TEST REPORT

Product Name:	Handhled wireless microphone
FCC ID:	2BKJP-K60
Trademark:	Talomen
Model Number:	K60, M50, K90, K120, K150, K180, K200, K1000, K2000, K3000
Prepared For:	shenzhenshiwuxikejiyouxiangongsi
Address:	baoanqu shajingjiedao wananlu17hao andongniaokejiyuan Cdong 3lou C303 shenzhenshi, China
Manufacturer:	shenzhenshiwuxikejiyouxiangongsi
Address:	baoanqu shajingjiedao wananlu17hao andongniaokejiyuan Cdong 3lou C303 shenzhenshi, China
Prepared By:	Shenzhen CTB Testing Technology Co., Ltd.
Address:	1&2/F., Building A, No.26, Xinhe Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	Jun. 27, 2024
Sample tested Date:	Jun. 27, 2024 to Jul. 18, 2024
Issue Date:	Jul. 18, 2024
Report No.:	CTB240718010RF
Test Standards	FCC CFR Title 47 Part 15 Subpart C Section 15.236 ANSI C63.10:2013
Test Results	PASS
Remark:	This is FM radio test report.

Compiled by:	Reviewed by:	Approved by:
Zhou Kui	Arron Liu	Bin Mei / Director

Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

TABLE OF CONTENT

(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB240718010RF	Jul. 18,2024	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

Test Item	Test Requirement	Test method	Result
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
Radiated Spurious emissions	47 CFR Part 15 Subpart C Section 15.236(g)	ANSI C63.10-2013	PASS
RF Power Output	47 CFR Part 15 Subpart C Section 15.236(d)	ANSI C63.10-2013	PASS
Occupied Bandwidth	47 CFR Part 15 Subpart C Section 15.236(f) (2)	ANSI C63.10-2013	PASS
Necessary Bandwidth	47 CFR Part 15 Subpart C Section 15.236(g)	ANSI C63.10-2013	PASS
Frequency Stability	47 CFR Part 15Subpart C Section 15.236(f) (3)	ANSI C63.10-2013	PASS
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203/15.247 (b)	/	PASS

Remark:
Test according to ANSI C63.10-2013.

3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Item	Uncertainty
Occupancy bandwidth	54.3kHz
Conducted output power Above 1G	0.9dB
Conducted output power below 1G	0.9dB
Power Spectral Density , Conduction	0.9dB
Conduction spurious emissions	2.0dB
Out of band emission	2.0dB
3m camber Radiated spurious emission(9K-30MHz)	4.8dB
3m camber Radiated spurious emission(30MHz-1GHz)	4.6dB
3m chamber Radiated spurious emission(1GHz-18GHz)	5.1dB
3m chamber Radiated spurious emission(18GHz-40GHz)	3.4dB
humidity uncertainty	5.5%
Temperature uncertainty	0.63℃
frequency	1×10-7
Conducted Emission (150KHz-30MHz)	3.2 dB
Radiated Emission(30MHz ~ 1000MHz)	4.8 dB
Radiated Emission(1GHz ~6GHz)	4.9 dB

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	K60, M50, K90, K120, K150, K180, K200, K1000, K2000, K3000
Model Description:	All the model are the same circuit and RF module, only for model name. Test sample model: K60
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	653MHz
Type of Modulation:	FM
Antenna installation:	PCB antenna
Antenna Gain:	-0.18dBi
Ratings:	DC 5V charging from adapter DC 3.7V by Battery

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

Item	Equipment	Mfr/Brand	Model/TypeNo.	SeriesNo.	Note
1	Adapter	JIYIN	JY-05100C	/	AE

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

CH No.	Frequency (MHz)	CH No.	Frequency (MHz)	CH No.	Frequency (MHz)	CH No.	Frequency (MHz)
1	653	/	/	/	/	/	/

4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Low channel	Middle channel	High channel
Transmitting (FM)	/	653MHz	/

4.6 Test Environment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(DC):	3.7V
Normal Temperature(℃)	23
Low Temperature(℃)	0
High Temperature(℃)	40

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at 1&2F., Building A, No. 26, Xinhe Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

No.	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	A.14.16	2025/6/28
2	Power Sensor	Agilent	U2021XA	MY56120032	/	2025/6/28
3	Power Sensor	Agilent	U2021XA	MY56120034	/	2025/6/28
4	Communication test set	R&S	CMW500	108058	V3.5.80	2025/6/28
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2025/6/28
6	Signal Generator	Agilent	N5181A	MY50140365	A.01.60	2025/6/28
7	Vector signal generator	Agilent	N5182A	MY47420195	A.01.87	2025/6/28
8	Communication test set	Agilent	E5515C	MY50102567	B.19.07 (E1962B)	2025/6/28
9	2.4 GHz Filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	/	2025/6/30
10	5 GHz Filter	Shenxiang	MSF5150-5850MS-1155	20181015001	/	2025/6/30
11	Filter	Xingbo	XBLBQ-DZA120	190821-1-1	/	2025/6/30
12	BT&WI-FI Automatic test software	Micowave	MTS8000	Ver. 2.0.0.0	/	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	/	2025/6/28
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	/	2025/6/28
15	234G Automatic test software	Micowave	MTS8200	Ver. 2.0.0.0	/	/
16	966 chamber	C.R.T.	966	/	/	2027/6/21
17	Receiver	R&S	ESPI	100362	RF_ATTEN_7 (104489/003)	2025/6/28
18	Amplifier	HP	8447E	2945A02747	/	2025/6/28
19	Amplifier	Agilent	8449B	3008A01838	/	2025/6/28
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	/	2025/6/28
21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	/	2025/6/28

