Test Report

FCC ID: 2AKL5-KMU208

Product Name:	UHF Instrument Microphone
Trademark:	N/A
Model Name :	KM-U208 KM-U307, KM-U308, KM-U209, KM-U208A, KM-U307A, KM-U308A, KM-U209A, KM-U208B, KM-U307B, KM-U308B, KM-U209B, KM-U208C, KM-U307C, KM-U308C, KM-U209C, KM-U208C-1, KM-U307-1, KM-U308-1, KM-U209-1, KM-U208C-2, KM-U307-2, KM-U308-2, KM-U209-2, KM-U208C-3, KM-U307-3, KM-U308-3, KM-U209-3, KM-U208C-4, KM-U307-4, KM-U308-4, KM-U209-4, KM-U208C-5, KM-U307-5, KM-U308-5, KM-U209-5, KM-U208C-6, KM-U307-6, KM-U308-6, KM-U209-6
Prepared For : Address :	SHENZHEN JHC ELECTRONICS CO.,LTD Floor 1-3, Building No.5, Tongqing Road Yanghelang, Tongxin Community, Baolong Street, Longgang District, Shenzhen, China
Prepared By : Address :	Shenzhen BCTC Testing Co., Ltd. BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Date:	Jan . 07, 2020 to Jun. 11, 2020
Date of Report :	Jun. 11, 2020
Report No.:	BCTC2001000973E

TEST RESULT CERTIFICATION

Applicant's name ..... SHENZHEN JHC ELECTRONICS CO,LTD

Address ..... Floor 1-3, Building No.5, Tongqing Road Yanghelang, Tongxin Community, Baolong Street, Longgang District, Shenzhen, China

Manufacture's Name..... SHENZHEN JHC ELECTRONICS CO,LTD

Address ..... Floor 1-3, Building No.5, Tongqing Road Yanghelang, Tongxin Community, Baolong Street, Longgang District, Shenzhen, China

Product description

Product name..... UHF Instrument Microphone

Trademark ..... N/A

Model and/or type reference . KM-U208

KM-U307, KM-U308, KM-U209, KM-U208A, KM-U307A, KM-U308A, KM-U209A, KM-U208B, KM-U307B, KM-U308B, KM-U209B, KM-U208C, KM-U307C, KM-U308C, KM-U209C, KM-U208C-1, KM-U307-1, KM-U308-1, KM-U209-1, KM-U208C-2, KM-U307-2, KM-U308-2, KM-U209-2, KM-U208C-3, KM-U307-3, KM-U308-3, KM-U209-3, KM-U208C-4, KM-U307-4, KM-U308-4, KM-U209-4, KM-U208C-5, KM-U307-5, KM-U308-5, KM-U209-5, KM-U208C-6, KM-U307-6, KM-U308-6, KM-U209-6

Standards ..... FCC Part 15.236

This device described above has been tested by BCTC, 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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Prepared by(Engineer):	Willem Wang	Willem Wang
Reviewer(Supervisor):	Eric Yang	
Approved(Manager):	Zero Zhou	

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.236) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.236(d)(2)	Output Power Measurement	PASS	
15.236(f)(2)	Occupied Bandwidth Emission	PASS	
15.236(g)	Necessary Bandwidth	PASS	
15.236(g)	Radiated Spurious Emission	PASS	
15.236(f)(3)	Frequency Tolerance	PASS	

1.1 TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.
Add.: BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 712850
IC Registered No.: 23583

1.2 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** %。

No.	Item	Uncertainty
1	3m camber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
3	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
4	Conducted Adjacent channel power	U=1.38dB
5	Conducted output power uncertainty Above 1G	U=1.576dB
6	Conducted output power uncertainty below 1G	U=1.28dB
7	humidity uncertainty	U=5.3%
8	Temperature uncertainty	U=0.59 ℃

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	UHF Instrument Microphone
Trade Name	N/A
Model Name	KM-U208 KM-U307, KM-U308, KM-U209, KM-U208A, KM-U307A, KM-U308A, KM-U209A, KM-U208B, KM-U307B, KM-U308B, KM-U209B, KM-U208C, KM-U307C, KM-U308C, KM-U209C, KM-U208C-1, KM-U307-1, KM-U308-1, KM-U209-1, KM-U208C-2, KM-U307-2, KM-U308-2, KM-U209-2, KM-U208C-3, KM-U307-3, KM-U308-3, KM-U209-3, KM-U208C-4, KM-U307-4, KM-U308-4, KM-U209-4, KM-U208C-5, KM-U307-5, KM-U308-5, KM-U209-5, KM-U208C-6, KM-U307-6, KM-U308-6, KM-U209-6
Model Difference	All the model are the same circuit and RF module, only for model name and color.
Product Description	The EUT is a UHF Instrument Microphone Operation Frequency: 658-661MHz Modulation Type: FM Number Of Channel 4CH Antenna Designation: Please see Note 3.
Channel List	Please refer to the Note 2.
Power Source	DC 3.7V
Connecting I/O Port(s)	Please refer to the User's Manual
Hardware Version:	N/A
Software Version:	N/A

Note:
1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	658	02	659	03	660
04	661				

3.

Table for Internal Antenna

Ant.	Brand	Model Name	Antenna Type	Gain (dBi)
1	N/A	N/A	Internal antenna	-0.05

2.2 DESCRIPTION OF TEST MODES

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 above was evaluated respectively.

For All Mode	Description	Modulation Type
Mode 1	CH01	FM(Transmitting)
Mode 2	CH02	
Mode 3	CH04	
Mode 4	Charging	

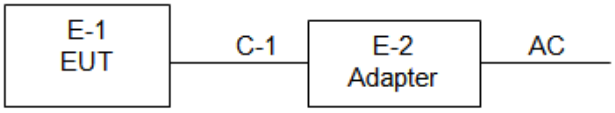
Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

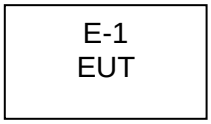
(2) Fully-charged battery is used during the test

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Radiated Spurious Emission



2.4 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.

No.	Device Type	Brand	Model	Series No.	Data Cable
E-1	UHF Instrument Microphone	N/A	KM-U208	N/A	EUT
E-2	Adapter	N/A	BCTC005	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	0.5M	USB cable unshielded

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.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45109572	Jun. 13, 2019	Jun. 12, 2020
2	Test Receiver (9kHz-7GHz)	R&S	ESR7	101154	Jun. 13, 2019	Jun. 12, 2020
3	Bilog Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	VULB9163-942	Jun. 22, 2019	Jun. 21, 2020
4	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1541	Jun. 22, 2019	Jun. 21, 2020
5	Horn Antenna (18GHz-40GHz)	SCHWARZBECK	BBHA9170	822	Jun. 22, 2019	Jun. 21, 2020
6	Amplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	9744-0037	Jun. 25, 2019	Jun. 24, 2020
7	Amplifier (0.5GHz-18GHz)	SCHWARZBECK	BBV9718	9718-309	Jun. 25, 2019	Jun. 24, 2020
8	Amplifier (18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	Jun. 17, 2019	Jun. 16, 2020
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	014	Jul. 02, 2019	Jul. 01, 2020
10	RF cables1 (9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	Jun. 25, 2019	Jun. 24, 2020
11	RF cables2 (30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	Jun. 25, 2019	Jun. 24, 2020
12	RF cables3 (1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	Jun. 25, 2019	Jun. 24, 2020
13	Power Metter	Keysight	E4419B	\	Jun. 17, 2019	Jun. 16, 2020
14	Power Sensor (AV)	Keysight	E9 300A	\	Jun. 17, 2019	Jun. 16, 2020
15	Signal Analyzer 20kHz-26.5GHz	KEYSIGHT	N9020A	MY49100060	Jun. 13, 2019	Jun. 12, 2020
16	Spectrum Analyzer 9kHz-40GHz	Agilent	FSP40	100363	Jun. 13, 2019	Jun. 12, 2020
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Software	Frad	EZ-EMC	FA-03A2 RE	\	\

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESR3	102075	Jun. 13, 2019	Jun. 12, 2020
2	LISN	SCHWARZBECK	NSLK8127	8127739	Jun. 13, 2019	Jun. 12, 2020
3	LISN	R&S	ENV216	101375	Jun. 13, 2019	Jun. 12, 2020
4	RF cables	Huber+Suhnar	9kHz-30MHz	B1702988-0008	Jun. 25, 2019	Jun. 24, 2020
5	Software	Frad	EZ-EMC	EMC-CON 3A1	\	\

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quas□-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

3.1.2 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.

