



PRECISE TESTING

# FCC TEST REPORT

## FCC ID: 2AMYQ-20180720300

Product	:	Robotic Vacuum Cleaner
Model Name	:	HX-V302, HX-V303, HX-V304, HX-V305, V302, V303, V304, TAB-QT560Z
Brand	:	N/A
Report No.	:	PTC18060122001E-FC01
<b>Prepared for</b>		
Shenzhen Hua Xin Information Technology Co., Ltd		
Section A,10/F, Block 1, No.7 Industrial Park, Yulu Community, Yutang, Guangming New District, Shenzhen, China		
<b>Prepared by</b>		
Dongguan Precise Testing & Certification Corp., Ltd.		
Building D, Baoding Technology Park, Guangming Road 2, Guangming Community, Dongcheng District, Dongguan, Guangdong, China		



**PRECISE TESTING**

Report No.: PTC18060122001E-EM01

## 1 TEST RESULT CERTIFICATION

Applicant's name : Shenzhen Hua Xin Information Technology Co., Ltd  
Address : Section A,10/F, Block 1, No.7 Industrial Park, Yulu Community, Yutang, Guangming New District, Shenzhen, China  
Manufacture's name : Shenzhen Hua Xin Information Technology Co., Ltd  
Address : Section A,10/F, Block 1, No.7 Industrial Park, Yulu Community, Yutang, Guangming New District, Shenzhen, China  
Product name : Robotic Vacuum Cleaner  
Model name : HX-V302, HX-V303, HX-V304, HX-V305, V302, V303, V304, TAB-QT560Z  
Standards : FCC CFR47 Part 15 Section 15.247  
Test procedure : ANSI C63.10:2013  
Test Date : July 12, 2018 to July 24, 2018  
Date of Issue : July 24, 2018  
Test Result : Pass

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Test Engineer:

Leo Yang / Engineer

Technical Manager:

Chris Du / Manager



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## 2 Test Summary

Test Items	Test Requirement	Result
Conduct Emission	15.207	PASS
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Conducted Spurious Emission	15.247(d)	PASS
Band edge	15.247(d) 15.205(a)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Power Spectral Density	15.247(e)	PASS
Antenna Requirement	15.203	PASS
Remark: N/A: Not Applicable		



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### 3 General Information

#### 3.1 General Description of E.U.T.

Product Name	:	Robotic Vacuum Cleaner
Model Name	:	HX-V302, HX-V303, HX-V304, HX-V305, V302, V303, V304, TAB-QT560Z (Note: The models HX-V302, HX-V303, HX-V304, HX-V305 are Mocha Brown. The other models V302, V303, V304, TAB-QT560Z are gray and purple. All samples are the same except different colors.)
Specification	:	802.11b/g/n HT20
Operation Frequency	:	2412-2462MHz
Number of Channel	:	11 channels
Type of Modulation	:	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n;
Antenna installation	:	Internal PCB Antenna
Antenna Gain	:	3 dBi
Power supply	:	DC 14.4V 2000mAh Battery For Adapter Model: YJS015D-1900600U Input: AC 120V, 60Hz, 500mA
Hardware Version	:	N/A
Software Version	:	3411101



### 3.2 Channel List

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b: 1 Mbps; 802.11g: 6 Mbps; 802.11n (HT20): MCS0; ) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for 802.11 b/g/n (HT20):

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

Test Frequency and Channel for 802.11 b/g/n (HT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	11	2462



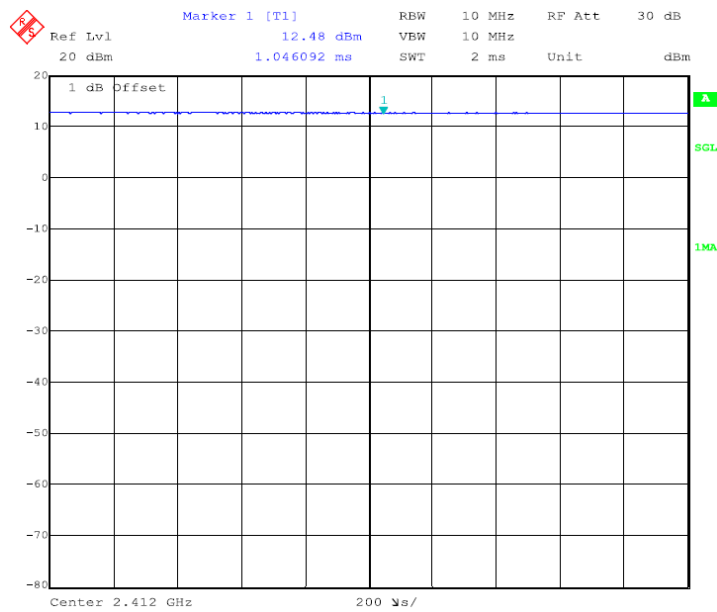
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The maximum duty cycle as following table:

Test Mode	T <sub>on</sub> (ms)	T <sub>on+off</sub> (ms)	Duty Cycle(%)
802.11b	100	100	100%
802.11g	100	100	100%
802.11n(HT20)	100	100	100%

Test Plots:

802.11b



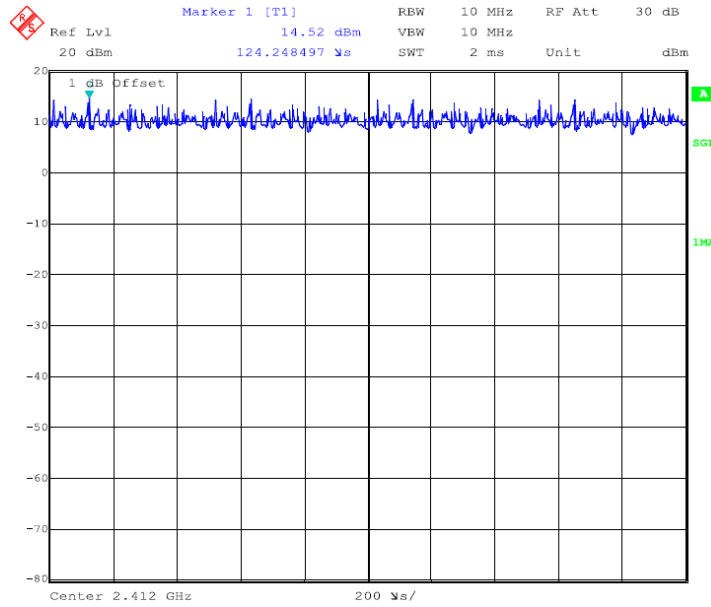




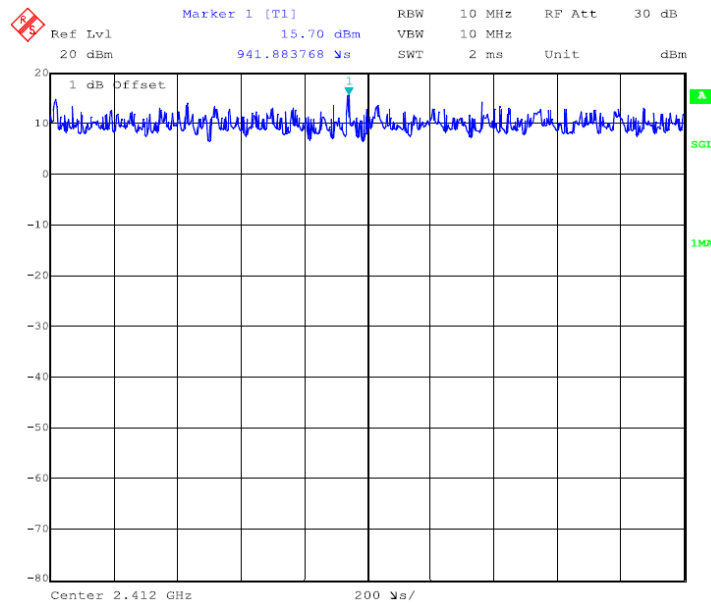
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### 802.11g



### 802.11n(HT20)





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### 3.3 Test Site

Dongguan Precise Testing & Certification Corp., Ltd.

Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan, Guangdong,  
China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A-1

Test Lab: Shenzhen BCTC Testing Co., Ltd.

Address: BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou  
Community, Fuyong Street, Bao'an District, Shenzhen, China

FCC Registered No.: 712850

Test items: Radiated Spurious Emission(18GHz to 25GHz)



## 4 Equipment During Test

### 4.1 Equipments List

RF Conducted Test

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
MXG Signal Analyzer	Agilent	N9020A	MY56070279	10Hz-30GHz	Apr 07, 2019
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Oct 09, 2018
Power Meter	Anritsu	ML2495A	0949003	300MHz-40GHz	Oct 09, 2018
Power Sensor	Anritsu	MA2411B	0917017	300MHz-40GHz	Oct 09, 2018

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Radiated Emissions(Test Frequency from 9KHz-18GHz)

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep. 03, 2018
Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	Aug 31, 2018
Bilog Antenna	SCHWARZBECK	VULB9160	9160-3355	25MHz-2GHz	Aug 31, 2018
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	1MHz-1GHz	Sep. 03, 2018
Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	Sep. 03, 2018
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-40GHz	Oct. 13, 2018
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	1GHz-18GHz	Aug. 31, 2018
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	Aug. 31, 2018
Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Sep. 03, 2018



Radiated Emission (Test Frequency from 18GHz-25GHz)

<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial No.</b>	<b>Characteristics</b>	<b>Calibration Due</b>
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-26.5GHz	2018.08.26
Test Receiver	R&S	ESPI	101396	9KHz-7GHz	2018.08.26
Horn Antenna	SCHWARZBECK	BBHA 9170	9170-181	14GHz-40GHz	2018.09.02
Amplifier	SCHWARZBECK	BBV 9721	9721-205	18GHz-40GHz	2018.08.26
RF Cable	R&S	R204	R21X	1GHz-40GHz	2018.08.26
Antenna Connector	Florida RF Labs	N/A	RF01#	N/A	2018.08.26

Conducted Emissions

<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial No.</b>	<b>Characteristics</b>	<b>Calibration Due</b>
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep. 03, 2018
Artificial Mains Network	Rohde&Schwarz	L2-16B	000WX31025	9KHz-300MHz	Sep. 03, 2018
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	Sep. 03, 2018



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## 4.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10 <sup>-6</sup>
Bandwidth	± 1.5 x 10 <sup>-6</sup>
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB



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### **4.3 Description of Support Units**

Equipment	Model No.	Series No.
N/A	N/A	N/A



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**5 Conducted Emission**

Test Requirement: : FCC CFR 47 Part 15 Section 15.207  
Test Method : ANSI C63.10: 2013  
Test Result : PASS  
Frequency Range : 150kHz to 30MHz  
Class/Severity : Class B

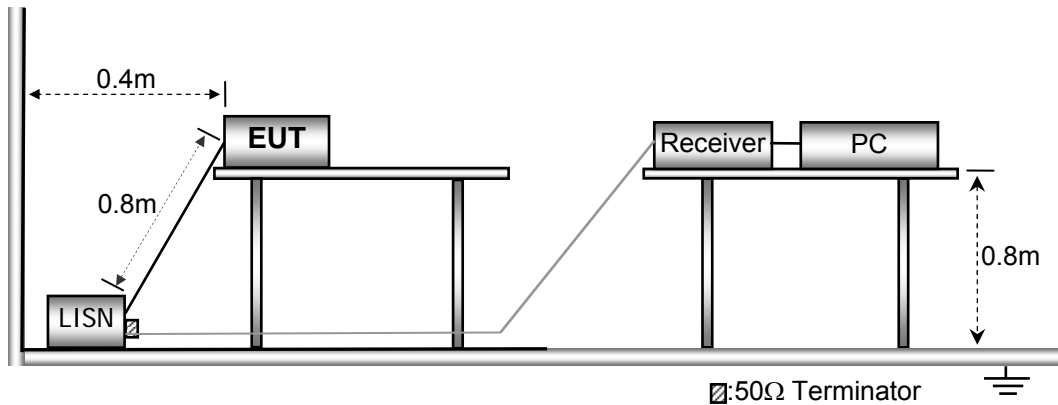
**5.1 E.U.T. Operation**

Operating Environment :

Temperature : 25.5 °C  
Humidity : 51 % RH  
Atmospheric Pressure : 101.2kPa

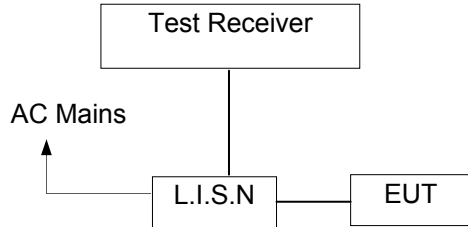
**5.2 EUT Setup**

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.





### 5.3 Test SET-UP (Block Diagram of Configuration)



### 5.4 Measurement Procedure

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

### 5.5 Conducted Emission Limit

#### Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

**Note:**

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 5.6 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

### 5.7 Conducted Emission Test Result

Pass.

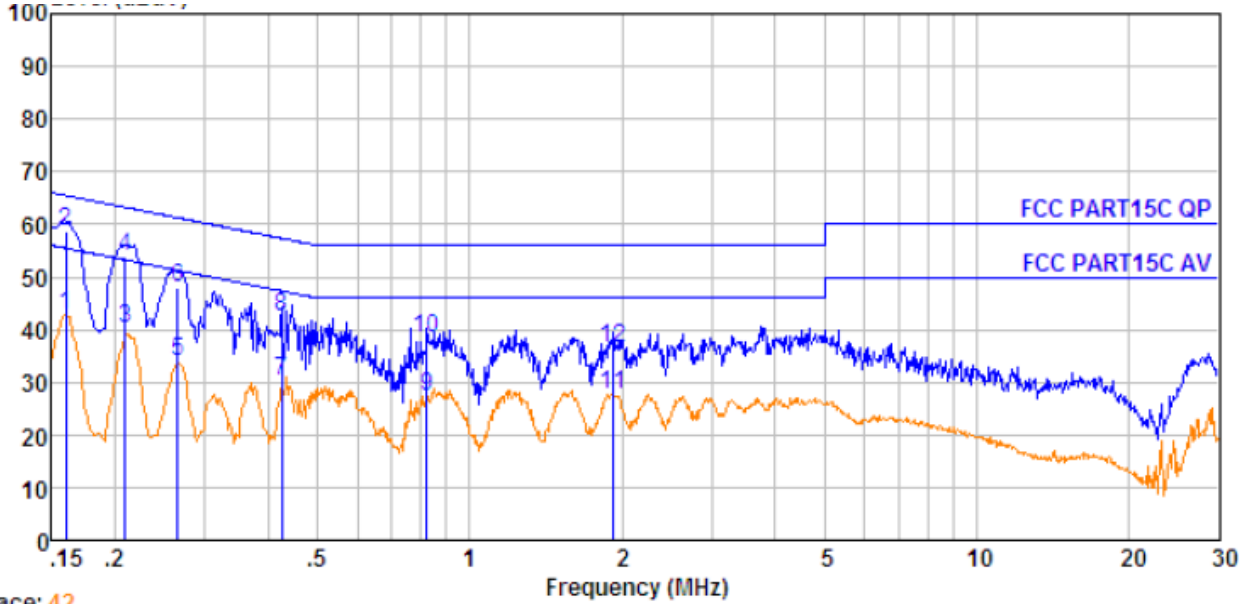
Please refer to the following pages.





