FCC TEST REPORT
FCC ID:2A3NZ-KMS-IEM420

Product	:	UHF Wireless System
Model Name	:	For details, see section 3.1 of the report
Brand	:	N/A
Report No.	:	NCT24043235E

Prepared for

Enping Tianheng Electroacoustic Equipment Factory limited company

Second Floor, Rear Building, Xiot Building Jinjiang Avenue, Encheng Enping, Jiangmen, China

Prepared by

Shenzhen NCT Testing Technology Co., Ltd.

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TEST RESULT CERTIFICATION

Applicant's name	:	Enping Tianheng Electroacoustic Equipment Factory limited company
Address	:	Second Floor, Rear Building, Xiot Building Jinjiang Avenue, Encheng Enping, Jiangmen, China
Manufacture's name	:	en ping shi tian heng dian sheng qi cai chang
Address	:	HouDongErLou, EnChengJinJiangDaDaoXiAoTeDaSha, Enping Guangdong
Product name	:	UHF Wireless System
Model name	:	For details, see section 3.1 of the report
Standards	:	FCC CFR47 Part 15 Section 15.236
Test procedure	:	ANSI C63.10:2013
Date of test	:	Oct. 22, 2024-Oct. 31, 2024
Date of Issue	:	Nov. 04, 2024

This device described above has been tested by NCT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Test Engineer:

Keven Wu / Engineer

Technical Manager:

Henry Wang / Manager

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1. VERSION

Report No.	Version	Description	Approved
NCT24043235E	Rev.01	Initial issue of report	Nov. 04, 2024

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.236) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.203	Antenna Requirement	N/A	
15.207	Conducted Emission	PASS	
15.236(d)(1)	Maximum Radiated Power(EIRP)	PASS	
15.236(g)	Radiated Spurious Emission Measurement	PASS	
15.236(g)	Spurious Emission at Antenna Port	PASS	
15.236(f)(2)	Occupied Bandwidth Emission	PASS	
15.236(f)(3)	Frequency Stability	PASS	

NOTE:

(1)” N/A” denotes test is not applicable in this Test Report

2.1 TEST FACILITY

Site Description

EMC Lab. : Accredited by CNAS, 2022-09-27
The certificate is valid until 2028.01.07
The Laboratory has been assessed and proved to be in compliance with
CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)
The Certificate Registration Number is L8251
Designation Number: CN1347
Test Firm Registration Number: 894804
Accredited by A2LA, June 14, 2023
The Certificate Registration Number is 6837.01

Accredited by Industry Canada, November 09, 2018
The Conformity Assessment Body Identifier is CN0150
Company Number: 30806

Name of Firm : Shenzhen NCT Testing Technology Co., Ltd.

Site Location : A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, People's Republic of China

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± 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 %.

Parameter	**Uncertainty**
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(9KHz~30MHz)	±4.51dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB
Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%	

3.GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	UHF Wireless System
Model Name	KMS-IEM420
Serial Model	KMS-IEM430, KMS-400, KMS-IEM500S, IE-X1000, IE-X500, IE-X700, UX-IEM1200, UX-IEM1600, UX-IEM2000, UX-IEM2200, UX-IEM2500, UX-IEM2800, UX-IEM3200, SU-A10, SU-A8, SU-A5, SU-A20, SU-A50, AU-200, AU-300, AU-1000, AU-2000, IE-X8, IE-X5, IE-X1200, KMS-700, KMS-800, KMS-900, KMS-121, KMS-111, KMS-189, KMS-260
Model Difference	All the same except for differences in the model number, interface, exterior buttons, or exterior colors.
Hardware version	N/A
Software version	N/A
Operation Frequency:	510.6-589.6MHz
Modulation Type:	DQPSK
Antenna Type:	External antenna
Antenna Gain:	2.15 dBi
Ratings	DC 12V
Remark：the Antenna gain is provided by customer from Antenna spec. and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.	

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.
The EUT has been associated with peripherals pursuant to ANSI C63.10-2013 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).
The details of test channels and bandwidth were for RF conductive measurement.

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	**510.6**	09	519.6	42	551.6	75	584.4
02	511.6	...	...	43	552.6	76	585.6
03	512.6	...	...	44	553.6	77	586..6
04	513.6	37	546.6	45	554.6	78	587.6
05	514.6	38	547.6	...	...	79	588.6
06	515.6	39	548.6	...	...	80	**589.6**
07	517.6	40	549.6	...	...		
08	518.6	41	**550.6**	74	583.6		

Note:

1. Test of channel was included the lowest, middle and highest frequency in highest data rate and to perform the test, then record on this report.

	Channel	Frequency(MHz)
Low Channel	01	510.6
Mid Channel	41	550.6
High Channel	80	589.6

3.2 DESCRIPTION OF TEST MODES

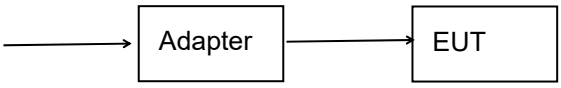
For All Emission	
Final Test Mode	Description
Transmitting mode	Keep the EUT in continuously transmitting mode

Note:

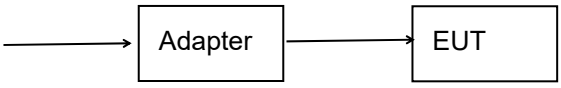
(1) Fully-charged battery is used during the test

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission



Conducted Emission Test



Spurious emissions

3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Adapter	OMIX	X2903	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
966 Shielded Room	966 Room	/	EMToni	2022/5/31	2025/5/30
EMI Test Receiver	ESCI	101178	Rohde & Schwarz	2024/6/17	2025/6/16
Amplifi（30MHz-1GHz）	BBV 9743 B	00374	SCHNWARZBECK	2024/6/17	2025/6/16
Bilog Antenna（30MHz-1GHz）	VULB9162	00473	SCHNWARZBECK	2023/3/19	2025/3/18
Horn antenna（1GHz-18GHz）	BBHA 9120 D	02622	SCHNWARZBECK	2023/3/19	2025/3/18
Pream plifier（1GHz-18GHz）	BBV 9718D	0024	SCHNWARZBECK	2024/6/17	2025/6/16
Spectrum Analyze（10Hz-40GHz）	FSV 40	100952	Rohde & Schwarz	2024/6/17	2025/6/16
Pream plifier（18GHz-40GHz）	BBV 9721	0056	SCHNWARZBECK	2024/6/17	2025/6/16
Double Ridge Guide Horn Antenna（18GHz-40GHz）	SAS-574	588	A.H.System	2023/3/19	2025/3/18
Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHNWARZBECK	2024/6/17	2025/6/16
Amplifier (9KHz-30MHz)	CVP 9222 C	00109	CHNWARZBECK	2024/6/17	2025/6/16
MXG Signal Analyzer	N9020A	MY50510202	Agilent	2024/6/17	2025/6/16
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2024/6/17	2025/6/16
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2024/6/17	2025/6/16
Power Sensor	TR1029-2	512364	Techoy	2024/6/17	2025/6/16
RF Swith	TR1029-1	512364	Techoy	2024/6/17	2025/6/16
Cable	DA800-4000MM	NA	DA	2024/6/17	2025/6/16
Cable	DA800-11000MM	NA	DA	2024/6/17	2025/6/16
Filter	LLF-1001	NA	Lair Microwave	2024/6/17	2025/6/16

Conduction Test equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
944 Shielded Room	944 Room	/	EMToni	2022/5/31	2025/5/30
EMI Test Receiver	ESPI	101604	Rohde & Schwarz	2024/6/17	2025/6/16
LISN	ENV 216	102796	Rohde & Schwarz	2024/6/17	2025/6/16
LISN	VN1-13S	004023	CRANAGE	2024/6/17	2025/6/16
Cable	RG223-1500MM	NA	RG	2024/6/17	2025/6/16

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ-EMC	Ver.EMC-CON 3A1.1+
2	EMC radiation test system	FALA	EZ-EMC	Ver.FA-03A2 RE+
3	RF test system	TACHOY	RFTest	V1.0.0
4	RF communication test system	TACHOY	RFTest	V1.0.0

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION LIMITS

(Frequency Range 150KHz-30MHz)

FREQUNCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

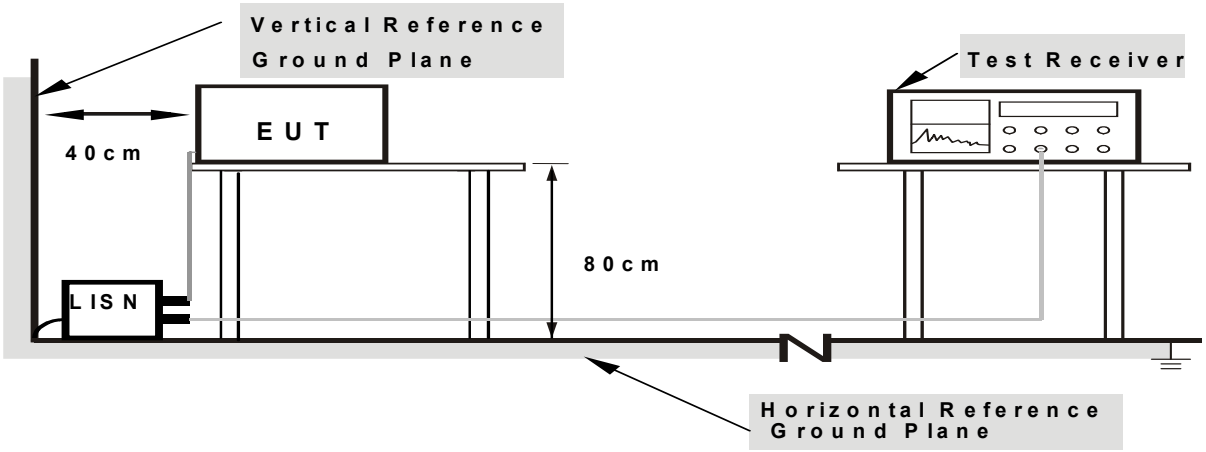
4.1.2 TEST PROCEDURE

a. 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.
b. 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.
c. 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.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



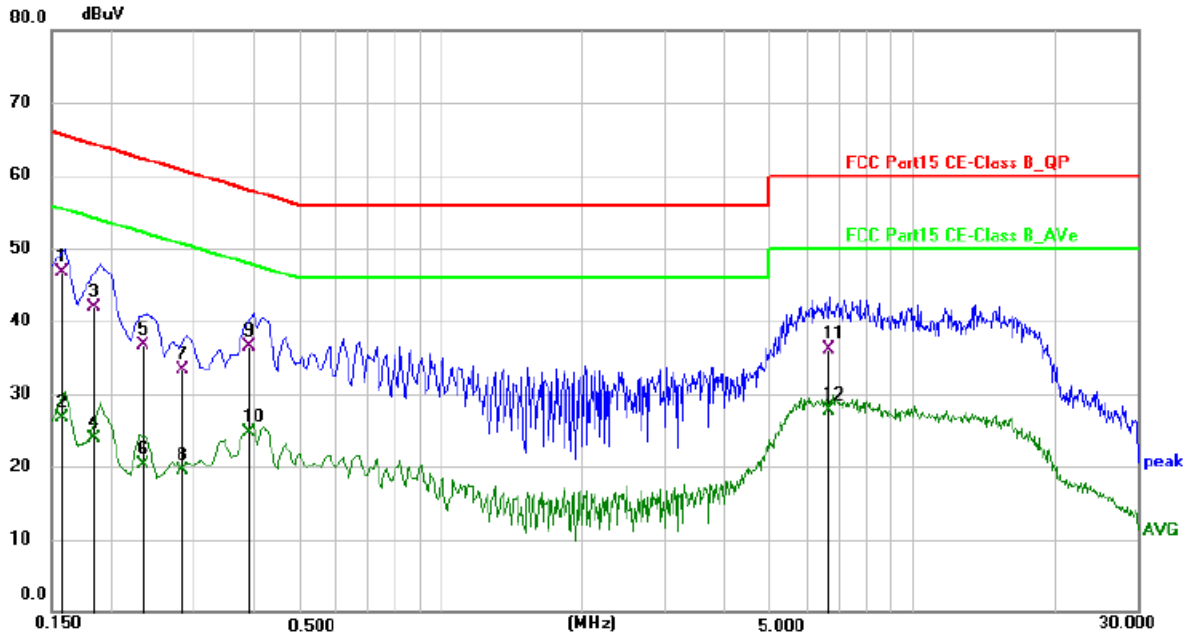
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

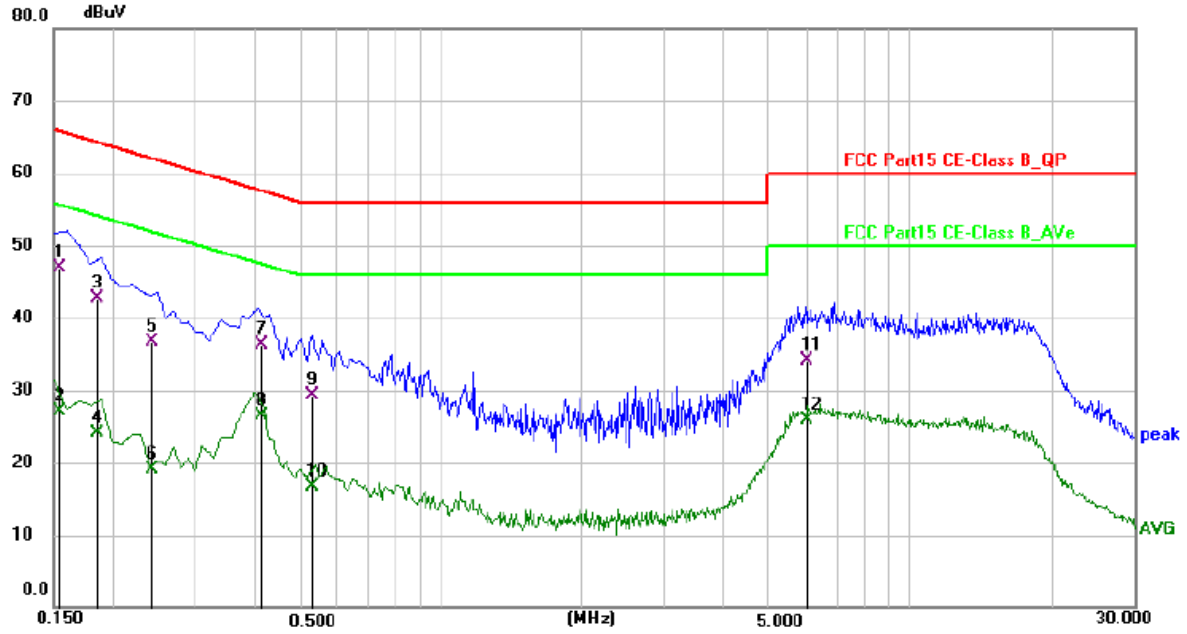
4.1.6 TEST RESULTS

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	L
Test Voltage ：	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1 *	0.1586	37.12	9.67	46.79	65.54	-18.75	QP	P
2	0.1586	17.02	9.67	26.69	55.54	-28.85	AVG	P
3	0.1850	32.17	9.67	41.84	64.26	-22.42	QP	P
4	0.1850	14.22	9.67	23.89	54.26	-30.37	AVG	P
5	0.2341	27.05	9.67	36.72	62.30	-25.58	QP	P
6	0.2341	10.57	9.67	20.24	52.30	-32.06	AVG	P
7	0.2836	23.55	9.67	33.22	60.71	-27.49	QP	P
8	0.2836	9.91	9.67	19.58	50.71	-31.13	AVG	P
9	0.3935	26.85	9.67	36.52	57.99	-21.47	QP	P
10	0.3935	15.12	9.67	24.79	47.99	-23.20	AVG	P
11	6.6677	26.35	9.74	36.09	60.00	-23.91	QP	P
12	6.6677	17.94	9.74	27.68	50.00	-22.32	AVG	P

