FCC RADIO TEST REPORT

FCC ID	:	**2BFSB-SG100**
Equipment	:	**Quilt Sense**
Brand Name	:	**Quilt**
Model Name	:	**QS1**
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 May 01, 2024 to May 29, 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.)

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History of this test report

Report No.	Version	Description	Issue Date
FR432213-01	01	Initial issue of report	Jun. 12, 2024
FR432213-01	02	Revise content of section 3.4.3, section 3.4.4, section 3.5.3, section 3.6.3 and section 3.7.5. This report is an updated version, replacing the report issued on Jun. 12, 2024.	Jun. 19, 2024
FR432213-01	03	Revise Test Configuration. This report is an updated version, replacing the report issued on Jun. 19, 2024.	Jun. 20, 2024

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Limit	Result (PASS/FAIL)
3.4	§15.255(c)(2)(ii)	Duty Cycle	16.5 ms off time per 33 ms	Pass
3.5	§15.215(c) §15.255(c)(2)(ii)	Emission Bandwidth	20dB bandwidth Within 57 ~ 61.56GHz	Pass
3.6	§15.255(c)(2)(ii)	Peak EIRP Power	< 20dBm	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 ~ 61.56GHz	Pass
-	§15.207	AC Power Conducted Emission	§15.207	Not Required

Note: Not required means after assessing, test items are not necessary to carry out.

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: Clio Lo

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

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 Chip 1+2 (Diversity Transmit) FMCW mode**	**59.85 - 61.35GHz**
Mode 2	**60GHz Chip 1+2 (Diversity Transmit) FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 18)**	**59.85 - 61.35GHz**

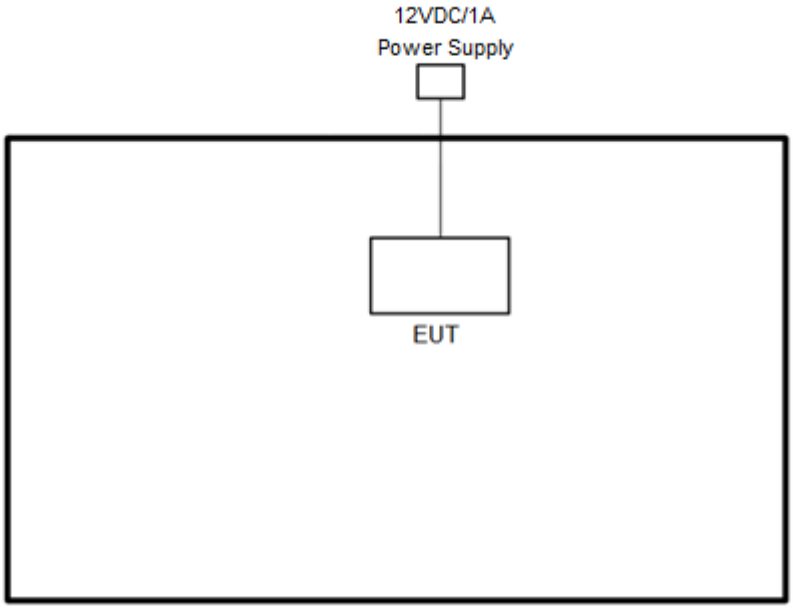
For EIRP/99% OBW/6dB BW/20dB BW/DT/ Frequency Stability

Test Configuration		
Mode 1	**60GHz Chip 1+2 (Diversity Transmit) FMCW mode**	**59.85 - 61.35GHz**

Note: The FMCW is used during test.

2.2 Connection Diagram of Test System

<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.	Power Supply	GW Instek	GPE-2323	N/A	N/A	Unshielded, 1.8 m
2.	Notebook	Dell	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	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.

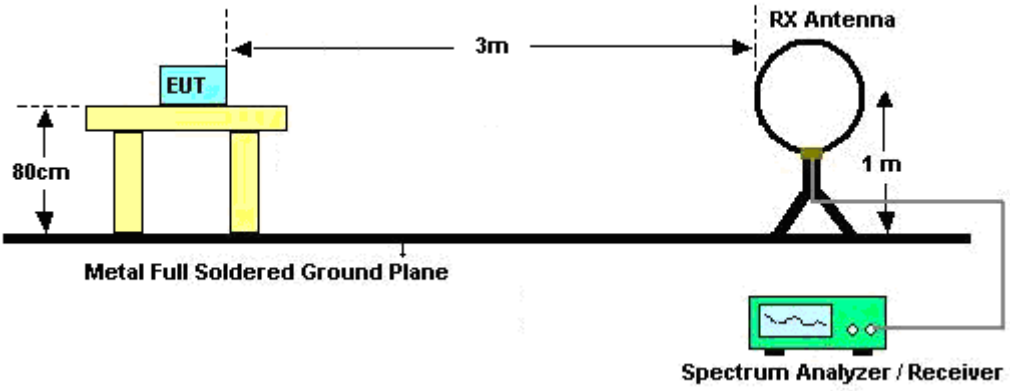
3 Radiated Test Items

3.1 Measuring Instruments

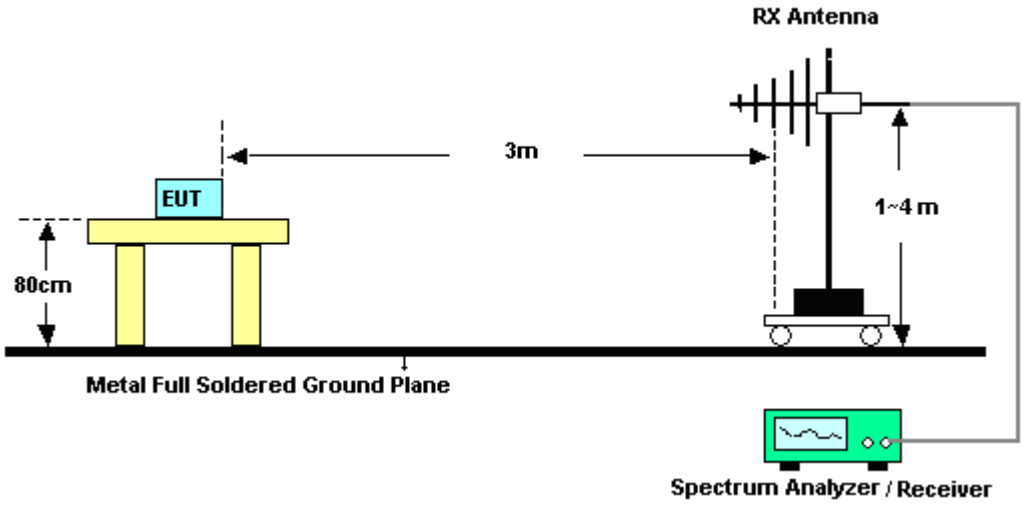
See list of measuring instruments of this test report.

3.2 Test Setup

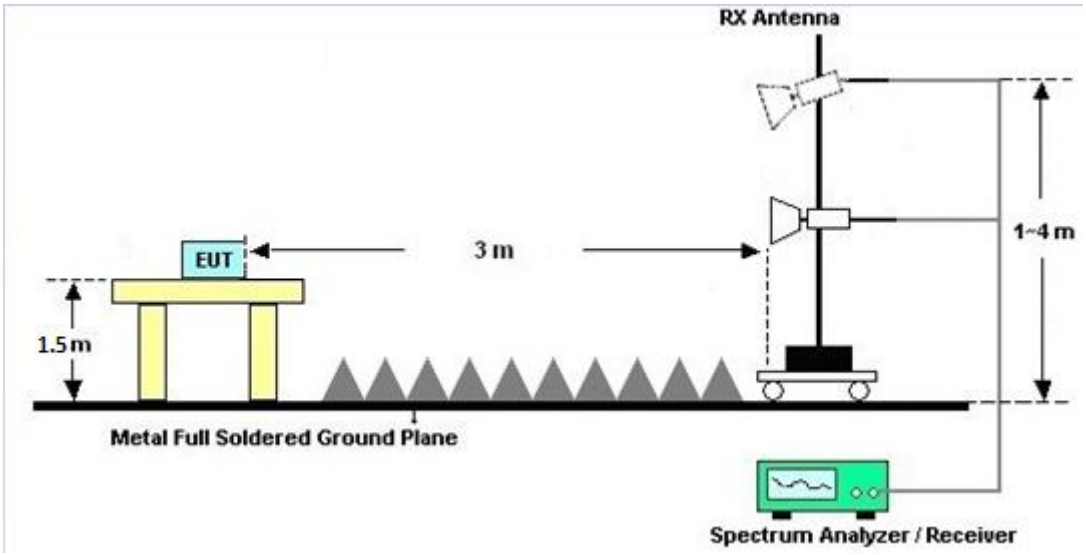
For radiated emissions from 9kHz to 30MHz



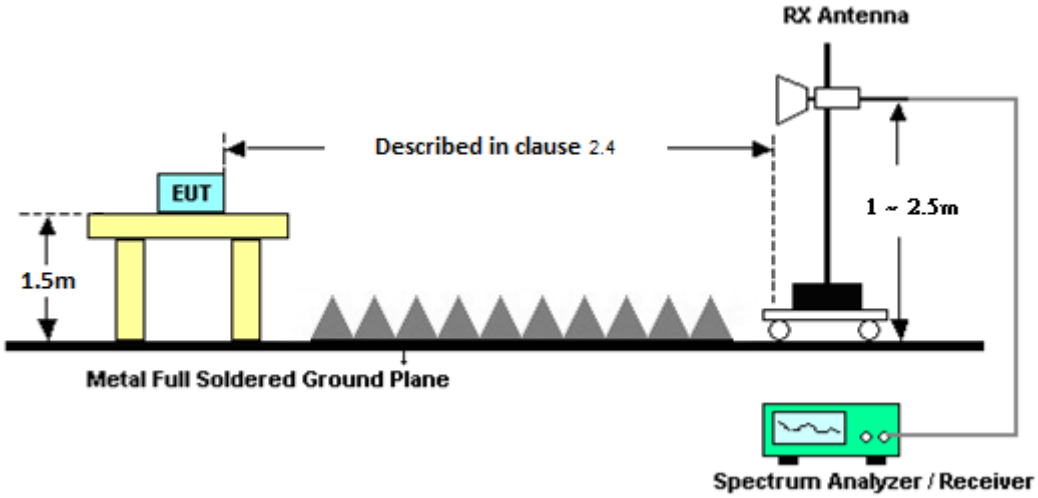
For radiated emissions from 30MHz to 1GHz



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)(ii) 57.0–61.56 GHz:

the peak EIRP shall not exceed 3 dBm except that the peak EIRP shall not exceed 20 dBm if the sum of continuous transmitter off-times of at least two milliseconds equals at least 16.5 milliseconds within any contiguous interval of 33 milliseconds.

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.

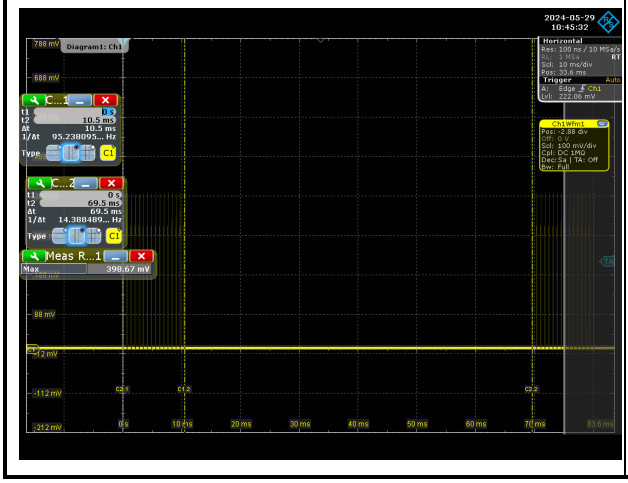
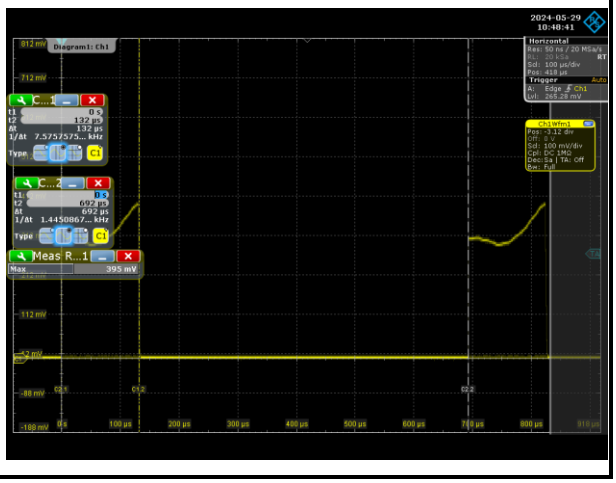
3.4.4 Test Results

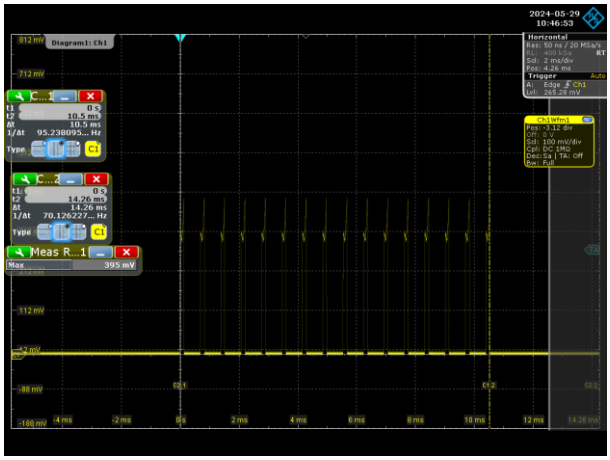
Chirp Width	Chirp numbers per 33 ms	On Time per 33 ms	Off Time per 33 ms	limit	Result
132µs	16	2.112ms	30.888ms	> 16.5ms	Pass

Note:

1. On time per 33ms = Chirp numbers (16) x Chirp Width (132µs)
2. Off time per 33ms = 33ms - On time per 33ms.

3.4.5 Test Plot

Burst Period	Chirp Width
	

Chirp Numbers: 16	
	

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 - 61.56 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.

