



TEST REPORT

Applicant	SHANTOU SKYTECH TOYS INDUSTRIAL CO. , LTD
Address	XINGYE SOUTH ROAD LAIMEI INDUSTRIAL PARK CHENGHAI DISTRICT SHANTOU CITY GUANGDONG CHINA

Manufacturer or Supplier	SHANTOU SKYTECH TOYS INDUSTRIAL CO. , LTD
Address	XINGYE SOUTH ROAD LAIMEI INDUSTRIAL PARK CHENGHAI DISTRICT SHANTOU CITY GUANGDONG CHINA
Product	R/C helicopter
Brand Name	N/A
Model	M16G
Additional Model & Model Difference	M6,M18,M60,M61,etc,see item 2.1
Date of tests	Oct. 28 ~ Nov. 20, 2013

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

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

Tested by Venless Long	Approved by Glyn He
Project Engineer / EMC Department	Supervisor / EMC Department
Ventos	Ghyn

Date: Nov. 20, 2013

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF131023N007	Original release	Nov. 20, 2013

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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		
§15.215I	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
	9KHz ~ 30MHz	2.74dB
Radiated emissions	30MHz ~ 1GHz	4.81dB
Nadiated emissions	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.

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3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	R/C helicopter
TEST MODEL	M16G
FCC ID	ZKV075458827998
NOMINAL VOLTAGE	DC 6V from Battery
MODULATION TYPE	GFSK
OPERATING FREQUENCY	2405-2475MHz
ANTENNA TYPE	Wire Antenna
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB Line: Unshielded, Undetachable 1.66m

NOTE:

- 1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- 2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
- 3. Additional models

M6,M18,M60,M61,M62,M63,M65,M66,M67,M68,M69,M70,M71,M72,M73,M75,M76,M77,M78,M79,M80,M81,M82,M83,M85,M86,M87,M88,M89,M90,M91,M92,M93,M95,M96,M97,M98,M99,M100,M101,M102,M103,M104,M106,M107,M108,M109,M120,M121,M122,M123,M125,M126,M127,M128,M129,M130,M131,M132,M133,M135,M136,M137,M138,M139,M140,M141,M142,M143,M145,M146,M147,M148,M149,M150,M151,M152,M153,M154,M155,M156,M157,M158,M159,M160,M161,M162,M163,M165,M166,M167,M170,M171,M172,M173,M175,M176,M177,M178,M179,M180,M181,M182,M183,M185,M186,M187,M188,M189,M190,M191,M192,M193,M195,M196,M197,M198,M199,M200 are identical with the test model M16G except the appearance, trade name, and model number for trading purpose.

4. The EUT was powered by the following adapter:

SWITCHING ADAPTER				
BRAND:	Y/X			
MODEL:	KX4V2-060			
INPUT:	AC 110-240V 50/60Hz			
OUTPUT:	DC 4.2V 600mA			
USB LINE:	Unshielded,Undetachable,1.15m			

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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	APPLICABLE TO				DESCRIPTION
MODE	RE<1G	RE≥1G	PLC	BW	DESCRIPTION
А	√	√	√	√	Powered by battery

Where **RE<1G:** Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

PLC: Power Line Conducted Emission

BW: 20db bandwidth

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

TESTED CHANNEL	TESTED FREQUENCY
Low	2405 MHz
Middle	2445 MHz
High	2475 MHz

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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.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together without any other necessary accessories or support units.

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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.

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4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer (9KHz-25GHz)	Agilent	E7405A	MY45118807	May 14,13	May 13,14
Power Meter	Anritsu	ML2495A	1139001	Nov. 04,13	Nov. 03,14
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep. 17,13	Sep. 16,14
Oscilloscope	Agilent	DSO9254A	MY51260160	Oct. 17, 13	Oct. 16, 14
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 26,12	Nov. 25,13
Spectrum Analyzer (9KHz–40GHz)	Agilent	E4446A	MY46180622	Apr. 24,13	Apr. 23,14
Digital Multimeter	FLUKE	15B	A1220010D G	Oct. 30, 13	Oct. 29, 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 Chamber
- 3. The FCC Site Registration No. is 502831

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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/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. 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

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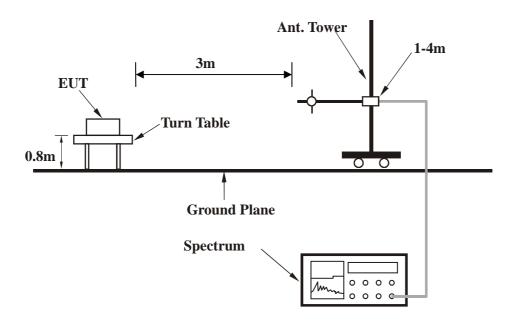
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4.1.5 TEST SETUP



