



Project No.: TM-2201000527P Report No.: TMTN2201000127NR FCC ID: JFZLP120XBTA

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

For

DIRECT DRIVE Turntable

Model: AT-LP120XBT-USB

Data Applies To: N/A

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 Lab. No.8, Jiucengling, Xinhua Dist., Tainan City, Taiwan Issued Date: April 07, 2022

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。

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REVISION HISTORY

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	April 07, 2022	Initial Issue	ALL	Gina Lin



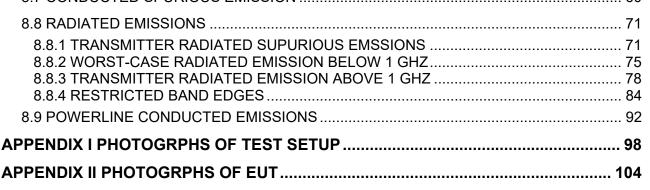
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1. TEST REPORT CERTIFICATION

Applicant	:	Audio-Technica Corporation 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	:	DIRECT DRIVE Turntable
Model Number	:	AT-LP120XBT-USB
Data Applies To	:	N/A
Brand Name	:	audio-technica
Date of Test	:	February 07, 2022 ~ February 10, 2022

APPLICABLE STANDARD			
STANDARD	TEST RESULT		
FCC Part 15 Subpart C AND ANSI C63.10: 2013	PASS		
Statements of Conformity			
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.			

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:

John Char

John Chen Supervisor



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2. TEST RESULT SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.203	3	ANTENNA REQUIREMENT	Pass
15.247(a)(1)	8.1	20dB BANDWIDTH	Pass
15.247(b)(1)	8.2	MAXIMUM PEAK OUTPUT POWER	Pass
15.247(a)(1)	8.3	HOPPING CHANNEL SEPARATION	Pass
15.247(a)(1)(iii)	8.4	NUMBER OF HOPPING FREQUENCY USED	Pass
15.247(a)(1)(iii)	8.5	DWELL TIME	Pass
-	8.6	DUTY CYCLE	-
15.247(d)	8.7	CONDUCTED SPURIOUS EMISSION	Pass
15.247(d)	8.8	RADIATED EMISSIONS	Pass
15.207(a)	8.9	POWERLINE CONDUCTED EMISSIONS	Pass



3. EUT DESCRIPTION

3.1 DESCRIPTION OF EUT & POWER

Product	DIRECT DRIVE Turntable
Model Number	AT-LP120XBT-USB
Data Applies To	N/A
Brand Name	audio-technica
Identify Number	TMTN2201000127NR
Received Date	January 28, 2022
Reported Date	March 15, 2022
Frequency Range	2402MHz ~ 2480MHz
Transmit Peak Power	GFSK : 2.13dBm / 1.633mW 8DPSK: 2.471dBm / 1.766mW
Channel Spacing	1MHz
Transmit Data Rate	GFSK Mode : 1 Mbps 4/πDQPSK Mode : 2Mbps 8DPSK Mode : 3Mbps
Modulation Type	GFSK、π/4DQPSK、8DPSK
Number of Channels	79 Channels
EUT Power Supply	DC 12V (Powered by adapter)
Antenna Type	Manufacturer: Advanced Ceramic X Type: Multilayer Chip Antenna Model: AT3216-A2R4PAAT/LF Gain: 1.5 dBi
Firmware Version	V1.0
Software Version	V1.0

Power Adapter :

Manufacturer	Model No.	Power Input	Power Output
SHENZHEN FUJIA APPLIANCE CO., LTD.	FJ-SW1202000N	AC 100-240V, 50/60Hz, 0.6A	DC 12V, 2.0A, 24W

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: JFZLP120XBTA** 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.



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4. 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).
- Following channel(s) was (were) 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).
- 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



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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).
- 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



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5. 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.



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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, ANSI C63.10 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, 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."

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

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



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6.5 MEASUREMENT EQUIPMENT USED

For §8.8.2~8.8.3	
------------------	--

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	100221	04/16/2021	04/15/2022		
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		Excel(ccs-	o6-2020 v1.1),e3(v	/6.101222)			

For §8.1~8.7 8.8.4

Chamber 966 Room (Conducted Test)									
Name of Equipment	Manufacturer	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 §8.9

Conducted Emission room #1									
Name of Equipment	Manufacturer	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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6.6 MEASURING INSTRUMENT CALIBRATION

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

6.7 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



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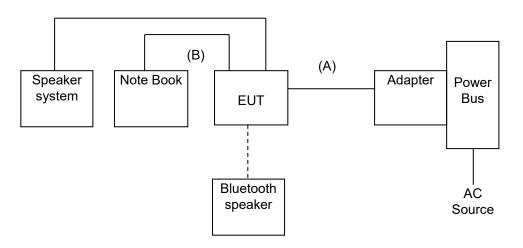
7. SETUP OF EQUIPMENT UNDER TEST

(C)

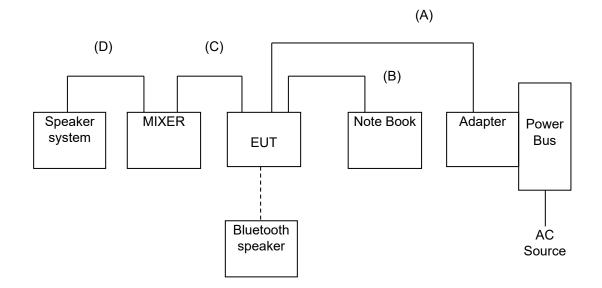
7.1 SETUP CONFIGURATION OF EUT

EMI

[Line]



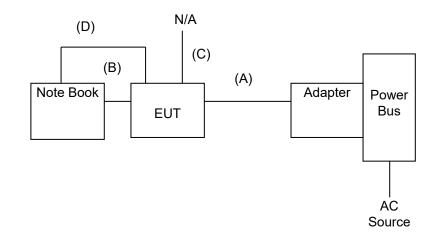
【Phono】





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RF





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7.2 SUPPORT EQUIPMENT

For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	MIXER	HANPIN	HP-MU1	N/A	N/A
2	Speaker System	T.C.SATR	TCS2285	DCC	N/A
3	Note Book	TOSHIBA	PORTEGE R30-A	DCC	N/A
4	Bluetooth speaker	PHILIPS	TAS1505	N/A	N/A

No.	Signal cable description			
А	DC Cable	Unshielded, 1.4m 1 pcs.		
В	USB	Shielded, 2.0m 1 pcs.		
С	Audio	Shielded, 1.0m 1 pcs.		
D	Audio	Shielded, 1.0m 1 pcs.		

For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Power cable
1	Note Book	Acer	Z5WE1	N/A	unshd, 1.8m, with 1 core

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



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(100)"

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 Bit pattern > Pseudo-rdm 9 PHY > 1M (2M) Page: 17 / 115 Rev.: 00



Report No.: TMTN2201000127NR **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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8. APPLICABLE LIMITS AND TEST RESULTS

8.1 20dB BANDWIDTH FOR HOPPING

<u>LIMIT</u>

None; for reporting purposes only.

TEST SETUP



TEST PROCEDURE

The 20dB bandwidth 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 N dB Points function, the 20dB bandwidth of the emission was determined.



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TEST RESULTS

Model Name AT-LP120XBT-USB		Test By	Peter Chu
Temp & Humidity	23.5°C, 58%	Test Date	2022/02/10

Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)	Pass / Fail
Low	2402	1118.00	0.75	PASS
Middle	2441	1114.00	0.74	PASS
High	2480	1114.00	0.74	PASS

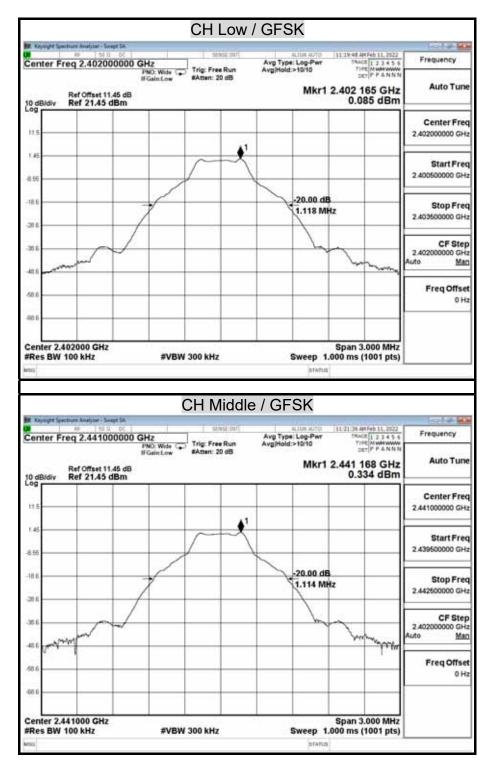
Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)	Pass / Fail
Low	2402	1395.00	0.93	PASS
Middle	2441	1396.00	0.93	PASS
High	2480	1393.00	0.93	PASS



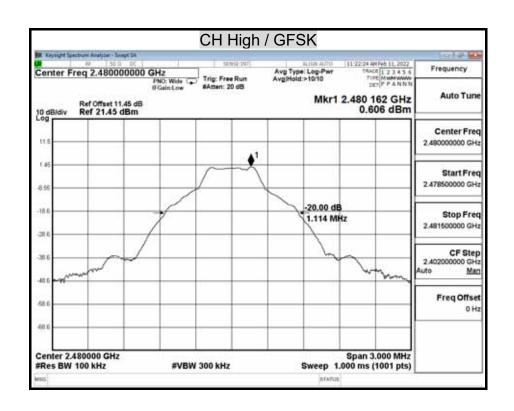
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20dB BANDWIDTH



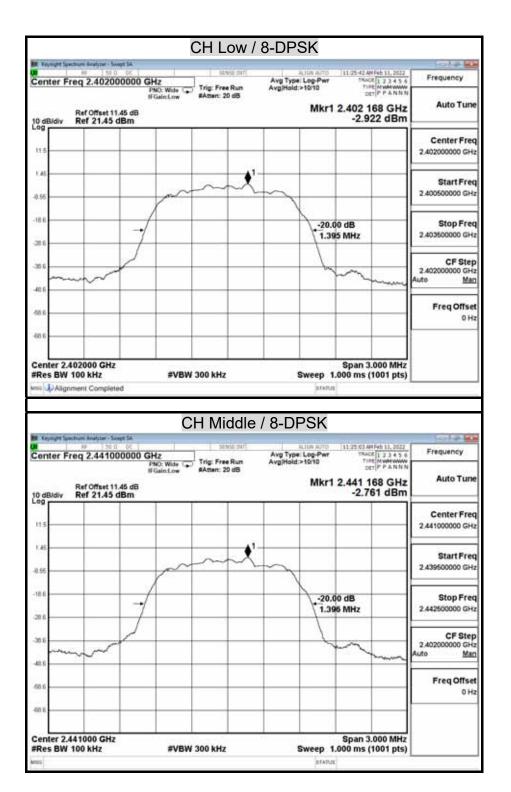


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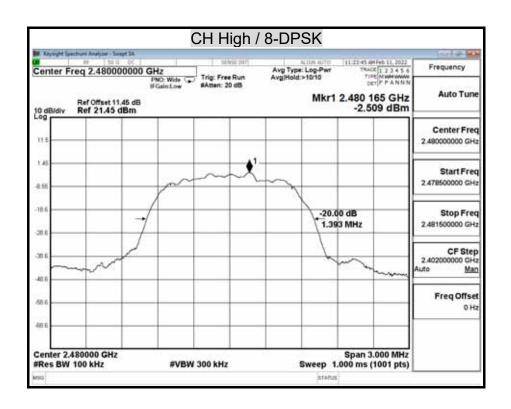


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8.2 MAXIMUM PEAK OUTPUT POWER

<u>LIMIT</u>

§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 Configuration



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.

Peak Power set:

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

8.Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select 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.



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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 \geq [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

Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Temp & Humidity	23.5°C, 58%	Test Date	2022/02/10

Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	2.08	1.613		PASS
Mid	2441	1.86	1.535	125	PASS
High	2480	2.13	1.633		PASS

Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	2.04	1.598		PASS
Mid	2441	2.43	1.750	125	PASS
High	2480	2.47	1.766		PASS



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Average Power Data

Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	1.312
Middle	2441	1.167
High	2480	1.711

Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-1.422
Middle	2441	-1.093
High	2480	-1.183



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MAXIMUM PEAK OUTPUT POWER

Knunght Spectrum Analyter - Sweet SA	CH Low			and an and
## 150.0 CC	station!	ALITY MICO	12-18-55 PH Mar 22, 2022	Frequency
Center Freq 2.402000000 GHz	fast 😱 Trig: Free Run	Avg Type: Log-Pwr Avg/Hold:>1/1	THE NUMEWWW DET PPAANN	Frequency
PNC: F IFGain:		1000 C 1000 C 100	DET PPAANN	10001-000
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58.6				
Center 2.402000 GHz	un alle and	R	Span 3.000 MHz	
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102 1 Xonget Sectors Analysis - Sampt Sa 1 89 [55:3 05] Center Freq 2.441000000 GHz PNC F If Gain: 0 dB/div 0 dB/div 16 16 16 16 16 16 16 16 16 16	CH Middl	e / GFSK Avg Type: Log-Pwr Avg[Hold:>1/1 Mkr1	1214.18 PH Mar 22, 2022 PACE 1 2.3 4.5 6 Trig Mathematica Description of the second	Frequency Auto Turn Center Free 2.44100000 GH Start Free 2.43950000 GH Stop Free
An and the sectors and the sector and the secto	CH Middl	e / GFSK Avg Type: Log-Pwr Avg[Hold:>1/1 Mkr1	1214.18 PH Mar 22, 2022 PACE 1 2.3 4.5 6 Trig Mathematica Description of the second	Frequency Auto Turn Center Free 2.44100000 GH Start Free
102 1 Xonget Sectors Analysis - Sampt Sa 1 89 [55:3 05] Center Freq 2.441000000 GHz PNC F If Gain: 0 dB/div 0 dB/div 16 16 16 16 16 16 16 16 16 16	CH Middl	e / GFSK Avg Type: Log-Pwr Avg[Hold:>1/1 Mkr1	1214.18 PH Mar 22, 2022 PACE 1 2.3 4.5 6 Trig Mathematica Description of the second	Frequency Auto Turn Center Free 2.44100000 GH Start Free 2.43950000 GH Stop Free 2.442500000 GH
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Result Sweet Sa. 00 35.0 00 201 35.0 00 201 35.0 00 PNC F PRC F PRC F 0 dBidly Ref Offset 11.45 dBm 00 03 0 0 0 0 16 0 0 0 0 0 16 0 0 0 0 0 0 16 0	CH Middl	e / GFSK Avg Type: Log-Pwr Avg[Hold:>1/1 Mkr1	1214.18 PH Mar 22, 2022 PACE 1 2.3 4.5 6 Trif Mathematica Design P A A 191 2.441 156 GHz	Frequency Auto Turn Center Free 2.44100000 GH Start Free 2.43950000 GH Stop Free 2.44250000 GH CF Step 2.40200000 GH Auto Mai
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Result Result Summary Section Summary Section Summary Section Processing Procesing Processing P	CH Middl	e / GFSK Avg Type: Log-Pwr Avg[Hold:>1/1 Mkr1	1214.18 PH Mar 22, 2022 PACE 1 2.3 4.5 6 Trif Mathematica Design P A A 191 2.441 156 GHz	Frequency Auto Turn Center Free 2.44100000 GH Start Free 2.43950000 GH Stop Free 2.44250000 GH CF Step 2.40200000 GH Auto Mai
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Report Sectors Regist Sectors Sectors Center Freq 2.441000000 GHz Proc r Proc r IFGain: 0 dBidiv Ref Offset 11.45 dB 215 0 145 0 165 0 165 0 165 0 165 0 11.45 0 165 0 165 0 165 0 165 0 165 0 165 0 165 0 165 0 165 0 11.45 0 11.45 0 11.45 0 11.45 0 11.45 0 11.45 0 11.45 0 11.45 0 11.45 0 11.45 0 11.45 0 11.45 0 11.45 0 11.45 <td>CH Middl</td> <td>e / GFSK</td> <td>1214.18 PH Mar 22, 2022 PACE 1 2.3 4.5 6 Trif Mathematica Design P A A 191 2.441 156 GHz</td> <td>Frequency Auto Tun Center Free 2.44100000 GH Start Free 2.43950000 GH Stop Free 2.44250000 GH Auto Ma Freq Offsee</td>	CH Middl	e / GFSK	1214.18 PH Mar 22, 2022 PACE 1 2.3 4.5 6 Trif Mathematica Design P A A 191 2.441 156 GHz	Frequency Auto Tun Center Free 2.44100000 GH Start Free 2.43950000 GH Stop Free 2.44250000 GH Auto Ma Freq Offsee



