

FCC Test Report

FCC ID : NKR-DHUB81

Equipment : 11abgn WLAN/Bluetooth Combo adapter

Model No. : DHUB-81, 700-0022-001

Brand Name : WNC

Applicant : Wistron Neweb Corporation

Address : 20 Park Avenue II, Hsinchu Science Park,

Hsinchu 308, Taiwan, R.O.C.

Standard : 47 CFR FCC Part 15.247

Received Date : Feb. 18, 2014

Tested Date : Feb. 20 ~ Feb. 28, 2014

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.

Approved & Reviewed by:

Gary Chang / Manager

ilac-MRA



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Release Record

Report No.	Version	Description	Issued Date
FR421807AI	Rev. 01	Initial issue	Apr. 21, 2014

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Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.166MHz 47.58 (Margin -7.58dB) - AV	Pass
15.247(d)	Radiated Emissions	[dBuV/m at 3m]:11490.00MHz	Pass
15.209	Radiated Emissions	52.59 (Margin -1.41dB) - AV	Fd55
15.247(b)(3)	Fundamental Emission Output Power	Power [dBm]: 11a: 24.62 HT20: 24.59 HT40: 24.50	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

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1 General Description

1.1 Information

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
WNC	DHUB-81	11abgn WLAN/Bluetooth	markating purpose
VVINC	700-0022-001	Combo adapter	marketing purpose

[★] All models are electrically identical, different model names are for marketing purpose.

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information							
Frequency Range (MHz)	IEEE Std. 802.11	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		

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

1.1.3 Antenna Details

Ant.	Model	Туре	Connector	Operating Frequencies (MHz) / Antenna Gain (dB			Gain (dBi)
No.	No.	C 0	5150~5250	5250~5350	5470~5725	5725~5850	
1	Left (ANT1)	Printed	NA	-2.93	-2.65	-2.71	-3.84
2	Right (ANT0)	Printed	NA	-3.14	-2.83	-2.73	-3.12

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc from host
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1.1.5 Accessories

N/A

1.1.6 Channel List

Frequency band (MHz)	5725~5850	
802.11 a / HT20	802.11n HT40	

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The above models, model **DHUB-81** was selected as a representative one for the final test and only its data was recorded in this report.

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



Channel	Frequency(MHz)	Channel	Frequency(MHz)
149	5745	151	5755
153	5765	159	5795
157	5785		
161	5805		
165	5825		

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1.1.7 Test Tool and Duty Cycle

Test Tool	Mtool, V2.0.0.9				
	Mode	Duty cycle (%)	Duty factor (dB)		
Duty Cycle and Duty Factor	11a	99.31%	0.03		
Duty Cycle and Duty Factor	HT20	99.25%	0.03		
	HT40	98.19%	0.08		

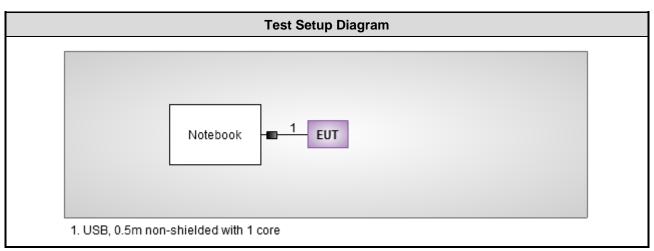
1.1.8 Power Setting

Modulation Mode	Test Frequency (MHz)	Power Set
11a	5745	76
11a	5785	76
11a	5825	76
HT20	5745	76
HT20	5785	76
HT20	5825	76
HT40	5755	68
HT40	5795	76

1.2 Local Support Equipment List

	Support Equipment List						
No.	Equipment	Brand	Model	S/N	FCC ID	Signal cable / Length (m)	
1	Notebook	DELL	E6430		DoC	USB 0.5m non-shielded cable with 1 core.	

1.3 Test Setup Chart



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1.4 The Equipment List

Conducted Emission								
Conduction room 1 / (CO01-WS)								
Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until				
R&S	ESCS 30	100169	Oct. 15, 2013	Oct. 14, 2014				
SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 23, 2013	Nov. 22, 2014				
SCHWARZBECK	Schwarzbeck 8127	8127-666	Dec. 04, 2013	Dec. 03, 2014				
Woken	CFD200-NL	CFD200-NL-001	Apr. 24, 2013	Apr. 23, 2014				
NA	50	04	Apr. 22, 2013	Apr. 21, 2014				
	Conduction room 1 / (Manufacturer R&S SCHWARZBECK SCHWARZBECK Woken	Conduction room 1 / (CO01-WS) Manufacturer Model No. R&S ESCS 30 SCHWARZBECK Schwarzbeck 8127 SCHWARZBECK Schwarzbeck 8127 Woken CFD200-NL	Manufacturer Model No. Serial No. R&S ESCS 30 100169 SCHWARZBECK Schwarzbeck 8127 8127-667 SCHWARZBECK Schwarzbeck 8127 8127-666 Woken CFD200-NL CFD200-NL-001	Manufacturer Model No. Serial No. Calibration Date R&S ESCS 30 100169 Oct. 15, 2013 SCHWARZBECK Schwarzbeck 8127 8127-667 Nov. 23, 2013 SCHWARZBECK Schwarzbeck 8127 8127-666 Dec. 04, 2013 Woken CFD200-NL CFD200-NL-001 Apr. 24, 2013				

Test Item	Radiated Emission	Radiated Emission								
Test Site	966 chamber 2 / (03C	966 chamber 2 / (03CH02-WS)								
Instrument	Manufacturer	Model No. Serial No. Calibration Date Calibrati								
Spectrum Analyzer	R&S	FSV40	101499	Feb. 08, 2014	Feb. 07, 2015					
Receiver	R&S	ESR3	101657	Jan. 18, 2014	Jan. 17, 2015					
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-524	Jan. 08, 2014	Jan. 07, 2015					
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Jan. 07, 2014	Jan. 06, 2015					
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Dec. 27, 2013	Dec. 26, 2014					
Preamplifier	Burgeon	BPA-530	100218	Dec. 09, 2013	Dec. 08, 2014					
Preamplifier	Agilent	83017A	MY39501309	Dec. 09, 2013	Dec. 08, 2014					
Preamplifier	EM	EM18G40G	060572	Jun. 20, 2013	Jun. 19, 2014					
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	Dec. 17, 2013	Dec. 16, 2014					
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Dec. 17, 2013	Dec. 16, 2014					
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16015/4	Dec. 17, 2013	Dec. 16, 2014					
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Dec. 17, 2013	Dec. 16, 2014					
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-004	Dec. 17, 2013	Dec. 16, 2014					
Note: Calibration Inter	rval of instruments liste	d above is one year.								

Test Item	Radiated Emission above 1GHz							
Test Site	966 chamber 2 / (03C	966 chamber 2 / (03CH02-WS)						
Instrument	Manufacturer	acturer Model No. Serial No. Calibration Date (
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014			
Note: Calibration Inte	rval of instruments listed	l above is two year.		•				

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Test Item	RF Conducted							
Test Site	(TH01-WS)							
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until			
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2014	Feb. 16, 2015			
Spectrum Analyzer	Agilent	N9010A	MY53400091	Oct. 07, 2013	Oct. 06, 2014			
Power Sensor	Anritsu	MA2411B	1207366	Oct. 24, 2013	Oct. 23, 2014			
Note: Calibration Inte	Note: Calibration Interval of instruments listed above is one year.							

1.5 Test Standards

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

47 CFR FCC Part 15.247

ANSI C63.10-2009

FCC KDB 558074 D01 DTS Meas Guidance v03r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

Note: The EUT has been tested and complied with FCC part 15B requirement. FCC Part 15B test results are issued to another report.

