

TEST REPORT

FCC ID: BBO9907

Product: Sports camera

Model No.: WASPcam 9907

Additional Model: N/A

Trade Mark:

Report No.: TCT160612E006 Issued Date: July 06, 2016

a Date: July 55, 2516

Cobra

Issued for:

Cobra Electronics Corporation
6500 West Cortland Street Chicago, IL 60707 USA

Issued By:

Shenzhen Tongce Testing Lab.

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1. Test Certification

Product:	Sports camera			
Model No.:	WASPcam 9907			
Additional Model No.:	N/A (S)			
Applicant:	Cobra Electronics Corporation			
Address:	6500 West Cortland Street Chicago, IL 60707 USA			
Manufacturer:	Guangzhou Yaozhong Electronics Co., Ltd.			
Address:	No.2, Shaxing Road, Shajiao, Lanhe, Nansha district, Guangzhou, China			
Date of Test:	Jun. 12 – July 05, 2016			
Applicable Standards:	·			

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:	GOVEN	Date:	July 04, 2016	
(6)	Garen		(0)	•
Reviewed By:	Zandhon	Date:	July 05, 2016	
	Joe Zhou		(0)	•
Approved By:	Tomsin	Date:	July 05, 2016	
(6)	Tomsin	_	(.c.)	•



2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203/§15.247 (c)	PASS
AC Power Line Conducted Emission	§15.207	PASS
Conducted Peak Output Power	§15.247 (b)(3) §2.1046	PASS
6dB Emission Bandwidth	§15.247 (a)(2) §2.1049	PASS
Power Spectral Density	§15.247 (e)	PASS
Band Edge	1§5.247(d) §2.1051, §2.1057	PASS
Spurious Emission	§15.205/§15.209 §2.1053, §2.1057	PASS

- 1. PASS: Test item meets the requirement.
- 2. Fail: Test item does not meet the requirement.
- 3. N/A: Test case does not apply to the test object.
- 4. The test result judgment is decided by the limit of test standard.





3. EUT Description

Product Name:	Sports camera		
Froduct Name.	•		
Model:	WASPcam 9907		
Additional Model:	N/A		
Trade Mark:	S ,Cobra		
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20)) 2422MHz~2452MHz (802.11n(HT40))		
Channel Separation:	5MHz		
Number of Channel:	11 for 802.11b/802.11g/802.11n(HT20) 7 for 802.11n(HT40)		
Modulation Technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)		
Modulation Technology: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)		
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps		
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps		
Data speed (IEEE 802.11n):	Up to 150Mbps		
Antenna Type:	Internal Antenna		
Antenna Gain:	2.21dBi		
Power Supply:	Rechargeable Li-ion Battery DC3.7V		

Operation Frequency each of channel For 802.11b/g/n(HT20)

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		



Operation Frequency each of channel For 802.11n (HT40)

<u> </u>	7 Continue 1 Continue Con						
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
		4	2427MHz	7	2442MHz		
(5	2432MHz	8	2447MHz		
3	2422MHz	6	2437MHz	9	2452MHz		(,C,)

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

802.11b/802.11g/802.11n (HT20)

Channel	Frequency
The lowest channel	2412MHz
The middle channel	2437MHz
The Highest channel	2462MHz

802.11n (HT40)

- 1	
Channel	Frequency
The lowest channel	2422MHz
The middle channel	2437MHz
The Highest channel	2452MHz





4. Genera Information

4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 98.46%)

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	Data rate
802.11b	1Mbps
802.11g	6Mbps
802.11n(H20)	6.5Mbps
802.11n(H40)	13.5Mbps

Final Test Mode:

Operation mode:	Keep the EUT in continuous transmitting
	with modulation

According to ANSI C63.4 standards, the test results are both the "worst case" and "worst setup" 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n(H20), 13.5Mbps for 802.11(H40). Duty cycle setting during the transmission is 98.5% with maximum power setting for all modulations.



4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Notebook	G485	1	1	Lenovo

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
- 3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.





5. Facilities and Accreditations

5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

• FCC - Registration No.: 572331

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC - Registration No.: 10668A-1

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

CNAS - Registration No.: CNAS L6165
 Shenzhen TCT Testing Technology Co., Ltd. is accredited to ISO/IEC 17025:2005
 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6165.