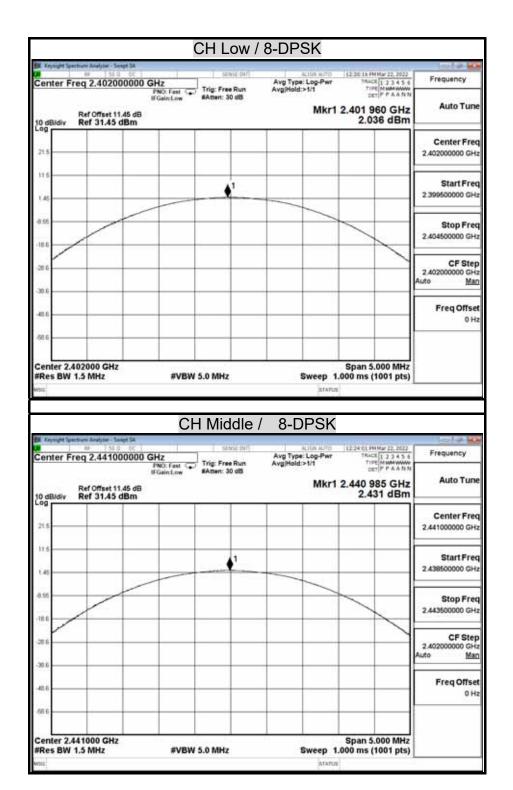
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	er - Swept SA 59 SL 0C	SING OF	ALIUN W/PD	12-18-22 PH Har 22, 2022	
Center Freq 2.48	80000000 GHz	Trig: Free Run	Avg Type: Log-Pwr Avg/Hold:>1/1	THACE 1 2 3 4 5 6 THE MUMMUMU DET P P A A N N	Frequency
10 dB/div Ref 31	IFGein:L et 11.45 dB .45 dBm	ow #Atten: 30 dB	Mkr1	2.479 871 GHz 2.130 dBm	Auto Tun
21.5					Center Free 2.49000000 GH
116		♦ ¹	-		Start Fre 2.47850000 GH
855					Stop Fre 2.481500000 GH
20.6					CF Ste 2.40200000 GH Auto <u>Ma</u>
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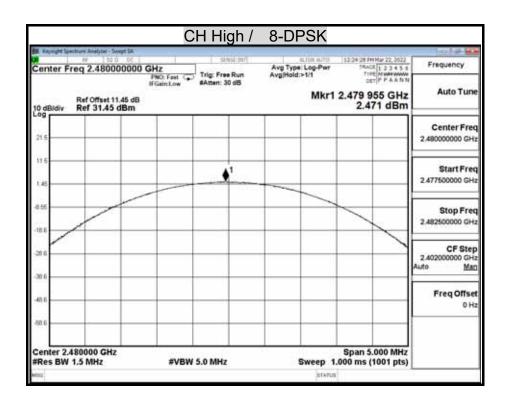
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8.3 HOPPING CHANNEL SEPARATION

<u>LIMIT</u>

§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 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 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.



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

Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Temp & Humidity	23.5°C, 58%	Test Date	2022/02/10

Modulation Type: GFSK / DH5

Channel	Adjacent Hopping Channel Separation (MHz)	Two –third of 20dB bandwidth (MHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.75	25 KHz	PASS
2441MHz	1.00	0.74	25 KHz	PASS
2480MHz	1.00	0.74	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	0.93	25 KHz	PASS
2441MHz	1.00	0.93	25 KHz	PASS
2480MHz	1.00	0.93	25 KHz	PASS



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HOPPING CHANNEL SEPARATION

		GFSK	(Low)		
Kaysight Spectrum Analyzer - 5		SING OUT	A IDA M2D	111:37:02 AM Feb 11, 2022	and at the
Center Freq 2.4020	00000 GHz	Trig: Free Run	Avg Type: Log-Per Avg[Hold:>10/10	TRACE 1 2 3 4 5 6 TIPE MUMMUMUM DET P P A N N N	Frequency
Ref Offset 1 10 dB/div Ref 21,45		#Atten: 20 dB	ΔΜ	kr1 1.000 MHz -0.040 dB	Auto Turi
115 1.45		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		▲1∆2	Center Free 2.402000000 GH
10.6					Start Free 2.400500000 GH
40.6					Stop Fre 2.403500000 GH
Center 2.402000 GH #Res BW 100 kHz		300 kHz	Sweep 1.	Span 3.000 MHz 000 ms (1001 pts)	CF Step 2.402000000 GH
	1.000 MHz (Δ)	-0.040 dB	NCTON SUNCTION MODE	TUNKTON WITH -	Auto <u>Ma</u>
2 F 1 3 4 5 6	2.402 000 GHz	-0.278 dBm			Freq Offse 0 H
7 8 9 10 11					
< [STAPUS		

R Keysight Sp	ectrure Analyter - Sw	Contraction in the second		and the second second second second	Middle)		
Center F	req 2.44100	00000 GI		Trig: Free Run	Avg Type: Log-Pwr Avg/Hold:>10/10	11:36:16 AR Feb 11, 2022 TRACE 1 2 3 4 5 6 TYPE M WAY WWW	Frequency
			NO: Wide Gain:Low	#Atten: 20 dB	Addition	DET PANNN	
10 dB/div	Ref Offset 11 Ref 21,45				ΔM	kr1 1.000 MHz 0.021 dB	Auto Tun
Log		1					Center Fre
1,45	23	4	-	~~×a~		♦ ^{1Δ2}	2.441000000 GH
10.6			\sim		\mathbf{M}	/	Start Fre
-26.6							2.439500000 GH
40.6	-		-				Stop Fre
-52.6							2.442500000 GH
Center 2.	441000 GHz	8	#VBV	V 300 kHz	Sweep 1	Span 3.000 MHz 000 ms (1001 pts)	CF Ste 2.40200000 GH
	10 10 1	х			anaton (Internation	tonetonetoneton	Auto Ma
1 A2 2 F	1 (Δ)	2.441 00		-0.064 dBm			FreqOffse
3 04 4 F 5	τ (Δ) τ	2.441 00	0 MHz (Δ) 0 GHz	-0.011 dB -0.055 dBm			OH
7 8							
9 10 11			-				
						100	



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GFSK(High) H. Key re Anatyper - Swept SA 1 and 1 ALIGN MUTO 11:34:56 ARFeb 11, 2022 Avg Type: Log-Pwr TRACE 12:3:4:3:6 Avg[Hold:>15/15 DET P A N N N Center Freq 2.48000000 GHz PNO: Wide (Trig: Free Run IFGainLow #Atten: 20 dB Frequency ΔMkr1 -1.000 MHz -0.003 dB Auto Tune Ref Offset 11.45 dB Ref 21.45 dBm 1∆2 11 Center Freq 2.49000000 GHz 1.4 2 8.5 10. Start Freq 28.1 2.478500000 GHz 38.1 Trad 40. Stop Freq 80. 2.481500000 GHz 681 Center 2.480000 GHz #Res BW 100 kHz Span 3.000 MHz Sweep 1.000 ms (1001 pts) CF Step 2.402000000 GHz Suto Man #VBW 300 kHz CONTRACTOR DATA i ta Δ2 1 (Δ) F 1 -1.000 MHz (Δ) 2.480 000 GHz -0.003 dB 0.170 dBm Freq Offset 0 Hz 10 STATUS

Keysight Spectrum Analyse		interfilier (1. Statistics	Internet and the second		
enter Freq 2.40	2000000 GHz	Avg Type: Log-Pwr ee Run Avg/Hold >10/10	11-29-01 AM Feb 11, 2022 SRACE 1 2 3 4 5 6 T/PE MWMWWW	Frequency	
	PNO: Wide C Trig: Fr IFGain:Low #Atten:	20 dB	DET PPANNN	Auto Tupe	
	45 dBm	Δι	4 Mkr1 1.000 MHz -0.021 dB	Auto Tun	
og go.				1210-1201-201	
145			▲1 <u>∆</u> 2	Center Free 2.402000000 GH	
8.55		12 mm			
10.6	6				
28.6				Start Free 2.400500000 GH	
38.6					
40.6				Stop Free 2.403500000 GH	
62.6					
Center 2.402000 G Res BW 100 kHz	HZ #VBW 300 kH	z Sweep 1	Span 3.000 MHz .000 ms (1001 pts)	2.40200000 GH	
ani (1993) (1993 (1993)	X X	FUNCTION FUNCTION MOTH		Auto <u>Ma</u>	
	1.000 MHz (Δ) -0.02 2.402 000 GHz -3.585 c	1 dB		100 015	
3 A4 t 4 F t	625.0 µs 1.025 ms			Freq Offset	
5				01	
7 8					
9		_]		
11					



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R. Keysight Spectru	re Analyter - Sw			1 595	cinie:	AUGAN	an lunaration	WFeb 11, 2022	and at the
Center Free		00000 GH	O: Wide 🕞	1200200	Rum	Avg Type: Log-f Avg/Hold:>10/10	WT TRA	CE 173456 PE NWHWWW ET P PANNN	Frequency
10 dB/div	ef Offset 11 tef 21.45 (.45 dB	ainLow	RADen: 201	35		ΔMkr1 1.0		Auto Tura
11.5 1.45	³⁴	4	~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	\sim	~~~~		}	Center Fre 2.441000000 GH
10.6 28.6									Start Fre 2.439500000 GH
40.6									Stop Fre 2.442500000 GH
Center 2.44 Res BW 10	0 kHz		#VBW	V 300 kHz		NAMES OF TAXABLE PARTY.	p 1.000 ms	And and a local division of the local divisi	CF Ste 2.402000000 GH Auto Ma
2 F	τ (Δ) f (Δ) f	2.441 000	MHz (A)	0.001 dl -3.376 dBr -0.476 dl -3.376 dBr	8 n 8			KIN WALLIE	Freq Offse 0 H
8 9 10 11								₫.	

R. Keysight Spect				PSK (H			
Center Fre		00000 GHz		Avg Avg	Type: Log-Pwr (Hold:>10/10	11:33:58 ANFeb 11, 2022 TRACE 1 2 3 4 5 6 TUPE N WARWARK	Frequency
		PNO: Wi IFGain L			provid Par Pa	DET PPANNN	Auto Tup
	Ref Offset 11 Ref 21.45				ΔMk	r1 -1.000 MHz 0.010 dB	Auto Tun
115							0
1.45	1	Δ2					Center Fre 2,48000000 GH
8.55		h	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	2	_		2.000000000
10.6	1		-				Start Fre
28.6	-		_				2.478500000 GH
-38.6	-		-			~	
40.6							Stop Fre
-50.6	-						2.481500000 GH
4.63	1						
Center 2.41 #Res BW 1			VBW 300 kHz		Sweep 1.0	Span 3.000 MHz 00 ms (1001 pts)	CF Ste 2.40200000 GH
and the state			V		FUNCTION MOTH	FUNCTION VALUE	Auto Ma
1 A2 2 F	1 (A)	-1.000 MH		dB 3m			Freq Offse
3 4 5	-						OH
6 7			-	-			
8			-	-			
10							
(<u></u>					2.40.0.9	108	



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8.4 NUMBER OF HOPPING FREQUENCY USED

<u>LIMIT</u>

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

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.



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TEST RESULTS

Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Temp & Humidity	23.5°C, 58%	Test Date	2022/02/10

Modulation Type: GFSK / DH5

Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS

Modulation Type: 8-DPSK / 3-DH5

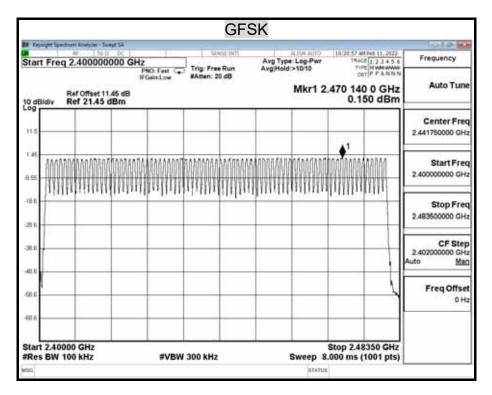
Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS



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NUMBER OF HOPPING FREQUENCY USED



	8-D	PSK		
	D DC SENSE INT		0-28-38 AM (46-11, 2022	Frequency
Ref Offset 10 dBidiv Ref 11.45	PNO: Fest Trig: Free Run IFGain:Low SAtten: 10 dB	Avg Type: Log-Pwr Avg Hold:>10:10 Mkr1 2.47	77 154 0 GHz -2.889 dBm	Auto Tun
Log Las	anggighatwingtwindthatwa	หมดสิกมาสิกสิทิส	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	Center Fre 2.441750000 GH
-0.6				Start Fre 2.400000000 GH
3.05				Stop Fre 2.483500000 GH
48.6				CF Ste 2.40200000 GH Auto Mi
68.0				Freq Offs 0 H
-78.6 Start 2.40000 GHz			op 2.48350 GHz	
#Res BW 100 kHz	#VBW 300 kHz	Sweep 8.00	0 ms (1001 pts)	



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8.5 DWELL TIME ON EACH CHANNEL

<u>LIMIT</u>

§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 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.