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						
Bandwidth	±35.286 Hz						
Conducted power	±0.536 dB						
Frequency error	±35.286 Hz						
Temperature	±0.3 °C						
Conducted emission	±2.946 dB						
AC conducted emission	±2.43 dB						
Radiated emission	±2.49 dB						

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2 Test Configuration

2.1 Testing Condition

Test Item Test Site		Ambient Condition	Tested By
AC Conduction	CO01-WS	19°C / 65%	Skys Huang
Radiated Emissions	03CH02-WS	17-18°C / 63-65%	Anderson Hong
RF Conducted	TH01-WS	22°C / 62%	Felix Sung

FCC site registration No.: 657002IC site registration No.: 10807A-2

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Conducted Emissions	11a	5745	MCS 0	
Radiated Emissions ≤1GHz	11a	5745	MCS 0	
RF Output Power	11a	5745 / 5785 / 5825	6 Mbps	
6dB bandwidth	HT20	5745 / 5785 / 5825	MCS 0	
Power spectral density	HT40	5755 / 5795	MCS 0	

NOTE:

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^{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.



3 Transmitter Test Results

3.1 Conducted Emissions

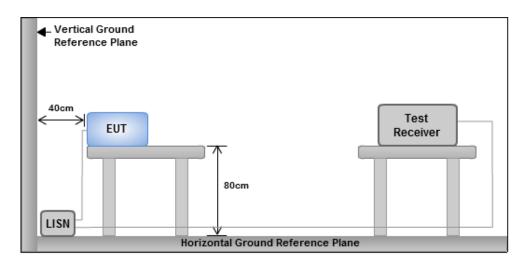
3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit							
Frequency Emission (MHz)	Quasi-Peak	Average					
0.15-0.5	66 - 56 *	56 - 46 *					
0.5-5	56	46					
5-30	60	50					
Note 1: * Decreases with the logarith	m of the frequency.						

3.1.2 Test Procedures

- 1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
- 2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
- 3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
- 4. This measurement was performed with AC 120V / 60Hz.

3.1.3 Test Setup



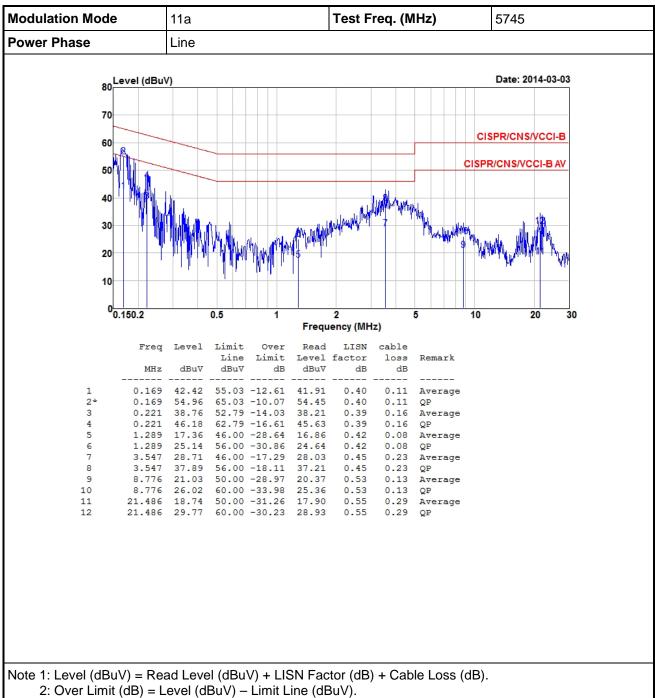
Note: 1. Support units were connected to second LISN.

Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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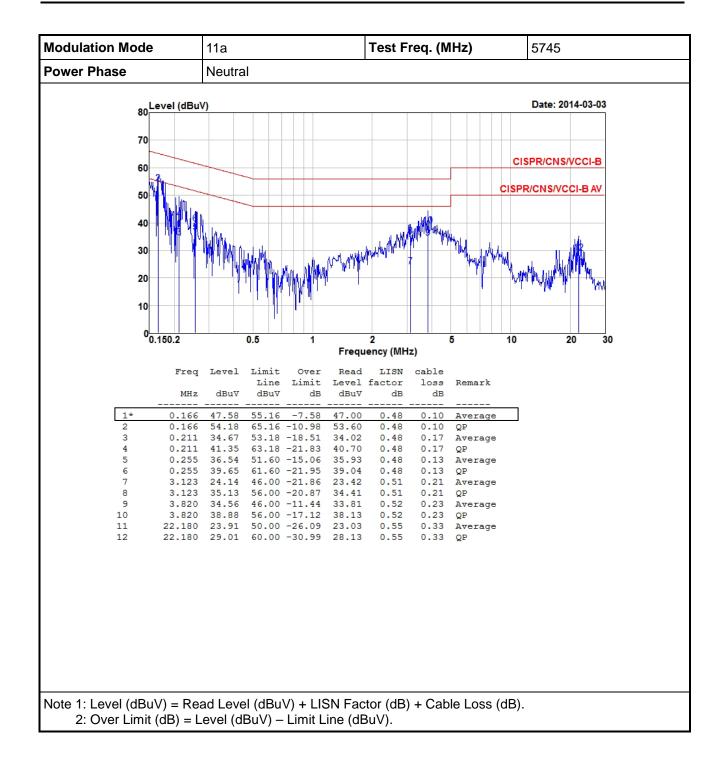


3.1.4 **Test Result of Conducted Emissions**



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3.2 6dB and Occupied Bandwidth

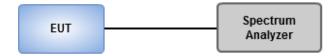
3.2.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

3.2.2 Test Procedures

- 1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
- 2. Detector = Peak, Trace mode = max hold.
- 3. Sweep = auto couple, Allow the trace to stabilize.
- 4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

3.2.3 Test Setup

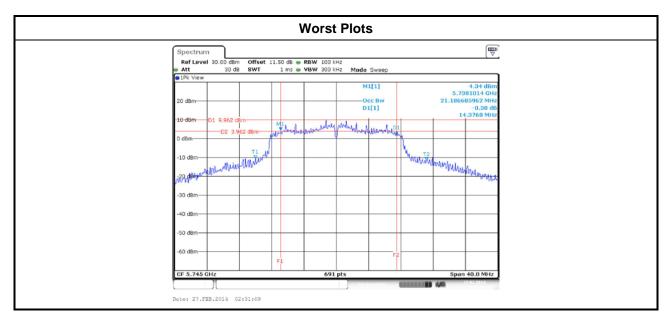


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3.2.4 Test Result of 6dB and Occupied Bandwidth

Modulation	N	6dB Bandwidth (MHz)					
Mode	N _{TX}	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Limit (kHz)
11a	2	5745	15.88	14.38			500
11a	2	5785	15.07	15.07			500
11a	2	5825	16.29	15.13			500
HT20	2	5745	15.94	15.13			500
HT20	2	5785	16.93	15.13			500
HT20	2	5825	15.13	15.71			500
HT40	2	5755	36.29	36.29			500
HT40	2	5795	36.29	36.41			500



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Modulation	N	Eroa (MUT)		99% Occupied E	Bandwidth (MHz)	
Mode	N _{TX}	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3
11a	2	5745	21.24	20.30		
11a	2	5785	21.13	19.07		
11a	2	5825	20.30	19.83		
HT20	2	5745	21.45	19.39		
HT20	2	5785	20.30	20.30		
HT20	2	5825	21.42	18.99		
HT40	2	5755	37.25	37.25		
HT40	2	5795	38.23	37.58		



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3.3 RF Output Power

3.3.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

Antenna gain <= 6dBi, no any corresponding reduction is in output power limit.

Antenna gain > 6dBi

Non Fixed, point to point operations.
The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB

Fixed, point to point operations
Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations, no any corresponding reduction is in transmitter peak output power

3.3.2 Test Procedures

Maximum Peak Conducted Output Power

□ Spectrum analyzer

- 1. Set RBW = 1MHz, VBW = 3MHz, Detector = Peak.
- 2. Sweep time = auto, Trace mode = max hold, Allow trace to fully stabilize.
- 3. Use the spectrum analyzer channel power measurement function with the band limits set equal to the DTS bandwidth edges.