5.2. Location

Shenzhen Tongce Testing Lab

Address: 1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China

Tel: 86-755-36638142

5.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%



6. Test Results and Measurement Data

6.1. Antenna requirement

Standard requirement: FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

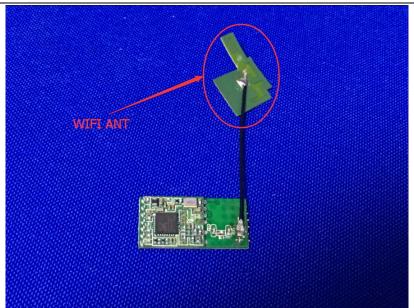
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:

The EUT antenna is an internal internal antenna which permanently attached, and the best case gain of the antenna is 2.21dBi.



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6.2. Conducted Emission

6.2.1. Test Specification

Test Requirement:	FCC Part15 C Section	15 207					
•		10.207					
Test Method:	ANSI C63.10:2013		(%)				
Frequency Range:	150 kHz to 30 MHz						
Receiver setup:	RBW=9 kHz, VBW=30	kHz, Sweep time:	=auto				
	Frequency range	Limit (dBuV)					
	(MHz)	Quasi-peak	Áverage				
Limits:	0.15-0.5	66 to 56*	56 to 46*				
	0.5-5	56	46				
	5-30	60	50				
	Reference	e Plane					
Test Setup:	Test table/Insulation plane Remark E.U.T: Equipment Under Test LISN: Line Impedence Stabilization Ne Test table height=0.8m	EMI Receiver	— AC power				
Test Mode:	Charging + transmitting	g with modulation					
Test Procedure:	 The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement. 						
Test Result:	PASS						



6.2.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)									
Equipment	Manufacturer	Model	Serial Number	Calibration Due					
EMI Test Receiver	R&S	ESCS30	100139	Sep. 11, 2016					
LISN	Schwarzbeck	NSLK 8126	8126453	Sep. 16, 2016					
Coax cable	TCT	CE-05	N/A	Sep. 11, 2016					
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A					

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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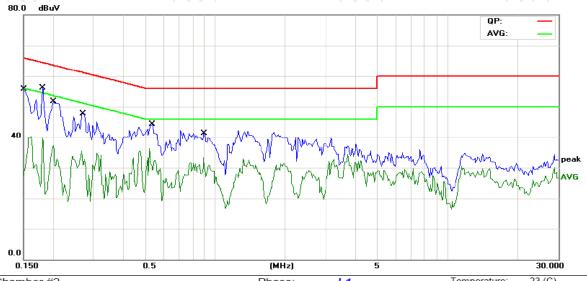




6.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



Site Chamber #2	Phase:	L1	Temperature: 23 (C)
Limit: FCC Part 15B Class B Conduction(QP)	Power:	AC 120V/60Hz	Humidity: 54 %

	No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
_			MHz	dBuV	dB	dBuV	dBu∨	dB	Detector	Comment
_	1	*	0.1500	41.10	11.52	52.62	65.99	-13.37	QP	
_	2		0.1500	27.00	11.52	38.52	55.99	-17.47	AVG	
	3		0.1812	30.55	11.50	42.05	64.43	-22.38	QP	
_	4		0.1812	10.49	11.50	21.99	54.43	-32.44	AVG	
-	5		0.2008	35.86	11.48	47.34	63.57	-16.23	QP	
_	6		0.2008	24.82	11.48	36.30	53.57	-17.27	AVG	
_	7		0.2711	25.26	11.44	36.70	61.08	-24.38	QP	
_	8		0.2711	16.96	11.44	28.40	51.08	-22.68	AVG	
_	9		0.5406	26.67	11.29	37.96	56.00	-18.04	QP	
_	10		0.5406	16.20	11.29	27.49	46.00	-18.51	AVG	
ζ-	11		0.9000	25.28	11.20	36.48	56.00	-19.52	QP	
)	12		0.9000	17.90	11.20	29.10	46.00	-16.90	AVG	

