

### FCC 47 CFR PART 15 SUBPART C AND ANSI C63.10: 2013

### **TEST REPORT**

For

## **APC Clip Controller**

### Model: APC Live

## Data Applies to: N/A

## **Brand: AKAI PROFESSIONAL**

Issued for

### inMusic Brands, Inc.

200 Scenic View Drive, Cumberland, RI 02864, U.S.A.

Issued by

Compliance Certification Services Inc. Tainan Lab. No.8,Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.) TEL: 886-6-580-2201 FAX: 886-6-580-2202 Date of Issue: April 16, 2018



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No.8, Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

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Report No.: T180118N03-RP1 Page 2 of 121 Rev. 00 FCC ID: Y4O-ADA2

## **REVISION HISTORY**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	April 16, 2018	Initial Issue	ALL	Sunny Chang



## TABLE OF CONTENTS.

1. TEST REPORT CERTIFICATION	4
2. EUT DESCRIPTION	5
3. DESCRIPTION OF TEST MODES	6
4. TEST METHODOLOGY	7
5. FACILITIES AND ACCREDITATIONS	7
5.1 FACILITIES	
5.2 EQUIPMENT	7
5.3 LABORATORY ACCREDITATIONS LISTINGS	
5.4 TABLE OF ACCREDITATIONS AND LISTINGS	8
6. CALIBRATION AND UNCERTAINTY	8
6.1 MEASURING INSTRUMENT CALIBRATION	8
6.2 MEASUREMENT UNCERTAINTY	8
7. SETUP OF EQUIPMENT UNDER TEST	9
7.1 SETUP CONFIGURATION OF EUT	9
7.2 SUPPORT EQUIPMENT	11
7.3 EUT OPERATING CONDITION	13
8. APPLICABLE LIMITS AND TEST RESULTS	16
8.1 6DB BANDWIDTH	16
8.2 MAXIMUM PEAK OUTPUT POWER	
8.3 DUTY CYCLE	40
8.4 POWER SPECTRAL DENSITY	
8.5 CONDUCTED SPURIOUS EMISSION	
8.6 RADIATED EMISSIONS	
8.6.2 WORST-CASE RADIATED EMISSION BELOW 1 GHZ	77
8.6.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHZ	79
8.6.4 RESTRICTED BAND EDGES	91
8.7 POWERLINE CONDUCTED EMISSIONS	107
9. ANTENNA REQUIREMENT	111
9.1 STANDARD APPLICABLE	111
9.2 ANTENNA CONNECTED CONSTRUCTION	
APPENDIX II PHOTOGRAPHS OF EUT	A1



# **1. TEST REPORT CERTIFICATION**

Applicant	:	<b>inMusic Brands, Inc.</b> 200 Scenic View Drive, Cumberland, RI 02864, U.S.A.
Equipment Under Test	:	APC Clip Controller
Model	:	APC Live
Data Applies To	:	N/A
Brand	:	AKAI PROFESSIONAL
Date of Test	:	February 07, 2018 ~ March 20, 2018

APPLICABLE STANDARD			
STANDARD	TEST RESULT		
FCC Part 15 Subpart C AND ANSI C63.10: 2013	No non-compliance noted		

Approved by:

Jeter Wu Assistant Manager

Reviewed by:

Eric Huang Section Manager



# 2. EUT DESCRIPTION

Product Name	APC Clip Controller
Model	APC Live
Data Applies To	N/A
Brand	AKAI PROFESSIONAL
Received Date	January 18, 2018
Frequency Range	IEEE 802.11b/g, 802.11n HT20: 2412MHz~2462MHz Bluetooth 4.0: 2402MHz~2480MHz
Transmit Power	IEEE 802.11b Mode: 9.82dBm (9.594mW) IEEE 802.11g Mode: 14.35dBm (27.227mW) IEEE 802.11n HT20 Mode: 14.43dBm (27.733mW) Bluetooth 4.0 Mode: 1.24dBm (1.3289mW)
Channel Spacing	IEEE 802.11b/g, 802.11n HT20: 5MHz Bluetooth 4.0: 2MHz
Channel Number	IEEE 802.11b/g, 802.11n HT20: 11 Channels Bluetooth 4.0 : 40 Channels
Transmit Data Rate	IEEE 802.11b : 11, 5.5, 2, 1 Mbps IEEE 802.11g : 54, 48 ,36, 24, 18, 12, 9, 6 Mbps IEEE 802.11n HT20 : 130, 117 ,104, 78, 65, 58.5, 52, 39, 26, 19.5,13, 6.5 Mbps Bluetooth 4.0: 1 Mbps
Type of Modulation	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK, BPSK) Bluetooth 4.0: GFSK
Frequency Selection	By software / firmware
Antenna Type	Type: PCB Antenna Model: WLA-EM-1508-0008-B Manufacturer: BRITO Gain: 4.6 dBi
Hardware Version	AZ01: AZ01CRE01B E
Software Version	ADA2-1.0.3-AP6255-TESTING-2018-03-06-full
Power Rating	DC 19V, 3.42A (Powered by Adapter)
Temperature Range	25°C

#### **Power Adapter :**

No.	Manufacturer	Model No.	Power Input	Power Output
1	Sunny	SYS1548-6519-T3	100-240Vac, 50-60Hz, 1.5A	19Vdc, 3.42A

#### **REMARK:**

- 1. The sample **(APC Live)** selected for test was engineering sample that approximated to production product and was provided by manufacturer.
- This submittal(s) (test report) is intended for FCC ID: <u>Y40-ADA2</u> filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
- 3. For more details, please refer to the User's manual of the EUT.



# **3. DESCRIPTION OF TEST MODES**

The EUT is a APC Clip Controller. It has one transmitter chains and one receive chains (1x1 configurations) and BT4.0. The 1x1 configuration is implemented with one outside chains (Chain 0).

The RF chipset is manufactured by SMSC.

The antenna peak gain 4.6dBi (highest gain) were chosen for full testing.

#### IEEE 802.11 b ,802.11g ,802.11n HT20 mode (DTS Band)

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b mode: 1Mbps long data rate (worst case) were chosen for full testing. IEEE 802.11g mode: 6Mbps data rate (worst case) were chosen for full testing. IEEE 802.11n HT20 mode: 6.5Mbps data rate (worst case) were chosen for full testing.

### GFSK mode

The EUT had been tested under operating condition. There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2402
Middle	2442
High	2480

Bluetooth 4.0 (GFSK) mode: 1Mbps data rate (worst case) were chosen for full testing.



# 4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10 and FCC CFR 47 15.207, 15.209 and 15.247.

# **5. FACILITIES AND ACCREDITATIONS**

# **5.1 FACILITIES**

All measurement facilities used to collect the measurement data are located at

No.8, Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

## 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

# **5.3 LABORATORY ACCREDITATIONS LISTINGS**

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by TAF or any agency of the Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: TW1109).



### 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan

TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada
Germany	TUV NORD
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, <u>http://www.ccsrf.com</u>

# 6. CALIBRATION AND UNCERTAINTY

## 6.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

## 6.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz Test Site : OATS-6	±3.59dB
Radiated Emission, 200 to 1000 MHz Test Site : OATS-6	±3.27dB
Radiated Emission, 1 to 26.5 GHz	± 3.20dB
Power Line Conducted Emission	± 2.90dB

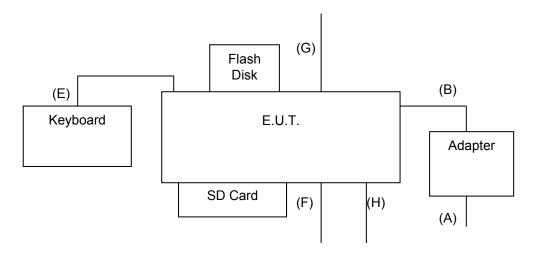
Uncertainty figures are valid to a confidence level of 95%, K=2



# 7. SETUP OF EQUIPMENT UNDER TEST

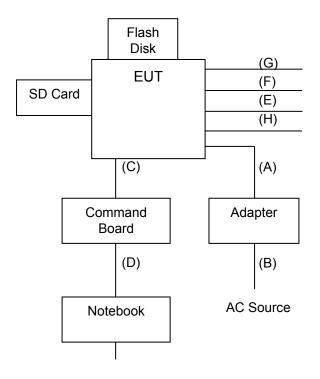
## 7.1 SETUP CONFIGURATION OF EUT

FOR RF TEST WIFI:





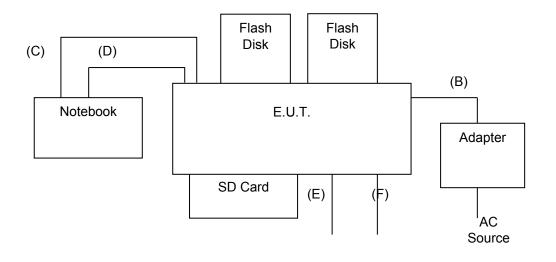
### **BLUETOOTH:**





Report No.: T180118N03-RP1 Page 10 of 121 Rev. 00 FCC ID: Y4O-ADA2

### FOR EMI TEST





# 7.2 SUPPORT EQUIPMENT

#### RF test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Notebook	Acer	AS 3830TG	DOC	Power cable, unshd, 1.6m
2	Flash Disk	Transcend	Jet Flash790	DOC	N/A
3	SD CARD	TOSHIBA	2GB	DOC	N/A
4	Keyboard	Lenovo	KU-0225	DOC	N/A

No.	Signal cable description		
А	DC Power	Unshielded, 1.4m, 1pcs	
В	AC Power	Unshielded, 1.5m, 1pcs.	
С	Command	Unshielded, 0.4m, 1pcs.	
D	USB	Shielded, 1.7m, 1pcs. With one core	
Е	USB	Shielded, 1.8m, 1pcs. With one core	
F	RJ45	Unshielded, 0.5m, 1pcs.	
G	Audio	Shielded, 1.0m, 13pcs.	
н	Audio	Shielded, 1.0m, 1pcs.	



#### EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Notebook	TOSHIBA	Satellite L730	DOC	Power cable, unshd, 1.6m
2	Flash Disk	Transcend	Jet Flash790	DOC	N/A
3	SD CARD	TOSHIBA	2GB	DOC	N/A

No.	Signal cable descr	iption
А	AC Power	Unshielded, 1.4m, 1pcs.
В	DC Power	Unshielded, 1.5m, 1pcs.
С	USB	Shielded, 1.8m, 1pcs. With one core
D	RJ45	Unshielded, 0.5m, 1pcs.
Е	Audio	Shielded, 1.0m, 13pcs.
F	Audio	Shielded, 1.0m, 1pcs.

#### **REMARK:**

- 1. All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



Report No.: T180118N03-RP1 Page 13 of 121 Rev. 00 FCC ID: Y4O-ADA2

## 7.3 EUT OPERATING CONDITION

### **RF Setup**

#### WIFI:

- 1. Set up a whole system as the setup diagram.
- 2. Turn on power and press "Exit"
- 3.Keyboard press Ctrl+Alt+F2 and key in "root".

	AZ01 Pr	oduction	Tests 1.:	29	
R 3.6 Phi 8 8 8 8 8 8 Name Clevit 833.333 Mile GPU Clevit 688 Mile GPU Hansary: 8 Mil	Autor Distance				
Thurnal Sons 1: 31,343 C Thurnal Rom 3: 31,818 C	Famil Harmer Printing	mak antist			
	, Registration Societ				
na an an Anna Anna Anna Anna Anna Anna A					
Leff	NCX v3.1.1 built on Aug 2				

TX Mode Key in

- B Mode : wl down
  - wl mpc 0 wl country ALL wl band b wl up wl 2g\_rate -r 01 -b 20 wl channel 01(01,06,11) wl phy\_watchdog 0 wl scansuppress 1 wl phy\_forcecal 1 wl phy\_txpwrctrl 1 wl txpwr1 -o -d 10 wl pkteng\_start 00:90:4c:14:43:19 tx 100 1000 0



Report No.: T180118N03-RP1 Page 14 of 121 Rev. 00 FCC ID: Y4O-ADA2

G Mode : wl down wl mpc 0 wl country ALL wl band b wl up wl 2g\_rate –r 06 –b 20 wl channel 01 (01,06,11) wl phy\_watchdog 0 wl scansuppress 1 wl phy\_forcecal 1 wl phy\_txpwrctrl 1 wl txpwr1 -o -d 10 wl pkteng\_start 00:90:4c:14:43:19 tx 100 1000 0 HT20 Mode : wl down wl mpc 0 wl country ALL wl band b wl up wl 2g\_rate -- h 0 -- b 20 wl channel 01/20 (01,06,11) wl phy\_watchdog 0 wl scansuppress 1 wl phy\_forcecal 1 wl phy\_txpwrctrl 1 wl txpwr1 -o –d 10 (9,10) wl pkteng\_start 00:90:4c:14:43:19 tx 100 1000 0 **RX Mode** Key in wl down wl band auto wl mpc 0 wl country ALL wl channel 01 (01,06,11) wl bi 65535 wl up wl phy\_watchdog 0 wl scansuppress 1 wl phy\_forcecal 1

4. All of the function are under run.

5. Start test.



Report No.: T180118N03-RP1 Page 15 of 121 Rev. 00 FCC ID: Y4O-ADA2

### Bluetooth:

- 1. Set up a whole system as the setup diagram.
- 2. The "putty.exe" software was used for testing
- 3. Key in "root".

### TX Mode Key in

hciconfig hci0 up hcitool cmd 0x03 0x0003 hcitool cmd 0x08 0X0001e 00(00,14,27) 25 00

### RX Mode Key in

hciconfig hci0 up hcitool cmd 0x03 0x0003 hcitool cmd 0x3f 0x0052 EE FF C0 88 00 00 E8 03 00(00,27,4E) 04 00 01 FF FF

- 4. All of the function are under run.
- 5. Start test.



# 8. APPLICABLE LIMITS AND TEST RESULTS

## 8.1 6DB BANDWIDTH

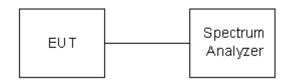
### <u>LIMIT</u>

§ 15.247(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

### TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	05/08/2018

#### TEST SETUP



### TEST PROCEDURE

- 1. Set resolution bandwidth (RBW) = 1-5 % of the emission bandwidth (EBW).
- 2. Set the video bandwidth (VBW)  $\ge$  3 x RBW.
- 3. Detector = Peak.
- 4. Trace mode = max hold.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize.
- 7. 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 6 dB relative to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is 1-5 %.



### TEST RESULTS

No non-compliance noted.

Model Name	APC Live	Test By	Ted Huang
Temp & Humidity	22.5 , 48%	Test Date	2018/03/16

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	8.08	500	PASS
Middle	2437	8.07	500	PASS
High	2462	8.08	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
 2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

#### IEEE 802.11g mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16.40	500	PASS
Middle	2437	16.38	500	PASS
High	2462	16.39	500	PASS

**NOTE :** 1. At finial test to get the worst-case emission at 6Mbps.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.



#### IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	17.62	500	PASS
Middle	2437	17.63	500	PASS
High	2462	17.62	500	PASS

**NOTE :** 1. At finial test to get the worst-case emission at 6.5Mbps.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

Model Name	APC Live	Test By	Ted Huang
Temp & Humidity	18.5 , 52%	Test Date	2018/02/07

Bluetooth 4.0 (GFSK) mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2402	720.00	500	PASS
Middle	2442	717.00	500	PASS
High	2480	716.00	500	PASS

**NOTE :** 1. At finial test to get the worst-case emission at 1Mbps.

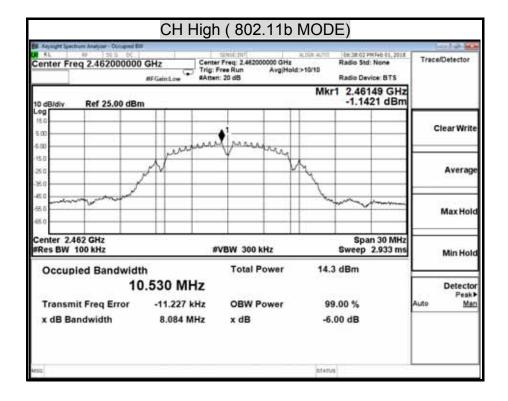
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.



### 6dB BANDWIDTH (802.11b MODE)

	CH LOV	v ( 802.11b N	ЛODE)	
Center Freq 2.412000000 C	GHz Center Trig: F	SINGLINI Freq: 2.412000000 GHz Free Run AvgiHold: 20 dB	ALISN AUTT Code 36 26 PM Feb 81. >10/10 Radio Std: None Radio Device: BTS Mkr1 2.41248 G -1.3721 dE	HZ
Log 150 500 500		a fran		Clear Write
150 350 350	N	V	94	Average
45.0 55.0 65.0			- harring	Max Hold
Center 2.412 GHz #Res BW 100 kHz		VBW 300 kHz	Span 30 M Sweep 2.933	
Transmit Freq Error x dB Bandwidth	111 1711	OBW Power x dB	99.00 % -6.00 dB status MODE)	Detector Peak+ Auto Man
VBW 300.00 kHz	Center Trig: F	Freq: 2.437000000 GHz Free Run Avg Hold: 20 dB	Radio Std: None	Trace/Detector
10 dB/div Ref 25.00 dBm	22		Mkr1 2.43748 G	
6.00		• • ·	-0.85217 dE	Hz
500 600 150 260 360	mours		-0.85217 dE	Hz Sm Clear Write
500 150 350	Maria		-0.85217 dE	Hz 3m
5.00 15.0 35.0 35.0 45.0 55.0 45.0 55.0			-0.85217 dE	Hz Sm Clear Write Average Max Hold
600 150 360 360 460 460 460 460 460 460 460 4	M 	Vannen	Span 30 M	Hz Sm Clear Write Average Max Hold







### 6dB BANDWIDTH (802.11g MODE)

		′(802.11g I	NODE)	
ALL STORE SHOW ALL STORE ALL STORE SHOW AND ALL STO	RFGein1ow RAtter	sinal INT r Freq: 2.412000000 GHz Free Run Avg Hold: t: 20 dB	ALISA AUTI 105:57:15 PM Feb 1 Radio Std: None >10/10 Radio Device: 5 Mkr1 2.41446 ( -5.4774 c	TS GHz
10 dB/div Ref 25,00 dBm Log 150 500		♦'		Clear Write
150 30 30	nalisalinalinakinaki	ng panhankan kan kan kan kan kan kan kan kan ka		Average
450 48.0 48.0				Max Hold
Center 2.412 GHz #Res BW 100 kHz Occupied Bandwidt	224	VBW 300 kHz Total Power	Span 30 Sweep 2.93 13.2 dBm	
Transmit Freq Error x dB Bandwidth	5.523 MHz -18.979 kHz 16.40 MHz	OBW Power x dB	99.00 % -6.00 dB	Detector Peak≯ Auto <u>Man</u>
AL HISTORY CONTRACTORY CONTRACTORY	GHz Cente	(802.11g N	ALIUN AUTO COTOS AS PRIFES C	
		r Freq: 2.437000000 GHz Free Run Avg Hold: 1: 20 dB	>10/10 Radio Std: None Radio Device: B Mkr1 2.44447 (	TS GHZ
150 500	#FGainLow #Atter	r Free; 2.437600000 GHz Free Run Avg Hold: 1: 20 dB	Radio Std: None Radio Device: B Mkr1 2.44447 ( -5.2644 c	TS GHZ
150 500	#FGainLow #Atter	r Freq: 2.437000000 GHz Free Run Avg/Hold:	Radio Std: None Radio Device: B Mkr1 2.44447 ( -5.2644 c	TS GHz
Log 15.0 6.00 75.0 75.0 75.0	#FGainLow #Atter	r Free; 2.437600000 GHz Free Run Avg Hold: 1: 20 dB	-10/10 Radio Std: None Radio Device: B Mkr1 2.44447 ( -5.2644 c	Ts GHz IBm Clear Write
Log 150 500 600 150 260 260 260 260 260 260 260 26	#FGeinLow #Atter	veriliaria verilia veriliaria ver	Radio Std: None Radio Device B Mkr1 2.44447 ( -5.2644 c	TracedDetector TS IBm Clear Write Average Max Hold MHz
Log 150 600 150 300 450 450 450 450 450 450 450 4	#FGeinLow #Atter	r Free, 2.43700000 OHz Free Run AvgiHold: 1: 20 dB	Radio Std: Norse Radio Device B Mkr1 2.44447 ( -5.2644 c	TracelDetector TS IBm Clear Write Average Max Hold MHz



- AL	ne 2.93 ms	Cente	street and Free Run AvgHold	Radi	A 52 PM Feb 81, 2018 o Std: None	Trace/Detector
		#FGain1.ow #Atter	1: 20 dB	Radi Mkr1 2	46326 GHz	
10 dB/div	Ref 25.00 dBm	<u>ا ا ا ا ا ا</u>		-4	.9750 dBm	
15.0						Clear Wri
6.00	ph		ny and more thank and	miling		
×0 ×0				1		Avera
450 550	10-2				hanne	MaxHo
65.0						maxity
Center 2.4 #Res BW			VBW 300 kHz	Sw	Span 30 MHz ep 2.933 ms	Min Ho
Occup	ied Bandwidt	h	Total Power	13.3 dB	n	1,000,000
	2019 - 22 - <sup>2019</sup>	.524 MHz				Detect Pea
	iit Freq Error Indwidth	-25.131 kHz 16.39 MHz	OBW Power x dB	99.00 <sup>4</sup> -6.00 d	7 I	Auto M
				STATUS		