Nower meter

- A broadband Peak RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.
- Maximum Conducted Output Power (For reference only)

Nower meter

 A broadband Average RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

3.3.3 Test Setup



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3.3.4 Test Result of Maximum Output Power

Modulation Mode	N _{TX}	Freq. (MHz)	Peak	Peak conducted output power (dBm)			Total Power	Total Power	Limit (dBm)
Wode		(IVITIZ)	Chain 0	Chain 1	Chain 2	Chain 3	(mW)	(dBm)	(ubili)
11a	2	5745	21.43	21.78			289.656	24.62	30.00
11a	2	5785	21.37	21.57			280.637	24.48	30.00
11a	2	5825	21.29	21.52			276.492	24.42	30.00
HT20	2	5745	21.55	21.59			287.101	24.58	30.00
HT20	2	5785	21.41	21.75			287.980	24.59	30.00
HT20	2	5825	21.34	21.73			285.081	24.55	30.00
HT40	2	5755	21.22	21.51			274.014	24.38	30.00
HT40	2	5795	21.37	21.60			281.632	24.50	30.00

Modulation Mode	N _{TX}	Freq.	Conduc	ucted (average) output power (dBm)			Total Power	Total Power	Limit
Wode		(IVITIZ)	Chain 0	Chain 1	Chain 2	Chain 3	(mW)	(dBm)	(dBm)
11a	2	5745	19.71	19.24			177.487	22.49	30.00
11a	2	5785	19.74	19.48			182.905	22.62	30.00
11a	2	5825	19.51	19.22			172.891	22.38	30.00
HT20	2	5745	19.55	18.93			168.320	22.26	30.00
HT20	2	5785	19.93	19.53			188.144	22.74	30.00
HT20	2	5825	19.45	19.07			168.828	22.27	30.00
HT40	2	5755	17.91	17.71			120.822	20.82	30.00
HT40	2	5795	19.41	19.38			173.993	22.41	30.00

Note: Conducted average output power is for reference only.

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3.4 Power Spectral Density

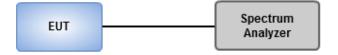
3.4.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

3.4.2 Test Procedures

- Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.
 - Set the RBW = 3kHz, VBW = 10kHz.
 - 2. Detector = Peak, Sweep time = auto couple.
 - 3. Trace mode = max hold, allow trace to fully stabilize.
 - 4. Use the peak marker function to determine the maximum amplitude level.
- Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.
 - Set the RBW = 100kHz, VBW = 300 kHz.
 - 2. Detector = RMS, Sweep time = auto couple.
 - 3. Set the sweep time to: ≥ 10 x (number of measurement points in sweep) x (maximum data rate per stream).
 - 4. Perform the measurement over a single sweep.
 - 5. Use the peak marker function to determine the maximum amplitude level.\

3.4.3 Test Setup



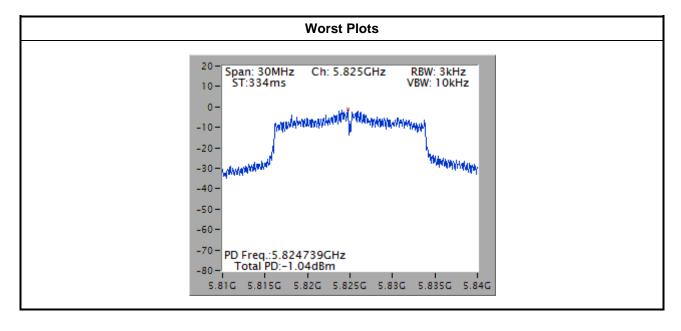
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3.4.4 Test Result of Power Spectral Density

Modulation Mode	N _{TX}	Freq. (MHz)	Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
11a	2	5745	-1.79	8
11a	2	5785	-2.10	8
11a	2	5825	-2.01	8
HT20	2	5745	-2.27	8
HT20	2	5785	-2.47	8
HT20	2	5825	-1.04	8
HT40	2	5755	-8.27	8
HT40	2	5795	-5.96	8

Note: Test result is bin-by-bin summing measured value of each TX port.



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3.5 Unwanted Emissions into Restricted Frequency Bands

3.5.1 Limit of Unwanted Emissions into Restricted Frequency Bands

	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.

3.5.2 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 a height of 0.8 m test table above the ground plane.
- 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.

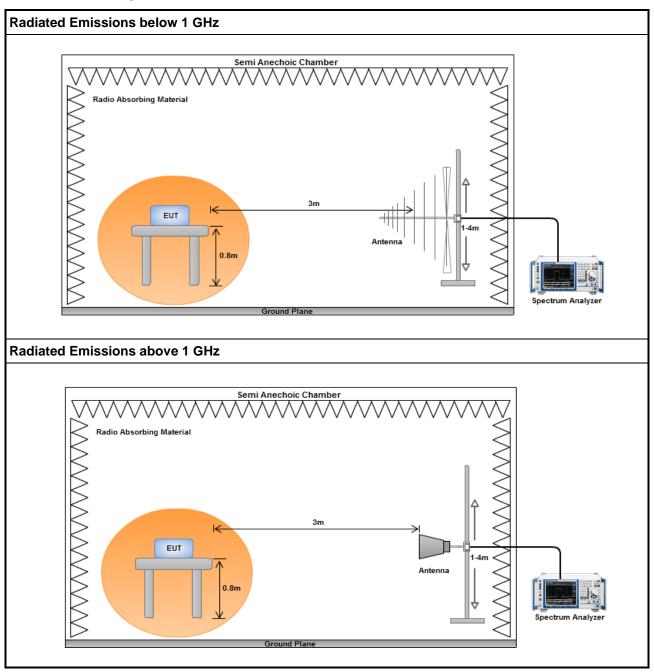
Note:

- 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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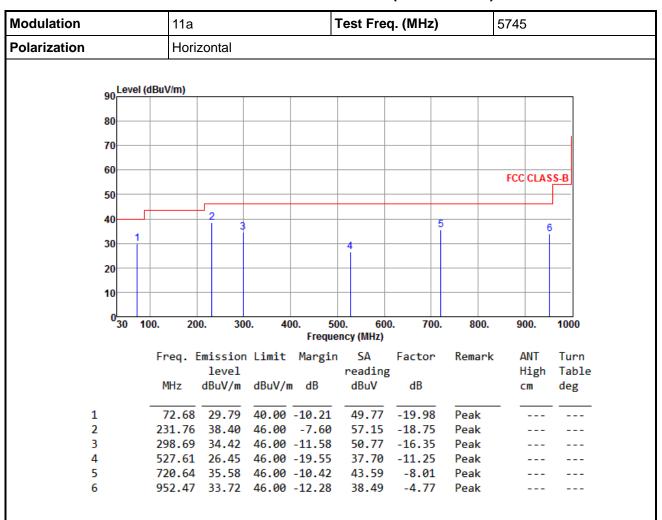
3.5.3 Test Setup



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3.5.4 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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Modulation			11a	ì			Te	st Fre	q. (MHz)		5745	5	
Polarization			Vei	tical							•		
1													
l	90 Le	evel (dBuV/m)				_						
	80												
	80												
	70						+						
	60						1						
											FCC	CLAS	S-B
	50			1			+						_
	40						+				6		
	30-		2	3			4	4	5				
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	0 30) 10	00. 2	200.	300.		00.	60	0. 700.	800.	9	00.	1000
			_			-		y (MHz)	_				
			Freq.	Lmiss		t Margi		SA eading	Factor	Remark		ANT	Turn Table
			MHz		m dBuV	/m dB		dBuV	dB			digh cm	deg
				aba v,	abar	/		ubu.	45		`		acg
:	1		72.6			0 -15.16		44.82	-19.98	Peak			
	2		156.1			0 -11.66		48.93	-17.09	Peak			
	3		231.7			0 -18.07		46.68		Peak			
	4 5					0 -14.72 0 -15.40		39.05	-11.25 -8.45	Peak Peak			
	-		557.5			-15.40			-0.43	- Cak			-

42.60

-6.29

Peak

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).

