

Shenzhen Toby Technology Co., Ltd.



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Radio Test Report

FCC ID: ZRR-S312

Report No. : TBR-C-202203-0290-2

Applicant : Shenzhen Adition Audio Science & Technology Co.,Ltd

Equipment Under Test (EUT)

EUT Name : 3.1.2 CH Dolby Atmos Soundbar and Subwoofer

Model No. : S312

Series Model No. : ----

Brand Name : Lark Sound

Sample ID : 202203-0290-1-1#& 202203-0290-1-2#

Receipt Date : 2022-04-01

Test Date : 2022-04-01 to 2022-04-30

Issue Date : 2022-05-05

Standards : FCC Part 15 Subpart C 15.247

Test Method : ANSI C63.10: 2013

KDB 558074 D01 15.247 Meas Guidance v05r02

Conclusions : PASS

In the configuration tested, the EUT complied with the standards specified above.

Seven Wu

Witness Engineer :

Engineer Supervisor : JWW SV

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Engineer Manager : Lougha.

Ray La

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.





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Revision History

Report No.	Version	Description	Issued Date
TBR-C-202203-0290-2	Rev.01	Initial issue of report	2022-05-05
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1. General Information about EUT

1.1 Client Information

Applicant	Shenzhen Adition Audio Science & Technology Co.,Ltd	
Address : Industrial Zone, Baihua Community, Gua		Floor1-5, No.2 Building, Huidebao Industrial Park, No.11, Second Industrial Zone, Baihua Community, Guangming Sub-district, Guangming District, Shenzhen City, China
Manufacturer : Shenzhen Adition Audio Science &		Shenzhen Adition Audio Science & Technology Co.,Ltd
Address	01	Floor1-5, No.2 Building, Huidebao Industrial Park, No.11, Second Industrial Zone, Baihua Community, Guangming Sub-district, Guangming District, Shenzhen City, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name		3.1.2 CH Dolby Atmos Soundbar and Subwoofer				
Models No.		S312				
Model Different						
		Operation Frequency:	Bluetooth 4.2(BDR+EDR): 2402MHz~2480MHz			
Due duet		Number of Channel:	79 channels			
Product Description		Antenna Gain:	2.5dBi PCB Antenna			
TOBY		Modulation Type:	GFSK(1Mbps) π /4-DQPSK(2Mbps) 8-DPSK(3Mbps)			
Power Rating		Adapter:GW48W-180250UH Input:100-240V~50/60Hz 1.2A Output:18V, 2.5A				
Software Version		MCU: BV06 Dolby decoder: V23				
Hardware Version	M	V0				

- (1) The antenna gain and adapter provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.
- (2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (3) Antenna information provided by the applicant.



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(4)Channel List:

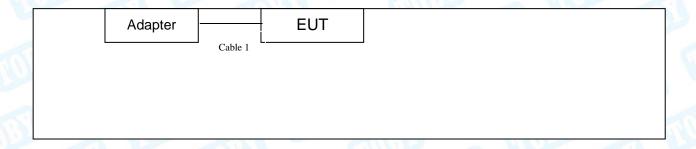
Bluetooth Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)		
00	2402	27	2429	54	2456		
01	2403	28	2430	55	2457		
02	2404	29	2431	56	2458		
03	2405	30	2432	57	2459		
04	2406	31	2433	58	2460		
05	2407	32	2434	59	2461		
06	2408	33	2435	60	2462		
07	2409	34	2436	61	2463		
08	2410	35	2437	62	2464		
09	2411	36	2438	63	2465		
10	2412	37	2439	64	2466		
11	2413	38	2440	65	2467		
12	2414	39	2441	66	2468		
13	2415	40	2442	67	2469		
14	2416	41	2443	68	2470		
15	2417	42	2444	69	2471		
16	2418	43	2445	70	2472		
17	2419	44	2446	71	2473		
18	2420	45	2447	72	2474		
19	2421	46	2448	73	2475		
20	2422	47	2449	74	2476		
21	2423	48	2450	75	2477		
22	2424	49	2451	76	2478		
23	2425	50	2452	77	2479		
24	2426	51	2453	78	2480		
25	2427	52	2454				
26	2428	53	2455				



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1.3 Block Diagram Showing the Configuration of System Tested

Conducted Test& Radiated Test



1.4 Description of Support Units

Faurinment Information								
	Equipment Information							
Name	Model	FCC ID/VOC	Manufacturer	Used "√"				
Adapter	GW48-180250UH			W				
	Cable Information							
Number	Shielded Type	Ferrite Core	Length	Note				
Z		MULL	100					



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1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

	For Conducted Test			
Final Test Mode Description				
Mode 1	Charging + TX GFSK Mode Channel 00			
	For Radiated Test			
Final Test Mode	Description			
Mode 2	TX GFSK Mode Channel 00			
Mode 3	TX Mode(GFSK) Channel 00/39/78			
Mode 4	TX Mode(II /4-DQPSK) Channel 00/39/78			
Mode 5	TX Mode(8-DPSK) Channel 00/39/78			
Mode 6	Hopping Mode(GFSK)			
Mode 7 Hopping Mode(π /4-DQPSK)				
Mode 8 Hopping Mode(8-DPSK)				

Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

TX Mode: GFSK (1 Mbps)
TX Mode: # /4-DQPSK (2 Mbps)
TX Mode: 8-DPSK (3 Mbps)

- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a Mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.