22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2025/6/28
24	loop antenna	ZHINAN	ZN30900A	GTS534	/	/
25	40G Horn antenna	A/H/System	SAS-574	588	/	2025/6/28
26	Amplifier	AEROFLEX	Aeroflex	097	/	2025/6/28
27	Power Metter	KEYSIGHT	N1912AP	N/A	A.05.00	2025/6/28

Continuous disturbance

No.	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Calibrated until
1	843 Shield Room	C/ R/ T	843	/	/	2027/6/21
2	AMN	ROHDE&SCHWARZ	ESH3-Z5	831551852	/	2025/6/30
3	Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	/	2025/6/28
4	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428	V4.42.SP3	2025/6/30
5	Coaxial cable	ZDECL	Z302S	18091904	/	2025/6/30
6	ISN	Schwarzbeck	NTFM8158	183	/	2025/6/30
7	Voltage sensor	Schwarzbeck	TK 9420	01189	/	2024/11/16
8	EZ-EMC	Frad	EMC-con3A1.1	/	/	/
9	Current Probe	FCC	F-52B	199453	/	2025/5/27
10	Communication test set	R&S	CMW500	108058	B.19.07 (E1962B)	2025/6/28
11	Communication test set	Agilent	E5515C	MY50102567	V3.5.80	2025/6/28

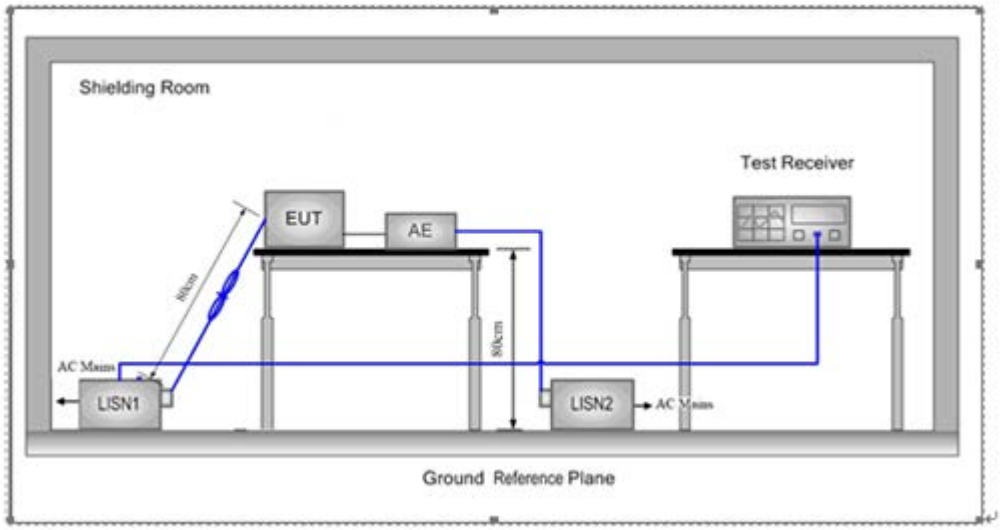
Radiated emission

No.	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Calibrated until
1	966 Chamber	C/ R/ T	966	/	/	2027/6/21
2	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	01911	/	2025/7/06
3	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	/	2025/6/29
4	Amplifier	Agilent	8449B	3008A01838	/	2025/6/30
5	Amplifier	HP	8447E	2945A02747	/	2025/6/28
6	loop antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2025/6/29
7	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI	100362	RF_ATTEN_7 (104489/003)	2025/6/28
8	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2025/6/28
9	Coaxial cable	ETS	RFC-SNS-100-NMS-80	/	/	2025/6/28

10	Coaxial cable	ETS	RFC-SN-100-NMS-20	/	/	2025/6/28
11	Coaxial cable	ETS	RFC-SNS-100-SMS-20	/	/	2025/6/28
12	Coaxial cable	ETS	RFC-NNS-100-NMS-300	/	/	2025/6/28
13	EMI test software	Frad	EZ-EMC	Ver/ FA-03A2 RE	/	/
14	Communication test set	R&S	CMW500	108058	B.19.07 (E1962B)	2025/6/28
15	Communication test set	Agilent	E5515C	MY50102567	V3.5.80	2025/6/28

6. AC POWER LINE CONDUCTED EMISSION

6.1 Block Diagram Of Test Setup



6.2 Limit

Table 4 – AC power-line conducted emissions limits

Frequency (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56[Note 1]	56 to 46[Note 1]
0.5 – 5	56	46
5 – 30	60	50

Note 1: The level decreases linearly with the logarithm of the frequency.

