



FCC RADIO TEST REPORT

FCC ID : B32V400M2
Equipment : Point of Sale Terminal
Brand Name : Verifone
Model Name : V400m-2
V400m Plus 4G WW2
Applicant : VeriFone, Inc.
1400 West Stanford Ranch Road
Suite 150 Rocklin CA 95765 USA
Manufacturer : VeriFone, Inc.
Standard : FCC Part 15 Subpart E §15.407

The product was received on Jul. 25, 2023 and testing was performed from Aug. 11, 2023 to Aug. 24, 2023. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this partial 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
FR372517E	01	Initial issue of report	Sep. 20, 2023
FR372517E	02	Revise model name, applicant and manufacturer information This report is an updated version, replacing the report issued on Sep. 20, 2023.	Oct. 11, 2023

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.407(a)	Maximum Conducted Output Power	Pass	-
3.2	15.407(b)	Unwanted Emissions	Pass	3.61 dB under the limit at 5150.00 MHz
3.3	15.203	Antenna Requirement	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/manufacture 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:

1. 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.
2. The purpose of different model name is for marketing segmentation.

Reviewed by: Yun Huang**Report Producer: Lea Yu**

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
General Specs GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac and NFC.	
Antenna Type WWAN: Fixed Internal Antenna WLAN: PCB Antenna Bluetooth: PCB Antenna NFC: Loop Antenna	

Antenna information		
5150 MHz ~ 5250 MHz	Peak Gain (dBi)	3.15
5250 MHz ~ 5350 MHz	Peak Gain (dBi)	2.95
5470 MHz ~ 5725 MHz	Peak Gain (dBi)	2.87

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

1.2 Modification of EUT

No modifications made to the EUT during the testing.

1.3 Testing Location

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. TH05-HY, 03CH22-HY

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

FCC designation No.: TW3786



1.4 Applicable Standards

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

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ ANSI C63.10-2013

Remark:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5150-5250 MHz Band 1 (U-NII-1)	36	5180	44	5220
	38*	5190	46*	5230
	40	5200	48	5240
	42 [#]	5210		

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5250-5350 MHz Band 2 (U-NII-2A)	52	5260	60	5300
	54*	5270	62*	5310
	56	5280	64	5320
	58 [#]	5290		

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5470-5725 MHz Band 3 (U-NII-2C)	100	5500	112	5560
	102*	5510	116	5580
	104	5520	132	5660
	106 [#]	5530	134*	5670
	108	5540	136	5680
	110*	5550	140	5700

Note: The above Frequency and Channel with "*" are 802.11n HT40.

2.2 Test Mode

The final test modes include the worst data rates for each modulation shown in the table below.

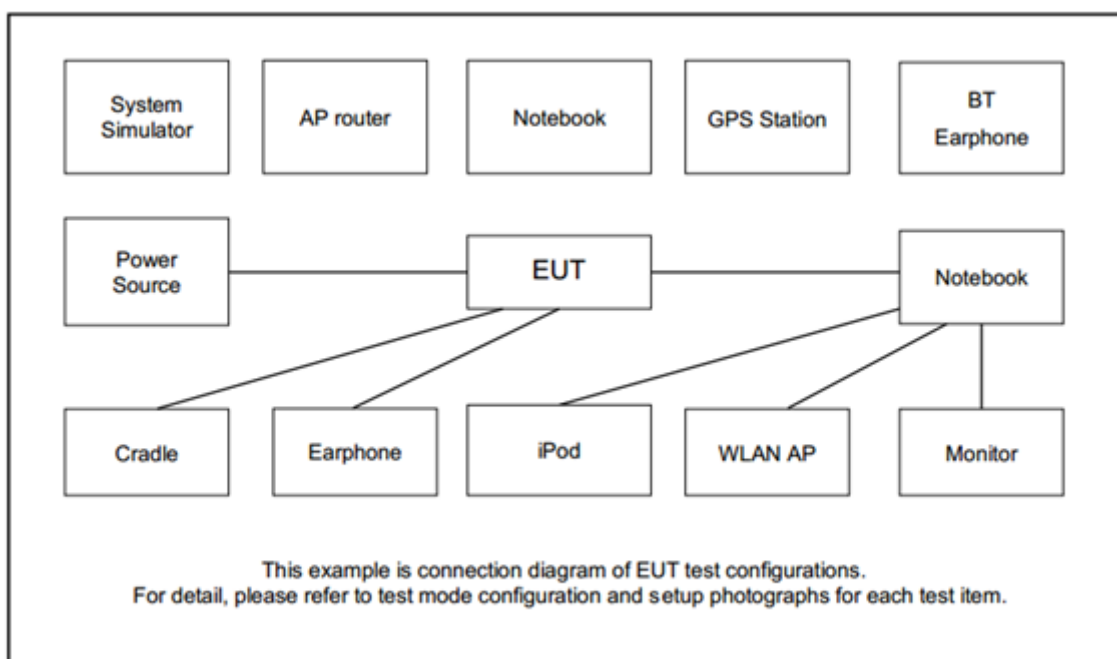
Modulation	Data Rate
802.11a	6 Mbps
802.11n HT40	MCS0

