
FCC Test Report

Report No.: AGC01924220503FE10

FCC ID : 2A3JH-CZ649

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : WIRELESS FM TRANSMITTER

BRAND NAME : N/A

MODEL NAME : CZ649, BH649, BH649A, BH649B, BH649C, CZ649A, CZ649B, CZ649C

APPLICANT : Dongguan Yuzhenrong Trading Co., Ltd.

DATE OF ISSUE : Aug. 09, 2022

STANDARD(S) : FCC Part 15.239

REPORT VERSION : V1.0

Attestation of Global Compliance(Shenzhen) Co., Ltd



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Attestation of Global Compliance(Shenzhen)Co., Ltd
Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd
Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: <http://www.agccert.com/>



Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug. 09, 2022	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	Dongguan Yuzhenrong Trading Co., Ltd.
Address	Room 204, No.74, Humen Xinlian 9th Street, Humen Village, Humen Town, Dongguan City, Guangdong, China
Manufacturer	Dongguan Yuzhenrong Trading Co., Ltd.
Address	Room 204, No.74, Humen Xinlian 9th Street, Humen Village, Humen Town, Dongguan City, Guangdong, China
Factory	Dongguan Pinmi Electronic Technology Co., Ltd
Address	2F, E block, Hongda Industrial Park, Shima Community, Tangxia Town, Dongguan City, Guangdong, China
Product Designation	WIRELESS FM TRANSMITTER
Brand Name	N/A
Test Model	CZ649
Series Model	BH649, BH649A, BH649B, BH649C, CZ649A, CZ649B, CZ649C
Difference Description	All the same except for the model name
Date of test	May 17, 2022 to Jul. 29, 2022
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCTR-ER-FCC-FMV1.0

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC part 15.239.

Prepared By 
 Alan Duan
 (Project Engineer) Aug. 09, 2022

Reviewed By 
 Calvin Liu
 (Reviewer) Aug. 09, 2022

Approved By 
 Max Zhang
 (Authorized Officer) Aug. 09, 2022

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2. GENERAL INFORMATION

2.1. Product technical description

Operation Frequency	88.1MHz-107.9MHz
Test Frequency	Low: 88.1 MHz; Middle:98.0 MHz; High: 107.9 MHz
Field Strength(3m)	46.12dBuV/m(PK)@3m
Modulation	FM
Number of channels	199(Channel spacing 100kHz)
Hardware Version	V1.3
Software Version	V1.0
Antenna Designation	Built-in Antenna (Met 15.203 Antenna requirement)
Power Supply	DC 12-24V

2.2 TEST FREQUENCY LIST

Frequency Band	Channel Number	Frequency
88.1MHz-107.9MHz	1	88.10
	2	88.20
	--	--
	100	98.00
	101	98.10
	--	--
	198	107.80
	199	107.90

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2.3 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2A3JH-CZ649** filing to comply with RSS-210 of the Science and Economic Development Canada rules.

2.4. MEASUREMENT UNCERTAINTY

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

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 2.9$ dB
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 3.8$ dB
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.9$ dB
Uncertainty of total RF power, conducted	$U_c = \pm 0.8$ dB
Uncertainty of RF power density, conducted	$U_c = \pm 2.6$ dB
Uncertainty of spurious emissions, conducted	$U_c = \pm 2$ %
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2$ %

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3. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	FM TX_88.1 MHz
2	FM TX_98.0 MHz
3	FM TX_107.9 MHz

Note:

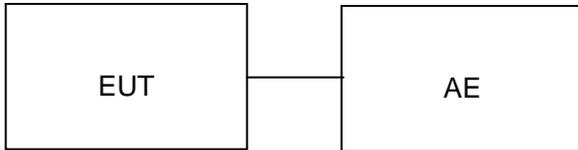
1. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
2. All the requirements have been tested by modulating the transmitter with a 2.5 kHz tone at a fixed level which set to the manufacturer's maximum rated input to the modulator.
3. Only the result of the worst case was recorded in the report, if no other cases.
4. Tuning-Range confirmed 88.1 ~ 107.9 MHz.
5. To start the radio test and cycle through the different modes press the user button on top of the EUT.

