

TMTN2202000202NR

Report No.:



FCC ID: JFZLP60XBTA

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

### **TEST REPORT**

For

### **Automatic Wireless Turntable**

### Model: AT-LP60XBT-USB

### Brand: audio-technica

Issued for

### **Audio-Technica Corporation**

### 2-46-1 Nishi-naruse, Machida, Tokyo 194-8666, JAPAN

Issued by

Compliance Certification Services Inc. Tainan Lab. No.8, Jiucengling, Xinhua Dist., Tainan City, Taiwan Issued Date: May 03, 2022

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### **REVISION HISTORY**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	May 03, 2022	Initial Issue	ALL	Polly Wang



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## **1. TEST REPORT CERTIFICATION**

Applicant	:	<b>Audio-Technica Corporation</b> 2-46-1 Nishi-naruse, Machida, Tokyo 194-8666, JAPAN
Manufacturer	:	Audio-Technica Corporation
		2-46-1 Nishi-naruse, Machida, Tokyo 194-8666, JAPAN
Equipment Under Test	:	Automatic Wireless Turntable
Model Number	:	AT-LP60XBT-USB
Brand Name	:	audio-technica
Date of Test	:	February 17, 2022 ~ March 16, 2022

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

### **Statements of Conformity**

Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

Approved by:

John Chen

John Chen Supervisor



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# 2. TEST RESULT SUMMARY

FCC Standard Section	<b>Report Section</b>	Test Item	Result
15.247(a)	9.1	6dB BANDWIDTH	Pass
15.247(b)	9.2	MAXIMUM PEAK OUTPUT POWER	Pass
-	9.3	DUTY CYCLE	-
15.247(e)	9.4	POWER SPECTRAL DENSITY	Pass
15.247(d)	9.5	CONDUCTED SPURIOUS EMISSION	Pass
15.209(a)	9.6	RADIATED EMISSIONS	Pass
15.207(a)	9.7	POWERLINE CONDUCTED EMISSIONS	Pass
15.203	10	ANTENNA REQUIREMENT	Pass



## **3. EUT DESCRIPTION**

### **3.1 DESCRIPTION OF EUT & POWER**

Product Name	Automatic Wireless Turntable
Model Number	AT-LP60XBT-USB
Brand Name	audio-technica
Received Date	February 17, 2022
Reported Date	March 24, 2022
Operating Frequency Range	GFSK(5.2) Mode : 2402MHz~2480MHz
Transmit Power	GFSK(4.0) Mode : -0.68dBm (0.856mW) GFSK(5.2) Mode : -0.48dBm (0.895mW)
Channel Spacing	GFSK(5.2) Mode:2 MHz
Channel Number	GFSK(5.2) Mode : 40 Channels
Transmit Data Rate	GFSK(4.0) Mode : 1 Mbps GFSK(5.2) Mode : 2 Mbps
Type of Modulation	GFSK
Antenna Type	Manufacturer: Advanced Ceramic X Type: Multilayer Chip Antenna Model: AT1608-A2R4ZM31T/LF Gain: 0.4 dBi
Power Source	DC 12V(Power by Adapter)
Firmware Version	V1.0
Software Version	V1.0

#### **Power Adapter :**

Manufacturer	Model No.	Power Input	Power Output
SHENZHEN FUJIA APPLIANCE CO.,LTD	FJ-SW1261200500DN	100-240V~ 50/60Hz 0.4A Max	DC 12V, 0.5A, 6.0W

#### **REMARK:**

- 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
- This submittal(s) (test report) is intended for FCC ID: <u>JFZLP60XBTA</u> filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
- 3. For more details, please refer to the user manual.

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## 4. DESCRIPTION OF TEST MODES

The EUT is a Automatic Wireless Turntable.

The RF Chip is manufactured by Advanced Ceramic X

The antenna peak gain 0.4 dBi (highest gain) were chosen for full testing.

### GFSK(5.2) mode

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2402
Middle	2442
High	2480

GFSK(5.2) mode: 1Mbps long data rates (worst case) were chosen for full testing.

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## 5. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10 and FCC CFR 47 15.207, 15.209 and 15.247 and KdB 558074.

## 6. FACILITIES AND ACCREDITATIONS

### 6.1 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 C63.7:1992, ANSI C63.10: 2013 and CISPR Publication 22.

### 6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors 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."

### **6.3 LABORATORY ACCREDITATIONS LISTINGS**

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



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## 6.4 TABLE OF ACCREDITATIONS AND LISTINGS

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

Taiwan TAF

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

Canada	Industry Canada (ISED#: 2324H)
Germany	TUV NORD
Taiwan	BSMI
USA	FCC



### **6.5 MEASUREMENT EQUIPMENT USED**

#### For §9.7

Chamber 966 Room (Radiation Test)							
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due		
Active Loop Antenna	ETS-LINDREN	6502	8905-2356	09/06/2021	09/05/2023		
Attenuator	MCL	BW-S15W5	0535	01/28/2022	01/27/2023		
Band Reject Filter	MICRO-TRONICS	HPM13525	006	01/28/2022	01/27/2023		
Band Reject Filter	MICRO-TRONICS	HP50107-01	001	01/28/2022	01/27/2023		
Bilog Antenna With 6dB Attenator	SUNOL SCIENCES & EMCI	JB1 & N-6-06	A070506-1 & AT-N0681	10/07/2021	10/06/2022		
Cable	Suhner	SUCOFLEX104PE A	20520/4PEA&O6	01/28/2022	01/27/2023		
Double Ridged Guide Horn Antenna	ETS-LINDGREN	3116	00078900	03/30/2021	03/29/2022		
EMI Test Receiver	R&S	ESCI 7	100856	07/01/2021	06/30/2022		
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	07/22/2021	07/21/2022		
Horn Antenna	Com-Power	AH-118	071032	05/04/2021	05/03/2022		
Notch Filter	MICRO-TRONICS	BRM50702-01	018	01/28/2022	01/27/2023		
Pre-Amplifier	EMCI	EMC012645	980098	01/28/2022	01/27/2023		
Pre-Amplifier	HP	8447F	2443A01683	01/18/2022	01/17/2023		
Pre-Amplifier	Com-Power	PAM-840A	461378	07/05/2021	07/04/2022		
Type N coaxial cable	Suhner	CHA9513	6	01/18/2022	01/17/2023		
Software	Software Excel(ccs-o6-2020 v1.1), e3(v6.101222)						

#### For §9.1~9.6

Chamber 966 Room (Conducted Test)							
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due		
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	07/22/2021	07/21/2022		
Power Meter	Anritsu	ML2487A	6K00003888	05/18/2021	05/17/2022		
Power Sensor	Anritsu	MA2491A	033265	05/18/2021	05/17/2022		
SMA Cable+10dB Attenuator	CCS	SMA+10dB ATT	SMA/10dB	01/28/2022	01/27/2023		
Software	Excel(ccs-o6-2020 v1.1)						

For §9.8

Conducted Emission room #1								
Name of Equipment	Manufacturer         Model         Serial Number         Calibration Date         Calibration Due							
BNC Coaxial Cable	CCS	BNC50	11	01/20/2022	01/19/2023			
EMI Test Receiver	R&S	ESCS 30	100348	02/25/2021	02/24/2022			
LISN	FCC	FCC-LISN-50-32-2	08009	06/29/2021	06/28/2022			
LISN	SCHWARZBECK	NNLK8130	8130124	01/14/2022	01/13/2023			
Pulse Limiter	R&S	ESH3-Z2	100116	01/20/2022	01/19/2023			
Test S/W	e3(6.101222)							

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## 7. CALIBRATION AND UNCERTAINTY

### 7.1 MEASURING INSTRUMENT CALIBRATION

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

### 7.2 MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz Test Site : OATS-6	±3.3456dB
Radiated Emission, 200 to 1000 MHz Test Site : OATS-6	±2.6828dB
Radiated Emission, 1 to 8 GHz	± 2.6485dB
Radiated Emission, 8 to 18 GHz	± 2.6852dB
Radiated Emission, 18 to 26.5 GHz	± 2.6485dB
Radiated Emission, 26 to 40 GHz	± 3.0295dB
Power Line Conducted Emission	±1.91dB
Band Width	136.49kHz
Peak Output Power MU	±1.904dB
Band Edge MU	±0.302dBuV
Channel Separation MU	361.69Hz
Duty Cycle MU	0.064ms
Frequency Stability MU	0.223kHz

This measurement uncertainty is confidence of approximately 95%, k=2

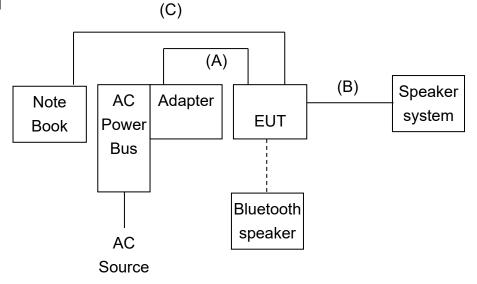


## 8. SETUP OF EQUIPMENT UNDER TEST

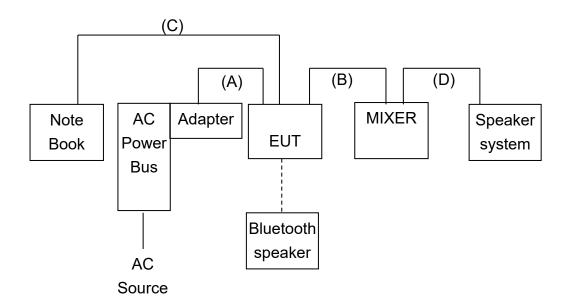
## 8.1 SETUP CONFIGURATION OF EUT

EMI

### 【Line】



【Phono】

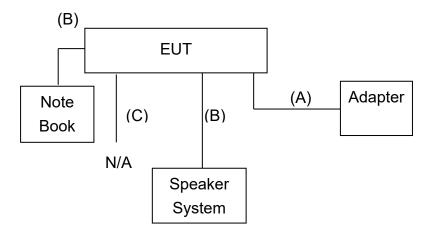


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RF





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### **8.2 SUPPORT EQUIPMENT**

### For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	MIXER	HAMPIN	HP-MUI	N/A	N/A
2	Speaker System	T.C.SATR	TCS2285	DOC	N/A
3	Notebook	TOSHIBA	PORTEGE R30-A	DOC	N/A
4	Bluetooth speaker	PHILIPS	TAS1505	N/A	N/A

No.	Signal cable description		
А	DC Power Cable Unshielded, 1.5m 1 pcs with 1 core		
В	Audio	Shielded, 1.0m 1 pcs.	
С	USB	Shielded, 2.0m 1 pcs.	
D	Audio	Shielded, 1.0m 1 pcs.	

### For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Power cable
1	Speaker System	T.C.SATR	TCS2285	DOC	N/A
2	Note Book	Acer	Z5WE1	N/A	AC: unshd, 1.0m DC: unshd, 1.5m, with 1 core

No.	Signal cable description		
А	Power	Unshielded, 1.5m 1 pcs with 1 core.	
В	Audio	Unshielded, 1.2m 1 pcs.	
С	USB	Shielded, 1.6m 1 pcs.	
D	USB	Shielded, 1.0m 1 pcs.	

### Note:

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
- 3) shd. = shielded; unshd. = unshielded



### **8.3 EUT OPERATING CONDITION**

### **RF Setup**

- 1. Set up all computers like the setup diagram.
- 2. The "Blue Test 3 V3.3.9.1137" software was used for testing
- 3. Choose Transport "DEBUG" and Device "USB DBG(105)"

### BT1.0、3.0

### TX Mode:

PACKET TX Channel 1~5: 0,39,78 GFSK(DH1): Packet Type:DH1 > Packet Length 27 Power(0-9) : 6 GFSK(DH3): Packet Type:DH3 > Packet Length 183 Power(0-9) : 6 GFSK(DH5): Packet Type:DH5 > Packet Length 339 Power(0-9) : 6 8-DPSK(3DH1): Packet Type:3DH1 > Packet Length 83 Power(0-9) : 6

8-DPSK(3DH3):

Packet Type:3DH3 > Packet Length 552

Power(0-9) : 6

```
8-DPSK(3DH5):
```

Packet Type:3DH5 > Packet Length 1021

Power(0-9):6

### RX Mode:

PACKET TX

### BT4.0、5.0

TX Mode: BLE TEST TX Channel > 0,20,39 (0-39) Length > 37 (0) Bit pattern > Pseudo-rdm 9 (Alt. 11110000) PHY > 1M (2M) Page: 15 / 101 Rev.: 00



Report No.: TMTN2202000202NR RX Mode: BLE TEST RX Channel : 0 (0-39) PHY : 1M (2M)

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

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## 9. APPLICABLE LIMITS AND TEST RESULTS

### 9.1 6dB BANDWIDTH

### <u>LIMIT</u>

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

### TEST SETUP



### TEST PROCEDURE

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW)  $\ge$  3 x RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



### **TEST RESULTS**

No non-compliance noted.

