

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

# **TEST REPORT**

For

# WIRELESS TURNTABLE

# Model: AT-LP60-BT

## Brand Name: audio-technica

Issued for

Audio-Technica Corporation 2-46-1 Nishi-naruse, Machida, Tokyo 194-8666, Japan

> Issued By Compliance Certification Services Inc.

Tainan Laboratory No.8, Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.) TEL: 886-6-580-2201 FAX: 886-6-580-2202 http://www.ccsrf.com E-Mail : service@ccsrf.com Issued Date: September 19, 2015



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# **REVISION HISTORY**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	September 19, 2015	Initial Issue	ALL	Sunny Chang

# TABLE OF CONTENTS

TITLE PAGE NO.
1. TEST REPORT CERTIFICATION
2. EUT DESCRIPTION
2.1 DESCRIPTION OF EUT & POWER
3. DESCRIPTION OF TEST MODES 6
4. TEST METHODOLOGY
5. FACILITIES AND ACCREDITATIONS
5.1 FACILITIES
5.2 EQUIPMENT
5.3 LABORATORY ACCREDITATIONS LISTINGS
5.4 TABLE OF ACCREDITATIONS AND LISTINGS
6. SETUP OF EQUIPMENT UNDER TEST 10
6.1 SETUP CONFIGURATION OF EUT10
6.2 SUPPORT EQUIPMENT
7. APPLICABLE LIMITS AND TEST RESULTS
7.1 20DB BANDWIDTH FOR HOPPING13
7.2 MAXIMUM PEAK OUTPUT POWER19
7.3 HOPPING CHANNEL SEPARATION25
7.4 NUMBER OF HOPPING FREQUENCY USED
7.5 DWELL TIME ON EACH CHANNEL
7.6 DUTY CYCLE
7.7 CONDUCTED SPURIOUS EMISSION
7.8 RADIATED EMISSIONS
7.7.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS
7.7.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHZ66
7.7.4 RESTRICTED BAND EDGES
APPENDIX I PHOTOGRPHS OF TEST SETUP

# **1. TEST REPORT CERTIFICATION**

Applicant	:	Audio-Technica Corporation
Address	:	2-46-1 Nishi-naruse, Machida, Tokyo 194-8666, Japan
Manufacturer	:	HANCHIH ELECTRONICS(SHENZHEN) CO.,LTD
Address	:	XINGYE FIRST ROAD 60#, FENGHUANG INDUSTRIAL DISTRICT, FUYONG TOWN,BAOAN COUNTY, SHENZHEN CITY, GUANG DONG PROVINCE, CHINA
Equipment Under Test	:	WIRELESS TURNTABLE
Model Number	:	AT-LP60-BT
Brand Name	:	audio-technica
Date of Test	:	September 02, 2015 ~ September 03, 2015

APPLICABLE STANDARD		
STANDARD	TEST RESULT	
FCC Part 15 Subpart C: 2013 AND ANSI C63.10: 2013	PASS	

# We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.10: 2013** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

Jeter Wu Assistant Manager

**Reviewed by:** 

Eric Huang Assistant Section Manager

# 2. EUT DESCRIPTION

# 2.1 DESCRIPTION OF EUT & POWER

Product	WIRELESS TURNTABLE
Model Number	AT-LP60-BT
Brand Name	audio-technica
Identify Number	T150826N01
Received Date	August 26, 2015
Frequency Range	2402 ~ 2480 MHz
Transmit Peak Power	GFSK : 3.072dBm / 2.02768272mW 8DPSK: 2.44dBm / 1.7538805mW
Channel Spacing	1MHz
Transmit Data Rate	GFSK (1Mbps), $\pi$ /4-DQPSK (2Mbps), 8-DPSK (3Mbps)
Modulation Technique	Frequency Hopping Spread Spectrum
Number of Channels	79 Channels
Power Supply	AC~120V, 60Hz, 3W
Antenna Type	Type: PCB Model: 704-60BT-B251 Gain: 0.467dBi
Hardware Version	BHC43-3
Software Version	BHS26-3

#### Remark:

1. The sample selected for test was production product and was provided by manufacturer.

- 2. This submittal(s) (test report) is intended for **FCC ID: JFZLP60BT** 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 had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)	
Low	2402	
Middle	2441	
High	2480	

#### Radiated Emission Test (Below 1 GHz):

- ☑ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Example Selected for the final test as listed below.

Normal Operation

#### Radiated Emission Test (Above 1 GHz):

- ☑ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- EX Following channel(s) was (were) selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH5
Low, Mid, High	FHSS	8-DPSK	3-DH5

#### Bandedge Measurement :

- ☑ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Example Selected for the final test as listed below.

Tested Channel Modulation Technology		Modulation Type	Packet Type
Low, High	FHSS	GFSK	DH5
Low, High	FHSS	8-DPSK	3-DH5

#### Antenna Port Conducted Measurement :

- ☑ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Example Selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH5
Low, Mid, High	FHSS	8-DPSK	3-DH5

# 4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10 : 2013 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: TW-1037).

# 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Our laboratories are accredited and approved by the following approval agencies 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

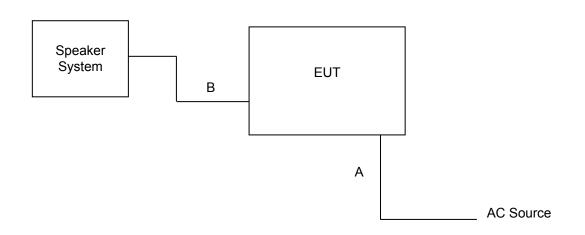
Copies of granted accreditation certificates are available for downloading from our web site, http:///www.ccsrf.com



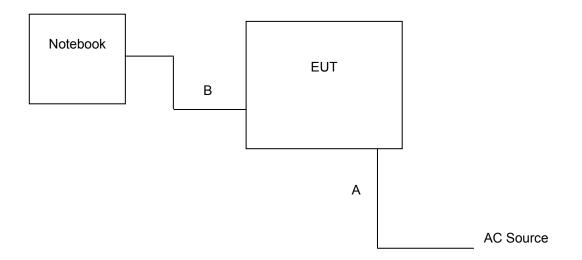
# 6. SETUP OF EQUIPMENT UNDER TEST

# **6.1 SETUP CONFIGURATION OF EUT**

EMI



RF



# **6.2 SUPPORT EQUIPMENT**

### For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Speaker System	KINKO	KY-550	DOC	Audio cable, unshd, 1.6m

No.	Signal cable description	
A	AC Power	Unshielded, 1.5m, 1 pcs
В	Audio cable	Unshielded, 1.0m, 1 pcs

#### For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Notebook	Acer	AS 3830TG	DOC	Power cable, unshd, 1.6m

No.	Signal cable description		
А	Power	Unshielded, 1.6m, 1pcs	
В	USB	Unshielded, 0.5m, 1pcs.	

100

#### **EUT OPERATING CONDITION**

#### **RF Setup**

- 1. Set up a whole system as the setup diagram.
- 2. Use the software "RF Control Kit v1.0" for test.

REALINER IN	AR Const Kent D	2 🖸 U
	COM Nurl Iab COM Nurl Iab COM Nurl Iconell	
31年527 9 21日27日 9	Both in Densit           67 Tain           Channel:         0ax [27]         60 - 40)         Hopping:         007         -           From:         0ax [27]         60 - 40)         Hopping:         007         -           From:         0ax [27]         60 - 40)         Hopping:         007         -           Prove:         0ax [27]         60 - 40)         Hopping:         007         -           Prove:         0ax [27]         00 - 40)         Hopping:         007         -           Prove:         0ax [27]         00 - 40)         Hopping:         007         -           Prove:         0ax [27]         00 - 40)         Hopping:         007         -           Prove:         0ax [27]         00 - 40)         Hopping:         007         -           Prove:         0ax [27]         Prove:         101         -         -           1         +3         -1         -5         -         -         -         -           1         72         82         Tort Mode         -         -         -         -	

3. Set COM Port

TX TEST

Set Channel (00,27,4E),

Set Power (03),

Set Hopping (ON,OFF),

Set Packet type (DH1,DH3,DH5,3DH1,3DH3,3DH5)

Push the button "TX"

#### RX TEST

Set Channel (00,27,4E),

Set Hopping (ON,OFF),

Set Packet type (DH1,DH3,DH5,3DH1,3DH3,3DH5)

Push the button "RX"

# 7. APPLICABLE LIMITS AND TEST RESULTS

# 7.1 20dB BANDWIDTH FOR HOPPING

### LIMIT

None; for reporting purposes only.

## **TEST EQUIPMENT**

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	JAN. 23, 2016

## **TEST SETUP**



### TEST PROCEDURE

The 20dB band width was measured with a spectrum analyzer connected to RF antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer. Display Line and Marker Delta functions, the 20dB band width of the emission was determined.

## TEST RESULTS

# Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Pass / Fail
Low	2402	982.00	N/A
Middle	2441	958.00	N/A
High	2480	910.10	N/A

# Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Pass / Fail
Low	2402	1274.00	N/A
Middle	2441	1268.00	N/A
High	2480	1264.00	N/A

### 20dB BANDWIDTH

		Low / GFS			
Center Freq 2.402000000	Trig: F	r Freq: 2.402000000 GHz Free Run AvgiHold t: 10 dB	Radio Std:	1990 a	Frequency
10 dB/div Ref 21.10 dBm					
11.1 1.10 6.30 18.9 38.9 48.9 48.9	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	Source and the second s	~~	Center Freq 2.402000000 GHz
68.9 68.9 Center 2.402 GHz				an 3 MHz	
#Res BW 30 kHz	#	VBW 100 kHz		p 3.2 ms	CF Step 2.441000000 GHz Auto Man
Occupied Bandwidth 88 Transmit Freq Error x dB Bandwidth	982.0 kHz 982.0 kHz	Total Power OBW Power x dB	10.2 dBm 99.00 % -20.00 dB		Freq Offset 0 Hz
55			STATUS		
AL 88 55.5 DC	GHz Center Trig: F	Middle / GF	SK Radio Std	1990 a	Frequency
AL ## 55.9 DC	GHz Cente #FGainLow #Atten	streef the r Freq: 2.441000000 GHz Free Run Avg/Hold	SK Alisa Aliti (1226-419) Radio Std: 2111	None	5.55
Center Freq 2.441000000	GHz Cente #FGainLow #Atten	streef the r Freq: 2.441000000 GHz Free Run Avg/Hold	SK Alisa Aliti (1226-419) Radio Std: 2111	None	Frequency Center Freq 2.441000000 GHz
KL         W         SUB_C           Center Freq 2.441000000         Ref 21.10 dBm           10 dB/div         Ref 21.10 dBm           10	GHz Centa BFGainLow Attac	streef the r Freq: 2.441000000 GHz Free Run Avg/Hold	SK Ridos AUTO Radio Sol Radio Dev	an 3 MHz p 3.2 ms	Center Freq 2.441000000 GHz 2.441000000 GHz
AL         B         SS         Center Freq 2.441000000           10 dB/div         Ref 21.10 dBm           Log         11         110           11 1         110         650           18 9         38.9         48.9           38 9         48.9         56.3           26 9         20         20           Center 2.441 GHz         #Res BW 30 kHz         Occupied Bandwidth	GHz Centa BFGeinLow SAtter	sand_mill Freq: 2.44100000 GHz FreeRun AvgiHold k: 10 dB	SK Ridos AUTO Radio Sol Radio Dev	an 3 MHz p 3.2 ms	Center Freq

Kuroget lastour Radjor - Oco KL 99 - 55 8 Center Freq 2.48000	0000 GHz	Center Trig: F	High / C	4,155	AJTE 1229:1594 Radio Std: f Radio Devic	None	Frequency
10 dB/div Ref 21.10	) dBm						
Log 11.1 1.10 6.50 (18.9 38.9 48.9		~		~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~	Center Freq 2.48000000 GHz
Center 2.48 GHz #Res BW 30 kHz		#	VBW 100 kHz			n 3 MHz 3.2 ms	CF Step 2.441000000 GHz Auto Man
Occupied Band Transmit Freq Err x dB Bandwidth	862.65 k	kHz	Total Pow OBW Pow x dB	er	9.23 dBm 99.00 % -20.00 dB		Auto Man Freq Offset 0 Hz
WSID:					STATUS		

CH Low / 8-DPSK 12:25:32.94 Sep 83, 2015 Radio Std: None Center Freq: 2.402000000 GHz Trig: Free Run Avg|Hold:>1/1 #Atten: 10 dB Frequency Center Freq 2.402000000 GHz 9 Radio Device: BTS #FGainLow Ref 21.10 dBm ٥g **Center Freq** 2.402000000 GHz B. Center 2.402 GHz Span 3 MHz CF Step 2.441000000 GHz Juto Man #VBW 100 kHz Res BW 30 kHz Sweep 3.2 ms **Total Power** 9.26 dBm **Occupied Bandwidth** 1.1717 MHz Freq Offset **OBW Power** 0 Hz **Transmit Freq Error** -84.715 kHz 99.00 % 1.274 MHz x dB Bandwidth -20.00 dB x dB STATUS CH Middle / 8-DPSK tours As 12-28-09 PM Sep 63, 2015 Radio Std: None Center Freq: 2.441000000 GHz Trig: Free Run Avg/Hold:>1/1 #Atten: 10 dB Frequency Center Freq 2.441000000 GHz ç Radio Device: BTS #FGainLow Ref 21.10 dBm **Center Freq** 2.441000000 GHz B. Center 2.441 GHz Span 3 MHz CF Step 2.441000000 GHz #VBW 100 kHz Res BW 30 kHz Sweep 3.2 ms Map sto **Total Power** 8.98 dBm **Occupied Bandwidth** 1.1652 MHz Freq Offset 0 Hz -86.258 kHz **OBW Power** 99.00 % **Transmit Freq Error** x dB Bandwidth 1.268 MHz -20.00 dB x dB STATUS

	CH	High / 8-D	PSK		
B Arroadt Inection Analyse - Occupied In AL 9 - Society Center Freq 2.480000000	GHz Cente	SINSE (117) Freq: 2.480000000 GH	- ALISA AUTO	(1231-0194 Sep 83, 2015 Radio Std: None Radio Device: BTS	Frequency
10 dBJdiv Ref 21.10 dBn Log 11.1 1.10 6.90 48.9 38.9 38.9					Center Freq 2.48000000 GHz
48.9 58.9 48.9 Center 2.48 GHz #Res BW 30 kHz	#	VBW 100 kHz		Span 3 MHz Sweep 3.2 ms	CF Step 2.44100000 GHz Auto Man
Occupied Bandwidt 1. Transmit Freq Error x dB Bandwidth	h 1570 MHz -88.787 kHz 1.264 MHz	Total Power OBW Power x dB	99	l dBm 9.00 % 00 dB	Freq Offset 0 Hz
4955			STARL	s	

# **7.2 MAXIMUM PEAK OUTPUT POWER**

#### LIMIT

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§15.247(b)(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

### **TEST EQUIPMENT**

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	JAN. 23, 2016

## **Test Configuration**

FUT	SPECTRUM
LUI	ANALYZER

### **TEST PROCEDURE**

The RF power output was measured with a Spectrum Analyzer connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, A power meter was used to record the shape of the transmit signal.