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Line-AC 120V/60Hz

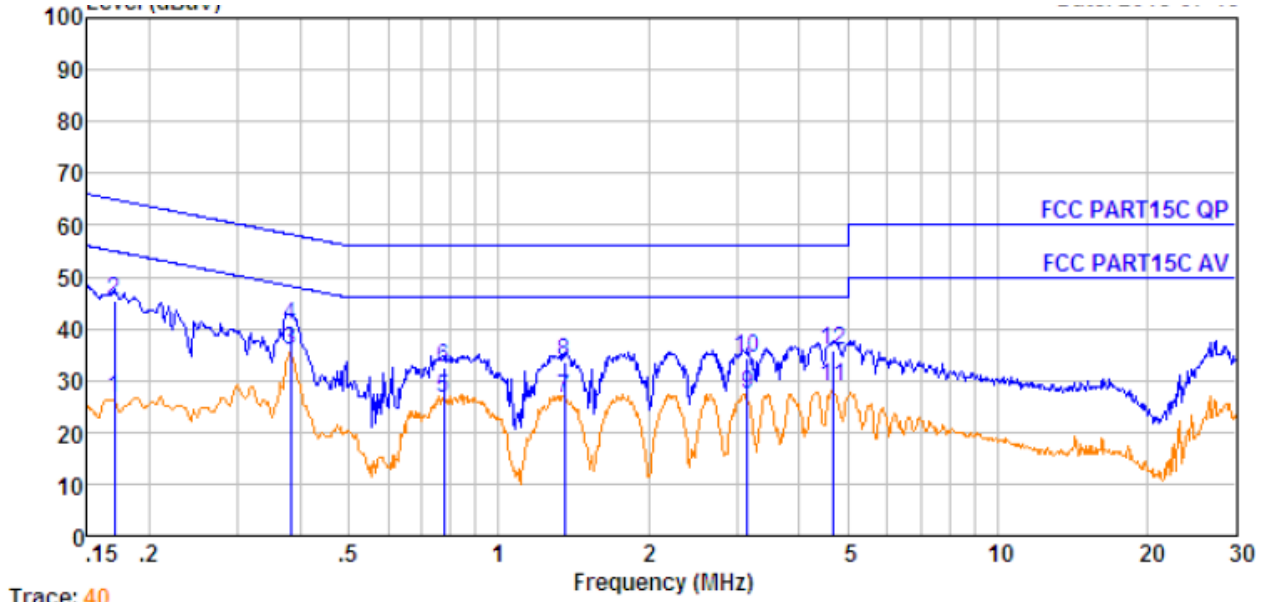


Trace: 42

No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.160	0.22	9.52	32.95	42.69	55.47	-12.78	Average
2.	0.160	0.22	9.52	48.95	58.69	65.47	-6.78	QP
3.	0.209	0.29	9.60	30.16	40.05	53.23	-13.18	Average
4.	0.209	0.29	9.60	44.16	54.05	63.23	-9.18	QP
5.	0.266	0.34	9.65	24.00	33.99	51.25	-17.26	Average
6.	0.266	0.34	9.65	38.00	47.99	61.25	-13.26	QP
7.	0.426	0.41	9.75	20.10	30.26	47.33	-17.07	Average
8.	0.426	0.41	9.75	32.16	42.32	57.33	-15.01	QP
9.	0.822	0.45	9.81	17.04	27.30	46.00	-18.70	Average
10.	0.822	0.45	9.81	28.30	38.56	56.00	-17.44	QP
11.	1.918	0.47	9.85	17.26	27.58	46.00	-18.42	Average
12.	1.918	0.47	9.85	26.30	36.62	56.00	-19.38	QP



Neutral-AC 120V/60Hz



Trace: 40

No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.170	0.24	9.57	16.62	26.43	54.94	-28.51	Average
2.	0.170	0.24	9.57	35.70	45.51	64.94	-19.43	QP
3.	0.383	0.40	9.75	25.52	35.67	48.21	-12.54	Average
4.	0.383	0.40	9.75	30.60	40.75	58.21	-17.46	QP
5.	0.775	0.45	9.84	16.24	26.53	46.00	-19.47	Average
6.	0.775	0.45	9.84	22.29	32.58	56.00	-23.42	QP
7.	1.352	0.46	9.86	16.14	26.46	46.00	-19.54	Average
8.	1.352	0.46	9.86	23.25	33.57	56.00	-22.43	QP
9.	3.156	0.47	9.92	16.75	27.14	46.00	-18.86	Average
10.	3.156	0.47	9.92	24.00	34.39	56.00	-21.61	QP
11.	4.696	0.49	9.95	18.25	28.69	46.00	-17.31	Average
12.	4.696	0.49	9.95	25.31	35.75	56.00	-20.25	QP

**PRECISE TESTING****6 Radiated Spurious Emissions**

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.247  
 Test Method : ANSI C63.10:2013  
 Test Result : PASS  
 Measurement Distance : 3m  
 Limit : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

**6.1 EUT Operation**

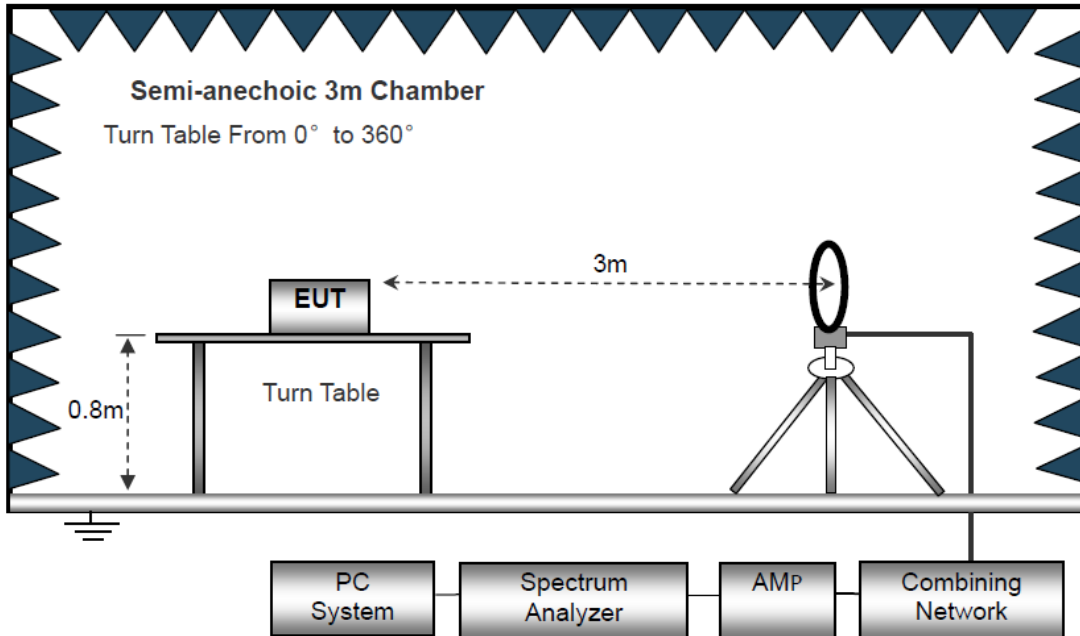
Operating Environment :

Temperature: : 23.5 °C  
 Humidity: : 51.1 % RH  
 Atmospheric Pressure: : 101.2kPa  
 Test Voltage : DC 3.8V Battery

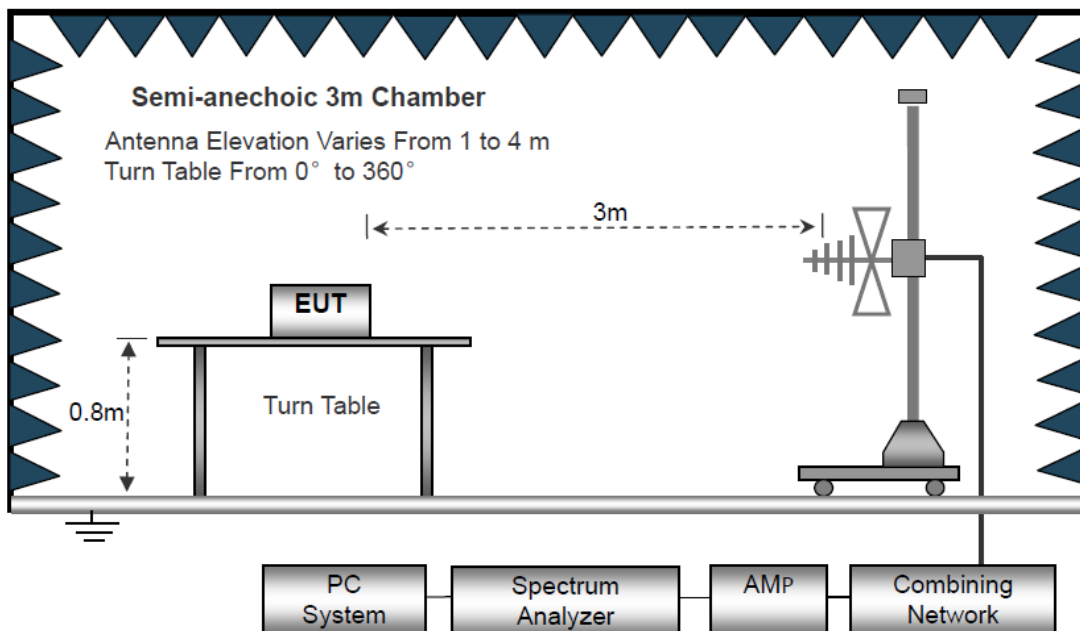
## 6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

The test setup for emission measurement below 30MHz

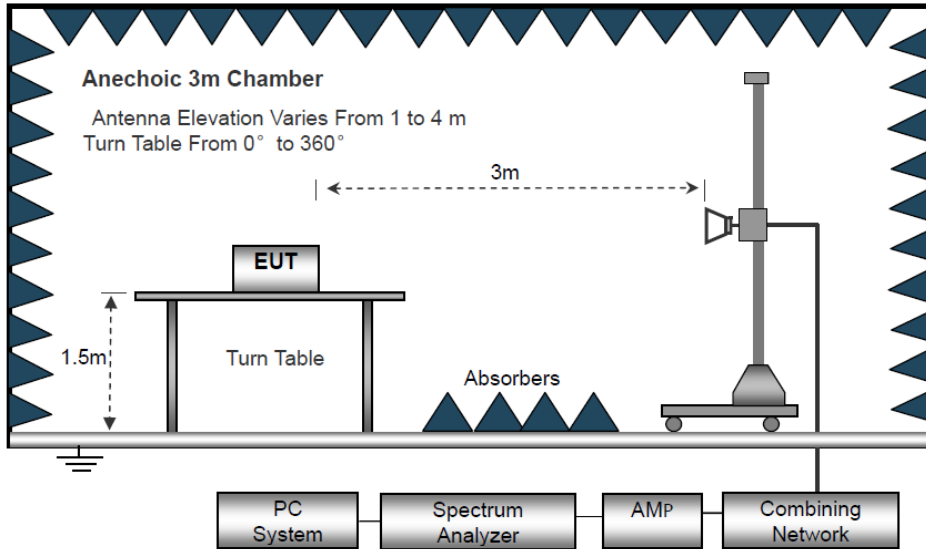


The test setup for emission measurement from 30 MHz to 1 GHz.



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The test setup for emission measurement above 1 GHz



**6.3 Spectrum Analyzer Setup**

	Frequency	Detector	RBW	VBW	Remark
Receiver Setup	Below 30MHz	--	10kHz	10kHz	--
	30MHz ~ 1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value



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#### **6.4 Test Procedure**

1. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane, And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.
8. The test above 1GHz must be use the fully anechoic room, and the test below 1GHz use the half anechoic room



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**6.5 Summary of Test Results**

**Test Frequency: 9KHz-30MHz**

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor =  $40\log(\text{Specific distance/ test distance})$  (dB);

Limit line = Specific limits (dBuV) + distance extrapolation factor.

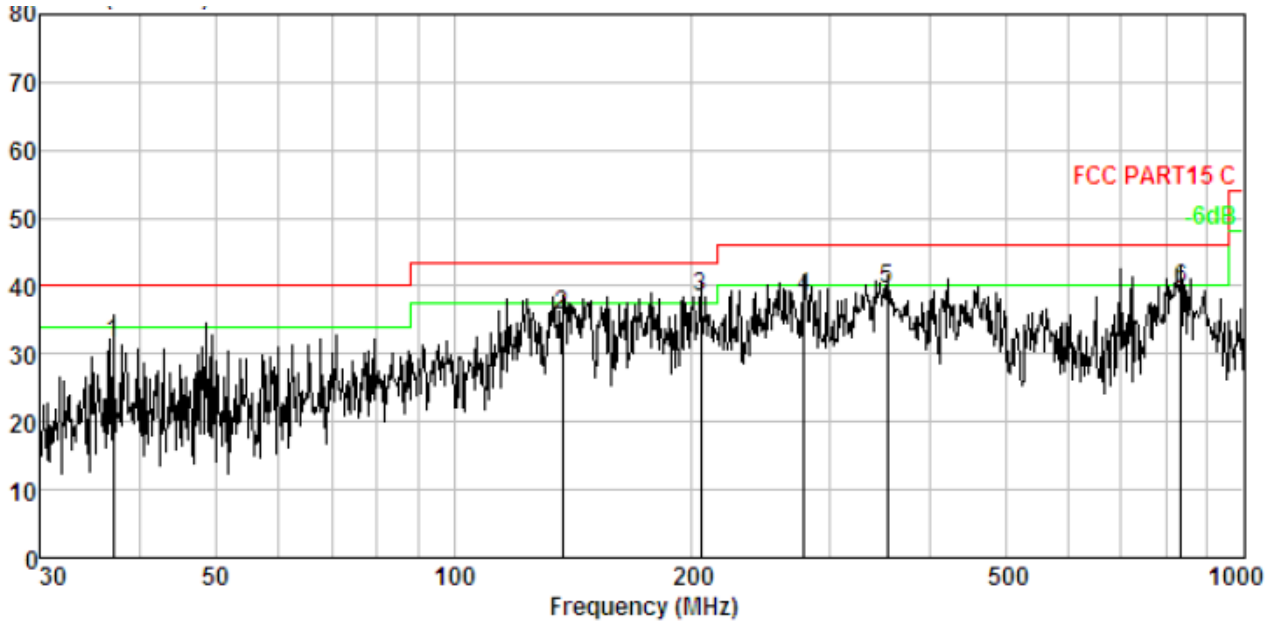
**Test Frequency: 30MHz ~ 1GHz**

All the modulation modes were tested the data of the worst mode (TX 802.11b Low Channel) are recorded in the following pages and the others modulation methods do not exceed the limits.

Please refer to the following test plots:



Antenna Polarization: Horizontal



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	37.025	1.25	13.49	46.97	30.04	31.67	40.00	-8.33	QP
2.	137.420	2.43	13.18	50.67	30.50	35.78	43.50	-7.72	QP
3.	205.675	2.80	10.49	55.84	30.64	38.49	43.50	-5.01	QP
4.	278.067	3.07	12.75	53.42	30.74	38.50	46.00	-7.50	QP
5.	354.183	3.29	14.30	52.81	30.83	39.57	46.00	-6.43	QP
6.	833.317	4.06	21.97	44.77	31.13	39.67	46.00	-6.33	QP

Remark: Emission Level = Reading + Cable Loss + ANT Factor - AMP Factor

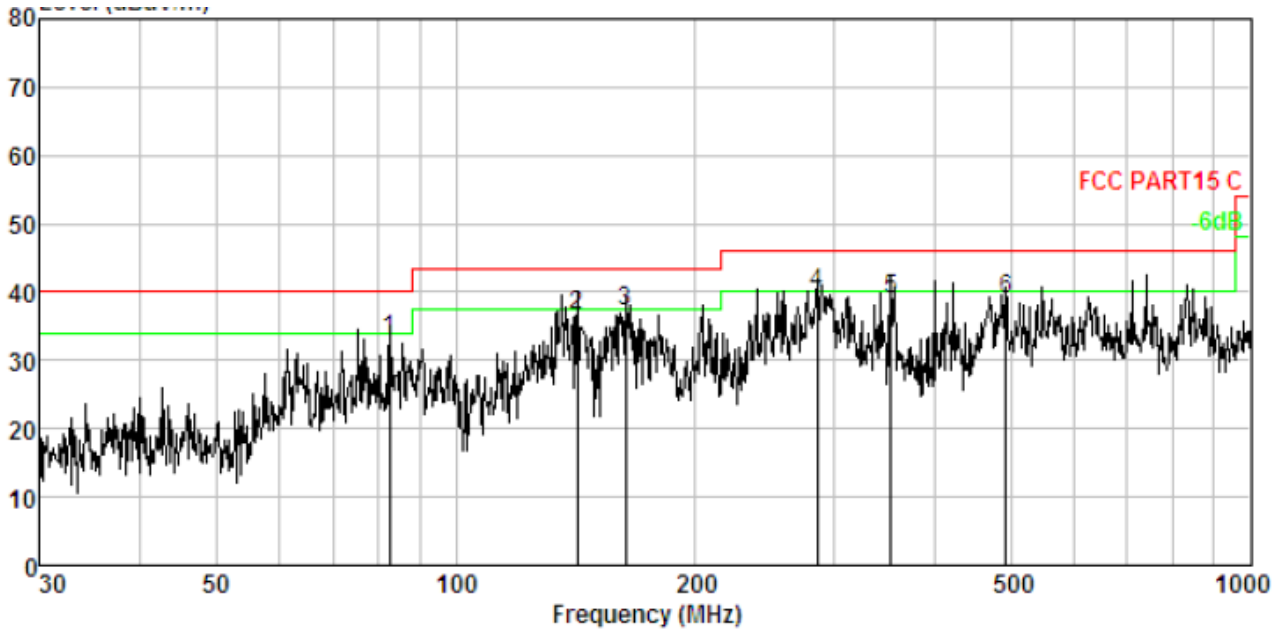




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Antenna Polarization: Vertical



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	82.648	1.97	8.72	52.68	30.32	33.05	40.00	-6.95	QP
2.	142.324	2.46	13.49	51.27	30.51	36.71	43.50	-6.79	QP
3.	163.755	2.59	13.67	51.46	30.56	37.16	43.50	-6.34	QP
4.	284.977	3.09	12.91	54.54	30.75	39.79	46.00	-6.21	QP
5.	352.943	3.29	14.29	52.35	30.83	39.10	46.00	-6.90	QP
6.	492.469	3.59	17.00	49.20	30.94	38.85	46.00	-7.15	QP

