# TEST REPORT

FCC ID: ZLZRF013B-MR-001 Product: Remote Control Model No.: RF013B-MR-001 Additional Model: N/A Trade Mark: N/A Report No.: TCT161010E005 Issued Date: Oct. 25, 2016

Shenzhen Mindray BIO-Medical electronics Co.,LTD Mindray Building, Keji 12th Road South, High-tech industrial Park, Nanshan, Shenzhen, China

Issued for:

Issued By:

Shenzhen Tongce Testing Lab. 1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China TEL: +86-755-27673339 FAX: +86-755-27673332

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# 1. Test Certification

Product:	Remote Control
Model No.:	RF013B-MR-001
Additional Model:	N/A
Applicant:	Shenzhen Mindray BIO-Medical electronics Co.,LTD
Address:	Mindray Building, Keji 12th Road South, High-tech industrial Park, Nanshan, Shenzhen, China
Manufacturer:	Fenito Electronic Technology (Shenzhen) Co., Ltd
Address:	3rd-4th floor of Yuye comprehensive building, Hezhou Village, Xixiang Street, Bao'an Shenzhen, China
Date of Test:	Oct. 10 – Oct. 24, 2016
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.249

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Ser Tested By: Oct. 24, 2016 Date: Beryl Zhao **Reviewed By:** Date: Oct. 25, 2016 Joe Zhou Approved By: Oct. 25, 2016 Date: Tomsin Page 3 of 26



# 2. Test Result Summary

AC Power L Em	Requirement			ction		Result	
Em			§15.20	3		PASS	
	ine Conducted		§15.20	7		N/A	
	Strength of lamental		§15.249	(a)		PASS	
Spurious	s Emissions	§15	§2.105 5.249 (a) (d)		S	PASS	N.
Ban	d Edge	§1	§2.105 ا /(15.249 (d)			PASS	
20dB Occu	pied Bandwidth		§2.104 §15.215			PASS	
	item meets the requi		Ś		Ś		(C)
	ase does not apply to sult judgment is decid						

# 3. EUT Description

Product Name:	Remote Control
Model :	RF013B-MR-001
Additional Model:	N/A
Trade Mark:	N/A
Operation Frequency:	2406-2433MHz
Number of Channel:	4
Modulation Technology:	FSK
Antenna Type:	Internal Antenna
Antenna Gain:	1.5dBi
Power Supply:	DC 3.0V(2pcs AA ABattery)

#### Operation Frequency Each of Channel

Frequency	Channel	Frequency
2406 MHz	2	2424 MHz
2411 MHz	3	2433 MHz
	2406 MHz	

#### Note:

In section 15.31(*m*), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2406MHz
The middle channel	2424MHz
The Highest channel	2433MHz

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4.

Operating Environment:							
Temperature:	25.0 °C						
Humidity:	54 % RH						
Atmospheric Pressure:	1010 mbar						
Test Mode:	Test Mode:						

Engineering mode:	Keep the EUT in continuous transmitting by select channel

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

# 4.2. 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.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
1		) /		

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

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# 5. Facilities and Accreditations

### 5.1.Facilities

The test facility is recognized, certified, or accredited by the following organizations:

• FCC - Registration No.: 572331

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Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

• IC - Registration No.: 10668A-1

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

• CNAS - Registration No.: CNAS L6165

Shenzhen TCT Testing Technology Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6165.