### 6dB BANDWIDTH ( 802.11n HT20 MODE)

		302.11n HT2	20 MODE)	
A August Instant Analyse - Occuped Wi AL Center Freq 2.412000000 (	Trig: 1	sinsi (HT) r Freq: 2.412000000 GHz Free Run Avg(Hold h: 20 dB	Radio Device: B Mkr1 2.41326	TS GHZ
10 dB/div Ref 25.00 dBm	1		-4.7735 c	IBm
150 500 500		<b>∮</b> <sup>1</sup>	* *	Clear Write
15.0 350 360			1	Average
45.0			Aw	Max Hold
Center 2.412 GHz #Res BW 100 kHz		VBW 300 kHz Total Power	Span 30 Sweep 2.93 13.7 dBm	
17. Transmit Freq Error x dB Bandwidth	734 MHz -4.353 kHz 17.62 MHz	OBW Power x dB	99.00 % -6.00 dB	Detector Peak Auto <u>Man</u>
AL SE 1989 BUILDER	Cente		ALISA AUTT (87-36-27 PM Feb 6	
		r Freq: 2.437000000 GHz Free Run Avg Hold: n: 20 dB	Radio Std: Non >10/10 Radio Device: B	Trace/Detector
		Free Run Avg/Hold:	>10/10	TS GHZ
500	#Atter	Free Run Avg Hold	Radio Device: 5 Mkr1 2.43823 ( -5.0089 c	TS GHZ
500		Free Run Avg Hold	Radio Device: 5 Mkr1 2.43823 ( -5.0089 c	TracelDetector TS 3Hz IBm
Log 15.0 6.00 15.0 2	#Atter	Free Run Avg Hold	Radio Device: B Mkr1 2.43823 ( -5.0089 c	Trace/Detector
Log 15.0 6.00 15.0 5.00 6.00 5	Algorithms and and a	VBW 300 kHz	Radio Device B Radio Device B Mkr1 2.43823 ( -5.0089 c -5.0089 c -5.0080	TracelDetector
Log 150 500 600 150 500 600 450 600 600 600 Center 2.437 GHz #Res BW 100 kHz Occupied Bandwidth	Algorithms and and a	1 1 1 1 1 1 1 1 1 1 1 1 1 1	*1019 Radio Device 5 Mkr1 2.43823 0 -5.0089 c	Trace/Detector TS IBm Clear Write Average Max Hold MHz
Log 150 500 500 500 500 500 500 500	717 MHz	VBW 300 kHz Total Power	Radio Device B Mkr1 2.43823 0 -5.0089 c -5.0089 c -5.0080 c -5.008	Trace/Detector TS GHz Bm Clear Write Average Max Hold MHz 3 ms Min Hold Detector



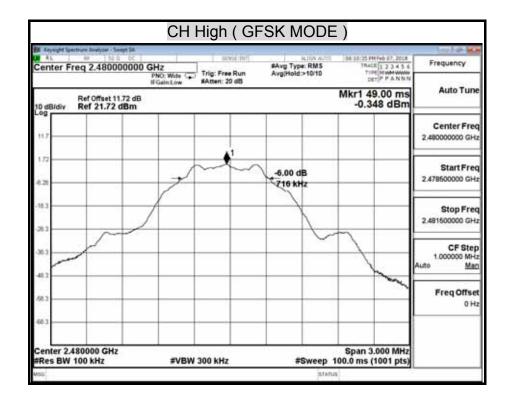
Center Fre	eq 2.462000000	Trig: F	spear off r Freq: 2.482000000 GHz Free Run Avg Hold: 1: 20 dB	Radio Devi	None ce: BTS		Detector
10 dB/div	Ref 25.00 dBm			Mkr1 2.4632 -6.425	26 GHz 0 dBm		
150 600			1			c	lear Write
-6.00 -15.0 -25.0 -36.0		ale a Aran Aran Aran Aran Aran Aran Aran Ar	n fan kun de fan de	handhang ha			Averag
45.0 55.0 65.0	- And the second				ayyatar		Max Hol
Center 2.4 #Res BW			VBW 300 kHz	Span Sweep 2	30 MHz 2.933 ms		Min Hol
annenne Gel	ied Bandwidth 17. iit Freg Error	.721 MHz -6.997 kHz	Total Power OBW Power	12.0 dBm 99.00 %		Auto	Detecto Peak
	ndwidth	17.62 MHz	x dB	-6.00 dB			
4545				STATUS			



### 6dB BANDWIDTH ( GFSK MODE)

and the second lite	pectrum Analyzer - Swept SA	•	2011 ( 0.	SK MODE	- /	
AL.	9F 3511 DC		SENSE ONT	TITUM APILIA	06-29-39 PH Feb 87, 2	Frequency
Center F	Freq 2.402000000	PNO: Wide Ca	Trig: Free Run	#Avg Type: RMS Avg(Hold:>10/10	THACE 1 2 3 A TYPE MWMV DET P P A T	
2		IFGainLow	#Atten: 20 dB		Mkr1 49.40 r	Auto Tumo
10 dB/div	Ref Offset 11.72 dB Ref 21.72 dBm				-0.517 dE	Bm
		_				Center Free
11.7						2.402000000 GH
1.72			<b>1</b>			
			m	-6.00 dB		Start Free
-8.26		17		720 kHz		2.400500000 GHs
18.3		1				
10.4		Λ				2.403500000 GHz
20.5					-	-
30.7						CF Step
1	-					1.000000 MHz Auto Man
-40.7						
						Freq Offset
68.2						0 Hz
68.1		_				_
MSIS			/ 300 kHz	STAR		A5)
	entrum Analyzer - Swept SA 99 - 1 55 (2) - 00		Mid ( GF	SK MODE	us (	
AL.	entrum Reidyoe - Sengt 18 99   50 0 00 Freq 2.442000000	CH	Mid ( GF	STAR	(65.07.27 PH Feb 87.)	tis Frequency
AL.	Freq 2.442000000	СН	Mid ( GF	SK MODE	US 06:07:07 PM Feb 07. 754625 (1.2.3. 77062 (M MMH DET) P P A 1	Frequency
Center F	## 351.0 DC	CH GHz PNC: Wide C	Mid ( GF	SK MODE	(65.07.27 PH Feb 87.)	Frequency Auto Tune
Center F	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (05272779166.07.7 58402 [ 2 3 4 7100 [ A 1040 0 [ 7 9 A 1 Mkr1 49.20 r	Sis Frequency Auto Tune
Center F	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (05272779166.07.7 58402 [ 2 3 4 7100 [ A 1040 0 [ 7 9 A 1 Mkr1 49.20 r	Center Frequency
10 dBidiv	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (05272779166.07.7 58402 [ 2 3 4 7100 [ A 1040 0 [ 7 9 A 1 Mkr1 49.20 r	Center Frequency
Center F	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE Augu Autor Avg Type: RMS Avg Hold:>1010	) (05272779166.07.7 58402 [ 2 3 4 7100 [ A 1040 0 [ 7 9 A 1 Mkr1 49.20 r	Auto Tune
10 dBidiv	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE 8Avg Type: RMS Avg(Hold>10110	) (05272779166.07.7 58402 [ 2 3 4 7100 [ A 1040 0 [ 7 9 A 1 Mkr1 49.20 r	Auto Tune
10 dBidiv 11.7 1.72 8.21	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE Augu Autor Avg Type: RMS Avg Hold:>1010	) (0527277WFeb 07. 5%ccl [ 2 3 4 700 [ A sect ] 2 7 700 [ A sect ] 2 7	Center Frequency Center
10 dB/div Log 11.7	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (0527277WFeb 07. 5%ccl [ 2 3 4 700 [ A sect ] 2 7 700 [ A sect ] 2 7	Center Frequency Center
10 dBidiv 11.7 1.72 8.21	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (0527277WFeb 07. 5%ccl [ 2 3 4 700 [ A sect ] 2 7 700 [ A sect ] 2 7	Center Frequency Center
10 dBidiv 10 dBidiv 11 7 1.72 6 28 -18.3 -28.3	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (0527277WFeb 07. 5%ccl [ 2 3 4 700 [ A sect ] 2 7 700 [ A sect ] 2 7	Center Frequency Auto Tune Auto Tune Center Frec 2.44200000 GH 2.44350000 GH 2.44350000 GH CF Step
10 dBidiv 11.7 1.72 8.21	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (0527277WFeb 07. 5%ccl [ 2 3 4 700 [ A sect ] 2 7 700 [ A sect ] 2 7	Center Frequency Center Frequency Center Frequency Center Frequency Center Freq 2.442000000 GH2 CEStop Freq 2.443500000 GH2 CF Step 1.00000 MH2 CF Step 1.0000 MH
10 dBidiv 10 dBidiv 11 7 1.72 6 28 -18.3 -28.3	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (0527277WFeb 07. 5%ccl [ 2 3 4 700 [ A sect ] 2 7 700 [ A sect ] 2 7	Center Frequency Center
10 dBidiv 10 dBidiv 11.7 1.72 4.21 -11.3 -11.5 -11.	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (0527277WFeb 07. 5%ccl [ 2 3 4 700 [ A sect ] 2 7 700 [ A sect ] 2 7	Center Frequency Center Frequency Center Frequency Center Freq C44200000 GHz C544200000 GHz C44350000 GHz CF Step C65 Stop Freq C65 Stop Freq C75 Stop Freq C75 Stop Freq FreqOffset
10 dBidiv Log 11.7 1.72 4.21 -10.3 -30.3	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (0527277WFeb 07. 5%ccl [ 2 3 4 700 [ A sect ] 2 7 700 [ A sect ] 2 7	Center Frequency Center Frequency Center Frequency Center Freq C44200000 GHz C544200000 GHz C44350000 GHz CF Step C65 Stop Freq C65 Stop Freq C75 Stop Freq C75 Stop Freq FreqOffset
10 dBidiv 10 dBidiv 11.7 1.72 4.21 -11.3 -11.5 -11.	Freq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	) (0527277WFeb 07. 5%ccl [ 2 3 4 700 [ A sect ] 2 7 700 [ A sect ] 2 7	Center Frequency Center Frequency Center Freq Center Freq C44200000 GHz C44200000 GHz CF Step 1.00000 MHz CF Step 1.00000 MHz CF Step 5% Freq Offset
AL           Center F           10 dBidiv           117           117           117           117           113           303           403           663	Preq 2.442000000	CH GHz PNC: Wide C	Mid ( GF	SK MODE	(1) (0) (0) (0) (0) (0) (0) (0) (0	Center Frequency Categories Center Freq Categories Center Freq Categories Cat
10 dBidiv 10 dBidiv 11 7 11 7	Freq 2.442000000	CH GHz PHO: Wols G IF Gain Low	Mid ( GF	SK MODE Auge and the second s	) (05272779166.07.7 58402 [ 2 3 4 7100 [ A 1040 0 [ 7 9 A 1 Mkr1 49.20 r	Center Frequency Center Freq Center Freq C44200000 GHz C44200000 GHz C44350000 GHz CF Step 1.00000 MHz Freq Offset 0 Hz







## **8.2 MAXIMUM PEAK OUTPUT POWER**

### <u>LIMIT</u>

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :

§ 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.

§ 15.247(b) (4) Except as shown in paragraphs (c) of this section , if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	05/08/2018
Power Meter	Anritsu	ML2487A	6K00003888	04/06/2018

### TEST SETUP

#### For Peak Power



For Average Power





### TEST PROCEDURE

The tests were performed in accordance with KDB 558074 5.2.1.2 and 5.2.2.1.

### 5.2.1.2 Measurement Procedure PK2:

- 1. Set the RBW = 1 MHz.
- 2. Set the VBW ≥ 3 RBW
- 3. Set the span  $\geq$  1.5 x DTS bandwidth.
- 4. Detector = peak.
- 5. Sweep time = auto couple.
- 6. Trace mode = max hold.
- 7. Allow trace to fully stabilize.
- 8. Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function,
- 9. Sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

#### **Average Power**

Connect the EUT to power meter, set the center frequency of the power meter to the channel center frequency.



### TEST RESULTS

No non-compliance noted

Model Name	APC Live	Test By	Ted Huang
Temp & Humidity	22.5 , 48%	Test Date	2018/03/16

#### IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	9.60	30.00	PASS
Middle	2437	9.82	30.00	PASS
High	2462	9.74	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
 2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

#### IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	14.22	30.00	PASS
Middle	2437	14.27	30.00	PASS
High	2462	14.35	30.00	PASS

NOTE : 1.At finial test to get the worst-case emission at 6Mbps.
 2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.



#### IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	14.43	30.00	PASS
Middle	2437	14.22	30.00	PASS
High	2462	13.06	30.00	PASS

**NOTE**: 1. At finial test to get the worst-case emission at 6.5Mbps.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

Model Name	APC Live	Test By	Ted Huang
Temp & Humidity	18.5 , 52%	Test Date	2018/02/07

#### Bluetooth 4.0 (GFSK) mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	0.35	30.00	PASS
Middle	2442	1.24	30.00	PASS
High	2480	0.45	30.00	PASS

**NOTE** : 1. At finial test to get the worst-case emission at 1Mbps.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.



## **Average Power Data**

## IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	6.35
Middle	2437	6.81
High	2462	6.66

# IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	5.90
Middle	2437	6.05
High	2462	6.02

## IEEE 802.11n HT20 mode

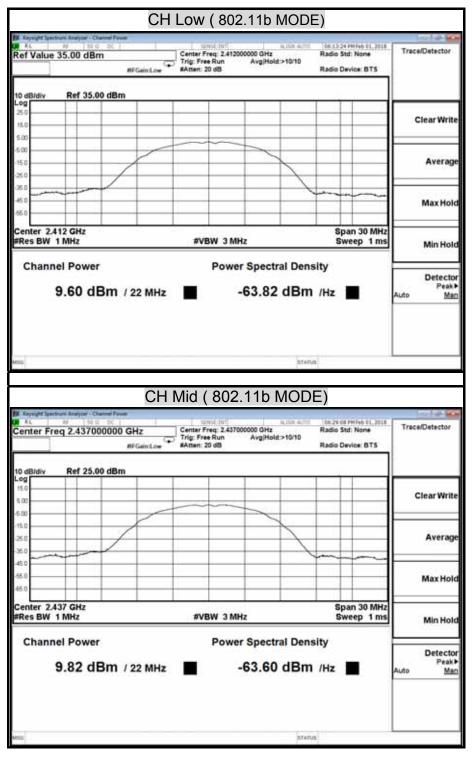
Channel	Channel Frequency (MHz)	Average Power (dBm)
		Chain 0
Low	2412	6.07
Middle	2437	5.88
High	2462	4.75

# Bluetooth 4.0 (GFSK) mode

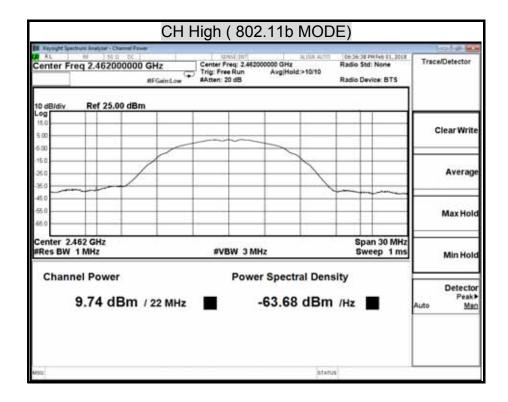
Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-2.06
Middle	2442	-1.19
High	2480	-1.97



#### MAXIMUM PEAK OUTPUT POWER ( 802.11b MODE)

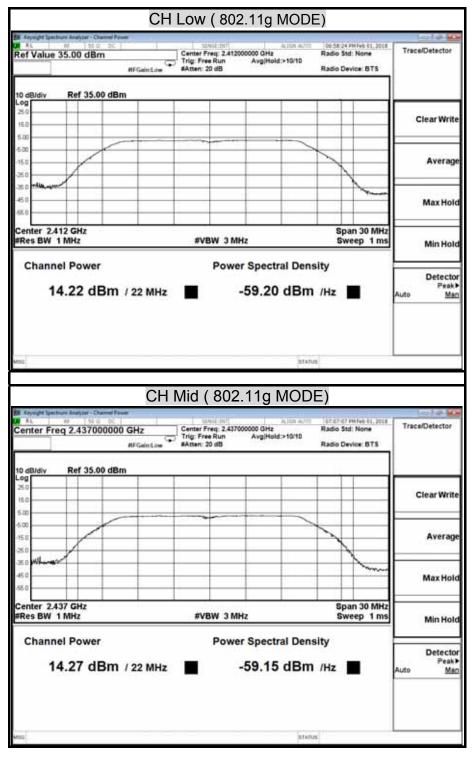




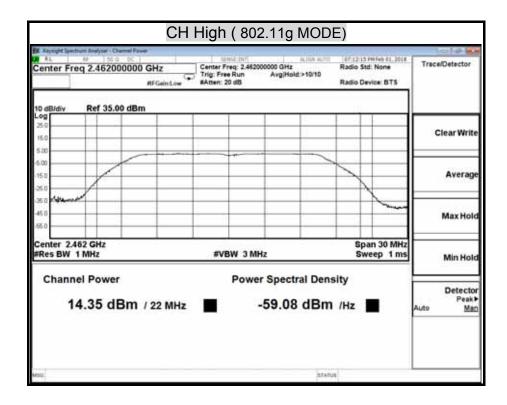




### MAXIMUM PEAK OUTPUT POWER ( 802.11g MODE)

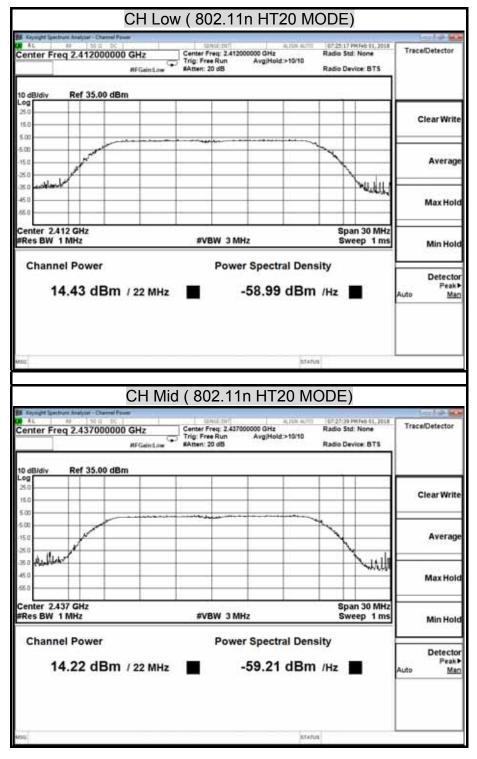




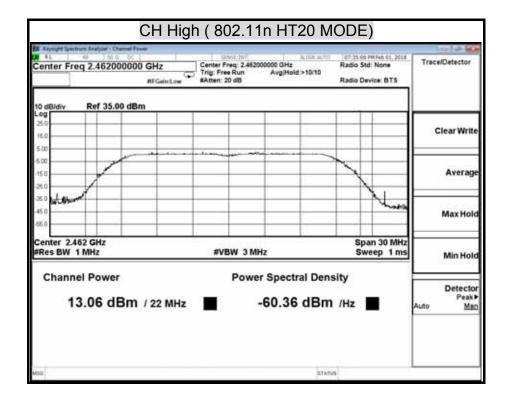




### MAXIMUM PEAK OUTPUT POWER ( 802.11n HT20 MODE)









# MAXIMUM PEAK OUTPUT POWER ( GFSK MODE)

Frequency	10:17:20 PH Feb 07, 2018 78ACK 1 2 3 4 5 6 7.000 M MM WWW DET P P A N N N	Auto Auto Avg Type: RMS IvgHold:>10/10		- Same	pc.	eq 2.402000	AL.
Auto Tur	2.402 205 GHz 0.350 dBm	Mkr1			72 dB	Ref Offset 11.7 Ref 21.72 di	0 dB/div
Center Fre 2.402000000 GH							11.7
Start Fre 2.399500000 GH			¢1		_		1.72
Stop Fre 2.404500000 GH							m3 m3
CF Ste 1.000000 MH Auto Ma							
Freq Offse 0 H							83
		STAPUS	20	3W 5.0 MH2		02000 GHz 1.5 MHz	enter 2.4 Res BW
Frequency	000 ms (1001 pts)		(GF	H Mid	er Sa colono GHz PRC: Feat		Res BW
	.000 ms (1001 pts)	STATUS K MODE) Autor Autor Avg Type: RMS uvgiHold:>10/10	(GF	H Mid	PHO: Fast FGainLow 72 dB	tourn Rinklyter - Sweep	Res BW
Frequency	000 ms (1001 pts)	STATUS K MODE) Autor Autor Avg Type: RMS uvgiHold:>10/10	(GF	H Mid	PHO: Fast FGainLow 72 dB	1.5 MHz	Res BW
Frequency Auto Tur Center Fre	000 ms (1001 pts)	STATUS K MODE) Autor Autor Avg Type: RMS uvgiHold:>10/10	(GF	H Mid	PHO: Fast FGainLow 72 dB	1.5 MHz	Res BW
Frequency Auto Tur Center Fre 2.44200000 GH	000 ms (1001 pts)	STATUS K MODE) Autor Autor Avg Type: RMS uvgiHold:>10/10	(GF	H Mid	PHO: Fast FGainLow 72 dB	1.5 MHz	Res BW
Frequency Auto Tur Center Fre 2.44200000 GH Start Fre 2.43950000 GH Stop Fre	000 ms (1001 pts)	STATUS K MODE) Autor Autor Avg Type: RMS uvgiHold:>10/10	(GF	H Mid	PHO: Fast FGainLow 72 dB	1.5 MHz	Acception Accept
Frequency Auto Tur Center Fre 2.44200000 GF 2.439500000 GF 2.439500000 GF 2.444500000 GF 2.444500000 GF	000 ms (1001 pts)	STATUS K MODE) Autor Autor Avg Type: RMS uvgiHold:>10/10	(GF	H Mid	PHO: Fast FGainLow 72 dB	1.5 MHz	Res BW



	2.480000000 G	Hz PNO: Fast G	Trig: Free Run	#Avg Type: RMS Avg(Hold:>10/10	106-12-25 PHT46 07, 201 TRACE 1 2 2 4 5 TUPE M WH WW	6 Frequency
	f Offset 11.72 dB	FGainLow	#Atten: 20 dB	earthainn earth h	Mkr1 447.0 μ 0.454 dBr	
11.3						Center Fre 2.480000000 GH
8 26			• <sup>1</sup>			Start Fre 2.477500000 GH
18.3						Stop Fre 2.482500000 GH
40.3						CF Ste 1.000000 MH Auto Ma
58.2						Freq Offse
68.1	000 CH2				Span 5.000 MH	



# 8.3 DUTY CYCLE

# <u>LIMIT</u>

Nil (No dedicated limit specified in the Rules)

## TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	05/08/2018

**Remark:** Each piece of equipment is scheduled for calibration once a year.

#### TEST SETUP



## TEST PROCEDURE

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)



# TEST RESULTS

No non-compliance noted.

