

TEST REPORT

Applicant	Musical Electronics Limited
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Manufacturer or Supplier	Musical Electronics (Qing Yuan) Limited
Address	Tai He Industrial Park, Qing Xin County, Qing Yuan City, Guang Dong Province, China
Product	G-BOOM Wireless Boombox
Brand Name	G-PROJECT
Model	G-650
Additional Model & Model Difference	N/A
Date of tests	Jan. 10 ~ Jan. 21, 2014

The submitted sample of the above equipment has been tested according to the requirements of the following standards:

☒ **FCC Part 15, Subpart C, Section 15.249(2012-10)**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Tested by Venless Long Project Engineer / EMC Department	Approved by Glyn He Supervisor / EMC Department
	 Date: Jan. 21, 2014

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140110N016	Original release	Jan. 21, 2014



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.249)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
§15.203	Antenna Requirement	PASS	No antenna connector is used
§15.207 (a)	Conducted Emission Measurement	PASS	Compliant
§15.205	Restricted Band of Operation	PASS	Compliant
§15.209 §15.249(a)	Radiated Emission	PASS	Compliant
§15.215(c)	20dB Bandwidth Test	PASS	Compliant

2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.67dB
Radiated emissions	9KHz ~ 30MHz	2.74dB
	30MHz ~ 1GHz	4.81dB
	1GHz ~ 18GHz	4.3 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.



3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	G-BOOM Wireless Boombox
TEST MODEL	G-650
FCC ID	AUIG650B
NOMINAL VOLTAGE	DC 12V from Adapter DC 7.4V from Battery
MODULATION TECHNOLOGY	FHSS
MODULATION TYPE	GFSK, 8DPSK, $\pi/4$ DQPSK
OPERATING FREQUENCY	2402-2480MHz
ANTENNA TYPE	PCB antenna; 2.12dBi gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The EUT was powered by the following adapter:

Adapter	
Brand:	N/A
Model:	GQ30-120200-AU
Input:	100-240V~ 50/60Hz
Output:	DC 12V
DC Line:	Unshielded, Non-detachable, 1.8m

3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.



3.2 DESCRIPTION OF TEST MODES

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and packet type. The EUT was tested under the following modes, and the final worst is marked in boldface and recorded in the report.

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE<1G	RE≥1G	PLC	BW	
A	√	√	√	√	DC 12V from Adapter
B	-	-	-	-	DC 7.4V from Battery

Where **RE<1G**: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission

RE≥1G: Radiated Emission above 1GHz
BW: 20db bandwidth

Following channel(s) was (were) selected for the test as listed below:

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE	PACKET TYPE
Low, Middle, High	FHSS	GFSK	1M	DH1/3/5
Low, Middle, High	FHSS	$\pi/4$ DQPSK	2M	DH1/3/5
Low, Middle, High	FHSS	8DPSK	3M	DH1/3/5

CHANNEL NUMBER	TESTED CHANNEL	TESTED FREQUENCY
0	Low	2402 MHz
39	Middle	2441 MHz
78	High	2480 MHz

After estimating all the combination of every test mode, the result shown as below is the worst case

TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE	PACKET TYPE
Low, Middle, High	FHSS	GFSK	1M	DH5
Low, Middle, High	FHSS	8DPSK	3M	DH5



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C, Section 15.249(2012-10)

ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

NOTE: It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (Verification). The test report has been issued separately.

3.4 DESCRIPTION OF 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.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	BT Tester	Rohde&Schwarz	CBT 32	1153.9000.32	N/A
2	iPhone 4	APPLE	A1332	81124KCJA4S	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable, 0.6m.



4 TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU 26	100005	May 14,13	May 13,14
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	May 14,13	May 13,14
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	May 14,13	May 13,14
Test software	ADT	ADT_Con _V7.3.7	N/A	N/A	N/A

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GREGT/CHINA and NIM/CHINA.
2. The test was performed in Shielding Room 553.

4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

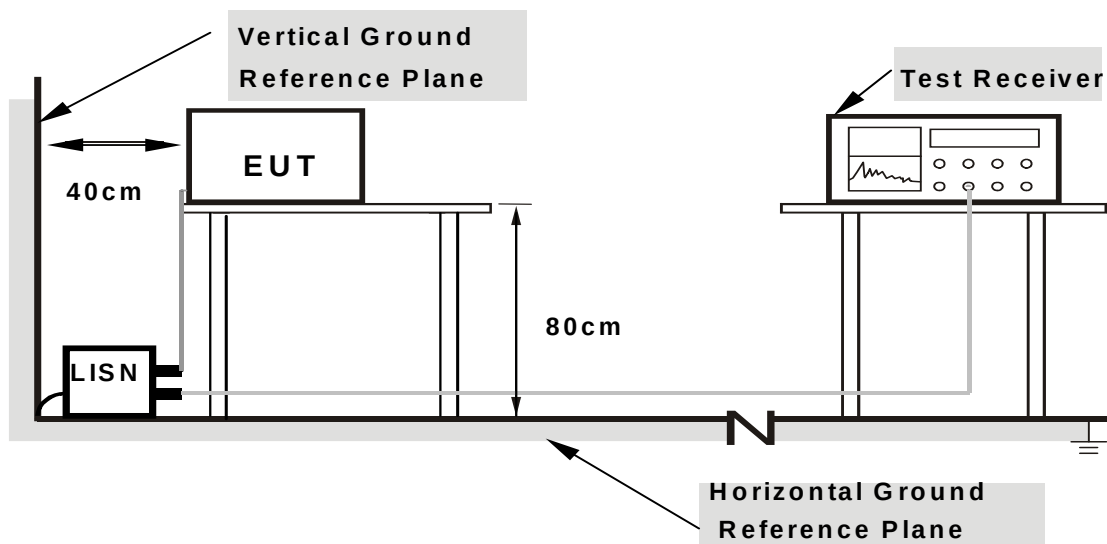
NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.