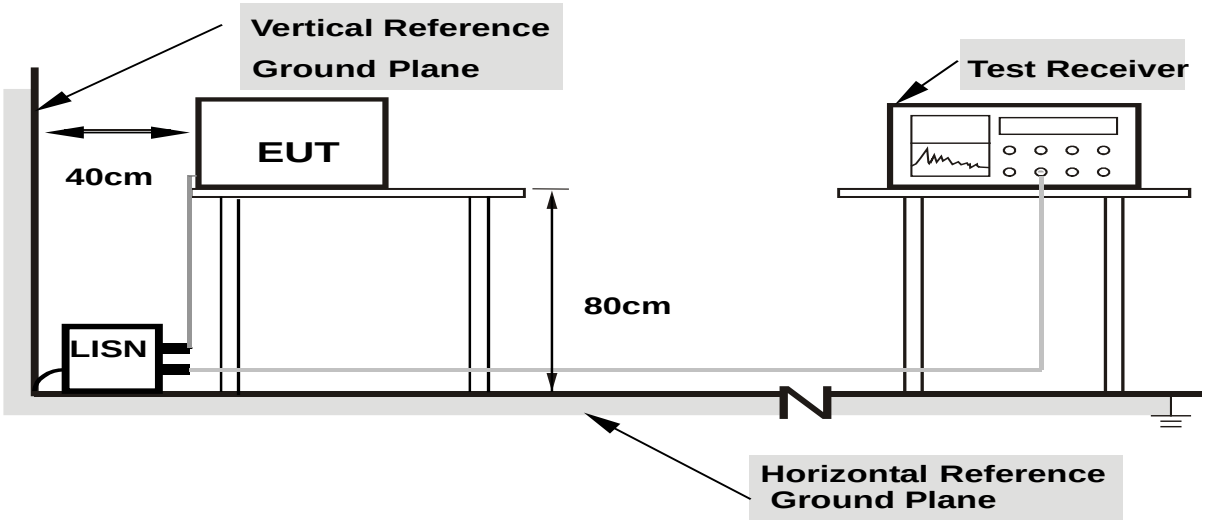
d. LISN at least 80 cm from nearest part of EUT chassis.

e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



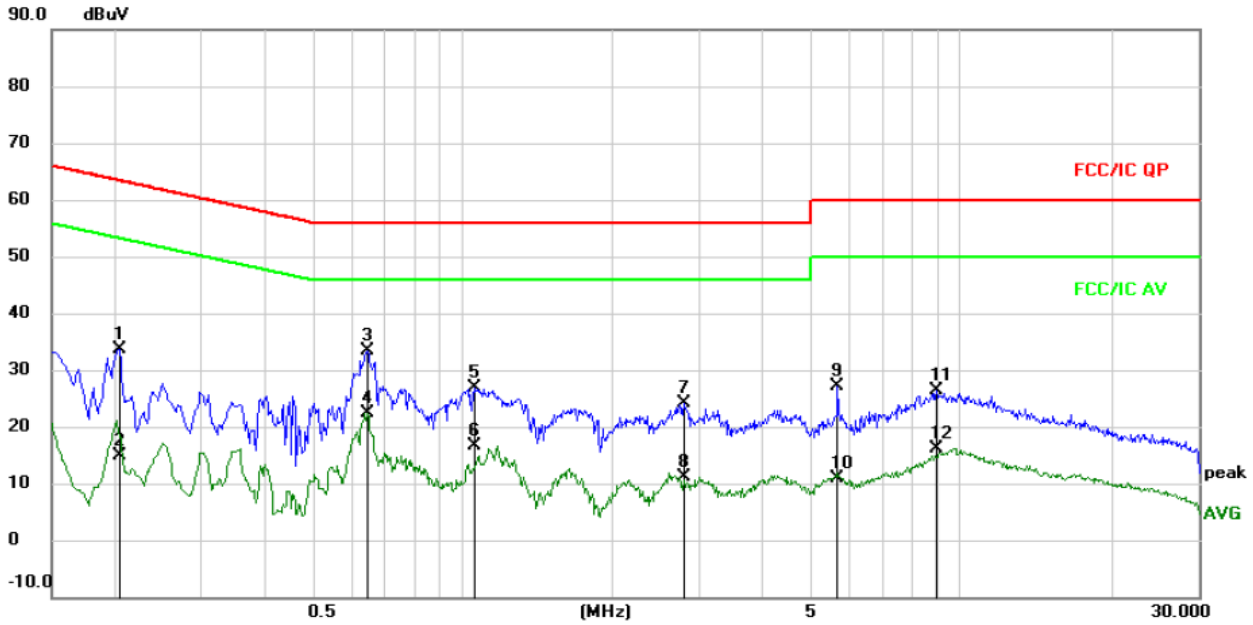
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 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.

3.1.6 TEST RESULTS

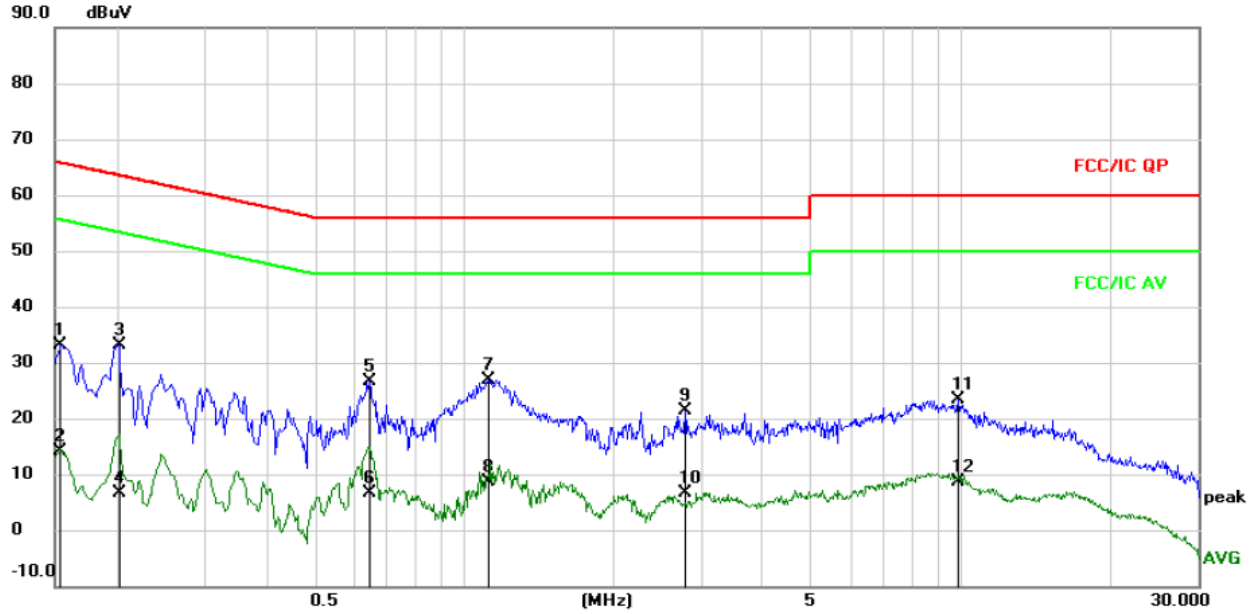
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	L
Test Voltage ：	AC120V 60Hz	Test Mode：	Mode 4



Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV		dBuV	dBuV	dB	Detector	Comment
1		0.2060	24.12	9.47	33.59	63.37	-29.78	QP	
2		0.2060	5.32	9.47	14.79	53.37	-38.58	AVG	
3	*	0.6460	23.51	9.84	33.35	56.00	-22.65	QP	
4		0.6460	12.59	9.84	22.43	46.00	-23.57	AVG	
5		1.0620	17.24	9.57	26.81	56.00	-29.19	QP	
6		1.0620	7.01	9.57	16.58	46.00	-29.42	AVG	
7		2.7860	14.39	9.64	24.03	56.00	-31.97	QP	
8		2.7860	1.40	9.64	11.04	46.00	-34.96	AVG	
9		5.6660	17.46	9.77	27.23	60.00	-32.77	QP	
10		5.6660	1.15	9.77	10.92	50.00	-39.08	AVG	
11		8.9340	16.65	9.70	26.35	60.00	-33.65	QP	
12		8.9340	6.40	9.70	16.10	50.00	-33.90	AVG	

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	N
Test Voltage ：	AC120V 60Hz	Test Mode：	Mode 4



Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV		dBuV	dBuV	dB	Detector	Comment
1		0.1539	23.56	9.52	33.08	65.79	-32.71	QP	
2		0.1539	4.54	9.52	14.06	55.79	-41.73	AVG	
3		0.2020	23.60	9.46	33.06	63.53	-30.47	QP	
4		0.2020	-2.83	9.46	6.63	53.53	-46.90	AVG	
5		0.6460	16.87	9.84	26.71	56.00	-29.29	QP	
6		0.6460	-3.19	9.84	6.65	46.00	-39.35	AVG	
7	*	1.1180	17.24	9.57	26.81	56.00	-29.19	QP	
8		1.1180	-0.86	9.57	8.71	46.00	-37.29	AVG	
9		2.7860	11.86	9.64	21.50	56.00	-34.50	QP	
10		2.7860	-3.02	9.64	6.62	46.00	-39.38	AVG	
11		9.8780	13.73	9.69	23.42	60.00	-36.58	QP	
12		9.8780	-1.10	9.69	8.59	50.00	-41.41	AVG	

3.2 RADIATED SPURIOUS EMISSIONS

3.2.1 TEST REQUIREMENT

According to FCC 15.236(g), Emission 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). Emissions outside this band shall comply with the limit specified at the edges of the ETSI mask.

