

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 Chew/ Assistant Manager Gary Chang / Manager

TAF)
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	Pass
15.209	Radiated Emissions	52.75 (Margin -1.25dB) - AV	Fd55

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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 $5250 \sim 5350 / 5470 \sim 5725$ 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.	Туре	Operating	Connector		
Ant. No.		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 / HT20 / VHT20 HT40 / VHT40					
Channel	Channel Frequency(MHz)		Frequency(MHz)		
36	5180	38	5190		
40	5200	46	5230		
44	5220	VH	Т80		
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.	Т80		
161	5805	155	5775		
165	5825				

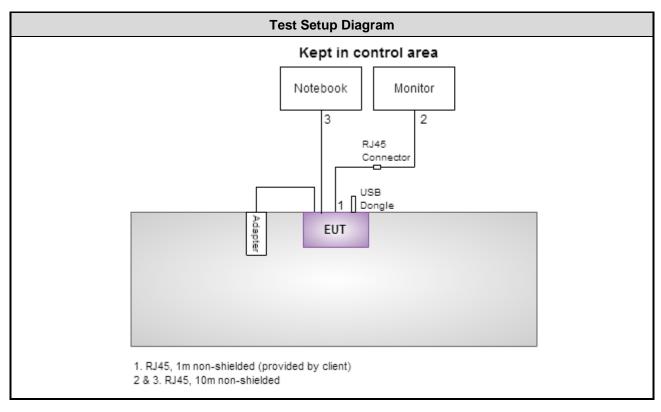
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1.2 Local Support Equipment List

Support Equipment List								
No.	No. Equipment Brand Model FCC ID Signal cable / Length (m)							
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 / (03C	966 chamber1 / (03CH01-WS)						
Tested Date	Sep. 12 ~ Sep. 13, 2	Sep. 12 ~ Sep. 13, 2016						
Instrument	Manufacturer Model No. Serial No. Calibration Date Calibration Until							
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.: 181692IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

	For Frequen	cy 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 Frequer	ncy 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

- 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.

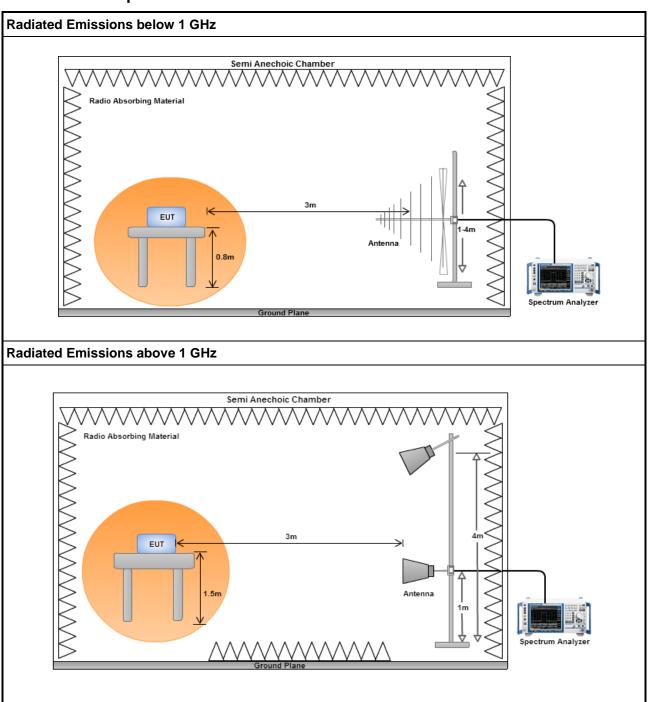
Note:

- 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.
- RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