Model Name	AT-LP60XBT-USB	Test By	Ted Huang
Temp & Humidity	25.7°C, 51%	Test Date	2022/03/16

#### GFSK(4.0) mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2402	720	500	PASS
Middle	2442	717	500	PASS
High	2480	703	500	PASS

**NOTE :** 1. At finial test to get the worst-case emission at1Mbps long.

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

#### GFSK(5.2) mode

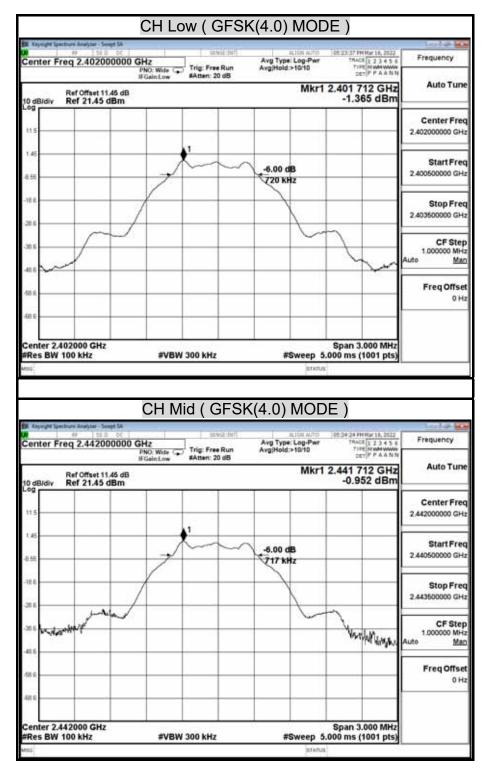
Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2402	1130	500	PASS
Middle	2442	1128	500	PASS
High	2480	1128	500	PASS

NOTE: 1. At finial test to get the worst-case emission at1Mbps long.
 2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

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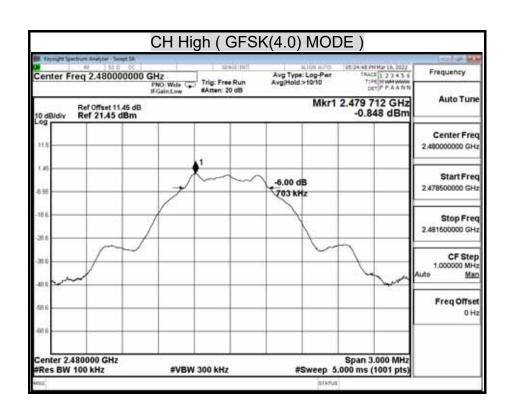
#### 6dB BANDWIDTH ( GFSK(4.0) MODE)





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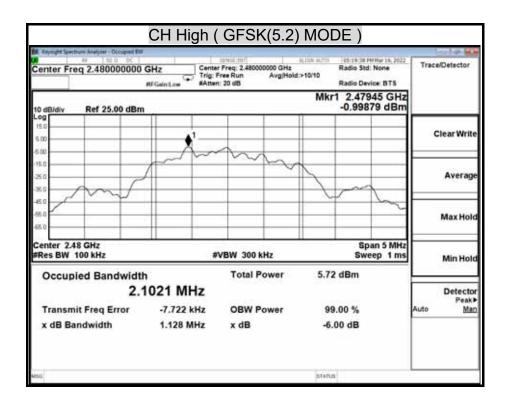
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#### 6dB BANDWIDTH ( GFSK(5.2) MODE)

and the second se		2) MODE )	
Span 5.0000 MHz		fold:>10/10 Radio Device: BTS	Trace/Detector
IO dB/div Ref 25.00 dBm		Mkr1 2.40145 GH -1.5291 dBr	
5.00	Am		ClearWrite
150 350 350			Average
45.0			Max Hold
Center 2.402 GHz #Res BW 100 kHz	#VBW 300 kHz	Span 5 MH Sweep 1 m	
Occupied Bandwidth	Total Power	5.21 dBm	
2.1039 Transmit Freg Error -4.	MHz 619 kHz OBW Power	99.00 %	Detector Peak> Auto <u>Man</u>
CH	I Mid ( GFSK(5.2	2) MODE )	
Kaynett Spectrum Analyse - Occupied Wit Status Conter Freq 2.442000000 GHz	Center Freq: 2.442000000 GH	2) MODE )	22 Trace/Detector
Krysteft Sectoria Radyser - Occupied Witten     How 150.5 Keil     Center Freq 2.442000000 GHz     HFGaint	Center Freq: 2.442000000 GH	2) MODE )	Z
Keyself Sectors Andpar-Occessed Bit     H	Center Freq: 2.442000000 GH	2) MODE ) Alim Alfon Tester 12 PM Mar 16, 20 Sz Radio Std: None Radio Device: BTS Mkr1 2.44145 GH	Trace/Detector
Kayset leicture Andjar - Occupied Bit     Port Standard Content for Standard Content Freq 2.442000000 GHz      #FGam1      OdBJdiv Ref 25.00 dBm      Iso	Center Freq: 2.442000000 GH	2) MODE ) Alim Alfon Tester 12 PM Mar 16, 20 Sz Radio Std: None Radio Device: BTS Mkr1 2.44145 GH	Z
Bit Keyster Sectors Religion - Occupied Bit           Image: Center Freq 2.442000000 GHz           Image: Center Freq 2.4420000000 GHz           Image: Center Freq 2.4420000000 GHz           Image: Center Freq 2.44200000000 GHz           Image: Center Freq 2.44200000000 GHz           Image: Center Freq 2.44200000000 GHz           Image: Center Freq 2.4420000000 GHz           Image: Center Fre	Center Freq: 2.442000000 GH	2) MODE ) Alim Alfon Tester 12 PM Mar 16, 20 Sz Radio Std: None Radio Device: BTS Mkr1 2.44145 GH	Z n Clear Write
Keysel Igerbank Religion - Occuped Bit     M	Center Freq: 2.442000000 GH	2) MODE ) Alim Alfon Tester 12 PM Mar 16, 20 Sz Radio Std: None Radio Device: BTS Mkr1 2.44145 GH	Clear Write Average Max Holc
Keynedi Igechani Anigor - Occuped Bit     P     Si 3 0 00     P     Si 3 0     P     P     Si 3 0     P	Center Freq: 2.44200000 GH Trig: Free Run AvgH #Atten: 20 dB	2) MODE )	Clear Write Average Max Hold Min Hold Detector
Center Freq 2.442000000 GHz WFGand 0 dB/div Ref 25.00 dBm 0 dB/div Ref 25.0	Center Freq: 2.44200000 GH Trig: Free Run AvgH #Atten: 20 dB	2) MODE ) Relia AUTO Redio Std: None Radio Device: BTS Mkr1 2.44145 GH -1.1261 dBr 4 Span 5 MH Sweep 1 m	Z Average Max Hold



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## 9.2 MAXIMUM PEAK OUTPUT POWER

#### <u>LIMIT</u>

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

§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.

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

#### TEST SETUP





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#### TEST PROCEDURE

The tests were performed in accordance with KDB 558074 9.1.1

#### 9.2.1 Measurement Procedure PK2:

Peak Power set:

- 1. Set the RBW = 1 MHz.
- 2. Set the VBW  $\geq$  [3 × RBW].
- 3. Set the span  $\geq$  [1.5 × DTS bandwidth].
- 4. Detector = peak.
- 5. Sweep time = auto couple.
- 6.Trace mode = max hold.
- 7. Allow trace to fully stabilize.

8.Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

#### **Average Power**

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

Average power set:

1.Measure the duty cycle D of the transmitter output signal

- 2. Set span to at least 1.5 times the OBW.
- 3.Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- 4. Set VBW ≥ [3 × RBW].

5. Number of points in sweep  $\geq$  [2 × span / RBW]. (This gives bin-to-bin spacing  $\leq$  RBW / 2, so that narrowband signals are not lost between frequency bins.)

6.Manually set sweep time  $\geq$  [10 × (number of points in sweep) × (total ON/OFF period of the transmitted signal)].

7. Set detector = RMS (power averaging).

8. Perform a single sweep.

9.Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW.

10. Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.



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#### TEST RESULTS

No non-compliance noted.

Model Name	AT-LP60XBT-USB	Test By	Ted Huang
Temp & Humidity	25.7°C, 51%	Test Date	2022/03/16

#### GFSK(4.0) mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	-1.20	30.00	PASS
Middle	2442	-0.76	30.00	PASS
High	2480	-0.68	30.00	PASS

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

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

#### GFSK(5.2) mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	-1.20	30.00	PASS
Middle	2442	-0.48	30.00	PASS
High	2480	-0.64	30.00	PASS

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

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



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### **Average Power Data**

Model Name	AT-LP60XBT-USB	Test By	Ted Huang
Temp & Humidity	25.7°C, 51%	Test Date	2022/03/16

### GFSK(4.0) mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-1.70
Middle	2442	-1.21
High	2480	-1.11

### GFSK(5.2) mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-1.96
Middle	2442	-1.53
High	2480	-1.42



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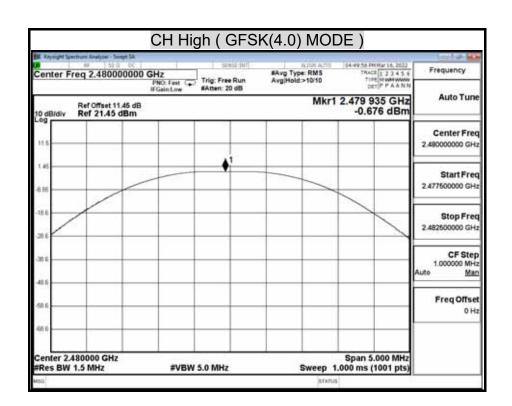
#### MAXIMUM PEAK OUTPUT POWER ( GFSK(4.0) MODE)

enter Freq 2.402000000	GHz PNO: Fast Trig: Free Ru IFGainLow #Attent: 20 dB	#Avg Type: RMS n Avg Hold:>10/10	04-46-50 PHI Har 16, 2022 TRACE 1 2 3 4 5 TriPE NuMP WWW DET P P A A N	Frequency
Ref Offset 11.45 dB 0 dB/div Ref 21.45 dBm			1 2.401 975 GHz -1.201 dBm	
115				Center Free 2.402000000 GH
45				Start Free 2.399500000 GH
16				Stop Free 2.404500000 GH
n 6				CF Step 1.000000 MH Auto <u>Ma</u>
86				Freq Offse 0 H
	#VBW 5.0 MHz	Sweep	Span 5.000 MH 1.000 ms (1001 pts s	
Res BW 1.5 MHz		SK(4.0) MOE	1.000 ms (1001 pts s	Trace/Detector
Res BW 1.5 MHz		SK(4.0) MOE	1.000 ms (1001 pts = DE ) (0.440.05 PH Mar 16, 2022 PMCR[ 2 3 4 5	TraceDetector
Res BW 1.5 MHz		SK(4.0) MOE	1.000 ms (1001 pts a) DE ) 104-035 PHIME 15, 2022 PRACE [ 2 3 4 5 TOPE   P A A 10 1 2.441 940 GH2	Trace/Detector Select Trace
Res BW 1.5 MHz		SK(4.0) MOE	1.000 ms (1001 pts a) DE ) 104-035 PHIME 15, 2022 PRACE [ 2 3 4 5 TOPE   P A A 10 1 2.441 940 GH2	Trace/Detector Select Trace Detecto Auto Ma
Res BW 1.5 MHz		SK(4.0) MOE	1.000 ms (1001 pts a) DE ) 104-035 PHIME 15, 2022 PRACE [ 2 3 4 5 TOPE   P A A 10 1 2.441 940 GH2	TraceDetector Select Trace Auto Mar Detecto Peak Detectors
Res BW 1.5 MHz		SK(4.0) MOE	1.000 ms (1001 pts a) DE ) 104-035 PHIME 15, 2022 PRACE [ 2 3 4 5 TOPE   P A A 10 1 2.441 940 GH2	TraceDetector Select Trace Auto Mar Preset Detectors Clear Trace
enter 2.402000 GHz Res BW 1.5 MHz		SK(4.0) MOE	1.000 ms (1001 pts a) DE ) 104-035 PHIME 15, 2022 PRACE [ 2 3 4 5 TOPE   P A A 10 1 2.441 940 GH2	Trace/Detector Select Trace Detecto Auto Mar Preset



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Report No.: TMTN2202000202NR





