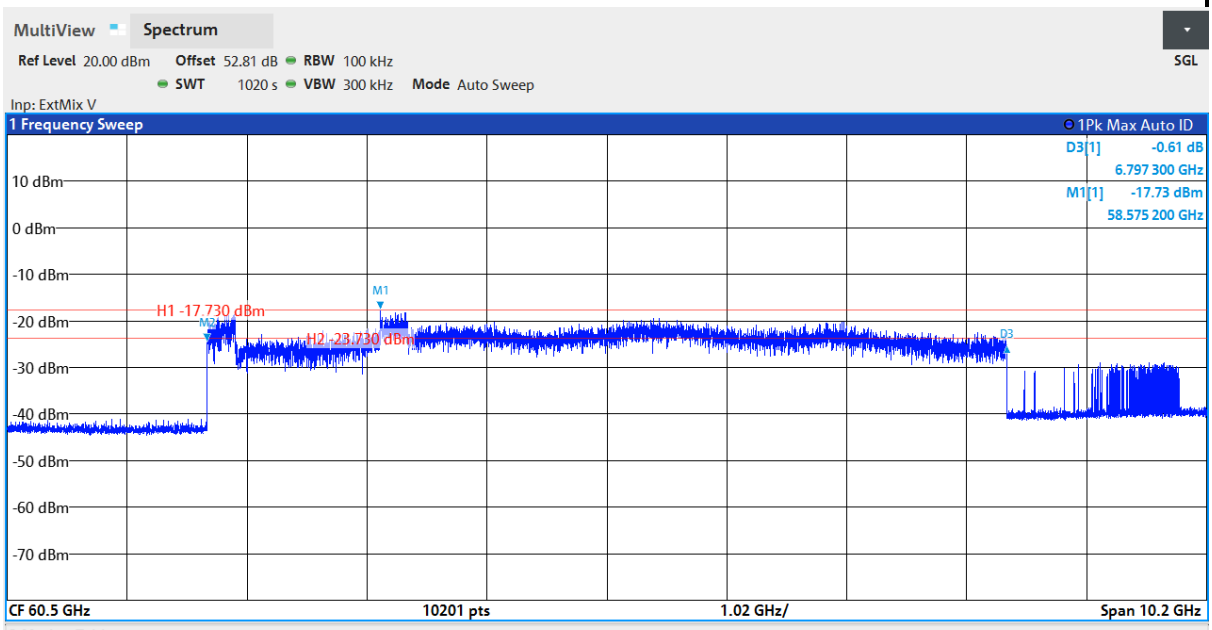


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	58.652 2 GHz	0.77 dBm	Occ Bw	6.732 984 39 GHz
T1		1	57.126 061 GHz	-1.00 dBm	Occ Bw Centroid	60.492 553 06 GHz
T2		1	63.859 045 GHz	-7.33 dBm	Occ Bw Freq Offset	-7.446 939 746 MHz

Ready 2024-05-10 23:06:14

6dB bandwidth

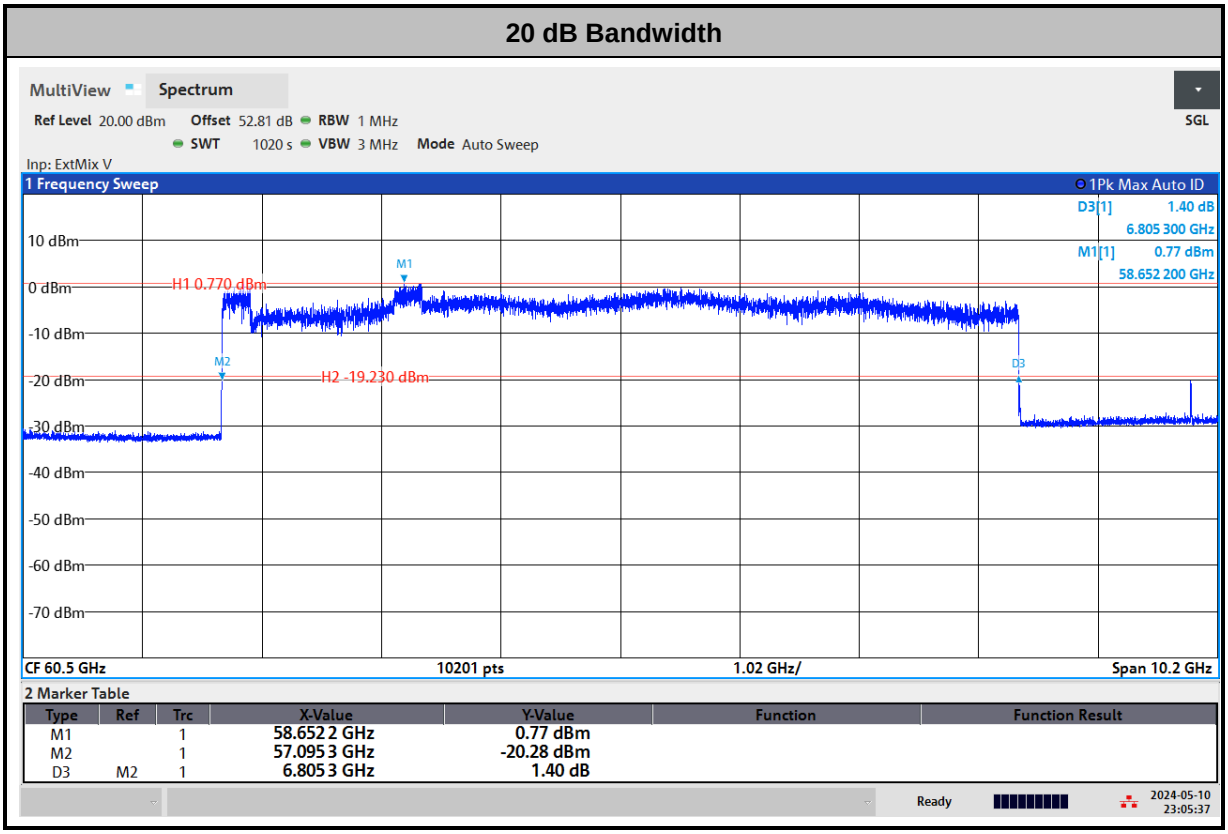


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	58.575 2 GHz	-17.73 dBm		
M2		1	57.101 3 GHz	-24.56 dBm		
D3	M2	1	6.797 3 GHz	-0.61 dB		

Ready 2024-05-10 23:45:27

20 dB Bandwidth



3.6 EIRP Power Measurement

3.6.1 Limit of EIRP Power Measurement

Regulation	Product Type	Peak EIRP Power (dBm)
FCC 15.255(c)(2)(iii)(A)	Field disturbance sensors	14

3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

3.6.3 Test Procedures

1. The testing follows ANSI C63.10-2020 Section 9.8.
2. Set the maximum power setting and enable the EUT to FMCW mode.
3. The EUT is placed on a turntable with 1.6 meter respectively above ground.
4. The EUT is set 0.62 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
5. Use 50-75 GHz receiver antenna, mixer and spectrum analyzer.
6. The EUT is arranged to its worst case and then tune the antenna tower and turntable (from 0 degree to 360 degrees) to find the maximum reading.
7. The spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and Video bandwidth (VBW) is set 3MHz.
8. Use mark Peak function to check result.
9. Measure and record the results in the test report.

3.6.4 Test Results

Temperature		20~25℃	Relative Humidity	50~60%	
Test Engineer		Eric Jeng and Yu Wang			
EIRP Power Measurement					
Frequency (GHz)	Measure Dist. (m)	Measure Ant Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm) Peak	Result
60.5	0.62	22.6	0.77	14	PASS

Note:

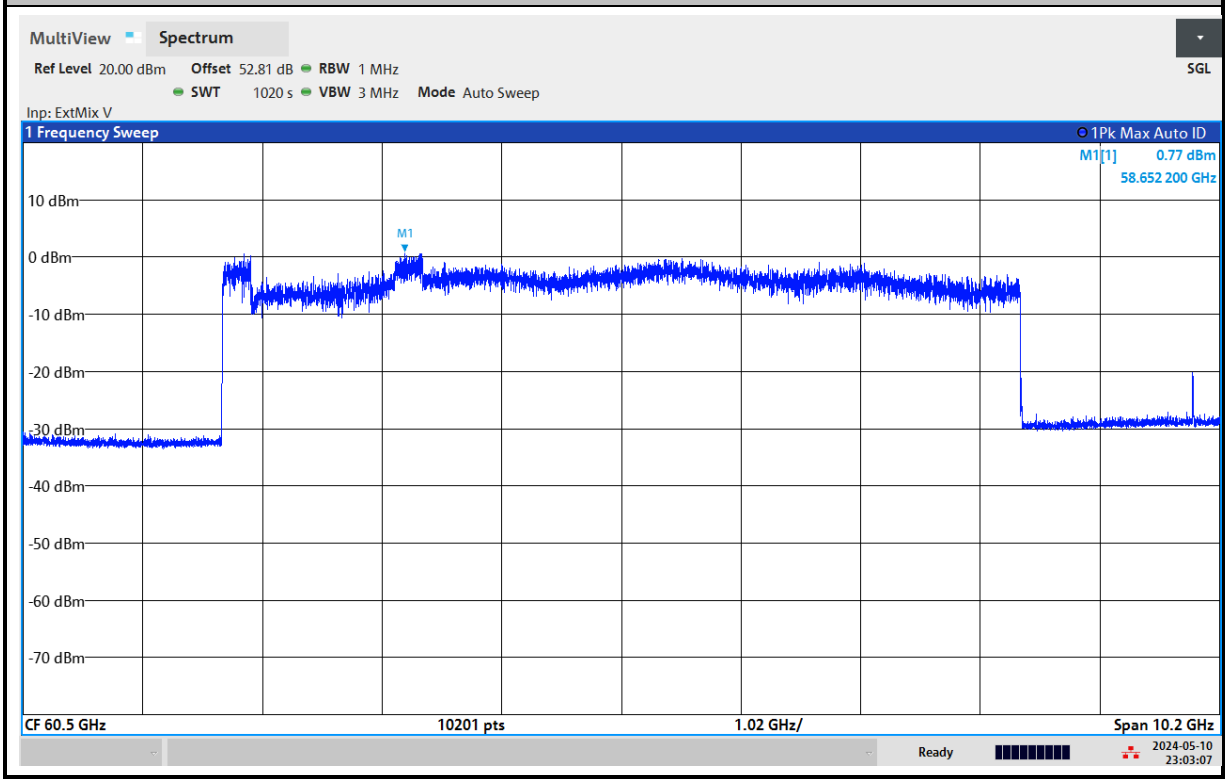
Total path loss = Air loss - Antenna Factor (dB) + Cable loss(dB) + desensitization correction factor(See section 3.7.5)

Ex:

Total path loss = 63.92 - 22.6 + 0.43 + 11.059 = 52.81

3.6.5 Test Plots

Test data



3.7 Transmit Spurious Emission

3.7.1 Limit of Radiated Spurious Emission

Frequency Range	Limit
Below 40GHz	Follow 15.209
Above 40GHz	90 pW/cm^2 @ 3m (equivalent EIRP 102µW, -10dBm)

Note 1: For the applicable limit, see FCC 15.255 (d)

Note 2: Spurious emissions shall not exceed the level of fundamental emission.

Note 3: Per Part 15.215(c), the provisions in Part 15.35(b) and (c) that require emissions to be averaged over a 100 millisecond period and that limits the peak power to 20 dB above the average limit do not apply to devices operating under paragraphs Part 15.255(c)(2) and (3) of this section.

3.7.2 Measuring Instruments

See list of measuring equipment of this test report.

3.7.3 Test Procedures

The testing follows ANSI C63.10-2020 Section 9.10 and 9.11 and ANSI C63.10-2020 clause 4.1.5.2.8 and Annex L.

For above 40GHz emission:

EIRP = Prx –Grx + Free space loss = Prx – Grx + 20*log(4π d/ λ) + Path Loss

Which

Prx = Read Level

Grx = Rx Antenna Gain

A distance factor is offset and formula is 20*log(D1/D2)

Which

D1 = Specification distance = 3m

D2 = Measurement distance

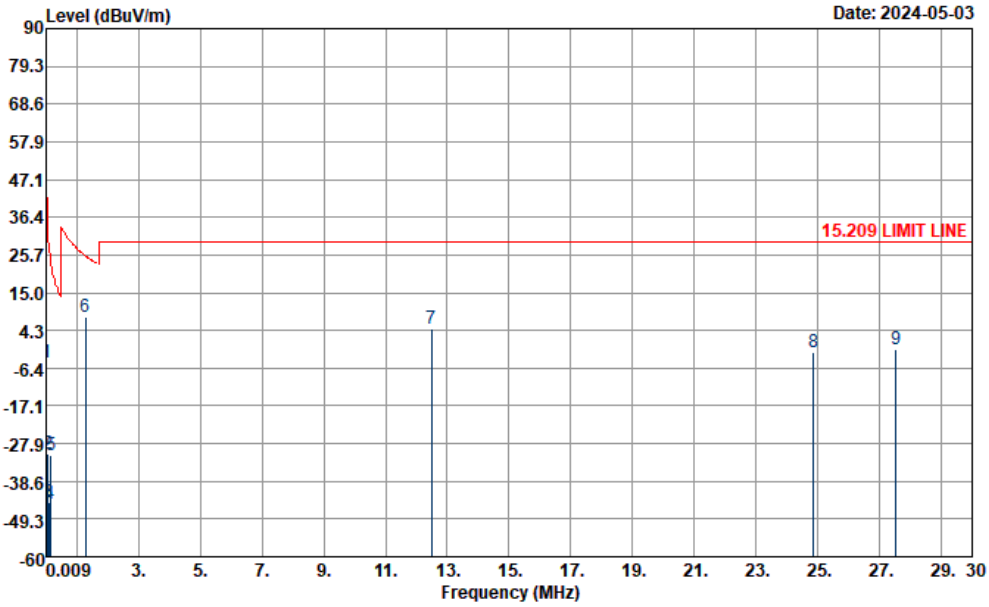
Power Density (W/m^2) = 10^[(EIRP-30)/10] / 4π d

Power Density (pW/cm^2) = Power Density (W/m^2) * 10^(-8)