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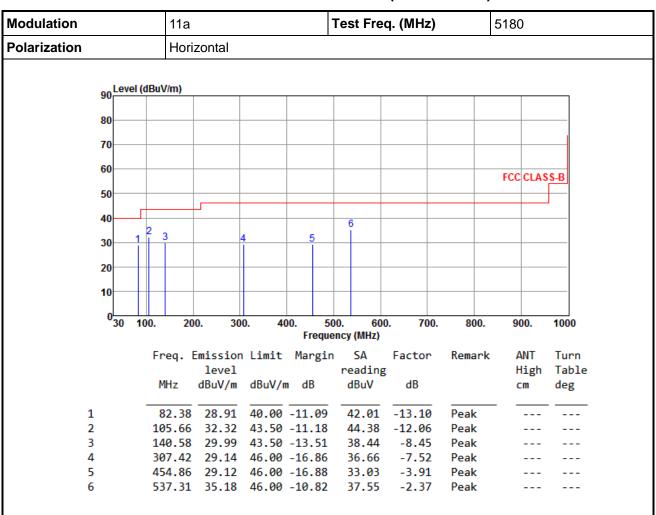
3.1.3 Test Setup



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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)

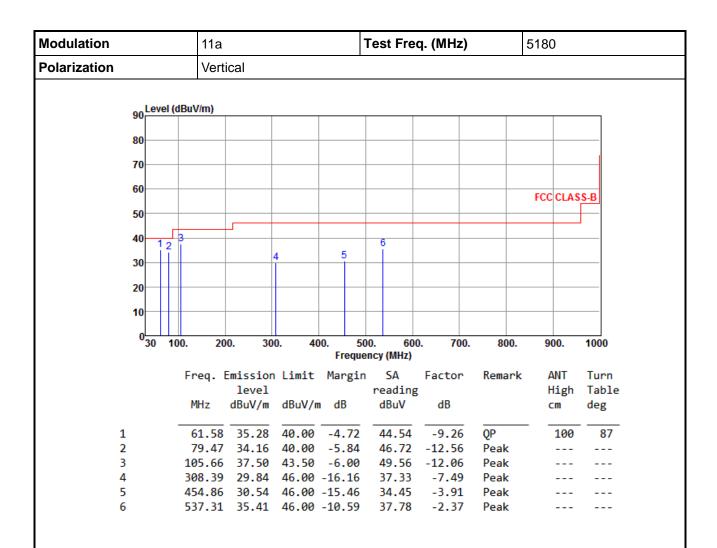
*Factor includes antenna factor, cable loss and amplifier gain

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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	VHT20 Test Freq. (MHz) 5785									
	Horizontal									
Level (dB	ıV/m)									_
1										
)										
)										
								FCC C	CLASS	-В
					6					_
	2		5		Ĭ					
	Ιĭ									
)										_
'30 100.	20	0. 30	0. 40			0. 700.	800.	900).	1000
F	req.	Emission	Limit	Margin	SA	Factor	Remark	ΑN	IT	Turn
		level		_	reading			Hi	_	Table
	MHz	dBuV/m	dBuV/r	n dB	dBuV	dB		cm	1	deg
	04.69	32.12	43.50	-11.38	44.33	-12.21	Peak			
					38.41	-8.42	Peak	-		
					35.74	-9.25	Peak	-		
								-		
3	80.1/	29.62	46.00	-16.38	35.32	-5.70	reak	-		
	30 100.	Hori Level (dBuV/m) 1 2 3 3 30 100. 20 Freq. MHz 104.69 142.52 174.53 305.48	Horizontal Level (dBuV/m) 1 2 3 4 4 5 6 6 4 9 30 5 . 48 27 . 10	Horizontal Level (dBuV/m) 1 2 5 30 100. 200. 300. 4 Freq. Emission Limit level MHz dBuV/m dBuV/r 104.69 32.12 43.50 142.52 29.99 43.50 174.53 26.49 43.50 305.48 27.10 46.00	Horizontal Level (dBuV/m) 1 2 5 5 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Horizontal Level (dBuV/m) 1 2 4 5 6 30 100. 200. 300. 400. 500. 600 Frequency (MHz) Freq. Emission Limit Margin SA level reading MHz dBuV/m dBuV/m dB dBuV 104.69 32.12 43.50 -11.38 44.33 142.52 29.99 43.50 -13.51 38.41 174.53 26.49 43.50 -17.01 35.74 305.48 27.10 46.00 -18.90 34.66	Horizontal Level (dBuV/m) 1 2 4 5 6 30 100. 200. 300. 400. 500. 600. 700. Frequency (MHz) Freq. Emission Limit Margin SA Factor reading MHz dBuV/m dBuV/m dB dBuV dB 104.69 32.12 43.50 -11.38 44.33 -12.21 142.52 29.99 43.50 -13.51 38.41 -8.42 174.53 26.49 43.50 -17.01 35.74 -9.25 305.48 27.10 46.00 -18.90 34.66 -7.56	Horizontal Level (dBuV/m) 1 2 3 4 5 6 6 7 700. 800. Frequency (MHz) Freq. Emission Limit Margin SA Factor Remark level reading MHz dBuV/m dBuV/m dB dBuV dB 104.69 32.12 43.50 -11.38 44.33 -12.21 Peak 142.52 29.99 43.50 -13.51 38.41 -8.42 Peak 174.53 26.49 43.50 -17.01 35.74 -9.25 Peak 305.48 27.10 46.00 -18.90 34.66 -7.56 Peak	Horizontal Level (dBuV/m) 30 100. 200. 300. 400. 500. 600. 700. 800. 900 Frequency (MHz) Freq. Emission Limit Margin SA Factor Remark AN level reading Hi MHz dBuV/m dBuV/m dB dBuV dB cn 104.69 32.12 43.50 -11.38 44.33 -12.21 Peak 142.52 29.99 43.50 -13.51 38.41 -8.42 Peak 174.53 26.49 43.50 -17.01 35.74 -9.25 Peak 305.48 27.10 46.00 -18.90 34.66 -7.56 Peak	Horizontal Level (dBuV/m) FCC CLASS