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1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.

Test Software Version	FrequencyTools v0.2.8		
Frequency	2402 MHz	2441MHz	2480 MHz
GFSK	DEF	DEF	DEF
π /4-DQPSK	DEF	DEF	DEF
8-DPSK	DEF	DEF	DEF

1.7 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U _{Lab})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	±3.50 dB ±3.10 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.50 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB



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1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1/F.,Building 6, Rundongsheng Industrial Zone, Longzhu, Xixiang, Bao'an District, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.FCC Accredited Test Site Number: 854351. Designation Number: CN1223.

IC Registration No.: (11950A)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A. CAB identifier: CN0056.



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2. Test Summary

Standard Section	Took Itoms	To a (O a constant a)			
FCC	Test Item	Test Sample(s)	Judgment	Remark	
FCC 15.207(a)	Conducted Emission	202203-0290-1-1#	PASS	N/A	
FCC 15.209 & 15.247(d)	Radiated Unwanted Emissions	202203-0290-1-1#	PASS	N/A	
FCC 15.203	Antenna Requirement	202203-0290-1-2#	PASS	N/A	
FCC 15.247(a)	99% Occupied Bandwidth & 20dB Bandwidth	202203-0290-1-2#	PASS	N/A	
FCC 15.247(b)(1)	Peak Output Power	202203-0290-1-2#	PASS	N/A	
FCC 15.247(a)(1)	Carrier frequency separation	202203-0290-1-2#	PASS	N/A	
FCC 15.247(a)(1)	Time of occupancy	202203-0290-1-2#	PASS	N/A	
FCC 15.247(b)(1)	Number of Hopping Frequency	202203-0290-1-2#	PASS	N/A	
FCC 15.247(d)	Band Edge	202203-0290-1-2#	PASS	N/A	
FCC 15.207(a)	Conducted Unwanted Emissions	202203-0290-1-2#	PASS	N/A	
FCC 15.205	Emissions in Restricted Bands	202203-0290-1-2#	PASS	N/A	
MUDE	On Time and Duty Cycle	202203-0290-1-2#	1	N/A	

3. Test Software

Test Item	Test Software	Manufacturer	Version No.
Conducted Emission	EZ-EMC	EZ	CDI-03A2
Radiation Emission	EZ-EMC	EZ	FA-03A2RE
Radiation Emission	EZ-EMC	EZ	FA-03A2RE+
RF Conducted Measurement	MTS-8310	MWRFtest	V2.0.0.0
RF Test System	JS1120	Tonscend	V2.6.88.0336



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4. Test Equipment

Conducted Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 02, 2021	Jul. 01, 2022
	Compliance				
RF Switching Unit	Direction Systems	RSU-A4	34403	Jul. 02, 2021	Jul. 01, 2022
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 02, 2021	Jul. 01, 2022
LISN	Rohde & Schwarz	ENV216	101131	Jul. 02, 2021	Jul. 01, 2022
Radiation Emission	Test				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jul. 02, 2021	Jul. 01, 2022
MXA Signal Analyzer	Agilent	N9020A	MY47380425	Sep. 03, 2021	Sep. 02, 2022
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 02, 2021	Jul. 01, 2022
EMI Test Receiver	Rohde & Schwarz	ESU-8	100472	Feb. 26, 2022	Feb. 25, 2023
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Feb. 27, 2022	Feb. 26, 2024
Bilog Antenna	SCHWARZBECK	VULB 9168	1225	Dec. 05, 2021	Dec. 04, 2023
Horn Antenna	ETS-LINDGREN	3117	00143207	Feb. 26, 2022	Feb. 25, 2024
Horn Antenna	SCHWARZBECK	BBHA 9120 D	2463	May 20, 2021	May 19, 2022
Horn Antenna	SCHWARZBECK	BBHA 9170	1118	Feb. 26, 2022	Feb. 25, 2024
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 06, 2021	Jul. 05, 2022
Pre-amplifier	SONOMA	310N	185903	Feb. 26, 2022	Feb. 25, 2023
Pre-amplifier	HP	8449B	3008A00849	Feb. 26, 2022	Feb. 25, 2023
HF Amplifier	Tonscend	TAP9E6343	AP21C806117	Sep. 03, 2021	Sep. 02, 2022
HF Amplifier	Tonscend	TAP051845	AP21C806141	Sep. 03, 2021	Sep. 02, 2022
HF Amplifier	Tonscend	TAP0184050	AP21C806129	Sep. 03, 2021	Sep. 02, 2022
Antenna Conducted	Emission				
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 02, 2021	Jul. 01, 2022
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jul. 02, 2021	Jul. 01, 2022
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Sep. 03, 2021	Sep. 02, 2022
Spectrum Analyzer	KEYSIGT	N9020B	MY60110172	Sep. 03, 2021	Sep. 02, 2022
WU .	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO26	Sep. 03, 2021	Sep. 02, 2022
DE Dower Senser	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO29	Sep. 03, 2021	Sep. 02, 2022
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO31	Sep. 03, 2021	Sep. 02, 2022
U. A.	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO33	Sep. 03, 2021	Sep. 02, 2022
RF Control Unit	Tonsced	JS0806-2	21F8060439	Sep. 03, 2021	Sep. 02, 2022