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

Receiver Parameter	Setting
Attenuation	Auto
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

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	12750MHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.2.2 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-chamber test. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8m; above 1GHz, the height was 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. 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.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
g. For the radiated emission test above 1GHz:
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.
Note:

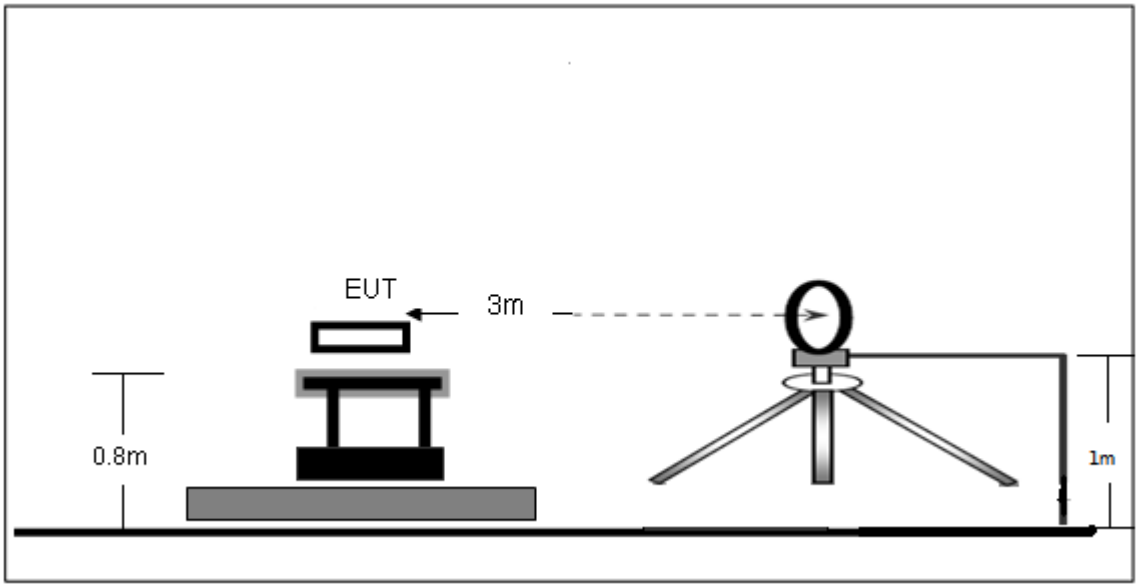
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

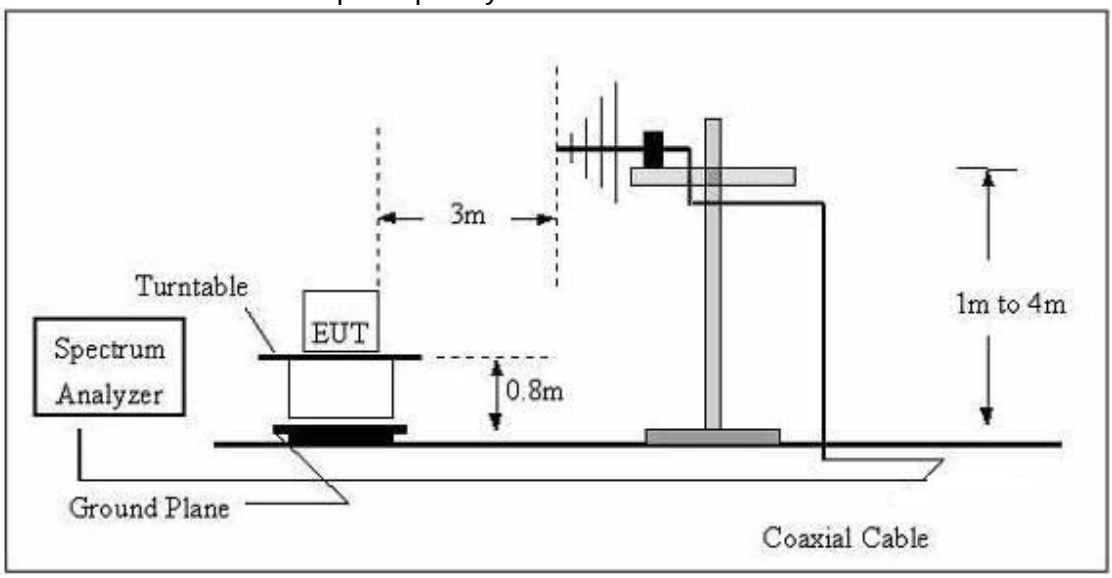
No deviation

3.2.4 TEST SETUP

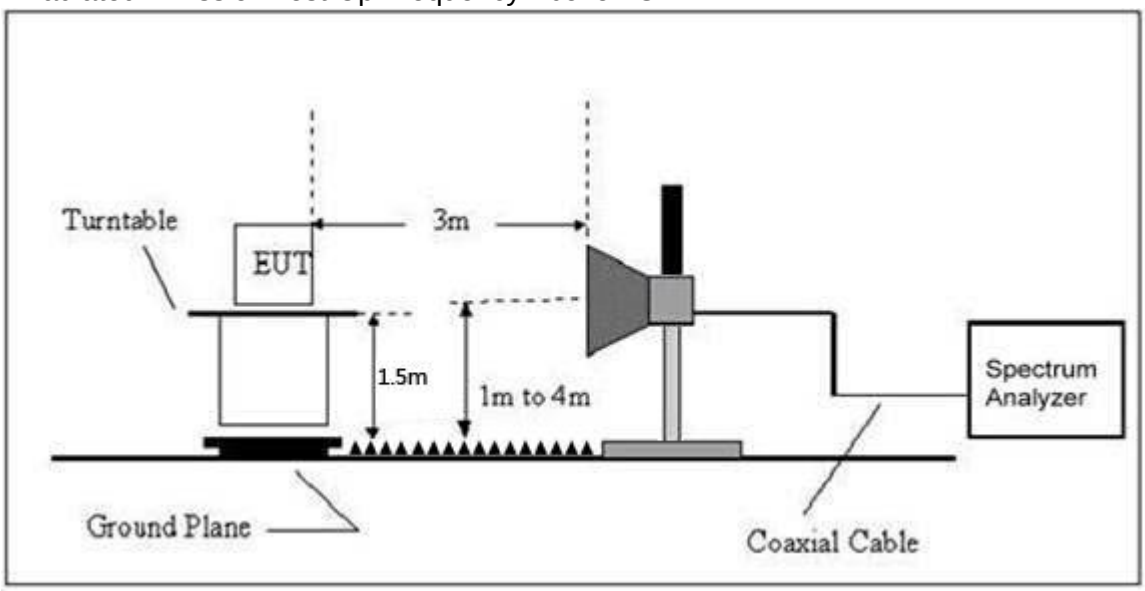
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING 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.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

Temperature：	26℃	Relative Humidtity：	54%
Pressure：	101 kPa	Test Voltage ：	DC 3.7V
Test Mode ：	Mode 1	Polarization :	--

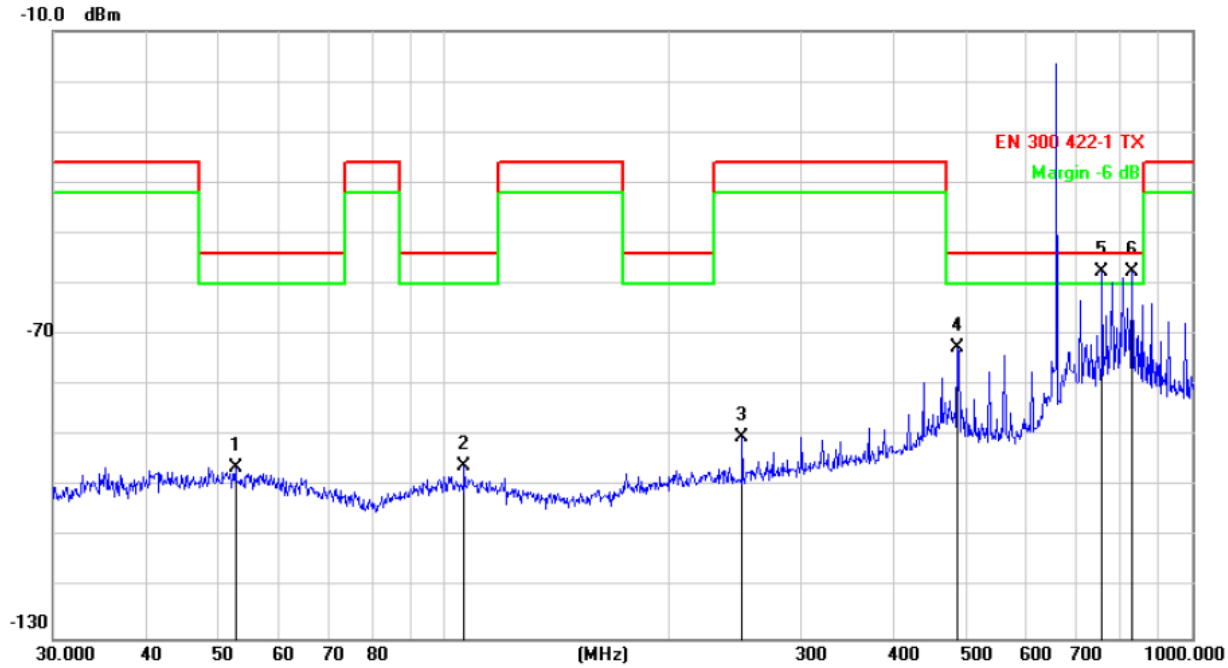
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