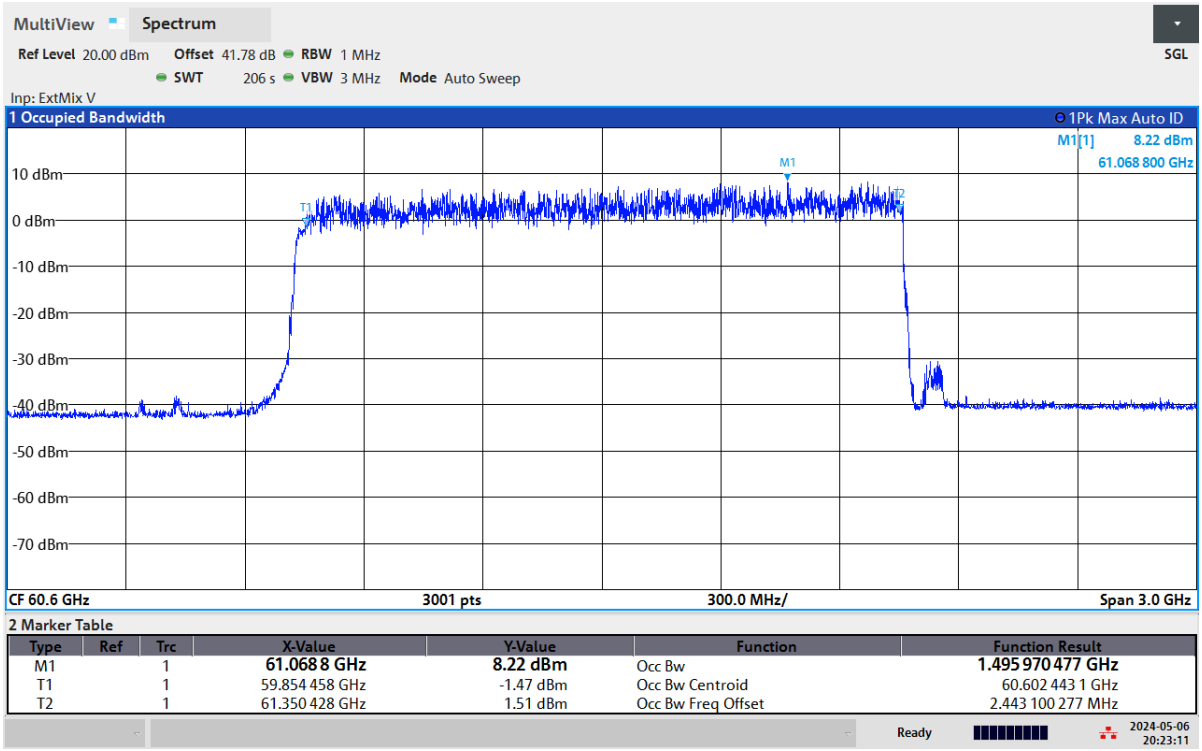
3.5.4 Test Results

Temperature	20~25℃	Relative Humidity	50~60%
Test Engineer	Eric Jeng and Yu Wang		
99% Occupied Bandwidth (GHz)		Limit (GHz)	
1.4960		Report Only	
6dB Bandwidth (GHz)		Limit (GHz)	
1.4885		Report Only	

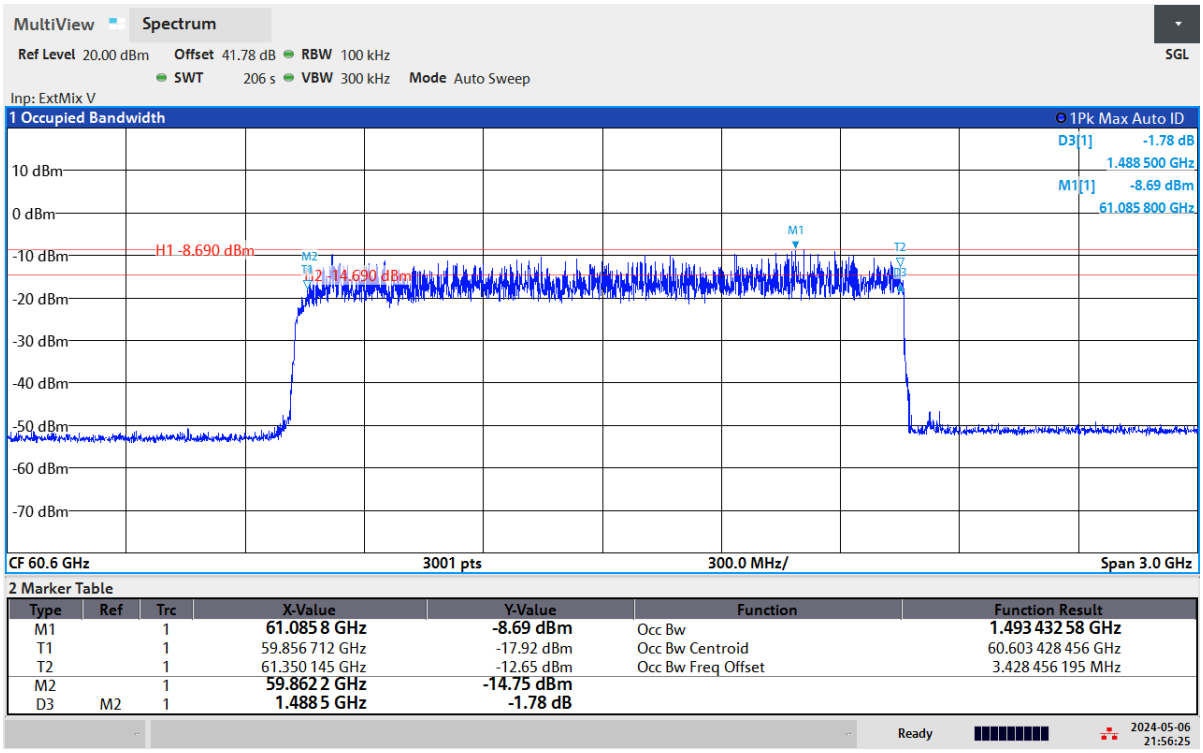
20dB Bandwidth Measurement				
Bandwidth (GHz)	Low Frequency (GHz)	High Frequency (GHz)	Limit	Result
1.5375	59.8243	61.3618	Within 57 ~ 61.56GHz	Pass

3.5.5 Test Plots

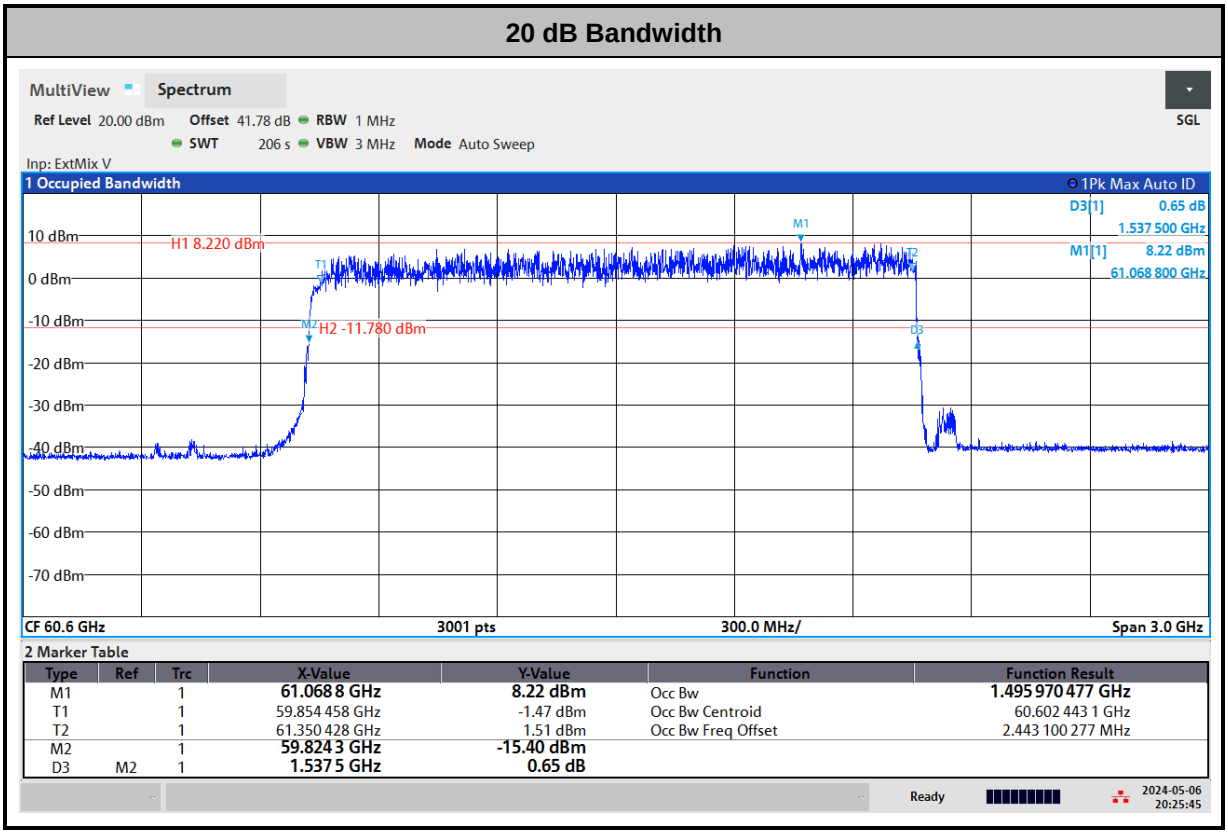
99% Occupied Bandwidth



6dB bandwidth



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)(ii)	Field disturbance sensors	20

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
60.6	0.62	22.6	9.37	20	PASS

Note:

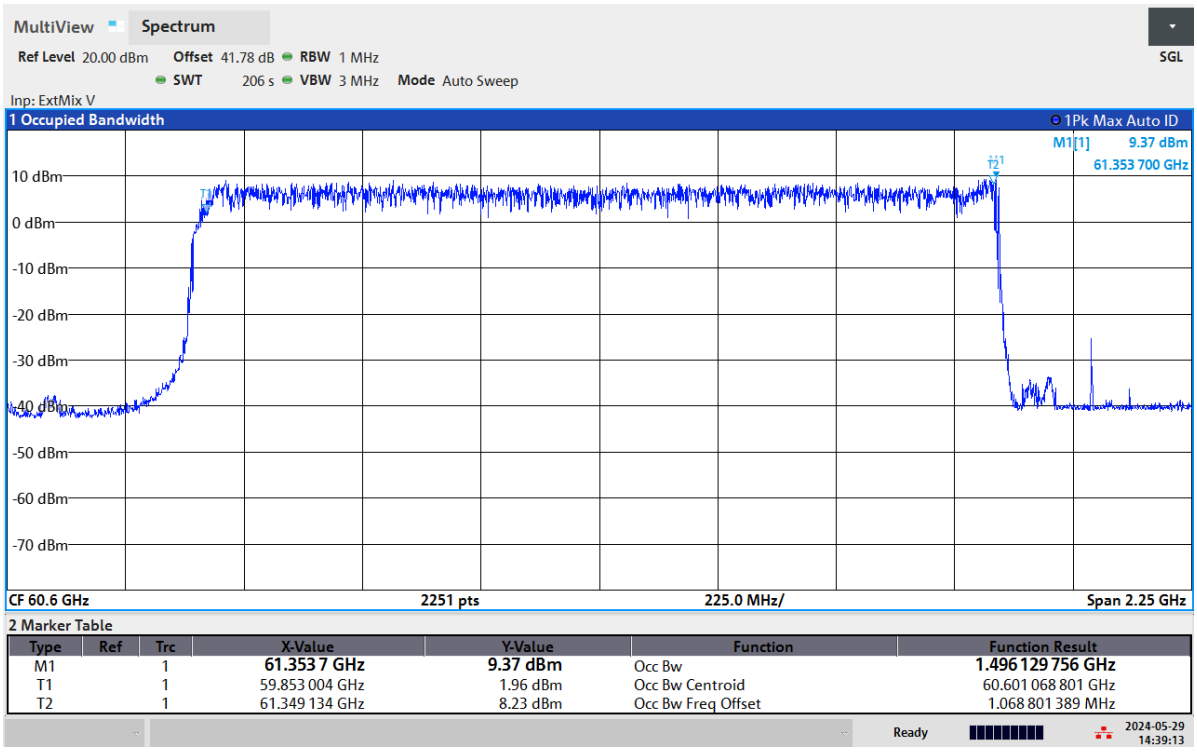
Total path loss = Air loss - Antenna Factor (dB) + Cable loss(dB) + desensitization correction factor(See section 3.7.5)

Ex:

Total path loss = 63.94 - 22.6 + 0.43 + 0.009 = 41.78

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(4 π 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

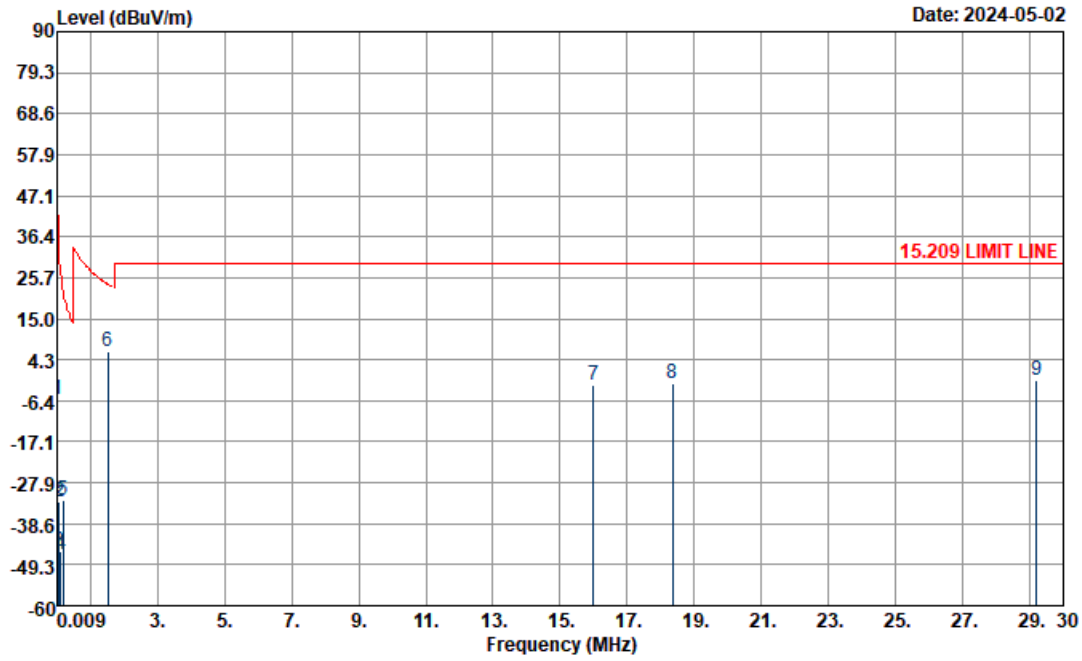
Power Density (W/m^2) = 10^[(EIRP-30)/10] / 4 π d