# 5.2. Location

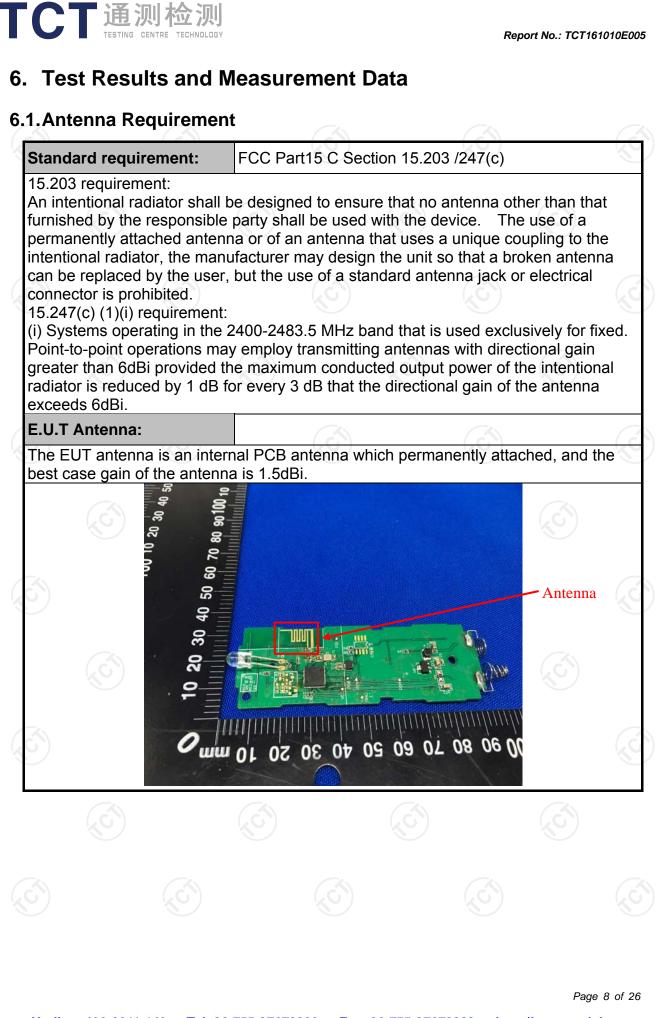
Shenzhen Tongce Testing Lab

Address: 1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China Tel: 86-755-36638142

# 5.3. 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	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1GHz)	±3.92dB
5	All emissions, radiated(>1GHz)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%



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**6.2.Conducted Emission** 

Test Requirement:	FCC Part15 C Section	15.207	No.			
Test Method:	ANSI C63.10:2013	ANSI C63.10:2013				
Frequency Range:	150 kHz to 30 MHz	150 kHz to 30 MHz RBW=9 kHz, VBW=30 kHz, Sweep time=au				
Receiver setup:	RBW=9 kHz, VBW=30					
Limits:	Frequency range (MHz)         Limit (d Quasi-peak           0.15-0.5         66 to 56*           0.5-5         56           5-30         60		dBuV) Average 56 to 46* 46 50			
Test Setup:	LISN 40cm 40cm Equipment E.I Test table/Insulation pla Remark: E.U.T. Equipment Under Test LISN: Line Impedence Stabilizatio	U.T EMI Receiver	ter — AC power			
Test Mode:	Test table height=0.8m Transmitting mode witl	h modulation	Ć			
Test Procedure:	<ol> <li>The E.U.T and simulation power through a line (L.I.S.N.). This proving through a constrained and the power through a LI coupling impedance refer to the block photographs).</li> <li>Both sides of A.C. conducted interferer emission, the relative the interface cables ANSI C63.10:2013 of the construction of the construction of the construction of the construction of the construction.</li> </ol>	e impedance stab ovides a 500hm neasuring equipme ces are also conne ISN that provides with 500hm tern diagram of the line are checken nce. In order to fin e positions of equ s must be chang	bilization network h/50uH coupling ent. ected to the main a 50ohm/50uH nination. (Please test setup and ed for maximum nd the maximum ipment and all or led according to			
Test Result:	The EUT is powered b this test item is not app	•	AA battery, so			

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# 6.3. Radiated Emission Measurement

#### 6.3.1. Test Specification

Test Requirement:	FCC Part15	C Section	15.209/	Part 2 J	Section 2.1053
Test Method:	ANSI C63.10:2013				
Frequency Range:	9 kHz to 25 GHz				
Measurement Distance:	3 m	No.			
Antenna Polarization:	Horizontal & Vertical				
	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
Receiver Setup:	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Above IGHZ	Peak	1MHz	10Hz	Average Value
Limit(Field strength of the	Freque	ency	Limit (dBu)	//m @3m)	Remark
fundamental signal):	2400MHz-24	183 5MU-	94.	00	Average Value
runuamentai signai).	240010102-24		114.00		Peak Value
	Freque	ency	Limit (dBuV/m @3m)		Remark
	0.009-0.490		2400/F(KHz)		Quasi-peak Value
	0.490-1.705		24000/F(KHz)		Quasi-peak Value
	1.705-30		30		Quasi-peak Value
	30MHz-88MHz		40.0		Quasi-peak Value
Limit(Spurious Emissions):	88MHz-2	16MHz	43	.5	Quasi-peak Value
	216MHz-9	60MHz	46	.0	Quasi-peak Value
	960MHz	-1GHz	54.0		Quasi-peak Value
	Above 1GHz		54	.0	Average Value
			74	-	Peak Value
Limit (band edge) :	Emissions radiated outside of the specified frequence bands, except for harmonics, shall be attenuated by least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.20 whichever is the lesser attenuation.				
Test Procedure:	<ol> <li>Whichever is the lesser attenuation.</li> <li>The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber in below 1GHz, 1.5m above the ground in above 1GHz. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna 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.</li> </ol>				