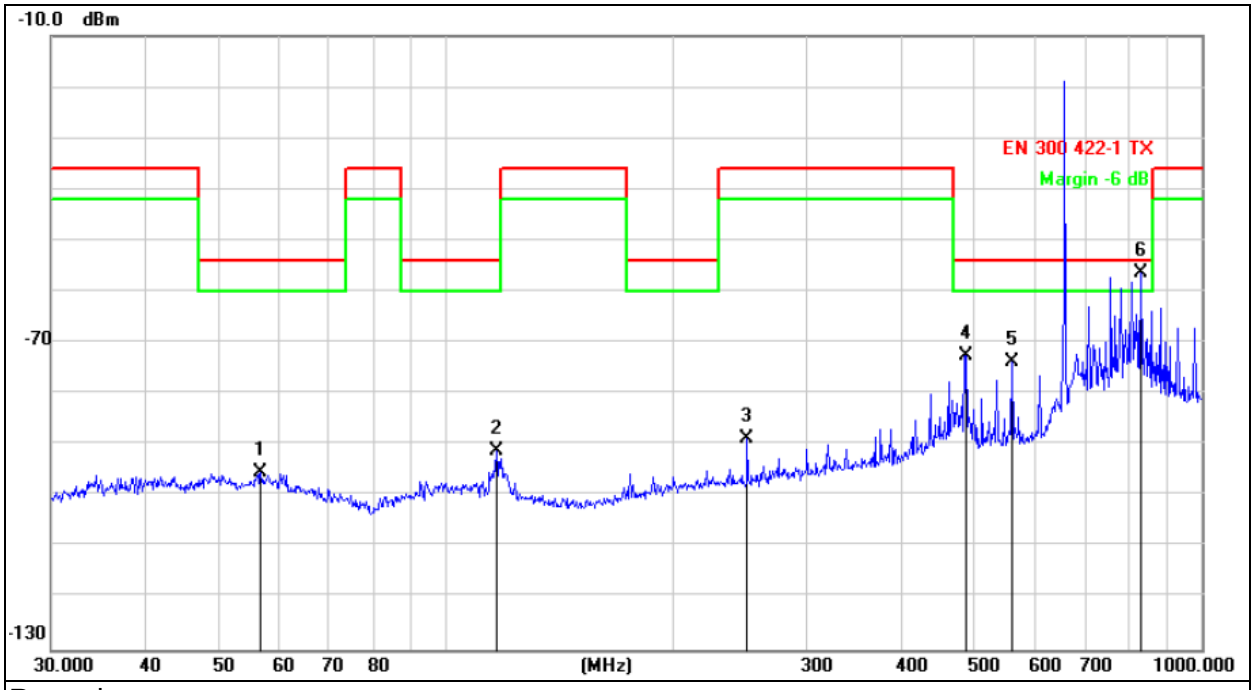
Temperature：	26℃	Relative Humidity：	54%
Pressure：	101 kPa	Polarization：	Horizontal
Test Voltage ：	DC 3.7V		
Test Mode ：	Mode 1		



Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Exceeding the limit is the main wave.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBm	dB	dBm	dB	dB	Detector
1		52.5753	-81.10	-15.12	-96.22	-54.00	-42.22	QP
2		106.3850	-79.25	-16.69	-95.94	-54.00	-41.94	QP
3		250.3012	-75.21	-15.14	-90.35	-36.00	-54.35	QP
4		485.6093	-63.23	-9.24	-72.47	-54.00	-18.47	QP
5	*	758.0408	-53.37	-4.23	-57.60	-54.00	-3.60	QP
6	!	830.4002	-54.69	-2.96	-57.65	-54.00	-3.65	QP

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Polarization：	Vertical
Test Voltage ：	DC 3.7V		
Test Mode ：	Mode 1		



Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Exceeding the limit is the main wave.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBm	dB	dBm	dB	dB	Detector
1		56.7917	-79.65	-15.57	-95.22	-54.00	-41.22	QP
2		116.5401	-73.77	-17.35	-91.12	-54.00	-37.12	QP
3		250.3012	-73.75	-15.14	-88.89	-36.00	-52.89	QP
4		487.3151	-63.31	-9.20	-72.51	-54.00	-18.51	QP
5		560.6928	-66.42	-7.43	-73.85	-54.00	-19.85	QP
6	*	830.4002	-53.48	-2.96	-56.44	-54.00	-2.44	QP

Remark:
Test all the modes and only worst case was reported.

3.2.8 TEST RESULTS (1GHz~12.75GHz)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Correct	Absolute Level	Result	
			Height	Polar	Factor		Limit	Margin
(MHz)	(dBm)	Degree	(m)	(H/V)	(dBm)	(dBm)	(dBm)	(dB)
CH01								
1316.00	-48.25	26	1.9	H	-9.42	-57.67	-30	-27.67
1316.00	-49.36	340	1.9	V	-9.42	-58.78	-30	-28.78
1974.00	-47.59	236	1.0	H	-6.42	-54.01	-30	-24.01
1974.00	-48.39	89	1.6	V	-6.42	-54.81	-30	-24.81
2632.00	-51.22	6	1.5	H	-6.94	-58.16	-30	-28.16
2632.00	-54.51	219	1.3	V	-6.94	-61.45	-30	-31.45
CH02								
1318.00	-47.88	240	1.4	H	-9.41	-57.29	-30	-27.29
1318.00	-48.63	144	1.6	V	-9.41	-58.04	-30	-28.04
1977.00	-47.44	240	1.2	H	-6.40	-53.84	-30	-23.84
1977.00	-49.34	49	1.9	V	-6.40	-55.74	-30	-25.74
2636.00	-50.73	290	1.5	H	-6.95	-57.68	-30	-27.68
2636.00	-55.21	217	1.5	V	-6.95	-62.16	-30	-32.16
CH04								
1322.00	-48.62	257	1.4	H	-9.39	-58.01	-30	-28.01
1322.00	-49.82	39	1.5	V	-9.39	-59.21	-30	-29.21
1983.00	-47.46	202	1.4	H	-6.38	-53.84	-30	-23.84
1983.00	-48.24	224	1.6	V	-6.38	-54.62	-30	-24.62
2644.00	-50.85	123	1.1	H	-6.96	-57.81	-30	-27.81
2644.00	-54.44	77	1.3	V	-6.96	-61.40	-30	-31.40

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

4. RF OUTPUT POWER

4.1 TEST REQUIREMENT:

FCC Part15 (15.236) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.236	EIRP	20mW	657-663	PASS

4.1.1 TEST PROCEDURE

1. The maximum peak output power was measured with a Spectrum Analyzer connected to the antenna terminal while EUT was operating in unmodulatedsituation.

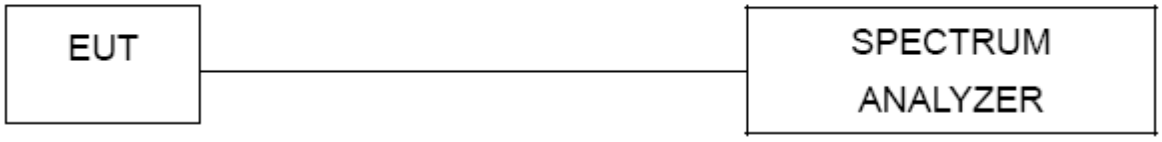
2. Power was supplied to the battery input connector a power supply. The power supply was set for +3.7VDC. The Spectrum Analyzer was connected at antennaterminal to measure RF power ofthe carrier.

3. A Multimeter was connected in series with final RF Stage to measure thecurrent; A Multimeter was used tomeasure final RF Stage supply voltage. Then the voltage v.s. current of the final RF Stage can be showed.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



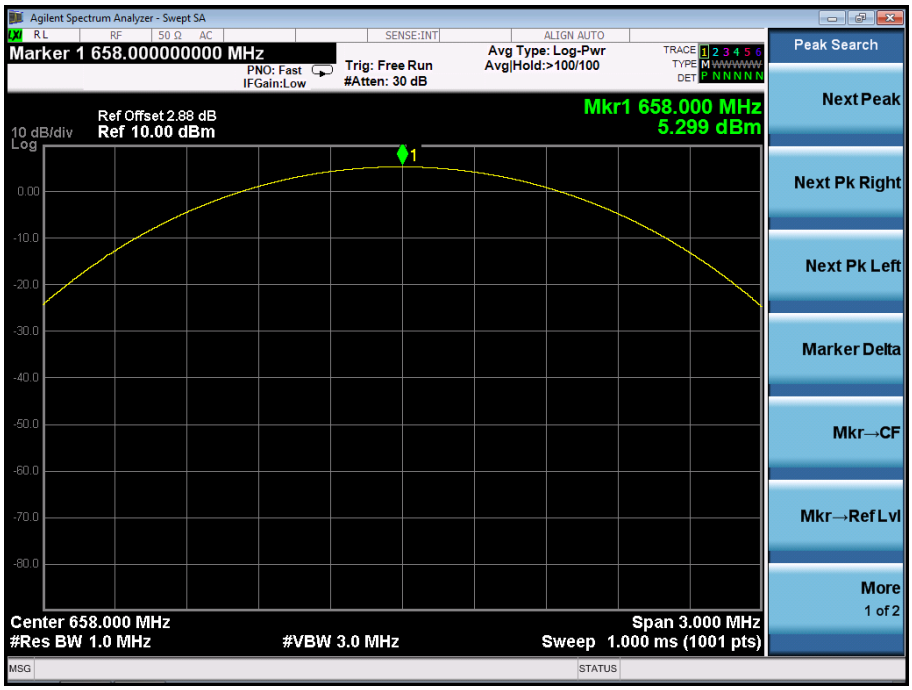
4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