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5. Conducted Emission

5.1 Test Standard and Limit

5.1.1 Test Standard

FCC Part 15.207

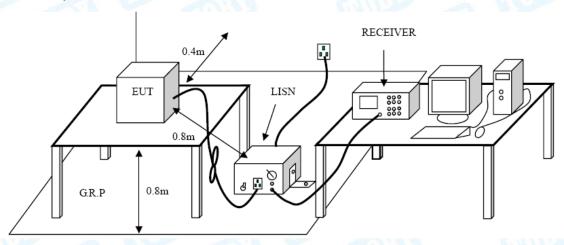
5.1.2 Test Limit

Fragueney	Maximum RF Line Voltage (dBμV)		
Frequency	Quasi-peak Level	Average Level	
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *	
500kHz~5MHz	56	46	
5MHz~30MHz	60	50	

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.2 Test Setup



5.3 Test Procedure

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- ●I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- ●LISN at least 80 cm from nearest part of EUT chassis.
- The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.



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5.4 Deviation From Test Standard

No deviation

5.5 EUT Operating Mode

Please refer to the description of test mode.

5.6 Test Data

Please refer to the Attachment A inside test report.



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6. Radiated and Conducted Unwanted Emissions

6.1 Test Standard and Limit

6.1.1 Test Standard

FCC Part 15.209 & FCC Part 15.247(d)

6.1.2 Test Limit

Genera	General field strength limits at frequencies Below 30MHz		
Frequency Field Strength Measurement (MHz) (microvolt/meter)** (meter			
0.009~0.490	2400/F(KHz)	300	
0.490~1.705	24000/F(KHz)	30	
1.705~30.0	30	30	

Note: 1, The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

General field strength limits at frequencies above 30 MHz			
Frequency (MHz)	Field Strength(IIV/m at 3 m)		
30~88	100	3	
88~216	150	3	
216~960	200	3	
Above 960	500	3	

General field strength limits at frequencies Above 1000MHz			
Distance of 3m (dBuV/m)			
Peak	Average		
74	54		
	Distance of 3n		

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level(dBuV/m)=20log Emission Level(uV/m)

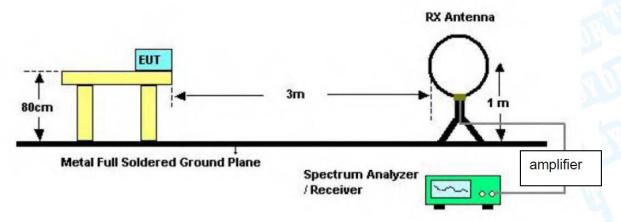
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

6.2 Test Setup

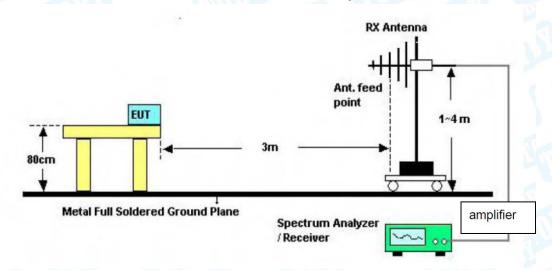
Radiated measurement



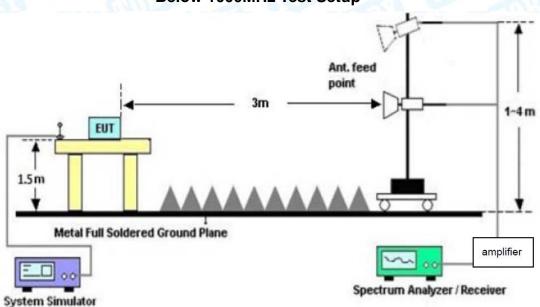
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Below 30MHz Test Setup



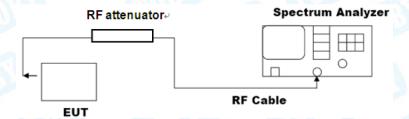
Below 1000MHz Test Setup



Above 1GHz Test Setup Conducted measurement



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6.3 Test Procedure

---Radiated measurement

- The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Below 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- Testing frequency range 30MHz-1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection. Testing frequency range 9KHz-150Hz the measuring instrument use VBW=200Hz with Quasi-peak detection. Testing frequency range 9KHz-30MHz the measuring instrument use VBW=9kHz with Quasi-peak detection.
- Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- For the actual test configuration, please see the test setup photo.



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--- Conducted measurement

Reference level measurement

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to≥1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW≥[3*RBW].
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Emission level measurement

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW≥[3*RBW].
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

6.4 Deviation From Test Standard

No deviation

6.5 EUT Operating Mode

Please refer to the description of test mode.

6.6 Test Data

Radiated measurement please refer to the Attachment B inside test report. Conducted measurement please refer to the Appendix B.