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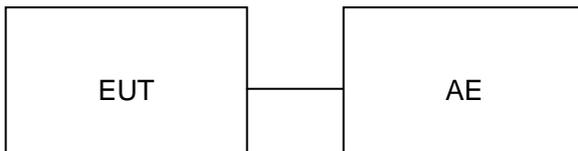
4. SYSTEM TEST CONFIGURATION

4.1. CONFIGURATION OF TESTED SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:



4.2 EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	WIRELESS FM TRANSMITTER	CZ649	2A3JH-CZ649	EUT
2	Battery	N/A	DC 12V	AE
3	Battery	L2 400-H	DC 12V	AE
4	Cement resistance	N/A	0.6m unshielded	AE

4.3 SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.239	Field Strength of Fundamental and Spurious Emission	Compliant
15.215	Bandwidth	Compliant
15.207	Line Conducted Emission	Not applicable

Note: 1.N/A means not applicable.

2. The device under test is battery-powered and does not require evaluation of AC Power Line Conducted Emission.

5. TEST FACILITY

TestSite	Attestation of Global Compliance(Shenzhen) Co., Ltd
Location	1-2/F,Building19,JunfengIndustrialPark,ChongqingRoad,HepingCommunity,Fuhai Street,Bao'anDistrict,Shenzhen,Guangdong,China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESCI	10096	Mar. 28, 2022	Mar. 27, 2023
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Nov. 17, 2021	Nov. 16, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn Antenna	SCHWARZBEC	BBHA9170	768	Oct. 31, 2021	Oct. 30, 2023
Active Loop Antenna (9K-30Mhz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS	3117	00034609	Apr. 23, 2021	Apr. 22, 2023
Preamplifier Assembly	ETS	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
Wideband Antenna	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 08, 2021	Jan. 07, 2023
Test Software	FARA	EZ-EMC(Ver.R A-03A)	N/A	N/A	N/A

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6. RADIATED EMISSION

6.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

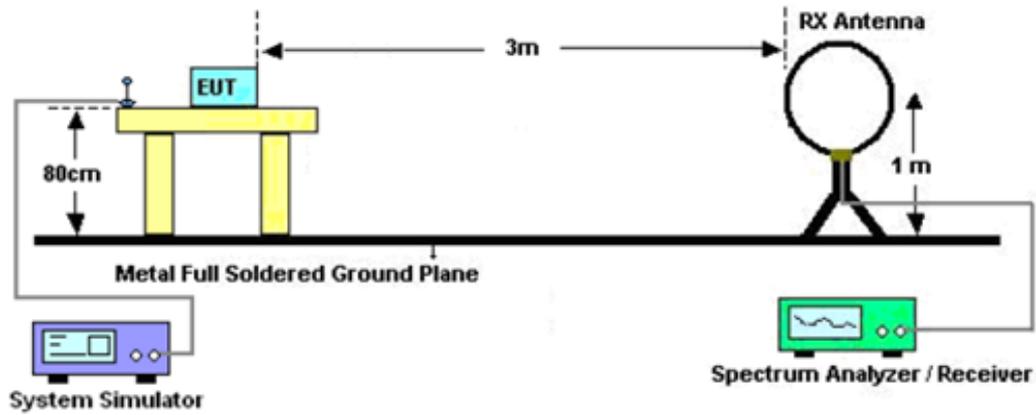
Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

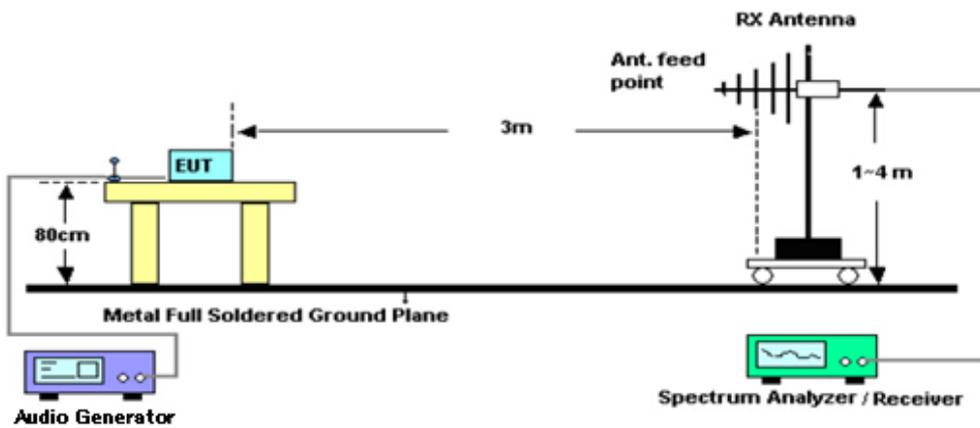
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6.2.TEST SETUP

