

Report No.:



TM-2201000527P FCC ID: JFZLP120XBTA TMTN2201000126NR

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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

Brand: audio-technica

Issued for

Audio-Technica Corporation

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

Issued by

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

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REVISION HISTORY

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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
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	No non-compliance noted			

Statements of Conformity

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

Approved by:

John Chen

John Chen Supervisor



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2. TEST RESULT SUMMARY

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



3. EUT DESCRIPTION

3.1 DESCRIPTION OF EUT & POWER

Product Name	DIRECT DRIVE Turntable
Model Number	AT-LP120XBT-USB
Brand Name	audio-technica
Received Date	January 28, 2022
Reported Date	March 15, 2022
Operating Frequency Range	GFSK(5.2) Mode : 2402MHz~2480MHz
Transmit Power	GFSK(4.0) Mode : -3.06dBm (0.494mW) GFSK(5.2) Mode : -3.05dBm (0.495mW)
Channel Spacing	GFSK(5.2) Mode:2 MHz
Channel Number	GFSK(5.2) Mode : 40 Channels
Transmit Data Rate	GFSK(4.0) Mode : 1 Mbps GFSK(5.2) Mode : 2 Mbps
Type of Modulation	GFSK
Antenna Type	Manufacturer: Advanced Ceramic X Type: Multilayer Chip Antenna Model: AT3216-A2R4PAAT/LF Gain: 1.5 dBi
Power Source	DC 12V (Powered by adapter)
Firmware Version	V1.0
Software Version	V1.0

Power Adapter :

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

REMARK: 1. The sample selected for test was engineering sample that approximated to 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 manual.



4. DESCRIPTION OF TEST MODES

The EUT is a DIRECT DRIVE Turntable.

The RF Chip is manufactured by Sunitec

The antenna peak gain 1.5 dBi (highest gain) were chosen for full testing.

GFSK(5.2) mode

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2402
Middle	2442
High	2480

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

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5. TEST METHODOLOGY

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

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

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

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

The sites are constructed in conformance with the requirements of ANSI C63.7:1992, ANSI C63.10: 2013 and CISPR Publication 22.

6.2 EQUIPMENT

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

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

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

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

6.3 LABORATORY ACCREDITATIONS LISTINGS

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



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6.4 TABLE OF ACCREDITATIONS AND LISTINGS

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

Taiwan TAF

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

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



6.5 MEASUREMENT EQUIPMENT USED

For §9.7

Chamber 966 Room (Radiation Test)							
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due		
Active Loop Antenna	ETS-LINDREN	6502	8905-2356	09/06/2021	09/05/2023		
Attenuator	MCL	BW-S15W5	0535	01/28/2022	01/27/2023		
Band Reject Filter	MICRO-TRONICS	HPM13525	006	01/28/2022	01/27/2023		
Band Reject Filter	MICRO-TRONICS	HP50107-01	001	01/28/2022	01/27/2023		
Bilog Antenna With 6dB Attenator	SUNOL SCIENCES & EMCI	JB1 & N-6-06	A070506-1 & AT-N0681	10/07/2021	10/06/2022		
Cable	Suhner	SUCOFLEX104PE A	20520/4PEA&O6	01/28/2022	01/27/2023		
Double Ridged Guide Horn Antenna	ETS-LINDGREN	3116	00078900	03/30/2021	03/29/2022		
EMI Test Receiver	R&S	ESCI	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(v6.101222)						

For §9.1~9.6

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

For §9.8

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

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7. CALIBRATION AND UNCERTAINTY

7.1 MEASURING INSTRUMENT CALIBRATION

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

7.2 MEASUREMENT UNCERTAINTY

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

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

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

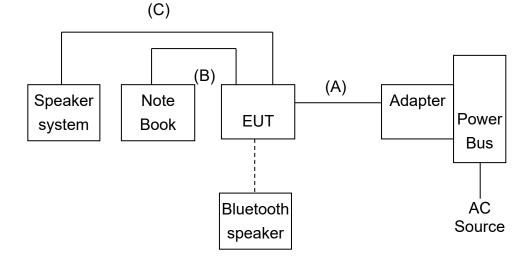


8. SETUP OF EQUIPMENT UNDER TEST

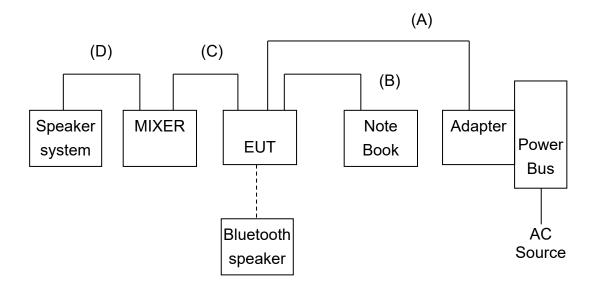
8.1 SETUP CONFIGURATION OF EUT

EMI

【Line】



【Phono】

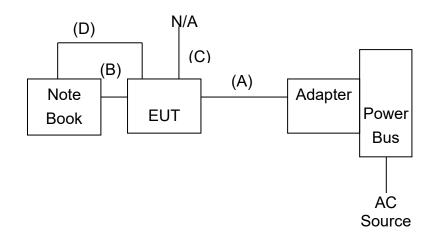


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RF





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8.2 SUPPORT EQUIPMENT

For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	MIXER	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



8.3 EUT OPERATING CONDITION

RF Setup

- 1. Set up all computers like the setup diagram.
- 2. The "Blue Test 3 V3.3.9.1137" software was used for testing
- 3. Choose Transport "DEBUG" and Device "USB DBG(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: 15 / 98 Rev.: 00



Report No.: TMTN2201000126NR RX Mode: BLE TEST RX Channel > 0 (0-39) PHY > 1M (2M)

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

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9. APPLICABLE LIMITS AND TEST RESULTS

9.1 6dB BANDWIDTH

<u>LIMIT</u>

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

TEST SETUP



TEST PROCEDURE

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

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



TEST RESULTS

No non-compliance noted.

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

GFSK(4.0) mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2402	714.00	500	PASS
Middle	2442	715.00	500	PASS
High	2480	712.00	500	PASS

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

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

GFSK(5.2) mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2402	1265	500	PASS
Middle	2442	1265	500	PASS
High	2480	1254	500	PASS

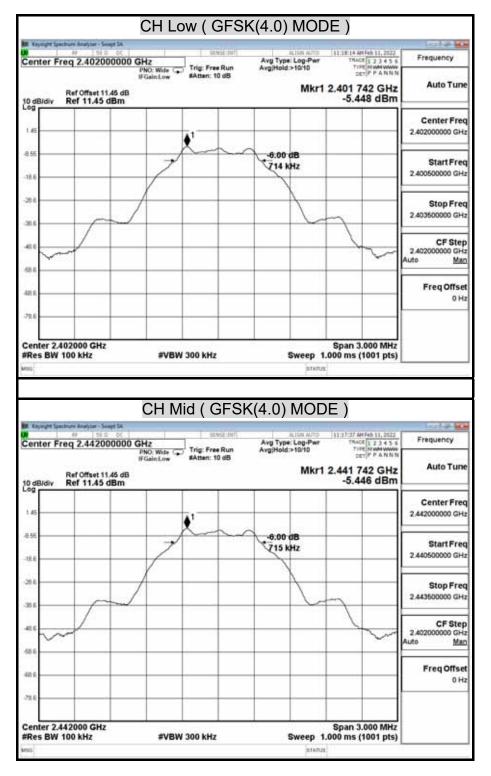
NOTE: 1. At finial test to get the worst-case emission at1Mbps long.
 2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

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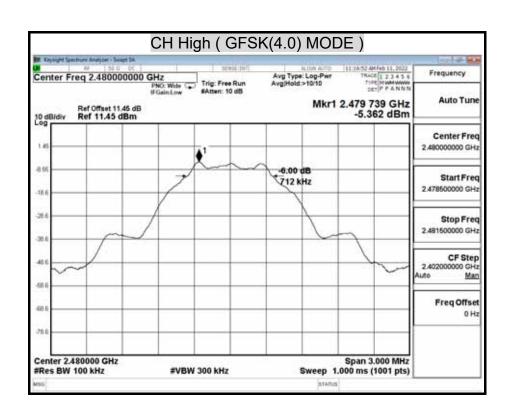
6dB BANDWIDTH (GFSK(4.0) MODE)





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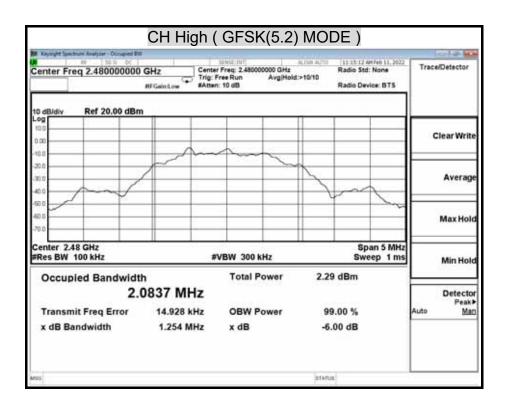
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6dB BANDWIDTH (GFSK(5.2) MODE)

Trace/Detector	Init 4010 [11:13:19 Ale Peb 11, 2022 Radio Std: None Radio Device: BTS	street not AL r Freq: 2.40200000 GHz Free Run Avg Hold> t: 10 dB	2.402000000 GHz Cente	8
			Ref 20.00 dBm	
Clear Writ				0.00
Averag				20.0
Max Hol	~			60.0 70.0
Min Hol	Span 5 MHz Sweep 1 ms	VBW 300 kHz		Center 2.402 Res BW 10
Detecto Peak Auto Ma	99.00 %	OBW Power	d Bandwidth 2.0877 MHz Freq Error 14.342 kHz	andraadaa Sha dh
	-6.00 dB	x dB GFSK(5.2) N	CH Mid (
Trace/Detector	STARUS MODE) Radio Std: None	GFSK(5.2) I	CH Mid (Margar - Occupied the State of th	ss Kappel Sector Center Freq
	STATUS MODE) Radio Std: None 19/10	GFSK(5.2) N	CH Mid (2.442000000 GHz Cente	Center Freq
Trace/Detector	STATUS MODE) Radio Std: None 19/10	GFSK(5.2) N	CH Mid (Margar - Occupied the State of th	R Kayset Sector Penter Freq 10 dBJdiv
Trace/Detector Clear Writ	STATUS MODE) Radio Std: None 19/10	GFSK(5.2) N	CH Mid (Margar - Occupied the State of th	Kayset Sector Societar Freq Center Freq 10 dB/div
Clear Writ Averag	STATUS MODE) Radio Std: None 19/10	GFSK(5.2) N	CH Mid (Konst Sector Center Freq Code C



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9.2 MAXIMUM PEAK OUTPUT POWER

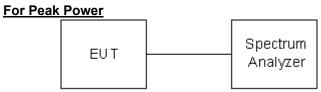
<u>LIMIT</u>

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

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

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

TEST SETUP



For Average Power





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TEST PROCEDURE

The tests were performed in accordance with KDB 558074 9.1.1

9.2.1 Measurement Procedure PK2:

Peak Power set:

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

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

Average Power

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

Average power set:

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

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

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

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

7. Set detector = RMS (power averaging).

8. Perform a single sweep.

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

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



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TEST RESULTS

No non-compliance noted.