3.7.4 Test Result

<Below 30MHz>

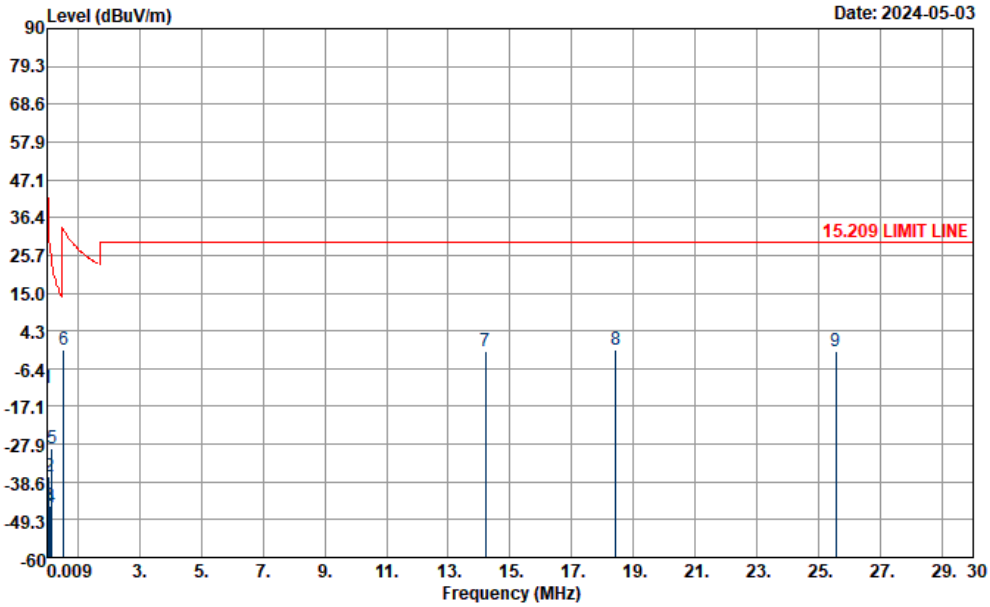
Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	9KHz to 30MHz	**Test Polarization**	Horizontal
Test Configuration	Mode 1: 60GHz FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Cable Loss (dB) + Distance extrapolation factor (dB). 2. Distance extrapolation factor (dB) = 40 log (specific distance / test distance)		



Site : 03CH11-HY
Condition : 15.209 LIMIT LINE 3m LOOP_100488_230912 HORIZONTAL
: .
Detector : Peak
Porject : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Distance extrapolation Factor (dB)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	0.0192	-5.01	-80	-46.95	41.94	55.62	19.31	0.06	-	-	Average
2	0.06654	-30.59	-80	-61.73	31.14	31.14	18.2	0.07	-	-	Average
3	0.09586	-44.41	-80	-72.38	27.97	17.46	18.06	0.07	-	-	QP
4	0.11644	-44.76	-80	-71.04	26.28	17	18.17	0.07	-	-	Average
5	0.15442	-31.03	-80	-54.86	23.83	30.58	18.32	0.07	-	-	Average
6	1.279	7.9	-40	-17.57	25.47	29.16	18.67	0.07	-	-	QP
7	12.496	4.74	-40	-24.76	29.5	23.82	20.8	0.12	-	-	QP
8	24.856	-1.88	-40	-31.38	29.5	15.28	22.74	0.1	-	-	QP
9	27.525	-1.21	-40	-30.71	29.5	15.83	22.8	0.16	-	-	QP

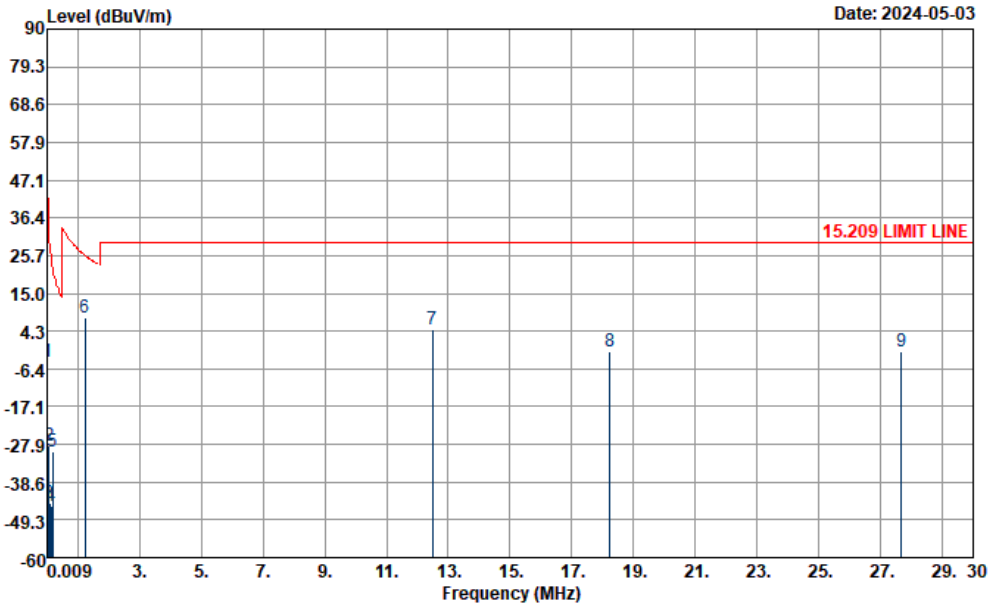
Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	9KHz to 30MHz	**Test Polarization**	Vertical
Test Configuration	Mode 1: 60GHz FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Cable Loss (dB) + Distance extrapolation factor (dB). 2. Distance extrapolation factor (dB) = 40 log (specific distance / test distance)		



Site : 03CH11-HY
Condition : 15.209 LIMIT LINE 3m LOOP_100488_230912 VERTICAL
: .
Detector : Peak
Porject : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Distance extrapolation Factor (dB)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	0.0192	-12.14	-80	-54.08	41.94	48.49	19.31	0.06	-	-	Average
2	0.06639	-36.87	-80	-68.03	31.16	24.87	18.19	0.07	-	-	Average
3	0.10192	-45.37	-80	-72.81	27.44	16.45	18.11	0.07	-	-	QP
4	0.11392	-45.62	-80	-72.09	26.47	16.15	18.16	0.07	-	-	Average
5	0.16054	-29.25	-80	-52.74	23.49	32.34	18.34	0.07	-	-	Average
6	0.55008	-1	-40	-33.8	32.8	20.09	18.85	0.06	-	-	QP
7	14.216	-1.65	-40	-31.15	29.5	17.59	20.62	0.14	-	-	QP
8	18.421	-0.93	-40	-30.43	29.5	17.22	21.74	0.11	-	-	QP
9	25.545	-1.44	-40	-30.94	29.5	15.77	22.68	0.11	-	-	QP

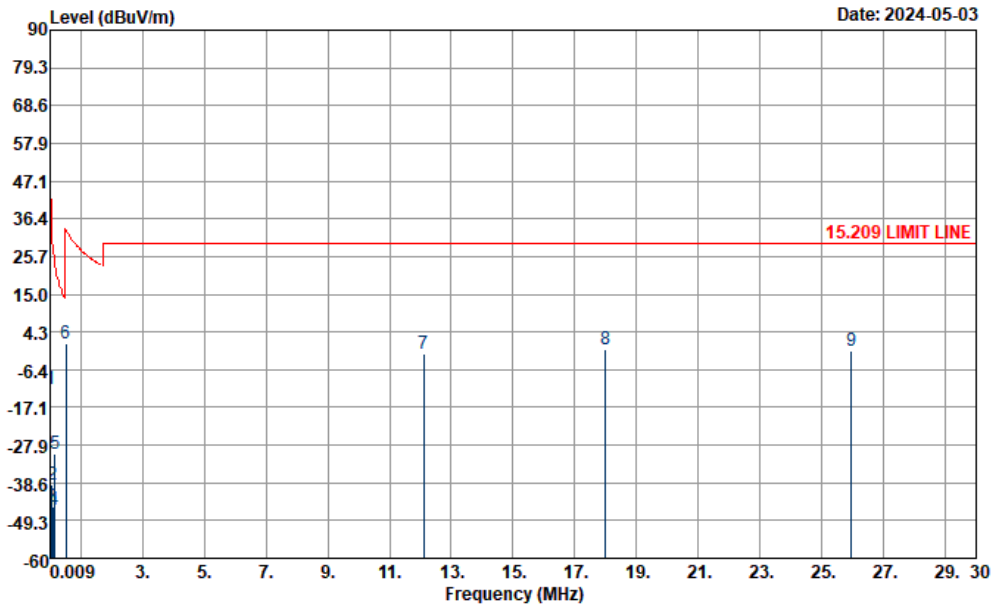
Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	9KHz to 30MHz	**Test Polarization**	Horizontal
Test Configuration	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Cable Loss (dB) + Distance extrapolation factor (dB). 2. Distance extrapolation factor (dB) = 40 log (specific distance / test distance)		



Site : 03CH11-HY
Condition : 15.209 LIMIT LINE 3m LOOP_100488_230912 HORIZONTAL
: .
Detector : Peak
Project : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Distance extrapolation Factor (dB)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	0.0192	-4.61	-80	-46.55	41.94	56.02	19.31	0.06	-	-	Average
2	0.06642	-28.33	-80	-59.49	31.16	33.41	18.19	0.07	-	-	Average
3	0.09578	-44.66	-80	-72.64	27.98	17.21	18.06	0.07	-	-	QP
4	0.135	-45.3	-80	-70.3	25	16.39	18.24	0.07	-	-	Average
5	0.17754	-29.91	-80	-52.53	22.62	31.61	18.41	0.07	-	-	Average
6	1.241	7.92	-40	-17.81	25.73	29.17	18.68	0.07	-	-	QP
7	12.496	4.97	-40	-24.53	29.5	24.05	20.8	0.12	-	-	QP
8	18.241	-1.49	-40	-30.99	29.5	16.68	21.72	0.11	-	-	QP
9	27.67	-1.39	-40	-30.89	29.5	15.65	22.8	0.16	-	-	QP

Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	9KHz to 30MHz	**Test Polarization**	Vertical
Test Configuration	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Cable Loss (dB) + Distance extrapolation factor (dB). 2. Distance extrapolation factor (dB) = 40 log (specific distance / test distance)		

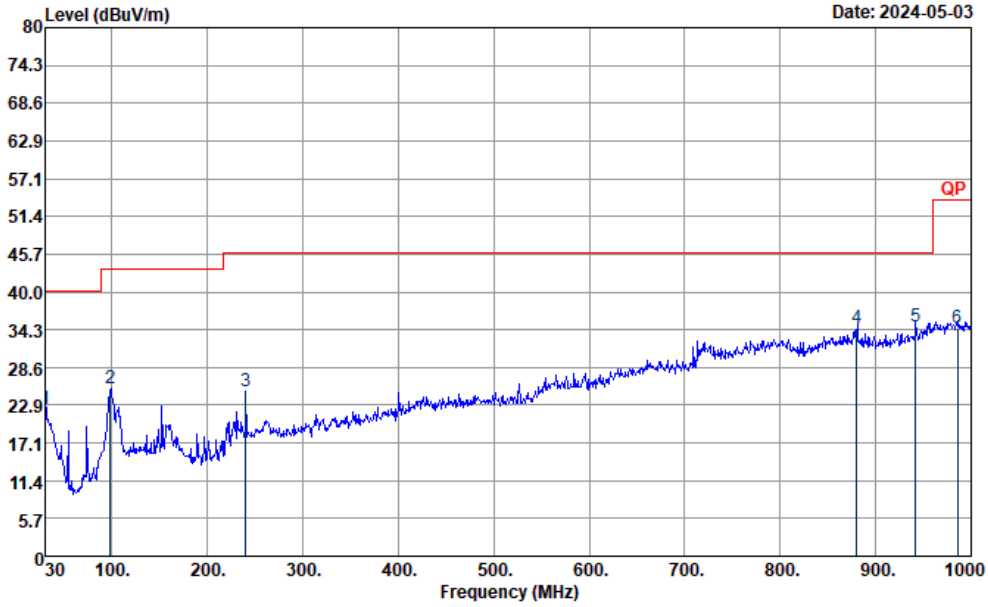


Site : 03CH11-HY
Condition : 15.209 LIMIT LINE 3m LOOP_100488_230912 VERTICAL
: .
Detector : Peak
Project : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Distance extrapolation Factor (dB)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	0.0192	-12.02	-80	-53.96	41.94	48.61	19.31	0.06	-	-	Average
2	0.06654	-38.98	-80	-70.12	31.14	22.75	18.2	0.07	-	-	Average
3	0.10278	-45.43	-80	-72.8	27.37	16.39	18.11	0.07	-	-	QP
4	0.11736	-46.1	-80	-72.31	26.21	15.66	18.17	0.07	-	-	Average
5	0.15544	-30.33	-80	-54.1	23.77	31.28	18.32	0.07	-	-	Average
6	0.51253	1.08	-40	-32.33	33.41	22.13	18.89	0.06	-	-	QP
7	12.096	-1.87	-40	-31.37	29.5	17.13	20.88	0.12	-	-	QP
8	18.007	-0.7	-40	-30.2	29.5	17.48	21.7	0.12	-	-	QP
9	25.96	-1.14	-40	-30.64	29.5	16.22	22.52	0.12	-	-	QP

<30MHz to 1GHz>

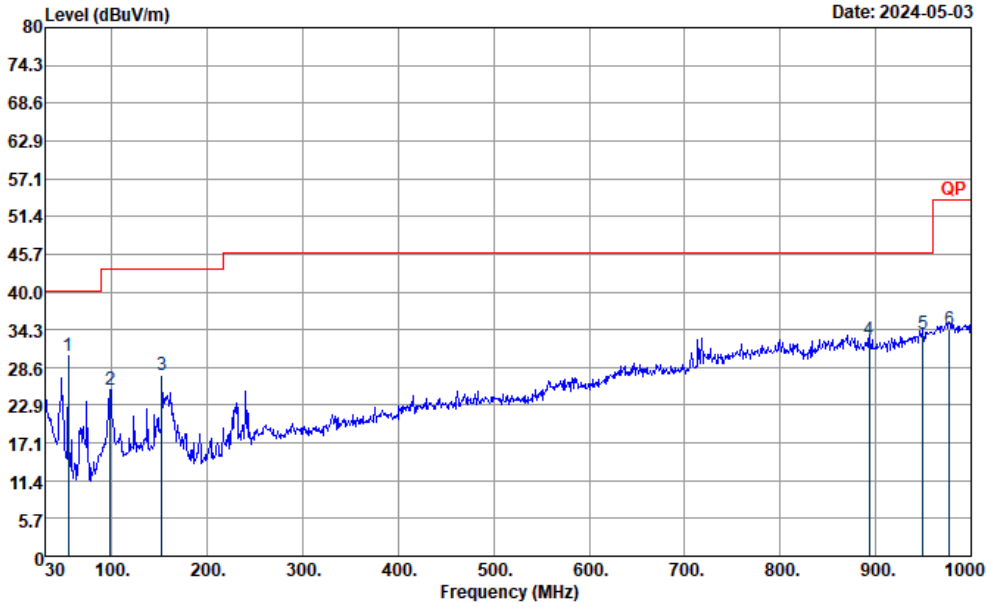
Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	30MHz to 1GHz	**Test Polarization**	Horizontal
Test Configuration	Mode 1: 60GHz FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) 3. The emission position marked as "-" means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.		



