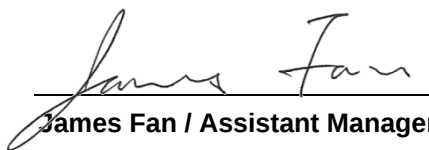


CE Partial Test Report

Equipment : 802.11ac Professional Wi-Fi + BT5.0 Module
Model No. : SU60-SOMC (453-00003),
SU60-SOMC-2G (453-00004)
(please refer to section 1.1.1 for more details.)
Brand Name : Laird Connectivity
Applicant : Laird Connectivity, LLC
Address : W66N220 Commerce Court Cedarburg WI
53012 United States Of America (Excluding
The States Of Alaska)
Standard : EN 300 440 V2.1.1 (2017-03)
Received Date : Aug. 11, 2021
Tested Date : Sep. 15 ~ Sep. 16, 2021

We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:


James Fan / Assistant Manager

Approved by:


Gary Chang / Manager



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Release Record

Report No.	Version	Description	Issued Date
EQ841101-05	Rev. 01	Initial issue	Oct. 05, 2021

Summary of Test Results

Ref. Std. Clause	Test Items	Measured	Result
4.2.2	Equivalent Isotropically Radiated Power	13.40 dBm	Pass
4.2.4	Unwanted Emissions in the Spurious Domain	Meet the requirement of limit.	Pass
4.3.5	Receiver Spurious Radiation	Meet the requirement of limit.	Pass

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Information

This report is issued as a supplementary report to the original project no. EQ841101-01. The modification is concerned with following:

- ✧ Revised brand name, Applicant and address.
- ✧ Changed U1 to RT5170A for lower suspend mode current.
- ✧ Added C87 for solve the co-location issue with LTE.

Therefore, related test items had been performed and presented in the following sections.

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
Laird	SU60-SOMC (453-00003)	802.11ac Professional Wi-Fi + BT5.0 Module	2G/1G MCP
	SU60-SOMC-2G (453-00004)		4G/2G MCP
✦ The above models, both options were assessed and SU60-SOMC-2G (453-00004) was found to be worst case and was selected for the final testing.			

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N _{TX})	Data Rate / MCS
5725-5850	a	5745-5825	149-165 [5]	1	6-54 Mbps
				2	6-54 Mbps
5725-5850	n (HT20)	5745-5825	149-165 [5]	1	MCS 0-7
				2	MCS 0-7
				2	MCS 8-15
5725-5850	n (HT40)	5755-5795	151-159 [2]	1	MCS 0-7
				2	MCS 0-7
				2	MCS 8-15
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	1	MCS 0-9
				2	
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	1	MCS 0-9
				2	
5725-5850	ac (VHT80)	5775	155 [1]	1	MCS 0-9
				2	
Note 1: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation. Note 2: The device supports TX antenna diversity function. The conducted power of single chain is same for 1TX and 2TX operating mode. Therefore, Ant1 + Ant 2 configuration is chosen for final testing.					

1.1.3 Antenna Details

Brand	Model	Type	Connector	Operating Frequency (MHz) / Gain (dBi)			
				5150~5250	5250~5350	5470~5725	5725~5850
LSR	001-0009	Dipole	IPEX U.FL	2			
Laird	NanoBlade-IP04	PCB Dipole	IPEX U.FL	3.9		4	4
Laird	MAF95310 Mini NanoBlade Flex	PCB Dipole	IPEX U.FL	3.38			
LSR	FlexPIFA 001-0016	PIFA	IPEX U.FL	3			
Ethertronics	WLAN_1000146	Magnetic Dipole	IPEX U.FL	3.5			
Laird	MIMO FlexPIFA Antenna	PIFA	IPEX U.FL	3			
LSR	001-0009 (with filter)	Dipole	IPEX U.FL	2			

1.1.4 EUT Operational Condition

Power Supply Type	3.3 Vdc from host		
SW Version	6.0.0.x		
Operational Voltage	☒ Vnom (3.30 V)	☒ Vmax (3.63 V)	☒ Vmin (2.97V)
Operational Climatic	☒ Tnom (20°C)	☒ Tmax (85°C)	☒ Tmin (-30°C)

1.1.5 Accessories

Accessories		
No.	Equipment	Description
1	AC Adapter	Brand Name: I.T.E POWER SUPPLY Model Name: MU12AY120100-A1 Power Rating: I/P: 100-240Vac, 50/60Hz, 0.3A O/P: 12Vdc, 1A Power Line: 1.48m non-shielded cable without core

1.1.6 Channel List

Frequency band (MHz)		5725~5850	
802.11 a / n HT20 / ac VHT20		802.11n HT40 / ac VHT40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
149	5745	151	5755
153	5765	159	5795
157	5785	802.11ac VHT80	
161	5805	155	5775
165	5825	---	---

1.1.7 Test Tool and Duty Cycle

Test Tool	Test command	
Modulation Mode	Duty Cycle Of Test Signal (%)	Duty Factor (dB)
a	100.00	0
ac (VHT20)	100.00	0
ac (VHT40)	100.00	0
ac (VHT80)	100.00	0