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Time of occupancy on the TX channel in 31.6sec = time domain slot length × hop rate \div 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.

Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Temp & Humidity	23.5°C, 58%	Test Date	2022/02/10

Modulation Type: GFSK / 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	DH1	0.400	128.00	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=	1.660 m	s×(1600÷2)÷79×3 s×(1600÷4)÷79×3 s×(1600÷6)÷79×3	31.6= 265.60 (ms)		

DH5 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)

Modulation Type: 8-DPSK / 3-DH5

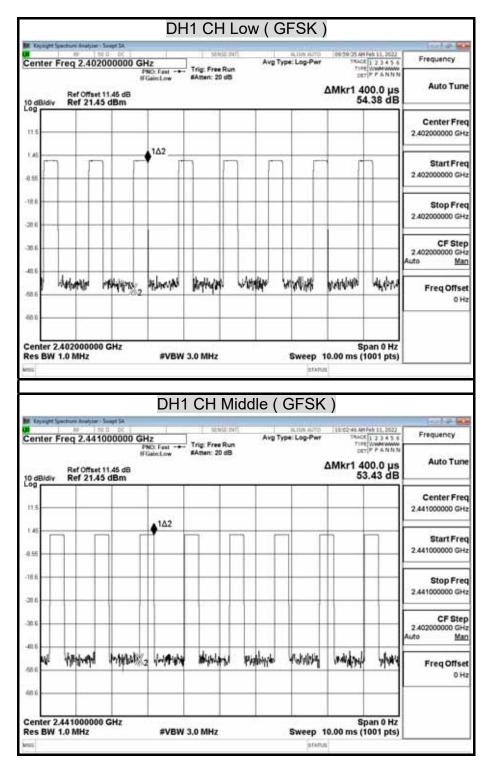
Packet type	Dwell time (ms)	on the TV channel	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
3DH1	0.400	128.00	400.00	PASS
3DH3	1.660	265.60	400.00	PASS
3DH5	2.900	309.33	400.00	PASS
AFH	2.900	154.67	400.00	PASS
	type 3DH1 3DH3 3DH5	type(ms)3DH10.4003DH31.6603DH52.900	Packet typeDwell time (ms)on the TX channel in 31.6sec (ms)3DH10.400128.003DH31.660265.603DH52.900309.33	Packet typeDwell time (ms)on the TX channel in 31.6sec (ms)occupancy on the TX channel in 31.6sec (ms)3DH10.400128.00400.003DH31.660265.60400.003DH52.900309.33400.00

3DH1 Dwell tine=0.400ms×(1600÷2)÷79×31.6=128.00 (ms)3DH3 Dwell tine=1.660ms×(1600÷4)÷79×31.6=265.60 (ms)3DH5 Dwell tine=2.900ms×(1600÷6)÷79×31.6=309.33 (ms)AFH Dwell tine=2.900ms×(800÷6)÷20×8=154.67 (ms)



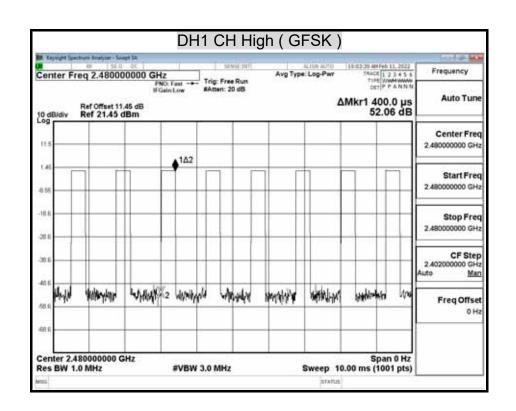
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DWELL TIME ON EACH PAYLOAD



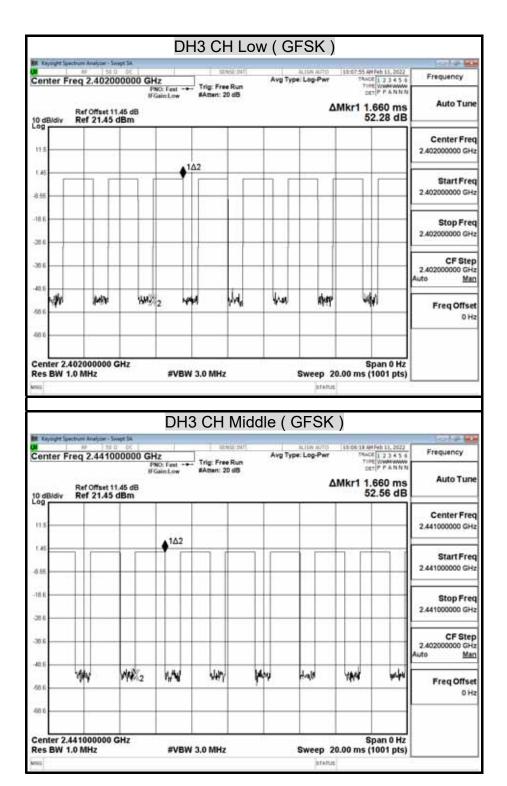


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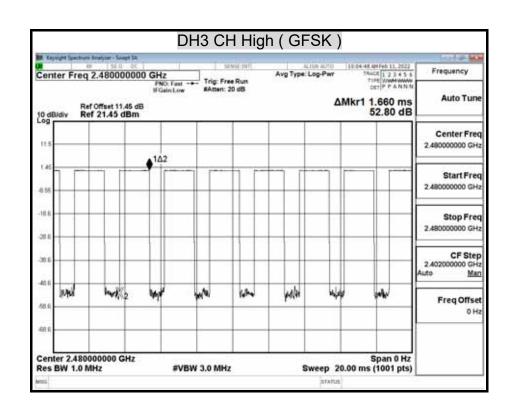


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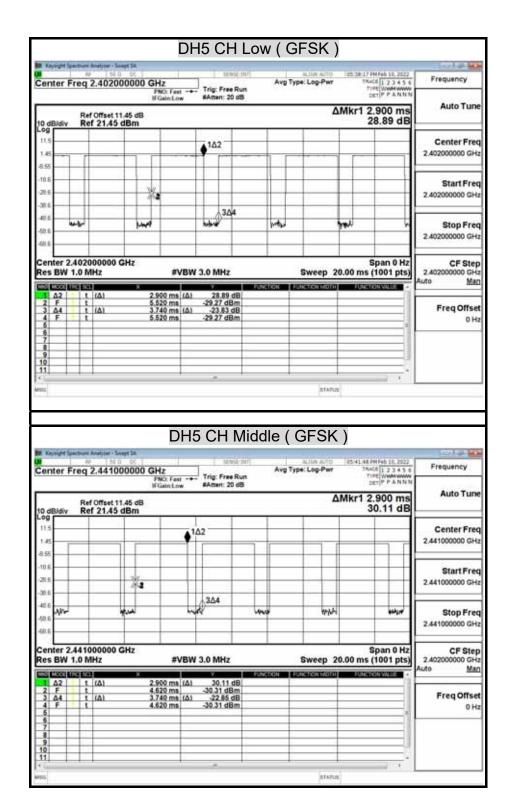


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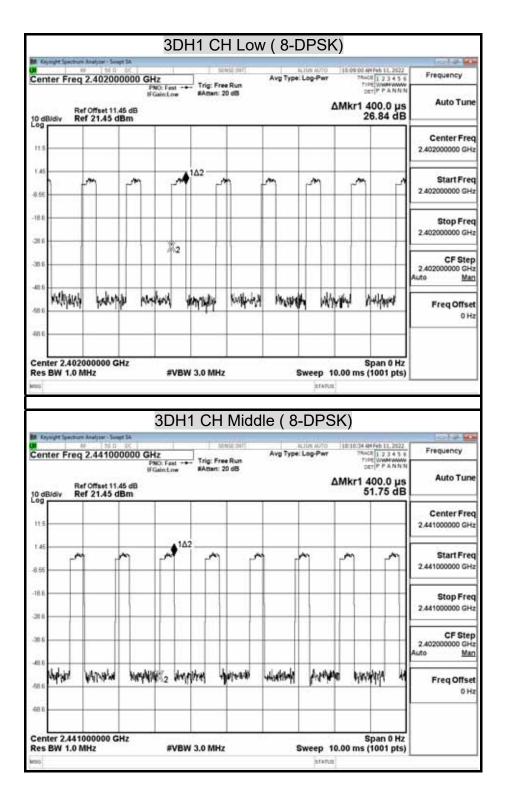


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R. Keysight	Spectrure					11520167	Wie 1		STREET, DO			
Center	Freq		00000			Strig: Free Ru	2.2	Avg Typ	action AUPO	105:43:30 PH Feb 10, 2 TRACE 1 2 3 4 TYPE WWWW	5.6	Frequency
				PNO: Fas IFGainLo		#Atten: 20 dB				DET P AT	INN	Auto Tupe
10 dB/di		Offset 1 21.45	1.45 dB dBm						Δ	Vkr1 2.900 r 31.06 d		Auto Turr
11.5					14:				1 2			Center Fre
1.45	-		-	-			1 1				-1	2.49000000 GH
-10.6	_		1									Start Fre
35.6			×a.									2.48000000 GH
40.6	_	-	-	-	-40	3∆4	ale's		eler	in	-li	Stop Free
-52.6												2.48000000 GH
Center Res BV			GHz		1014	3.0 MHz			Sugar 20	Span 0 .00 ms (1001 p		CF Step 2.402000000 GH
					DI	3.0 mmz	10.74		Sweep 20	too ms (1001 p		Auto Ma
1 A2		(Δ)		2.900 ms		31.06 dB -30.78 dBm		1			11	200 .002
3 <u>04</u> 4 F 5		(Δ)		3.740 ms 4.200 ms	(4)	-23.06 dB -30.78 dBm		-				Freq Offse 0 H
6 7 8							_		-		11	
9											뭵	
11											-11	

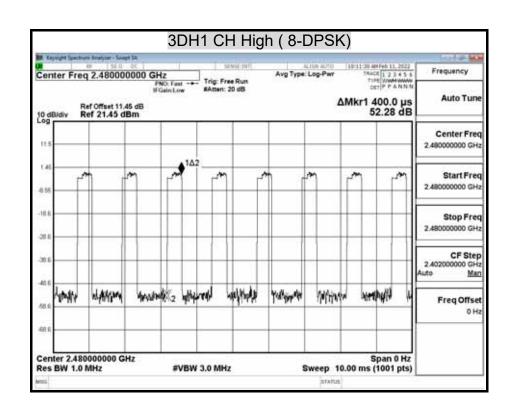


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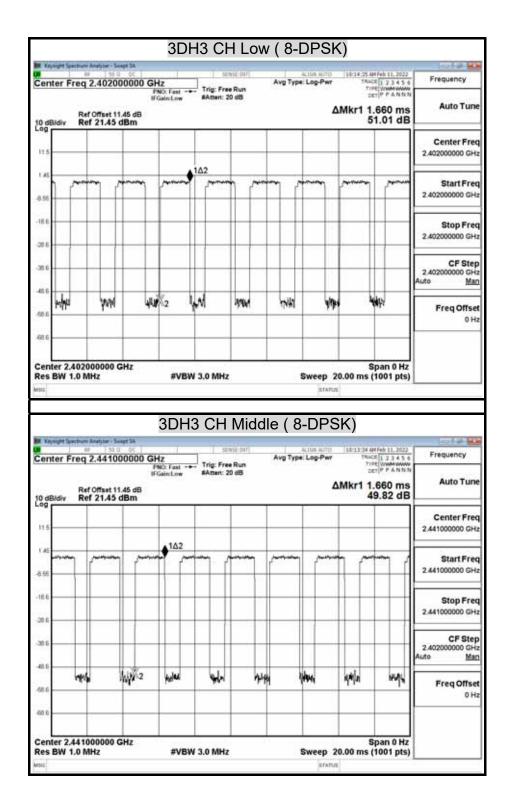


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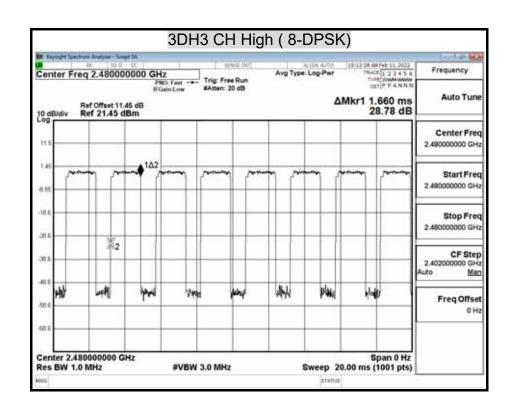


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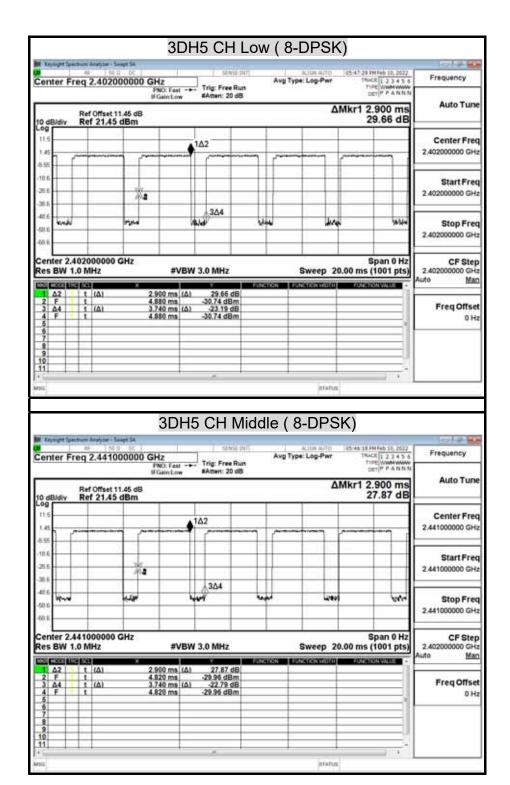


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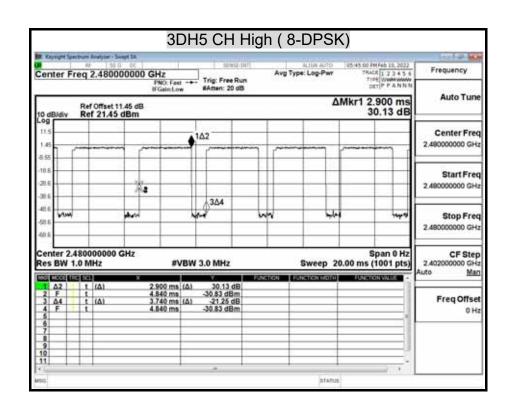


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8.6 DUTY CYCLE

<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.)