Site : 03CH11-HY
Condition : QP 3m 2_BILOG_35414_231007 HORIZONTAL
: RBW:120.000KHz VBW:300.000KHz SWT:0.500sec
: .
Detector : Peak
Porject : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	30.27	22.28	-17.72	40	30.16	23.91	0.67	32.46	-	-	Peak
2	98.31	25.48	-18.02	43.5	40.9	15.69	1.26	32.37	-	-	Peak
3	240.06	24.98	-21.02	46	38.07	17.02	2.09	32.2	-	-	Peak
4	880.3	34.47	-11.53	46	32.75	29	4.28	31.56	-	-	Peak
5	941.9	34.73	-11.27	46	31.24	30.06	4.51	31.08	-	-	Peak
6	986	34.49	-19.51	54	29.88	30.56	4.61	30.56	-	-	Peak

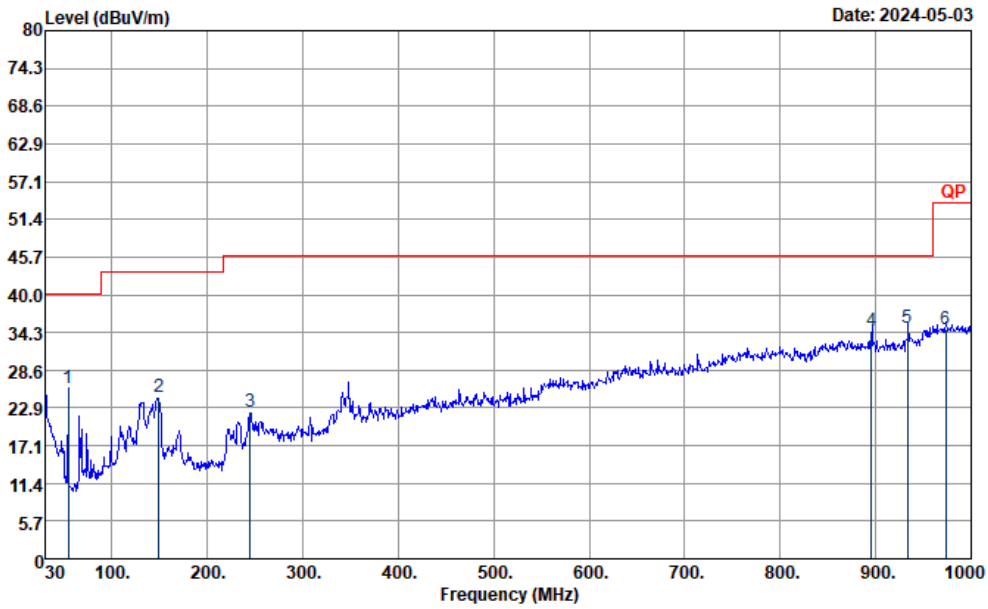
Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	30MHz to 1GHz	**Test Polarization**	Vertical
Test Configuration	Mode 1: 60GHz FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) 3. The emission position marked as "-" means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.		



Site : 03CH11-HY
Condition : QP 3m 2_BILOG_35414_231007 VERTICAL
: RBW:120.000KHz VBW:300.000KHz SWT:0.500sec
: .
Detector : Peak
Porject : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	54.03	30.38	-9.62	40	49.14	12.63	0.78	32.17	-	-	Peak
2	98.31	25.14	-18.36	43.5	40.56	15.69	1.26	32.37	-	-	Peak
3	152.04	27.33	-16.17	43.5	41.21	16.72	1.64	32.24	-	-	Peak
4	892.9	32.75	-13.25	46	31.01	28.93	4.33	31.52	-	-	Peak
5	949.6	33.69	-12.31	46	29.6	30.55	4.54	31	-	-	Peak
6	976.9	34.34	-19.66	54	29.44	30.98	4.59	30.67	-	-	Peak

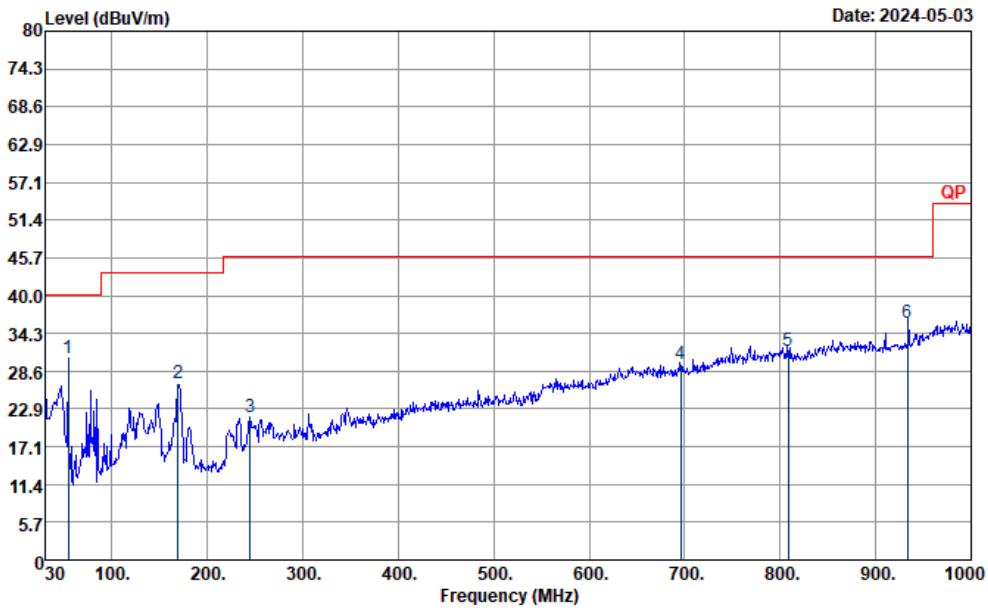
Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	30MHz to 1GHz	**Test Polarization**	Horizontal
Test Configuration	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.		



Site : 03CH11-HY
Condition : QP 3m 2_BILOG_35414_231007 HORIZONTAL
: RBW:120.000KHz VBW:300.000KHz SWT:0.500sec
: .
Detector : Peak
Project : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	54.03	25.76	-14.24	40	44.52	12.63	0.78	32.17	-	-	Peak
2	149.07	24.43	-19.07	43.5	38.25	16.83	1.61	32.26	-	-	Peak
3	244.92	22.18	-23.82	46	34.64	17.62	2.1	32.18	-	-	Peak
4	895.7	34.57	-11.43	46	32.82	28.91	4.35	31.51	-	-	Peak
5	933.5	34.97	-11.03	46	32	29.66	4.48	31.17	-	-	Peak
6	973.4	34.82	-19.18	54	29.87	31.07	4.59	30.71	-	-	Peak

Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	30MHz to 1GHz	**Test Polarization**	Vertical
Test Configuration	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.		

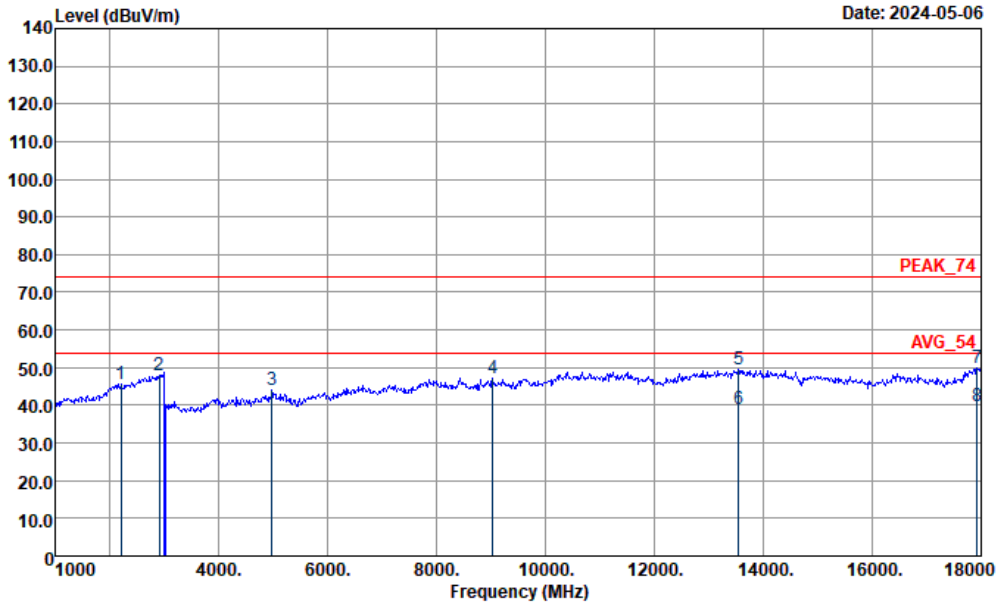


Site : 03CH11-HY
Condition : QP 3m 2_BILOG_35414_231007 VERTICAL
: RBW:120.000KHz VBW:300.000KHz SWT:0.500sec
: .
Detector : Peak
Project : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	54.03	30.46	-9.54	40	49.22	12.63	0.78	32.17	-	-	Peak
2	169.32	26.64	-16.86	43.5	41.55	15.45	1.72	32.08	-	-	Peak
3	244.38	21.56	-24.44	46	34.09	17.55	2.1	32.18	-	-	Peak
4	695.5	29.55	-16.45	46	31.03	26.51	3.74	31.73	-	-	Peak
5	808.2	31.66	-14.34	46	31.08	27.99	4.13	31.54	-	-	Peak
6	933.5	35.93	-10.07	46	32.96	29.66	4.48	31.17	-	-	Peak

<1GHz to 18GHz>

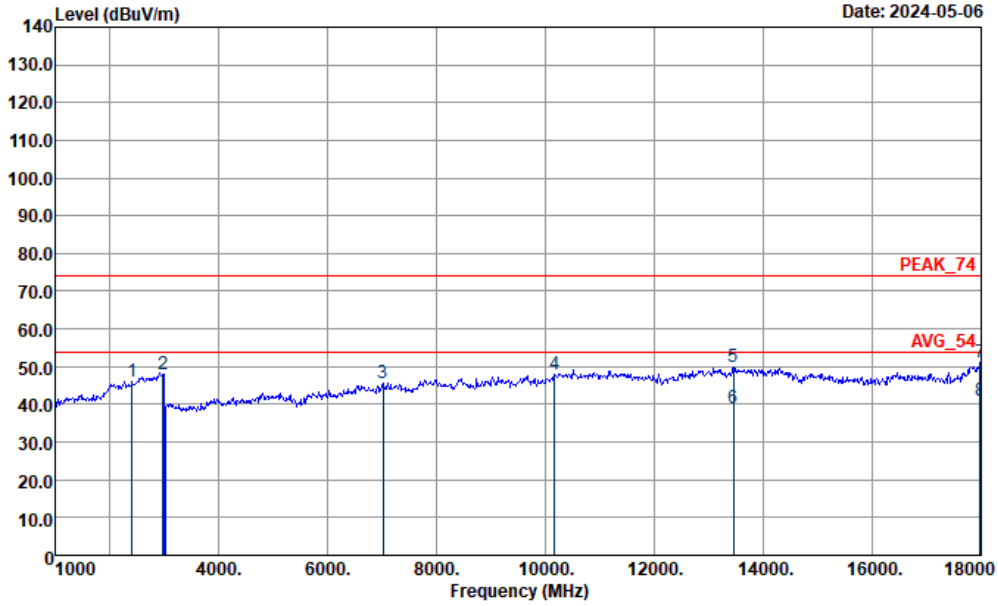
Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	1GHz to 18GHz	**Test Polarization**	Horizontal
Test Configuration	Mode 1: 60GHz FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Average Path Loss(dB) = Cable loss(dB) + Filter loss(dB) 3. Peak Path loss(dB) = Cable loss(dB) + Filter loss(dB) + desensitization correction factor(See section 3.7.5) 4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.		



Site : 03CH11-HY
Condition : PEAK_74 3m 9120D_01620_230817 HORIZONTAL
: .
Detector : Peak
Project : 432213

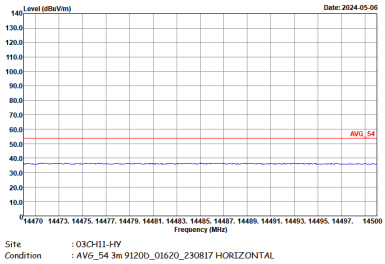
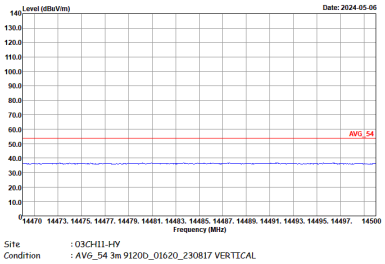
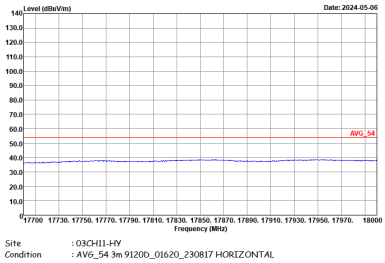
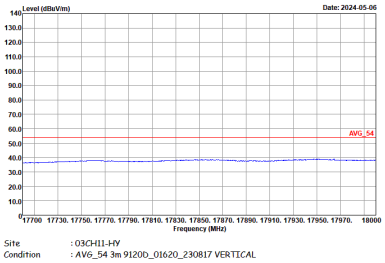
Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	2206	56.79	-17.21	74	45.34	27.2	17.70	33.45	-	-	Peak
2	2908	58.89	-15.11	74	44.53	29.06	18.62	33.32	-	-	Peak
3	4980	55.18	-18.82	74	57.06	33.12	22.86	57.86	-	-	Peak
4	9030	58.16	-15.84	74	51.27	37.9	27.24	58.25	-	-	Peak
5	13545	60.40	-13.60	74	51.6	40.48	30.87	62.55	100	120	Peak
6	13545	39.12	-14.88	54	41.38	40.48	19.81	62.55	100	120	Average
7	17925	61.06	-12.94	74	41.23	41.65	34.44	56.26	100	354	Peak
8	17925	39.90	-14.10	54	31.13	41.65	23.38	56.26	100	354	Average

Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	1GHz to 18GHz	**Test Polarization**	Vertical
Test Configuration	Mode 1: 60GHz FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) 3. Peak Path loss(dB) = Cable loss(dB) + Filter loss(dB) + desensitization correction factor(See section 3.7.5) 4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.		