* Decreasing linearly with the logarithm of the frequency

6.3 Test procedure

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50µH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under

test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

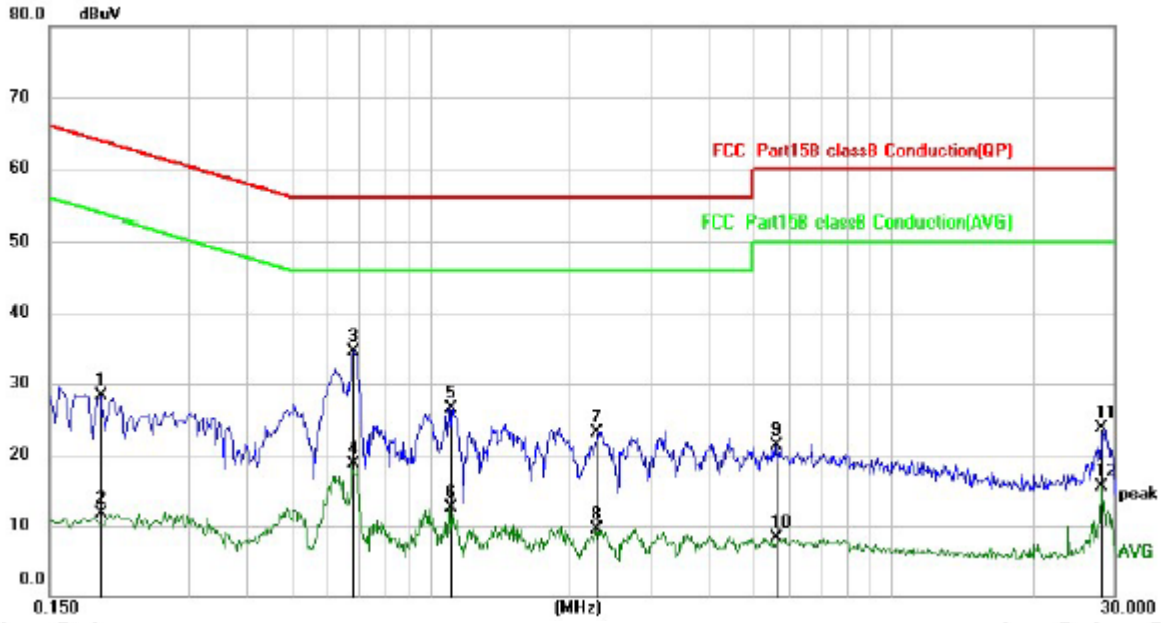
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement**.**

6) All modes were tested at AC 120V and 240V, only the worst result of AC 120V 60Hz was reported.

7) If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.

6.4 Test Result

L: Worst case-FM(low channel)

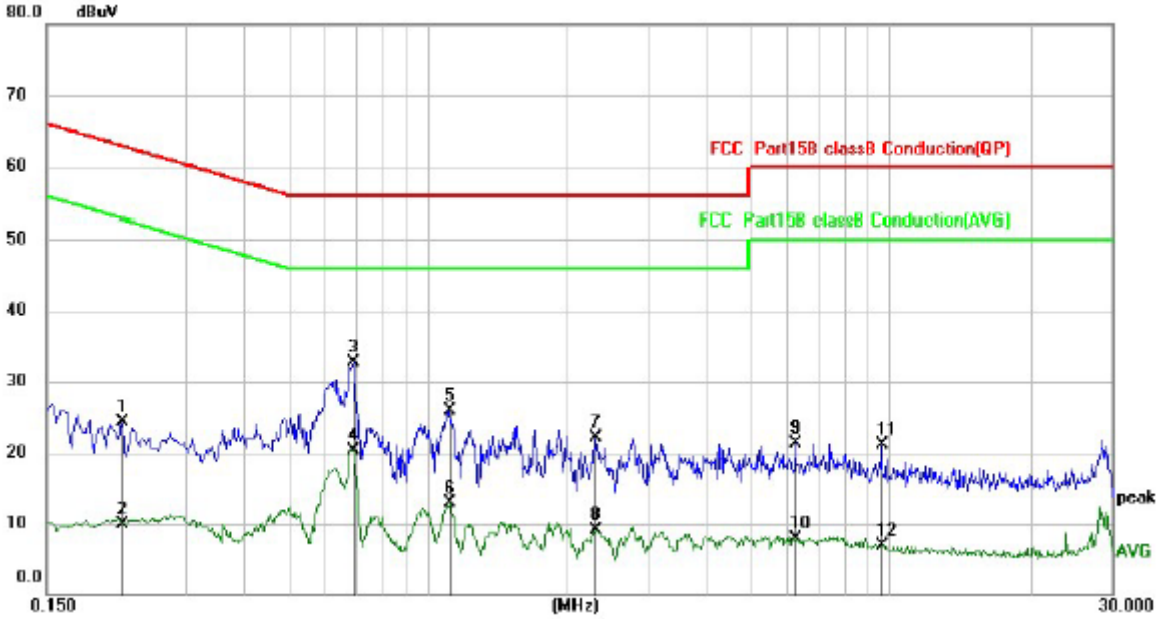


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1940	18.41	9.95	28.36	63.86	-35.50	QP
2		0.1940	1.80	9.95	11.75	53.86	-42.11	AVG
3	*	0.6820	24.51	10.02	34.53	56.00	-21.47	QP
4		0.6820	8.68	10.02	18.70	46.00	-27.30	AVG
5		1.1100	16.57	10.02	26.59	56.00	-29.41	QP
6		1.1100	2.53	10.02	12.55	46.00	-33.45	AVG
7		2.2900	13.01	10.12	23.13	56.00	-32.87	QP
8		2.2900	-0.62	10.12	9.50	46.00	-36.50	AVG
9		5.6220	10.81	10.42	21.23	60.00	-38.77	QP
10		5.6220	-2.11	10.42	8.31	50.00	-41.69	AVG
11		28.2140	12.45	11.29	23.74	60.00	-36.26	QP
12		28.2140	4.15	11.29	15.44	50.00	-34.56	AVG

