



FCC Test Report

Report No: FCS202101045W01

Issued for

Applicant:	Guangzhou Dongda Electronic Technology Company Limited
Address:	5th Floor, No. 138 Shibei Road, Dashi, Panyu District, Guangzhou, China
Product Name:	Bluetooth earphones
Brand Name:	NOIRAY
Model Name:	Noiray Cube
Series Model:	N/A
FCC ID:	2AWXB-NOIRAY2
Issued By: Flux Compliance Service Laboratory Add: Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan Tel: 769-27280901 Fax:769-27280901 http://www.fcs-lab.com	

TEST RESULT CERTIFICATION

Applicant's Name.....: Guangzhou Dongda Electronic Technology Company Limited

Address.....: 5th Floor, No. 138 Shibei Road, Dashi, Panyu District, Guangzhou, China

Manufacture's Name.....: Guangzhou Dongda Electronic Technology Company Limited

Address.....: 5th Floor, No. 138 Shibei Road, Dashi, Panyu District, Guangzhou, China

Product Description

Product Name.....: Bluetooth earphones

Brand Name: NOIRAY

Model Name.....: Noiray Cube

Series Model.....: N/A

Test Standards.....: FCC Rules and Regulations Part 15 Subpart C, Section 249

Test Procedure.....: ANSI C63.10:2013

This device described above has been tested FCS, 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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Date of Test.....:

Date (s) of performance of tests.: 29 Feb, 2021 ~ 15 Mar, 2021

Date of Issue.....: 015 Mar, 2021

Test Result.....: Pass

Tested by

:

Scott Shen

(Scott Shen)

Reviewed by

:

Duke Qian

(Duke Qian)

Approved by

:

Kait Chen

(Kait Chen)

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Revision History

Rev.	Issue Date	Effect Page	Contents
00	15 Mar, 2021	All	Initial Issue

1. SUMMARY OF TEST RESULTS

FCC Part 15.249,Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	--
15.205(a), 15.209(a), 15.249(a), 15.249(c)	Radiated Spurious Emission	PASS	--
15.209	Field strength of fundamental	PASS	
15.249(d)	Band Edge Emission	PASS	--
15.215(c)	20dB Bandwidth	PASS	--
15.203	Antenna Requirement	PASS	--

NOTE:

- (1)" N/A" denotes test is not applicable in this Test Report
- (2) All tests are according to ANSI C63.10-2013

1.1 TEST FACTORY

Company Name:	Flux Compliance Service Laboratory
Address:	Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan
Telephone:	+86-769-27280901
Fax:	+86-769-27280901
FCC Test Firm Registration Number: 514908 Designation number: CN0127 A2LA accreditation number: 5545.01	

1.2 MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	RF output power, conducted	± 0.71 dB
2	Unwanted Emissions, conducted	± 2.98 dB
3	Conducted Emission (9KHz-150KHz)	± 4.13 dB
4	Conducted Emission (150KHz-30MHz)	± 4.74 dB
5	All emissions,radiated(<1G) 30MHz-1000MHz	± 3.2 dB
6	All emissions,radiated (1GHz -18GHz)	± 3.66 dB
7	All emissions,radiated (18GHz -40GHz)	± 4.31 dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Bluetooth earphones
Trade Name	NOIRAY
Model Name	Noiray Cube
Series Model	N/A
Model Difference	N/A
Channel List	Please refer to the Note 2.
BT	Frequency:2402-2480MHz Modulation: GFSK Data rate: 1Mbps Channel number: 40CH
Power Supply	DC 3.7V,60mA
Hardware version number	V1.0
Software version number	V1.0
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

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

2. **Operation Frequency each of channel**

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	NA	TRWD	PCB Antenna	N/A	5.19	Antenna

2.2 DESCRIPTION OF THE 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.

Test software: FCC tool

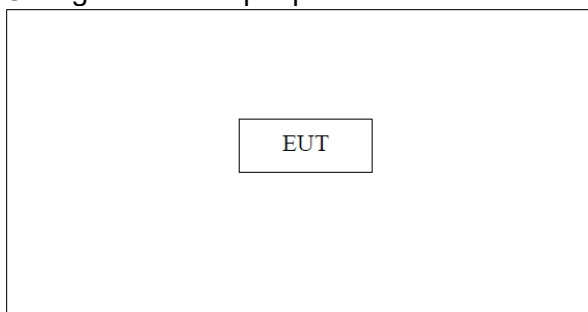
The test software was used to control EUT work in continuous TX mode, and select test channel, Wireless mode as below table

No.	Test model description
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK

Note:

1. All the test modes can be supply by battery, only the result of the worst case recorded in the report. GFSK mode is worst mode.
2. For radiated emission, 3 axis were chosen for testing for each applicable mode.
3. The EUT used fully charge battery when tested.
4. During the test, the dutycycle>98%, the test voltage was tuned from 85% to 115% of the Nominal rate supply votage, and found that the worst case was the nominal rated supply condition, So the report just shows that condition's data
5. We finally chose to test the right earphone of the sample, because the circuit of the left earphone and the right earphone are the same

Configuration and peripherals



2.3 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

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.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	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”.

2.4 EQUIPMENTS LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESRP 3	FCS-E001	2020. 06.26	2021. 06.25
Signal Analyzer	R&S	FSV40-N	FCS-E012	2020.06.05	2021.06.04
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2020.08.09	2021.08.10
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2020.08.26	2021.08.25
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2020.08.26	2021.08.25
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2020.06.26	2021.06.25
Pre-Amplifier(0.1M-3G Hz)	EMCI	EM330N	FCS-E004	2020.06.26	2021.06.25
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2020.06.03	2021.06.02
Pre-Amplifier (18G-40GHz)	TERA-MW	TRLA-0400	FCS-E019	2020.08.08	2021.08.07
Temperature & Humidity	HTC-1	victor	FCS-E005	2020.08.26	2021.08.25

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	FCS-E020	2020.06.03	2021.06.02
LISN	R&S	ENV216	FCS-E007	2020.08.08	2021.08.07
LISN	ETS	3810/2NM	FCS-E009	2020.06.03	2021.06.02
Temperature & Humidity	HTC-1	victor	FCS-E008	2020.08.08	2021.08.07

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
Spectrum Analyzer	Keysight	N9020A	FCS-E015	2020.06.03	2021.06.02
Spectrum Analyzer	Agilent	E4447A	MY50180039	2020.08.08	2021.08.07
Spectrum Analyzer	R&S	FSV-40	101499	2020.08.26	2021.08.25

3 CONDUCTED EMISSION MEASUREMENT

3.1 LIMIT

Operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) limit in the table below has to be followed.

FREQUENCY (MHz)	Conducted Emissionlimit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

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.