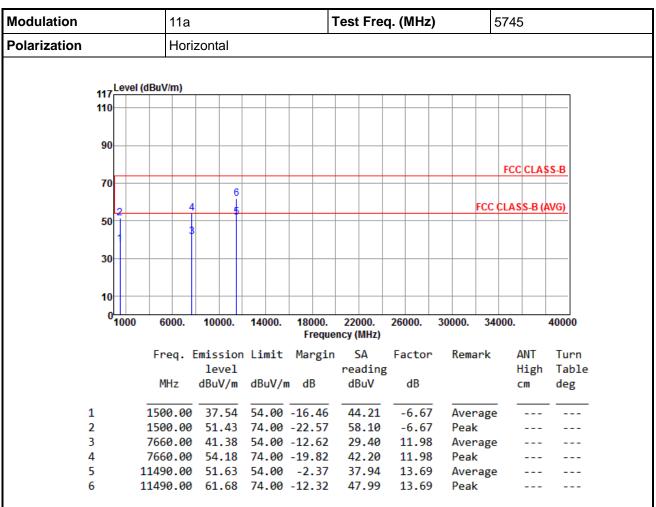
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

840.92 36.31 46.00 -9.69

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3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11a



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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2

3

4

5

Modulation			11a					Т	est Fre	q. ((MHz)	;	5745	5	
Polarization			Vert	ical				1								
	المحاد	evel ((dBuV/m)													
	110							-								
	90-							4								
	70													FCC	CLA	SS-B
			4	ļ	6 5								FCC	CLAS	S-B (AVG)
	50 ²		3	1												
	30				+			+								
	10							4								
	0 <mark></mark>	000	6000.	10000	0.	14000.	18000 Freq		22000. ncy (MHz)	26	6000.	30000.	34	000.		40000
			Freq.	Emissi leve		Limit	Marg	in			actor	Rem	ark		NT	Turn
			MHz			dBuV/n	n dB		reading dBuV	В	dB				ligh :m	Table deg
	1		1500.00	35.6	59	54.00	-18.3	1	42.36	-	-6.67	Ave	rage	-		

55.49

28.76

42.60

38.90

50.21

-6.67

11.98

11.98

13.69

13.69

Peak

Peak

Peak

Average

Average

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor, cable loss and amplifier gain

1500.00 48.82 74.00 -25.18

7660.00 40.74 54.00 -13.26

7660.00 54.58 74.00 -19.42

52.59 54.00 -1.41

63.90 74.00 -10.10

11490.00

11490.00

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

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3

4

5

Modulation			11a				Test Fre	q. (MHz)		5785	
Polarization			Hor	zontal		•				•	
		l aval	(dBuV/m)								
		1	(ubu viiii)								
	110										
	90	\vdash									-
										FCC CLA	
	70									FCC CLA	22-B
	70	1		6							
		2	4	- 5					FC	C CLASS-B	(AVG)
	50	ΉТ	 								
		1									
	30	Н-									
	10										
		Π									
	0	1000	6000.	10000.	14000.	18000. Frequ	22000. ency (MHz)	26000.	30000. 3	34000.	40000
			Freq.	Emission	Limit	Margin	n SA	Factor	Remark	c ANT	Turn
			•	level		3	reading			High	Tabl
			MHz	dBuV/m	dBuV/ı	n dB	dBuV	dB		cm	deg
	1							-6.67	_	ge	
	2		1500.00	51.88	/4.00	-22.12	58.55	-6.67	Peak		

7713.30 41.05 54.00 -12.95 29.18 11.87

7713.30 53.72 74.00 -20.28 41.85 11570.00 51.27 54.00 -2.73 37.50 11570.00 61.28 74.00 -12.72 47.51 Average

Peak Average

Peak

11.87

13.77

13.77

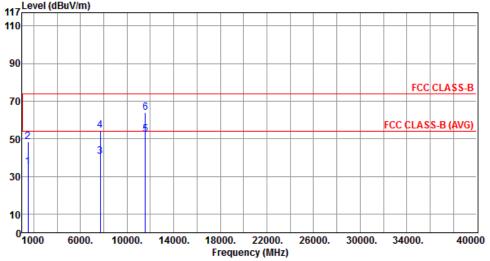
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor , cable loss and amplifier gain

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

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Modulation		11a			٦	Гest	Fre	q. (l	MHz	:)	5	785	;	
Polarization		Vertical												
44.7	Level (dBu	V/m)												
11/1														
110											_	_		



	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	1500.00	35.18	54.00	-18.82	41.85	-6.67	Average		
2	1500.00	48.57	74.00	-25.43	55.24	-6.67	Peak		
3	7713.30	40.53	54.00	-13.47	28.66	11.87	Average		
4	7713.30	54.23	74.00	-19.77	42.36	11.87	Peak		
5	11570.00	52.32	54.00	-1.68	38.55	13.77	Average		
6	11570.00	63.70	74.00	-10.30	49.93	13.77	Peak		

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Polarization Horizontal H	Modulation			11	la					-	Test	Fre	q. (Mł	łz)			582	5	
FCC CLASS.B (AVG) 10 1000 6000. 10000. 14000. 18000. 22000. 26000. 30000. 34000. 4000 Frequency (MHz) Freq. Emission Limit Margin SA Factor Remark ANT Turlevel reading High Taken MHz dBuV/m dB dBuV dB cm deg 1 1500.00 37.42 54.00 -16.58 44.09 -6.67 Average 2 1500.00 51.26 74.00 -22.74 57.93 -6.67 Peak 3 3883.30 42.93 54.00 -11.07 39.06 3.87 Average	Polarization			Н	oriz	zonta	al			•									
FCC CLASS.B (AVG) 10 1000 6000. 10000. 14000. 18000. 22000. 26000. 30000. 34000. 4000 Frequency (MHz) Freq. Emission Limit Margin SA Factor Remark ANT Turlevel reading High Taken MHz dBuV/m dB dBuV dB cm deg 1 1500.00 37.42 54.00 -16.58 44.09 -6.67 Average 2 1500.00 51.26 74.00 -22.74 57.93 -6.67 Peak 3 3883.30 42.93 54.00 -11.07 39.06 3.87 Average		117 ^{Le}	evel (dBuV/m)														
FCC CLASS B (AVG) 10 10 1000 6000. 10000. 14000. 18000. 22000. 26000. 30000. 34000. 4000 Frequency (MHz) Freq. Emission Limit Margin SA Factor Remark ANT Turlevel reading High Tallevel Remark ABUV/m dBuV/m dBu		- 1																	
Freq. Emission Limit Margin SA Factor Remark ANT Turlevel reading High Tal MHz dBuV/m dBuV/m dB dBuV dB cm deg 1 1500.00 37.42 54.00 -16.58 44.09 -6.67 Average 3 3883.30 42.93 54.00 -11.07 39.06 3.87 Average 3		90																	
Freq. Emission Limit Margin SA Factor Remark ANT Turlevel reading High Tallevel reading High Tallevel dBuV/m dB dBuV dB cm deg 1500.00 51.26 74.00 -16.58 44.09 -6.67 Average 3 3883.30 42.93 54.00 -11.07 39.06 3.87 Average		70															FCC	CLA	SS-B
30 10 1000 6000. 10000. 14000. 18000. 22000. 26000. 30000. 34000. 4000 Frequency (MHz) Freq. Emission Limit Margin SA Factor Remark ANT Turlevel reading High Take MHz dBuV/m dBuV/m dB dBuV dB cm deg 1 1500.00 37.42 54.00 -16.58 44.09 -6.67 Average 2 1500.00 51.26 74.00 -22.74 57.93 -6.67 Peak 3 3883.30 42.93 54.00 -11.07 39.06 3.87 Average		70		4			6									FCC	CLAS	SS-B (AVG)
10		50		3															
0 1000 6000. 10000. 14000. 18000. 22000. 26000. 30000. 34000. 4000 Frequency (MHz) Freq. Emission Limit Margin SA Factor Remark ANT Turneading High Table MHz dBuV/m dBuV/m dB dBuV dB cm deg 1 1500.00 37.42 54.00 -16.58 44.09 -6.67 Average		30																	
1 1500.00 51.26 74.00 -16.58 44.09 -6.67 Average 3 3883.30 42.93 54.00 -11.07 39.06 3.87 Average 3		10												_					
Freq. Emission Limit Margin SA Factor Remark ANT Turlevel reading MHz dBuV/m dB uV/m dB dBuV dB cm deg 1 1500.00 37.42 54.00 -16.58 44.09 -6.67 Average 2 1500.00 51.26 74.00 -22.74 57.93 -6.67 Peak 3 3883.30 42.93 54.00 -11.07 39.06 3.87 Average		010	000	6000).	1000	00.	14000	. 1				26000	. ;	30000.	34	000.		4000
MHz dBuV/m dB dBuV dB cm deg 1 1500.00 37.42 54.00 -16.58 44.09 -6.67 Average 2 1500.00 51.26 74.00 -22.74 57.93 -6.67 Peak 3 3883.30 42.93 54.00 -11.07 39.06 3.87 Average				Freq	. Е			Limit	. 1		S	Α		or	Rem	ark			
2 1500.00 51.26 74.00 -22.74 57.93 -6.67 Peak 3 3883.30 42.93 54.00 -11.07 39.06 3.87 Average				MHz				dBuV,	/m	dB		_	•					_	
3 3883.30 42.93 54.00 -11.07 39.06 3.87 Average																_			
_																			
- 2002120 22101 14100 TOTES 25100 2101 LCUK	4															_	=		