TEST RESULTS

No non-compliance noted.

TEST DATA

Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Temp & Humidity	23.5°C, 58%	Test Date	2022/02/10

Modulation Type: GFSK / DH5

	us	Times	Ton	Total Ton time(ms)
Ton1	2900.000	1	2900	
Ton2		0	0	
Ton3			0	2.9
Тр				3.74

Ton	2.9
Tp(Ton+Toff)	3.74
Duty Cycle	0.77540107
Duty Factor	1.105

Modulation Type: 8-DPSK / 3-DH5

	us	Times	Ton	Total Ton time(ms)
Ton1	2900.000	1	2900	
Ton2		0	0	
Ton3			0	2.9
Тр				3.74

Ton	2.9
Tp(Ton+Toff)	3.74
Duty Cycle	0.77540107
Duty Factor	1.105

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TEST PLOT

Duty Cycle

		(Low)	GFSK		
-		107 ALMANADO 70		r - Swept SA	Keysight Spectrum Analys
Frequency	25.38:17 PH Feb 10, 2022 TRACE 1 2 3 4 5 6 TriPE WWWWWWW DET P P A N N N	Aug Type: Log-Per	SINGEONT		enter Freq 2.4
Auto Tun				PNO: Fast IFGain:Low	
Autorus	Akr1 2.900 ms 28.89 dB	ΔN		et 11.45 dB 45 dBm	0 dB/div Ref 21
1210-1201-220			2000		og go
Center Fre 2.40200000 GH			1∆2		1.45
					155
Start Fre					10.6
2.40200000 GH					25.6
Citere Free		-	304	1.4	10.6 44 but
Stop Fre 2.40200000 GH	n n	burden dat	Now.	junt	26
CF Ste	Span 0 Hz			00 GHz	enter 2.402000
2.40200000 GH Auto Ma	00 ms (1001 pts)		BW 3.0 MHz	#VB	es BW 1.0 MHz
	FUNKTION WALKE	CTION FUNCTION WOTH		2.900 ms (//	Δ2 τ (Δ)
Freq Offse			-29.27 dBm	5.520 ms 3.740 ms (/ 5.520 ms	2 F t 3 Δ4 t (Δ) 4 F t
2007	1				5 6 7
					8
					10
					1
	1.00				
	-201	STATUS			11
		- Anno and	GFSK(I	ŀ	
		/liddle)		r - Sweet Sa	15
Frequency	05-41-48 PH Neb 10, 2022 TRACE [1 2 3 4 5 6 THE WARK WARK DET P A N N N	- Anno and	Statut Stat	1000000 GHz	1 <u>1</u>
	TRACE 1 2 3 4 5 6 TIPE WWW WWW DET P P A N N N	Aiddle)	Statut Stat	1000000 GHz	Ref Offi
Frequency	TRACE 1 2 3 4 5 6 TIPE WWWWWWW DET P P A N N N	Aiddle)	Statut Stat	SU DE 1000000 GHz PNO: Fast IFGainLow	Ref Offi
Frequency Auto Tun Center Fre	TRACE 1 2 3 4 5 6 TIPE WWW WWW DET P P A N N N	Aiddle)	stand darf	1000000 GHz PNC: Fast IFGain:Low	Renget Sectors Red; enter Freq 2.4- 0 dBJdiv Ref 21
Frequency Auto Tun	TRACE 1 2 3 4 5 6 TIPE WWW WWW DET P P A N N N	Aiddle)	stred furf	1000000 GHz PNC: Fast IFGain:Low	Ref Office
Frequency Auto Tun Center Fre 2.44100000 GH	TRACE 1 2 3 4 5 6 TIPE WWW WWW DET P P A N N N	Aiddle)	stred furf	1000000 GHz PNC: Fast IFGain:Low	Renget Sectors Red; enter Freq 2.4- 0 dBJdiv Ref 21
Frequency Auto Tun Center Fre	TRACE 1 2 3 4 5 6 TIPE WWW WWW DET P P A N N N	Aiddle)	stred furf	55 0 00 1000000 GHz PR0: Fast - IFGainLow et 11.45 dB 45 dBm	Ref Office 0 dBJdiv 145 145 155 155 155 155 155 155
Frequency Auto Turn Center Fre 2.44100000 GH Start Fre	TRACE 1 2 3 4 5 6 TIPE WWW WWW DET P P A N N N	Aiddle)	Trig: Free Run #Attent: 20 dB	1000000 GHz PNC: Fast IFGain:Low	enter Freq 2.4
Frequency Auto Turn Center Fre 2.44100000 GH Start Fre	TRACE 1 2 3 4 5 6 TIPE WWW WWW DET P P A N N N	Aiddle)	Trig: Free Run RAttert: 20 dB	SS D CC 1000000 GHz PRO: Fast - If GainLow et 11.45 dB 45 dBm	Ref Office 0 dBJdiv Ref 21 0 dBJdiv Re
Frequency Auto Tun Center Fre 2.441000000 GH Start Fre 2.441000000 GH	TRACE 1 2 2 4 3 5 Tride WWW WWW DET P A NW M Akr1 2.900 ms 30.11 dB	Aiddle) Avg Type: Log-Per ΔΛ	Trig: Free Run RAttert: 20 dB	55 0 02 1000000 GHz PHO: Fast - If Gain Low et 11.45 dB 45 dBm	Arrought Seechare Andre enter Freq 2.44 O dB/div Ref 21 Og 145 145 145 145 145 145 145
Frequency Auto Turn Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH	Trace (1 2 2 4 5 6 Trace (WMM WWW Det (P P A NH N Akr1 2.900 ms 30.11 dB		1Δ2	51 0 000 GHz	It is a set of the se
Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH	Trace (1 2 2 4 5 6 Trace (WMM WWW Det (P P A NH N 30,11 dB 30,11 dB 400 ms 30,11 dB 400 ms 500 ms 500 ms 1001 pts)	Aiddle) Avg Type: Log-Pwr ΔΝ	1Δ2 1Δ2 3Δ4 BW 3.0 MHz	51 0 000 GHz	It is set in the set
Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH CF Ste 2.40200000 GH	Trace (1 2 2 4 5 6 Trace (WMM WWW Det (P P A NH N 30,11 dB 30,11 dB 400 ms 30,11 dB 400 ms 500 ms 500 ms 1001 pts)		stride (30) Trig: Free Run #Attent: 20 dB 1Δ2 3Δ4 NN WBW 3.0 MHz	519 02 1000000 GHz PHO: Fast If GainLow et 11.45 dB 45 dBm 45 dB	It is set in the set
Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH CF Ste 2.402000000 GH Auto Ma	Trace (1 2 2 4 5 6 Trace (WMM WWW Det (P P A NH N 30,11 dB 30,11 dB 400 ms 30,11 dB 400 ms 500 ms 500 ms 1001 pts)	Aiddle) Avg Type: Log-Pwr ΔΝ	Trig: Free Run #Attent: 20 dB	51 0 000 10000000 GHz PRO: Fast - If GainLow et 11.45 dB 45 dBm 45 dBm	It is set in the set
Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH CF Ste 2.40200000 GH	Trace (1 2 2 4 5 6 Trace (WMM WWW Det (P P A NH N 30,11 dB 30,11 dB 400 ms 30,11 dB 400 ms 500 ms 500 ms 1001 pts)	Aiddle) Avg Type: Log-Pwr ΔΝ	Trig: Free Run #Attent: 20 dB	51 0 000 1000000 GHz PRC: Fast - If GainLow 54 dBm 45 dBm	Ref Office 0 dBldiv Ref Office 0 dBl
Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH CF Ste 2.402000000 GH Auto Ma	Trace (1 2 2 4 5 6 Trace (WMM WWW Det (P P A NH N 30,11 dB 30,11 dB 400 ms 30,11 dB 400 ms 500 ms 500 ms 1001 pts)	Aiddle) Avg Type: Log-Pwr ΔΝ	Trig: Free Run #Attent: 20 dB	51 0 000 10000000 GHz PRO: Fast - If GainLow et 11.45 dB 45 dBm 45 dBm	Ref Office Ref Office 0 dB/div Ref Office
Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH CF Ste 2.402000000 GH Auto Ma	Trace (1 2 2 4 5 6 Trace (WMM WWW Det (P P A NH N 30,11 dB 30,11 dB 400 ms 30,11 dB 400 ms 500 ms 500 ms 1001 pts)	Aiddle) Avg Type: Log-Pwr ΔΝ	Trig: Free Run #Attent: 20 dB	51 0 000 10000000 GHz PRO: Fast - If GainLow et 11.45 dB 45 dBm 45 dBm	Ref Office 0 dBidiv Ref Office 0 dAi
Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH CF Ste 2.402000000 GH Auto Ma	Trace (1 2 2 4 5 6 Trace (WMM WWW Det (P P A NH N 30,11 dB 30,11 dB 400 ms 30,11 dB 400 ms 500 ms 500 ms 1001 pts)	Aiddle) Avg Type: Log-Pwr ΔΝ	Trig: Free Run #Attent: 20 dB	51 0 000 10000000 GHz PRO: Fast - If GainLow et 11.45 dB 45 dBm 45 dBm	Ref Office Ref Office 0 dB/div Ref Office



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GFSK(High) H Key re Realizer - Sweet SA ALTAN MUTD 05-43-30 PH Feb 18, 2022 Avg Type: Log-Per TRACE 12.3.4.3.6 Tract Vertex Ve August Ind Frequency ΔMkr1 2.900 ms 31.06 dB Auto Tune Ref Offset 11.45 dB Ref 21.45 dBm 10 0 11 Center Freq 142 2.49000000 GHz 1.4 842 10. Start Freq 28.1 2.48000000 GHz 84 38.1 344 40.5 where mer ** ada¹1 1945 Stop Freq 80. 2.49000000 GHz 621 Center 2.480000000 GHz Res BW 1.0 MHz Span 0 Hz Sweep 20.00 ms (1001 pts) CF Step 2.402000000 GHz uto <u>Man</u> #VBW 3.0 MHz CONTRACTOR DATA t (Δ) t t (Δ) t 2.900 ms (Δ) 4.200 ms 3.740 ms (Δ) 4.200 ms Δ2 F Δ4 F 31.06 dB -30.78 dBm -23.06 dB -30.78 dBm Freq Offset 0 Hz 10 11 STATUS 8-DPSK (Low) BR. Knutight Spectrum Analyter - Sweet SA A state last 105-47-29 PHTeb 18, 2022 TRACE 1 2 3 4 5 6 Trife Westerwest DET P A N N N Avg Type: Log-Pwr Frequency Center Freq 2.402000000 GHz PNC: Feat Trig: Free Run #Atten: 20 dB Auto Tune ΔMkr1 2.900 ms 29.66 dB Ref Offset 11.45 dB Ref 21.45 dBm 11 **Center Freq** 142 2.402000000 GHz 8.42 10.8 Start Freq 28.1 2.402000000 GHz 12 ÷. 344 40.6 end 1.1 4.00 145 Stop Freq 68. 2.40200000 GHz Center 2.402000000 GHz Res BW 1.0 MHz CF Step 2.402000000 GHz uto <u>Man</u> Span 0 Hz Sweep 20.00 ms (1001 pts) #VBW 3.0 MHz CASE BUREAU 29.66 dB -30.74 dBm -23.19 dB -30.74 dBm A2 F A4 F 2.900 ms (Δ) 4.880 ms 3.740 ms (Δ) 4.880 ms t (Δ) t t (Δ) t Freq Offset 0 Hz 10 STATUS