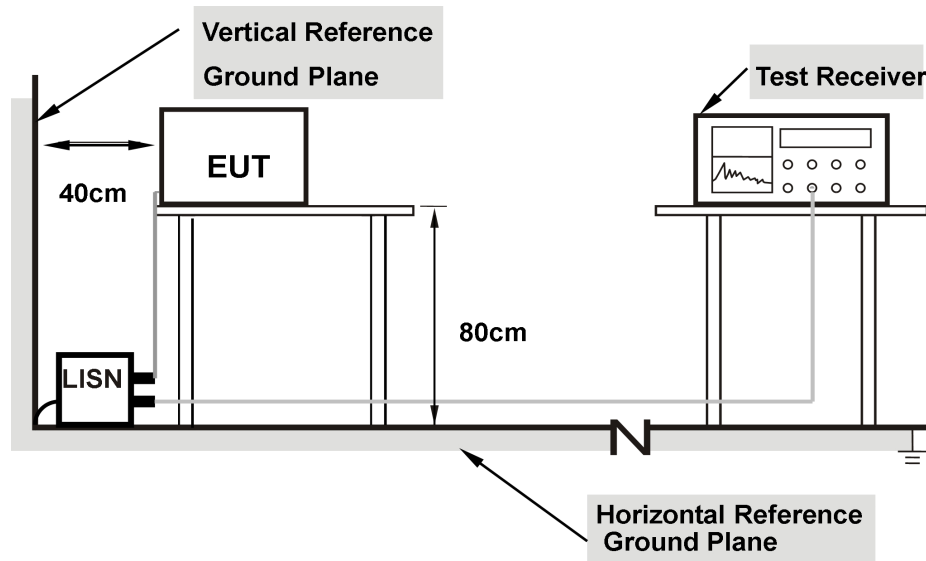
3.2 TEST PROCEDURE

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

- a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical 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.

3.3 TEST SETUP



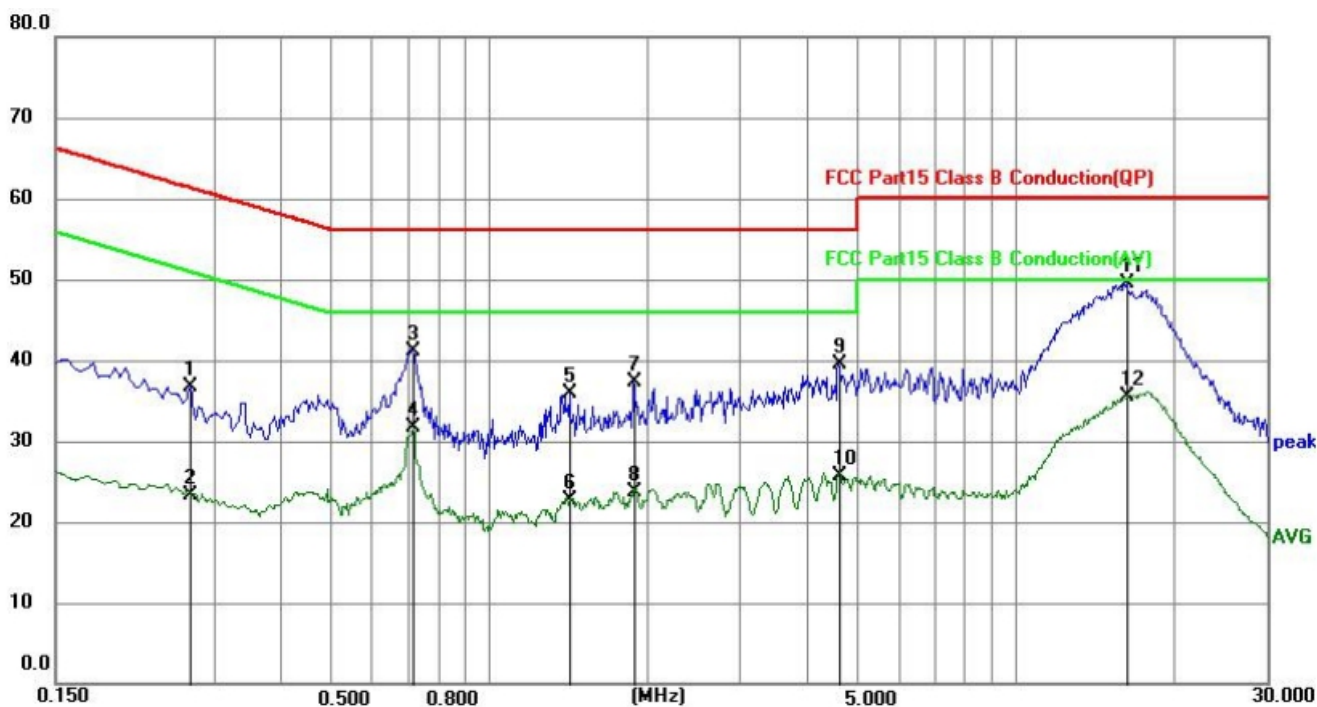
Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.4 TEST RESULTS

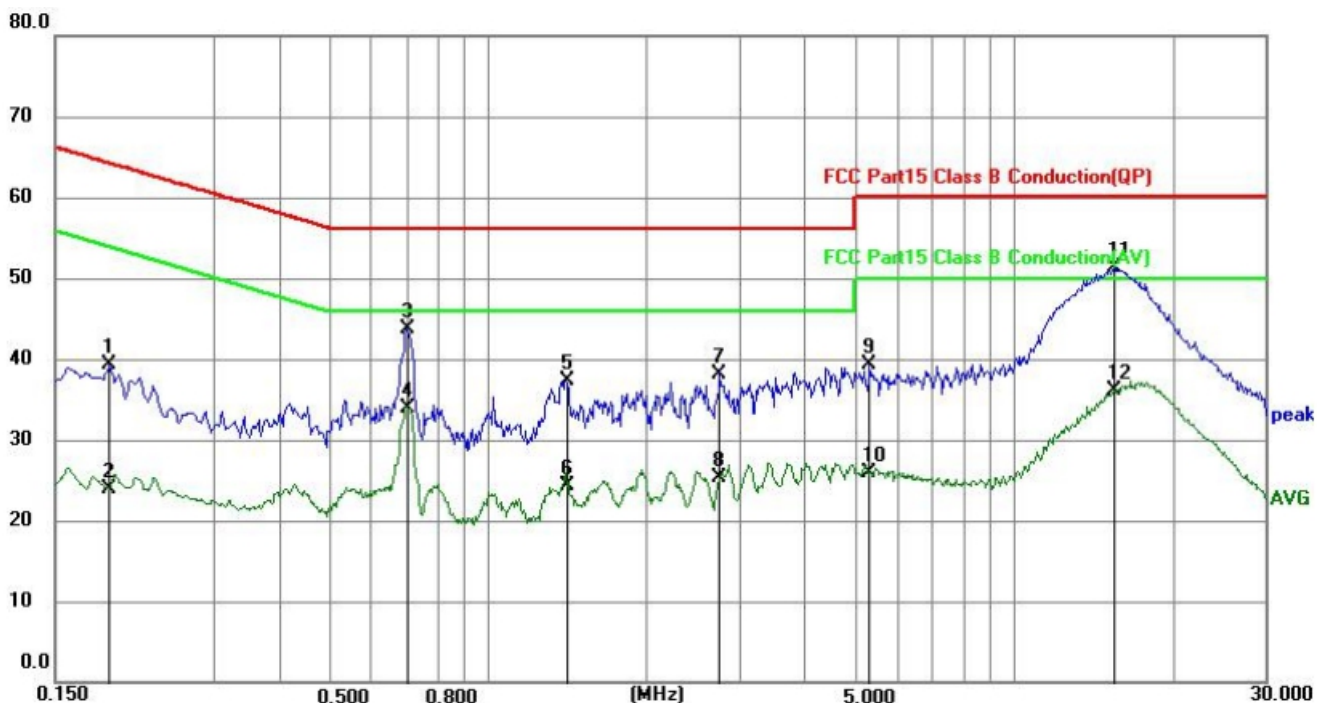
Temperature:	25℃	Relative Humidity:	50%
Test Mode:	GFSK	Test Voltage:	DC 3.7V
Phase:	L	Result:	Pass