# TEST DATA

## <u>WIFI</u>

Model Name	odel Name APC Live		Ted Huang
Temp & Humidity	22.5 , 48%	Test Date	2018/03/16

	us	Times	Ton	Total Ton time(ms)
Ton1	412.000	1	412	0.412
Ton2		0	0	
Ton3			0	
Тр				0.624

Ton	0.412
Tp(Ton+Toff)	0.624
Duty Cycle	0.66025641
10 * log (1/x) =	1.802873736



# TEST PLOT

# <u>Plot</u>

<b>IEEE 802.11b CH Low</b>										
B Report Sectors Reduce - Sect SA KL 0 State Center Freq 2.412000000 GH	sinstant	A.IGA A.ITO RAvg Type: RMS	01-46-16 PH Feb 02, 2018 78402 1 2 3 4 5 6 7100	Frequency						
Ref Offset 11.72 dB 10 dB/div Ref 21.72 dBm	NO: Fast Trig: Free Run Gain:Low #Atten: 20 dB		Mkr1 59.60 ms 2.77 dBm	Auto Tune						
11.7				Center Free 2.412000000 GHz						
8.20		•		Start Free 2.412000000 GH						
-18.3				Stop Free 2.41200000 GH						
-30.3				CF Step 1.000000 MH Auto Mar						
-48.2				Freq Offse 0 H						
683										
Center 2.412000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep	Span 0 Hz 100.0 ms (1001 pts)							

AL	req 2.442000000 G		sense and	ALINA AUT RAvg Type: RMS	TRACE 1 2 2 4	5.4 Frequency
2			en: 20 dB		DET P N N N	
10 dB/div	Ref Offset 11.72 dB Ref 21.72 dBm				Mkr1 85.90 n 3.03 dB	15
Log						Center Fre
11.7					•1	2.442000000 GH
-8.26						Start Fre 2.442000000 GH
-18.5						Stop Fre 2.44200000 GH
-20.5			-			
-30.3						CF Ste 1.000000 MH Auto Ma
48.2						FreqOffs
68.1			-			-
Center 2.4 Res BW 1	42000000 GHz	#VBW 3.01			Span 0 100.0 ms (1001 p	



IEEE 802.11b CH High										
chure Analyzer - Swept SA		1.000	51 STATES 10		10108					
eq 2.472000000	PNO: Fast -4	Trig: Free Run	#Avg Type: RMS	TRACE 1 2 3 4 5 6	Frequency					
Ref Offset 11.72 dB Ref 21.72 dBm	IFGainLow	#Atten: 20 dB		Mkr1 29.70 ms 2.84 dBm	Auto Tur					
	1				Center Fre 2.472000000 GH					
-	-				Start Fre 2.472000000 GH					
					Stop Fre 2.47200000 GH					
					CF Ste 1.000000 Mi Auto Mi					
					Freq Offs 01					
72000000 GHz 0 MHz	#VB	W 3.0 MHz	Sweep	Span 0 Hz 100.0 ms (1001 pts)						
	P 1583 00 1 eq 2.472000000 Ref Offset 11.72 dB Ref 21.72 dBm	rbun Andpos-Sengt Sk reg 2.472000000 GHz PND: Fast	the Ref 2.472000000 GHz PRO: Fast	Human Analyser - Sweet BA         Straid helf         Action ac           eq 2.472000000 GHz BrGainLow         Trig: Free Run BAtten: 20 dB         BAvg Type: RMS           Ref Offset 11.72 dB Ref 21.72 dB         Image: Sweet BA         Image: Sweet BA           1         Image: Sweet BA         Image: Sweet BA	Human Restore         Stand State         ALIGN ACTIO         EL-44/33 Methods 22 2013           eg 2.472000000 GHz PNO2 Fast Break Low         Trig: Free Run #Atten: 20 dB         #Avg Type: RMS         Trig: 23.4 5.6 Trig: PNNO4 Methods 22 2013           Ref Offiset 11.72 dB Ref 21.72 dBm         Mkr1 29.70 ms 2.84 dBm         2.84 dBm           1         1         1         1           1         1         1         1         1           1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1         1           1 </td					



		IEEE 8	<b>302.11</b>	g CH L	.ow			
Keysight Spectrum Analy		111						
Center Freq 2.4	12000000 GHz	1 - Takes	NSE ONT	RAvg Type	RMS	28A	#Feb 02,2018 # 1 2 3 4 5 6	Frequency
J.	PNO	Fast Trig: Fre nLow #Atten: 3				D	PNNNNN	0.01110.011
	set 11.72 dB 1.72 dBm						3.40 ms 01 dBm	Auto Tun
Lug								Center Fre
217								2.412000000 GH
11.7					el statutes a	<b>↓</b> <sup>1</sup>	and all all all all all all all all all al	Start Fre
1.25 ELLERING	n plainipianiana ana ana ana ana ana ana ana ana		a lafa u afalai	alalais le la la	which in		- Indersteiner	2.412000000 GH
-6.26						11111		Stop Fre
-18.3								2.412000000 GH
								CF Ste
-20.3								1.000000 MH Auto Ma
-30.3						-		
40.2						-		Freq Offs
68.3						-		
Center 2.412000	100 GHz				_		pan 0 Hz	
Res BW 1.0 MHz		#VBW 3.0 MHz	8	_	Sweep	-	1001 pts)	L

M. Knowld In	ectrum Analyzer - Sr	wept SA		IEEE 802.	11g CH Mid		010 0
AL .	req 2.4420	1 00		Sansa and	ALISA AU AAvg Type: RMS	TRACE 1 2 3 4 5 6	Frequency
		1	PNO: Fast ···	#Atten: 30 dB	39979 - 10 <b>9</b> 875 90851	DET P NNNN	
10 dBidiv	Ref Offset 1 Ref 31.72					Mkr1 86.30 ms 9.14 dBm	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
217							Center Free 2.442000000 GH
11.7						<b>A</b> 1	2.44200000 01
1.72	lafa ja fa fa fa fa fa fa fa			delalalarianianianiani	e creterioriariaria integrationalista integrationalista integrationalista integrationalista integrationalista i	มมูลรางเราสี่ยุงเหลือ เราะ เม	Start Free 2.442000000 GH
-6.25		11					Stop Free 2.442000000 GH
-10.3		-					CF Ste 1.000000 MH
-20.2	_	-					<u>Auto</u> Ma
40.2	_	-					Freq Offse 0 H
68.1	-	-					
Center 2. Res BW	442000000 1.0 MHz	GHz	#VBV	V 3.0 MHz	Sweep	Span 0 Hz 100.0 ms (1001 pts)	
1945						ATUS	



			IEEE 802.11	lg CH High		
AL AL	gectrure Analyzer - Swept BA	in a second second	Sanse dwitt	ALTIN ALTIN ALTIN	102 cl -49 PH Feb 02, 2018	
Center	Freq 2.47200000	PNO: Feat	Trig: Free Run	#Avg Type: RMS	THACE 1 2 3 4 5 6 TIPE WWWWWW DET P NNNNN	Frequency
9		IFGainLow	#Atten: 30 dB			Auto Tur
10 dB/div	Ref Offset 11.72 dB Ref 31.72 dBm	i.			Mkr1 33.10 ms 9.01 dBm	- Auto Tu
-09						Center Fre
217		-				2.472000000 GH
11.7		1				
	here the second second second		*****	والا الالاليان المرادي الا الما الما الما الما الم	or or a local distance in the local distance in the	Start Fre
1.72				-		2.472000000 GH
-8.26	1111				3.0	Stop Fre
line -						2.47200000 GH
-10.5						
20.3		_				CF Ste 1.000000 MH
30.3						Auto Ma
						FreqOffs
40.3						OF
68.1						
	.472000000 GHz	1 1000	Adversed to	A 5	Span 0 Hz	
Res BW	1.0 MHz	#VBI	N 3.0 MHz		100.0 ms (1001 pts)	L
50				STAT	US .	-



		IEEE	E 802.11n l	HT20 CH Lo	w	
Keysight 1	gectrum Analyzer - Swept SA		The second strike			
	Freq 2.4120000		SEASE 2017	RAvg Type: RMS	03:07:31 PH Feb 02, 2018 7RACE 1 2 3 4 5 6	Frequency
		PNO: Fast IFGainLow	Trig: Free Run #Atten: 30 dB		DET PNNNNN	0.00179285
10 dBidiv	Ref Offset 11.72 d Ref 31.72 dBm				Mkr1 43.40 ms 8.45 dBm	Auto Tur
217						Center Fre 2.412000000 GH
11.7 1.72	and the start of the second	energi pinaban assir p	** +*************		เสาะสารรุงคารระบาทเหาะรุง	Start Fre 2.412000000 GP
-8.26			1			Stop Fre 2.41200000 GH
20.2						CF Sto 1.000000 Mi Auto M
40.3						Freq Offs 01
68.3						
	.412000000 GHz 1.0 MHz	#VBW	3.0 MHz	Sweep	Span 0 Hz 100.0 ms (1001 pts)	
496				STAD	15	

Keysight Spectrum Analyzer - Swee	*14	.11n HT20 CH Mi		
Center Freq 2.44200	0000 GHz	BAvg Type: RMS	TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast Trig: Free IFGain:Low #Atten: 30		DET PNNNNN	Auto Tun
Ref Offset 11.3 0 dB/div Ref 31.72 dl			Mkr1 73.20 ms 8.80 dBm	Auto Tun
21.7				Center Free 2.442000000 GH
11.7 47449977499749974997		*****	****	Start Fre 2.442000000 GH
6.20			.1	Stop Fre 2.442000000 GH
28.3	1			CF Ste 1.000000 MH Auto Ma
40.3				Freq Offse
68.3				
Center 2.442000000 Gl Res BW 1.0 MHz	Hz #VBW 3.0 MHz	Sweep	Span 0 Hz 100.0 ms (1001 pts)	



Keysight Spectrum Analyzer - Swept			HT20 CH Hig		
Center Freq 2.472000	000 GHz	SENSE (NV)	RAvg Type: RMS	12 13 25 PH Feb 82, 2018 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast ···	#Atten: 30 dB	1997 B. C. B.	DET PNNNNN	0.000
Ref Offset 11.7 10 dBidiv Ref 31.72 dE				Mkr1 34.60 ms 8.46 dBm	Auto Tun
21.7					Center Fre 2.472000000 GH
11.7 1.72	ะศูสรองสู่เวลุขางรูปหารอง	man af a grand de se	allylogenesisters	person and a second second	Start Fre 2.47200000 GF
6.26					Stop Fre 2.47200000 GH
28.3					CF Ste 1.000000 Mi Auto Mi
40.3					Freq Offs 0 F
66.1					
Center 2.472000000 GH Res BW 1.0 MHz		3.0 MHz	Sweep	Span 0 Hz 100.0 ms (1001 pts)	



Bluet	ooth	4.0:
Diact	000	<b>T.V</b> .

Model Name	APC Live	Test By	Ted Huang
Temp & Humidity	28.7 ,44%	Test Date	2018/03/16

	us	Times	Ton	Total Ton time(ms)
Ton1	412.000	1	412.000	0.412
Ton2		0	0	
Ton3			0	
Тр				0.624

Ton	0.412
Tp(Ton+Toff)	0.624
Duty Cycle	0.66025641
10 * log (1/x) =	1.802873736



<u>Plot</u>

			H Low			
Center Freq 2.402	50 0 00	z strol	#Avg Type: I	194 AUTO (45-54-63 PM RMS 7840	Teb 87, 2018	Frequency
	PN	O: Fast Trig: Free Ru ain:Low #Atten: 20 dl			PPANNN	Auto Tune
10 dB/div Ref 21.7	t 11.72 dB 72 dBm			Mkr1 19 0.3	38 dBm	
11.7						Center Freq 2.402000000 GHz
1.72 -8.28	<b>*</b>					Start Freq 2.402000000 GHz
-18.5						Stop Freq 2.40200000 GHz
-00.3						CF Step 1.000000 MHz uto Man
48.2 An Ind Indentities of the	hilli mihlili	himmitten hiten hi	nun Matur den alem	ntanatahilathat	ndidnul][	Freq Offset 0 Hz
Center 2.40200000 Res BW 1.0 MHz	0 GHz	#VBW 3.0 MHz	Sv	S weep 100.0 ms (1 status	pan 0 Hz 1001 pts)	
Res BW 1.0 MHz	- Swept SA 50.0 0C		sAvg Type	100.0 ms (1 314045 100 actor (1552232 PH RMS 11645	1001 pts)	Frequency
Res BW 1.0 MHz	- Sweet IA 51 0 00 2000000 GH 19 11 0 11.72 dB	stad	sun sLi sAvg Type: un	weep 100.0 ms (1 status 104.4/11 (455252 Pr RMS 5744 0 ΔMkr1 4	1001 pts)	Frequency
Res BW 1.0 MHz	- Sweet IA 51 0 00 2000000 GH 19 11 0 11.72 dB	Z CR: Feet +++- Trig: Free Ri	sun sLi SAvg Type: In	weep 100.0 ms (1 status 104.4/11 (455252 Pr RMS 5744 0 ΔMkr1 4	1001 pts) (1001 pts) (12.2.4.3.6 (12.2.4.3.6 (1000 чино) (12.0 µs) 1.48 dB	Frequency Auto Tune Center Freq
Res BW 1.0 MHz	- Sweet IA 51 0 00 2000000 GH 19 11 0 11.72 dB	Z CR: Feet +++- Trig: Free Ri	Avg Type:	weep 100.0 ms (1 status 104.4/11 (455252 Pr RMS 5744 0 ΔMkr1 4	1001 pts)	Frequency Auto Tune Center Freq 2.40200000 GHz Start Freq
Res BW 1.0 MHz	- Sweet IA 51 0 00 2000000 GH 19 11 0 11.72 dB	Z CR-Fast atriLow Akter: 20 d	Avg Type:	weep 100.0 ms (1 status 104.4/11 (455252 Pr RMS 5744 0 ΔMkr1 4	1001 pts)	Frequency Auto Tune Center Freq 2.40200000 GHz Start Freq 2.40200000 GHz Stop Freq
Res BW 1.0 MHz	- Sense IA 50 0 0C   20000000 GH PM IFG tt 11.72 dB 72 dBm	Z CR-Fast atriLow Akter: 20 d	2 304 10 2	weep 100.0 ms (1           istatus           istatus           istatus           DAMKT1 1           Control 1 <t< td=""><td>1001 pts)</td><td>Frequency Auto Tune Center Frec 2.402000000 GH Start Frec 2.402000000 GH Stop Frec 2.402000000 GH CF Step 1.000000 MH</td></t<>	1001 pts)	Frequency Auto Tune Center Frec 2.402000000 GH Start Frec 2.402000000 GH Stop Frec 2.402000000 GH CF Step 1.000000 MH
Ref Offse         Offse           0 dB/div         Ref Offse           0 dB/div         Ref 21.2           0 dV         Ref 21.2           0 dV         Ref 21.2           0 dV         Ref 21.2           0 dV         Ref 21.2	- Senget IA Sit III - 20 20000000 GH BYA III BYA III Sit III - 72 dB T2 dBm III Sit III - 72 dB T2 dBm III Sit III - 72 dB Sit I	Z Z altr.Low Trig: Free R #Attent: 20 dl Trig: Free R #Attent: 20 dl Trig: Free R Trig: Free R #Attent: 20 dl Trig: Free R #UBW 3.0 MHz	2 304 Milling SW	weep 100.0 ms (1           istatus           istatus           istatus           DMKr1 4           11           ΔMkr1 4           11           weep 2.000 ms (1	1001 pts)	
Res BW 1.0 MHz           Hop of the character is analyzer           M AL         Hop of the character is analyzer	- Senget IA Sit III - 20 20000000 GH BYA III BYA III Sit III - 72 dB T2 dBm III Sit III - 72 dB T2 dBm III Sit III - 72 dB Sit I	Z Z Attrict.cow Z Trig: Free R #Attent: 20 dl #Attent: 20 dl #Attent: 20 dl #Attent: 20 dl #Attent: 20 dl #Attent: 20 dl #Attent: 20 dl #UBW 3.0 MHz Z0 us (Δ) 11.48 dB 3.0 us (Δ) 11.48 dB	2 304 Milling SW	weep 100.0 ms (1           istatus           istatus           istatus           DMKr1 4           11           ΔMkr1 4           11           weep 2.000 ms (1	1001 pts)	Frequency Auto Tune Center Freq 2.40200000 GHz Start Freq 2.40200000 GHz Stop Freq 2.40200000 GHz 1.000000 MHz uto MHz Freq Offset



		СН			
AL STATE	DC .	Same and	ALINA AUTO RAvg Type: RMS	145:57:54 PH/Hb 07,2018 784CE 1 2 3 4 5 4	Frequency
	PNO: Fax IFGainLo	t Trig: Free Run w #Atten: 20 dB		TRACE 123456 TOPE WWWWWWW	
Ref Offset 11. 0 dB/div Ref 21.72 d	72 dB IBM			Mkr1 63.40 ms 1.26 dBm	Auto Tune
11.7					Center Freq 2.442000000 GHz
8.26					Start Freq 2.442000000 GHz
78.3					Stop Freq 2.442000000 GHz
20.3					CF Step 1.000000 MHz Auto Map
40.3 <b>11 12 14 14 14 14 14 14 14</b>	nt italati (film) (fil	nutitio di forma franta	n na mana ang ang ang ang ang ang ang ang ang	nterrative data ta statute data data	Freq Offset 0 Hz
Center 2.442000000 G Res BW 1.0 MHz		VBW 3.0 MHz	Sweep	Span 0 Hz 100.0 ms (1001 pts)	
	#14 00000 GHz	sansidari Trig: Free Run		100.0 ms (1001 pts)	Frequency
Res BW 1.0 MHz	#14 cc 00000 GHz PXC: Far IFGainLo 72 dB	stroictori t -+-	STAPL ALISA AVIT RAvg Type: RMS	100.0 ms (1001 pts) s 106-51:13 PH Feb 67, 2018 TRACE [1:2:2:4:5 6 77462 [1:2:4:5 6 77462 [1:2:4:5 6 77462 [1:2:4:5 6 77462 [1:2:4:5 6	Frequency
Res BW 1.0 MHz           800           8 Annoted Sectors Analyse - Sec           8 AL         80           8 AL         80           9 Center Freq 2.44200           Ref Offset 11.           Ref Offset 11.           0 dBJdiv         Ref 21.72 c           112         1.72	#14 cc 00000 GHz PXC: Far IFGainLo 72 dB	stroictori t -+-	STAPL ALISA AVIT RAvg Type: RMS	100.0 ms (1001 pts)	Frequency
Res BW 1.0 MHz           Status           Kappet Sectors Andres - Sec           K.         69           K.         69           Center Freq 2.44200           Ref Offset 11.           0 dBJdiv         Ref Offset 11.           10 dBJdiv         Ref 21.72 c	#14 cc 00000 GHz PXC: Far IFGainLo 72 dB	Trig: Free Run sAtten: 20 dB	STAPL ALISA AUTO BAvg Type: RMS	100.0 ms (1001 pts) s 106-51:13 PH Feb 67, 2018 TRACE [1:2:2:4:5 6 77462 [1:2:4:5 6 77462 [1:2:4:5 6 77462 [1:2:4:5 6 77462 [1:2:4:5 6	Auto Tune
Res BW 1.0 MHz           800           8. Anyoget Sectors Analyse - Sec           9. Anyoget Sectors Analyse - Sec           10. dBlow           9. Anyoget Sectors Analyse - Sec           11.7           17.2           17.2           17.3           17.4           17.2           18.3           18.3           18.3	#14 cc 00000 GHz PXC: Far IFGainLo 72 dB	Trig: Free Run #Atten: 20 dB	ALISK AUTO ALISK AUTO AAvg Type: RMS	100.0 ms (1001 pts) s 106-51:13 PH Feb 67, 2018 TRACE [1:2:2:4:5 6 77462 [1:2:4:5 6 77462 [1:2:4:5 6 77462 [1:2:4:5 6 77462 [1:2:4:5 6	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.44200000 GHz Stop Freq
Res BW 1.0 MHz	#1 accords	stand (107) ti Trig: Free Run #Atten: 20 dB	stan	100.0 ms (1001 pts) s That I 2 2 4 5 6 That I 2 2 4 5 6 The I 2 4 5 6 The	Frequency Auto Tune Center Freq 2.44200000 GHz 2.44200000 GHz 2.44200000 GHz 2.44200000 GHz 2.44200000 GHz 2.6450000 GHz
Ref Offset 11.         Ref Offset 11.           0         8.         89         23.0           2         8.         89         23.0           Center Freq 2.44200         8.         9.0         1.0           0         8.         8.         9.0         1.0           10         dBJdiv         Ref 0.         8.         1.0           172         9.0         8.         9.0         1.0           173         9.0         9.0         1.0         1.0         1.0           172         9.0         9.0         9.0         1.0	#1 accords	Trig: Free Run #	stan	100.0 ms (1001 pts) s Phate (12.2 + 3.5 d) Phate (12.2 + 3.5 d	Frequency Auto Tune Center Freq 2.44200000 GHz 2.44200000 GHz 2.44200000 GHz 2.44200000 GHz 2.44200000 GHz CF Step 1.00000 MHz Auto Man
Ref Offset 11.0 MHz           Manual Sectors Analyse - Sec           KL         82           Center Freq 2.44200           Ref Offset 11.0           0 dB/div         Ref 21.72 c           99         82           117         172           123         172           133         172           143         172           133         173           143         174           143         174           143         174           143         174           143         174           143         174           143         174           143         174           143         174           143         174           143         174           143         174           143         174           143         174           143         174           144         174	#154 00000 GHz PNC Fai IF Gain Lo IBm IBm IBm IBm IBm IBm IBm IBm IBm IBm	Trig: Free Run #	stan	100.0 ms (1001 pts) s Phate (12.2 + 3.5 th Phate (12.2 + 3.5 th) Phate (12.2 + 3.5 th) Phat	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.44200000 GHz Stop Freq 2.44200000 GHz CF Step 1.00000 MHz