Remark: Emission Level = Reading + Cable Loss + ANT Factor - AMP Factor



**PRECISE TESTING**

Report No.: PTC18060122001E-EM01

**Test Frequency: From 1GHz to 18GHz**

**Low Channel (2412MHz) Worst case 802.11g**

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4824	25.34	AV	V	9.13	8.06	8.52	34.01	54	-19.99
4824	26.91	AV	H	9.13	8.06	8.52	35.58	54	-18.42
4824	30.58	PK	V	9.13	8.06	8.52	39.25	74	-34.75
4824	31.49	PK	H	9.13	8.06	8.52	40.16	74	-33.84
16457	29.35	AV	V	10.22	8.39	10.44	37.52	54	-16.48
16457	30.48	AV	H	10.22	8.39	10.44	38.65	54	-15.35
16457	36.29	PK	V	10.22	8.39	10.44	44.46	74	-29.54
16457	38.18	PK	H	10.22	8.39	10.44	46.35	74	-27.65

**Middle Channel (2437MHz) Worst case 802.11n (HT20)**

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4874	26.15	AV	V	9.15	8.22	9.36	34.16	54	-19.84
4874	28.59	AV	H	9.15	8.22	9.36	36.6	54	-17.4
4874	31.46	PK	V	9.15	8.22	9.36	39.47	74	-34.53
4874	35.08	PK	H	9.15	8.22	9.36	43.09	74	-30.91
14856	27.49	AV	V	11.69	9.27	11.05	37.4	54	-16.6
14856	29.56	AV	H	11.69	9.27	11.05	39.47	54	-14.53
14856	35.18	PK	V	11.69	9.27	11.05	45.09	74	-28.91
14856	38.46	PK	H	11.69	9.27	11.05	48.37	74	-25.63

**High Channel (2462MHz) Worst case 802.11b**

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4924	27.54	AV	V	9.28	8.35	9.36	35.81	54	-18.19
4924	28.61	AV	H	9.28	8.35	9.36	36.88	54	-17.12
4924	32.95	PK	V	9.28	8.35	9.36	41.22	74	-32.78
4924	35.48	PK	H	9.28	8.35	9.36	43.75	74	-30.25
15478	29.68	AV	V	10.26	9.53	11.08	38.39	54	-15.61
15478	32.48	AV	H	10.26	9.53	11.08	41.19	54	-12.81
15478	35.94	PK	V	10.26	9.53	11.08	44.65	74	-29.35
15478	39.15	PK	H	10.26	9.53	11.08	47.86	74	-26.14

Note:

1. The testing has been conformed to  $10 \times 2462\text{MHz} = 24620\text{MHz}$ .
2. All other emissions more than 30dB below the limit.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.  
Emission Level = Reading + Factor  
Margin=Emission Level-Limit
4. X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.



Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

2.4G WiFi (802.11b/g/n)mode have been tested, and the worst result(802.11g) was report as below

Test Mode: 802.11g Low Channel 2412MHz									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Polarity H/V	Test Value
2310.00	27.03	27.27	6.62	0	60.92	74	-13.08	V	Peak
2390.00	25.81	27.53	6.75	0	60.09	74	-13.91	V	
2310.00	28.26	27.27	6.62	0	62.15	74	-11.85	H	
2390.00	26.30	27.53	6.75	0	60.58	74	-13.42	H	
2310.00	12.89	27.27	6.62	0	46.78	54	-7.22	V	Average
2390.00	12.66	27.53	6.75	0	46.94	54	-7.06	V	
2310.00	12.87	27.27	6.62	0	46.76	54	-7.24	H	
2390.00	12.90	27.53	6.75	0	47.18	54	-6.82	H	

Test Mode: 802.11g High Channel 2462MHz									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Polarity H/V	Test Value
2483.50	26.26	27.84	6.83	0	60.93	74	-13.07	V	Peak
2500.00	26.72	27.9	6.84	0	61.46	74	-12.54	V	
2483.50	27.08	27.84	6.83	0	61.75	74	-12.25	H	
2500.00	27.14	27.9	6.84	0	61.88	74	-12.12	H	
2483.50	12.64	27.84	6.83	0	47.31	54	-6.69	V	Average
2500.00	12.55	27.9	6.84	0	47.29	54	-6.71	V	
2483.50	12.70	27.84	6.83	0	47.37	54	-6.63	H	
2500.00	12.56	27.9	6.84	0	47.30	54	-6.70	H	

**Test Frequency: From 18GHz to 25GHz**

The measurements were more than 20dB below the limit and not reported.



## 7 Conducted Spurious Emission

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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)).

### 7.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto  
Detector function = peak, Trace = max hold

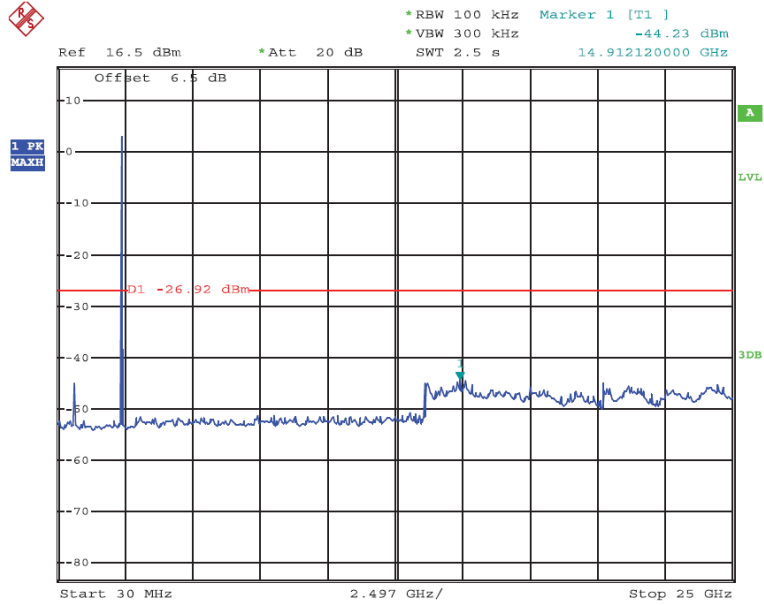
### 7.2 Test Result



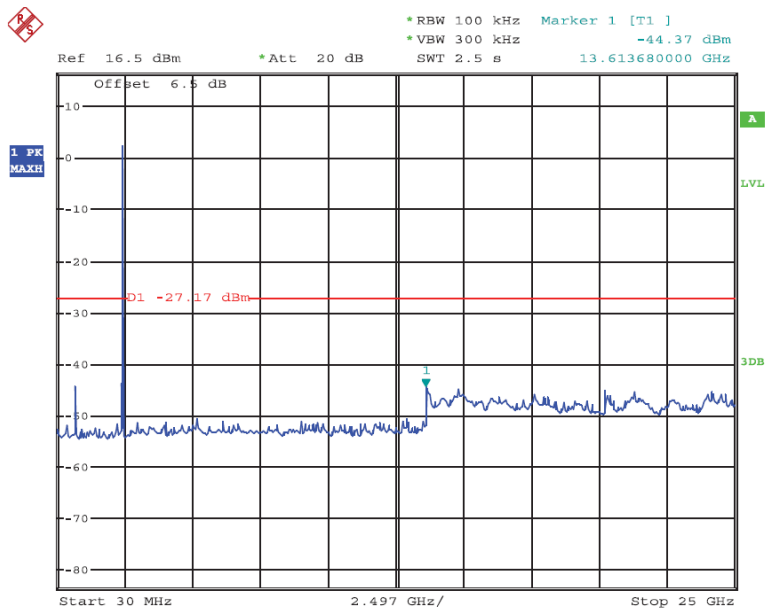
PRECISE TESTING

Report No.: PTC18060122001E-EM01

### 802.11 b Low Channel

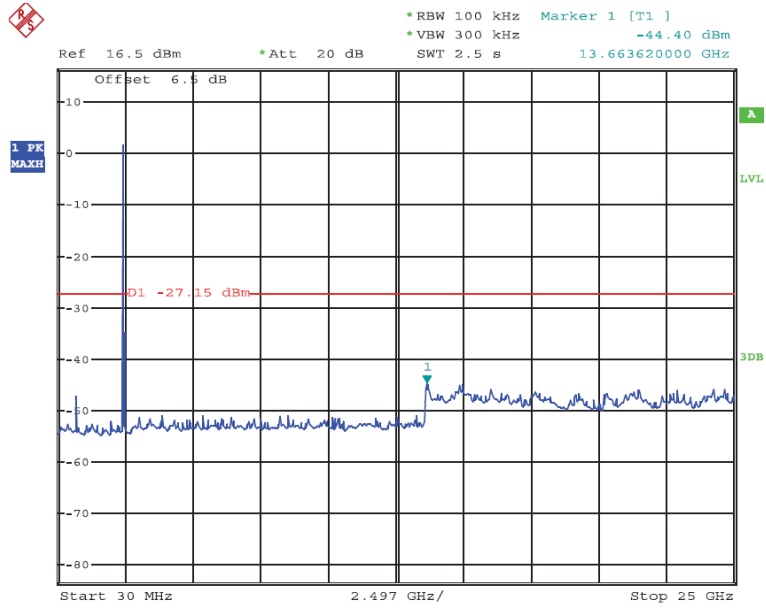


### Middle Channel



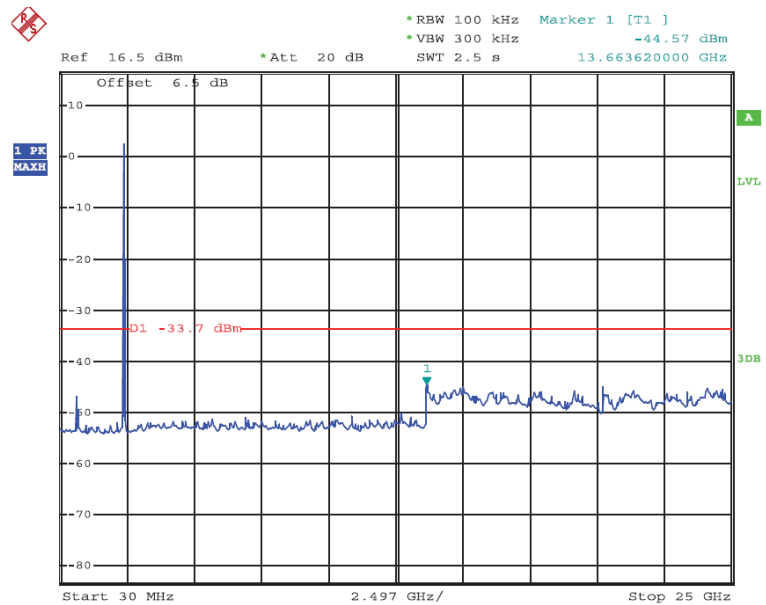


### High Channel



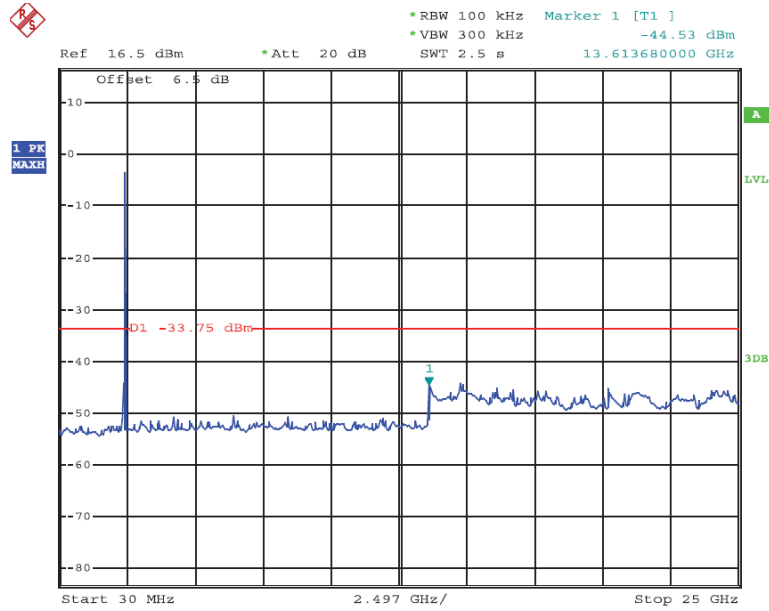
### 802.11g

### Low Channel

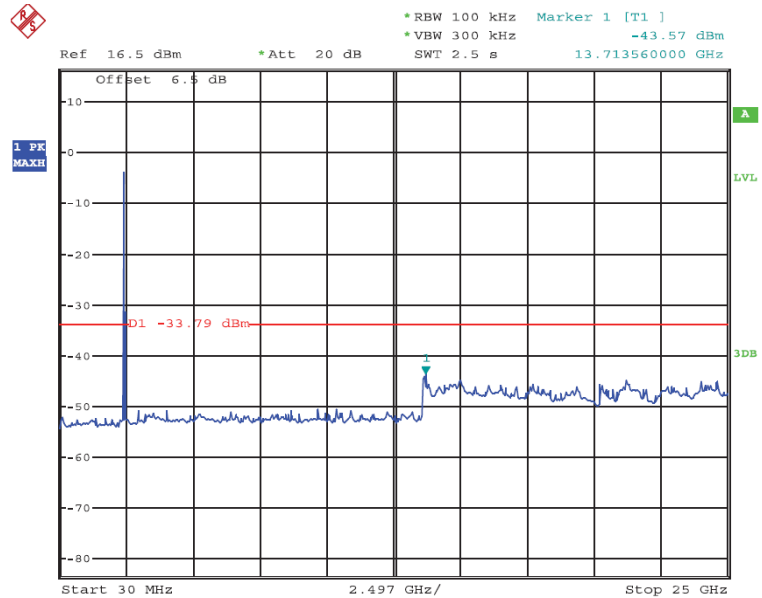




### Middle Channel



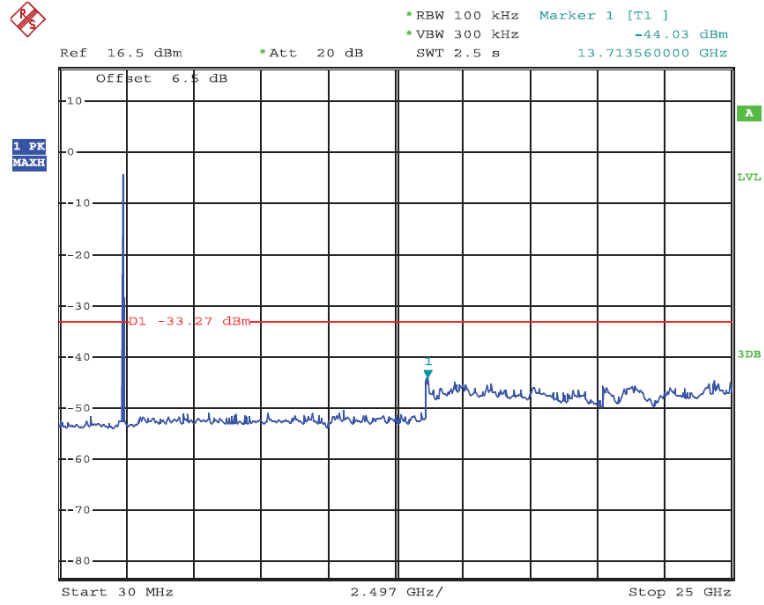
### High Channel



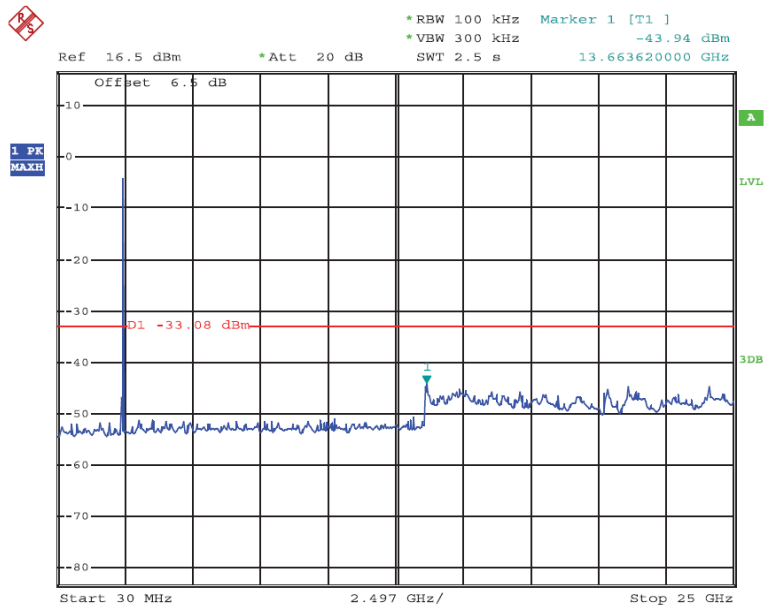


802.11n-HT20

Low Channel



Middle Channel



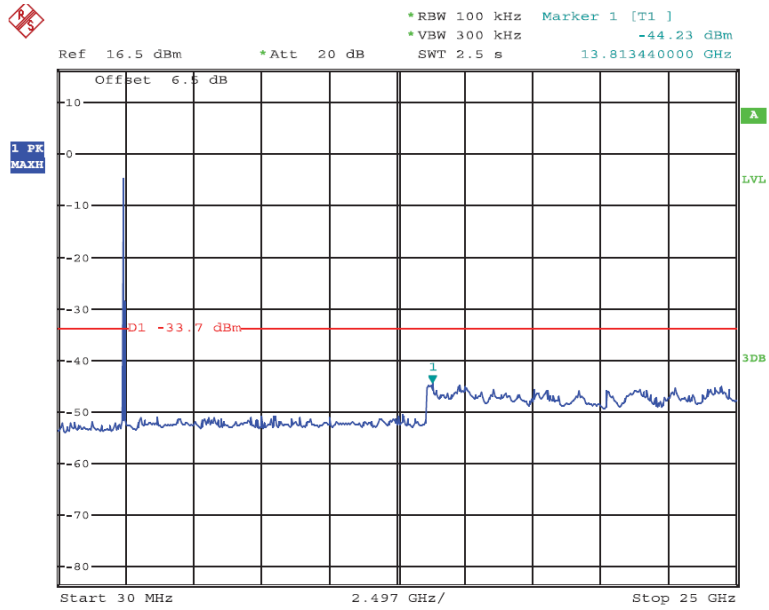




PRECISE TESTING

Report No.: PTC18060122001E-EM01

### High Channel





## **8 Band Edge Measurement**

Test Requirement	: Section 15.247(d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method	: ANSI C63.10:2013
Test Limit	: Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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)).