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit

N:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.2180	14.33	9.95	24.28	62.89	-38.61	QP
2		0.2180	-0.06	9.95	9.89	52.89	-43.00	AVG
3	*	0.6900	22.74	10.02	32.76	56.00	-23.24	QP
4		0.6900	10.36	10.02	20.38	46.00	-25.62	AVG
5		1.1140	15.96	10.02	25.98	56.00	-30.02	QP
6		1.1140	2.90	10.02	12.92	46.00	-33.08	AVG
7		2.3060	12.07	10.12	22.19	56.00	-33.81	QP
8		2.3060	-1.00	10.12	9.12	46.00	-36.88	AVG
9		6.2780	10.78	10.47	21.25	60.00	-38.75	QP
10		6.2780	-2.61	10.47	7.86	50.00	-42.14	AVG
11		9.6260	10.55	10.57	21.12	60.00	-38.88	QP
12		9.6260	-3.63	10.57	6.94	50.00	-43.06	AVG

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit

7. TRANSMITTER SPURIOUS EMISSION

7.1 Block Diagram Of Test Setup

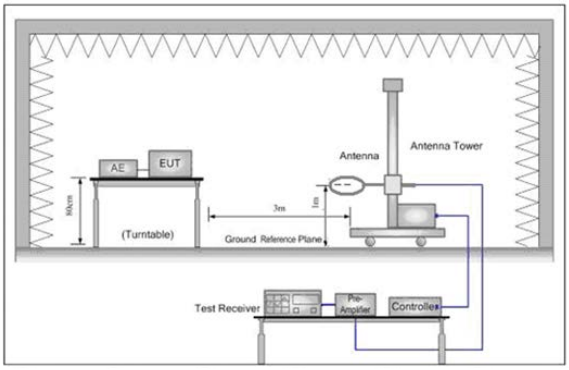


Figure 1. Below 30MHz

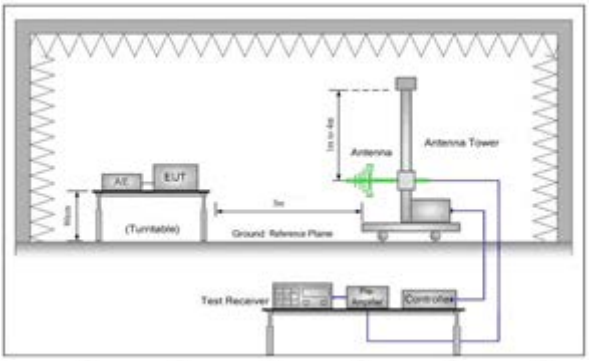
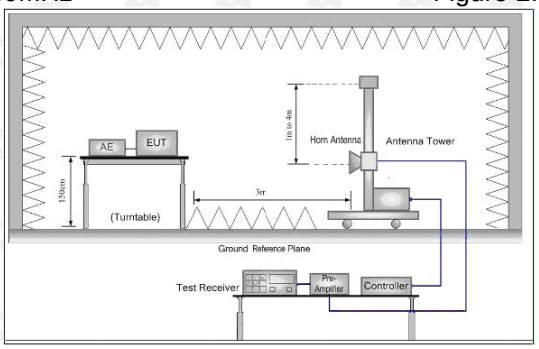


Figure 2. 30MHz to 1GHz



7.2 Limit

Spurious emissions are emissions outside the frequency range(s) of the equipment. The power of the spurious emissions shall not exceed the limits of table as below:

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

7.3 Test procedure

Below 1GHz test procedure as below:

a.The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b.The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c.The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d.For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.

e.The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f.If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

g.Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).

h.Test the EUT in the lowest channel ,the middle channel ,the Highest channel

i.Repeat above procedures until all frequencies measured was complete.

