

FCC Partial Test Report

FCC ID : MXF-L1000

Equipment : Luma Home

Model No. : WRTQ-329ACN

Brand Name : Gemtek

Applicant : Gemtek Technology Co., Ltd.

Address : No. 15-1 Zhonghua Road, Hsinchu Industrial

Park, Hukou, Hsinchu, Taiwan, 30352.

Standard : 47 CFR FCC Part 15.407

Received Date : Mar. 18, 2016

Tested Date : Sep. 12 ~ Sep. 13, 2016

We, International Certification Corp., 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: Approved by:

Along Cher / Assistant Manager Gary Chang / Manager

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FR632301-01-1AN	Rev. 01	Initial issue	Nov. 11, 2016

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Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.407(b)	Radiated Emissions	[dBuV/m at 3m]: 5150.00MHz	Paga
15.209	nadiated Emissions	52.75 (Margin -1.25dB) - AV	Pass

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1 General Description

1.1 Information

This report is issued as a supplement report to the original project no. FR632301AN. The device has modifications as below

- 1. Size and location of conductive foam is changed.
- 2. Height of Shielding case is changed
- 3. Adding 5250~5350 / 5470 ~ 5725 MHz band by software setting

1.1.1 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		
5150-5250	а	5180-5240	36-48 [4]	2	6-54 Mbps		
5150-5250	n (HT20)	5180-5240	36-48 [4]	2	MCS 0-15		
5150-5250	n (HT40)	5190-5230	38-46 [2]	2	MCS 0-15		
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	2	MCS 0-9		
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	2	MCS 0-9		
5150-5250	ac (VHT80)	5210	42 [1]	2	MCS 0-9		

Note 1: RF output power specifies that Maximum Conducted Output Power.

Note 2: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.

RF General Information							
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N _{TX})	Data Rate / MCS		
5725-5850	а	5745-5825	149-165 [5]	2	6-54 Mbps		
5725-5850	n (HT20)	5745-5825	149-165 [5]	2	MCS 0-15		
5725-5850	n (HT40)	5755-5795	151-159 [2]	2	MCS 0-15		
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	2	MCS 0-9		
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	2	MCS 0-9		
5725-5850	ac (VHT80)	5775	155 [1]	2	MCS 0-9		

Note 1: RF output power specifies that Maximum Conducted Output Power.

Note 2: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.

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1.1.2 Antenna Details

Ant No	Time	Operating	Commontor		
Ant. No.	Туре	2400~2483.5	5150~5250	5725~5850	Connector
1	PIFA	3	4.5	5.5	IPEX

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from AC adapter
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1.1.4 Accessories

	Accessories					
No.	Equipment	Description				
1	Adapter	Brand: Luma Model: LWONCA-US1215 I/P: 100-240Vac, 50-60Hz, 0.5A Max O/P: 12Vdc, 1.5A Power line: 1.55m non-shielded without core				
2	RJ45 cable	Brand: EKSON Model: ZP01-C254 1m non-shielded w/o core				
3	RJ45 cable	Brand: Ricolink Model: 21A16030101 1m non-shielded w/o core				

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1.1.5 Channel List

For Frequency band 5150-5250 MHz					
802.11 a / H	HT20 / VHT20	HT40 /	VHT40		
Channel	Channel Frequency(MHz)		Frequency(MHz)		
36	5180	38	5190		
40	5200	46	5230		
44	5220	VH	T80		
48	5240	42	5210		

For Frequency band 5725~5850 MHz					
802.11 a / H	T20 / VHT20	HT40 /	VHT40		
Channel	Channel Frequency(MHz)		Frequency(MHz)		
149	5745	151	5755		
153	5765	159	5795		
157	5785	VH	T80		
161	5805	155	5775		
165	5825				