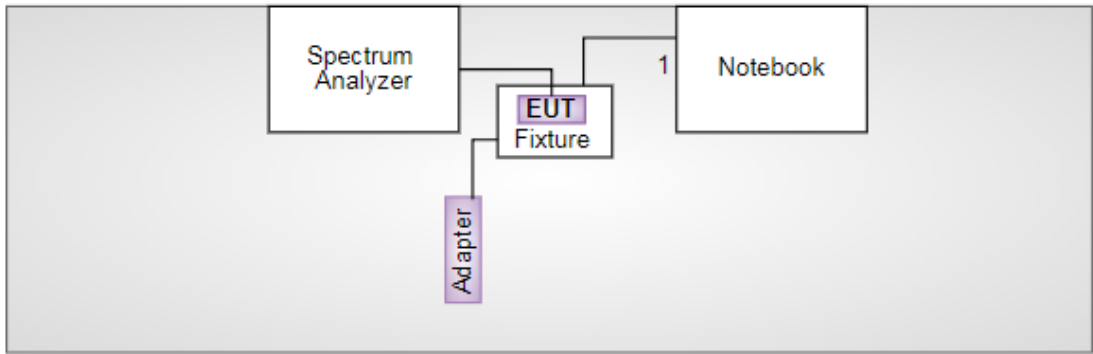
1.1.8 Power Index of Test Tool

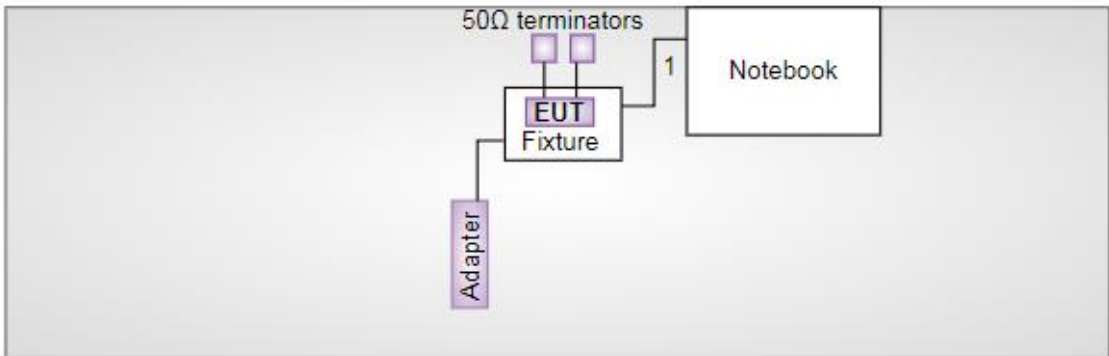
Modulation Mode	Test Frequency (MHz)					
	a / VHT20			VHT40		VHT80
	5745	5785	5825	5755	5795	5775
a	Default - 3	Default - 3	Default - 3	---	---	---
ac (VHT20)	Default - 3	Default - 3	Default - 3	---	---	---
ac (VHT40)	---	---	---	Default - 3	Default - 3	---
ac (VHT80)	---	---	--	---	---	Default - 3

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	S/N	Remarks
1	Notebook	DELL	Latitude E6430	F2JB4X1	---
2	Notebook	DELL	Latitude E6430	D3LNYW1	---
3	Fixture	---	---	---	Provided by applicant.

1.3 Test Setup Chart

Test Setup Diagram (Conducted)	
	
No.	Signal cable / Length (m)
1	USB, 1m shielded.

Test Setup Diagram (Radiated)	
	
No.	Signal cable / Length (m)
1	USB, 1m shielded.

1.4 Test Equipment and Calibration Data

Test Item	Radiated Emissions				
Test Site	Fully-anechoic chamber 1 / (05CH01-WS)				
Test Date	Sep. 15 ~ Sep. 16, 2021				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	Agilent	N9010A	MY54200247	Oct. 16, 2020	Oct. 15, 2021
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-524	Nov. 11, 2020	Nov. 10, 2021
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1094	Nov. 03, 2020	Nov. 02, 2021
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170508	Dec. 31, 2020	Dec. 30, 2021
Preamplifier	Agilent	83017A	MY39501310	Nov. 30, 2020	Nov. 29, 2021
Preamplifier	EMC	EMC02325	980146	Nov. 16, 2020	Nov. 15, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY22626/4	Oct. 13, 2020	Oct. 12, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16609/4	Oct. 13, 2020	Oct. 12, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY15686/4	Oct. 13, 2020	Oct. 12, 2021
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-005	Oct. 13, 2020	Oct. 12, 2021
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-006	Oct. 13, 2020	Oct. 12, 2021
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Test Date	Sep. 15, 2021				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Apr. 19, 2021	Apr. 18, 2022
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	May 25, 2021	May 24, 2022
AC POWER SOURCE	APC	AFC-500W	F312060012	Dec. 04, 2020	Dec. 03, 2021
Power Sensor	Agilent	U2021XA	MY53480019	Feb. 19, 2021	Feb. 18, 2022
Power Sensor	Agilent	U2021XA	MY53510003	Feb. 19, 2021	Feb. 18, 2022
Power Sensor	Agilent	U2021XA	MY54070003	Mar. 09, 2021	Mar. 08, 2022
Power Sensor	Agilent	U2021XA	MY54060013	Mar. 09, 2021	Mar. 08, 2022
RF cable	HUBER+SUHNER	SUCOFLEX104	MY16016/4	Oct. 16, 2020	Oct. 15, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16013/4	Oct. 16, 2020	Oct. 15, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16616/4	Oct. 16, 2020	Oct. 15, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16617/4	Oct. 16, 2020	Oct. 15, 2021
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Measurement Software	Agilent	EN RF test	1.1501125	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Testing Applied Standards

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

EN 300 440 V2.1.1 (2017-03)

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$)).

Measurement Uncertainty		
Parameters	Uncertainty	Limit
Radio Frequency	$\pm 0.059 \times 10^{-7}$	$\pm 1 \times 10^{-7}$
RF power (conducted)	± 0.685 dB	$\pm 2,5$ dB
Radiated emission of transmitter, valid up to 40 GHz	± 3.40 dB	± 8 dB
Radiated emission of receiver, valid up to 40 GHz	± 3.40 dB	± 8 dB
Temperature	± 0.4 °C	± 1 °C
Humidity	± 3.3 %	± 5 %
Voltage (DC)	± 0.15 %	± 1 %
Voltage (AC, < 10kHz)	± 0.15 %	± 2 %

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	TH01-WS, 05CH01-WS
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Equivalent Isotropic Radiated Power Transmitter Unwanted Emissions Receiver Spurious Emissions	11a VHT20 VHT40 VHT80	5745 / 5785 / 5825 5745 / 5785 / 5825 5755 / 5795 5775	6 Mbps MCS 0 MCS 0 MCS 0	---
Transmitter Unwanted Emissions ≤ 1GHz	VHT20 VHT40	5745 5755	MCS 0 MCS 0	
Transmitter Unwanted Emissions > 1GHz	11a	5745 / 5825	6 Mbps	
Receiver Spurious Emissions ≤ 1GHz	11a	5785	6 Mbps	
Receiver Spurious Emissions > 1GHz	11a VHT40	5785 5755	6 Mbps MCS 0	

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **X-plane** results were found as the worst case and were shown in this report.
2. 50Ω terminators are connected to antenna port of EUT for radiated emission measurement.