### **8.1 Test Procedure**

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto  
Detector function = peak, Trace = max hold

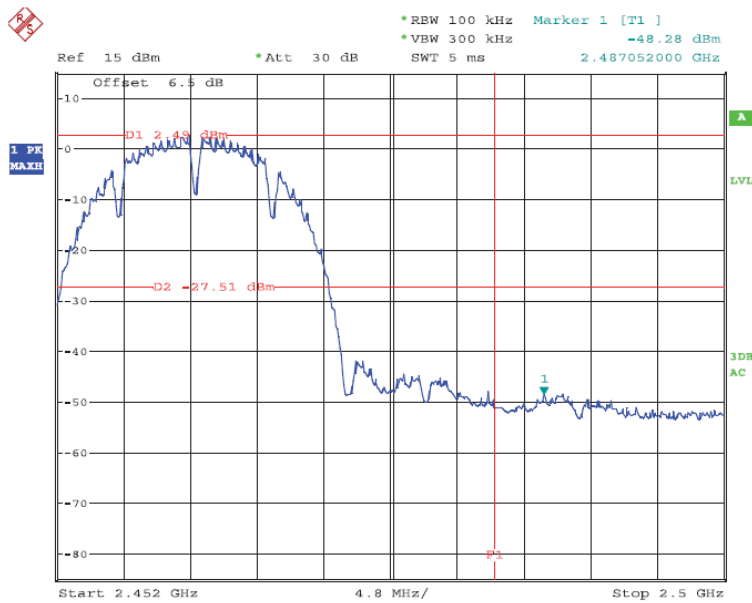
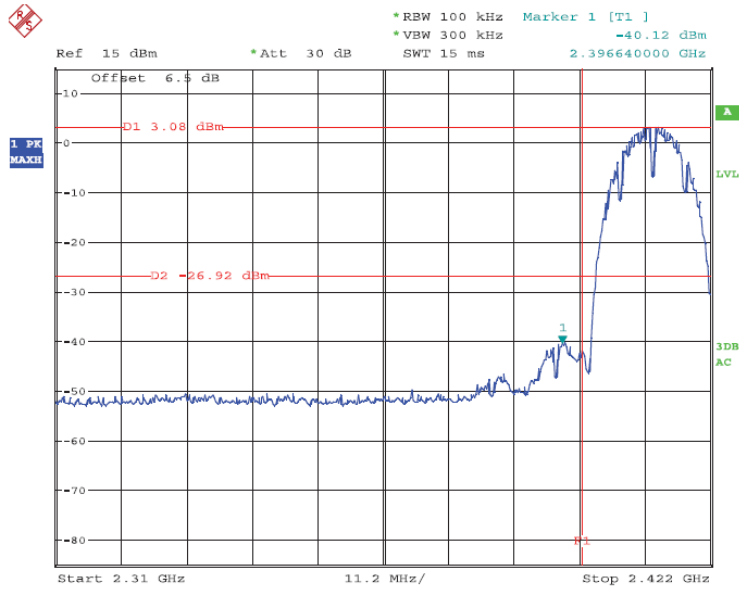


PRECISE TESTING

Report No.: PTC18060122001E-EM01

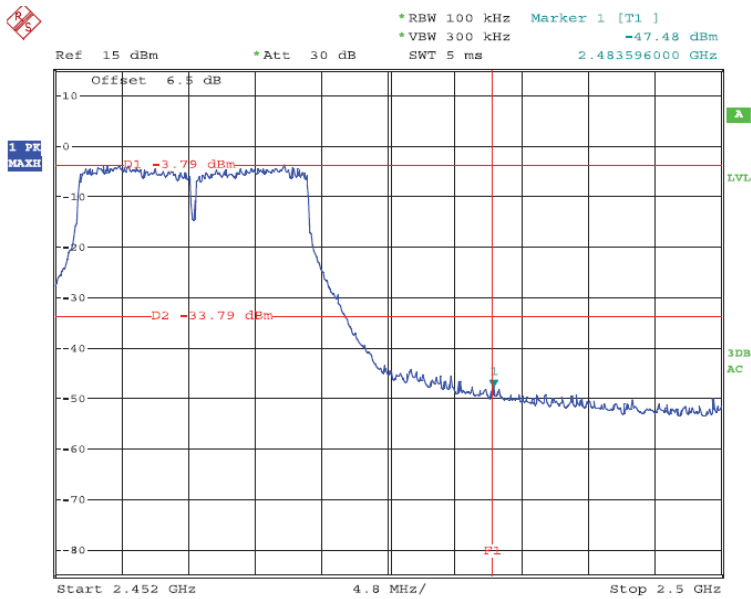
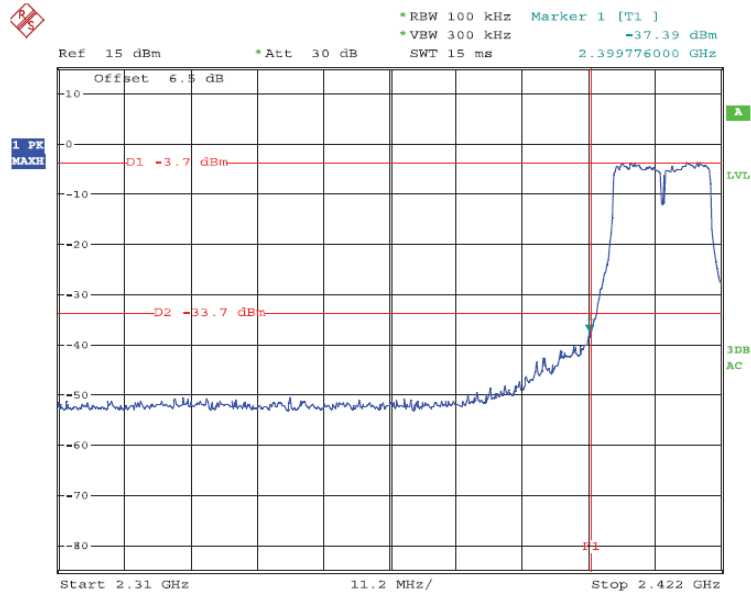
### 8.2 Test Result

#### 802.11b





802.11g

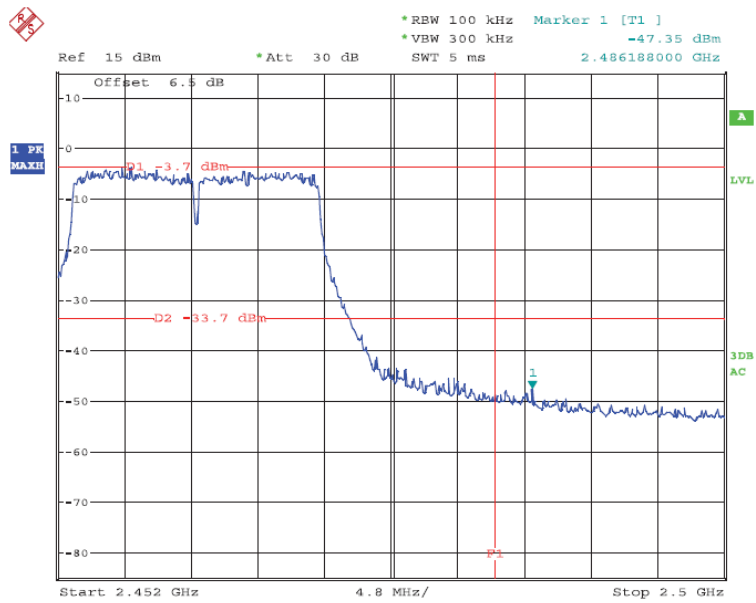
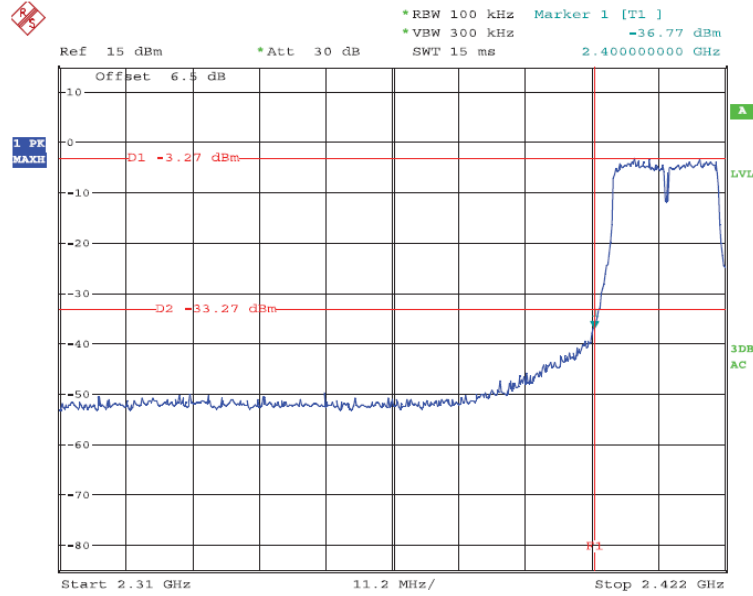




PRECISE TESTING

Report No.: PTC18060122001E-EM01

### 802.11n-HT20





### 9 6dB Bandwidth Measurement

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10:2013

Test Limit Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 9.1 Test Procedure

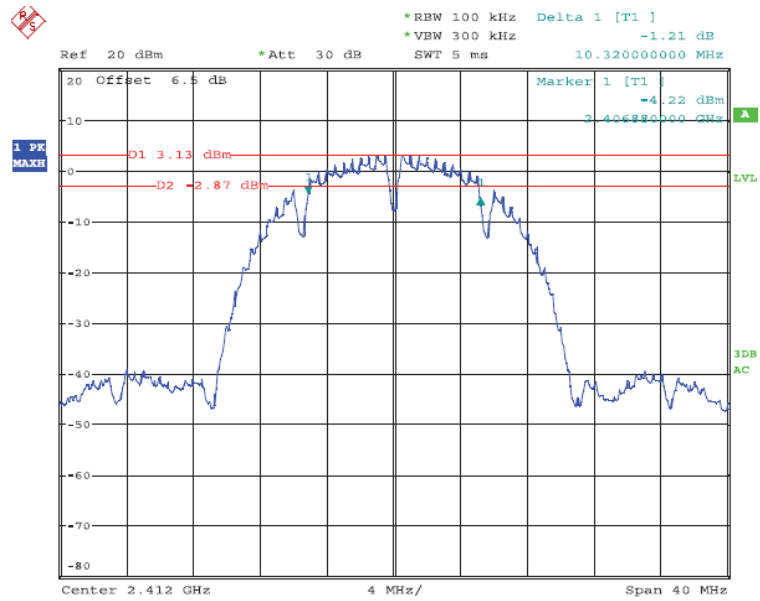
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

#### 9.2 Test Result

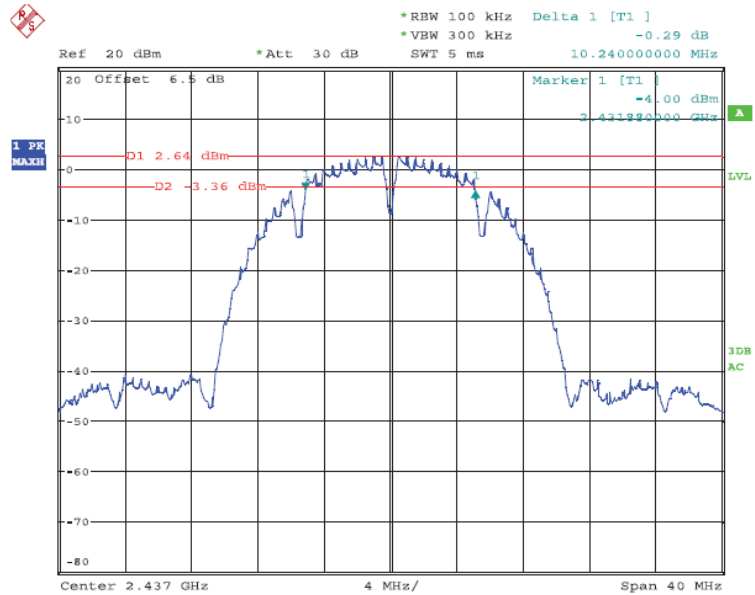
Modulation	Bandwidth(MHz)			Limit
	Low Channel	Middle Channel	High Channel	
802.11b	10.32	10.24	10.24	≥500kHz
802.11g	16.80	16.80	16.72	≥500kHz
802.11n-HT20	17.92	17.92	17.92	≥500kHz