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

3.7.4 Test Result

<Below 30MHz>

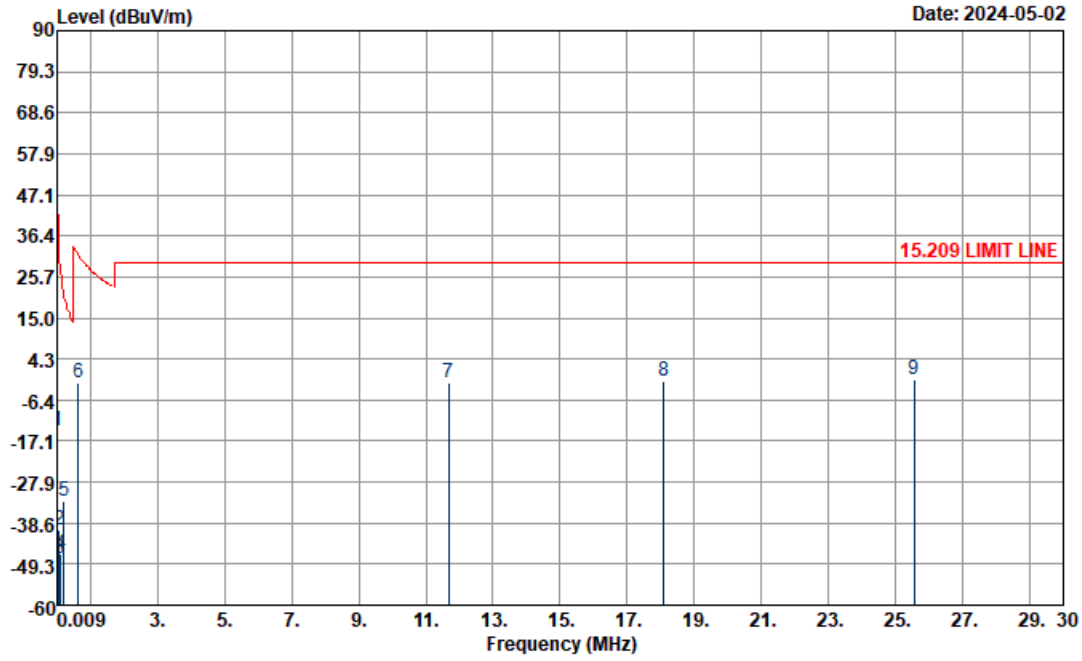
Temperature	20.1 ~ 22.4℃	Relative Humidity	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	Test Distance	3m
Test Range	9KHz to 30MHz	Test Polarization	Horizontal
Test Configuration	Mode 1: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna 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
Project : 432213-01

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	-6.1	-80	-48.04	41.94	54.53	19.31	0.06	-	-	Average
2	0.06642	-33.05	-80	-64.21	31.16	28.69	18.19	0.07	-	-	Average
3	0.0958	-45.75	-80	-73.73	27.98	16.12	18.06	0.07	-	-	QP
4	0.11948	-46.78	-80	-72.84	26.06	14.97	18.18	0.07	-	-	Average
5	0.18978	-32.46	-80	-54.5	22.04	29.01	18.46	0.07	-	-	Average
6	1.519	6.5	-40	-17.47	23.97	27.77	18.65	0.08	-	-	QP
7	15.984	-2.18	-40	-31.68	29.5	16.69	21	0.13	-	-	QP
8	18.349	-1.73	-40	-31.23	29.5	16.43	21.73	0.11	-	-	QP
9	29.195	-1.27	-40	-30.77	29.5	15.73	22.8	0.2	-	-	QP

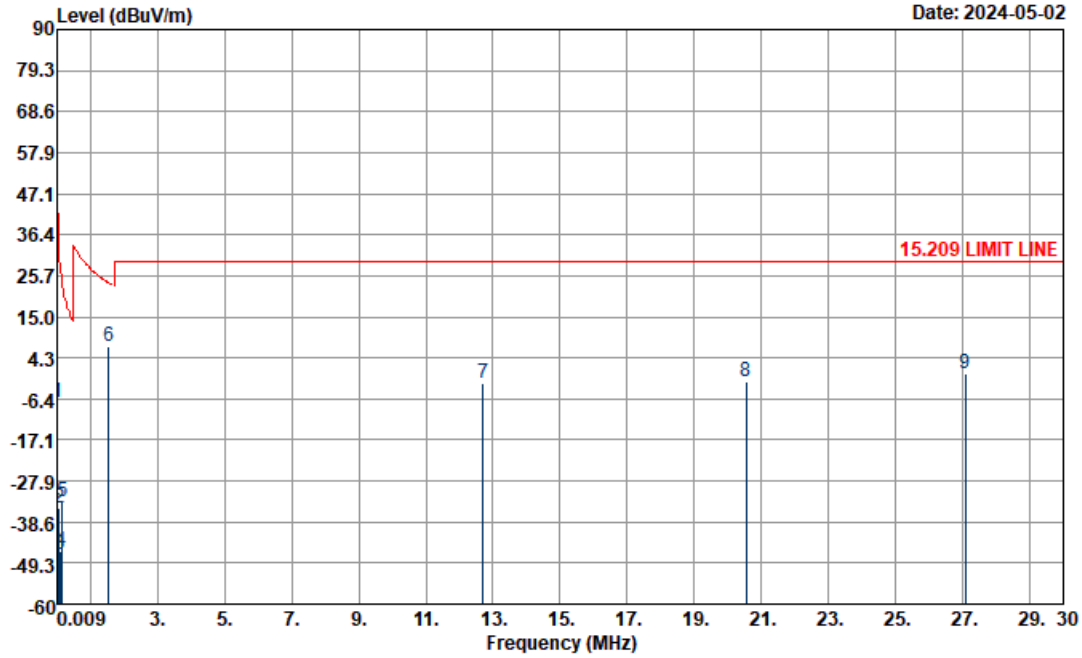
Temperature	20.1 ~ 22.4℃	Relative Humidity	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	Test Distance	3m
Test Range	9KHz to 30MHz	Test Polarization	Vertical
Test Configuration	Mode 1: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna 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
Project : 432213-01

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	-14.57	-80	-56.51	41.94	46.06	19.31	0.06	-	-	Average
2	0.06651	-40.45	-80	-71.6	31.15	21.28	18.2	0.07	-	-	Average
3	0.0902	-47.99	-80	-76.49	28.5	13.94	18	0.07	-	-	QP
4	0.11432	-46.54	-80	-72.98	26.44	15.23	18.16	0.07	-	-	Average
5	0.2061	-32.86	-80	-54.18	21.32	28.58	18.49	0.07	-	-	Average
6	0.6402	-1.99	-40	-33.47	31.48	19.23	18.72	0.06	-	-	QP
7	11.68	-1.91	-40	-31.41	29.5	17.1	20.87	0.12	-	-	QP
8	18.088	-1.43	-40	-30.93	29.5	16.74	21.71	0.12	-	-	QP
9	25.565	-1.18	-40	-30.68	29.5	16.04	22.67	0.11	-	-	QP

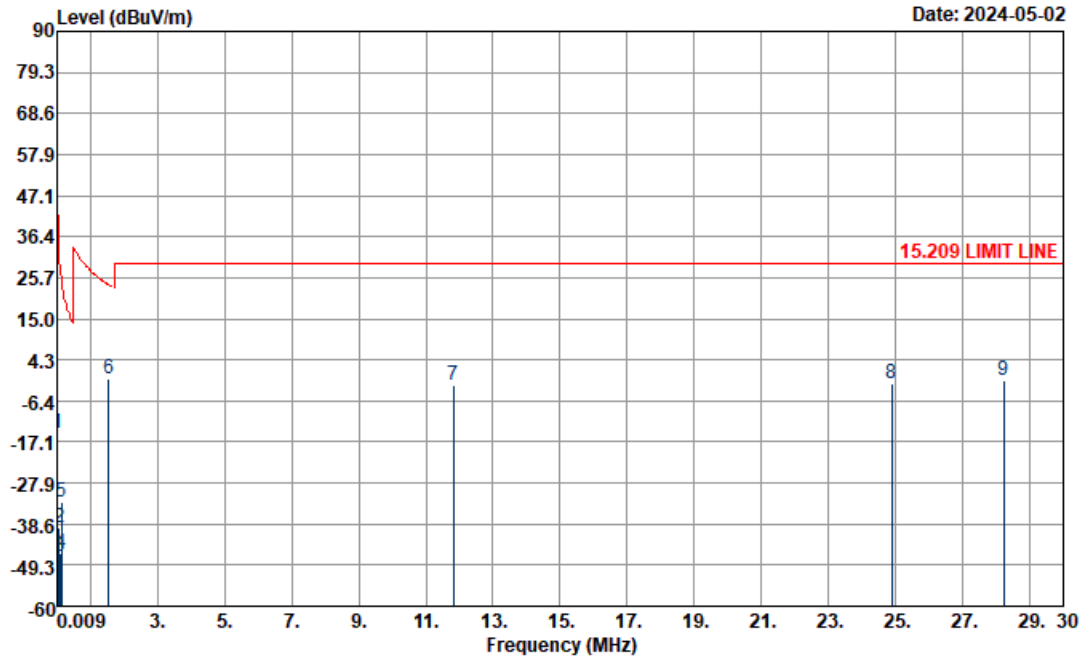
Temperature	20.1 ~ 22.4℃	Relative Humidity	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	Test Distance	3m
Test Range	9KHz to 30MHz	Test Polarization	Horizontal
Test Configuration	Mode 2: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 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 : 432213-01

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	-7.5	-80	-49.44	41.94	53.13	19.31	0.06	-	-	Average
2	0.06651	-34.93	-80	-66.08	31.15	26.8	18.2	0.07	-	-	Average
3	0.0929	-47.07	-80	-75.31	28.24	14.83	18.03	0.07	-	-	QP
4	0.11512	-46.07	-80	-72.45	26.38	15.7	18.16	0.07	-	-	Average
5	0.15374	-33.3	-80	-57.17	23.87	28.32	18.31	0.07	-	-	Average
6	1.541	7.3	-40	-16.55	23.85	28.57	18.65	0.08	-	-	QP
7	12.696	-2.35	-40	-31.85	29.5	16.76	20.76	0.13	-	-	QP
8	20.554	-1.79	-40	-31.29	29.5	16.32	21.79	0.1	-	-	QP
9	27.09	0.12	-40	-29.38	29.5	17.17	22.8	0.15	-	-	QP

Temperature	20.1 ~ 22.4℃	Relative Humidity	55.3 ~ 66.3%
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 Chip 1+2 (Diversity Transmit) 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)		

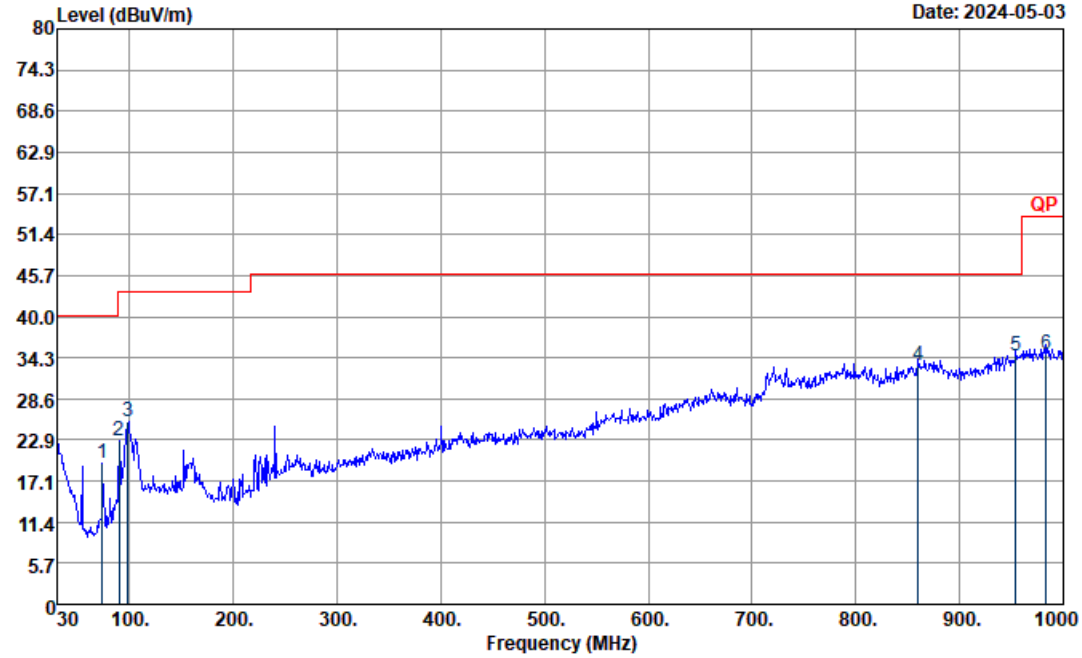


Site : 03CH11-HY
Condition : 15.209 LIMIT LINE 3m LOOP_100488_230912 VERTICAL
: .
Detector : Peak
Project : 432213-01

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	-14.93	-80	-56.87	41.94	45.7	19.31	0.06	-	-	Average
2	0.06654	-39.67	-80	-70.81	31.14	22.06	18.2	0.07	-	-	Average
3	0.0935	-47.08	-80	-75.27	28.19	14.82	18.03	0.07	-	-	QP
4	0.11432	-46.3	-80	-72.74	26.44	15.47	18.16	0.07	-	-	Average
5	0.15204	-32.98	-80	-56.95	23.97	28.64	18.31	0.07	-	-	Average
6	1.556	-0.69	-40	-24.45	23.76	20.59	18.64	0.08	-	-	QP
7	11.816	-2.27	-40	-31.77	29.5	16.73	20.88	0.12	-	-	QP
8	24.883	-1.78	-40	-31.28	29.5	15.35	22.77	0.1	-	-	QP
9	28.215	-0.98	-40	-30.48	29.5	16.02	22.82	0.18	-	-	QP