3 Transmitter Test Results

3.1 Equivalent Isotropically Radiated Power (e.i.r.p.)

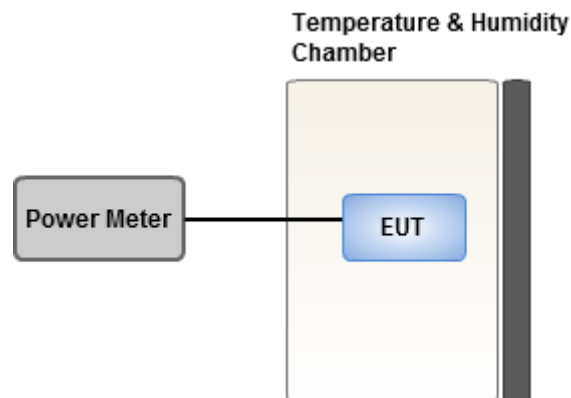
3.1.1 Limit of Equivalent Isotropically Radiated Power

Frequency Bands	Power	Applications
5 725 MHz to 5 875 MHz	25 mW (14dBm) e.i.r.p.	Non-specific short range devices

3.1.2 Test Procedures

Reference to clause 4.2.2.3 of EN 300 440 V2.1.1 (2017-03).

3.1.3 Test Setup



3.1.4 Test Result of Equivalent Isotropically Radiated Power

Ambient Condition	24°C / 65%	Tested By	Alan Tang
--------------------------	------------	------------------	-----------

Maximum Transmit Power (dBm)				
Modulation Mode	11a			
Condition	Freq. (MHz)	EIRP Power (dBm)	EIRP Limit (dBm)	Results
T _{nom} V _{nom}	5745	13.24	14	Pass
T _{nom} V _{nom}	5785	13.26	14	Pass
T _{nom} V _{nom}	5825	13.25	14	Pass

Maximum Transmit Power (dBm)				
Modulation Mode	VHT20			
Condition	Freq. (MHz)	EIRP Power (dBm)	EIRP Limit (dBm)	Results
T _{nom} V _{nom}	5745	13.39	14	Pass
T _{nom} V _{nom}	5785	13.39	14	Pass
T _{nom} V _{nom}	5825	13.40	14	Pass

Maximum Transmit Power (dBm)				
Modulation Mode	VHT40			
Condition	Freq. (MHz)	EIRP Power (dBm)	EIRP Limit (dBm)	Results
T _{nom} V _{nom}	5755	13.26	14	Pass
T _{nom} V _{nom}	5795	13.27	14	Pass

Maximum Transmit Power (dBm)				
Modulation Mode	VHT80			
Condition	Freq. (MHz)	EIRP Power (dBm)	EIRP Limit (dBm)	Results
T _{nom} V _{nom}	5775	12.68	14	Pass

Note:

- 1) Test method is conducted.
- 2) EIRP = Measured conducted power + Antenna gain. (3.38dBi)

3.2 Transmitter Unwanted Emissions in the Spurious Domain

3.2.1 Limit of Transmitter Unwanted Emissions in the Spurious Domain

Limit for Radiated Spurious Emission

Frequency ranges / State	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies $\leq 1\,000$ MHz	Frequencies > 1 000 MHz
Operating	4 nW (-54 dBm)	250 nW (-36 dBm)	1 μ W (-30 dBm)
Standby	2 nW (-57 dBm)	2 nW (-57 dBm)	20 nW (-47 dBm)

Limit for Conducted Spurious Emission

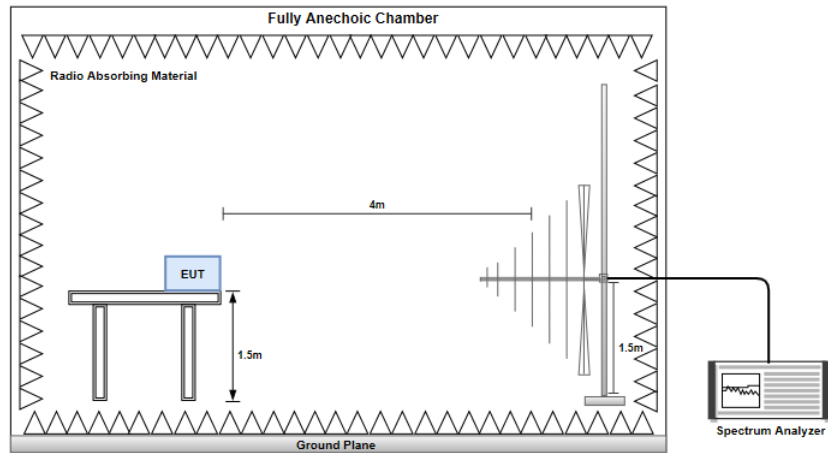
Frequency ranges / State	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies $\leq 1\,000$ MHz	Frequencies > 1 000 MHz
Operating	-57.01 dBm	-39.01 dBm	-33.01 dBm
Standby	-60.01 dBm	-60.01 dBm	-50.01 dBm

3.2.2 Test Procedures

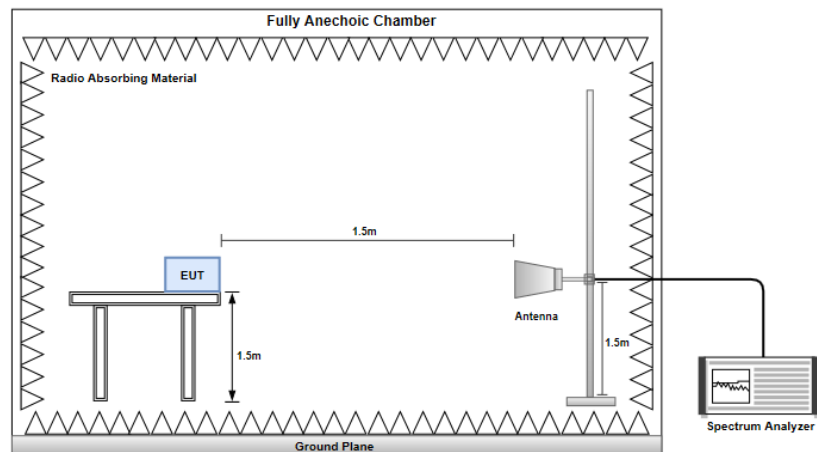
Reference to 4.2.4.3 of EN 300 440 V2.1.1 (2017-03).