### 802.11b Low Channel

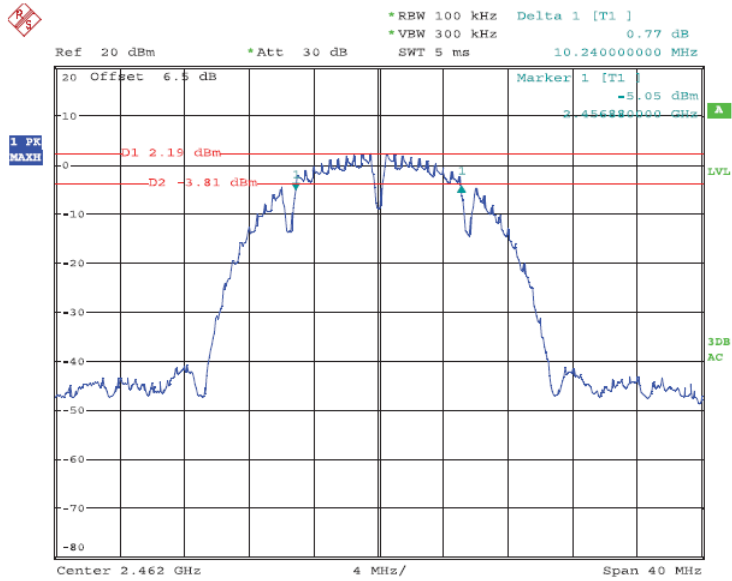


### 802.11b Middle Channel

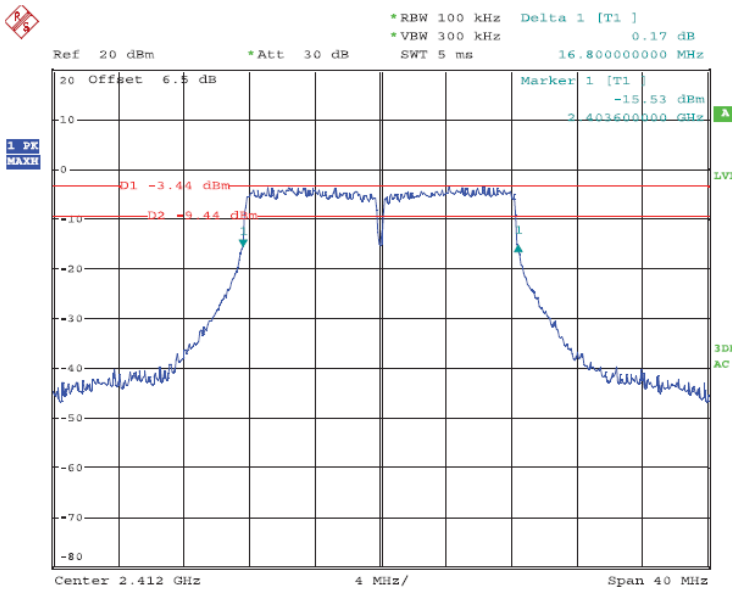




### 802.11b High Channel



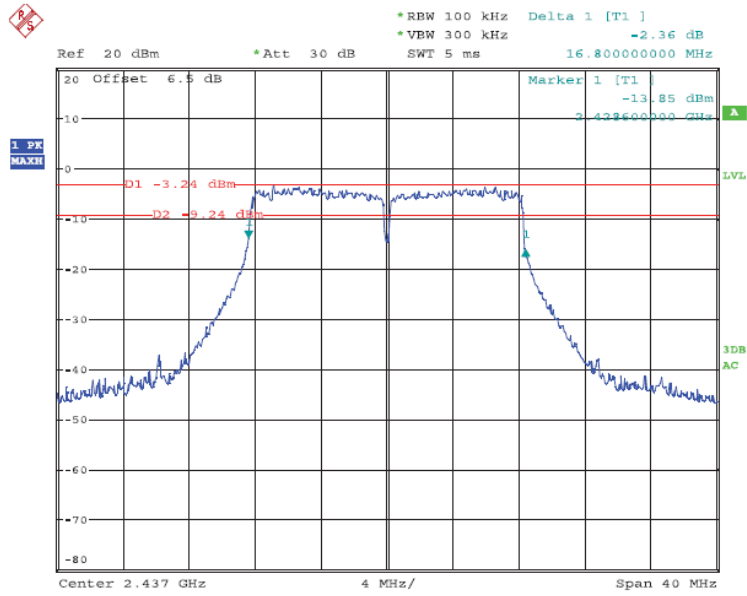
### 802.11g Low Channel



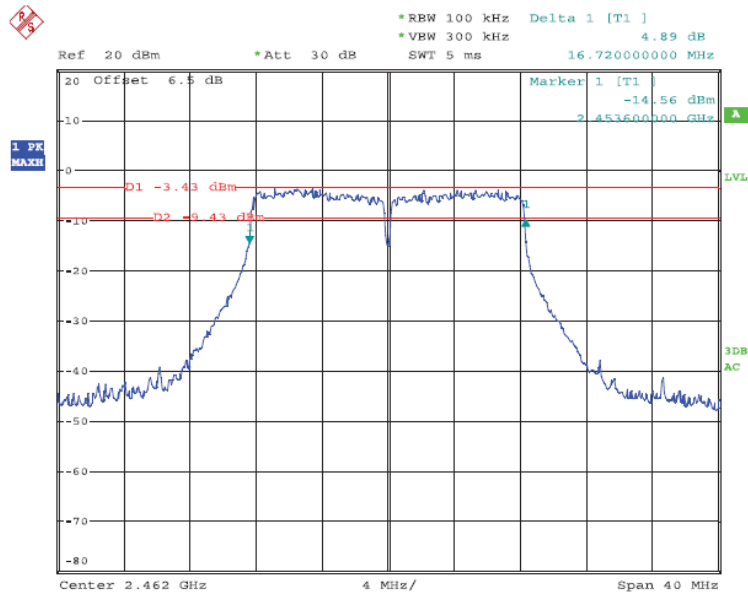




### 802.11g Middle Channel

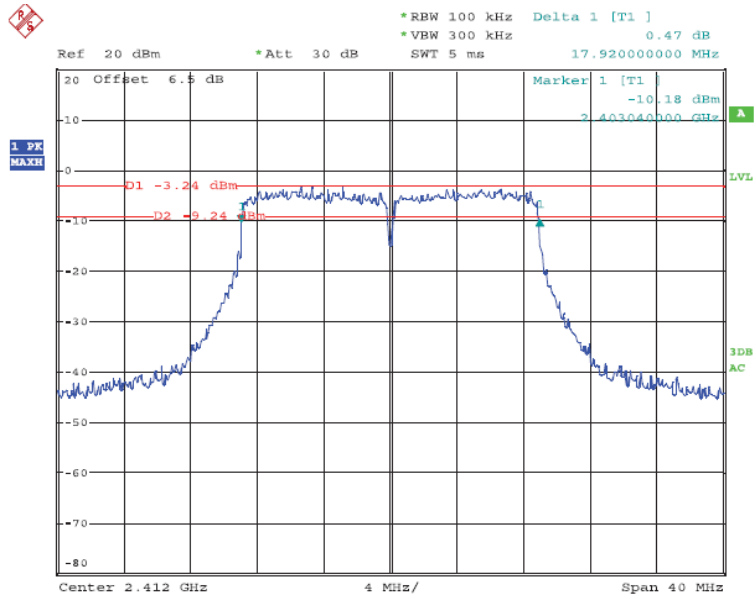


### 802.11g High Channel

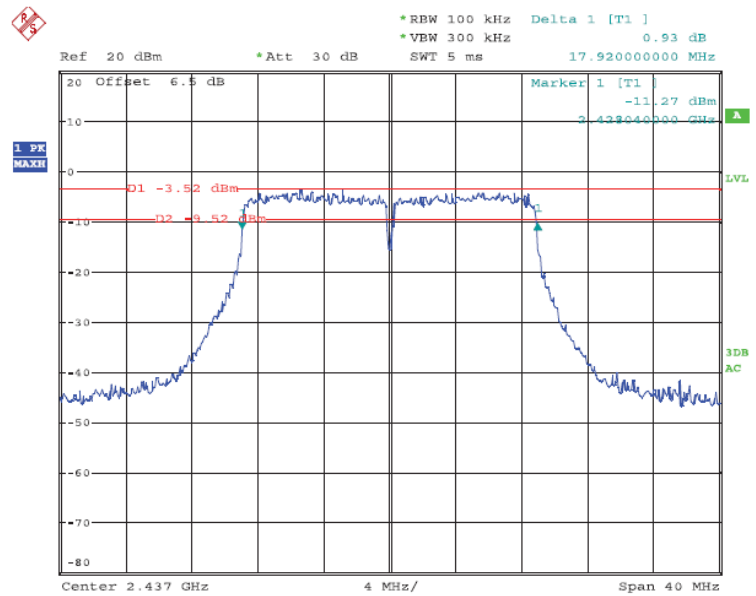




### 802.11n-HT20 Low Channel



### 802.11n-HT20 Middle Channel

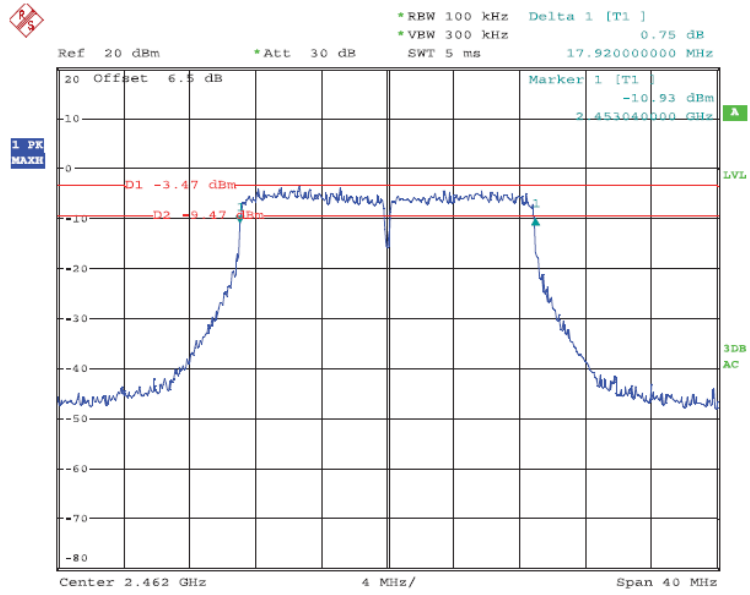




PRECISE TESTING

Report No.: PTC18060122001E-EM01

### 802.11n-HT20 High Channel





### 10 Maximum Peak Output Power

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10:2013

Test Limit : Regulation 15.247 (b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

#### 10.1 Test Procedure

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.1.2 PKPM1 Peak Power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

#### 10.2 Test Result

Modulation	Maximum Peak Output Power (dBm)			Limit
	Low Channel	Middle Channel	High Channel	
802.11b	15.98	15.44	14.90	1W(30dBm)
802.11g	14.19	13.83	13.47	1W(30dBm)
802.11n-HT20	14.10	14.65	14.07	1W(30dBm)



### 11 Power Spectral density

- Test Requirement : FCC CFR47 Part 15 Section 15.247
- Test Method : ANSI C63.10:2013
- Test Limit : Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

#### 11.1 Test Procedure

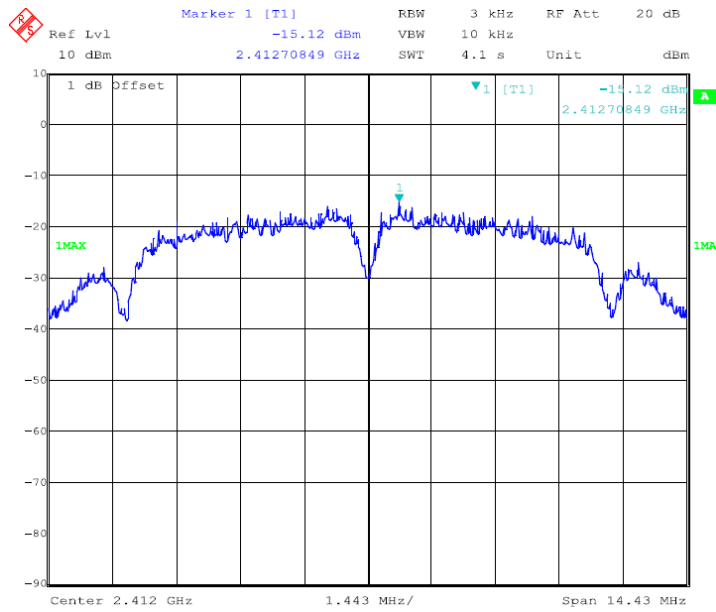
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz, Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

#### 11.2 Test Result

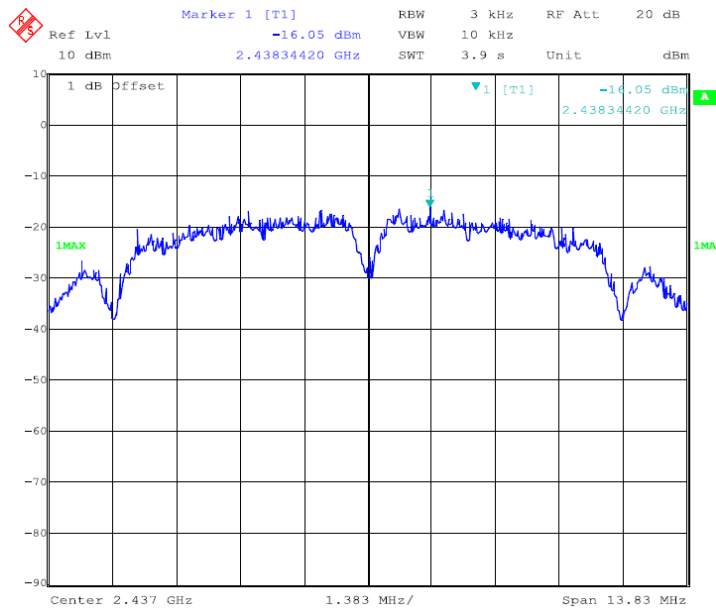
Modulation	Power Spectral density ( dBm/3kHz )			Limit
	Low Channel	Middle Channel	High Channel	
802.11b	-15.12	-16.05	-15.71	8dBm/3kHz
802.11g	-20.27	-20.48	-19.94	8dBm/3kHz
802.11n-HT20	-19.61	-20.34	-20.00	8dBm/3kHz