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

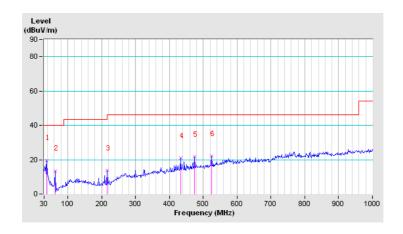
BELOW 1GHz WORST-CASE DATA:

CHANNEL	Low Channel	DETECTOR	Ougai Book (OD)
FREQUENCY RANGE	30MHz ~ 1GHz	FUNCTION	Quasi-Peak (QP)

	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	38.08	19.6 QP	40.0	-20.4	1.00 H	160	4.11	15.50				
2	62.33	13.5 QP	40.0	-26.5	1.00 H	147	5.66	7.86				
3	215.92	13.7 QP	43.5	-29.8	1.00 H	174	2.61	11.12				
4	432.55	21.0 QP	46.0	-25.1	1.00 H	196	1.66	19.29				
5	474.58	21.9 QP	46.0	-24.1	1.00 H	224	1.51	20.35				
6	524.70	22.0 QP	46.0	-24.0	1.00 H	212	0.81	21.18				

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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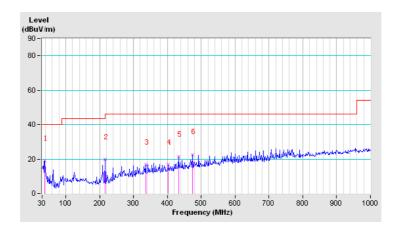


CHANNEL	Low Channel	DETECTOR	Ougoi Pook (OP)
FREQUENCY RANGE	30MHz ~ 1GHz	FUNCTION	Quasi-Peak (QP)

	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	38.08	19.0 QP	40.0	-21.0	1.00 V	138	3.54	15.50			
2	215.92	19.9 QP	43.5	-23.6	1.00 V	152	8.75	11.12			
3	335.55	16.9 QP	46.0	-29.1	1.00 V	165	0.56	16.32			
4	401.83	16.7 QP	46.0	-29.3	1.00 V	177	-1.76	18.44			
5	432.55	21.4 QP	46.0	-24.6	1.00 V	189	2.14	19.29			
6	474.58	22.7 QP	46.0	-23.3	1.00 V	201	2.32	20.35			

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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ABOVE 1GHz WORST-CASE DATA:

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL Low Channel		FREQUENCY RANGE	1 ~ 25GHz	
TEST VOLTAGE	DC 6V from battery	DETECTOR FUNCTION	Peak (PK) Average (AV)	

		ANTENNA	POLARITY &	& TEST DIS	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	45.2 PK	74.0	-28.8	1.54 H	155	7.93	37.27						
2	2400.00	33.5 AV	54.0	-20.5	1.54 H	155	-3.77	37.27						
3	*2405.00	83.4 PK	114.0	-30.6	1.54 H	155	46.13	37.27						
4	*2405.00	83.3 AV	94.0	-10.7	1.54 H	155	46.03	37.27						
5	4810.00	52.8 PK	74.0	-21.2	1.00 H	322	11.19	41.61						
6	4810.00	41.7 AV	54.0	-12.3	1.00 H	322	0.09	41.61						
		ANTENNA	POLARITY	/ & TEST DI	STANCE: V	ERTICAL A	T 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)						
		, ,			(111)	(509.00)	()	, ,						
1	2400.00	43.3 PK	74.0	-30.7	1.00 V	175	6.03	37.27						
1	2400.00 2400.00	,	74.0 54.0	-30.7 -20.8	` ,		,	, ,						
		43.3 PK	_		1.00 V	175	6.03	37.27						
2	2400.00	43.3 PK 33.2 AV	54.0	-20.8	1.00 V 1.00 V	175 175	6.03	37.27 37.27						
3	2400.00 *2405.00	43.3 PK 33.2 AV 79.6 PK	54.0 114.0	-20.8 -34.4	1.00 V 1.00 V 1.00 V	175 175 175	6.03 -4.07 42.33	37.27 37.27 37.27						

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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EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL Middle Channel		FREQUENCY RANGE 1 ~ 25GHz		
TEST VOLTAGE	DC 6V from battery	DETECTOR FUNCTION	Peak (PK) Average (AV)	

		ANTENNA	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	*2445.00	81.4 PK	114.0	-32.6	1.00 H	141	44.06	37.34
2	*2445.00	81.2 AV	94.0	-12.8	1.00 H	141	43.86	37.34
3	4890.00	51.2 PK	74.0	-22.8	1.00 H	214	9.47	41.73
4	4890.00	38.7 AV	54.0	-15.3	1.00 H	214	-3.03	41.73
5	7335.00	53.2 PK	74.0	-20.8	1.00 H	204	7.40	45.80
6	7335.00	40.8 AV	54.0	-13.2	1.00 H	204	-5.00	45.80
		ANTENNA	POLARITY	/ & TEST DI	STANCE: V	ERTICAL A	T 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	*2445.00	80.6 PK	114.0	-33.4	1.00 V	145	43.26	37.34
2	*2445.00	79.5 AV	94.0	-14.5	1.00 V	145	42.16	37.34
3	4890.00	51.3 PK	74.0	-22.7	1.04 V	211	9.57	41.73
4	4890.00	38.5 AV	54.0	-15.5	1.04 V	211	-3.23	41.73
5	7335.00	53.6 PK	74.0	-20.4	1.00 V	153	7.80	45.80
6	7335.00	41.0 AV	54.0	-13.0	1.00 V	153	-4.80	45.80