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.2714	26.90	9.82	36.72	61.07	24.35	QP
2	0.2714	13.46	9.82	23.28	51.07	27.79	AVG
3	0.7125	31.31	9.89	41.20	56.00	14.80	QP
4	0.7125	21.87	9.89	31.76	46.00	14.24	AVG
5	1.4190	23.90	12.02	35.92	56.00	20.08	QP
6	1.4190	10.61	12.02	22.63	46.00	23.37	AVG
7	1.8825	22.87	14.34	37.21	56.00	18.79	QP
8	1.8825	9.46	14.34	23.80	46.00	22.20	AVG
9	4.6140	20.11	19.32	39.43	56.00	16.57	QP
10	4.6140	6.38	19.32	25.70	46.00	20.30	AVG
11	16.2555	29.41	20.13	49.54	60.00	10.46	QP
12	16.2555	15.35	20.13	35.48	50.00	14.52	AVG



Temperature:	25℃	Relative Humidity:	50%
Test Mode:	GFSK	Test Voltage:	DC 3.7V
Phase:	N	Result:	Pass

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1905	29.44	9.80	39.24	64.01	24.77	QP
2	0.1905	14.06	9.80	23.86	54.01	30.15	AVG
3	0.6990	33.77	9.89	43.66	56.00	12.34	QP
4	0.6990	24.10	9.89	33.99	46.00	12.01	AVG
5	1.4055	25.39	11.95	37.34	56.00	18.66	QP
6	1.4055	12.35	11.95	24.30	46.00	21.70	AVG
7	2.7554	21.98	16.22	38.20	56.00	17.80	QP
8	2.7554	9.10	16.22	25.32	46.00	20.68	AVG
9	5.3250	19.23	20.03	39.26	60.00	20.74	QP
10	5.3250	5.97	20.03	26.00	50.00	24.00	AVG
11	15.5310	31.07	20.21	51.28	60.00	8.72	QP
12	15.5310	15.94	20.21	36.15	50.00	13.85	AVG



Remark:

1. All readings are Quasi-Peak and Average values.

4. RADIATED EMISSION MEASUREMENT

4.1 LIMIT

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009mhz - 1000mhz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

LIMITS OF FIELD STRENGTH OF THE FUNDAMENTAL SIGNAL

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
2400-2483.5	114	94

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	PK=1MHz / 1MHz, AV=1 MHz /10 Hz (Peak detector is for Both)

- The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then QuasiPeak detector mode re-measured.
- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

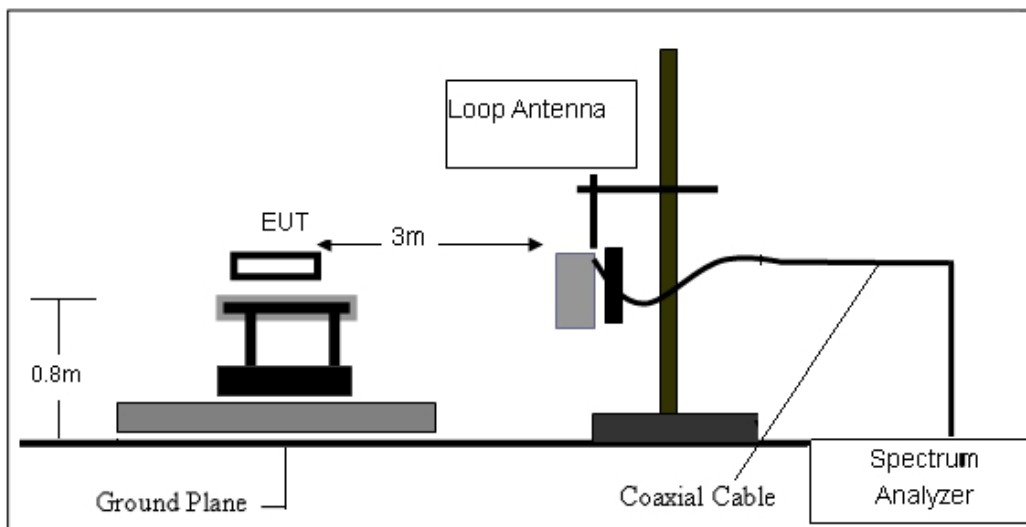
Note:

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

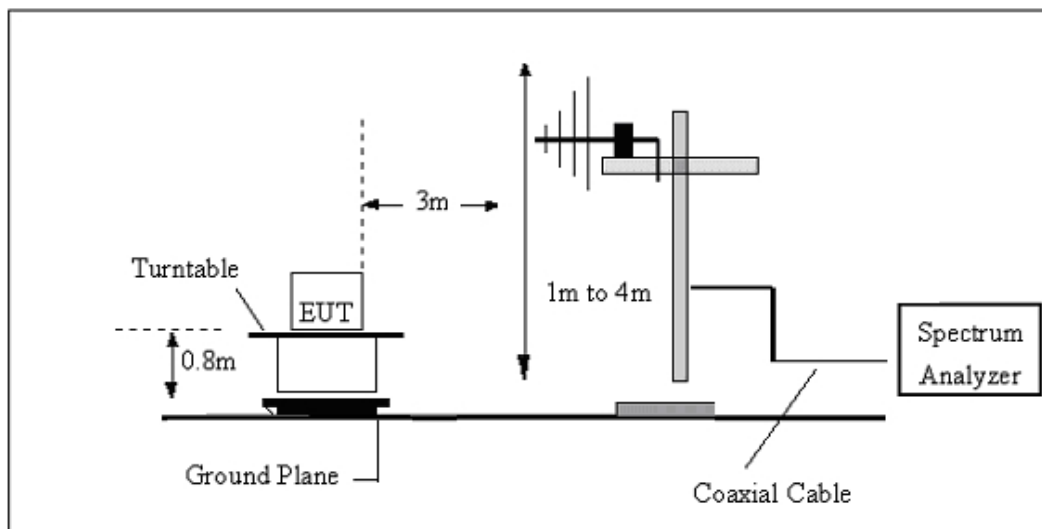
For fundamental frequency ,RBW>20dB BW ,VBW>RBW,PK detector for PK value, RMS detector for AV value.