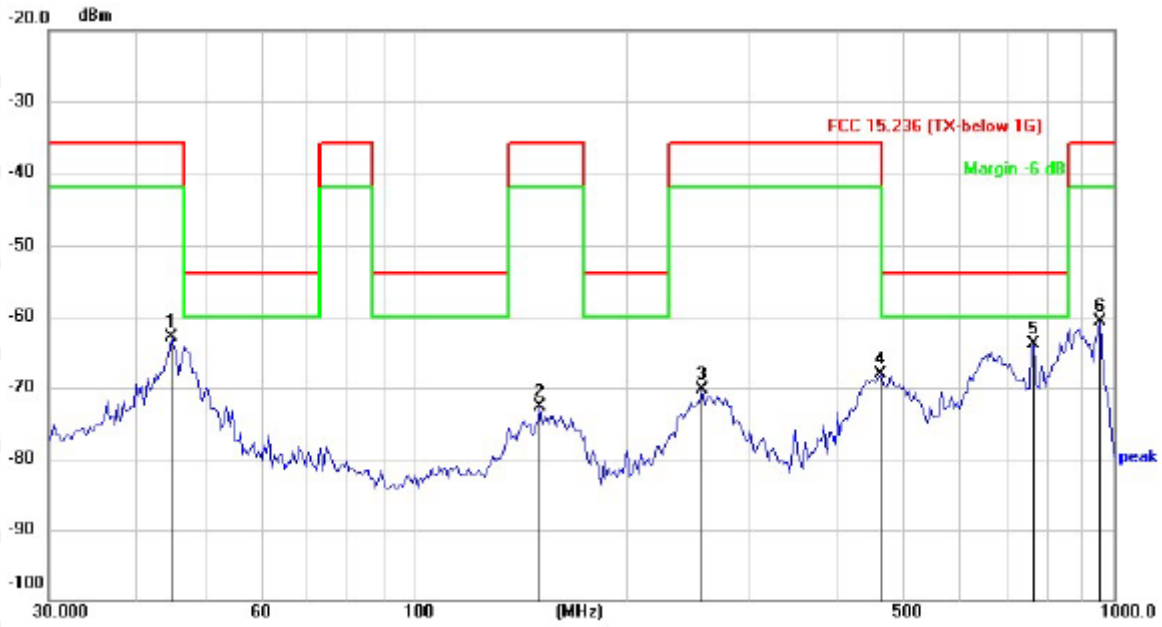
j. Full battery is usedduring test

Receiver set:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

7.4 Test Result

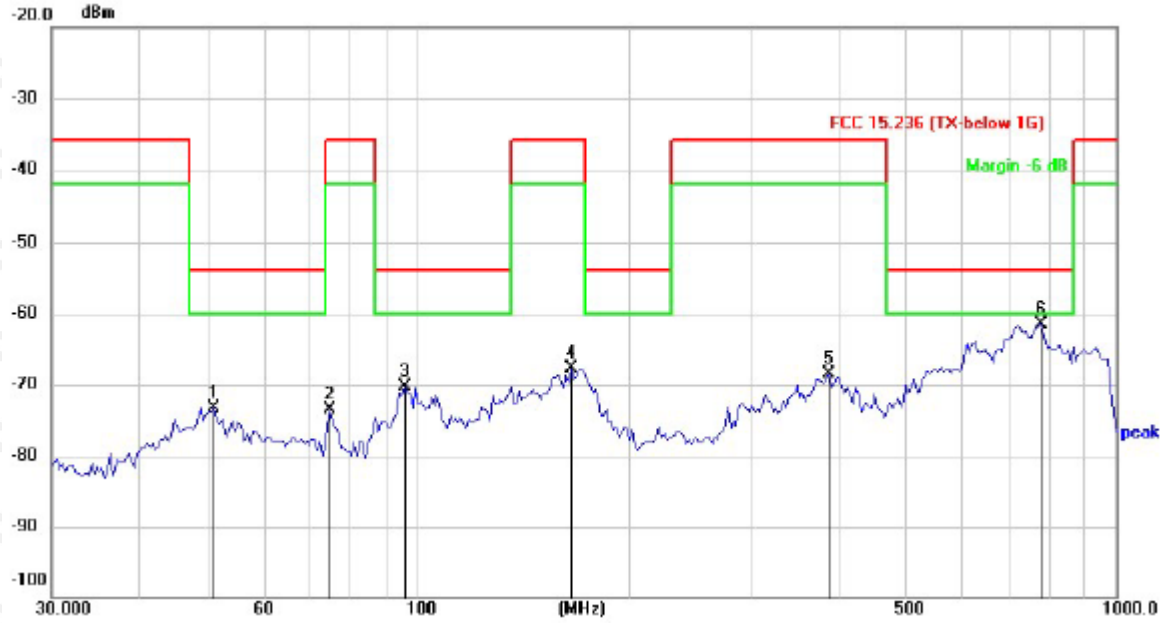
Below 1GHz Test Results:
Antenna polarity: H
Worst case-FM



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBm	dB	dBm	dB	dB	Detector
1		44.9006	-73.18	10.36	-62.82	-36.00	-26.82	peak
2		151.8632	-76.83	4.17	-72.66	-36.00	-36.66	peak
3		256.9712	-82.18	11.82	-70.36	-36.00	-34.36	peak
4		462.3455	-84.31	16.24	-68.07	-36.00	-32.07	peak
5	*	768.7481	-79.44	15.59	-63.85	-54.00	-9.85	peak
6		957.1147	-76.56	15.77	-60.79	-36.00	-24.79	peak

Remark:
1. Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Measurement– Limit
   Measurement=Reading level+correct facto
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Note: a filter is used during the test.

Antenna polarity: V
Worst case-GFSK(low channel)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBm	dB	dBm	dB	dB	Detector
1		51.2105	-76.94	3.68	-73.26	-54.00	-19.26	peak
2		75.3141	-76.90	3.39	-73.51	-36.00	-37.51	peak
3		96.2672	-75.38	5.01	-70.37	-54.00	-16.37	peak
4		165.7770	-79.05	11.34	-67.71	-36.00	-31.71	peak
5		387.9917	-79.43	11.01	-68.42	-36.00	-32.42	peak
6	*	782.3452	-80.31	18.90	-61.41	-54.00	-7.41	peak

Remark:
1. Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Measurement– Limit
   Measurement=Reading level+correct facto
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Note: a filter is used during the test.