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		8-DPS	SK (Mido	dle)		
Keyoght Spectrum Analyzer		10 000000	West 10	ALCONTRACTOR AND A	Managa Managana at	
Center Freq 2.441			Avg Ty		R PM Feb 10, 2022 RACE 1 2 3 4 5 6	Frequency
	PNC	D: Fast Trig: Free Ru ain:Low #Atten: 20 dl			DET PPANNN	30.00 No.000
Ref Offset	11.45 dB			ΔMkr1	2.900 ms	Auto Tune
O dB/div Ref 21.4					27.87 dB	
11.5		▲1∆2	_		-	Center Free
1.45				-		2.441000000 GH
8.55						
10.6						Start Free
22.6	1/2					2.441000000 GH
40.6		304				
50.0	N.W	4401	Nager .	Linest	1010	Stop Free
68.6						2.441000000 GH
Center 2.44100000	O CHT				Soon O Ha	A
Center 2.44100000 Res BW 1.0 MHz	GHZ	#VBW 3.0 MHz		Sweep 20.00 m	Span 0 Hz s (1001 pts)	2.40200000 GH
CE (CCC) (CC) (CC)	X		FUNCTION F	and the second	-	Auto <u>Mar</u>
1 Δ2 t (Δ) 2 F t	4.82	0 ms (Δ) 27.87 dB 0 ms -29.96 dBm		(p.		
2 F t 3 Δ4 t (Δ) 4 F t	3.74	0 ms (Δ) -22.79 dB 0 ms -29.96 dBm				Freq Offse
5						
7						
8		-				
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			I		*	
845		2	I	[STAPUS]	^*	
843		8-DP	SK (Hia			
		8-DP	SK (Hig			
Kayoght Spectrum Analyzer	30 DC	sinsi	WS	h)	NI PHI-146 ED, 2022	
Kayoght Spectrum Analyzer	000000 GHz	Stree Ru	Avg Tyr	h)	RACE 1 2 3 4 5 6	Frequency
Kayoght Spectrum Analyzer	000000 GHz		Avg Tyr	h) Allan Auto (45-45 f pe: Log-Pwr)	TIPE WWWWWW	Frequency
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Center Freq 2.480 Ref Offset	0000000 GHz PNC IFGa 11.45 dB	Since 2. Fast -+- Trig: Free Ru	Avg Tyr	h) Allan Auto (45-45 f pe: Log-Pwr)	TIPE WWWWWW	Frequency
Center Freq 2.480 Ref Offset	0000000 GHz PNC IFGa 11.45 dB	Since 2. Fast -+- Trig: Free Ru	Avg Tyr	h) Allan Auto (45-45 f pe: Log-Pwr)	2.900 ms	Frequency Auto Tune Center Free
Ref Offset	0000000 GHz PNC IFGa 11.45 dB	Z C: Fast In:Low SAtten: 20 dl	Avg Tyr	h) Allan Auto (45-45 f pe: Log-Pwr)	2.900 ms	Frequency Auto Tune Center Free
Ref Offset	0000000 GHz PNC IFGa 11.45 dB	Z C: Fast In:Low SAtten: 20 dl	Avg Tyr	h) Allan Auto (45-45 f pe: Log-Pwr)	2.900 ms	Frequency Auto Tune Center Fred
Ref Offset	0000000 GHz PNC IFGa 11.45 dB	Z C: Fast In:Low SAtten: 20 dl	Avg Tyr	h) Allan Auto (45-45 f pe: Log-Pwr)	2.900 ms	Frequency Auto Turn Center Free 2.49000000 GH Start Free
Ref Offset	0000000 GHz PNC IFGa 11.45 dB	Z C: Fast In:Low SAtten: 20 dl	Avg Tyr	h) Allan Auto (45-45 r pe: Log-Pwr 1	2.900 ms	Frequency Auto Turn Center Free 2.49000000 GH Start Free
Ref Offset	80 000000 GH2 PW FG 11.45 dB 5 dBm	Z C: Fast In:Low SAtten: 20 dl	Avg Tyr	h) ALIAN AUTO 105-95 pe: Log-Pwr 5 ΔMkr1	2.900 ms	Frequency Auto Turn Center Free 2.49000000 GH Start Free
Ref Offset	8000000 GH2 PM IFG 11.45 dB 5 dBm	Trig: Free Ri AAtten: 20 dl	Avg Tyr	h) Allan Auto (45-45 r pe: Log-Pwr 1	2.900 ms	Frequency Auto Tune Center Free 2.48000000 GH Start Free 2.48000000 GH Stop Free
Ref Offset	80 000000 GH2 PW FG 11.45 dB 5 dBm	Trig: Free Ri AAtten: 20 dl	Avg Tyr	h) ALIAN AUTO 105-95 pe: Log-Pwr 5 ΔMkr1	2.900 ms 30.13 dB	Frequency Auto Turn Center Free 2.49000000 GH Start Free 2.49000000 GH Stop Free
Ref Offset 0 dBJdiv 115 1.45 1.45 1.45 1.45 1.45 1.45 1.45	800 000 GHz 9000000 GHz 9% 9% 9% 9% 9% 9% 9% 9% 9% 9%	Trig: Free Ri AAtten: 20 dl	Avg Tyr	h) ALIAN AUTO 105-95 pe: Log-Pwr 5 ΔMkr1	2.900 ms 30.13 dB	Frequency Auto Turn Center Free 2.48000000 GH Start Free 2.48000000 GH Stop Free 2.48000000 GH
Konset Sector Relation Ref Offset delate	800 000 GHz 9000000 GHz 9% 9% 9% 9% 9% 9% 9% 9% 9% 9%	torial Cr.Fast → Trig: Free R Hint.tow #Atten: 20 dl	Avg Tyr	h) ALIAN AUTO Pe: Log-Per ΔMkr1	2.900 ms 30.13 dB	Frequency Auto Turn Center Free 2.49000000 GH Start Free 2.49000000 GH Stop Free 2.49000000 GH
Center 2.48000000 Ref 21.4 20 20 20 20 20 20 20 20 20 20 20 20 20	800 000 GHz 9000000 GHz 9% 9% 9% 9% 9% 9% 9% 9% 9% 9%	Trig: Free Ri AAtten: 20 dl	Avg Tyr	h) ALIAN ACTO PE: Log-Per ΔMkr1 ΔMkr1 Sweep 20.00 m	2.900 ms 30.13 dB 30.13 dB 30.13 db 50.13 db 50.10 db 50.	Frequency Auto Tum Center Free 2.48000000 GH 2.48000000 GH 2.48000000 GH 2.48000000 GH
Ref Offset 0 dBJdiv Ref 21.4 0	2000000 GHz PK FG 11.45 dB 5 dBm 2 dBm 0 GHz 2 900	Trig: Free Ri #Attent: 20 dl 10.2 #Attent: 20 dl 20 dl	Avg Tyr	h) ALIAN ACTO PE: Log-Per ΔMkr1 ΔMkr1 Sweep 20.00 m	2.900 ms 30.13 dB 50.13 dB 50.13 dB 50.13 dB 50.13 dB 50.13 dB 50.13 dB	Frequency Auto Tum Center Free 2.48000000 GH 2.48000000 GH 2.48000000 GH 2.48000000 GH
Conserve Seatture Restrict Conter Freq 2.480 Ref Offset O	2.0000000 GHz PM FG 11.45 dB 5 dBm 0 GHz 2.90 4.84 3.74 3.74	2 λ Fast	Avg Tyr	h) ALIAN ACTO PE: Log-Per ΔMkr1 ΔMkr1 Sweep 20.00 m	2.900 ms 30.13 dB 30.13 dB 30.13 db 50.13 db 50.10 db 50.	Frequency Auto Turn Center Free 2.48000000 GH Start Free 2.48000000 GH Stop Free 2.48000000 GH CF Step 2.40200000 GH Auto Mar
Ref Offset 0 β 3 Center Freq 2.480 Ref Offset 0 dB/div Ref 21.4 0 dB/div dB/div	2.0000000 GHz PM FG 11.45 dB 5 dBm 0 GHz 2.90 4.84 3.74 3.74	2 Feat	Avg Tyr	h) ALIAN ACTO PE: Log-Per ΔMkr1 ΔMkr1 Sweep 20.00 m	2.900 ms 30.13 dB 30.13 dB 30.13 db 50.13 db 50.10 db 50.	Frequency Auto Turn Center Free 2.48000000 GH Start Free 2.48000000 GH Stop Free 2.48000000 GH CF Step 2.40200000 GH Auto Mar
Ref Offset 0 β 5 Center Freq 2.480 Ref Offset 0 0 dB/div Ref 21.4 0 0 dB/div dB/div 0 0 dB/div dB/div 0 0 dB/div dB/div 0 0 0 dB/div dB/div 0 0 0 dB/div dB/div dB/div 0 0 dB/div dB/div dB/div dB/div 0	2.0000000 GHz PM FG 11.45 dB 5 dBm 0 GHz 2.90 4.84 3.74 3.74	2 λ Fast	Avg Tyr	h) ALIAN ACTO PE: Log-Per ΔMkr1 ΔMkr1 Sweep 20.00 m	2.900 ms 30.13 dB 30.13 dB 30.13 db 50.13 db 50.10 db 50.	Frequency Auto Turn Center Free 2.48000000 GH Start Free 2.48000000 GH Stop Free 2.48000000 GH CF Step 2.40200000 GH Auto Mar
Ref Offset 0 dB/div Ref 21,4 0	2.0000000 GHz PM FG 11.45 dB 5 dBm 0 GHz 2.90 4.84 3.74 3.74	2 λ Fast	Avg Tyr	h) ALIAN ACTO PE: Log-Per ΔMkr1 ΔMkr1 Sweep 20.00 m	2.900 ms 30.13 dB 30.13 dB 30.13 db 50.13 db 50.10 db 50.	Frequency Auto Turn Center Free 2.48000000 GH Start Free 2.48000000 GH Stop Free 2.48000000 GH CF Step 2.40200000 GH Auto Mai
Kappet Sectors Ref. 0 2 Center Freq 2.480 0 Bidliv Ref Offset 0 Bidliv Ref 21.4 0 Bidliv Ref 0ffset 0 Bidliv Ref 0ffset 0 Bidliv 145	2.0000000 GHz PM FG 11.45 dB 5 dBm 0 GHz 2.90 4.84 3.74 3.74	2 λ Fast	Avg Tyr	h) ALIAN ACTO PE: Log-Per ΔMkr1 ΔMkr1 Sweep 20.00 m	2.900 ms 30.13 dB 30.13 dB 30.13 db 50.13 db 50.10 db 50.	Frequency Auto Turn Center Free 2.48000000 GH Start Free 2.48000000 GH Stop Free 2.48000000 GH CF Step 2.40200000 GH Auto Mar
Ref Offset 0 β 5 Center Freq 2.480 Ref Offset 0 0 dB/div Ref 21.4 0 0 dB/div dB/div 0 0 dB/div dB/div 0 0 dB/div dB/div 0 0 0 dB/div dB/div 0 0 0 dB/div dB/div dB/div 0 0 dB/div dB/div dB/div dB/div 0	2000000 GHz PM FG 11.45 dB 5 dBm 0 GHz 2.90 4.84 3.74 3.74	2 λ Fast	Avg Tyr	h) ALIAN ACTO PE: Log-Per ΔMkr1 ΔMkr1 Sweep 20.00 m	2.900 ms 30.13 dB 30.13 dB 30.13 db 50.13 db 50.10 db 50.	Auto Tune Center Free 2.48000000 GH 2.48000000 GH 2.48000000 GH 2.48000000 GH 2.48000000 GH



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8.7 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 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.



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Report No.: TMTN2201000127NR TEST RESULTS

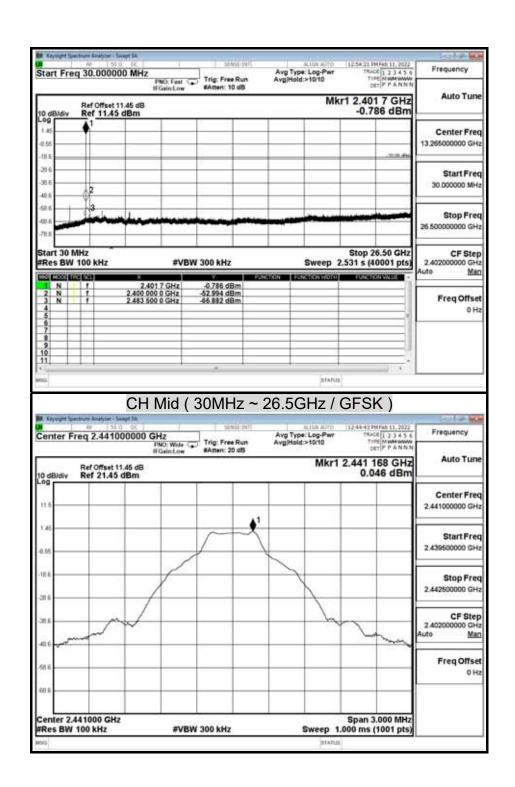
Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Temp & Humidity	23.5°C, 58%	Test Date	2022/02/10

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

	Spectrum Analyzer	30 D D	I SING SHT	ALIUN AUTO	112-45-35 PH (46-11, 2022	Frequency
Center	Freq 2.402	2000000 GHz PNO: 1 IFGain	Wide 😱 Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr Avg/Hold:>10/10	THE NUMBER	2000 Charles
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8.55						Start Fre 2.400500000 GH
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38.6		~/-		- h		CF Ste 2.40200000 Gi Auto M
40.6 - 40 58.6					- Andrew -	Freq Offs 0 i
Res BV	2.402000 G V 100 kHz		#VBW 300 kHz	Sweep 1	Span 3.000 MHz .000 ms (1001 pts)	
Center 2 Res BV	V 100 kHz	- Sweet SA 51 0 0C]	Sansal Sant		.000 ms (1001 pts)	Frequency
Center 2 Res BV	eq 2.3100 Ref Offse	- Swept SA SI G CC 000000 GHz PNC: IF Gain et 11.45 dB	Sansai Sant	ALIDA AUTO Avg Type: Log-Pwr Avg Hold:>1010	12:52:15 PH (46:11, 2022 TRACE (12:34:3:6 TRACE (12:34:3:6 TRAC	Frequency
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Center 2 FRes BV ms Start Fr 145 055 145 055 145 055 145 055 145 055 145 055 145 055 145 055 145 055 145 055 145 055 145 055 145 055 145 055 145 055 145 055 145 145 145 145 145 145 145 145 145 1	eq 2.3100 Ref Offse Ref 11.4	- Swept SA SI G CC 000000 GHz PNC: IF Gain et 11.45 dB	#VBW 300 kHz	Avg Type: Log-Pwr Avg/Hold:>1919 Mkr1 2	.000 ms (1001 pts)	Frequency Auto Tur Center Fre 2.36000000 Gi Start Fre 2.31000000 Gi Stop Fre 2.41000000 Gi CF Ste 2.40000000 Gi

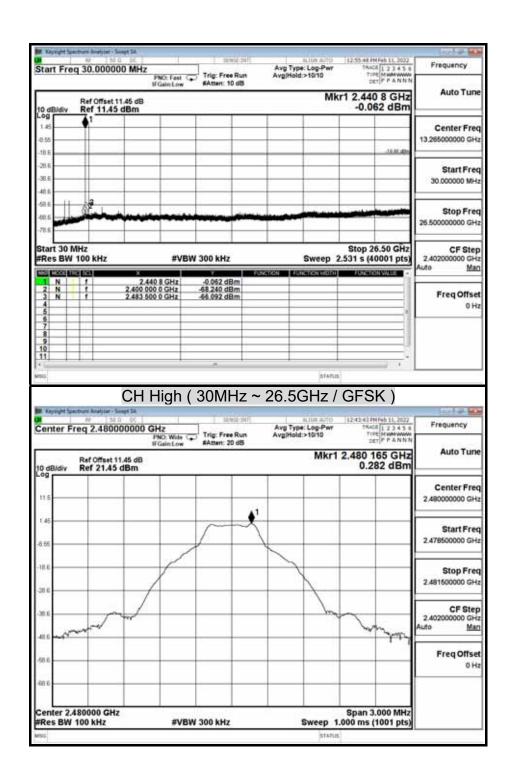


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40.6	and the second	and the second	manne			Stop Fre
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	7500 GH				Stop 2.50000 GHz	CF Ste
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Start Fre	Ref Offs	PNO: Fas IFGain:Lo iet 11.45 dB	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	12:56:58 PH Heb 11, 2022 TRACE [2 3 4 5 6 THE NUMBER OF PANNIN CET P PANNIN CET 2.479 8 GHz	Frequency Auto Tun
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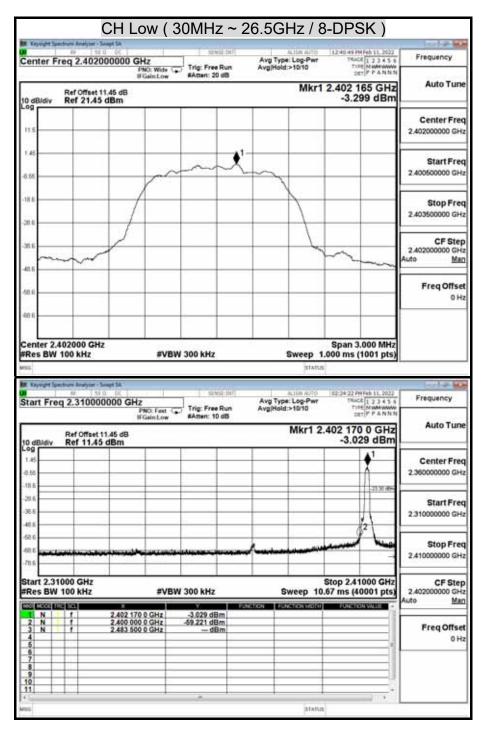