### 802.11b Low Channel



### 802.11b Middle Channel

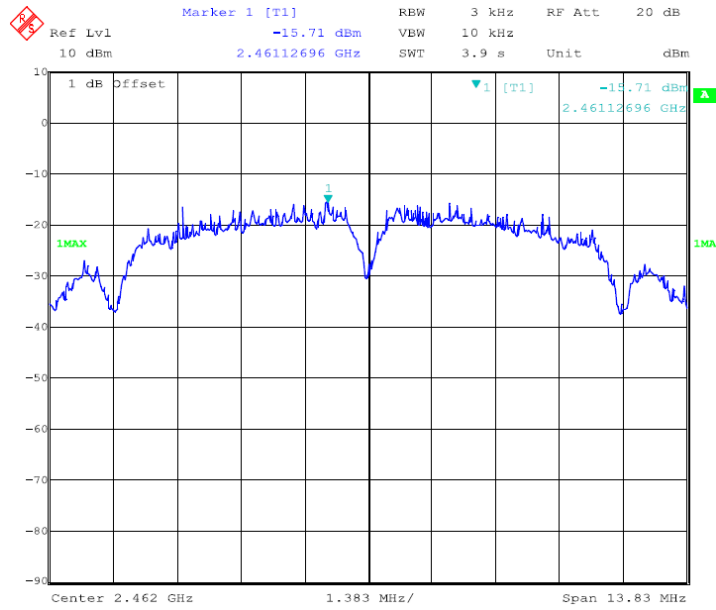




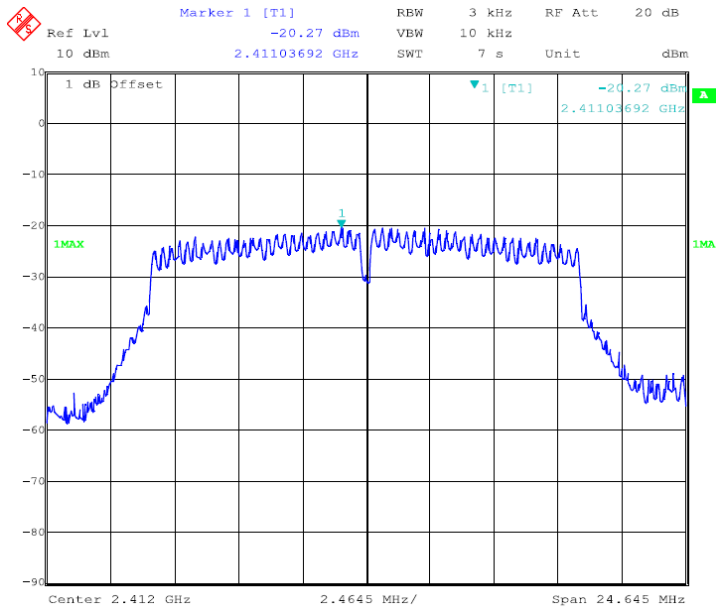
PRECISE TESTING

Report No.: PTC18060122001E-EM01

### 802.11b High Channel



### 802.11g Low Channel

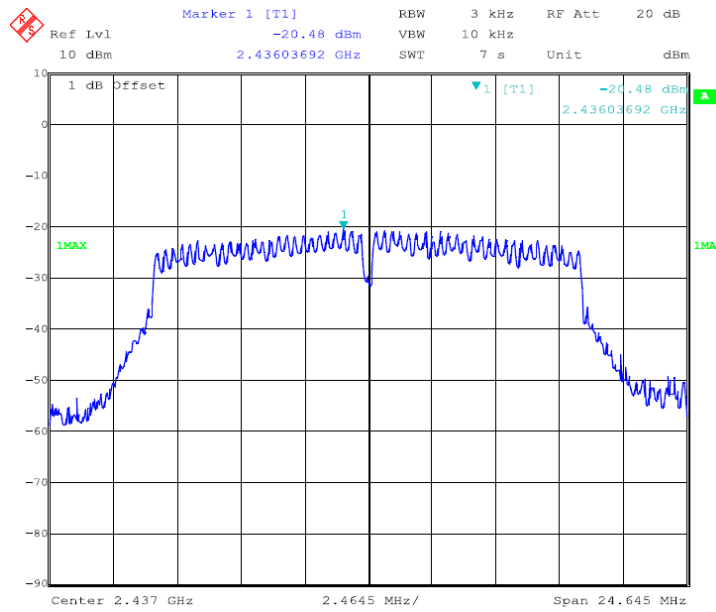




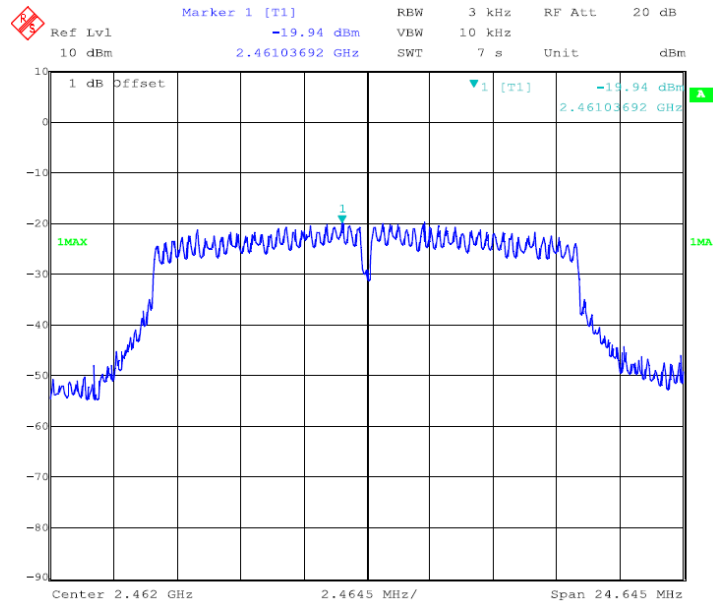
PRECISE TESTING

Report No.: PTC18060122001E-EM01

### 802.11g Middle Channel



### 802.11g High Channel



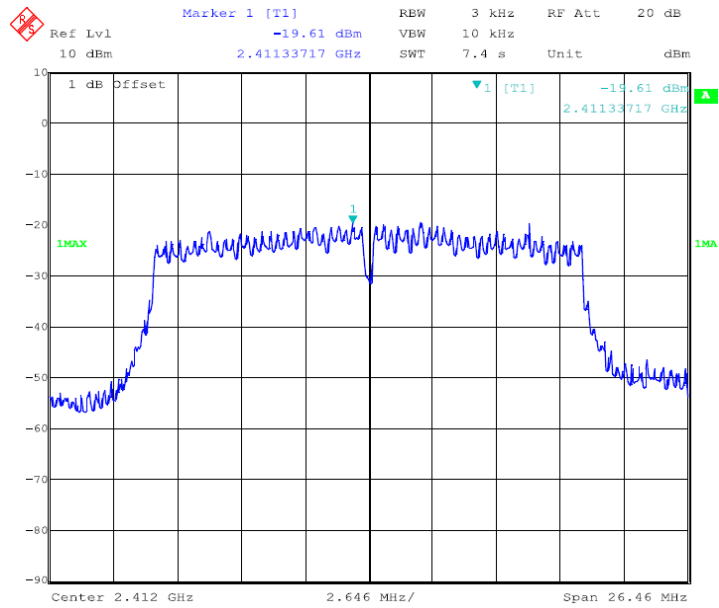




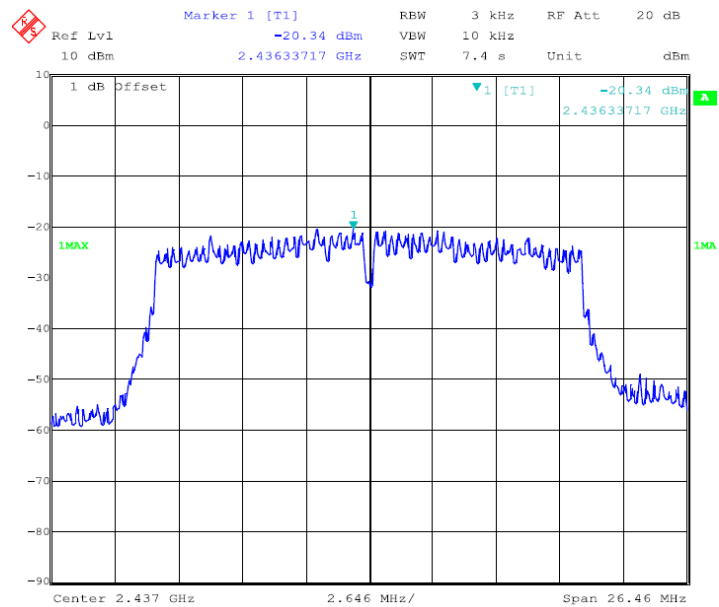
PRECISE TESTING

Report No.: PTC18060122001E-EM01

### 802.11n-HT20 Low Channel



### 802.11n-HT20 Middle Channel

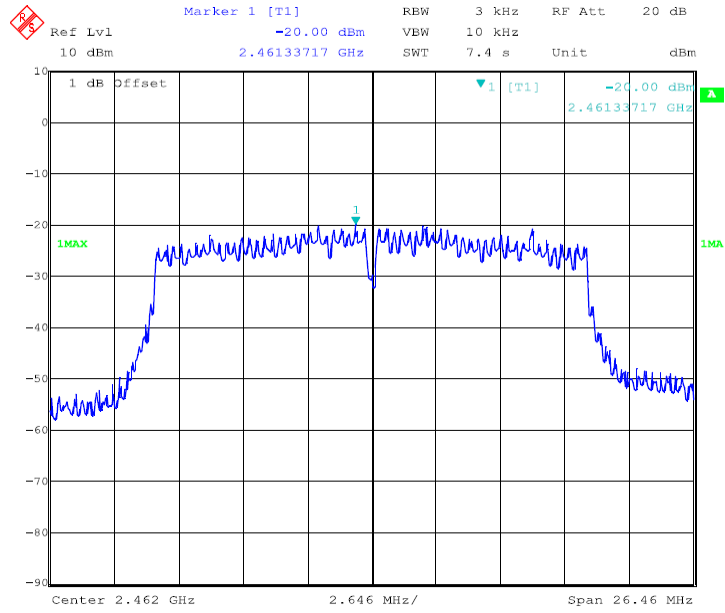




PRECISE TESTING

Report No.: PTC18060122001E-EM01

### 802.11n-HT20 High Channel





**PRECISE TESTING**

Report No.: PTC18060122001E-EM01

## **12 Antenna Application**

### **12.1 Antenna Requirement**

For intentional device, according to FCC 47 CFR Section 15.203, 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **12.2 Result**

The EUT'S antenna, permanent attached antenna, is internal PCB antenna. The antenna's gain is 3dBi and meets the requirement.



PRECISE TESTING

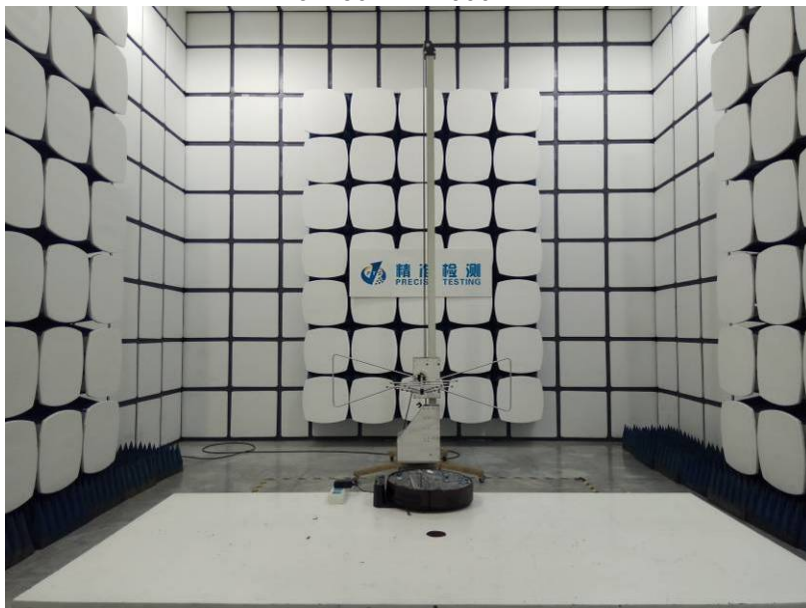
Report No.: PTC18060122001E-EM01

## 13 Test Setup

### Conducted Emissions



### Radiated Spurious Emissions From 30MHz-1000MHz





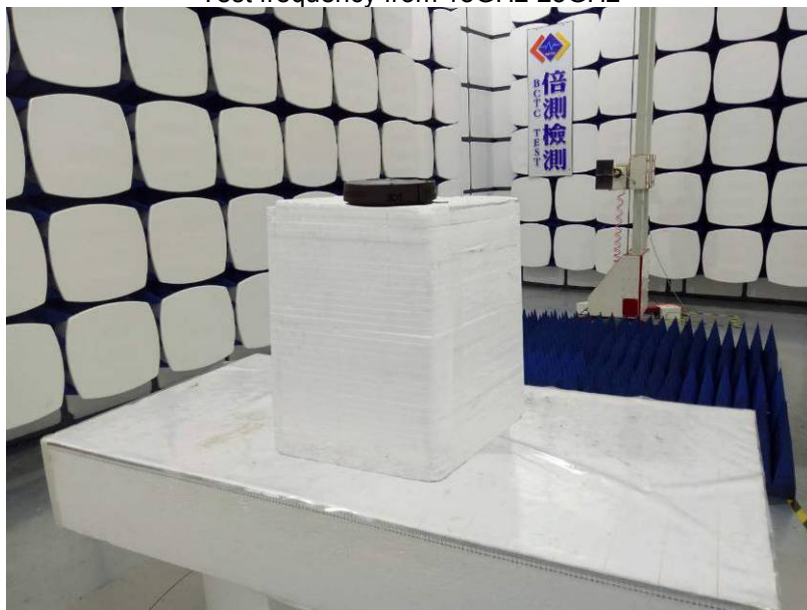
PRECISE TESTING

Report No.: PTC18060122001E-EM01

Test frequency from 1GHz-18GHz



Test frequency from 18GHz-25GHz

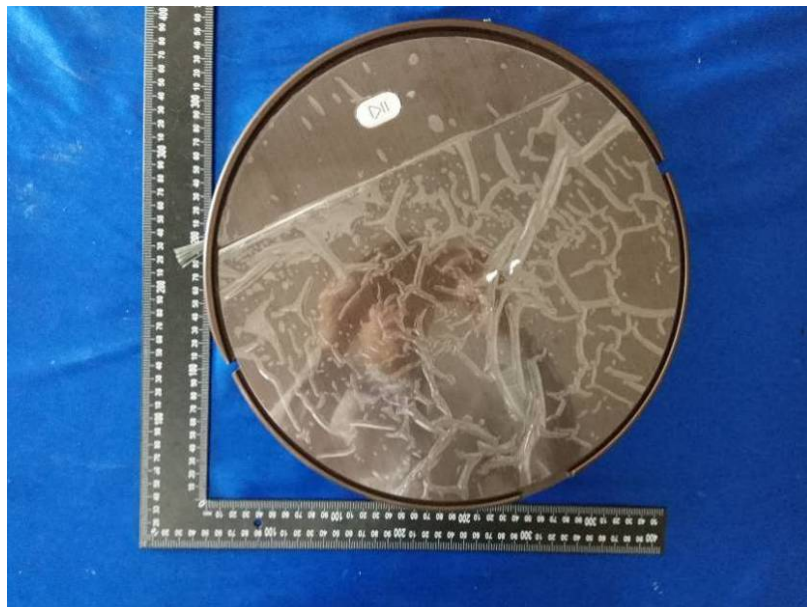
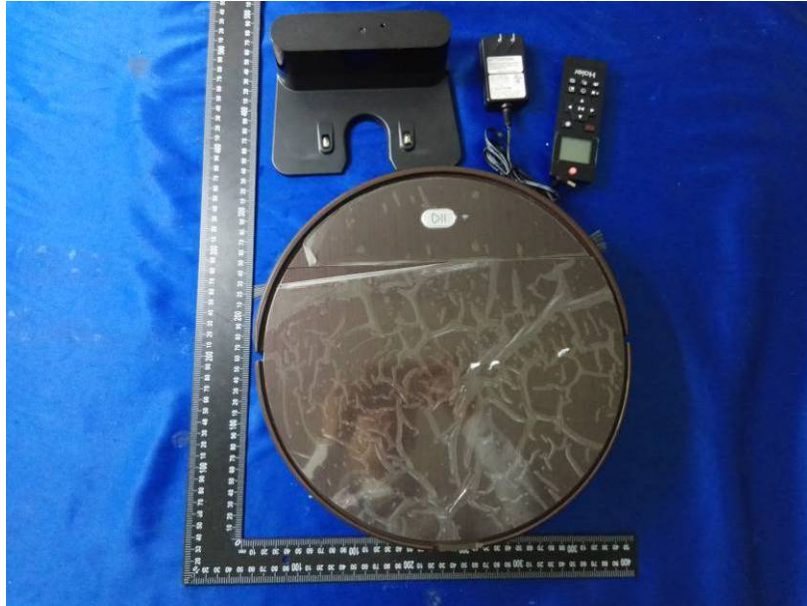




PRECISE TESTING

Report No.: PTC18060122001E-EM01

## 14 EUT Photos

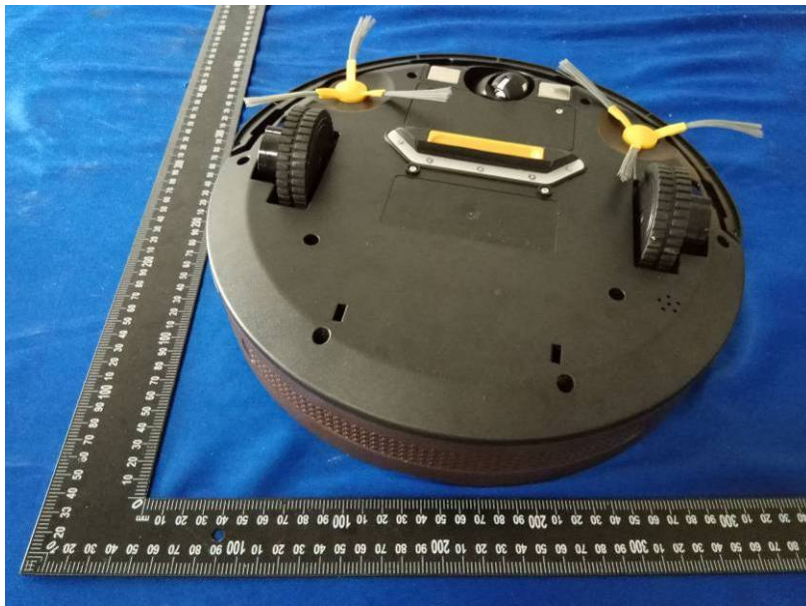
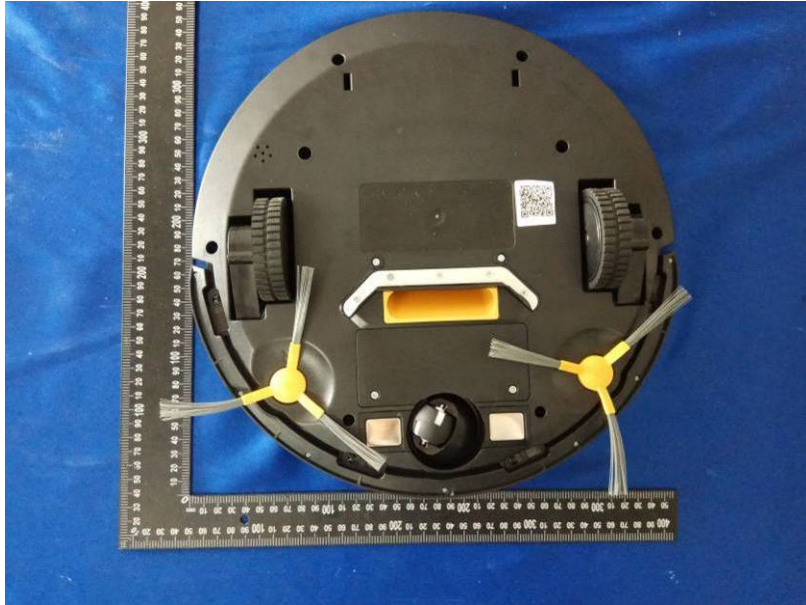