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW > the 20 dB bandwidth of the emission being measured VBW ≥ RBW Sweep = auto Detector function = peak Trace = max hold

#### **TEST RESULTS**

# Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)			Result
Low	2402	3.07	2.02768		PASS
Mid	2441	2.94	1.96698	125	PASS
High	2480	2.29	1.69317		PASS

# Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Limit (mW)	Result	
Low	2402	2.44	1.75388		PASS
Mid	2441	2.23	1.66955	125	PASS
High	2480	1.49	1.40799		PASS

#### MAXIMUM PEAK OUTPUT POWER

	CH Lov	// GFSK		
Keysight Spectrum Analyzer - Swept SA		a and a substantian	- Andrewski Antonio an	
Center Freq 2.402000000 GHz	SENSE (NV)	#Avg Type: RMS	12 56:37 PM Sep 03, 2015 7NACE 1 2 3 4 5 6	Frequency
PNO	: Fast C Trig: Free Run	Avg/Hold:>1/1	DET P PANNN	
IFGa	in:Low #Atten: 20 dB			Auto Tune
Ref Offset 11.1 dB		Mkr	1 2.402 090 GHz	Autorune
10 dBidiv Ref 21.10 dBm		207 C.31.3	3.070 dBm	
	· · · · · · · · · · · · · · · · · · ·			
11.1				Center Fred
1.3	↓ <sup>1</sup>			2.40200000 GHz
		12.5		
1.10				Start Fred
8.80				2.399500000 GHz
~~				
18.9				
11.0				Stop Free
				2.404500000 GHz
20.5				-
38.9				CF Step
				2.441000000 GHz
40.9				Auto Man
				201200
68.9				Freq Offset
				0 Hz
66.9				
Center 2.402000 GHz	and a fair and the	- N	Span 5.000 MHz	
#Res BW 2.0 MHz	#VBW 8.0 MHz	Sweep	1.000 ms (1001 pts)	
55			04-1-	
	CH Midd	le / GFSK	5	
<ul> <li>Knocht fürstnist Register - Seest 18. \</li> </ul>	CH Midd	le / GFSK	5	
AL ## 55.0 0C	SING ONT	le / GFSK	1256-1174 Sep 01, 2015	Francisco
Center Freg 2.441000000 GHz	sesi set	le / GFSK	1256-1194 Seg 13, 2015 TRACE 1-2-3-4-5-6	Frequency
Center Freq 2.441000000 GHz	SING ONT	le / GFSK	1256-1174 Sep 01, 2015	Frequency
AL 09 53.0 00 Center Freq 2.441000000 GHz P90 IFGe	Strige Strige Strige	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2013 State) [1, 2, 3, 4, 5, 6 Trate] [1, 2, 3, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Dec [1, 2, 7, 4, 5, 6]	Frequency
KL 89 153 0 00 Center Freq 2.441000000 GHz PRO IFGa Ref Offset 11.1 dB 10 dB/div Ref 21.10 dBm	Strige Strige Strige	le / GFSK #Avg Type: RMS AvgHold:>1/1	12:56:13 PM Sep 02, 2015 STACE [1:2:3:4:5:6 Trifle IN MM WAVE DET  P  P A N H N	Frequency
KL 89 153 0 00 Center Freq 2.441000000 GHz PRO IFGa Ref Offset 11.1 dB 10 dB/div Ref 21.10 dBm	Strige Strige Strige	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2013 State) [1, 2, 3, 4, 5, 6 Trate] [1, 2, 3, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Dec [1, 2, 7, 4, 5, 6]	Frequency Auto Tune
AL         91         513         60           Center Freq 2.441000000 GHz         F90         F90         F90           IO dB/div         Ref Offset 11.1 dB         P90         F00	Strige Strige Strige	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2013 State) [1, 2, 3, 4, 5, 6 Trate] [1, 2, 3, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Dec [1, 2, 7, 4, 5, 6]	Frequency Auto Tune Center Freq
KL 89 153 0 00 Center Freq 2.441000000 GHz PRO IFGa Ref Offset 11.1 dB 10 dB/div Ref 21.10 dBm	Stree Run Free Run int.ow #Atten: 20 dB	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2013 State) [1, 2, 3, 4, 5, 6 Trate] [1, 2, 3, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Dec [1, 2, 7, 4, 5, 6]	Frequency Auto Tune Center Freq
AL         PI         Still OC           Center Freq 2.441000000 GHz         PIO           Proving         PIO           Ref Offset 11.1 dB         PIO           Od Blow         Ref 21.10 dBm	Strige Strige Strige	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2013 State) [1, 2, 3, 4, 5, 6 Trate] [1, 2, 3, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Dec [1, 2, 7, 4, 5, 6]	Frequency Auto Tune Center Freq
AL         97         55.0         60           Center Freq 2.441000000 GHz         F90         F90         F90           IFGa         Ref Offset 11.1 dB         Ref 21.10 dBm         90	Stree Run Free Run int.ow #Atten: 20 dB	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2013 State) [1, 2, 3, 4, 5, 6 Trate] [1, 2, 3, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Dec [1, 2, 7, 4, 5, 6]	Frequency Auto Tune Center Freq 2.44100000 GHz
AL         91         553         92           Center Freq 2.441000000 GHz         PNO	Stree Run Free Run int.ow #Atten: 20 dB	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2013 State) [1, 2, 3, 4, 5, 6 Trate] [1, 2, 3, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Dec [1, 2, 7, 4, 5, 6]	Frequency
AL         PI         SSI2         DC           Center Freq 2.441000000 GHz         PNO	Stree Run Free Run int.ow #Atten: 20 dB	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2013 State) [1, 2, 3, 4, 5, 6 Trate] [1, 2, 3, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Dec [1, 2, 7, 4, 5, 6]	Frequency Auto Tune Center Freq 2.44100000 GHz Start Freq
AL 99 553 00 Center Freq 2.441000000 GHz P80 IFGe 10 dB/div Ref 0ffset 11.1 dB 0 dB/div Ref 21.10 dBm 11 1 10 8 30	Stree Run Free Run int.ow #Atten: 20 dB	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2013 State) [1, 2, 3, 4, 5, 6 Trate] [1, 2, 3, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Trate] [1, 2, 7, 4, 5, 6 Dec [1, 2, 7, 4, 5, 6]	Frequency Auto Tune Center Freq 2.44100000 GHz Start Freq 2.438500000 GHz
AL         PI         Still OC           Center Freq 2.441000000 GHz         PIO           Proving         PIO           Ref Offset 11.1 dB         PIO           Od Blow         Ref 21.10 dBm	Stree Run Free Run int.ow #Atten: 20 dB	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2015 5840) [1, 2, 3, 4, 5, 6 700 [1, 2, 3, 4, 5, 6 700 [1, 2, 3, 4, 5, 6 700 [1, 2, 2, 4, 5, 6] 00 [1, 2, 7, 4, 1] 1, 2, 441, 090 GHz	Frequency Auto Tune Center Freq 2.44100000 GHz Start Freq 2.43850000 GHz Stop Freq
AL 09 563 00 Center Freq 2.441000000 GHz P80 IGa BodBldiv Ref Offset 11.1 dB Ref Offset 11.1 dB Ref 21.10 dBm 11 1 1 10 830	Stree Run Free Run int.ow #Atten: 20 dB	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2015 5840) [1, 2, 3, 4, 5, 6 700 [1, 2, 3, 4, 5, 6 700 [1, 2, 3, 4, 5, 6 700 [1, 2, 2, 4, 5, 6] 00 [1, 2, 7, 4, 1] 1, 2, 441, 090 GHz	Frequency Auto Tune Center Frec 2.44100000 GHz Start Frec 2.438500000 GHz
AL 09 563 00 Center Freq 2.441000000 GHz P80 IGa BodBldiv Ref Offset 11.1 dB Ref Offset 11.1 dB Ref 21.10 dBm 11 1 1 10 830	Stree Run Free Run int.ow #Atten: 20 dB	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2015 5840) [1, 2, 3, 4, 5, 6 700 [1, 2, 3, 4, 5, 6 700 [1, 2, 3, 4, 5, 6 700 [1, 2, 2, 4, 5, 6] 00 [1, 2, 7, 4, 1] 1, 2, 441, 090 GHz	Frequency Auto Tune Center Frec 2.44100000 GH Start Frec 2.43850000 GH Stop Frec
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AL         91         55:3         92           Center Freq 2.441000000 GHz         PN0         PN0         PN0           PN0         Ref Offset 11.1 dB         PN0         PN0           0 dB/div         Ref 21.10 dBm         PN0         PN0           11         1         PN0         PN0         PN0           11         1         PN0         PN0         PN0           28.9         PN0         PN0         PN0         PN0	Stree Run Free Run int.ow #Atten: 20 dB	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2015 5840) [1, 2, 3, 4, 5, 6 700 [1, 2, 3, 4, 5, 6 700 [1, 2, 3, 4, 5, 6 700 [1, 2, 2, 4, 5, 6] 00 [1, 2, 7, 4, 1] 1, 2, 441, 090 GHz	Frequency Auto Tune Center Frec 2.44100000 GHz Start Frec 2.43850000 GHz Stop Frec 2.443500000 GHz CF Step 2.441000000 GHz
AL         90         5523         90           Center Freq 2.441000000 GHz         P90         P90         P90           P90	Stree Run Free Run int.ow #Atten: 20 dB	le / GFSK #Avg Type: RMS AvgHold:>1/1	1256 1399 5ep (2, 2015 5840) [1, 2, 3, 4, 5, 6 700 [1, 2, 3, 4, 5, 6 700 [1, 2, 3, 4, 5, 6 700 [1, 2, 2, 4, 5, 6] 00 [1, 2, 7, 4, 1] 1, 2, 441, 090 GHz	Frequency Auto Tune Center Frec 2.44100000 GHz Start Frec 2.43850000 GHz Stop Frec 2.44360000 GHz CF Step 2.44100000 GHz
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	bure Analyzer - Swept SA		The second second	1.7 01,000,000	- Alexandre		
Center Fre	eq 2.40200000	GHz	SENSE 2017	#Avg Type: RMS	38AC	M Sep 83, 2015	Frequency
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-18.5		_			-		Stop Free
in the second							2.404500000 GH
-28.9					-		
222							CF Step
-38.9							2.441000000 GHz
							Auto Mar
-40.9							
68.9							Freq Offset
20.8							0 Hz
68.9							
Center 2.40						.000 MHz	
#Res BW 2							
uss			N 8.0 MHz	STAP		(1001 pts)	
MSIS				Subscreen A	n	(1001 pts)	-
MSIS	burn Analyzer - Swept BA		H Middle	/ 8-DPSk	1(2:55-419	W Sec (13, 2015	
Missi Si Aryoght land	trum Analyzer - Swept SA	С	H Middle	/ 8-DPSK	n  1255-4329 7544	M Sep (3, 2013	Frequency
Missi Si Aryoght land	burn Analyzar - Swept SA 99   55 B   00	С	H Middle	/ 8-DPSK	n  1255-4329 7544	W Sec (13, 2015	
Kassard Januar AL Center Fre	eq 2.441000000	C GHz PNC Fast		/ 8-DPSK Autoraction AvgType: RMS AvgType: RMS	12:55:4378 784 784 787 12:440 8	M Sep 83, 2015 (1, 2, 3, 4, 5, 4) (1, 2, 3, 4) (1, 2,	
Autor and Autor	burn Analyzar - Swept SA 99   55 B   00	C GHz PNC Fast		/ 8-DPSK Autoraction AvgType: RMS AvgType: RMS	12:55:4378 784 784 787 12:440 8	H Sep 83, 2015 21 1 2 3 4 5 6 21 P P A N N N	
Miss Report land AL Center Fre	burn Rindyor - Swept SA 00   33 0 00 bq 2.4410000000 Ref Offset 11.1 dB	C GHz PNC Fast		/ 8-DPSK Autoraction AvgType: RMS AvgType: RMS	12:55:4378 784 784 787 12:440 8	M Sep 83, 2015 (1, 2, 3, 4, 5, 4) (1, 2, 3, 4) (1, 2,	Auto Tune
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Autor and Autor	burn Rindyor - Swept SA 00   33 0 00 bq 2.4410000000 Ref Offset 11.1 dB	C GHz PNC Fast	H Middle	/ 8-DPSK Autoraction AvgType: RMS AvgType: RMS	12:55:4378 784 784 787 12:440 8	M Sep 83, 2015 (1, 2, 3, 4, 5, 4) (1, 2, 3, 4) (1, 2, 4)	Auto Tune
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Center Fre	burn Rindyor - Swept SA 00   33 0 00 bq 2.4410000000 Ref Offset 11.1 dB	C GHz PNC Fast	H Middle	/ 8-DPSK Autoraction AvgType: RMS AvgType: RMS	12:55:4378 784 784 787 12:440 8	M Sep 83, 2015 (1, 2, 3, 4, 5, 4) (1, 2, 3, 4) (1, 2, 4)	Auto Tune Center Free 2.44100000 GH Start Free 2.438500000 GH
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Center Fre	burn Rindyor - Swept SA 00   33 0 00 bq 2.4410000000 Ref Offset 11.1 dB	C GHz PNC Fast	H Middle	/ 8-DPSK Autoraction AvgType: RMS AvgType: RMS	12:55:4378 784 784 787 12:440 8	M Sep 83, 2015 (1, 2, 3, 4, 5, 4) (1, 2, 3, 4) (1, 2, 4)	Auto Tun Center Free 2.44100000 GH Start Free 2.43850000 GH Stop Free
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Anno 1 long     AL     AL     Center Fre     OdBidiv     Og     III     IIII     III     III	burn Rindyor - Swept SA 00   33 0 00 bq 2.4410000000 Ref Offset 11.1 dB	C GHz PNC Fast	H Middle	/ 8-DPSK Autoraction AvgType: RMS AvgType: RMS	12:55:4378 784 784 787 12:440 8	M Sep 83, 2015 (1, 2, 3, 4, 5, 4) (1, 2, 3, 4) (1, 2, 4)	Auto Tun Center Fre 2.44100000 GH Start Fre 2.438500000 GH Stop Fre 2.443500000 GH CF Ste 2.441000000 GH Auto Ma
Konset land     KL	burn Rindyor - Swept SA 00   33 0 00 bq 2.4410000000 Ref Offset 11.1 dB	C GHz PNC Fast	H Middle	/ 8-DPSK Autoraction AvgType: RMS AvgType: RMS	12:55:4378 784 784 787 12:440 8	M Sep 83, 2015 (1, 2, 3, 4, 5, 4) (1, 2, 3, 4) (1, 2, 4)	Auto Tun Center Fre 2.44100000 GH Start Fre 2.438500000 GH Stop Fre 2.443500000 GH CF Ste 2.441000000 GH Auto Ma
Konset land     KL	burn Rindyar - Swept IA 00   31 0 00 bq 2.441000000 Ref Offset 11.1 dB	C GHz PNC Fast	H Middle	/ 8-DPSK Autoraction AvgType: RMS AvgType: RMS	12:55:4378 784 784 787 12:440 8	M Sep 83, 2015 (1, 2, 3, 4, 5, 4) (1, 2, 3, 4) (1, 2, 4)	Auto Tun Center Fre 2.44100000 GH Start Fre 2.438500000 GH Stop Fre 2.443500000 GH
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Konsett lees     AL     Center Fre     OdB/div     Og     III 1     III      IIII     IIII     IIII     III     III     III     IIII     III	Ref Offset 11.1 dB Ref 2.441000000	C OGHz PMO: Fest IFGain.Low	H Middle	AvgiHold>11	12:55:4179 TMA 711 12:440 8 2.2	380 GHz 26 dBm	Auto Tun Center Fre 2.44100000 GH Start Fre 2.438500000 GH Stop Fre 2.443500000 GH CF Ste 2.441000000 GH Auto Ma

enter Freq 2.480000000 0	Hz PNC Feet () Trig: Free Run	#Avg Type: RMS Avg Hold:>1/1	5:1974 Sep E3, 2015 TRACE 1 2 3 4 5 6 T/PE NWHWWW DET P P A N N N	Frequency
Ref Offset 11.1 dB	PNO: Fest 🕞 Trig: Free Run IFGain:Low #Atten: 20 dB	1.00 Teleford (* 1.1.)	79 855 GHz 1.486 dBm	Auto Tune
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10				Start Free 2.477500000 GHz
19				Stop Free 2.482500000 GH:
19				CF Step 2.441000000 GHz Auto Mar
89				Freq Offset 0 Ha
69				

# 7.3 HOPPING CHANNEL SEPARATION

#### LIMIT

§15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo andomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

## TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	JAN. 23, 2016

### **TEST SETUP**

ЕПТ	SPECTRUM
LUI	ANALYZER

### **TEST PROCEDURE**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- 3. By using the MaxHold function record the separation of adjacent channels.
- 4. Measure the frequency difference of these two adjacent channels by spectrum analyzer MARK function. And then plot the result on spectrum analyzer screen.
- 5. Repeat above procedures until all frequencies measured were complete.

#### TEST RESULTS

Refer to section 8.1, 20dB bandwidth measurement, the measured channel separation should be greater than two-third of 20dB bandwidth or Minimum bandwidth.