Ch. #		Band I : 5150-5250 MHz	Band II : 5250-5350 MHz	Band III : 5470-5725MHz
		802.11a	802.11a	802.11a
L	Low	-	-	-
M	Middle	-	-	-
H	High	-	-	140

Ch. #		Band I : 5150-5250 MHz	Band II : 5250-5350 MHz	Band III : 5470-5725MHz
		802.11n HT40	802.11n HT40	802.11n HT40
L	Low	38	-	-
M	Middle	-	-	-
H	High	-	-	-

Remark: For Radiated Test Cases, the tests were performed with AC Adapter.

2.3 Connection Diagram of Test System





2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	MP2CWZYZ	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.5 EUT Operation Test Setup

The RF test items, utility "Tera Term 4.105" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.



3 Test Result

3.1 Maximum Conducted Output Power Measurement

3.1.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For the 5.15–5.25 GHz bands:

■ For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW. For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

For the 5.25–5.725 GHz bands:

■ The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

3.1.2 Measuring Instruments

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

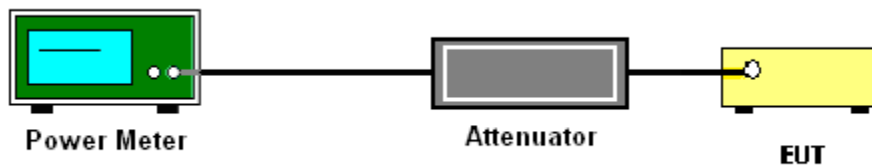
3.1.3 Test Procedures

The testing follows Method PM-G of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM-G (Measurement using a gated RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit at its maximum power control level.
3. Measure the average power of the transmitter.
4. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

3.1.4 Test Setup



3.1.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.2 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

3.2.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27dBm/MHz.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

For transmitters operating in the 5470-5600 MHz and 5650-5725MHz band: all emissions outside of the 5470-5600 MHz and 5650-5725MHz band shall not exceed an EIRP of -27 dBm/MHz.

- (2) Unwanted spurious emissions falls in restricted bands shall comply with the general field strength limits as below table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

Note: The following formula is used to convert the EIRP to field strength.

$$E = \frac{1000000\sqrt{30P}}{3} \text{ } \mu\text{V/m, where P is the eirp (Watts)}$$

EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.3

(3) KDB789033 D02 v02r01 G)2)c)

(i) Sections 15.407(b)(1-3) specifies the unwanted emissions limit for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.

(ii) Section 15.407(b)(4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are based on the use of a peak detector.

3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000 MHz

- RBW = 120 kHz
- VBW = 300 kHz
- Detector = Peak
- Trace mode = max hold

(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

- RBW = 1 MHz
- VBW $\geq$ 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

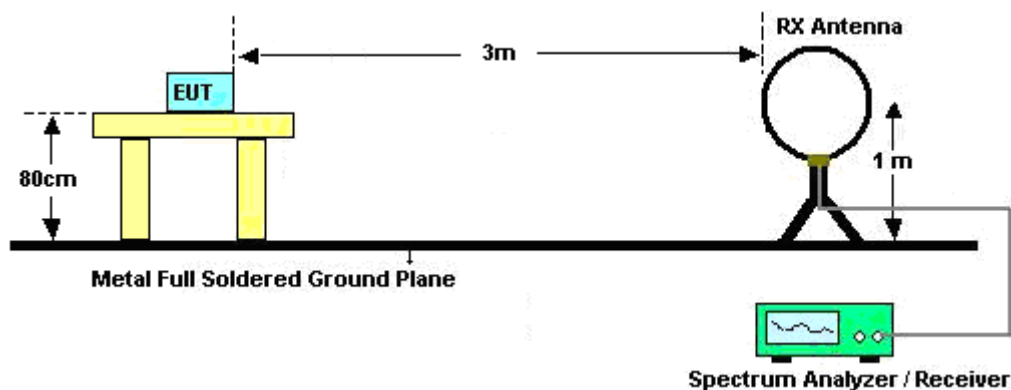
(3) Procedures for Average Unwanted Emissions Measurements Above 1000 MHz

- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

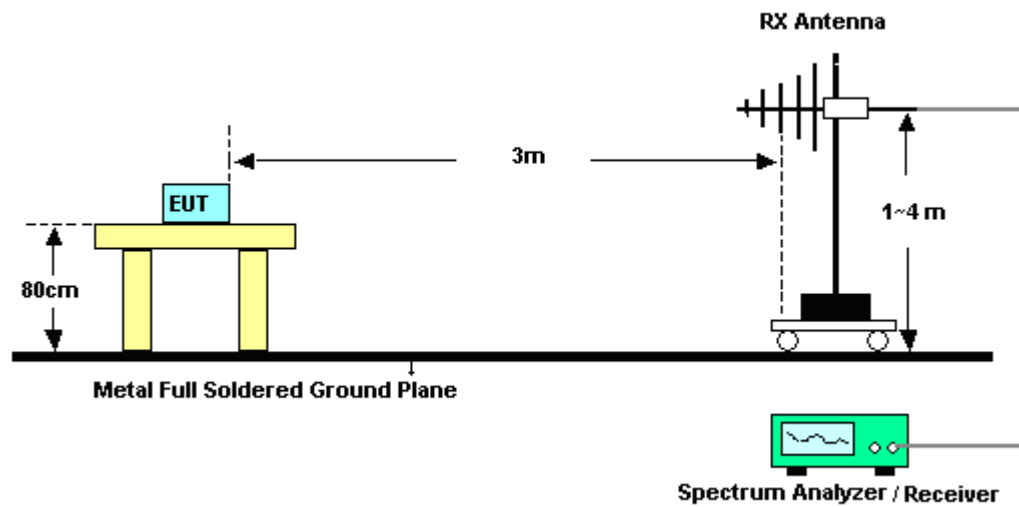
2. The EUT is placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
3. The EUT is set 3 meters away from the receiving antenna which is mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT is arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as “-”.
7. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as “-”.

3.2.4 Test Setup

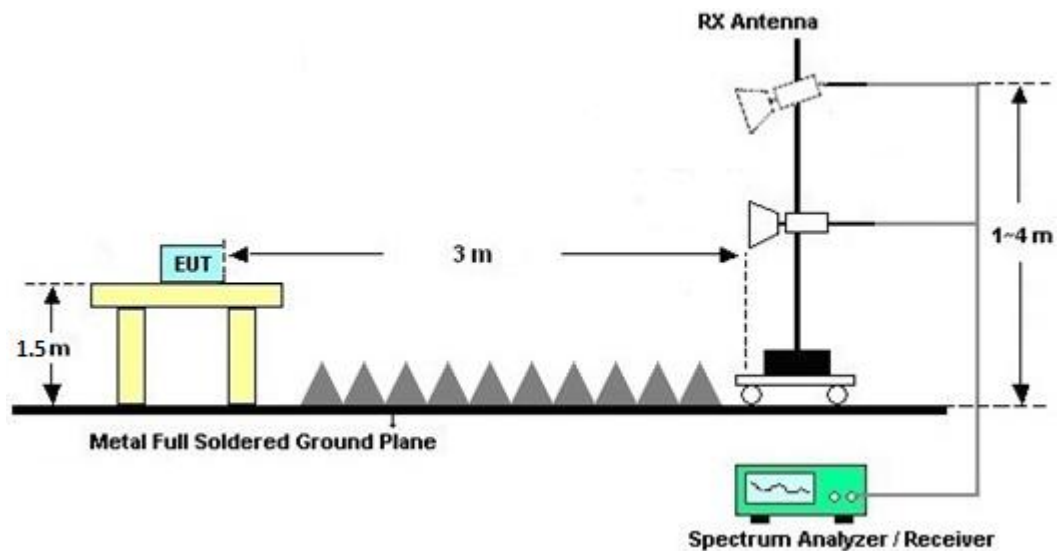
For radiated emissions below 30MHz



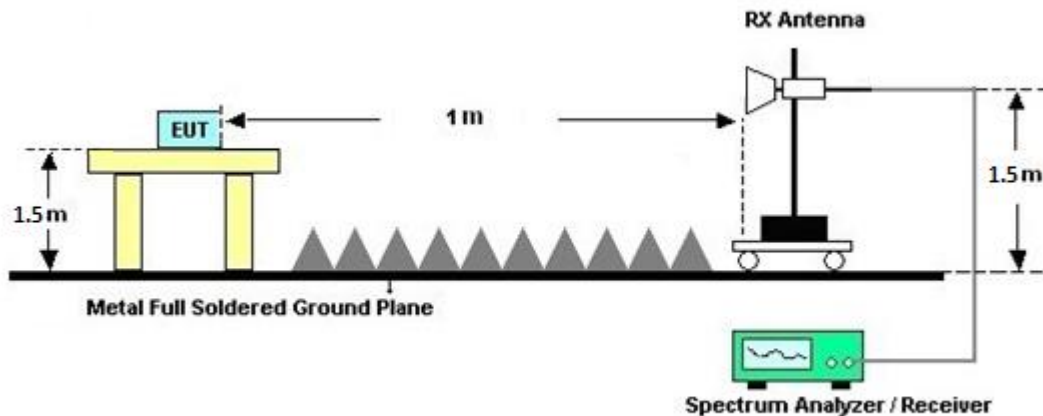
For radiated emissions from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



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

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

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.2.7 Duty Cycle

Please refer to Appendix D.