4.1.5 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

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

Set the EUT under transmission condition continuously at specific channel frequency.



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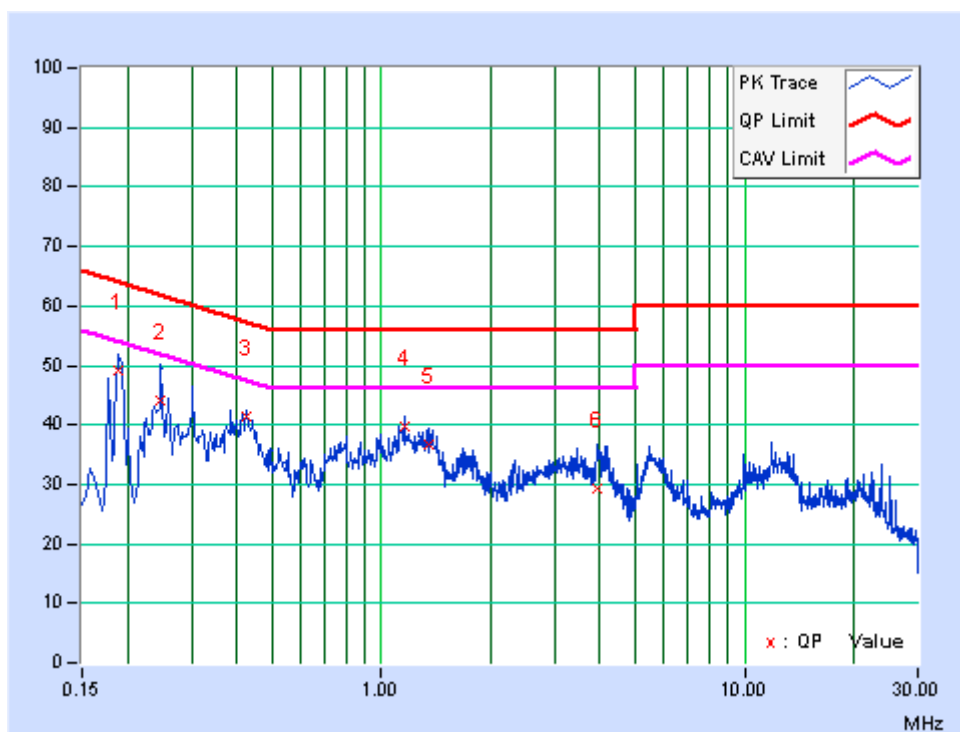
4.1.7 TEST RESULTS

CONDUCTED WORST-CASE DATA: GFSK DH5

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18903	10.47	38.69	24.90	49.16	35.37	64.08	54.08	-14.92	-18.71
2	0.24775	10.39	33.69	21.03	44.08	31.42	61.83	51.83	-17.75	-20.41
3	0.42445	10.29	31.10	25.48	41.39	35.77	57.36	47.36	-15.97	-11.59
4	1.16269	10.02	29.67	21.15	39.69	31.17	56	46	-16.31	-14.83
5	1.35819	10	26.61	20.17	36.61	30.17	56	46	-19.39	-15.83
6	3.92706	9.95	19.43	14.42	29.38	24.37	56	46	-26.62	-21.63

- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.





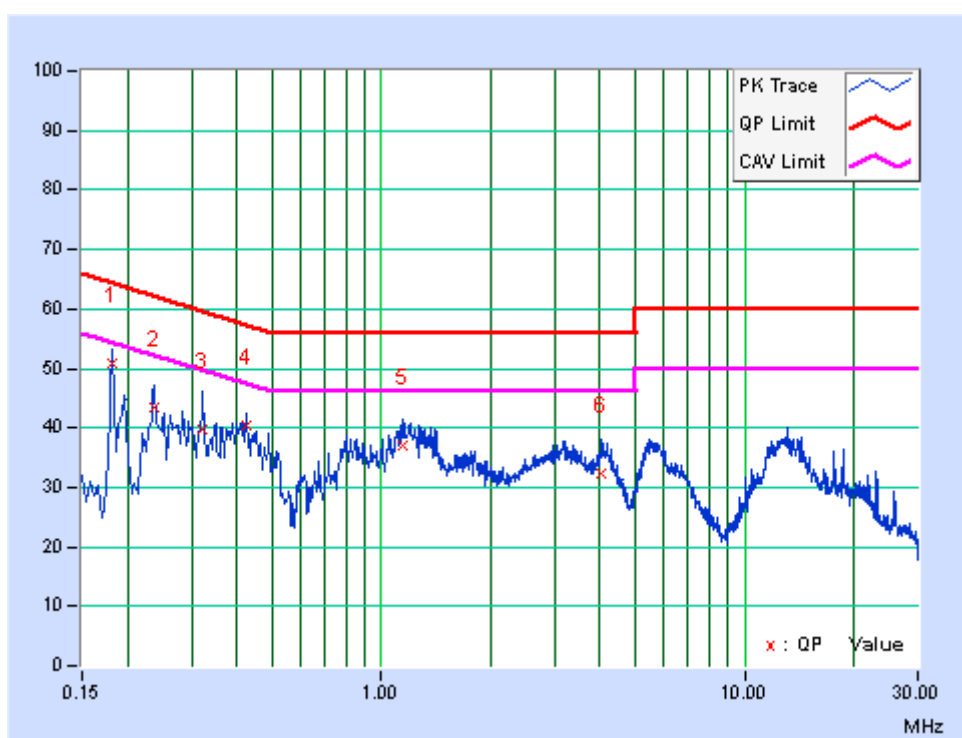
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Test Report No.: RF140110N016