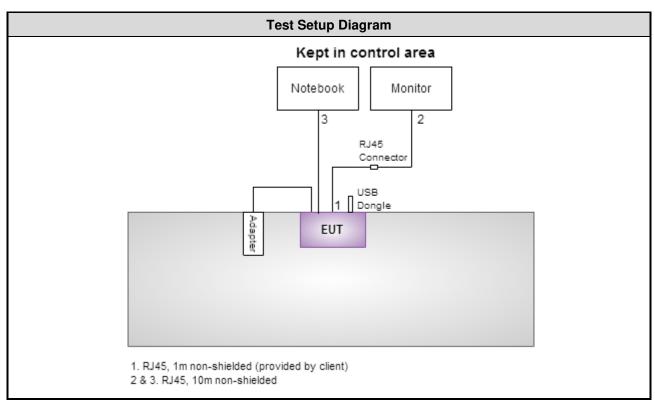
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1.2 Local Support Equipment List

	Support Equipment List							
No. Equipment Brand Model FCC ID Signal cable / Length								
1	Notebook	DELL	Latitude E6430	DoC	RJ45, 10m non-shielded.			
2	Notebook	DELL	Latitude E6430	DoC	RJ45, 10m non-shielded. RJ45, 1m non-shielded.			
3	USB Dongle	Kingston	DTSE9					

1.3 Test Setup Chart



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1.4 The Equipment List

Test Item	Radiated Emission								
Test Site	966 chamber1 / (03CH01-WS)								
Tested Date	Sep. 12 ~ Sep. 13, 2	Sep. 12 ~ Sep. 13, 2016							
Instrument	Manufacturer								
Spectrum Analyzer	R&S	FSV40	101498	Dec. 13, 2015	Dec. 12, 2016				
Receiver	R&S	ESR3	101658	Nov. 04, 2015	Nov. 03, 2016				
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017				
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 16, 2015	Dec. 15, 2016				
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016				
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 16, 2015	Nov. 15, 2016				
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 2017				
Preamplifier	Agilent	83017A	MY39501308	Oct. 02, 2015	Oct. 01, 2016				
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017				
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 10, 2015	Dec. 09, 2016				
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 10, 2015	Dec. 09, 2016				
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 10, 2015	Dec. 09, 2016				
LF cable 1M	EMC	EMCCFD400-NM-NM-100 0	16052	Dec. 10, 2015	Dec. 09, 2016				
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 10, 2015	Dec. 09, 2016				
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 10, 2015	Dec. 09, 2016				
Measurement Software	AUDIX	e3	6.120210g	NA	NA				
Note: Calibration Inte	erval of instruments list	ted above is one year.							

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1.5 Testing Applied Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.407

ANSI C63.10-2013

FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03

FCC KDB 644545 D03 Guidance for IEEE 802 11ac New Rules v01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty		
Parameters	Uncertainty	
Radiated emission ≤ 1GHz	±3.66 dB	
Radiated emission > 1GHz	±5.63 dB	

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2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	21-24°C / 61-62%	Vincent Yeh Felix Sung

➤ FCC site registration No.: 181692➤ IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

For Frequency band 5150-5250 MHz				
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Radiated Emissions ≤1GHz	11a	5180	6 Mbps	
Radiated Emissions >1GHz	11a	5180	6 Mbps	

Note:

- 1) The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement X, Y, and Z-plane. The **Y-plane** results were found as the worst case and were shown in this report.
- 2) 2 RJ45 cables, EKSON and Ricolink, had been pretested and found that **EKSON** was the worst case and was selected for final testing.

For Frequency band 5725-5850 MHz				
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Radiated Emissions ≤1GHz	VHT20	5785	MCS 0	
Radiated Emissions >1GHz	VHT20	5785	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 **Y-plane** results were found as the worst case and were shown in this report.
- 2 RJ45 cables, EKSON and Ricolink, had been pretested and found that EKSON was the worst case and was selected for final testing.