Average

Peak

13.88 13.88

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor, cable loss and amplifier gain

11650.00 51.28 54.00 -2.72 37.40 11650.00 61.33 74.00 -12.67 47.45

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

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4

5

Modulation				11	la					-	Test I	Fred	դ. (MH	z)			5825	5		
Polarization				Ve	ertio	cal				•										
	117	Leve	el (di	BuV/m)	<u> </u>											T		T	1	1
	110						_							+						
	90																			
	30																			
		\perp							\perp								FCC	CLA	SS-B	
	70					\rightarrow	6		+			\rightarrow								
			4				Ţ									FCC	CLAS	S-B (AVG)	
	50	2					7										-	001		
		Ш	3																	
		1																		
	30	\Box			\neg									\top						
	10	₩		_	\dashv	-	+		+			-		+	-	-			-	
	0	100		6000	\perp	1000		14000.		8000.	2200		26000.		0000.	24	000.		4000]
		100	U	0000	<i>)</i> .	1000	Ιυ.	14000			ency (M		20000.	3	0000.	34	000.		4000	JU
				Freq	. Е	miss	ion	Limit	. M	argin	s SA	1	Facto	r	Rem	ark	1	ANT	Tu	rn
						lev				_	read						H	ligh	Ta	ble
				MHz		dBuV	/m	dBuV/	m	dB	dBu	ı۷	dB					m	de	g
	1		1	500.	00	35.	24	54.00	-1	8.76	41.	91	-6.6	7	Ave	rage	-			
	2							74.00			55.		-6.6		Pea	_			-	
	3		3	883.	30	42.	64	54.00	-1	1.36	38.	77	3.8	7	Ave	rage			_	
	_		_											_	_					

52.16

49.54

3.87

13.88

13.88

Peak Average

Peak

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor , cable loss and amplifier gain

3883.30 56.03 74.00 -17.97

11650.00 63.42 74.00 -10.58

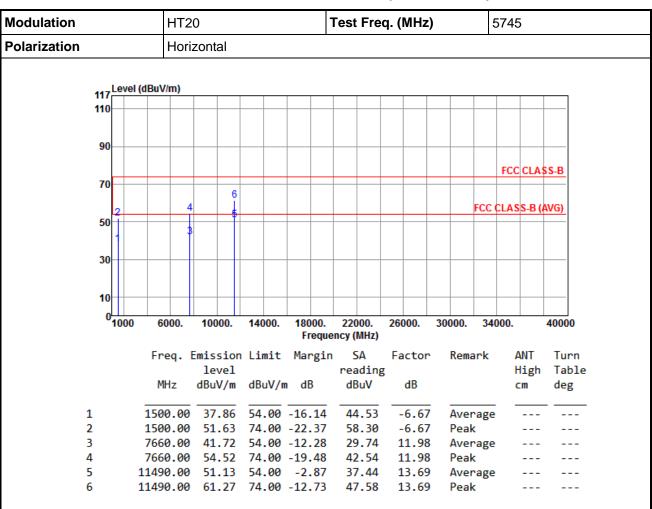
11650.00 52.28 54.00 -1.72 38.40

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

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3.5.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT20



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

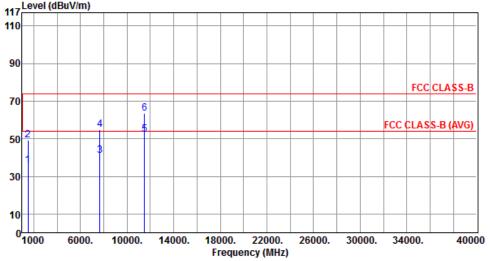
*Factor includes antenna factor, cable loss and amplifier gain

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

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Modulation			I	HT2	0			-	Γest	Fre	q. (MHz	:)	5	745	,	
Polarization			,	Verti	cal												
117	Lev	el (dE	BuV/	m)													
110																	

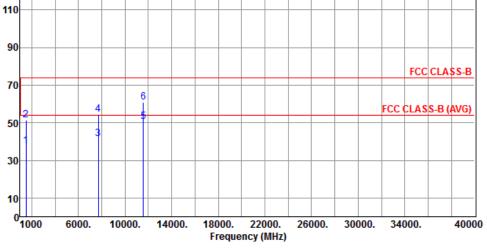


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Ū	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1500.00	35.94	54.00	-18.06	42.61	-6.67	Average		
2	1500.00		74.00		55.84	-6.67	Peak		
3	7660.00	40.93	54.00	-13.07	28.95	11.98	Average		
4	7660.00	55.00	74.00	-19.00	43.02	11.98	Peak		
5	11490.00	52.17	54.00	-1.83	38.48	13.69	Average		
6	11490.00	63.45	74.00	-10.55	49.76	13.69	Peak		

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Modulation		HT2	0			1	Test	Fre	q. (I	MHz	<u>:)</u>	5	785	5	
Polarization		Hori	zonta	al											
117	Level (dBı	ıV/m)													
110															
90															

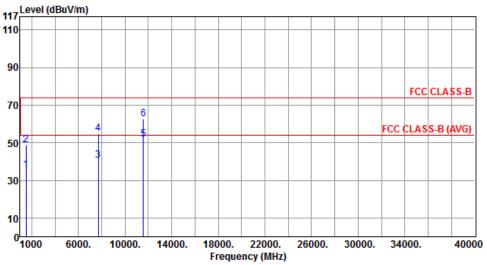


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Ū	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1500.00	37.64	54.00	-16.36	44.31	-6.67	Average		
2		51.25			57.92	-6.67	Peak		
3	7713.30	41.42	54.00	-12.58	29.55	11.87	Average		
4	7713.30	54.29	74.00	-19.71	42.42	11.87	Peak		
5	11570.00	50.72	54.00	-3.28	36.95	13.77	Average		
6	11570.00	60.74	74.00	-13.26	46.97	13.77	Peak		

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Modulation	HT20	Test Freq. (MF	łz)	5785	
Polarization	Vertical				
117 Level (c	fBuV/m)				
117					



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Ū	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1500.00	35.49	54.00	-18.51	42.16	-6.67	Average		
2	1500.00	48.87	74.00	-25.13	55.54	-6.67	Peak		
3	7713.30	40.58	54.00	-13.42	28.71	11.87	Average		
4	7713.30	54.78	74.00	-19.22	42.91	11.87	Peak		
5	11570.00	51.80	54.00	-2.20	38.03	13.77	Average		
6	11570.00	62.79	74.00	-11.21	49.02	13.77	Peak		