3.2.3 Test Setup

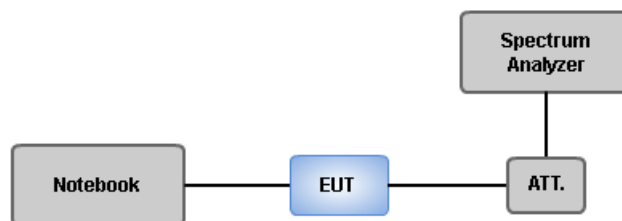
Below 1GHz



Above 1 GHz



Conducted Emission



Main Port

3.2.4 Transmitter Conducted Unwanted Emissions (Below 1GHz)

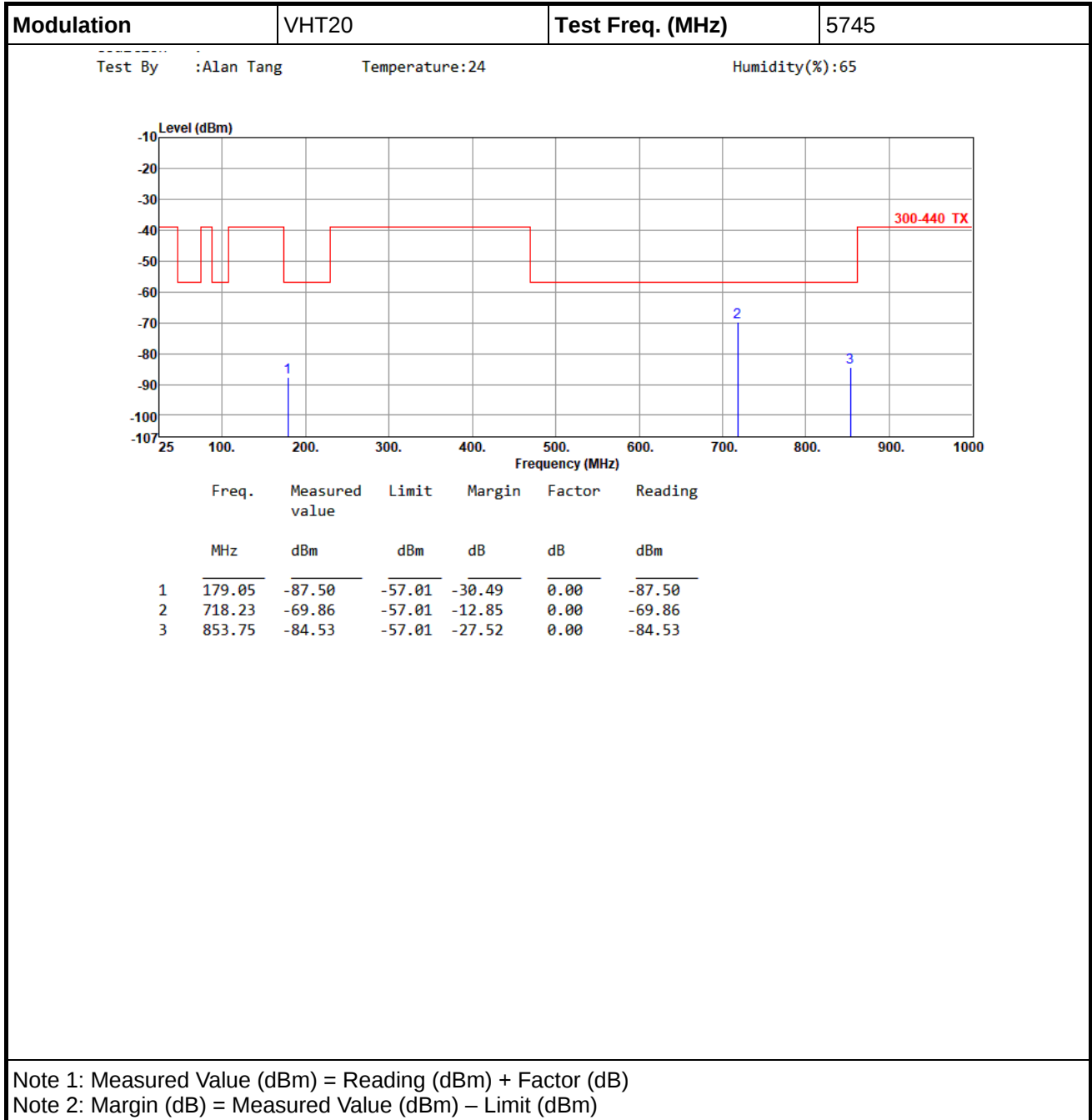
Modulation	VHT20	Test Freq. (MHz)	5745
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm) </			

3.2.5 Transmitter Conducted Unwanted Emissions (Above 1GHz)

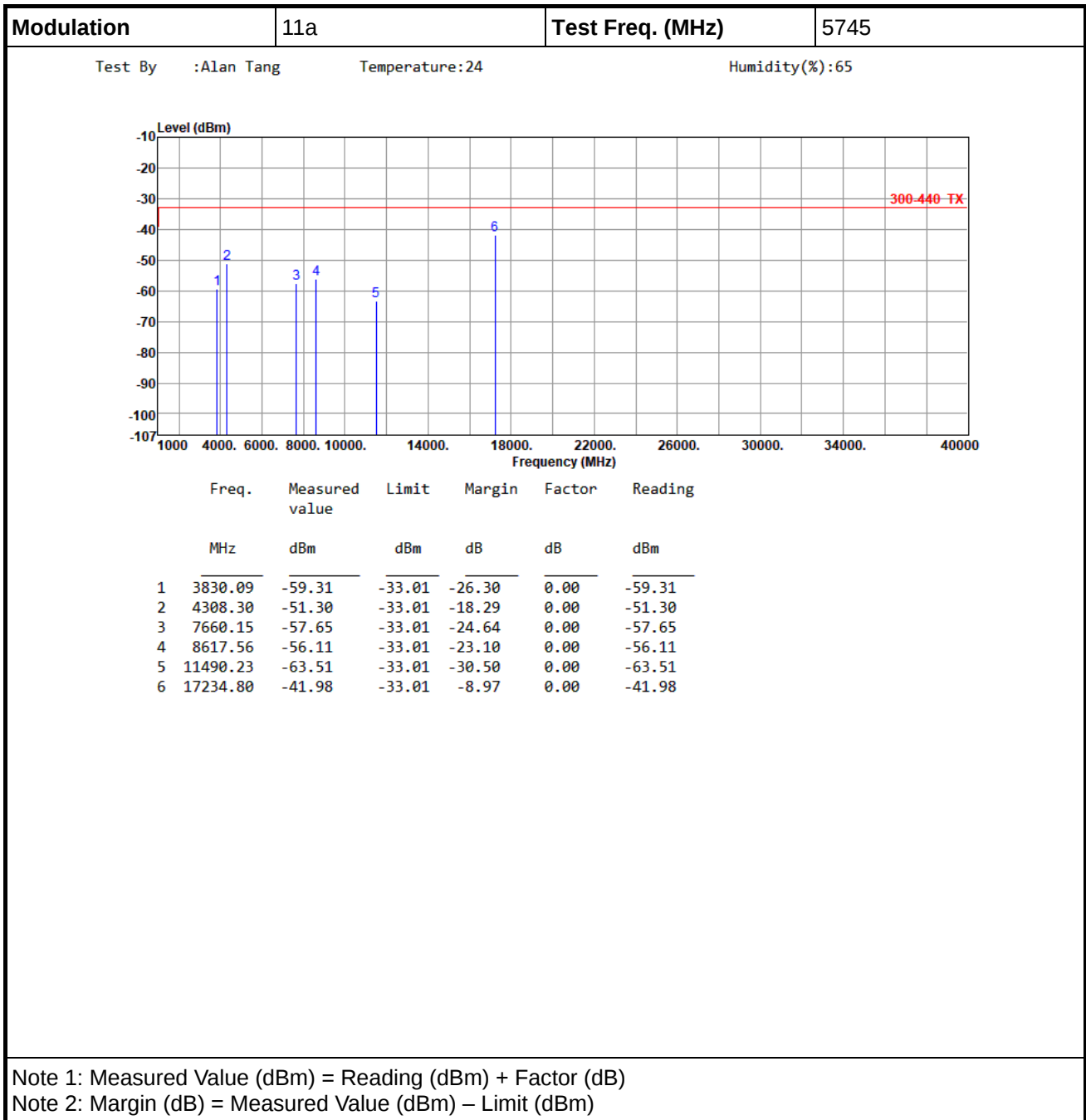
Modulation	11a	Test Freq. (MHz)	5745
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm) </			