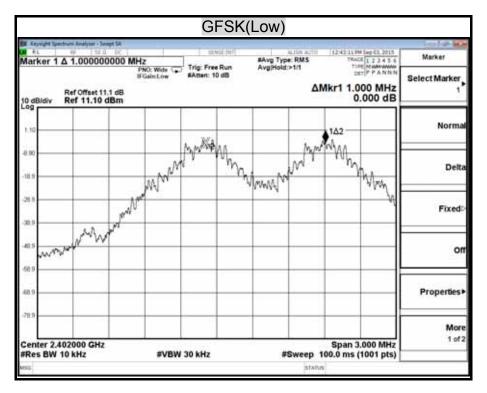
#### Modulation Type: GFSK / DH5

Channel	Adjacent Hopping Channel Separation (MHz)	Two –third of 20dB bandwidth (MHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.65	25 KHz	PASS
2441MHz	1.00	0.64	25 KHz	PASS
2480MHz	1.00	0.61	25 KHz	PASS

#### Modulation Type: 8-DPSK / 3-DH5

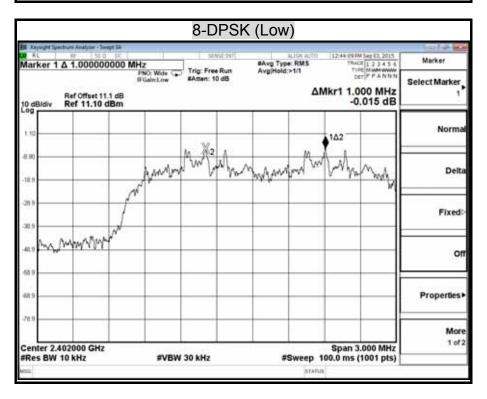
Channel	Adjacent Hopping Channel Separation (kHz)	Two –third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.85	25 KHz	PASS
2441MHz	1.01	0.85	25 KHz	PASS
2480MHz	1.00	0.84	25 KHz	PASS

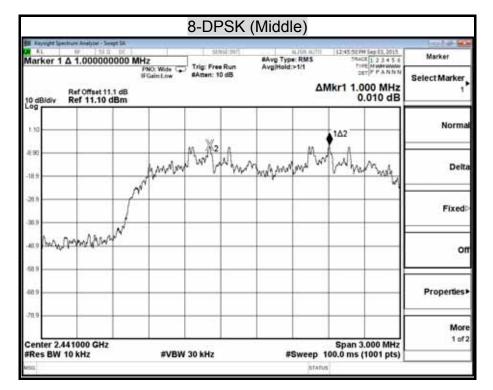
### **HOPPING CHANNEL SEPARATION**

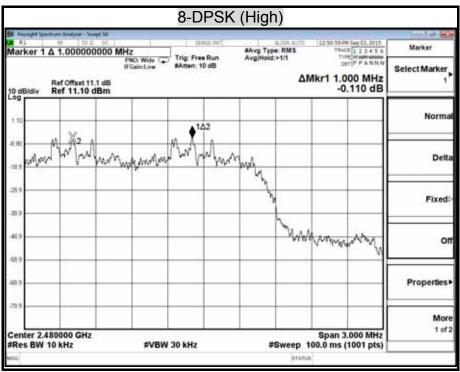


	Ċ	GFSK(N	/liddle)		
Keysight Spectrum Analyzer - Seep     KL		SING OUT	AUG AUG	12-48-47 PM Sep 13, 2015	- 10 M
Marker 1 & 1.000000	DOO MHz PNO: Wide C	Free Run	#Avg Type: RM5 Avg/Hold:>1/1	TRACE 1 2 3 4 5 TIPE MMM MM DET P P A N N	Marker
Ref Offset 11.1 10 dBidiv Ref 11.10 di	IFGainLow #An	en: 10 dB	6-0-10-000 - 10-	Mkr1 1.000 MH 1.114 de	Z Select Marker
1.10		x.0 a		1∆2	Norma
4.90	WWW	Mary Mary	Amarina	mun	Delta
-20.9	And Market		N. MARY		Fixed
10.5 Windy have					or
68.9					Properties
Center 2.441000 GHz	and the second sec			Span 3.000 MH	
#Res BW 10 kHz	#VBW 30 k	12	#Sweep	100.0 ms (1001 pts	9

					G	FSK(	(High)				
	At Spectrum A	and the second se	pt la	1.1							
Marke	r 1 Δ 1.	000000			1.0.0	NGE:DNT	#Avg Typ		12.52	17 PM Sep E3, 2015 TRACE 1 2 3 4 5 6	Market
10 dB/d		Offset 11. 11.10 d	1 dB	PNO: Wide G FGain:Low	Atten: 1		Avg(Hold		Mkr1 *	1.000 MHz 1.101 dB	Select Marker
1.10					•	Δ2					Normal
-8.90 -18.90	m	ASS W	h	M	Marin	Mh	J.s.		-		Delta
-20.9				NWV			NN NO				Fixed
-48.9								hay	m	-Annon	on
68.9	-			-				-	-	_	Properties •
Center	r 2.4800	00 GH2							Snar	n 3.000 MHz	More 1 of 2
	BW 10 ki			#VB	N 30 kHz				100.0 m	is (1001 pts)	
MSIS:								STATU	15		









# 7.4 NUMBER OF HOPPING FREQUENCY USED

#### LIMIT

§15.247(a)(1)(iii) For frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

### TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	JAN. 23, 2016

### TEST SETUP



### TEST PROCEDURE

- 1 Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2 Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- 3 Set the spectrum analyzer on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- 4 Set the spectrum analyzer on View mode and then plot the result on spectrum analyzer screen.
- 5 Repeat above procedures until all frequencies measured were complete.



#### TEST RESULTS

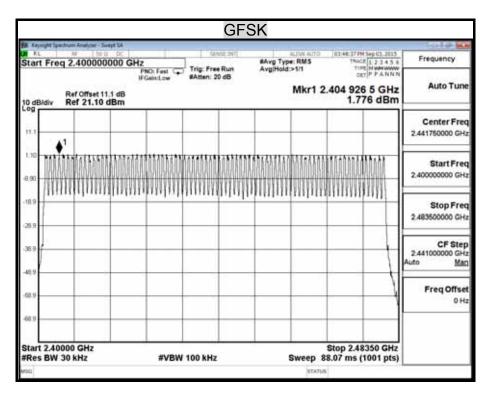
#### Modulation Type: GFSK / DH5

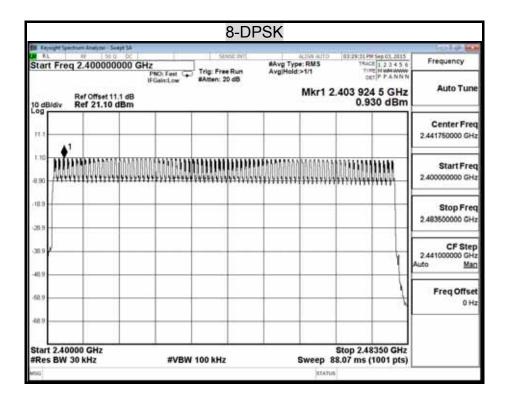
Result(No.of CH)	Limit(No.of CH)	Result
79	>75	PASS

#### Modulation Type: 8-DPSK / 3-DH5

Result(No.of CH)	Limit(No.of CH)	Result
79	>75	PASS

#### NUMBER OF HOPPING FREQUENCY USED





# 7.5 DWELL TIME ON EACH CHANNEL

### LIMIT

§15.247(a)(1)(iii) For frequency hopping system operating in the 2400-2483.5MHz band, the average time of occupancy on any frequency shall not be greater than 0.4 second within a 31.6 second period.

## **TEST EQUIPMENT**

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	JAN. 23, 2016

## TEST SETUP



# TEST PROCEDURE

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- 3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- 4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- 5. Repeat above procedures until all frequencies measured were complete.
- 6. The Bluetooth Headset has 3 type of payload, DH1, DH3, DH5. The hopping rate is 1600 per second. The longer the payload is, the slower the hopping rate is.

#### TEST RESULTS

Time of occupancy on the TX channel in 31.6sec = time domain slot length × hop rate ÷ number of hop per channel × 31.6

Refer to the attached graph.

The hopping rates of Bluetooth devices change with different types of payload. The longer the payload is, the slower the hopping rate. The hopping rate scenario is defined in Bluetooth core specification.

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
2441MHz	DH1	0.410	131.20	400.00	PASS
2441MHz	DH3	1.660	265.60	400.00	PASS
2441MHz	DH5	2.900	309.33	400.00	PASS
2441MHz	AFH	2.900	154.67	400.00	PASS
DH1 Dwell tine= DH3 Dwell tine= DH5 Dwell tine= AFH Dwell tine=	1.660 ms 2.900 ms	×(1600÷2)÷79×3 ×(1600÷4)÷79×3 ×(1600÷6)÷79×3 ×(800÷6)÷20×8=	1.6= 265.60 (ms) 1.6= 309.33 (ms)		

#### Modulation Type: GFSK / DH5

#### Modulation Type: 8-DPSK / 3-DH5

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
2441MHz	3DH1	0.410	131.20	400.00	PASS
2441MHz	3DH3	1.660	265.60	400.00	PASS
2441MHz	3DH5	2.900	309.33	400.00	PASS
2441MHz	AFH	2.900	154.67	400.00	PASS
3DH1 Dwell tine= 0.410 ms×(1600÷2)÷79×31.6= 131.20 (ms)					

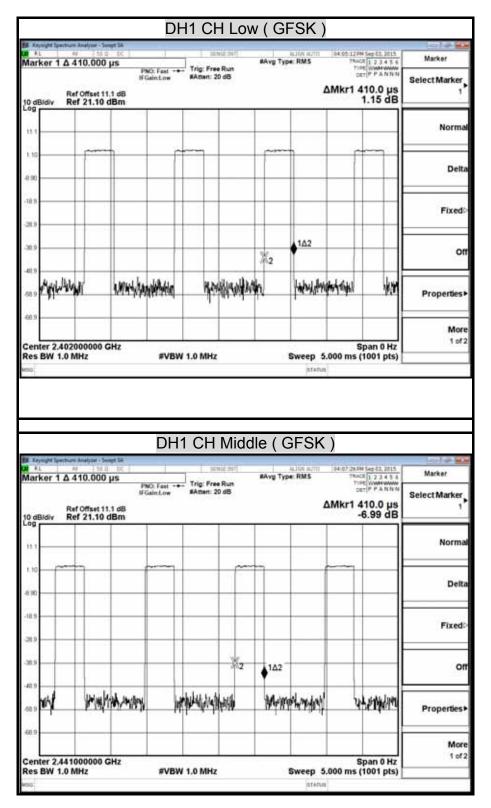
3DH3 Dwell tine= 1.660 ms×(1600÷4)÷79×31.6= 265.60 (ms) 3DH5 Dwell tine= 2.900 ms×(1600÷6)÷79×31.6= 309.33 (ms)

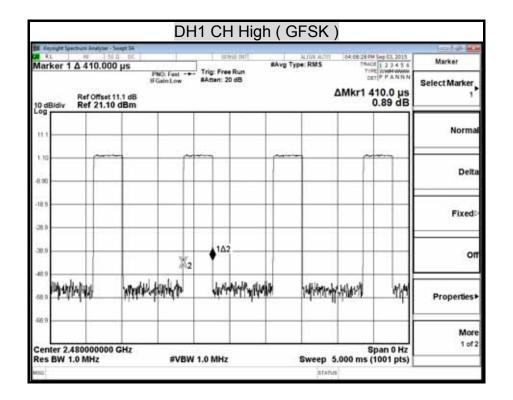
AFH Dwell tine= 2.900 ms×(800÷6)÷20×8= 154.67 (ms)

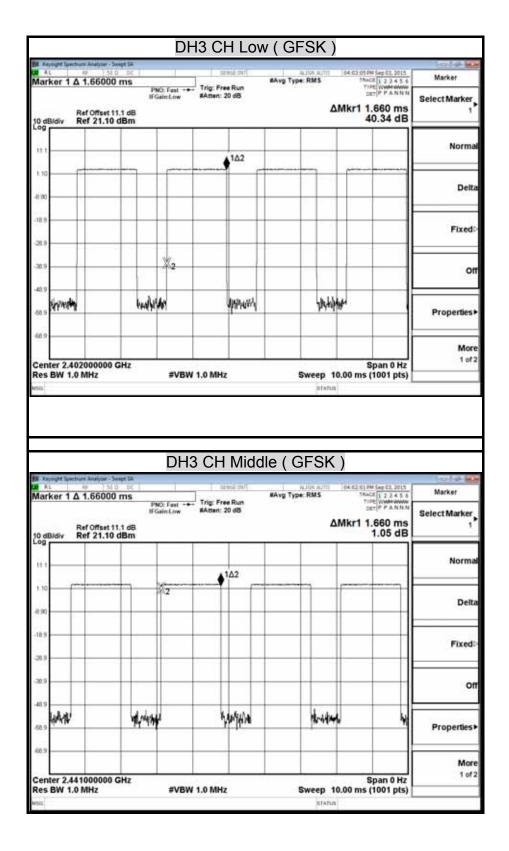
Report No.: T150826N01-RP1

#### FCC : JFZLP60BT

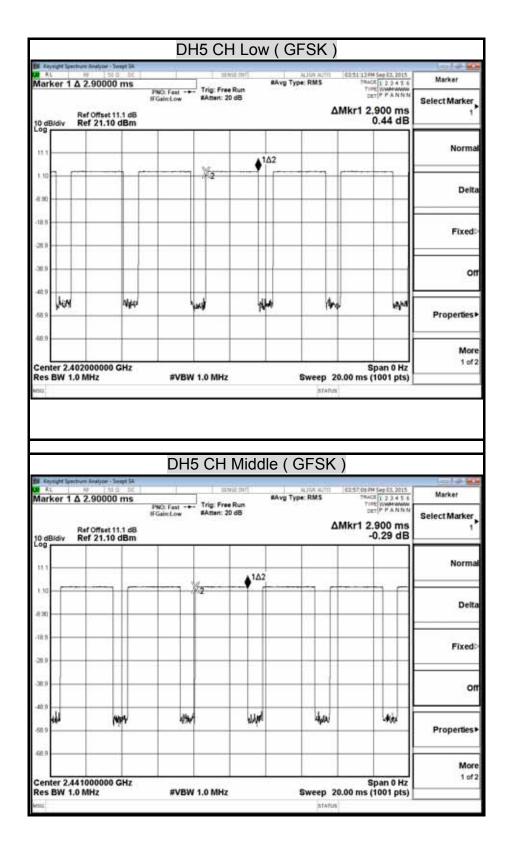
#### **DWELL TIME ON EACH PAYLOAD**

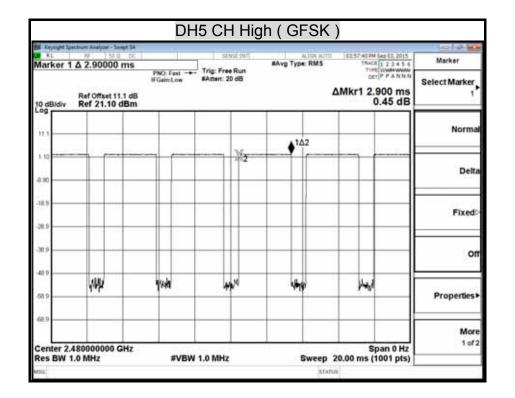


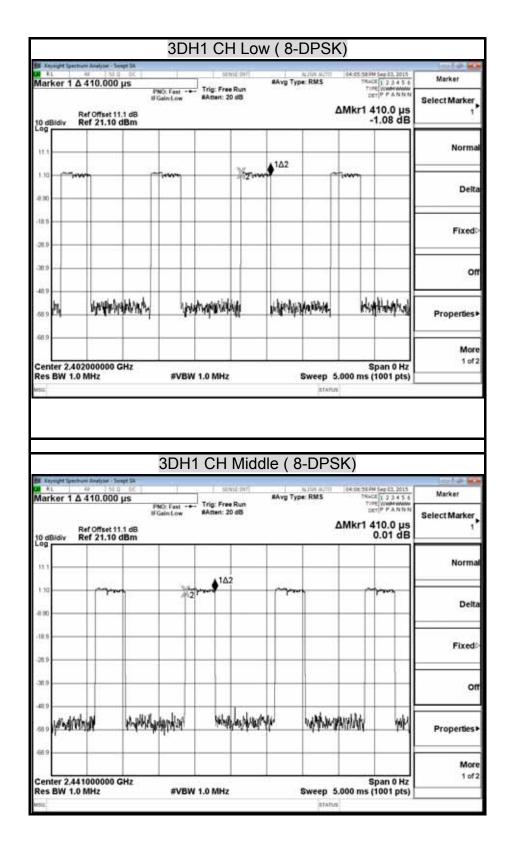


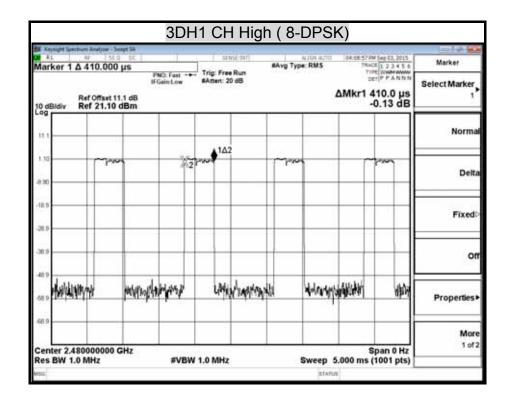


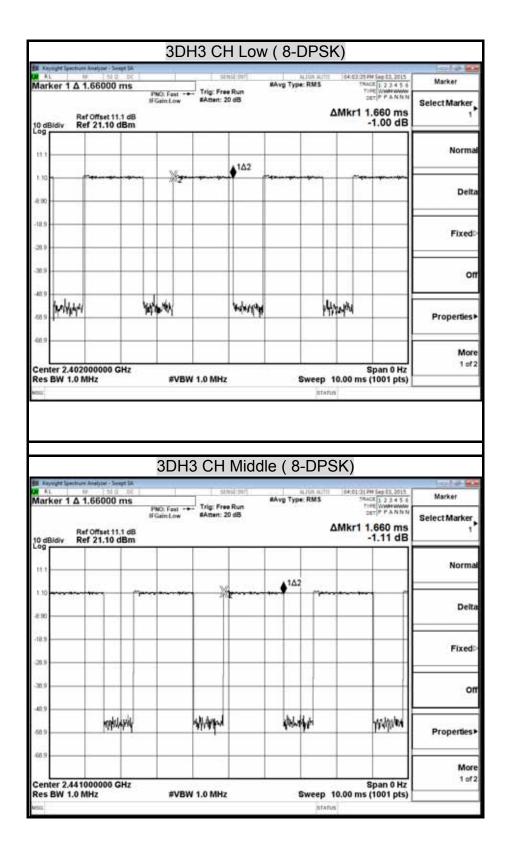
AL	ectrure Analyter - Swept RF 7.55.0	56 I		1 54	NA INT	AUD	w/m 16254	56 PM Sep 03, 2015	ale e
larker 1	Δ 1.66000 m		O: Fast -+	Trig: Free	e Run	#Avg Type: RN	15	TRACE 1 2 3 4 5 6 TOPE WARNAW	Marker
0 dB/div	Ref Offset 11.1 Ref 21.10 dE	dB	ainLow	#Atten: 2	D dB		∆Mkr	1 1.660 ms 22.15 dB	Select Marker
111									Norma
10				· · · ·	Δ2				
10									Delt
n 9			C2						Fixed
m.9							_		o
89 89		entertip		M	Wrine	ŕ	waltery	-	Properties
9	48000000 GH							Span 0 Hz	Mor 1 of