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Modulation			HT20						Test Freq. (MHz) 5						5825	5825		
Polarization			Horizontal															
	117 Level (dB			uV/m)														
	110		-	+			-	\dashv							+			
	90	\vdash	_					_										
																FCC	CLA	ce D
	70															rcc	CLA	33-Б
			4			6												
	50	2				- 5									FCC	CLAS	S-B (AVG)
	50		3															
	30							\exists										
	10							\exists										
	0	100	0 (6000.	100	00.	1400	0.	18000.	220	000.	260	000.	30000.	34	000.		40000
									Frequ	ency (MHz)							
			F	req.			Limi	t	Margi				ctor	Rem	ıark		ANT	Tur
						vel					ding	_					ligh	
				MHz	dBu	V/m	dBu\	//m	dВ	dE	₿uV		dB			(zm .	deg
1			150	00.00	37	.78	54.6	00	-16.22	44	1.45	_	6.67	Ave	rage			
2				00.00					-22.42		3.25		6.67		_			
3			38	83.30	43	. 29	54.6	90	-10.71		.42		3.87		rage	•		
4									-17.80		2.33		3.87		k			
5									-3.11		7.01		3.88		erage	•		
_			446				74 /		43 07				2 00	_				

13.88

Peak

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor, cable loss and amplifier gain

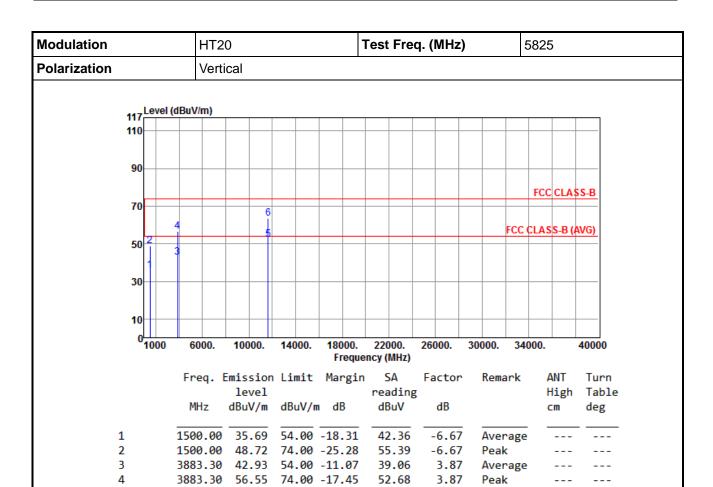
11650.00 60.93 74.00 -13.07 47.05

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

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38.24

49.41

13.88

13.88

Average

Peak

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor , cable loss and amplifier gain

11650.00 52.12 54.00 -1.88

11650.00 63.29 74.00 -10.71

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

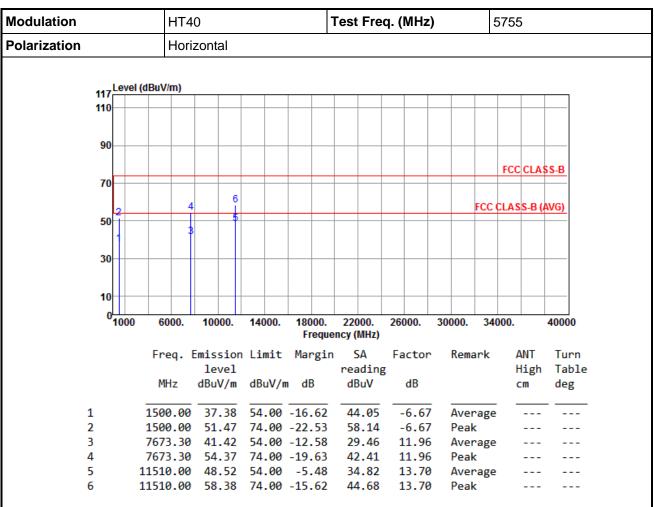
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3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT40



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

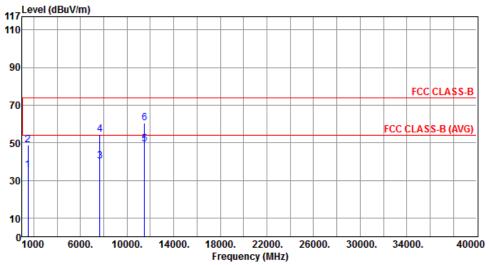
*Factor includes antenna factor, cable loss and amplifier gain

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

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Modulation	HT40	Test Freq. (MHz)	5755						
Polarization	Vertical								
Love (4DvV/m)									



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	J	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1500.00	35.43	54.00	-18.57	42.10	-6.67	Average		
2	1500.00		74.00		55.49	-6.67	Peak		
3	7673.30	40.28	54.00	-13.72	28.32	11.96	Average		
4	7673.30	54.39	74.00	-19.61	42.43	11.96	Peak		
5	11510.00	49.42	54.00	-4.58	35.72	13.70	Average		
6	11510.00	60.57	74.00	-13.43	46.87	13.70	Peak		

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

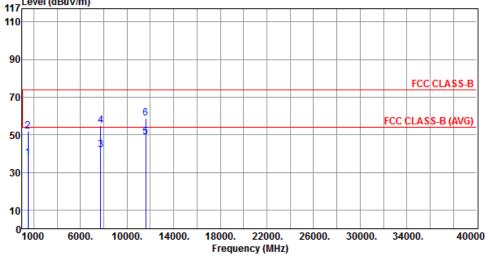
*Factor includes antenna factor, cable loss and amplifier gain

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

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Modulation			HT4	0		•	Γest	Fre	q. (MHz	<u>:)</u>	5	795)		
Polarization			Horiz	zontal												
11	Level	(dBuV	//m)													
11																



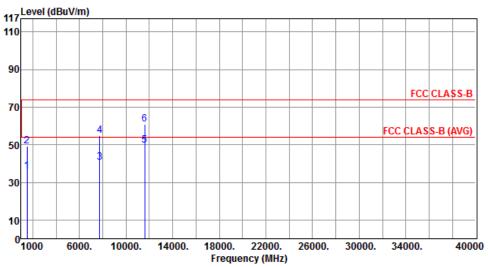
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	1500.00	37.55	54.00	-16.45	44.22	-6.67	Average		
2	1500.00	51.68	74.00	-22.32	58.35	-6.67	Peak		
3	7726.70	41.68	54.00	-12.32	29.84	11.84	Average		
4	7726.70	54.67	74.00	-19.33	42.83	11.84	Peak		
5	11590.00	48.87	54.00	-5.13	35.07	13.80	Average		
6	11590.00	58.66	74.00	-15.34	44.86	13.80	Peak		

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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Modulation	HT40	Test Freq. (MHz)	5795						
Polarization	Vertical								
Level (dBuV/m)									
117 Level (d.ba)									



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Ū	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1500.00	35.71	54.00	-18.29	42.38	-6.67	Average		
2	1500.00		74.00		55.85	-6.67	Peak		
3	7726.70	40.58	54.00	-13.42	28.74	11.84	Average		
4	7726.70	54.73	74.00	-19.27	42.89	11.84	Peak		
5	11590.00	49.83	54.00	-4.17	36.03	13.80	Average		
6	11590.00	60.93	74.00	-13.07	47.13	13.80	Peak		

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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3.6 Unwanted Emissions into Non-Restricted Frequency Bands

3.6.1 Limit of Unwanted Emissions into Non-Restricted Frequency Bands

The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

3.6.2 Test Procedures

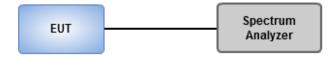
Reference Level Measurement

- 1. Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
- 2. Set Sweep time = auto couple, Trace mode = max hold.
- 3. Allow trace to fully stabilize.
- 4. Use the peak marker function to determine the maximum amplitude level.