	СНН	ligh	
AL STATUS		ALIDA AUTO (Keises BAvg Type: RMS	RACE 1 2 3 4 5 6 Frequency
Ref Offset 11.72 dB 0 dBidiv Ref 21.72 dBm	PNC: Fast Trig: Free Run IFGain:Low #Atten: 20 dB	Mkr1	46.30 ms 0.43 dBm
117			Center Freq 2.48000000 GHz
1.72 8.28			Start Freq 2.48000000 GHz
18.3 26.3			Stop Freq 2.48000000 GHz
30.3			CF Step 1.00000 MHz Auto Man
eo 3 Allinari Iliniari Allini Ano 3	nt a chain an ann ann an 140 mainn.	t de lind modele and the state of the lind in the second second second second second second second second second	Freq Offset
Center 2.48000000 GHz	and the second	2	Span 0 Hz
Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 100.0 m	s (1001 pts)
Res BW 1.0 MHz           March 1.0 MHz	stractor.	alina autor Alina autor Alina autor Bavg Type: RMS	IZ PHP66 87, 2018 RACE 1, 2, 3, 4, 5, 6 THE VIEW WWW DET P P A N NN
Res BW 1.0 MHz           500           Kapagint Igentourn Resigner - Swept IA           AL         69         55.31         00	GHz street of the Run	alina autor (desta Alina autor (desta Alina Type: RMS	127976637,2018 TACK (2.2.4.5.6 THE COMPANY DET P P A N N N
Res BW 1.0 MHz	GHz street of the Run	alina autor (desta Alina autor (desta Alina Type: RMS	I2 PHFeb 87, 2018 TOTE: Content of the second seco
Res BW 1.0 MHz           State         State           Kapself Sectors Andport Sweet DA           Kt         State           Center Freq 2.480000000           Ref Offset 11.72 dB           Cog           11.7           1.72	GHz PNO: Fast → Trig: Free Run #Gein:Low #Atten: 20 dB	alina autor (desta Alina autor (desta Alina Type: RMS	I 412.0 µS -0.64 dB Center Frequency 240000000 GH Start Frequency Center Frequency 240000000 GH Start Frequency
Res BW 1.0 MHz           800           8 Append Sectors Andres Sectors Andres Conternational Sectors Andres Conternational Sectors Conternation Sectors Conternationa Sectors Conternation Sectors Conte	GHz PNC: Fast → Trig: Free Run #Atten: 20 dB	алария	I 412.0 µS -0.64 dB Center Frequency 2480000000 GH Start Frequency 2480000000 GH Start Frequency Stop Frequency 2480000000 GH
Res BW 1.0 MHz           Marsaid Sectors Andres Sweet IA           At         99           Center Freq 2.480000000           Marsaid Sectors Andres Sweet IA           At         99           Conter Freq 2.480000000           Ref Offset 11.72 dB           Marsaid Sectors Andres Sweet IA	GHz PNC: Fast → Trig: Free Run #Geint.tow #Atten: 20 dB 1Δ2 #VBW 3.0 MHz	алария	I2 PHY Heb 87, 2013           I2 PHY Heb 87, 2013           TYPE ID 23 6 3 5           TYPE ID 23 6 3 6           TYPE ID 23 6 3 6           TYPE ID 23 6 7           TYPE ID 23 7
Res BW 1.0 MHz           Mapself lanchuit Andyor - Senst IA           AL         99           Center Freq 2.480000000           Ref Offset 11.72 dB           0 dB/div         Ref 21.72 dBm           10 dB/div         Ref 21.72 dBm           10 dB/div         Ref 21.72 dBm           10 dB/div         Ref 21.72 dBm           11 /2 dB         10 dB/div           12 /2 dB         10 dB/div           13 /2 dB         10 dB/div           14 /2 dB         10 dB/div           15 /2 dB         10 dB/div           16 /2 dB         10 dB/div           17 /2 dB         10 dB/div           10 dB/div         Ref 21.72 dBm           11 dD         Ref 21.72 dBm           12 f         L           13 dA         L           14 f         L	GHz PNC: Fast → Trig: Free Run #Geint.tow #Atten: 20 dB 1Δ2 #VBW 3.0 MHz	status           status           sAvg Type: RMS           ΔMkr <sup>*</sup> 304           Sweep 2.000 m	I2 PHYLeb 87, 2018           I2 PHYLeb 87, 2018           IF A IN IN           IAI2.0 µS           -0.64 dB           Center Free           2480000000 GHz           Start Free           Span 0 Hz           Stoop Free           1.00000 MHz           Freq Offset
Res BW 1.0 MHz           Max State         Max State           M	GHz PNO: Fast → IFGeint.cov Trig: Free Run #Attent: 20 dB 1Δ2 # #VBW 3.0 MHz #VBW 3.0 MHz #VBW 3.0 MHz	status           status           sAvg Type: RMS           ΔMkr <sup>*</sup> 304           Sweep 2.000 m	I 2 Mileb 87, 2013           I 2 Mileb 87, 2013           TYPE to 87, 2013           TYPE to 87, 2013           TYPE to 22, 2013           TYPE to 23, 24 3           TYPE to 24 Miles           -0.64 dB           Center Frequency           2,49000000 GH2           2,49000000 GH2           Start Frequency           2,49000000 GH2           Start Frequency           2,49000000 GH2           Stop Freq           2,48000000 GH2           Stop Freq           2,480000000 GH2           Stop Freq           1,00000 MH2           Stop Mileb           Stop Mi



# **8.4 POWER SPECTRAL DENSITY**

### <u>LIMIT</u>

§ 15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	05/08/2018

#### TEST SETUP



### TEST PROCEDURE

The tests were performed in accordance with KDB 558074 5.3.1.

#### 5.3.1 Measurement Procedure PKPSD:

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to 1.5 times the *DTS bandwidth*.
- 3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- 4. Set the VBW  $\geq$  3 RBW.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level within the RBW.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



#### TEST RESULTS

Model Name	APC Live	Test By	Ted Huang
Temp & Humidity	22.5 , 48%	Test Date	2018/03/16

#### IEEE 802.11b mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	-1.37	8.00	-9.37	PASS
Middle	2437	-0.85	8.00	-8.85	PASS
High	2462	-1.14	8.00	-9.14	PASS

**NOTE**: 1. At finial test to get the worst-case emission at 1long Mbps long.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

#### IEEE 802.11g mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	-5.48	8.00	-13.48	PASS
Middle	2437	-5.26	8.00	-13.26	PASS
High	2462	-4.98	8.00	-12.98	PASS

**NOTE**: 1. At finial test to get the worst-case emission at 6Mbps long.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

#### IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	PPSD Chain0 (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	-4.77	8.00	-12.77	PASS
Middle	2437	-5.01	8.00	-13.01	PASS
High	2462	-6.43	8.00	-14.43	PASS

**NOTE** : 1. At finial test to get the worst-case emission at 6.5Mbps long.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.



Model Name	APC Live	Test By	Ted Huang
Temp & Humidity	18.5 , 52%	Test Date	2018/02/07

#### Bluetooth 4.0 (GFSK) mode

Channel	Frequency (MHz)	PPSD Chain0 (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2402	-0.52	8.00	-8.52	PASS
Middle	2442	0.64	8.00	-7.36	PASS
High	2480	-0.35	8.00	-8.35	PASS

**NOTE** : 1. At finial test to get the worst-case emission at 1Mbps long.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.



#### POWER SPECTRAL DENSITY ( IEEE 802.11b MODE)

	CITLOW	(802.11b N	NODE)	
AL 10 23.3 CC	Trig: I	sava hill r Freq: 2.412000000 GHz Free Run AvgiHold 1: 20 dB	Radio Device: B	Trace/Detector
10 dB/div Ref 25.00 dBm	2		Mkr1 2.41248 -1.3721 c	
500		a frances		ClearWrite
15.0 35.0 35.0	M	VV	My -	Average
450 650 660			horm	Max Hold
Center 2.412 GHz #Res BW 100 kHz		VBW 300 kHz	Span 30 Sweep 2.93	
Occupied Bandwidth 10	.503 MHz	Total Power	13.8 dBm	Detector
Transmit Freq Error x dB Bandwidth	12.918 kHz	OBW Power	99.00 %	Peak≯ Auto <u>Man</u>
	CH Mid	(802.11b N	NODE )	
Kuppet Sectors Relater - Occupied W kt 99 - 25.0 DC VBW 300.00 kHz	Cente	special Series r Free; 2,437000000 GHz Free Run Avg Hold:	NODE ) Radio Std: Non >1010	Trace/Detector
AL AF SES DC	rFGainLow Atter	streat dell r Freq: 2.437000000 GHz	NODE ) Radio Std: Non	Trace/Detector
VBW 300.00 kHz	RFGeintow	r Freg: 2.437000000 GHz Freg: 2.437000000 GHz Free Run Avg Hold t: 20 dB	ADDE) ALIGN AUTO (00-28-25 PM Feb 0 Radio Std: Non Page 25 PM Feb 1 Radio Device: B Mkr1 2.43748	Trace/Detector
10 dB/div Ref 25.00 dBm	rFGainLow Atter	r Freg: 2.437000000 GHz Freg: 2.437000000 GHz Free Run Avg Hold t: 20 dB	ADDE) ALIGN AUTO (00-28-25 PM Feb 0 Radio Std: Non Page 25 PM Feb 1 Radio Device: B Mkr1 2.43748	GHz
KL         W         SLO         KL           VBW 300.00 kHz         ISO         IS	RFGeintow	r Freg: 2.437000000 GHz Freg: 2.437000000 GHz Free Run Avg Hold t: 20 dB	ADDE) ALIGN AUTO (00-28-25 PM Feb 0 Radio Std: Non Page 25 PM Feb 1 Radio Device: B Mkr1 2.43748	GHz JBm Clear Write
ki         so         cc           VBW 300.00 kHz         Image: Solution of the s	RFGeinlow Cente Albert	r Freg: 2.437000000 GHz Freg: 2.437000000 GHz Free Run Avg Hold t: 20 dB	ADDE) ALIGN AUTO (00-28-25 PM Feb 0 Radio Std: Non Page 25 PM Feb 1 Radio Device: B Mkr1 2.43748	Max Hold
Ki         Siss         S	RFGeinLow Cente Atter	r Preg. 2.437000000 GHz Free Run AvgiHold t: 20 db	AODE ) Radio Std: Non Radio Device: B Mkr1 2.43748 / -0.85217 c Span 30	MHz
Ki         Siss         S	RFGeinLow Cente Atter	r Preg. 2.43700000 GHz Free Run AvgiHold t: 20 dB	AODE ) Radio Stid: Non Platio Stid: Non Radio Device B Mkr1 2.43748 -0.85217 c Span 30 Sweep 2.93	Min Hold
AL BOOK STATES OF CONTRACTS OF	RFGeinlow Cente Albert Abbert	VBW 300 kHz Total Power OBW Power	AODE ) ALIAN ALIA Radio Std: Non Radio Device: B Mkr1 2.43748 0 -0.85217 c -0.85217 c -0.95217	Min Hold Detector



Akr1 2.46149 C -1.1421 d	м			
			Ref 25.00 dBm	10 dB/div
	man			150 500 500
	V My	N		15.0 25.0 36.0
-			-	45.0 55.0 65.0
Span 30 I Sweep 2.933		#		Center 2.4 Res BW
99.00 % -6.00 dB	OBW Power	.530 MHz	10	Transm
veep 2.933 8m %	4.3 dE 99.00	Total Power 14.3 dE OBW Power 99.00	#VBW 300 kHz Sw #VBW 300 kHz Sw h Total Power 14.3 dE .530 MHz -11.227 kHz OBW Power 99.00	62 GHz 100 kHz #VBW 300 kHz Sw 100 kHz #VBW 300 kHz Sw 100 kHz 14.3 dE 10.530 MHz 10.530 MHz 99.00



### POWER SPECTRAL DENSITY ( IEEE 802.11g MODE )

	CH Low				
Keysight Spectrum Analyzer - Occupied BW		Sum a links	annean an ann		1010
/BW 300.00 kHz		r Freq: 2.412000000 GHz	Ra	dio Std: None	Trace/Detector
		Free Run Avg Hold n: 20 dB		dio Device: BTS	
			Mkr1	2.41446 GHz	
10 dB/div Ref 25.00 dBm				5.4774 dBm	
Log					
5.00					Clear Write
150	Marchanter	ng mar and a strand and a strand	i'm rha		
30			N_		Average
360				$\sim$	1.1250.011250
45.0				1	
65.0				-	Max Hold
65.0					
Center 2.412 GHz				Span 30 MHz	
#Res BW 100 kHz		VBW 300 kHz	Sv	veep 2.933 ms	Min Hold
	120				mininoid
Occupied Bandwidth		Total Power	13.2 dE	ŝm	
16	.523 MHz				Detector
Transmit Freq Error	-18.979 kHz	OBW Power	99.00	96	Auto Man
x dB Bandwidth	16.40 MHz	x dB	-6.00	SI 1	
855 -	CH Mid	(802.11g N	atarus MODE )		
R Appert lacture Andpar-Occupied Wi A. K. 199 SS DC Center Freq 2.437000000	GHz Cente	SINGE (191) r Freq: 2.437000000 GHz	AODE )	-03-46 FM Feb 81, 2018 dio Std: None	Trace/Detector
AL # 552 00	GHz Cente	sinst mit	/ODE) x.154 x.112 [4 >15/15 Ra Ra	dio Std: None	Trace/Detector
Center Freq 2.437000000	GHz Cente #FGein1.ow #Atter	state bill ir Freq: 2.437000000 GHz Free Run Avg Hold	/ODE )	f c3-45 PMTeb 81, 2018 dio Std: None	TracelDetector
Center Freq 2.437000000	GHz Cente #FGein1.ow #Atter	state bill ir Freq: 2.437000000 GHz Free Run Avg Hold	/ODE )	dio Std: None dio Device: BTS 2.44447 GHz	
AL         99         2010         2010           Center Freq 2.437000000	GHz Cente #FGein1.ow #Atter	state bill ir Freq: 2.437000000 GHz Free Run Avg Hold	/ODE )	dio Std: None dio Device: BTS 2.44447 GHz	Trace/Detector Clear Write
KL         99         500         500           Center Freq 2.437000000         Image: Center Freq 2.437000000         Image: Center Freq 2.437000000           10 dB/div         Ref 25.00 dBm         Image: Center Freq 2.437000000           10 dB/div         Ref 25.00 dBm           150         Image: Center Freq 2.437000000	GHz Cente RFGeinLow Atter	state bill ir Freq: 2.437000000 GHz Free Run Avg Hold	AODE ) Alba arm 10 Ra Na Mkr1 2 A	dio Std: None dio Device: BTS 2.44447 GHz	
AL         99         355         00           Center Freq 2.437000000         100         800         100         800         100	GHz Cente RFGeinLow Atter	streat shift in Freq: 2.43700000 GHz Free Run Avg/Hold n: 20 dB	AODE ) Alba arm 10 Ra Na Mkr1 2 A	dio Std: None dio Device: BTS 2.44447 GHz	Clear Write
AL         99         353         SC           Center Freq 2.437000000         Center Freq 2.437000000         Center Freq 2.437000000           10 dB/div         Ref 25.00 dBm         Center Freq 2.437000000           150         Center Freq 2.437000000         Center Freq 2.4370000000           150         Center Freq 2.4370000000         Center Freq 2.4370000000	GHz Cente RFGeinLow Atter	streat shift in Freq: 2.43700000 GHz Free Run Avg/Hold n: 20 dB	AODE ) Alba arm 10 Ra Na Mkr1 2 A	dio Std: None dio Device: BTS 2.44447 GHz	
AL         99         300         C           Center Freq 2.437000000         C<	GHz Cente RFGeinLow Atter	streat shift in Freq: 2.43700000 GHz Free Run Avg/Hold n: 20 dB	AODE ) Alba arm 10 Ra Na Mkr1 2 A	dio Std: None dio Device: BTS 2.44447 GHz	Clear Write
AL         W         Social           Center Freq 2.437000000         Ref 25.00 dBm           10 dB/div         Ref 25.00 dBm           150	GHz Cente RFGeinLow Atter	streat shift in Freq: 2.43700000 GHz Free Run Avg/Hold n: 20 dB	AODE ) Alba arm 10 Ra Na Mkr1 2 4	dio Std: None dio Device: BTS 2.44447 GHz	Clear Write Average
AL         99         352         CC           Center Freq 2.437000000         Conter Freq 2.4370000000         Conter Freq 2.4370000000           10 dB/div         Ref 25.00 dBm         Conter Freq 2.4370000000           150         Conter Freq 2.437000000         Conter Freq 2.4370000000           150         Conter Freq 2.437000000         Conter Freq 2.4370000000           150         Conter Freq 2.437000000         Conter Freq 2.4370000000           150         Conter Freq 2.4370000000         Conter Freq 2.43700000000           150         Conter Freq 2.43700000000         Conter Freq 2.43700000000           150         Conter Freq 2.437000000000000000000000000000000000000	GHz Cente RFGeinLow Atter	streat shift in Freq: 2.43700000 GHz Free Run Avg/Hold n: 20 dB	AODE ) Alba arm 10 Ra Na Mkr1 2 4	ACLAS PHILE II. 2018 dio Stat: Nore dio Device: BTS 2.44447 GHz 5.2644 dBm	Clear Write Average
AL         99         352         C           Center Freq 2.437000000         C<	GHz Cente RFGeinLow Atter	streat shift in Freq: 2.43700000 GHz Free Run Avg/Hold n: 20 dB	AODE ) Alba arm 10 Ra Na Mkr1 2 4	ACLAS PHILE II. 2018 dio Stat: Nore dio Device: BTS 2.44447 GHz 5.2644 dBm	Clear Write Average
*L         #	GHz Cente BFGeinLow AAtter	stree suit in Free; 2.43700000 GHz Free Run AvgiHold in: 20 dB	AODE )	Span 30 MHz	Clear Write Average Max Hold
*L         #	GHz Cente BFGeinLow AAtter	streat shift in Freq: 2.43700000 GHz Free Run Avg/Hold n: 20 dB	AODE )	dio Std: None dio Device: BTS 2.44447 GHz 5.2644 dBm	Clear Write Average Max Hold
*L         #	GHz Cente BFGainLow AAtter	stree suit in Free; 2.43700000 GHz Free Run AvgiHold in: 20 dB	AODE )	Span 30 MHz veep 2.933 ms	Clear Write Average Max Hold
N         99         200         C           Center Freq 2.437000000         Center Freq 2.437000000         Center 2.437000000           10 dB/div         Ref 25.00 dBm         Center 2.00 dBm           150         Center 2.00 dBm         Center 2.00 dBm           150         Center 2.437 GHz         Center 2.437 GHz           #Res BW 100 kHz         Occupied Bandwidth	GHz Cente BFGeinLow AAtter	r Free 2.43700000 GHz Free Run AvgHold	AODE ) ALISA AUTO IO Ra Na Mkr1 : Junio II Junio III Junio Junio II Junio II Junio Junio III Junio III	Span 30 MHz veep 2.933 ms	Clear Write Average Max Hold Min Hold
AL OF Center Freq 2.437000000 10 dBJdiv Ref 25.00 dBm Log 15 0 6 0 6 0 6 0 6 0 6 0 6 0 6 0 6	GHz Cente #FGeinLow Adden Adden Adden STI9 MHz	In Free, 2.43700000 GHz Free Run AvgiHold In 20 dB	AODE )	Span 30 MHz veep 2.933 ms	Clear Write Average Max Hold Min Hold Detector Peak
AL 90 2000 Center Freq 2.437000000 10 dB/div Ref 25.00 dBm 10 dB/div	GHz Cente #FGeinLow AAter AA	r Free, 2.43700000 GHz Free Run AvgiHold AvgiHold	AODE ) ALIGN 4/17 (0) Ra NKr1 2 MKr1 2 MKr1 2 Sv 13.3 dE 99.00	Span 30 MHz veep 2.933 ms	Clear Write Average Max Hold Min Hold Detector Peak
AL 92 200 Center Freq 2.437000000 10 dB/div Ref 25.00 dBm 150 500 500 500 500 500 500 500	GHz Cente #FGeinLow Adden Adden Adden STI9 MHz	In Free, 2.43700000 GHz Free Run AvgiHold In 20 dB	AODE )	Span 30 MHz veep 2.933 ms	Clear Write Average Max Hold Min Hold Detector Peak
AL 90 2000 Center Freq 2.437000000 10 dB/div Ref 25.00 dBm 10 dB/div	GHz Cente #FGeinLow AAter AA	r Free, 2.43700000 GHz Free Run AvgiHold AvgiHold	AODE ) ALIGN 4/17 (0) Ra NKr1 2 MKr1 2 MKr1 2 Sv 13.3 dE 99.00	Span 30 MHz veep 2.933 ms	Clear Write Average Max Hold Min Hold Detector Peak
AL 99 200 C Center Freq 2.437000000 10 dB/div Ref 25.00 dBm 150 500 600 500 600 500 600 600 6	GHz Cente #FGeinLow AAter AA	r Free, 2.43700000 GHz Free Run AvgiHold AvgiHold	AODE ) ALIGN 4/17 (0) Ra NKr1 2 MKr1 2 MKr1 2 Sv 13.3 dE 99.00	Span 30 MHz veep 2.933 ms	Clear Write Average Max Hold Min Hold Detector Peak
to dBJdiv Ref 25.00 dBm Log 10 dBJdiv Ref 25.00 dBm Log 15 d 5 0 6 0 6 0 6 0 6 0 Center 2.437 GHz #Res BW 100 kHz Occupied Bandwidth 16 Transmit Freq Error	GHz Cente #FGeinLow AAter AA	r Free, 2.43700000 GHz Free Run AvgiHold AvgiHold	AODE ) ALIGN 4/17 (0) Ra NKr1 2 MKr1 2 MKr1 2 Sv 13.3 dE 99.00	Span 30 MHz veep 2.933 ms	Clear Write Averag Max Hole Min Hole Detecto Peak