3.2.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix B and C.



3.3 Antenna Requirements

3.3.1 Standard Applicable

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.



4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 17, 2022	Aug. 11, 2023	Nov. 16, 2023	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO 12 (NO:113)	10MHz~6GHz	Dec. 13, 2022	Aug. 11, 2023	Dec. 12, 2023	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101564	10Hz ~ 40GHz	Sep. 13, 2022	Aug. 11, 2023	Sep. 12, 2023	Conducted (TH05-HY)
Bilog Antenna	TESEQ & WOKEN	CBL 6111D & 00802N1D-06	63304 & 002	N/A	Oct. 04, 2022	Aug. 22, 2023~ Aug. 24, 2023	Oct. 03, 2023	Radiation (03CH22-HY)
Amplifier	SONOMA	310N	421581	N/A	Jul. 15, 2023	Aug. 22, 2023~ Aug. 24, 2023	Jul. 14, 2024	Radiation (03CH22-HY)
Horn Antenna	RFSPIN	DRH18-E	LE2C04A18EN	1GHz~18GHz	Jul. 12, 2023	Aug. 22, 2023~ Aug. 24, 2023	Jul. 11, 2024	Radiation (03CH22-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	1224	18GHz-40GHz	Jul. 10, 2023	Aug. 22, 2023~ Aug. 24, 2023	Jul. 09, 2024	Radiation (03CH22-HY)
Amplifier	EMEC	EM01G18GA	060877	N/A	Sep. 29, 2022	Aug. 22, 2023~ Aug. 24, 2023	Sep. 28, 2023	Radiation (03CH22-HY)
Preamplifier	EMEC	EM18G40G	060872	18-40GHz	Sep. 28, 2022	Aug. 22, 2023~ Aug. 24, 2023	Sep. 27, 2023	Radiation (03CH22-HY)
Signal Analyzer	Keysight	N9010B	MY62170278	10Hz~44GHz	Sep. 06, 2023	Aug. 22, 2023~ Aug. 24, 2023	Sep. 05, 2024	Radiation (03CH22-HY)
Hygrometer	TECPEL	DTM-303A	TP211469	N/A	Jan. 06, 2022	Aug. 22, 2023~ Aug. 24, 2023	Jan. 05, 2023	Radiation (03CH22-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Aug. 22, 2023~ Aug. 24, 2023	N/A	Radiation (03CH22-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Aug. 22, 2023~ Aug. 24, 2023	N/A	Radiation (03CH22-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Aug. 22, 2023~ Aug. 24, 2023	N/A	Radiation (03CH22-HY)
Software	Audix	E3 6.09824_2019 122	RK-002347	N/A	N/A	Aug. 22, 2023~ Aug. 24, 2023	N/A	Radiation (03CH22-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9kHz~30MHz	Mar. 07, 2023	Aug. 22, 2023~ Aug. 24, 2023	Mar. 06, 2024	Radiation (03CH22-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	804390/2,8046 11/2,804615/2	N/A	Oct. 25, 2022	Aug. 22, 2023~ Aug. 24, 2023	Oct. 24, 2023	Radiation (03CH22-HY)



5 Measurement Uncertainty

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.92 dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.42 dB
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Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.40 dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.38 dB
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Appendix A. Test Result of Conducted Test Items

Test Engineer:	Ju Chang	Temperature:	21~25	°C
Test Date:	2023/8/11	Relative Humidity:	51~54	%

TEST RESULTS DATA
Average Power Table

FCC U-NII-1 single antenna													
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)			Pass/Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	1	44	5220	12.40	-	-	24.00	-	3.15	-	-	Pass
HT40	MCS0	1	38	5190	11.60	-		24.00	-	3.15	-		Pass

IC U-NII-1 single antenna														
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Average Conducted Power (dBm)			IC Conducted Power Limit (dBm)		DG (dBi)		IC EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	44	5220	12.40	-	-	19.86	-	3.15	-	23.01	-	Pass
HT40	MCS0	1	38	5190	11.60	-		19.86	-	3.15	-	23.01	-	Pass

TEST RESULTS DATA
Average Power Table

FCC U-NII-2C single antenna													
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		EIRP Power Limit (dBm)	Pass/Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	1	140	5700	10.80	-	-	23.98	-	2.87	-	26.99	Pass



Appendix B. Radiated Spurious Emission

Test Engineer :	Bank Lin and Wen-Kai Lu	Temperature :	20.1~23.1°C
		Relative Humidity :	55~65%