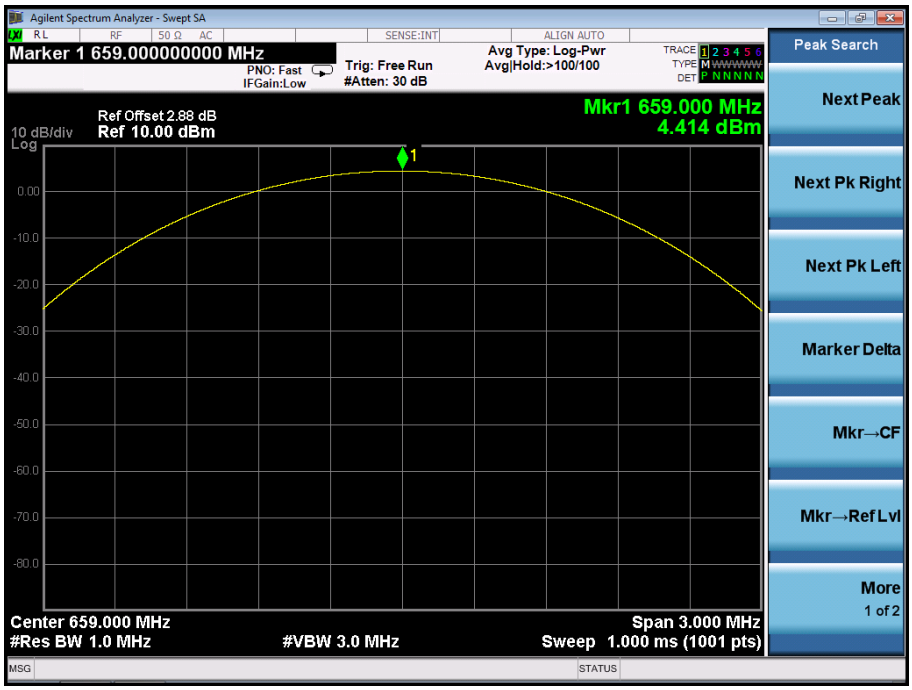
4.1.5 TEST RESULTS

Channel	Frequency (MHz)	Conducted power (dBm)	Antenna gain(dBi)	EIRP (dBm)	Limit (dBm)
01	658	5.30	-0.05	5.25	13
02	659	4.41	-0.05	4.36	13
04	661	4.76	-0.05	4.71	13

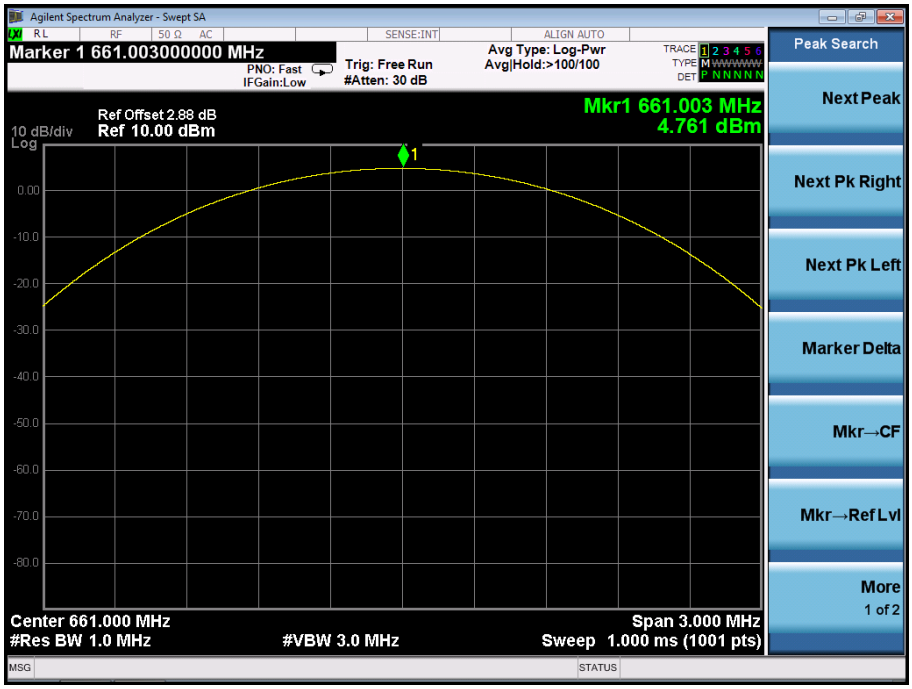
CH 01



CH 02


Agilent Spectrum Analyzer - Swept SA
Marker 1 659.000000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ref Offset 2.88 dB
10 dB/div
Ref 10.00 dBm
Mkr1 659.000 MHz
4.414 dBm
Center 659.000 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

CH 04


Agilent Spectrum Analyzer - Swept SA
Marker 1 661.003000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ref Offset 2.88 dB
10 dB/div
Ref 10.00 dBm
Mkr1 661.003 MHz
4.761 dBm
Center 661.000 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

5. BANDWIDTH TEST & EMISSION MASK

5.1 APPLIED PROCEDURES / LIMIT

According to FCC 15.236(f), The operating frequency within a permissible band of operation as defined in paragraph (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) 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.

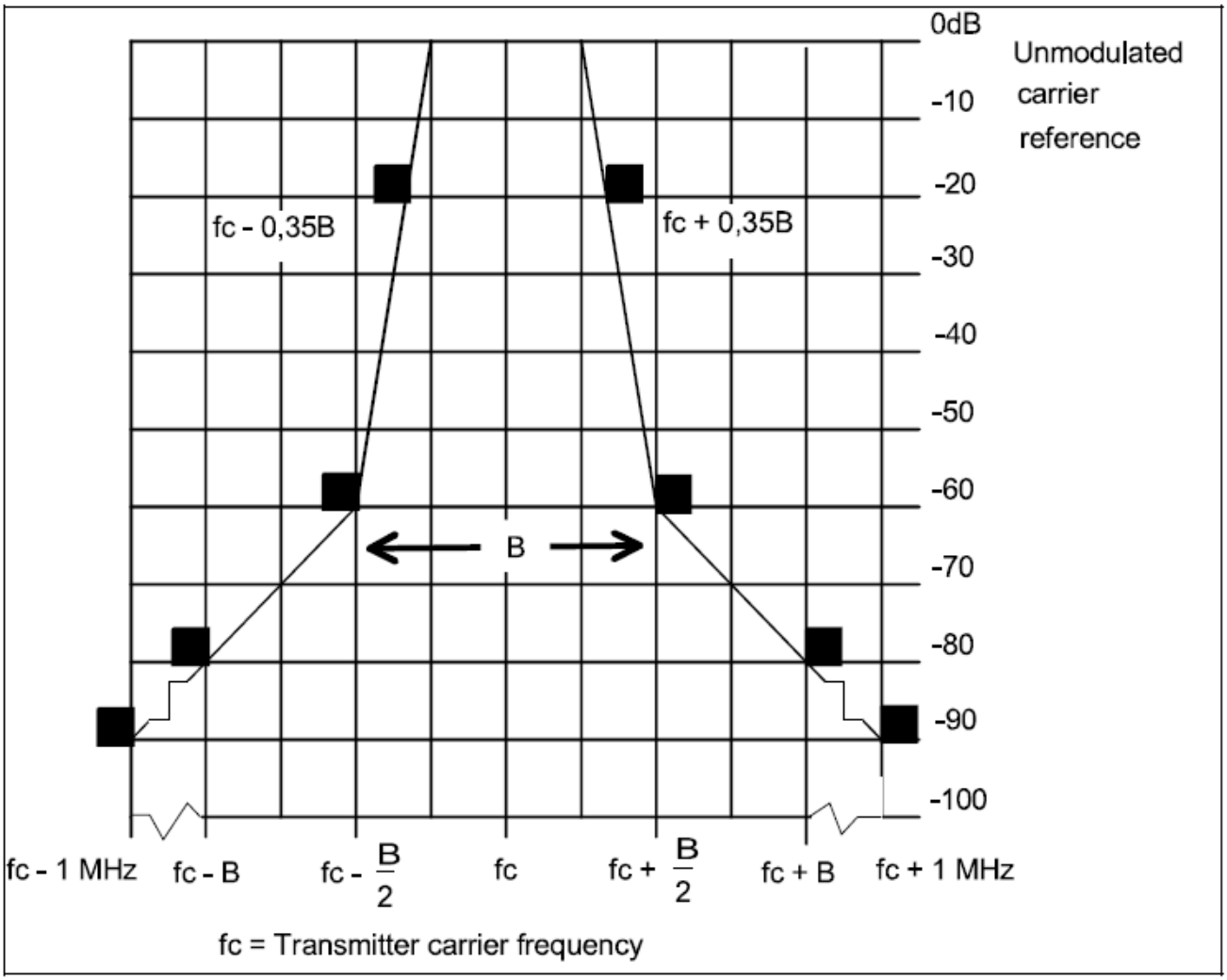
Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in Section 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08) (incorporated by reference, see §15.38). Emissions outside this band shall comply with the limit specified at the edges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

5.1.1 TEST PROCEDURE

According to TIA-603 for additional Test Set-Up procedures, the occupied bandwidth of emission was measured with a Spectrum Analyzer connected to the antenna terminal while EUT was operating in 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. Then mark the 99% Occupied Bandwidth and record it..