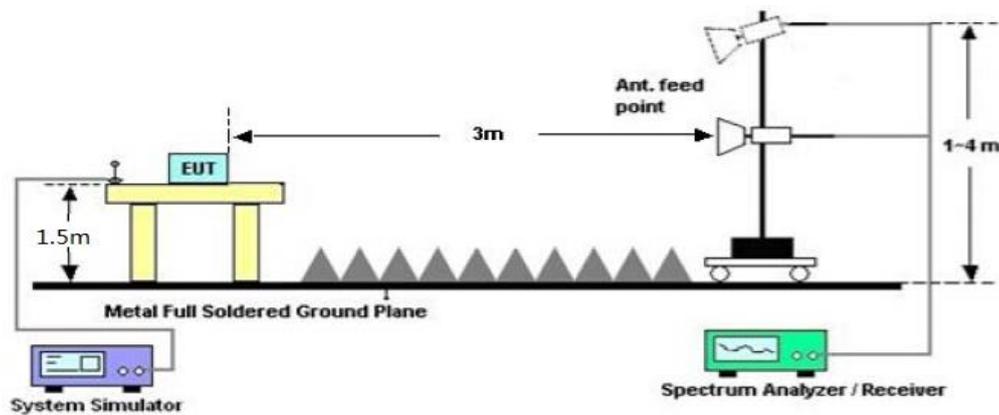
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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6.3. MEASUREMENT RESULT

TTEST RESULT FOR FIELD STRENGTH OF FUNDAMENTAL

Frequency MHz	Polarization	Measurementd B(uV/m) PK	Limit dB(uV/m) AV	Over dB	Pass/Fail	Detector
88.100	H	34.40	47.96	13.56	Pass	PK
88.100	V	45.86	47.96	2.10	Pass	PK
98.000	H	33.13	47.96	14.83	Pass	PK
98.000	V	43.20	47.96	4.76	Pass	PK
107.900	H	33.19	47.96	14.77	Pass	PK
107.900	V	46.12	47.96	1.84	Pass	PK

TEST RESULT FOR FIELD STRENGTH OF BAND EDGE EMISSION

Frequency MHz	Polarization	Measurement dB(uV/m) QP	Limit dB(uV/m) QP	Over dB	Pass/Fail	Detector
88.000	H	28.63	40	11.37	Pass	QP
88.000	V	33.16	40	6.84	Pass	QP
108.000	H	26.73	43.5	16.77	Pass	QP
108.000	V	34.16	43.5	9.34	Pass	QP

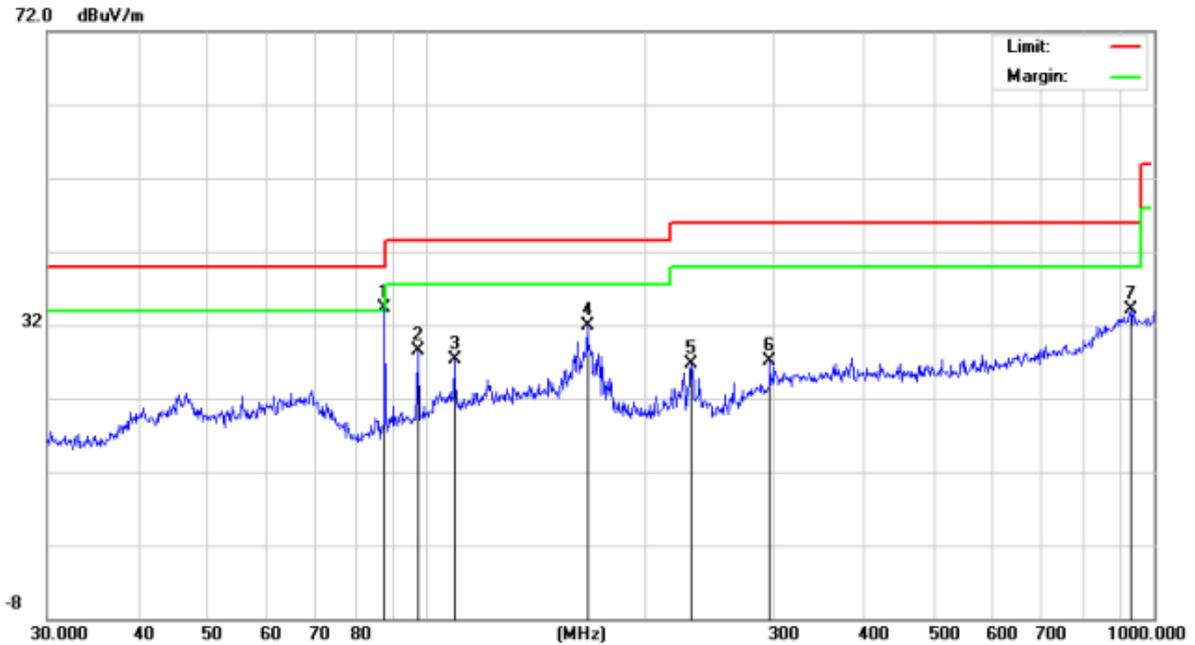
Note: The above two frequencies are the worst case for the band edge emission test.