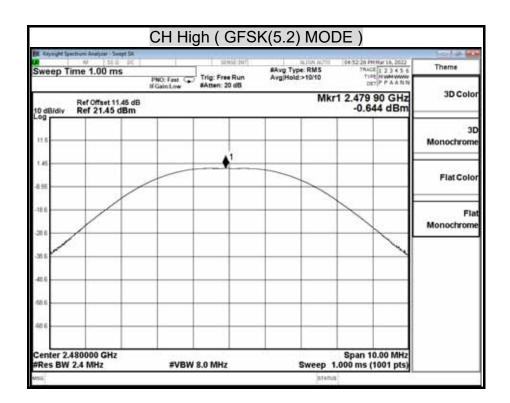
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#### MAXIMUM PEAK OUTPUT POWER ( GFSK(5.2) MODE)

enter Freq 2.402000000		ree Run 20 dB	Allin All Avg Type RMS AvgHold>10/10	TRACE	Har 16, 2022	Frequency
Ref Offset 11.45 dB 0 dB/div Ref 21.45 dBm			M	r1 2.402 - -1.20	49 GHz 2 dBm	Auto Tuni
ns						Center Free 2.402000000 GH
355		<b>•</b> <sup>1</sup>				Start Free 2.397000000 GH
ma						Stop Free 2.407000000 GH
86					$\geq$	CF Step 1.000000 MH Auto <u>Mar</u>
86						Freq Offse 0 H
Center 2.402000 GHz Res BW 2.4 MHz	#VBW 8.0 MH	z	Sweep		0.00 MHz	
Res BW 2.4 MHz	GHz	GFSK	3181	1.000 ms (1	001 pts)	Frequency
Res BW 2.4 MHz	CH Mid (	GFSK	(5.2) MO alia Adr #Avg Type: RMS AvgHold:>10'10	1.000 ms (1 us DE ) (455:18 PM 744 744 007	001 pts)	20.000 20.000
Res BW 2.4 MHz	CH Mid ( GHz PRO: Feat FGainLow Trig: Fr #Attent	GFSK	(5.2) MO alia Adr #Avg Type: RMS AvgHold:>10'10	1.000 ms (1 us DE ) (455:18 PM 744 744 007	001 pts)	Auto Turo Center Free
Res BW 2.4 MHz	CH Mid (	GFSK	(5.2) MO alia Adr #Avg Type: RMS AvgHold:>10'10	1.000 ms (1 us DE ) (455:18 PM 744 744 007	001 pts)	Auto Tun Center Free 2.44200000 GH Start Free
Res BW 2.4 MHz	CH Mid ( GHz PRO: Feat FGainLow Trig: Fr #Attent	GFSK	(5.2) MO alia Adr #Avg Type: RMS AvgHold:>10'10	1.000 ms (1 us DE ) (455:18 PM 744 744 007	001 pts)	Frequency Auto Turn Center Free 2.44200000 GH Start Free 2.437000000 GH Stop Free 2.447000000 GH
Res BW 2.4 MHz	CH Mid ( GHz PRO: Feat FGainLow Trig: Fr #Attent	GFSK	(5.2) MO alia Adr #Avg Type: RMS AvgHold:>10'10	1.000 ms (1 us DE ) (455:18 PM 744 744 007	001 pts)	Auto Tun Center Fre 2.44200000 GH Start Fre 2.43700000 GH Stop Fre 2.44700000 GH
Res BW 2.4 MHz	CH Mid ( GHz PRO: Feat FGainLow Trig: Fr #Attent	GFSK	(5.2) MO alia Adr #Avg Type: RMS AvgHold:>10'10	1.000 ms (1 us DE ) (455:18 PM 744 744 007	001 pts)	Auto Tune Center Free 2.44200000 GH Start Free 2.437000000 GH Stop Free 2.447000000 GH



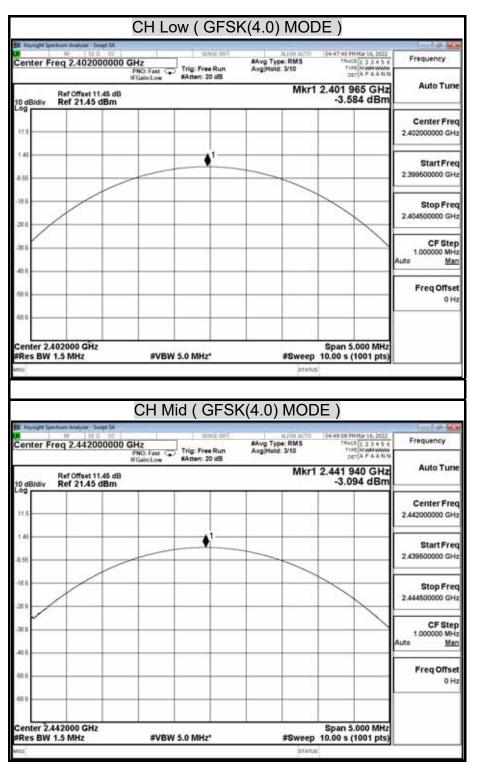
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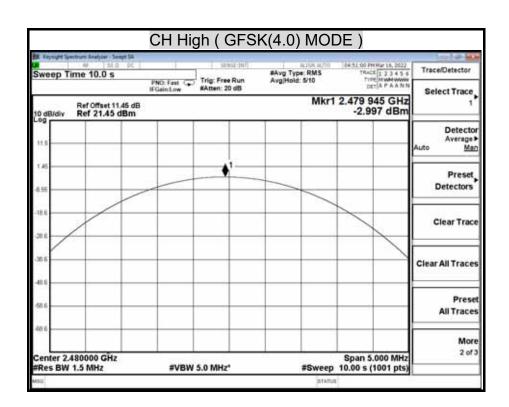
#### Report No.: TMTN2202000202NR MAXIMUM Average OUTPUT POWER ( GFSK(4.0) MODE)





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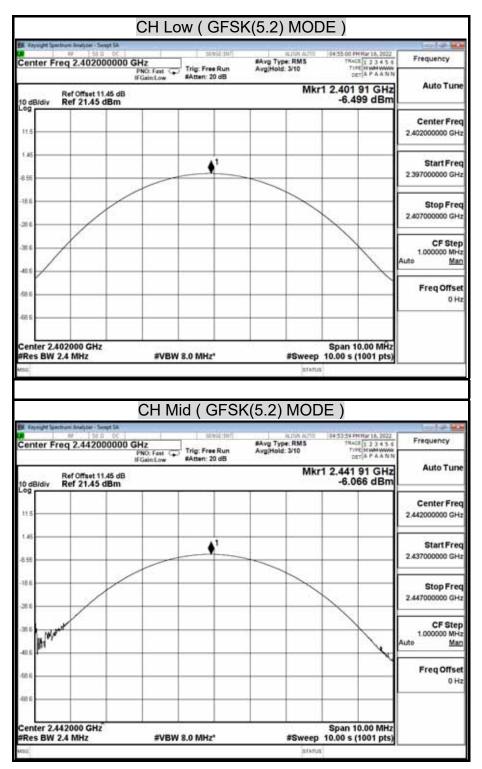




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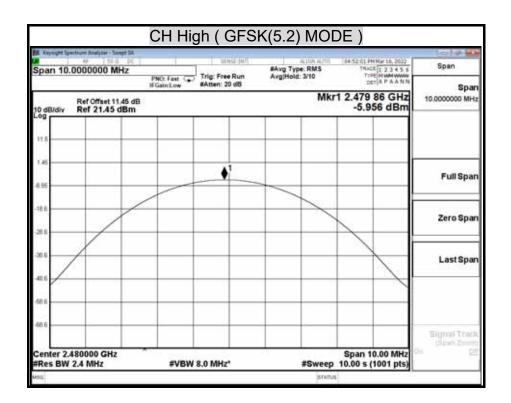
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#### MAXIMUM Average OUTPUT POWER ( GFSK(5.2) MODE)





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### 9.3 DUTY CYCLE

### <u>LIMIT</u>

Nil (No dedicated limit specified in the Rules)

#### TEST SETUP



#### TEST PROCEDURE

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

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### **TEST RESULTS**

No non-compliance noted.

Model Name	AT-LP60XBT-USB	Test By	Ted Huang
Temp & Humidity	25.7°C, 51%	Test Date	2022/03/16

### GFSK(5.2) Mode

	us	Times	Ton	Total Ton time(ms)
Ton1	405	1	405	
Ton2		0	0	
Ton3			0	0.405
Тр				0.625

Ton	0.405
Tp(Ton+Toff)	0.625
Duty Cycle	0.648
Duty Factor	1.884

#### GFSK(5.2) Mode

	us	Times	Ton	Total Ton time(ms)
Ton1	220	1	220	
Ton2		0	0	
Ton3			0	0.22
Тр				0.625

Ton	0.22
Tp(Ton+Toff)	0.625
Duty Cycle	0.352
Duty Factor	4.535



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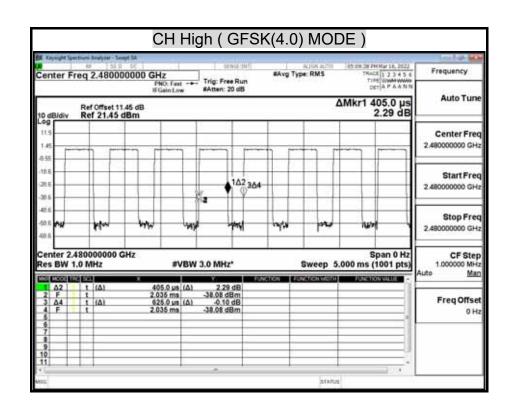
#### TEST PLOT

# **Duty Cycle**

	req 2.4020	000000 GI		Sansi (M) Trig: Free Run		AUGA AUTO Type: RMS	05:08:04 PH TRACE TYPE	123456	Frequency
0 dB/div	Ref Offset 1 Ref 21.45	11.46 dB	NO: Fast GainLow	#Atten: 20 dB			ΔMkr1 40	05.0 µs .24 dB	Auto Tune
.0g 11.5 1.45	-		-					_	Center Fred 2.402000000 GH
10.6 28.6 36.6				142 364				_	Start Free 2.402000000 GH
40.6 50.6	Vorte	inter .	m		wije	-	MASH	(49s)	Stop Free 2.40200000 GH
Res BW	.402000000 1.0 MHz	GHz	#VBW 3	3.0 MHz*		the second se	5.000 ms (1	And in case of the local division of the loc	CF Step 1.000000 MH
Δ2 2 F 3 Δ4 4 F 5	t (Δ) t t t	1.	05.0 μs (Δ) 870 ms 25.0 μs (Δ) 870 ms	-1.24 dB -37.51 dBm 0.05 dB -37.51 dBm	PENCTION	HUNCTION WORK	Punction		Freq Offse 0 H
6 7 8 9									
11									
						1000	-		
965.						STAD	1211		
			CH Mi	d ( GFS	SK(4.0	101110	1211	- · [	
	recture Endport	a eç i		I SUNG DU	li selle	101110		173456	Frequency
L Keynget Is	req 2.4420	000000 G		C - 110	li selle	) MOE		Har 16, 2022 1 2 3 4 5 6 A P A A N N	Frequency
Center F	Ref Offset 1	000000 GI	Hz WO: Fast -+-	savid dar Trig: Free Run	li selle	)) MOE	DE)	123456 WWWWWWWW APAANN	
o dBidiv	Freq 2.4420	000000 GI	Hz WO: Fast -+-	savid dar Trig: Free Run	li selle	)) MOE	DE)	123456 ΑΡΑΑΝΝ	Frequency
0 dB/div 0 dB/div 11 5 1 45 1 8 55	Ref Offset 1	000000 GI	Hz GainLow	Stree Run #Atten: 20 dB	BAvg	)) MOE	DE)	123456 ΑΡΑΑΝΝ	Frequency Auto Tune Center Free
0 dBldiv 0 dBldiv 11 5 1 45 28 5 38 5 48 6 68 6 68 6	Ref Offset 1	000000 GI	Hz GainLow	Stree Run #Atten: 20 dB	BAvg	D) MOE	DE)	05.0 µs .78 dB	Frequency Auto Turn Center Free 2.44200000 GH Start Free
0 dB/div 9 11.5 1.45	Ref Offset 1 Ref 21.45	11.45 dB	Hz GainLow	Stree Run #Atten: 20 dB	204	D) MOE	DE)	123454 A P A A 191 D5.0 µS 78 dB 	Frequency Auto Turn Center Free 2.44200000 GH Start Free 2.44200000 GH Stop Free 2.44200000 GH
0 dBJdiv 99 115 145 285 285 285 285 285 285 285 285 285 28	Ref Offset 1 Ref 21.45	Annual 18 1000000 GI 11.45 dB dBm GHz 4 4 2.6	Hz GainLow	Stree Run #Atten: 20 dB	204	D) MOE	DE)	123454 A PAANN 05.0 µS 78 dB 	Frequency Auto Tun Center Fre 2.44200000 GH Start Fre 2.44200000 GH Stop Fre 2.44200000 GH CF Step 1.00000 MH Auto Ma
0 dB)div 99 11.5 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 8.55 1.45 1.45 1.45 1.45 1.45 1.45 1.45 1	A42000000 1.0 MHz t (Δ) t (Δ)	Annual 18 1000000 GI 11.45 dB dBm GHz 4 4 2.6	Hz %0. Feat → Gain.Low #VBW 3 05.0 µs (Δ) 05.0 µs (Δ)	102 Trig: Free Run #Atten: 20 dB 102 102 102 3.0 MHz* 2.78 dB .35.50 dBm 9.17 dB	204	D) MOE	DE)	123454 A P A A 191 D5.0 µS 78 dB 	Frequency Auto Turn Center Free 2.44200000 GH Start Free 2.44200000 GH Stop Free 2.44200000 GH



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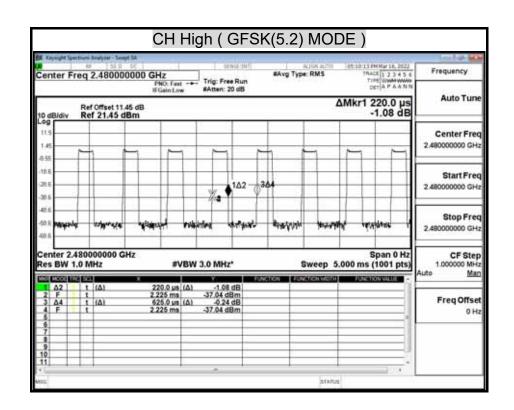
Report No.: TMTN2202000202NR

