

TEST REPORT



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Manufacturer or Supplier	G.tech Technology Ltd.
Address	No.21, Jinding Industrial Park, West Jinfeng Road, Tangjiawan Town, Xiangzhou District Zhuhai Guangdong
Product	SlimStar i8050
Brand Name	Genius
Model	GK-120012/T
Additional Model & Model Difference	N/A
Date of tests	Aug. 15, 2013~ Sep.16, 2013

the tests have been carried out according to the requirements of the following standard:

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

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

Tested by Glyn He Project Engineer / EMC Department	Approved by Sam Tung Manager / EMC Department
	 Date: Sep. 16, 2013

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TABLE OF CONTENTS

RELEASE CONTROL RECORD	3
1 SUMMARY OF TEST RESULTS.....	4
2 MEASUREMENT UNCERTAINTY	4
3 GENERAL INFORMATION	5
3.1 GENERAL DESCRIPTION OF EUT	5
3.2 DESCRIPTION OF TEST MODES	6
3.3 DESCRIPTION OF TEST MODES	7
3.4 DESCRIPTION OF SUPPORT UNITS	7
4 TEST TYPES AND RESULTS.....	8
4.1 RADIATED EMISSION MEASUREMENT	8
4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT	8
4.1.2 TEST INSTRUMENTS	9
4.1.3 TEST PROCEDURES	10
4.1.4 DEVIATION FROM TEST STANDARD	10
4.1.5 TEST SETUP	11
4.1.6 EUT OPERATING CONDITIONS	11
4.1.7 TEST RESULTS.....	12
4.2 20dB BANDWIDTH MEASUREMENT	17
4.2.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT	17
4.2.2 TEST INSTRUMENTS	17
4.2.3 TEST PROCEDURE	17
4.2.4 DEVIATION FROM TEST STANDARD.....	17
4.2.5 TEST SETUP	18
4.2.6 EUT OPERATING CONDITIONS	18
4.2.7 TEST RESULTS.....	18
5 PHOTOGRAPHS OF THE TEST CONFIGURATION	21
6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	22



Test Report No.: RF130830N015-2

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130830N015-2	Original release	Sep.16, 2013



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	N/A	EUT is powered by battery
§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	2.94dB
Radiated emissions	9KHz ~ 30MHz	2.74dB
	30MHz ~ 1GHz	4.81dB
	1GHz ~ 18GHz	4.3dB
	18GHz ~ 40GHz	1.94dB

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	SlimStar i8050
TEST MODEL	GK-120012/T
FCC ID	OO9GK-120012T
NOMINAL VOLTAGE	DC 1.5V By Battery
MODULATION TYPE	GFSK
OPERATING FREQUENCY	2402-2479MHz
ANTENNA TYPE	Integral PCB Antenna; 0dBi 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 product specifications or the User's Manual.
2. For the test results, the EUT had been tested with all conditions, and only the worst case was shown in this 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, XYZ axis and packet type. The worst case was found when the EUT was positioned on X axis for radiated emission. 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	√	√	N/A	√	Powered by battery with Bluetooth link

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	TESTED FREQUENCY
Low	2402 MHz
Middle	2439 MHz
High	2479 MHz



3.3 DESCRIPTION OF TEST MODES

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.

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	N/A	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A



4 TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 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.



4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Agilent	E4446A	MY46180622	April 24,13	April 23,14
EMI Test Receiver	Rohde&Schwarz	ESVD	847398/003	May 14,13	May 13,14
Bilog Antenna	Teseq	CBL 6111D	25757	Nov. 22,12	Nov. 21,13
Horn Antenna (1GHz -18GHz)	EMCO	3117	00062558	Oct.18,12	Oct.17,13
Pre-Amplifier (20MHz-3GHz)	EMCI	EMC 330	980095	Nov. 02,12	Nov.01,13
Pre-Amplifier (100MHz-26.5GHz)	Agilent	8449B	3008A00409	May 14,13	May 13,14
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 04,11	Jan. 03,14
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 04,12	Nov. 03,13
10m Semi-anechoic Chamber	CHANGLING	21.4m*12.1m*8 .8m	NSEMC006	Mar. 24,13	Mar. 23,14
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 31,12	Oct. 30,13
Loop antenna (9kHz~30MHz)	Daze	ZN30900A	0708	Nov. 28,12	Nov. 27,13
Pre-Amplifier (9kHz~1GHz)	SONOMA	310D	186955	Mar. 06,13	Mar. 05,14
Spectrum Analyzer	Agilent	E4446A	MY46180622	April 24,13	April 23,14
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 and NIM/CHINA.