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7. Emissions in Restricted Bands

7.1 Test Standard and Limit

7.1.1 Test Standard

FCC Part 15.205 & FCC Part 15.247(d)

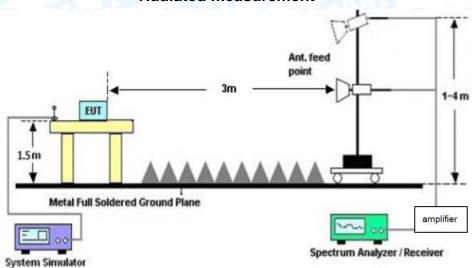
7.1.2 Test Limit

Restricted Frequency	Distance Meters(at 3m)		
Band (MHz)	Peak (dBuV/m)	Average (dBuV/m)	
2310 ~2390	74	54	
2483.5 ~2500	74	54	
	Peak (dBm)see 7.3 e)	Average (dBm) see 7.3 e)	
2310 ~2390	-21.20	-41.20	
2483.5 ~2500	-21.20	-41.20	

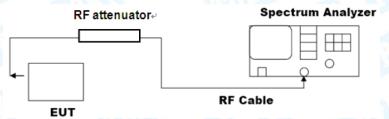
Note: According the ANSI C63.10 11.12.2 antenna-port conducted measurements may also be used as an alternative to radiated measurements for determining compliance in the restricted frequency bands requirements. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test forcabinet/case emissions is required.

7.2 Test Setup

Radiated measurement



Conducted measurement





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7.3 Test Procedure

---Radiated measurement

- Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- ●The Peak Value and average value both need to comply with applicable limit above 1 GHz.
- Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- For the actual test configuration, please see the test setup photo.

--- Conducted measurement

- a) Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 11.12.2.3 through 11.12.2.5 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
- b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP (see 11.12.2.6 for guidance on determining the applicable antenna gain).
- c) Add the appropriate maximum ground reflection factor to the EIRP (6 dB for frequencies ≤30 MHz; 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive; and 0 dB for frequencies > 1000 MHz).
- d) For MIMO devices, measure the power of each chain and sum the EIRP of all chains in linear terms (i.e., watts and mW).
- e) Convert the resultant EIRP to an equivalent electric field strength using the following relationship:

 $E = EIRP-20 \log d + 104.8$

where

E is the electric field strength in dBuV/m

EIRP is the equivalent isotropically radiated power in dBm

d is the specified measurement distance in m

- f) Compare the resultant electric field strength level with the applicable regulatory limit.
- g) Perform the radiated spurious emission test.



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7.4 Deviation From Test Standard

No deviation

7.5 EUT Operating Mode

Please refer to the description of test mode.

7.6 Test Data

Remark: The test uses antenna-port conducted measurements as an alternative to radiated measurements for determining compliance in the restricted frequency bands requirements.

Please refer to the Appendix B section.



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8. 99% Occupied and 20dB Bandwidth

8.1 Test Standard and Limit

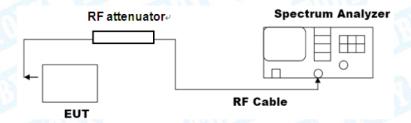
8.1.1 Test Standard

FCC Part 15.205 & FCC Part 15.247(a)

8.1.2 Test Limit

For an FHSS system operating in the 2400 to 2483.5 MHz band, there are no limits for 20dB bandwidth and 99% occupied bandwidth.

8.2 Test Setup



8.3 Test Procedure

- The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:
- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.



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h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

8.4 Deviation From Test Standard

No deviation

8.5 EUT Operating Mode

Please refer to the description of test mode.

8.6 Test Data

Please refer to the Appendix A.



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9. Peak Output Power Test

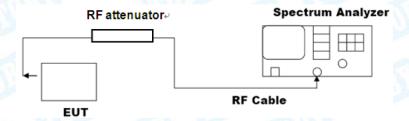
9.1 Test Standard and Limit

9.1.1 Test Standard FCC Part 15.247(b)(1)

9.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
	P _{max-pk} ≤ 1 W	
	<i>N</i> _{ch} ≥ 75	
	f ≥ MAX { 25 kHz, BW _{20dB} }	
	max. BW20dB not specified	
	t ch ≤ 0.4 s for $T = 0.4*N$ ch	
Peak Output Power	<i>P</i> max-pk ≤ 0.125 W	2400~2483.5
	Nch ≥ 15	
	f ≥ [MAX{25 kHz, 0.67*BW _{20dB} }	
	OR MAX{25 kHz, BW20dB}]	
	max. BW20dB not specified	
	t ch ≤ 0.4 s for $T = 0.4$ * N ch	

9.2 Test Setup



f = hopping channel carrier frequency separation

9.3 Test Procedure

- This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:
- a) Use the following spectrum analyzer settings:
 - 1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
 - 2) RBW > 20 dB bandwidth of the emission being measured.
 - 3) VBW≥ RBW.
 - 4) Sweep: Auto.
 - 5) Detector function: Peak.
 - 6) Trace: Max hold.
- b) Allow trace to stabilize.
- c) Use the marker-to-peak function to set the marker to the peak of the emission.
- d) The indicated level is the peak output power, after any corrections for external



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attenuators and cables.

e) A plot of the test results and setup description shall be included in the test report.

NOTE-A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

9.4 Deviation From Test Standard

No deviation

9.5 EUT Operating Mode

Please refer to the description of test mode.

9.6 Test Data

Please refer to the Appendix A.