Temperature :	26℃	Relative Humidity:	54%
Pressure :	101kPa	Phase :	N
Test Voltage :	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1 *	0.1554	37.23	9.67	46.90	65.71	-18.81	QP	P
2	0.1554	17.50	9.67	27.17	55.71	-28.54	AVG	P
3	0.1869	33.09	9.68	42.77	64.17	-21.40	QP	P
4	0.1869	14.43	9.68	24.11	54.17	-30.06	AVG	P
5	0.2436	27.01	9.66	36.67	61.97	-25.30	QP	P
6	0.2436	9.48	9.66	19.14	51.97	-32.83	AVG	P
7	0.4163	26.60	9.67	36.27	57.52	-21.25	QP	P
8	0.4163	16.89	9.67	26.56	47.52	-20.96	AVG	P
9	0.5305	19.65	9.67	29.32	56.00	-26.68	QP	P
10	0.5305	7.09	9.67	16.76	46.00	-29.24	AVG	P
11	6.0012	24.35	9.74	34.09	60.00	-25.91	QP	P
12	6.0012	16.19	9.74	25.93	50.00	-24.07	AVG	P

Notes: 1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

4.2 RADIATED EMISSION MEASUREMENT

Test Requirement:	ETSI EN 300 422-1 V1.4.2(2011-08)
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

4.2.1 RADIATED EMISSION LIMITS

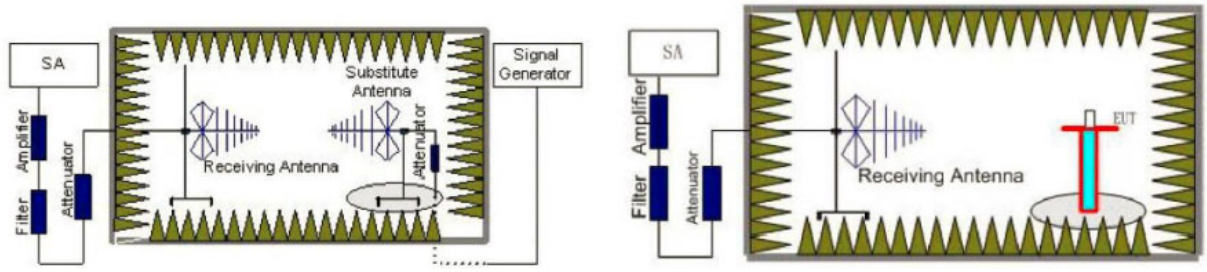
According to 15.236(g)

Table 3: Limits for spurious emissions

State	Frequency		
	47 MHz to 74 MHz 87,5 MHz to 137 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other Frequencies below 1 000 MHz	Frequencies above 1 000 MHz
Operation	4 nW	250 nW	1 µW
Standby	2 nW	2 nW	20 nW

Remark：
dbm=10Log(mw)
EIRP=Emeas+20Log(dmeas)-104.7
EIRP is the equivalent isotropically radiated power, in dBm
Emeas is the field strength of the emission at the measurement distance, in dBuV/m
dmeas is the measurement distance. in 3m
So 4nw=4*10^(-6) mW=-54dbm 250nW=250*10^(-6) mW=-36dbm
Emeas=(-54)-20Log(3)+104.7 Emeas=(-36)-20Log(3)+104.7
=41.16 dBuV/m =59.16 dBuV/m
4.2.2 DEVIATION FROM TEST STANDARD
No deviation

4.2.3 TEST SETUP



Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10KHz,	RBW=120KHz,	RBW=1MHz,
VBW =30KHz	VBW=300KHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak	QP Detector function = peak, AV

4.2.4 **TEST PROCEDURE**

1. The EUT was placed on a turntable with 1.5m height
2. The test distance between the receiving antenna and the EUT is 3 meter, while the receiving (test)antenna is kept at 1.5 meter height.
3. Set EUT in continuous transmitting with maximum output power at test frequency.
4. The table was rotated from 0 to 360 degree to search the highest radiated emission.
5. Repeat step 3 to 4 for each polarization and test channel to find the worst emission level
6. The results obtained are compared to the limits in order to prove compliance with the reguirement

4.2.5 TEST RESULTS

Radiated Spurious Emission (9KHz-30MHz)

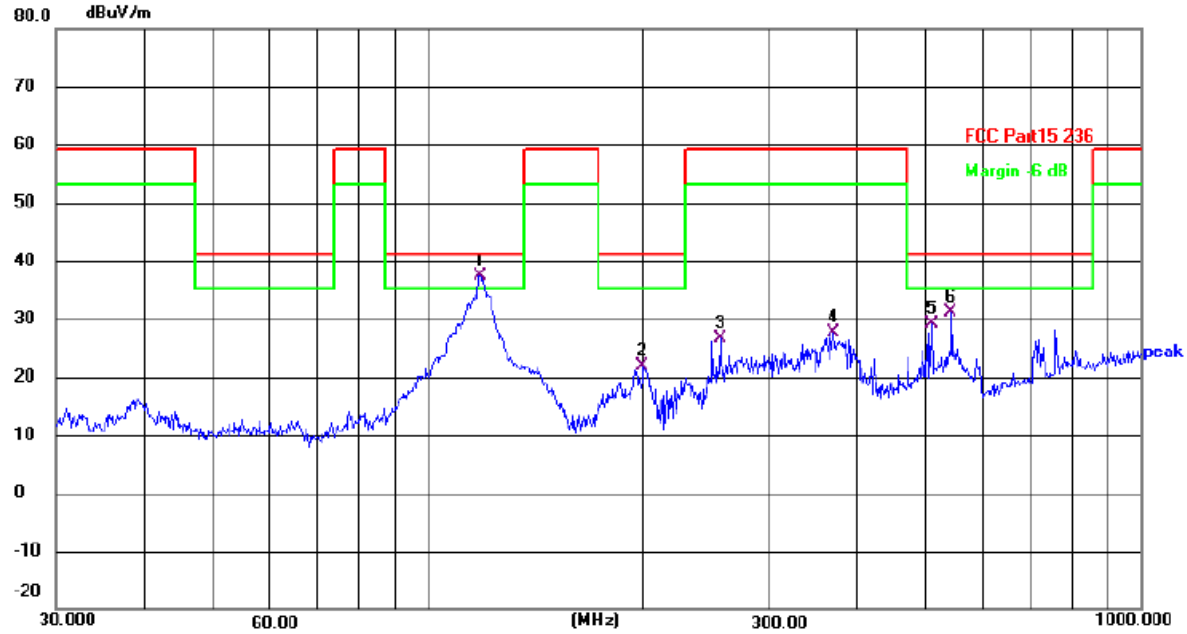
Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

1. The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
2. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
3. Limit line=Specific limits(dBuV) + distance extrapolation factor.

Radiated Spurious Emission (Between 30MHz – 1GHz)

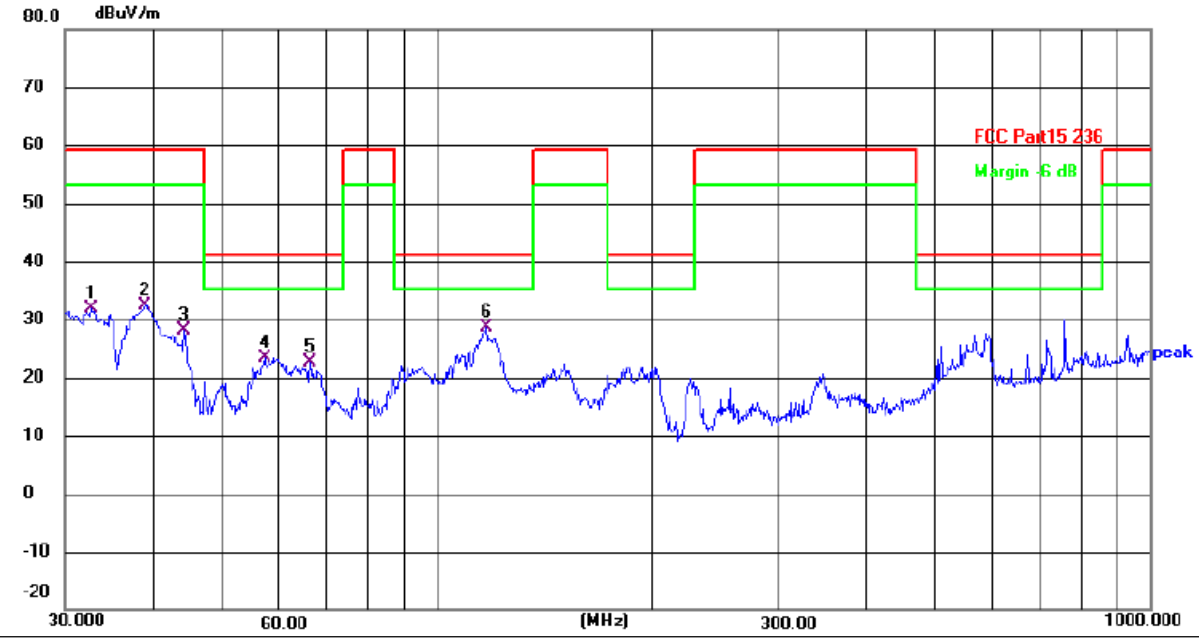
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	101 kPa	Polarization :	Horizontal
Test Voltage :	DC 12V		
Test Mode :	TX Mode (Low Channel)		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	118.1862	54.37	-17.05	37.32	41.16	-3.84	QP
2	199.9855	38.21	-16.44	21.77	41.16	-19.39	QP
3	256.5210	41.60	-14.90	26.70	59.16	-32.46	QP
4	369.4047	39.87	-12.13	27.74	59.16	-31.42	QP
5	508.2582	38.65	-9.49	29.16	41.16	-12.00	QP
6	541.3725	40.06	-9.01	31.05	41.16	-10.11	QP