2. The test was performed in Chamber

3. The horn antenna are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 502831.

4.1.3 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 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.

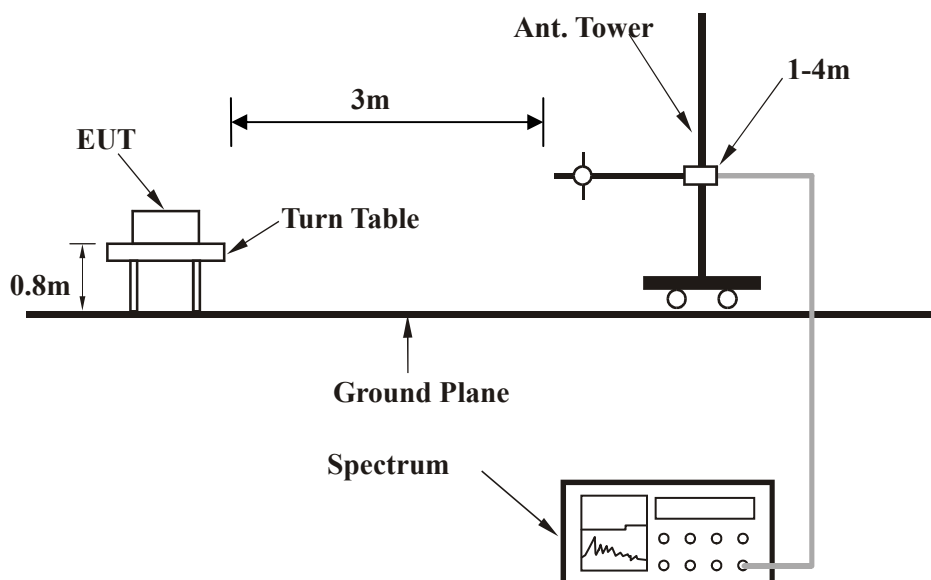
NOTE:

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. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. 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



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

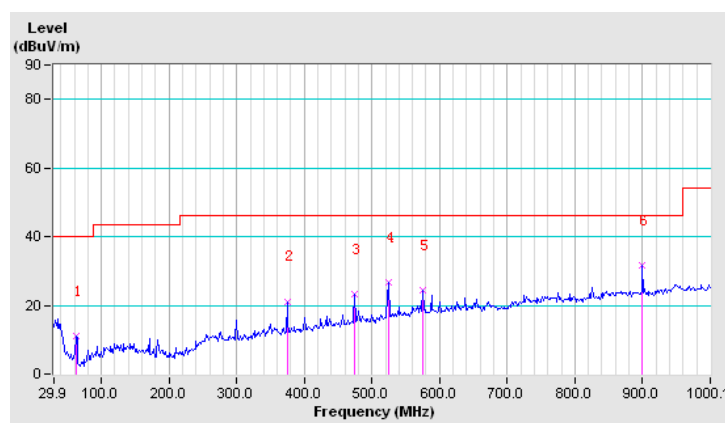
BELOW 1GHz WORST-CASE DATA:

CHANNEL	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	62.24	11.1 QP	40.0	-28.9	1.00 H	263	3.18	7.88
2	374.32	21.1 QP	46.0	-24.9	1.00 H	285	3.74	17.40
3	474.57	23.2 QP	46.0	-22.8	1.00 H	244	2.87	20.35
4	524.70	26.7 QP	46.0	-19.3	1.00 H	302	5.50	21.18
5	574.83	24.3 QP	46.0	-21.7	1.00 H	211	1.31	23.00
6	899.85	31.7 QP	46.0	-14.3	1.00 H	228	4.37	27.36

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. For the test results, the EUT had been tested from 9KHz ~25GHz. But only the worst case was shown in test report.



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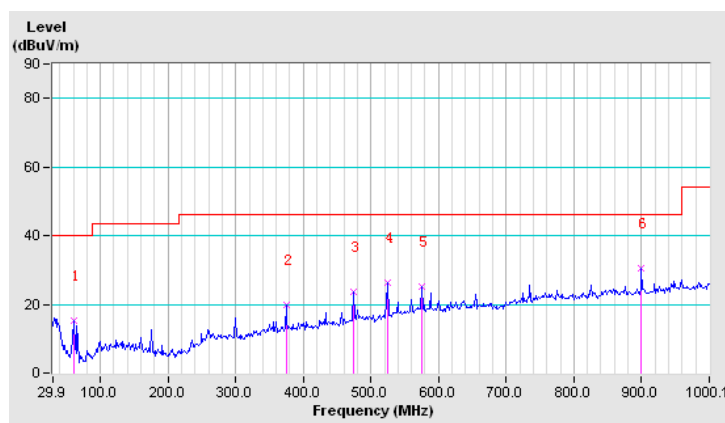
Test Report No.: RF130830N015-2