# Duty Cycle

DET A P A A NN	#Avg Type: RMS	Trig: Free Run #Atten: 20 dB	PNO: Fast IFGain:Low	q 2.40200	enter Fre
Mkr1 220.0 µs 6.97 dB	Δ				0 dB/div
1	1 14	<u> </u>		-	11.5 1.45
		∆2 3∆4			10.6
e water	hangerlight induntation	site spears		H-114044	40.6 50.6 68.6
and a second	the second s			MHz	tes BW 1.0
		6.97 dB -38.56 dBm	1,560 ms	t (Δ) t (Δ) t	Δ2 2 F 3 Δ4 4 F 5 6
					7 8 9 10 11
	STATUS	2			10
)E)	((5.2) MOD	/lid(GFS	CH N		
105-10-56 PHIMar 16, 2022 TRACE 1 2 3 4 5 6	AUSA AUTO RAvg Type: RMS	T state of	00	# 311	
Mkr1 220.0 µs	Δ	#Atten: 20 dB	PNO: Fast IFGainLow	Ref Offset 11.	
3.01 08	5 5		am	Ref 21.45 d	0 dB/div 99
		↓ <sup>1∆2</sup> <sub>()</sub> 3∆4	x		10.6
rianha yawaant	the solutions and			on hu	8.6 8.6 8.8
Span 0 Hz .000 ms (1001 pts)	Sweep 5.0	W 3.0 MHz*		Contraction of the local division of the loc	tes BW 1.0
			220.0 µs (Δ	t (Δ)	Δ2
B Izsi	6.97 d	6.97 d	6.97 d 304 304 304 304 305 304 305 500 ms (1001 pt 507 dB 305 dBm 30.0 MHz* 500 ms (1001 pt 500	Bm         6.97 di           1Δ2         3Δ4           +1Δ2         3Δ4           +12         Span 0 Hz           5000 ms (1001 pt           -1.560 ms         -38.56 dBm           -1.560 ms         -3.38.56 dBm           -1.560 ms	Ref 21.45 dBm       6.97 d         Ref 21.45 dBm       102         102       304         102       304         102       304         102       304         102       304         102       304         102       304         104       220,0 μs (Δ)         507 dB       Span 0 H         104       220,0 μs (Δ)         105       500 ms (1001 pt         104       220,0 μs (Δ)         105       500 dB         1       1.660 ms (-38.56 dBm)         1       1.67 ms (-17.50 m



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# 9.4 POWER SPECTRAL DENSITY

#### <u>LIMIT</u>

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

#### TEST SETUP



#### TEST PROCEDURE

The tests were performed in accordance with 558074 D01 15.247 Meas Guidance v05

#### 10.2 Method PKPSD (peak PSD):

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



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Report No.: TMTN2202000202NR TEST RESULTS

No non-compliance noted.

Model Name	AT-LP60XBT-USB	Test By	Ted Huang
Temp & Humidity	25.7°C, 51%	Test Date	2022/03/16

#### GFSK(4.0) mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Result
Low	2402	-16.799	8.00	-24.799	PASS
Middle	2442	-16.314	8.00	-24.314	PASS
High	2480	-16.057	8.00	-24.057	PASS

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

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

#### GFSK(5.2) mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Result
Low	2402	-20.338	8.00	-28.338	PASS
Middle	2442	-19.939	8.00	-27.939	PASS
High	2480	-19.694	8.00	-27.694	PASS

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

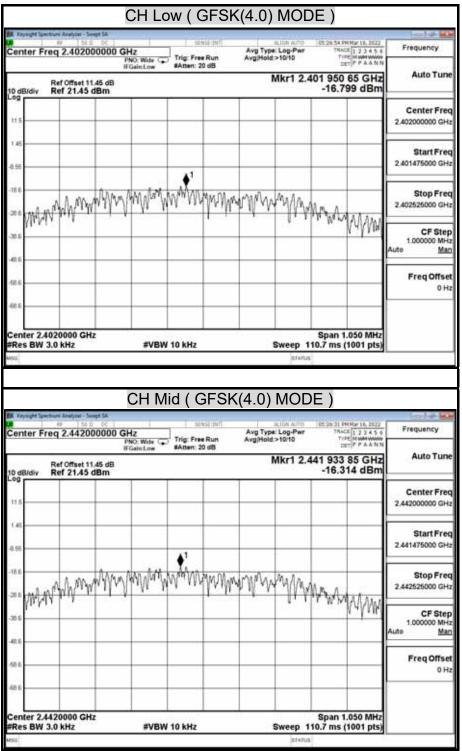
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.



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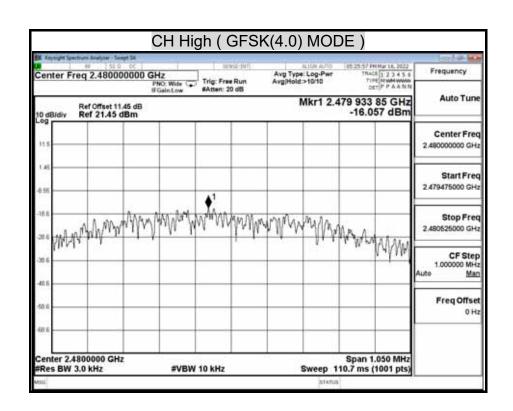
Report No.: TMTN2202000202NR

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





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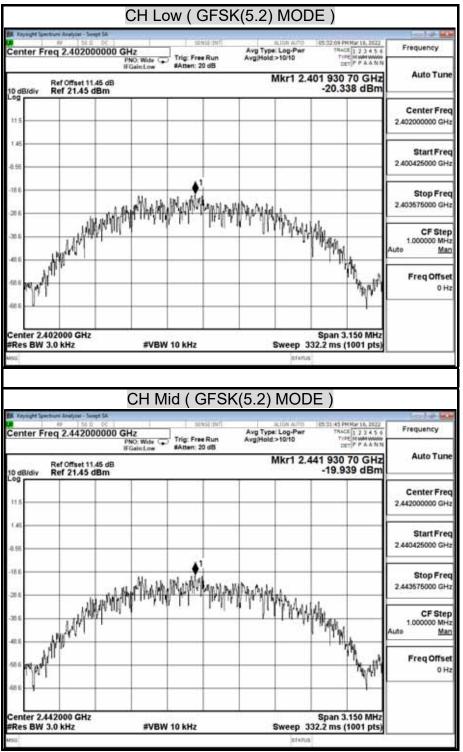




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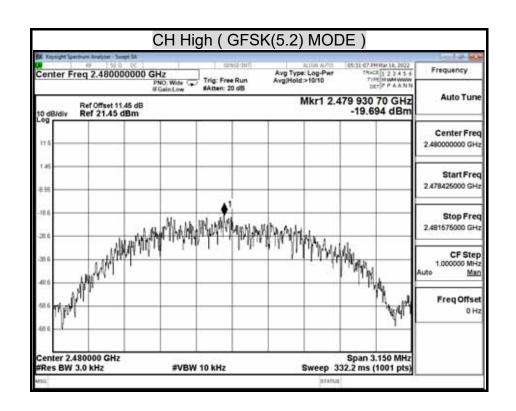
Report No.: TMTN2202000202NR

#### POWER SPECTRAL DENSITY ( GFSK(5.2) MODE)





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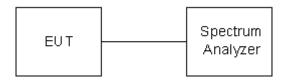
Report No.: TMTN2202000202NR

# 9.5 CONDUCTED SPURIOUS EMISSION

#### **LIMITS**

§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

#### TEST SETUP



#### TEST PROCEDURE

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

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**

No non-compliance noted.



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#### TEST DATA

Model Name	AT-LP60XBT-USB	Test By	Ted Huang
Temp & Humidity	25.7°C, 51%	Test Date	2022/03/16

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

			_ow(GFS	( )	,	
1.1.1.1	reg 2.402	000000 GHz	1 sector	Avg Type: Log-Pwr	05/23-37 PH Har 16, 2022 TRACE 1 2 3 4 5 6	Frequency
		PNO: Wide IFGain:Low	Atten: 20 dB	Avg Hold:>10/10	DET PPAANN	Auto Tur
dBidiv	Ref Offset			100000	-1.365 dBm	
5						Center Fre 2.402000000 GH
45			*	-6.00 dB		Start Fre 2.400500000 GH
6						Stop Fre 2.403500000 GH
6	$\checkmark$	$\downarrow$			$\mathcal{A}$	CF Ste 1.000000 Mi Auto Ma
6						Freq Offse 0 F
	.402000 GH / 100 kHz		300 kHz		Span 3.000 MHz 00 ms (1001 pts)	
tes BW	r 100 kHz rectours Analyter - NF 150	#VE	BW 300 kHz	#Sweep 5.0	00 ms (1001 pts)	Frequency
art Fre	r 100 kHz sectore Analyse eq 2.31000 Ref Offset	#VE	stast out	#Sweep 5.0 STATUS Avg Type: Log-Pwr Avg[Hold:>10/10	00 ms (1001 pts) 1545 22 PHNar 16, 2022 TRACE [1 2 3 4 5 6 TRACE [P P A A NN 01 717 5 GHz	Frequency
art Fre	7 100 kHz antion Analyse eq 2.31000	#VE	Strigt Free Run	#Sweep 5.0 STATUS Avg Type: Log-Pwr Avg[Hold:>10/10	00 ms (1001 pts) 1545 22 PHRar 16, 2022 TRACE [1 2 3 4 5 6 TUDE N MARKAGE DET  P P A A N N	Frequency Auto Tur
dB/div 9 5 5	r 100 kHz sectore Analyse eq 2.31000 Ref Offset	#VE	Strigt Free Run	#Sweep 5.0 STATUS Avg Type: Log-Pwr Avg[Hold:>10/10	00 ms (1001 pts) 1545 22 PHNar 16, 2022 TRACE [1 2 3 4 5 6 TRACE [P P A A NN 01 717 5 GHz	Frequency
dB/div s	r 100 kHz sectore Analyse eq 2.31000 Ref Offset	#VE	Strigt Free Run	#Sweep 5.0 STATUS Avg Type: Log-Pwr Avg[Hold:>10/10	00 ms (1001 pts) 1545 22 PHNar 16, 2022 TRACE [1 2 3 4 5 6 TRACE [P P A A NN 01 717 5 GHz	Frequency Auto Tur Center Fre 2.36000000 Gi Start Fre
dBidiv 9 5 5 5 6 6 6 6 6	r 100 kHz sectore Analyse eq 2.31000 Ref Offset	#VE	Strigt Free Run	#Sweep 5.0 STATUS Avg Type: Log-Pwr Avg[Hold:>10/10	00 ms (1001 pts) 1545 22 PHNar 16, 2022 TRACE [1 2 3 4 5 6 TRACE [P P A A NN 01 717 5 GHz	Frequency Auto Tur Center Fre 2.36000000 Gi Start Fre 2.31000000 Gi Stop Fre
dBJdiv 9 9 5 55 16 16 16 16 16 16 16 16 16 16 16 16 16	r 100 kHz sectore Analyse eq 2.31000 Ref Offset	#VE	Strigt Free Run	#Sweep 5.0	00 ms (1001 pts) 1545 22 PHNar 16, 2022 TRACE [1 2 3 4 5 6 TRACE [P P A A NN 01 717 5 GHz	Frequency Auto Tur Center Fri 2.36000000 G Start Fri 2.31000000 G Stop Fri 2.41000000 G
ant Fre	100 kHz	#VE	Trig: Free Run sAtten: 20 dB	#Sweep 5.0	00 ms (1001 pts)	Frequency Auto Tur Center Frr 2.36000000 Gi Start Frr 2.31000000 Gi Stop Frr 2.41000000 Gi CF Ste 1.00000 Mi Auto Mi
art Fre	r 100 kHz	#VE	Trig: Free Run sAtten: 20 dB	#Sweep 5.0	00 ms (1001 pts)	Frequency Auto Tur Center Fre 2:36000000 Gi Start Fre 2:31000000 Gi Stop Fre 2:41000000 Gi CF Ste 1:00000 Mi Auto
art Fre	100 kHz	#VE	Trig: Free Run sAtten: 20 dB	#Sweep 5.0	00 ms (1001 pts)	Frequency Auto Tur Center Fre 2.36000000 G Start Fre 2.31000000 G Stop Fre 2.41000000 G CF Ste 1.00000 M



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Frequency	105.44.54 PH Mar 16, 2022 TRACE 1 2 3 4 5 6 Trifle DET P P A A N M	d:>10/10				Q: Fast C	MHz	30.00000	t Fre	ta
Auto Tun	1 2.402 4 GHz -1.900 dBm	Mk						Ref Offset 1 Ref 21.45	Bidiv	0 d
Center Fre 13.265000000 GH			-					<b>♦</b> ¹		11.5
Start Fre 30.000000 MH	-(H (P 40))									8.55 10.6 28.6 36.6
Stop Fre 26.50000000 GH			-			-		3	-	40.6 50.6 60.6
CF Ste 1.000000 MH Auto Ma	Stop 26.50 GHz 531 s (40001 pts)	THE OWNER AND ADDRESS OF			V 300 kHz	#VB		00 kHz	-	Re
Freq Offse 0 H	-		201700	Bm Bm	-1.900 df -55.020 df -59.324 df	0 GHz	2,402 2,400 2,483	1	N N N	1234567
										8 9 10 11