PHASE	Neutral	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18128	10.4	40.56	26.36	50.96	36.76	64.43	54.43	-13.47	-17.67
2	0.23586	10.33	33.13	20.82	43.46	31.15	62.24	52.24	-18.78	-21.09
3	0.32204	10.37	29.39	21.51	39.76	31.88	59.65	49.65	-19.90	-17.78
4	0.4237	10.42	30.05	25.10	40.47	35.52	57.38	47.38	-16.91	-11.86
5	1.14916	9.87	27.19	20.74	37.06	30.61	56	46	-18.94	-15.39
6	4.02481	9.75	22.69	17.89	32.44	27.64	56	46	-23.56	-18.36

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/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

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Agilent	E4446A	MY46180622	Apr. 24,13	Apr. 23,14
EMI Test Receiver	Rohde&Schwarz	ESVD	847398/003	May 14,13	May 13,14
Bilog Antenna	Teseq	CBL 6111D	27089	Jul. 27, 13	Jul. 26, 14
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	Oct. 18, 12	Oct. 17, 14
Pre-Amplifier (9kHz~1GHz)	SONOMA	310D	186955	Mar. 06,13	Mar. 05,14
Pre-Amplifier (100MHz-26.5GHz)	Agilent	8449B	3008A00409	May 14,13	May 13,14
10m Semi-anechoic Chamber	CHANGLING	21.4m*12.1m*8 .8m	NSEMC006	Mar. 24,13	Mar. 23,14
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 30, 13	Oct. 29, 14
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 03,14	Jan. 02,15
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 04,13	Nov. 03,14
Loop antenna (9kHz~30MHz)	Daze	ZN30900A	0708	Dec. 05,13	Dec. 04,14
Test Software	ADT	ADT_Radiated _V7.6.15	N/A	N/A	N/A

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in 10m Chamber
3. The FCC Site Registration No. is 502831

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meters semi-anechoic chamber. 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 is a broadband antenna, and its 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver/spectrum 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 lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

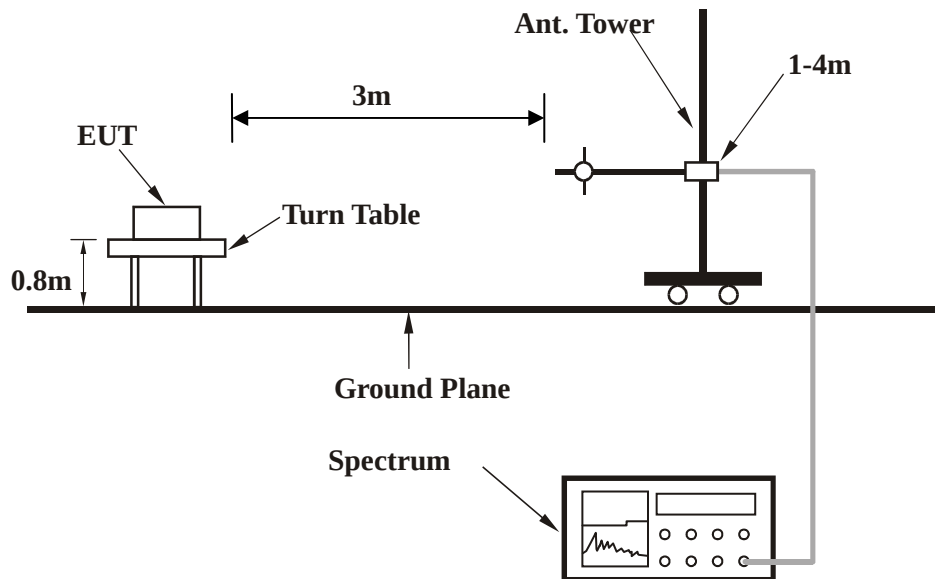
- 1 The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
- 2 The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
- 3 Bluetooth duty factor correction is not correct as it is based on 79 channels, worst case would be with AFH enabled and device using the minimum of 20 channels. In this case the dwell time for a DH5 packet is $0.625 * 5$ per 75ms, (assuming one DH5 packet transmitted and then a DH1 packet received, 20 channels to cycle through would take 75ms on average before repeating a channel) so in any 100ms there would be, on average, two DH5 packets = 6.25ms per 100ms
Therefore, the duty cycle correlation factor be equal to: $20\log(6.25 / 100) = -24.1$ dB.
Average value = peak reading + $20\log(\text{duty cycle})$.
- 4 All modes of operation were investigated and the worst-case emissions are reported.