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

GFSK(4.0) mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	-3.29	30.00	PASS
Middle	2442	-3.13	30.00	PASS
High	2480	-3.06	30.00	PASS

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

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

GFSK(5.2) mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	-3.23	30.00	PASS
Middle	2442	-3.09	30.00	PASS
High	2480	-3.05	30.00	PASS

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

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



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Average Power Data

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

GFSK(4.0) mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-3.73
Middle	2442	-3.63
High	2480	-3.50

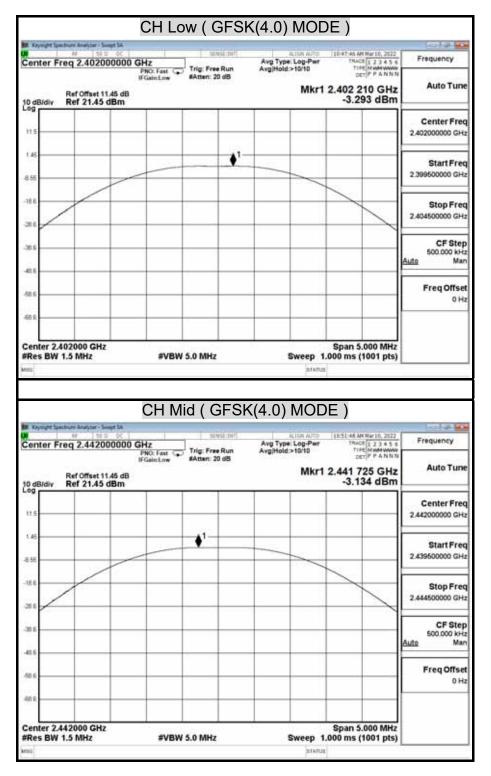
GFSK(5.2) mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-3.59
Middle	2442	-3.44
High	2480	-3.39



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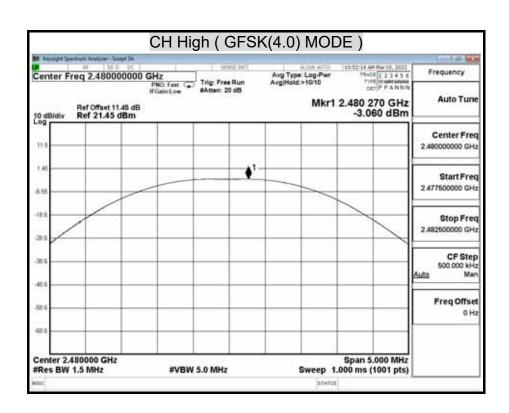
MAXIMUM PEAK OUTPUT POWER (GFSK(4.0) MODE)





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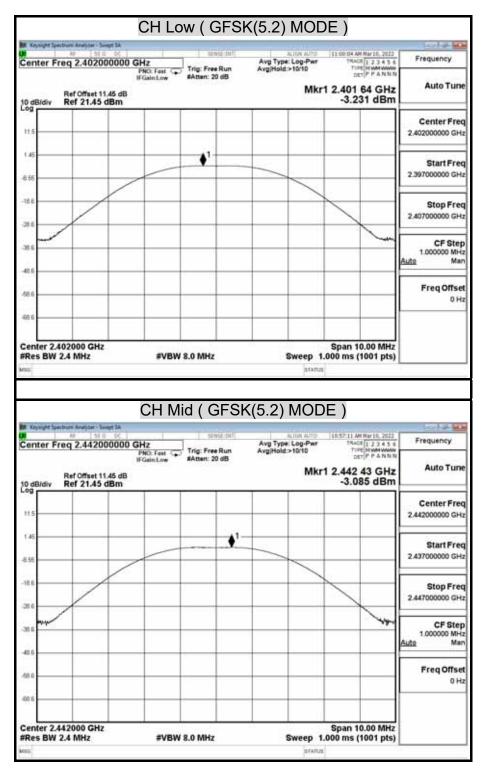
Report No.: TMTN2201000126NR





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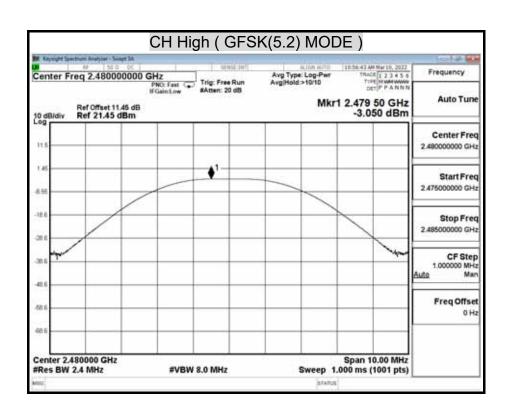
MAXIMUM PEAK OUTPUT POWER (GFSK(5.2) MODE)





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9.3 DUTY CYCLE

<u>LIMIT</u>

Nil (No dedicated limit specified in the Rules)

TEST SETUP



TEST PROCEDURE

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW \geq OBW if possible; otherwise, set RBW to the largest available value. Set VBW \geq 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 \leq 16.7 microseconds.)

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TEST RESULTS

No non-compliance noted.

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

GFSK(5.2) Mode

	us	Times	Ton	Total Ton time(ms)
Ton1	400.000	1	400	
Ton2		0	0	
Ton3			0	0.4
Тр				0.625

Ton	0.4
Tp(Ton+Toff)	0.625
Duty Cycle	0.64
Duty Factor	1.938

GFSK(5.2) Mode

	us	Times	Ton	Total Ton time(ms)
Ton1	200.000	1	200	
Ton2		0	0	
Ton3			0	0.2
Тр				0.625

Ton	0.2
Tp(Ton+Toff)	0.625
Duty Cycle	0.32
Duty Factor	4.949



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TEST PLOT

Duty Cycle

		C⊦	l Low (GFSI	K(4.0)	MODE	Ξ)	
	q 2.40200	0000 GHz	ast -+- Trig: Fr			kiliki Alifo 🛛 👔 Log-Pwr	SHEAD PHIFeb 10, 202 TRACE 1 2 3 4 5 TIPE WINH WW DET P P A N N	Frequency
0 dBidiv	Ref Offset 11. Ref 21.45 d		Low #Atten:	20 88		ΔM	lkr1 400.0 µ 30.79 di	s Auto Ture
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0.50 10.6 20.6			304					Start Free 2.402000000 GH
40.6 50.6 60.5	ayar	~~	Nov	-41		wy4	him	Stop Free 2.40200000 GH
Center 2.40 Res BW 1.0			#VBW 3.0 MH:	z		Sweep 5.00	Span 0 H 0 ms (1001 pts	
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8 9 10 11								
845						STATUS	100	
			H Mid((GFSł	<(4.0)	1000	.)	
t Keynget Senter	RF 50.0	0000 GHz	ast -+- Trig: Fr	ee Run	()	MODE	55211 PH P45 10, 202	Frequency
Center Free	RF 50.0	et 14: 00000 GHz PNO: F IFGain: 45 dB	ast -+- Trig: Fr	ee Run			5 5 2 11 PM (+6 10, 202	Auto Tune
Center Free	q 2.44200	et 14: 00000 GHz PNO: F IFGain: 45 dB	ast -+- Trig: Fr	ee Run			55211 PHTeb 10, 202 SRACE 1 2 3 4 5 THE WARN WARN WARN WARN WARN WARN WARN WARN	Frequency Auto Tune Center Freq
Center Free	q 2.44200	et 14: 00000 GHz PNO: F IFGain: 45 dB	ast Trig: Fr #Atten:	ee Run			55211 PHTeb 10, 202 SRACE 1 2 3 4 5 THE WARN WARN WARN WARN WARN WARN WARN WARN	Frequency Auto Tune
Center Free O dBidiv	q 2.44200	et Ba 00000 GHz IPGC: F IFGate: 45 dB Bm	aat → Trig: Fri Low #Atten:	ee Run			55211 PHTeb 10, 202 SRACE 1 2 3 4 5 THE WARN WARN WARN WARN WARN WARN WARN WARN	2 5 5 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7
Center 2.44 Center 2.44 Center 2.44	2000000 G MHz	et Ba 00000 GHz PPro: F IF Gainst 45 dB Bm 45 dB Bm 45 dB Hz	aat → Trig: Fri Low 741000	ee Run 20 old	Avg Type		Span 0 H 0 ms (1001 pts	2 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7
Center Free 0 dBJdiv 0 d	2000000 G MHz	et Ba 00000 GHz PPro: F IF Gainst 45 dB Bm 45 dB Bm 45 dB Hz		z z	Avg Type		Span 0 H	2 2 2 2 2 3 4 5 5 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7
Center Free CodBJdiv F	20000000 G MHz 20000000 G MHz 21 (Δ)	et Ba 00000 GHz PHO: F BFGale: 45 dB Bm 46 dB 45 dB 46 dB		z z	Avg Type		Span 0 H 0 ms (1001 pts	2 6 7 7 7 7 7 7 7 7 7 7 7 7 7



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Report No.: TMTN2201000126NR

		000000 GH	Z	Trig: Free F	Ai	ALIUN AUPO Vg Type: Log-Pwr	1455324 PHI TRACE TIPE	6 18,2022	Frequency
0 dB/div	Ref Offset Ref 21.43	11.45 dB	ain Low	#Atten: 20	18		ΔMkr1 40		Auto Tuni
og 11.5 1.45			≜ 1∆2						Center Fre 2.49000000 GH
10.6 20.6		×.		3/4					Start Fre 2.48000000 GH
86 86	Wayay	Wh	14N	eri.	rulle	wyw	uje ste	Va	Stop Fre 2.48000000 GH
enter 2 es BW	2.480000000 1.0 MHz	GHz	#VBW	/ 3.0 MHz	PARTON	Sweep (5.000 ms (10		CF Stej 2.40200000 GH Auto <u>Ma</u>
Δ2 2 F 3 Δ4 4 F 5 6 7	τ (Δ) τ τ (Δ) τ	1.2	0.0 μs (Δ) 80 ms 5.0 μs (Δ) 80 ms	25.14 dl -35.88 dBr -0.18 dl -35.88 dBr	3				Freq Offse 0 H
8 9 10									