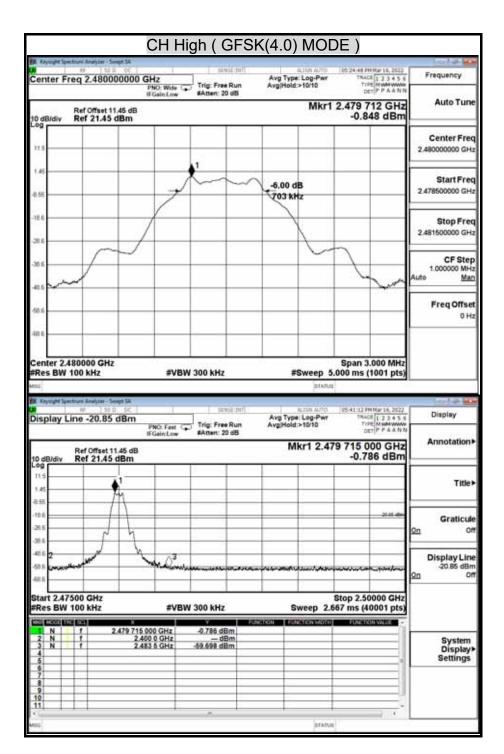
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yoght Spectrum Analyse			K(4.0) MOD		014
nter Freq 2.44	2000000 GHz PNO: Wide (	Stand Out	Avg Type: Log-Pwr Avg/Hold:>10/10	18:24:24 PH Har 16, 2022 TRACE 1 2 3 4 5 6 TriPE M WH WWW DET P P A A N N	Frequency
Bidiv Ref 21.4	IFGain:Low	#Atten: 20 dB	0.20010-0046	2.441 712 GHz -0.952 dBm	Auto Tu
					Center Fr 2.442000000 G
		×	-6.00 dB 717 kHz		Start Fr 2.440500000 G
					Stop Fr 2.443500000 G
where the second	-			Versilement	CF Ste 1.000000 Mi Auto Mi
					Freq Offs
ter 2.442000 G s BW 100 kHz		W 300 kHz		Span 3.000 MHz 000 ms (1001 pts)	
	#VB - Seept SA 560 CC	i sedant	STATUS BLIDA AUPO Avg Type: Log-Pwr	000 ms (1001 pts)	Frequency
s BW 100 kHz	#VB	i sedant	Autor Autor Avg Type: Log-Per Avg[Hold:>1010	000 ms (1001 pts)	Frequency
s BW 100 kHz	#VB - Swept Sk S0 0 00 IFGain.Low	strid (stri	Autor Autor Avg Type: Log-Per Avg[Hold:>1010	000 ms (1001 pts)	Frequency
s BW 100 kHz	#VB	strid (stri	Autor Autor Avg Type: Log-Per Avg[Hold:>1010	000 ms (1001 pts)	Frequency Auto Tur Center Fro 13.26500000 G Start Fro
s BW 100 kHz	#VB	strid (stri	Autor Autor Avg Type: Log-Per Avg[Hold:>1010	000 ms (1001 pts)	Frequency Auto Tu Center Fr 13.26500000 G Start Fr 30.00000 M Stop Fr
Ref Offs: Ref Offs: Bidiv Ref 21.	#VB	Trig: Free Run #Attant: 20 dB	AUGR AND Avg Type: Log-Par Avg/Hold:>1010 Mk:	000 ms (1001 pts)	Frequency Auto Tu Center Fn 13.26500000 G Start Fn 30.000000 M Stop Fn 26.50000000 G
s BW 100 kHz	#VB	Trig: Free Run #Attant: 20 dB	Avg Type: Log-Pwr Avg Type: Log-Pwr AvgHold:>10110 Mkr	000 ms (1001 pts)	Frequency Auto Tu Center Fr 13.265000000 G Start Fr 30.00000 M Stop Fr 26.50000000 G CF Stt 1.00000 M Auto M
Ref Offse Ref Offse Budev Ref 21.	#VB	1.858 dBm	Avg Type: Log-Pwr Avg Type: Log-Pwr AvgHold:>10110 Mkr	000 ms (1001 pts)	Frequency Auto Tui Center Fm 13.26500000 G Start Fm 30.000000 M Stop Fm 26.50000000 G



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		ALCONT. LOD		0-01-01			ectrure Analyter	Caysight Sp
Frequency	05:42:02 PH Mar 16, 2022 TRACE 1:2:3:4:5:6 TYPE Muse www. DET P P A A N N	pe: Log-Pwr Id:>10/10	Avg	Strict of	Hz PNO: Fast	000000 GH		op Fre
Auto Tune	r1 2.479 8 GHz -0.837 dBm	Mkr	-01-25	#Atten: 20 dB	IFGainLow	t 11.45 dB	Ref Offset Ref 21.4	dB/div
Center Free 13.26500000 GH			_		_		•'	5
Start Free 30.000000 MH	20.00 aller							6 6 6
Stop Fre			****		-		Jen.	6
25.50000000 GH						3		art 30
CF Step 1.000000 MH	Stop 26.50 GHz 2.531 s (40001 pts)			300 kHz	#VBV		100 kHz	es BW
25.50000000 GH CF Step 1.000000 MH Auto <u>Mar</u> Freq Offse 0 H	2.531 s (40001 pts)	Sweep 2	Function	300 kHz -0.837 dBm -59.167 dBm -59.362 dBm	#VBV 19.8 GHz 00.0 GHz 33.5 GHz	2.40	100 kHz	



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Model Name	AT-LP60XBT-USB	Test By	Ted Huang
Temp & Humidity	25.7°C, 51%	Test Date	2022/03/16

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

Keysight Spe	ctrure Analyter - O	_	CH Low (	STATE OF		00000000	100000	and the second	
pan 5.00	000 MHz	NFG	Trig:	rr Freq: 2.402 Free Run n: 20 dB		22222	Radio Std Radio Dev	rice: BTS	Trace/Detector
0 dB/div	Ref 25.0	0 dBm				Mkr		91 dBm	
.og									
6.90			<b>i</b>	_	-				Clear Writ
5.00	-		Am	m	~				
15.0			~		m				Averag
360	An	C					~		Averag
450	/ / ~~	¥		_			1	12	
50	-				-				Max Hol
65.0									
Center 2. #Res BW				VBW 300	kHz	27R		an 5 MHz eep 1 ms	Min Hol
Occup	oied Band			Total	Power	5.21	dBm		
		2.10	39 MHz						Detecto
Transn	nit Freq Er	ror	-4.619 kHz	OBW	Power	99.	.00 %		Auto Ma
tss M. Kaysoph Spe	ctrum Analyter - Sv	rept SA		could not		STATUS	100.111.00	100011-0011	
	q 2.310000			stast darf	Avg Type AvgHold	AUTA APO	3%A 77	HI Har 16, 2022	Frequency
Start Free	Ref Offset 1	PN IFG 1.45 dB			Avg Type Avg[Hold	ALIM A/10 I: Log-Pwr >1910	401 45	7 5 GHz	Frequency
Start Free		PN IFG 1.45 dB		Free Run	Avg Type AvgPoid	ALIM A/10 I: Log-Pwr >1910	401 45	CE 173456 PE Numerowe ET P P A A N N	Frequency Auto Tur
Start Free	Ref Offset 1	PN IFG 1.45 dB		Free Run	Avg Type Avg[Hold	ALIM A/10 I: Log-Pwr >1910	401 45	7 5 GHz	Auto Tur
Start Free	Ref Offset 1	PN IFG 1.45 dB		Free Run	Avg Type Avg[Hold	ALIM A/10 I: Log-Pwr >1910	401 45	7 5 GHz	Frequency Auto Tur
10 dB/div 10 dB/div 10 dB/div 10 dB/div 10 dB/div 10 dB/div 10 dB/div 10 dB/div	Ref Offset 1	PN IFG 1.45 dB		Free Run	Avg Type Avg/Hold	ALIM A/10 I: Log-Pwr >1910	401 45	7 5 GHz 32 dBm	Auto Tur
0 dBJdiv 	Ref Offset 1	PN IFG 1.45 dB		Free Run	Avg Type Avg/Hold	ALIM A/10 I: Log-Pwr >1910	401 45	7 5 GHz	Frequency Auto Tur Center Fre 2.36000000 GP Start Fre
10 dB/div 99 11.5 1.45	Ref Offset 1	PN IFG 1.45 dB		Free Run	Avg Type Avg[Hold	ALIM A/10 I: Log-Pwr >1910	401 45	7 5 GHz 32 dBm	Frequency Auto Tur Center Fre 2.36000000 GH Start Fre 2.31000000 GH
10 dB/div 10 dB/div	Ref Offset 1	PN IFG 1.45 dB		Free Run	Avg Type Avg/Hold	ALIM A/10 I: Log-Pwr >1910	401 45	7 5 GHz 32 dBm	Frequency Auto Tur Center Fre 2.36000000 GP Start Fre
10 dBJdiv 	Ref Offset 1	PN IFG 1.45 dB		Free Run	Avg Type Avg/Hold	ALIM A/10 I: Log-Pwr >1910	401 45	7 5 GHz 32 dBm	Frequency Auto Tur Center Fre 2.36000000 GP Start Fre 2.31000000 GP Stop Fre
10 dB/div 0 dB/div 0 dB/div 115 145 145 285 285 285 486 688 688 55art 2.31	Ref Offset 1 Ref 21.45	PN IFG 1.45 dB	Adus of Constant	Free Run n: 20 dB		ALIEN ANTO IL Log-Parr >1010 Mkr1 2.	401 45 -1.3	7 5 GHz 32 dBm 1 2 2 32 dBm 2 2 3 3 4 3 3 4 3 3 4 3 4 3 4 3 4 3 4 3	Frequency Auto Tur Center Fre 2.36000000 GF 2.31000000 GF 2.41000000 GF
10 dBJdv -99 115 145 355 366 456 456 456 456 456 456 456 4	Ref Offset 1 Ref 21.45	PN IFG 1.45 dB		Free Run n: 20 dB	AvgMold	ALIEN AUTO II: Log-Pwr >1010 Mkr1 2. Weep 10.	401 45 -1.3 Stop 2.4 67 ms (4	7 5 GHz 32 dBm 1 2 2 32 dBm 2 2 3 3 4 3 3 4 3 3 4 3 4 3 4 3 4 3 4 3	Frequency Auto Tur Center Fre 2.36000000 GP Start Fre 2.31000000 GP Stop Fre 2.41000000 GP
10 dBJdiv -99 115 145 355 145 365 366 486 666 566 566 566 566 566 566 5	Ref Offset 1 Ref 21.45	PN IFG 1.45 dB	#VBW 300 k	Free Run n: 20 dB	AvgMold	ALIEN ANTO IL Log-Parr >1010 Mkr1 2.	401 45 -1.3 Stop 2.4 67 ms (4	7 5 GHz 32 dBm 1000 GHz 1000 GHz	Frequency Auto Tur Center Fre 2.36000000 GP Start Fre 2.31000000 GP Stop Fre 2.41000000 GP CF Ste 1.000000 MP Auto MI
10 dBJdiv -99 11 5 145 855 146 606 606 606 606 606 606 606 6	Ref Offset 1 Ref 21.45	Pre- IrG dBm 24014575 24004575	#VBW 300 k	Free Run n: 20 dB	AvgMold	ALIEN AUTO II: Log-Pwr >1010 Mkr1 2. Weep 10.	401 45 -1.3 Stop 2.4 67 ms (4	7 5 GHz 32 dBm	Frequency Auto Tur Center Fre 2.36000000 G Start Fre 2.31000000 G Stop Fre 2.41000000 G
10 dBJdiv -99 11 5 145 485 485 486 486 536 546 546 546 546 546 546 546 54	Ref Offset 1 Ref 21.45	Pre- IrG dBm 24014575 24004575	#VBW 300 k	Free Run n: 20 dB	AvgMold	ALIEN AUTO II: Log-Pwr >1010 Mkr1 2. Weep 10.	401 45 -1.3 Stop 2.4 67 ms (4	7 5 GHz 32 dBm	Frequency Auto Tur Center Fre 2.36000000 GP Start Fre 2.31000000 GP Stop Fre 2.41000000 GP CF Ste 1.000000 MP Auto MI
10 dBJdiv -99 115 145 335 145 336 486 486 486 581 486 581 486 581 486 581 581 581 581 581 581 581 581	Ref Offset 1 Ref 21.45	Pre- IrG dBm 24014575 24004575	#VBW 300 k	Free Run n: 20 dB	AvgMold	ALIEN AUTO II: Log-Pwr >1010 Mkr1 2. Weep 10.	401 45 -1.3 Stop 2.4 67 ms (4	7 5 GHz 32 dBm	Frequency Auto Tur Center Fre 2.36000000 GP Start Fre 2.31000000 GP Stop Fre 2.41000000 GP CF Ste 1.000000 MP Auto MI
0 dBJdiv 	Ref Offset 1 Ref 21.45	Pre- IrG dBm 24014576	#VBW 300 k	Free Run n: 20 dB	AvgMold	ALIEN AUTO II: Log-Pwr >1010 Mkr1 2. Weep 10.	401 45 -1.3 Stop 2.4 67 ms (4	7 5 GHz 32 dBm	Frequency Auto Tur Center Fre 2.36000000 GP Start Fre 2.31000000 GP Stop Fre 2.41000000 GP CF Ste 1.000000 MP Auto MI



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10.0 0C SINUE SINUE SINUE AUTO AUTO (25.27.11.9H Mar 16, 2022     21.0 000 MHz     21.0 0 000 MHz     PNC: Fast ↓ Trig: Free Run     FGaint.cov     #Atten: 20 dB     DOT P P A A N N	equency
	Auto Tun
	Center Free 5000000 GH
	Start Fre
26.500	Stop Fre
Auto	CF Ste
2.4017 GHz - 2.945 dBm 2.400.0 GHz	Freq Offse 0 H