Emission Mask test procedure:
Necessary Bandwidth (BN) for Analogue Systems
Method of Measurement
The arrangement of test equipment as shown in figure B.1 shall be used. Note that the noise meter conforms to (quasi peak) without weighting filter (flat).
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 (-8 dB (lim)) as declared by the manufacturer. The corresponding audio output level from the demodulator shall be measured and recorded.
The input impedance of the noise meter shall be sufficiently high to avoid more than 0,1 dB change in input level when the meter is switched between input and output. 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.
It shall be checked that the audio output level has increased by $\leqslant$ 10 dB.
If this condition 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 -8 dB (lim).
If the transmitter incorporates more than one audio input, e.g. stereo systems, the second and subsequent channels shall be simultaneously driven from the same noise source, attenuated to a level of -6 dB (lim).
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.



5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP

5.1.4 EUT OPERATION CONDITIONS

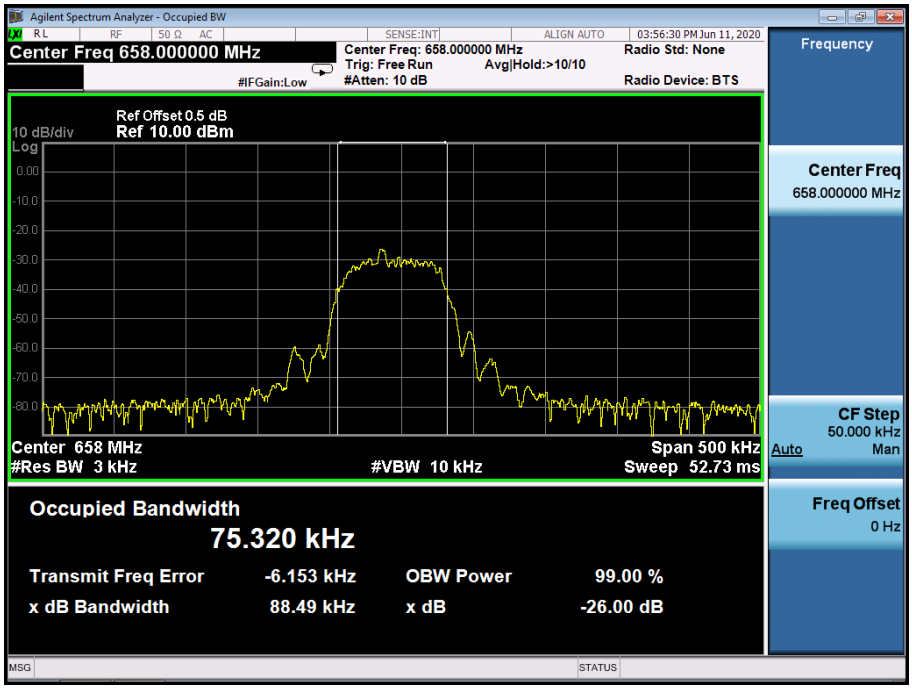
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

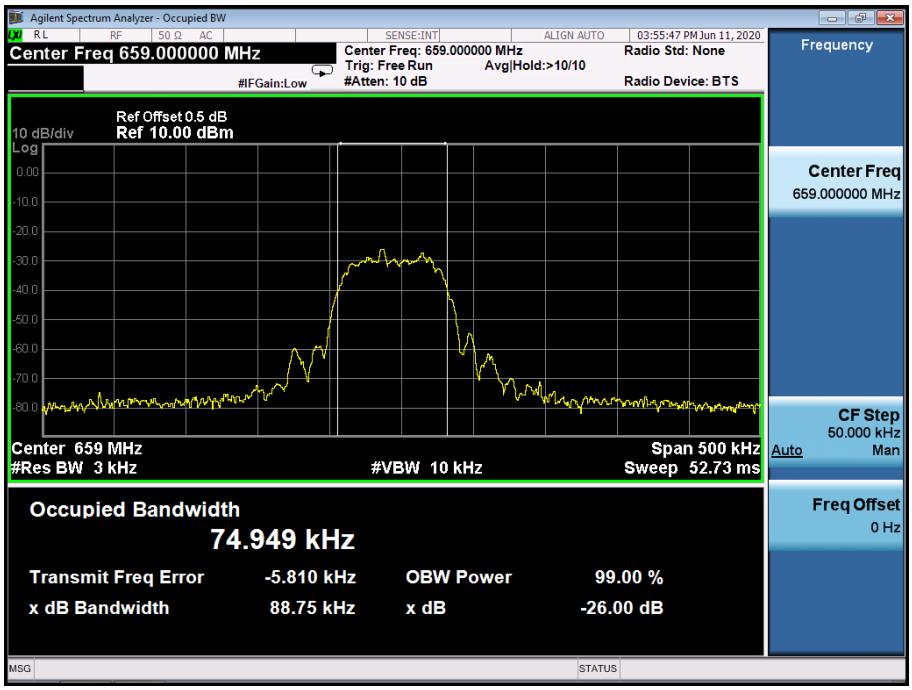
Temperature：	26℃	Relative Humidity：	54%
Test Mode ：	FM	Test Voltage ：	DC 3.7V

Frequency (MHz)	-26dB bandwidth (KHz)	99% Bandwidth (kHz)	Limit (kHz)	Result
658	88.49	75.320	200	Pass
659	88.75	79.949	200	Pass
661	87.77	75.446	200	Pass

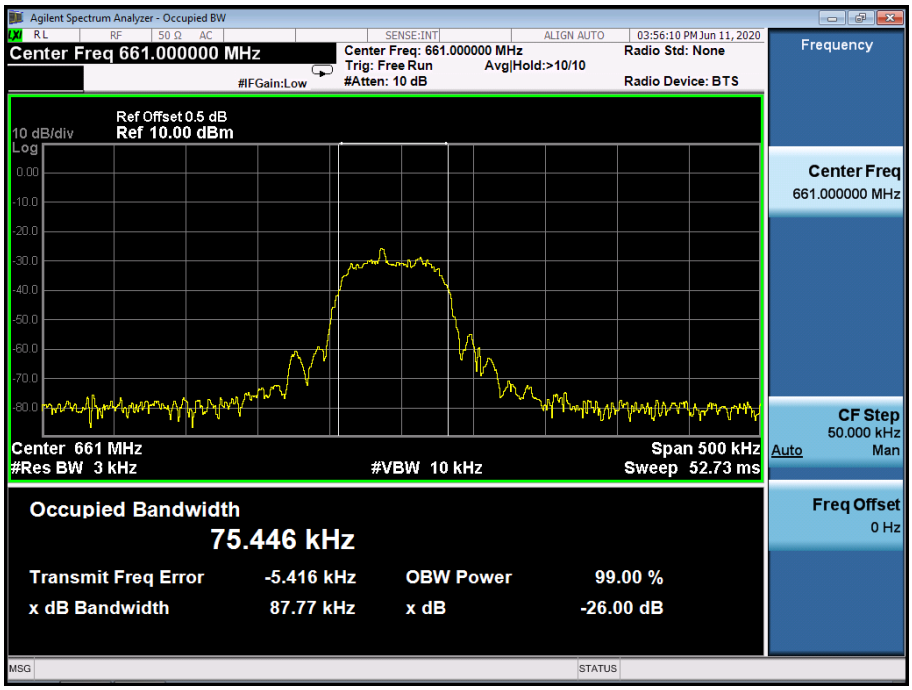
CH 01



CH 02

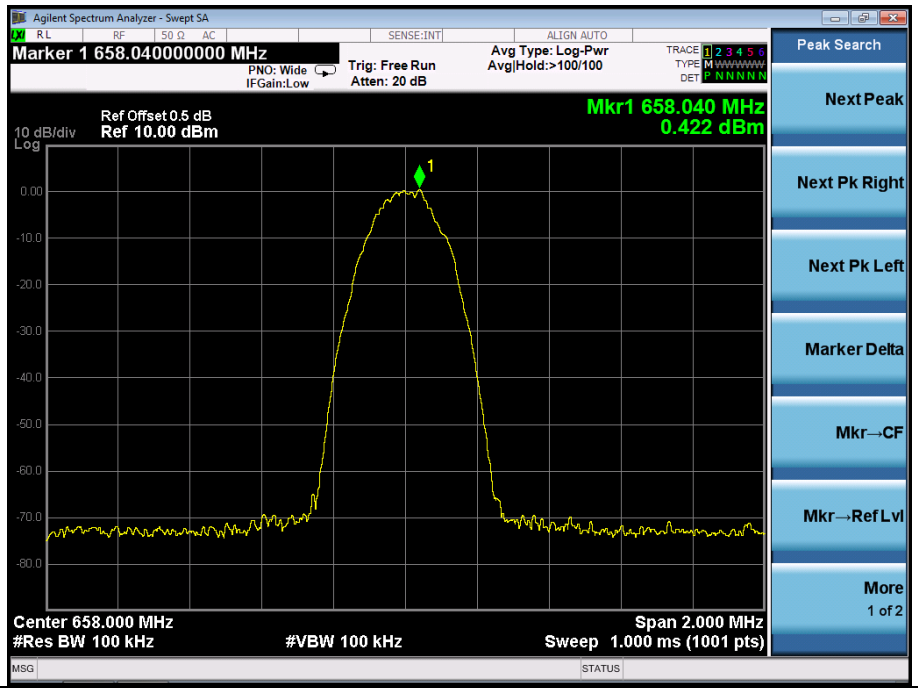

Agilent Spectrum Analyzer - Occupied BW
Center Freq 659.000000 MHz
Center Freq: 659.000000 MHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
03:55:47 PM Jun 11, 2020
Frequency
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Log
Center Freq
659.000000 MHz
CF Step
50.000 kHz
Auto
Man
Center 659 MHz
#Res BW 3 kHz
#VBW 10 kHz
Span 500 kHz
Sweep 52.73 ms
Occupied Bandwidth
74.949 kHz
Transmit Freq Error
-5.810 kHz
OBW Power
99.00 %
x dB Bandwidth
88.75 kHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