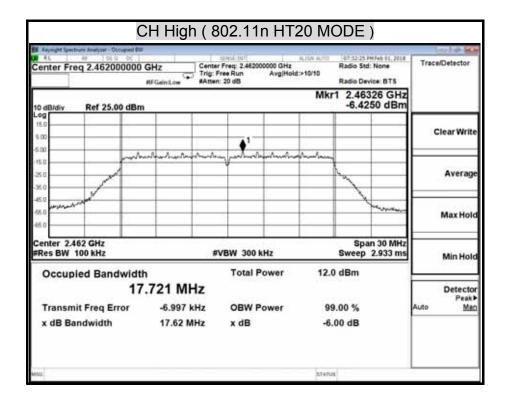
BE Keysight Spect	trure Analyzer - Occupied BA		SING INT	A.155 A.712 [47	14.52 PM Feb 01, 2018	and an an
Sweep Tin	ne 2.93 ms	Trig: I	r Freq: 2.482000000 GHz Free Run Avg Hold 1: 20 dB	1:>10/10	tio Std: None tio Device: BTS	Trace/Detector
10 dB/div	Ref 25.00 dBm	1			.46326 GHz 4.9750 dBm	
15.0 6.00			<b>●</b> <sup>1</sup>			Clear Write
-5.00 -15.0 -25.0 -26.0	1 An	antere and a second	n fan hen de ser de	and have	_	Average
450 450 460	North Contraction of the second secon				1	Max Hold
Center 2.4 #Res BW			VBW 300 kHz	Sw	Span 30 MHz eep 2.933 ms	Min Hole
Occup	ied Bandwidt 16	<sup>h</sup> 5.524 MHz	Total Power	13.3 dB	m	Detecto
	it Freq Error Indwidth	-25.131 kHz 16.39 MHz	OBW Power x dB	99.00 -6.00 c	20 I	Auto <u>Mar</u>
and the second se				STARIES		



## POWER SPECTRAL DENSITY ( 802.11n HT20 MODE )

	DDE)	20 MC	02.11n HT	H Low ( 8	C
s Hz	Radio Std: None Radio Device: BTS 1 2.41326 GI -4.7735 dB	1993-1974 -	specified Free 2.412000000 GHz Free Run AvgiHol I: 20 dB	Trig: F	Freq 2.412000000
					Rei 25,00 dBill
Clear Wri			<b>∮</b> <sup>1</sup>	Rent marken the	
Avera					
Max Ho	alla t				welwww
	Span 30 M Sweep 2.933	42.7	VBW 300 kHz Total Power		2.412 GHz W 100 kHz
Detect Pea Auto M	0.00 % 00 dB	99	OBW Power	734 MHz -4.353 kHz 17.62 MHz	upled Bandwidth 17 smit Freq Error Bandwidth
		stena 20 MC	02.11n HT2	H Mid ( 8	
2018 Trace/Detector		20 MC	speat perf	Center	Institute Relative - Occupied Bits Statistics - Occupied Bits 1.00.000 kHz
s Hz	DDE ) Radio Std: Norre Radio Device: BTS 1 2.43823 GI	20 MC	speat perf	Center Trig: F	Sectors Relater Occuped IN M SSS DC 00.00 kHz
s Hz	DDE ) Radio Sad: None Radio Device: BTS	20 MC	Freq: 2.437000000 0Hz FreeRun AvgHol	FGainLow SAtter	American Analyse - Occupied Bit W 1512 EC 100.00 kHz Ref 25.00 dBm
s Hz Bm	DDE ) Radio Std: Norre Radio Device: BTS 1 2.43823 GI	20 MC	Freq: 2.437000000 0Hz FreeRun AvgHol	Center Trig: F	American Analyse - Occupied Bit W 1512 EC 100.00 kHz Ref 25.00 dBm
S Clear Wri Avera	DDE ) Radio Std: Norre Radio Device: BTS 1 2.43823 GI	20 MC	Freq: 2.437000000 0Hz FreeRun AvgHol	FGainLow SAtter	American Analyse - Occupied Bit W 1512 EC 100.00 kHz Ref 25.00 dBm
TraceUetector S Hz Bm Clear Wri Avera Nxx Max Ho IHz	DDE ) Radio Salt None Radio Device: BTS 1 2.43823 Gil -5.0089 dE	20 MC	VBW 300 kHz	FGainLow Centa Rear/non/low-fram/low	Ref 25.00 dBm
Sm Clear Wri Avera Max Ho IHz	DDE ) Radio Std: Nome Radio Device: BTS 1 2.43823 Gi -5.0089 dE 5.0089 dE Span 30 M Sweep 2.933 r 5 dBm	20 MC x.151 A/10 4>19/19 MKr <sup>-</sup> 13.5 99	VBW 300 kHz Total Power OBW Power	FGainLow Centra FGainLow Adden	Ref 25.00 dBm Ref 25.00 dBm 2.437 GHz V 100 kHz upled Bandwidth 17 smit Freq Error
Sm Clear Wri Avera Max Ho IHz Min Ho Detect Pea	DDE ) Radio Std: Nome Radio Device: BTS 1 2.43823 Gi -5.0089 dE	20 MC x.151 A/10 4>19/19 MKr <sup>-</sup> 13.5 99	VBW 300 kHz	FGainLow Centa FGainLow Adden	Ref 25.00 dBm Ref 25.00 dBm 2.437 GHz W 100 kHz upled Bandwidth 17







### POWER SPECTRAL DENSITY ( Bluetooth 4.0 (GFSK) MODE )

			Low (G		_ /	
AL.	ectrure Analyzer - Swept SA RF 351 0 0C		strid dell	NUM 4/10	(66:09:39 PH Feb 07.2	
Center F	Freq 2.402000000 0	FGainLow	Trig: Free Run #Atten: 20 dB	#Avg Type: RM5 Avg(Hold:>10/10	THACE 1 2 3 4 TYPE NWMW DET P P A 1	
10 dB/div	Ref Offset 11.72 dB Ref 21.72 dBm				Mkr1 49.40 r -0.517 dE	
11.7						Center Free 2.402000000 GH
1.72 -8.26		1	~~	-6.00 dB		Start Free 2.400500000 GH
-18.3						Stop Fre 2.403500000 GH
-30.3	$\downarrow$				N	CF Step 1.000000 MH Auto Ma
40.3						Freq Offse
	402000 GHz 100 kHz		300 kHz	STAP		
#Res BW	100 kHz esture Analyse - Swept SA 90   51 0   52 Freq 2.442000000 C		Mid ( GF		100.0 ms (1001 p	tis Frequency
FRes BW	100 kHz esture Analyse - Swept SA 90   51 0   52 Freq 2.442000000 C	CH	Mid ( GF	SK MODE	100.0 ms (1001 p us )	EIS 5 5 5 5 5 5 5 6 Frequency 1111 Auto Tun
FRes BW	100 kHz		Mid ( GF	SK MODE	100.0 ms (1001 p us ) ) (04.97-97 PW Heb 87.0 77005 (1 2 3 4 77005 (1 2 3 4 77005 (1 2 3 4 77005 (1 2 3 4 7700 (1 2 3 4)) (1 2 3 4 7700 (1 2 3 4)) (	cis 6 Frequency Kis 6 Auto Tun Bm Center Fre
#Res BW ess Accepted to Accepted to Center F	100 kHz		Mid ( GF	SK MODE	100.0 ms (1001 p us ) ) (04.97-97 PW Heb 87.0 77005 (1 2 3 4 77005 (1 2 3 4 77005 (1 2 3 4 77005 (1 2 3 4 7700 (1 2 3 4)) (1 2 3 4 7700 (1 2 3 4)) (	EIS 5 5 5 5 5 5 5 6 Frequency 1111 Auto Tun
Accepted by the second	100 kHz		Mid ( GF	SK MODE	100.0 ms (1001 p us ) ) (04.97-97 PW Heb 87.0 77005 (1 2 3 4 77005 (1 2 3 4 77005 (1 2 3 4 77005 (1 2 3 4 7700 (1 2 3 4)) (1 2 3 4 7700 (1 2 3 4)) (	Center Fre 2.44200000 GH Start Fre 2.442050000 GH Start Fre 2.540550000 GH
Center F     10 dBldiv     11.7     1.72     1.72     1.13     30.3     30.3	100 kHz		Mid ( GF	SK MODE	100.0 ms (1001 p us ) ) (04.97-97 PW Heb 87.0 77005 (1 2 3 4 77005 (1 2 3 4 77005 (1 2 3 4 77005 (1 2 3 4 7700 (1 2 3 4)) (1 2 3 4 7700 (1 2 3 4)) (	Center Fre           2.442000000 GH           Start Fre           2.443500000 GH           Stop Fre           2.443500000 GH           CF Ste           1.00000 MH
Kepset b     Separat b     AL     Center F     Center F     Center S     Cente	100 kHz		Mid ( GF	SK MODE	100.0 ms (1001 p	Center Fre           2.442000000 GH           Start Fre           2.442050000 GH           Start Fre           2.443500000 GH           Stop Fre           2.443500000 GH           Stop Fre           2.443500000 GH           Stop Fre           2.443500000 GH           Stop Fre           2.44350000 GH           Freq Offse
Kesset b     Accord b	100 kHz		Mid ( GF	SK MODE	100.0 ms (1001 p	tts)



Center Freq 2.48	0000000 GHz PNC Wide	Sanse dwit	#Avg Type: RMS Avg(Hold:>10/10	TRACE 1 2 3 4 5 6	
Ref Offse	IFGainLow			Mkr1 49.00 ms -0.348 dBm	1000.0280
11.7		-			Center Fre 2.480000000 GH
8.20	7		-6.00 dB		Start Fre 2.478500000 GH
18.3					Stop Fre 2.481500000 GH
30.3				$\mathbb{N}$	CF Ste 1.000000 MH Auto Ma
98.2				1	Freq Offse
Center 2.480000 G				Span 3.000 MHz	



# **8.5 CONDUCTED SPURIOUS EMISSION**

#### LIMITS

§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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 and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. 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)).

### **TEST EQUIPMENT**

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	05/08/2018

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### TEST SETUP



### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.



## TEST RESULTS

#### **OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT**

Model Name	APC Live	Test By	Ted Huang
Temp & Humidity	22.5 , 48%	Test Date	2018/03/16

#### (IEEE 802.11b MODE)

Frequency	11:45:02 ANTeb 02, 2018 TRACE 1 2 3 4 5 6 TUPE N NNNN DET PNNNNN	vg Type: RMS g[Hold:>10/10	Trig: Free Run #Atten: 20 dB	D MHz PNO: Fast ( IFGainLow	q 30.0000	Start Fre
Auto Tu	-3.022 dBm	Mk			Ref Offset 1 Ref 21.72	10 dB/div
Center Fr 13.265000000 G					<b>†</b> <sup>1</sup>	11.7 1.72 8.26
Start Fr 30.000000 M	di stale					10.3 20.3
Stop Fr 25.50000000 G					_l~	48.3
CF St 2.647000000 G Auto M	Stop 26.50 GHz 531 s (40001 pts)	Sweep 2	W 300 kHz	#VB	100 kHz	Start 30 Res BW
			-3.022 dBm	2.411 0 GHz 2.400 0 GHz	1	1 N 2 N 3 N
Freq Offs		Stable	-47.527 dBm -69.230 dBm -	2.483 5 GHz		4 5 6 6 7 8 9 9 10 11
) Frequency	1b MODE	z) (802.1 Alteration vg Type: RMS giffold:>1010		2.483 5 GHz Mid (30M	CH store Reference 5 og 30.000000	5 6 7 8 9 9 10 11 11
)	11.51.25 AN Feb 02, 2018 TRACE 1 2 3 4 5 6	z) (802.1 Alteration vg Type: RMS giffold:>1010		2.483 5 GHz Mid (30N et sk D MHz BGainLow 72 dB	ectrure Analyter - 5 AF 51	5 6 7 7 8 9 9 10 11 11 555 555
) Frequency	115123 ANT HE 52, 2018 TRACE 1, 2, 3, 4, 5, 6 TOPE NINNIN DET P NINNIN 1 2.435 5 GHz	z) (802.1 Alteration vg Type: RMS giffold:>1010		2.483 5 GHz Mid (30N et sk D MHz BGainLow 72 dB	q 30.00000	5 6 7 7 8 9 9 10 11 11 5 5 5 6 7 7 8 9 9 10 11 11 5 5 5 7 7 8 9 9 10 11 11 5 5 5 11 11 11 5 5 5 11 11 11 11
) Frequency Auto Tu Center Fr	115123 ANT HE 52, 2018 TRACE 1, 2, 3, 4, 5, 6 TOPE NINNIN DET P NINNIN 1 2.435 5 GHz	z) (802.1 Alteration vg Type: RMS giffold:>1010		2.483 5 GHz Mid (30N et sk D MHz BGainLow 72 dB	q 30.00000 Ref Offset 1 Ref 21.72	5 6 7 7 8 9 10 11 11 4 5 5 8 9 11 11 4 5 5 8 8 9 9 11 11 4 5 5 8 9 9 10 10 11 11 4 5 5 10 10 11 11 11 11 11 11 11 11 11 11 11
) Frequency Auto Tu Center Fr 13 26500000 G Start Fr	115123 ANT HE 52, 2018 TRACE 1, 2, 3, 4, 5, 6 TOPE NINNIN DET P NINNIN 1 2.435 5 GHz	z) (802.1 Alteration vg Type: RMS giffold:>1010		2.483 5 GHz Mid (30N et sk D MHz BGainLow 72 dB	q 30.00000 Ref Offset 1 Ref 21.72	5 6 7 7 9 9 9 9 10 11 4 5 5 6 7 7 8 9 9 9 9 9 9 9 9 9 9 9 9 9
) Frequency Auto Tu Center Fr 13.26500000 G Start Fr 30.00000 M Stop Fr	115123 ##Peb 92.2018 784CE [ 2 3 4 5 6 798CE [ 2	z) (802.1		2.483 5 GHz Mid (30M st la 0 MHz PNC: Fast ( IFGainLow 72 dB IBm	Ref Offset 1 Ref 21.72	5 6 7 7 9 9 9 9 9 9 9 9 9 9 9 9 9



Frequency	11:55:03 AM Feb 82, 2018	ALISA W/TD		strid in		0 0C 1	10	Keysight Spe AL
riequeiny	THACE 1 2 3 4 5 6 TIPE MINIMUM DET PINNINN	g Type: RM5  Hold:>10/10		Trig: Free Run	PNO: Fast C	P	q 30.00	art Fre
Auto Tun	r1 2.463 3 GHz -2.761 dBm	Mk				11.72 dB 2 dBm	Ref Offs Ref 21	dB/div
Center Fre 13.265000000 GH							<b>♦</b> <sup>1</sup>	29 1.7 72 26
Start Fre 30.000000 MH	-914404							
Stop Fre 25.50000000 GH			-				Jen.	
CF Ste 2.647000000 GH	Stop 26.50 GHz 2.531 s (40001 pts)	Sweep 2		/ 300 kHz	#VB		NHz 100 kHz	art 30 M Res BW
Auto Ma	FUNCTION VALUE	CONTRACTOR MODE	15501	-2.761 dBm	3 GHz	2.463		a anna an
Freq Offse				-59.384 dBm -57.439 dBm	0 GHz 15 GHz	2.400	1	N 2 N 3 N 4
								6 7 8 9
		1						1



#### **OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT**

Frequency	12:06:18 PH Feb 52, 2018 TRACE 1 2 3 4 5 6 TUPE N NOVIMUL DET P N N N N N	#Avg Type: RMS Avg/Hold:>10/10	Trig: Free Run #Atten: 20 dB	MHz PNO: Fast C IFGainLow	q 30.00000	Start Fre
Auto Tun	r1 2.418 3 GHz -8.273 dBm	Mk			Ref Offset 11 Ref 21.72	10 dB/div
Center Fre 13.265000000 GH					•1	11.7 1.72 8.26
Start Fre 30.000000 MH	送井御					-10.3
Stop Fre 25.50000000 GH					, Line Line Line	48.3 -68.3
CF Ste 2.647000000 GH Auto Ma	Stop 26.50 GHz 2.531 s (40001 pts)	Sweep 2	W 300 kHz	#VB	100 kHz	Start 30 I #Res BW
Freq Offse 0 H			-8.273 dBm -48.859 dBm -61.290 dBm	2.418 3 GHz 2.400 0 GHz 2.483 5 GHz	1	1 N 2 N 3 N 4 5 6 7
\		Steps Hz) (802 1	1Hz~26.50	Mid (30M	СН	8 9 10 11 11
) Frequency Auto Tun	1g MODE	Hz) (802.1	i sansadort	MHz FGainLow	CH	8 9 10 11 11 11 4 555 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
Frequency	1g MODE	Hz) (802.1	Strig: Free Run	MHz PNC: Fast IFGainLow	q 30.00000	8 9 10 11 4 455 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
Frequency Auto Tun Center Fre	1g MODE	Hz) (802.1	Strig: Free Run	MHz PNC: Fast IFGainLow	Ref Offset 11 Ref 21.72	8 9 9 10 11 11 4 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 9 9 9 9
Frequency Auto Tun Center Fre 13.26500000 GH Start Fre	1g MODE	Hz) (802.1	Strig: Free Run	MHz PNC: Fast IFGainLow	Ref Offset 11 Ref 21.72	8 9 9 10 11 11 4 4 5 11 5 11 5 11 5 11 5 11 11 11 11 11 11
Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre	1g MODE	Hz) (802.1	Trig: Free Run #Atten: 20 dB	MHz PNC: Fast 4 IFGainLow 2 dB Bm	Ref Offset 11 Ref 21.72	8 9 10 11 11 11 5 5 5 10 5 10 10 5 10 10 10 10 10 10 10 10 10 10 10 10 10

#### (802.11g MODE)



Frequency	12:11:04 PM Feb 62, 2018 TRACE 1 2 3 4 5 6 TUPE M MANAGEMENT		#Avg Ty Avg/Hol	Ni IN	1		0 MHz	0.0000	2010.0	AL.
2017283	DET PNNNNN	- FOR FOR	extinue		#Atten: 2	PNC: Fast 4				
Auto Tun	r1 2.468 5 GHz -8.035 dBm	Mk						ef Offset 1 ef 21.72		) dBJ
Center Fre		1			1			· ·		°8
13.265000000 GH			-	+				h	-	72
Start Fre	-0101.005			-						0.3
30.000000 MH										83
Stop Fre		40000	2.5	-				2	_	83
25.50000000 GH			*****	***	-	-			-	8.3 8.3
CF Ste 2.64700000 GH	Stop 26.50 GHz	Sweep 2			V 300 kHz	#VB			30 MH BW 10	
<u>Auto</u> Ma	IUNCION WUE -	STORESON!	UNHON N		v		X	a)		
Freq Offse			-	Bm	-8.035 d8 -59.298 d8 -56.838 d8	8 5 GHz 0 0 GHz 3 5 GHz	2.400			2 N 3 N
01								_		5
			-	+		-				7 8 9
										9
		STATUS								