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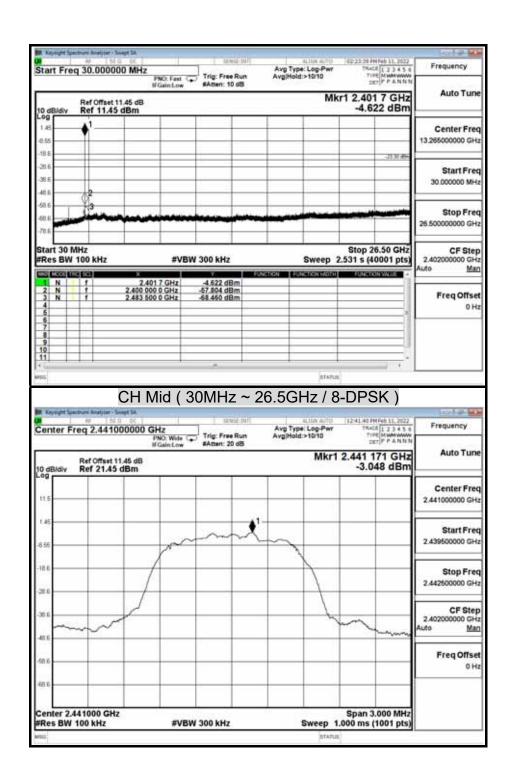


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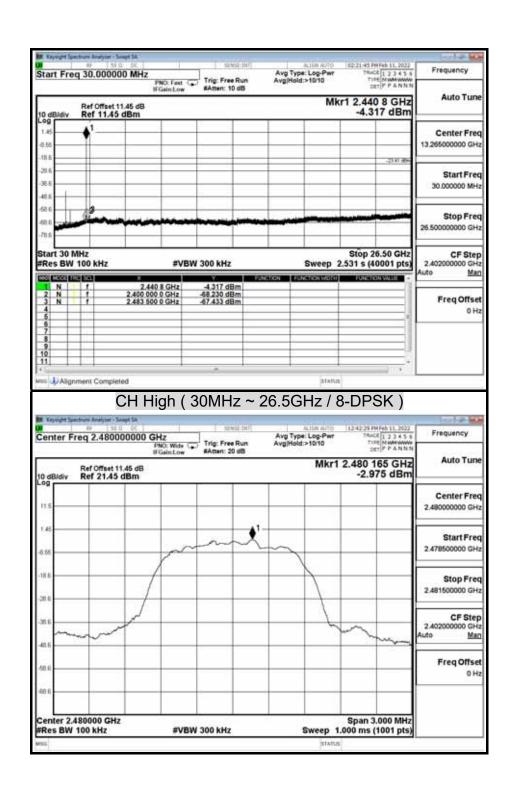


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Ref Offs cart Freq 30.000 debdiv Ref 11. 9 45 55 86 86 86 86 86 86 86 86 86 86 86 86 86	SIG BC D0000 MHz PRO: Fast IFGainLow et 11.45 dB A5 dBm	Trig: Free Run #Attent: 10 dB	Avg Type: Log-Pwr Avg Type: Log-Pwr Avg/Hold:>1010 Mkr	THACE 1 2 3 4 5 4 THACE 1 2 3 4 5 THACE 1 2 3 5 THACE	Frequency Auto Tun Center Fre 13.265000000 GH 30.000000 MH 25.50000000 GH 25.50000000 GH 2.402000000 GH
Ref Offs art Freq 30.000 dBJdiv Ref 11.	SIG BC D0000 MHz PRC: Fast IFGainLow et 11.45 dB 45 dBm #VE #VE #VE	Trig: Free Run #Attant: 10 dB	Avg Type: Log-Pwr Avg Type: Log-Pwr Avg/Hold:>10r10	THACE 1 2 3 4 5 4 THACE 1 2 3 4 5 THACE 1 2 3 5 THACE	Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre 26.50000000 GH CF Ste 2.40200000 GH
Ref Offs art Freq 30.000 dBJdiv Ref 11.	SIG DC D0000 MHz PRO: Fast If GainLow et 11.45 dB .45 dBm .45 dBm	Trig: Free Run #Attent: 10 68	Avg Type: Log-Pwr Avg Type: Log-Pwr Avg/Hold:>1010 Mkr	THACE 1 2 3 4 5 4 THACE 1 2 3 4 5 THACE 1 2 3 5 THACE	Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre 25.50000000 GH 2.402000000 GH Auto Ma
Art Freq 30.000 Ref Offs ast Freq 30.000 dBJdiv Ref 11, 29 45 45 45 45 45 45 45 45 45 45	SIG BC D0000 MHz PRC: Fast IFGainLow et 11.45 dB 45 dBm #VE #VE #VE	Trig: Free Run #Attant: 10 dB	Avg Type: Log-Pwr Avg Type: Log-Pwr Avg/Hold:>1010 Mkr	THACE 1 2 3 4 5 4 THACE 1 2 3 4 5 THACE 1 2 3 5 THACE	Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre 25.50000000 GH
Art Freq 30.000 Ref Offs ast Freq 30.000 dBJdiv Ref 11, 29 45 45 45 45 45 45 45 45 45 45	SIG DC D0000 MHz PRO: Fast If GainLow et 11.45 dB .45 dBm .45 dBm	Trig: Free Run #Attent: 10 68	Avg Type: Log-Pwr Avg Type: Log-Pwr Avg/Hold:>1010 Mkr	THACE 1 2 3 4 5 4 THACE 1 2 3 4 5 THACE 1 2 3 5 THACE	Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre 26.50000000 GH Auto Ma Freq Offse
Ref Offs art Freq 30.000 Ref Offs Big Big Big Big Big Big Big Big	SIG DC D0000 MHz PRO: Fast If GainLow et 11.45 dB .45 dBm .45 dBm	Trig: Free Run #Attent: 10 68	Avg Type: Log-Pwr Avg Type: Log-Pwr Avg/Hold:>1010 Mkr	THACE 1 2 3 4 5 4 THACE 1 2 3 4 5 THACE 1 2 3 5 THACE	Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre 26.50000000 GH Auto Ma Freq Offse
Ref Offs art Freq 30.000 Bldiv Ref 11, 9 85 66 66 66 66 66 86 86 86 86 86	SIG DC D0000 MHz PRO: Fast If GainLow et 11.45 dB .45 dBm .45 dBm	Trig: Free Run #Attent: 10 68	Avg Type: Log-Pwr Avg Type: Log-Pwr Avg/Hold:>1010 Mkr	THACE 1 2 3 4 5 4 THACE 1 2 3 4 5 THACE 1 2 3 5 THACE	Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre 26.50000000 GH Auto Ma Freq Offse
Ref Offs art Freq 30.000 Ref Offs Big Big Big Big Big Big Big Big	SIG DC D0000 MHz PRO: Fast If GainLow et 11.45 dB .45 dBm .45 dBm	Trig: Free Run #Attent: 10 68	Avg Type: Log-Pwr Avg Type: Log-Pwr Avg/Hold:>1010 Mkr	THACE 1 2 3 4 5 4 THACE 1 2 3 4 5 THACE 1 2 3 5 THA	Frequency Auto Tur Center Fre 13.265000000 GP Start Fre 30.000000 MP 25.50000000 GP 2.402000000 GP Auto Ma



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and the second se	58.0. 00	. 11 - yr	stast		ALIUN MURD	112-24-28 444	vb 11, 2022	Frequency
0 dBidiv Ref 11.	PN		Trig: Free Ri #Atten: 10 d	un Avg/Ho	me: Log-Pwr Id:>1010 Mkr1 2	.477 154	0 GHz 9 dBm	
1 45		attactive	AA.ANAAAA	mananana	NAMATA	Manu	•1	Center Free 2,441750000 GH
18.6	14411494111					1.1.1.0.1		Start Free 2.400000000 GH
20.6								Stop Free 2.483500000 GH
40.6							1	CF Step 2.40200000 GH Auto <u>Mar</u>
60.6							h	Freq Offse 0 H
Start 2.40000 GHz Res BW 100 kHz		#VBW 3	300 kHz	-		Stop 2.483 .000 ms (10		
Res BW 100 kHz	s - Sweet SA SI 0 DC D000000 GHz PN	O faul (C)	300 kHz strid Trig: Free Ri #Atten: 10 d	Avg Ty un Avg/Ho	Sweep 8 status action AUTO pel Log-Pwr Id:>10/10	1000 ms (10 12 18227 AL PRI- TRACE 719E 0ET	001 pts)	262,000,00000
Res BW 100 kHz	s - Sweet SA SI 0 DC D000000 GHz PN	IO, Fast 🔾	stree R	Avg Ty un Avg/Ho	Sweep 8 status action AUTO pel Log-Pwr Id:>10/10	1000 ms (10 1022741 PMP 198428 198428 19842 1984 1984 1985 1985 1985 1985 1985 1985 1985 1985	001 pts)	Frequency
Res BW 100 kHz	r - Sweet 1A 51 B - DC 0000000 GHz PN IFG et 11.45 dB	IO, Fast 🔾	Trig: Free R #Atten: 10 d	Avg Ty un Avg/Ho	Sweep 8 status action AUTO pel Log-Pwr Id:>10/10	43 166 2 -2.791	001 pts) +	Frequency Auto Turn Center Free
Res BW 100 kHz	r - Sweet 1A 51 B - DC 0000000 GHz PN IFG et 11.45 dB	IO, Fast 🔾	Stivia Trig: Free Ri #Atten: 10 d	Avg Ty un Avg Ho B	Sweep 8 status action AUTO pet Log-Pwr id:>10/10 Mkr1 2.4	43 166 2 -2.791	001 pts)	Frequency Auto Turn Center Free 2.40500000 GH Start Free
Res BW 100 kHz	r - Sweet 1A 51 B - DC 0000000 GHz PN IFG et 11.45 dB	IO, Fast 🔾	Trig: Free R #Atten: 10 d	Avg Ty un Avg Ho B	Sweep 8 status action AUTO pet Log-Pwr id:>10/10 Mkr1 2.4	43 166 2 -2.792	001 pts) +	Frequency Auto Turn Center Free 2.40500000 GH Start Free 2.31000000 GH Stop Free
Res BW 100 kHz	* Swet 14 510 DC D000000 GHz PH WG et 11.45 dB 45 dBm	PC: Feat ()	Trig: Free R RAttent: 10 d	un Avg Ty B	Sweep 8 status autos ware stat	.000 ms (10 122741 Pm Trace 7 Trace 207 143 166 2 -2.792	001 pts)	Frequency Auto Turn Center Frequency 2.405000000 GH Start Frequency 2.310000000 GH Stop Frequency 2.50000000 GH CF Steg 2.40200000 GH
Res BW 100 kHz	# Seet 14 510 DC D000000 GHz B% #FG et 11.45 dB 45 dBm	#VEW 3	Trig: Free R #Attent: 10 d	Avg Ty Avg Ho B	Sweep 8 status autos ware stat	.000 ms (10 122741 Pm Trace 7 Trace 207 143 166 2 -2.792	001 pts)	Frequency Auto Turn Center Frequency 2.405000000 GH Start Frequency 2.310000000 GH Stop Frequency 2.50000000 GH CF Steg 2.40200000 GH



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8.8 RADIATED EMISSIONS

8.8.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

LIMITS

§ 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
¹ 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			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² 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.: TMTN2201000127NR 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.

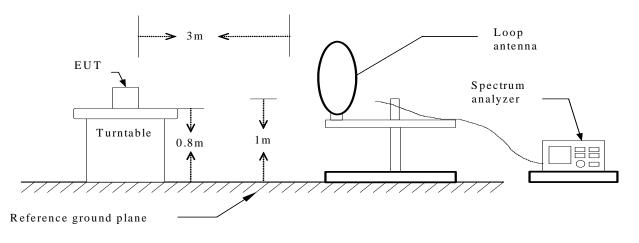


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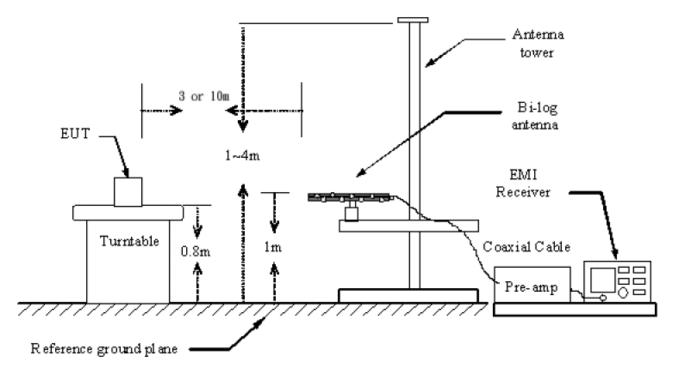
TEST SETUP

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

9kHz ~ 30MHz



30MHz ~ 1GHz

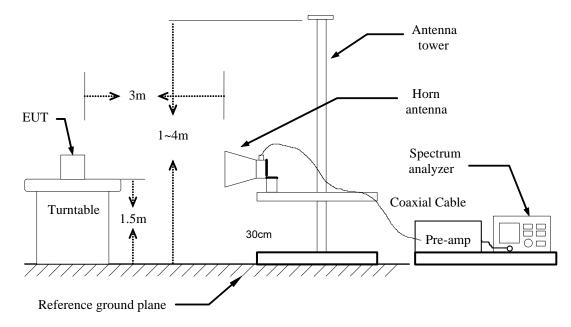




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The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8/1.5 meters above the ground at a 3 or 10 meter open site/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 QUASIPEAK 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.



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8.8.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

BELOW 1 GHz (9kHz ~ 30MHz)

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

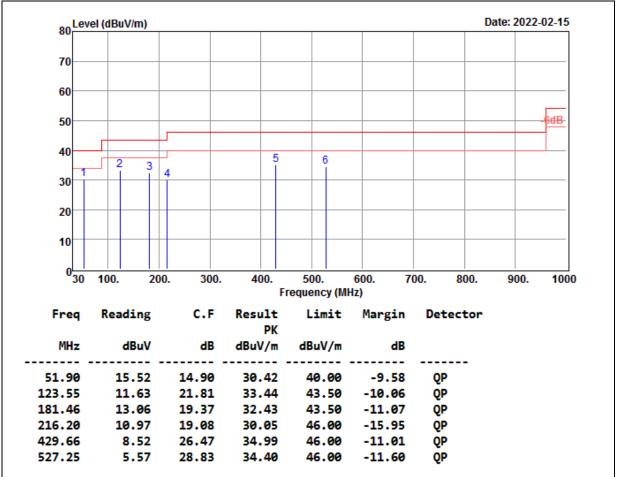


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Report No.: TMTN2201000127NR BELOW 1 GHz (30MHz ~ 1GHz)

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/15
Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	ТХ	Temp & Humidity	21.4°C, 60%

Vertical



- 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).