Unwanted Emissions Level Measurement

- 1. Set RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
- 2. Trace Mode = max hold, Sweep = auto couple.
- 3. Allow the trace to stabilize.
- Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

3.6.3 Test Setup



3.6.4 Test Result of Emissions in non-restricted frequency bands

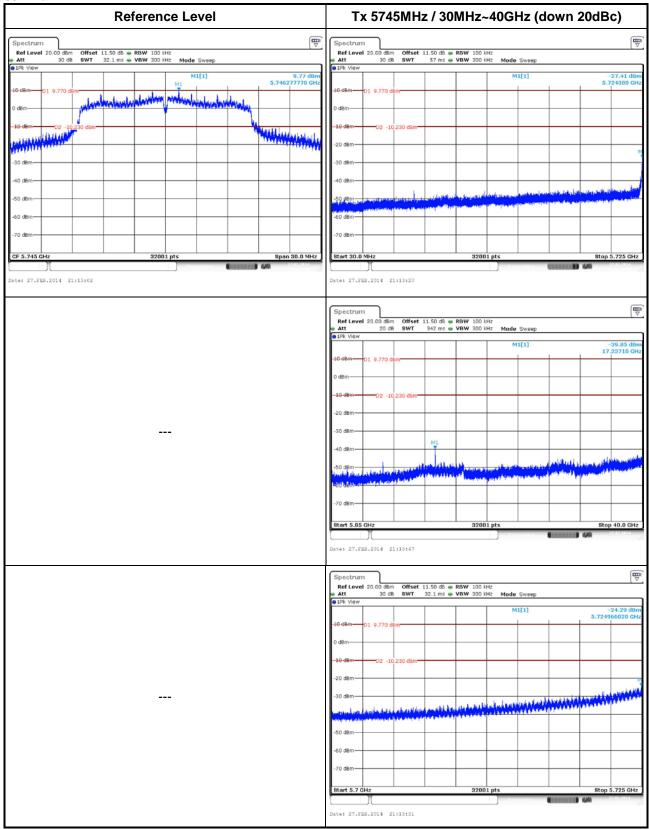
This test item is performed on each TX output individually without summing or adding 10 $log(N_{ANT})$ since measurements are made relative to the in-band emissions on the individual outputs. Only worst test result of each operating mode is presented.

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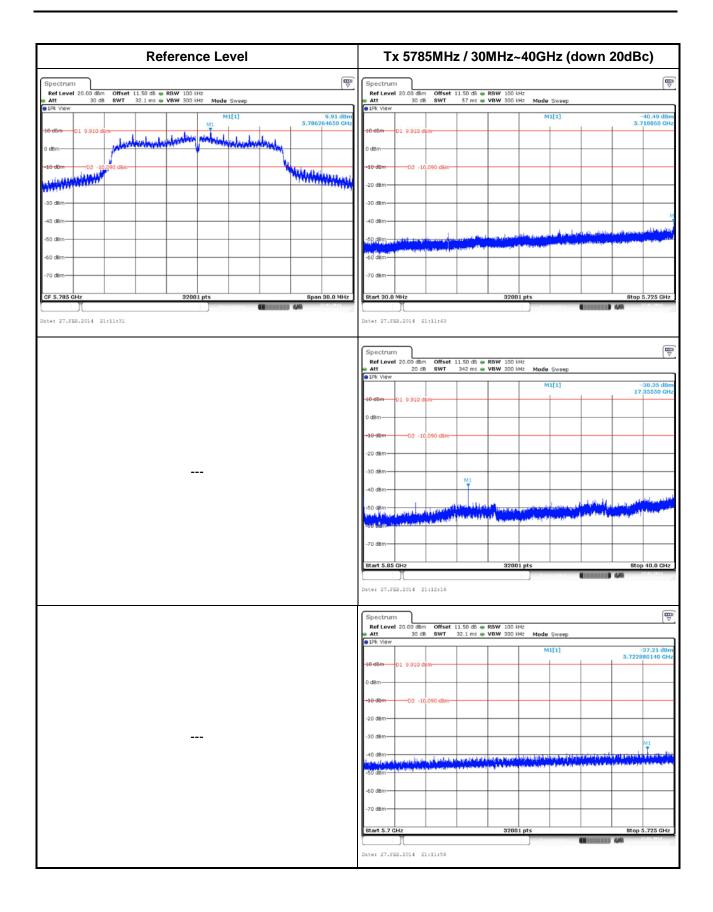
3.6.5 Unwanted Emissions into Non-Restricted Frequency Bands

802.11a



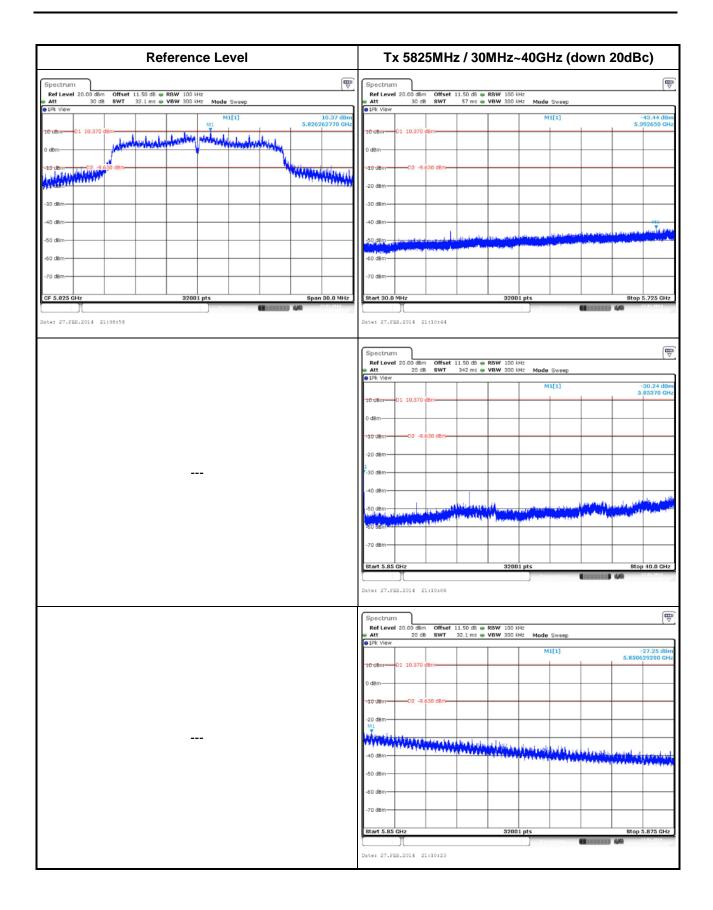
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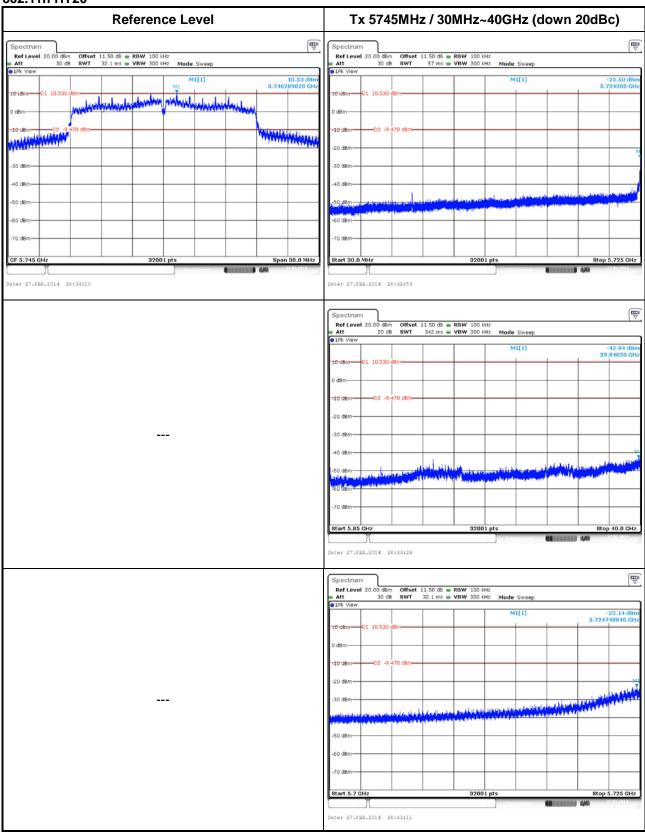