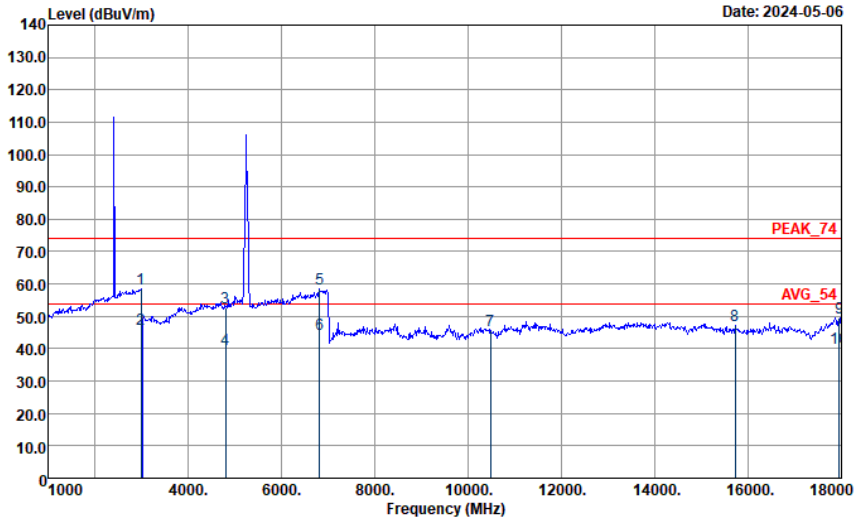


Site : 03CH11-HY
Condition : PEAK_74 3m 9120D_01620_230817 VERTICAL
: .
Detector : Peak
Project : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	2408	56.94	-17.06	74	44.91	27.5	17.86	33.33	-	-	Peak
2	2978	58.90	-15.10	74	43.92	29.58	18.73	33.33	-	-	Peak
3	7020	56.70	-17.30	74	53.55	35.98	25.73	58.56	-	-	Peak
4	10170	58.99	-15.01	74	51.68	38.64	28.46	59.79	-	-	Peak
5	13455	60.87	-13.13	74	52.19	40.3	30.86	62.48	100	41	Peak
6	13455	39.01	-14.99	54	41.39	40.3	19.80	62.48	100	41	Average
7	17985	62.11	-11.89	74	41.84	41.94	34.48	56.15	100	59	Peak
8	17985	41.12	-12.88	54	31.91	41.94	23.42	56.15	100	59	Average

	Mode 1: 60GHz FMCW mode	
	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg		

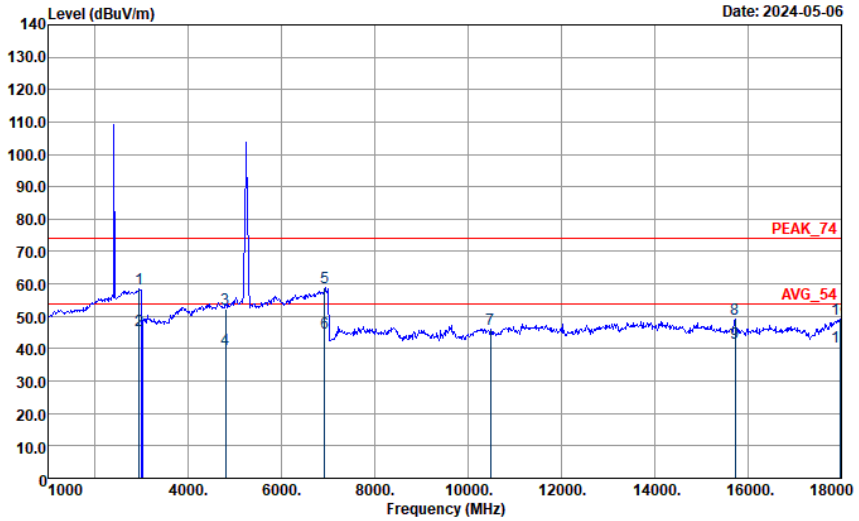
Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	1GHz to 18GHz	**Test Polarization**	Horizontal
Test Configuration	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Average Path Loss(dB) = Cable loss(dB) + Filter loss(dB) 3. Peak Path loss(dB) = Cable loss(dB) + Filter loss(dB) + desensitization correction factor(See section 3.7.5) 4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.		



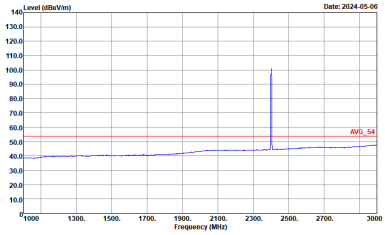
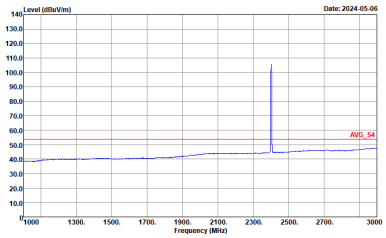
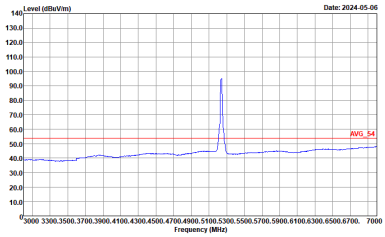
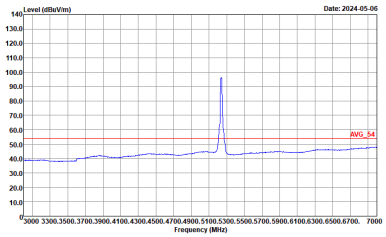
Site : 03CH11-HY
Condition : PEAK_74 3m 9120D_01620_220824 HORIZONTAL
: .
Detector : Peak
Project : 432213

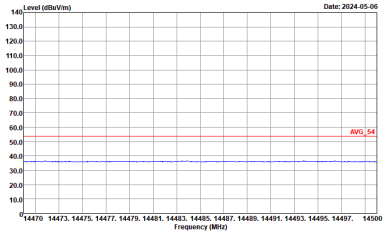
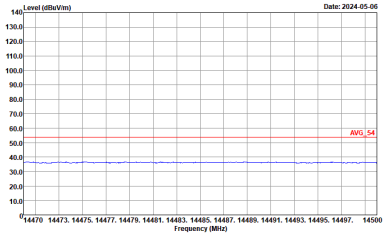
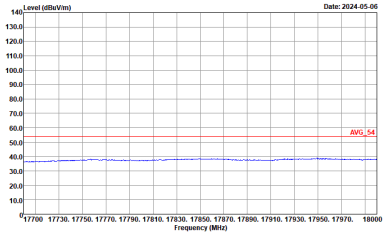
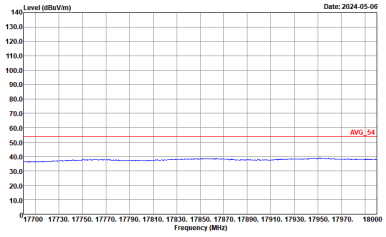
Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	2990	69.66	-4.34	74	44.36	29.6	29.03	33.33	100	326	Peak
2	2990	46.00	-8.00	54	31.76	29.6	17.97	33.33	100	326	Average
3	4804	63.82	-10.18	74	42.5	32.42	21.80	32.9	100	345	Peak
4	4804	39.82	-14.18	54	29.56	32.42	10.74	32.9	100	345	Average
5	6812	69.46	-4.54	74	42.69	35.88	24.35	33.46	100	23	Peak
6	6812	44.45	-9.55	54	28.74	35.88	13.29	33.46	100	23	Average
7	10480	56.50	-17.50	74	49.46	38.9	28.32	60.18	-	-	Peak
8	15720	58.11	-15.89	74	49.57	37.8	32.13	61.39	-	-	Peak
9	17956	60.53	-13.47	74	40.56	42.14	34.03	56.2	100	112	Peak
10	17956	40.19	-13.81	54	31.28	42.14	22.97	56.2	100	112	Average

Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	1GHz to 18GHz	**Test Polarization**	Vertical
Test Configuration	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) 3. Peak Path loss(dB) = Cable loss(dB) + Filter loss(dB) + desensitization correction factor(See section 3.7.5) 4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.		



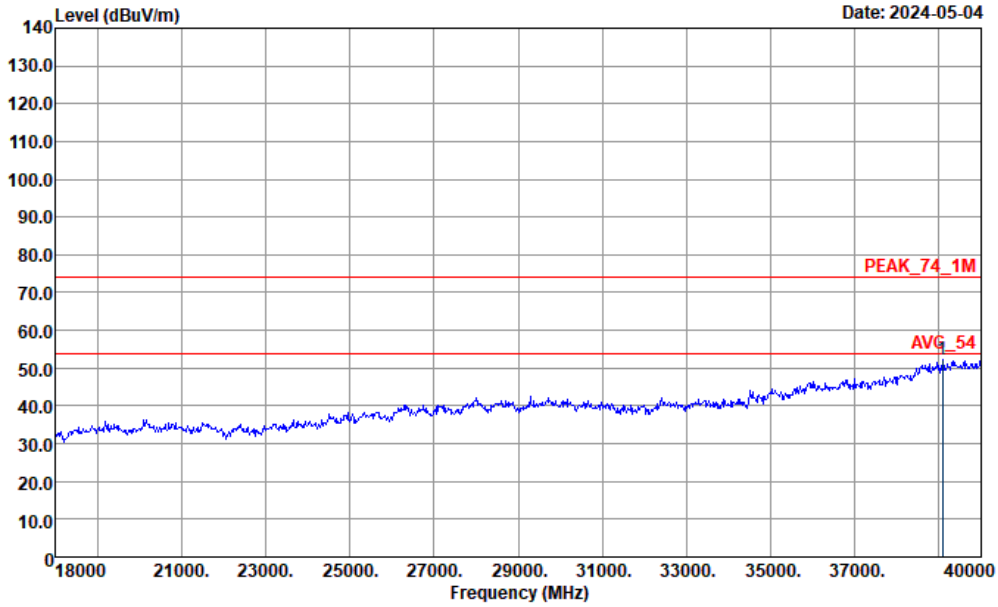
Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	2950	69.47	-4.53	74	44.44	29.4	28.95	33.32	100	61	Peak
2	2950	45.76	-8.24	54	31.79	29.4	17.89	33.32	100	61	Average
3	4804	63.23	-10.77	74	41.91	32.42	21.80	32.9	100	32	Peak
4	4804	39.78	-14.22	54	29.52	32.42	10.74	32.9	100	32	Average
5	6924	69.79	-4.21	74	43.09	35.8	24.43	33.53	100	140	Peak
6	6924	44.73	-9.27	54	29.09	35.8	13.37	33.53	100	140	Average
7	10480	57.03	-16.97	74	49.99	38.9	28.32	60.18	-	-	Peak
8	15720	60.33	-13.67	74	51.79	37.8	32.13	61.39	100	249	Peak
9	15720	41.89	-12.11	54	44.41	37.8	21.07	61.39	100	249	Average
10	17967	60.23	-13.77	74	40.18	42.2	34.03	56.18	100	346	Peak
11	17967	40.42	-13.58	54	31.43	42.2	22.97	56.18	100	346	Average

	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)	
	Horizontal	Vertical
1G ~3G Avg.		
3G ~7G Avg		

	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)	
	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg		

<18GHz to 40GHz>

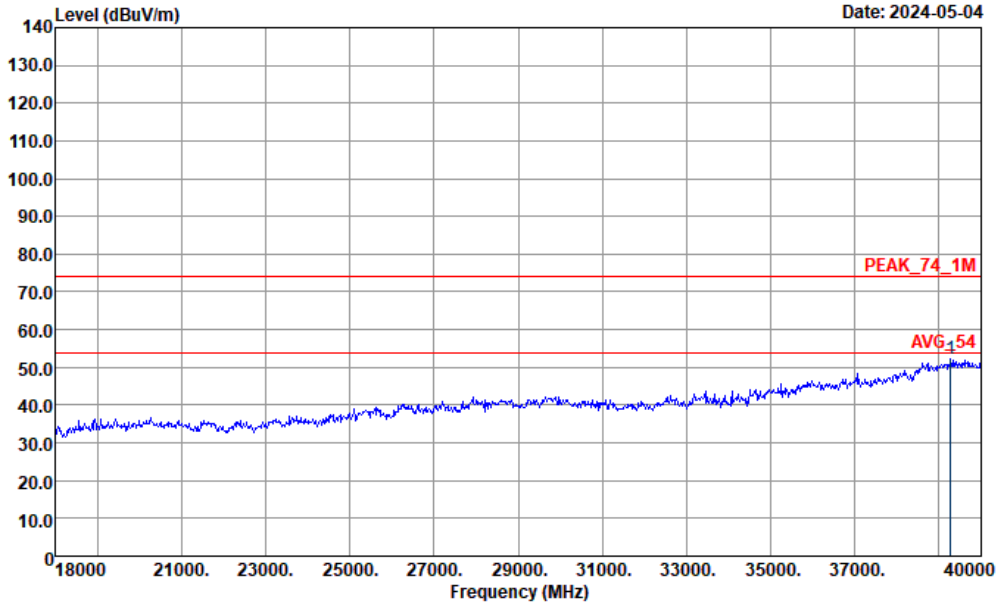
Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	1m
Test Range	18GHz to 40GHz	**Test Polarization**	Horizontal
Test Configuration	Mode 1: 60GHz FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Average Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Distance extrapolation factor (dB). 3. Peak Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Distance extrapolation factor (dB) + desensitization correction factor(See section 3.7.5) 4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.		



Site : 03CH11-HY
Condition : PEAK_74_1M 1m SHF_00993_231124 HORIZONTAL
: .
Detector : Peak
Project : 432213

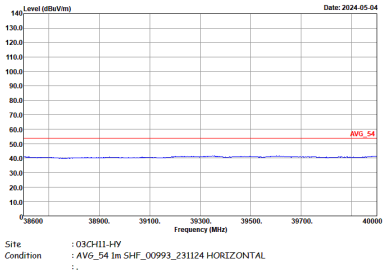
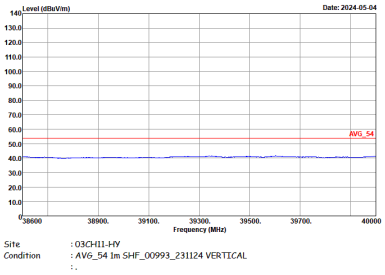
Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	39076	63.27	-10.73	74	39.73	44.26	36.03	56.75	-	-	Peak

Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	1m
Test Range	18GHz to 40GHz	**Test Polarization**	Vertical
Test Configuration	Mode 1: 60GHz FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Average Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Distance extrapolation factor (dB). 3. Peak Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Distance extrapolation factor (dB) + desensitization correction factor(See section 3.7.5) 4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.		