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	60.62	15.2 QP	40.0	-24.8	1.00 V	319	7.03	8.21
2	374.32	19.7 QP	46.0	-26.3	1.00 V	214	2.32	17.40
3	474.57	23.6 QP	46.0	-22.4	1.00 V	262	3.24	20.35
4	524.70	26.4 QP	46.0	-19.6	1.00 V	286	5.25	21.18
5	574.83	25.1 QP	46.0	-20.9	1.00 V	237	2.11	23.00
6	899.85	30.5 QP	46.0	-15.5	1.00 V	166	3.13	27.36

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. For the test results, the EUT had been tested from 9KHz ~25GHz. But only the worst case was shown in test report.



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Test Report No.: RF130830N015-2

ABOVE 1GHz WORST-CASE DATA:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
TEST VOLTAGE	DC 1.5V From Battery	DETECTOR FUNCTION	Peak (PK) 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	59.8 PK	74	-14.2	1.00 H	175	22.53	37.27
2	2400.00	50.4 AV	54	-3.6	1.00 H	175	13.13	37.27
3	*2402.00	78.9 PK	114	-35.1	1.00 H	175	41.63	37.27
4	*2402.00	71.4 AV	94	-22.6	1.00 H	175	34.13	37.27
5	4804.00	53.5 PK	74	-20.5	1.00 H	145	11.89	41.61
6	4804.00	47.6 AV	54	-6.4	1.00 H	145	5.99	41.61
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	2400.00	53.8 PK	74	-20.2	1.00 V	278	16.53	37.27
2	2400.00	47.9 AV	54	-6.1	1.00 V	278	10.63	37.27
3	*2402.00	71.0 PK	114	-43	1.00 V	278	33.73	37.27
4	*2402.00	65.5 AV	94	-28.5	1.00 V	278	28.23	37.27
5	4804.00	52.7 PK	74	-21.3	1.00 V	202	11.09	41.61
6	4804.00	45.7 AV	54	-8.3	1.00 V	202	4.09	41.61

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.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 39	FREQUENCY RANGE	1 ~ 25GHz
TEST VOLTAGE	DC1.5V by battery	DETECTOR FUNCTION	Peak (PK) 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	*2439.00	78.7 PK	114	-35.3	1.00 H	257	41.37	37.33
2	*2439.00	72.3 AV	94	-21.7	1.00 H	257	34.97	37.33
3	4878.00	52.8 PK	74	-21.2	1.00 H	144	11.1	41.7
4	4878.00	46.8 AV	54	-7.2	1.00 H	144	5.1	41.7
5	7317.00	55.8 PK	74	-18.2	1.00 H	292	10.01	45.79
6	7317.00	48.7 AV	54	-5.3	1.00 H	292	2.91	45.79
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	*2439.00	75.3 PK	114	-38.7	1.00 V	275	37.97	37.33
2	*2439.00	69.2 AV	94	-24.8	1.00 V	275	31.87	37.33
3	4878.00	52.9 PK	74	-21.1	1.00 V	110	11.2	41.7
4	4878.00	42.7 AV	54	-11.3	1.00 V	110	1	41.7
5	7317.00	56.2 PK	74	-17.8	1.00 V	262	10.41	45.79
6	7317.00	50.1 AV	54	-3.9	1.00 V	262	4.31	45.79

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.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.



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Test Report No.: RF130830N015-2