Note:

Freq. = Emission frequency in MHz

Reading level $(dB\mu V)$ = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss

Measurement $(dB\mu V)$ = Reading level $(dB\mu V)$ + Corr. Factor (dB)

Limit (dBµV) = Limit stated in standard

 $Margin (dB) = Measurement (dB\mu V) - Limits (dB\mu V)$

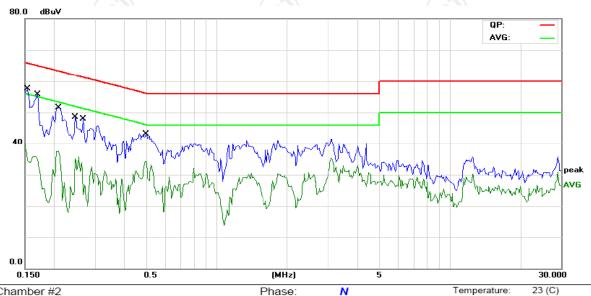
Q.P. =Quasi-Peak

AVG =average

^{*} is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.



Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Site Champer #2	Phase:	N	remperatu
Limit: FCC Part 15B Class B Conduction(QP)	Power:	AC 120V/60Hz	Humidity:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment	
1		0.1539	36.67	11.51	48.18	65.78	-17.60	QP		
2		0.1539	24.06	11.51	35.57	55.78	-20.21	AVG		
3		0.1695	36.56	11.51	48.07	64.98	-16.91	QP		
4		0.1695	22.93	11.51	34.44	54.98	-20.54	AVG		
5		0.2086	34.35	11.48	45.83	63.26	-17.43	QP		
6		0.2086	23.08	11.48	34.56	53.26	-18.70	AVG		
7		0.2477	31.66	11.46	43.12	61.83	-18.71	QP		
8		0.2477	17.59	11.46	29.05	51.83	-22.78	AVG		
9		0.2672	28.31	11.45	39.76	61.20	-21.44	QP		
10		0.2672	18.04	11.45	29.49	51.20	-21.71	AVG		
11		0.4977	27.43	11.31	38.74	56.04	-17.30	QP		
12	*	0.4977	19.48	11.31	30.79	46.04	-15.25	AVG		

Note:

Freq. = Emission frequency in MHz

Reading level $(dB\mu V)$ = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss

Measurement ($dB\mu V$) = Reading level ($dB\mu V$) + Corr. Factor (dB)

 $Limit (dB\mu V) = Limit stated in standard$

 $Margin (dB) = Measurement (dB\mu V) - Limits (dB\mu V)$

Q.P. =Quasi-Peak

AVG =average

 $^{^{\}star}$ is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.





6.2.4. Maximum Conducted (Average) Output Power

6.2.5. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (b)(3), CFR part 2.1046					
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r05					
Limit:	30dBm					
Test Setup:	Spectrum Analyzer EUT					
Test Mode:	Transmitting mode with modulation					
Test Procedure:	 The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r05. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Measure the conducted output power and record the results in the test report. 					
Test Result:	PASS					

6.2.6. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016
RF cable	TCT	RE-06	N/A	Sep. 12, 2016
Antenna Connector	TCT	RFC-01	N/A	Sep. 12, 2016

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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6.3. Emission Bandwidth

6.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(2), CFR part 2.1049				
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r05				
Limit:	>500kHz				
Test Setup:					
	Spectrum Analyzer EUT				
Test Mode:	Transmitting mode with modulation				
Test Procedure:	 The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r05. Set to the maximum power setting and enable the EUT transmit continuously. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz. Measure and record the results in the test report. 				
Test Result:	PASS				

6.3.2. Test Instruments

RF Test Room									
Equipment	Serial Number	Calibration Due							
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016					
RF cable	тст	RE-06	N/A	Sep. 12, 2016					
Antenna Connector	тст	RFC-01	N/A	Sep. 12, 2016					

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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6.4. Power Spectral Density