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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EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	High Channel	FREQUENCY RANGE	1 ~ 25GHz	
TEST VOLTAGE	DC 6V from battery	DETECTOR FUNCTION	Peak (PK) Average (AV)	

		ANTENNA	POLARITY &	& TEST DIS	TANCE: HO	RIZONTAL	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	*2475.00	81.2 PK	114.0	-32.8	1.00 H	165	43.80	37.40
2	*2475.00	81.1 AV	94.0	-12.9	1.00 H	165	43.70	37.40
3	2483.50	45.6 PK	74.0	-28.4	1.00 H	165	8.19	37.41
4	2483.50	35.2 AV	54.0	-18.8	1.00 H	165	-2.21	37.41
5	4950.00	50.3 PK	74.0	-23.7	1.00 H	150	8.51	41.79
6	4950.00	38.7 AV	54.0	-15.3	1.00 H	150	-3.09	41.79
7	7425.00	54.4 PK	74.0	-19.6	1.00 H	163	8.58	45.82
8	7425.00	42.7 AV	54.0	-11.3	1.00 H	163	-3.12	45.82
		ANTENNA	POLARITY	' & TEST DI	STANCE: V	ERTICAL A	T 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	*2475.00	82.4 PK	114.0	-31.6	1.00 V	320	45.00	37.40
2	*2475.00	82.1 AV	94.0	-11.9	1.00 V	320	44.70	37.40
3	2483.50	46.5 PK	74.0	-27.5	1.00 V	320	9.09	37.41
4	2483.50	35.8 AV	54.0	-18.2	1.00 V	320	-1.61	37.41
5	4950.00	52.2 PK	74.0	-21.8	1.00 V	195	10.41	41.79
6	4950.00	40.3 AV	54.0	-13.7	1.00 V	195	-1.49	41.79
7	7425.00	55.2 PK	74.0	-18.8	1.00 V	200	9.38	45.82
8	7425.00	43.1 AV	54.0	-10.9	1.00 V	200	-2.72	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.

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4.2 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. 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

4.3.3 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.

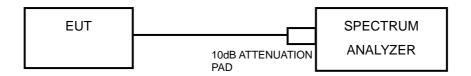
4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

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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.

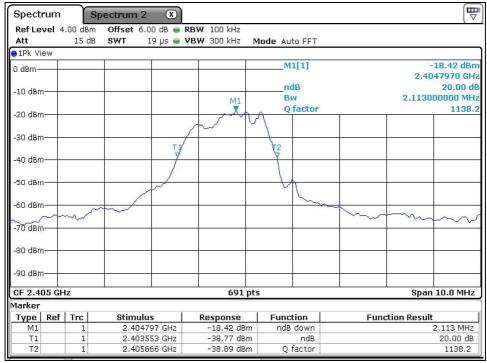
4.3.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2405	2.113
Middle	2445	2.055
High	2475	2.084

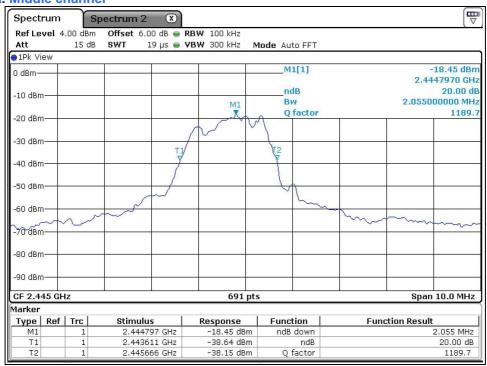
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Test Data: Low channel



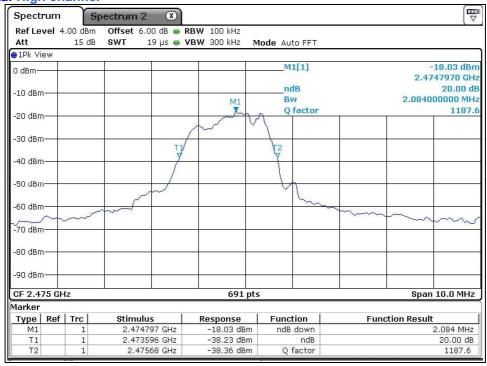
Test Data: Middle channel



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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---

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