4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

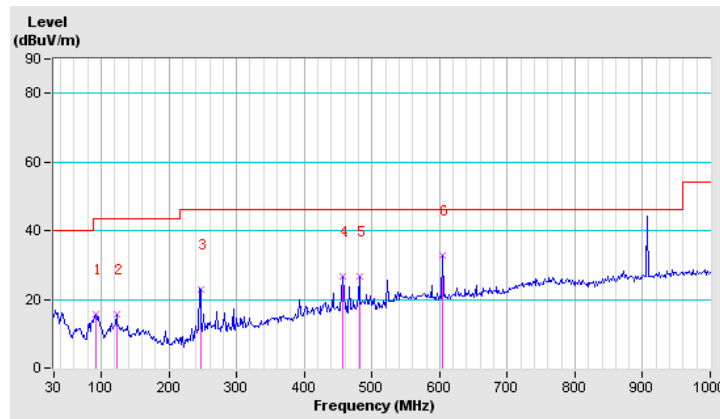
BT_GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	91.43	15.7 QP	43.5	-27.9	1.25 H	122	4.93	10.72
2	122.15	15.7 QP	43.5	-27.8	1.48 H	95	2.13	13.55
3	246.63	23.0 QP	46.0	-23.0	1.67 H	75	8.82	14.16
4	456.80	26.6 QP	46.0	-19.4	1.84 H	55	5.22	21.41
5	481.05	26.5 QP	46.0	-19.5	2.01 H	33	4.07	22.44
6	603.92	32.7 QP	46.0	-13.3	2.04 H	10	7.93	24.73

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



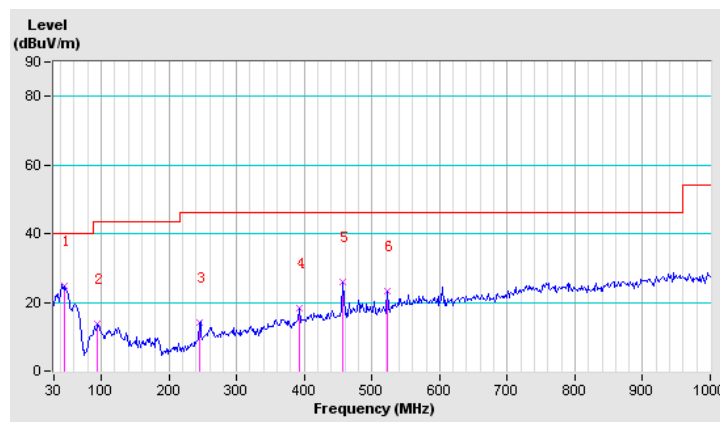


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	46.17	24.9 QP	40.0	-15.1	1.00 V	28	13.51	11.38
2	94.67	13.6 QP	43.5	-29.9	1.00 V	86	2.57	11.07
3	245.02	14.2 QP	46.0	-31.8	1.00 V	106	0.26	13.91
4	392.13	18.4 QP	46.0	-27.6	1.00 V	126	-1.23	19.66
5	456.80	25.9 QP	46.0	-20.1	1.00 V	144	4.47	21.41
6	523.08	23.4 QP	46.0	-22.6	1.00 V	170	0.62	22.74

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.





ABOVE 1GHz DATA

BT_GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	57.6 PK	74.0	-16.4	1.16 H	315	21.10	36.50
2	2400.00	33.5 AV	54.0	-20.5	1.16 H	315	-3.00	36.50
3	*2402.00	93.1 PK	114.0	-20.9	1.16 H	315	56.58	36.52
4	*2402.00	69.0 AV	94.0	-25.0	1.16 H	315	32.48	36.52
5	4804.00	56.8 PK	74.0	-17.2	1.07 H	220	7.55	49.25
6	4804.00	32.7 AV	54.0	-21.3	1.07 H	220	-16.55	49.25
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	58.9 PK	74.0	-15.1	1.05 V	241	22.40	36.50
2	2400.00	34.8 AV	54.0	-19.2	1.05 V	241	-1.70	36.50
3	*2402.00	96.8 PK	114.0	-17.2	1.05 V	241	60.28	36.52
4	*2402.00	72.7 AV	94.0	-21.3	1.05 V	241	36.18	36.52
5	4804.00	60.7 PK	74.0	-13.3	1.00 V	136	11.45	49.25
6	4804.00	36.6 AV	54.0	-17.4	1.00 V	136	-12.65	49.25

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.