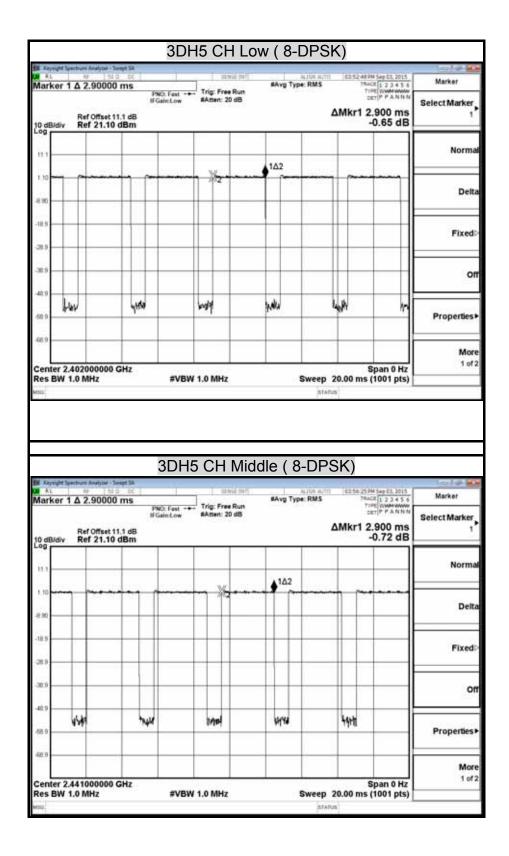








arker 1 Δ	1.66000				NSE 2017	#Avg Type: F		SESLIW Sept	3456	Marker
	ef Offset 11. tef 21.10 d	IFC	¥O: Fast →● Jain:Low	#Atten: 1			ΔMk	r1 1.660 7.90		Select Marker
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10 00000000		-		2			~,**	1		Delta
19										Fixed
19									_	01
9	hewaldtal		Hart	1040		yop Wey to J		ininia)ini		Properties
9									Ī	Mor 1 of



arker 1 /	1 2.90000 ms		Trig: Free Run	RAvg Type: RMS	TRACE 1 2 3 4 5 6	Marker
	Ref Offset 11.1 di Ref 21.10 dBn		#Amen: 20 dB		ΔMkr1 2.900 ms -0.83 dB	Select Marker
11 1						Norma
1 10		<sup>%</sup> 2				Delta
18.9						Fixed
8.9						o
89	wh	, inv	1.ph	10.5	hil	Properties
66.9						Mor 1 of

# 7.6 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	JAN. 23, 2016

**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 method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

## **TEST RESULTS**

No non-compliance noted.

## <u>TEST DATA</u>

### Modulation Type: GFSK / DH5

	us	Times	Ton	Total Ton time(ms)
Ton1	2900.000	1	2900	2.9
Ton2		0	0	
Ton3			0	
Тр				3.76

Ton	2.9
Tp(Ton+Toff)	3.76
Duty Cycle	0.771276596
Duty Factor	1.12789847

## Modulation Type: G8-DPSK / 3-DH5

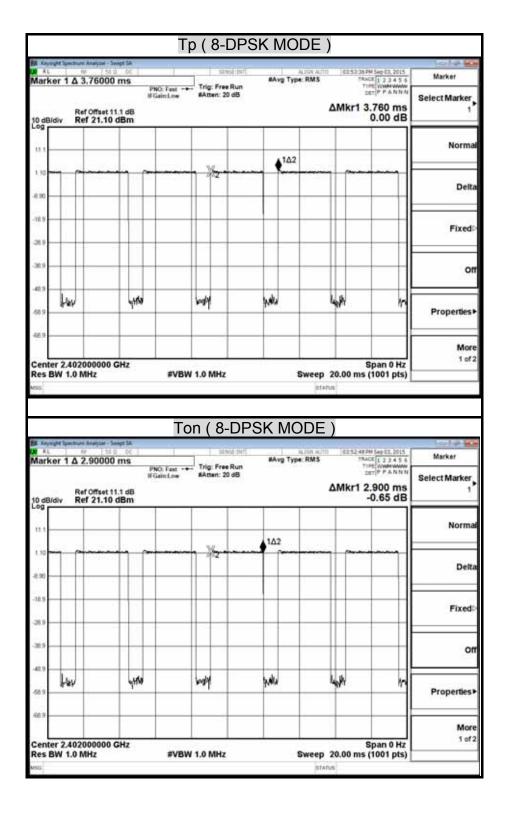
	us	Times	Ton	Total Ton time(ms)
Ton1	2900.000	1	2900	2.9
Ton2		0	0	
Ton3			0	
Тр				3.76

Ton	2.9
Tp(Ton+Toff)	3.76
Duty Cycle	0.771276596
Duty Factor	1.12789847

# TEST PLOT

## **Duty Cycle**

rysight Spectrum Any	alyoer - Swept SA	Tp ( GFS				010		
ker 1 Δ 3.7	6000 ms	SENSE 197	#Avg Type: RM	AUTO 605150	TACE 1 2 3 4 5 6	Marker		
NOT 1 14 3.7	PNC	Fast Trig: Free Run #Atten: 20 dB			DET P PANNN	Select Marke		
		Intow Promit 20 00		ΔMkr1 3.760 ms				
Bidiv Ref 2	fiset 11.1 dB 21.10 dBm				0.00 dB			
						Norn		
		10 A.M.	▲1∆2					
n (***	p=	W2						
						De		
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HUM	Ngapi	"we we	wither .	Ars.	1945	12000325		
						Propertie		
						Me		
						10		
ter 2.40200 BW 1.0 MH		#VBW 1.0 MHz			Span 0 Hz s (1001 pts)			
	£			STAPUS				
nysgift lansbure An	4juni - Swept SA	Ton ( GF	SK MODE	)		-14		
ysgit Syecbure An	eljum - Sevent 18.   56 g. 50		SK MODE	)		Marker		
nysgift lansbure An	atjon - Sweet SA   55 0 50   00000 ms	Ton ( GF	SK MODE	)		Marker		
noettenten in L ≫ ker 1Δ2.9	etper - Sweet SA   -51 0 - 00 - 00000 ms   FGa   FGa	Ton ( GF	SK MODE	814PUS 	1745 Sep 03, 2015 SACE 1 23 4 5 6 DET P P A N N N	Marker		
ker 1 Δ 2.9 Ref 0	atjon - Sweet SA   55 0 50   00000 ms	Ton ( GF	SK MODE	814PUS 		Marker		
ker 1 Δ 2.9 Ref 0	1/00 - 5-mpt 14   5-0 - 50   00000 ms   FGa ffset 11.1 dB	Ton ( GF	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke		
ker 1 Δ 2.9 Ref 0	1/00 - 5-mpt 14   5-0 - 50   00000 ms   FGa ffset 11.1 dB	Ton ( GF	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke		
ker 1 Δ 2.9 Bidiv Ref 2	1/00 - 5-mpt 14   5-0 - 50   00000 ms   FGa ffset 11.1 dB	Ton ( GF stroid for E Feat	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke		
ker 1 Δ 2.9 Ref 0	1/00 - 5-mpt 14   5-0 - 50   00000 ms   FGa ffset 11.1 dB	Ton ( GF	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke Norm		
ker 1 Δ 2.9 Bidiv Ref 2	1/00 - 5-mpt 14   5-0 - 50   00000 ms   FGa ffset 11.1 dB	Ton ( GF stroid for E Feat	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke Norm		
ker 1 ∆ 2.9 Bidiv Ref 2	1/00 - 5-mpt 14   5-0 - 50   00000 ms   FGa ffset 11.1 dB	Ton ( GF stroid for E Feat	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke Norm		
ker 1 ∆ 2.9 Bidiv Ref 2	1/00 - 5-mpt 14   5-0 - 50   00000 ms   FGa ffset 11.1 dB	Ton ( GF stroid for E Feat	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke Norm De		
ker 1 ∆ 2.9 Bidiv Ref 2	1/00 - 5-mpt 14   5-0 - 50   00000 ms   FGa ffset 11.1 dB	Ton ( GF stroid for E Feat	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke Norm De		
ker 1 ∆ 2.9 Bidiv Ref 2	1/00 - 5-mpt 14   5-0 - 50   00000 ms   FGa ffset 11.1 dB	Ton ( GF stroid for E Feat	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke Norm De		
ker 1 ∆ 2.9 Ref 0 Bidiv Ref 2	1/00 - 5-mpt 14   5-0 - 50   00000 ms   FGa ffset 11.1 dB	Ton ( GF stroid for E Feat	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke Norm De Fixe		
ker 1 ∆ 2.9 Bidiv Ref 2	1/00 - 5-mpt 14   5-0 - 5C   00000 ms   FGa ffset 11.1 dB	Ton ( GF stroid for E Feat	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke Norm De Fixe		
ker 1 Δ 2.9 Ref 0 Bidiv Ref 2	elper - Sweet IA SS 0 DC   00000 ms PWC IFGa Maet 11.1 dB 21.10 dBm	Ton ( GF		stafus )	2.900 ms 0.44 dB	Marker Select Marke Norm De Fixe		
ker 1 Δ 2.9 Bidiv Ref 2	1/00 - 5-mpt 14   5-0 - 5C   00000 ms   FGa ffset 11.1 dB	Ton ( GF stroid for E Feat	SK MODE	814PUS 	2011 Sep 02, 2015 MACE 12 2 4 5 5 6 TOTE WHAT WANT DET P P A NH M 2,900 ms	Marker Select Marke Norm De Fixe		
ker 1 Δ 2.9 Ref 0 Bidiv Ref 2	elper - Sweet IA SS 0 DC   00000 ms PWC IFGa Maet 11.1 dB 21.10 dBm	Ton ( GF		stafus )	2.900 ms 0.44 dB	Marker Select Marke Norm De Fixe		
ker 1 ∆ 2.9 Bidiv Ref 2	elper - Sweet IA SS 0 DC   00000 ms PWC IFGa Maet 11.1 dB 21.10 dBm	Ton ( GF		stafus )	2.900 ms 0.44 dB	Marker Select Marke Norm De Fixe		
ker 1 Δ 2.9 Bidiv Ref 2	elper - Sweet IA SS 0 DC   00000 ms PWC IFGa Maet 11.1 dB 21.10 dBm	Ton ( GF		stafus )	2.900 ms 0.44 dB	Marker Select Marke Norm De Fixe O Propertie		
ker 1 ∆ 2.9 Bidiv Ref 2	Alger - Sweet 14- 250 000 ms PHC If Ge PhC If Ge PhC If Ge If Ge	Ton ( GF		stafus )	2.900 ms 0.44 dB	Marker Select Marke Norm De Fixe		



# 7.7 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	JAN. 23, 2016

## 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 26.5 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

Display	05:04:12 PM Sep 03, 2015 TRACE 1 2 3 4 5 6 TIPE M WHY WWW DET P P A N N N	pe: RMS Id:>1/1		Sansi Trig: Free F	O Fest 😱	IBm	e -16.99 d	splay L	
Annotation	Ref Offset 11.1 dB Mkr1 2.412 GHz 10 dB/dy Ref 21.10 dBm 2.222 dBm								
Title								11	
Graticul 2n of								10	
Display Lin -16.99 dBr 20 Of	-16.00 dbm							1.9	
				-				0.9	
System Display Settings	ang nation - and a static	بمعاريه مريعهم	water	r and	المرسيداليلي	man	hn		
	Stop 26.50 GHz			00 kHz	20184	_	z 0 kHz	t 30 N	

Display L	ine -17.19	dBm P	NO: Fast 😱	Trig: Fre		#Avg Typ Avg(Hold		TRAC	5 ap (23, 2015 # 1 2 3 4 5 6 # MWM WWW T P P A N N N	L	Display
Ref Offset 11.1 dB Mkr1 2.439 GHz 10 dB/dy Ref 21.10 dBm 2.197 dBm											Annotation
111										Γ	Title
1.10	1									<u>On</u>	Graticu 0
28.9									-17.19 die	٩n	Display Lin -17.19 dB
m.9											
10.9 50.9	Inna	ومعارجاتهم	e-yecestania	~~~~~	aronne.	فيعيداده	وبغيانتهامتهم	a i a seconda da second	-gransponski		System Display Settings
Start 30 N			2000	300 kHz				Stop 2 2.530 s (	6.50 GHz		

Display	M Sep E3, 2015	5%A	pe: RMS	#Avg T Avg/Ho	ee Run		NO: Fast C		ine -17.93	play L
Annotation	492 GHz	Ref Offset 11.1 dB Mkr1 2.492 GHz dB/dW Ref 21.10 dBm 1.612 dBm 1.612 dBm								
Title								ubm	Rei 21.10	
274-551-520									¢1	
Graticu On O					_					
Display Lir -17.93 dB	17.81.494		-	-	-			-		
System	man	جرديطرحه	-	-	-					_
Display Settings			<sub>a</sub> athine taran	arinker.	and the low we	ukrymury		Sec.14	a lance	more
	26.50 GHz (1001 pts)					W 300 kHz			IHz 100 kHz	rt 30 M

		-SK	g / G	lopping		Swept BA	ctrure Analyter - 3	Keysight la
10M Sep E3, 2015 TACE 1, 2, 3, 4, 5, 6 TOPE M MM WMW DET P P A N N N	596A	ALIIA ALIII Type: RMS lold:>1/1		sense and	PNO: Fast		ine -17.02	Display I
.412 GHz .515 dBm	Mkr1 2.4	'		Atten: 20 dB	FGainLow	11.1 dB	Ref Offset 1 Ref 21.10	0 dB/div
							1	
Gra							1	8.90
at co_atim Displa -17.0 On								18 S
	_		_	_			-	30.9
Sy Dis Sett	مملحوطهمو	ستعمله فسعم	*****	-two-layer-same		munu	www	40.9 50.9
								66.9
26.50 GHz s (1001 pts)	Stop 2 2.530 s (	Sweep	-11	0 kHz	#VBW			Start 30 M Res BW

Display		M Sep E3, 2015 CE 1 2 3 4 5 6 PE Multi-Works ET P P A N N N	5%A		#Avg Typ Avg(Hold:		Trig: Free	O: Fest 😱	IBm	-17.96 c	play L	
Annotation		12 GHz	If Gain Low         #Attent: 20 dB         Det (P / A NH)           Ref Offset 11.1 dB         Mkr1 2.412 GH2         Hkr1 2.412 GH2           10 dB/dV         Ref 21.10 dBm         -2.043 dBm									
Title	Γ											
Graticul	<u>on</u>									·	a 0	
Display Lin -17.96 dBr Of	Qn	.1736.49H									9	
											9	
System Display	Г	-united and	mante	han an a	musian	elon-ali	wenter	بالديدمت	وللواحر الدوار	wing	°	
Settings											-	

Display I	ine -18.16 d		NO: Fast Ca	Tring	e Run	#Avg Typ Avg/Hold		3RAC T2P	5ep 83, 2015 1 2 3 4 5 6 E M MM WWW	-	Display
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41.9 58.9	hurm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	حادروهموالح	www.we	باسمعادي	ay	p.+**46.es;~*	and the second	محصيما		System Display Settings
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Marker	H Sep E3, 2015 21 2 3 4 5 6 PE M WH WWW	58AC		#Avg Ty Avg(Hok	e Run	1.000	Hz NO: Fast G		4917100	rker 1	
Marker Tabl	92 GHz 52 dBm	IFGeinLow #Atten: 20 dB DET[FFAN Ref Offset 11.1 dB Ref 21.10 dBm -2.152 dB -2.152 dB									
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		Strid dutt		schure Analyzer - Swept S	Keysight lips				
TRACE 1 2 3 4 TYPE MWHW DET P P A N	#Avg Type: RMS Avg[Hold:>1/1	Trig: Free Run #Atten: 20 dB	m PNO: Fast	ine -17.95 dB	Display L				
Ref Offset 11.1 dB Mkr1 2.412 GHz 0 dBidiv Ref 21.10 dBm 1.731 dBm 1.731 dBm									
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		300 kHz	#VBW	100 kHz	Res BW				
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# Band-edge Compliance of RF Conducted Emissions