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Duty Cycle

		011	Low (0.01	(0.2)		/	
Keysight Spectrum	re Analyzer - Swept SA				10 200	107.00 TOT		,
enter Fred	2.40200000	0 GHz		SEASE (INT)	Avg Type: Lo		100 PHI Feb 10, 2022 TRACE 1 2 3 4 5 6	Frequency
		PNO: Fast IFGainLow		ree Run 20 dB	1007-045033	221:345	DET PPANNN	
	1021025					AMkr	1 200.0 µs	Auto Tune
	ef Offset 11.45 d ef 21.45 dBm					Laterte	29.45 dB	
-og								04111-0410-044-014
11.5		102						Center Fred
1.45	-	• ····		-	-	-		2.40200000 GH
10.6								100000
28.6		34	4		1			Start Free
38.6	No.	Y						2.40200000 GH
me								
SE C MANYAN	Adver	Arritor	104-11-14	Maridian	~++1,-14m	Apple	mornal.	Stop Free
62.5								2.40200000 GH
Center 2.402 Res BW 1.01	2000000 GHz	#1/	BW 3.0 MH	47	C.u.	een 5 000 n	Span 0 Hz ns (1001 pts)	CF Step 2.40200000 GH
NAMES OF TAXABLE PARTY.			DH 3.0 m	12	and the second designed	Contractory in the local diversion of	is (iou pis)	Auto Mar
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	t t (Δ)	1.025 ms 625.0 µs	-35.18 (A) -0.6	is dB	-			Freq Offse
4 F 1	t	1.025 ms	-35.18	dBm				0 Ha
6 7								
8								
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1.4						STATUS		
		011	N 4: 1 /	0501/				
		СН	Mid (GFSK	(5.2) N	IODE)		
E Keysight Spectrum	re Analyzar - Swegt DA	СН	100	1010 A.M.	7.7 2.14	10DE)		
R. Keysight Spectrum	20 D. 16 1	1	100	GFSK	ALIS	10DE)	21 PHF46 10, 2022 TRACE[1 2 3 4 5 4	Frequency
R. Keysight Spectrum		00 GHz PNO: Fast	Trig: F	stasi dali	7.7 2.14	10DE)		
Center Freq	2.44200000	00 GHz PNO: Fast IFGainLow	Trig: F	stasi dali	ALIS	10DE) a auto Tetats ng-Per	21 PH Heb 18, 2022 TRACE 1 2 3 4 5 6 7:PE Web 40000 DET P P A N N N	Frequency
Center Freq	2.44200000	00 GHz PNO: Fast IFGain Low	Trig: F	stasi dali	ALIS	10DE) a auto Tetats ng-Per	21 PHF46 10, 2022 TRACE[1 2 3 4 5 4	Frequency
Center Freq	2.44200000	00 GHz PNO: Fast IFGain Low	Trig: F	stasi dali	ALIS	10DE) a auto Tetats ng-Per	21 PH/sb 18, 2022 TRACE 1 2 3 4 5 6 Trace 1 2 3 4 5 6	Frequency Auto Tune
Center Freq	2.44200000	00 GHz PNO: Fast IFGain Low	Trig: F #Atten	stasi dali	ALIS	10DE) a auto Tetats ng-Per	21 PH/sb 18, 2022 TRACE 1 2 3 4 5 6 Trace 1 2 3 4 5 6	Frequency Auto Tune Center Freq
Center Freq	2.44200000	00 GHz PNO: Fast IFGain Low	Trig: F	stasi dali	ALIS	10DE) a auto Tetats ng-Per	21 PH/sb 18, 2022 TRACE 1 2 3 4 5 6 Trace 1 2 3 4 5 6	Frequency Auto Tune Center Freq
Center Freq	2.44200000	00 GHz PNO: Fast IFGain Low	Trig: F #Atten	stasi dali	ALIS	10DE) a auto Tetats ng-Per	21 PH/sb 18, 2022 TRACE 1 2 3 4 5 6 Trace 1 2 3 4 5 6	Frequency Auto Tune Center Freq 2.44200000 GHz
Center Freq 0 dBJdiv R 115 1.45 1.65	2.44200000	00 GHz PNO: Fast IFGain Low	Trig: F #Atten	streat (str)	ALIS	10DE) a auto Tetats ng-Per	21 PH/sb 18, 2022 TRACE 1 2 3 4 5 6 Trace 1 2 3 4 5 6	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq
Center Freq 0 dB/div R 	2.44200000	00 GHz PNO: Fast IFGain Low	Trig: F #Atten	stasi dali	ALIS	10DE) a auto Tetats ng-Per	21 PH/sb 18, 2022 TRACE 1 2 3 4 5 6 Trace 1 2 3 4 5 6	Frequency Auto Tune Center Freq 2.44200000 GHz
Center Freq 0 dB/div R 0 dB/div R	2.44200000	00 GHz PNO: Fast IFGain Low	Trig: F #Atten	streat (str)	ALIS	10DE) a auto Tetats ng-Per	21 PH/sb 18, 2022 TRACE 1 2 3 4 5 6 Trace 1 2 3 4 5 6	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq
Center Freq 0 dB/div R 0 dB/	# 1910 000 1 2.44200000 ef Offset 11.45 d ef 21.45 dBm	B	Trig. F. #Atten	streat (str)	ALIS	10DE) a auto Tetats ng-Per	21 PH/sb 18, 2022 TRACE 1 2 3 4 5 6 Trace 1 2 3 4 5 6	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.44200000 GHz Stop Freq
R Center Freq 0 dBJdiv R 0 dBJdiv R	# 1910 000 1 2.44200000 ef Offset 11.45 d ef 21.45 dBm	DO GHZ PNC: Fast IFGain:Low B	Trig: F #Atten	32/24	Avg Type: Lo	10DE) α. κ/70 39-Pwr ΔMkr	21 FH reb 10, 2022 Protoc (1, 2) 4 5 6 Trade (1, 2) 4 5 6 Dett ⁽¹⁾ (1, 2) 4 5 6 Dett ⁽²⁾ (1, 2) 4 5 7 Dett	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.44200000 GHz
Center Freq Center Freq 10 dBJdiv R 115 145 145 215 215 215 215 215 215 215 215 215 21	** 1910 000 1 2.44200000 ef Offset 11.45 d lef 21.45 dBm	DO GHZ PNC: Fast IFGain:Low B	Trig. F. #Atten	sawa awi ree Run 20 dB	Avg Type: Lo	10DE) α. κ/70 39-Pwr ΔMkr	21 FHYNH 10, 2022 Phand (1, 2, 3, 4, 5, 6) performance (1, 2, 3, 4, 5, 6) performance (1, 2, 3, 4, 5, 6) performance (1, 2, 3, 4, 5) performance (1, 2, 3, 4) performance (1, 2, 3, 4) performance (1, 2, 3, 4) per	Frequency Auto Tune Center Frec 2.44200000 GHz Start Frec 2.44200000 GHz Stop Frec 2.44200000 GHz
Center Freq 0 dB/div R 0 dB/div R	ef Offset 11.45 d ef Offset 11.45 d ef 21.45 dBm	DO GHZ PRO: Fast IFGain:Low B	Trig: F SAtten	3264	Avg Type: Lo	ADDE) a μτο g-Pwr ΔMkr wf v m ^s	21 PHYLAR 10, 2022 IMAGE 11, 23 43 64 DET/P P A N HW 2027/P P A N HW 1 200.0 µS 34.73 dB	Frequency Auto Tune Center Frec 2.44200000 GH: Start Frec 2.44200000 GH: Stop Frec 2.44200000 GH: CF Step
Center Freq 0 dBJdv R 9 115 1.45 38.5 38.6 48.6 9 20 10 10 10 10 10 10 10 10 10 10 10 10 10	ef Offset 11.45 d ef 21.45 dBm visit 45 dBm visit 45 dBm visit 45 dBm	DO GHZ PRO: Fast IFGain:Low B	Trig. F. #Atten	3204 3204 4z	Avg Type: Lo	10DE) α μ200 145.35 ΔMkr μ[θγμε ⁴] eep 5.000 n	21 FHYNH 10, 2022 THACK (1 2 3 4 3 6 THACK (1 3 4 6 THACK (1 3	Frequency Auto Tune Center Free 2.442000000 GH: Start Free 2.442000000 GH: Stop Free 2.442000000 GH: CF Step 2.40200000 GH:
Center Freq	2.44200000 ef Offset 11.45 d lef 21.45 dBm visition visit	200 GHz PNC: Fast IFGain:Low B Mission #V	Trig: F SAtten 1Δ2 1Δ2 4 M2(μ)(Λ) BW 3.0 MH (Δ) 3Δ3	same two ree Run 20 dB	Avg Type: Lo	ADDE) a μτο g-Pwr ΔMkr wf v m ^s	21 FHYNH 10, 2022 THACK (1 2 3 4 3 6 THACK (1 3 4 6 THACK (1 3	Frequency Auto Tune Center Frec 2.44200000 GHz Start Frec 2.44200000 GHz Stop Frec 2.44200000 GHz CF Step 2.40200000 GHz
Renter Freq	2.44200000 ef Offset 11.45 d ef 21.45 dBm v vsylution v vsylution	200.0 Jan PNC: Feat IFGain:Low B Wilson Wilson 200.0 Jan 1.745 ms 625.0 Jan	Trig: F SAtten 1Δ2	3204 32045 32045 3204 42 42	Avg Type: Lo	10DE) α μ200 145.35 ΔMkr μ[θγμε ⁴] eep 5.000 n	21 FHYNH 10, 2022 THACK (1 2 3 4 3 6 THACK (1 3 4 6 THACK (1 3	Frequency Auto Tune Center Frec 2.44200000 GHz Start Frec 2.44200000 GHz Stop Frec 2.44200000 GHz CF Step 2.40200000 GHz
R Center Freq 0 dB/div R 99 115 125 125 125 125 125 125 125 125 125	2.44200000 ef Offset 11.45 d ef 21.45 dBm visit 4.45 dBm visit 4.4	200.0 usp	Trig. F SAtten 102 102 102 102 10	3204 32045 32045 3204 42 42	Avg Type: Lo	10DE) α μ200 145.35 ΔMkr μ[θγμε ⁴] eep 5.000 n	21 FHYNH 10, 2022 THACK (1 2 3 4 3 6 THACK (1 3 4 6 THACK (1 3	Frequency Auto Tune 2.44200000 GHz 2.44200000 GHz 2.44200000 GHz 2.44200000 GHz 2.40200000 GHz 2.40200000 GHz Auto Mar
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R Center Freq 0 dB/div R 99 115 145 145 145 145 145 145 145 145 145	# (42) (42) 1 2.44200000 (42) ef Offset 11.45 d (42) (42)	200.0 Jan PNC: Feat IFGain:Low B Wilson Wilson 200.0 Jan 1.745 ms 625.0 Jan	Trig: F SAtten 1Δ2	3204 32045 32045 3204 42 42	Avg Type: Lo	10DE) α μ200 145.35 ΔMkr μ[θγμε ⁴] eep 5.000 n	21 FHYNH 10, 2022 THACK (1 2 3 4 3 6 THACK (1 3 4 6 THACK (1 3	Frequency Auto Tune 2.44200000 GH 2.44200000 GH 2.44200000 GH 2.44200000 GH 2.40200000 GH 2.40200000 GH Auto Mar
Center Freq	# (42) (42) 1 2.44200000 (42) ef Offset 11.45 d (42) (42)	200.0 Jan PNC: Feat IFGain:Low B Wilson Wilson 200.0 Jan 1.745 ms 625.0 Jan	Trig: F SAtten 1Δ2	3204 32045 32045 3204 42 42	Avg Type: Lo	10DE) α μ200 145.35 ΔMkr μ[θγμε ⁴] eep 5.000 n	21 FHYNH 10, 2022 THACK (1 2 3 4 3 6 THACK (1 3 4 6 THACK (1 3	Frequency Auto Tune Center Frec 2.44200000 GHz Start Frec 2.44200000 GHz Stop Frec 2.442000000 GHz CF Step 2.402000000 GHz
R Center Freq 0 dB/div R 99 115 145 145 145 145 145 145 145 145 145	# (42) (42) 1 2.44200000 (42) ef Offset 11.45 d (42) (42)	200.0 Jan PHO: Feat IFGain:Low B Wilson Wilson 200.0 Jan 1.745 ms 625.0 Jan	Trig: F SAtten 1Δ2	3204 32045 32045 3204 42 42	Avg Type: Lo	10DE) α μ200 145.35 ΔMkr μ[θγμε ⁴] eep 5.000 n	21 FHYNH 10, 2022 THACK (1 2 3 4 3 6 THACK (1 3 4 6 THACK (1 3	Frequency Auto Tune 2.44200000 GHz 2.44200000 GHz 2.44200000 GHz 2.44200000 GHz 2.40200000 GHz 2.40200000 GHz Auto Mar



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	10.00		2.48000	0000 G		at -+		Stand	n	Avg Typ	aLitas AURO el Log-Perr	15.54 25 PH Feb TRACE 1 3 TYPE WW DET P P	3456	Frequency
10 0	Bidiv		offset 11.	45 dB	FGaint	ow	#Atta	m: 20 dB			Δ	Mkr1 200. 41.0	0 µs	Auto Tun
11.9 1.4 1.4	4			-		142	p						1	Center Fre 2.480000000 GH
-10.8							.34	4						Start Fre 2.480000000 GH
-40 -40 -40	1.000	1	et montal state	Maryan	×.	unite	M	hayay	al	Himpy	berberth	tean and	Nh	Stop Fre 2.48000000 GH
Cer		1.01	1000	Hz		VBW	3.0 N	NHz			Sweep 5.0	Span 00 ms (100	t pts)	CF Ste 2.402000000 GH Auto Ma
2	Δ2 F Δ4	1	(Δ) (Δ)	- 1	00.0 y 505 m 25.0 y 505 m	5 5 (Δ)	-46.7	1.09 dB 12 dBm 0.78 dB 12 dBm						Freq Offse 0 H
8 9 10	-										_			



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9.4 POWER SPECTRAL DENSITY

<u>LIMIT</u>

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

TEST SETUP



TEST PROCEDURE

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

10.2 Method PKPSD (peak PSD):

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



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Report No.: TMTN2201000126NR TEST RESULTS

No non-compliance noted.