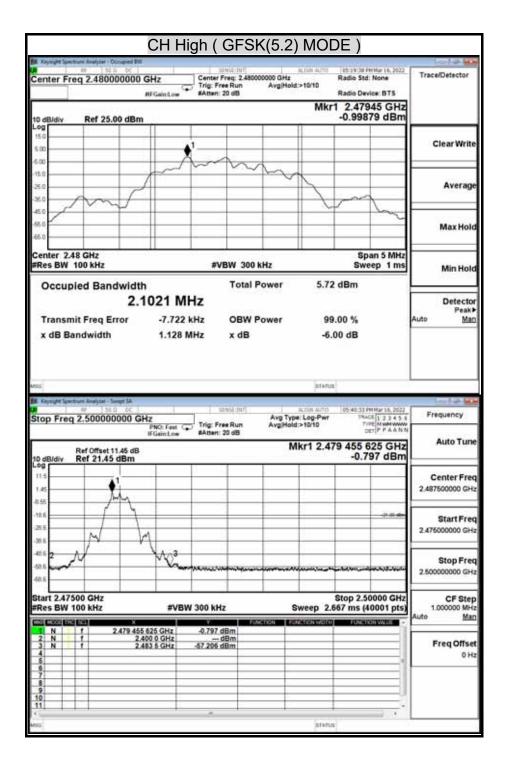


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CH Mid (GFSK(5.2) MODE) Radio Std: None Center Freq: 2.442000000 GHz Trig: Free Run Avg|Hold:>10/10 #Atten: 20 dB Trace/Detector Center Freq 2.442000000 GHz #FGaint.ow Radio Device: BTS Mkr1 2.44145 GHz -1.1261 dBm Ref 25.00 dBm Clear Write Averag Max Hold Center 2.442 GHz Span 5 MHz #VBW 300 kHz Res BW 100 kHz Sweep 1 ms Min Hold **Occupied Bandwidth Total Power** 5.59 dBm 2.1039 MHz Detector Peak> Man -6.366 kHz **OBW Power** 99.00 % **Transmit Freq Error** 1.128 MHz x dB Bandwidth x dB -6.00 dB STATUS 15 38 36 PH Par 16, 2022 TRACE 1 2 3 4 5 6 TIPE N MMMMMM DET P P A A N M Avg Type: Log-Pwr Avg/Hold>1010 Frequency Start Freq 30.000000 MHz PNO: Fast Trig: Free Run #Atten: 20 dB Mkr1 2.442 1 GHz -1.962 dBm Auto Tune Ref Offset 11.45 dB Ref 21.45 dBm Center Freq 13.265000000 GHz Start Freq 30 000000 MH; Stop Freq 26 50000000 GHz Stop 26.50 GHz Sweep 2.531 s (40001 pts) start 30 MHz CF Step 1.000000 MHz Res BW 100 kHz #VBW 300 kHz Man NNN 2.442 1 GHz 2,400 0 GHz 2,483 5 GHz dB Freq Offset 0 Hz Alignment Completed STATUS



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		A1603.000	S				ctrure Analyter - 5	reight Sp	. Ke
Frequency	05:39:57 PH Mar 16, 2022 TRACE 1 2 3 4 5 6 TUPE Muse www. DET P P A A N N	ype: Log-Pwr old:>10/10	Avg	Stast of	NO: Fast 😱	00 MHz	q 30.0000	t Fre	tar
Auto Turs	r1 2.479 8 GHz -1.460 dBm	Mkr		#Atten: 20 dB	Gain:Low	1.45 dB	Ref Offset 1 Ref 21,45	Bidiv	
Center Free 13.26500000 GH							<b>∳</b> '		og 11.5
Start Free 30.000000 MH	-24.00 aller								155 10.6 20.6 20.6
									8.6
				-	-		- Since	-	8.6 8.6
Stop Free 26.50000000 GH CF Steg 1.00000 MH Auto Mar	Stop 26.50 GHz 2.531 s (40001 pts)		********	300 kHz	#VBW		100 kHz	-	tar Re
25.50000000 GH CF Step 1.000000 MH	2.531 s (40001 pts)	Sweep 2	Function	300 kHz -1.450 dBm 59.592 dBm 58.187 dBm	8 GHz	2.400	100 kHz		tar Re



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Report No.: TMTN2202000202NR

# 9.6 RADIATED EMISSIONS

# 9.6.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

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

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

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

<sup>2</sup> Above 38.6

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



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**Report No.:** TMTN2202000202NR Rev.: 00 § 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.

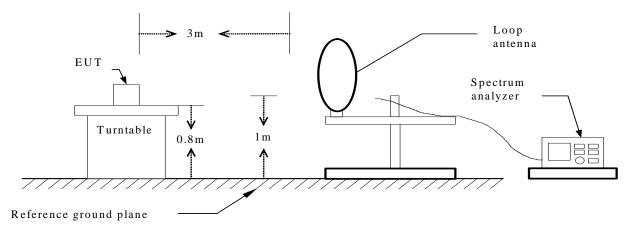


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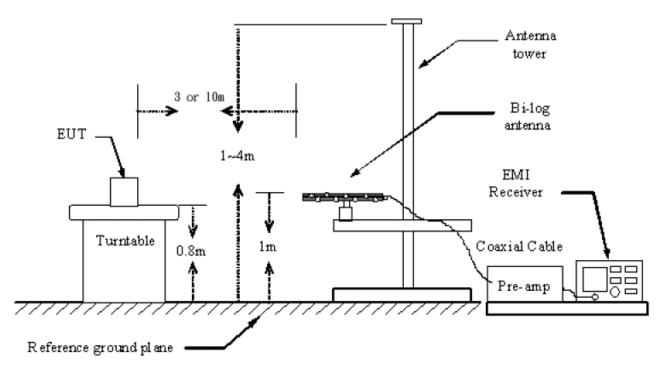
#### TEST SETUP

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

#### 9kHz ~ 30MHz

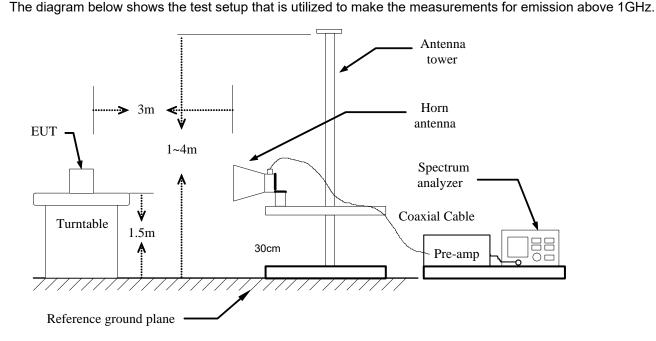


30MHz ~ 1GHz





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#### TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8/1.5 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. While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The spectrum analyzer was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The tests were performed in accordance with 558074 D01 15.247 Meas Guidance v05



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#### NOTE :

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

#### **TEST RESULTS**

No non-compliance noted.



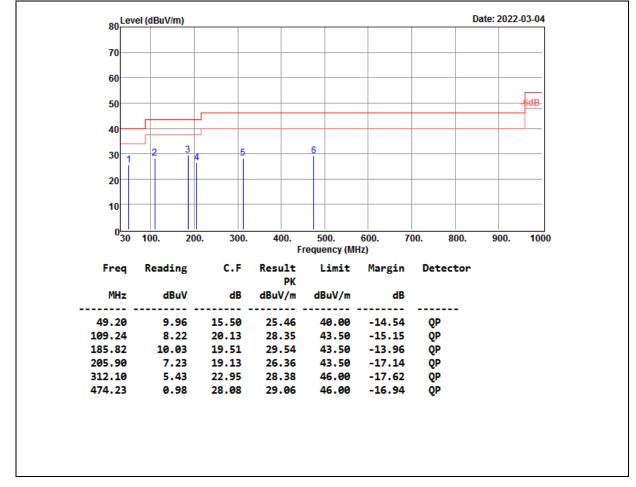
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## Report No.: TMTN2202000202NR 9.6.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

#### Test Voltage: AC 120V, 60Hz

Product Name	Automatic Wireless Turntable	Test Date	2022/03/04
Model Name	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	ТХ	Temp & Humidity	25°C, 61%

#### Vertical



#### Remark:

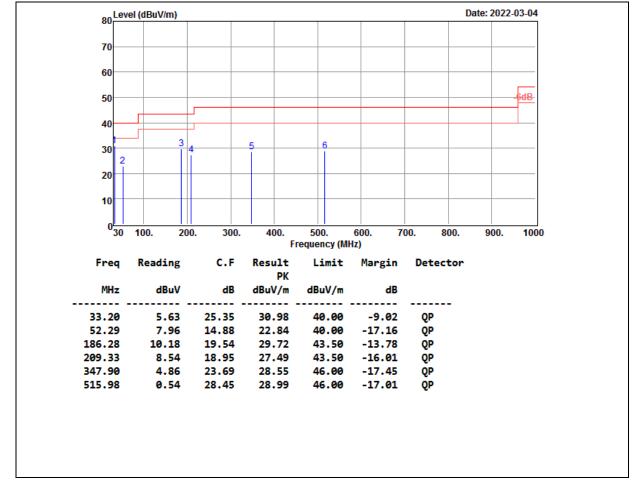
- 1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
- 2. Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.
- 3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
- 4. Margin (dB) = Remark result (dBuV/m) Quasi-peak limit (dBuV/m).



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Product Name	Automatic Wireless Turntable	Test Date	2022/03/04
Model Name	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	ТХ	Temp & Humidity	25°C, 61%

#### 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. Margin (dB) = Remark result (dBuV/m) Quasi-peak limit (dBuV/m).



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# Report No.: TMTN2202000202NR 9.6.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16	
Model	AT-LP60XBT-USB	Test By Ted Hu		
Test Mode	GFSK(4.0) TX (CH Low)	TEMP& Humidity	25.7°C, 51%	

Horizontal

	TX / (	H Low	Meas	uremen	t Distance	at 3m H	orizontal	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)
*	1103.47	57.72	24.93	2.56	44.74	0.65	41.12	74.00	-32.88	Р
*	1103.47	47.63	24.93	2.56	44.74	0.65	31.03	54.00	-22.97	А
*	1602.44	57.23	27.42	2.79	44.50	0.81	43.75	74.00	-30.25	Р
*	1602.44	48.36	27.42	2.79	44.50	0.81	34.88	54.00	-19.12	А
*	4803.56	53.29	33.07	4.38	42.51	0.57	48.81	74.00	-25.19	Р
*	4803.56	41.92	33.07	4.38	42.51	0.57	37.44	54.00	-16.56	А

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16
Model	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	GFSK(4.0) TX (CH Low)	TEMP& Humidity	25.7°C, 51%

Vertical

	ТХ / С	CH Low	Measurement Distance at 3m Vertical polarity					olarity		
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1123.47	57.31	25.02	2.57	44.73	0.65	40.81	74.00	-33.19	Р
*	1123.47	47.50	25.02	2.57	44.73	0.65	31.00	54.00	-23.00	A
*	1598.76	58.14	27.39	2.79	44.50	0.81	44.62	74.00	-29.38	Р
*	1598.76	46.49	27.39	2.79	44.50	0.81	32.97	54.00	-21.03	А
*	4803.59	53.22	33.07	4.38	42.51	0.57	48.74	74.00	-25.26	Р
*	4803.59	42.04	33.07	4.38	42.51	0.57	37.56	54.00	-16.44	А

**REMARK:** 

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

2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz,A(Average): RBW=1MHz, VBW 1/T

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 distance is 3m.



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Report No.: TMTN2202000202NR

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16
Model	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	GFSK(4.0) TX (CH Middle)	TEMP& Humidity	25.7°C, 51%

Horizontal

	TX / G	node / Cł	H Middle	Meas	urement	t Distance	at 3m H	orizontal	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)
*	1102.85	58.23	24.93	2.56	44.74	0.65	41.63	74.00	-32.37	Р
*	1102.85	47.44	24.93	2.56	44.74	0.65	30.84	54.00	-23.16	А
*	1599.82	57.03	27.40	2.79	44.50	0.81	43.53	74.00	-30.47	Р
*	1599.82	46.72	27.40	2.79	44.50	0.81	33.22	54.00	-20.78	А
*	4883.42	54.22	33.33	4.43	42.50	0.57	50.04	74.00	-23.96	Р
*	4883.42	42.90	33.33	4.43	42.50	0.57	38.72	54.00	-15.28	А

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16
Model	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	GFSK(4.0) TX (CH Middle)	<b>TEMP&amp; Humidity</b>	25.7°C, 51%

#### Vertical

	TX / G	FSK(5.2) r	node / Cl	H Middle	Mea	sureme	ent Distanc	e at 3m	Vertical po	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1103.47	57.22	24.93	2.56	44.74	0.65	40.62	74.00	-33.38	Р
*	1103.47	46.81	24.93	2.56	44.74	0.65	30.21	54.00	-23.79	А
*	1599.14	58.36	27.39	2.79	44.50	0.81	44.85	74.00	-29.15	Р
*	1599.14	46.47	27.39	2.79	44.50	0.81	32.96	54.00	-21.04	А
*	4883.58	54.20	33.33	4.43	42.50	0.57	50.02	74.00	-23.98	Р
*	4883.58	43.46	33.33	4.43	42.50	0.57	39.28	54.00	-14.72	А

#### **REMARK:**

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

2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz,A(Average): RBW=1MHz, VBW 1/T

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 distance is 3m.