*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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Modulation			VHT20 Test Freq. (MHz) 5785								
Polarization			Vertical								
	90 ^{L0}	evel (dB	uV/m)								
	80										
	70										
	60										
										FCC CLAS	SS-B
	50										_
	40	1 2		_			6				
	30	<u>il</u>	2		4	5					
	30		ĭ								
	20										
	10	++									
	03	0 100.	20	0. 30	0. 4		00. 600 ency (MHz)	0. 700.	800.	900.	1000
						-		F	DI-	ANT	т
		1	req. i	mission level	Limit	margin	reading	Factor	Remark	ANT High	Turn Table
			MHz	dBuV/m	dBuV/r	n dB	dBuV	dB		cm	deg
	1	_	62.54	35.16	40.00	-4.84	44.61	-9.45	QP .	100	
	2		97.90			-6.90	49.94		Peak		
	3		66.77			-15.80	36.26	-8.56	Peak		
	4		309.36			-16.42	37.04	-7.46	Peak		
	5 6		154.86 537.31	31.14		-14.86 -9.50	35.05 38.87	-3.91 -2.37	Peak		
'	0	-	57.51	30.30	40.00	-9.50	30.07	-2.5/	Peak		

*Factor includes antenna factor, cable loss and amplifier gain

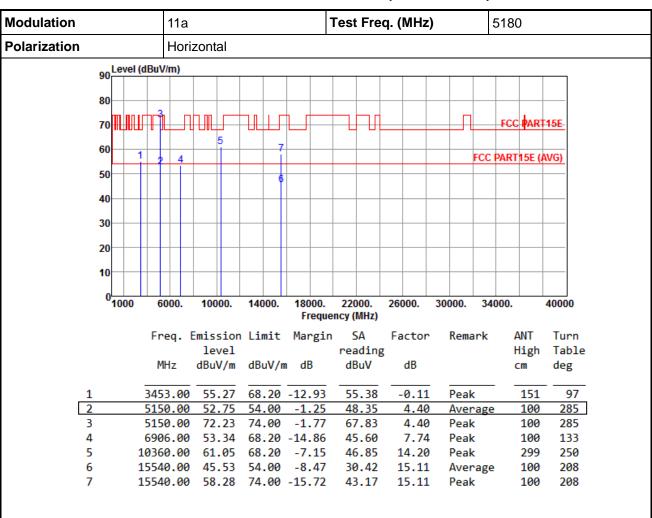
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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)