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Display Line -16.99 dBm         Proc. Fast IFGstnLow         Trig: Free Run #Atten: 20 dB         #Avg Type: RMS Avg/Hold:>E11         Proc. [3,2,3,6,5] Trig: Free Run addition         Display           Ref Offset 11.1 dB 10 dB/div         Ref Offset 11.1 dB 10 dB/div         Mkr1 2.401 77 GHz 3.007 dBm         Annotation           10 dB/div         Ref Offset 11.1 dB 10 dB/div         Image: Store Sto		ectrure Analyter -	Swept SA							14
Ref Offset 11.1 dB         Mkr1 2.401 77 GHz         Annotation           10 dB/div         Ref 21.10 dBm         3.007 dBm         Title           11         1		ine -16.9	9 dBm	O Fest C	Trig: Free Run	#Avg Type: RMS	584	1123456		play
11.3     1	10 dB/div		IFG	ainLow	#Atten: 20 dB	Mk	r1 2.401	77 GHz	1. Second	otation►
109	11.1	¢1								Title
389         360         360 <td>100</td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td>-11.99 (0%)</td> <td></td> <td></td>	100		-					-11.99 (0%)		
All 9         On         On           Start 2.39000 GHz         #VBW 300 kHz         Stop 2.50000 GHz           #Res BW 100 kHz         #VBW 300 kHz         Sweep 10.53 ms (1001 pts)           1         1         2.401 77 GHz         3.007 dBm           3         N         1         2.403 50 GHz	28.9	02						-		Graticule
#Res BW 100 kHz         #VBW 300 kHz         Sweep 10.53 ms (1001 pts)           Image: Second and the s	-58.9	/ \	Man	****			3			
N         f         240177 GHz         3.007 dBm         System           2         N         f         2.400 00 GHz         -37.837 dBm         System         Displayi           5         5         5         Settings         Settings           6         7         5         Settings         Settings           9         9         10         10         Settings				#VB	V 300 kHz	Sweep	Stop 2.50 10.53 ms (	0000 GHz 1001 pts)		
2         N         f         2.400.00 GHz         -37.837 dBm         System           3         N         f         2.483.50 GHz         -58.153 dBm         Displayi           5         -         -         -         -         Displayi           6         -         -         -         -         -           7         - <td></td> <td></td> <td>2 401 77</td> <td>GHa</td> <td></td> <td>FUNCTION FUNCTION MOT</td> <td>-</td> <td>IN WALLE</td> <td></td> <td></td>			2 401 77	GHa		FUNCTION FUNCTION MOT	-	IN WALLE		
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			CH Mid	/ GFSK			
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nalybel - Swept SA				
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17.93 dBm	Feat Trig: Free Run	#Avg Type: RM5 Avg/Hold:>1/1	TRACE 1 2 3 4 5 TYPE MWHWW DET P P A NN	4 Diapiay
IFGa	in:Low #Atten: 20 dB	00000000000000000000000000000000000000		Apportation
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ista oc	Hopping	g / GFSK		5 6 Display
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17.02 dBm PN0 IFGe Offset 11.1 dB	Sassi deri	g / GFSK Avg Type: RMS Avg(Hold:>11	12.441 78 60 50 50 51.201 7902 1 2 3 4 5 702 1 2 3 4 5 702 1 2 4 1 78 GH	Display
17.02 dBm PNC IFGe	Sassi deri	g / GFSK Avg Type: RMS Avg(Hold:>11	04-45.38794 Sep 23, 201 TRACE (12.3.4.5 TOPE (NAMAND DET (P.P.A.N.9	Display
17.02 dBm Pso #Ga Offset 11.1 dB 21.10 dBm	Strat off	g / GFSK Aug Type: RMS Avg/Hold:>11 Mkr	12.441 78 60 50 50 51.201 7902 1 2 3 4 5 702 1 2 3 4 5 702 1 2 4 1 78 GH	5 Display
17.02 dBm Pso #Ga Offset 11.1 dB 21.10 dBm	Sassi deri	g / GFSK Aug Type: RMS Avg/Hold:>11 Mkr	12.441 3894 (ap 81, 20) Trace (1 2 3 4 5 Trace	5 Display
17.02 dBm Pso #Ga Offset 11.1 dB 21.10 dBm	Strat off	g / GFSK Avg Type: RMS Avg Hold:>1/1 Mkr	12.441 78 60 50 50 51.201 7902 1 2 3 4 5 702 1 2 3 4 5 702 1 2 4 1 78 GH	S 6 Display
17.02 dBm Pso #Ga Offset 11.1 dB 21.10 dBm	Strat off	g / GFSK Avg Type: RMS Avg Hold:>1/1 Mkr	12.441 3894 (ap 81, 20) Trace (1 2 3 4 5 Trace	S 6 Display
17.02 dBm Pso #Ga Offset 11.1 dB 21.10 dBm	Strat off	g / GFSK Avg Type: RMS Avg Hold:>1/1 Mkr	12.441 3894 (ap 81, 20) Trace (1 2 3 4 5 Trace	Annotation Title Graticul Qn O
17.02 dBm Pso #Ga Offset 11.1 dB 21.10 dBm	Strat off	g / GFSK Avg Type: RMS Avg Hold:>1/1 Mkr	12.441 38 74 Sep 83, 201 78445 12 3 4 5 79445 12 3 4 5 7945 12 4 4 201 17 4 2 4 12.411 78 GH2 2.980 dBn	5     Display       M     Annotation       Annotation     Title       Graticul     Graticul       Qn     O       Display Lin     -17.02 dBr
17,02 dBm PNO FGe 0ffset 11,1 dB 21,10 dBm 1 1 1 1 1 1 1 1 1 1 1 1 1	Strat off	g / GFSK Avg Type: RMS Avg Hold:>1/1 Mkr	12.411 78 GH 2.980 dBn 	S     Display       Min     Annotation       Annotation     Title       Graticul     On       O     Display Lin       -17.02 dBr     O
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24117.02 dBm PNO IT.02 dBm PNO IFGe Offset 11.1 dB 21.10 dBm 1 Iteration Iteration 24.11 786 2.400 00	#VBW 300 kHz	g / GFSK #Avg Type: RMS Avg[Hold:>11 Mki	(4 44 39 70 5ep 83, 201 TRACE [1 2 4 5 TRACE [1 2 4 5 TRACE [1 2 4 5 TRACE [1 2 4 5 MARAY MARAY DET P P A N 1 2.411 78 GH2 2.980 dBn .17.02 dB .17.02 dB	Annotation Title Graticul Qn 0 Display Lin -17.02 dBr Qn 0 System Display J
24117.02 dBm PNO IT.02 dBm PNO IFGe Offset 11.1 dB 21.10 dBm 1 Iteration Iteration 24.11 786 2.400 00	#VBW 300 kHz	g / GFSK #Avg Type: RMS Avg[Hold:>11 Mki	(4 44 39 70 5ep 83, 201 TRACE [1 2 4 5 TRACE [1 2 4 5 TRACE [1 2 4 5 TRACE [1 2 4 5 MARAY MARAY DET P P A N 1 2.411 78 GH2 2.980 dBn .17.02 dB .17.02 dB	S Display Annotation Title Graticul On Of DisplayLin -17.02 dBr On Of System
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	Gifset 11.1 dB 21.10 dBm	Offset 11.1 dB 21.10 dBm SHz CHZ 2479 76 GHz 2.070 dBm	Offset 11.1 dB         Mki           21.10 dBm	Offset 11.1 dB         Mkr1 2.479 76 GH;           21.10 dBm         1           4         1           4         1           4         1           4         1           4         1           4         3           3         3

		CH Low /	/ 8-DPSK								
BE Keysight Spectrum Analyzer - Swept 1	41 C		1.7 014041040		- 10 E						
Display Line -17.96 dB	en PNO: Fast C	Trig: Free Run	#Avg Type: RMS Avg(Hold:>1/1	04 50 59 74 5ep 63, 2015 TRACE 1 2 3 4 5 6 TVPE NUMPERATION	Display						
10 dB/div Ref 21.10 dB	Ref Offset 11.1 dB Mkr1 2.401 77 GHz 2.037 dBm 2.037 dBm										
11.1 1.10					Title≻						
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28.9 -36.9					Graticule On Off						
42.9			****	- Q <sup>3</sup>	Display Line -17.96 dBm On Off						
Start 2.39000 GHz #Res BW 100 kHz	#VB1	N 300 kHz	Sweep	Stop 2.50000 GHz 10.53 ms (1001 pts)							
THE PARTY PARTY NAME	exercise and		INCTION FUNCTION MOTO	FUNCTION VALUE							
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11											
MISIS .			STATU	15							

	Contraction of the second second		-14-00
PMC: Feet (-) Trig: Free Run	#Avg Type: RMS Avg(Hold:>1/1	TRACE 1 2 3 4 5 6	Display
IFGain:Low #Atten: 20 dB			Annotation
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une the fun		~	Display Lin -18.16 dBr On O
#VBW 300 kHz			
	NCTON FUNCTION MOTOR	IUNITION WILLIE	
00 00 GHz -50,585 dBm 33 50 GHz -59,539 dBm			System Displays Settings
	#VBW 300 kHz	PNO: Feat         Trig: Free Run #Atten: 20 dB         #Avg Type RMS Avg/Hold:>11           If GainLow         #Atten: 20 dB         Mkr1           If GainLow         If GainLow         If GainLow           If GainLow         If GainLow         If GainLow           If GainLow         If GainLow         If GainLow	PHO: Fast         Trig: Free Run #Atten: 20 dB         Avg Type: RMS Avg/Hold:>111         Trid: [1:2:3:4:5:4           PHO: Fast         Trig: Free Run #Atten: 20 dB         Mkr1 2:440 71 GHz 1.844 dBm           Image: Pho: Fast         Image: Pho: Fast         Trig: Free Run Trig: Free Run #Atten: 20 dB           Image: Pho: Fast         Image: Pho: Fast         Trig: Free Run Trig: Free Run Trig: Free Run Trig: Free Run RAtten: 20 dB           Image: Pho: Fast         Image: Pho: Fast Run Trig: Free Run Trig: Free Run Trig: Free Run Trig: Free Run Trig: Free Run Trig: Free Run Ratten: 20 dB         Trig: Free Run Trig: Free

				CH Hig	h / 8-l	DPSK				
	ectrure Analyter					7				1010
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10 dB/div	Ref Offse Ref 21.1					M	kr1 2.479 1.1	76 GHz 21 dBm	- 51	Annotation
Log							41-			
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-8.90		-	-		-	-	1	-11.01.004	F	
-10.9										Graticule
-36.9	_	_			_		14		<u>on</u>	0#
-42.9	2	100			40.00 202		1 13	100		Display Line
-58.9	mildense				and a star	~~~~~	~ V		Qn	-18.88 dBm Off
	9000 GHz				_		Stop 2.5	0000 GHz		
THE OWNER AND INCOME.	100 kHz		#VB	W 300 kHz		Sweep	10.53 ms	(1001 pts)		
I N	1	2,4797		1.121 dBm	Paralitan	Part I tak 140	10 1000	04 WLUE - 8	H	17.02.757.0117
2 N 3 N 4 5	1	2,400 0 2,483 6		-59.985 dBm -58.322 dBm						System Display* Settings
6 7 8			-			-	-			
9			-				-			
11							1			
MISES						STA	rus		-	

		Hopping <i>i</i>	/ 8-DPSK		
AL STREET	dBm	I section	AUR AUR SAvg Type: RMS	144-422-56 PM Sep 22, 2015 TRACE 1, 2, 3, 4, 5, 6	Display
	PNO: Fast 4 IFGain:Low	* Trig: Free Run #Atten: 20 dB	Avg(Hold:>1/1	1 2.405 73 GHz	Annotation
Ref Offset			MIKI	2.054 dBm	
11.1	านเหลือการเลือง	พระสมเกิดการ	ารของจากเป็นของการการการการการการการการการการการการการก		Title
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42.9 (2.9) antroduce				V <sup>3</sup>	Display Lin -17.95 dBr On O
Start 2.39000 GHz	#VB	W 300 kHz	Sweep 1	Stop 2.50000 GHz 0.53 ms (1001 pts)	
	2.405 73 GHz	2.054 dBm	NCTION FUNCTION MOTH	-	
2 N 1 3 N 1 4 5	2,400 00 GHz 2,483 50 GHz	47.817 dBm -68.357 dBm			System Display Settings
6 7 8 9 10					
11					
45			STATU	5	03

# 7.8 RADIATED EMISSIONS

# 7.7.1 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	( <sup>2</sup> )
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.

**Compliance Certification Services Inc.** FCC : JFZLP60BT

§ 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.

	Ор	en Area Test Site # 6			
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due	
TYPE N COAXIAL CABLE	SUHNER	CHA9513	6	JAN. 21, 2016	
BI-LOG Antenna	Sunol	JB1	A070506-2	AUG. 09, 2016	
LOOP ANTENNA	EMCO	6502	8905-2356	JUN. 10, 2016	
Pre-Amplifier	HP	8447F	2944A03817	JAN. 20, 2016	
Pre-Amplifier	EMCI	EMC 012645	980098	DEC04.2015	
EMI Test Receiver	R&S	ESCS 30	100348	DEC. 08, 2015	
Horn Antenna	Com-Power	AH-118	071032	JAN. 09, 2016	
3116 Double Ridge Antenna (40G)	ETS-LINDGREN	3116	00078900	MAR. 04, 2016	
Turn Table	Yo Chen	001		N.C.R.	
Antenna Tower	AR	TP1000A	309874	N.C.R. N.C.R.	
Controller	СТ	SC101			
RF Swicth	E-INSTRUMENT TELH LTD	ERS-180A	EC1204141	N.C.R	
Power Meter	Anritsu	ML2487A	6K00003888	NOV. 23, 2015	
Power Sensor	Anritsu	MA2491A	33265	NOV. 23, 2015	
Temp./Humidity Chamber	K.SON	THS-M1	242	AUG. 27, 2016	
DC Power Source	LOKO	DSP-5050	L1507009282	N.C.R	
Spectrum Analyzer	R&S	FSU	200789	JUL. 01, 2016	
Spectrum Analyzer	R&S	FSEM	830270/015	NCR	
Spectrum Analyzer	R&S	FSEK 30	100264	JAN. 26, 2016	
Signal Analyzer	ROHDE&SCHWARZ	FSV 40	101073	APR. 25, 2016	
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	JAN. 23, 2016	

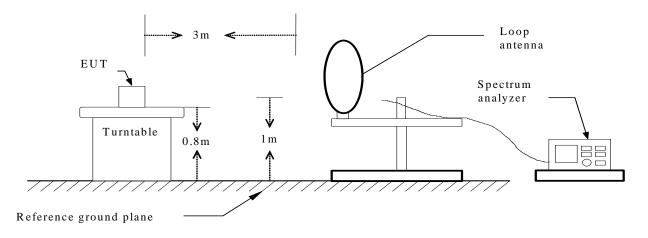
#### TEST EQUIPMENT

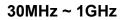
**Remark:** 1. Each piece of equipment is scheduled for calibration once a year. 2. N.C.R = No Calibration Request.

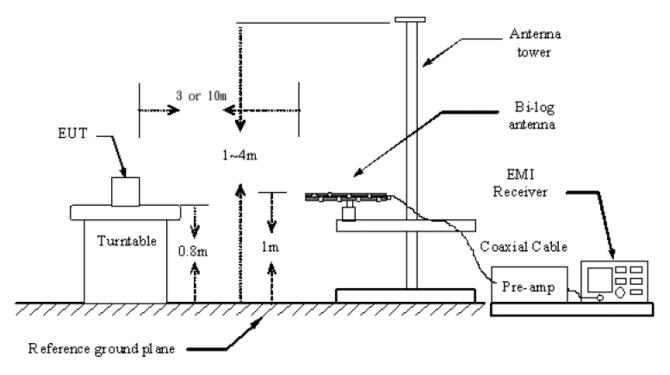
## **TEST SETUP**

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

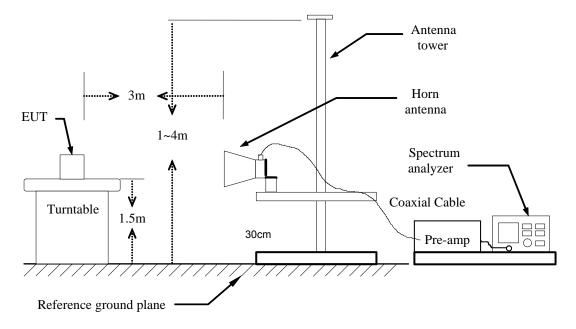
#### 9kHz ~ 30MHz







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 1.5 meters above the ground at a 3 meter chamber 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 or 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 or 10 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.

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 510 Hz for Average detection (AV) at frequency above 1GHz.