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

GFSK(4.0) mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Result
Low	2402	-21.00	8.00	-29.00	PASS
Middle	2442	-21.03	8.00	-29.03	PASS
High	2480	-20.87	8.00	-28.87	PASS

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

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

GFSK(5.2) mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Result
Low	2402	-25.24	8.00	-33.24	PASS
Middle	2442	-24.93	8.00	-32.93	PASS
High	2480	-24.68	8.00	-32.68	PASS

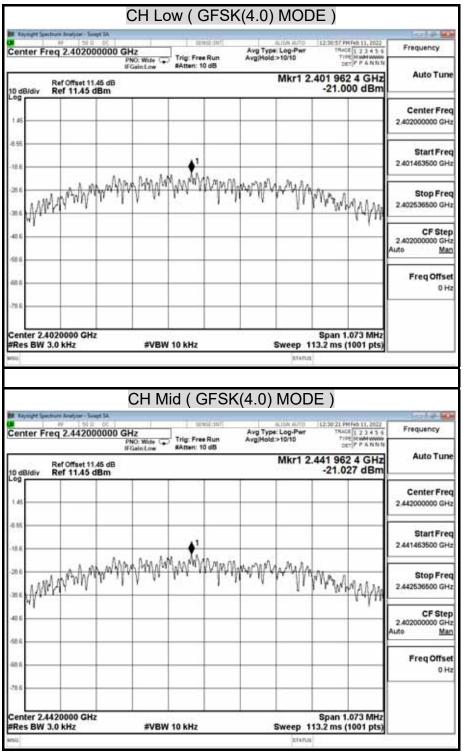
NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.

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



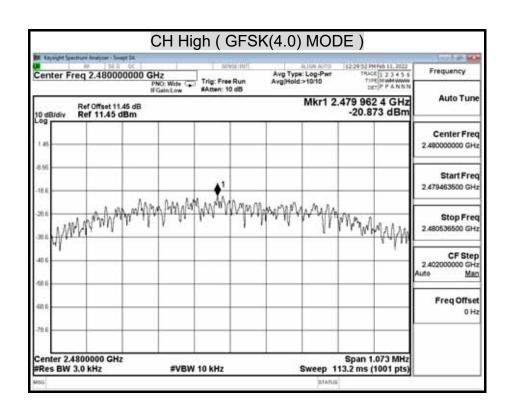
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POWER SPECTRAL DENSITY (GFSK(4.0) MODE)





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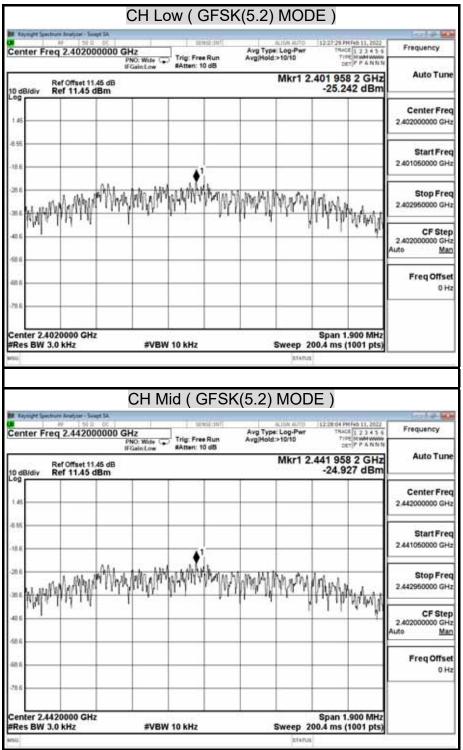




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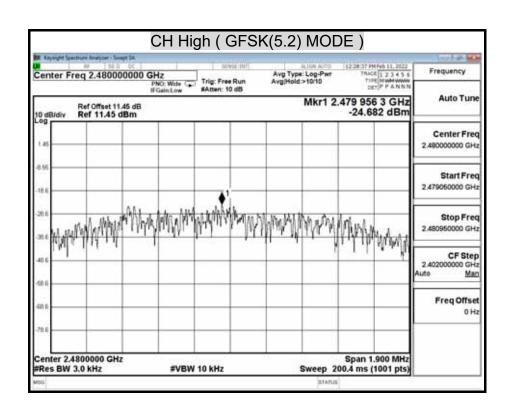
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POWER SPECTRAL DENSITY (GFSK(5.2) MODE)





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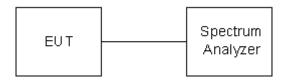
Report No.: TMTN2201000126NR

9.5 CONDUCTED SPURIOUS EMISSION

LIMITS

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

TEST SETUP



TEST PROCEDURE

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

The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

TEST RESULTS

No non-compliance noted.



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Report No.: TMTN2201000126NR

TEST DATA

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

Frequency	12:38:57 PM Feb 11, 2022 TRACE 1 2 3 4 5 6 TIPE M MANAGE DET P P A N N N	Avg Type: Log-Pwr Avg Hold:>1910	Trig: Free Run #Atten: 10 dB	SI D DC 2000000 GHz PNO: Wide C	ter Freq 2.4020
Auto Tur	.401 742 GHz -5.515 dBm	Mkr1 2.	Anten: 10 db		Ref Offset 1 Bidiv Ref 11.45
Center Fre 2.402000000 GH			● ¹		
Start Fre 2.400500000 GH		\leq			
Stop Fre 2.403500000 GH	~				
CF Ste 2.402000000 GH Auto Ma					\sim
Freq Offse 0 H					
Francisco	Span 3.000 MHz 00 ms (1001 pts) 6231 17 PHFe5 11, 3022	Sweep 1.00	W 300 kHz	#VB	ter 2.402000 GHz s BW 100 kHz
Frequency Auto Tur	00 ms (1001 pts)	Sweep 1.00 status Avg Type: Log-Pwr Avg(Hold:>1010	stast part	#VB - Seest IA SI G C IFGaint Cov HT 145 dB	s BW 100 kHz
Frequency	00 ms (1001 pts)	Sweep 1.00 status Avg Type: Log-Pwr Avg(Hold:>1010	Sansa Surt	#VB - Seest IA SI G C IFGaint Cov HT 145 dB	s BW 100 kHz
Frequency Auto Tur Center Fre	00 ms (1001 pts)	Sweep 1.00 status Avg Type: Log-Pwr Avg(Hold:>1010	Sansa Surt	#VB - Seest IA SI G C IFGaint Cov HT 145 dB	s BW 100 kHz
Frequency Auto Tur Center Fre 2.36000000 GH Start Fre	00 ms (1001 pts) 100 ms (1001 p	Sweep 1.00 status Avg Type: Log-Pwr Avg(Hold:>1010	Sansa Surt	#VB - Seest IA SI G C IFGaint Cov HT 145 dB	s BW 100 kHz
Frequency Auto Tur Center Fre 2.36000000 GH Start Fre 2.31000000 GH Stop Fre	00 ms (1001 pts)	Sweep 1.00 status AvgType:Log-Per AvgHold:>1010 Mkr1 2.40	Trig: Free Run #Atten: 10 dB	#VB 510 0C IFGaintLow PNC: Feat C IFGaintLow th 11.46 dB 45 dBm	s BW 100 kHz
Frequency Auto Tur Center Fre 2.36000000 GF 2.31000000 GF 2.31000000 GF 2.41000000 GF 2.41000000 GF	00 ms (1001 pts)	Sweep 1.00	Trig: Free Run #Atten: 10 dB	#VB 510 0C IFGaintLow PNC: Feat C IFGaintLow th 11.46 dB 45 dBm	s BW 100 kHz



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		17 202037202		19.54		knatyber - Swept	Spectrure A	Keysight
Frequency	122 33:05 PM Feb 11, 2022 TRACE 1 2 3 4 5 6 TIPE N MARYWWW DET P P A N N N	vg Type: Log-Pwr vg Hold:>10/10	Stand ONT	Trig: Fr	HZ PNC: Fast	.000000	eq 30.	art Fr
Auto Tun	IFGainLow #Atten: 10 dB DET[P # A N M Ref Offset 11.45 dB Mkr1 2.401 7 GHz 10 dB/div Ref 11.45 dBm -5.936 dBm							
Center Fre							1	9 45 55
Start Fre	-25.52 dbs			-		_		18
30.000000 MH				-	_		12	16
Stop Fre 26.50000000 GF					~~~~~		- Ma	16
CF Ste 2.402000000 GH Auto Ma	Stop 26.50 GHz 2.531 s (40001 pts)	Sweep 2	Hz	W 300 KH	#VB	kHz	MHz V 100 P	art 30 tes Bl
Freq Offse			idBm idBm	-5,936 (-59,208 (-67,868 (2.401 7 GHz 00 000 0 GHz 83 500 0 GHz	2		NN