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CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	92.8 PK	114.0	-21.2	1.12 H	320	55.93	36.87
2	*2441.00	68.7 AV	94.0	-25.3	1.12 H	320	31.83	36.87
3	4882.00	56.6 PK	74.0	-17.4	1.02 H	214	7.37	49.23
4	4882.00	32.5 AV	54.0	-21.5	1.02 H	214	-16.73	49.23
5	7323.00	59.5 PK	74.0	-14.5	1.00 H	110	12.89	46.61
6	7323.00	35.4 AV	54.0	-18.6	1.00 H	110	-11.21	46.61
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	97.1 PK	114.0	-16.9	1.02 V	246	60.23	36.87
2	*2441.00	73.0 AV	94.0	-21.0	1.02 V	246	36.13	36.87
3	4882.00	60.2 PK	74.0	-13.8	1.00 V	140	10.97	49.23
4	4882.00	36.1 AV	54.0	-17.9	1.00 V	140	-13.13	49.23
5	7323.00	58.7 PK	74.0	-15.3	1.04 V	286	12.09	46.61
6	7323.00	34.6 AV	54.0	-19.4	1.04 V	286	-12.01	46.61

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.



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Test Report No.: RF140110N016

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	92.4 PK	114.0	-21.6	1.11 H	316	55.19	37.21
2	*2480.00	68.3 AV	94.0	-25.7	1.11 H	316	31.09	37.21
3	2483.50	55.4 PK	74.0	-18.6	1.11 H	316	18.16	37.24
4	2483.50	31.3 AV	54.0	-22.7	1.11 H	316	-5.94	37.24
5	4960.00	61.5 PK	74.0	-12.5	1.04 H	220	12.29	49.21
6	4960.00	37.4 AV	54.0	-16.6	1.04 H	220	-11.81	49.21
7	7440.00	58.8 PK	74.0	-15.2	1.00 H	116	12.10	46.70
8	7440.00	34.7 AV	54.0	-19.3	1.00 H	116	-12.00	46.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	97.5 PK	114.0	-16.5	1.05 V	250	60.29	37.21
2	*2480.00	73.4 AV	94.0	-20.6	1.05 V	250	36.19	37.21
3	2483.50	59.7 PK	74.0	-14.3	1.05 V	250	22.46	37.24
4	2483.50	35.6 AV	54.0	-18.4	1.05 V	250	-1.64	37.24
5	4960.00	60.9 PK	74.0	-13.1	1.00 V	134	11.69	49.21
6	4960.00	36.8 AV	54.0	-17.2	1.00 V	134	-12.41	49.21
7	7440.00	58.8 PK	74.0	-15.2	1.03 V	290	12.10	46.70
8	7440.00	34.7 AV	54.0	-19.3	1.03 V	290	-12.00	46.70

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.



BT_8DPSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	54.3 PK	74.0	-19.7	1.05 H	326	17.80	36.50
2	2400.00	30.2 AV	54.0	-23.8	1.05 H	326	-6.30	36.50
3	*2402.00	89.8 PK	114.0	-24.2	1.05 H	326	53.28	36.52
4	*2402.00	65.7 AV	94.0	-28.3	1.05 H	326	29.18	36.52
5	4804.00	55.6 PK	74.0	-18.4	1.05 H	202	6.35	49.25
6	4804.00	31.5 AV	54.0	-22.5	1.05 H	202	-17.75	49.25
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	56.8 PK	74.0	-17.2	1.00 V	251	20.30	36.50
2	2400.00	32.7 AV	54.0	-21.3	1.00 V	251	-3.80	36.50
3	*2402.00	92.4 PK	114.0	-21.6	1.00 V	251	55.88	36.52
4	*2402.00	68.3 AV	94.0	-25.7	1.00 V	251	31.78	36.52
5	4804.00	54.7 PK	74.0	-19.3	1.00 V	142	5.45	49.25
6	4804.00	30.6 AV	54.0	-23.4	1.00 V	142	-18.65	49.25

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.



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Test Report No.: RF140110N016

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	90.6 PK	114.0	-23.4	1.10 H	320	53.73	36.87
2	*2441.00	66.5 AV	94.0	-27.5	1.10 H	320	29.63	36.87
3	4882.00	56.9 PK	74.0	-17.1	1.06 H	214	7.67	49.23
4	4882.00	32.8 AV	54.0	-21.2	1.06 H	214	-16.43	49.23
5	7323.00	57.4 PK	74.0	-16.6	1.00 H	100	10.79	46.61
6	7323.00	33.3 AV	54.0	-20.7	1.00 H	100	-13.31	46.61
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	93.9 PK	114.0	-20.1	1.00 V	242	57.03	36.87
2	*2441.00	69.8 AV	94.0	-24.2	1.00 V	242	32.93	36.87
3	4882.00	56.6 PK	74.0	-17.4	1.03 V	142	7.37	49.23
4	4882.00	32.5 AV	54.0	-21.5	1.03 V	142	-16.73	49.23
5	7323.00	55.3 PK	74.0	-18.7	1.08 V	282	8.69	46.61
6	7323.00	31.2 AV	54.0	-22.8	1.08 V	282	-15.41	46.61

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

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Test Report No.: RF140110N016