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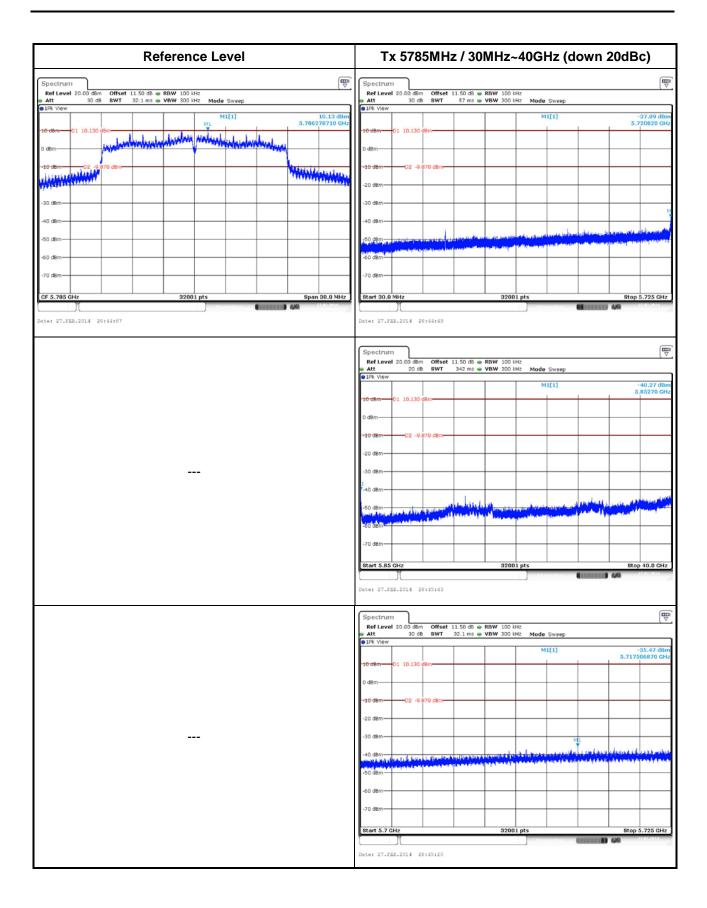


802.11n HT20



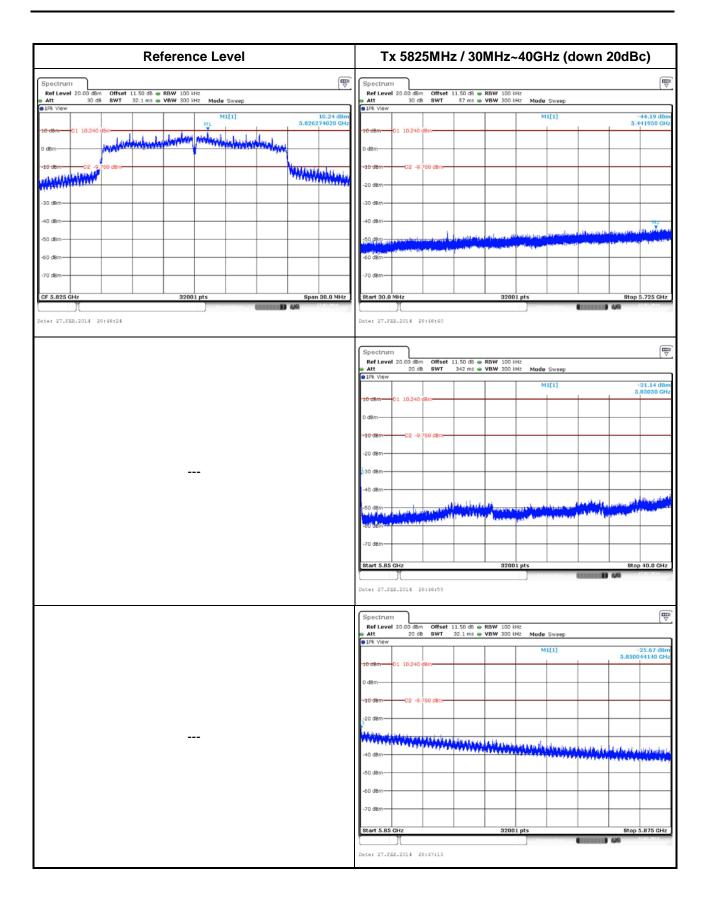
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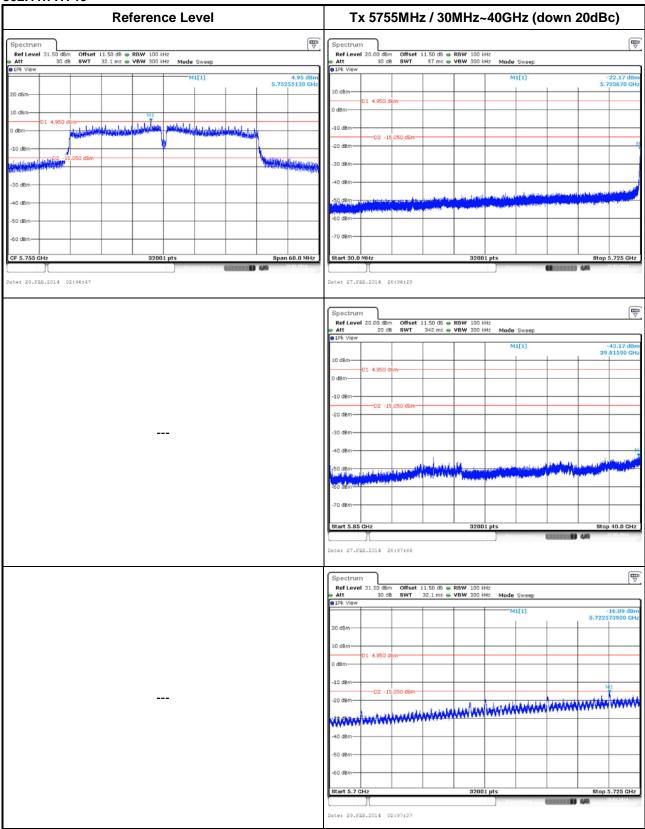




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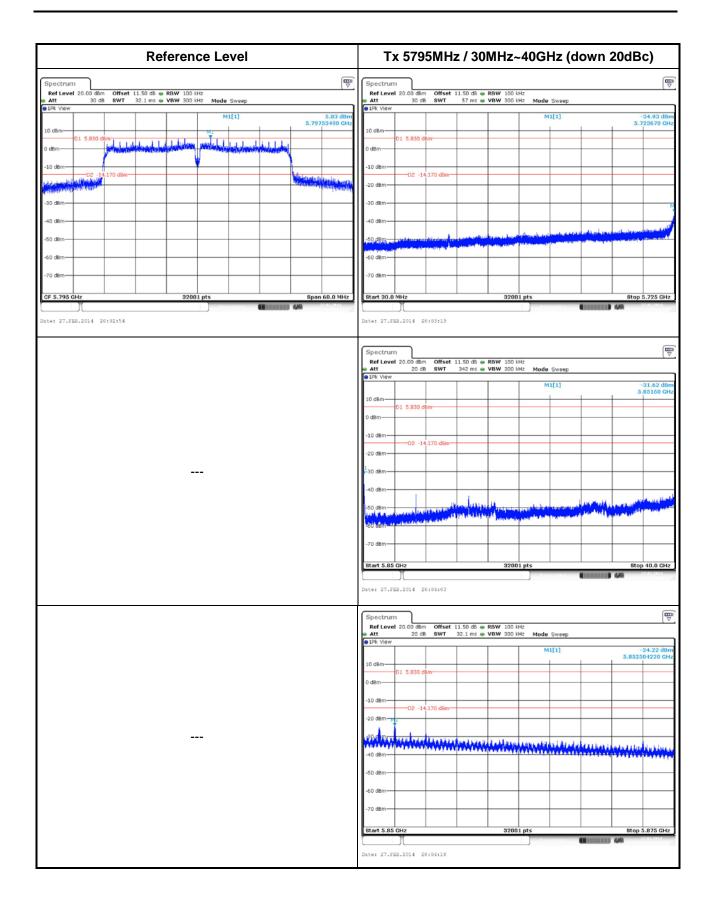


802.11n HT40



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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 Hsiang. Location map can be found on our website http://www.icertifi.com.tw.

Linkou Kwei Shan

Tel: 886-2-2601-1640 Tel: 886-3-271-8666

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

No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan
Hsiang, Tao Yuan Hsien 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

Email: ICC_Service@icertifi.com.tw

==END==

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