<30MHz to 1GHz>

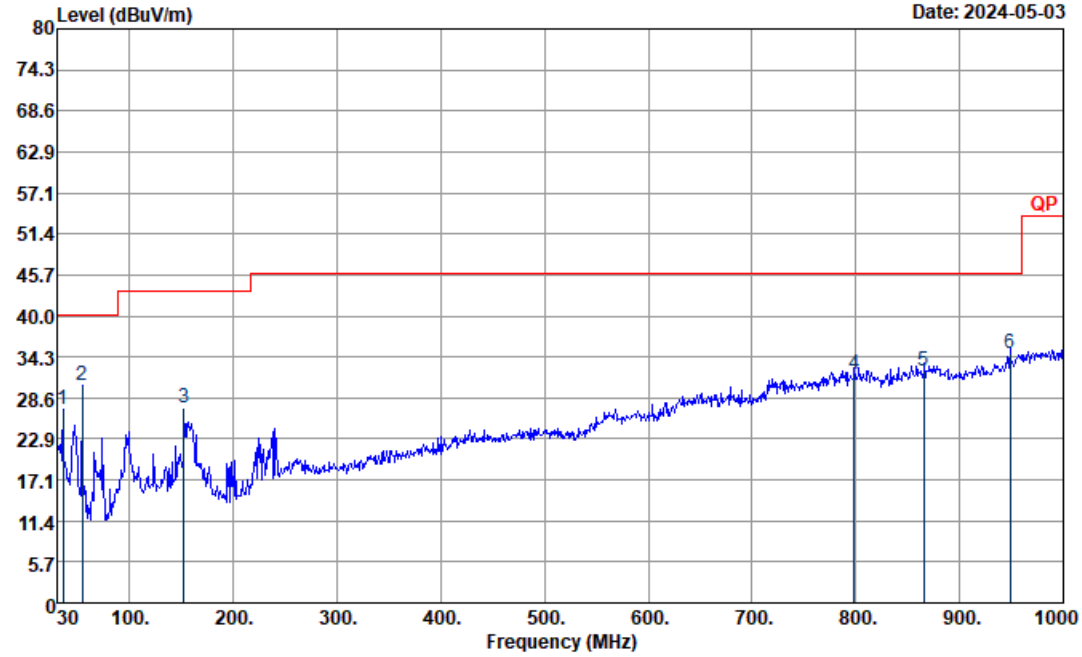
Temperature	20.1 ~ 22.4℃	**Relative Humidity**	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	30MHz to 1GHz	**Test Polarization**	Horizontal
Test Configuration	Mode 1: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (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 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 : 432213-01

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	73.74	19.71	-20.29	40	38.37	12.52	1.05	32.23	-	-	Peak
2	89.67	22.68	-20.82	43.5	39.29	14.65	1.16	32.42	-	-	Peak
3	98.31	25.48	-18.02	43.5	40.9	15.69	1.26	32.37	-	-	Peak
4	860	33.13	-12.87	46	31.45	29.12	4.17	31.61	-	-	Peak
5	953.8	34.52	-11.48	46	30.12	30.8	4.55	30.95	-	-	Peak
6	983.2	34.86	-19.14	54	30.11	30.73	4.61	30.59	-	-	Peak

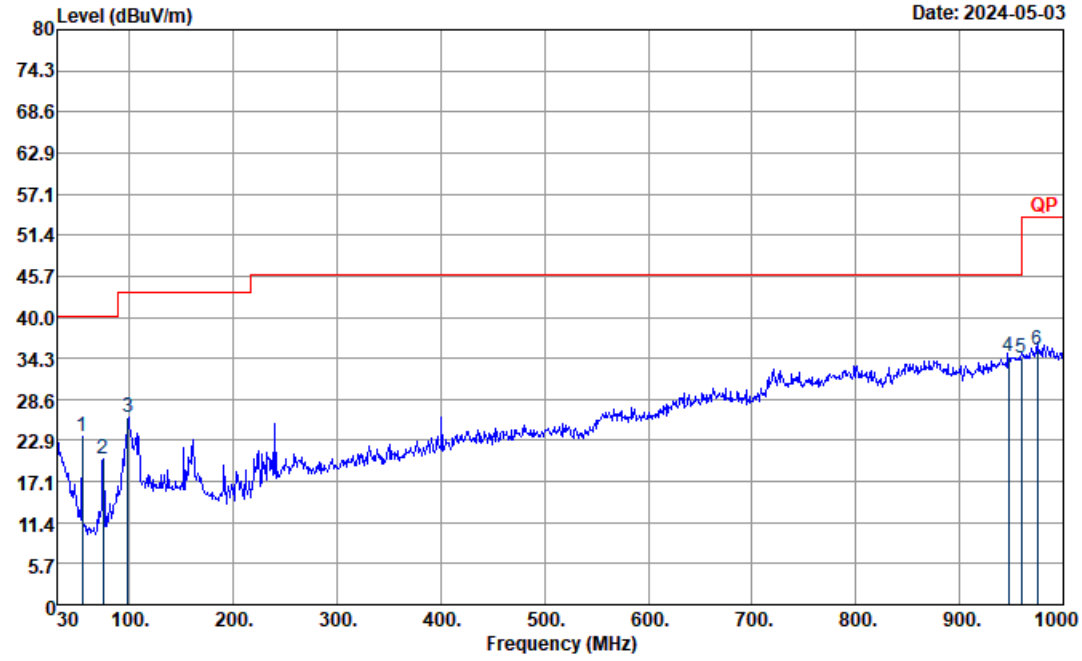
Temperature	20.1 ~ 22.4℃	Relative Humidity	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	Test Distance	3m
Test Range	30MHz to 1GHz	Test Polarization	Vertical
Test Configuration	Mode 1: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (dBμV) + Antenna 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 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 : 432213-01

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	35.4	27.04	-12.96	40	37.12	21.74	0.57	32.39	-	-	Peak
2	54.03	30.41	-9.59	40	49.17	12.63	0.78	32.17	-	-	Peak
3	152.04	27.12	-16.38	43.5	41	16.72	1.64	32.24	-	-	Peak
4	798.4	31.84	-14.16	46	31.02	28.21	4.13	31.52	-	-	Peak
5	865.6	32.42	-13.58	46	30.69	29.13	4.2	31.6	-	-	Peak
6	948.9	34.78	-11.22	46	30.75	30.5	4.54	31.01	-	-	Peak

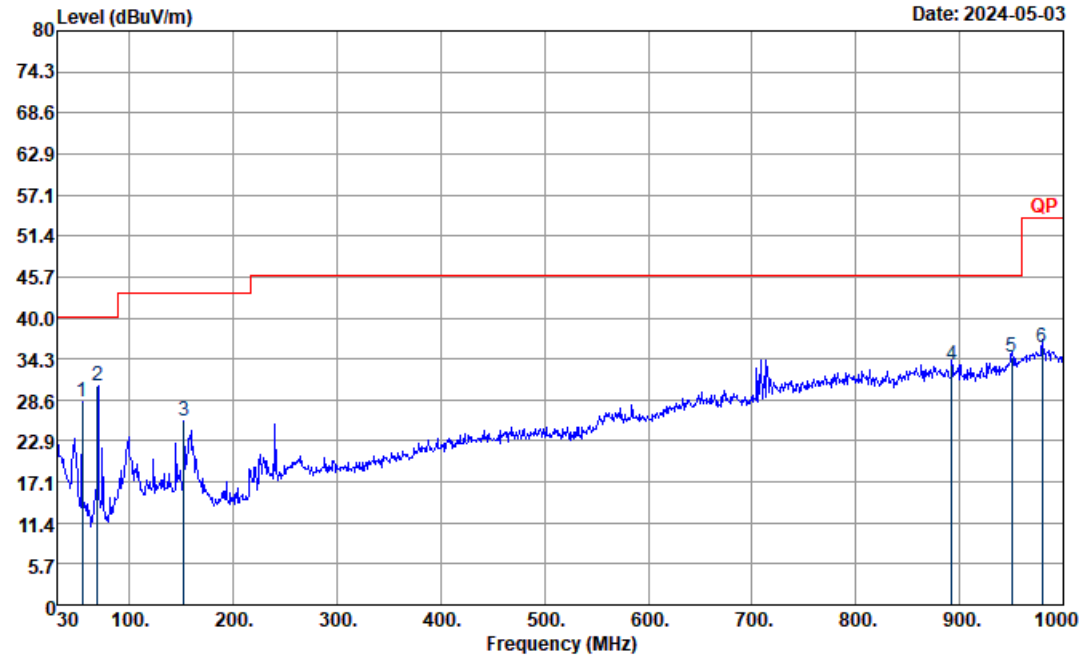
Temperature	20.1 ~ 22.4℃	Relative Humidity	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	Test Distance	3m
Test Range	30MHz to 1GHz	Test Polarization	Horizontal
Test Configuration	Mode 2: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 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 : 432213-01

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	23.35	-16.65	40	42.11	12.63	0.78	32.17	-	-	Peak
2	74.28	20.25	-19.75	40	38.84	12.59	1.06	32.24	-	-	Peak
3	98.31	26.06	-17.44	43.5	41.48	15.69	1.26	32.37	-	-	Peak
4	946.8	34.48	-11.52	46	30.61	30.37	4.53	31.03	-	-	Peak
5	959.4	34.42	-11.58	46	29.79	30.96	4.56	30.89	-	-	Peak
6	974.8	35.49	-18.51	54	30.58	31.02	4.59	30.7	-	-	Peak

Temperature	20.1 ~ 22.4℃	**Relative Humidity**	55.3 ~ 66.3%
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 Chip 1+2 (Diversity Transmit) 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.		

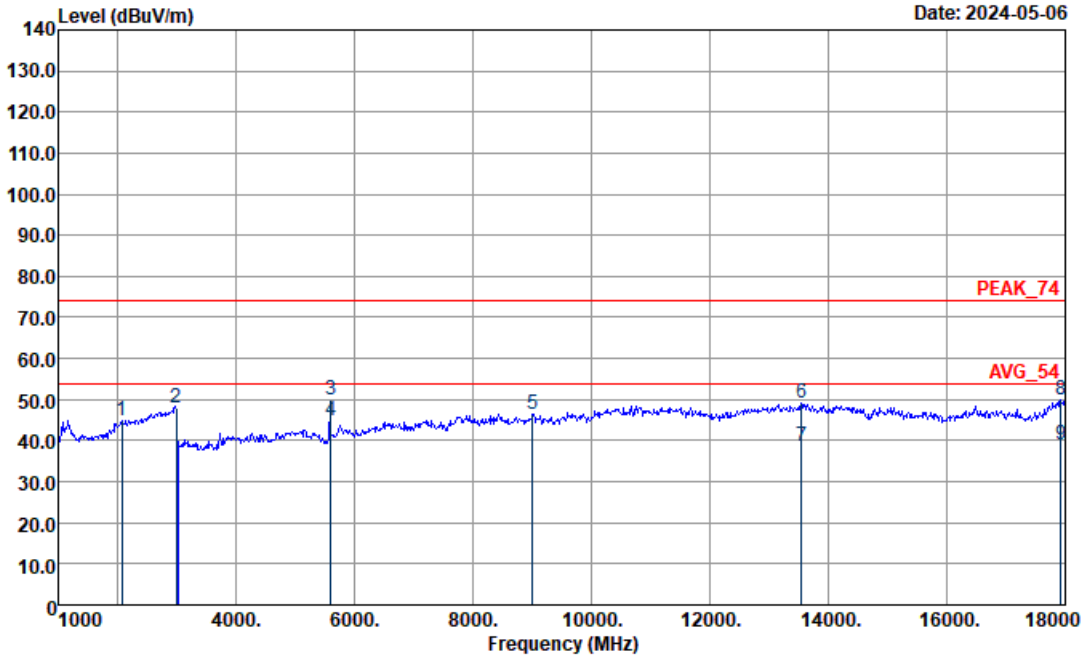


Site : 03CH11-HY
Condition : QP 3m 2_BILOG_35414_231007 VERTICAL
: RBW:120.000KHz VBW:300.000KHz SWT:0.500sec
: .
Detector : Peak
Project : 432213-01

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	28.34	-11.66	40	47.1	12.63	0.78	32.17	-	-	Peak
2	69.15	30.59	-9.41	40	49.7	12.06	0.98	32.15	-	-	Peak
3	152.04	25.68	-17.82	43.5	39.56	16.72	1.64	32.24	-	-	Peak
4	892.2	33.42	-12.58	46	31.68	28.93	4.33	31.52	-	-	Peak
5	950.3	34.65	-11.35	46	30.52	30.59	4.54	31	-	-	Peak
6	979.7	35.97	-18.03	54	31.03	30.98	4.6	30.64	-	-	Peak

<1GHz to 18GHz>

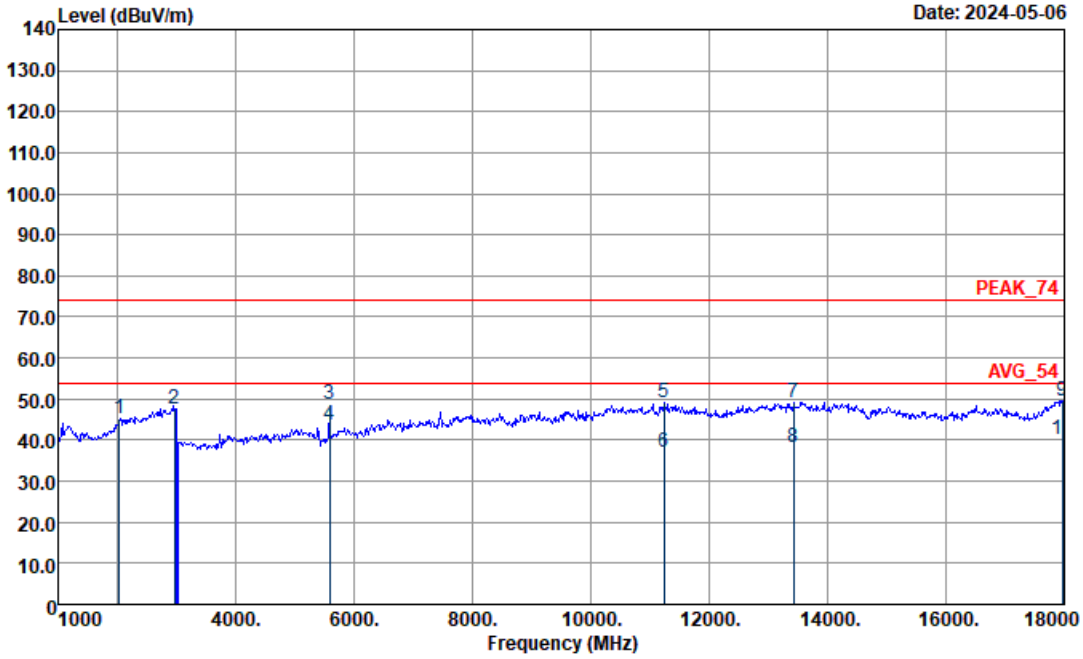
Temperature	20.1 ~ 22.4℃	**Relative Humidity**	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	1GHz to 18GHz	**Test Polarization**	Horizontal
Test Configuration	Mode 1: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (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 : 432213-01

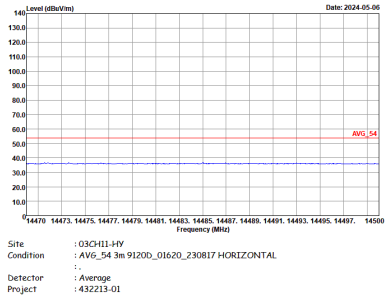
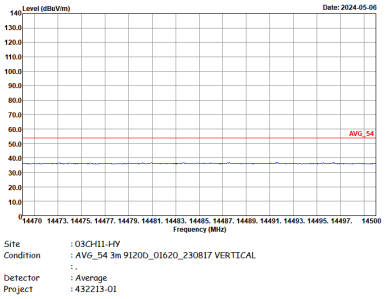
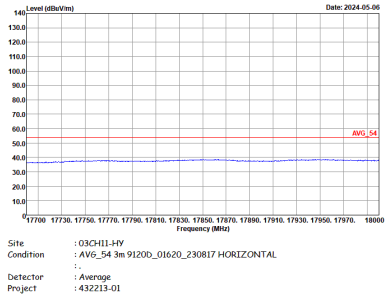
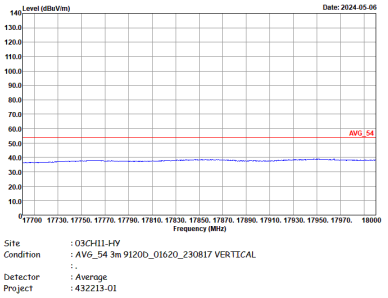
Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	2072	44.85	-29.15	74	44.42	27.3	6.67	33.54	-	-	Peak
2	2998	47.93	-26.07	74	43.94	29.6	7.72	33.33	-	-	Peak
3	5595	49.95	-24.05	74	63	32.99	12.35	58.39	100	191	Peak
4	5595	45.04	-8.96	54	58.1	32.99	12.34	58.39	100	191	Average
5	9000	46.47	-27.53	74	50.63	37.9	16.16	58.22	-	-	Peak
6	13545	49.28	-24.72	74	51.53	40.48	19.82	62.55	100	23	Peak
7	13545	38.74	-15.26	54	41	40.48	19.81	62.55	100	23	Average
8	17925	49.79	-24.21	74	41.01	41.65	23.39	56.26	100	133	Peak
9	17925	39.13	-14.87	54	30.36	41.65	23.38	56.26	100	133	Average

Temperature	20.1 ~ 22.4℃	Relative Humidity	55.3 ~ 66.3%
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 Chip 1+2 (Diversity Transmit) 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.		