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Report No.: TMTN2202000202NR

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16
Model	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	GFSK(4.0) TX (CH High)	TEMP& Humidity	25.7°C, 51%

Horizontal

	TX / 0	GFSK(5.2)	mode / C	H High	Meas	uremen	t 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)
*	1123.68	56.59	25.02	2.57	44.73	0.65	40.10	74.00	-33.90	Р
*	1123.68	47.00	25.02	2.57	44.73	0.65	30.51	54.00	-23.49	А
*	1589.20	57.35	27.31	2.78	44.52	0.80	43.73	74.00	-30.27	Р
*	1589.20	46.76	27.31	2.78	44.52	0.80	33.14	54.00	-20.86	А
*	4959.81	53.93	33.57	4.47	42.49	0.56	50.04	74.00	-23.96	Р
*	4959.81	42.60	33.57	4.47	42.49	0.56	38.71	54.00	-15.29	А

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16
Model	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	GFSK(4.0) TX (CH High)	<b>TEMP&amp; Humidity</b>	25.7°C, 51%

#### Vertical

	TX / 0	GFSK(5.2)	mode / 0	CH High	Meas	suremen	t 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)			
*	1104.48	56.73	24.94	2.56	44.74	0.65	40.14	74.00	-33.86	Р			
*	1104.48	48.38	24.94	2.56	44.74	0.65	31.79	54.00	-22.21	А			
*	1599.22	58.14	27.39	2.79	44.50	0.81	44.63	74.00	-29.37	Р			
*	1599.22	47.08	27.39	2.79	44.50	0.81	33.57	54.00	-20.43	А			
*	4959.47	55.48	33.57	4.47	42.49	0.56	51.59	74.00	-22.41	Р			
*	4959.47	44.85	33.57	4.47	42.49	0.56	40.96	54.00	-13.04	А			

#### **REMARK:**

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

2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz,A(Average): RBW=1MHz, VBW 1/T

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 distance is 3m.



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Report No.: TMTN2202000202NR

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16
Model	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	GFSK(5.2) TX (CH Low)	TEMP& Humidity	25.7°C, 51%

Horizontal

	TX / (	GFSK(5.2)	mode / C	H Low	Meas	urement	t Distance	at 3m H	orizontal polarity				
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark			
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)			
*	1125.24	57.35	25.03	2.57	44.73	0.65	40.86	74.00	-33.14	Р			
*	1125.24	46.54	25.03	2.57	44.73	0.65	30.05	54.00	-23.95	А			
*	1601.39	57.66	27.41	2.79	44.50	0.81	44.17	74.00	-29.83	Р			
*	1601.39	47.25	27.41	2.79	44.50	0.81	33.76	54.00	-20.24	А			
*	4802.82	53.49	33.07	4.38	42.51	0.57	49.01	74.00	-24.99	Р			
*	4802.82	42.20	33.07	4.38	42.51	0.57	37.72	54.00	-16.28	А			

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16
Model	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	GFSK(5.2) TX (CH Low)	TEMP& Humidity	25.7°C, 51%

#### Vertical

	TX / 0	GFSK(5.2)	mode / 0	CH Low	Меа	sureme	ent Distanc	e at 3m 🛛 🔪	/ertical po	olarity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1101.62	58.02	24.93	2.55	44.74	0.65	41.41	74.00	-32.59	Р
*	1101.62	46.83	24.93	2.55	44.74	0.65	30.22	54.00	-23.78	А
*	1598.96	57.53	27.39	2.79	44.50	0.81	44.02	74.00	-29.98	Р
*	1598.96	47.56	27.39	2.79	44.50	0.81	34.05	54.00	-19.95	А
*	4802.88	53.48	33.07	4.38	42.51	0.57	49.00	74.00	-25.00	Р
*	4802.88	42.24	33.07	4.38	42.51	0.57	37.76	54.00	-16.24	А

#### **REMARK:**

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

2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz,A(Average): RBW=1MHz, VBW 1/T

 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 distance is 3m.



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Report No.: TMTN2202000202NR

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16	
Model	AT-LP60XBT-USB	T-USB Test By		
Test Mode	GFSK(5.2) TX (CH Middle)	TEMP& Humidity	25.7°C, 51%	

Horizontal

	TX / G	FSK(5.2) r	node / Cł	H Middle	Meas	uremen	t Distance	at 3m H	orizontal 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)		
*	1103.56	58.31	24.93	2.56	44.74	0.65	41.71	74.00	-32.29	Р		
*	1103.56	46.98	24.93	2.56	44.74	0.65	30.38	54.00	-23.62	А		
*	1598.14	56.95	27.39	2.79	44.50	0.81	43.43	74.00	-30.57	Р		
*	1598.14	47.29	27.39	2.79	44.50	0.81	33.77	54.00	-20.23	А		
*	4882.97	53.74	33.33	4.43	42.50	0.57	49.56	74.00	-24.44	Р		
*	4882.97	42.06	33.33	4.43	42.50	0.57	37.88	54.00	-16.12	А		

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16
Model	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	GFSK(5.2) TX (CH Middle)	<b>TEMP&amp; Humidity</b>	25.7°C, 51%

#### Vertical

	TX / G	FSK(5.2) r	node / Cl	H Middle	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)
*	1106.72	57.34	24.95	2.56	44.74	0.65	40.76	74.00	-33.24	Р
*	1106.72	46.99	24.95	2.56	44.74	0.65	30.41	54.00	-23.59	А
*	1599.45	57.46	27.40	2.79	44.50	0.81	43.95	74.00	-30.05	Р
*	1599.45	47.21	27.40	2.79	44.50	0.81	33.70	54.00	-20.30	А
*	4882.80	55.97	33.32	4.43	42.50	0.57	51.79	74.00	-22.21	Р
*	4882.80	42.28	33.32	4.43	42.50	0.57	38.10	54.00	-15.90	А

#### **REMARK:**

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

2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz,A(Average): RBW=1MHz, VBW 1/T

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 distance is 3m.



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Report No.: TMTN2202000202NR

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16
Model	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	GFSK(5.2) TX (CH High)	TEMP& Humidity	25.7°C, 51%

Horizontal

	ТХ / С	GFSK(5.2)	mode / C	H 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)
*	1105.23	56.68	24.94	2.56	44.74	0.65	40.09	74.00	-33.91	Р
*	1105.23	47.31	24.94	2.56	44.74	0.65	30.72	54.00	-23.28	А
*	1563.31	57.09	27.11	2.78	44.56	0.77	43.19	74.00	-30.81	Р
*	1563.31	46.86	27.11	2.78	44.56	0.77	32.96	54.00	-21.04	А
*	4958.88	53.58	33.57	4.47	42.49	0.56	49.69	74.00	-24.31	Р
*	4958.88	42.35	33.57	4.47	42.49	0.56	38.46	54.00	-15.54	А

Product Name	Automatic Wireless Turntable	Test Date	2022/03/16
Model	AT-LP60XBT-USB	Test By	Ted Huang
Test Mode	GFSK(5.2) TX (CH High)	<b>TEMP&amp; Humidity</b>	25.7°C, 51%

#### Vertical

	TX / 0	GFSK(5.2)	mode / 0	CH High	Measurement Distance at 3m Vertical polar					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)
*	1110.06	58.53	24.96	2.56	44.74	0.65	41.97	74.00	-32.03	Р
*	1110.06	49.03	24.96	2.56	44.74	0.65	32.47	54.00	-21.53	А
*	1599.22	58.00	27.39	2.79	44.50	0.81	44.49	74.00	-29.51	Р
*	1599.22	47.03	27.39	2.79	44.50	0.81	33.52	54.00	-20.48	А
*	4958.99	54.82	33.57	4.47	42.49	0.56	50.93	74.00	-23.07	Р
*	4958.99	44.04	33.57	4.47	42.49	0.56	40.15	54.00	-13.85	А

#### **REMARK:**

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

2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz,A(Average): RBW=1MHz, VBW 1/T

3. The result basic equation calculation is as follow:

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

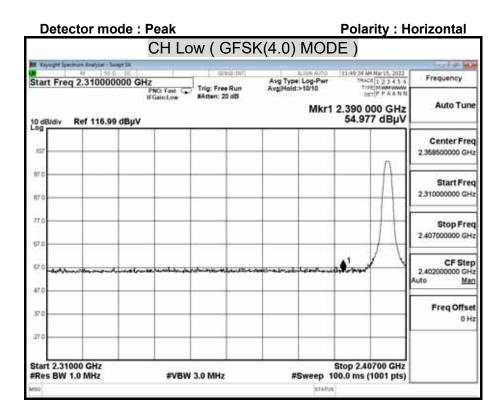
4. The other emission levels were 20dB below the limit

5. The test distance is 3m.



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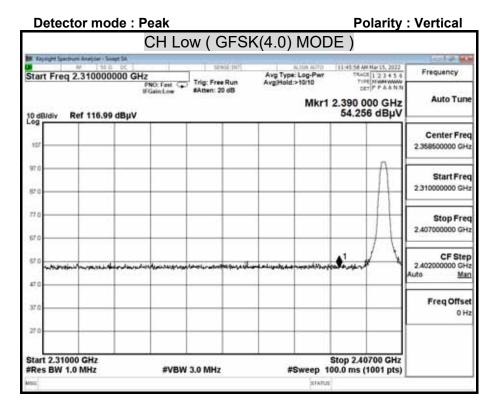
Detector mode	CH Lo		K(4.0) MOE	Polarity DE)		
Kaysight Spectrum Analyter - Swept SA     Nº ( 55 0 DC		stations	ALIBA AUTO	11:49:55 AH Bart		Frequency
Start Freq 2.310000000	PNO: Fast	Trig: Free Run	Avg Type: Log-Pwr Avg(Hold:>10/10	TRACE 1 2 TYPE NM	ALWWY B	Frequency
10 dBidiv Ref 116.99 dBj	IFGainLow	#Atten: 20 dB	Mkr1	2.390 000 43.279 d	GHz	Auto Tun
107						Center Fre 2.358500000 GH
97.0					4	Start Fre
87.0					+	2.31000000 GH
77.0					+	Stop Fre 2.40700000 GH
67.0	_			+ + +		
67.0					+	CF Ste 2.40200000 GH Auto Ma
47.0					6	20.22
37.0					-	Freq Offse 0 H
27.0						
Start 2.31000 GHz #Res BW 1.0 MHz	#VBW	2.7 kHz	Sweep 2	Stop 2.40700		
495			STATU	100 A.A. 200 A.A. 40 A.A.		



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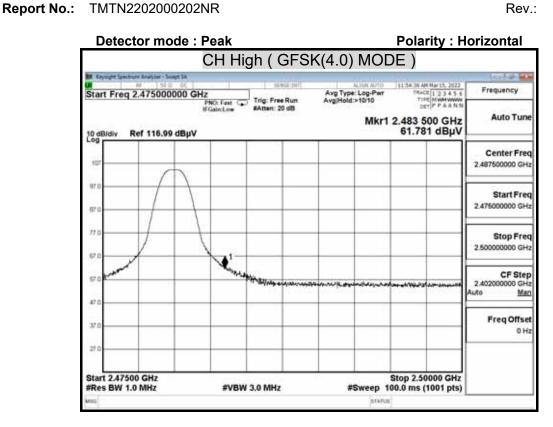
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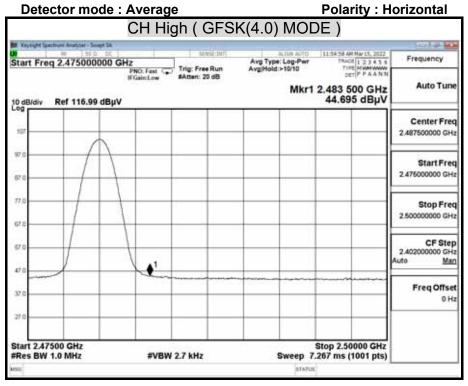


Detector mo	de : Average		Polarity : Vertical				
	CH Low ( G	FSK(4.0) MC	DDE)				
R Kaysight Spectrure Analyter - Swept		11.2 I I I I I I I I I I I I I I I I I I I			and an end		
Start Freq 2.31000000	0 GHz	Avg Type: Log-Pr	NT TRACE	123456	Frequency		
	PNC: Feat  IFGain:Low FAtten: 20 d	8	DET	PPAANN	Auto Tup		
10 dB/div Ref 116.99 dl	BμV	MK	43.415		1.0.000.0000		
100 C					Center Fre		
107					2.358500000 GH		
97.0				A	Start Fre		
67.0					2.31000000 GH		
77.0				11	Stop Fre 2.407000000 GH		
67.0				11	2.40700000 GH		
57.0				++	CF Ste 2.40200000 GH		
47.0			•1	$\downarrow$	Auto <u>Ma</u>		
37.0				6 X	Freq Offse		
27.0							
Start 2.31000 GHz #Res BW 1.0 MHz	#VBW 2.7 kHz	Sweep	Stop 2.407 28.07 ms (1				
495		31	ATUS				