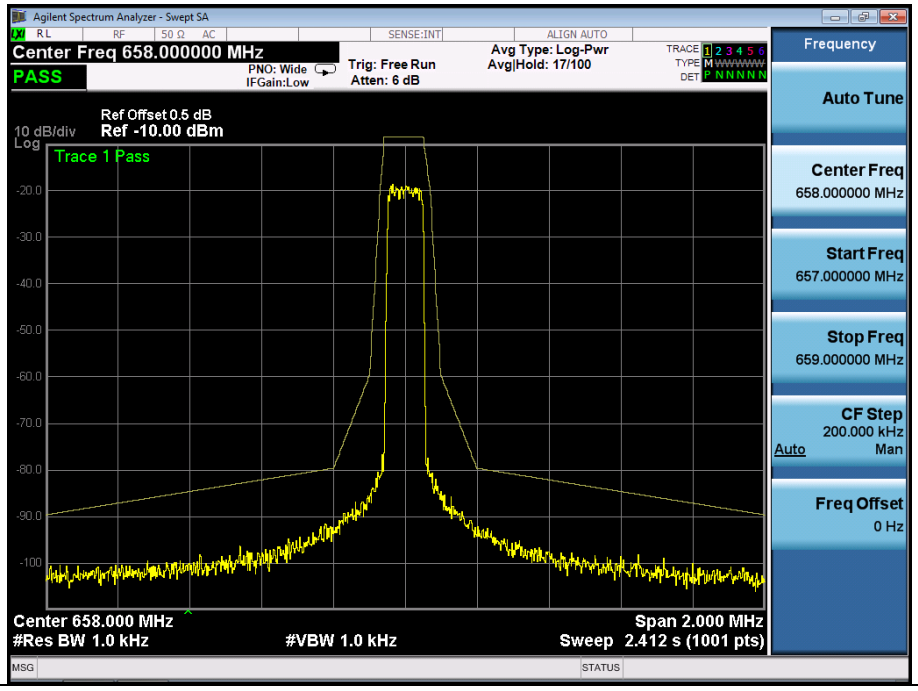
CH 04


Agilent Spectrum Analyzer - Occupied BW
Center Freq 661.000000 MHz
Center Freq: 661.000000 MHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
03:56:10 PM Jun 11, 2020
Frequency
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Log
Center Freq
661.000000 MHz
CF Step
50.000 kHz
Auto
Man
Center 661 MHz
#Res BW 3 kHz
#VBW 10 kHz
Span 500 kHz
Sweep 52.73 ms
Occupied Bandwidth
75.446 kHz
Transmit Freq Error
-5.416 kHz
OBW Power
99.00 %
x dB Bandwidth
87.77 kHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