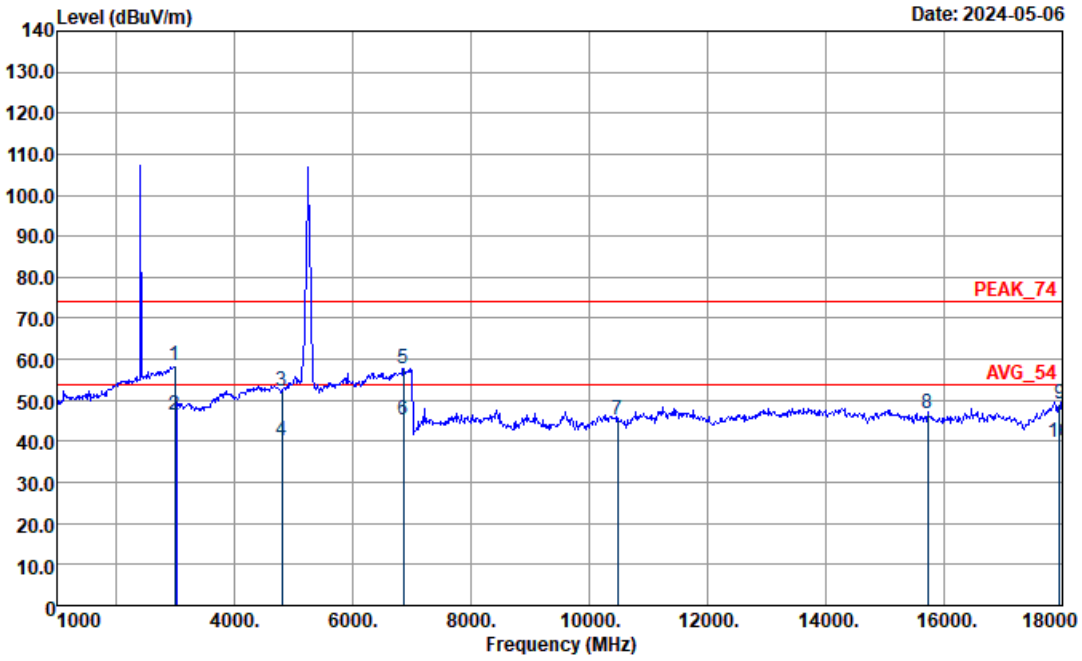


Site : 03CH11-HY
Condition : PEAK_74 3m 9120D_01620_230817 VERTICAL
: .
Detector : Peak
Project : 432213-01

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	2038	45.21	-28.79	74	44.94	27.16	6.67	33.56	-	-	Peak
2	2968	47.66	-26.34	74	43.84	29.48	7.67	33.33	-	-	Peak
3	5592	48.84	-25.16	74	61.91	32.98	12.34	58.39	105	201	Peak
4	5592	43.73	-10.27	54	56.81	32.98	12.33	58.39	105	201	Average
5	11235	49.04	-24.96	74	53.17	39.04	17.97	61.14	100	46	Peak
6	11235	37.13	-16.87	54	41.27	39.04	17.96	61.14	100	46	Average
7	13425	49.33	-24.67	74	51.81	40.2	19.80	62.48	100	53	Peak
8	13425	38.15	-15.85	54	40.64	40.2	19.79	62.48	100	53	Average
9	17970	49.65	-24.35	74	40.52	41.88	23.43	56.18	100	322	Peak
10	17970	40.04	-13.96	54	30.92	41.88	23.42	56.18	100	322	Average

	Mode 1: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode	
	Horizontal	**Vertical**
14.47G ~14.5G Avg.	 Site : 03CH11-HY Condition : AVG_54 3m 9120D_01620_230817 HORIZONTAL : . Detector : Average Project : 432213-01	 Site : 03CH11-HY Condition : AVG_54 3m 9120D_01620_230817 VERTICAL : . Detector : Average Project : 432213-01
17.7G ~18G Avg	 Site : 03CH11-HY Condition : AVG_54 3m 9120D_01620_230817 HORIZONTAL : . Detector : Average Project : 432213-01	 Site : 03CH11-HY Condition : AVG_54 3m 9120D_01620_230817 VERTICAL : . Detector : Average Project : 432213-01

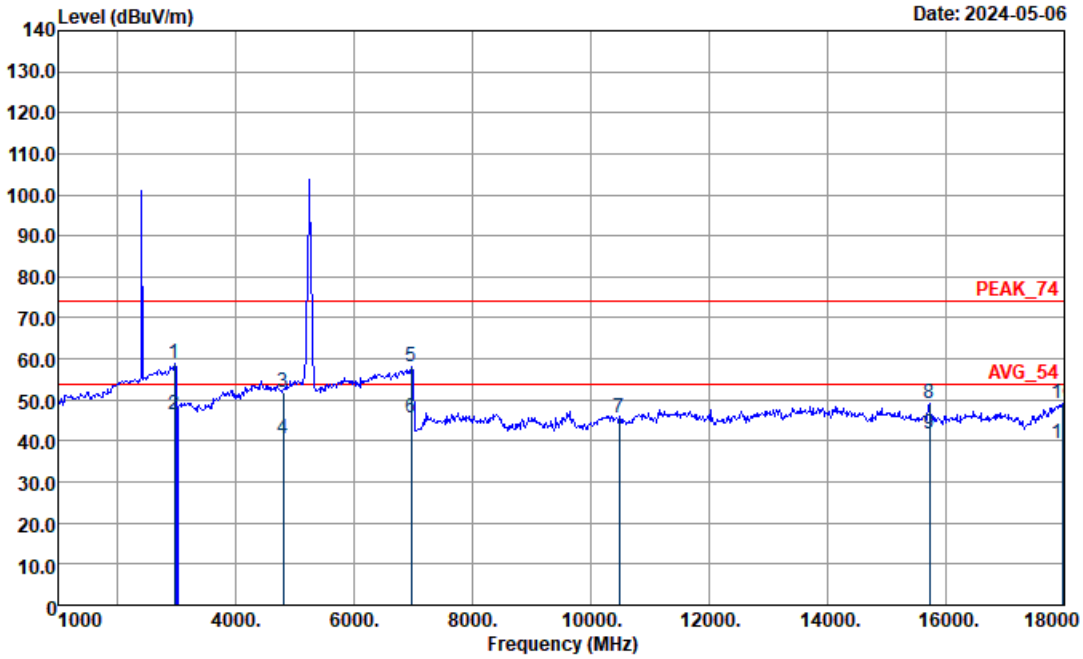
Temperature	20.1 ~ 22.4℃	**Relative Humidity**	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	1GHz to 18GHz	**Test Polarization**	Horizontal
Test Configuration	Mode 2: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE 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_230817 HORIZONTAL
: .
Detector : Peak
Project : 432213-01

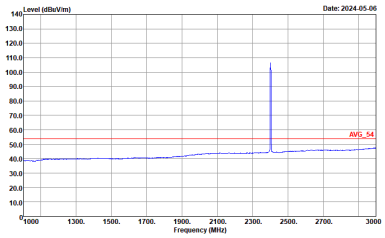
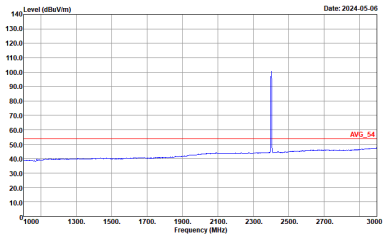
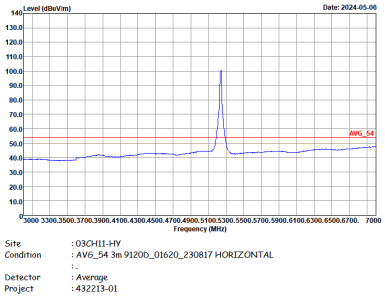
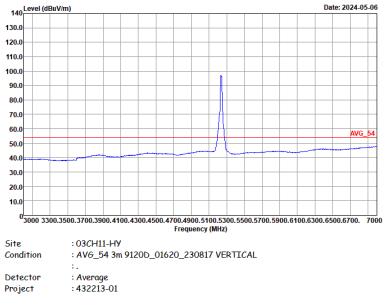
Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	2996	58.47	-15.53	74	44.21	29.6	17.99	33.33	100	43	Peak
2	2996	46.6	-7.4	54	32.35	29.6	17.98	33.33	100	43	Average
3	4804	52.21	-21.79	74	41.94	32.42	10.75	32.9	100	311	Peak
4	4804	40.11	-13.89	54	29.85	32.42	10.74	32.9	100	311	Average
5	6852	57.65	-16.35	74	42.01	35.8	13.33	33.49	100	133	Peak
6	6852	45.39	-8.61	54	29.76	35.8	13.32	33.49	100	133	Average
7	10480	45.29	-28.71	74	49.46	38.74	17.27	60.18	-	-	Peak
8	15720	46.86	-27.14	74	49.57	37.6	21.08	61.39	-	-	Peak
9	17956	49.17	-24.83	74	40.57	41.82	22.98	56.2	100	213	Peak
10	17956	39.7	-14.3	54	31.11	41.82	22.97	56.2	100	213	Average

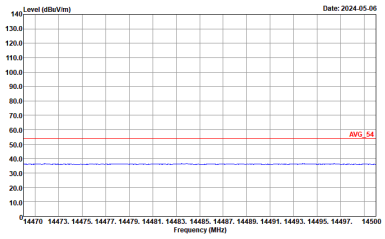
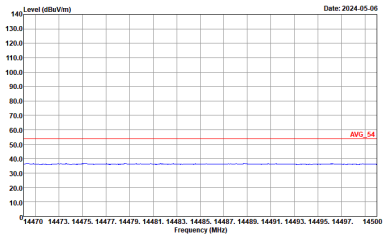
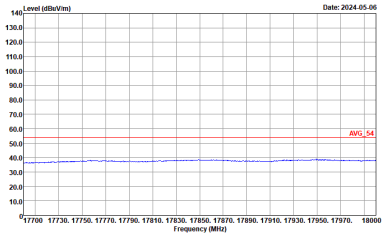
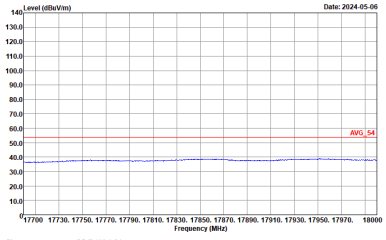
Temperature	20.1 ~ 22.4℃	**Relative Humidity**	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	3m
Test Range	1GHz to 18GHz	**Test Polarization**	Vertical
Test Configuration	Mode 2: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 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.		



Site : 03CH11-HY
Condition : PEAK_74 3m 9120D_01620_230817 VERTICAL
: .
Detector : Peak
Project : 432213-01

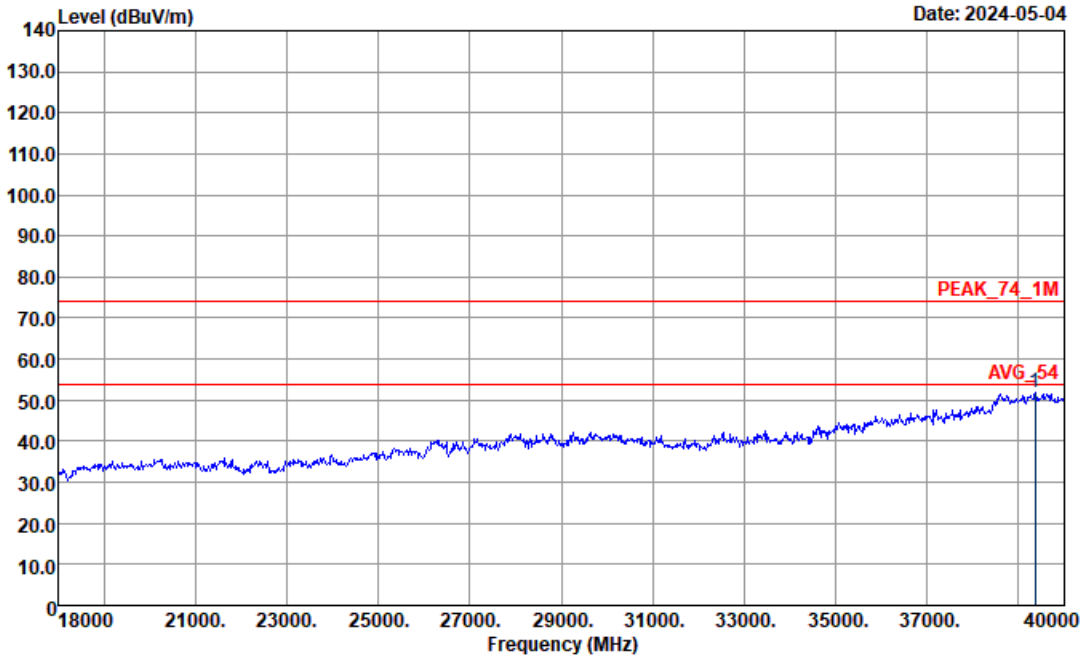
Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	2970	58.95	-15.05	74	44.84	29.5	17.94	33.33	100	72	Peak
2	2970	46.54	-7.46	54	32.44	29.5	17.93	33.33	100	72	Average
3	4804	52.06	-21.94	74	41.79	32.42	10.75	32.9	100	249	Peak
4	4804	40.45	-13.55	54	30.19	32.42	10.74	32.9	100	249	Average
5	6960	58.03	-15.97	74	42.36	35.82	13.41	33.56	100	34	Peak
6	6960	45.64	-8.36	54	29.98	35.82	13.40	33.56	100	34	Average
7	10480	45.82	-28.18	74	49.99	38.74	17.27	60.18	-	-	Peak
8	15720	49.08	-24.92	74	51.79	37.6	21.08	61.39	100	249	Peak
9	15720	41.69	-12.31	54	44.41	37.6	21.07	61.39	100	249	Average
10	17967	49.18	-24.82	74	40.51	41.87	22.98	56.18	100	56	Peak
11	17967	39.48	-14.52	54	30.82	41.87	22.97	56.18	100	56	Average