PRECISE TESTING

Report No.: PTC18060122001E-EM01



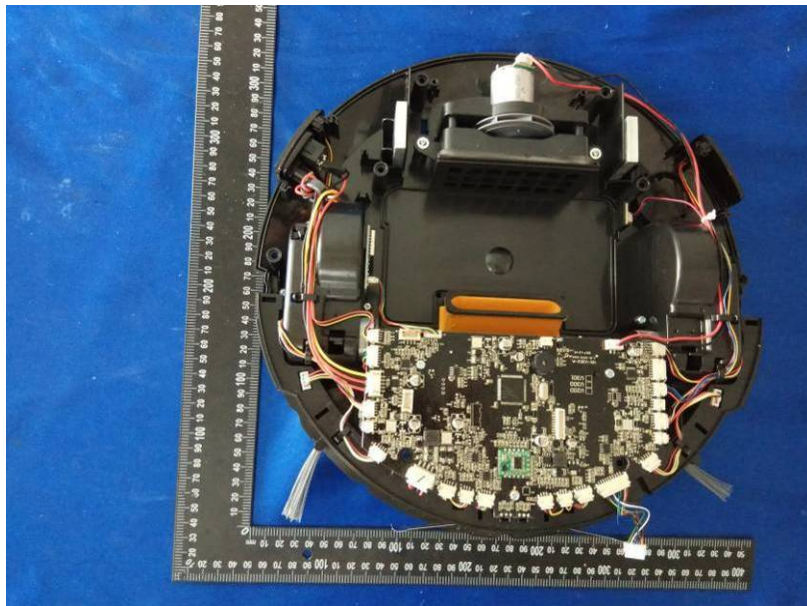






PRECISE TESTING

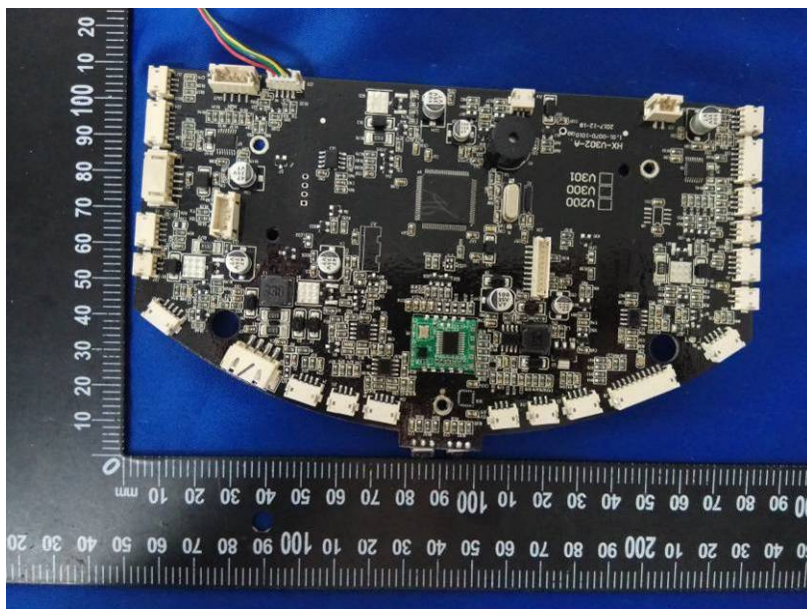
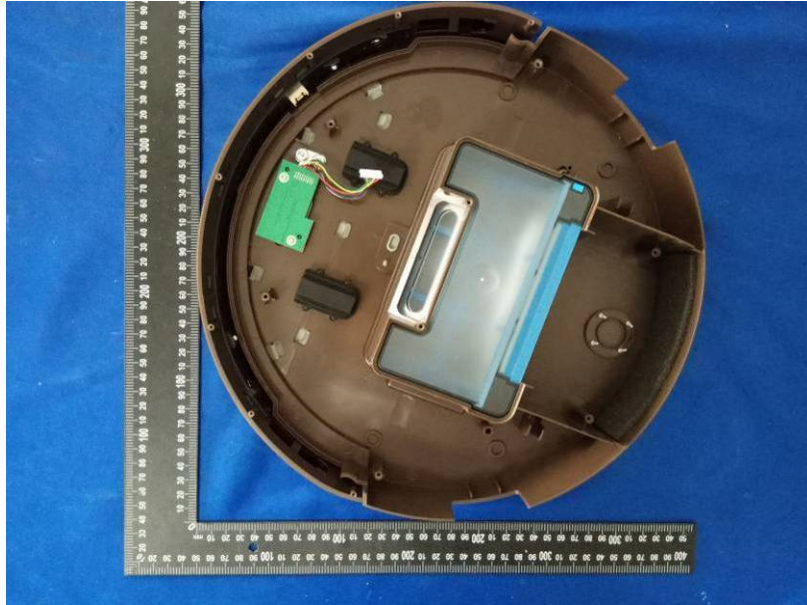
Report No.: PTC18060122001E-EM01

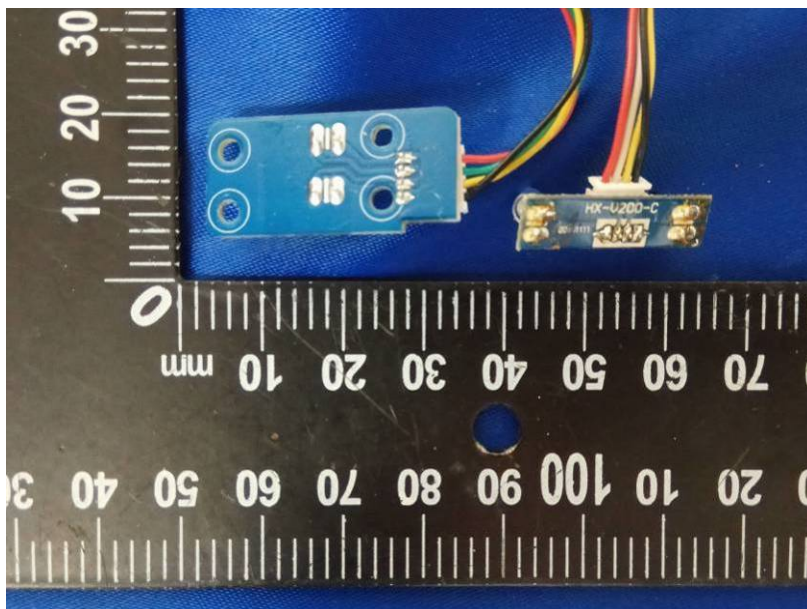
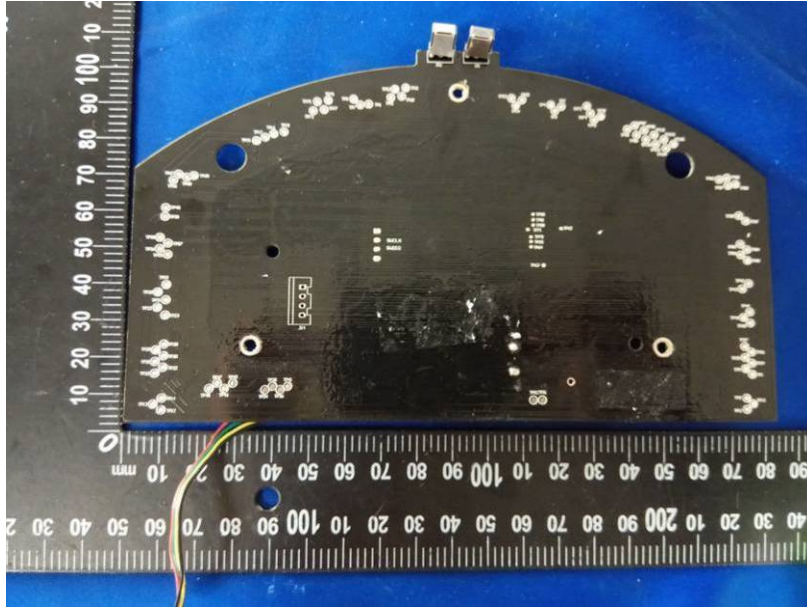




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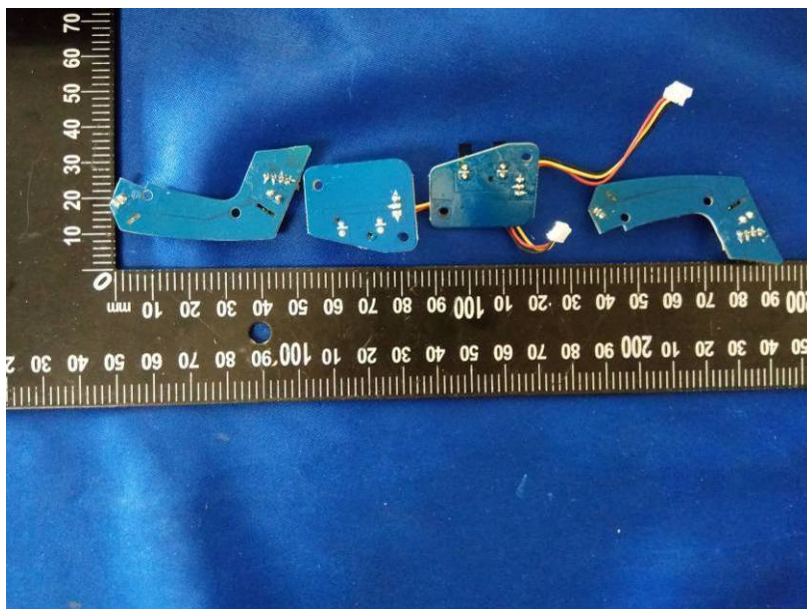
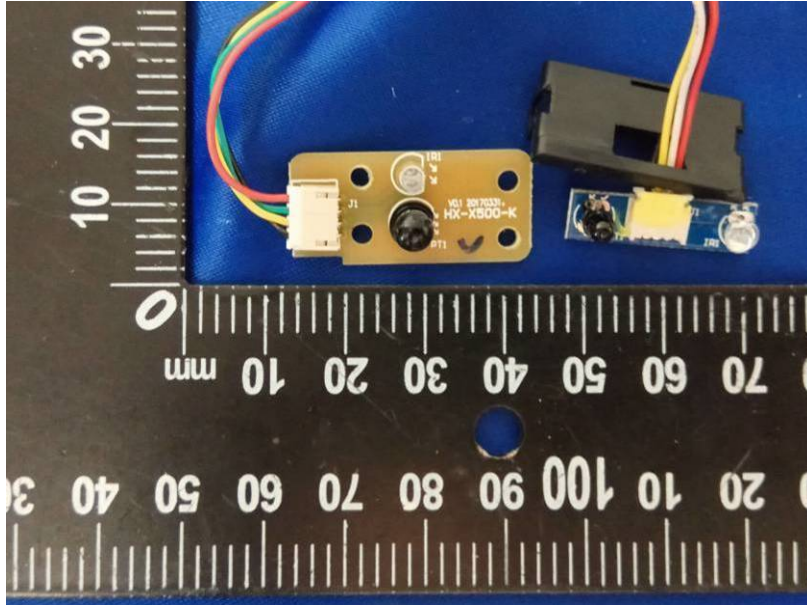






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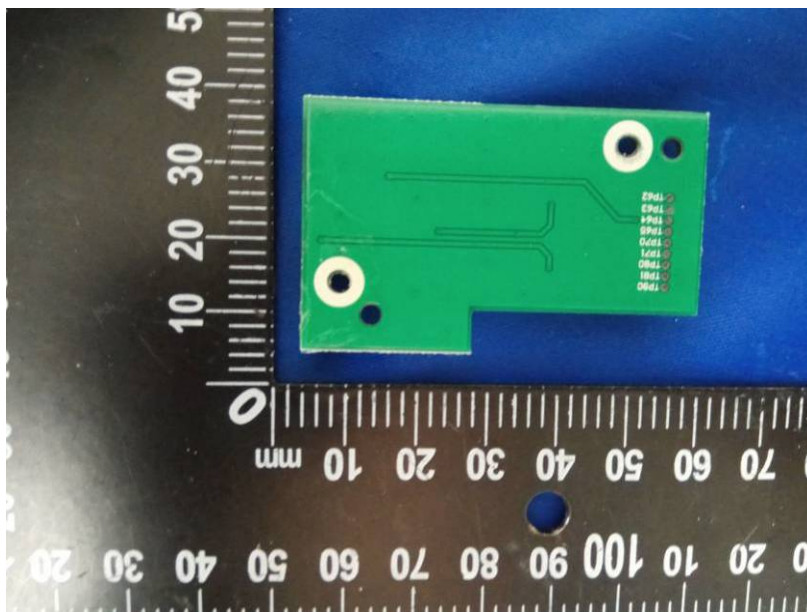
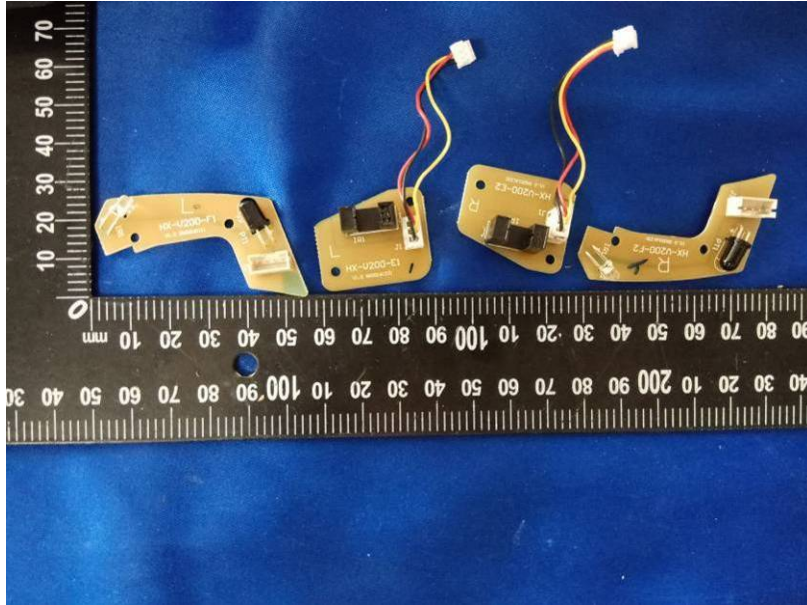
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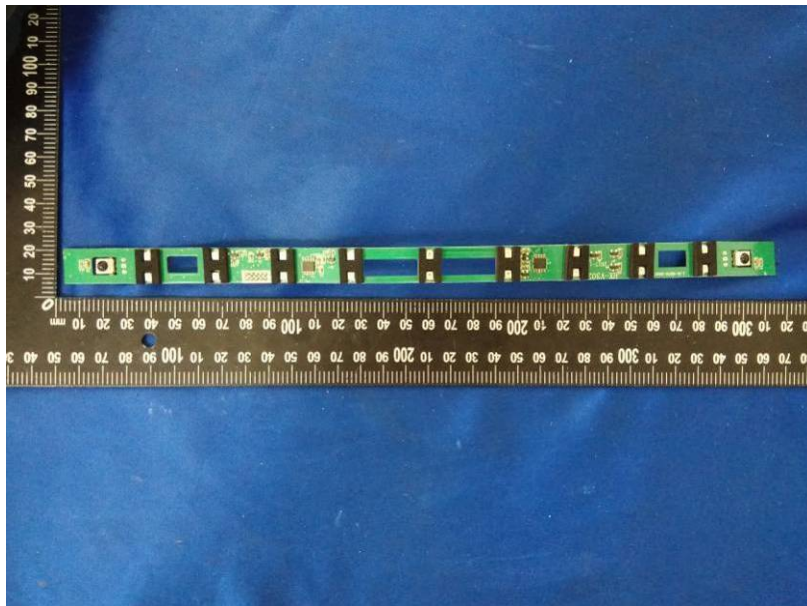
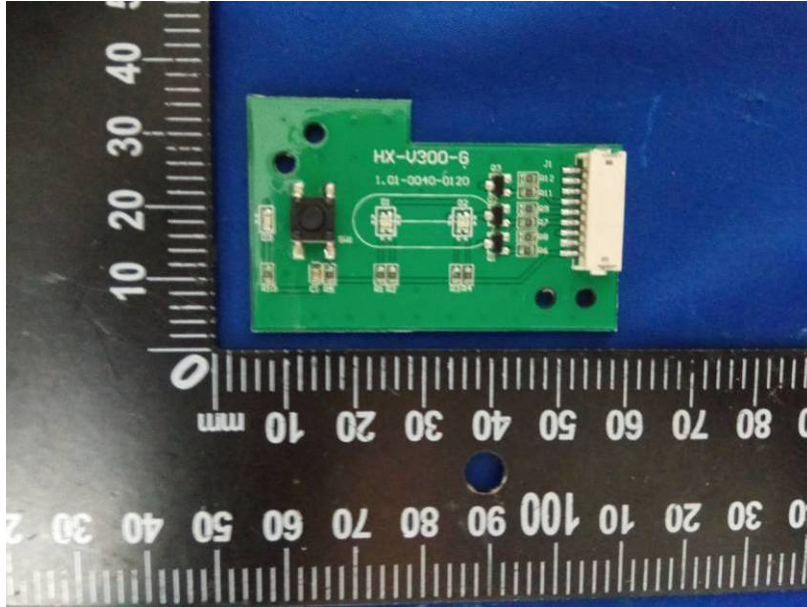
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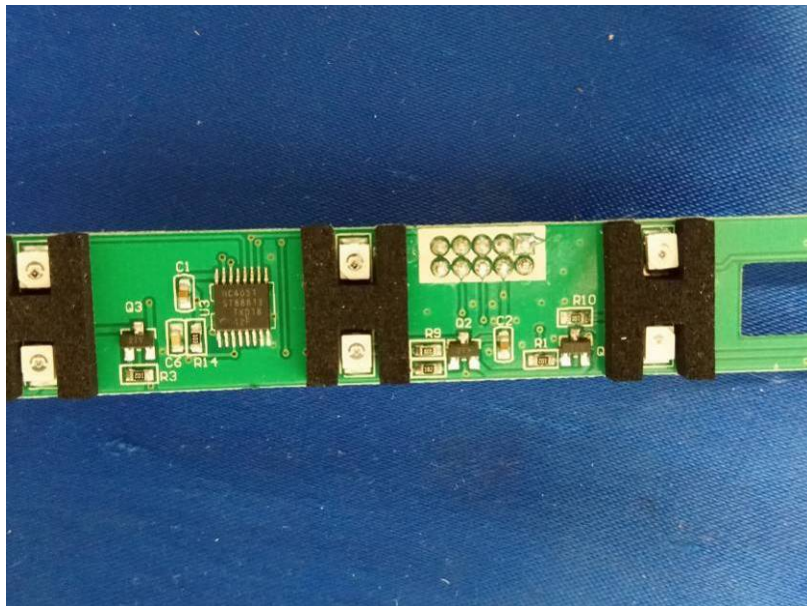
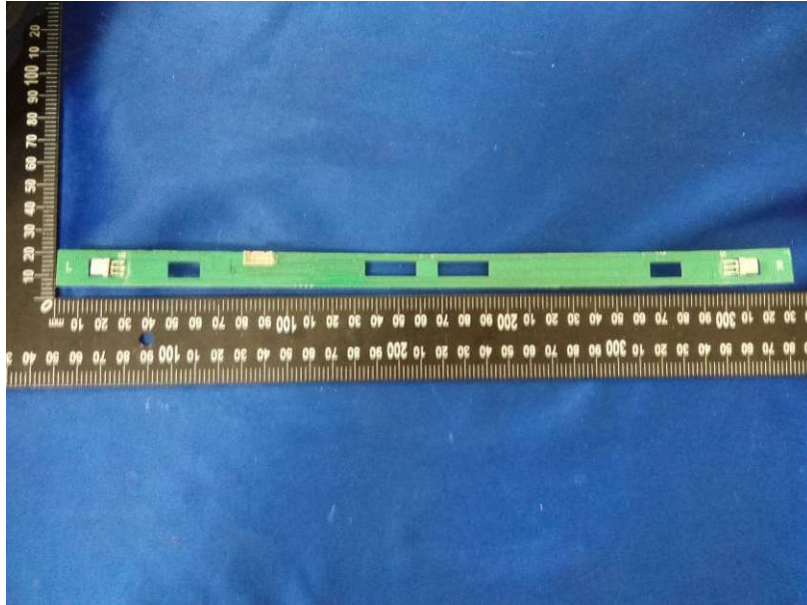