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	90.2 PK	114.0	-23.8	1.08 H	324	52.99	37.21
2	*2480.00	66.1 AV	94.0	-27.9	1.08 H	324	28.89	37.21
3	2483.50	54.7 PK	74.0	-19.3	1.08 H	324	17.46	37.24
4	2483.50	30.6 AV	54.0	-23.4	1.08 H	324	-6.64	37.24
5	4960.00	57.4 PK	74.0	-16.6	1.04 H	209	8.19	49.21
6	4960.00	33.3 AV	54.0	-20.7	1.04 H	209	-15.91	49.21
7	7440.00	58.5 PK	74.0	-15.5	1.02 H	107	11.80	46.70
8	7440.00	34.4 AV	54.0	-19.6	1.02 H	107	-12.30	46.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	94.5 PK	114.0	-19.5	1.04 V	256	57.29	37.21
2	*2480.00	70.4 AV	94.0	-23.6	1.04 V	256	33.19	37.21
3	2483.50	57.5 PK	74.0	-16.5	1.04 V	256	20.26	37.24
4	2483.50	33.4 AV	54.0	-20.6	1.04 V	256	-3.84	37.24
5	4960.00	57.6 PK	74.0	-16.4	1.01 V	140	8.39	49.21
6	4960.00	33.5 AV	54.0	-20.5	1.01 V	140	-15.71	49.21
7	7440.00	57.2 PK	74.0	-16.8	1.05 V	281	10.50	46.70
8	7440.00	33.1 AV	54.0	-20.9	1.05 V	281	-13.60	46.70

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

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4.3 20dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT

According to FCC 15.215(c), 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.

4.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 25,13	Nov. 24,14
Spectrum Analyzer (9KHz-25GHz)	Agilent	E7405A	MY45118807	May 14,13	May 13,14
Digital Multimeter	FLUKE	15B	A1220010D G	Oct. 30,13	Oct. 29,14
Bluetooth tester	Rohde&Schwarz	CBT	100325	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GREGT/CHINA and NIM/CHINA.
 2. The test site was performed in Oven room

4.3.3 TEST PROCEDURE

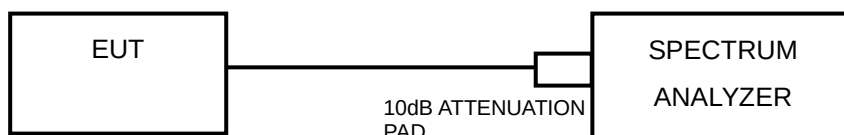
- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.



4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

GFSK DH5

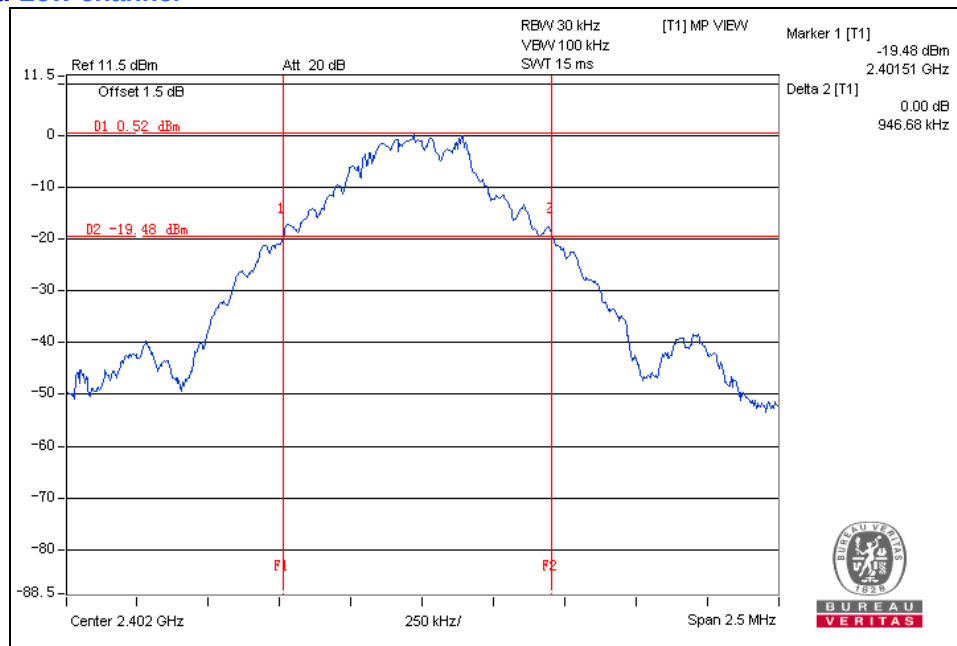
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Low	2402	0.95
Middle	2441	0.94
High	2480	0.94