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

	Mode 2: 60GHz Chip 1+2 (Diversity Transmit) 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>

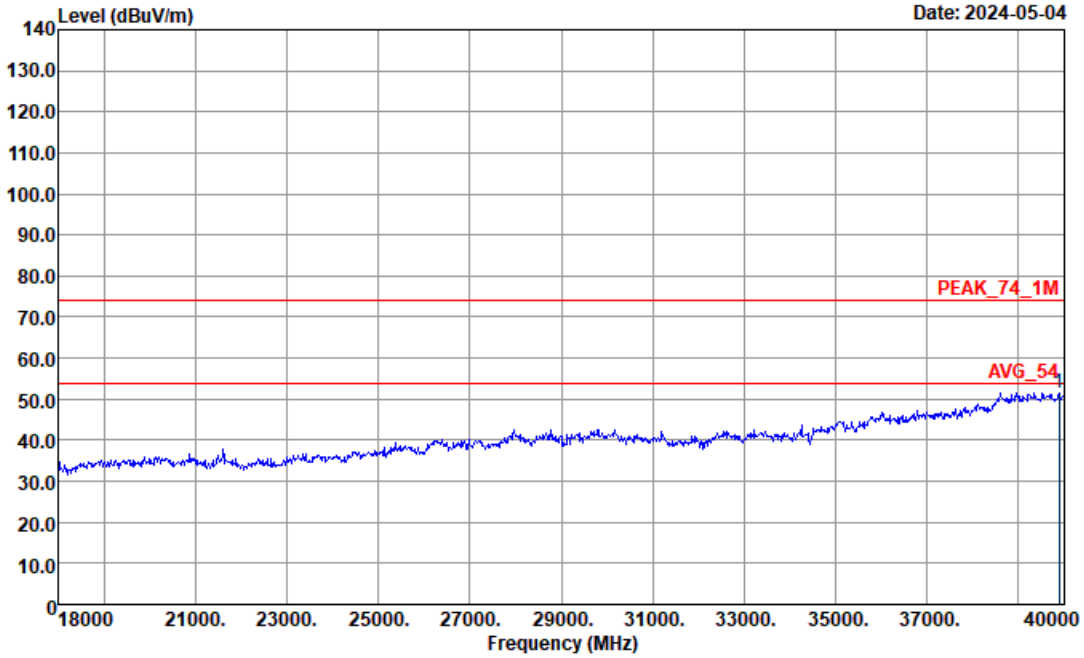
Temperature	20.1 ~ 22.4℃	**Relative Humidity**	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	**Test Distance**	1m
Test Range	18GHz to 40GHz	**Test Polarization**	Horizontal
Test Configuration	Mode 1: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode		
Remark	1. Level (dBμV/m) = Read Level (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 : 432213-01

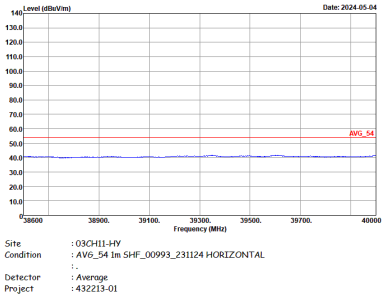
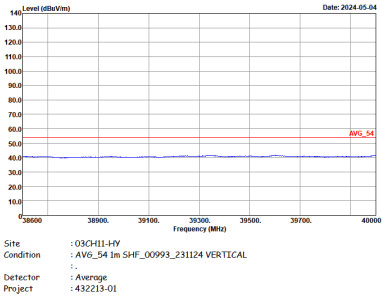
Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	39370	52.01	-21.99	74	38.74	44.98	24.87	56.58	-	-	Peak

Temperature	20.1 ~ 22.4℃	Relative Humidity	55.3 ~ 66.3%
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 Chip 1+2 (Diversity Transmit) 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.		

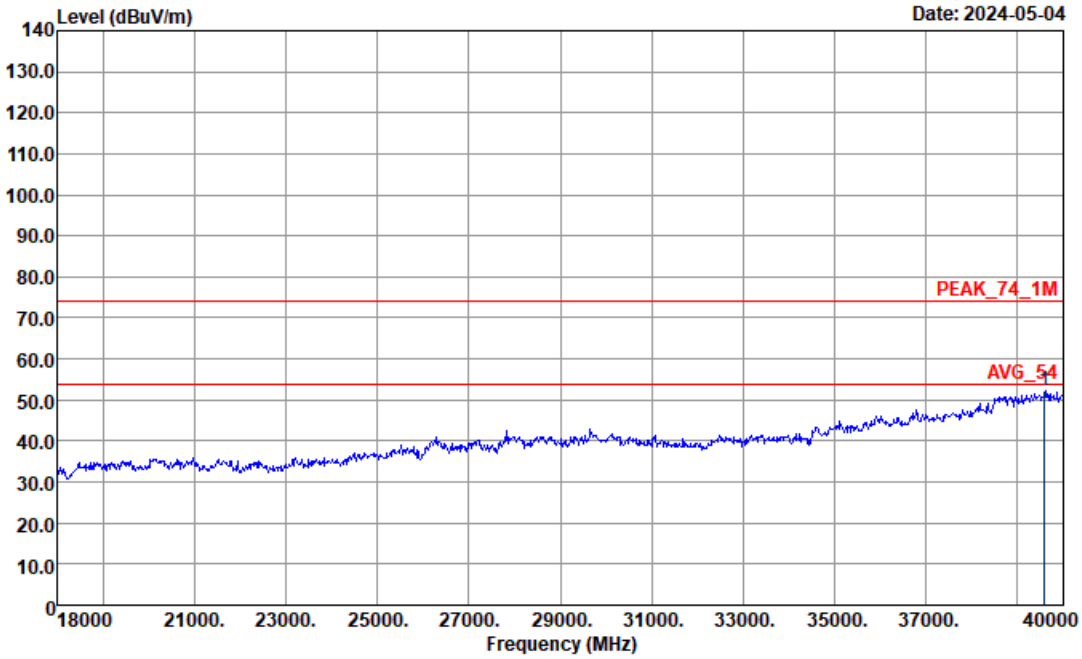


Site : 03CH11-HY
Condition : PEAK_74_1M 1m SHF_00993_231124 VERTICAL
: .
Detector : Peak
Project : 432213-01

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	39888	51.54	-22.46	74	38.24	44.65	24.68	56.03	-	-	Peak

	Mode 1: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode	
	Horizontal	Vertical
38.6G ~40G Avg.		

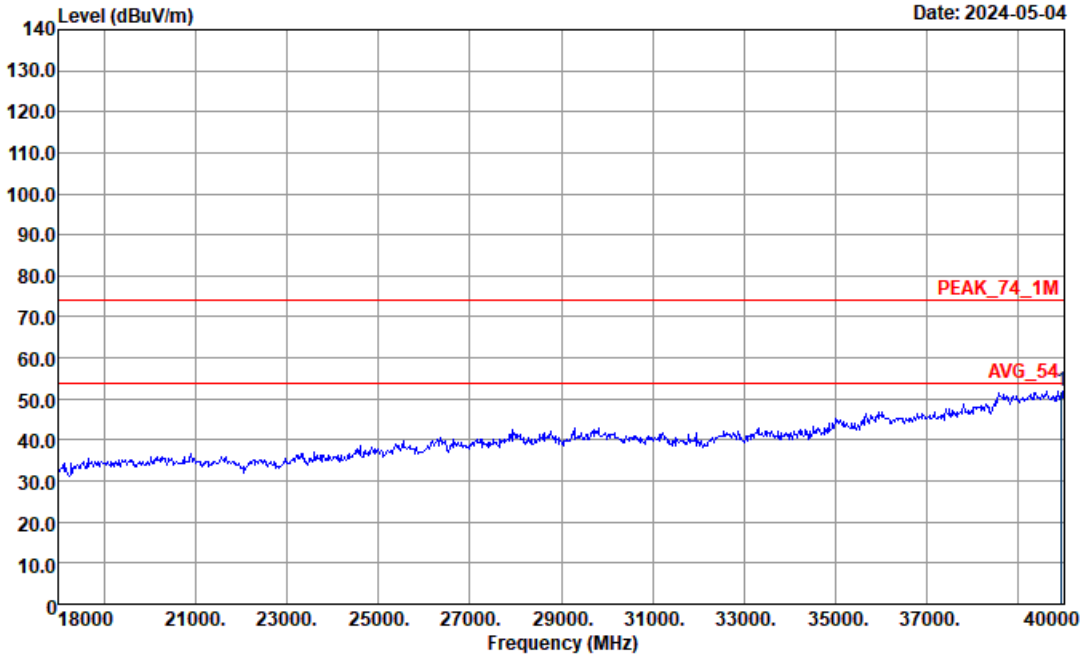
Temperature	20.1 ~ 22.4℃	Relative Humidity	55.3 ~ 66.3%
Test Engineer	Troye Hsieh, Yuan Lee and Sam Chou	Test Distance	1m
Test Range	18GHz to 40GHz	Test Polarization	Horizontal
Test Configuration	Mode 2: 60GHz Chip 1+2 (Diversity Transmit) FMCW mode + WLAN module (11n Ch48 Setting 19 + BLE Ch00 Setting 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 : 432213-01

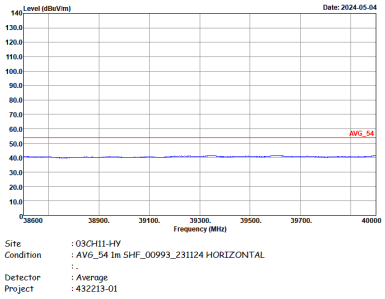
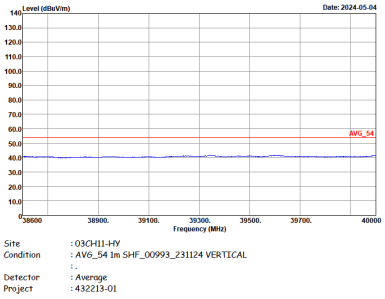
Mark	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
1	39594	52.26	-21.74	74	38.94	44.92	24.79	56.39	-	-	Peak

Temperature	20.1 ~ 22.4℃	Relative Humidity	55.3 ~ 66.3%
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 Chip 1+2 (Diversity Transmit) 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 : 432213-01

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	39944	51.9	-22.1	74	38.79	44.42	24.66	55.97	-	-	Peak

	Mode 2: 60GHz Chip 1+2 (Diversity Transmit) 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 Chip 1+2 (Diversity Transmit) 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	40.6265	-80.67
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-36.53	3	0.196584	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	89.9885	-77.42
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-32.30	3	0.520652	90	PASS

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

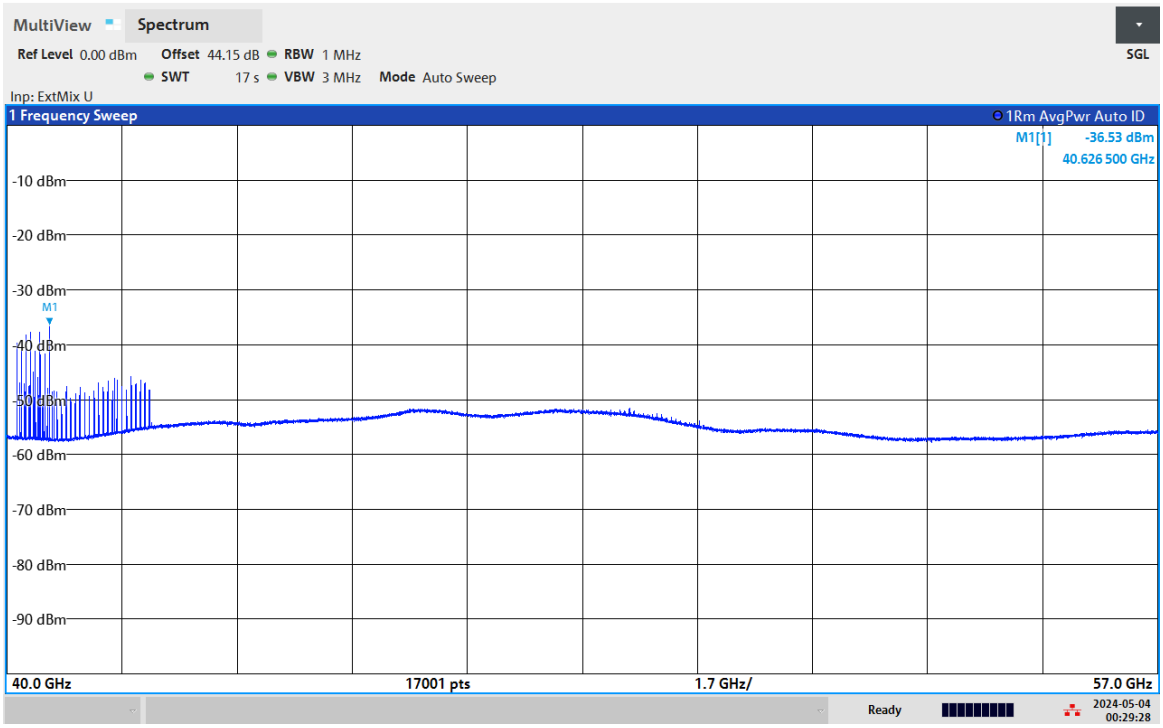
Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
90 - 140	22.4	0.43	90.7705	-71.07
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-25.01	3	2.789637	90	PASS