4.3 TEST SETUP

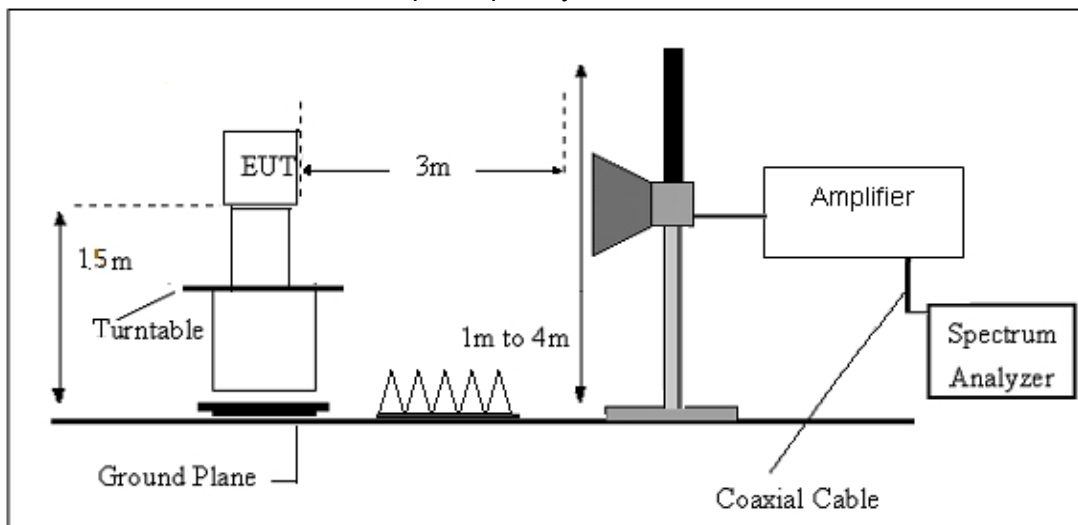
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



4.4 TEST RESULTS

Temperature:	25℃	Relative Humidity:	60%
Test Mode:	GFSK Mode	Test Voltage:	DC 3.7V

For field strength of the fundamental signal

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	78.85	13.46	92.31	114	-21.69	Horizontal
2402	78.42	13.46	91.88	114	-22.12	Vertical
2441	79.40	13.88	93.28	114	-20.72	Horizontal
2441	78.93	13.88	92.81	114	-21.19	Vertical
2480	80.22	14.11	94.33	114	-19.67	Horizontal
2480	79.73	14.11	93.84	114	-20.16	Vertical

Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	70.95	13.46	84.41	94	-9.59	Horizontal
2402	70.69	13.46	83.85	94	-10.15	Vertical
2441	71.42	13.88	85.30	94	-8.70	Horizontal
2441	70.98	13.88	84.86	94	-9.14	Vertical
2480	72.22	14.11	86.33	94	-7.67	Horizontal
2480	71.81	14.11	85.92	94	-8.08	Vertical

For spurious emission
(9KHz-30MHz)

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

Note:

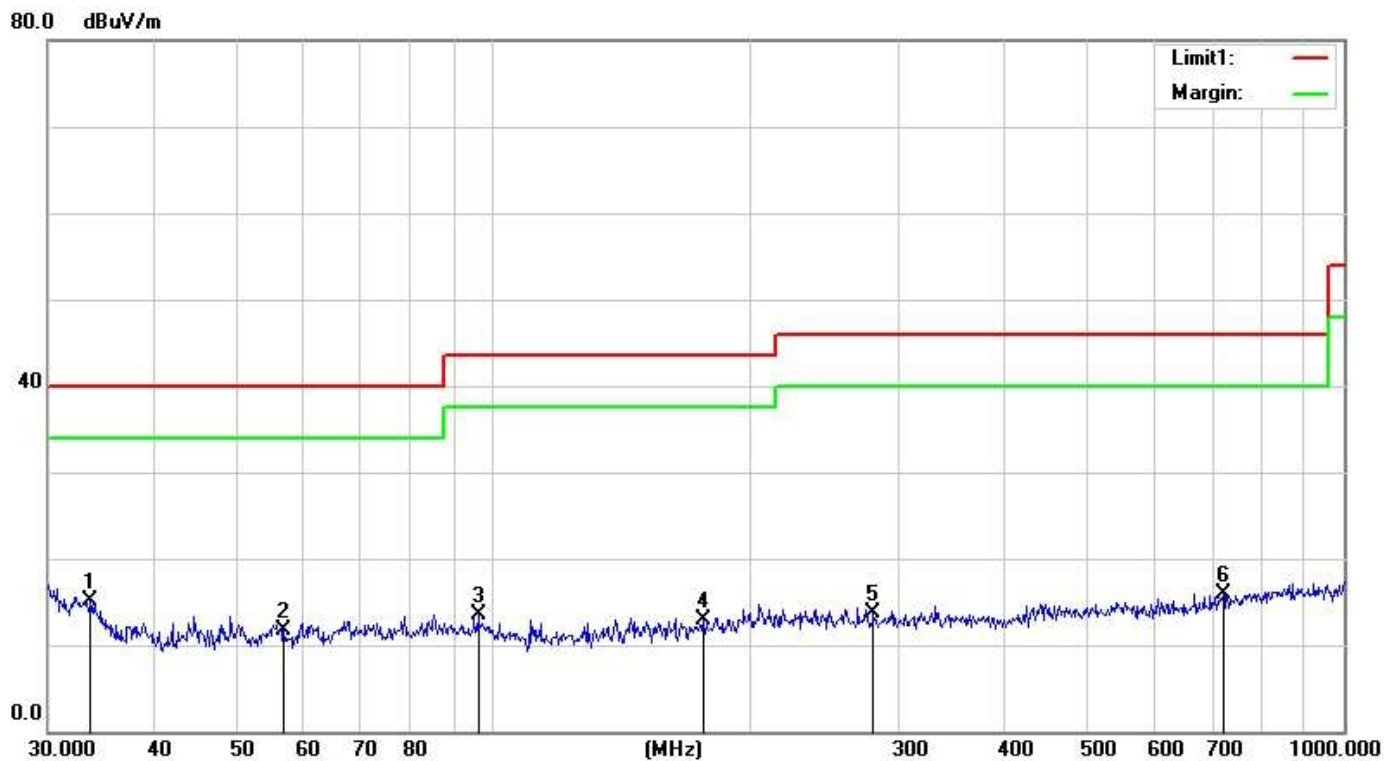
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB);

Limit line = specific limits (dBuv) + distance extrapolation factor.