Aux Port

3.2.6 Transmitter Conducted Unwanted Emissions (Below 1GHz)



3.2.7 Transmitter Conducted Unwanted Emissions (Above 1GHz)



3.2.8 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	VHT40	Test Freq. (MHz)	5755
Polarization	Horizontal		
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm)			

Modulation	VHT40	Test Freq. (MHz)	5755
Polarization	Vertical		
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm) </			

3.2.1 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation	11a	Test Freq. (MHz)	5825
Polarization	Horizontal		
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm) </			

Modulation	11a	Test Freq. (MHz)	5825
Polarization	Vertical		
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm)			

4 Receiver Test Results

4.1 Receiver Spurious Emissions

4.1.1 Limit of Receiver Spurious Emissions

Limit for Radiated Spurious Emission

Frequency Range	Limit
25 MHz to 1 GHz	2 nW (-57 dBm)
Above 1 GHz	20 nW (-47 dBm)

Limit for Conducted Spurious Emission

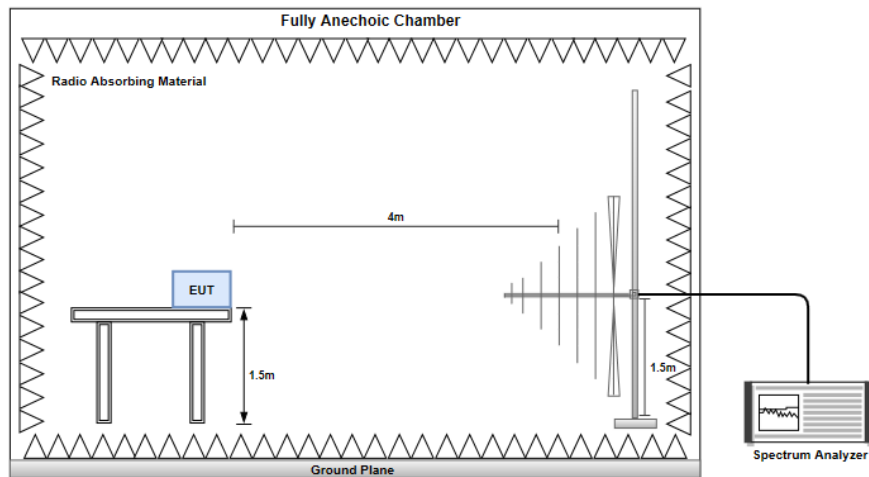
Frequency Range	Maximum power (dBm)	Measurement bandwidth (kHz)
30 MHz to 1 GHz	-60.01	100
Above 1 GHz to 12,75 GHz	-50.01	1000

4.1.2 Test Procedures

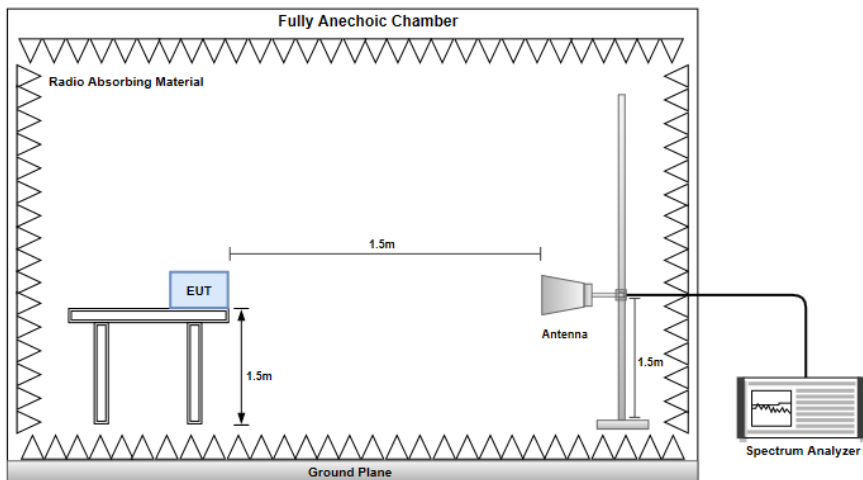
Reference to clause 4.3.5.3 of EN 300 440 V2.1.1 (2017-03).