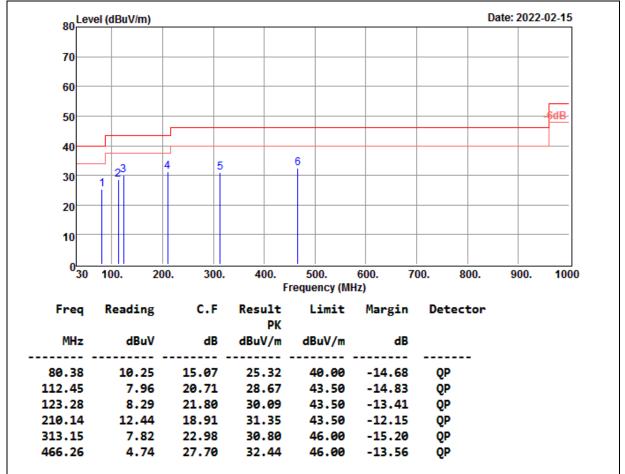


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Report No.: TMTN2201000127NR

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/15
Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	ТХ	Temp & Humidity	21.4°C, 60%

Horizontal



- 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.: TMTN2201000127NR

8.8.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	CH Low TX / GFSK	Temp & Humidity	23.5°C, 58%

Horizontal

		TX mode	e / CH Low		Measurement Distance at 3m Horizontal pola					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1558.56	65.74	27.07	2.78	44.56	0.76	51.79	74.00	-22.21	Р
*	1558.56	54.53	27.07	2.78	44.56	0.76	40.58	54.00	-13.42	А
	1944.63	58.41	30.16	2.84	43.98	1.23	48.66	74.00	-25.34	Р
	1944.63	48.33	30.16	2.84	43.98	1.23	38.58	54.00	-15.42	А
*	4804.25	56.50	33.07	4.38	42.51	0.57	52.02	74.00	-21.98	Р
*	4804.25	48.07	33.07	4.38	42.51	0.57	43.59	54.00	-10.41	А

Vertical

		TX mode / CH Low				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)	
*	1025.45	60.98	24.61	2.51	44.75	0.64	43.99	74.00	-30.01	Р	
*	1025.45	50.25	24.61	2.51	44.75	0.64	33.26	54.00	-20.74	А	
	1759.53	59.19	28.68	2.81	44.26	1.01	47.42	74.00	-26.58	Р	
	1759.53	48.47	28.68	2.81	44.26	1.01	36.70	54.00	-17.30	А	
*	4804.04	57.83	33.07	4.38	42.51	0.57	53.35	74.00	-20.65	Р	
*	4804.04	50.31	33.07	4.38	42.51	0.57	45.83	54.00	-8.17	А	

- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 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 distance is 3m.
- 6. *=Restricted bands of operation



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Report No.: TMTN2201000127NR

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	CH Mid TX / GFSK	Temp & Humidity	23.5°C, 58%

Horizontal

		TX mode	e / CH Mid		Measu	rement D)istance at 3	3m Hori	izontal 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)
*	1059.40	66.83	24.75	2.53	44.75	0.65	50.01	74.00	-23.99	Р
*	1059.40	54.14	24.75	2.53	44.75	0.65	37.32	54.00	-16.68	А
	1947.23	56.82	30.18	2.84	43.98	1.24	47.10	74.00	-26.90	Р
	1947.23	47.66	30.18	2.84	43.98	1.24	37.94	54.00	-16.06	А
*	4881.89	57.42	33.32	4.43	42.50	0.57	53.24	74.00	-20.76	Р
*	4881.89	48.41	33.32	4.43	42.50	0.57	44.23	54.00	-9.77	А

Vertical

		TX mod	e / CH Mid		Measurement Distance at 3m Vertical polarity					rity
	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)
*	1026.54	59.66	24.61	2.51	44.75	0.64	42.67	74.00	-31.33	Р
*	1026.54	51.56	24.61	2.51	44.75	0.64	34.57	54.00	-19.43	А
	1762.16	58.64	28.70	2.81	44.26	1.01	46.90	74.00	-27.10	Р
	1762.16	47.22	28.70	2.81	44.26	1.01	35.48	54.00	-18.52	А
*	4882.17	57.52	33.32	4.43	42.50	0.57	53.34	74.00	-20.66	Р
*	4882.17	49.37	33.32	4.43	42.50	0.57	45.19	54.00	-8.81	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 distance is 3m.
- 6. *=Restricted bands of operation



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Report No.: TMTN2201000127NR

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	CH High TX / GFSK	Temp & Humidity	23.5°C, 58%

Horizontal

		TX mode	e / CH High		Measu	irement I	Distance at	3m Hor	izontal pol	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)
*	1058.24	64.28	24.74	2.53	44.75	0.65	47.45	74.00	-26.55	Р
*	1058.24	52.46	24.74	2.53	44.75	0.65	35.63	54.00	-18.37	А
	1926.59	58.02	30.01	2.84	44.01	1.21	48.07	74.00	-25.93	Р
	1926.59	46.34	30.01	2.84	44.01	1.21	36.39	54.00	-17.61	А
*	4959.42	57.46	33.57	4.47	42.49	0.56	53.57	74.00	-20.43	Р
*	4959.42	49.17	33.57	4.47	42.49	0.56	45.28	54.00	-8.72	А

Vertical

		TX mode	e / CH High		Meas	urement	Distance a	t 3m Ve	ertical pola	rity
	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)
*	1031.48	58.42	24.63	2.52	44.75	0.64	41.46	74.00	-32.54	Р
*	1031.48	50.39	24.63	2.52	44.75	0.64	33.43	54.00	-20.57	А
	1763.25	53.14	28.71	2.81	44.26	1.01	41.41	74.00	-32.59	Р
	1763.25	48.34	28.71	2.81	44.26	1.01	36.61	54.00	-17.39	А
*	4960.03	56.06	33.57	4.47	42.49	0.56	52.17	74.00	-21.83	Р
*	4960.03	47.54	33.57	4.47	42.49	0.56	43.65	54.00	-10.35	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 distance is 3m.
- 6. *=Restricted bands of operation



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Report No.: TMTN2201000127NR

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	CH Low TX / 8-DPSK	Temp & Humidity	23.5°C, 58%

Horizontal

		TX mode	e / CH Low		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)
*	1062.41	65.28	24.76	2.53	44.75	0.65	48.48	74.00	-25.52	Р
*	1062.41	52.49	24.76	2.53	44.75	0.65	35.69	54.00	-18.31	А
	1759.63	56.34	28.68	2.81	44.26	1.01	44.57	74.00	-29.43	Р
	1759.63	46.85	28.68	2.81	44.26	1.01	35.08	54.00	-18.92	А
*	4803.55	56.72	33.07	4.38	42.51	0.57	52.24	74.00	-21.76	Р
*	4803.55	46.80	33.07	4.38	42.51	0.57	42.32	54.00	-11.68	А

Vertical

		TX mode	e / CH Low		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)
*	1026.41	60.52	24.61	2.51	44.75	0.64	43.53	74.00	-30.47	Р
*	1026.41	52.41	24.61	2.51	44.75	0.64	35.42	54.00	-18.58	А
	1728.23	59.63	28.43	2.81	44.31	0.97	47.52	74.00	-26.48	Р
	1728.23	47.91	28.43	2.81	44.31	0.97	35.80	54.00	-18.20	А
*	4804.02	57.18	33.07	4.38	42.51	0.57	52.70	74.00	-21.30	Р
*	4804.02	47.38	33.07	4.38	42.51	0.57	42.90	54.00	-11.10	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 distance is 3m.
- 6. *=Restricted bands of operation



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Report No.: TMTN2201000127NR

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	CH Mid TX / 8-DPSK	Temp & Humidity	23.5°C, 58%

Horizontal

		TX mode / CH Mid				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)	
*	1060.14	63.58	24.75	2.53	44.75	0.65	46.76	74.00	-27.24	Р	
*	1060.14	52.14	24.75	2.53	44.75	0.65	35.32	54.00	-18.68	А	
	1938.26	56.22	30.11	2.84	43.99	1.22	46.40	74.00	-27.60	Р	
	1938.26	48.05	30.11	2.84	43.99	1.22	38.23	54.00	-15.77	А	
*	4882.20	56.29	33.32	4.43	42.50	0.57	52.10	74.00	-21.90	Р	
*	4882.20	46.02	33.32	4.43	42.50	0.57	41.84	54.00	-12.16	А	

Vertical

		TX mod	e / CH Mid		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)
*	1084.53	57.63	24.86	2.55	44.74	0.65	40.94	74.00	-33.06	Р
*	1084.53	52.31	24.86	2.55	44.74	0.65	35.62	54.00	-18.38	А
	1762.60	58.52	28.70	2.81	44.26	1.01	46.79	74.00	-27.21	Р
	1762.60	47.72	28.70	2.81	44.26	1.01	35.99	54.00	-18.01	А
*	4881.89	57.26	33.32	4.43	42.50	0.57	53.08	74.00	-20.92	Р
*	4881.89	46.93	33.32	4.43	42.50	0.57	42.75	54.00	-11.25	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 distance is 3m.
- 6. *=Restricted bands of operation



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Report No.: TMTN2201000127NR

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	CH High TX / 8-DPSK	Temp & Humidity	23.5°C, 58%

Horizontal

		TX mode	e / CH High	l	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)
*	1101.28	64.69	24.93	2.55	44.74	0.65	48.08	74.00	-25.92	Р
*	1101.28	52.31	24.93	2.55	44.74	0.65	35.70	54.00	-18.30	А
	1952.15	58.63	30.22	2.84	43.97	1.24	48.96	74.00	-25.04	Р
	1952.15	43.83	30.22	2.84	43.97	1.24	34.16	54.00	-19.84	А
*	4959.19	56.24	33.57	4.47	42.49	0.56	52.35	74.00	-21.65	Р
*	4959.19	46.11	33.57	4.47	42.49	0.56	42.22	54.00	-11.78	А

Vertical

		TX mode	e / 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)
*	1026.83	59.27	24.61	2.51	44.75	0.64	42.28	74.00	-31.72	Р
*	1026.83	50.03	24.61	2.51	44.75	0.64	33.05	54.00	-20.95	А
	1725.05	58.22	28.40	2.81	44.31	0.96	46.08	74.00	-27.92	Р
	1725.05	46.11	28.40	2.81	44.31	0.96	33.97	54.00	-20.03	А
*	4959.88	56.50	33.57	4.47	42.49	0.56	52.61	74.00	-21.39	Р
*	4959.88	46.78	33.57	4.47	42.49	0.56	42.89	54.00	-11.11	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 distance is 3m.
- 6. *=Restricted bands of operation



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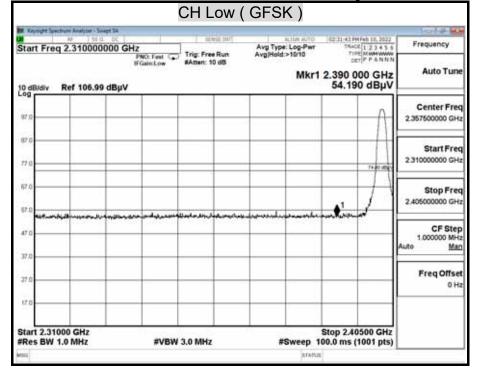
Report No.: TMTN2201000127NR

8.8.4 RESTRICTED BAND EDGES

Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Temp & Humidity	23.5°C, 58%	Test Date	2022/02/10

Detector Mode : Peak

Polarity : Horizontal

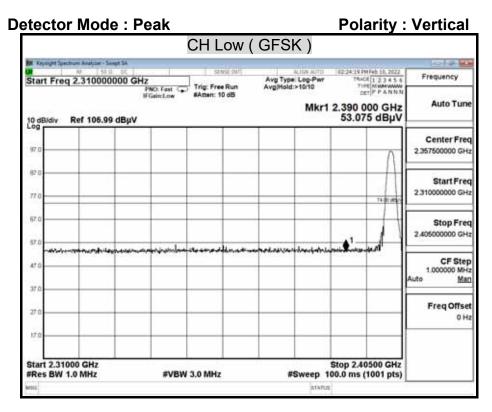




R Keybight Spectrum Analyzer - Swept SA	SING ONT	ALIUN AUTO 162-12-32 PM Feb 10.	5000 I
Start Freq 2.310000000 G	SHz	Avg Type: Log-Per TRUCE 1.2.2	45.6 Frequency
0 dBidiv Ref 106.99 dBµV	IFGainLow #Atten: 10 dB	AvgiHoid.>1010 THE MAN DET P A Mkr1 2.390 000 C 41.894 dE	Hz Auto Tun
97.0			Center Fre 2.357500000 GH
77.0			Start Free 2.310000000 GH
67.0			Stop Fre 2.40500000 GH
47 0		••••••••••••••••••••••••••••••••••••••	CF Ste 1.000000 MH Auto Ma
27.0			Freq Offse
17.0			
Start 2.31000 GHz Res BW 1.0 MHz	#VBW 360 Hz	Stop 2.40500 Sweep 205.8 ms (1001	



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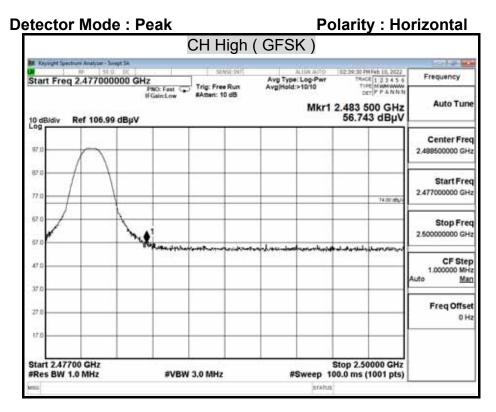
Detector Mode : Average

Polarity : Vertical

Frequency	7-03 PM Feb 18, 2022 TRACE 1 2 3 4 5 6	28	Auto MPD Avg Type: Log-Pwr	SEASE ONT	0.00	Freq 2.310	0.775
z Auto Tu	90 000 GHz 1.876 dBµV	1 2.390	Avg Hold:>1010 Mkr1	Atten: 10 dB	PNC: Fas IFGain:Lo 19 dBµV	13 5.355	0 dB/
Center Fr 2.357500000 0	Δ.						ag #7.0 -
Start Fr 2.310000000 0							87 G 77 G
Stop Fr 2.40500000 0	54 D0 mBu/v						57.0
CF St 1.000000 M Auto	1	● ¹					e7 0
FreqOff							27.01
-	_	-					17.0
	2.40500 GHz ms (1001 pts)		Sweep 2	W 360 Hz	#\	2.31000 GH	