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	<ol> <li>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.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>
	For radiated emissions below 30MHz Distance = 3m Computer Pre - Amplifier UT Turn table Ground Plane 30MHz to 1GHz
Test setup:	Antenna Tower Antenna Tower Search Antenna RF T est Receiver Ground Plane Above 1GHz
<u>Hotline: 400-6611-140 Tel: 86</u>	Page 11 of 26 -755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

# EXERCISE Bencher Steller EXERCISE Description

#### 6.3.2. Test Instruments

o.z. rest instrument	( ( )			
ESPI Test Receiver	ROHDE&SCHW ARZ	ESVD	100008	Aug. 11, 2017
Spectrum Analyzer	ROHDE&SCHW ARZ	FSEM	848597/001	Aug. 11, 2017
Spectrum Analyzer	Agilent	N9020A	MY49100060	Aug. 12, 2017
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Aug. 11, 2017
Pre-amplifier	HP	8447D	2727A05017	Aug. 11, 2017
Loop antenna	ZHINAN	ZN30900A	12024	Aug. 13, 2017
Broadband Antenna	Schwarzbeck	VULB9163	340	Aug. 13, 2017
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Aug. 13, 2017
Horn Antenna	Schwarzbeck	BBHA 9170	373	Aug. 13, 2017
Coax cable	тст	RE-low-01	N/A	Aug. 11, 2017
Coax cable	тст	RE-high-02	N/A	Aug. 11, 2017
Coax cable	тст	RE-low-03	N/A	Aug. 11, 2017
Coax cable	тст	RE-high-04	N/A	Aug. 11, 2017
Antenna Mast	CCS	CC-A-4M	N/A	N/A
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

#### 6.3.3. Test Data

#### Field Strength of Fundamental

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal /Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
2406	95.14(PK)	Н	114/94	-18.86
2406	80.37(AV)	H G	114/94	-13.63
2424	93.61(PK)	Н	114/94	-20.39
2424	79.74(AV)	Н	114/94	-14.26
2433	93.27(PK)	(C)H	114/94	-20.73
2433	79.23(AV)	Н	114/94	-14.77
2406	97.29(PK)	V	114/94	-16.71
2406	81.75(AV)	V	114/94	-12.25
2424	98.58(PK)	V	114/94	-15.42
2424	83.23(AV)	V	114/94	-10.77
2433	98.63(PK)	V	114/94	-15.37
2433	83.63(AV)	V	114/94	-10.37

#### **Spurious Emissions**

#### Frequency Range (9 kHz-30MHz)

/	Frequency (MHz)	Level@3m (dBµV/m)	Limit@3m (dBµV/m)
~			
		(6) - (6)	-

Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor

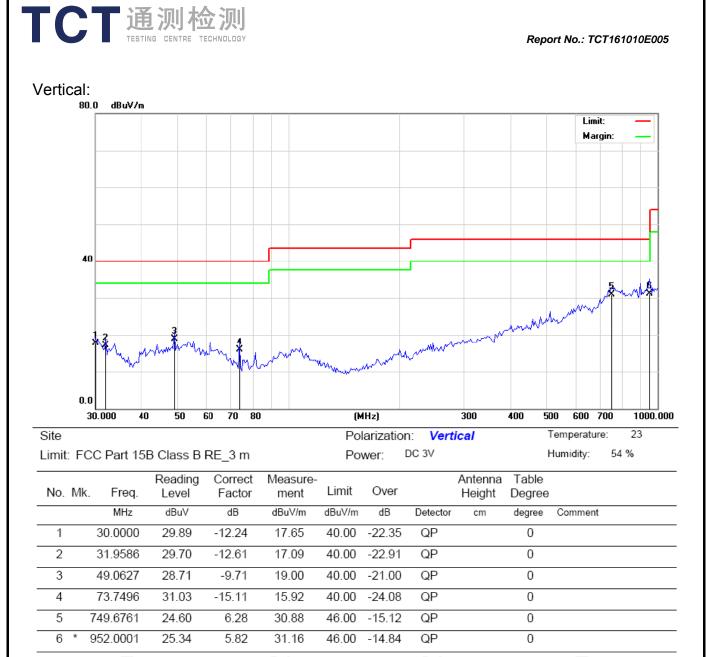
2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

Frequency Range (30MHz-1GHz)

#### Horizontal:



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**Note:** Measurements were conducted in all channels (high, middle, low), and the worst case (low channel) was submitted only.