6.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r05
Limit:	The Average power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.
Test Setup:	Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test Procedure:	 The testing follows Measurement Procedure 10.3 Method AVGPSD of FCC KDB Publication No.558074 D01 DTS Meas. Guidance v03r05 The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): 3 kHz ≤ RBW ≤ 100 kHz. Video bandwidth VBW ≥ 3 x RBW. Set the span to at least 1.5 times the OBW. Detector = RMS, Sweep time = auto couple. Employ trace averaging (RMS) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level. Measure and record the results in the test report.
Test Result:	PASS

6.4.2. Test Instruments

		1291									
RF Test Room											
Equipment	Manufacturer	Model	Serial Number	Calibration Due							
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016							
RF cable	TCT	RE-06	N/A	Sep. 12, 2016							
Antenna Connector	TCT	RFC-01	N/A	Sep. 12, 2016							

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



6.5. Conducted Band Edge and Spurious Emission Measurement

6.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (d), §2.1051, §2.1057	7
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r05	
Limit:	In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in non-restricted bands shall be attenuated at least 20 30dB relative to the maximum PSD level in 100 kHRF conducted measurement and radiated emis which fall in the restricted bands, as defined in Set 15.205(a), must also comply with the radiated emillimits specified in Section 15.209(a).	the dB / dz by sions ection
Test Setup:	Spectrum Analyzer EUT)
Test Mode:	Transmitting mode with modulation	
Test Procedure:	 The RF output of EUT was connected to the spectanalyzer by RF cable and attenuator. The path lower setting and enable the measurement. Set to the maximum power setting and enable the EUT transmit continuously. Set RBW = 100 kHz, VBW=300 kHz, Peak Detect Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency be shall be attenuated by at least 20 dB relative to maximum in-band peak PSD level in 100 kHz will maximum peak conducted output power procedused. If the transmitter complies with the conduction power limits based on the use of RMS averaging a time interval, the attenuation required under the paragraph shall be 30 dB instead of 20 dB per 15.247(d). Measure and record the results in the test report. The RF fundamental frequency should be excluded against the limit line in the operating frequency in the state of the second second. 	e e etor. eand the hen ure is eted over is ed
Test Result:	PASS	
		_



6.5.2. Test Instruments

RF Test Room										
Equipment	Manufacturer	Model	Serial Number	Calibration Due						
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016						
RF cable	тст	RE-06	N/A	Sep. 12, 2016						
Antenna Connector	TCT	RFC-01	N/A	Sep. 12, 2016						

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



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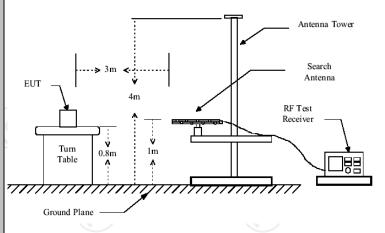
6.6. Radiated Spurious Emission Measurement

6.6.1. Test Specification

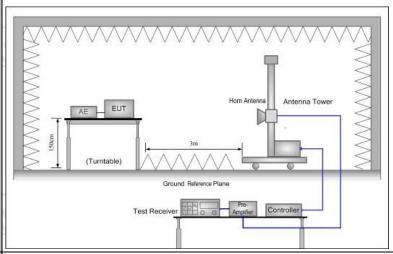
Test Requirement:	FCC Part15	FCC Part15 C Section 15.209, §2.1053, §2.1057						
Test Method:	ANSI C63.10	ANSI C63.10: 2013						
Frequency Range:	9 kHz to 25 (9 kHz to 25 GHz						
Measurement Distance:	3 m	3 m						
Antenna Polarization:	Horizontal &	Horizontal & Vertical						
Operation mode:	Transmitting mode with modulation							
	Frequency	Detector	RBW	VBW	Ī	Remark		
	9kHz- 150kHz	Quasi-peal	k 200Hz	1kHz	Qua	si-peak Value		
Receiver Setup:	150kHz- 30MHz	Quasi-pea		30kHz		si-peak Value		
	30MHz-1GHz	Quasi-peal	k 100KHz	300KHz	Qua	si-peak Value		
	Abaya 1015	Peak	1MHz	3MHz	P	eak Value		
	Above 1GHz	Peak	1MHz	10Hz	Av	erage Value		
	Frequen	ісу	Field Stro (microvolts	-		easurement ance (meters)		
	0.009-0.4	190	2400/F(KHz)	300			
	0.490-1.7	705	24000/F(k		30			
	1.705-3	30	30			30		
	30-88		100			3		
	88-216	3	150			3		
Limit:	216-96	0	200		3			
	Above 9	60	500			3		
			(,C))					
	Frequency		ld Strength ovolts/meter)	Measure Distan (mete	ice	Detector		
	Above 1GHz	,	500			Average		
	Above 10112	-	5000			Peak		
Test setup:	For radiated	Turn table		Pre -A	Comput	er]		
(< \)	33 12 (3 10	-						