# 7.7.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

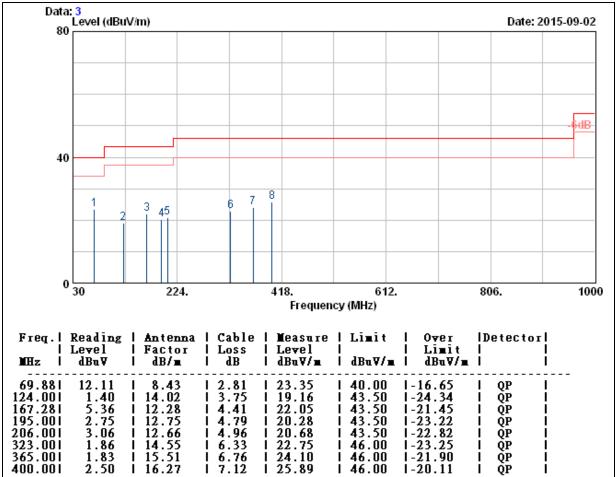
## BELOW 1 GHz (9kHz ~ 30MHz)

No emission found between lowest internal used/generated frequency to 30MHz.

## BELOW 1 GHz (30MHz ~ 1GHz)

Product Name	WIRELESS TURNTABLE	Test Date	2015/09/02
Model Name	AT-LP60-BT	Test By	Weici Lo
Test Mode	Normal Operation (worst case)	Temp & Humidity	26.8°C, 54%

Vertical



#### Remark:

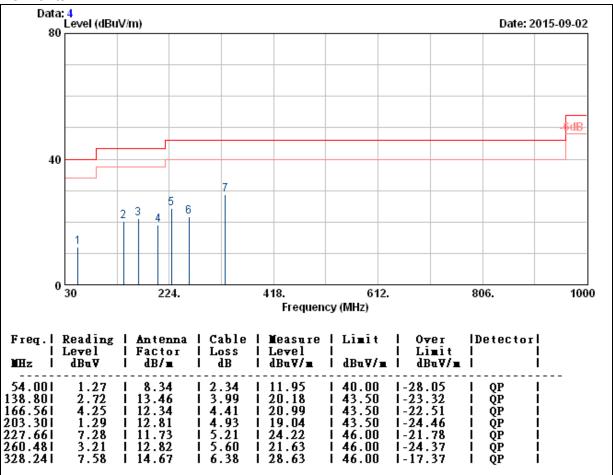
- 1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
- 2. Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.
- 3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
- 4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A "remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable imit) and considered that's already beyond the background noise floor.
- 5. Margin (dB) = Remark result (dBuV/m) Quasi-peak limit (dBuV/m).

## **CURRENT Compliance Certification Services Inc.**

FCC : JFZLP60BT

Product Name	WIRELESS TURNTABLE	Test Date	2015/09/02
Model Name	AT-LP60-BT	Test By	Weici Lo
Test Mode	Normal Operation (worst case)	Temp & Humidity	26.8°C, 54%

#### Horizontal



#### **Remark:**

- 1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
- 2. Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.
- 3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
- 4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A "remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable imit) and considered that's already beyond the background noise floor.
- 5. Margin (dB) = Remark result (dBuV/m) Quasi-peak limit (dBuV/m).

# 7.7.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

<b>Product Name</b>	WIRELESS TURNTABLE	Test Date	2015/09/02
Model Name	AT-LP60-BT	Test By	John Chen
Test Mode	CH Low TX / GFSK	Temp & Humidity	28.5°C, 67%

#### Horizontal

		TX mode / CH Low				rement D	Distance at	3m Hoi	rizontal po	larity		
	Freq.	Freq. Reading		eq. Reading AF Cable L		Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)		
	1998.93	62.42	30.49	2.33	48.08	0.30	47.46	74.00	-26.54	Р		
	1998.93	50.40	30.49	2.33	48.08	0.30	35.44	54.00	-18.56	А		
*	4803.63	59.57	33.81	3.77	48.29	0.40	49.26	74.00	-24.74	Р		
*	4803.63	50.88	33.81	3.77	48.29	0.40	40.56	54.00	-13.44	А		

### Vertical

		Meas	urement	Distance a	t 3m Ve	ertical pola	arity				
	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)	
	1999.43	63.81	30.50	2.33	48.08	0.30	48.85	74.00	-25.15	Р	
	1999.43	51.26	30.50	2.33	48.08	0.30	36.30	54.00	-17.70	А	
*	4803.74	60.16	33.81	3.77	48.29	0.40	49.85	74.00	-24.15	Р	
*	4803.74	52.09	33.81	3.77	48.29	0.40	41.78	54.00	-12.22	А	

### Remark:

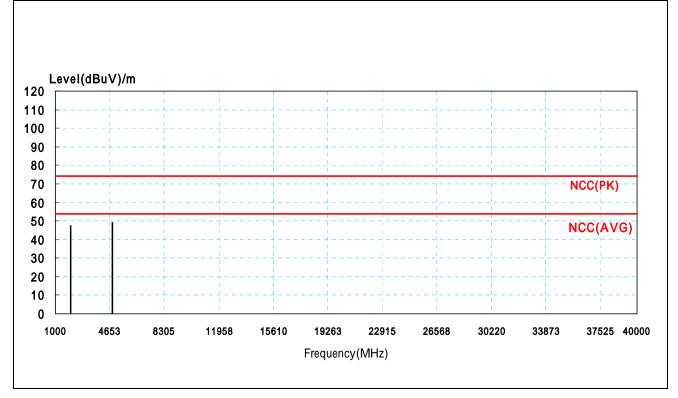
- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=510Hz
- 3. The result basic equation calculation is as follow:

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

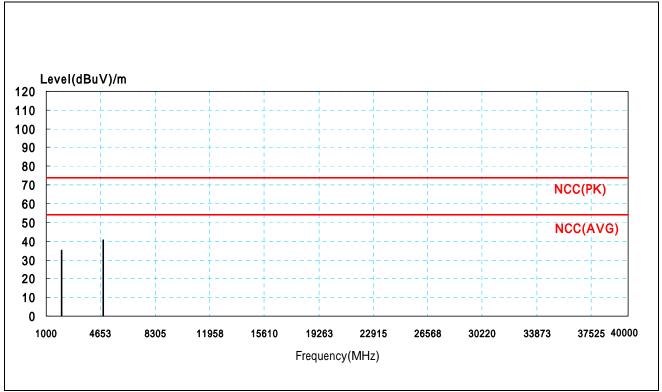
- 4. The other emission levels were 20dB below the limit
- 5. The test limit distance is 3M limit.



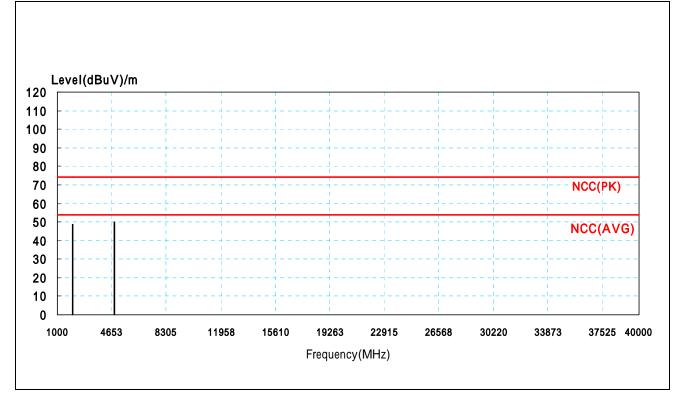
#### TX MODE / Horizontal Detect: PK



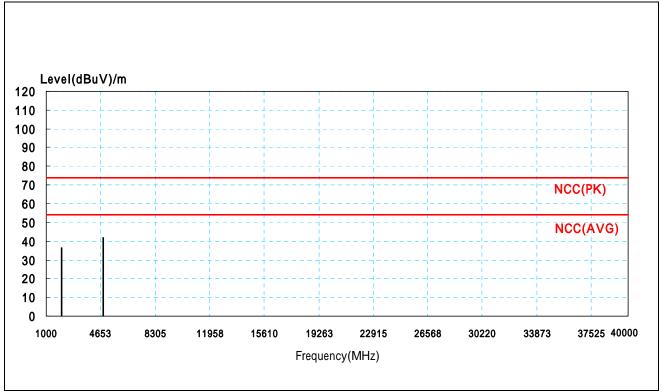
#### **Detect: AV**



#### TX MODE / Vertical Detect: PK



### **Detect: AV**



<b>Product Name</b>	WIRELESS TURNTABLE	Test Date	2015/09/02
Model Name	AT-LP60-BT	Test By	John Chen
Test Mode	CH Mid TX / GFSK	Temp & Humidity	28.5°C, 67%

Horizontal

	TX mode / CH Mid				Measur	rement D	istance at 3	3m Hor	izontal po	larity
	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)
	1999.71	61.59	30.50	2.33	48.08	0.30	46.64	74.00	-27.36	Р
	1999.71	49.63	30.50	2.33	48.08	0.30	34.68	54.00	-19.32	А
*	4881.83	58.21	34.05	3.80	48.30	0.40	48.16	74.00	-25.84	Р
*	4881.83	50.59	34.05	3.80	48.30	0.40	40.54	54.00	-13.46	А

Vertical

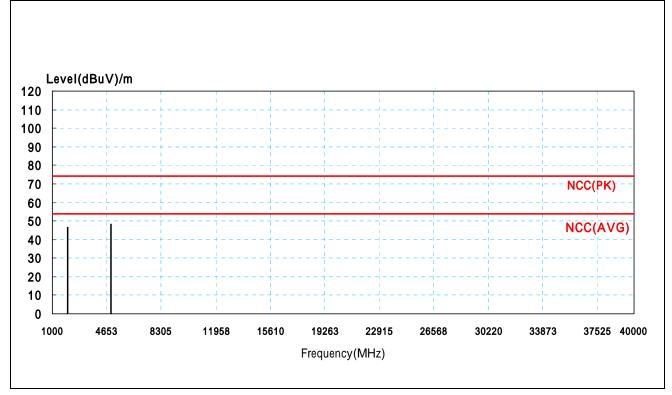
		TX mode / CH Mid				urement	Distance a	t 3m Ve	ertical pola	arity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1999.77	61.98	30.50	2.33	48.08	0.30	47.03	74.00	-26.97	Р
	1999.77	49.95	30.50	2.33	48.08	0.30	35.00	54.00	-19.00	А
*	4881.79	58.69	34.05	3.80	48.30	0.40	48.64	74.00	-25.36	Р
*	4881.79	51.18	34.05	3.80	48.30	0.40	41.13	54.00	-12.87	А
	1999.77	61.98	30.50	2.33	48.08	0.30	47.03	74.00	-26.97	Р

### **Remark:**

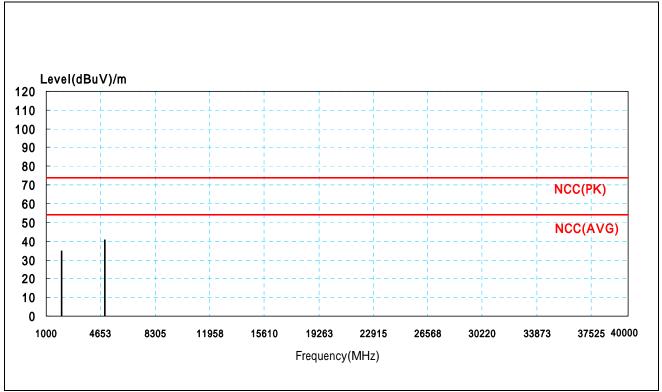
- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=510Hz
- 3. The result basic equation calculation is as follow:
- Level = Reading + AF + Cable Preamp + Filter, Margin = Level-Limit
- 4. The other emission levels were 20dB below the limit
- 5. The test limit distance is 3M limit.



#### TX MODE / Horizontal Detect: PK



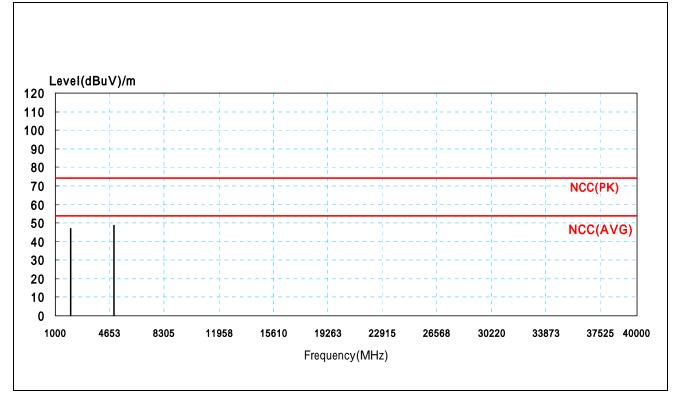
#### **Detect: AV**



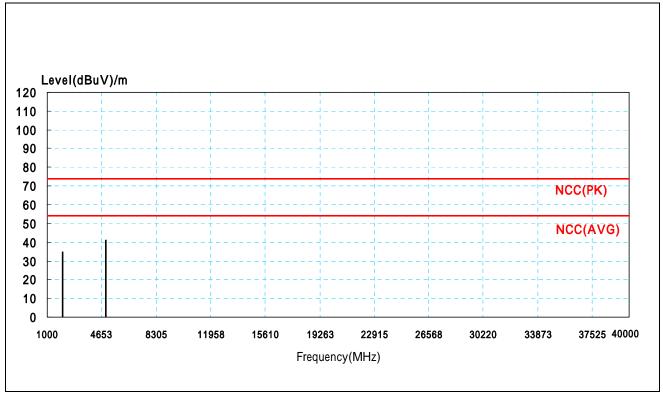
#### TX MODE / Vertical Detect: PK

CCSRF Compliance Certification Services Inc.

FCC : JFZLP60BT



#### **Detect: AV**



<b>Product Name</b>	WIRELESS TURNTABLE	Test Date	2015/09/02	
Model Name	AT-LP60-BT	Test By	John Chen	
Test Mode	CH High TX / GFSK	Temp & Humidity	28.5°C, 67%	

Horizontal

	TX mode / CH High				Measurement 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)
	1998.91	61.59	30.49	2.33	48.08	0.30	46.63	74.00	-27.37	Р
	1998.91	49.49	30.49	2.33	48.08	0.30	34.53	54.00	-19.47	А
*	4959.70	60.81	34.28	3.83	48.30	0.40	51.03	74.00	-22.97	Р
*	4959.70	54.02	34.28	3.83	48.30	0.40	44.23	54.00	-9.77	А

Vertical

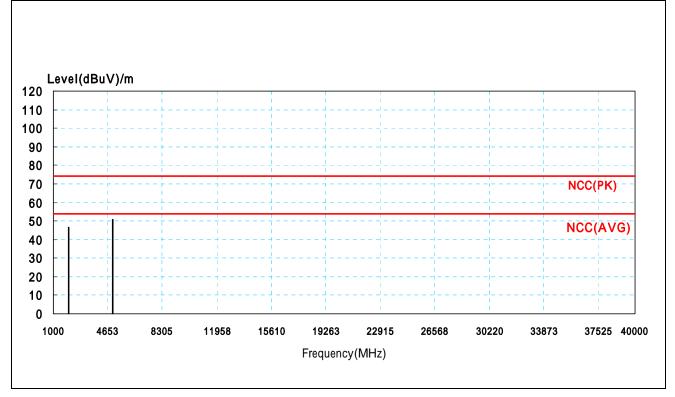
	TX mode / CH High				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1998.84	63.81	30.49	2.33	48.08	0.30	48.85	74.00	-25.15	Р
	1998.84	51.37	30.49	2.33	48.08	0.30	36.41	54.00	-17.59	А
*	4959.80	60.77	34.28	3.83	48.30	0.40	50.99	74.00	-23.01	Р
*	4959.80	54.68	34.28	3.83	48.30	0.40	44.90	54.00	-9.10	А

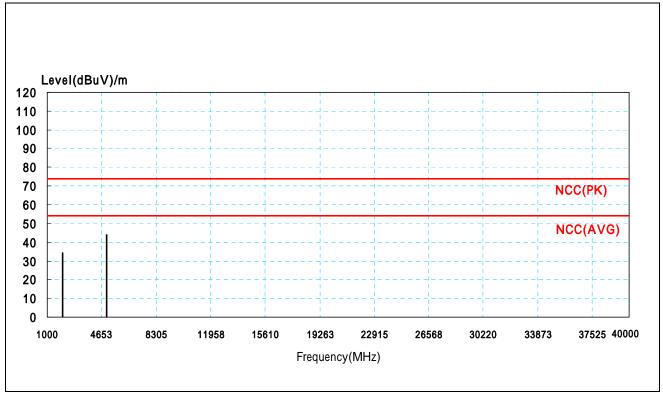
### **Remark:**

- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=510Hz
- 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
- 5. The test limit distance is 3M limit.