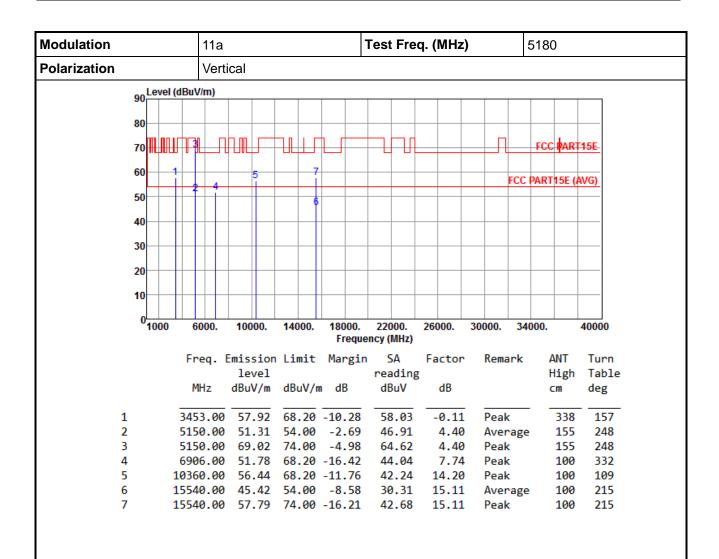
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

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

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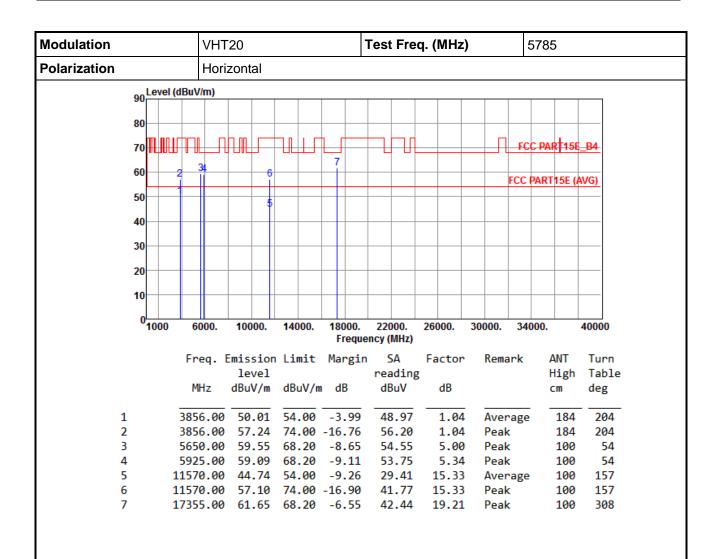


*Factor includes antenna factor, cable loss and amplifier gain

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

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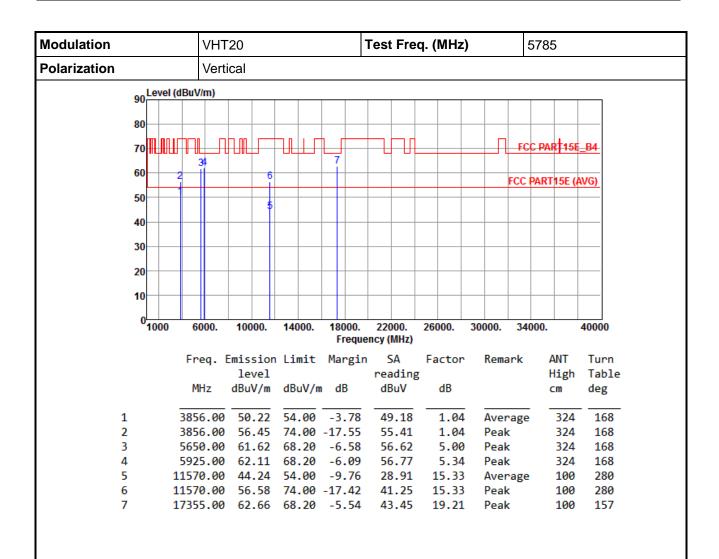


*Factor includes antenna factor, cable loss and amplifier gain

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,

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Kwei Shan

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No. 3-1, Lane 6, Wen San 3rd
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Kwei Shan Site II

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

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

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