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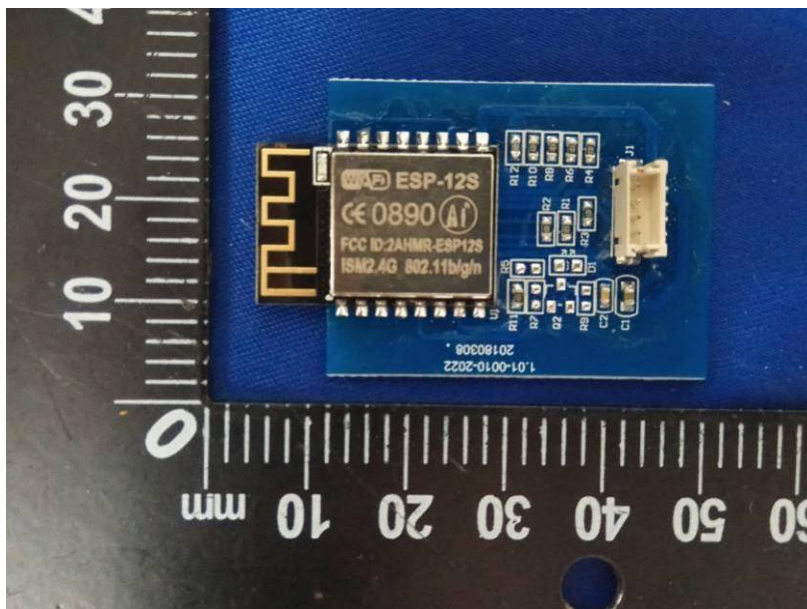
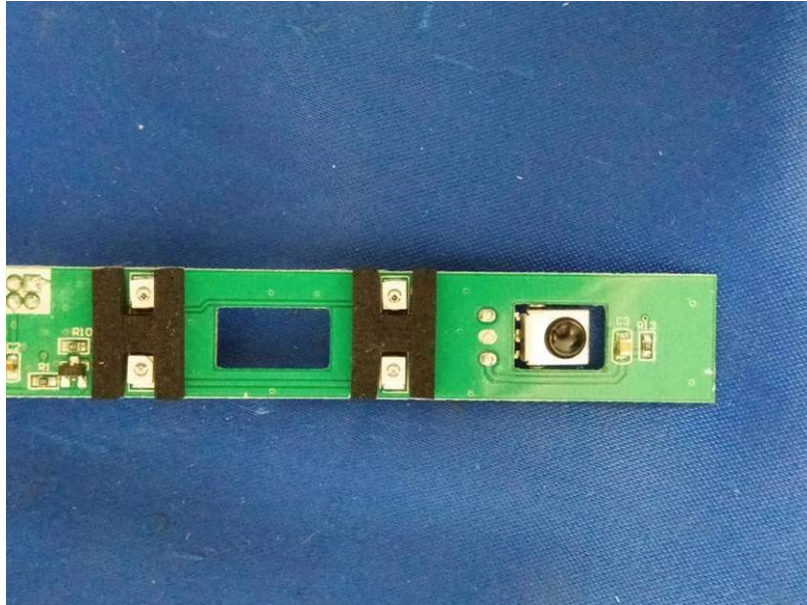
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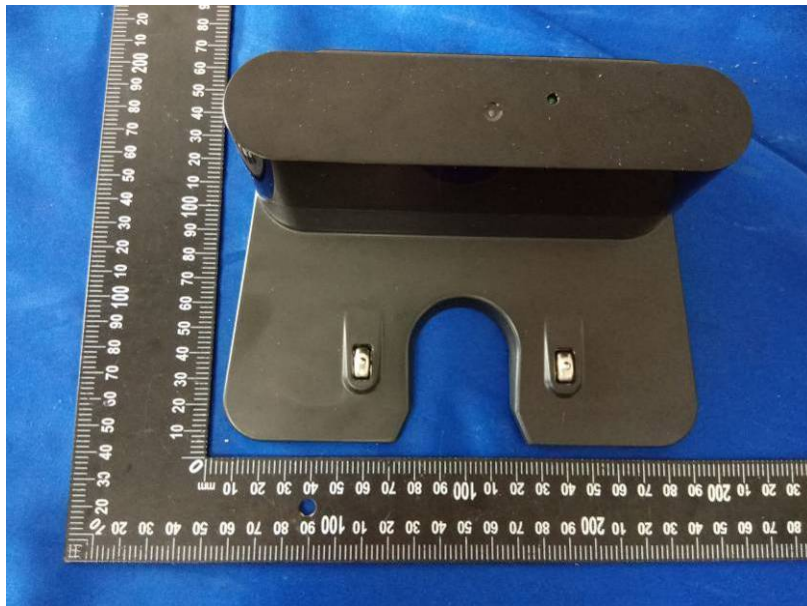
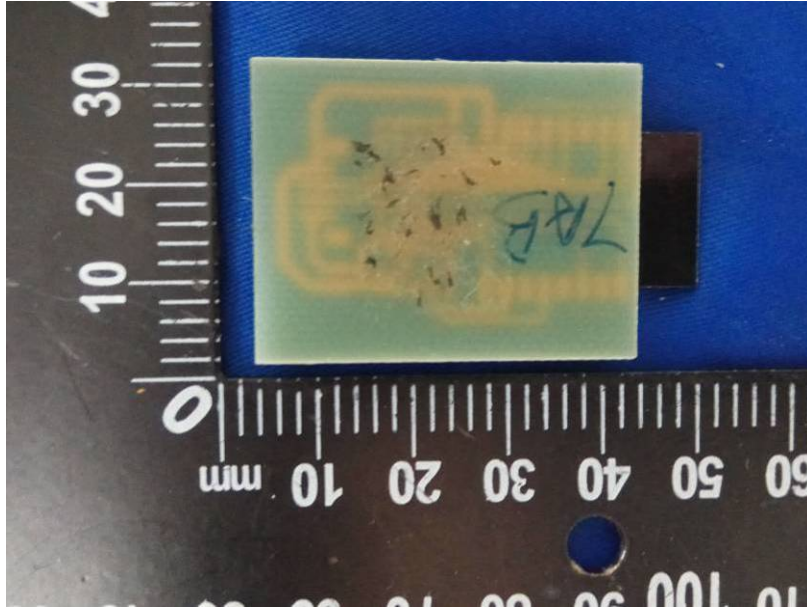






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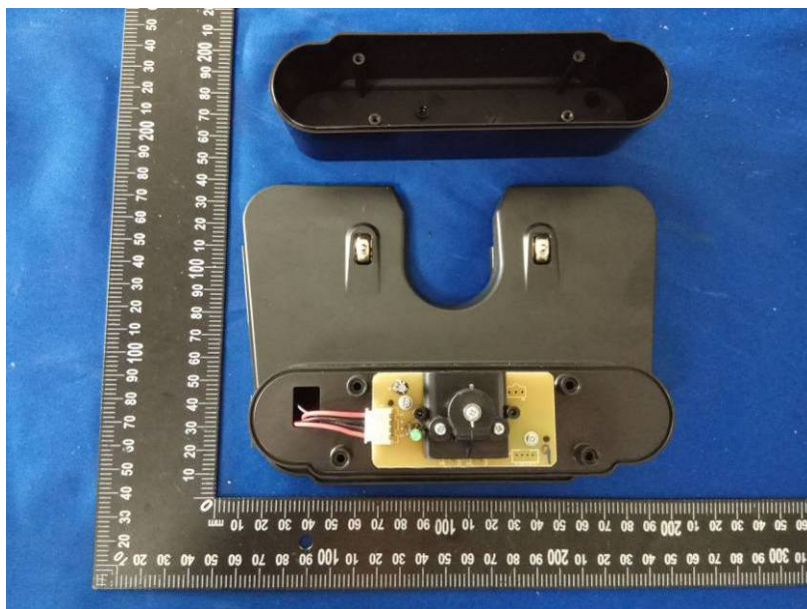
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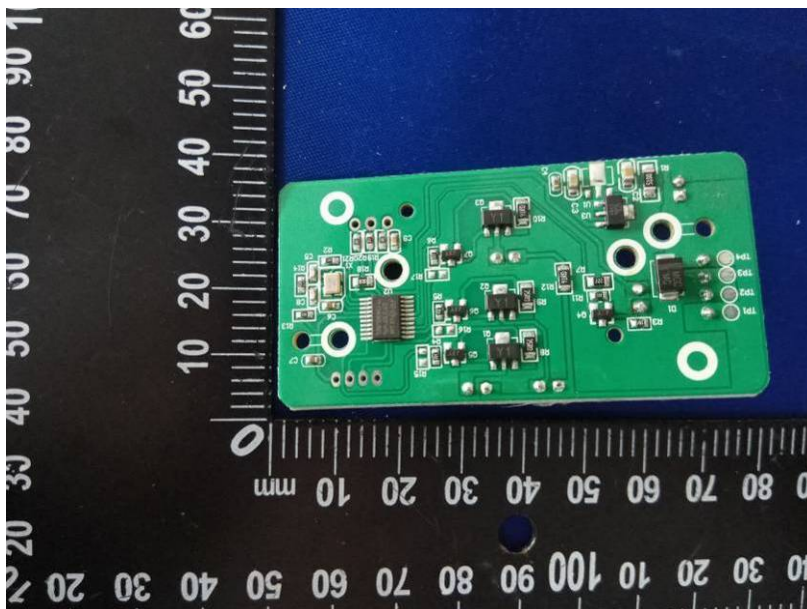
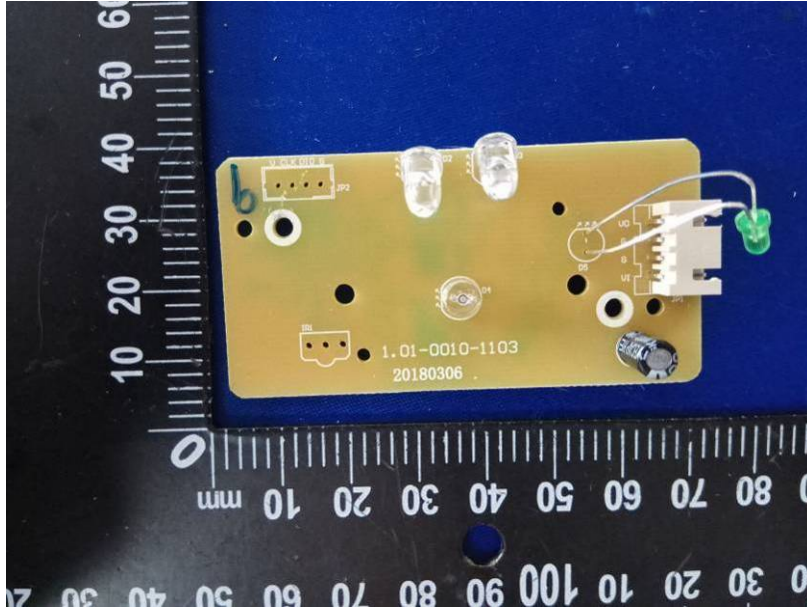
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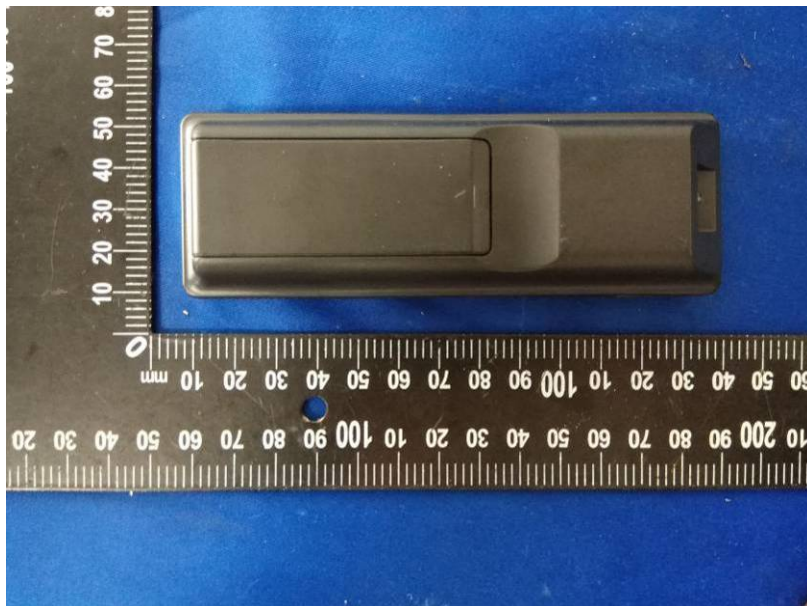






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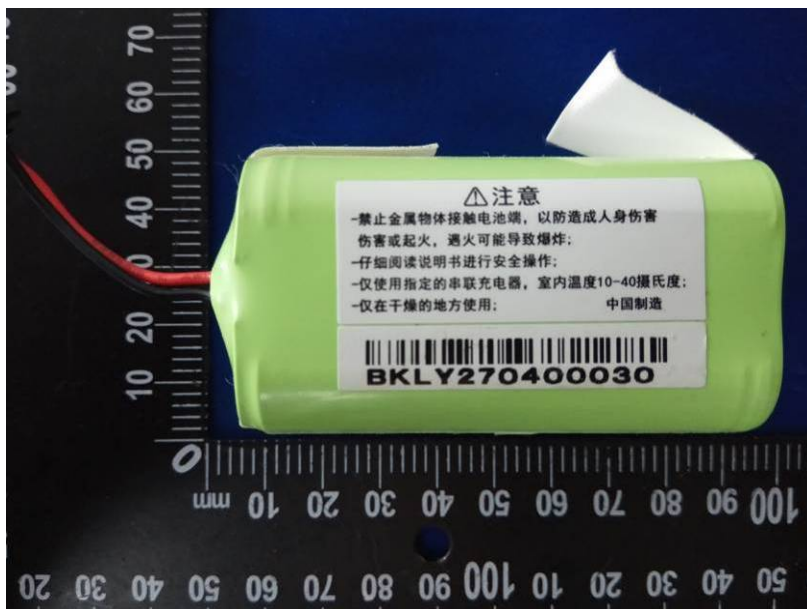
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PRECISE TESTING

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\*\*\*\*\*THE END REPORT\*\*\*\*\*