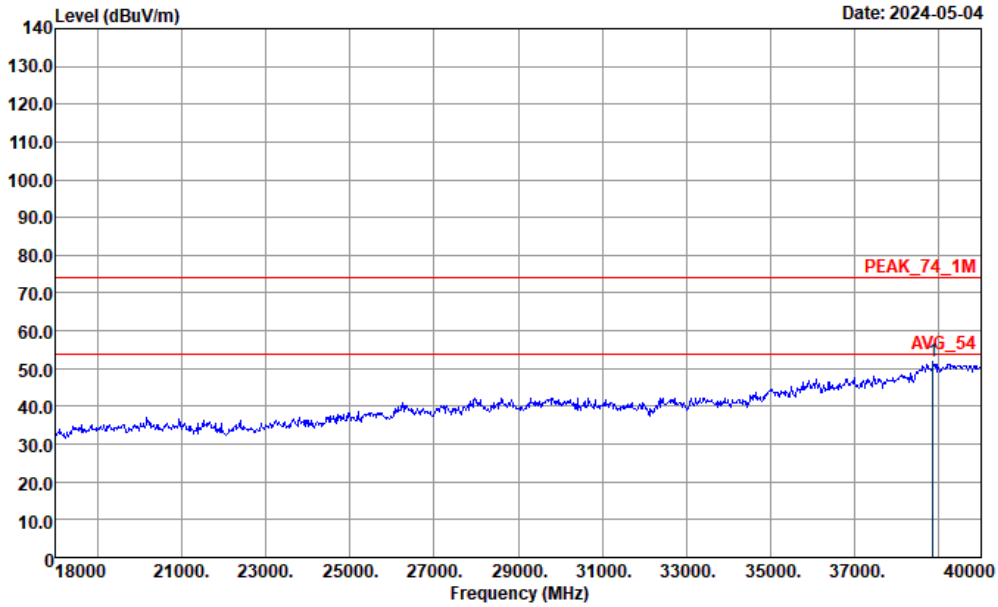


Site : 03CH11-HY
Condition : PEAK_74_1M 1m SHF_00993_231124 VERTICAL
: .
Detector : Peak
Project : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	39272	63.47	-10.53	74	39.28	44.87	35.96	56.64	-	-	Peak

	Mode 1: 60GHz FMCW mode	
	Horizontal	Vertical
38.6G ~40G Avg.		

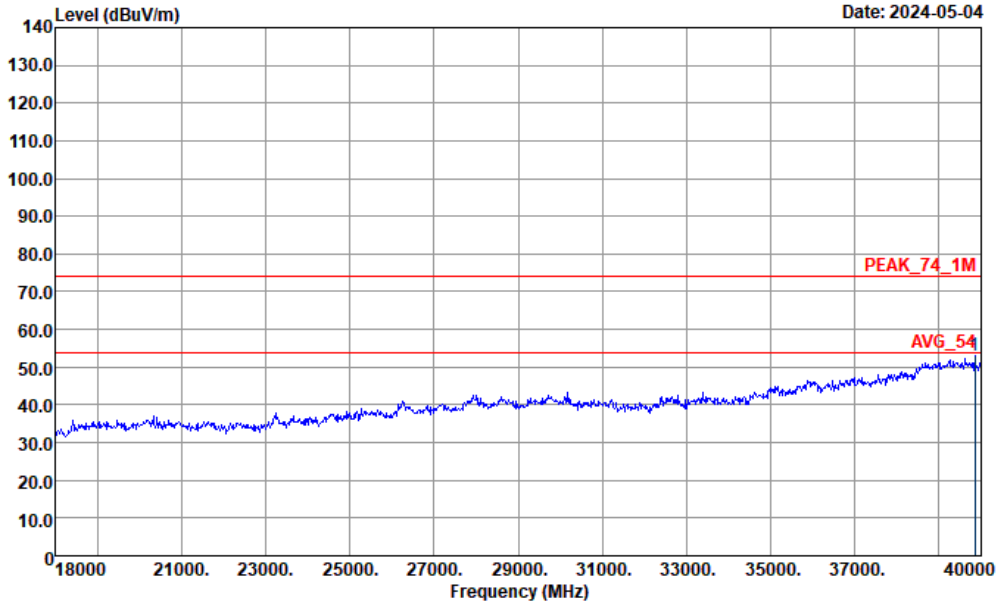
Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	1m
Test Range	18GHz to 40GHz	**Test Polarization**	Horizontal
Test Configuration	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Average Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Distance extrapolation factor (dB). 3. Peak Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Distance extrapolation factor (dB) + desensitization correction factor(See section 3.7.5) 4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.		



Site : 03CH11-HY
Condition : PEAK_74_1M 1m SHF_00993_231124 HORIZONTAL
: .
Detector : Peak
Project : 432213

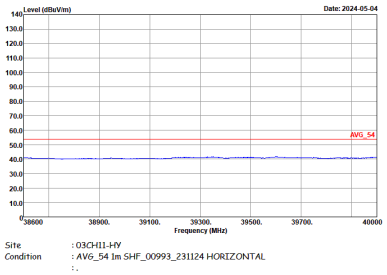
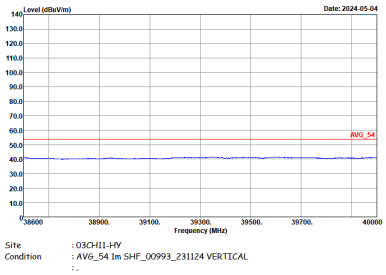
Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	38852	63.11	-10.89	74	40.51	43.59	35.90	56.89	-	-	Peak

Temperature	20.1 ~ 22.6℃	**Relative Humidity**	55.3 ~ 66.5%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	1m
Test Range	18GHz to 40GHz	**Test Polarization**	Vertical
Test Configuration	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna Factor (dB) + Path Loss(dB) - Preamp Factor (dB) 2. Average Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Distance extrapolation factor (dB). 3. Peak Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Distance extrapolation factor (dB) + desensitization correction factor(See section 3.7.5) 4. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.		



Site : 03CH11-HY
Condition : PEAK_74_1M 1m SHF_00993_231124 VERTICAL
: .
Detector : Peak
Project : 432213

Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	39846	63.94	-10.06	74	39.51	44.76	35.75	56.08	-	-	Peak

	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)	
	Horizontal	Vertical
38.6G ~40G Avg.		

<40GHz to 200GHz>

Temperature	20~25℃	**Relative Humidity**	50~60%
Test Engineer	Eric Jeng and Yu Wang	Test Range	40GHz to 200GHz
Test Configuration	Mode 1: 60GHz FMCW mode		

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
40 - 57	22.64	0.87	42.1074	-95.47
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-51.33	3	0.006509	90	PASS

Note: Path Loss = 0.43 dB; the calculate of λ using 57GHz as f.

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
71 - 90	22.4	0.6	89.6385	-82.83
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-37.71	3	0.149812	90	PASS

Note: Path Loss = 0.43 dB; the calculate of λ using 90GHz as f.

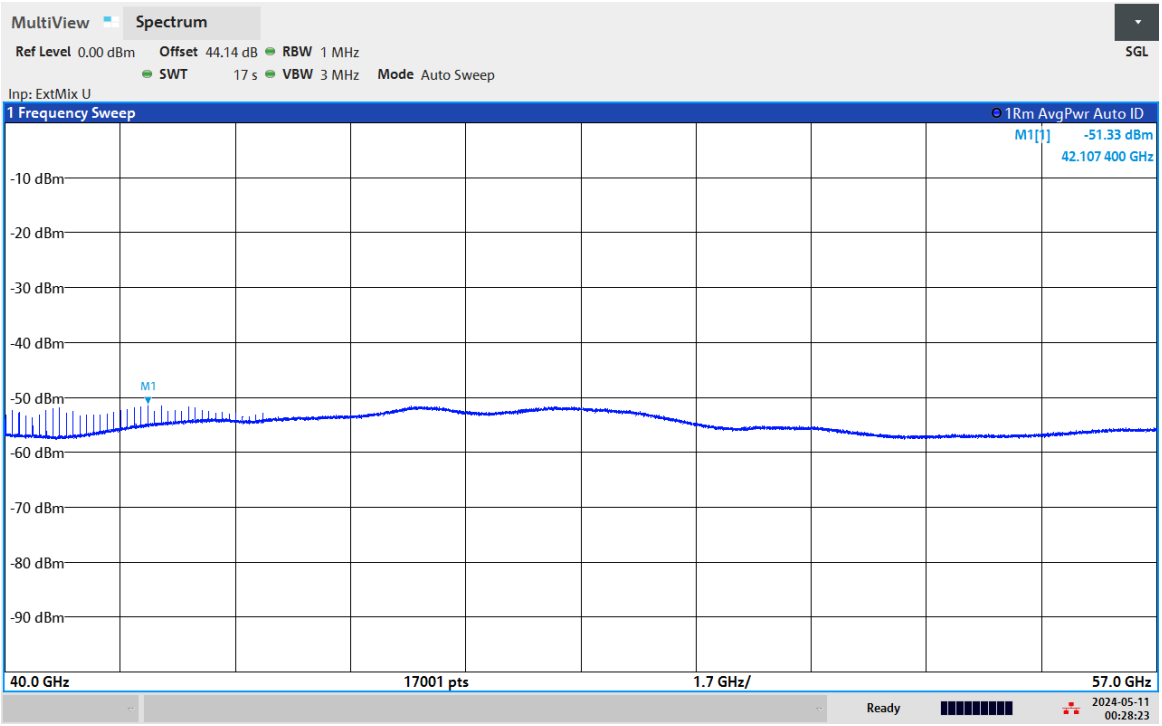
Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
90 - 140	22.4	0.43	90.7835	-71.37
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-25.31	3	2.603440	90	PASS

Note: Path Loss = 0.43 dB; the calculate of λ using 140GHz as f.

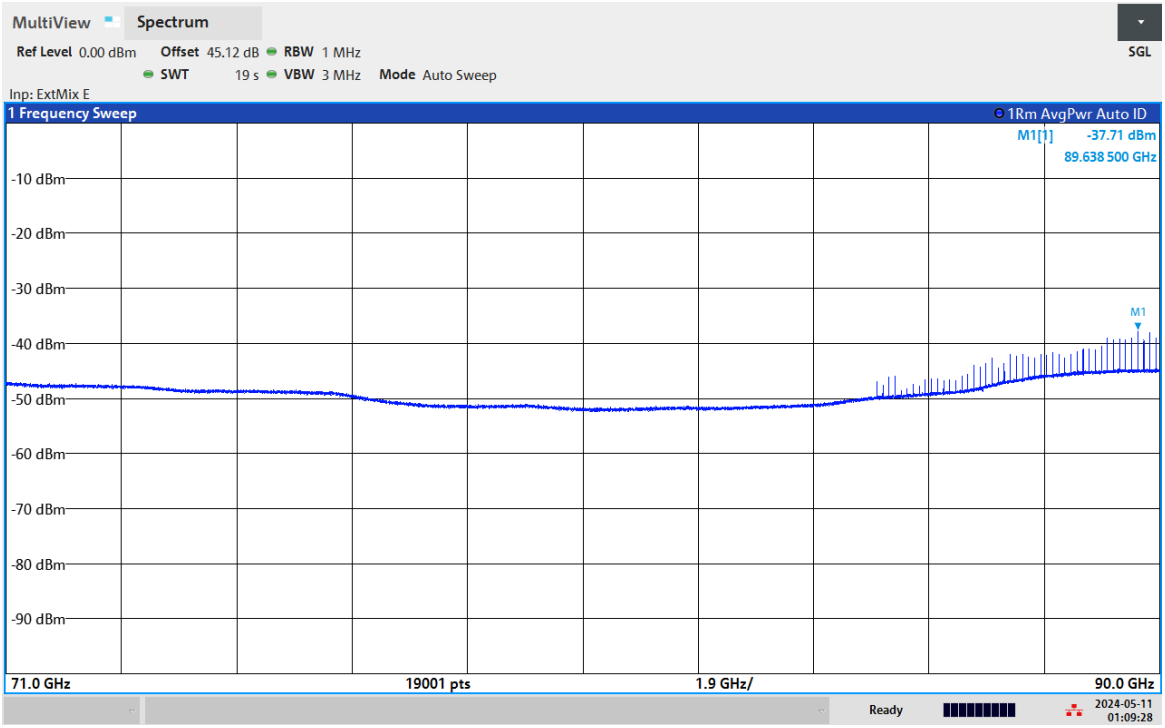
Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
140 - 200	22.8	0.27	140.4965	-71.38
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-26.66	3	1.907865	90	PASS

Note: Path Loss = 0.43 dB; the calculate of λ using 200GHz as f.