Above 1GHz



1. For the radiated emission test below 1GHz:
The EUT was placed on a turntable with 1.5 meter

Test Procedure:

above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level. For the radiated emission test above 1GHz: Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for





	receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. 2. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level 3. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. 4. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold; (3) Set RBW = 1 MHz, VBW= 3MHz for f 1 GHz for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent VBW > 1/T
	duty cycle is no less than 98 percent. VBW \geqslant 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test results:	PASS PASS





6.6.2. Test Instruments

	Radiated Emission Test Site (966)											
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due								
ESPI Test Receiver	ROHDE&SCHW ARZ	ESVD	100008	Sep. 11, 2016								
Spectrum Analyzer	ROHDE&SCHW ARZ	FSEM	848597/001	Sep. 11, 2016								
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016								
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 11, 2016								
Pre-amplifier	HP	8447D	2727A05017	Sep. 11, 2016								
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 13, 2016								
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 13, 2016								
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 13, 2016								
Horn Antenna	Schwarzbeck	BBHA 9170	373	Sep. 13, 2016								
Coax cable	TCT	RE-low-01	N/A	Sep. 11, 2016								
Coax cable	TCT	RE-high-02	N/A	Sep. 11, 2016								
Coax cable	тст	RE-low-03	N/A	Sep. 11, 2016								
Coax cable	тст	RE-High-04	N/A	Sep. 11, 2016								
Antenna Mast	ccs	CC-A-4M	N/A	Sep. 12, 2016								
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A								

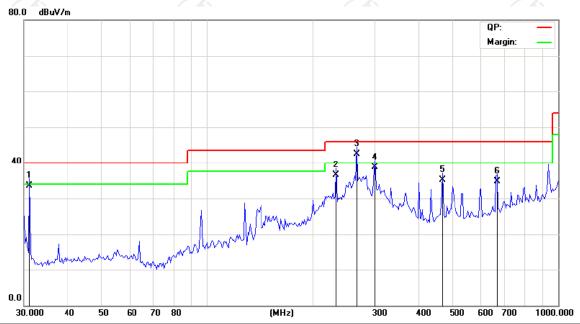
Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



6.6.3. Test Data

Please refer to following diagram for individual Below 1GHz

Horizontal:



Site Chamber #2 Polarization: Horizontal Temperature: 23 (C) Limit: FCC Part 15B Class B RE_3 m Power: AC 120V/60Hz Humidity: 54 %

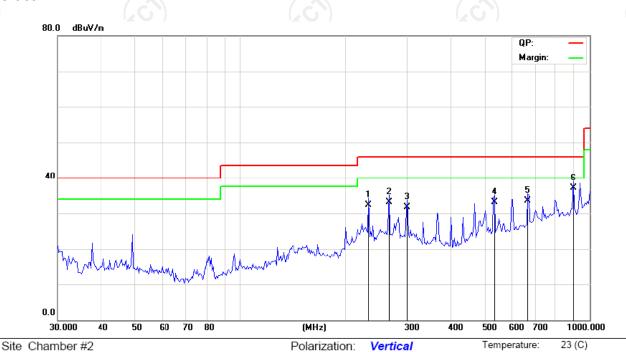
_	No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
			MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
_	1		31.0728	47.11	-13.59	33.52	40.00	-6.48	QP	
-	2		233.4881	47.05	-10.53	36.52	46.00	-9.48	QP	
_	3	*	266.8394	51.87	-9.38	42.49	46.00	-3.51	QP	
_	4		300.6988	47.03	-8.25	38.78	46.00	-7.22	QP	
-	5		468.1650	39.09	-3.99	35.10	46.00	-10.90	QP	
-	6		669.9523	35.16	-0.49	34.67	46.00	-11.33	QP	