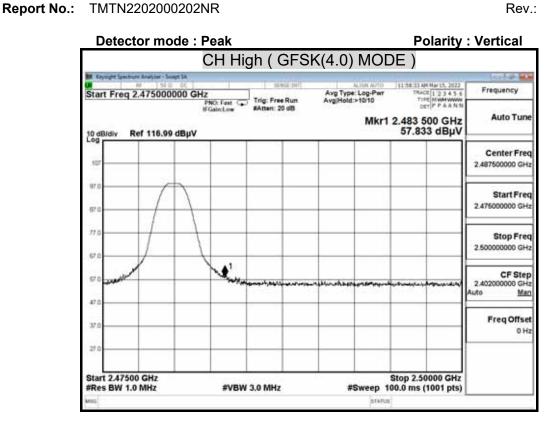
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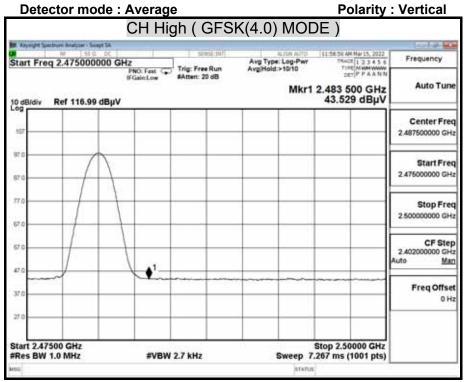






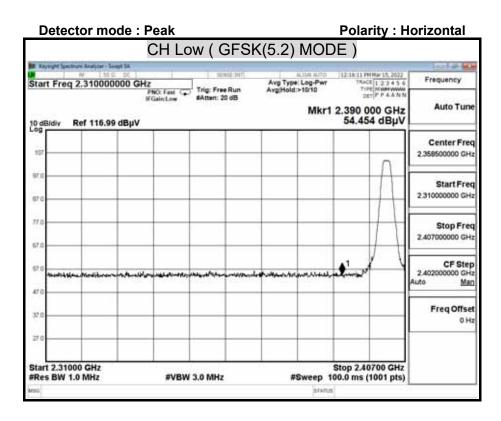
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Detector mode : Average		Polarity : Horizontal		
	CH Low (GFS	SK(5.2) MOE	DE)	
Start Freq 2.310000000	GHz	Auto Alton Alton Avg Type: Log-Pwr	12:16:15 PH Ray 15, 2022 TRACE 1 2 3 4 5 6 TUPE N MM MWW	Frequency
0 dBidiv Ref 116.99 dB	PNO: Fast Trig: Free Run IFGain:Low #Atten: 20 dB	Avg Hold:>10/10 Mkr1	2.390 000 GHz 43.785 dBµV	Auto Tun
107				Center Fre 2 358500000 GH
97.0			$\square$	Start Fre 2.31000000 GH
77.6 67.0				Stop Fre 2.407000000 GH
57 0 67 0				CF Ste 2.402000000 GH Auto Ma
37.0				Freq Offse
27.0				
Start 2.31000 GHz #Res BW 1.0 MHz	#VBW 5.1 kHz	100 M	Stop 2.40700 GHz 4.87 ms (1001 pts)	
46		STATU		



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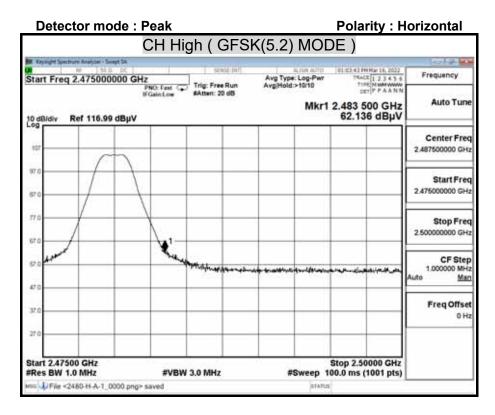
**Polarity : Vertical Detector mode : Peak** CH Low (GFSK(5.2) MODE) R. Keynight Spectrum Analyzer - Swept SA ----Start Freq 2.310000000 GHz FRO: Feet Const If GainLow AUDIA AUTO 12:19:23 PHIMU 15, 2022 Avg Type: Log-Pwr Avg[Hold:>10/10 2017] P A A N N Frequency Auto Tune Mkr1 2.390 000 GHz 54.650 dBµV 10 dB/div Ref 116.99 dBpV Center Freq 10 2.358500000 GHz 49 Start Freq 2.310000000 GHz 67 77 Stop Freq 2.407000000 GHz 67 CF Step 2.40200000 GHz uto <u>Man</u> 67 17 Freq Offset 17 0 Hz 27 Start 2.31000 GHz Stop 2.40700 GHz #VBW 3.0 MHz #Res BW 1.0 MHz #Sweep 100.0 ms (1001 pts) STA

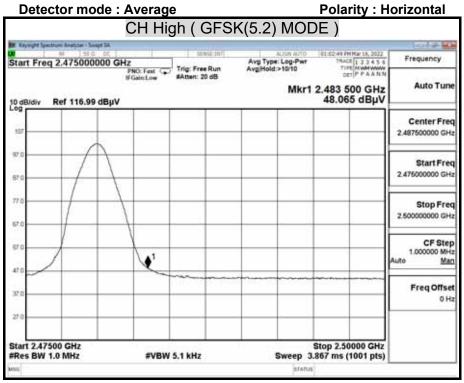
**Polarity : Vertical Detector mode : Average** CH Low (GFSK(5.2) MODE) Start Freq 2.31000000 GHz Free Run FGainLow Sugar Sec. AUTO 12:19-41 PH Mar 15, 2022 Avg Type: Log-Pwr Avg [Hold:>10/10 Def [P P A A N N Frequency Auto Tune Mkr1 2.390 000 GHz 43.547 dBµV 10 dBidiv Ref 116.99 dBpV Center Freq 10 2 358500000 GHz 97. Start Freq 2.310000000 GHz 67 77 Stop Freq 2.407000000 GHz 67 CF Step 2.40200000 GHz 67 Man 20 47 ٠ Freq Offset 37 0 Hz 37 Stop 2.40700 GHz Sweep 14.87 ms (1001 pts) Start 2.31000 GHz #Res BW 1.0 MHz #VBW 5.1 kHz STAD

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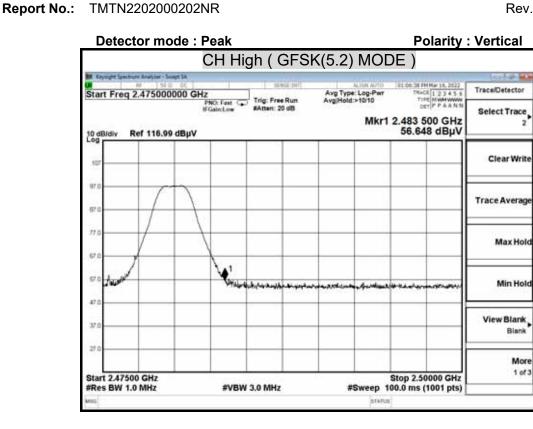
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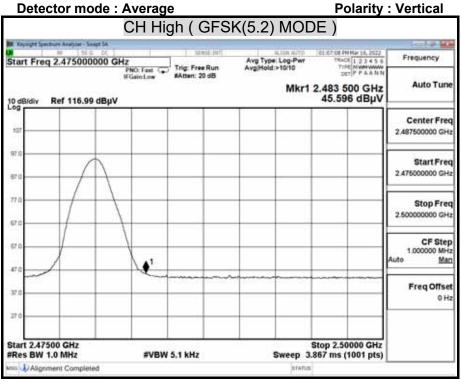






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### 9.7 POWERLINE CONDUCTED EMISSIONS

### **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.

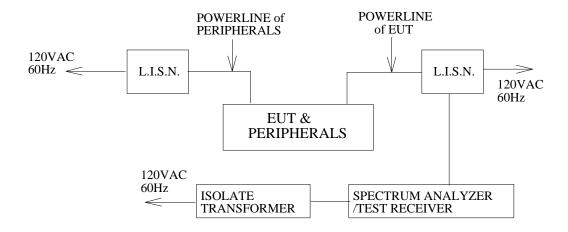
The lower limit applies at the boundary between the frequency ranges.

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



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#### TEST PROCEDURE

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

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

Line conducted data is recorded for both NEUTRAL and LINE.



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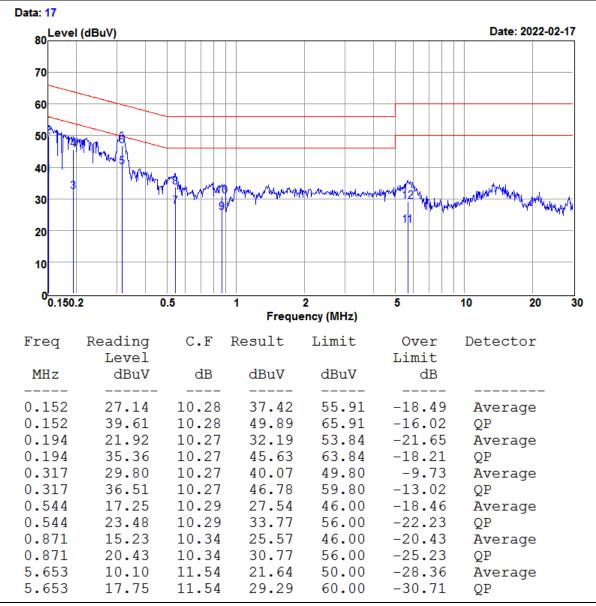
#### TEST RESULTS

No non-compliance noted.

#### Test Voltage: AC 120V, 60Hz

Model No.	AT-LP60XBT-USB	Test Mode	LINE
Environmental Conditions	1239 68% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

#### LINE

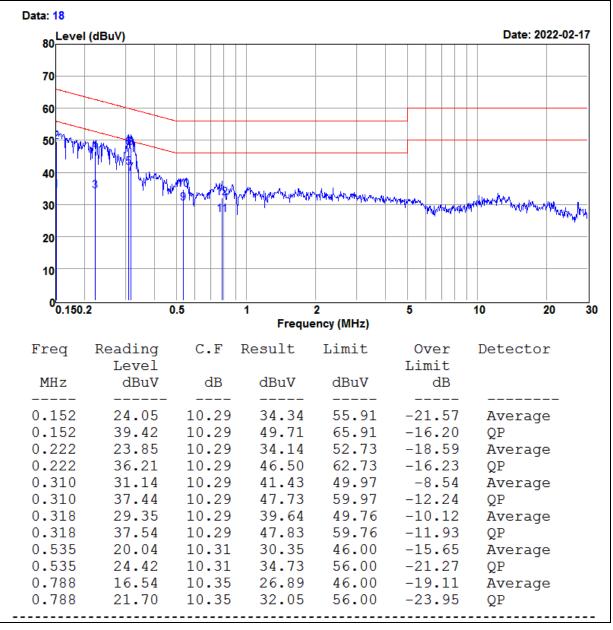




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Model No.	AT-LP60XBT-USB	Test Mode	LINE
Environmental Conditions	239 68% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

#### NEUTRAL





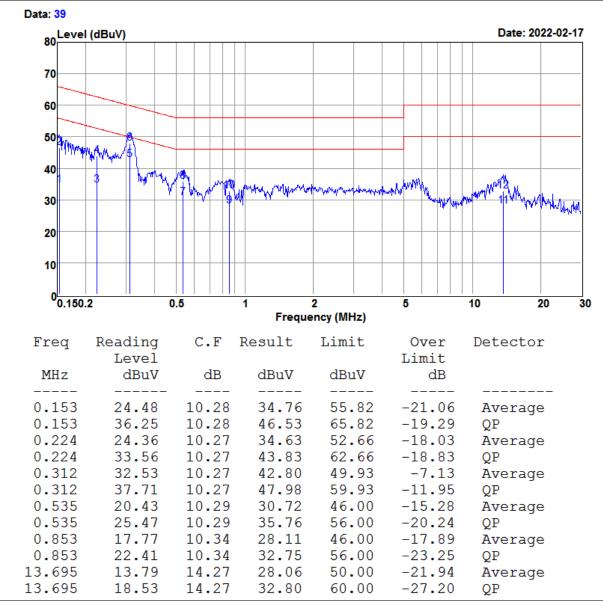
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### Test Voltage: AC 120V, 60Hz

Model No.	AT-LP60XBT-USB	Test Mode	PHONO
Environmental Conditions	1239 68% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

### LINE

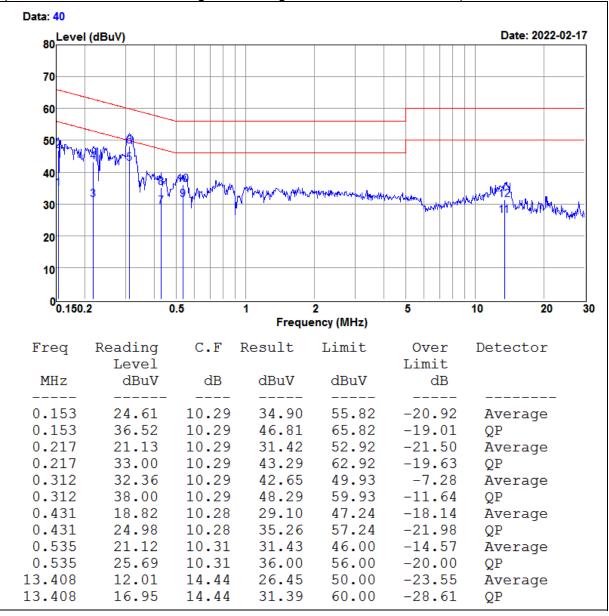




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Model No.	AT-LP60XBT-USB	Test Mode	PHONO
Environmental Conditions	239 68% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

#### NEUTRAL





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# **10. ANTENNA REQUIREMENT**

### **10.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **10.2 ANTENNA CONNECTED CONSTRUCTION**

Manufacturer: Advanced Ceramic X Type: Multilayer Chip Antenna Model: AT1608-A2R4ZM31T/LF Gain: 0.4 dBi

=== END of Report ===