Above 1G:

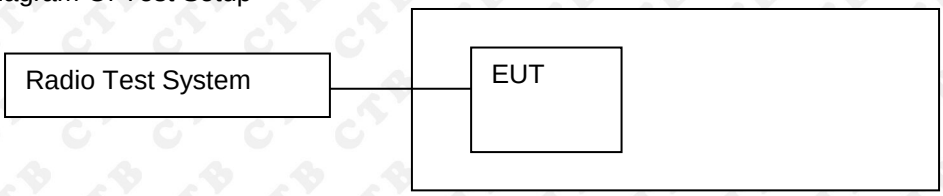
Freq	Rd_level	Factor	Level	Limit	Over	detector	Height	Degree	Antenna polarization
(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)				
1306	-55.16	8.43	-46.73	-30	-16.73	peak	1.1	327	H
1959	-54.28	12.45	-41.83	-30	-11.83	peak	1.6	67	H
2612	-54.76	8.43	-46.33	-30	-16.33	peak	1.7	188	H
3265	-54.48	8.43	-46.05	-30	-16.05	peak	1.8	147	H
3918	-56.26	12.45	-43.81	-30	-13.81	peak	1.4	259	H
4571	-56.96	8.43	-48.53	-30	-18.53	peak	1.8	229	H

Freq	Rd_level	Factor	Level	Limit	Over	detector	Height	Degree	Antenna polarization
(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)				
1306	-56.30	8.43	-47.87	-30	-17.87	peak	1.4	90	V
1959	-56.45	12.45	-44.00	-30	-14.00	peak	1.5	128	V
2612	-55.66	8.43	-47.23	-30	-17.23	peak	1.8	280	V
3265	-55.23	8.43	-46.80	-30	-16.80	peak	1.2	184	V
3918	-55.21	12.45	-42.76	-30	-12.76	peak	1.2	202	V
4571	-55.90	8.43	-47.47	-30	-17.47	peak	1.7	198	V

Remark:
Absolute Level = Receiver Reading + Factor
Factor = Antenna Factor + Cable Loss – Pre-amplifier

8. CONDUCTED OUTPUT POWER

8.1 Block Diagram Of Test Setup



8.2 Limit

The maximum radiated power shall not exceed the following values:

(1) In the bands allocated and assigned for broadcast television and in the 600 MHz service band: 50 mW EIRP

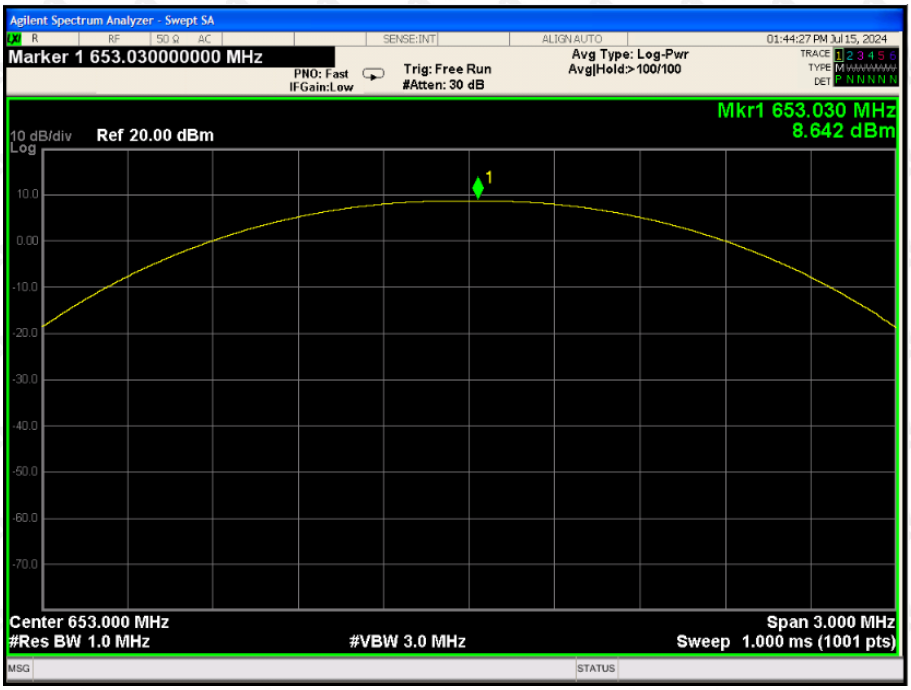
(2) In the 600 MHz guard band and the 600 MHz duplex gap: 20 mW EIRP.

8.3 Test procedure

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.

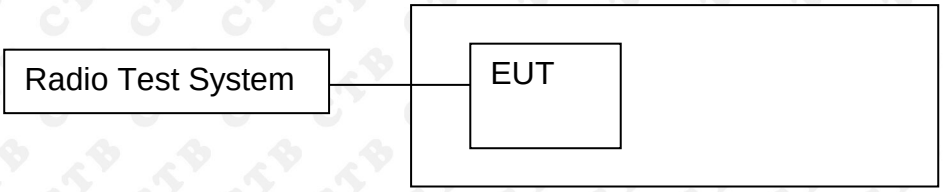
8.4 Test Result

Frequency (MHz)	COMDUCTED OUTOUT POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	FCC Limit (mW)	FCC Limit (dBm)	Reselt
658.80	8.642	-0.18	8.462	20	13	PASS



9. OCCUPIED BANDWIDTH

9.1 Block Diagram Of Test Setup



9.2 Limit

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 200 kHz.