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 78	FREQUENCY RANGE	1 ~ 25GHz
TEST VOLTAGE	DC1.5V by battery	DETECTOR FUNCTION	Peak (PK) 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	*2479.00	86.1 PK	114	-27.9	1.00 H	282	48.7	37.4
2	*2479.00	78.5 AV	94	-15.5	1.00 H	282	41.1	37.4
3	2483.50	58.8 PK	74	-15.2	1.00 H	282	21.39	37.41
4	2483.50	49.9 AV	54	-4.1	1.00 H	282	12.49	37.41
5	4958.00	52.6 PK	74	-21.4	1.00 H	167	10.8	41.8
6	4958.00	45.7 AV	54	-8.3	1.00 H	167	3.9	41.8
7	7437.00	55.1 PK	74	-18.9	1.00 H	268	9.28	45.82
8	7437.00	48.1 AV	54	-5.9	1.00 H	268	2.28	45.82
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	*2479.00	79.6 PK	114	-34.4	1.00 V	169	42.2	37.4
2	*2479.00	72.9 AV	94	-21.1	1.00 V	169	35.5	37.4
3	2483.50	53.6 PK	74	-20.4	1.00 V	169	16.19	37.41
4	2483.50	47.5 AV	54	-6.5	1.00 V	169	10.09	37.41
5	4958.00	53.6 PK	74	-20.4	1.00 V	175	11.8	41.8
6	4958.00	48.7 AV	54	-5.3	1.00 V	175	6.9	41.8
7	7437.00	55.3 PK	74	-18.7	1.00 V	122	9.48	45.82
8	7437.00	48.7 AV	54	-5.3	1.00 V	122	2.88	45.82

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.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.

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4.2 20DB BANDWIDTH MEASUREMENT

4.2.1 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.

4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Analyzer	Rohde&Schwarz	FSV7	102331	Nov. 26,12	Nov. 25,13
Spectrum Analyzer (9KHz-25GHz)	Agilent	E7405A	MY45118807	May 14,13	May 13,14
Digital Multimeter	FLUKE	15B	A1220010D G	Oct. 31,12	Oct. 30,13
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, GRGT/CHINA and NIM/CHINA.

2. The test site was performed in Oven room

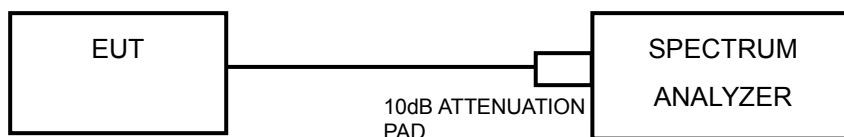
4.2.3 TEST PROCEDURE

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 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 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- Repeat above procedures until all frequencies measured were complete.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



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

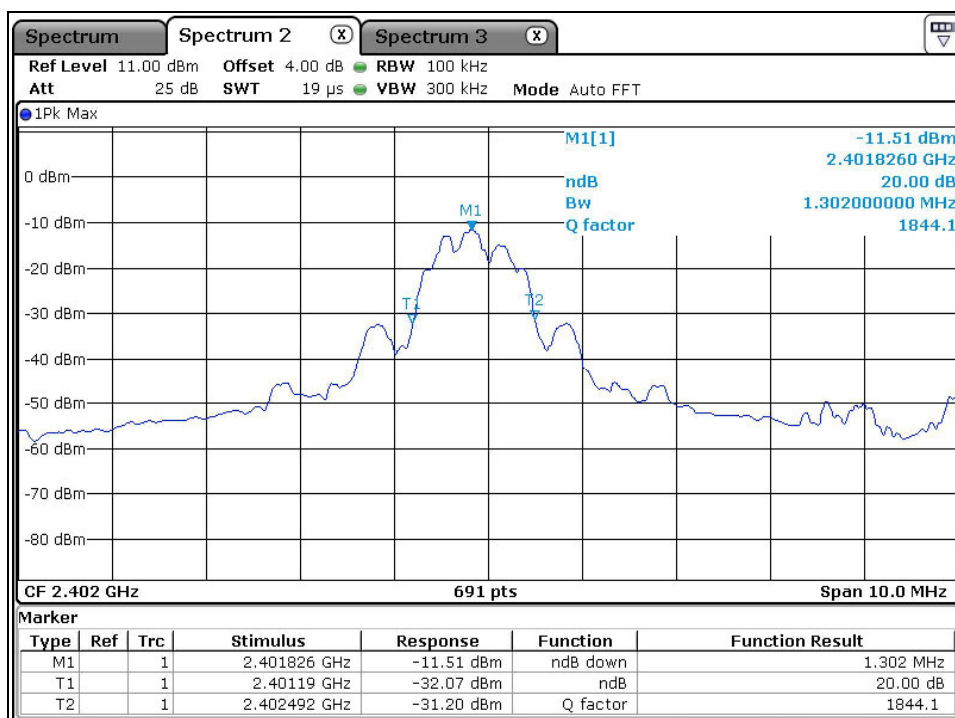
CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	1.302
Middle	2439	1.331
High	2479	1.317