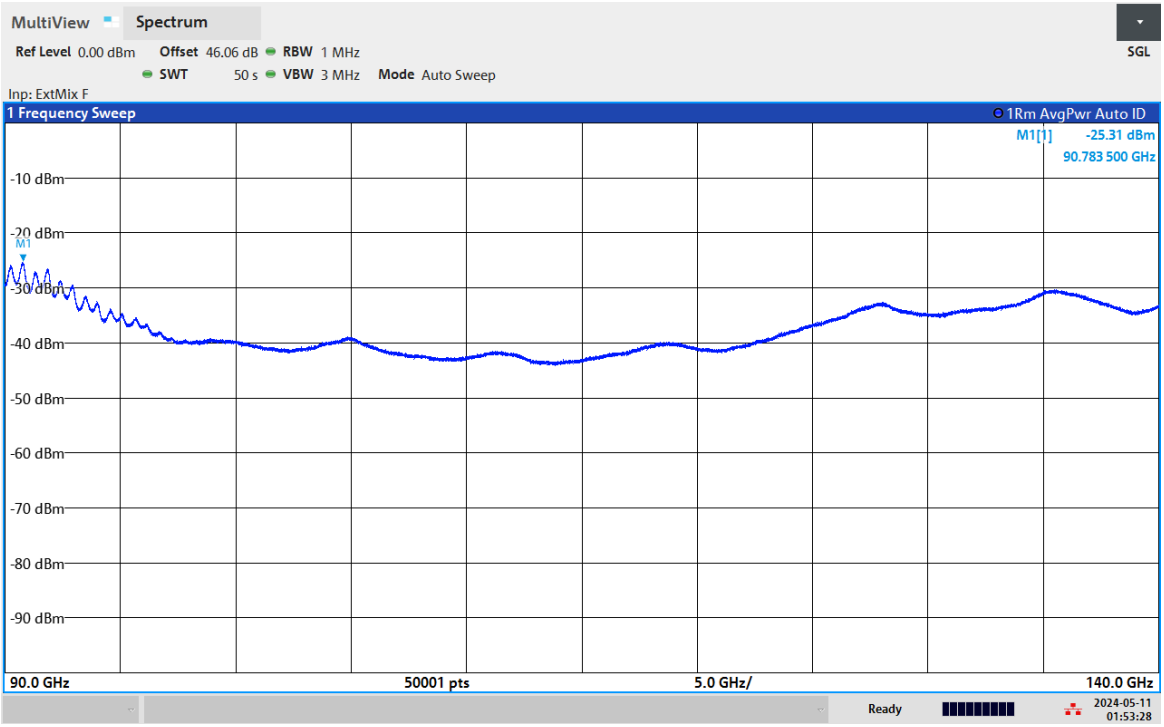
40GHz ~ 57GHz



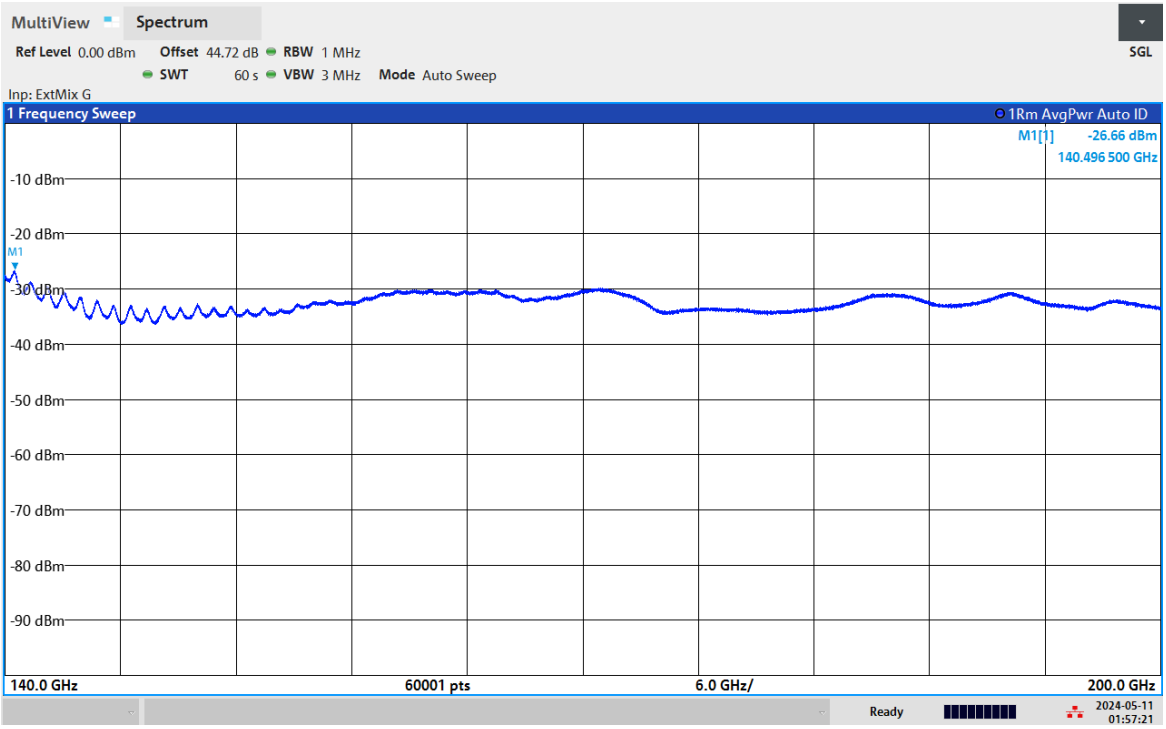
71GHz ~ 90GHz



90GHz ~ 140GHz



140GHz ~ 200GHz



Temperature	20~25℃	**Relative Humidity**	50~60%
Test Engineer	Eric Jeng and Yu Wang	**Test Range**	40GHz to 200GHz
Test Configuration	Mode 2: 60GHz FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)		

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
40 - 57	22.64	0.87	42.0864	-95.65
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-51.51	3	0.006245	90	PASS

Note: Path Loss = 0.43 dB; the calculate of λ using 57GHz as f.

Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
71 - 90	22.4	0.6	89.6545	-83.36
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-38.24	3	0.132601	90	PASS

Note: Path Loss = 0.43 dB; the calculate of λ using 90GHz as f.

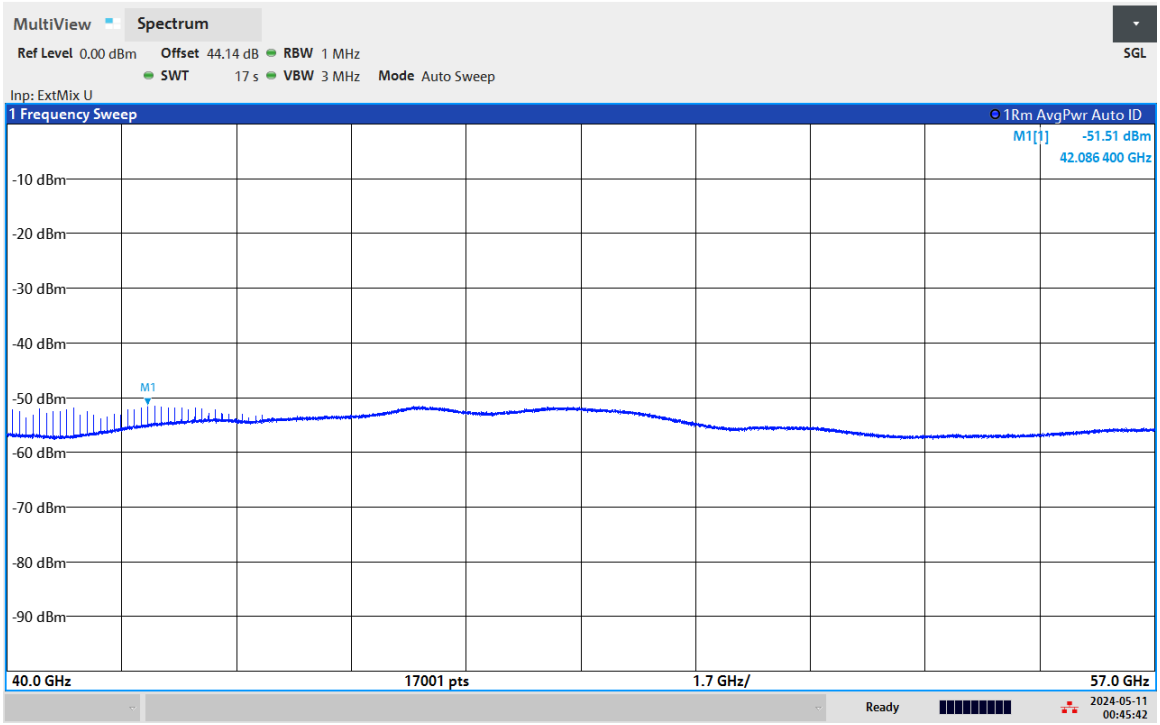
Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
90 - 140	22.4	0.43	90.7715	-71.38
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-25.32	3	2.597453	90	PASS

Note: Path Loss = 0.43 dB; the calculate of λ using 140GHz as f.

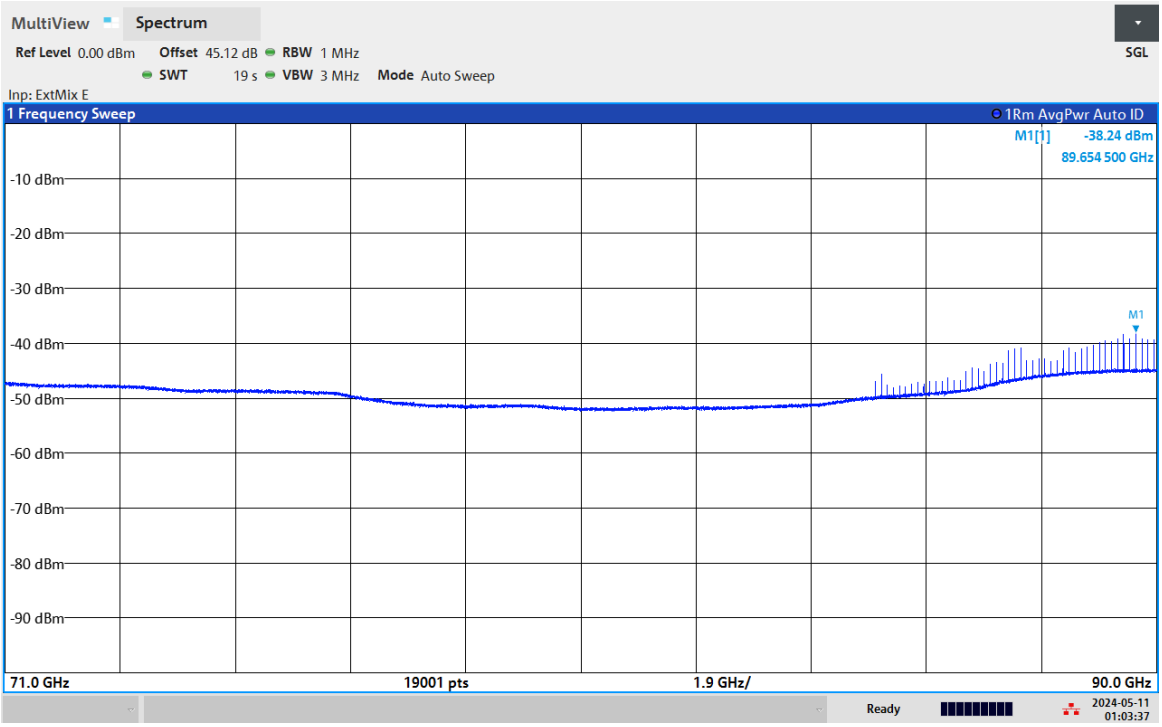
Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
140 - 200	22.8	0.27	140.4735	-71.5
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-26.78	3	1.855870	90	PASS

Note: Path Loss = 0.43 dB; the calculate of λ using 200GHz as f.