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10. Carrier frequency separation

10.1 Test Standard and Limit

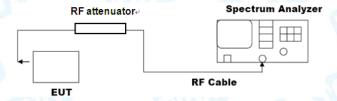
10.1.1 Test Standard

FCC Part 15.247(a)(1)

10.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
	<i>P</i> _{max-pk} ≤ 1 W	
	<i>N</i> _{ch} ≥ 75	
TILL	f ≥ MAX { 25 kHz, BW20dB }	
	max. BW20dB not specified	
	t ch ≤ 0.4 s for $T = 0.4*N$ ch	
Carrier frequency	<i>P</i> max-pk ≤ 0.125 W	2400~2483.5
separation	Nch ≥ 15	The same of the sa
	f ≥ [MAX{25 kHz, 0.67*BW _{20dB} }	
	OR MAX{25 kHz, BW20dB}]	
	max. BW20dB not specified	
	$tch \le 0.4 \text{ s for } T = 0.4*N_{ch}$	

10.2 Test Setup



f = hopping channel carrier frequency separation

10.3 Test Procedure

- ●The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
- a) Span: Wide enough to capture the peaks of two adjacent channels.
- b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- c) Video (or average) bandwidth (VBW) ≥ RBW.
- d) Sweep: Auto.
- e) Detector function: Peak.
- f) Trace: Max hold.
- g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.



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10.4 Deviation From Test Standard

No deviation

10.5 Antenna Connected Construction

Please refer to the description of test mode.

10.6 Test Data

Please refer to the Appendix A.



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11. Time of occupancy (dwell time)

11.1 Test Standard and Limit

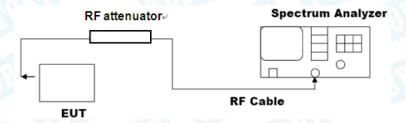
11.1.1 Test Standard

FCC Part 15.247(a)(1)

11.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
	P _{max-pk} ≤ 1 W	
	<i>N</i> _{ch} ≥ 75	
	f ≥ MAX { 25 kHz, BW _{20dB} }	
	max. BW20dB not specified	
	t ch ≤ 0.4 s for $T = 0.4*N$ ch	
Time of occupancy	<i>P</i> max-pk ≤ 0.125 W	2400~2483.5
(dwell time)	Nch ≥ 15	
	f ≥ [MAX{25 kHz, 0.67*BW _{20dB} }	
	OR MAX{25 kHz, BW20dB}]	
	max. BW20dB not specified	
	$tch \le 0.4 \text{ s for } T = 0.4*Nch$	

11.2 Test Setup



f = hopping channel carrier frequency separation

11.3 Test Procedure

- The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
- a) Span: Zero span, centered on a hopping channel.
- b) RBW shall be \Box channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
- c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
- d) Detector function: Peak.
- e) Trace: Max hold.

Use the marker-delta function to determine the transmit time per hop. If this value varies



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with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) =

(number of hops on spectrum analyzer)x(period specified in the requirements / analyzer sweep time)

The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.

The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

11.4 Deviation From Test Standard

No deviation

11.5 Antenna Connected Construction

Please refer to the description of test mode.

11.6 Test Data

Please refer to the Appendix A.



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12. Number of hopping frequencies

12.1 Test Standard and Limit

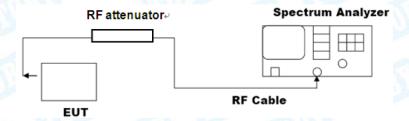
12.1.1 Test Standard

FCC Part 15.247(b)(1)

12.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
	P _{max-pk} ≤ 1 W	
	<i>N</i> _{ch} ≥ 75	
MILLOR	f ≥ MAX { 25 kHz, BW20dB }	
	max. BW20dB not specified	
	t ch ≤ 0.4 s for $T = 0.4*N$ ch	2400~2483.5
Carrier frequency	<i>P</i> max-pk ≤ 0.125 W	
separation	Nch ≥ 15	
	f ≥ [MAX{25 kHz, 0.67*BW _{20dB} }	
	OR MAX{25 kHz, BW20dB}]	
	max. BW20dB not specified	
	t ch ≤ 0.4 s for $T = 0.4*N$ ch	

12.2 Test Setup



f = hopping channel carrier frequency separation

12.3 Test Procedure

- ●The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
- a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- c) VBW ≥ RBW.
- d) Sweep: Auto.
- e) Detector function: Peak.
- f) Trace: Max hold.
- g) Allow the trace to stabilize.

It might prove necessary to break the span up into subranges to show clearly all of the



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hopping frequencies.

Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

12.4 Deviation From Test Standard

No deviation

12.5 Antenna Connected Construction

Please refer to the description of test mode.

12.6 Test Data

Please refer to the Appendix A.



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13. Antenna Requirement

13.1 Test Standard and Limit

11.1.1 Test Standard

FCC Part 15.203

11.1.2 Requirement

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

13.2 Deviation From Test Standard

No deviation

13.3 Antenna Connected Construction

The gains of the antenna used for transmitting is 2.5dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

13.4 Test Data

The EUT antenna is a PCB Antenna. It complies with the standard requirement.