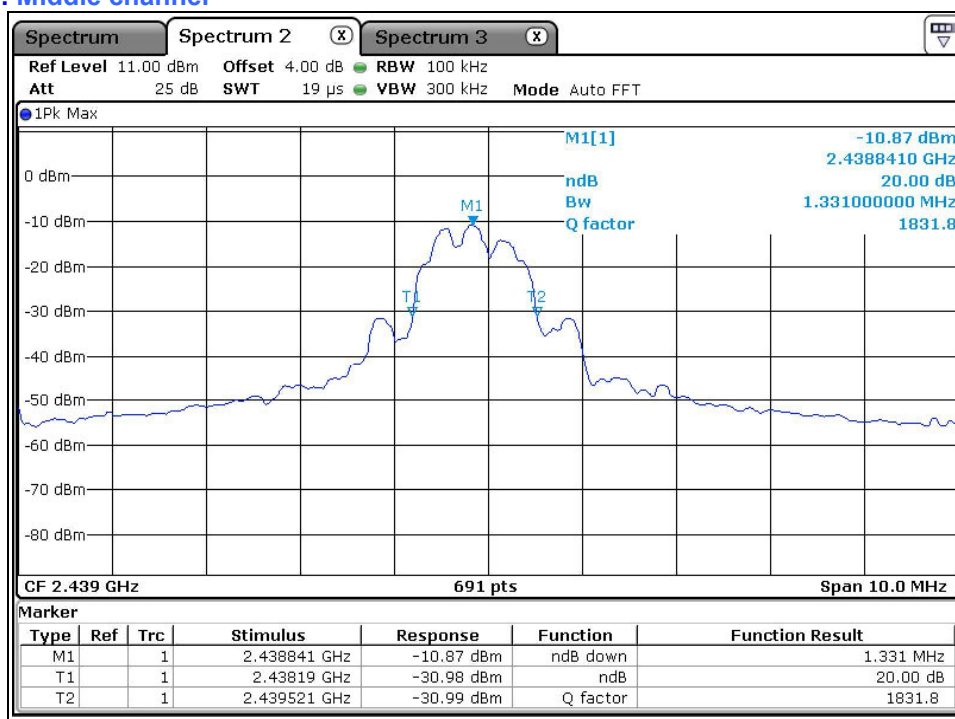
BUREAU
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Test Data: Low channel



Test Data: Middle channel



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Guangdong 523942, China

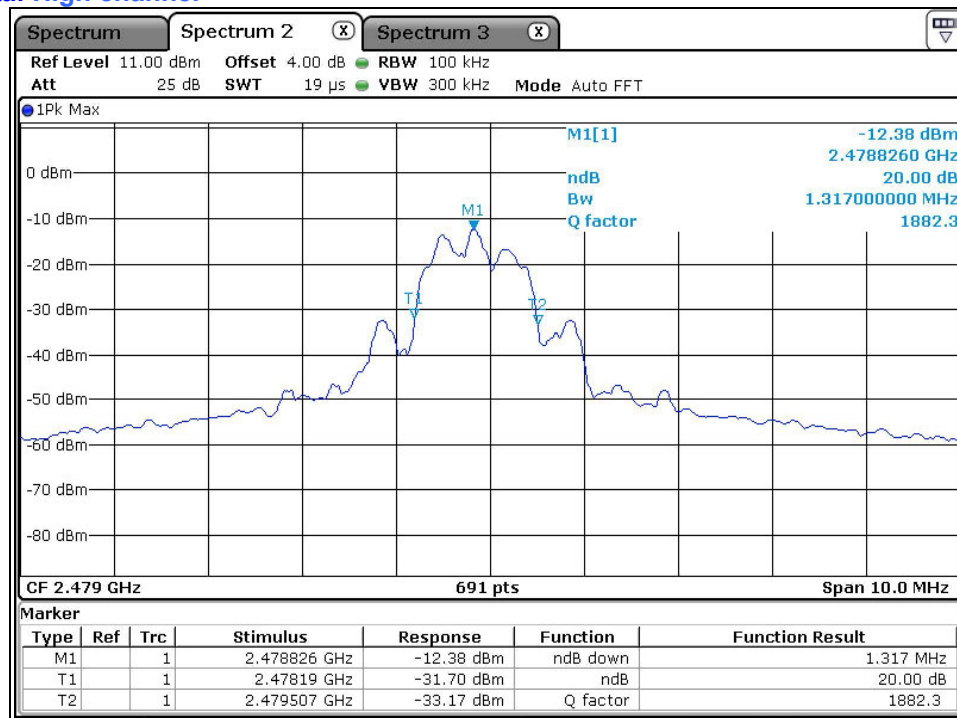
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BUREAU
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Test Report No.: RF130830N015-2

Test Data: High channel



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5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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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---