Remarks:
1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2.The emission levels of other frequencies are very lower than the limit and not show in test report.
3.All the modes have tested and record the worst mode(Low Channel) in the report.

Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	101 kPa	Polarization :	Vertical
Test Voltage :	DC 12V		
Test Mode :	TX Mode (Low Channel)		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.7486	48.27	-16.36	31.91	59.16	-27.25	QP
2	38.8878	47.69	-15.30	32.39	59.16	-26.77	QP
3	44.1202	42.66	-14.45	28.21	59.16	-30.95	QP
4	57.1914	38.25	-14.80	23.45	41.16	-17.71	QP
5	66.2662	39.54	-16.95	22.59	41.16	-18.57	QP
6	117.3603	45.63	-16.91	28.72	41.16	-12.44	QP

Remarks:
1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2.The emission levels of other frequencies are very lower than the limit and not show in test report.
3.All the modes have tested and record the worst mode(Low Channel) in the report.

Radiated Spurious Emission (Above 1GHz)

Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel-510.6MHz						
1021.2	-48.36	7.78	-40.58	-30	-10.58	H
1531.8	-51.01	13.12	-37.89	-30	-7.89	H
1021.2	-47.21	7.78	-39.43	-30	-9.43	V
1531.8	-46.99	13.12	-33.87	-30	-3.87	V
Middle Channel-550.6MHz						
1101.2	-53.27	8.03	-45.24	-30	-15.24	H
1651.8	-51.99	12.36	-39.63	-30	-9.63	H
1101.2	-50.58	8.03	-42.55	-30	-12.55	V
1651.8	-48.36	12.36	-36	-30	-6.00	V
High Channel-589.6MHz						
1179.2	-53.69	8.01	-45.68	-30	-15.68	H
1768.8	-53.56	13.27	-40.29	-30	-10.29	H
1179.2	-52.58	8.01	-44.57	-30	-14.57	V
1768.8	-51.01	13.27	-37.74	-30	-7.74	V

Note :
1. Result = Reading + Corrected Factor
2. The fundamental wave filtered out during the test.

5. MAXIMUM RADIATED POWER(EIRP)

5.1 APPLIED PROCEDURES / LIMIT

ACCORDING TO FCC 15.236(D)(1), FOR LOW POWER AUXILIARY STATION OPERATING IN THE 470-608, AND 614-698 MHZBANDS, IN THE BANDS ALLOCATED AND ASSIGNED FOR BROADCAST TELEVISION AND IN THE 600 MHZ SERVICE BAND: 50 MW EIRP

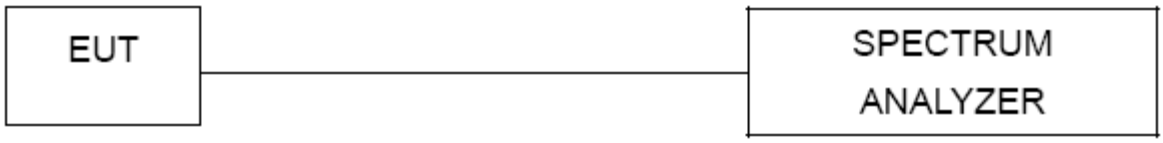
5.2 TEST PROCEDURE

1. THE MAXIMUM PEAK OUTPUT POWER WAS MEASURED WITH A SPECTRUM ANALYZER CONNECTED TO THE ANTENNA TERMINALWHILE EUT WAS OPERATING IN UNMODULATED SITUATION.
2. POWER WAS SUPPLIED TO THE BATTERY INPUT CONNECTOR A POWER SUPPLY. THE POWER SUPPLY WAS SET FOR +3.0VDC. THESPECTRUM ANALYZER WAS CONNECTED AT ANTENNA TERMINAL TO MEASURE RF POWER OF THE CARRIER.
3. A MULTIMETER WAS CONNECTED IN SERIES WITH FINAL RF STAGE TO MEASURE THE CURRENT; A MULTIMETER WAS USED TOMEASURE FINAL RF STAGE SUPPLY VOLTAGE. THEN THE VOLTAGE V.S. CURRENT OF THE FINAL RF STAGE CAN BE SHOWED.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

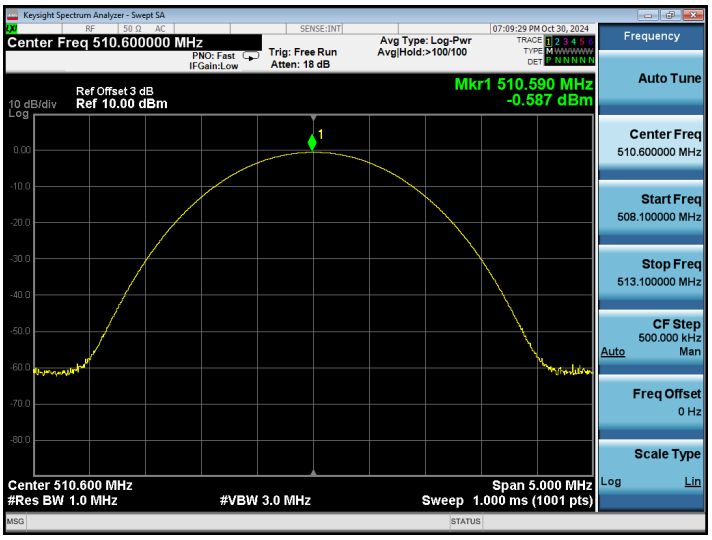
5.6 TEST RESULTS

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 12V

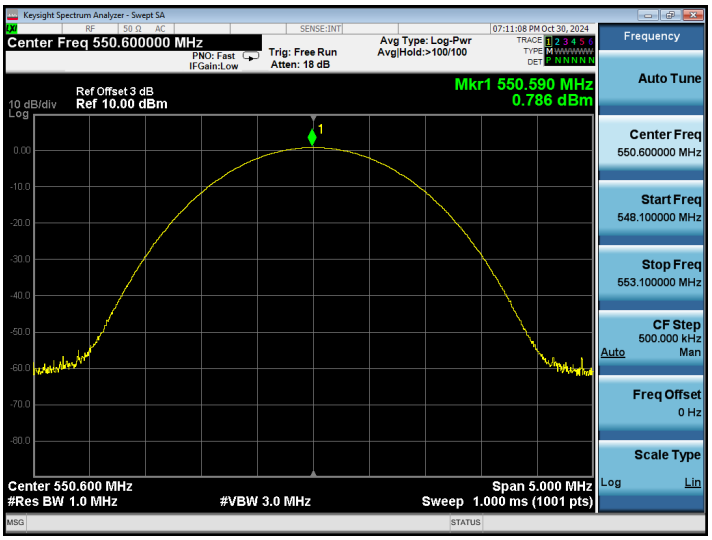
Frequency	CONDUCTED OUTPUT POWER (dBm)	ANT GAIN (dBi)	EIRP (dBm)	Limit (dBm)	Result
510.6MHz	-0.587	2.15	1.563	17	PASS
550.6MHz	0.786	2.15	2.936	17	PASS
589.6MHz	-2.110	2.15	0.040	17	PASS

Remark：cable loss is 3dBm, It has been compensated in the test diagram.