Band 1 - 5150~5250MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 38 5190MHz		5148.98	61.05	-12.95	74	48.32	32.5	14.01	33.78	277	52	P	H
		5150	50.39	-3.61	54	37.66	32.5	14.01	33.78	277	52	A	H
	*	5190	103.08	-	-	90.3	32.58	14.04	33.84	277	52	P	H
	*	5190	96.04	-	-	83.26	32.58	14.04	33.84	277	52	A	H
		5365.24	50.08	-23.92	74	37.57	32.5	14.12	34.11	277	52	P	H
		5442.19	41.15	-12.85	54	28.63	32.58	14.16	34.22	277	52	A	H
		5147.16	58.16	-15.84	74	45.41	32.51	14.01	33.77	400	347	P	V
		5150	49.39	-4.61	54	36.66	32.5	14.01	33.78	400	347	A	V
	*	5190	101.46	-	-	88.68	32.58	14.04	33.84	400	347	P	V
	*	5190	94.35	-	-	81.57	32.58	14.04	33.84	400	347	A	V
		5449.21	51.34	-22.66	74	38.8	32.6	14.17	34.23	400	347	P	V
		5452.18	40.69	-13.31	54	28.15	32.61	14.17	34.24	400	347	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

[illegible]

**Band 3 - 5470~5725MHz****WIFI 802.11a (Band Edge @ 3m)**

WIFI Ant.	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 140 5700MHz	*	5700	105.98	-	-	92.46	33.7	14.36	34.54	119	59	P	H
	*	5700	98.94	-	-	85.42	33.7	14.36	34.54	119	59	A	H
		5730.92	63.22	-4.98	68.2	49.52	33.89	14.38	34.57	119	59	P	H
													H
													H
													H
	*	5700	103.54	-	-	90.02	33.7	14.36	34.54	100	345	P	V
	*	5700	96.17	-	-	82.65	33.7	14.36	34.54	100	345	A	V
		5726.92	62.98	-5.22	68.2	49.31	33.86	14.38	34.57	100	345	P	V
													V
													V
													V
Remark	1. No other spurious found.												
	2. All results are PASS against Peak and Average limit line.												



Band 3 - 5470~5725MHz
WIFI 802.11a (Harmonic @ 3m)

WIFI Ant.	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 140 5700MHz		11400	53.34	-20.66	74	33.56	39	20.18	40.07	-	-	P	H
		11400	42.28	-11.72	54	22.5	39	20.18	40.07	-	-	A	H
		17100	53.78	-14.42	68.2	33.78	40.7	24.96	46.11	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		11400	53.14	-20.86	74	33.36	39	20.18	40.07	-	-	P	V
		11400	43.33	-10.67	54	23.55	39	20.18	40.07	-	-	A	V
		17100	55.84	-12.36	68.2	35.84	40.7	24.96	46.11	-	-	P	V
													V
													V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												



Emission above 18GHz

WIFI 802.11n HT40 (SHF @ 1m)

WIFI	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 SHF		24776.46	45.09	-23.11	68.2	43.01	39.45	32.07	59.9	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
		25000.74	45.01	-23.19	68.2	42.08	39.5	32.47	59.5	-	-	P	V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												

Emission below 1GHz

WIFI 802.11n HT40 (LF @ 3m)

WIFI	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 LF		30.97	22.99	-17.01	40	30.09	24.62	1.03	32.76	-	-	P	H
		120.21	25.15	-18.35	43.5	38.02	17.46	2.35	32.72	-	-	P	H
		360.77	28.71	-17.29	46	37.13	20.5	3.75	32.74	-	-	P	H
		576.11	29.41	-16.59	46	31.64	25.78	4.7	32.85	-	-	P	H
		741.98	32.96	-13.04	46	32.3	27.94	5.29	32.69	-	-	P	H
		962.17	36.3	-17.7	54	30.11	31.3	5.95	31.28	-	-	P	H
													H
													H
													H
													H
													H
													H
		30	23.99	-16.01	40	30.52	25.2	1.02	32.76	-	-	P	V
		78.5	25.67	-14.33	40	43.3	13.1	1.95	32.72	-	-	P	V
		145.43	24.92	-18.58	43.5	38.01	17.04	2.55	32.71	-	-	P	V
		359.8	26.39	-19.61	46	34.81	20.5	3.75	32.74	-	-	P	V
		644.01	30.09	-15.91	46	31.44	26.4	4.94	32.81	-	-	P	V
		985.45	36.71	-17.29	54	30.96	30.48	6.04	31.02	-	-	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found.												
	2. All results are PASS against limit line.												
	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.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is Margin line.
P/A	Peak or Average
H/V	Horizontal or Vertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a		5150	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 36		5150	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H
5180MHz													

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Margin (dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 5150MHz:

1. Level(dBμV/m)
 = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
 = 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
 = 55.45 (dBμV/m)
2. Margin (dB)
 = Level(dBμV/m) – Limit Line(dBμV/m)
 = 55.45(dBμV/m) – 74(dBμV/m)
 = -18.55(dB)

For Average Limit @ 5150MHz:

1. Level(dBμV/m)
 = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
 = 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
 = 43.54 (dBμV/m)
2. Margin (dB)
 = Level(dBμV/m) – Limit Line(dBμV/m)
 = 43.54 (dBμV/m) – 54(dBμV/m)
 = -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix C. Radiated Spurious Emission Plots

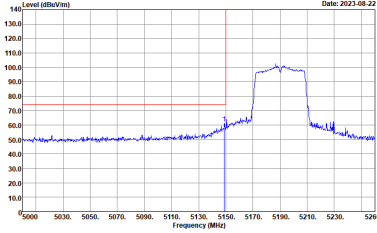
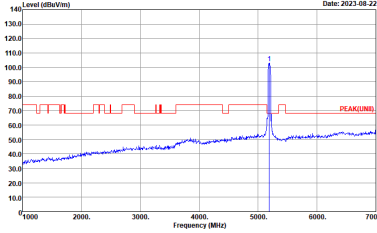
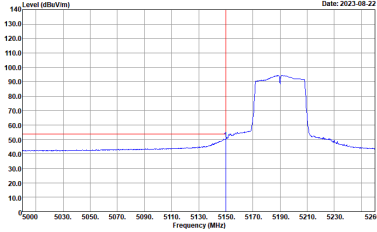
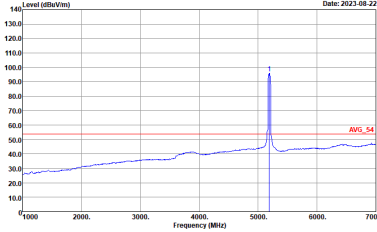
Test Engineer :	Bank Lin and Wen-Kai Lu	Temperature :	20.1~23.1°C
		Relative Humidity :	55~65%

Note symbol

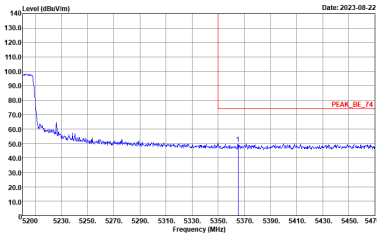
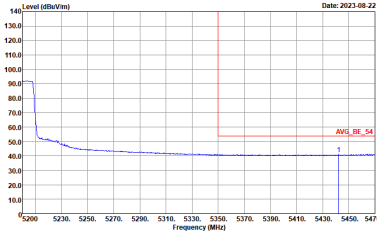
-L	Low channel location
-R	High channel location

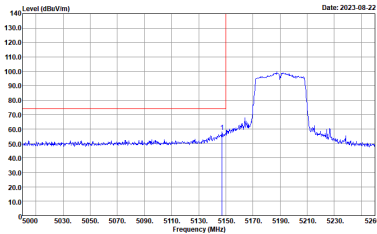
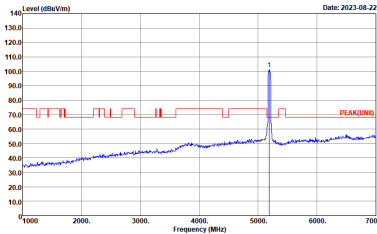
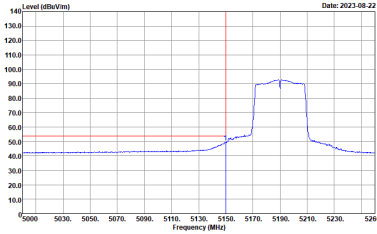
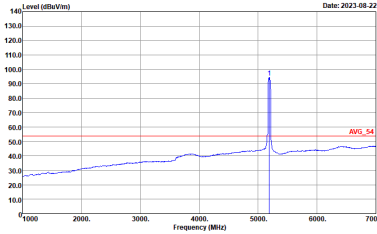


Band 1 - 5150~5250MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

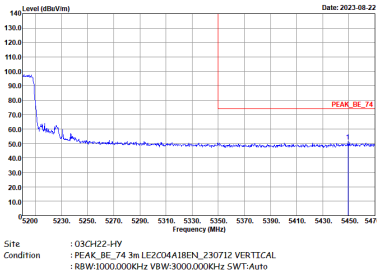
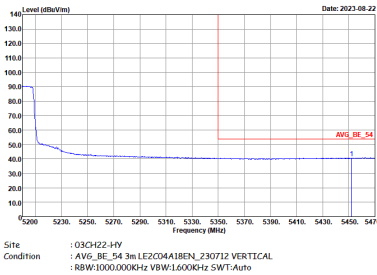
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - L	
	Horizontal	Fundamental
Peak	 Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_230712 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH22-HY Condition : PEAK(UNIT) 3m LEZC04A18EN_230712 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_230712 HORIZONTAL : RBW:1000.000KHz VBW:1600KHz SWT:Auto	 Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_230712 HORIZONTAL : RBW:1000.000KHz VBW:1600KHz SWT:Auto