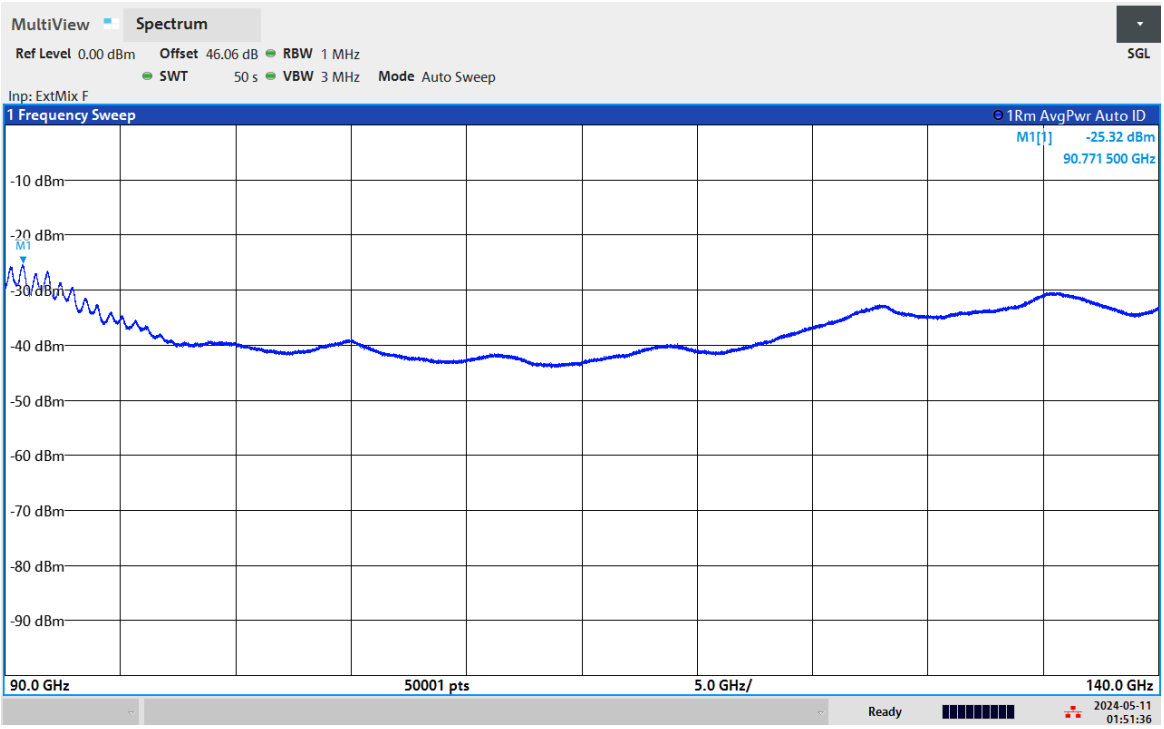
40GHz ~ 57GHz



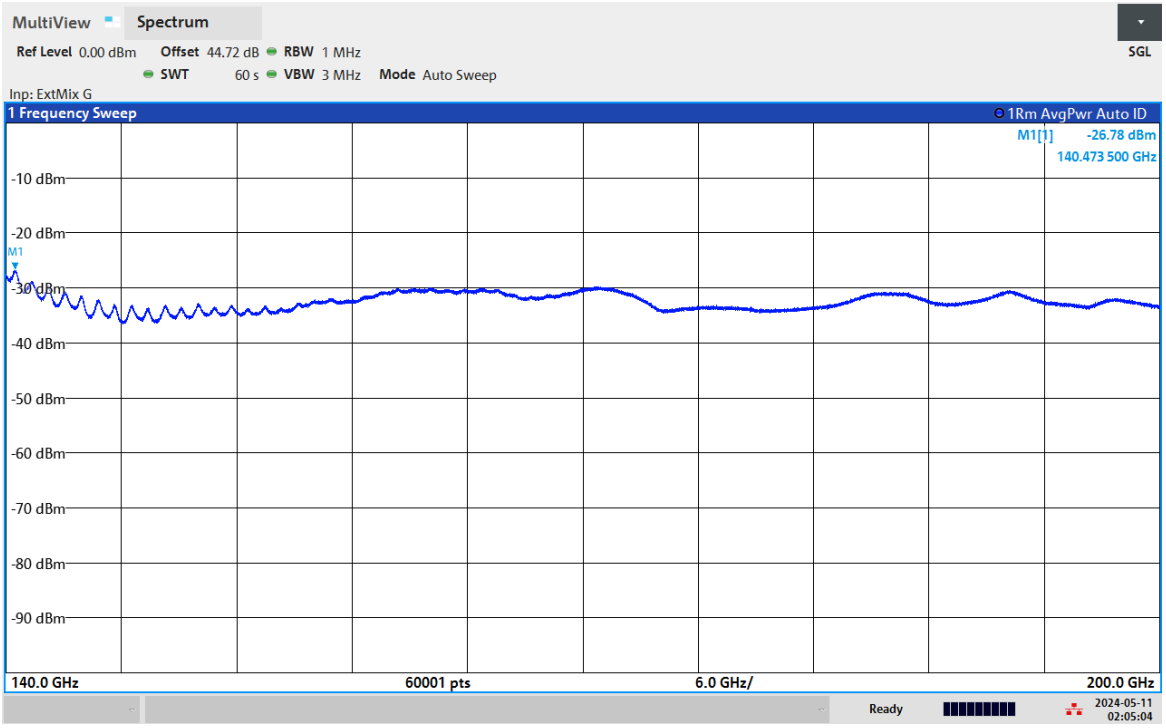
71GHz ~ 90GHz



90GHz ~ 140GHz



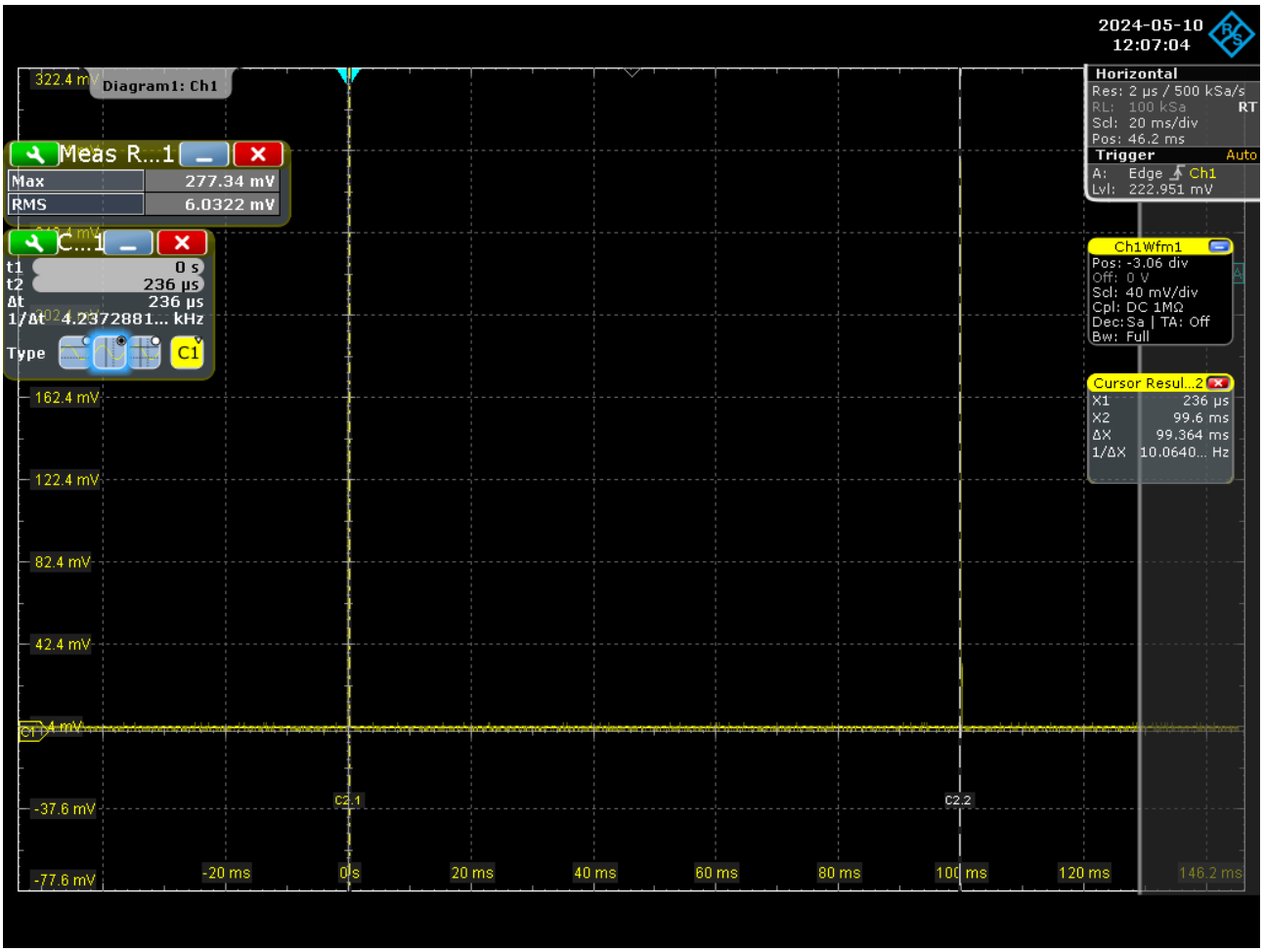
140GHz ~ 200GHz



3.7.5 Desensitization correction factor

The desensitization factor is used for compensating peak value, while signal with frequency swept is used during transmitter spurious emissions test according to the ANSI C63.10-2020 clause 4.1.5.2.8 and Annex L.

Single ramp time (Chirp on)



Start Freq	Stop Freq	Cntr Freq	FMCW Width, (Fs)	Ramp Time, (Ts)	Sweep Rate	Sweep Rate	RBW	RBW	Normalized Sweep Rate	Desensitization correction factor	Desensitization correction factor
(GHz)	(GHz)	(GHz)	(MHz)	(us)	(MHz/us)	(Hz/s)	(MHz)	(Hz)	(lin)	(lin)	(dB)
57.1	63.9	60.5	6800	236	28.81	2.88E+13	1.00	1.00E+6	28.81	0.28	11.059

Note:

1. Cntr Freq = (Start Freq + Stop Freq) / 2
2. FMCW Width, (Fs) = (Stop Freq - Start Freq) * 1000
3. Sweep Rate (MHz/us) = FMCW Width, (Fs) / Ramp Time, (Ts)
4. Normalized Sweep Rate (lin) = Sweep Rate (Hz/s) / [RBW $(Hz)^2$]
5. Desensitization correction factor (lin) = $1/((1+(((2*LN(2))/3.14)^2*(\text{Normalized Sweep Rate (lin)}^2)))^{0.25})$
6. Desensitization correction factor (dB) = |20*log(Desensitization correction factor (lin))|

Ex:

1. Cntr Freq = (57.1 + 63.9) / 2 = 60.5
2. FMCW Width, (Fs) = (63.9 - 57.1) * 1000 = 6800
3. Sweep Rate (MHz/us) = 6800 / 236 = 28.81
4. Normalized Sweep Rate (lin) = 2.88E+13 / [$1.00E+06^2$] = 28.81
5. Desensitization correction factor (lin) = $1/((1+(((2*LN(2))/3.14)^2*(28.81^2)))^{0.25}) = 0.28$
6. Desensitization correction factor (dB) = |20*log(0.28)| = 11.059

3.8 Frequency Stability

3.8.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency range, 57GHz – 64GHz.

3.8.2 Measuring Instruments

See list of measuring equipment of this test report.

3.8.3 Test Procedures

The testing follows ANSI C63.10-2020 Section 9.5.

3.8.4 Test Result

Test Engineer	Eric Jeng and Yu Wang				
Test Temperature (°C)	Voltage (Volt)	Low Frequency (GHz)	High Frequency (GHz)	Limit	Result
50	5	57.1188	63.8559	Within 57 ~ 64GHz	pass
40	5	57.1193	63.8554		
30	5	57.1408	63.8549		
20	5	57.1229	63.8508		
10	5	57.1252	63.8474		
0	5	57.1144	63.8520		
-10	5	57.1173	63.8545		
-20	5	57.1156	63.8545		
20	5.5	57.1385	63.8528		
20	4.5	57.1481	63.8460		

Note:

1. Normal Voltage =5 Vdc.；Low Voltage =4.5 Vdc.；Maximum Voltage =5.5 Vdc.
2. The frequency fundamental emissions stay within the operation band.

4 AC conducted Emission Measurement

4.1 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)	
	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.

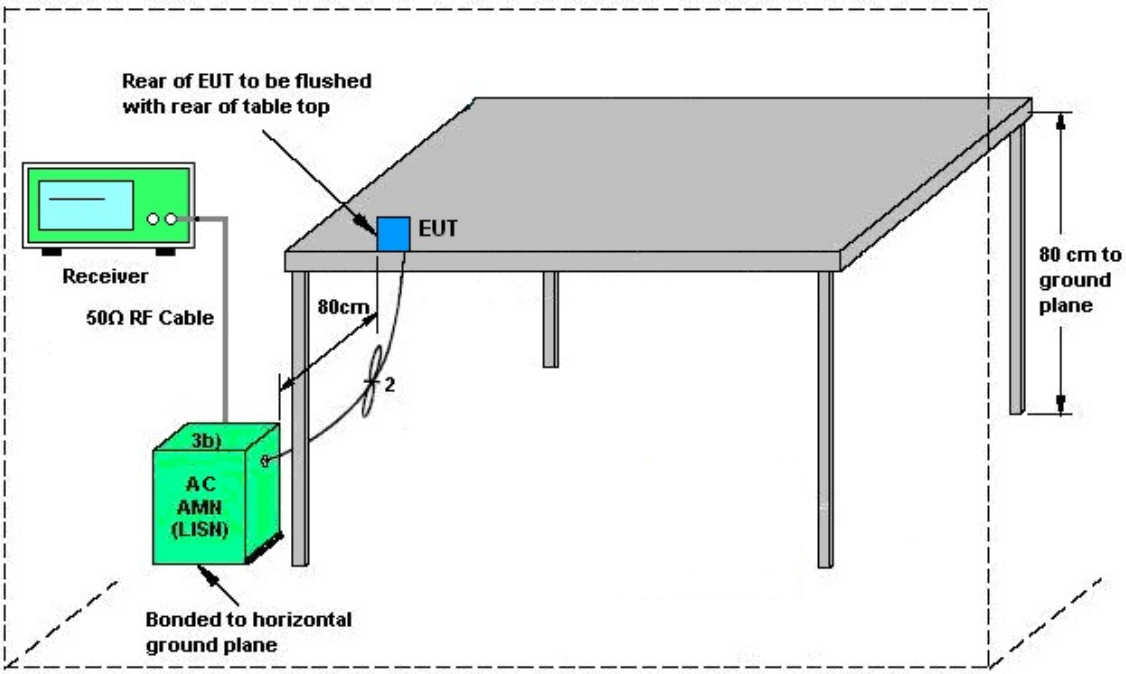
4.2 Measuring Instruments

See list of measuring equipment of this test report.

4.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was 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 should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