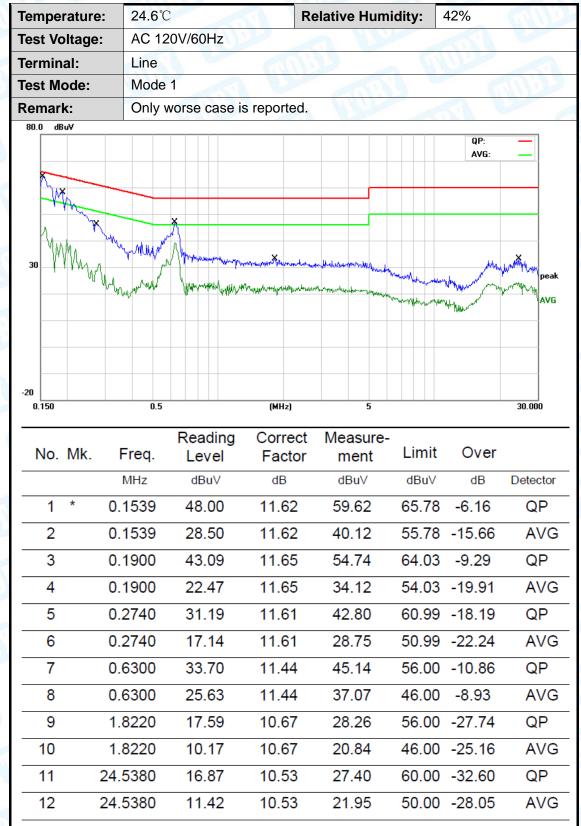
	Antenna Type			
100	⊠Permanent attached antenna			
3 5	Unique connector antenna			
	Professional installation antenna	4000		





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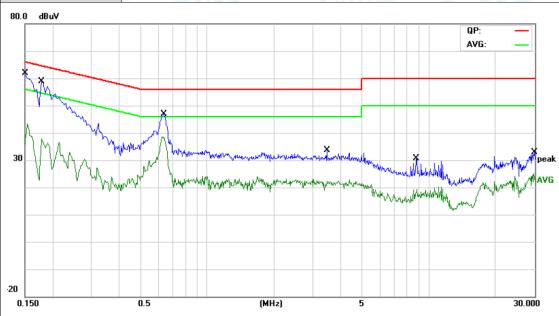
Attachment A-- Conducted Emission Test Data



- 1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
- 2. Margin (dB) =QuasiPeak/Average (dBuV)-Limit (dBuV)



	THE R. LEWIS CO., LANSING, MICH.				
	Temperature:	24.6℃	Relative Humidity:	42%	
1	Test Voltage:	AC 120V/60Hz		WILLIAM STATE	
	Terminal:	Neutral			
đ	Test Mode:	Mode 1			
Remark: Only worse case is reported.				WILLIAM STATE	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBu∀	dBu∀	dB	Detector
1	*	0.1500	47.88	11.59	59.47	65.99	-6.52	QP
2		0.1500	26.46	11.59	38.05	55.99	-17.94	AVG
3		0.1780	43.44	11.63	55.07	64.57	-9.50	QP
4		0.1780	22.62	11.63	34.25	54.57	-20.32	AVG
5		0.6340	33.56	11.46	45.02	56.00	-10.98	QP
6		0.6340	27.16	11.46	38.62	46.00	-7.38	AVG
7		3.4660	15.66	10.14	25.80	56.00	-30.20	QP
8		3.4660	8.66	10.14	18.80	46.00	-27.20	AVG
9		8.7460	10.78	10.08	20.86	60.00	-39.14	QP
10		8.7460	4.42	10.08	14.50	50.00	-35.50	AVG
11		29.8740	15.15	10.69	25.84	60.00	-34.16	QP
12		29.8740	9.05	10.69	19.74	50.00	-30.26	AVG

TOBY

- Remark:
 1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
- 2. Margin (dB) =QuasiPeak/Average (dBuV)-Limit (dBuV)



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Attachment B--Unwanted Emissions Data

--- Radiated Unwanted Emissions

9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB

Below the permissible value has no need to be reported.

30MHz~1GHz

emperature:	23.9℃			Relative Hu	midity:	44%	NA.
est Voltage:	AC 120V	60Hz		WALL STATE		Alike	
Ant. Pol.	Horizonta						
est Mode:	Mode 2	a. W	U				
Remark:	Only wors	se case is	reported.	Mary Control		Miller	
80.0 dBuV/m							
					(RF)FC	C 15C 3M Radia	ntion
						Margi	n -6 dB
30 ~		_					
30		,		3 4 X X	5		6 X
M		يُّر ا	M	Mark I I	A work	which was a popular	mm.
	My so a sa sa	,M, M,	VMV	Λ //ν	W/7 W		
	A. AMA.	k-A					
-20							
30.000 40 50	60 70		(MHz)	30	0 400	500 600 7	00 1000.0
	F	Reading	Correct	Measure-			
No. Mk.	Freq.	Level	Factor	ment	Limit	Over	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
		dDdv	UD/III	ubu v/III	abaviiii		
1 * 33		48.68	-15.88	32.80	40.00	-7.20	peak
	.3279						peak peak
2 118	.3279 3.6014	48.68	-15.88	32.80	40.00	-7.20	
2 118 3 204	.3279 3.6014 4.9551	48.68 41.45	-15.88 -22.45	32.80 19.00	40.00 43.50	-7.20 -24.50	peak
2 118 3 204 4 256	.3279 3.6014 4.9551 3.5211	48.68 41.45 43.14	-15.88 -22.45 -19.82	32.80 19.00 23.32	40.00 43.50 43.50	-7.20 -24.50 -20.18	peak peak

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = QuasiPeak (dB μ V/m)-Limit QPK(dB μ V/m)



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Temperature:	23.9℃	Relative Humidity:	44%				
Test Voltage:	AC 120V/60Hz		University				
Ant. Pol.	Vertical 2	ertical 2					
Test Mode:	Mode		W.				
Remark:	Only worse case is repor	ted.					