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3 Transmitter Test Results

3.1 Transmitter Radiated and Band Edge Emissions

3.1.1 Limit of Transmitter Radiated and Band Edge Emissions

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:

Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit **Note 2:**

Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

Un-restricted band emissions above 1GHz Limit		
Operating Band	Limit	
5.15 - 5.25 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]	
5.725 - 5.850 GHz	15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	
	15.407(b)(4)(ii) ,compliance with the emission limits in § 15.247(d) Shall be at least 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,. Attenuation below the general limits specified in §15.209(a) is not required. In addition,radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see § 15.205(c))	

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

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3.1.2 Test Procedures

- 1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
- 2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
- 3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

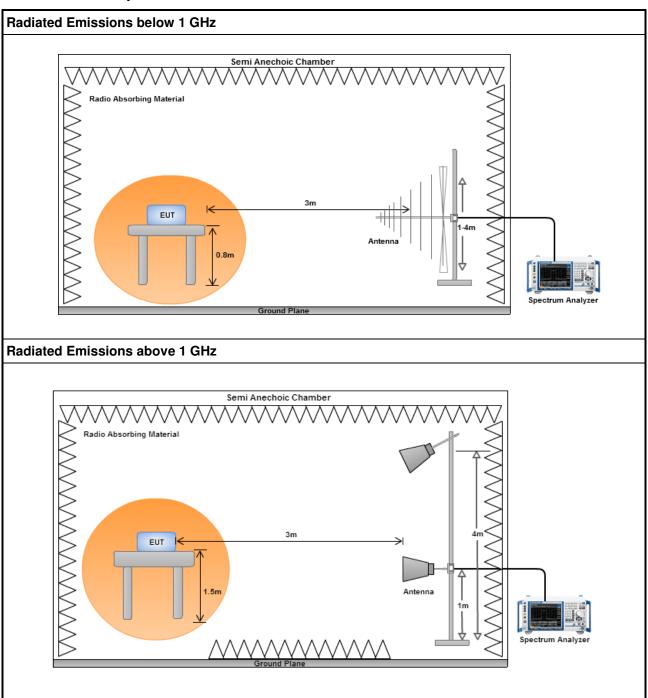
Note:

- 1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
- 2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
- 3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

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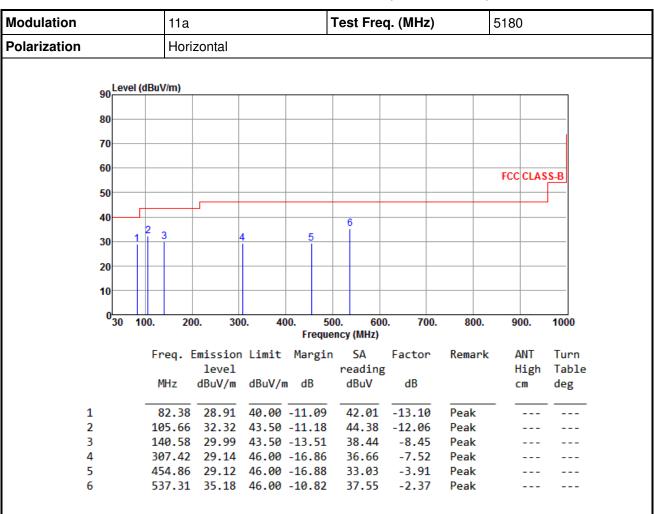
3.1.3 Test Setup



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3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)



Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

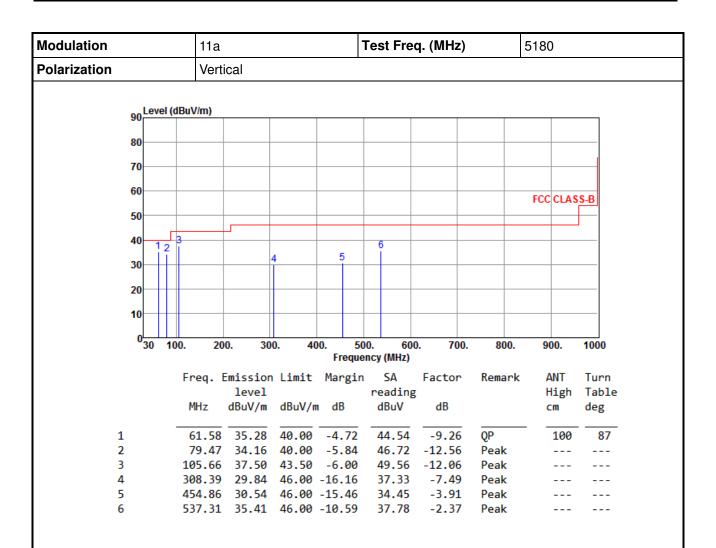
*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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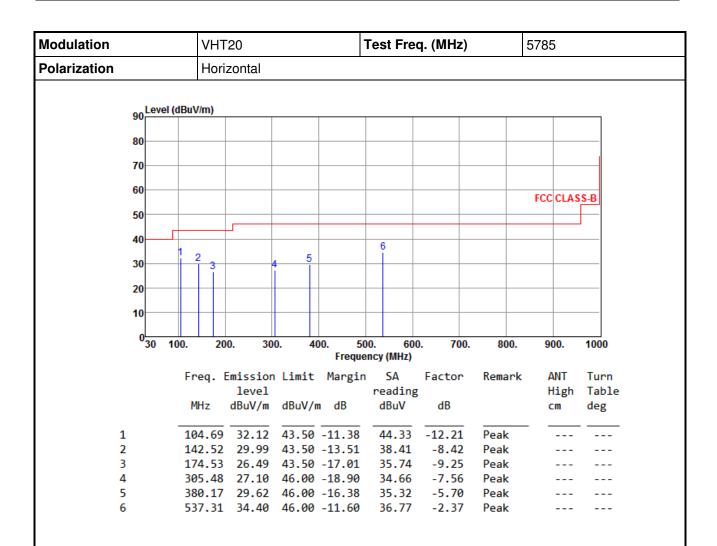
*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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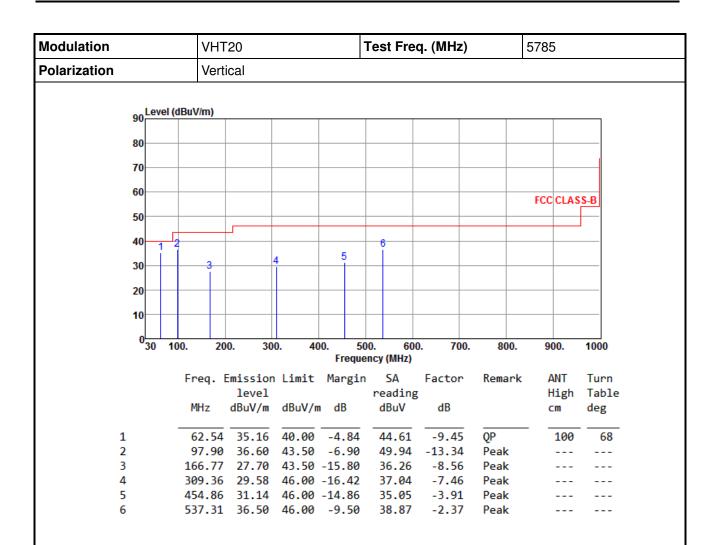
*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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*Factor includes antenna factor, cable loss and amplifier gain

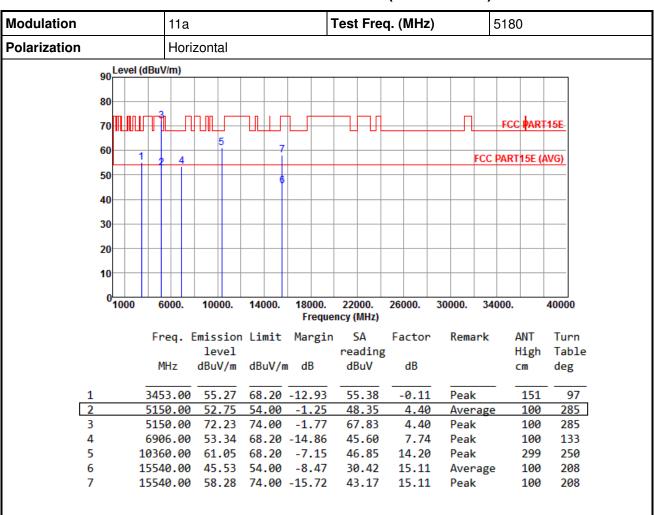
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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3.1.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)