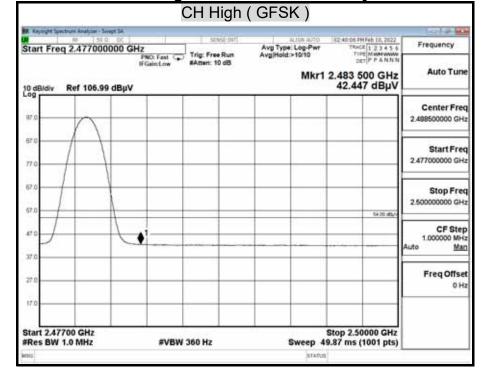


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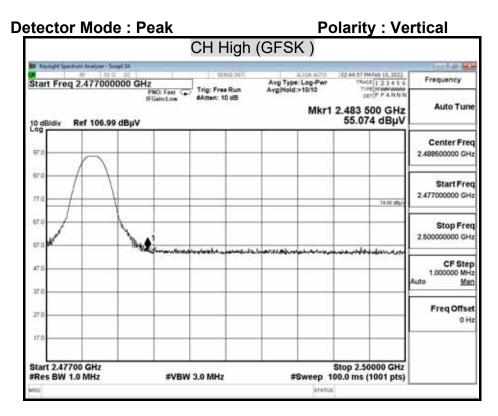
Detector Mode : Average

Polarity : Horizontal





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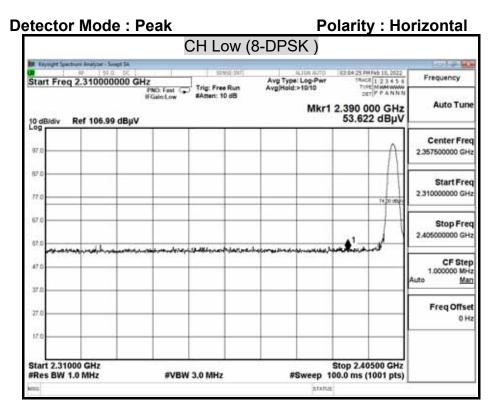


Detector Mode : Average Polarity : Vertical

R Keysight Spectrum Analyzer - Swept S				100 Mar 100
Start Freq 2.47700000	O GHZ PACK Event (CC) Trig: Free Run	Ava Type: Log-Pwr 19	PH Feb 10, 2022 ACR 1 2 3 4 5 6 TPE MWH WWW	Frequency
10 dBidiv Ref 106.99 dB	If Gain:Low #Atten: 10 dB	- Mkr1 2.483	DET PANNN	Auto Tun
97.0				Center Fre 2.488500000 GH
87.0 77.0				Start Fre 2.477000000 GH
67.0			54 30 mBu/4	Stop Fre 2.50000000 GH
#10 37.0				CF Ste 1.000000 Mi Auto Mi
27.0			[Freq Offs 01
Start 2.47700 GHz			50000 GHz	
#Res BW 1.0 MHz	#VBW 360 Hz	Sweep 49.87 ms	(1001 pts)	

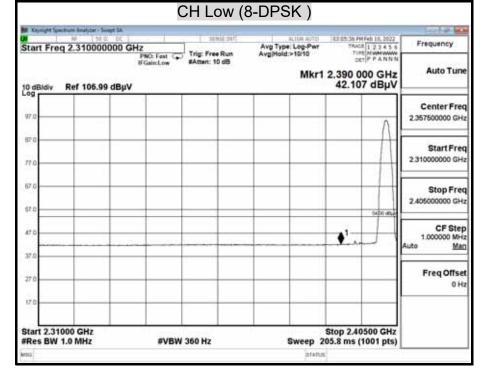


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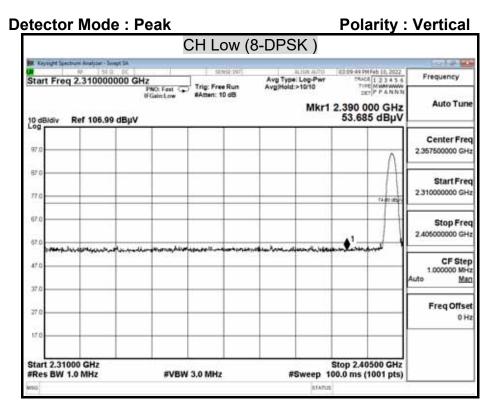
Detector Mode : Average

Polarity : Horizontal





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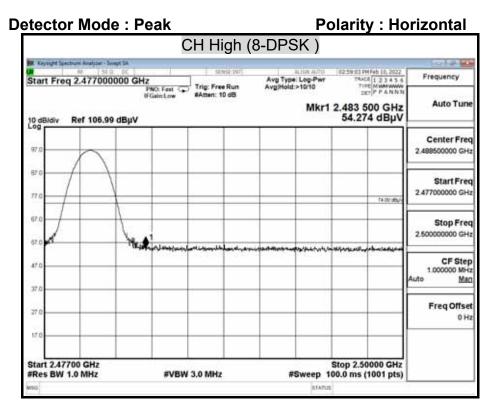
Detector Mode : Average

Polarity : Vertical

R. Keyzight Spectrum Analyter - Sv				and the second
Start Freq 2.310000	0000 GHz	Avg Type: Log-Pwr Avg Hold:>10/10	12:10:19 PM Feb 10, 2022 TRACE 1:2:2:4:5:6	Frequency
0 dB/div Ref 106.94	IFGainLow #Atten: 10 dB	0020424444	2.390 000 GHz 42.015 dBµV	Auto Turk
97.0				Center Free 2.357500000 GH
77.0				Start Free 2.310000000 GH
67.0				Stop Fre 2.405000000 GH
A7 0			5420 mb/	CF Stej 1.000000 MH Auto <u>Ma</u>
27.0				Freq Offse 0 H
17.0				
Start 2.31000 GHz Res BW 1.0 MHz	#VBW 360 Hz		top 2.40500 GHz 5.8 ms (1001 pts)	
86		BTATUS		

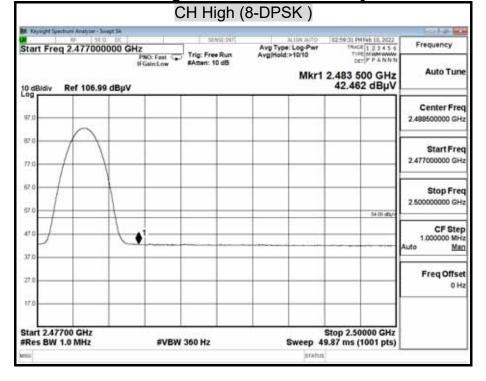


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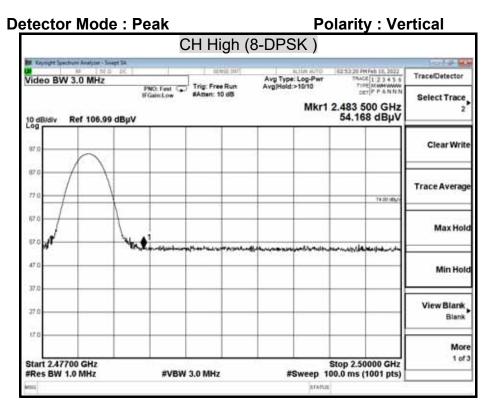
Detector Mode : Average

Polarity : Horizontal



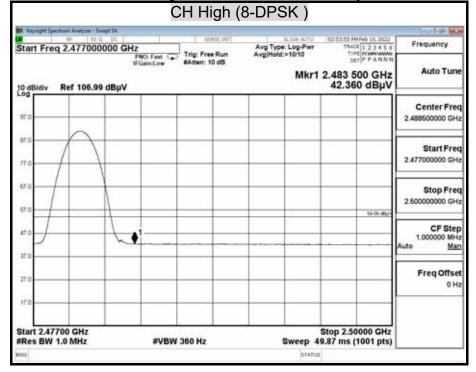


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Detector Mode : Average

Polarity : Vertical





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8.9 POWERLINE CONDUCTED EMISSIONS

LIMITS

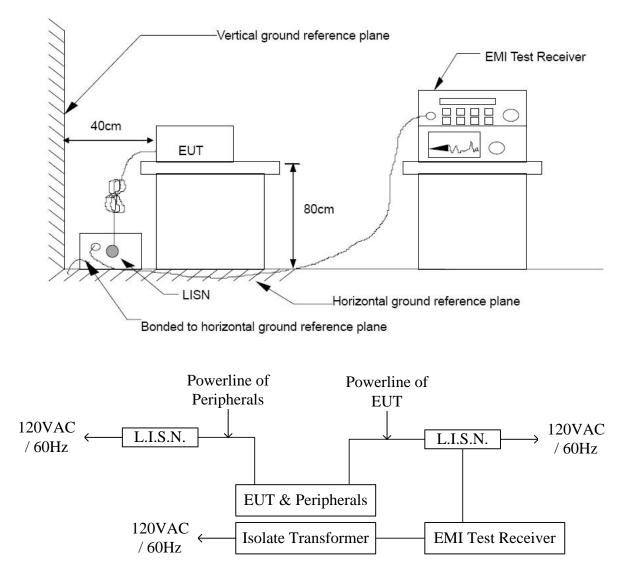
§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ 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 : 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.

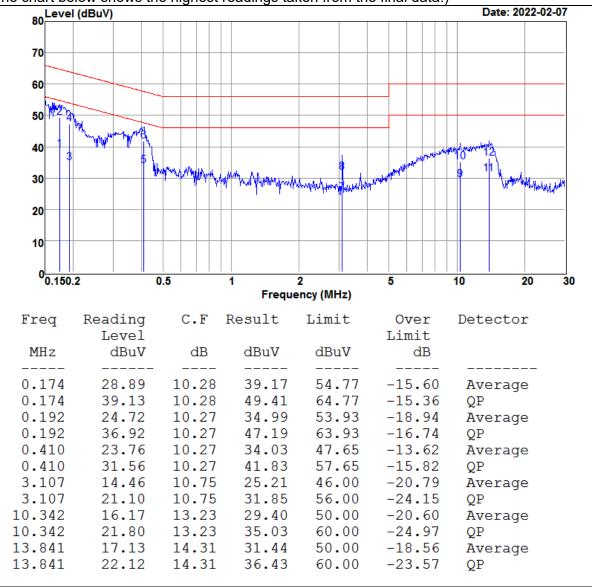


TEST RESULTS

Model No.	AT-LP120XBT-USB	Test Mode	Line
Environmental Conditions	120.3 /U% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

LINE

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



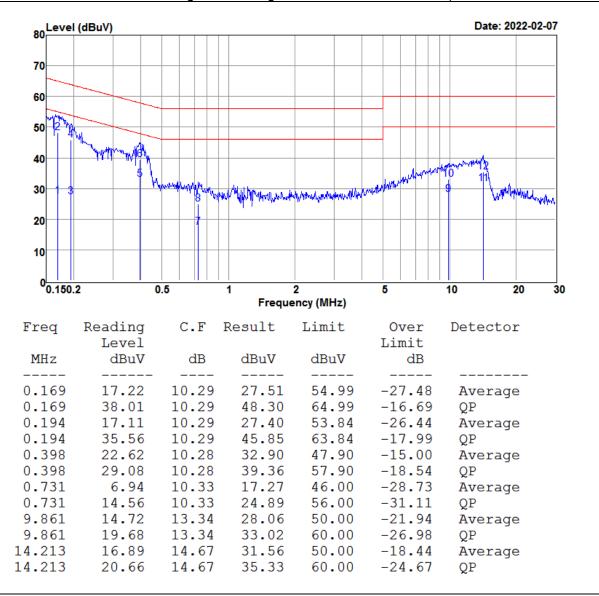


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Model No.	AT-LP120XBT-USB	Test Mode	Line
Environmental Conditions	203 /0% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

NEUTRAL

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



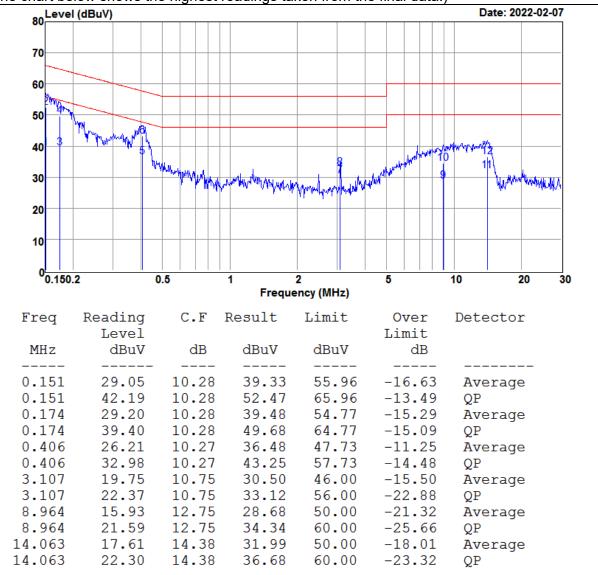


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Model No.	AT-LP120XBT-USB	Test Mode	Phono
Environmental Conditions	203 /0% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

LINE

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



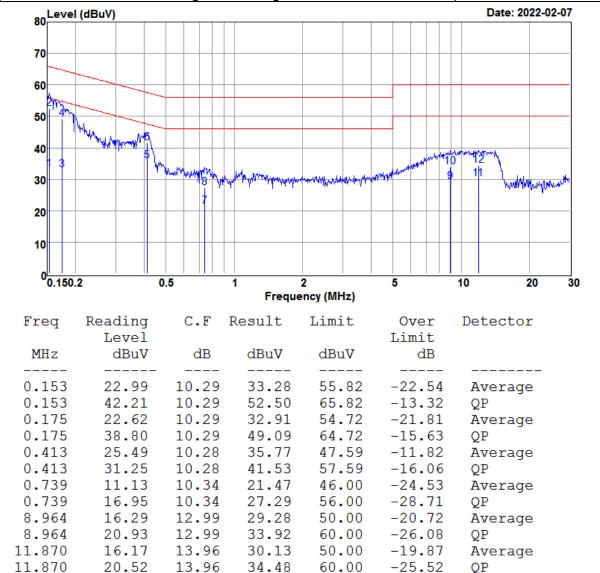


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Model No.	AT-LP120XBT-USB	Test Mode	Phono
Environmental Conditions	120.3 70% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

NEUTRAL

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



=== END of Report ===