4.1.3 Test Setup

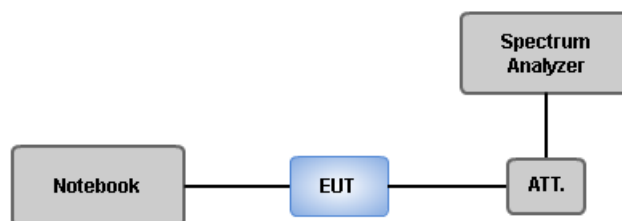
Below 1GHz



Above 1 GHz



Conducted Emission



Main Port

4.1.4 Receiver Conducted Unwanted Emissions (Below 1GHz)

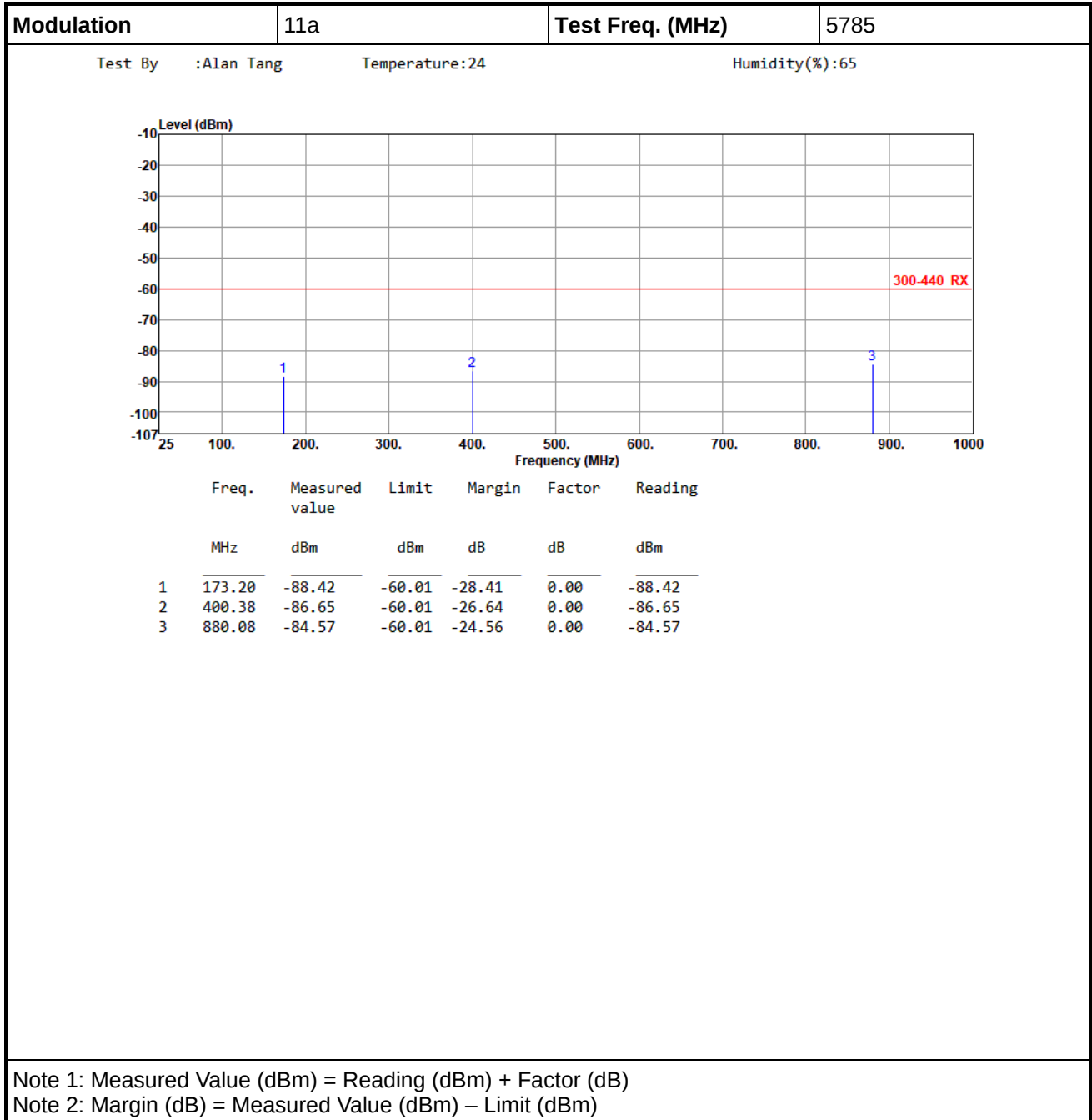
Modulation	11a	Test Freq. (MHz)	5785
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm)			

4.1.5 Receiver Conducted Unwanted Emissions (Above 1GHz)

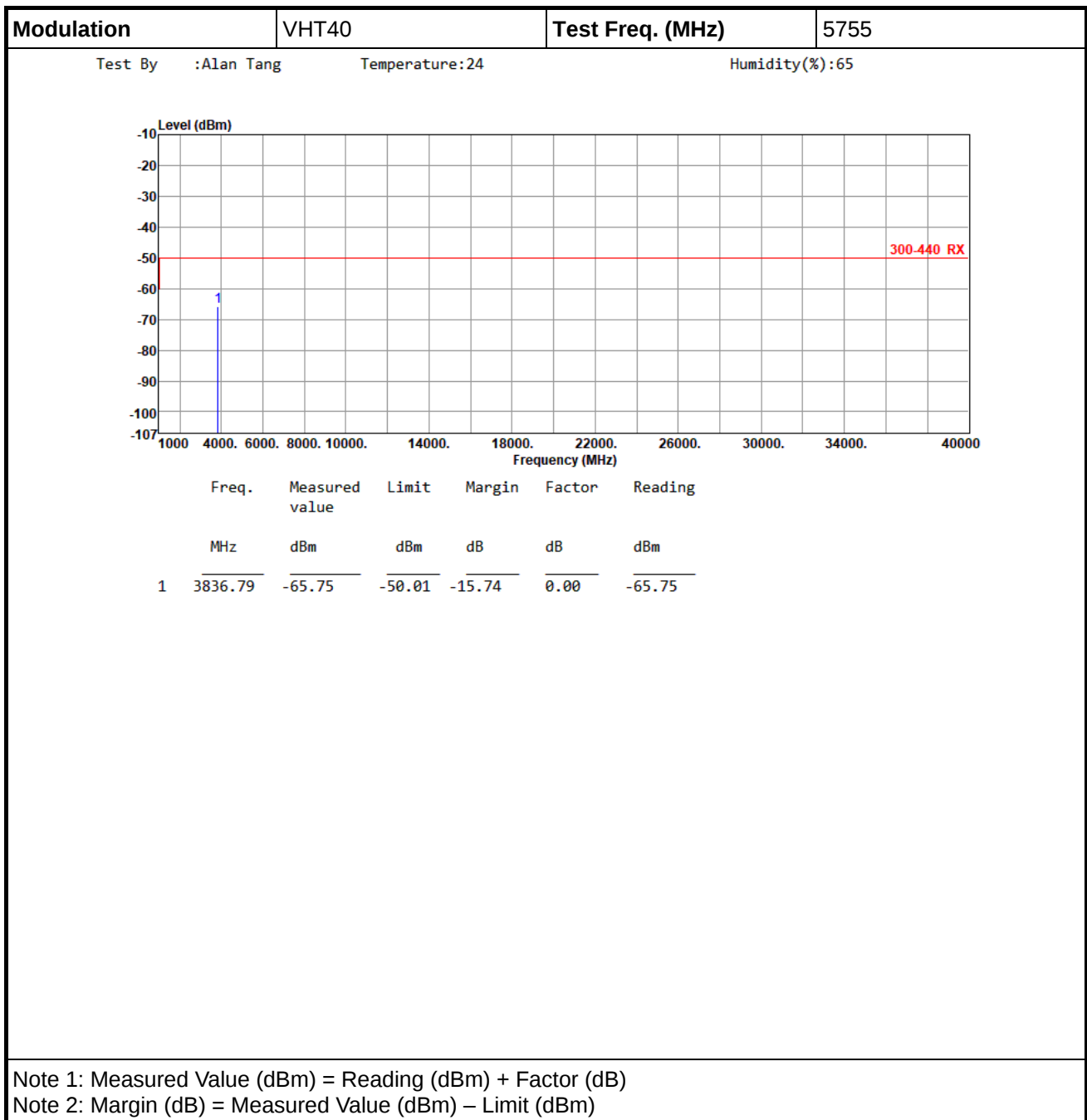
Modulation		VHT40		Test Freq. (MHz)		5755	
Test By		:Alan Tang		Temperature:24		Humidity(%):65	