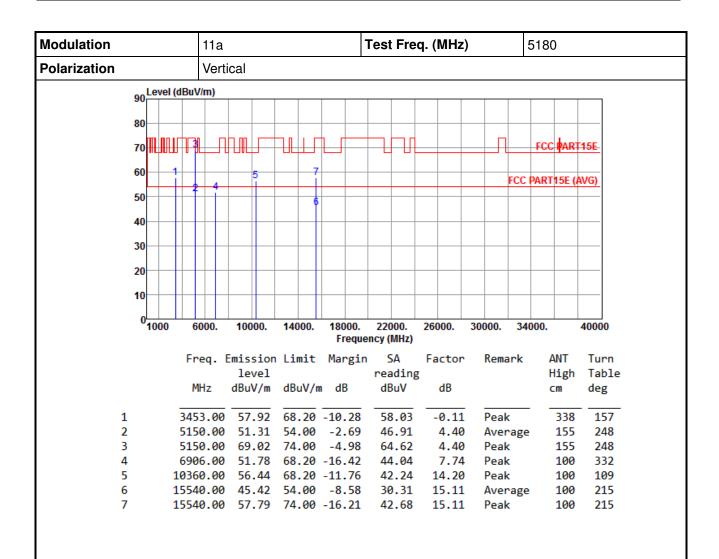
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).

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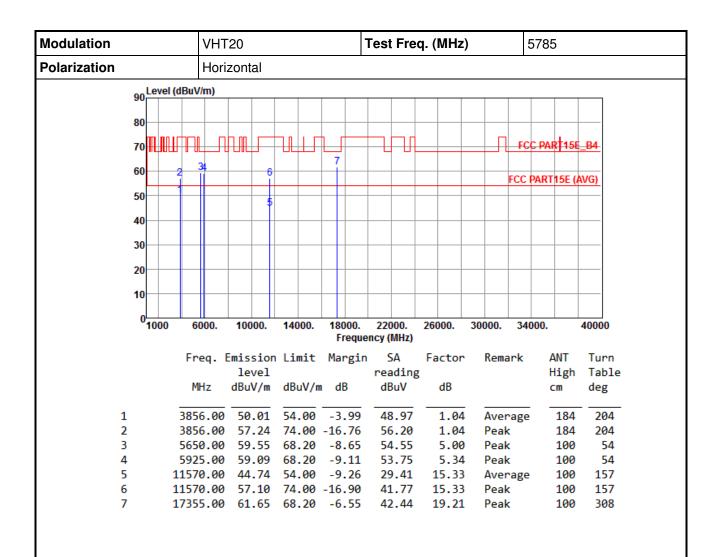


*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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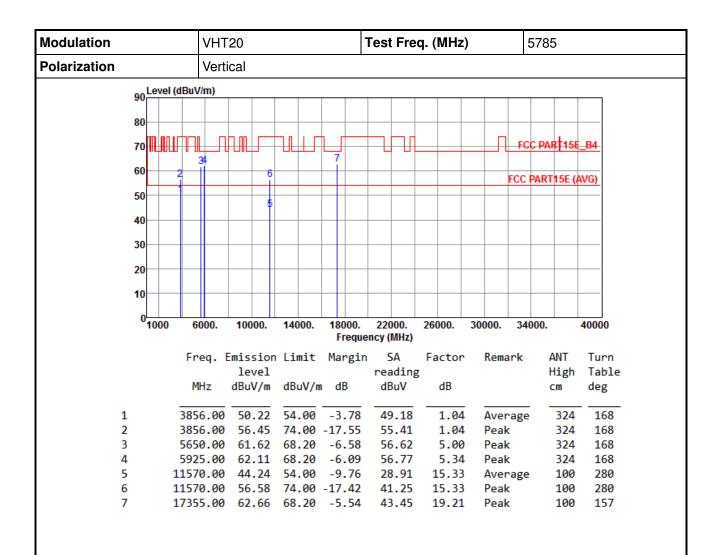


*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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4 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 Corp, 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 District, Tao Yuan City 333, Taiwan, R.O.C. Kwei Shan Site II

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, 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: 886-3-318-0155

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<u>==END</u>==

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