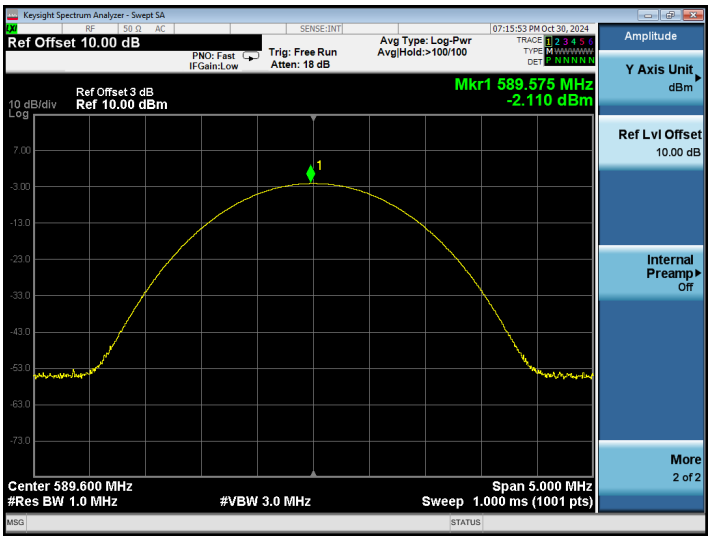
Low Channel



Mid Channel



High Channel



6. CHANNEL BANDWIDTH

6.1 APPLIED PROCEDURES / LIMIT

According to FCC 15.236(f)(2), The operating frequency within a permissible band of operation as defined inparagraph (c) must comply with the following requirements.

(1) The frequency selection shall be offset from the upper or lower band limits by 25 kHz or an integral multiple thereof.

(2) (2) One or more adjacent 25 kHz segments within the assignable frequencies may be combined to form a channel whose maximum bandwidth shall not exceed 200 kHz. The operating bandwidth shall not exceed 200kHz.

(3) Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in Section 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08) (incorporated by reference, see §15.38). Emissions outside this band shall comply with the limit specified at the edges of the ETSI mask

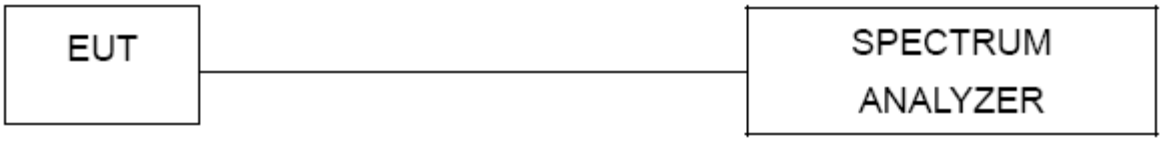
6.2 TEST PROCEDURE

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 1kHz, VBW = 3kHz
3. Mark the -20dB BANDWIDTH

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



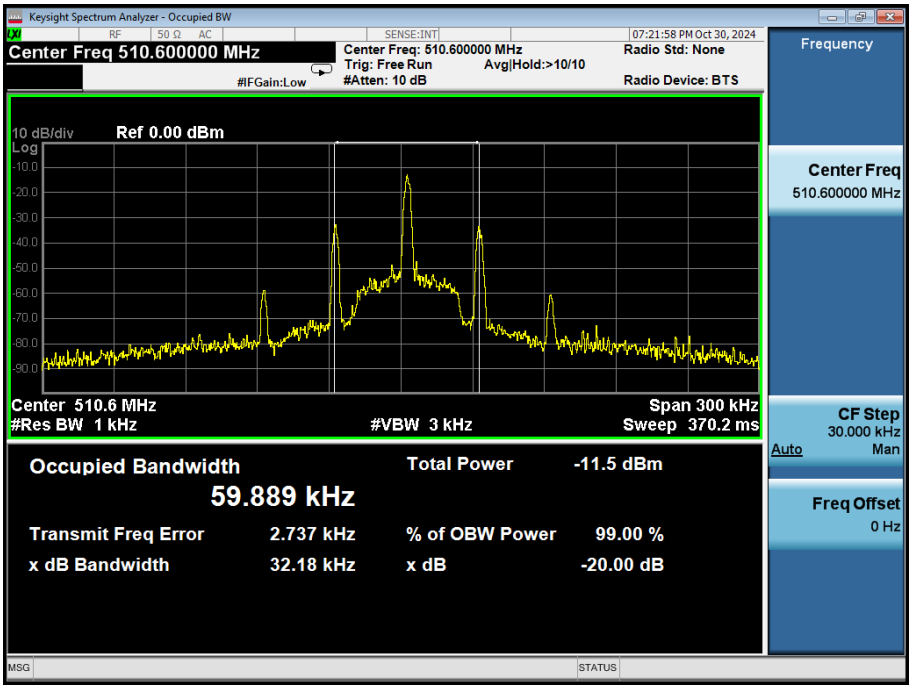
6.5 EUT OPERATION CONDITIONS

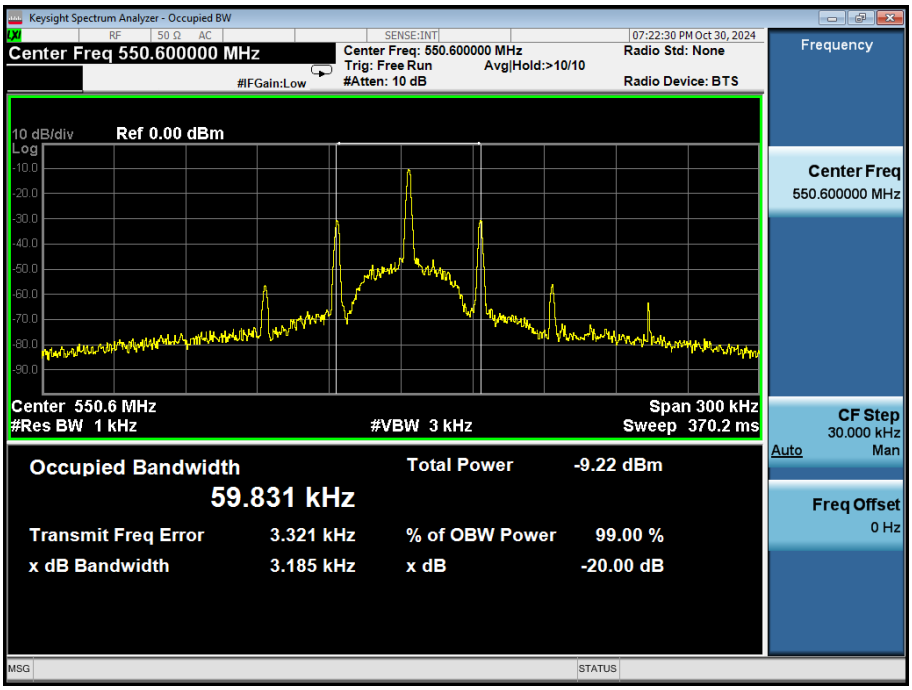
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