# **OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT**

#### (802.11n HT20 MODE)



000000 MHz	Trie	sense ont	8Avg Type: RMS Avg/Hold >10/10	07 45 25 PH Feb 51, 2018 TRACE 1 2 3 4 5 6 Trace New West	Frequency
IFG Offset 11.72 dB			20050300020474	kr1 2.463 3 GHz	Auto Tur
21.72 dBm				-0.384 GBM	Center Fro 13.26500000 G
				-28-60 mBe	Start Fre 30.000000 M
~~~~~~					Stop Fr 25.50000000 G
Hz	#VBW 300	kHz	Sweep	Stop 26.50 GHz 2.531 s (40001 pts)	CF Str 2.647000000 G
2.400 0	GHz -57.9	84 dBm 37 dBm	NCTION EUNCTION MOT		Freq Offs
	1500 EC 000000 MHz P9 BFC 00fiset 11.72 dB 21.72 dBm 1.72 dB	1510 DC 000000 MHz PRO: Feat IFGainLow Trig FaintLow Trig At Trig At Trig At Trig At Diffset 11.72 dB 21.72 dB	State         State <td< td=""><td>150 000000 MHz         Status 1911         Status 1911         Status 1911           PNO: Feat         Trig: Free Run BrGain:Low         Trig: Free Run BAtten: 20 dB         Status 1911           Offset 11.72 dB         M         M         M           21.72 dBm         M         M         M           Visition         Status 1910         M         M           1.72 dBm         M         M         M</td><td>State         State         <th< td=""></th<></td></td<>	150 000000 MHz         Status 1911         Status 1911         Status 1911           PNO: Feat         Trig: Free Run BrGain:Low         Trig: Free Run BAtten: 20 dB         Status 1911           Offset 11.72 dB         M         M         M           21.72 dBm         M         M         M           Visition         Status 1910         M         M           1.72 dBm         M         M         M	State         State <th< td=""></th<>



## OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

Model Name	APC Live	Test By	Ted Huang
Temp & Humidity	18.5 , 52%	Test Date	2018/02/07

	CHLOW	(30	MHz~26.				
art Freq 30.00	P9	NO: Fast C	Strid: 147	ALTIA A SAvg Type: RMS Avg(Hold:>10/10		9 PH Feb 07, 2018 RACE 1 2 3 4 5 6 TUPE N WHY WHY DET P P A N N N	Frequency
dB/div Ref 21	set 11.72 dB	SainLow	#Atten: 20 dB			02 4 GHz 928 dBm	Auto Tur
n +1							Center Fre 13.26500000 GH
28 0.3 5.3						20.046	Start Fre 30.000000 MH
	urque, en	-				-	Stop Fre 25.50000000 GH
tart 30 MHz Res BW 100 kHz	1	#VB	W 300 kHz		p 2.531 s	26.50 GHz (40001 pts)	CF Ste 1.000000 Mi Auto Ma
N f 2 N f 3 N f 4 6	2,402 2,400 2,483	0 GHz	-1.928 dBm -57.654 dBm -58.243 dBm				Freq Offs 01
7 8					-		
0					TAPUS		
0 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	er - Swept BA ) 56 0 . DC [	(301	MHz∼26.₹	5GHz) (GP	SK N	7 PH Feb 07, 2018 RACE 1 2 3 4 5 6	Frequency
An Societ Sectors Andread	er - Swept SA 1 St 0 CC 1 00000 MHz P3 1FC set 11.72 dB	(30I	MHz~26.է	5GHz) (GF	SK N		Frequency
Appropriate from a foreign tart Freq 30.00 D dBildiv Ref 21 12 12 72 1 72 1 72 1 72	00000 MHz	NO: Fast	MHz~26.5	5GHz) (GP	SK N	7 PH (+6 87, 2018 TALE ( 2 2 4 5 6 TALE P P A N N N 017 P P A N N N	Auto Tur
Appropriate Service Reality Ref Office Ref 21 0 dBidliv Ref 21	er - Swept SA 1 St 0 CC 1 00000 MHz P3 1FC set 11.72 dB	NO: Fast	MHz~26.5	5GHz) (GP	SK N	7 PH (+6 87, 2018 TALE ( 2 2 4 5 6 TALE P P A N N N 017 P P A N N N	Frequency Auto Tur Center Fre 13.26500000 Gi Start Fre
AL      Solution     AL     AL     Solution     AL	er - Swept SA 1 St 0 CC 1 00000 MHz P3 1FC set 11.72 dB	NO: Fast	MHz~26.5	5GHz) (GP	SK N	1 PHILE 07, 2018 RACE (123456 DET PPANNN DET PPANNN 414 GHz .090 dBm	Frequency Auto Tur Center Fre 13.26500000 Gi Start Fre 30.00000 Mi
AL AL AL AL AL AL AL AL AL AL	or - Small IA 758 0 - RC   199 000 MHz 19 10000 MHz 19 100 100 00 MHz 19 100 100 00 MHz 100 00 MHz 100 00 MHz 100 00 MHz 100 00 MHz 100 00 0 MHz 100 0 0 MHz 100 0 M	VC: Fast C Saint.ow	WHz~26.5	5GHz) (GF autora aAvgType: RM Avg(Hold>1010	Stop 2.531 s	2199-66-07.2018 719-67-2020 2017 22-07-07 2017 22-07-07 2017 22-07 2017 22-07 2017 22-07 2017 22-07 2017 22-07 2017 22-07 2018 2	Frequency           Auto Tur           Center Frr           13.265000000 Gr           Start Frr           30.000000 Mr           Stop Frr           26.50000000 Gr           CF Ste           1.00000 Mr
Ref Om Bldiv Ref Of Pldiv Ref 21	ar - Sweet 14   55 0 - DC     50 0 - DC     79   17   17	#VB	WHz~26.5	5GHz) (GF	Stop 2.531 s	2799 Peb 87, 2018 7199 Peb 87, 2018 7199 Pea N INN 41 4 GHz 090 dBm 	Frequency           Auto Tun           Center Fre           13.265000000 GH           Start Fre           30.000000 MH           Stop Fre           26.50000000 GH           CF Stej           1.00000 MH
Deposit Sectors Roly           AL         W Other           AL         W Other           AL         W Other           CodeJdiv         Ref Other           CodeJdiv         Ref Other           O dBJdiv         Ref Other     <	ar - Sweet 14 ( 55 0 - OC ) ( 50 0 - OC ) ( 75 0 - OC ) ( 79 0 - OC ) ( 70 0	#VB	VHz~26.5	5GHz) (GF autora aAvgType: RM Avg(Hold>1010	Stop 2.531 s	2199-66-07.2018 719-67-2020 2017 22-07-07 2017 22-07-07 2017 22-07 2017 22-07 2017 22-07 2017 22-07 2017 22-07 2017 22-07 2018 2	Frequency Auto Tun Center Fre 13.26500000 GH Start Fre 30.00000 MH Stop Fre 26.50000000 GH CF Ste 1.000000 MH Auto Ma



Frequency	00.45.58 PH Feb 07,2018 TRACE 1 2 3 4 5 6	Type: RMS	8.	Street P		00000 MHz	- 10	L n	
1	DET P P A N N N	fold:>10/10	• A	#Atten: 20 dB	PNO: Fast				
	r1 2.479 8 GHz -1.502 dBm	Mk				fset 11.72 dB 21.72 dBm		B/div	
Center Fr 13.265000000 G							¢1-	-	.0g
Start Fr 30.000000 M	2.11.65		-						8.29 10.3 20.3 36.3
Stop Fr 25.50000000 G				*****	-	-	(1 <sup>3</sup>	-	48.3 (8.3
	Stop 26.50 GHz 2.531 s (40001 pts)	Sweep 2		V 300 kHz	#VB	łz .	MHz 100 kł	rt 30 I is BW	
Auto M	FUNCTION VALUE	FURNISH MOTOR	1000100	1 600 40-1	10 × Citta		10 103		-
Freq Offs				-1.502 dBm -58.272 dBm -60.101 dBm	79 8 GHz 00 0 GHz 83 5 GHz	2.40	1	N N N	2345
									6789 10
			-	1.00					11



# **8.6 RADIATED EMISSIONS**

# 8.6.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

#### <u>LIMITS</u>

§ 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	(2)
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



§ 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.



## TEST EQUIPMENTS

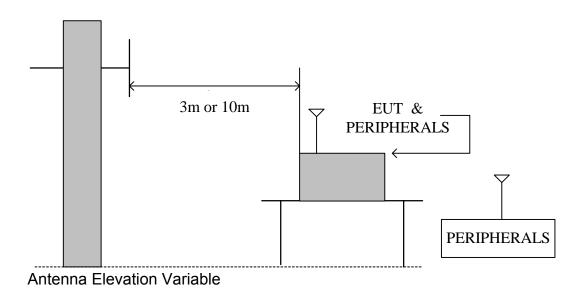
The following test equipments are utilized in making the measurements contained in this report.

	С	hamber 966			
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due	
Active Loop Antenna	ETS-LINDREN	6502	8905-2356	07/19/2019	
Amplifier	HP	8447F	2443A01671	01/21/2019	
Bi-Log Antenna	Sunol	JB1	A070506-2	02/08/2019	
Cable	Rosnol+Suhner	SUCOFLEX 104PEA	SN25737 /4PEA	01/26/2019	
Double Ridged Guide Horn Antenna	ETS-LINDGREN	3116	00078900	03/19/2019	
EMI Test Receiver	R&S	ESCI	100782	06/11/2018	
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	05/08/2018	
Horn Antenna	Com-Power	AH-118	071032	02/08/2019	
Pre-Amplifier	EMCI	EMC012645	980098	01/21/2019	

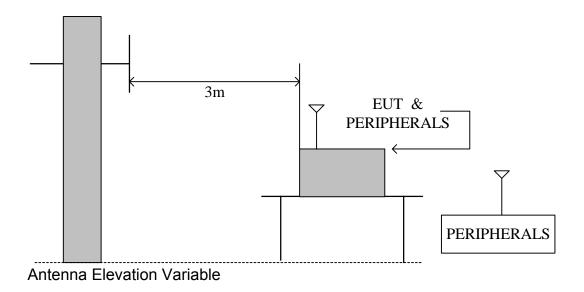


### TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 to 1GHz.



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.





#### TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8/1.5 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. White measuring the radiated emission below 1GHz, the EUT was set 3/10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. White measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The tests were performed in accordance with 558074 D01 DTS Meas Guidance v03r03.

#### NOTE :

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.
- No emission is found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)

#### TEST RESULTS

No non-compliance noted.

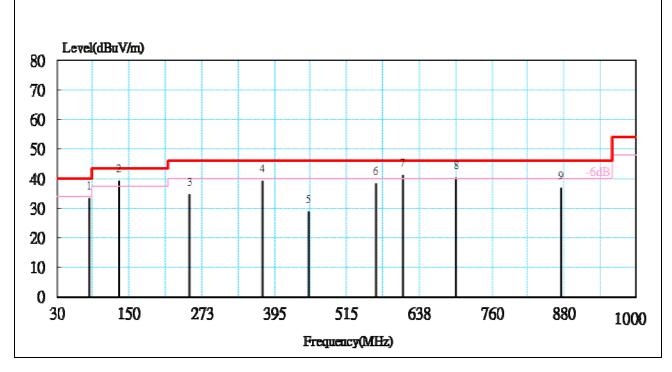


### 8.6.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

Product Name	APC Clip Controller	Test Date	2018/03/20	
Model	APC Live	Test By	Ted Huang	
Test Mode	Normal Operation	TEMP& Humidity	26.5 /60%	

#### Horizontal

(The chart below shows the highest readings taken from the final data.)



	Freq-	Meter Reading	Antenna	Cable	Emission	Limits	Morgin	Detector
No.	Uency	at 3 m Level	Factor	Loss	at 3 m Level	LIIIIIIS	Margin	Mode
	(MHz)	(dBµV)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	PK/QP
1	84.02	24.00	8.01	1.31	33.32	40.00	-6.68	QP
2	133.89	23.61	13.74	1.73	39.09	43.50	-4.41	QP
3	252.00	19.52	12.39	2.67	34.58	46.00	-11.42	QP
4	374.02	19.77	15.59	3.70	39.06	46.00	-6.94	QP
5	451.60	7.32	17.18	4.36	28.86	46.00	-17.14	QP
6	564.48	14.48	18.90	5.01	38.38	46.00	-7.62	QP
7	609.64	16.53	19.44	5.18	41.15	46.00	-4.85	QP
8	699.96	14.05	20.56	5.58	40.19	46.00	-5.81	QP
9	875.03	7.42	23.12	6.22	36.76	46.00	-9.24	QP

Note: 1. QP= Quasi-peak Reading.

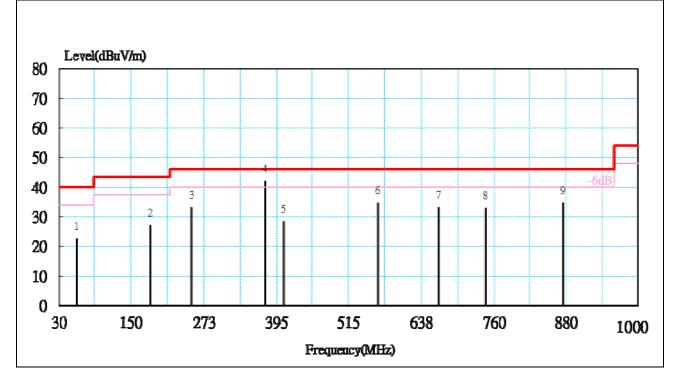
2. The other emission levels were very low against the limit



Product Name	APC Clip Controller	Test Date	2016/08/16
Model	APC Live	Test By	Ted Huang
Test Mode	Normal Operation	TEMP& Humidity	26.4 /52%

#### Vertical

(The chart below shows the highest readings taken from the final data.)



No.	Freq- Uency	Meter Reading at 3 m Level	Antenna Cable Factor Loss		Emission at 3 m Level	Limits	Margin	Detector Mode
110.	(MHz)	(dBµV)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	PK/QP
1	59.81	13.88	7.61	1.10	22.59	40.00	-17.41	QP
2	183.77	13.00	11.93	2.15	27.08	43.50	-16.42	QP
3	252.04	17.94	12.40	2.67	33.00	46.00	-13.00	QP
4	375.01	22.63	15.61	3.71	41.95	46.00	-4.05	QP
5	406.42	8.06	16.30	3.98	28.34	46.00	-17.66	QP
6	564.48	10.65	18.90	5.01	34.55	46.00	-11.45	QP
7	666.56	7.58	20.15	5.43	33.16	46.00	-12.84	QP
8	745.11	6.26	20.83	5.73	32.82	46.00	-13.18	QP
9	875.06	5.37	23.12	6.22	34.71	46.00	-11.29	QP

Note: 1. QP= Quasi-peak Reading.

2. The other emission levels were very low against the limit



### 8.6.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Product Name	APC Clip Controller	Test Date	2018/03/16
Model	APC Live	Test By	Ted Huang
Test Mode	IEEE 802.11b TX (CH Low)	TEMP& Humidity	22.5 , 48%

	TX / IE	EE 802.11	lb mode	/ CH Low	Measurement Distance at 3m Horizontal po				polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.93	64.82	25.07	1.80	47.28	0.41	44.83	74.00	-29.17	Р
*	1124.93	60.46	25.07	1.80	47.28	0.41	40.47	54.00	-13.53	А
*	1375.15	62.25	26.03	2.00	47.11	0.44	43.61	74.00	-30.39	Р
*	1375.15	57.36	26.03	2.00	47.11	0.44	38.72	54.00	-15.28	А
	1996.85	63.05	30.67	2.46	46.78	0.98	50.39	74.00	-23.61	Р
	1996.85	47.56	30.67	2.46	46.78	0.98	34.90	54.00	-19.10	А
	N/A									Р
	N/A									А

	TX / IE	EE 802.11	lb mode	/ CH Low	Measu	uremer	nt Distance	e at 3m	Vertical polarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.04	61.58	25.08	1.80	47.28	0.41	41.59	74.00	-32.41	Р
*	1125.04	57.69	25.08	1.80	47.28	0.41	37.70	54.00	-16.30	А
*	1374.95	61.75	26.02	2.00	47.11	0.44	43.11	74.00	-30.89	Р
*	1374.95	56.38	26.02	2.00	47.11	0.44	37.74	54.00	-16.26	А
	2002.86	70.23	30.70	2.47	46.77	0.98	57.60	74.00	-16.40	Р
	2002.86	51.85	30.70	2.47	46.77	0.98	39.22	54.00	-14.78	А
	N/A									Р
	N/A									А

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss

2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz

3. The result basic equation calculation is as follow:

Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit 4. The other emission levels were 20dB below the limit