9.3 Test procedure

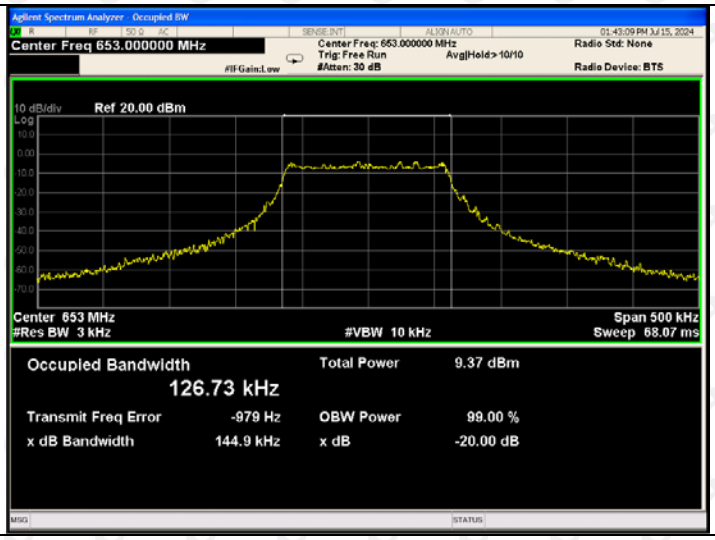
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3 KHz RBW and 10 KHz VBW.

10.4 Test Result

Test Mode	Frequency (MHz)	99% OBW (kHz)	Limit (kHz)	Result
FM	653	126.73	200	PASS

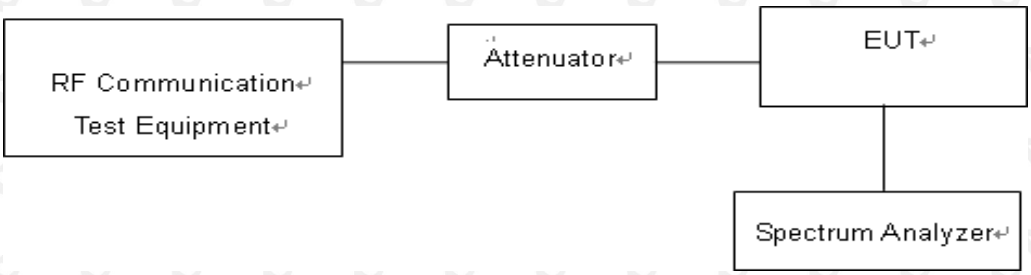
Note: All modes of operation were Pre-scan and the worst-case emissions are reported.

Test Graph:

FM Low channel	

10. NECESSARY BANDWIDTH

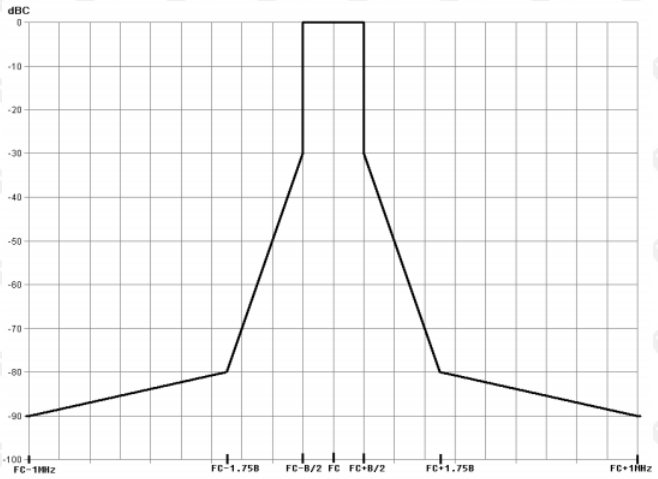
10.1 Block Diagram Of Test Setup



10.2 Limit

Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in §8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08) as below:

The transmitter output spectrum shall be within the mask defined in figure below where B is the declared channel bandwidth



10.3 Test procedure

1) With the Low Frequency (LF) audio signal generator set to 500 Hz, the audio input level to the EUT shall be Adjusted to 8 dB below the limiting threshold (-8dB limit) as declared by the manufacturer.

2) The corresponding audio output level from the demodulator shall be measured and recorded.

3) The input impedance of the noise meter shall be sufficiently high to avoid more than 0.1 dB changes in input level when the meter is switched between input and output.

4) The audio input level shall be increased by 20 dB, i.e. to 12 dB (lim), and the corresponding change in output level shall be measured.

5) It shall be checked that the audio output level has increased by ≤10 dB.

6) If the step 5 is not met, the initial audio input level shall be increased from -8 dB (lim) in 1 dB steps until the above condition is fulfilled, and the input level recorded in the test report. This level replaces the value derived from the manufacturer's declaration and is defined as -8dB (lim).