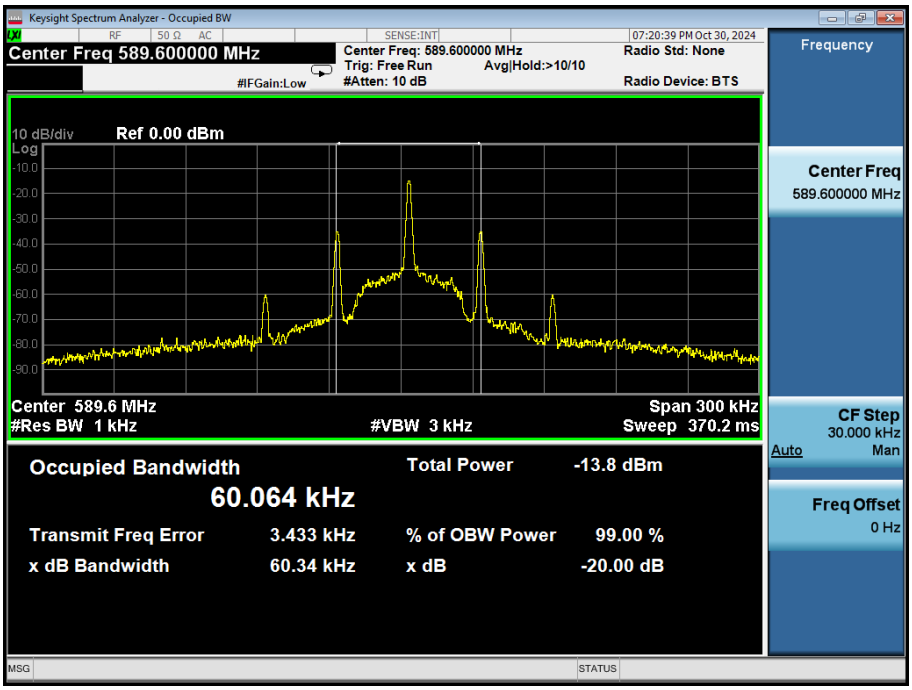
6.6 TEST RESULTS

Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 12V

Frequency (MHz)	-20 bandwidth (KHz)	Limit (KHz)	Result
510.6MHz	32.18	200	Pass
550.6MHz	3.185	200	Pass
589.6MHz	60.34	200	Pass

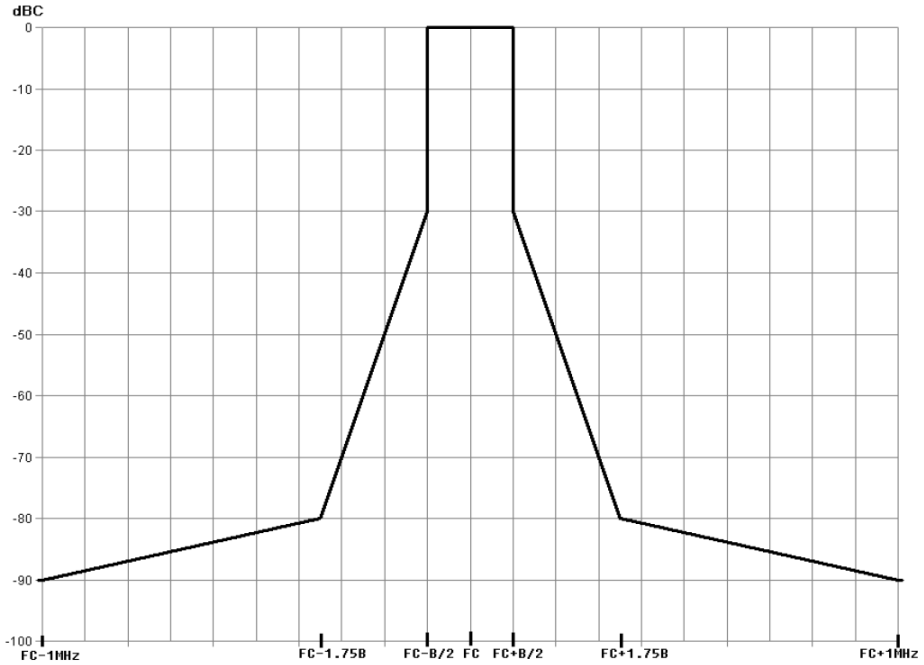



Keysight Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
07:22:30 PM Oct 30, 2024
Center Freq 550.600000 MHz
Center Freq: 550.600000 MHz
Trig: Free Run Avg|Hold:>10/10
#Atten: 10 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div Ref 0.00 dBm
Log
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Center 550.6 MHz
#Res BW 1 kHz
#VBW 3 kHz
Span 300 kHz
Sweep 370.2 ms
Occupied Bandwidth
59.831 kHz
Total Power -9.22 dBm
Transmit Freq Error 3.321 kHz
% of OBW Power 99.00 %
x dB Bandwidth 3.185 kHz
x dB -20.00 dB
Center Freq
550.600000 MHz
CF Step
30.000 kHz
Auto Man
Freq Offset
0 Hz
MSG
STATUS

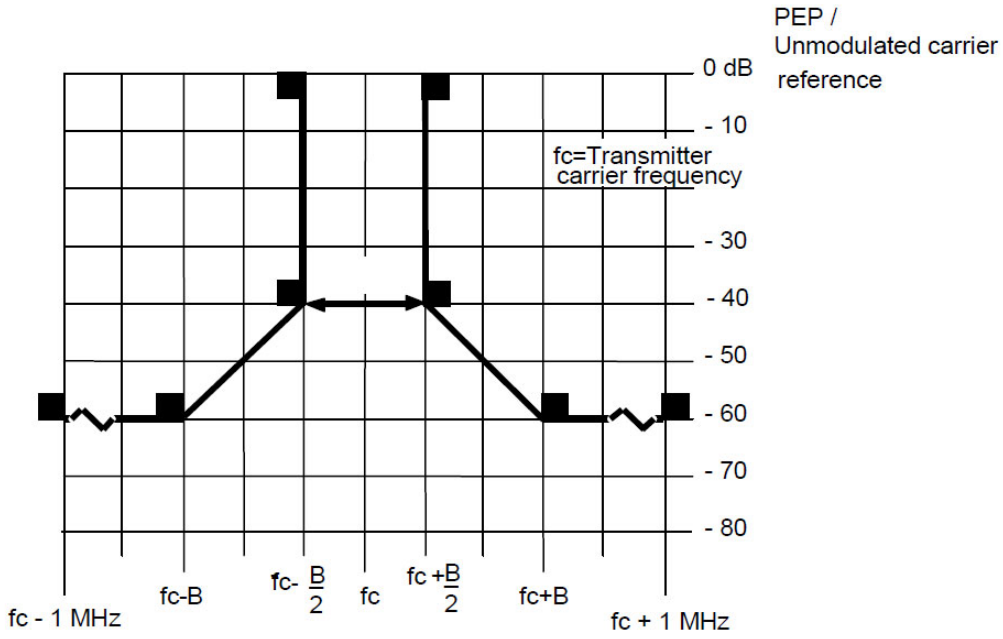

Keysight Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
07:20:39 PM Oct 30, 2024
Center Freq 589.600000 MHz
Center Freq: 589.600000 MHz
Trig: Free Run Avg|Hold:>10/10
#Atten: 10 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div Ref 0.00 dBm
Log
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Center 589.6 MHz
#Res BW 1 kHz
#VBW 3 kHz
Span 300 kHz
Sweep 370.2 ms
Occupied Bandwidth
60.064 kHz
Total Power -13.8 dBm
Transmit Freq Error 3.433 kHz
% of OBW Power 99.00 %
x dB Bandwidth 60.34 kHz
x dB -20.00 dB
Center Freq
589.600000 MHz
CF Step
30.000 kHz
Auto Man
Freq Offset
0 Hz
MSG
STATUS

7. NECESSARY BANDWIDTH

7.1 LIMIT



Spectrum mask for digital systems below 1 GHz



Spectral mask for digital systems above 1 GHz, normalized to channel bandwidth B

Hotline: 400-8868-419 Fax: 86-755-27790922 http://www.ncttesting.cn

Standard Applicable

According to §15.236 (g) Emissions within the band from one megahertz below to one megahertz above thecarrier frequency shall comply with the emission mask in §8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08),Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3GHz frequency range; Part 1: Technical characteristics and methods of measurement. Emissions outside of thisband shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 V1.4.2 (2011-08).

According to ETSI EN 300 422-2 V2.1.1 section 8.3, the transmitter output spectrum shall be within the maskdefined in the following figure.

7.2 TEST SETUP

7.3 TEST PROCEDURE

The transmitter shall be modulated with the test signals defined in clause 7.1.2. In any case the mask shall not be exceeded.

- Step 1: Measure the "Carrier Power" with the spectrum analyzer setup:

- Center Frequency = fc
- Span = Zero span
- Detector = RMS
- Trace Mode = Average
- RBW&VBW = 5 x B
- Sweep time ⩾ 2 s

- Step 2: Measure the "Maximum Relative Level (dBc) at Specified Carrier Offsets" with the following spectrum analyzer setup:

- Center Frequency = fc
- Span ⩾ 5 x B
- Detector = RMS
- Trace Mode = Peak Hold
- RBW&VBW = 1 kHz
- Sweep time ⩾ 2 s

Limits: Mask shall not be exceeded.