RADIATED EMISSION FROM BELOW 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

RADIATED EMISSION FROM 30MHz TO 1000MHz

EUT	WIRELESS FM TRANSMITTER	Model Name	CZ649
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

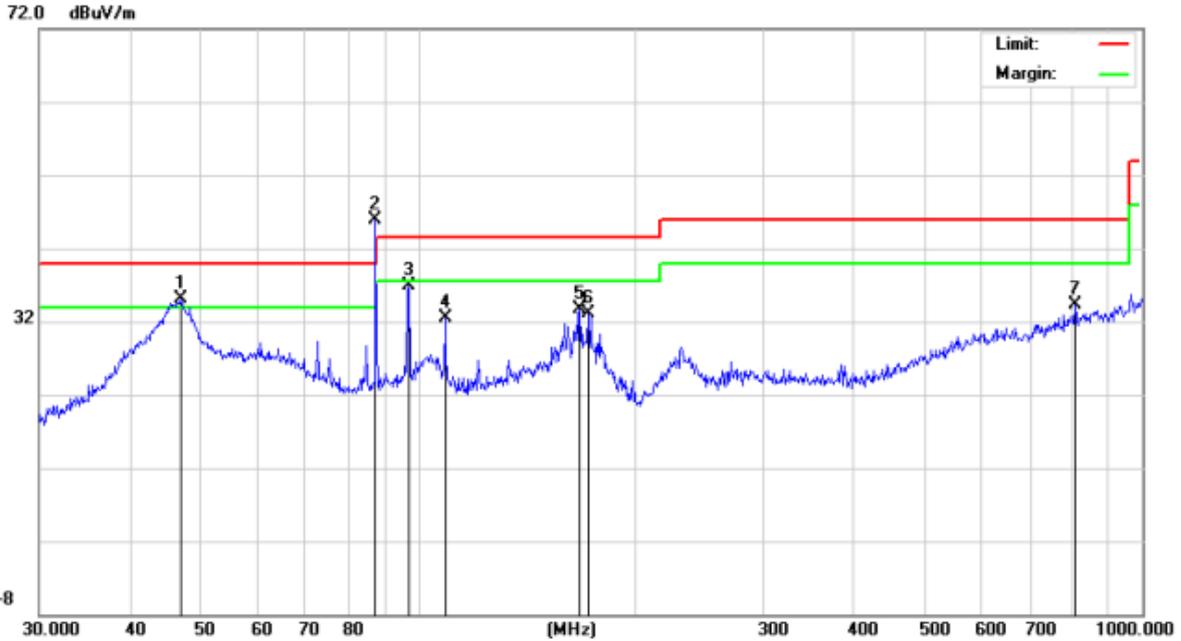


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	*	88.1000	19.95	14.45	34.40	47.96	-13.56	peak
2		97.1148	13.83	14.75	28.58	43.50	-14.92	peak
3		109.0286	11.21	16.15	27.36	43.50	-16.14	peak
4		166.0680	15.69	16.14	31.83	43.50	-11.67	peak
5		230.9068	10.29	16.47	26.76	46.00	-19.24	peak
6		296.1836	6.95	20.15	27.10	46.00	-18.90	peak
7		929.0082	6.12	27.90	34.02	46.00	-11.98	peak