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

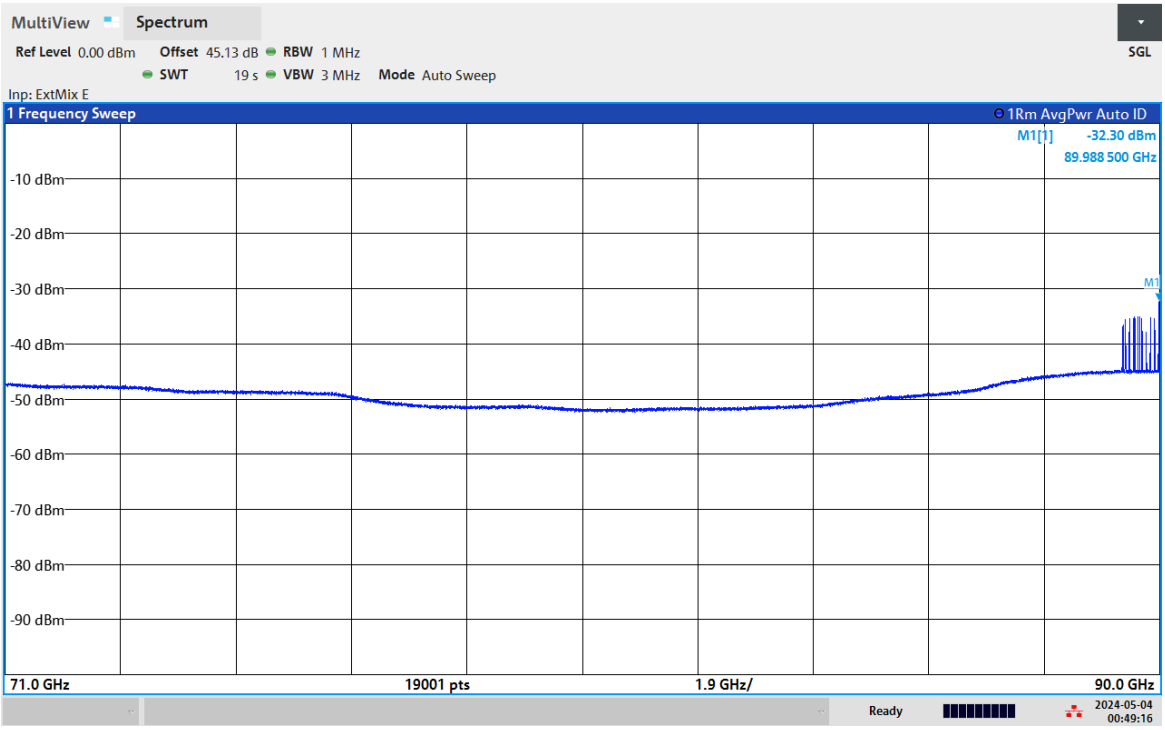
Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
140 - 200	22.8	0.27	140.5105	-71.37
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-26.65	3	1.912263	90	PASS

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

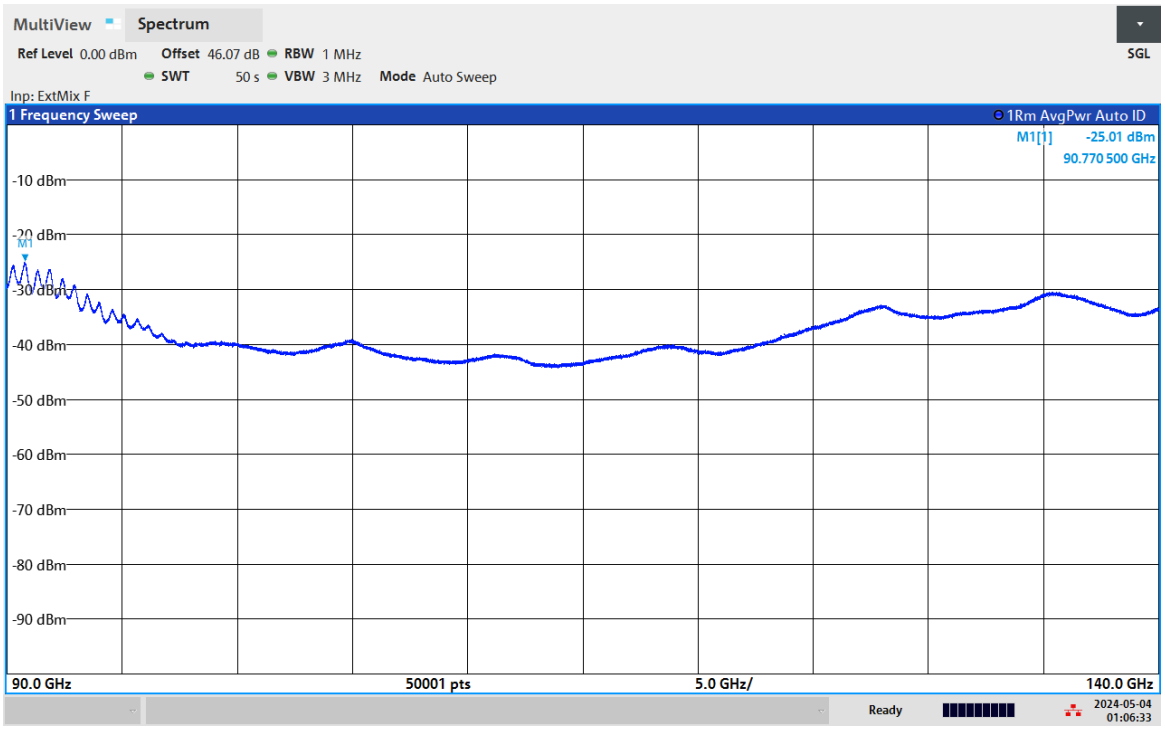
40GHz ~ 57GHz



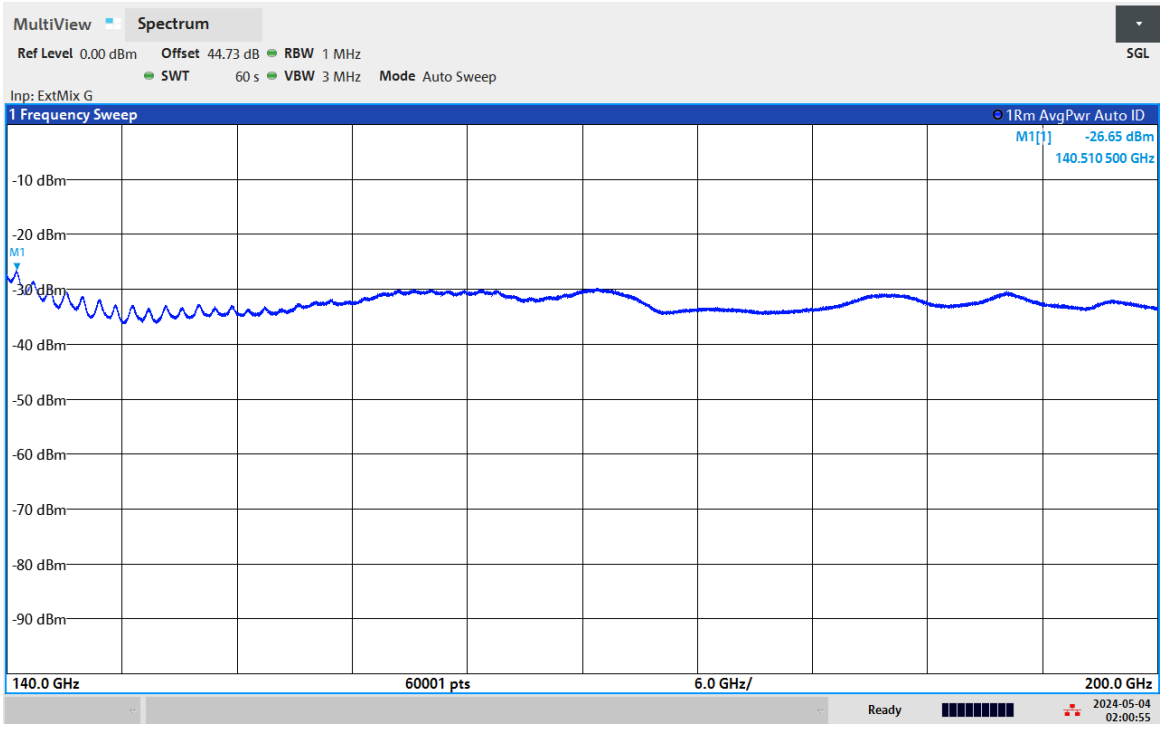
71GHz ~ 90GHz



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 Chip 1+2 (Diversity Transmit) 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	41.9904	-89.79
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-45.65	3	0.024074	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	89.8365	-73.64
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-28.52	3	1.243219	90	PASS

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

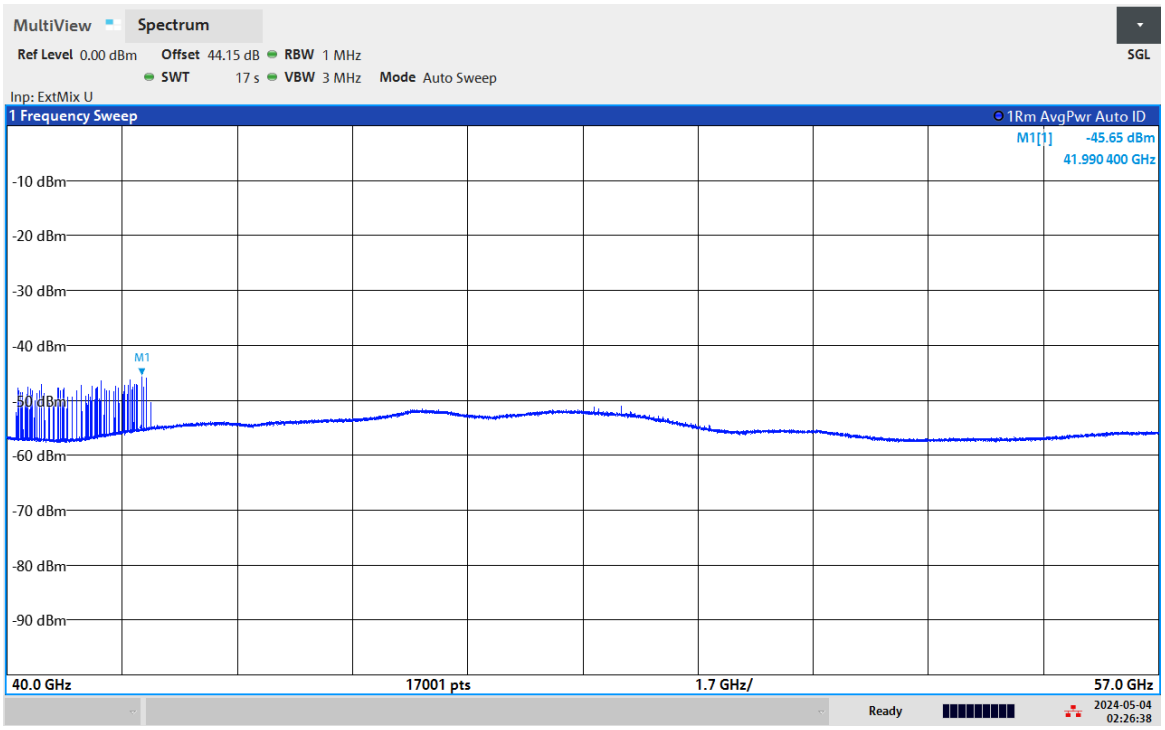
Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
90 - 140	22.4	0.43	90.7875	-70.58
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-24.52	3	3.122825	90	PASS

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

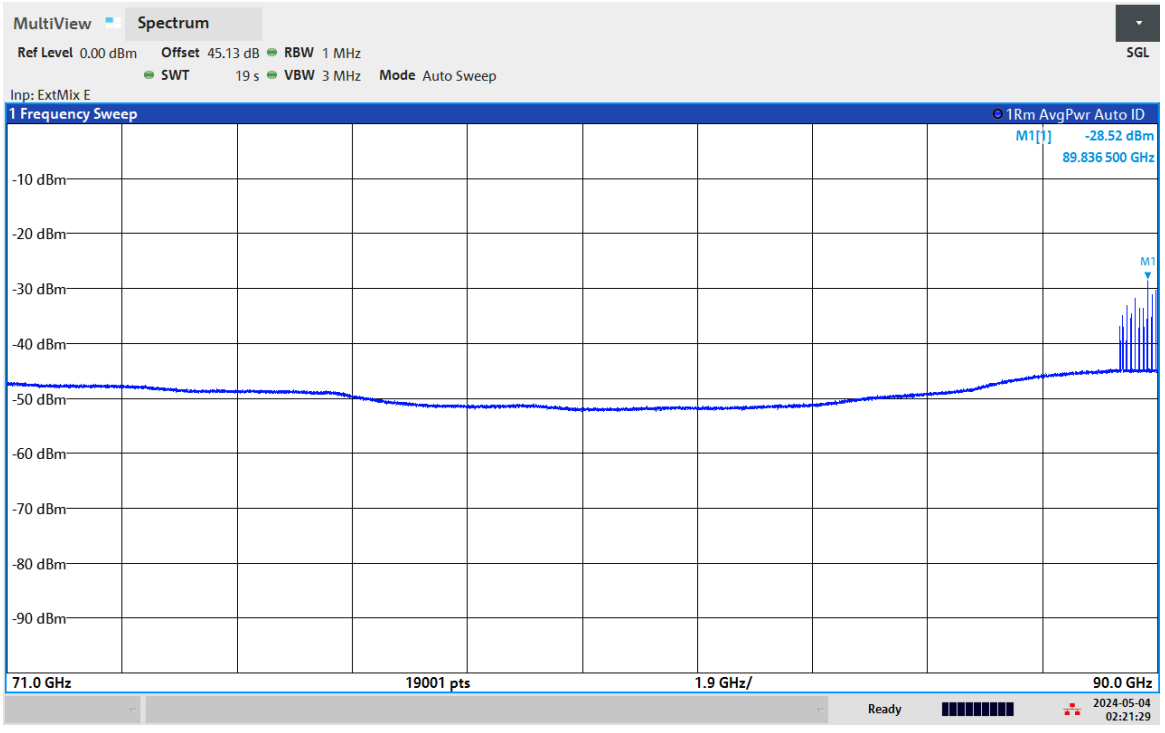
Test Frequency (GHz)	Rx Antenna Gain (dBi)	Measurement Distance (m)	Read Worse Frequency (GHz)	Read Level (dBm)
140 - 200	22.8	0.27	140.4765	-71.37
EIRP (dBm)	**Specification Distance (m)**	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Test Result**
-26.65	3	1.912263	90	PASS