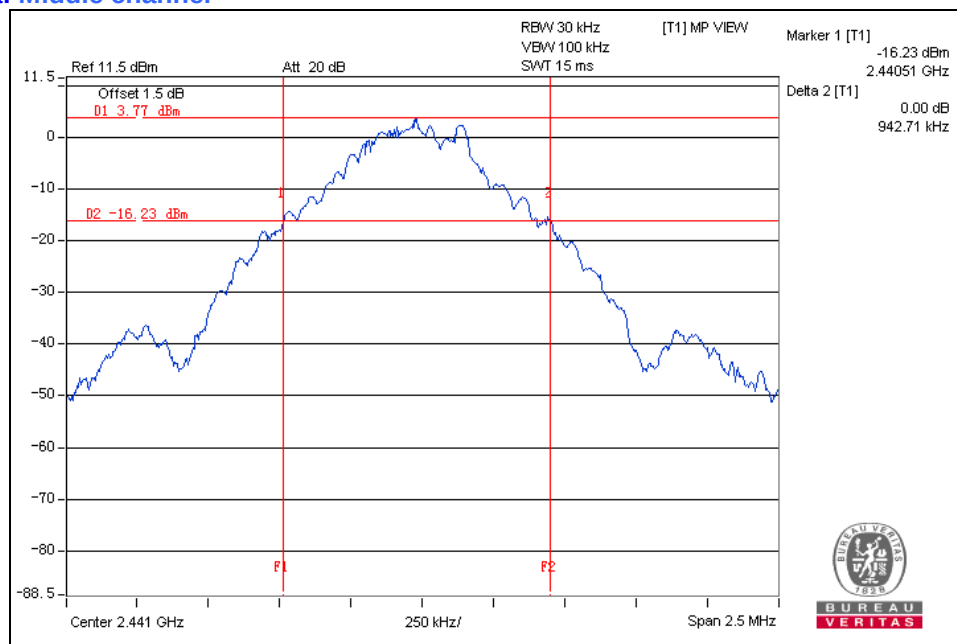
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Test Report No.: RF140110N016

Test Data: Low channel



Test Data: Middle channel



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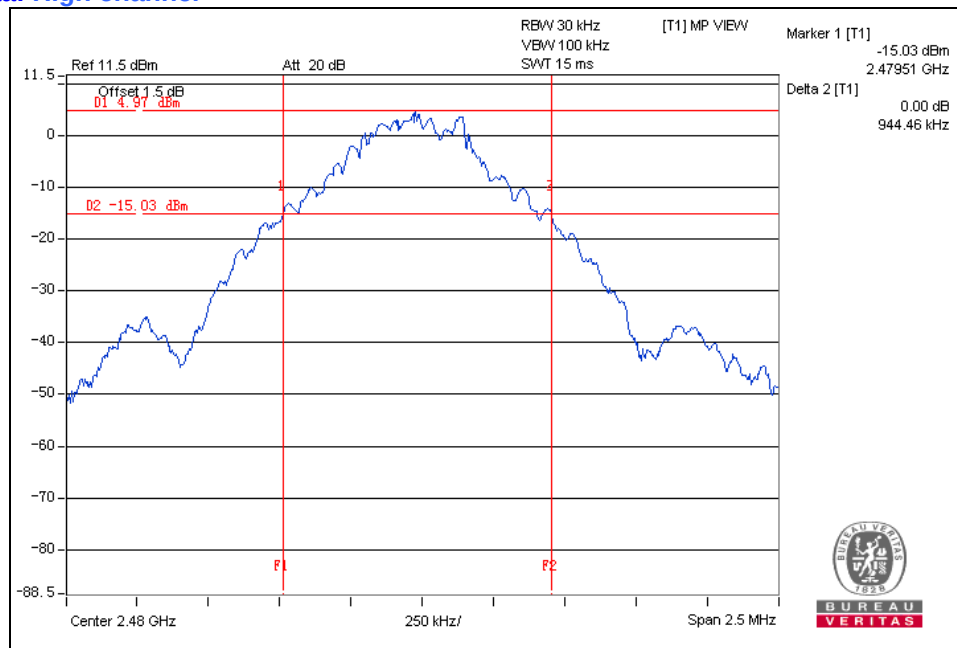
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Test Data: High channel



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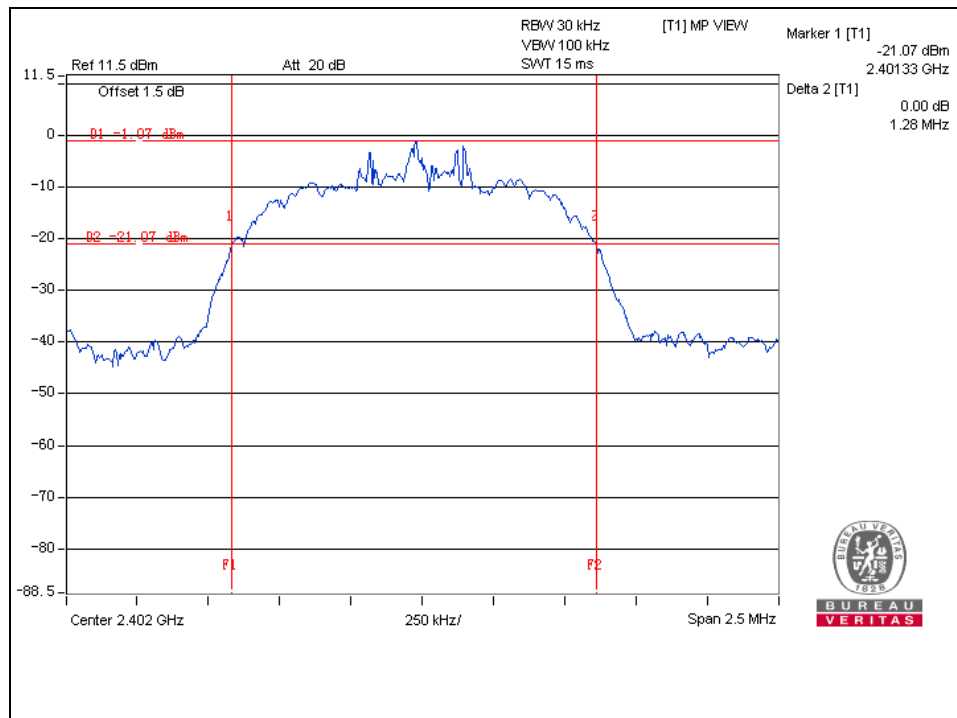
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8DPSK DH5