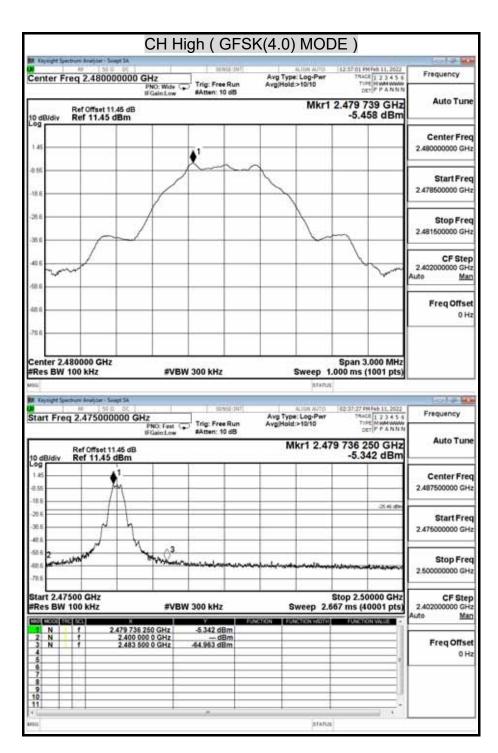


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Keysight Spectrum Analyzer - So					,
enter Freq 2.44200		Trig: Free Run	Avg Type: Log-Pwr Avg/Hold:>10/10	12:39:34 PHFeb 11, 2022 TRACE 1 2 3 4 5 6 TrPE M WH WWW	Frequency
Ref Offset 11 dB/div Ref 11.45	IFGainLow	#Atten: 10 dB	Mkr1	2.441 742 GHz -5.520 dBm	Auto Tum
45		↓ ¹			Center Free 2.442000000 GH
56		\prod	\mathbf{n}		Start Free 2.440500000 GH
5.				~	Stop Free 2.443500000 GH
**				-	CF Step 2.40200000 GH Auto Mar
n6					Freq Offse 0 H
enter 2.442000 GHz Res BW 100 kHz	#VB	W 300 kHz		Span 3.000 MHz .000 ms (1001 pts)	
enter 2.442000 GHz Res BW 100 kHz	opt la DC O MHZ IFGain:Low	W 300 kHz stret brit Trig: Free Run #Atten: 10 dB	ALIIM AND Avg Type: Log-Pwr Avg[Hold:>1010	000 ms (1001 pts)	
enter 2.442000 GHz Res BW 100 kHz	ent la OC PNO: Feat IFGain:Low	Trig: Free Run	ALIIM AND Avg Type: Log-Pwr Avg[Hold:>1010	.000 ms (1001 pts)	Frequency
enter 2.442000 GHz Res BW 100 kHz 6 Torset Sector Robot So tart Freq 30.00000 Ref Offset 11 0 dBidiv Ref 11.45	ent la OC PNO: Feat IFGain:Low	Trig: Free Run	ALIIM AND Avg Type: Log-Pwr Avg[Hold:>1010	1000 ms (1001 pts)	Frequency Auto Turn Center Free
enter 2.442000 GHz Res BW 100 kHz a tart Freq 30.00000 Ref Offset 11 0 dBJdiv Ref 11.45	ent la OC PNO: Feat IFGain:Low	Trig: Free Run	ALIIM AND Avg Type: Log-Pwr Avg[Hold:>1010	1000 ms (1001 pts)	Frequency Auto Turn Center Free 13.26500000 GH Start Free
enter 2.442000 GHz Res BW 100 kHz 6 8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	ent la OC PNO: Feat IFGain:Low	Trig: Free Run	ALIIM AND Avg Type: Log-Pwr Avg[Hold:>1010	1000 ms (1001 pts)	Frequency Auto Turn Center Free 13.26500000 GH Start Free 30.000000 MH Stop Free
enter 2.442000 GHz Res BW 100 kHz Toyset Sectors Andread Sec and Freq 30.00000 Ref Offset 11 0 dB/div Ref 11.45 155 85 85 85 85 85 85 85 85 85 85 85 85 8	Add dB m	Trig: Free Run #Attent: 10 dB	status Avg Type: Log-Pwr Avg[Hold:>1919 Mk	000 ms (1001 pts)	Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre 25.50000000 GH CF Step 2.40200000 GH
Ref Offset 11 Bidliv Ref 11.45	Add dB m	Trig: Free Run #Attent: 10 dB	status AvgType: Log-Pwr AvgType: Log-Pwr AvgHold:>10110 Mk	000 ms (1001 pts)	Frequency Auto Tune Center Free 13.26500000 GHz Start Free 30.000000 GHz Stop Free 26.50000000 GHz CF Step 2.40200000 GHz



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R. Keysight Spec	bure Analyber -	Swept SA					100 Mar 100
Start Free		000 MHz PNO: Fast	Trig: Free Run	Avg Typ	ALIUM AUPO di>Log-Pwr di>10/10	TRACE 1 2 3 4 TRACE 1 2 3 4 TIPE M WHW DET P P A N	5.6 Frequency
10 dB/div	Ref Offset Ref 11.4	IFGainLo	#Atten: 10 dB	0.500	Mk	r1 2.480 5 GH -5.836 dB	Auto Tura
1.45 0.55	\						Center Free 13.265000000 GH
18 6 20 6 30 6 40 6						34	Start Fre 30.000000 MH
88.6 98.6 78.6		*****					Stop Fre 25.50000000 GH
tart 30 M Res BW	100 kHz	#\	/BW 300 kHz	PARTON 1		Stop 26.50 GH 2.531 s (40001 p	Hz CF Ste 2.40200000 GH Auto Ma
N N N N N N N N N N N N N N N N N N N	1 1	2.480 5 GHz 2.400 000 0 GHz 2.483 500 0 GHz	-5.836 dBm -69.052 dBm -64.331 dBm				Freq Offse
7 8 9 10 11						- 2104	
					22, 123, 111		



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Report No.: TMTN2201000126NR

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

Frequency	12:34:13 PM Feb 11, 2022 3RACE 1 2 3 4 5 6 7:7E MWMWWW DET P P A N N N	Avg Type: Log-Pwr Avg Hold:>1010	Trig: Free Run #Atten: 10 dB	2000000 GHz PNO: Wide C IF Gain Low	nter Freq 2.40200
Auto Tun	.401 480 GHz -5.617 dBm	Mkr1 2.4		t 11.45 dB	Ref Offset 11. dB/div Ref 11.45 d
Center Fre 2.402000000 GH			1		45
Start Fre 2.399500000 GH			Amp		6
Stop Fre 2.404500000 GH	~				6 6
CF Ste 2.402000000 GH Auto <u>Ma</u>					
Freq Offse					6
01	Span 5.000 MHz				6 nter 2.402000 GHz
0 H	00 ms (1001 pts)	Sweep 1.000	W 300 kHz	#VB	6 Inter 2.402000 GHz es BW 100 kHz
	00 ms (1001 pts)	Sweep 1.000		#VB - Seest IA SI G C IFGaint Co WG Fast C IFGaint Co wt 11.45 dB	6 Inter 2.402000 GHz es BW 100 kHz Konst Sector Rolper Sec Mart Freq 2.3100000 Ref Offset 11
Frequency	000 ms (1001 pts) 58466 [2 3 4 5 6 THE MARK 1 2 3 4 5 6 THE MA	Sweep 1.000	Sand Surf	#VB - Seest IA SI G C IFGaint Co WG Fast C IFGaint Co wt 11.45 dB	6 Inter 2.402000 GHz es BW 100 kHz Sector Anger Sec N 1510 art Freq 2.3100000
Frequency Auto Tur Center Fre	00 ms (1001 pts) 37442 [1 2 3 4 5 6 7798 [M WM WWW DET P P A N N N 101 485 0 GHz	Sweep 1.000	Sand Surf	#VB - Seest IA SI G C IFGaint Co WG Fast C IFGaint Co wt 11.45 dB	e nter 2.402000 GHz es BW 100 kHz Const Sectors Andron Son N (510) art Freq 2.3100000 Ref Offset 11 dBidiv Ref 11.45 c
Frequency Auto Tur Center Fre 2.36000000 GH	000 ms (1001 pts) 58466 [2 3 4 5 6 THE MARK 1 2 3 4 5 6 THE MA	Sweep 1.000	Sand Surf	#VB - Seest IA SI G C IFGaint Co WG Fast C IFGaint Co wt 11.45 dB	6 nter 2.402000 GHz es BW 100 kHz Const Sectors Andron - Sec 8 8 8 9 9 9 9 1 1 1 1 1 1 1 1 1 1 1 1 1
Frequency Auto Tur Center Fre 2.36000000 GH Start Fre 2.31000000 GH	000 ms (1001 pts) 58466 [2 3 4 5 6 THE MARK 1 2 3 4 5 6 THE MA	Sweep 1.000	Trig: Free Run #Atten: 10 dB	#VBI	6
Frequency Auto Turn Center Fre 2.36000000 GH 2.310000000 GH 2.41000000 GH 2.41000000 GH 2.40000000 GH	100 ms (1001 pts) 100 ms (1001 pts) 100 ms (1001 pts) 101 485 0 GHz -5.417 dBm 2 0 6 GHz -5.417 dBm 2 0 6 GHz -5.417 dBm 2 1 6 2 de 2 1 6 2 de 1 2 3 4 5 6 GHz -5.417 dBm 2 1 6 2 de 2 3 6 2 de 1 7 ms (40001 pts)	Sweep 1.000	Trig: Free Run #Atten: 10 dB	#VBI	6



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	-
SINSE INT Augu Auto E24222 MM+b11,2022 Avg Type: Log-Per SNACE [1,2,3,4,5,6] Frequ Trig: Free Run Avg[Hold:>10/10 Trig: Makeway Atten: 10 dB DET [P A N/N N]	uency
	uto Tur
Cer 13.26500	nter Fre
	Start Fre
S	Stop Fre
	CF Ste
-5.005.dBm	eq Offs
	-



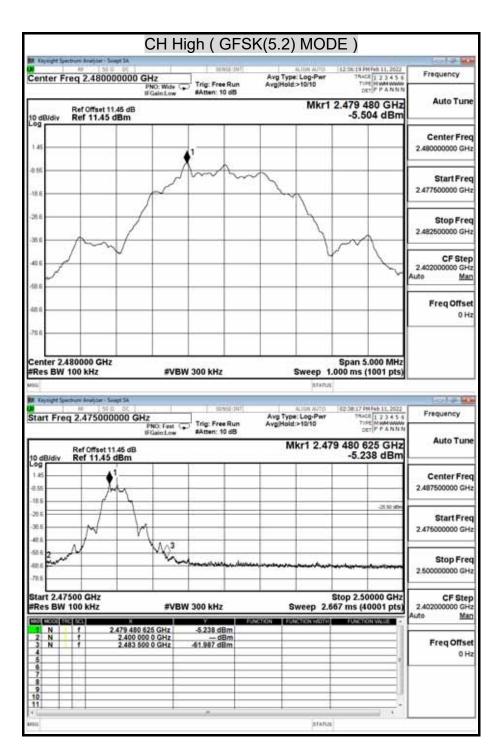
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CH Mid (GFSK(5.2) MODE) R. Keynight A state into r - Sweet 14 Center Freq 2.442000000 GHz PNO: Wide Trig: Free Run If Gain.Low
 ALIDA MUTO
 12:35:33 PM Feb 11, 2022

 Avg Type: Log-Pwr
 Tract [1 2 3 4 5 6 Avg[Hold:>10:10
 Track [1 2 3 4 5 6 Track [1 2 3 4 5 6 Det] P A N N N
 Frequency Auto Tune Mkr1 2.441 480 GHz Ref Offset 11.45 dB Ref 11.45 dBm -5.614 dBm 10 dB/div **Center Freq** 2.442000000 GHz 8.5 Start Freq 2.439500000 GHz 28 Stop Freq 2.444500000 GHz 35.1 CF Step 2.40200000 GHz 40.1 Man uto ca: Freq Offset 0 Hz Center 2.442000 GHz #Res BW 100 kHz Span 5.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz STAD 102-41-21 PH Feb 11, 2022 TRACE 1 2 3 4 5 6 Triffe M MM WWW DET P P A N N M Avg Type: Log-Pwr Avg/Hold>1010 Frequency Start Freq 30.000000 MHz PNO: Fast Trig: Free Run #Atten: 10 dB Mkr1 2.442 1 GHz -6.091 dBm Auto Tune Ref Offset 11.45 dB Ref 11.45 dBm 0 dB/div **Center Freq** 13.265000000 GHz 8-5 25.01 18 20.9 Start Freq 38 30.000000 MHz 40 iπ. Stop Freq 26 50000000 GHz Stop 26.50 GHz Sweep 2.531 s (40001 pts) Start 30 MHz #Res BW 100 kHz CF Step 2.40200000 GHz #VBW 300 kHz uto Man COOL BUS ESS N N N 2.442 1 GHz 2.400 000 0 GHz 2.483 500 0 GHz 6.091 dBn 67.312 dBm 67.618 dBm **Freq Offset** 0 Hz 11 STATUS



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1	ber - Swept SA	State out	ALIEA AUTO	102-39-42 PH Feb 11, 2022	
Start Freq 30.00	DOODO MHz PNO: Fast (~) IFGaint Low	Trig: Free Run #Atten: 10 dB	Avg Type: Log-Pwr Avg Hold:>10/10	THE NUMBER	Frequency
10 dB/div Ref 1	set 11.45 dB 1.45 dBm		Mk	r1 2.479 8 GHz -6.292 dBm	Auto Tun
1.45					Center Fre 13.26500000 GH
-18.6				-25.00 (0)	Start Fre 30.000000 MH
40.6 60.6 60.0					Stop Fre 26.50000000 GH
785 Start 30 MHz FRes BW 100 kH	z #VBW	300 kHz	Sweep 2	Stop 26.50 GHz 531 s (40001 pts)	CF Ste 2.40200000 GH Auto Ma
1 N f 2 N f 3 N f 4		-5.292 dBm -67.404 dBm -61.376 dBm			Freq Offse 0 H
5					



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Report No.: TMTN2201000126NR

9.6 RADIATED EMISSIONS

9.6.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
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.: TMTN2201000126NR 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.