N	Ю.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		*	33.7986	52.24	-16.24	36.00	40.00	-4.00	QP
2			45.3755	54.55	-22.03	32.52	40.00	-7.48	peak
3			117.7725	53.16	-22.46	30.70	43.50	-12.80	peak
4			163.7550	51.18	-20.89	30.29	43.50	-13.21	peak
5			277.0935	40.86	-16.75	24.11	46.00	-21.89	peak
6			750.1083	28.87	-6.55	22.32	46.00	-23.68	peak

^{*:}Maximum data x:Over limit !:over margin

- Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
 QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = QuasiPeak (dB μ V/m)-Limit QPK(dB μ V/m)



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Above 1GHz

Temperature:	23.9℃	Relative Humidity:	44%
Test Voltage:	DC 120V	THUE STATE OF THE PARTY OF THE	3 130
Ant. Pol.	Horizontal		133
Test Mode:	TX GFSK Mode 2402MHz		

No.	Mk	. Freq.			Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1		4804.387	43.89	12.42	56.31	74.00	-17.69	peak
2	*	4804.408	33.41	12.42	45.83	54.00	-8.17	AVG

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	23.9℃	Relative Humidity:	44%
Test Voltage:	DC 120V/60HZ	THU THE	
Ant. Pol.	Vertical	WILLIAM STATE	
Test Mode:	TX GFSK Mode 2402MHz		THE STATE OF THE S

No.	Mk	. Freq.			Measure- ment	Limit	Over	
		MHz	dBu∀	dB	dBuV/m	dB/m	dB	Detector
1		4804.174	43.32	12.42	55.74	74.00	-18.26	peak
2	*	4804.285	33.90	12.42	46.32	54.00	-7.68	AVG

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.



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MALL NATIONAL PROPERTY AND ADDRESS OF THE PARTY AND ADDRESS OF THE PART							
Temperature:	mperature: 23.9°C Relative Humidity						
Test Voltage:	DC 120V/60HZ	OC 120V/60HZ					
Ant. Pol.	Horizontal	7	VO				
Test Mode:	TX GFSK Mode 244	1MHz					

No.	Mk	. Freq.	_	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1	*	4882.328	32.38	12.90	45.28	54.00	-8.72	AVG
2		4882.448	43.84	12.90	56.74	74.00	-17.26	peak

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m) 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	23.9℃	Relative Humidity:	44%
Test Voltage:	DC 120V/60HZ		
Ant. Pol.	Vertical	U	
Test Mode:	TX GFSK Mode 2441MHz		A LIVE

No.	Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBu∀/m	dB/m	dB	Detector
1	*	4882.258	33.11	12.90	46.01	54.00	-7.99	AVG
2		4882.375	43.94	12.90	56.84	74.00	-17.16	peak

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.



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Temperature:	23.9℃	23.9℃ Relative Humidity:				
Test Voltage:	DC 120V/60HZ	OC 120V/60HZ				
Ant. Pol.	Horizontal	1 10				
Test Mode:	TX GFSK Mode 2480MHz					

No.	Mk	. Freq.			Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBu∀/m	dB/m	dB	Detector
1		4960.360	43.96	13.38	57.34	74.00	-16.66	peak
2	*	4960.425	32.86	13.38	46.24	54.00	-7.76	AVG

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	23.9℃	Relative Humidity:	44%
Test Voltage:	DC 120V/60HZ		DA CAL
Ant. Pol.	Vertical		
Test Mode:	TX GFSK Mode 2480MHz	TUDE	The same

No.	Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1		4960.217	43.41	13.37	56.78	74.00	-17.22	peak
2	*	4960.251	32.00	13.37	45.37	54.00	-8.63	AVG

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m) 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.



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	Temperature:	23.9℃	44%				
1	Test Voltage:	DC 120V/60HZ	DC 120V/60HZ				
	Ant. Pol.	Horizontal	Horizontal				
	Test Mode:	TX π /4-DQPSK Mode 2402	MHz				

No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1	*	4804.168	32.95	12.42	45.37	54.00	-8.63	AVG
2		4804.281	45.03	12.42	57.45	74.00	-16.55	peak

Remark

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	23.9℃	3.9℃ Relative Humidity:				
Test Voltage:	DC 120V/60HZ	DC 120V/60HZ				
Ant. Pol.	Vertical	Vertical				
Test Mode:	TX π /4-DQPSK Mode 240	TX π /4-DQPSK Mode 2402MHz				

No.	Mk	. Freq.			Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1	*	4804.323	33.60	12.42	46.02	54.00	-7.98	AVG
2		4804.411	45.47	12.42	57.89	74.00	-16.11	peak

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.