Product Name	APC Clip Controller	Test Date	2018/03/16	
Model	APC Live	Test By	Ted Huang	
Test Mode	IEEE 802.11b TX (CH Middle)	TEMP& Humidity	22.5 , 48%	

	TX / IEE	E 802.11t	o mode /	CH Middle	Measurement Distance at 3m Horizontal polarity					olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.23	64.74	25.08	1.80	47.28	0.41	44.75	74.00	-29.25	Р
*	1125.23	60.35	25.08	1.80	47.28	0.41	40.36	54.00	-13.64	А
*	1375.42	62.48	26.03	2.00	47.11	0.44	43.85	74.00	-30.15	Р
*	1375.42	57.56	26.03	2.00	47.11	0.44	38.93	54.00	-15.07	А
	1997.03	63.18	30.68	2.46	46.78	0.98	50.52	74.00	-23.48	Р
	1997.03	47.68	30.68	2.46	46.78	0.98	35.02	54.00	-18.98	А
	N/A									Р
	N/A									А

T

	TX / IEE	E 802.11k	o mode /	CH Middle	Measu	Measurement Distance at 3m				Vertical polarity		
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark		
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)		
*	1124.89	61.76	25.07	1.80	47.28	0.41	41.77	74.00	-32.23	Р		
*	1124.89	57.88	25.07	1.80	47.28	0.41	37.89	54.00	-16.11	А		
*	1374.82	61.92	26.02	2.00	47.11	0.44	43.28	74.00	-30.72	Р		
*	1374.82	56.53	26.02	2.00	47.11	0.44	37.89	54.00	-16.11	А		
	2001.96	70.28	30.70	2.47	46.77	0.98	57.65	74.00	-16.35	Р		
	2001.96	51.76	30.70	2.47	46.77	0.98	39.13	54.00	-14.87	А		
	N/A									Р		
	N/A									А		

REMARK:

AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz 1.

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The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit The other emission levels were 20dB below the limit

4.



Product Name	APC Clip Controller	Test Date	2018/03/16
Model	APC Live	Test By	Ted Huang
Test Mode	IEEE 802.11b TX (CH High)	TEMP& Humidity	22.5 , 48%

	TX / IEI	EE 802.11	b mod	e / CH High	Measu	rement	Horizontal p	olarity		
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.98	65.06	25.07	1.80	47.28	0.41	45.07	74.00	-28.93	Р
*	1124.98	60.74	25.07	1.80	47.28	0.41	40.75	54.00	-13.25	А
*	1375.23	62.36	26.03	2.00	47.11	0.44	43.72	74.00	-30.28	Р
*	1375.23	57.58	26.03	2.00	47.11	0.44	38.94	54.00	-15.06	А
	1998.62	63.23	30.69	2.46	46.78	0.98	50.59	74.00	-23.41	Р
	1998.62	47.62	30.69	2.46	46.78	0.98	34.98	54.00	-19.02	А
	N/A									Р
	N/A									А

	TX / IEE	EE 802.11	b mode	e / CH High	Measu	iremen	t Distance	e at 3m	Vertical p	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.12	61.68	25.08	1.80	47.28	0.41	41.69	74.00	-32.31	Р
*	1125.12	57.78	25.08	1.80	47.28	0.41	37.79	54.00	-16.21	А
*	1375.06	61.52	26.03	2.00	47.11	0.44	42.88	74.00	-31.12	Р
*	1375.06	56.25	26.03	2.00	47.11	0.44	37.61	54.00	-16.39	А
	2003.12	70.58	30.70	2.47	46.77	0.98	57.95	74.00	-16.05	Р
	2003.12	52.06	30.70	2.47	46.77	0.98	39.43	54.00	-14.57	А
	N/A									Р
	N/A									А

AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz 1.

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The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit The other emission levels were 20dB below the limit

4.



Product Name	APC Clip Controller	Test Date	2018/03/16
Model	APC Live	Test By	Ted Huang
Test Mode	IEEE 802.11g TX (CH Low)	TEMP& Humidity	22.5 , 48%

	TX / IE	EE 802.11	lg mod	e / CH Low	Measu	rement	Horizontal p	olarity		
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.85	64.65	25.07	1.80	47.28	0.41	44.66	74.00	-29.34	Р
*	1124.85	60.38	25.07	1.80	47.28	0.41	40.39	54.00	-13.61	А
*	1375.06	62.52	26.03	2.00	47.11	0.44	43.88	74.00	-30.12	Р
*	1375.06	57.72	26.03	2.00	47.11	0.44	39.08	54.00	-14.92	А
	1995.96	63.12	30.67	2.46	46.78	0.98	50.45	74.00	-23.55	Р
	1995.96	47.68	30.67	2.46	46.78	0.98	35.01	54.00	-18.99	А
	N/A									Р
	N/A									А

	TX / IE	EE 802.11	lg mod	e / CH Low	Measu	iremen	t Distance	e at 3m	Vertical p	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.13	61.87	25.08	1.80	47.28	0.41	41.88	74.00	-32.12	Р
*	1125.13	57.76	25.08	1.80	47.28	0.41	37.77	54.00	-16.23	А
*	1374.86	62.18	26.02	2.00	47.11	0.44	43.54	74.00	-30.46	Р
*	1374.86	56.76	26.02	2.00	47.11	0.44	38.12	54.00	-15.88	А
	2001.56	70.45	30.70	2.47	46.77	0.98	57.82	74.00	-16.18	Р
	2001.56	51.98	30.70	2.47	46.77	0.98	39.35	54.00	-14.65	А
	N/A									Р
	N/A									А

AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz 1.

2.

З.

The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit The other emission levels were 20dB below the limit

4.



Product Name	APC Clip Controller	Test Date	2018/03/16
Model	APC Live	Test By	Ted Huang
Test Mode	IEEE 802.11g TX (CH Middle)	TEMP& Humidity	22.5 , 48%

	TX / IEE	E 802.11g	mode /	CH Middle	Measur	rement	Distance	at 3m	Horizontal p	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.42	65.26	25.08	1.80	47.28	0.41	45.27	74.00	-28.73	Р
*	1125.42	60.48	25.08	1.80	47.28	0.41	40.49	54.00	-13.51	А
*	1375.26	62.62	26.03	2.00	47.11	0.44	43.98	74.00	-30.02	Р
*	1375.26	57.78	26.03	2.00	47.11	0.44	39.14	54.00	-14.86	А
	1999.36	63.26	30.69	2.46	46.78	0.98	50.63	74.00	-23.37	Р
	1999.36	47.82	30.69	2.46	46.78	0.98	35.19	54.00	-18.81	А
	N/A									Р
	N/A									А

	TX / IEE	E 802.11g	g mode /	CH Middle	Meas	ureme	nt Distanc	e at 3m	Vertical p	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.98	62.33	25.07	1.80	47.28	0.41	42.34	74.00	-31.66	Р
*	1124.98	57.96	25.07	1.80	47.28	0.41	37.97	54.00	-16.03	А
*	1375.06	61.62	26.03	2.00	47.11	0.44	42.98	74.00	-31.02	Р
*	1375.06	56.32	26.03	2.00	47.11	0.44	37.68	54.00	-16.32	А
	2002.28	70.15	30.70	2.47	46.77	0.98	57.52	74.00	-16.48	Р
	2002.28	51.62	30.70	2.47	46.77	0.98	38.99	54.00	-15.01	А
	N/A									Р
	N/A									А

AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz 1.

2.

З.

The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit The other emission levels were 20dB below the limit



Product Name	APC Clip Controller	Test Date	2018/03/16
Model	APC Live	Test By	Ted Huang
Test Mode	IEEE 802.11g TX (CH High)	TEMP& Humidity	22.5 , 48%

	TX / IEI	EE 802.11	g mod	e / CH High	Measu	Measurement Distance at 3m Horizon				
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.12	65.18	25.08	1.80	47.28	0.41	45.19	74.00	-28.81	Р
*	1125.12	60.56	25.08	1.80	47.28	0.41	40.57	54.00	-13.43	А
*	1375.08	62.48	26.03	2.00	47.11	0.44	43.84	74.00	-30.16	Р
*	1375.08	57.87	26.03	2.00	47.11	0.44	39.23	54.00	-14.77	А
	1999.33	63.42	30.69	2.46	46.78	0.98	50.78	74.00	-23.22	Р
	1999.33	47.82	30.69	2.46	46.78	0.98	35.18	54.00	-18.82	А
	N/A									Р
	N/A									А

	TX / IE	EE 802.11	g mode	e / CH High	Meas	ureme	nt Distanc	e at 3m	Vertical po	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.96	61.86	25.07	1.80	47.28	0.41	41.87	74.00	-32.13	Р
*	1124.96	57.93	25.07	1.80	47.28	0.41	37.94	54.00	-16.06	А
*	1375.26	61.42	26.03	2.00	47.11	0.44	42.78	74.00	-31.22	Р
*	1375.26	56.08	26.03	2.00	47.11	0.44	37.44	54.00	-16.56	А
	2002.78	70.26	30.70	2.47	46.77	0.98	57.63	74.00	-16.37	Р
	2002.78	52.38	30.70	2.47	46.77	0.98	39.75	54.00	-14.25	А
	N/A									Р
	N/A									А

AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz 1.

2.

З. The result basic equation calculation is as follow:

Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit The other emission levels were 20dB below the limit

4.



Product Name	APC Clip Controller	Test Date	2018/03/16
Model	APC Live	Test By	Ted Huang
Test Mode	IEEE 802.11n HT20 TX (CH Low)	TEMP& Humidity	22.5 , 48%

	TX / IEEE	802.11n H	IT20 mo	de / CH Low	Measur	rement	Distance a	at 3m 🛛 I	Horizontal	polarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.98	64.65	25.07	1.80	47.28	0.41	44.66	74.00	-29.34	Р
*	1124.98	60.28	25.07	1.80	47.28	0.41	40.29	54.00	-13.71	А
*	1375.22	62.63	26.03	2.00	47.11	0.44	43.99	74.00	-30.01	Р
*	1375.22	57.74	26.03	2.00	47.11	0.44	39.10	54.00	-14.90	А
	1997.36	63.23	30.68	2.46	46.78	0.98	50.57	74.00	-23.43	Р
	1997.36	47.75	30.68	2.46	46.78	0.98	35.09	54.00	-18.91	А
	N/A									Р
	N/A									А

	TX / IEEE	802.11n H	IT20 mo	de / CH Low	Measu	rement	Vertical po	olarity		
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.08	61.75	25.08	1.80	47.28	0.41	41.76	74.00	-32.24	Р
*	1125.08	57.82	25.08	1.80	47.28	0.41	37.83	54.00	-16.17	А
*	1375.09	61.43	26.03	2.00	47.11	0.44	42.79	74.00	-31.21	Р
*	1375.09	56.16	26.03	2.00	47.11	0.44	37.52	54.00	-16.48	Α
	2002.63	69.86	30.70	2.47	46.77	0.98	57.23	74.00	-16.77	Р
	2002.63	51.23	30.70	2.47	46.77	0.98	38.60	54.00	-15.40	Α
	N/A									Р
	N/A									А

AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz 1.

2.

З.

The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit The other emission levels were 20dB below the limit

4.



Product Name	APC Clip Controller	Test Date	2018/03/16
Model	APC Live	Test By	Ted Huang
Test Mode	IEEE 802.11n HT20 TX (CH Middle)	TEMP& Humidity	22.5 , 48%

	TX / IEEE	802.11n H1	20 mode	/ CH Middle	Measurement Distance at 3m Horizontal pola					oolarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.18	64.88	25.08	1.80	47.28	0.41	44.89	74.00	-29.11	Р
*	1125.18	60.48	25.08	1.80	47.28	0.41	40.49	54.00	-13.51	А
*	1375.29	62.62	26.03	2.00	47.11	0.44	43.98	74.00	-30.02	Р
*	1375.29	57.88	26.03	2.00	47.11	0.44	39.24	54.00	-14.76	А
	1998.24	63.36	30.69	2.46	46.78	0.98	50.71	74.00	-23.29	Р
	1998.24	47.86	30.69	2.46	46.78	0.98	35.21	54.00	-18.79	А
	N/A									Р
	N/A									А

	TX / IEEE 8	802.11n HT	20 mode /	CH Middle	Measurement Distance at 3m Vertical pola					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.78	61.58	25.07	1.80	47.28	0.41	41.59	74.00	-32.41	Р
*	1124.78	57.63	25.07	1.80	47.28	0.41	37.64	54.00	-16.36	А
*	1374.93	62.33	26.02	2.00	47.11	0.44	43.69	74.00	-30.31	Р
*	1374.93	56.86	26.02	2.00	47.11	0.44	38.22	54.00	-15.78	А
	2002.16	70.43	30.70	2.47	46.77	0.98	57.80	74.00	-16.20	Р
	2002.16	51.85	30.70	2.47	46.77	0.98	39.22	54.00	-14.78	А
	N/A									Р
	N/A									А

AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz 1.

2.

З.

The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit The other emission levels were 20dB below the limit

4.



Product Name	APC Clip Controller	Test Date	2018/03/16
Model	APC Live	Test By	Ted Huang
Test Mode	IEEE 802.11n HT20 TX (CH High)	TEMP& Humidity	22.5 , 48%

	TX / IEEE	802.11n H	T20 mod	e / CH High	Measurement Distance at 3m Horizontal pol					olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.86	65.28	25.07	1.80	47.28	0.41	45.29	74.00	-28.71	Р
*	1124.86	60.98	25.07	1.80	47.28	0.41	40.99	54.00	-13.01	А
*	1375.28	62.43	26.03	2.00	47.11	0.44	43.79	74.00	-30.21	Р
*	1375.28	57.68	26.03	2.00	47.11	0.44	39.04	54.00	-14.96	А
	1999.64	63.08	30.70	2.46	46.78	0.98	50.45	74.00	-23.55	Р
	1999.64	47.54	30.70	2.46	46.78	0.98	34.91	54.00	-19.09	А
	N/A									Р
	N/A									А

	TX / IEEE	802.11n H	T20 mod	e / CH High	Measu	rement	Vertical p	olarity		
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.24	61.86	25.08	1.80	47.28	0.41	41.87	74.00	-32.13	Р
*	1125.24	57.67	25.08	1.80	47.28	0.41	37.68	54.00	-16.32	А
*	1375.16	61.33	26.03	2.00	47.11	0.44	42.69	74.00	-31.31	Р
*	1375.16	56.57	26.03	2.00	47.11	0.44	37.93	54.00	-16.07	А
	2002.86	70.72	30.70	2.47	46.77	0.98	58.09	74.00	-15.91	Р
	2002.86	52.86	30.70	2.47	46.77	0.98	40.23	54.00	-13.77	А
	N/A									Р
	N/A									А

AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz 1.

2.

З. The result basic equation calculation is as follow:

Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit The other emission levels were 20dB below the limit

4.



Product Name	APC Clip Controller	Test Date	2018/02/07
Model	APC Live	Test By	Ted Huang
Test Mode	Bluetooth 4.0 TX (CH Low)	TEMP& Humidity	18.5 , 52%

	TX / Bluet	ooth 4.0 (C	SFSK) mo	de / CH Low	Measur	ement	Distance a	at 3m 🛛 🖁	lorizontal p	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.85	64.65	25.10	1.80	47.28	0.41	44.69	74.00	-29.31	Р
*	1124.85	60.38	25.10	1.80	47.28	0.41	40.42	54.00	-13.58	А
*	1375.06	62.52	26.10	2.00	47.11	0.44	43.96	74.00	-30.04	Р
*	1375.06	57.72	26.10	2.00	47.11	0.44	39.16	54.00	-14.84	А
*	4804.05	57.68	33.79	4.11	46.66	0.22	49.14	74.00	-24.86	Р
*	4804.05	48.94	33.79	4.11	46.66	0.22	40.40	54.00	-13.60	А
	N/A									Р
	N/A									А

	TX / Bluet	ooth 4.0 (C	GFSK) mo	de / CH Low	Measur	ement	Distance	at 3m	Vertical p	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.13	61.87	25.10	1.80	47.28	0.41	41.91	74.00	-32.09	Р
*	1125.13	57.76	25.10	1.80	47.28	0.41	37.80	54.00	-16.20	А
*	1374.86	62.18	26.10	2.00	47.11	0.44	43.62	74.00	-30.38	Р
*	1374.86	56.76	26.10	2.00	47.11	0.44	38.20	54.00	-15.80	А
*	4803.97	59.33	33.79	4.11	46.66	0.22	50.79	74.00	-23.21	Р
*	4803.97	49.82	33.79	4.11	46.66	0.22	41.28	54.00	-12.72	А
	N/A									Р
	N/A									А

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss

2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz

3. The result basic equation calculation is as follow:

Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit

4. The other emission levels were 20dB below the limit



Product Name	APC Clip Controller	Test Date	2018/02/07
Model	APC Live	Test By	Ted Huang
Test Mode	Bluetooth 4.0 TX (CH Middle)	TEMP& Humidity	18.5 , 52%

	TX / Blueto	oth 4.0 (GF	SK) mode	e / CH Middle	Measure	ement	Distance a	at 3m 🛛 🛛	Horizontal p	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.98	65.06	25.10	1.80	47.28	0.41	45.10	74.00	-28.90	Р
*	1124.98	60.74	25.10	1.80	47.28	0.41	40.78	54.00	-13.22	А
*	1375.23	62.36	26.10	2.00	47.11	0.44	43.80	74.00	-30.20	Р
*	1375.23	57.58	26.10	2.00	47.11	0.44	39.02	54.00	-14.98	А
*	4883.85	58.58	34.08	4.16	46.68	0.23	50.37	74.00	-23.63	Р
*	4883.85	50.67	34.08	4.16	46.68	0.23	42.46	54.00	-11.54	А
	N/A									Р
	N/A									А

	TX / Blueto	oth 4.0 (GF	SK) mode	/ CH Middle	Measu	remen	t Distance	e at 3m	Vertical p	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
,	1125.12	61.68	25.10	1.80	47.28	0.41	41.72	74.00	-32.28	Р
7	1125.12	57.78	25.10	1.80	47.28	0.41	37.82	54.00	-16.18	А
,	1375.06	61.52	26.10	2.00	47.11	0.44	42.96	74.00	-31.04	Р
,	1375.06	56.25	26.10	2.00	47.11	0.44	37.69	54.00	-16.31	А
,	4883.68	57.57	34.08	4.16	46.68	0.23	49.36	74.00	-24.64	Р
,	4883.68	49.76	34.08	4.16	46.68	0.23	41.55	54.00	-12.45	А
ſ	N/A									Р
ſ	N/A									Α

AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz 1.

2.

З. The result basic equation calculation is as follow:

Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit The other emission levels were 20dB below the limit

4.



Product Name	APC Clip Controller	Test Date	2018/02/07
Model	APC Live	Test By	Ted Huang
Test Mode	Bluetooth 4.0 TX (CH High)	TEMP& Humidity	18.5 , 52%

	TX / Blueto	ooth 4.0 (G	FSK) mod	de / CH High	Measur	ement	Distance	at 3m	Horizontal	polarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1125.42	65.26	25.10	1.80	47.28	0.41	45.30	74.00	-28.70	Р
*	1125.42	60.48	25.10	1.80	47.28	0.41	40.52	54.00	-13.48	А
*	1375.26	62.62	26.10	2.00	47.11	0.44	44.06	74.00	-29.94	Р
*	1375.26	57.78	26.10	2.00	47.11	0.44	39.22	54.00	-14.78	А
*	4959.57	57.35	34.35	4.21	46.70	0.24	49.45	74.00	-24.55	Р
*	4959.57	47.56	34.35	4.21	46.70	0.24	39.66	54.00	-14.34	А
	N/A									Р
	N/A									А

	TX / Blueto	ooth 4.0 (G	FSK) mod	de / CH High	Measur	rement	t Distance	at 3m	Vertical p	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1124.98	62.33	25.10	1.80	47.28	0.41	42.37	74.00	-31.63	Р
*	1124.98	57.96	25.10	1.80	47.28	0.41	38.00	54.00	-16.00	А
*	1375.06	61.62	26.10	2.00	47.11	0.44	43.06	74.00	-30.94	Р
*	1375.06	56.32	26.10	2.00	47.11	0.44	37.76	54.00	-16.24	А
*	4959.86	57.14	34.36	4.21	46.70	0.24	49.25	74.00	-24.75	Р
*	4959.86	48.40	34.36	4.21	46.70	0.24	40.50	54.00	-13.50	А
	N/A									Р
	N/A									А

AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: 2.4GHz~2.5GHz Filter Insertion Loss Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz 1.

2.

З.

The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter , Margin = Level-Limit The other emission levels were 20dB below the limit

4.



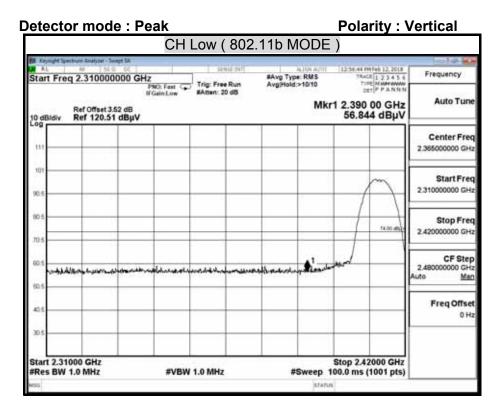
Report No.: T180118N03-RP1 Page 91 of 121 Rev. 00 FCC ID: Y4O-ADA2

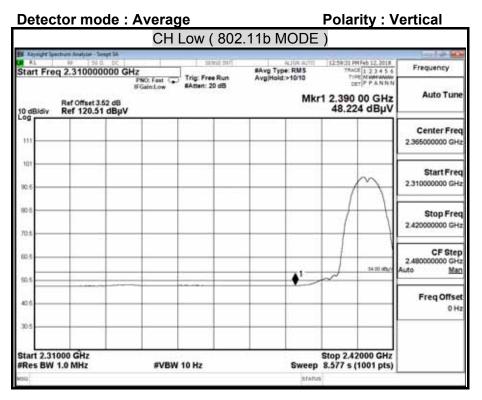
# 8.6.4 RESTRICTED BAND EDGES

Model Name	APC L	ive	Test By	Ted Huang
Temp & Humidity	22.5 ,	48%	Test Date	2018/03/16
Detect	or mode : Peak		Polarity : I	lorizontal
	CHI	_ow(802.11b N	MODE )	
AL AL	entres Andres - Sengt IA 90 22310000000 GHz		ALTIN AUTO 61 06:36 PH Feb 12,20 pe: RMS 3RACE 12.3 4 d>10/10 7/PE KWWW	Frequency
10 dB/div	PNC: Fast IFGainLow Ref Offset 3.52 dB Ref 120.51 dBµV	#Atten: 20 dB	d>1919 Mkr1 2.390 00 GH 58.406 dBµ	z Auto Tune
111				Center Freq 2.36500000 GHz
101 90 6				Start Freq 2.31000000 GHz
90 S			74.00.d	Stop Freq 2.42000000 GHz
60 S	and the section of th		- time with	CF Step 2.48000000 GHz Auto Man
42.5				Freq Offset 0 Hz
30.5 Start 2.31			Stop 2.42000 Gł	
#Res BW	1.0 MHz #VBW	1.0 MHz	#Sweep 100.0 ms (1001 pt status	s)

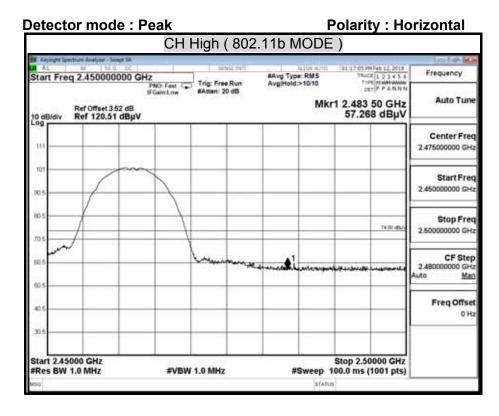
		CH	Low(802	2.11b MODE	.)	
Keysight la	ectrure Realyzer - See	pt IA	sing of	AUGA AUTO	61:11:04 PH Feb 12, 2018	
Start Fre	q 2.3100000	PNC Fast	Trig: Free Run	#Avg Type: RMS Avg(Hold:>10/10	TRACE 1 2 3 4 5 6	Frequency
10 dB/div	Ref Offset 3.5 Ref 120.51	IFGainLow	#Atten: 20 dB	Mk	ост/РРАNNИ 1 2.390 00 GHz 48.326 dBµV	Auto Tune
111						Center Free 2.36500000 GH
101						Start Free 2.31000000 GH
105 705						Stop Free 2.42000000 GH
60.5				1	54 00 attach	CF Step 2.48000000 GH Auto <u>Ma</u>
42.6	-					Freq Offse 0 H
30.5						
Start 2.31 #Res BW		#VBW	10 Hz	Shireson	Stop 2.42000 GHz 8.577 s (1001 pts)	

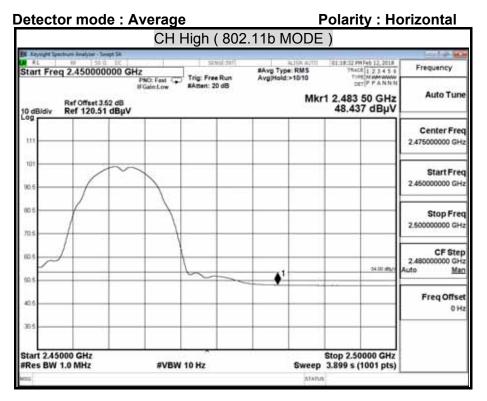




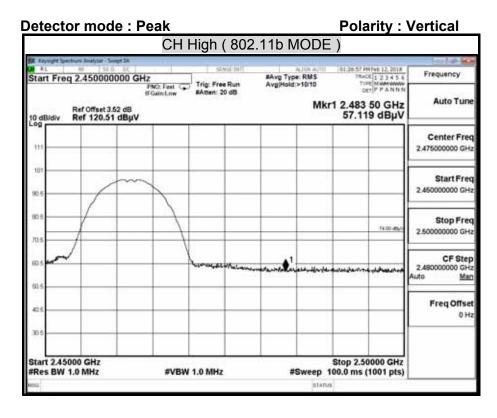


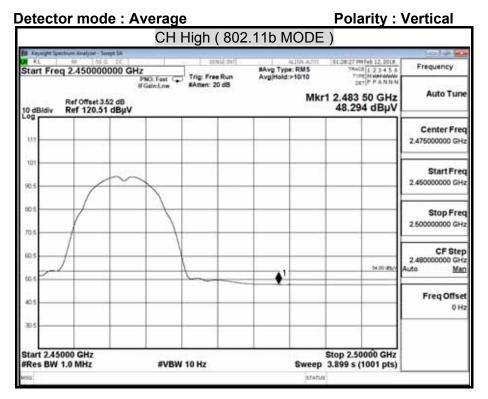




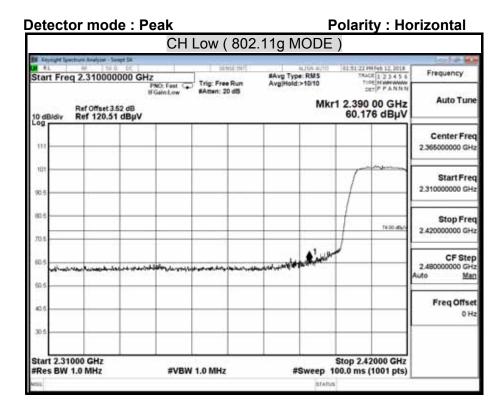


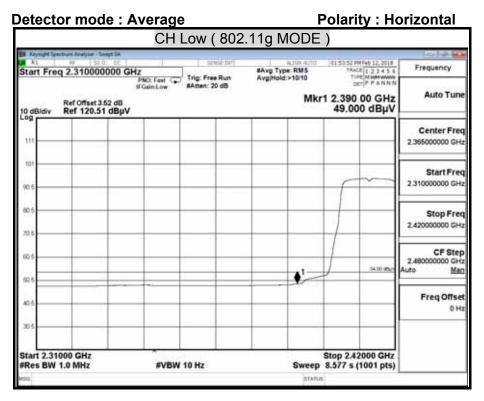




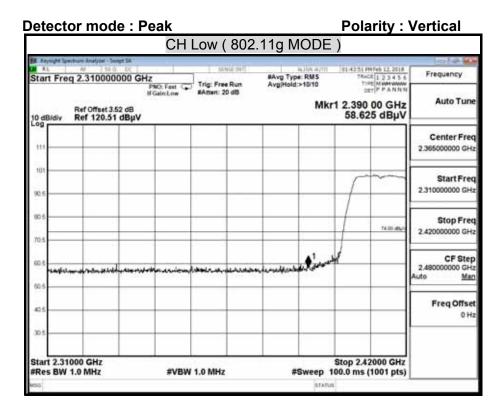


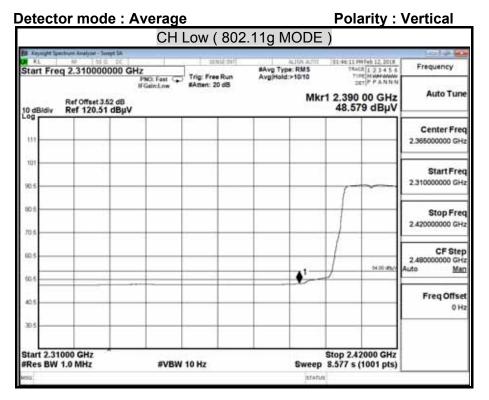




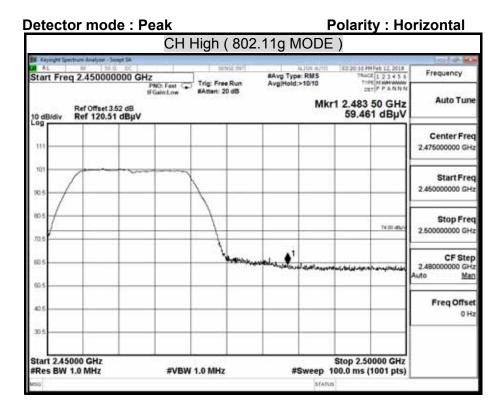


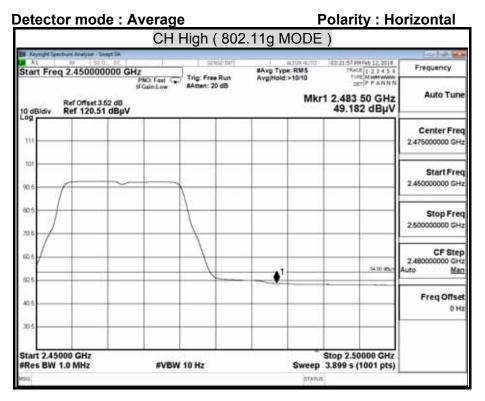




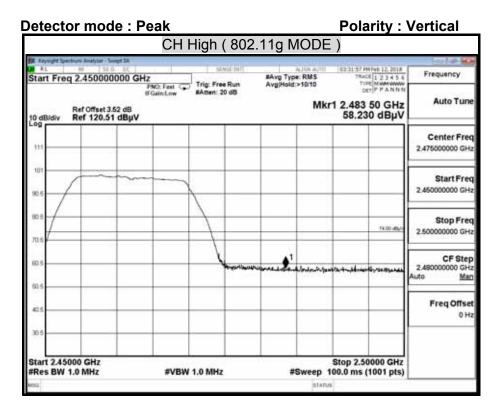


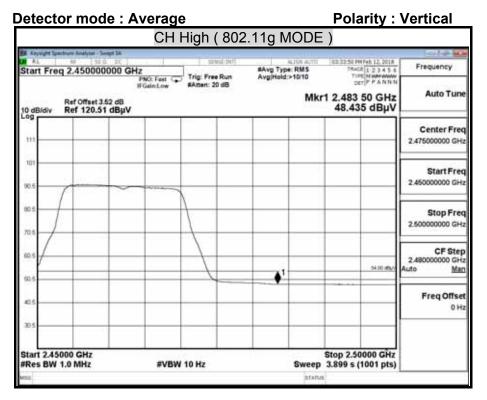




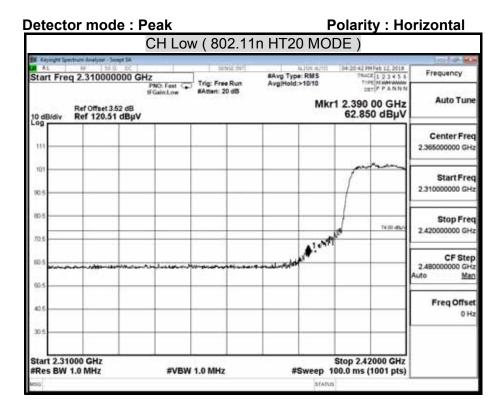


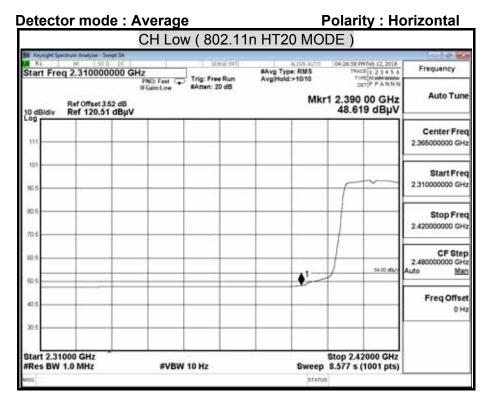




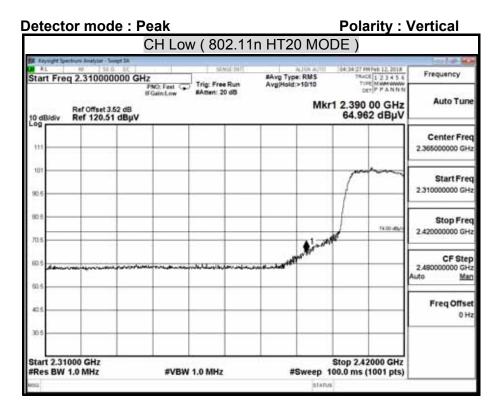


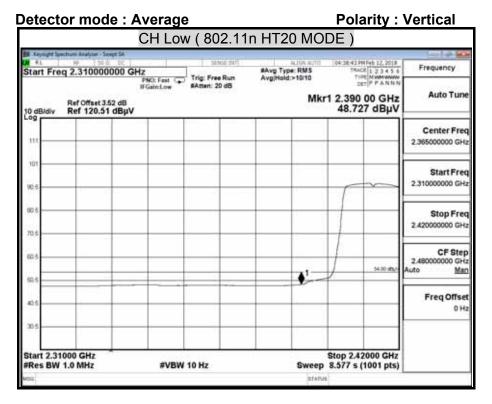




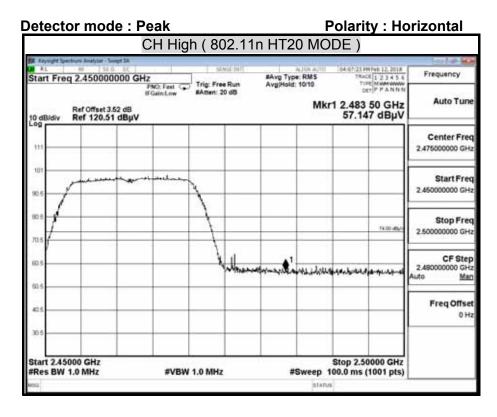


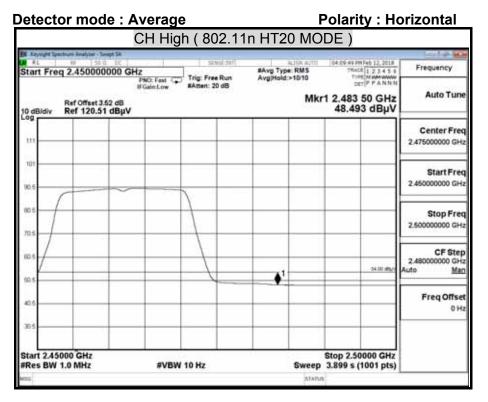




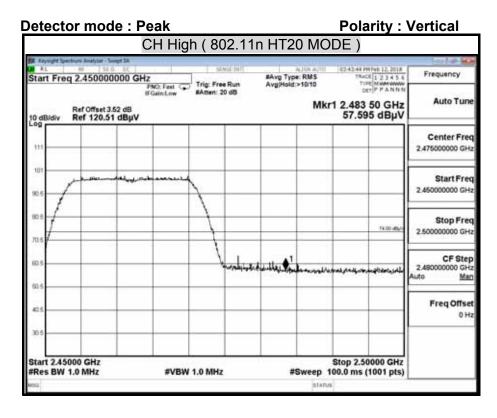


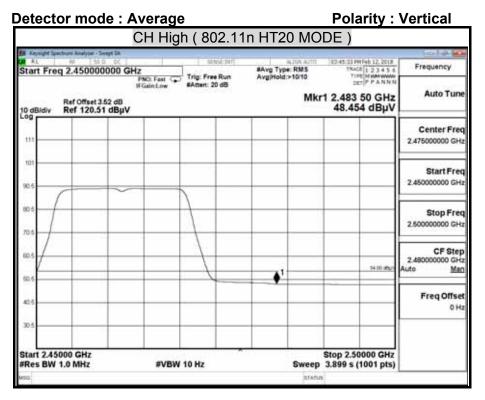














Report No.: T180118N03-RP1 Page 103 of 121 Rev. 00 FCC ID: Y4O-ADA2

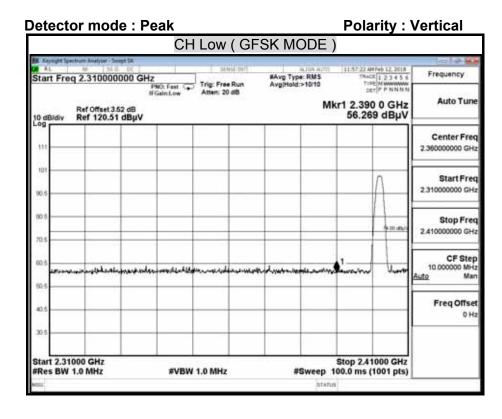
Bluetooth 4.0

Model Name	APC Live	Test By	Ted Huang
Temp & Humidity	18.5 , 52%	Test Date	2018/02/07

etector mode : F		FSK MODE )	olarity : Ho	nzontai
I Keysight Spectrum Analyzer - Swept SA				- 10 B
Start Freq 2.310000000 GH		#Avg Type: RMS	12:11:28 PH Feb 12, 2018 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 3.52 dB 10 dBidiv Ref 120.51 dBµV	PNO: Fest Trig: Free Run If Gein:Low #Atten: 20 dB	Avg(Hold:>10/10 Mki	1 2.390 0 GHz 57.335 dBµV	Auto Tun
111				Center Fre 2.36000000 GH
101				Start Fre 2.31000000 GH
80.5			TK 00 attu/s	Stop Fre 2.41000000 GH
60.5	acasulean are aution	، بالقندي يوماند مونية مهندا إسار مر	1 Unginerright Myseche	CF Ste 10.000000 MH Auto Ma
425				Freq Offse 0 H
30.5				
Start 2.31000 GHz #Res BW 1.0 MHz	#VBW 1.0 MHz		Stop 2.41000 GHz 0.0 ms (1001 pts)	

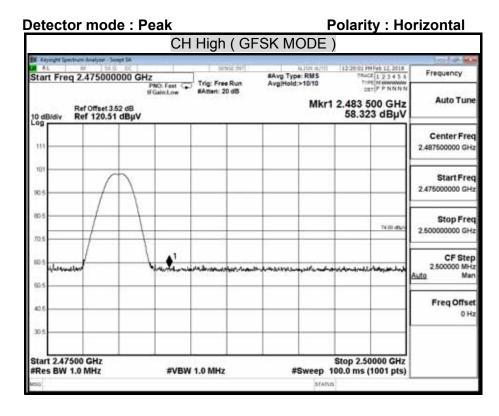
			MODE )	FS	Low (G	CH		
Frequency		12:13:17 PH Feb	ALTIN AUTO	1	strist duty	a li	ectrure Analyzer - Swept SA AF 255 0 DC	AL
Auto Tun	GHz	TUPPIN	Hold:>10/10		Trig: Free Run #Atten: 20 dB	1Z PNO: Fast G IFGain:Low	Ref Offset 3.52 dB	
Center Fre 2.36000000 GH		40.321					Ref 120.51 dBµV	og 111
Start Fre 2.31000000 GH	-	Λ						101
Stop Fre 2.41000000 GH								80 5 70 5
CF Ste 10.000000 Mi Auto Ma	14 20 attu-1	1		_				(0.5
Freq Offse 0 H	-							42.5
	_							30.5
		Stop 2.4100 8.93 ms (100	Sweep 2	- 11	2.7 kHz	#VBW	1000 GHz 1.0 MHz	

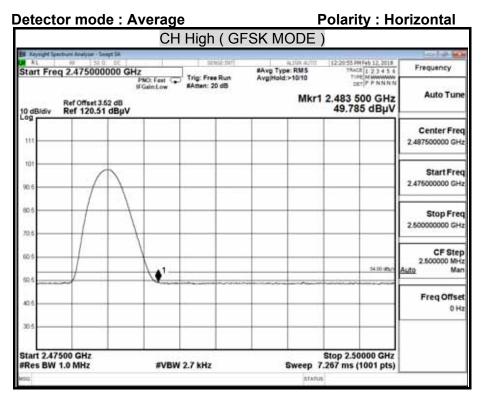




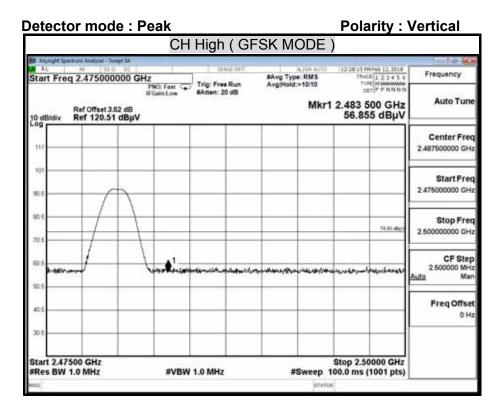
Vertical	ty :	Polari				е	verag	de : A	or mo	ect	)et
			DE)	SK MO	' ( GF	l Low	CH				
	and the second		ang man-12	11 11	in a mission	19-50			ctrure Analyter		
Frequency	23456	TRACE 1	RM5	#Avg Type:	INSECUTE	La de la de		00000 GH			
Auto Tun		2.390 0 19.013 d		Avg Hold>		Trig: Fre #Atten: 2	PNC: Fast G FGain:Low		Ref Offset Ref 120.	Bidiv	10 dl
Center Fre 2.36000000 GH		_			-		_		_		111
Start Fre 2.31000000 GH		Λ									101
Stop Fre 2.41000000 GH										-	805 705
СF Ste 10.000000 Мн Ацер Ма	4 00 attu/										60.5
Freq Offse	tim									~~~~	40.5
	_	_	_		-	-			-	-	30.5
		p 2.4100 3 ms (100	S weep 28.	ร	c.	2.7 kHz	#VBW		000 GHz 1.0 MHz		
1			STATUS								MBIS

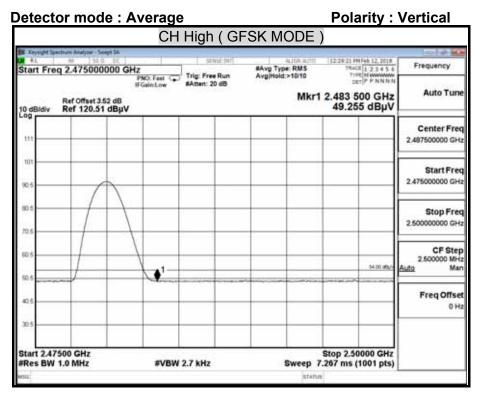














### 8.7 POWERLINE CONDUCTED EMISSIONS

#### <u>LIMITS</u>

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dBµv)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

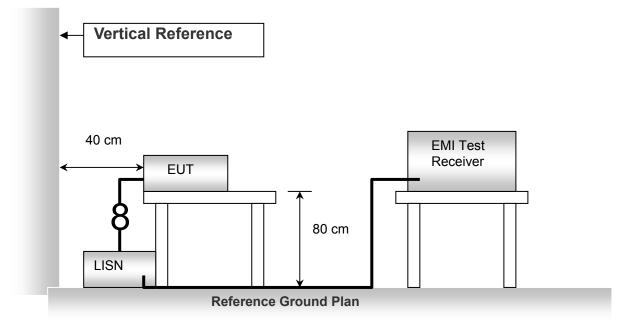
#### TEST EQUIPMENTS

The following test equipments are used during the conducted power line tests :

Conducted Emission room #1						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due		
BNC Coaxial Cable	CCS	BNC50	11	01/23/2019		
EMI Test Receiver	R&S	ESCS 30	100348	01/30/2019		
LISN	SCHWARZBECK	NNLK8130	8130124	11/30/2018		
LISN	FCC	FCC-LISN-50 -32-2	08009	05/07/2018		
Pulse Limiter	R&S	ESH3-Z2	100116	01/23/2019		
Software	e-3 (5.04211j)					



### TEST SETUP



#### TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.10.

The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.



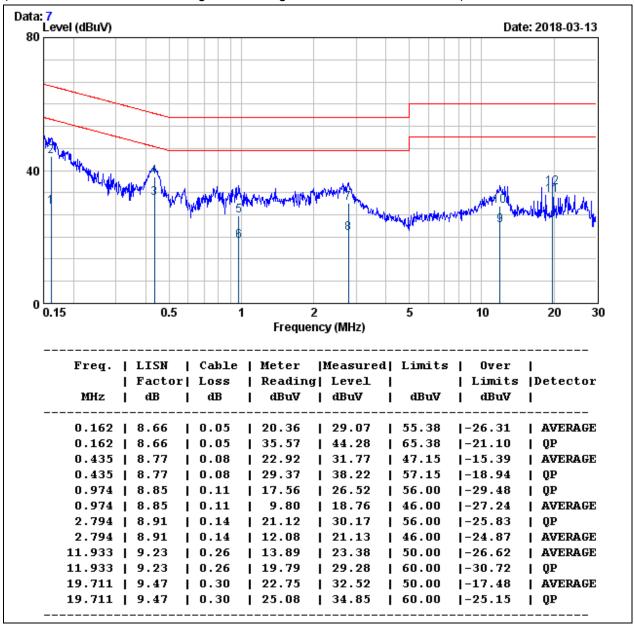
### TEST RESULTS

No non-compliance noted.

Model No.	APC Live	Test Mode	Normal Operation
Environmental Conditions	22 , 57% RH	Resolution Bandwidth	9 kHz
Tested by	Weici Lo		

#### Line

(The chart below shows the highest readings taken from the final data.)



#### NOTE:

1. Measured Level (dBuV) = LISN Factor (dB) + Cable Loss (dB)+ Meter Reading (dBuV)

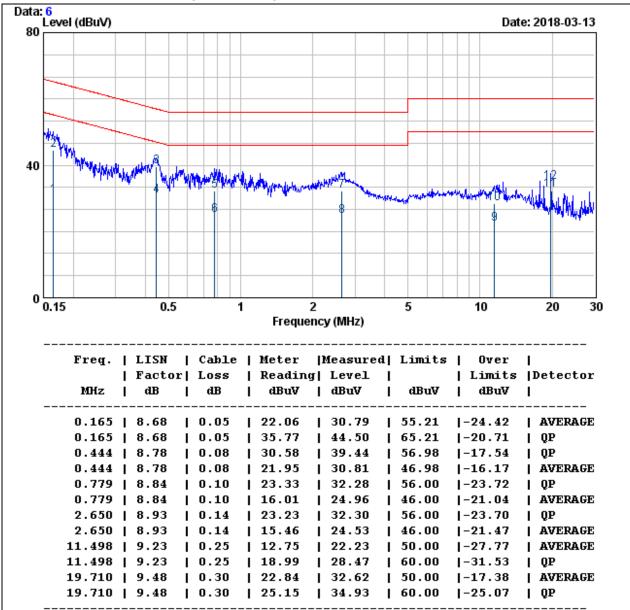
2. Over Limit (dBuV) = Measured Level (dBuV) – Limits (dBuV)



Model No.	APC Live	Test Mode	Normal Operation
Environmental Conditions		Resolution Bandwidth	9 kHz
Tested by	Weici Lo		

#### Neutral

(The chart below shows the highest readings taken from the final data.)



#### NOTE:

1. Measured Level (dBuV) = LISN Factor (dB) + Cable Loss (dB)+ Meter Reading (dBuV)

2. Over Limit (dBuV) = Measured Level (dBuV) – Limits (dBuV)



# 9. ANTENNA REQUIREMENT

### 9.1 STANDARD APPLICABLE

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.

### 9.2 ANTENNA CONNECTED CONSTRUCTION

Type: PCB Antenna Model: WLA-EM-1508-0008-B Manufacturer: BRITO Gain: 4.6 dBi