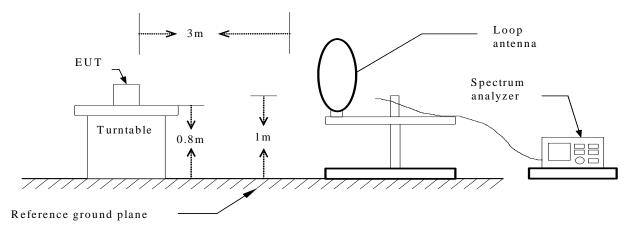


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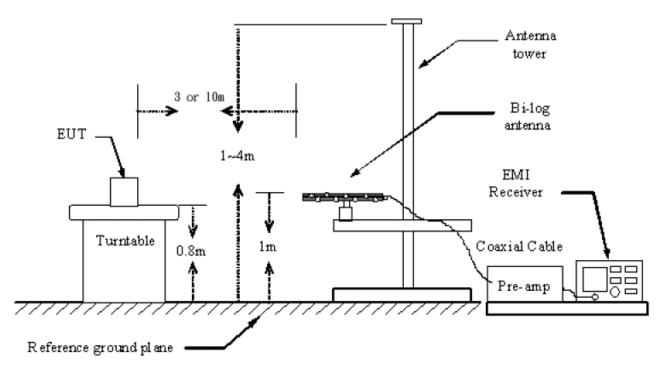
TEST SETUP

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

9kHz ~ 30MHz



30MHz ~ 1GHz

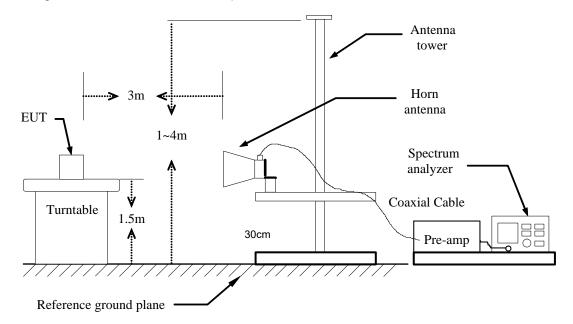




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The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



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



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NOTE :

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

TEST RESULTS

No non-compliance noted.

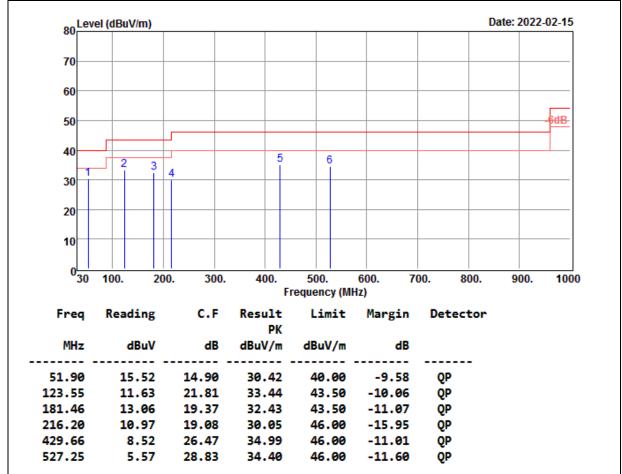


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Report No.: TMTN2201000126NR 9.6.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

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



Remark:

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

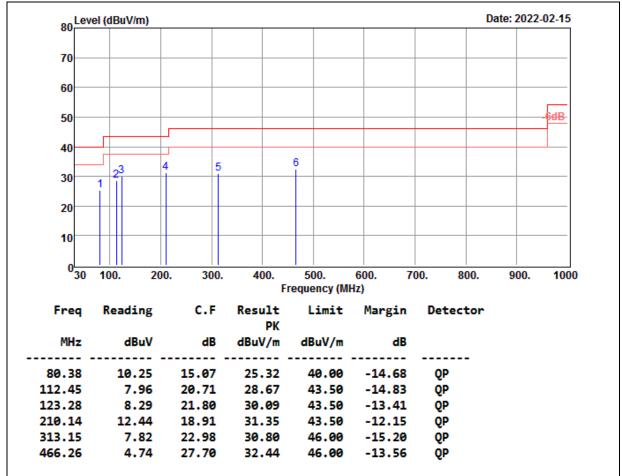


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Report No.:	TMTN2201000126NR
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Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/15
Model Name	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	ТХ	Temp & Humidity	21.4°C, 60%

Horizontal



Remark:

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



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Report No.: TMTN2201000126NR 9.6.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Low)	TEMP& Humidity	23.5°C, 58%

Horizontal

	TX / (H Low	Meas	urement	t Distance	at 3m H	orizontal	polarity		
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1066.27	64.25	24.78	2.54	44.75	0.65	47.47	74.00	-26.53	Р
*	1066.27	55.02	24.78	2.54	44.75	0.65	38.24	54.00	-15.76	А
	1936.47	58.20	30.09	2.84	44.00	1.22	48.36	74.00	-25.64	Р
	1936.47	48.33	30.09	2.84	44.00	1.22	38.49	54.00	-15.51	А
*	4804.28	56.60	33.07	4.38	42.51	0.57	52.12	74.00	-21.88	Р
*	4804.28	45.50	33.07	4.38	42.51	0.57	41.02	54.00	-12.98	А

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Low)	TEMP& Humidity	23.5°C, 58%

Vertical

	TX / GFSK(5.2) mode / CH Low				Measurement Distance at 3m Vertical polarity				olarity	
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1026.31	58.05	24.61	2.51	44.75	0.64	41.06	74.00	-32.94	Р
*	1026.31	50.53	24.61	2.51	44.75	0.64	33.54	54.00	-20.46	A
	1766.14	57.64	28.73	2.81	44.25	1.01	45.95	74.00	-28.05	Р
	1766.14	48.24	28.73	2.81	44.25	1.01	36.55	54.00	-17.45	А
*	4804.44	56.76	33.07	4.38	42.51	0.57	52.28	74.00	-21.72	Р
*	4804.44	46.79	33.07	4.38	42.51	0.57	42.31	54.00	-11.69	А

REMARK:

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

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

3. The result basic equation calculation is as follow:

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

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



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Report No.: TMTN2201000126NR

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Middle)	TEMP& Humidity	23.5°C, 58%

Horizontal

	TX / G	H Middle	Measurement Distance at 3m Horizontal polarity					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)
*	1060.42	63.17	24.75	2.53	44.75	0.65	46.36	74.00	-27.64	Р
*	1060.42	53.46	24.75	2.53	44.75	0.65	36.65	54.00	-17.35	А
	1947.30	56.77	30.18	2.84	43.98	1.24	47.05	74.00	-26.95	Р
	1947.30	47.48	30.18	2.84	43.98	1.24	37.76	54.00	-16.24	А
*	4885.46	56.67	33.33	4.43	42.50	0.57	52.50	74.00	-21.50	Р
*	4885.46	45.08	33.33	4.43	42.50	0.57	40.91	54.00	-13.09	А

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Middle)	TEMP& Humidity	23.5°C, 58%

Vertical

	TX / G	FSK(5.2) r	node / Cl	H Middle	Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1026.40	57.25	24.61	2.51	44.75	0.64	40.26	74.00	-33.74	Р
*	1026.40	50.59	24.61	2.51	44.75	0.64	33.60	54.00	-20.40	А
	1761.28	57.53	28.69	2.81	44.26	1.01	45.78	74.00	-28.22	Р
	1761.28	48.63	28.69	2.81	44.26	1.01	36.88	54.00	-17.12	А
*	4884.22	56.47	33.33	4.43	42.50	0.57	52.29	74.00	-21.71	Р
*	4884.22	45.54	33.33	4.43	42.50	0.57	41.36	54.00	-12.64	А

REMARK:

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

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

3. The result basic equation calculation is as follow:

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

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

5. The test distance is 3m.



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Report No.: TMTN2201000126NR

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10	
Model	AT-LP120XBT-USB	Test By	Peter Chu	
Test Mode	GFSK(4.0) TX (CH High)	TEMP& Humidity	23.5°C, 58%	

Horizontal

	TX / 0	GFSK(5.2)	mode / C	CH High	Meas	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)
ł	1059.40	66.83	24.75	2.53	44.75	0.65	50.01	74.00	-23.99	Р
ł	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
ł	4958.22	56.35	33.57	4.47	42.49	0.56	52.45	74.00	-21.55	Р
7	4958.22	45.35	33.57	4.47	42.49	0.56	41.46	54.00	-12.54	А

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model	AT-LP120XBT-USB	Peter Chu	
Test Mode	GFSK(4.0) TX (CH High)	TEMP& Humidity	23.5°C, 58%

Vertical

	TX / 0	GFSK(5.2)	mode / 0	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)
*	1035.34	57.52	24.65	2.52	44.75	0.64	40.58	74.00	-33.42	Р
*	1035.34	52.24	24.65	2.52	44.75	0.64	35.30	54.00	-18.70	А
*	1569.53	57.28	27.16	2.78	44.55	0.77	43.45	74.00	-30.55	Р
*	1569.53	48.63	27.16	2.78	44.55	0.77	34.80	54.00	-19.20	А
*	4957.80	56.48	33.56	4.47	42.49	0.56	52.58	74.00	-21.42	Р
*	4957.80	44.99	33.56	4.47	42.49	0.56	41.09	54.00	-12.91	А

REMARK:

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

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

3. The result basic equation calculation is as follow:

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

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

5. The test distance is 3m.



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Report No.: TMTN2201000126NR

Product Name	DIRECT DRIVE Turntable	2022/02/10	
Model	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH Low)	TEMP& Humidity	23.5°C, 58%