- Step 3: Measure the "transmitter wide band noise floor":
The measurement of transmitter broad band noise floor shall be carried out according to clause 8.3.1.1.

- Start Frequency = fc + 1,75B and fc - 1 MHz below 1 GHz,

Start Frequency = fc + B and fc - 1 MHz above 1 GHz.

- Stop Frequency = fc + 1 MHz and fc - 1,75 B below 1 GHz,

Stop Frequency = fc + 1 MHz and fc -B above 1 GHz.

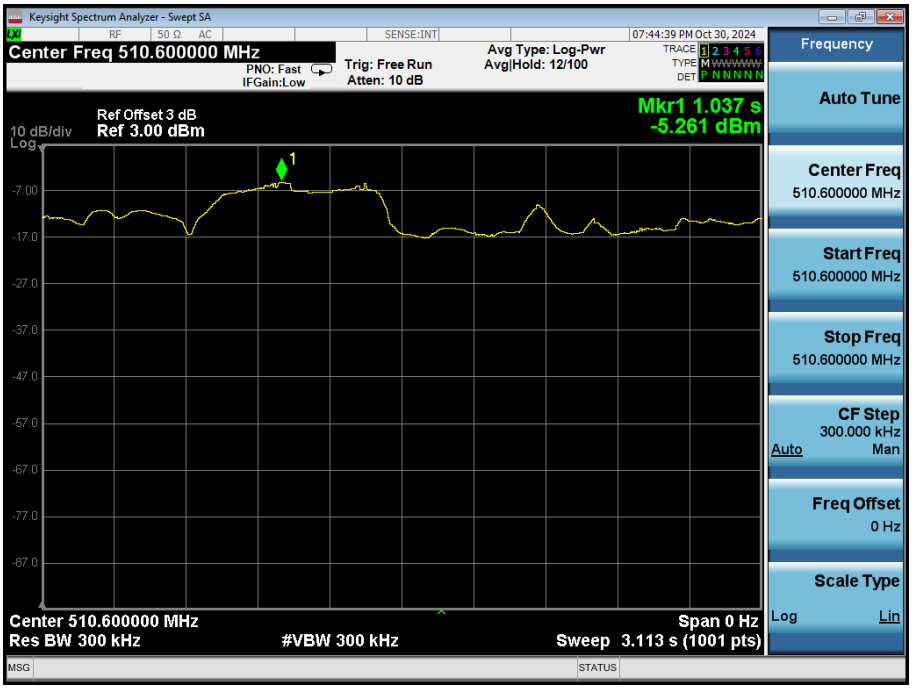
- Detector = RMS
- Trace Mode = Average
- RBW&VBW = 1 kHz
- Sweep time ⩾ 2 s

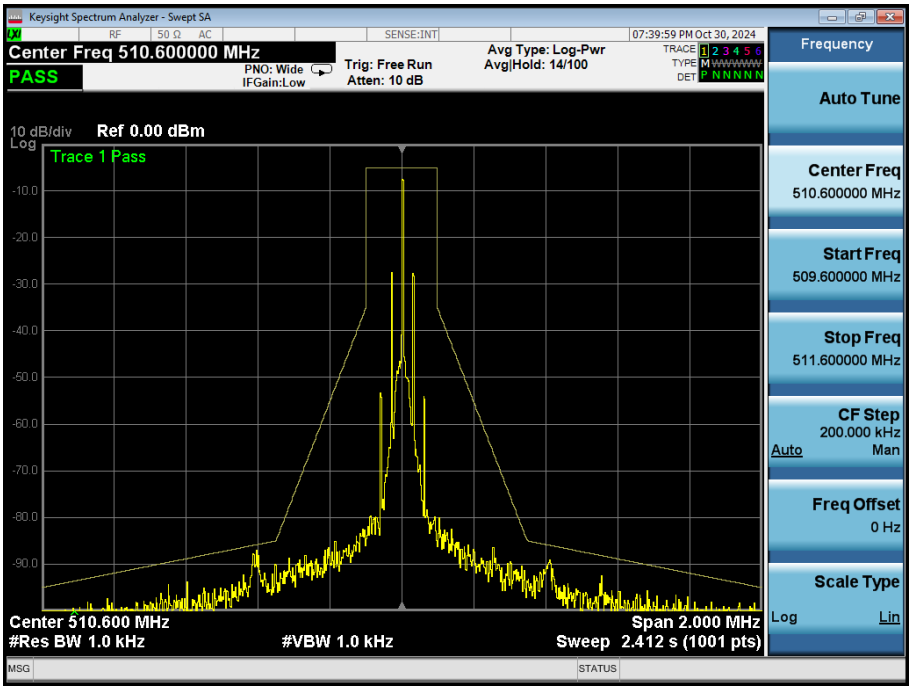
NOTE 2: Two spectrum ranges are to be measured!

Limits: Mask shall not be exceeded.

7.4 TEST RESULTS

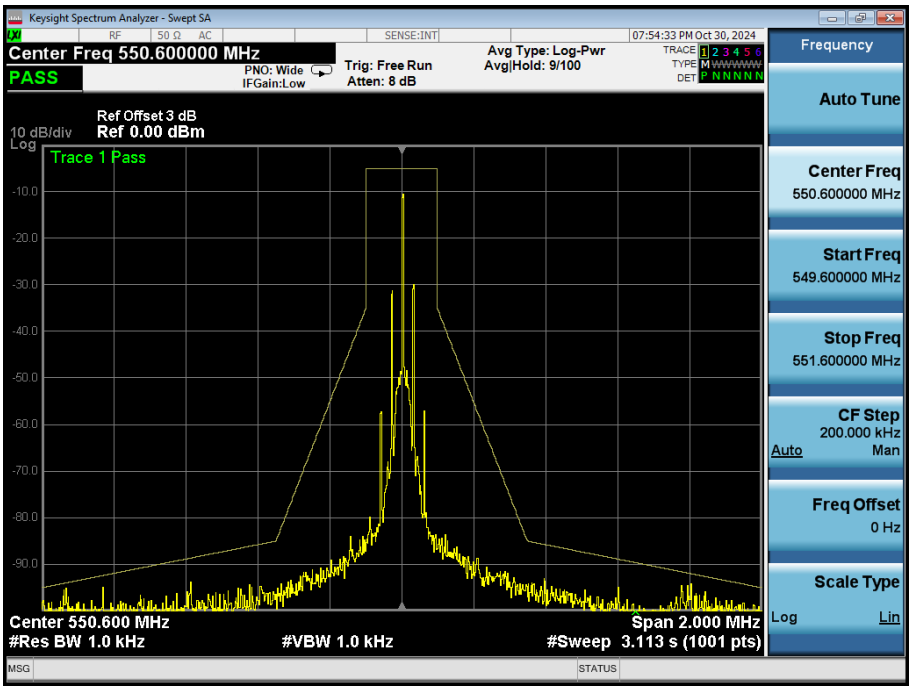
Low Channel


Keysight Spectrum Analyzer - Swept SA
Center Freq 510.600000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold: 12/100
07:44:39 PM Oct 30, 2024
Ref Offset 3 dB
10 dB/div
Log
Ref 3.00 dBm
Mkr1 1.037 s
-5.261 dBm
Center 510.600000 MHz
Res BW 300 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 3.113 s (1001 pts)
Frequency
Auto Tune
Center Freq
510.600000 MHz
Start Freq
510.600000 MHz
Stop Freq
510.600000 MHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