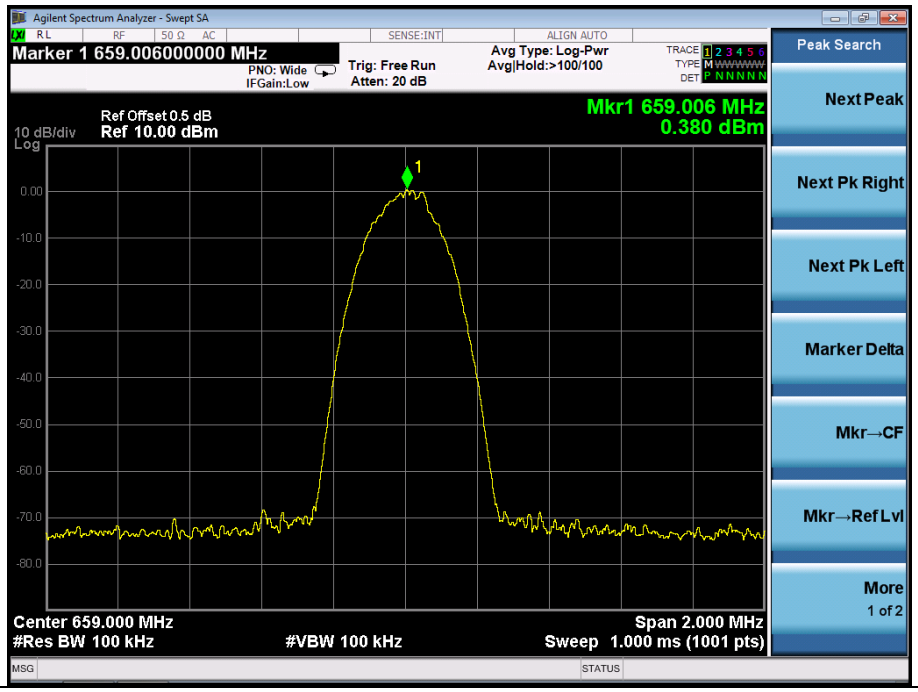
Emission Mask

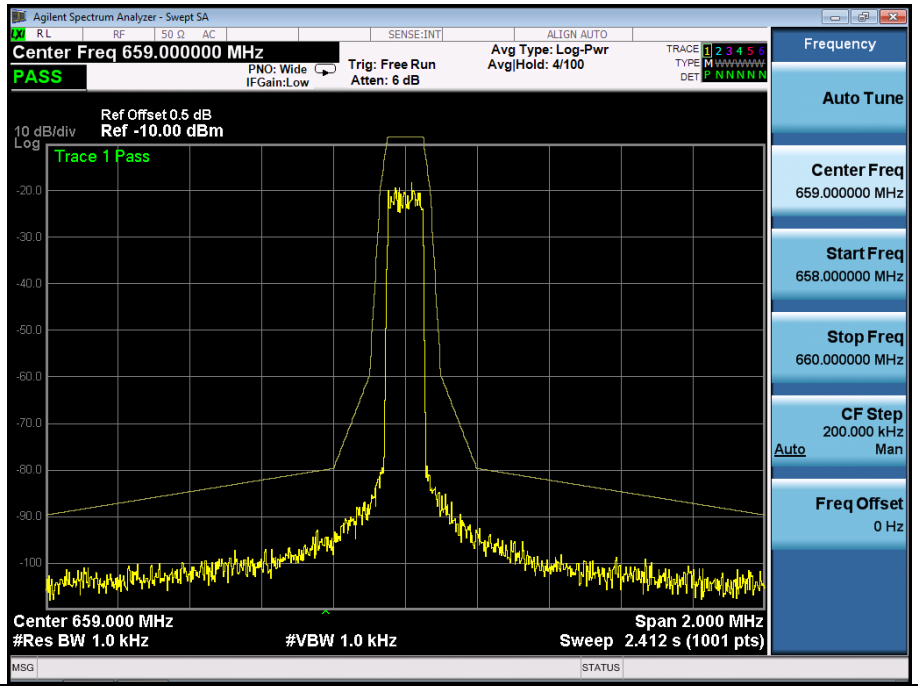
CH 01



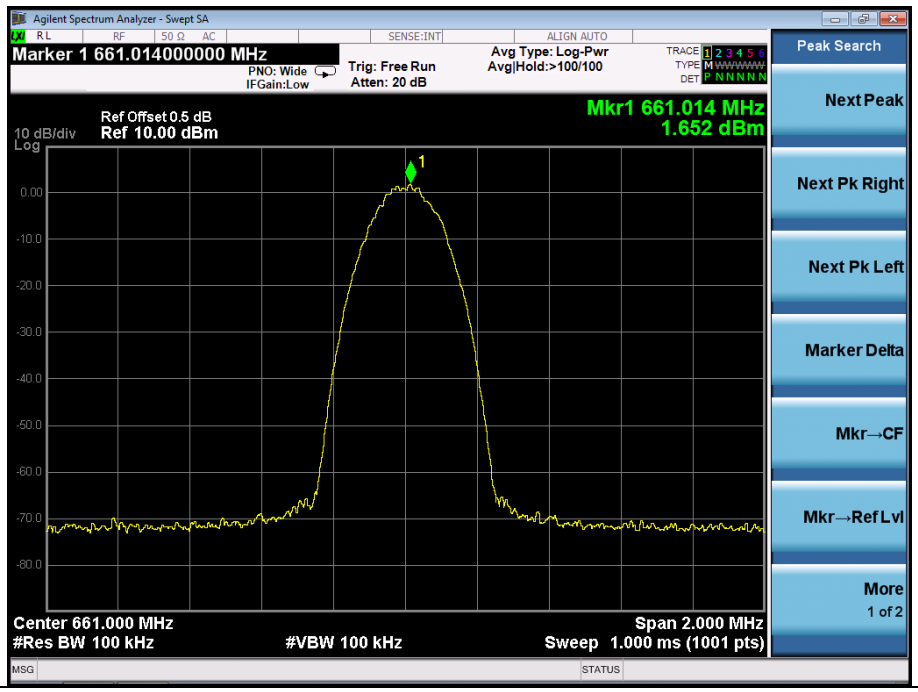


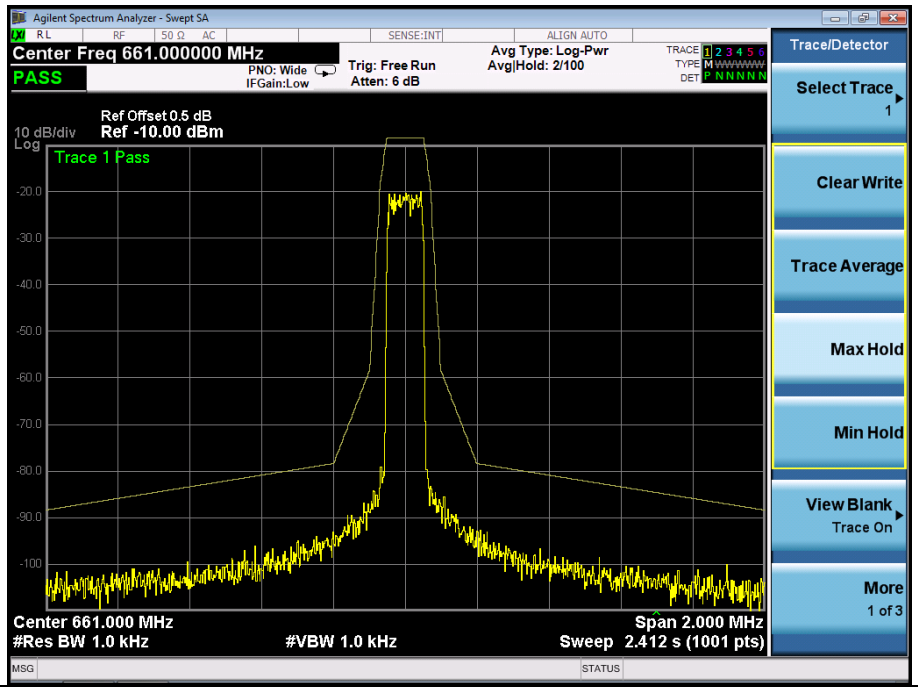
CH 02


Agilent Spectrum Analyzer - Swept SA
Marker 1 659.006000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 0.5 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 659.006 MHz
0.380 dBm
Center 659.000 MHz
#Res BW 100 kHz
#VBW 100 kHz
Span 2.000 MHz
Sweep 1.000 ms (1001 pts)


Agilent Spectrum Analyzer - Swept SA
Center Freq 659.000000 MHz
PASS
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold: 4/100
Frequency
Auto Tune
Center Freq
659.000000 MHz
Start Freq
658.000000 MHz
Stop Freq
660.000000 MHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz
Ref Offset 0.5 dB
10 dB/div
Log
Ref -10.00 dBm
Trace 1 Pass
Center 659.000 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 2.000 MHz
Sweep 2.412 s (1001 pts)

CH 04


Agilent Spectrum Analyzer - Swept SA
Marker 1 661.014000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 661.014 MHz
1.652 dBm
Center 661.000 MHz
#Res BW 100 kHz
#VBW 100 kHz
Span 2.000 MHz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Center Freq 661.000000 MHz
PASS
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold: 2/100
Ref Offset 0.5 dB
10 dB/div
Ref -10.00 dBm
Trace 1 Pass
Center 661.000 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 2.000 MHz
Sweep 2.412 s (1001 pts)
Trace/Detector
Select Trace
1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank
Trace On
More
1 of 3

6. FREQUENCY STABILITY

6.1 APPLICABLE STANDARD

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

6.2 TEST PROCEDURE

1, Setup the configuration of the ambient temperature form -20ºC to 50ºC with sufficient time. And measure the 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 measured.

6.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP

7.5 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.

7.6 TEST RESULTS

Test conditions		Frequency Error
		658 MHz
Tnom(20°C)	V_{min}(3.15V)	657.9941
	V_{max}(4.26V)	657.9944
T(-20°C)	V_{nom}(3.7V)	657.9943
T(-10°C)	V_{nom}(3.7V)	657.9944
T(0°C)	V_{nom}(3.7V)	657.9945
T(10°C)	V_{nom}(3.7V)	657.9944
T_{nom}(20°C)	V_{nom}(3.7V)	657.9942
T(30°C)	V_{nom}(3.7V)	657.9946
T(40°C)	V_{nom}(3.7V)	657.9944
T(50°C)	V_{nom}(3.7V)	657.9943
Tnom(20°C)	V_{min}(3.15V)	657.9942
	V_{max}(4.26V)	657.9944
Max. frequency error (ppm)		-8.97
Limit (ppm)		±50ppm
End Point		DC 3.7V

Test conditions		Frequency Error
		659 MHz
Tnom(20°C)	V_{min}(3.15V)	658.9942
	V_{max}(4.26V)	658.9946
T(-20°C)	V_{nom}(3.7V)	658.9945
T(-10°C)	V_{nom}(3.7V)	658.9944
T(0°C)	V_{nom}(3.7V)	658.9944
T(10°C)	V_{nom}(3.7V)	658.9943
T_{nom}(20°C)	V_{nom}(3.7V)	658.9943
T(30°C)	V_{nom}(3.7V)	658.9945
T(40°C)	V_{nom}(3.7V)	658.9944
T(50°C)	V_{nom}(3.7V)	658.9946
Tnom(20°C)	V_{min}(3.15V)	658.9942
	V_{max}(4.26V)	658.9943
Max. frequency error (ppm)		-8.80
Limit (ppm)		±50ppm
End Point		DC 3.7V

Test conditions		Frequency Error
		661 MHz
Tnom(20°C)	V_{min}(3.15V)	660.9941
	V_{max}(4.26V)	660.9945
T(-20°C)	V_{nom}(3.7V)	660.9944
T(-10°C)	V_{nom}(3.7V)	660.9943
T(0°C)	V_{nom}(3.7V)	660.9943
T(10°C)	V_{nom}(3.7V)	660.9942
T_{nom}(20°C)	V_{nom}(3.7V)	660.9945
T(30°C)	V_{nom}(3.7V)	660.9946
T(40°C)	V_{nom}(3.7V)	660.9944
T(50°C)	V_{nom}(3.7V)	660.9943
Tnom(20°C)	V_{min}(3.15V)	660.9942
	V_{max}(4.26V)	660.9943
Max. frequency error (ppm)		-8.93
Limit (ppm)		±50ppm
End Point		DC 3.7V

7. ANTENNA REQUIREMENT

7.1 STANDARD REQUIREMENT

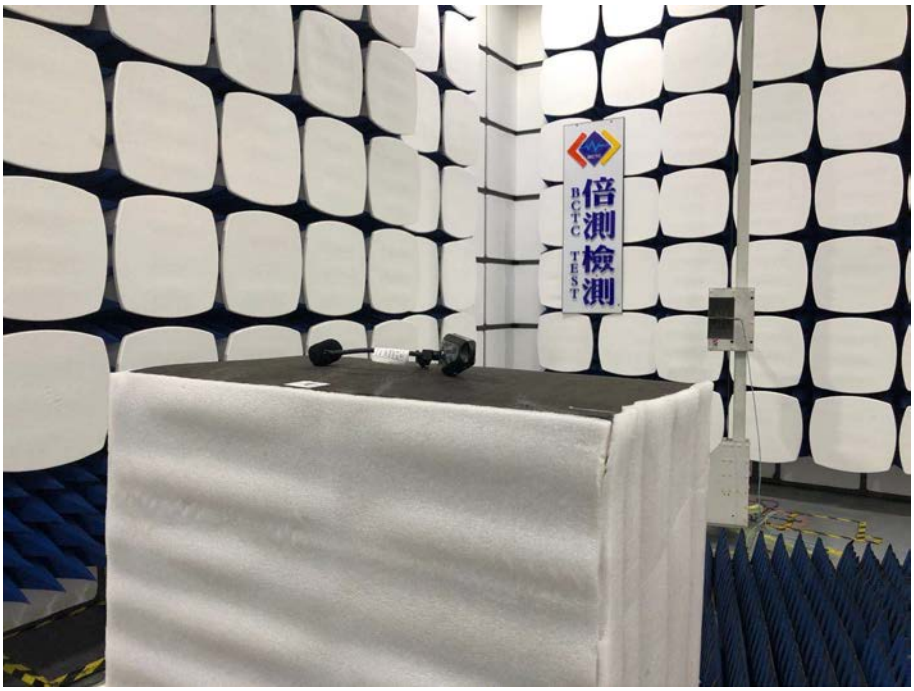
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

7.2 EUT ANTENNA

The EUT antenna is Internal antenna, fulfill the requirement of this section.

8. EUT TEST PHOTO

Radiated Measurement Photos



Conducted emissions

9. EUT PHOTO

※※※※※ END OF REPORT ※※※※※