Horizontal

	TX / (GFSK(5.2)	mode / C	H Low	Meas	leasurement 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)
*	1044.50	59.82	24.69	2.52	44.75	0.64	42.93	74.00	-31.07	Р
*	1044.50	50.23	24.69	2.52	44.75	0.64	33.34	54.00	-20.66	А
	1937.27	55.98	30.10	2.84	43.99	1.22	46.15	74.00	-27.85	Р
	1937.27	47.65	30.10	2.84	43.99	1.22	37.82	54.00	-16.18	А
*	4804.27	56.32	33.07	4.38	42.51	0.57	51.84	74.00	-22.16	Р
*	4804.27	45.30	33.07	4.38	42.51	0.57	40.82	54.00	-13.18	А

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10	
Model	AT-LP120XBT-USB Test By		Peter Chu	
Test Mode	GFSK(5.2) TX (CH Low)	TEMP& Humidity	23.5°C, 58%	

Vertical

	TX / 0	GFSK(5.2)	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)
,	1043.86	58.23	24.68	2.52	44.75	0.64	41.33	74.00	-32.67	Р
,	1043.86	48.69	24.68	2.52	44.75	0.64	31.79	54.00	-22.21	A
	2032.17	52.94	30.56	2.87	43.88	5.36	47.86	74.00	-26.14	Р
	2032.17	49.07	30.56	2.87	43.88	5.36	43.99	54.00	-10.01	А
;	4805.06	56.75	33.08	4.38	42.51	0.57	52.28	74.00	-21.72	Р
;	4805.06	45.54	33.08	4.38	42.51	0.57	41.07	54.00	-12.93	А

REMARK:

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

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

3. The result basic equation calculation is as follow:

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

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



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Report No.: TMTN2201000126NR

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10	
Model	AT-LP120XBT-USB Test By		Peter Chu	
Test Mode	GFSK(5.2) TX (CH Middle)	TEMP& Humidity	23.5°C, 58%	

Horizontal

	TX / G	FSK(5.2) r	node / Cł	H Middle	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)
*	1046.52	58.25	24.70	2.53	44.75	0.64	41.37	74.00	-32.63	Р
*	1046.52	51.33	24.70	2.53	44.75	0.64	34.45	54.00	-19.55	А
	1937.70	54.56	30.10	2.84	43.99	1.22	44.74	74.00	-29.26	Р
	1937.70	48.31	30.10	2.84	43.99	1.22	38.48	54.00	-15.52	А
*	4886.22	56.78	33.34	4.43	42.50	0.57	52.61	74.00	-21.39	Р
*	4886.22	45.26	33.34	4.43	42.50	0.57	41.09	54.00	-12.91	А

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10	
Model	AT-LP120XBT-USB	Test By	Peter Chu	
Test Mode	GFSK(5.2) TX (CH Middle)	TEMP& Humidity	23.5°C, 58%	

Vertical

	TX / G	TX / GFSK(5.2) mode / CH Middle				Measurement Distance at 3m Vertical polarity				
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
۲	1044.27	59.23	24.69	2.52	44.75	0.64	42.33	74.00	-31.67	Р
۲	1044.27	47.53	24.69	2.52	44.75	0.64	30.63	54.00	-23.37	А
L	2032.17	53.04	30.56	2.87	43.88	5.36	47.96	74.00	-26.04	Р
L	2032.17	48.34	30.56	2.87	43.88	5.36	43.26	54.00	-10.74	А
۲	4885.47	56.63	33.33	4.43	42.50	0.57	52.46	74.00	-21.54	Р
۲	4885.47	46.98	33.33	4.43	42.50	0.57	42.81	54.00	-11.19	А

REMARK:

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

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

3. The result basic equation calculation is as follow:

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

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

5. The test distance is 3m.



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Report No.: TMTN2201000126NR

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH High)	TEMP& Humidity	23.5°C, 58%

Horizontal

	TX / 0	TX / GFSK(5.2) mode / CH High			Measurement Distance at 3m Horizontal polarity				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)
4	1048.52	58.56	24.70	2.53	44.75	0.64	41.69	74.00	-32.31	Р
7	1048.52	48.91	24.70	2.53	44.75	0.64	32.04	54.00	-21.96	А
	1937.17	57.63	30.10	2.84	43.99	1.22	47.80	74.00	-26.20	Р
	1937.17	47.34	30.10	2.84	43.99	1.22	37.51	54.00	-16.49	А
۶	4959.11	56.33	33.57	4.47	42.49	0.56	52.44	74.00	-21.56	Р
7	4959.11	45.01	33.57	4.47	42.49	0.56	41.12	54.00	-12.88	А

Product Name	DIRECT DRIVE Turntable	Test Date	2022/02/10
Model	AT-LP120XBT-USB	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH High)	TEMP& Humidity	23.5°C, 58%

Vertical

	TX / 0	TX / GFSK(5.2) mode / CH High				Measurement Distance at 3m Vertical polarity				
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1050.44	52.47	24.71	2.53	44.75	0.65	35.61	74.00	-38.39	Р
×	1050.44	47.62	24.71	2.53	44.75	0.65	30.76	54.00	-23.24	А
L	2032.43	52.85	30.56	2.87	43.88	5.40	47.80	74.00	-26.20	Р
	2032.43	49.77	30.56	2.87	43.88	5.40	44.72	54.00	-9.28	А
×	4959.03	56.82	33.57	4.47	42.49	0.56	52.93	74.00	-21.07	Р
×	4959.03	45.24	33.57	4.47	42.49	0.56	41.35	54.00	-12.65	А

REMARK:

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

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

3. The result basic equation calculation is as follow:

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

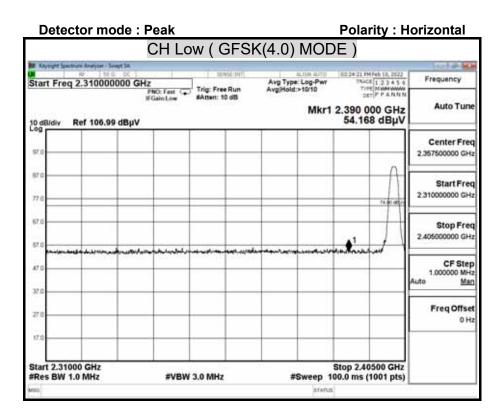
4. The other emission levels were 20dB below the limit

5. The test distance is 3m.



Report No.: TMTN2201000126NR 9.6.4 RESTRICTED BAND EDGES

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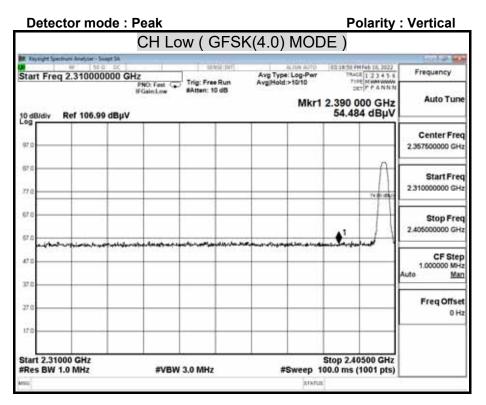


С	H Low (GFSI	<(4.0) MOD	E)	
Keysight Spectrum Analyter - Swept SA	steel stat	ALIA APO	142225-35 PM Feb 10, 2022	Frequency
	Fest Trig: Free Run sAtten: 10 dB	Avg Type: Log-Pwr Avg Hold:>1010 Mkr1	2.390 000 GHz 42.861 dBµV	Auto Tun
97.0				Center Fre 2.357500000 GH
77.0				Start Fre 2 310000000 GH
67.0			54-20 mJ/4	Stop Fre 2.405000000 GH
470			•1	CF Ste 1.000000 MH Auto <u>Ma</u>
27.0				Freq Offse
17.0				
Start 2.31000 GHz Res BW 1.0 MHz	#VBW 2.7 kHz		Stop 2.40500 GHz 7.47 ms (1001 pts)	



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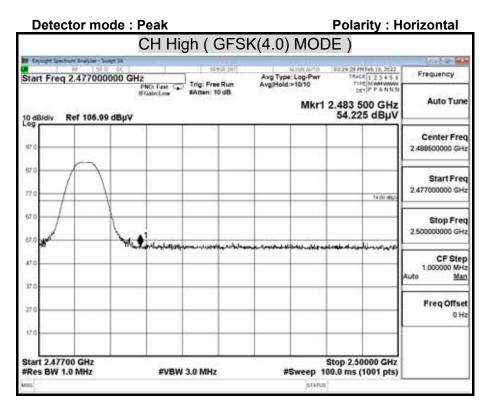


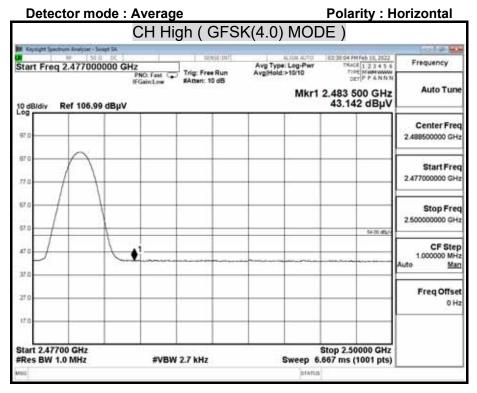
Detector mod			Polarity : Vertical			
	CH Low (GFS	SK(4.0) MOD	E)			
Start Freq 2.31000000	O GHz	ALIAN AUTO Avg Type: Log-Pwr	12 20:00 PH Feb 18, 2022 TRACE 1 2 3 4 5 6 TIPE N WH WWW	Frequency		
10 dB/div Ref 106.99 dE	PNO: Fast Trig: Free Run IFGainLow #Atten: 10 dB	AvgiHold:>1010 Mkr1 :	2.390 000 GHz 42.840 dBµV	Auto Tun		
97.0				Center Fre 2.357500000 GH		
77.0			A	Start Fre 2.31000000 GH		
67.0				Stop Fre 2.405000000 GH		
47 0 7 0			0+00 mb/-	CF Ste 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 2.7 kHz		top 2.40500 GHz .47 ms (1001 pts)			
495		STATUS				



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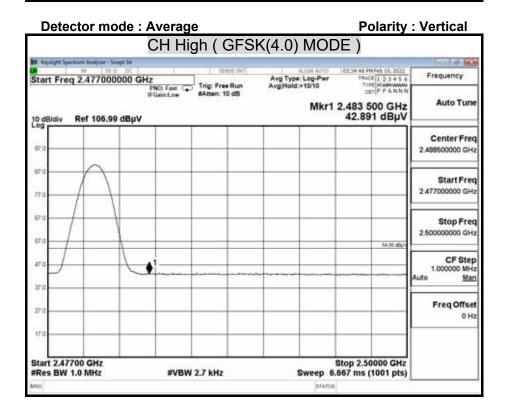




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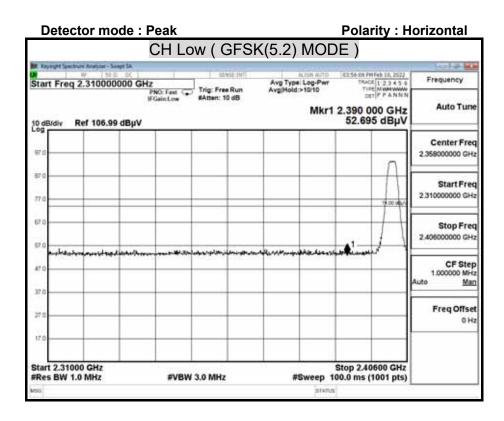
Report No.: TMTN2201000126NR