Limit: FCC Part 15B Class B RE_3 m

Report No.: TCT160612E006

Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	2	33.4881	42.85	-10.53	32.32	46.00	-13.68	QP		
2	2	66.8394	42.43	-9.38	33.05	46.00	-12.95	QP		
3	3	00.6988	40.00	-8.25	31.75	46.00	-14.25	QP		
4	5	35.0375	35.67	-2.60	33.07	46.00	-12.93	QP		
5	6	65.2609	34.15	-0.59	33.56	46.00	-12.44	QP		
- 6	* 8	99 9577	34 50	2 67	37 17	46 00	-8 83	QP		

Power:

AC 120V/60Hz

Humidity:

Note: 1.The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported

2. Measurements were conducted in all three channels (high, middle, low) and all modulation(802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40)), and the worst case Mode (Highest channel and 802.11g) was submitted only.



Test Result of Radiated Spurious at Band edges Modulation Type: 802.11b

ш.	211111111111111111111111111111111111111										
	Low channel: 2412 MHz										
	Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)				
ſ	2310	Н	45.83	-4.20	41.63	74.00	54.00				
	2377.38	Н	48.37	-4.10	44.27	74.00	54.00				
	2390	Н	53.40	-3.94	49.46	74.00	54.00				
	2310	V	44.22	-4.20	40.02	74.00	54.00				
	2377.38	V	54.25	-4.10	50.15	74.00	54.00				
	2390	V	55.77	-3.94	51.83	74.00	54.00				

Modulation Type: 802.11b

		IVIOGG	iddon Type. 66	2.110							
Low channel: 2462 MHz											
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)					
2483.5	Н	51.14	-3.60	47.54	74.00	54.00					
2487.09	Н	47.83	-3.50	44.33	74.00	54.00					
2500	Н	45.23	-3.34	41.89	74.00	54.00					
2483.5	V	54.86	-3.60	51.26	74.00	54.00					
2487.09	V	47.24	-3.50	43.74	74.00	54.00					
2500	V	42.56	-3.34	39.22	74.00	54.00					

Modulation Type: 802.11g

	Low channel: 2412 MHz											
Frequency Ant. Pol. (MHz) H/V		Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)						
2310	Н	43.06	-4.20	38.86	74.00	54.00						
2388.96	Н	50.89	-4.12	46.77	74.00	54.00						
2390	Н	53.42	-3.94	49.48	74.00	54.00						
2310	V	45.74	-4.20	41.54	74.00	54.00						
2388.96	V	49.69	-4.12	45.57	74.00	54.00						
2390	V	54.17	-3.94	50.23	74.00	54.00						

Modulation Type: 802.11g

	Low channel: 2462 MHz											
Frequency (MHz)	(MHz) H/V		Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)						
2483.5	Н	52.34	-3.60	48.74	74.00	54.00						
2487.59	Н	50.05	-3.52	46.53	74.00	54.00						
2500	Н	46.78	-3.34	43.44	74.00	54.00						
2483. 5	V	51.62	-3.60	48.02	74.00	54.00						
2487.59	V	47.73	-3.52	44.21	74.00	54.00						
2500	V	47.5	-3.34	44.16	74.00	54.00						



Modulation Type: 802.11n(20MHz) Low channel: 2412 MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)	
2310	Н	46.51	-4.20	42.31	74.00	54.00	
2388.01	Н	53.68	-4.10	49.58	74.00	54.00	
2390	Н	54.76	-3.94	50.82	74.00	54.00	
2310	V	48.06	-4.20	43.86	74.00	54.00	
2388.01	V	54.28	-4.10	50.18	74.00	54.00	
2390	V	55.53	-3.94	51.59	74.00	54.00	

Modulation Type: 802.11n(20MHz)