Aux Port

4.1.6 Receiver Conducted Unwanted Emissions (Below 1GHz)



4.1.7 Receiver Conducted Unwanted Emissions (Above 1GHz)



4.1.8 Receiver Radiated Unwanted Emissions (Below 1GHz)

Modulation	11a	Test Freq. (MHz)	5785
Polarization	Horizontal		
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm) </			

Modulation	11a	Test Freq. (MHz)	5785
Polarization	Vertical		
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm) <			

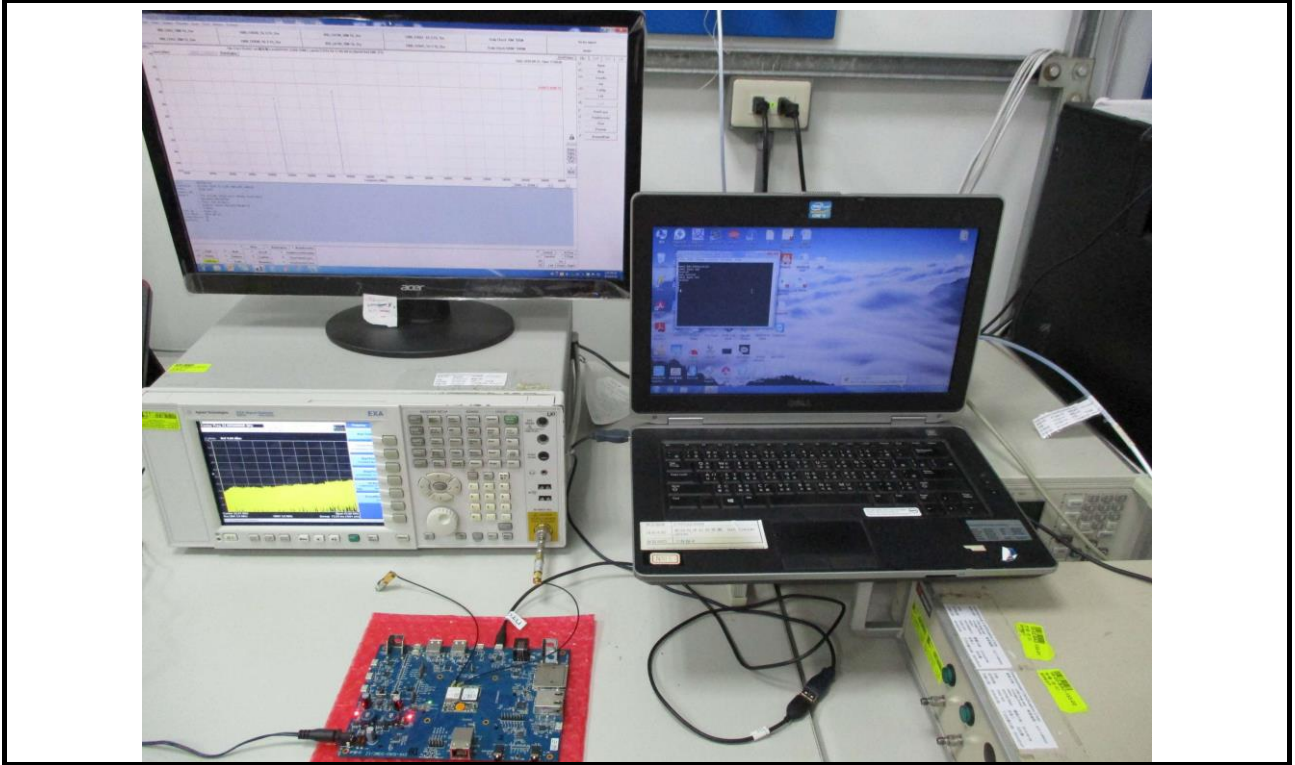
4.1.9 Receiver Spurious Emissions (Above 1GHz)

Modulation	11a	Test Freq. (MHz)	5785
Polarization	Horizontal		
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm) </			