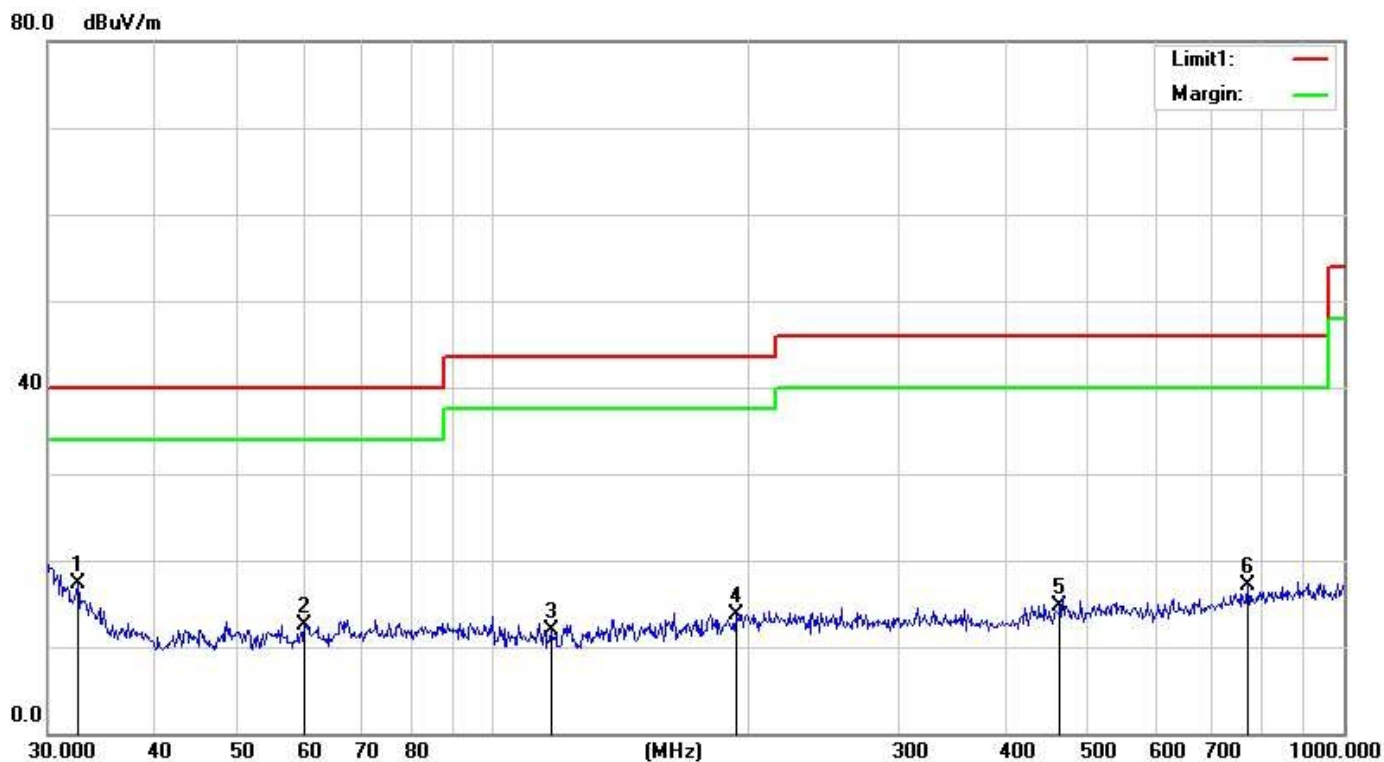
(30MHZ-1000MHZ)

Temperature:	23.7°C	Relative Humidity:	61%
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	GFSK		



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	33.6802	30.98	-15.84	15.14	40.00	-24.86	QP
2	56.7917	30.23	-18.60	11.63	40.00	-28.37	QP
3	96.0986	31.92	-18.46	13.46	43.50	-30.04	QP
4	176.8878	30.49	-17.64	12.85	43.50	-30.65	QP
5	280.0237	30.69	-17.02	13.67	46.00	-32.33	QP
6	721.7260	30.86	-14.92	15.94	46.00	-30.06	QP

Temperature:	22.7°C	Relative Humidity:	61%
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	GFSK		



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	32.5198	31.62	-14.24	17.38	40.00	-22.62	QP
2	60.0691	29.12	-16.61	12.51	40.00	-27.49	QP
3	116.9495	29.50	-17.53	11.97	43.50	-31.53	QP
4	193.0945	31.96	-18.31	13.65	43.50	-29.85	QP
5	463.9696	26.71	-12.01	14.70	46.00	-31.30	QP
6	771.4486	24.01	-6.81	17.20	46.00	-28.80	QP

Remarks:

1. Margin = Result (Result =Reading + Factor) - Limit

(1GHZ~25GHZ)

LOW CH(GFSK)

Peak value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	35.84	31.78	8.60	32.09	44.13	74.00	-29.87	Vertical
7206.00	31.01	36.15	11.65	32.00	46.81	74.00	-27.19	Vertical
9608.00	31.15	37.95	14.14	31.62	51.62	74.00	-22.38	Vertical
12010.00	*					74.00		Vertical
14412.00	*					74.00		Vertical
4804.00	39.56	31.78	8.60	32.09	47.85	74.00	-26.15	Horizontal
7206.00	32.90	36.15	11.65	32.00	48.70	74.00	-25.30	Horizontal
9608.00	29.65	37.95	14.14	31.62	50.12	74.00	-23.88	Horizontal
12010.00	*					74.00		Horizontal
14412.00	*					74.00		Horizontal

AV value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	25.11	31.78	8.60	32.09	33.40	54.00	-20.60	Vertical
7206.00	19.97	36.15	11.65	32.00	35.77	54.00	-18.23	Vertical
9608.00	19.52	37.95	14.14	31.62	39.99	54.00	-14.01	Vertical
12010.00	*					54.00		Vertical
14412.00	*					54.00		Vertical
4804.00	28.99	31.78	8.60	32.09	37.28	54.00	-16.72	Horizontal
7206.00	22.33	36.15	11.65	32.00	38.13	54.00	-15.87	Horizontal
9608.00	18.36	37.95	14.14	31.62	38.83	54.00	-15.17	Horizontal
12010.00	*					54.00		Horizontal
14412.00	*					54.00		Horizontal

MIDDLE CH(GFSK)

Peak value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.00	35.86	31.85	8.67	32.12	44.26	74.00	-29.74	Vertical
7323.00	31.03	36.37	11.72	31.89	47.23	74.00	-26.77	Vertical
9764.00	31.16	38.35	14.25	31.62	52.14	74.00	-21.86	Vertical
12205.00	*					74.00		Vertical
14646.00	*					74.00		Vertical
4882.00	39.59	31.85	8.67	32.12	47.99	74.00	-26.01	Horizontal
7323.00	32.91	36.37	11.72	31.89	49.11	74.00	-24.89	Horizontal
9764.00	29.67	38.35	14.25	31.62	50.65	74.00	-23.35	Horizontal
12205.00	*					74.00		Horizontal
14646.00	*					74.00		Horizontal

AV value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.00	25.13	31.85	8.67	32.12	33.53	54.00	-20.47	Vertical
7323.00	19.98	36.37	11.72	31.89	36.18	54.00	-17.82	Vertical
9764.00	19.53	38.35	14.25	31.62	40.51	54.00	-13.49	Vertical
12205.00	*					54.00		Vertical
14646.00	*					54.00		Vertical
4882.00	29.01	31.85	8.67	32.12	37.41	54.00	-16.59	Horizontal
7323.00	22.34	36.37	11.72	31.89	38.54	54.00	-15.46	Horizontal
9764.00	18.37	38.35	14.25	31.62	39.35	54.00	-14.65	Horizontal
12205.00	*					54.00		Horizontal
14646.00	*					54.00		Horizontal

HIGH CH(GFSK)

Peak value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	35.69	31.93	8.73	32.16	44.19	74.00	-29.81	Vertical
7440.00	30.91	36.59	11.79	31.78	47.51	74.00	-26.49	Vertical
9920.00	31.06	38.81	14.38	31.88	52.37	74.00	-21.63	Vertical
12400.00	*					74.00		Vertical
14880.00	*					74.00		Vertical
4960.00	39.38	31.93	8.73	32.16	47.88	74.00	-26.12	Horizontal
7440.00	32.78	36.59	11.79	31.78	49.38	74.00	-24.62	Horizontal
9920.00	29.55	38.81	14.38	31.88	50.86	74.00	-23.14	Horizontal
12400.00	*					74.00		Horizontal
14880.00	*					74.00		Horizontal

AV value

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	24.99	31.93	8.73	32.16	33.49	54.00	-20.51	Vertical
7440.00	19.89	36.59	11.79	31.78	36.49	54.00	-17.51	Vertical
9920.00	19.45	38.81	14.38	31.88	40.76	54.00	-13.24	Vertical
12400.00						54.00		Vertical
14880.00						54.00		Vertical
4960.00	28.86	31.93	8.73	32.16	37.36	54.00	-16.64	Horizontal
7440.00	22.24	36.59	11.79	31.78	38.84	54.00	-15.16	Horizontal
9920.00	18.28	38.81	14.38	31.88	39.59	54.00	-14.41	Horizontal
12400.00	*					54.00		Horizontal
14880.00	*					54.00		Horizontal

Remark:

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. *“*” means this data is too weak instrument of signal is unable to test.*

5. BAND EDGE TEST

5.1 LIMIT

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

5.2 TEST PROCEDURE

- a. Connect EUT's antenna output to spectrum analyzer by RF cable.