RESULT: PASS

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EUT	WIRELESS FM TRANSMITTER	Model Name	CZ649
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	!	46.9948	21.27	13.89	35.16	40.00	-4.84	peak
2	*	88.1000	30.89	14.97	45.86	47.96	-2.10	peak
3		97.1148	23.28	13.58	36.86	43.50	-6.64	peak
4		109.0286	17.23	15.25	32.48	43.50	-11.02	peak
5		167.2368	17.20	16.53	33.73	43.50	-9.77	peak
6		171.9945	16.31	16.75	33.06	43.50	-10.44	peak
7		807.4291	6.95	27.43	34.38	46.00	-11.62	peak

RESULT: PASS

- Note:** 1. Factor=Antenna Factor+ Cable loss-Amplifier gain, Over=Measurement-Limit.
 2. The "Factor" value can be calculated automatically by software of measurement system.
 3. All test modes had been pre-tested. The mode1 is the worst case and recorded in the report.
 4. Which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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7. BANDWIDTH

7.1. MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:

Centre frequency = Operation Frequency

RBW=3KHz

VBW=10KHz

Span: 300kHz

Sweep time: Auto

For the occupied bandwidth measurements, the input signal shall be a 2.5 kHz tone.

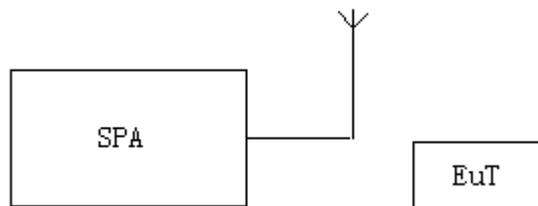
The level of the tone shall be 16 dB higher than that required to produce a frequency deviation of 75 kHz, or 50% of the manufacturer's rated deviation, whichever is less.

Alternatively, in the event that a 16 dB increase cannot be achieved, the level of the tone shall be set to the manufacturer's maximum rated input to the modulator.

2. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the "N dB down" function of SPA to define the bandwidth.