7) Measure the input level at the transmitter required to give +12 dB (lim) and record the EUT output level test plots by the spectrum analyzer.

8) The transmitter RF output spectrum shall be measured, using a spectrum analyser with the following settings:

-centre frequency: fc: Transmitter (Tx) nominal frequency;
-dispersion (Span): fc - 1 MHz to fc + 1 MHz;
-Resolution BandWidth (RBW): 1 kHz;

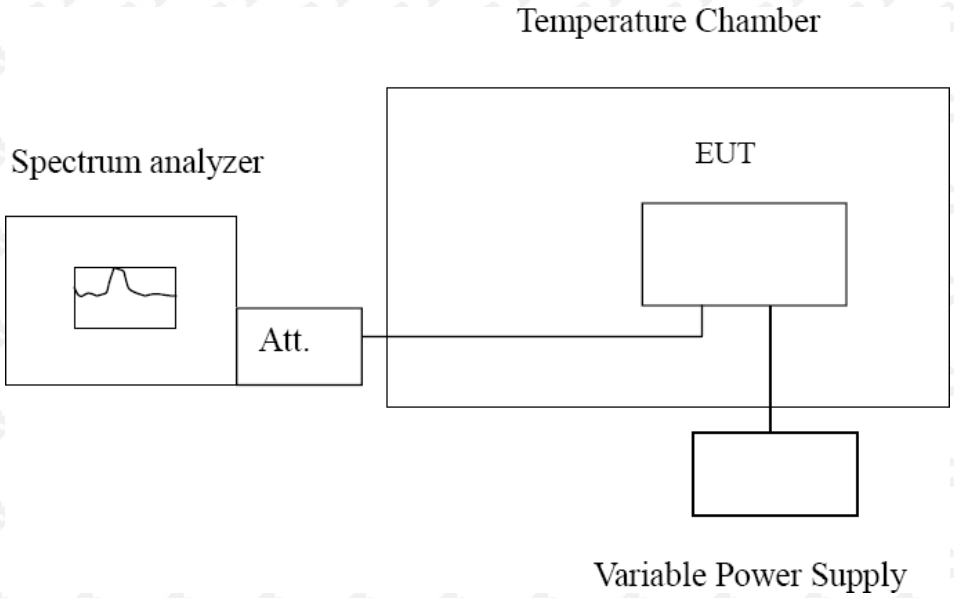
-Video BandWidth (VBW): 1 kHz;
-detector: Peak hold.

10.4 Test Result

Requirement (MHz)	Reading (dBm)	Result (dBm)
652-652.8	-84.11	Pass
652.8-652.9	-79.65	Pass
652.9-652.93	-56.75	Pass
652.93-652.95	-26.35	Pass
652.95-653.05	4.40	Pass
653.05-653.07	-26.18	Pass
653.07-653.1	-56.27	Pass
653.1-653.2	-78.04	Pass
653.2-654	-84.84	Pass

11. FREQUENCY STABILITY

11.1 Block Diagram Of Test Setup



11.2 Limit

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 temperature of 20 degrees C. Battery operated equipment shall be tested using a new battery.

11.3 Test procedure

a, With the Low Frequency (LF) audio signal generator set to 500 Hz, the audio input level to the EUT shall be Adjusted to 8 dB below the limiting threshold (-8dB limit) as declared by the manufacturer.

Frequency stability versus environmental temperature

1) Setup asTest Configuration for frequencies measured at ambient temperature if it is within 15℃to 25℃. Otherwise, an environmental chamber set for a temperature of 20℃ shall be used.

1) Turn on EUT and set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 3 kHz, VBW to 10kHz and frequency span to 500 kHz. Record this frequency to be a reference.

1) Set the temperature of chamber to 50℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.

1) Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -20℃ is measured, record all measurement frequencies.

b, Frequency stability versus input voltage

1) Setup asTest Configuration for frequencies measured at ambient temperature if it is within 15℃to 25℃. Otherwise, an environmental chamber set for a temperature of 20℃shall be used. Install new batteries in the EUT.

1) Set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 3kHz, VBW to 10kHz and frequency span to 500 kHz. Record this frequency to be a reference.

1) For non hand carried, battery operated device, supply the EUT primary voltage with 85 and 115 percent of the nominal value and record the frequency.

11.4 Test Result

Reference Frequency: 658.80MHz					
Voltage (V)	Temperature(℃)	Frequency error (MHz)	Frequency Tolerance (%)	Limit (%)	Result
3.70	-20	0.00281	0.000429%	±0.005	PASS
	-10	0.00301	0.000460%		
	0	0.00084	0.000129%		
	10	-0.00279	-0.000427%		
	20	0.00065	0.000099%		
	30	-0.00198	-0.000302%		
	40	0.00451	0.000690%		
	50	-0.00144	-0.000220%		
4.20	20	0.00363	0.000555%		
3.40	20	0.00279	0.000427%		

12. ANTENNA REQUIREMENT

15.203 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, 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.
15.247(b) (4) requirement:
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The EUT antenna is PCB antenna. The best case gain of the antenna is -0.18dBi.

13. EUT TEST SETUP PHOTOGRAPHS

Radiated Emissions

Below 1G

Above 1G

Conducted emission

※※※※※ END OF REPORT ※※※※※