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - R	
	Horizontal	Fundamental
Peak	 Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZCO4A18EN_230712 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank
Avg.	 Site : 03CH22-HY Condition : AVG_BE_54 3m LEZCO4A18EN_230712 HORIZONTAL : RBW:1000.000KHz VBW:1600KHz SWT:Auto	Left blank

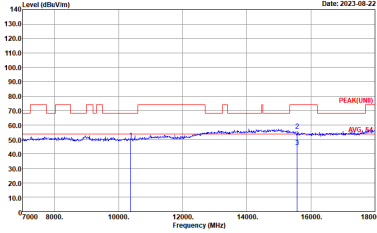
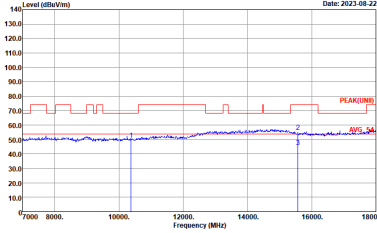
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - L	
	Vertical	Fundamental
Peak	 Site : 03CH22-HY Condition : PEAK_BE_74 3m LEZC04A18EN_230712 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH22-HY Condition : PEAK(LINE1) 3m LEZC04A18EN_230712 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH22-HY Condition : AVG_BE_54 3m LEZC04A18EN_230712 VERTICAL : RBW:1000.000KHz VBW:1600KHz SWT:Auto	 Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_230712 VERTICAL : RBW:1000.000KHz VBW:1600KHz SWT:Auto



WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11n HT40 CH38 5190MHz - R	
	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank



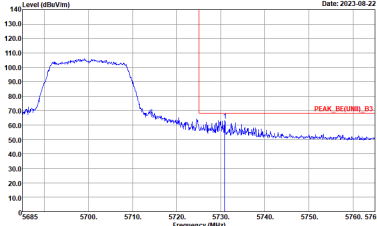
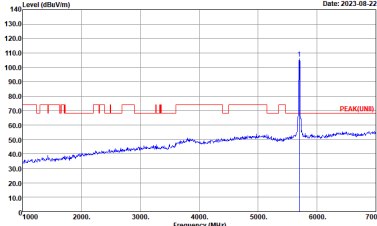
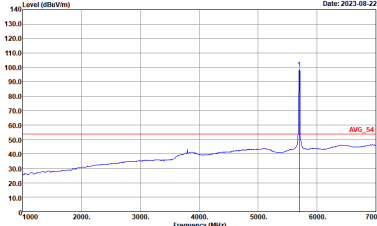
Band 1 - 5150~5250MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT40 CH38 5190MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH22-HY Condition : PEAK(UM) 3m LEZC04A1BEN_230712 HORIZONTAL :	 Site : 03CH22-HY Condition : PEAK(UM) 3m LEZC04A1BEN_230712 VERTICAL :

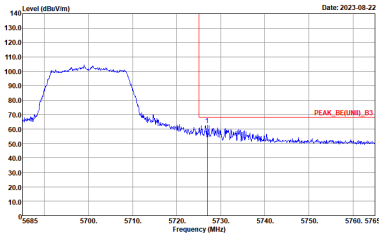
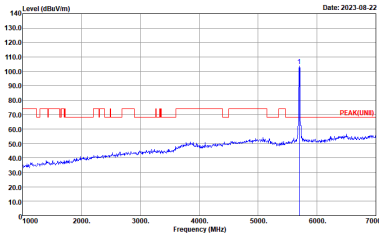
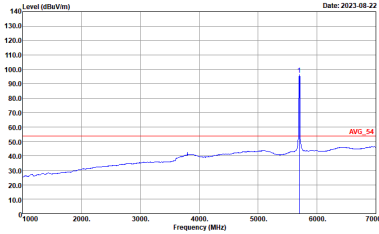


WIFI	Band 1 5150~5250MHz Harmonic @ 3m	
ANT	802.11n HT40 CH38 5190MHz	
	Horizontal	Vertical
10.6G ~18G Avg.	Level (dBuV/m) Date: 2023-08-22 Site : 03CH22-HY Condition : AVG_54 3m LE2C04A18EN_230712 HORIZONTAL	Level (dBuV/m) Date: 2023-08-22 Site : 03CH22-HY Condition : AVG_54 3m LE2C04A18EN_230712 VERTICAL

Band 3 - 5470~5725MHz
WIFI 802.11a (Band Edge @ 3m)

WIFI	Band 3 5470~5725MHz Band Edge @ 3m	
ANT	802.11a CH140 5700MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH22-HY Condition : PEAK_BE(UNIT)_B3 3m LEZC04A18EN_230712 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH22-HY Condition : PEAK(UNIT) 3m LEZC04A18EN_230712 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	Left blank	 Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_230712 HORIZONTAL : RBW:1000.000KHz VBW:0.750KHz SWT:Auto