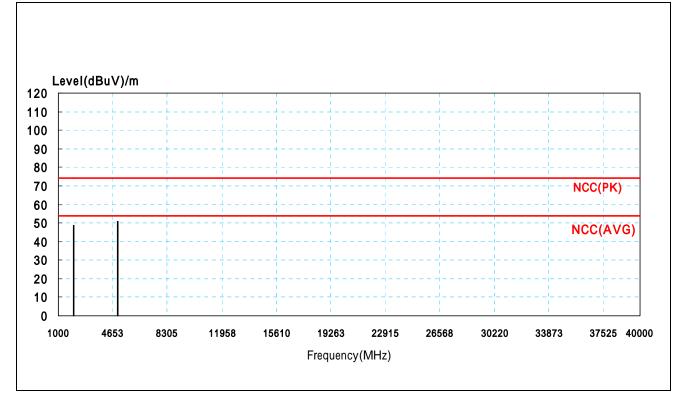
#### TX MODE / Horizontal Detect: PK

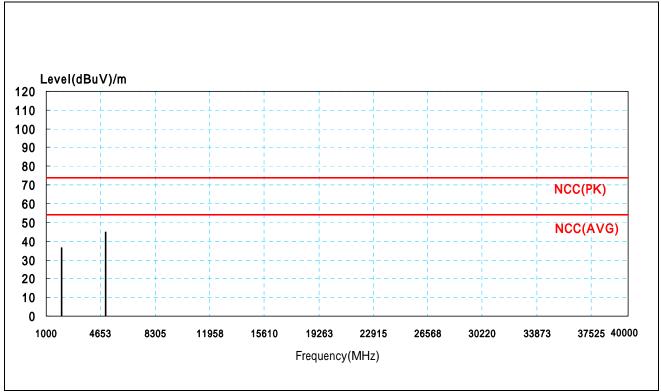






#### TX MODE / Vertical Detect: PK





Product Name	WIRELESS TURNTABLE	Test Date	2015/09/02
Model Name	AT-LP60-BT	Test By	John Chen
Test Mode	CH Low TX / 8-DPSK	Temp & Humidity	28.5°C, 67%

Horizontal

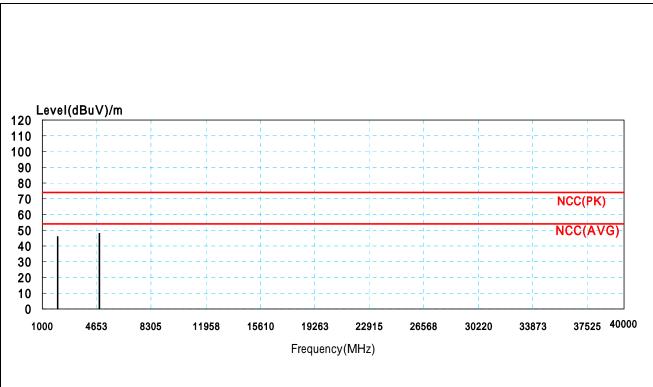
		TX mode	e / CH Low		Measu	Measurement Distance at 3m Horizontal polarity						
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark		
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)		
	1998.88	60.81	30.49	2.33	48.08	0.30	45.85	74.00	-28.15	Р		
	1998.88	48.82	30.49	2.33	48.08	0.30	33.86	54.00	-20.14	А		
*	4803.63	58.38	33.81	3.77	48.29	0.40	48.06	74.00	-25.94	Р		
*	4803.63	49.26	33.81	3.77	48.29	0.40	38.94	54.00	-15.06	А		

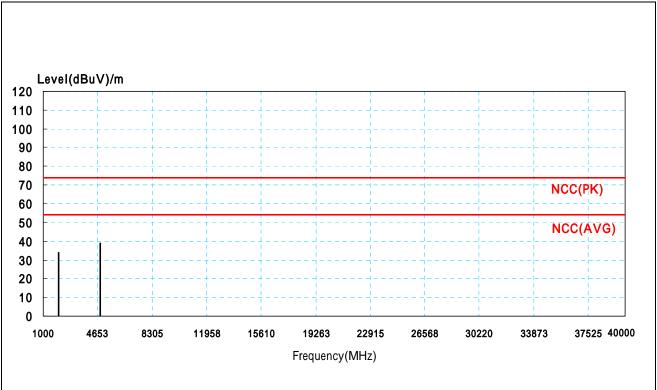
Vertical

		TX mode	e / CH Low		Meas	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)		
	1999.05	62.48	30.49	2.33	48.08	0.30	47.52	74.00	-26.48	Р		
	1999.05	50.11	30.49	2.33	48.08	0.30	35.15	54.00	-18.85	А		
*	4803.81	59.92	33.81	3.77	48.29	0.40	49.61	74.00	-24.39	Р		
*	4803.81	49.88	33.81	3.77	48.29	0.40	39.57	54.00	-14.43	А		

- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=510Hz
- 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
- 5. The test limit distance is 3M limit.

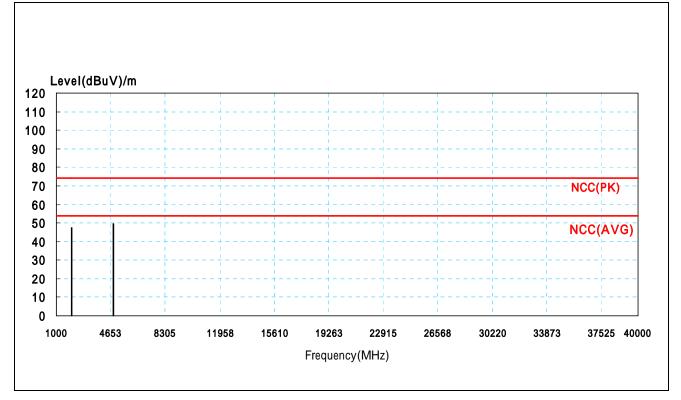
#### **TX MODE / Horizontal Detect: PK**

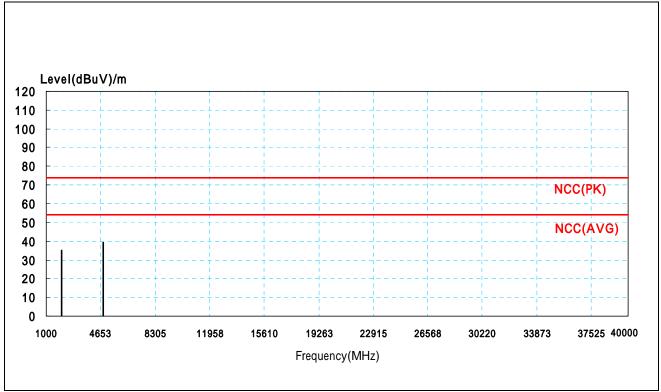






#### TX MODE / Vertical Detect: PK





<b>Product Name</b>	WIRELESS TURNTABLE	Test Date	2015/09/02
Model Name	AT-LP60-BT	Test By	John Chen
Test Mode	CH Mid TX / 8-DPSK	Temp & Humidity	28.5°C, 67%

Horizontal

		TX mode	e / CH Mid		Measu	Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark	
	(MHz) (dBµV) (d		(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)	
	1999.06	62.81	30.49	2.33	48.08	0.30	47.85	74.00	-26.15	Р	
	1999.06	50.17	30.49	2.33	48.08	0.30	35.21	54.00	-18.79	А	
*	4881.93	57.52	34.05	3.80	48.30	0.40	47.47	74.00	-26.53	Р	
*	4881.93	48.56	34.05	3.80	48.30	0.40	38.51	54.00	-15.49	A	

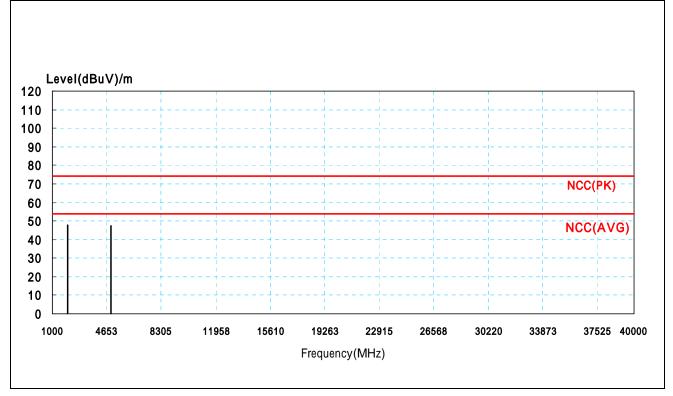
Vertical

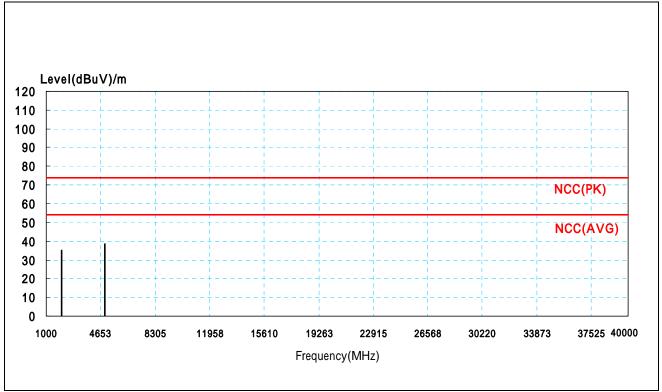
		TX mod	e / CH Mid		Meas	Measurement Distance at 3m Vertical polarity						
	Freq.	Reading	Cable Loss	Pre-amp	Filter	Level	Level Limit		Mark			
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)		
	1999.37	63.08	30.50	2.33	48.08	0.30	48.12	74.00	-25.88	Р		
	1999.37	51.38	30.50	2.33	48.08	0.30	36.42	54.00	-17.58	А		
*	4881.75	57.44	34.05	3.80	48.30	0.40	47.39	74.00	-26.61	Р		
*	4881.75	48.77	34.05	3.80	48.30	0.40	38.72	54.00	-15.28	А		

- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=510Hz
- 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
- 5. The test limit distance is 3M limit.

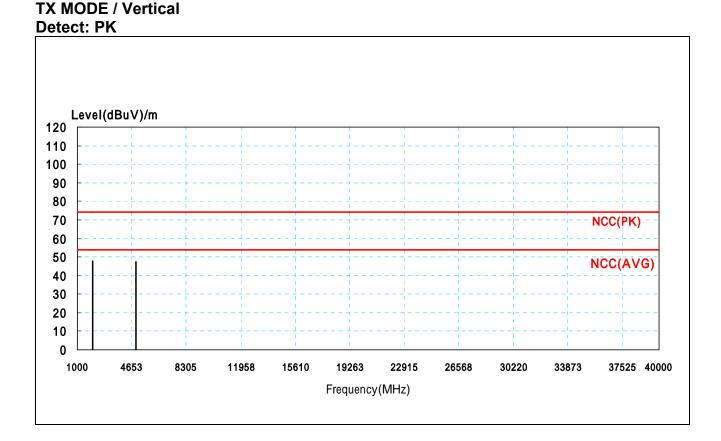


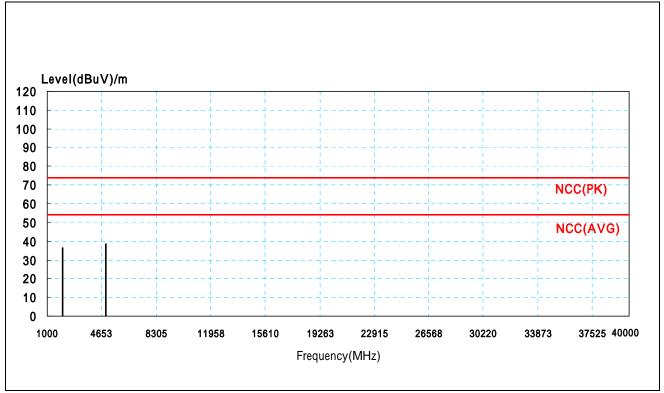
#### TX MODE / Horizontal Detect: PK





CCSRF Compliance Certification Services Inc.





<b>Product Name</b>	WIRELESS TURNTABLE	Test Date	2015/09/02
Model Name	AT-LP60-BT	Test By	John Chen
Test Mode	CH High TX / 8-DPSK	Temp & Humidity	28.5°C, 67%

Horizontal

		TX mode	e / CH High	ı	Measurement 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)	
	1999.24	62.14	30.49	2.33	48.08	0.30	47.18	74.00	-26.82	Р	
	1999.24	49.83	30.49	2.33	48.08	0.30	34.87	54.00	-19.13	А	
*	4959.81	58.60	34.28	3.83	48.30	0.40	48.82	74.00	-25.18	Р	
*	4959.81	50.52	34.28	3.83	48.30	0.40	40.73	54.00	-13.27	А	

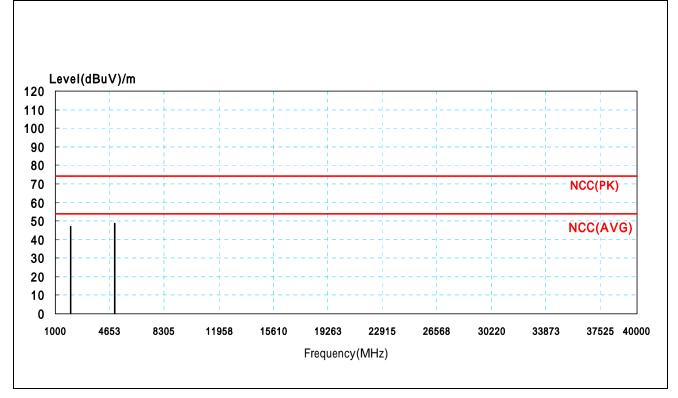
Vertical

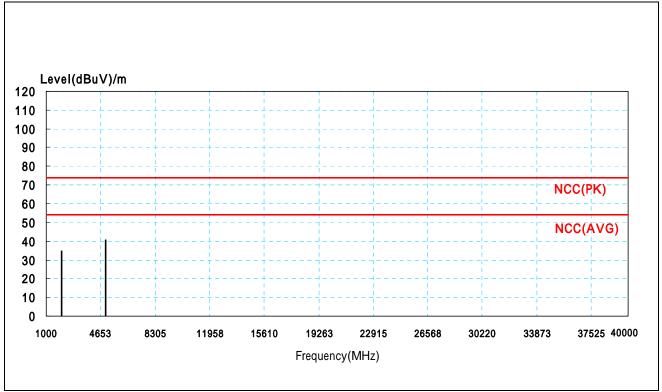
		TX mode	e / CH High	ı	Measurement Distance at 3m Vertical polarity						
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Level Limit		Mark	
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)	
	1999.86	62.71	30.50	2.33	48.08	0.30	47.76	74.00	-26.24	Р	
	1999.86	50.38	30.50	2.33	48.08	0.30	35.43	54.00	-18.57	А	
*	4959.85	58.61	34.28	3.83	48.30	0.40	48.82	74.00	-25.18	Р	
*	4959.85	51.08	34.28	3.83	48.30	0.40	41.29	54.00	-12.71	А	

- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=510Hz
- 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
- 5. The test limit distance is 3M limit.



#### TX MODE / Horizontal Detect: PK

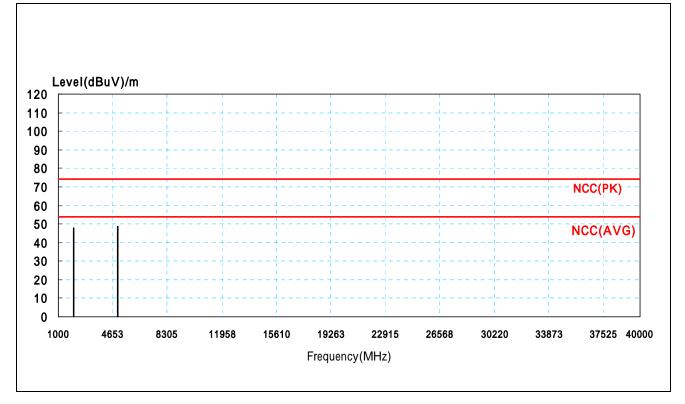


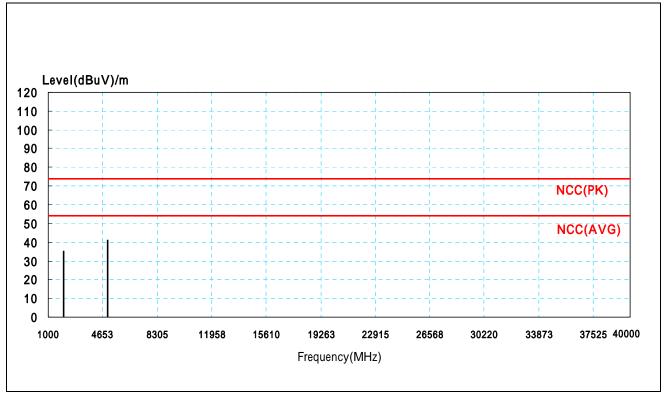


#### TX MODE / Vertical Detect: PK

CCSRF Compliance Certification Services Inc.