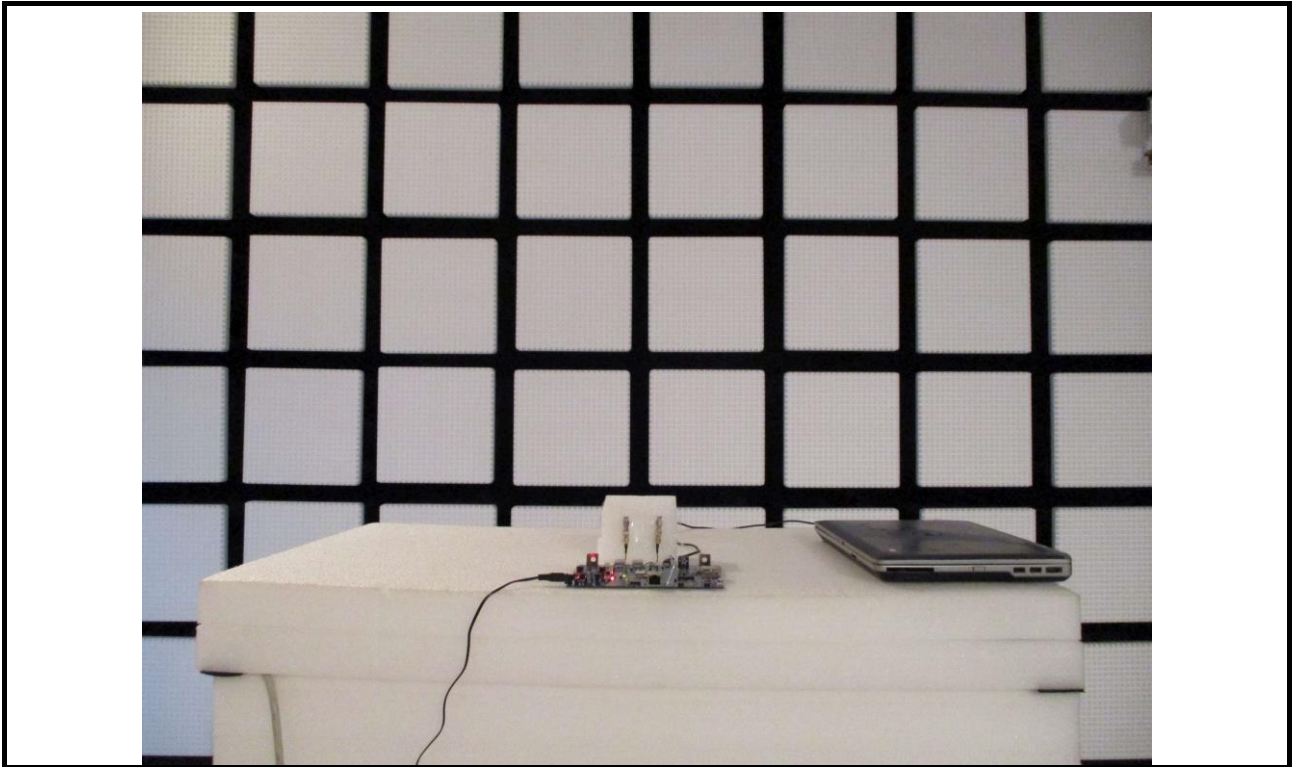
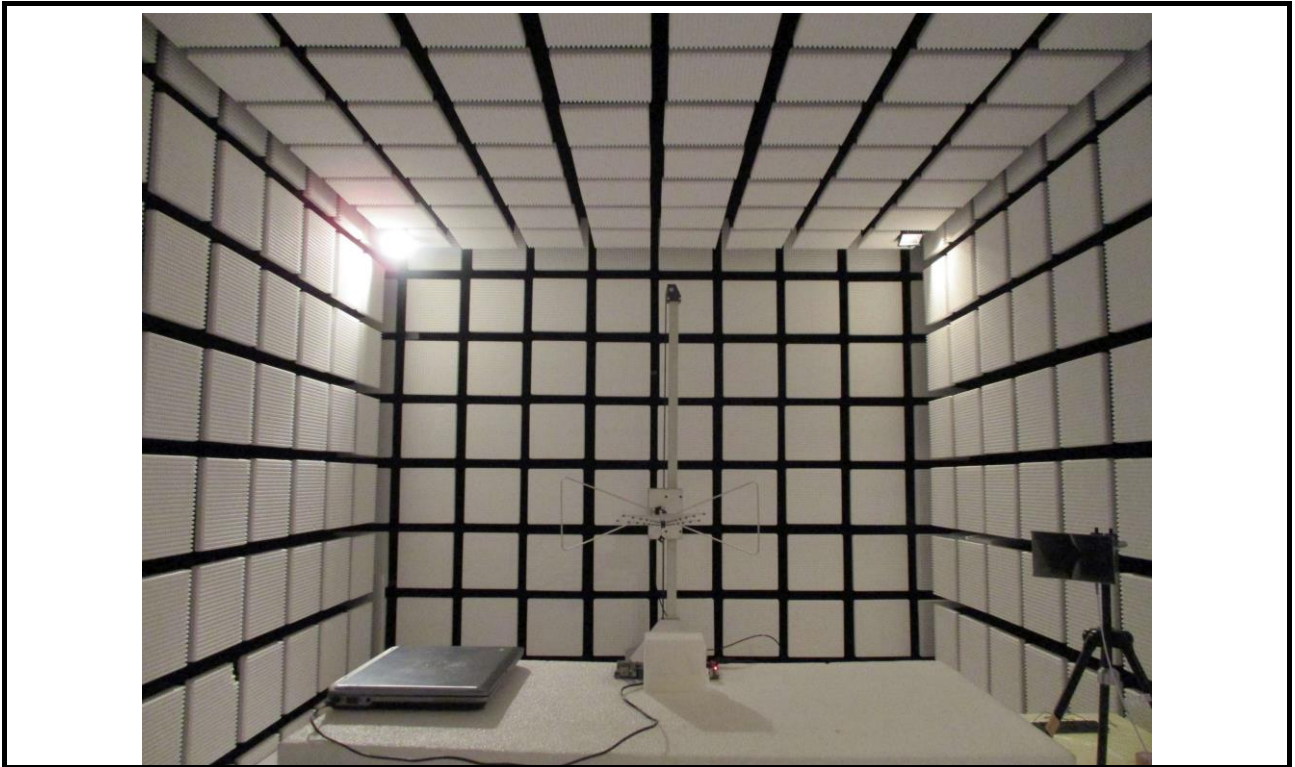
Modulation	11a	Test Freq. (MHz)	5785
Polarization	Vertical		
Test By :Alan Tang Temperature:24 Humidity(%):65			
Level (dBm)			

5 Photographs of the Test Configuration

Conducted Spurious Emission Test



Radiated Spurious Emission Test



6 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corporation (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

Linkou

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou
District, New Taipei City, Taiwan
(R.O.C.)

Kwei Shan

Tel: 886-3-271-8666

No.3-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)
No.2-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

Kwei Shan Site II

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 333, Taiwan (R.O.C.)

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666

Fax: 886-3-318-0345

Email: ICC_Service@icertifi.com.tw

==END==