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Temperature:	23.9℃	23.9℃ Relative Humidity:				
Test Voltage:	DC 120V/60HZ	DC 120V/60HZ				
Ant. Pol.	Horizontal	Horizontal				
Test Mode:	TX π /4-DQPSK Mode 2441	TX π /4-DQPSK Mode 2441MHz				

No.	Mk	. Freq.		Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1	*	4882.135	32.40	12.90	45.30	54.00	-8.70	AVG
2		4882.308	43.04	12.90	55.94	74.00	-18.06	peak

Remark

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	23.9℃	Relative Humidity:				
Test Voltage:	DC 120V/60HZ					
Ant. Pol.	Vertical	Vertical				
Test Mode:	TX π /4-DQPSK Mode 2441	MHz				

No.	Mk	. Freq.			Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1		4882.057	43.75	12.90	56.65	74.00	-17.35	peak
2	*	4882.328	32.05	12.90	44.95	54.00	-9.05	AVG

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.



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Temperature:	23.9℃	Relative Humidity:	44%			
Test Voltage:	DC 120V/60HZ	DC 120V/60HZ				
Ant. Pol.	Horizontal	1 100				
Test Mode:	TX π /4-DQPSK Mode 2480M	Hz				

No.	Mk	c. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1		4960.274	43.00	13.37	56.37	74.00	-17.63	peak
2	*	4960.340	32.35	13.38	45.73	54.00	-8.27	AVG

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	23.9℃	23.9°C Relative Humidity:				
Test Voltage:	DC 120V/60HZ	DC 120V/60HZ				
Ant. Pol.	Vertical					
Test Mode:	TX π /4-DQPSK Mode 2480M	Hz				

No.	Mk.	. Freq.			Measure- ment	Limit	Over	
		MHz	dBu∀	dB	dBuV/m	dB/m	dB	Detector
1	*	4960.274	32.20	13.37	45.57	54.00	-8.43	AVG
2		4960.420	43.40	13.38	56.78	74.00	-17.22	peak

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.





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Temperature:	23.9℃	Relative Humidity:	44%
Test Voltage:	DC 120V/60HZ		
Ant. Pol.	Horizontal		100
Test Mode:	TX 8-DPSK Mode 2402MHz		MILLER

No.	Mk	. Freq.			Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1		4803.758	44.04	12.42	56.46	74.00	-17.54	peak
2	*	4803.852	32.94	12.42	45.36	54.00	-8.64	AVG

- Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
 Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	23.9℃	Relative Humidity:	44%			
Test Voltage:	DC 120V/60HZ	DC 120V/60HZ				
Ant. Pol.	Vertical	THU				
Test Mode:	TX 8-DPSK Mode 240	2MHz	A HIVE			

No.	Mk.	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	4803.688	34.67	12.42	47.09	54.00	-6.91	AVG
2		4803.748	43.32	12.42	55.74	74.00	-18.26	peak

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- Margin (dB) = Peak/AVG (dBμV/m)-Limit PK/AVG(dBμV/m)
 The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.



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	Temperature:	23.9℃	23.9℃ Relative Humidity:					
1	Test Voltage:	DC 120V/60HZ	DC 120V/60HZ					
	Ant. Pol.	Horizontal	0	O. A.				
	Test Mode:	TX 8-DPSK Mode 2441MHz						

No.	Mk	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1	*	4882.349	32.38	12.90	45.28	54.00	-8.72	AVG
2		4882.405	42.71	12.90	55.61	74.00	-18.39	peak

Remark

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	23.9℃	23.9℃ Relative Humidity:				
Test Voltage:	DC 120V/60HZ	DC 120V/60HZ				
Ant. Pol.	Vertical	W. Taran	WWW.			
Test Mode:	TX 8-DPSK Mode 2441MHz					

No.	Mk	. Freq.			Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1	*	4882.207	32.81	12.90	45.71	54.00	-8.29	AVG
2		4882.318	43.97	12.90	56.87	74.00	-17.13	peak

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.







Temperature:	23.9℃	Relative Humidity:	44%
Test Voltage:	DC 120V/60HZ		Ullive
Ant. Pol.	Horizontal	1 10	
Test Mode:	TX 8-DPSK Mode 2480MHz		

No.	M	k.	Freq.	Reading Level		Measure- ment	Limit	Over	
			MHz	dBu∀	dB	dBuV/m	dB/m	dB	Detector
1	*	4	1959.691	32.83	13.37	46.20	54.00	-7.80	AVG
2		4	1959.741	44.51	13.37	57.88	74.00	-16.12	peak

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.

Temperature:	23.9℃	Relative Humidity:	44%
Test Voltage:	DC 120V/60HZ		
Ant. Pol.	Vertical		
Test Mode:	TX 8-DPSK Mode 2480MHz		WILL STATE

No.	Mk	c. Freq.			Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBuV/m	dB/m	dB	Detector
1		4960.280	43.41	13.37	56.78	74.00	-17.22	peak
2	*	4960.387	32.36	13.38	45.74	54.00	-8.26	AVG

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. Peak/AVG (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Peak/AVG (dB μ V/m)-Limit PK/AVG(dB μ V/m)
- 4. The tests evaluated1-26.5GHz,The testing has been conformed to the 10th harmonic of the highest fundamental frequency.
- 5. No report for the emission which more than 20dB below the prescribed limit.

----END OF REPORT-----