3. Record the plots and Reported.

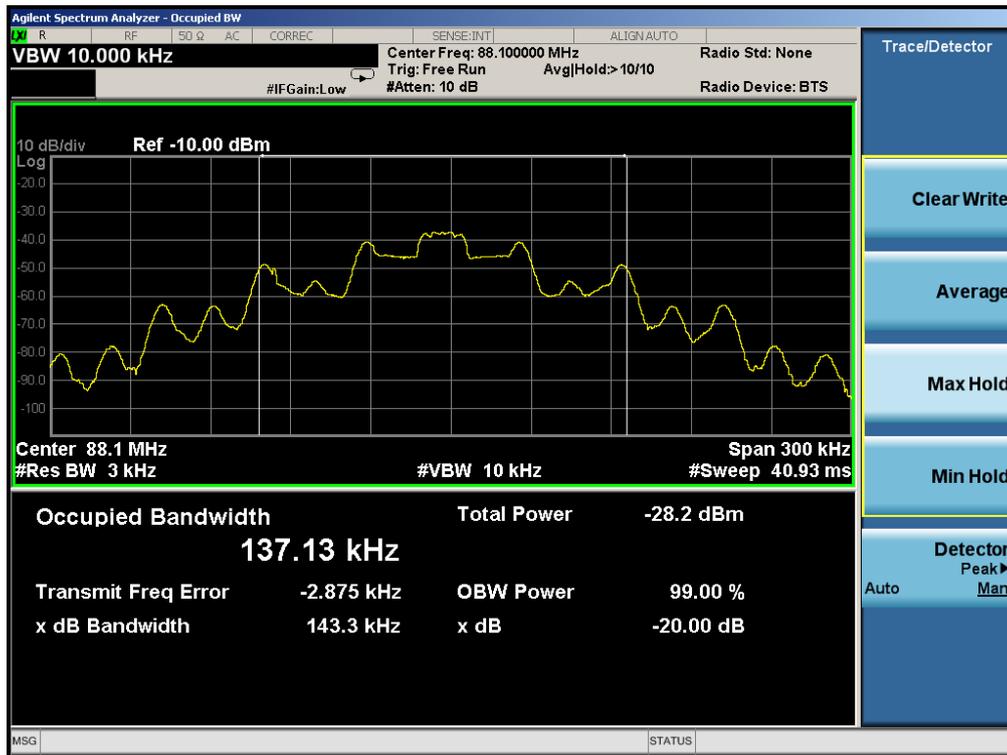
7.2. TEST SETUP



7.3. TEST RESULT

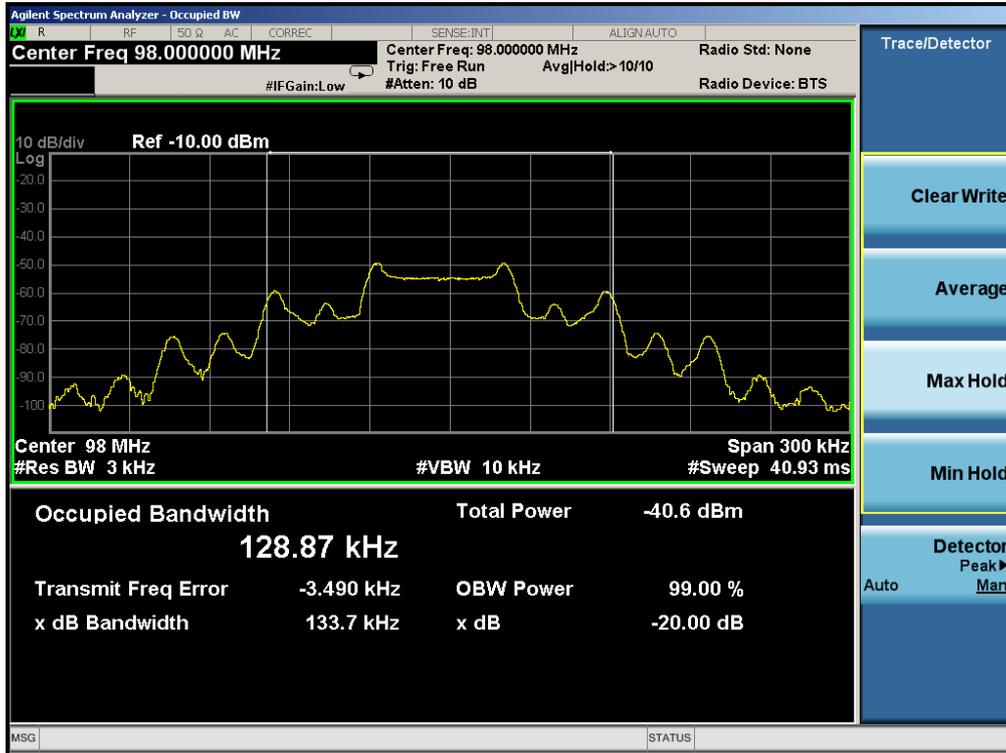
Test Data of Occupied Bandwidth and -20dB Bandwidth					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (KHz)	-20dB Bandwidth (KHz)	Limits (KHz)	Pass or Fail
FM	88.1	137.13	143.3	≤200	Pass
FM	98	128.87	133.7	≤200	Pass
FM	107.9	126.55	132.3	≤200	Pass