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	1.28
Middle	2441	1.27
Hight	2480	1.28

Test Data: Low channel

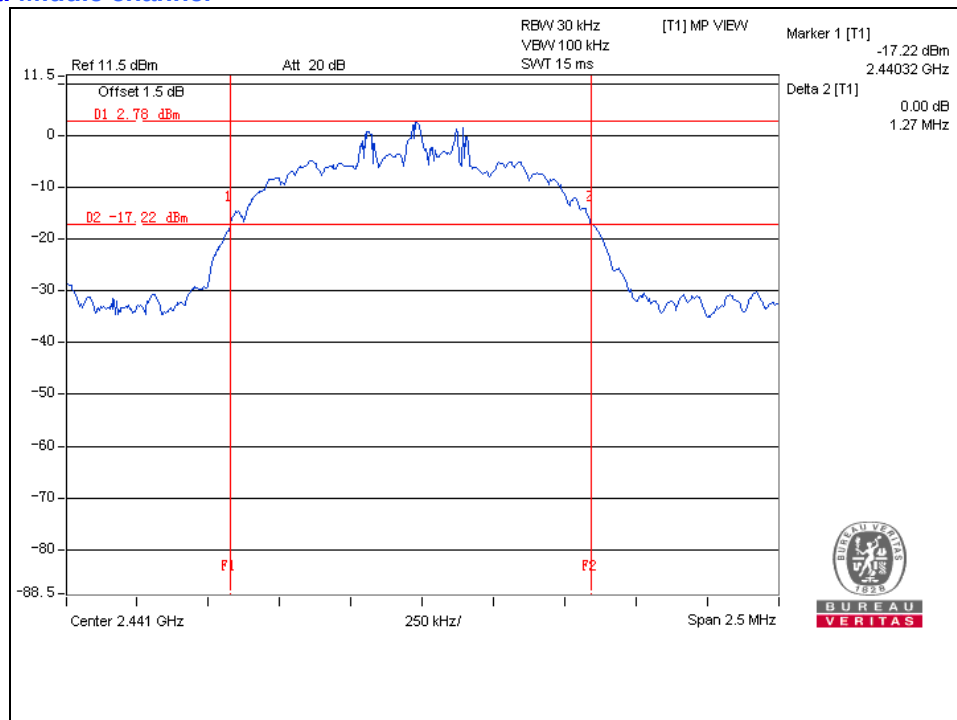




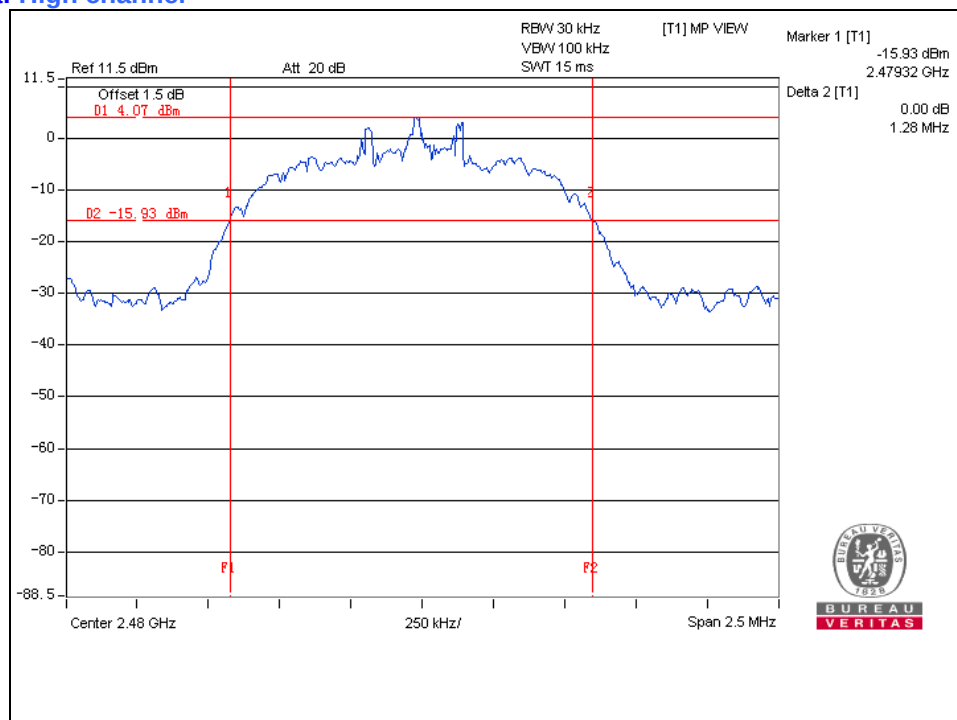
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Test Report No.: RF140110N016

Test Data: Middle channel



Test Data: High channel



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Test Report No.: RF140110N016

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---