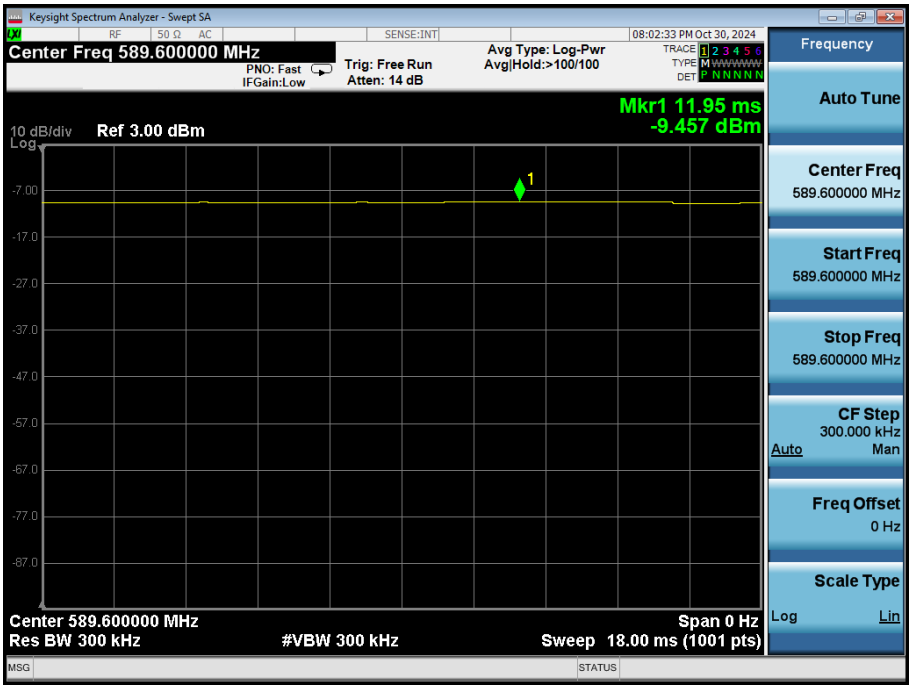

Keysight Spectrum Analyzer - Swept SA
Center Freq 510.600000 MHz
PASS
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold: 14/100
07:39:59 PM Oct 30, 2024
10 dB/div
Log
Ref 0.00 dBm
Trace 1 Pass
Center 510.600 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 2.000 MHz
Sweep 2.412 s (1001 pts)
Frequency
Auto Tune
Center Freq
510.600000 MHz
Start Freq
509.600000 MHz
Stop Freq
511.600000 MHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

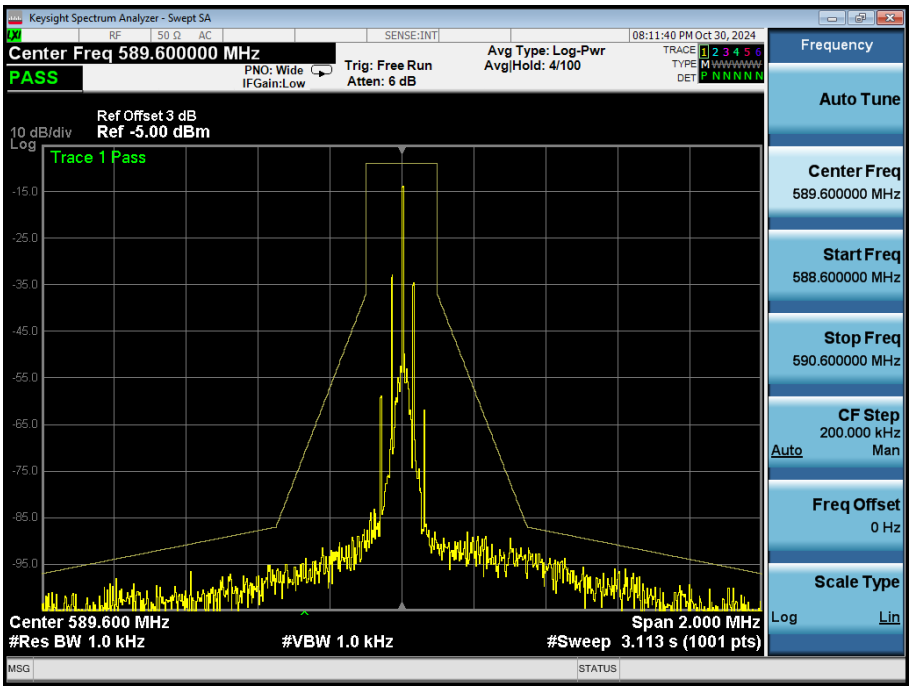
Mid Channel


Keysight Spectrum Analyzer - Swept SA
Center Freq 550.600000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold: 18/100
07:43:24 PM Oct 30, 2024
Ref Offset 3 dB
10 dB/div
Log
Ref 3.00 dBm
Mkr1 535.4 ms
-5.432 dBm
Center 550.600000 MHz
Res BW 300 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 3.113 s (1001 pts)
Frequency
Auto Tune
Center Freq
550.600000 MHz
Start Freq
550.600000 MHz
Stop Freq
550.600000 MHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin


Keysight Spectrum Analyzer - Swept SA
Center Freq 550.600000 MHz
PASS
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 8 dB
Avg Type: Log-Pwr
Avg|Hold: 9/100
07:54:33 PM Oct 30, 2024
Ref Offset 3 dB
10 dB/div
Log
Ref 0.00 dBm
Trace 1 Pass
Center 550.600 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 2.000 MHz
#Sweep 3.113 s (1001 pts)
Frequency
Auto Tune
Center Freq
550.600000 MHz
Start Freq
549.600000 MHz
Stop Freq
551.600000 MHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

High Channel





8. FREQUENCY STABILITY

8.1 Limit

±0.005%*510.6MHz=25.53 KHz

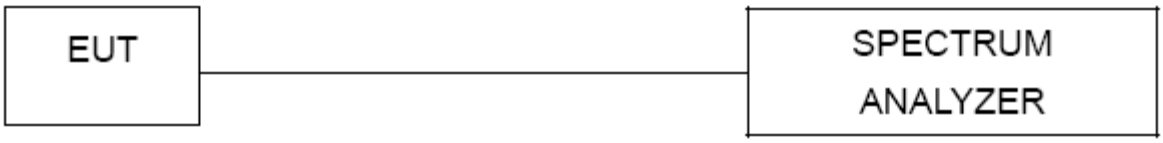
±0.005%*550.6MHz=27.53 KHz

±0.005%*589.6MHz=29.48 KHz

8.2 Standard Applicable

According to FCC 15.236(f)(3), The frequency tolerance of the carrier signal shall be maintained within ±0.005% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage,and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperatureof 20 degrees C. Battery operated equipment shall be tested using a new battery

8.3 TEST SETUP



8.4 Test Procedure

1. Setup the configuration of the ambient temperature form -20ºC to 50ºC with sufficient time. And measurethe different power of the EUT with an artificial power from highest to end point voltage.
2. Set frequency counter center frequency to the right frequency needs to be measuredband.

8.5 Test Result

Test frequency	Test Conditions		Measure Frequency	Frequency Error	Limit	Result
(MHz)	Voltage (V)	Temperature(ºC)	(MHz)	(KHz)	(KHz)	
510.6	N	N	510.615	15	±25.53	Pass
		L	510.615	15		Pass
		H	510.614	14		Pass
	L	N	510.616	16		Pass
		L	510.615	15		Pass
		H	510.614	14		Pass
	H	N	510.615	15		Pass
		L	510.616	16		Pass
		H	510.616	16		Pass

Test frequency	Test Conditions		Measure Frequency	Frequency Error	Limit	Result
(MHz)	Voltage (V)	Temperature(ºC)	(MHz)	(KHz)	(KHz)	
550.6	N	N	550.615	14	±27.53	Pass
		L	550.615	15		Pass
		H	550.615	15		Pass
	L	N	550.615	15		Pass
		L	550.616	16		Pass
		H	550.615	15		Pass
	H	N	550.615	15		Pass
		L	550.615	15		Pass
		H	550.616	16		Pass

Test frequency	Test Conditions		Measure Frequency	Frequency Error	Limit	Result
(MHz)	Voltage (V)	Temperature(ºC)	(MHz)	(KHz)	(KHz)	
589.6	N	N	589.614	14	±29.48	Pass
		L	589.616	16		Pass
		H	589.615	15		Pass
	L	N	589.615	15		Pass
		L	589.616	16		Pass
		H	589.615	15		Pass
	H	N	589.615	15		Pass
		L	589.615	15		Pass
		H	589.616	16		Pass

Note: LV=Low voltage10.2V NV=nominal voltage=12V HV= High voltage=13.8V

9. TEST PHOTO & EUT PHOTO

Reference to the appendix for details.

※※※※※ END OF REPORT ※※※※※