		Low	channel: 2462	MHz		
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)
2483.5	Н	52.60	-3.60	49.00	74.00	54.00
2392.55	Н	51.57	-3.50	48.07	74.00	54.00
2500	Н	47.77	-3.34	44.43	74.00	54.00
2483. 5	>	53.22	-3.60	49.62	74.00	54.00
2392.55	>	50.79	-3.50	47.29	74.00	54.00
2500	V	48.64	-3.34	45.30	74.00	54.00

Modulation Type: 802.11n(40MHz)

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)
2310	Н	51.02	-4.20	46.82	74.00	54.00
2387.85	Н	54.73	-4.10	50.63	74.00	54.00
2390	Н	50.86	-3.94	46.92	74.00	54.00
2310	V	52.19	-4.20	47.99	74.00	54.00
2389.98	V	48.77	-4.10	44.67	74.00	54.00
2390	V	47.26	-3.94	43.32	74.00	54.00

Modulation Type: 802.11n(40MHz)

	Low channel: 2452 MHz											
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	Correction Factor (dB/m)	Peak Final Emission Level	Peak limit (dBµV/m)	AV limit (dBµV/m)						
2483.5	Н	53.1	-3.60	49.5	74.00	54.00						
2493.51	Н	52.87	-3.50	49.37	74.00	54.00						
2500	Н	48.31	-3.34	44.97	74.00	54.00						
2493.51	V	53.56	-3.60	49.96	74.00	54.00						
2489.36	V	51.6	-3.46	48.14	74.00	54.00						
2500	V	49.43	-3.34	46.09	74.00	54.00						

- 1. Peak Final Emission Level=Peak Reading + Correction Factor;
- 2. Correction Factor= Antenna Factor + Cable loss Pre-amplifier





Above 1GHz

Modulation Type: 802	.11b
----------------------	------

			L	ow channe	I: 2412 MH:	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	AV (dBµV/m)	Peak limit (dBµV/m)		Margin (dB)
4824	Н	50.74	 ()	0.75	51.49		74	54	-2.51
7236	(OH	41.46	70	9.87	51.33	(O+)	74	54	-2.67
	H					<u></u>			
4824	V	49.78		0.75	50.53		74	54	-3.47
7236	V	41.58		9.87	51.45		74	54	-2.55
()	V	(, (, ')		(, C	(``ر		(, G)		(, (

	Middle channel: 2437MHz											
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissio Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)			
4874	H	49.59	140	0.97	50.56	(O J	74	54	-3.44			
7311	H	41.12		9.83	50.95		74	54	-3.05			
	Н											
4874	V	49.45		0.97	50.42		74	54	-3.58			
7311	V	40.96		9.83	50.79		74	54	-3.21			
/	V											

			Н	ligh channe	el: 2462 MH	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBμV)	Correction Factor (dB/m)	Emissio Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4924	Η	49.57		1.18	50.75		74	54	-3.25
7386	Ι	39.65		10.07	49.72		74	54	-4.28
	Η	ľ					-		
4924	V	49.99		1.18	51.17		74	54	-2.83
7386	V	40.53		10.07	50.60		74	54	-3.40
	V								

- 1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 2. $Margin (dB) = Emission Level (Peak) (dB\mu V/m)-Average limit (dB\mu V/m)$
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
- 5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.





Modulation Type: 802.11g

	Low channel: 2412 MHz										
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)		
4824	I	49.36		0.75	50.11		74	54	-3.89		
7236	Н	40.61		9.87	50.48		74	54	-3.52		
	Ŧ							7			
	(0)		(20)			$\langle \mathcal{O}_{i} \rangle$		(,0)			
4824	V	47.57		0.75	48.32		74	54	-5.68		
7236	V	40.68		9.87	50.55		74	54	-3.45		
	V										

		(.G))	М	iddle chann	el: 2437MF	łz	(.G)		
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBμV)	Correction Factor (dB/m)	Emissio Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4874	Н	48.15		0.97	49.12	-	74	54	-4.88
7311	Ξ	40.17	<i>+-</i>	9.83	50.00		74	54	-4.00
	H		120	/		7		1KO	
4874	V	47.32		0.97	48.29		74	54	-5.71
7311	V	40.58		9.83	50.41		74	54	-3.59
	V								(

	High channel: 2462 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissio Peak (dBµV/m)	AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)	
4924	Н	47.76	4	1.18	48.94		74	54	-5.06	
7386	Н	39.94		10.07	50.01	-	74	54	-3.99	
	Н									
4924	V	46.57		1.18	47.75		74	54	-6.25	
7386	V	40.20		10.07	50.27		74	54	-3.73	
/ /	V	<u> </u>))			

- 1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 2. Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
- 5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.