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

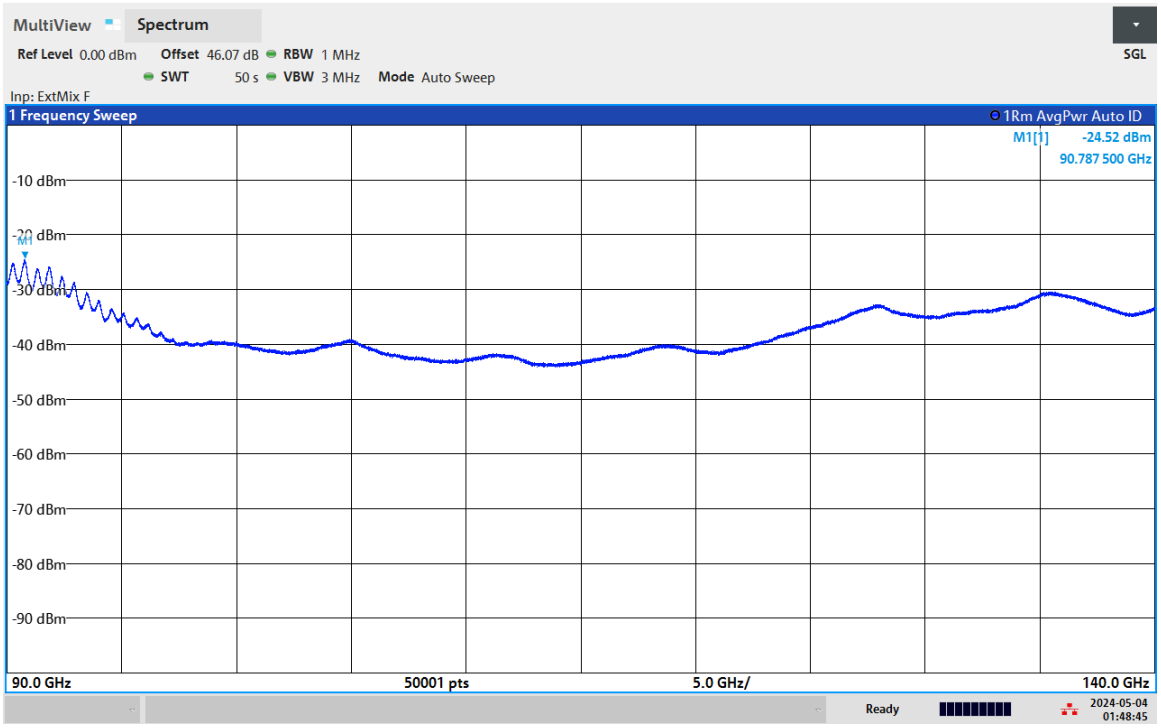
40GHz ~ 57GHz



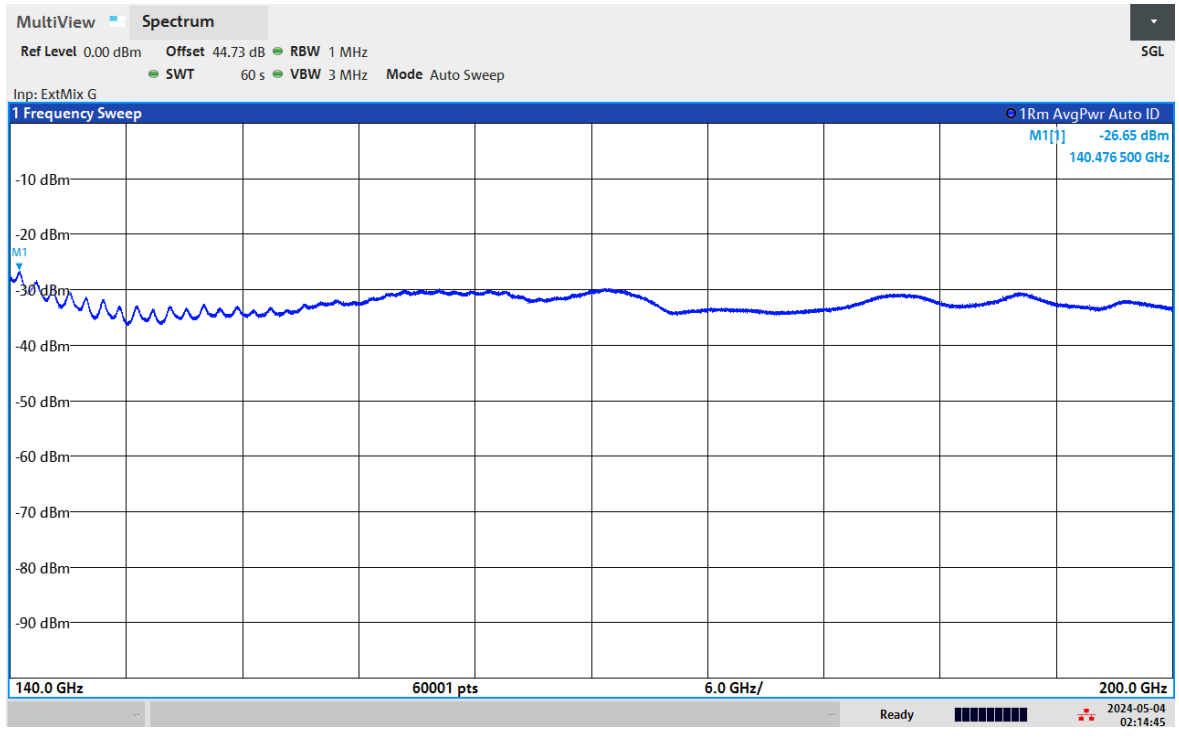
71GHz ~ 90GHz



90GHz ~ 140GHz



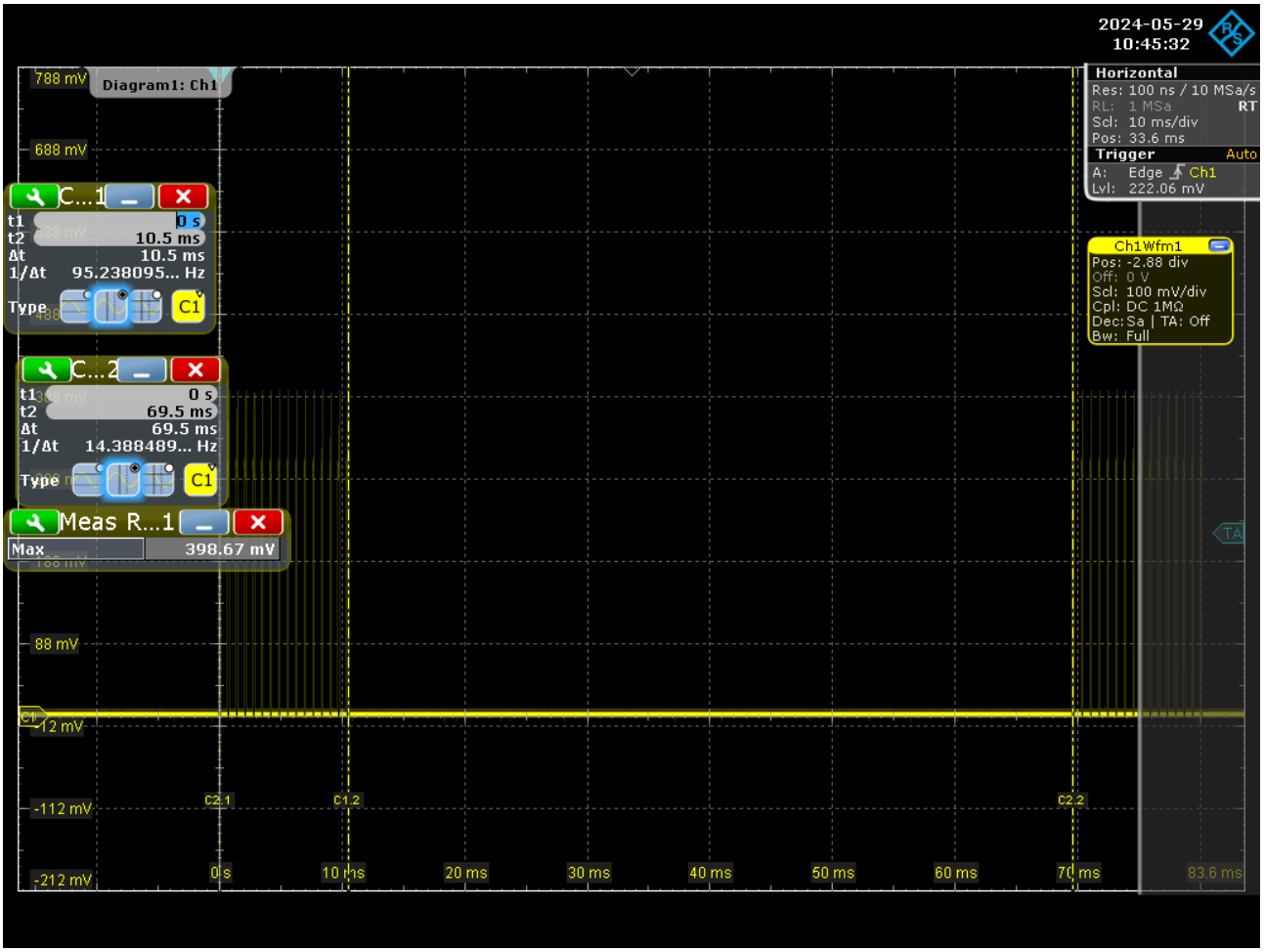
140GHz ~ 200GHz



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)
59.85	61.35	60.6	1500	10500	0.14	1.43E+11	1.00	1.00E+6	0.14	0.999	0.009

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 = (59.85 + 61.35) / 2 = 60.6
2. FMCW Width, (Fs) = (61.35 - 59.85) * 1000 = 1500
3. Sweep Rate (MHz/us) = 1500 / 10500 = 0.14
4. Normalized Sweep Rate (lin) = 1.43E+11 / [$1.00E+06^2$] = 0.14
5. Desensitization correction factor (lin) = $1/((1+(((2*LN(2))/3.14)^2*(0.14^2)))^{0.25})$ = 0.999
6. Desensitization correction factor (dB) = |20*log(0.999)| = 0.009

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 – 61.56GHz.

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	12	59.8432	61.3495	Within 57 ~ 61.56GHz	pass
40	12	59.8485	61.3513		
30	12	59.8499	61.3551		
20	12	59.8545	61.3520		
10	12	59.8430	61.3526		
0	12	59.8442	61.3521		
-10	12	59.8482	61.3521		
-20	12	59.8475	61.3525		
20	13.2	59.8538	61.3526		
20	10.8	59.8526	61.3518		

Note:

1. Normal Voltage =12 Vdc.；Low Voltage =10.8 Vdc.；Maximum Voltage =13.2 Vdc.
2. The frequency fundamental emissions stay within the operation band.

4 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	MY532700080	1GHz~26.5GHz	Mar. 25, 2024	May 01, 2024 ~ May 06, 2024	Mar. 24, 2025	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY542004486	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)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
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)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170584	18GHz-40GHz	Dec. 13, 2023	May 02, 2024 ~ May 29, 2024	Dec. 12, 2024	Radiation (03CH18-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV3044	101009	9kHz to 44GHz	Nov. 17, 2023	May 02, 2024 ~ May 29, 2024	Nov. 16, 2024	Radiation (03CH18-HY)
Harmonic Mixer*	Rohde & Schwarz	RPG FS-Z60	100986	40GHz to 60GHz	Oct. 31, 2023	May 02, 2024 ~ May 29, 2024	Oct. 30, 2026	Radiation (03CH18-HY)
Harmonic Mixer	Rohde & Schwarz	RPG FS-Z75	101557	50 GHz to 75 GHz	Jan. 04, 2024	May 02, 2024 ~ May 29, 2024	Jan. 03, 2027	Radiation (03CH18-HY)
Harmonic Mixer*	Rohde & Schwarz	FSZ-90	101811	60GHz to 90GHz	Oct. 31, 2023	May 02, 2024 ~ May 29, 2024	Oct. 30, 2026	Radiation (03CH18-HY)
Harmonic Mixer*	Rohde & Schwarz	RPG FS-Z140	101128	90GHz to 140GHz	Oct. 27, 2023	May 02, 2024 ~ May 29, 2024	Oct. 26, 2026	Radiation (03CH18-HY)
Harmonic Mixer	Rohde & Schwarz	RPG FS-Z220	101014	140GHz to 220GHz	Oct. 27, 2023	May 02, 2024 ~ May 29, 2024	Oct. 26, 2026	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-UPRR00	QWH-UPRR00-01	40-60 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-VPRR00	1371800008	50-75 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-VPRR00	1371800009	50-75 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-EPRR00	1372000000	60-90 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-FPRR00	1011500008	90-140 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Antenna	Quinstar	QWH-GPRR00	QWH-GPRR00-01	140-220 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801607/2	N/A	Nov. 28, 2023	May 02, 2024 ~ May 29, 2024	Nov. 27, 2024	Radiation (03CH18-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	519231/2	N/A	Nov. 28, 2023	May 02, 2024 ~ May 29, 2024	Nov. 27, 2024	Radiation (03CH18-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Detector	Quinstars	QEA-FBFBVP	2672009	50 ~ 75 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Oscilloscope	Rohde & Schwarz	RTO 1002	400025	600MHz, 10GSa/sec	Sep. 20, 2023	May 02, 2024 ~ May 29, 2024	Sep. 19, 2024	Radiation (03CH18-HY)
Power Meter	Agilent	E4416A	GB43312306	N/A	Apr. 17, 2024	May 02, 2024 ~ May 29, 2024	Apr. 16, 2025	Radiation (03CH18-HY)
Power Sensor	Keysight	V8486A	MY60170002	50 ~ 75 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Power Sensor	Keysight	V8486A	MY60170002	50 ~ 75 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Signal Generator	Anritsu	MG3694C	163401	8MHz~40GHz	Jan. 22, 2024	May 02, 2024 ~ May 29, 2024	Jan. 21, 2025	Radiation (03CH18-HY)
Active Frequency Multiplier	Eravant	SFA-503753416-15KF-E1	03099-01	50 ~ 75 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Attenuator	SAGE	STA-30-15-M2	18953-02	50 ~ 75 GHz	Jul. 06, 2021	May 02, 2024 ~ May 29, 2024	Jul. 05, 2024	Radiation (03CH18-HY)
Thermal Chamber	ESPEC	SU-641	92013721	-30℃ ~70℃	Oct. 11, 2023	May 02, 2024 ~ May 29, 2024	Oct. 10, 2024	Radiation (03CH18-HY)
AC Power Source	AC POWER	AFC-500W	F104070011	50Hz~60Hz	Sep. 09, 2023	May 02, 2024 ~ May 29, 2024	Sep. 21, 2024	Radiation (03CH18-HY)

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

5 Measurement Uncertainty

Test Item	Uncertainty
Radiated Emission Measurement (9 kHz ~ 30 MHz)	±3.9dB
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)	±5.64dB
Radiated Emission Measurement (140 GHz ~ 200 GHz)	±6.65dB
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))