Establish a reference level by using the following procedure:

Center frequency	DTS Channel center frequency
------------------	------------------------------

RBW:	100kHz
------	--------

- b. VBW: 300kHz

Span	1.5times the DTS bandwidth
------	----------------------------

Detector Mode:	AVG
----------------	-----

Sweep time:	auto
-------------	------

Trace mode	Max hold
------------	----------

- c. Establish Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

Set the spectrum analyzer as follows:

RBW:	100kHz
------	--------

VBW:	300kHz
------	--------

Span	Encompass frequency range to be
------	---------------------------------

- d. measured

Number of measurement points	$\geq \text{span/RBW}$
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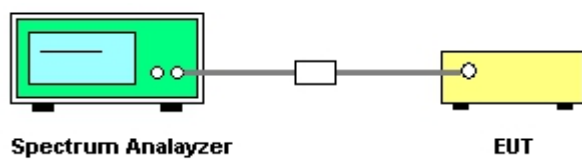
Detector Mode:	Pake
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Sweep time:	auto
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Trace mode	Max hold
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- e. Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

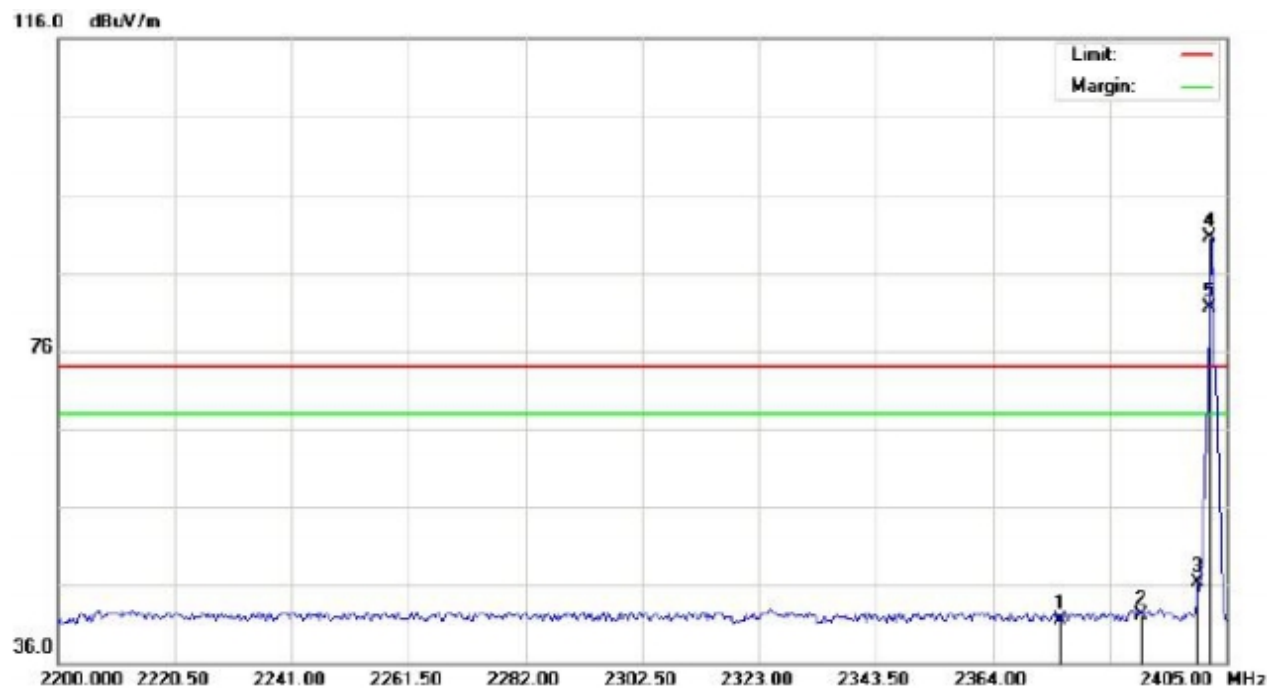
5.3 TEST SETUP



5.4 TEST RESULTS

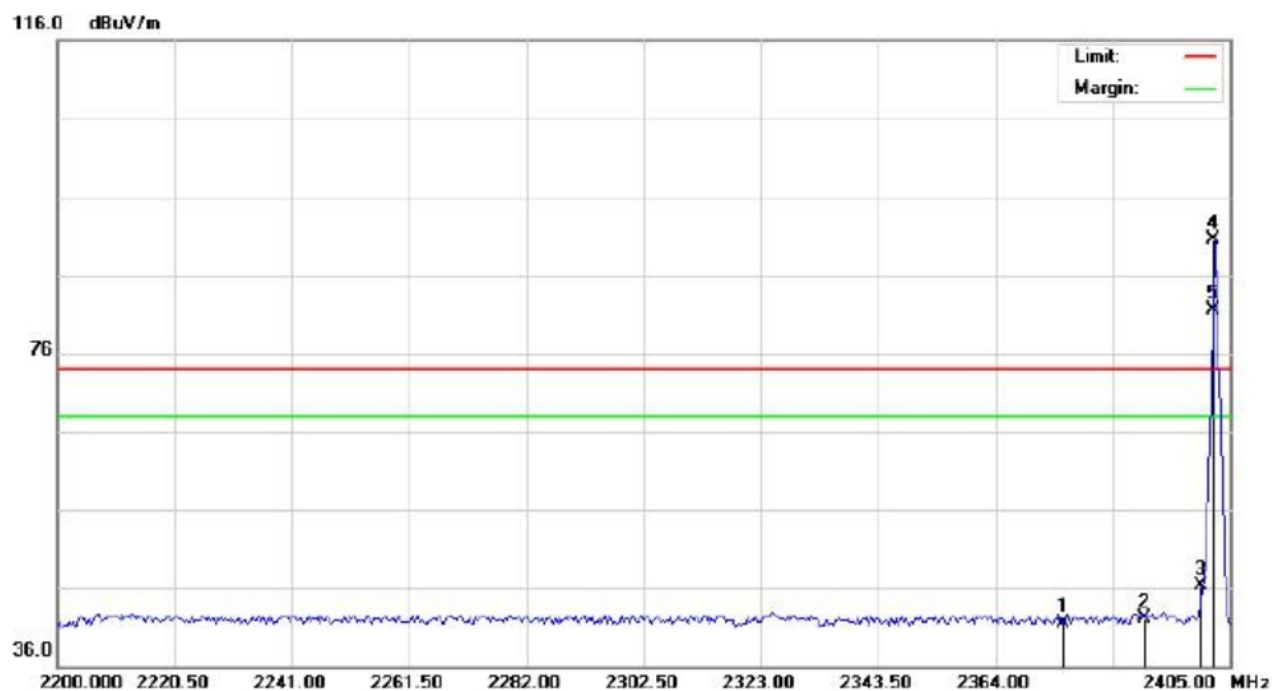
Low CH (GFSK)

Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1		2372.542	32.09	10.29	42.38	74.00	-31.62	peak	
2		2390.000	33.00	10.31	43.31	74.00	-30.69	peak	
3		2400.000	42.47	10.32	52.79	74.00	-21.21	peak	
4	*	2402.000	80.22	10.32	90.54	74.00	16.54	peak	
5	X	2402.000	71.59	10.32	81.91	74.00	7.91	AVG	

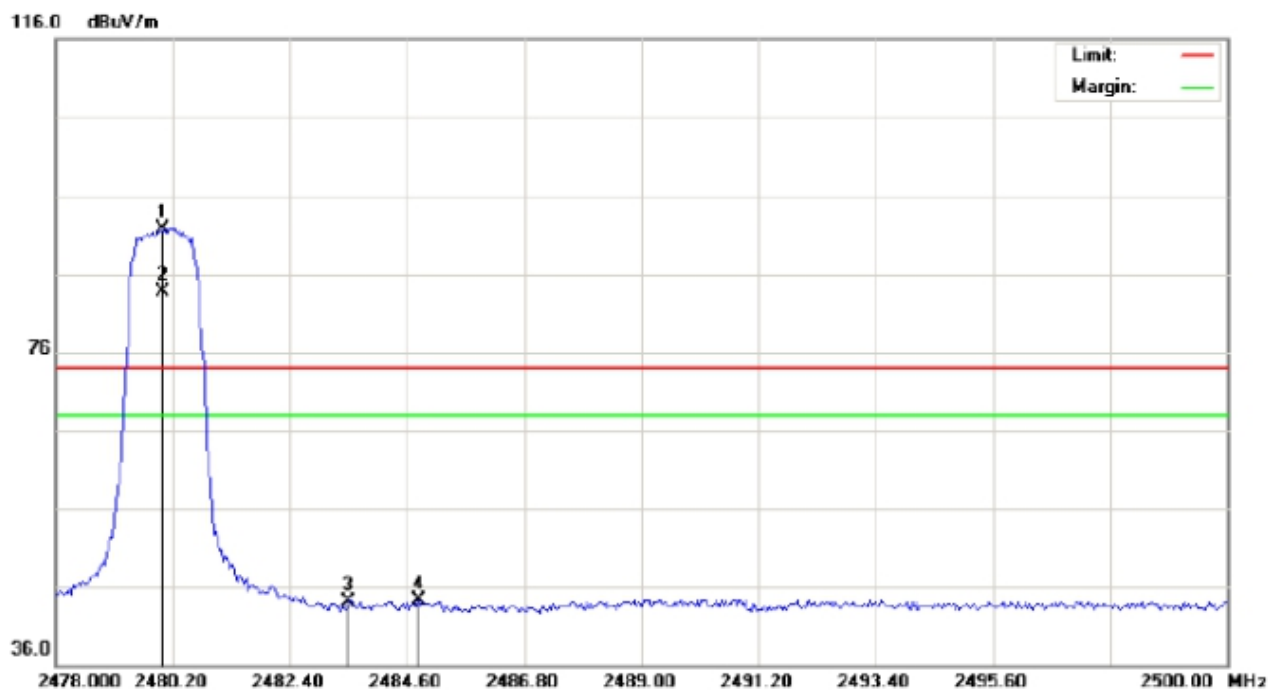
Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1		2375.958	31.23	10.29	41.52	74.00	-32.48	peak	
2		2390.000	31.71	10.31	42.02	74.00	-31.98	peak	
3		2400.000	36.06	10.32	46.38	74.00	-27.62	peak	
4	*	2402.000	80.09	10.32	90.41	74.00	16.41	peak	
5	X	2402.000	71.22	10.32	81.54	74.00	7.54	AVG	

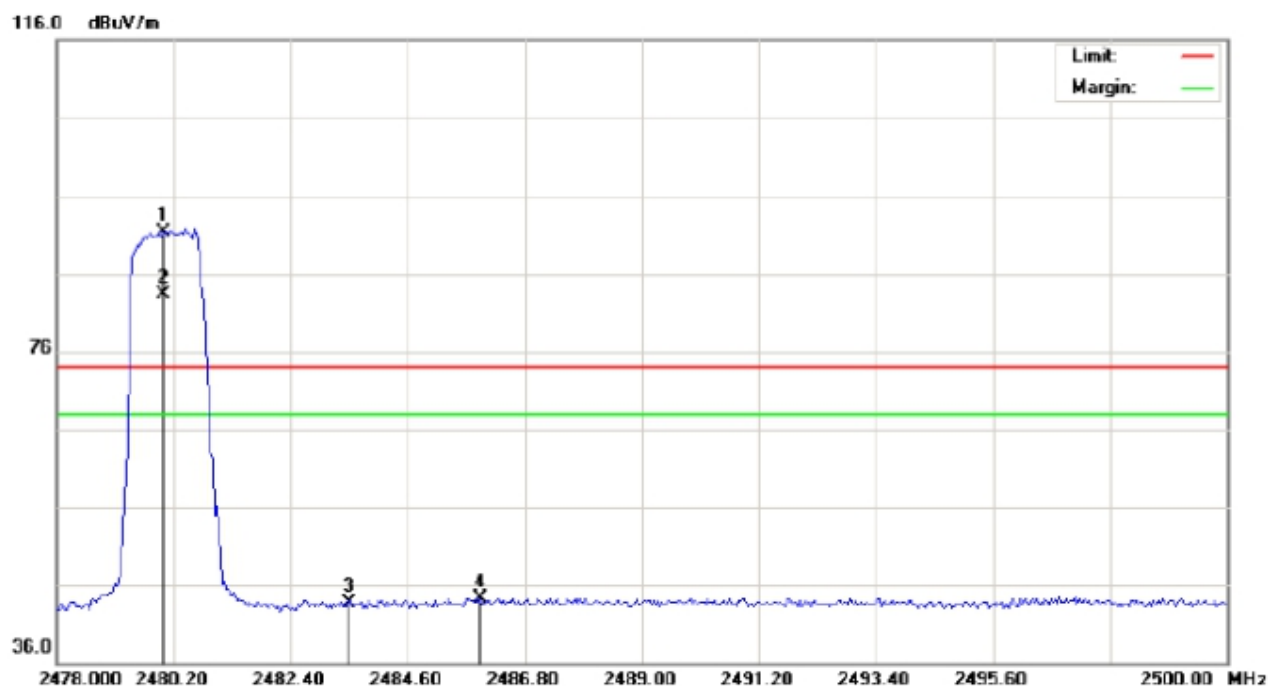
High CH (GFSK)

Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	*	2480.000	81.24	10.41	91.65	74.00	17.65	peak	
2	X	2480.000	73.27	10.41	83.68	74.00	9.68	AVG	
3		2483.500	33.69	10.41	44.10	74.00	-29.90	peak	
4		2484.820	33.86	10.41	44.27	74.00	-29.73	peak	

Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	*	2480.000	80.83	10.41	91.24	74.00	17.24	peak	
2	X	2480.000	72.82	10.41	83.23	74.00	9.23	AVG	
3		2483.500	33.26	10.41	43.67	74.00	-30.33	peak	
4		2485.957	33.98	10.41	44.39	74.00	-29.61	peak	

Note: Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

Hopping on mode and Hopping off mode have been tested, but only worst case reported.