Modulation Type: 802.11n (HT20)

	Low channel: 2412 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)	
4824	Н	49.07		0.75	49.82		74	54	-4.18	
7236	Η	40.60		9.87	50.47		74	54	-3.53	
	H		7					7		
	(0)		120)		(O')		(,0)		
4824	V	47.59		0.75	48.34	<u></u>	74	54	-5.66	
7236	V	40.24		9.87	50.11		74	54	-3.89	
	V									

		(.G.)	M	iddle chann	el: 2437MF	lz			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4874	Н	47.29		0.97	48.26		74	54	-5.74
7311	H	40.47		9.83	50.3		74	54	-3.70
\	Н		KO	/		(O-7		KO	
4874	V	47.42		0.97	48.39		74	54	-5.61
7311	V	40.03		9.83	49.86		74	54	-4.14
<u> </u>	V			((

			H	ligh channe	l: 2462 MH	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	AV (dBµV/m)	Peak limit (dBµV/m)		Margin (dB)
4924	Н	48.16		1.18	49.34		74	54	-4.66
7386	Н	40.64		10.07	50.71	<i>y</i> -	74	54	-3.29
	Н								
4924	V	47.00		1.18	48.18		74	54	-5.82
7386	V	40.28		10.07	50.35		74	54	-3.65
7 /	V)			7 /		2		

- 1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 2. Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
- 5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.





Modulation Type: 802.11n (HT40)

			IVIOGG	idiloii i ypc	. 002. 1 111 (1	11-10)			
			L	ow channe	I: 2422 MH:	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4844	Н	44.87		0.66	45.53		74	54	-8.47
7266	Н	37.69		9.5	47.19		74	54	-6.81
/	KO H		70			(O+)		70	
4824	V	45.12		0.66	45.78		74	54	-8.22
7236	V	38.06		9.5	47.56		74	54	-6.44
X\	V			((

			M	iddle chann	nel: 2437MF	Ηz			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4874	Н	46.33	<i>+-</i>	0.99	47.32		74	54	-6.68
7311	Н	36.57	14	9.85	46.42	-	74	54	-7.58
	Н								
4874	V	45.74		0.99	46.73		74	54	-7.27
7311	V	37.5		9.85	47.35		74	54	-6.65
))	V	70)		X)				🗸

			F	ligh channe	l: 2452 MH	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissio Peak (dBµV/m)	AV (dBµV/m)	Peak limit (dBµV/m)		Margin (dB)
4904	H	44.85		1.33	46.18	-/-	74	54	-7.82
7356	Н	36.17		10.22	46.39		74	54	-7.61
	Н								
7.					7.				
4904	V	45.21		1.33	46.54		74	54	-7.46
7356	V	36.42		10.22	46.64		74	54	-7.36
	V)					-		

Note:

- 1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 2. $Margin (dB) = Emission Level (Peak) (dB\mu V/m)-Average limit (dB\mu V/m)$
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 25GHz.
- 5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

*****END OF REPORT****



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Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com





Appendix A: Test result of conducted Test Conducted Average Output Power

Result Table

Mode	Channel	Meas.Level [dBm]	Av.Power [dBm]	Verdict
11B	LCH	18.55	18.55	PASS
11B	MCH	17.59	17.59	PASS
11B	HCH	18.74	18.74	PASS
11G	LCH	14.65	14.65	PASS
11G	MCH	13.43	13.43	PASS
11G	HCH	15.25	15.25	PASS
11N20SISO	LCH	14.19	14.19	PASS
11N20SISO	MCH	13.11	13.11	PASS
11N20SISO	HCH	14.89	14.89	PASS
11N40SISO	LCH	13.29	13.29	PASS
11N40SISO	MCH	13.06	13.06	PASS
11N40SISO	HCH	13.83	13.83	PASS

Test Graph