FCC : JFZLP60BT

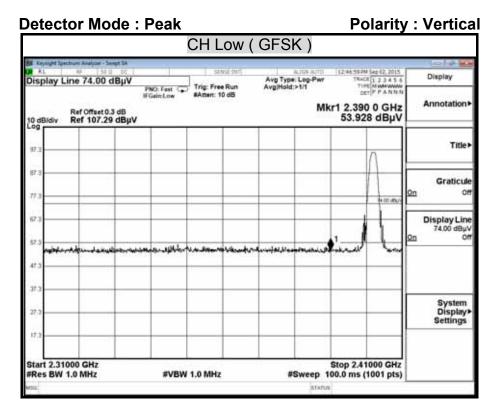


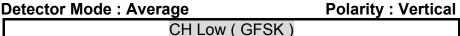


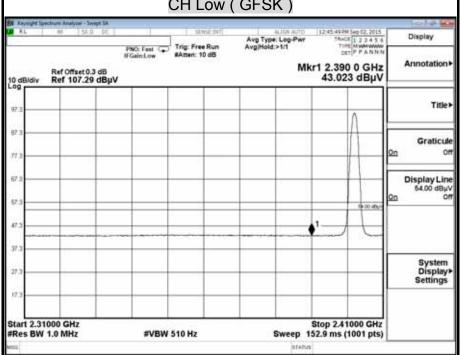
### 7.7.4 RESTRICTED BAND EDGES

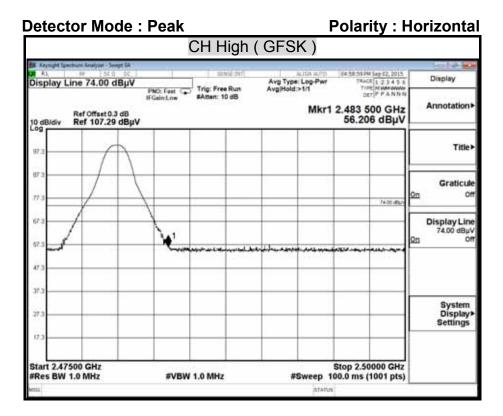
	CH Low (	(GFSK)	
Keysight Spectrum Analyzer - Swept SA		and the second second second second	
arker 1 2.3900000000	00 GHz	Aug Type: Log-Pwr TRACE 1 2 3 4 5	Feak Search
Ref Offset 0.3 dB 0 dB/div Ref 107.29 dBj	PNO: Feat Trig: Free Run IFGain:Low #Attent: 10 dB	AvgiHold:>1/1 The Downward Det P P A N Mkr1 2.390 0 GH 54.128 dBµ	NextPeak
97.3		Δ	Next Pk Righ
87 3		(4.00 etc)	Next Pk Let
67.3			Marker Delt
<sup>573</sup> Antonian-Labordania 173 173	1983-1972 - 445-56-51.982 (1985-1972) - 45-56-5	and a second second and the	MkrCi
27.3			MkrRefLv
17.3		Stop 2.41000 GH	Mor 1 of:

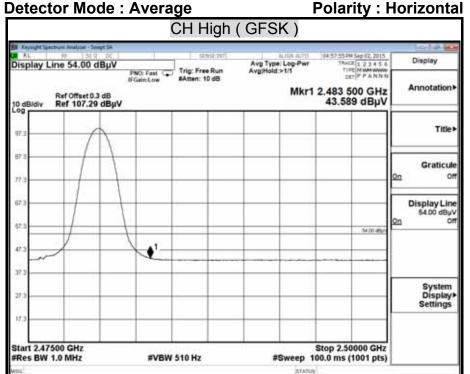
etector Mo				Polarity : H	0
		CHLOW	(GFSK)		
Keysight Spectrum Analyzer - 3	wept IA	Singler	8,105,6,70	01-00-037H Sep 02, 2015	012
Display Line 54.00			Avg Type: Log-Pwr Avg/Hold:>1/1	TRACE 1 2 3 4 5 6	Display
Ref Offset 0 10 dB/div Ref 107.2	IFGaint		640-54000 FTT	1 2.390 0 GHz 43.183 dBµV	Annotation
97.3					Title⊁
87.3					Graticule
67.5					Display Line 54.00 dBµV
47.3				1	
37.3					System
27.3					Display Settings
17.2					
Start 2.31000 GHz #Res BW 1.0 MHz		VBW 510 Hz		top 2.41000 GHz 2.9 ms (1001 pts)	



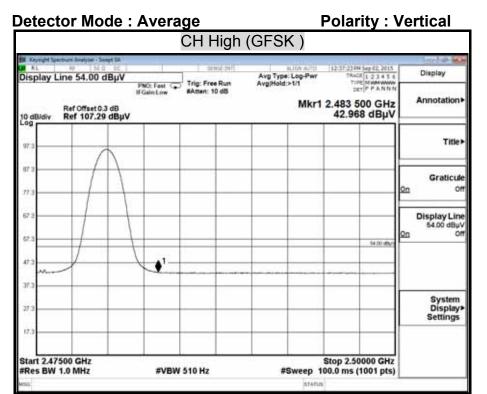








)etec	<u>tor Mo</u>	de :	Peak					Polari	ity:\	/e	rtical
				СНН	igh	(GFSł	< )				
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Display I	ine 74.00 d				E-3N7]	Avg Type Avg/Hold:			54p 02, 2015 1 2 3 4 5 6 N 004 WWW		Display
10 dB/div	Ref Offset 0. Ref 107.29	3 dB	PNO: Fast G IFGainLow	#Atten: 10		Avginua.		2.483 50	PPANNN		Annotation
97.3	Ref 107.25	JOBHA							c abpt	F	Title
87.3	$- \int$	$\sum$								F	12.03.03
17.3		$\left  \right $							14.00 abu/s	<u>On</u>	Graticul
67.5	$\wedge$		1							0n	Display Line 74.00 dBp
47.3			Much			-firencest	o de secondo a	in	بنهن با حارة		
37.3		-								L	12070000
27.3		-									System Display Settings
17.3											
	500 GHz 1.0 MHz		#VBW	1.0 MHz		#		Stop 2.50 00.0 ms (1			
#Res BW			#VBV	/ 1.0 MHz		#	Sweep 1	00.0 ms (1		L	



				SK)	B-DPS	ow (8	CHL	(		
-14 B	1 August August			an and the second		in constant			bure Analyter - Swept SA	
Sweep/Control	23456	CE 1	01:03:050 384	e: Log-Pwr		NGC1NT	1		ne 100 ms	Sweep T
Sweep Tim 100 m Auto <u>Ma</u>	GHz	0 0	r1 2.39		AvgiHold		Trig: Fre #Attent: 1	PNO: Fast IFGain:Low	Ref Offset 0.3 dB Ref 107.29 dBµV	10 dB/div
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		A	_			-		_		67.3
	4.00 /Bu/4									77.3
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	4x	┢		madeline		بعربيريدارا		simplement	-	67.3
		+						5 12 G ( North Sec 110		47.3
	_	+	-			-				37.3
Gate (off.LO)	_	┝								27.3
Point		╞		-		-			-	17.3
100			Stop 2.4	Sweep 1	<u> </u>		1.0 MHz	=VBW		Start 2.31

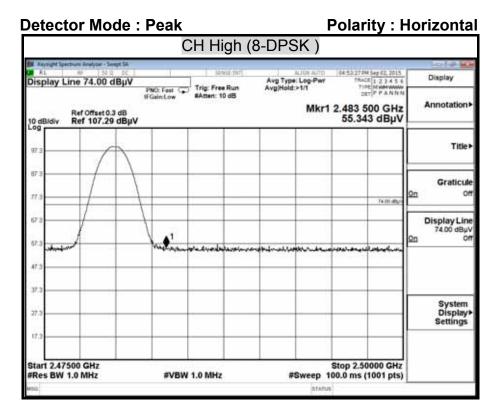
#### Detector Mode : Average Polarity : Horizontal

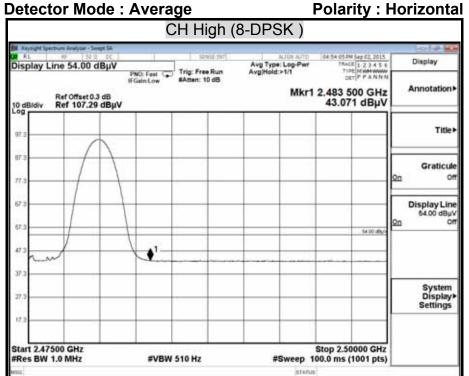
	ectrum Analyzer - Swept SA		1000 August 1000	177 STREET		
Display I	Line 54.00 dBµV		SEASE (NV)	Avg Type: Log-Pwr	01:01:57 PM Sep 02, 2015 TRACE 1 2 3 4 5 6	Display
10 dB/div	Ref Offset 0.3 dB Ref 107.29 dBµV	PNO: Fast G	Trig: Free Run #Atten: 10 dB	Avg Hold:>1/1	r1 2.390 0 GHz 43.082 dBµV	Annotation
97.3						Title
67.3					A	Graticul
77.3		_				<u>on</u> of
67.3						Display Line 54.00 dBµV
67.3		-			\$2.00 abu/s	<u>On</u> 01
47.5						
37.3						System
27.3						Display
17.3						
	1000 GHz 1.0 MHz	#VBW	510 Hz		Stop 2.41000 GHz 52.9 ms (1001 pts)	
85				STATUS		

	CH Low (8	B-DPSK)		
Keysight Spectrum Analyzer - Swept SA	I statist	AUGA 6/70 112	43.47 PH Sep 02, 2015	-14 B
Marker 1 2.39000000000		Avg Type: Log-Pwr Avg/Hold:>1/1	TRACE 1 2 3 4 5 6 TOPE N MARANAN DET P P A N N N	Peak Search
Ref Offset 0.3 dB	IFGainLow #Atten: 10 dB		2.390 0 GHz 53.961 dBµV	NextPea
97.3			2	Next Pk Righ
77.3			hourse	Next Pk Le
67.3				Marker Delt
57.3 Majaharikalahiralaharikalari 47.3		an a	prayor hadate	Mkr⊸C
37.3				mikiC
27.3				MkrRefLv
17.3				Mor 1 of
Start 2.31000 GHz #Res BW 1.0 MHz	#VBW 1.0 MHz		p 2.41000 GHz ms (1001 pts)	

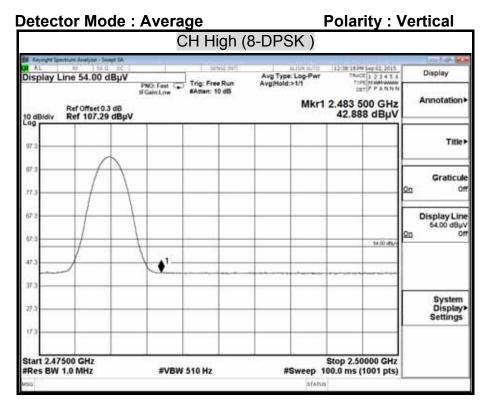


Keysight Spectrum Ready	and American	CH Low (	S-DFSK)		1010 00
AL RE	54.2 50	SENSE ONT	Avg Type: Log-Per	12:44:44 0H Sep 02, 2015 TRACE 1 2 3 4 5 6	Display
	PNO: Fest IFGainLow ret 0.3 dB 7.29 dBµV	Trig: Free Run #Atten: 10 dB	Avg/Hold:>1/1	r1 2.390 0 GHz 42.970 dBµV	Annotation
97.3					Title
2.0				0	
67.3					Graticule On Of
				11	
67.3					Display Line 54.00 dBµV On Of
67.3				54.00 /00/4	20 0
47.5					
37.3					
27.3					System Display Settings
17.3					
Start 2.31000 GH #Res BW 1.0 MH		W 510 Hz		Stop 2.41000 GHz 52.9 ms (1001 pts)	
was .			STARUS		





etector Mode : P	ertical			
	CH High (8	DPSK)		
Keynet leeduw Andres - Sweet IA KL RF 55 0 DC Sweep Time 100 ms	I senie durt	Auto Auto	12:38:44 PM Sep 62, 2015 TRACE 1 2 3 4 5 6	Sweep/Control
PNO	t Fast C Trig: Free Run inLow #Atten: 10 dB	Avg/Hold:>1/1	DET PPANNN	Sweep Time
Ref Offset 0.3 dB		Mkr1 2	.483 500 GHz 54.421 dBµV	100 mi Auto <u>Mar</u>
97.3				Sweep Setup
873				
///			74.00 //bg//	
67.3	A1			
473	Wines for in side lands	internations and a second	~*****	
37.3				
27.3				Gate [0ff,L0]
17.2				Point
Start 2.47500 GHz #Res BW 1.0 MHz	#VBW 1.0 MHz		top 2.50000 GHz 0.0 ms (1001 pts)	1001
64		STATUS		



## 7.9 POWERLINE CONDUCTED EMISSIONS

#### LIMITS

§ 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	

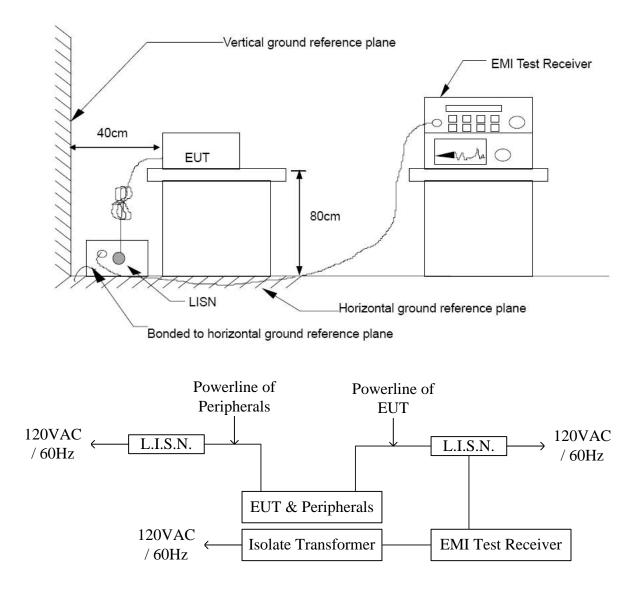
#### TEST EQUIPMENT

	Conducted Emission room #1							
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due				
L.I.S.N.	SCHWARZBECK	NNLK 8130	8130124	OCT. 19, 2015				
L.I.O.IN.	Rohde & Schwarz	ESH 3-Z5	893540/015	APR. 13, 2016				
TEST RECEIVER	Rohde & Schwarz	ESCS 30	100348	DEC. 08, 2015				
BNC COAXIAL CABLE	CCS	BNC50	11	DEC. 04, 2015				
Test S/W	e-3 (5.04211c) R&S (2.27)							

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



# 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 : 2013.

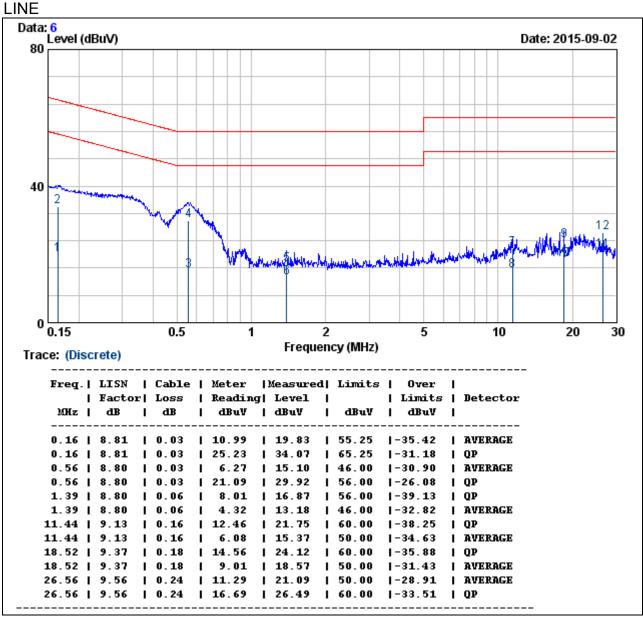
The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.



#### **TEST RESULTS**

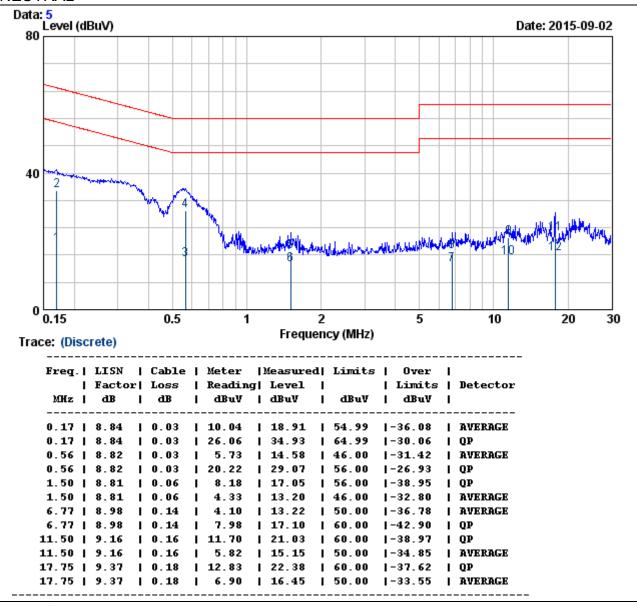
Product Name	WIRELESS TURNTABLE	Test Date	2015/09/02
Model Name	AT-LP60-BT	Test By	Peter Chu
Test Mode	Normal Operation	Temp & Humidity	26°C, 56%



- 1. Correction Factor = Insertion loss + Cable loss
- 2. Emission level = Reading Value + Correction factor
- 3. Margin value = Emission level Limit value

Product Name	WIRELESS TURNTABLE	Test Date	2015/09/02
Model Name	AT-LP60-BT	Test By	Peter Chu
Test Mode	Normal Operation	Temp & Humidity	26°C, 56%





- 1. Correction Factor = Insertion loss + Cable loss
- 2. Emission level = Reading Value + Correction factor
- 3. Margin value = Emission level Limit value