6. 20 DB BANDWIDTH TEST

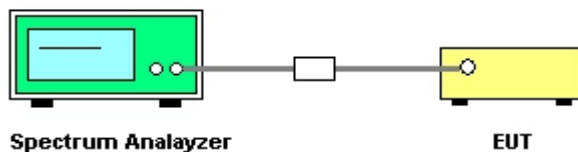
6.1 LIMIT

According to 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation

6.2 TEST PROCEDURE

- Check the calibration of the measuring instrument using either an internal calibrator or a
- known signal from an external generator
 - Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
 - Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

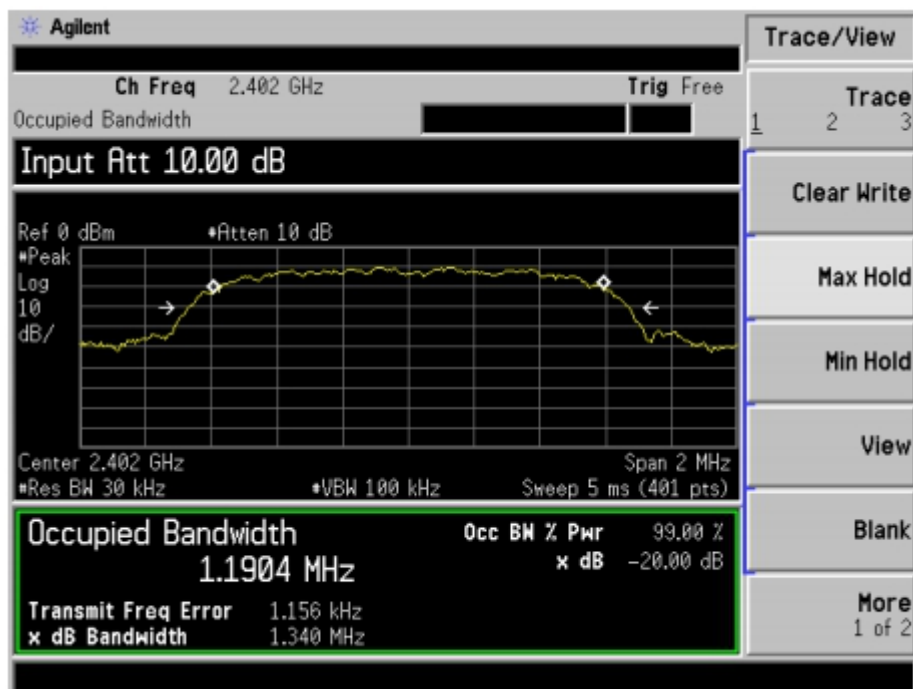
6.3 TEST SETUP

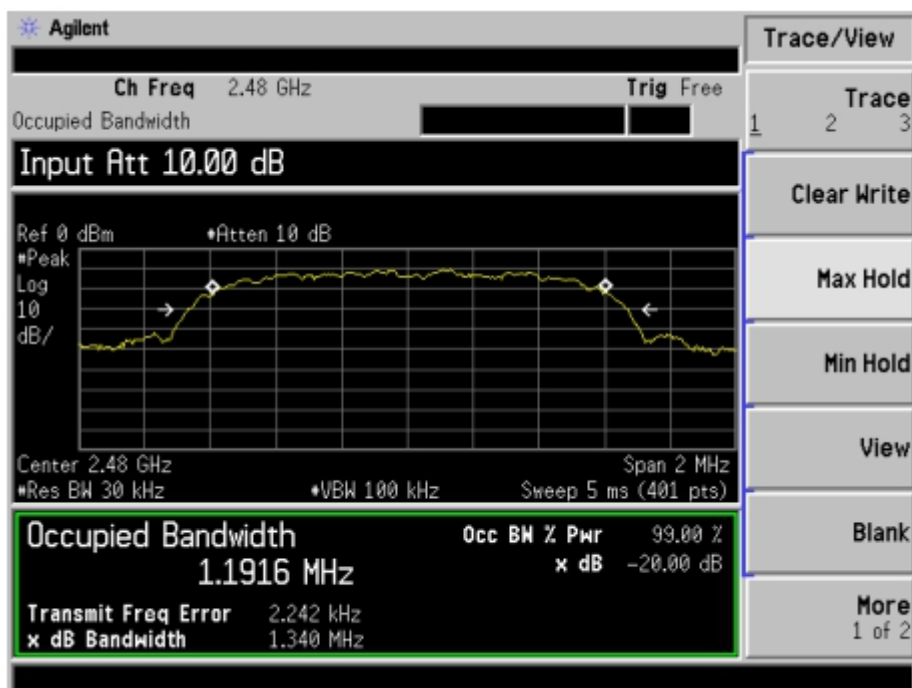
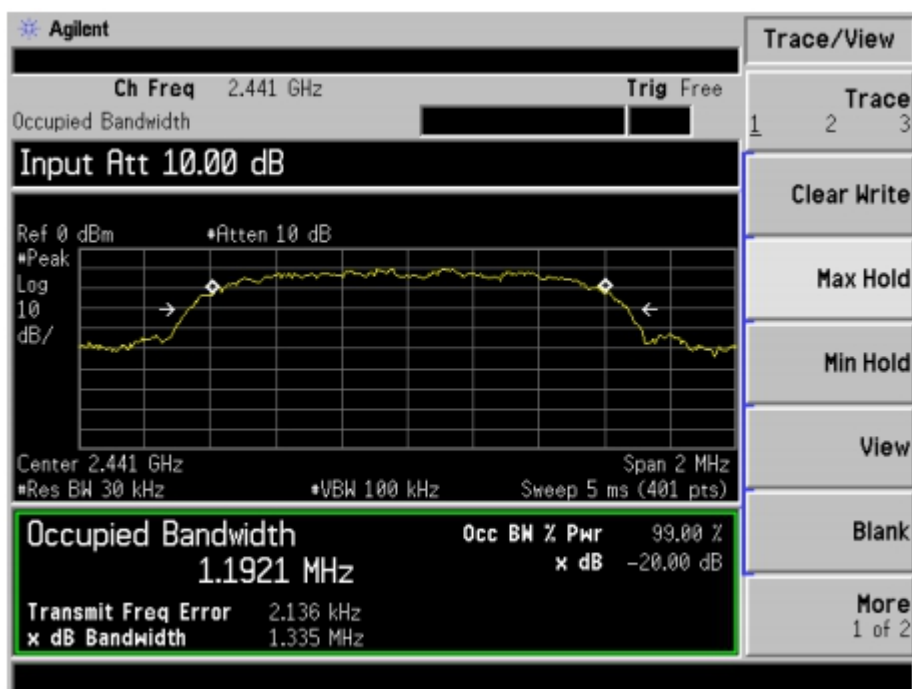


6.4 TEST RESULTS

Temperature:	25℃	Relative Humidity:	50%
Test Mode:	GFSK	Test Voltage:	DC 3.7V

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.340	PASS
2440 MHz	1.335	PASS
2480 MHz	1.340	PASS





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 antennas used for this product are PCB antenna and other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 5.19dBi.

*****END OF THE REPORT*****