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

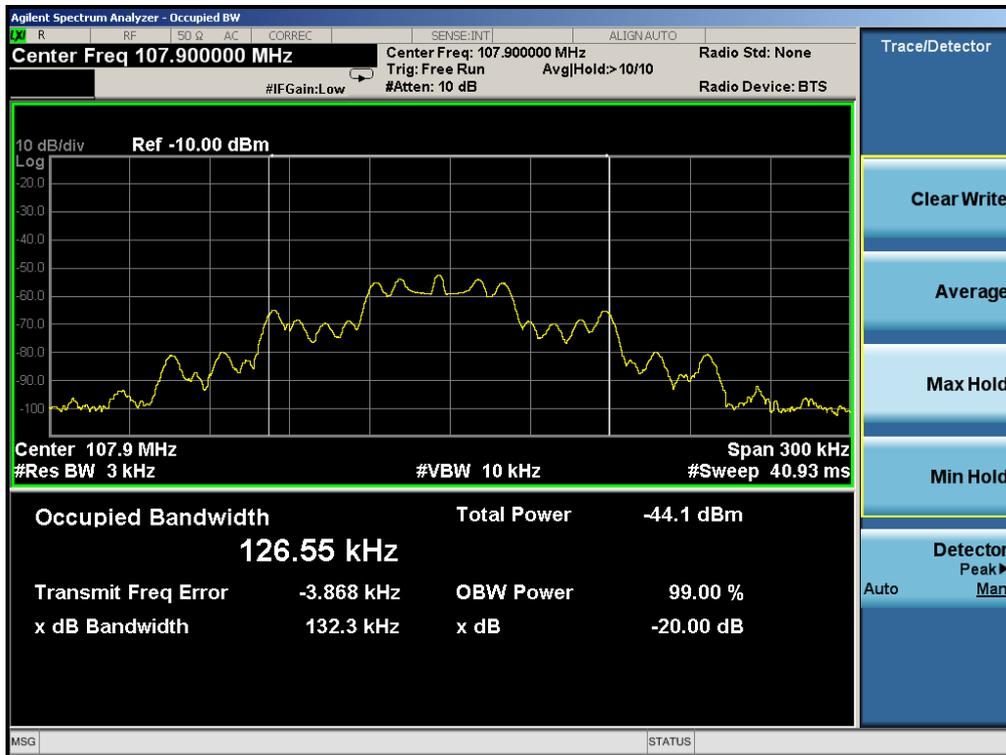


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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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8. AC Power LINE CONDUCTED EMISSION TEST

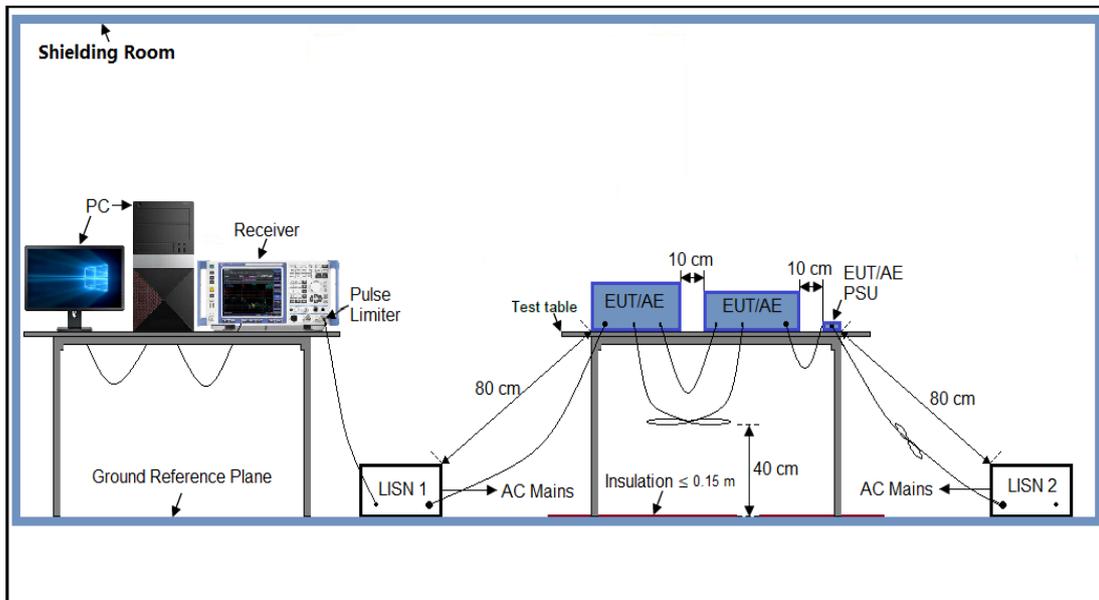
8.1 LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P. (dB μ V)	Average (dB μ V)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note: 1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

8.2 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



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8.3 PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

8.4 FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

8.5 MEASUREMENT RESULTS

Note: 1.N/A means not applicable.

2. The device under test is battery-powered and does not require evaluation of AC Power Line Conducted Emission.

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC01924220503AP01

APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC01924220503AP02

----END OF REPORT----

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Attestation of Global Compliance(Shenzhen)Co., Ltd

Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: <http://www.agccert.com/>



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