WIFI	Band 3 5470~5725MHz Band Edge @ 3m	
ANT	802.11a CH140 5700MHz	
	Vertical	Fundamental
Peak	 Site : 03CH22-HY Condition : PEAK_B3(UNIT)_B3 3m LEZC04A18EN_230712 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto	 Site : 03CH22-HY Condition : PEAK(UNIT)_B3 3m LEZC04A18EN_230712 VERTICAL : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto
Avg.	Left blank	 Site : 03CH22-HY Condition : AVG_54 3m LEZC04A18EN_230712 VERTICAL : RBW:1000.000kHz VBW:0.750kHz SWT:Auto



Band 3 - 5470~5725MHz
WIFI 802.11a (Harmonic @ 3m)

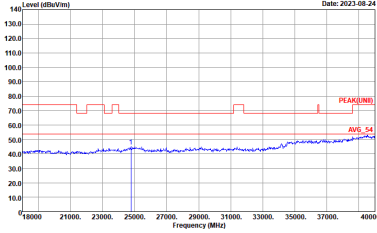
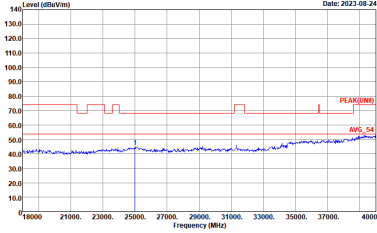
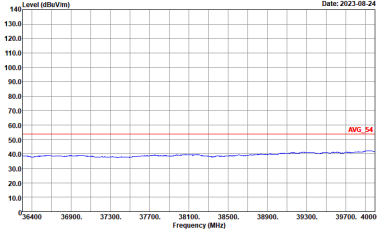
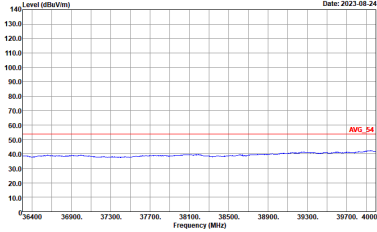
WIFI	Band 3 5470~5725MHz Harmonic @ 3m	
ANT	802.11a CH140 5700MHz	
	Horizontal	Vertical
Peak Avg.	Level (dBuV/m) Date: 2023-08-22 Site : 03CH22-HY Condition : PEAK(UNIT) 3m LEZC04A1BEN_230712 HORIZONTAL :	Level (dBuV/m) Date: 2023-08-22 Site : 03CH22-HY Condition : PEAK(UNIT) 3m LEZC04A1BEN_230712 VERTICAL :



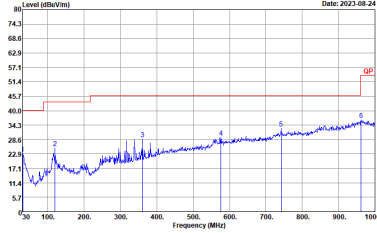
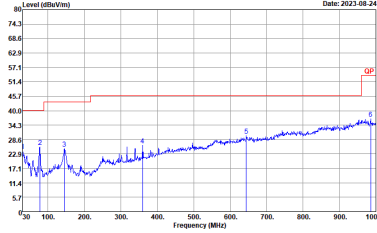
WIFI	Band 3 5470~5725MHz Harmonic @ 3m	
ANT	802.11a CH140 5700MHz	
	Horizontal	Vertical
10.6G ~18G Avg.	Level (dBuV/m) Date: 2023-08-22 Site : 03CH22-HY Condition : AVG_54 3m LE2C04A18EN_230712 HORIZONTAL	Level (dBuV/m) Date: 2023-08-22 Site : 03CH22-HY Condition : AVG_54 3m LE2C04A18EN_230712 VERTICAL



Emission above 18GHz
5GHz WIFI 802.11n HT40 (SHF @ 1m)

WIFI	5GHz WIFI	
ANT	802.11n HT40 SHF	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH22-HY Condition : PEAK(UNIT) 1m SHF_1224_230710 HORIZONTAL :	 Site : 03CH22-HY Condition : PEAK(UNIT) 1m SHF_1224_230710 VERTICAL :
36.4G ~40G Avg	 Site : 03CH22-HY Condition : AV6_54 1m SHF_1223_220705 HORIZONTAL :	 Site : 03CH22-HY Condition : AV6_54 1m SHF_1223_220705 VERTICAL :

Emission below 1GHz
5GHz WIFI 802.11n HT40 (LF)

WIFI	5GHz WIFI	
ANT	802.11n HT40 LF	
	Horizontal	Vertical
QP / Peak	 Site : 03CH22-HY Condition : QP 3m BIL06_63304_Z21004 HORIZONTAL	 Site : 03CH22-HY Condition : QP 3m BIL06_63304_Z21004 VERTICAL



Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
802.11a	93.44	1425	0.70	750Hz
5GHz 802.11n HT40	96.95	665.1	1.50	1.6kHz