4.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

4.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

5 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 08, 2023	May 01, 2024~ May 06, 2024	Dec. 07, 2024	Radiation (03CH11-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055007	1GHz~18GHz	Jun. 14, 2023	May 01, 2024~ May 06, 2024	Jun. 13, 2024	Radiation (03CH11-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 27, 2023	May 01, 2024~ May 06, 2024	Jun. 26, 2024	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20MHz~8.4GHz	Oct. 06, 2023	May 01, 2024~ May 06, 2024	Oct. 05, 2024	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 07, 2023	May 01, 2024~ May 06, 2024	Oct. 06, 2024	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-01620	1GHz~18GHz	Aug. 17, 2023	May 01, 2024~ May 06, 2024	Aug. 16, 2024	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00993	18GHz~40GHz	Nov. 24, 2023	May 01, 2024~ May 06, 2024	Nov. 23, 2024	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 12, 2023	May 01, 2024~ May 06, 2024	Sep. 11, 2024	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Mar. 25, 2024	May 01, 2024~ May 06, 2024	Mar. 24, 2025	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 05, 2023	May 01, 2024~ May 06, 2024	Oct. 04, 2024	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60SS	SN3	3GHz High Pass Filter	Sep. 11, 2023	May 01, 2024~ May 06, 2024	Sep. 10, 2024	Radiation (03CH11-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN11	1.53G Low Pass	Sep. 11, 2023	May 01, 2024~ May 06, 2024	Sep. 10, 2024	Radiation (03CH11-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40SS	SN3	6.75GHz High Pass Filter	Sep. 11, 2023	May 01, 2024~ May 06, 2024	Sep. 10, 2024	Radiation (03CH11-HY)
Attenuator	HONOVA	5910 SMA-50-005	0028	N/A	Jul. 10, 2023	May 01, 2024~ May 06, 2024	Jul. 09, 2024	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz~40GHz	Mar. 06, 2024	May 01, 2024~ May 06, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801595/2	30MHz~40GHz	Mar. 06, 2024	May 01, 2024~ May 06, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9K~30M	Mar. 06, 2024	May 01, 2024~ May 06, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	30M~40G	Mar. 06, 2024	May 01, 2024~ May 06, 2024	Mar. 05, 2025	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	May 01, 2024~ May 06, 2024	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	May 01, 2024~ May 06, 2024	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	May 01, 2024~ May 06, 2024	N/A	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	May 01, 2024~ May 06, 2024	N/A	Radiation (03CH11-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170584	18GHz-40GHz	Dec. 13, 2023	May 08, 2024~ May 14, 2024	Dec. 12, 2024	Radiation (03CH18-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV3044	101009	9kHz to 44GHz	Nov. 17, 2023	May 08, 2024~ May 14, 2024	Nov. 16, 2024	Radiation (03CH18-HY)
Harmonic Mixer*	Rohde & Schwarz	RPG FS-Z60	100986	40GHz to 60GHz	Oct. 31, 2023	May 08, 2024~ May 14, 2024	Oct. 30, 2026	Radiation (03CH18-HY)
Harmonic Mixer	Rohde & Schwarz	RPG FS-Z75	101557	50 GHz to 75 GHz	Jan. 04, 2024	May 08, 2024~ May 14, 2024	Jan. 03, 2027	Radiation (03CH18-HY)
Harmonic Mixer*	Rohde & Schwarz	FSZ-90	101811	60GHz to 90GHz	Oct. 31, 2023	May 08, 2024~ May 14, 2024	Oct. 30, 2026	Radiation (03CH18-HY)
Harmonic Mixer*	Rohde & Schwarz	RPG FS-Z140	101128	90GHz to 140GHz	Oct. 27, 2023	May 08, 2024~ May 14, 2024	Oct. 26, 2026	Radiation (03CH18-HY)
Harmonic Mixer	Rohde & Schwarz	RPG FS-Z220	101014	140GHz to 220GHz	Oct. 27, 2023	May 08, 2024~ May 14, 2024	Oct. 26, 2026	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-UPRR00	QWH-UPRR00-01	40-60 GHz	Jul. 06, 2021	May 08, 2024~ May 14, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-VPRR00	1371800008	50-75 GHz	Jul. 06, 2021	May 08, 2024~ May 14, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-VPRR00	1371800009	50-75 GHz	Jul. 06, 2021	May 08, 2024~ May 14, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-EPRR00	1372000000	60-90 GHz	Jul. 06, 2021	May 08, 2024~ May 14, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-FPRR00	1011500008	90-140 GHz	Jul. 06, 2021	May 08, 2024~ May 14, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-GPRR00	QWH-GPRR00-01	140-220 GHz	Jul. 06, 2021	May 08, 2024~ May 14, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801607/2	N/A	Nov. 28, 2023	May 08, 2024~ May 14, 2024	Nov. 27, 2024	Radiation (03CH18-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	519231/2	N/A	Nov. 28, 2023	May 08, 2024~ May 14, 2024	Nov. 27, 2024	Radiation (03CH18-HY)
Detector	Quinstars	QEA-FBFBVP	2672009	50 ~ 75 GHz	Jul. 06, 2021	May 08, 2024~ May 14, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Oscilloscope	Rohde & Schwarz	RTO 1002	400025	600MHz, 10GSa/sec	Sep. 20, 2023	May 08, 2024~ May 14, 2024	Sep. 19, 2024	Radiation (03CH18-HY)
Power Meter	Agilent	E4416A	GB43312306	N/A	Apr. 17, 2024	May 08, 2024~ May 14, 2024	Apr. 16, 2025	Radiation (03CH18-HY)
Power Sensor	Keysight	V8486A	MY60170002	50 ~ 75 GHz	Jul. 06, 2021	May 08, 2024~ May 14, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Signal Generator	Anritsu	MG3694C	163401	8MHz~40GHz	Jan. 22, 2024	May 08, 2024~ May 14, 2024	Jan. 21, 2025	Radiation (03CH18-HY)
Active Frequency Multiplier	Eravant	SFA-503753416-15KF-E1	03099-01	50 ~ 75 GHz	Jul. 06, 2021	May 08, 2024~ May 14, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Attenuator	SAGE	STA-30-15-M2	18953-02	50 ~ 75 GHz	Jul. 06, 2021	May 08, 2024~ May 14, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Thermal Chamber	ESPEC	SU-641	92013721	-30℃ ~70℃	Oct. 11, 2023	May 08, 2024~ May 14, 2024	Oct. 10, 2024	Radiation (03CH18-HY)
AC Power Source	AC POWER	AFC-500W	F104070011	50Hz~60Hz	Sep. 22, 2023	May 08, 2024~ May 14, 2024	Sep. 21, 2024	Radiation (03CH18-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ACPOWER	AFC-11003G	F317040033	N/A	N/A	Apr. 22, 2024	N/A	Conduction (CO07-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Apr. 22, 2024	N/A	Conduction (CO07-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-F N	9561-F N00373	9kHz-200MHz	Oct. 20, 2023	Apr. 22, 2024	Oct. 19, 2024	Conduction (CO07-HY)
RF Cable	HUBER + SUHNER	RG 214/U	1358175	9kHz~30MHz	Mar. 14, 2024	Apr. 22, 2024	Mar. 13, 2025	Conduction (CO07-HY)
Two-Line V-Network	TESEQ	NNB 51	45051	N/A	Mar. 10, 2024	Apr. 22, 2024	Mar. 09, 2025	Conduction (CO07-HY)
Four-Line V-Network	TESEQ	NNB 52	36122	N/A	Mar. 07, 2024	Apr. 22, 2024	Mar. 06, 2025	Conduction (CO07-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102317	9kHz~3.6GHz	Sep. 20, 2023	Apr. 22, 2024	Sep. 19, 2024	Conduction (CO07-HY)

Note: (*) Equipment manufacturer's Calibration Certificate.

6 Measurement Uncertainty

Test Item	Uncertainty
AC Power Conducted Emission Measurement (150 kHz ~ 30 MHz)	±3.44dB
Radiated Emission Measurement (9 kHz ~ 30 MHz)	±3.8dB
Radiated Emission Measurement (30 MHz ~ 1000 MHz)	±6.1dB
Radiated Emission Measurement (1 GHz ~ 6 GHz)	±4.3dB
Radiated Emission Measurement (6 GHz ~ 18 GHz)	±4.3dB
Radiated Emission Measurement (18 GHz ~ 40 GHz)	±5.3dB
Radiated Emission Measurement (40 GHz ~ 140 GHz)	±5.59dB
Radiated Emission Measurement (140 GHz ~ 200 GHz)	±6.57dB
99% Occupied Bandwidth	±1.324 MHz
6dB Bandwidth	±0.676 MHz
Frequency Stability	±0.671 MHz
Temperature	±0.58 ℃

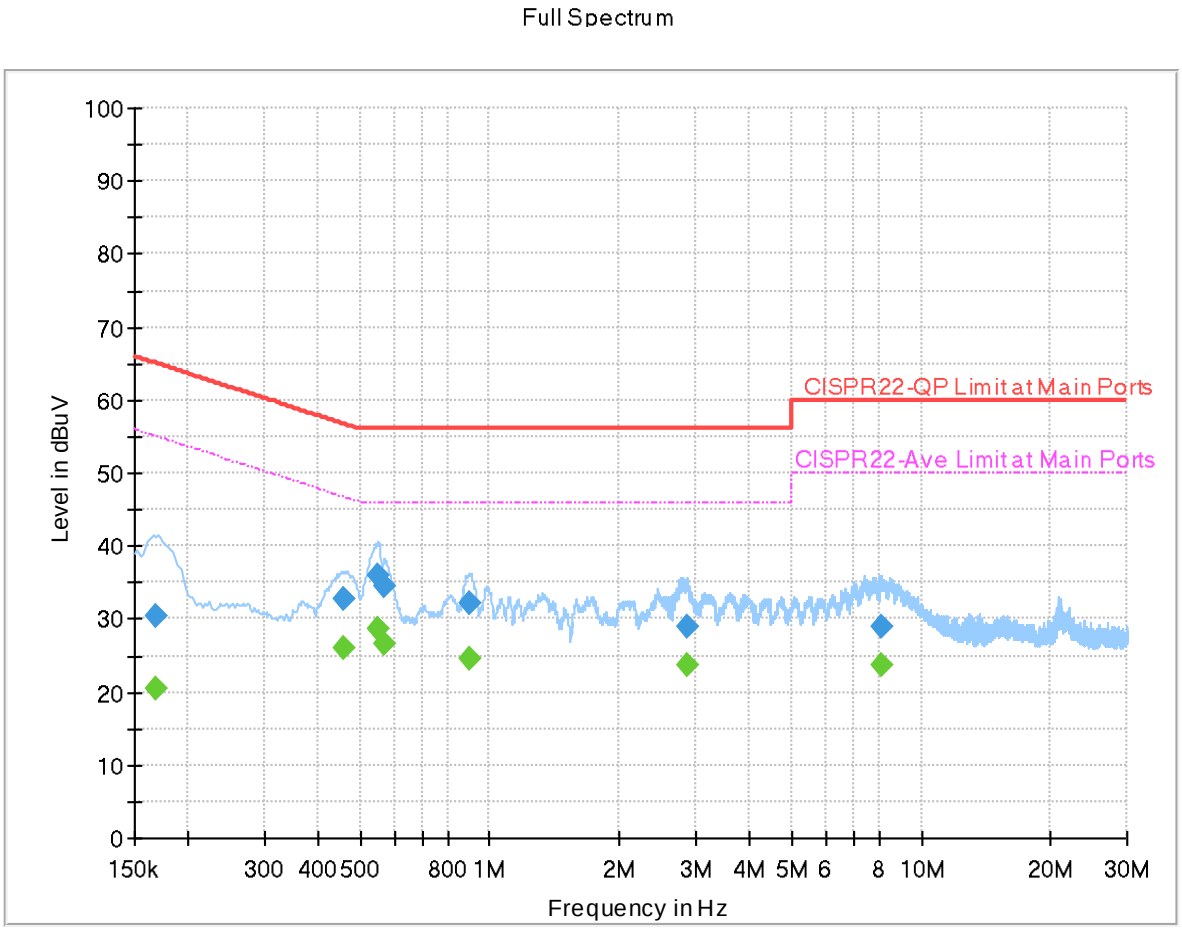
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))

Appendix A. AC Conducted Emission Test Results

Test Engineer :	Louis Chung	**Temperature :**	21.3~24.9℃
		Relative Humidity :	42.3~53.5%

EUT Information

Report NO :	432213
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line

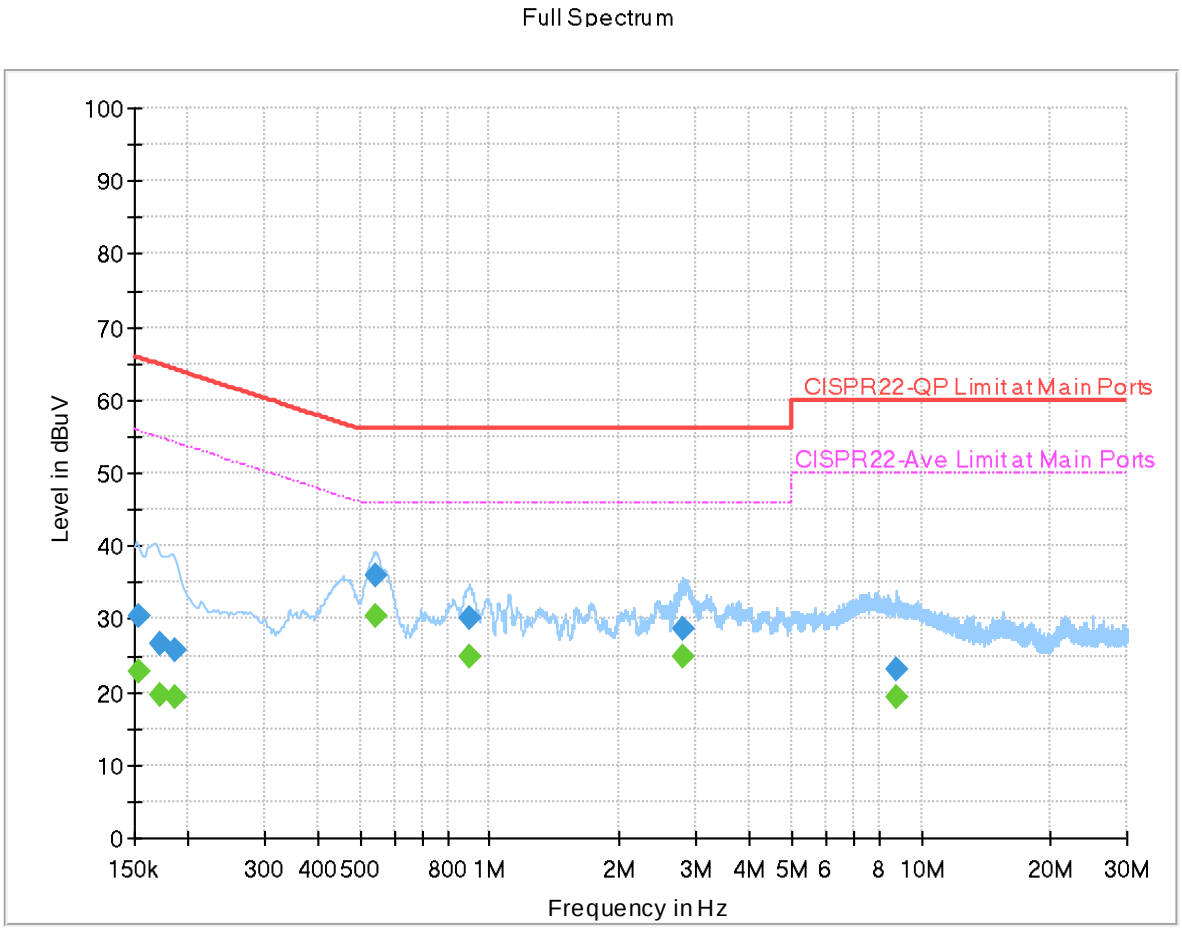


Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.168000	---	20.54	55.06	34.52	L1	OFF	19.9
0.168000	30.36	---	65.06	34.70	L1	OFF	19.9
0.456540	---	26.13	46.76	20.63	L1	OFF	19.9
0.456540	32.76	---	56.76	24.00	L1	OFF	19.9
0.552210	---	28.58	46.00	17.42	L1	OFF	19.9
0.552210	36.11	---	56.00	19.89	L1	OFF	19.9
0.569310	---	26.66	46.00	19.34	L1	OFF	19.9
0.569310	34.52	---	56.00	21.48	L1	OFF	19.9
0.892680	---	24.62	46.00	21.38	L1	OFF	19.9
0.892680	32.07	---	56.00	23.93	L1	OFF	19.9
2.871060	---	23.61	46.00	22.39	L1	OFF	20.0
2.871060	28.87	---	56.00	27.13	L1	OFF	20.0
8.119500	---	23.70	50.00	26.30	L1	OFF	20.0
8.119500	28.85	---	60.00	31.15	L1	OFF	20.0

EUT Information

Report NO :	432213
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154118	---	22.68	55.78	33.10	N	OFF	19.9
0.154118	30.36	---	65.78	35.42	N	OFF	19.9
0.171240	---	19.61	54.90	35.29	N	OFF	19.9
0.171240	26.50	---	64.90	38.40	N	OFF	19.9
0.186180	---	19.40	54.21	34.81	N	OFF	19.9
0.186180	25.69	---	64.21	38.52	N	OFF	19.9
0.546000	---	30.47	46.00	15.53	N	OFF	19.9
0.546000	35.92	---	56.00	20.08	N	OFF	19.9
0.899250	---	24.92	46.00	21.08	N	OFF	19.9
0.899250	30.05	---	56.00	25.95	N	OFF	19.9
2.796900	---	24.81	46.00	21.19	N	OFF	20.0
2.796900	28.79	---	56.00	27.21	N	OFF	20.0
8.732310	---	19.16	50.00	30.84	N	OFF	20.1
8.732310	22.96	---	60.00	37.04	N	OFF	20.1