Polarity : Vertical Detector mode : Peak CH High (GFSK(4.0) MODE) R. Keynight Spectrum Analyzer - Swept SA 1000 Start Freq 2.477000000 GHz FRO: Feet C AUTIN AUTO (22:33-42 PM/46 18, 2022) Avg Type: Log-Pwr Avg[Hold:>10/10 Det (P A N N N Frequency Auto Tune Mkr1 2.483 500 GHz 53.727 dBµV Ref 106.99 dBµV 10 dB/div Center Freq 97 2.488500000 GHz 82 Start Freq 2.477000000 GHz $\dot{\tau}$ 14.00 (Et 67 Stop Freq 2.50000000 GHz 67. CF Step 1.000000 MHz Man 47 37 Freq Offset 27 0 Hz 17 Start 2.47700 GHz Stop 2.50000 GHz #VBW 3.0 MHz #Res BW 1.0 MHz #Sweep 100.0 ms (1001 pts) STA





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Detector mod			Polarity : Horizontal ((5.2) MODE)			
IX Keysight Spectrum Analyzer - Swept	14 ·		and an and a state of the			
Start Freq 2.3100000	0 GHz	Trig: Free Run	Avg Type: Log-Pwr AvgHold:>10/10	E1:55:42 PH Feb 10, 2022 TRACE 1 2 3 4 5 6 TYPE M WH WWW	Frequency	
10 dB/div Ref 106.99 d	PNO: Fast G	#Atten: 10 dB	8820-00-00-00-00-00-00-00-00-00-00-00-00-0	2.390 000 GHz 42.814 dBµV	Auto Tun	
97.0					Center Free 2.358000000 GH	
77.0					Start Free 2.310000000 GH	
67.0					Stop Fre 2.40500000 GH	
***				\$1	CF Ste 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	5.1 kHz		Stop 2.40600 GHz 4.73 ms (1001 pts)		
645			STATUS		1	



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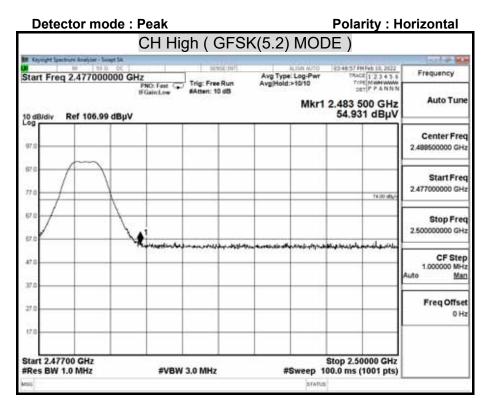
Polarity : Vertical Detector mode : Peak CH Low (GFSK(5.2) MODE) R. Keynight Spectrum Analyzer - Swept SA -----Start Freq 2.310000000 GHz FRO: Feet Const If GainLow 04:00:17 PM Feb 10, 2022 TRACE 1:2:3:45.6 T/PE M MM WWW DET P A N N N Avg Type: Log-Pwr Avg[Hold:>10/10 Frequency Auto Tune Mkr1 2.390 000 GHz 53.218 dBµV Ref 106.99 dBµV 10 dB/div Center Freq 97 2.358000000 GHz 82 Start Freq 2.310000000 GHz \dot{n} 67 Stop Freq 2.40500000 GHz 67. Acres Bellevil CF Step 1.000000 MHz Man 47 ,to 37 Freq Offset 27 0 Hz 17 Start 2.31000 GHz Stop 2.40600 GHz #VBW 3.0 MHz #Res BW 1.0 MHz #Sweep 100.0 ms (1001 pts) STA

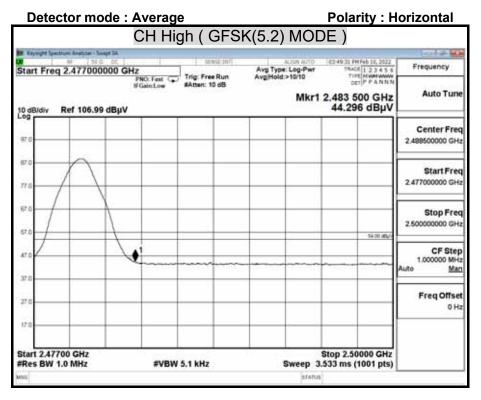
Polarity : Vertical Detector mode : Average CH Low (GFSK(5.2) MODE) Start Freq 2.310000000 GHz FRO: Feat Call Free Run FGainLow Sugar Sec. 04-00-44 PH/Heb 10, 2022 TRACE 1 2 3 4 5 6 TIPE NUMEROW DET P P A N N N Frequency Avg Type: Log-Pwr Avg/Hold:>10/10 Auto Tune Mkr1 2.390 000 GHz 43.051 dBµV 10 dBidiv Ref 106.99 dBµV Center Freq 97 2 358000000 GHz 671 Start Freq 2.310000000 GHz 77 67 Stop Freq 2.40600000 GHz 67 CF Step 1.000000 MHz \$1á? Man 37 Freq Offset 27 0 Hz Stop 2.40600 GHz Sweep 14.73 ms (1001 pts) Start 2.31000 GHz #Res BW 1.0 MHz #VBW 5.1 kHz STAD

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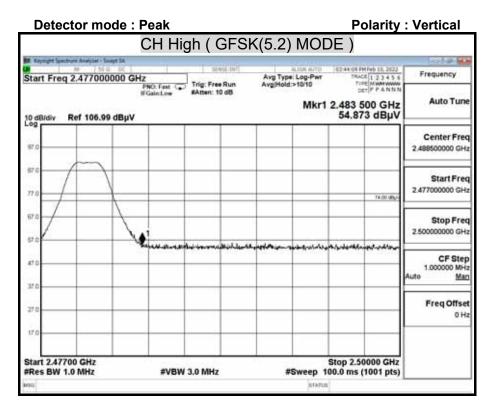
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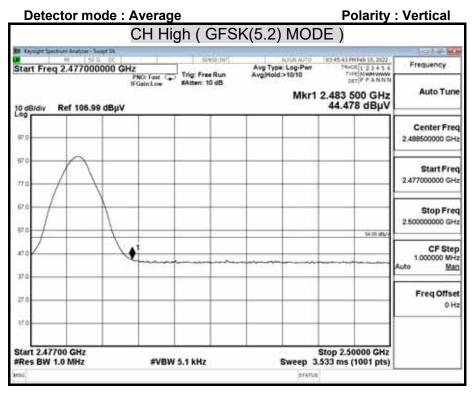






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9.7 POWERLINE CONDUCTED EMISSIONS

LIMITS

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

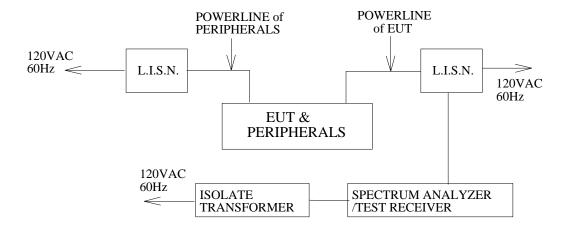
The lower limit applies at the boundary between the frequency ranges.

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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Report No.: TMTN2201000126NR TEST SETUP



TEST PROCEDURE

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

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

Line conducted data is recorded for both NEUTRAL and LINE.



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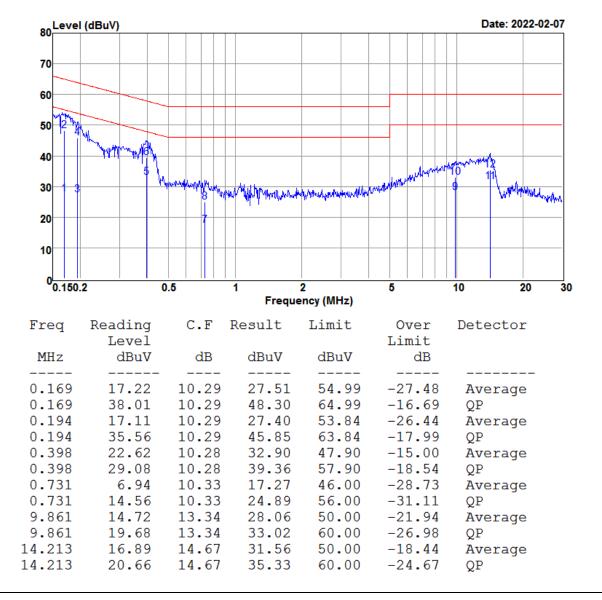
TEST RESULTS

No non-compliance noted.

Model No.	AT-LP120XBT-USB	Test Mode	Line
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.)



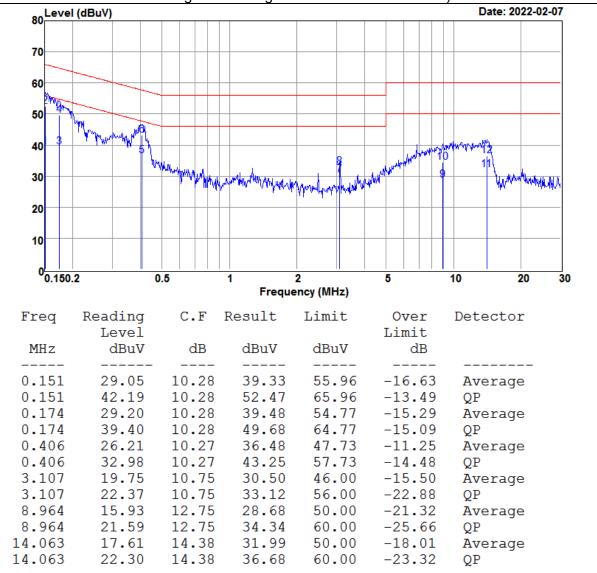


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Model No.	AT-LP120XBT-USB	Test Mode	Phono
Environmental Conditions	1203 70% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

LINE

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



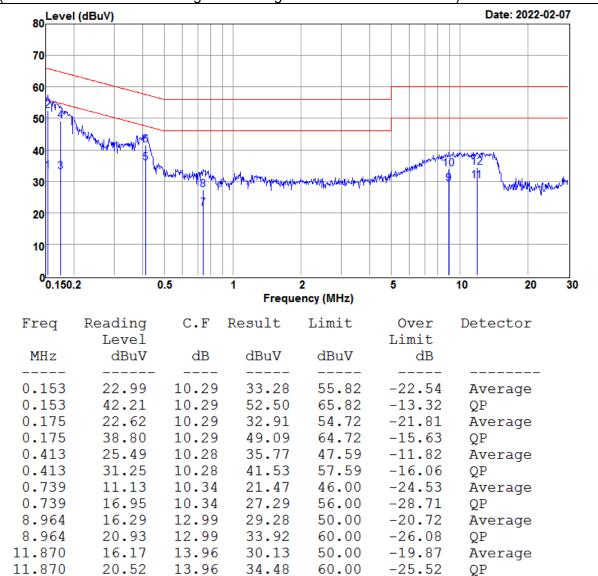


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Model No.	AT-LP120XBT-USB	Test Mode	Phono
Environmental Conditions	203 /0% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

NEUTRAL

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





10. ANTENNA REQUIREMENT

10.1 STANDARD APPLICABLE

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

10.2 ANTENNA CONNECTED CONSTRUCTION

Manufacturer: Advanced Ceramic X Type: Multilayer Chip Antenna Model: AT3216-A2R4PAAT/LF Gain: 1.5 dBi

=== END of Report ===

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