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					Above	1GHz					
	Low channel: 2406 MHz										
F	requency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Peak	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)	
	2387.50	Н	50.62		-4.2	46.42		74.00	54.00	-7.58	
	2387.50	Н		49.88	-4.2	J	45.68	74.00	54.00	-8.32	
	4804.00	Н	49.13		-3.94	45.19		74.00	54.00	-8.81	
	7206.00	Н	48.65		0.52	49.17		74.00	54.00	-4.83	
		4					<				
		XG )		2			S T				
	2387.50	V	53.29		-4.2	49.09		74.00	54.00	-4.91	
	2387.50	V		47.05	-4.2		42.85	74.00	54.00	-11.15	
	4804.00	V	47.62		3.94	51.56		74.00	54.00	-2.44	
	7206.00	V	47.83		0.52	48.35		74.00	54.00	-5.65	
5	)					/					

	Middle channel: 2424MHz									
Frequency	Ant Pol	Peak	AV	Correction	Emission Level		Peak limit	A\/ limit	Margin	
(MHz)	H/V	reading	reading	Factor	Peak	AV	(dBµV/m)		(dB)	
(1011 12)	1 1/ V	(dBµV)	(dBµV)	(dB/m)	(dBµV/m)	(dBµV/m)	(uDµ v/m)	(app v/m)	(GD)	
4880.00	Н	48.25		-3.98	44.27		74	54	-9.73	
7320.00	Н	49.66		0.57	50.23		74	54	-3.77	
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				(	×		-			
G`)		()		(20	)		( <u>_</u> )		C	
					/					
4000.00	N/	50.40		0.00	40.40		74	= 4	7.00	
4880.00	V	50.16		-3.98	46.18		74	54	-7.82	
7320.00	V	48.69		0.57	49.26		74	54	-4.74	
				)						

				High channe	el: 2433MH	Ηz			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissio Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
2486.58	Н	52.31		-2.38	49.93		74	54	-4.07
2486.58	Н		42.79	-2.38		40.41	74	54	-13.59
4960.00	Н	52.44		-3.98	48.46		74	54	-5.54
7440.00	Н	48.57		0.57	49.14		74	54	-4.86
The second				_	2				
2483.51	V	50.93		-2.38	48.55		74.00	54.00	-5.45
2483.51	V		45.47	-2.38	J	43.09	74.00	54.00	-10.91
4960.00	V	51.73		-3.98	47.75		74.00	54.00	-6.25
7440.00	V	49.25		0.57	49.82		74.00	54.00	-4.18
				<u> </u>					
Note:			N.						

#### Note:

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss - Pre-amplifier

2. Margin (dB) = Emission Level (Peak) (dB $\mu$ V/m)-Average limit (dB $\mu$ V/m)

3. The emission levels of other frequencies are very lower than the limit and not show in test report.

4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

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#### **Band Edge Requirement**

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Low chann	Low channel: 2406MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)		n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)	170
2400	Н	52.35	)	-4.2	48.15		74.00		-25.85	$\mathbb{P}$
2400	Н		43.67	-4.2		39.47		54.00	-14.53	~
2400	V	50.73	(	-4.2	46.53		74.00		-27.47	
2400	V		41.89	-4.2		37.69		54.00	-16.31	

-	/ /				
I	∩w/	char	nel.	2433	MHz

Low chann	el: 2433M	Hz							
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
2483.5	H	51.28		-4.2	47.08		74.00		-26.92
2483.5			42.75	-4.2		38.55		54.00	-15.45
			~						
2483.5	V	53.41		-4.2		49.21	74.00		-24.79
2483.5	V		43.95	-4.2		39.75		54.00	-14.25
			/						/

#### Note:

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss - Pre-amplifier

2. Margin (dB) = Emission Level (Peak/Average)(dB $\mu$ V/m)-(Peak/Average) limit (dB $\mu$ V/m)

3. The emission levels of other frequencies are very lower than the limit and not show in test report.

4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

5. Data of measurement shown "----"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.



# 6.4.20dB Occupied Bandwidth

#### 6.4.1. Test Specification

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Test Requirement:	FCC Part15 C Section 15.2 2.1049	15(c)/ Part 2 J Section				
Test Method:	ANSI C63.10: 2013					
Limit:	N/A					
	<ul> <li>position between the art</li> <li>2. Set to the maximum po EUT transmit continuous</li> <li>3. Use the following spect 20dB Bandwidth measur</li> <li>Span = approximately bandwidth, centered on a hopping of dB bandwidth;</li> </ul>	ctrum analyzer settings for rement. 2 to 3 times the 20 dB channel; RBW≥1% of the 20 auto; Detector function =				
Test setup:	Spectrum Analyzer	EUT				
Test Mode:	Transmitting mode with mode	Transmitting mode with modulation				
Test results:	PASS					

#### 6.4.2. Test Instruments

	RF Test Room								
0	Equipment	Manufacturer	Model	Serial Number	Calibration Due				
	Spectrum Analyzer	R&S	FSU	200054	Aug. 12, 2017				

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

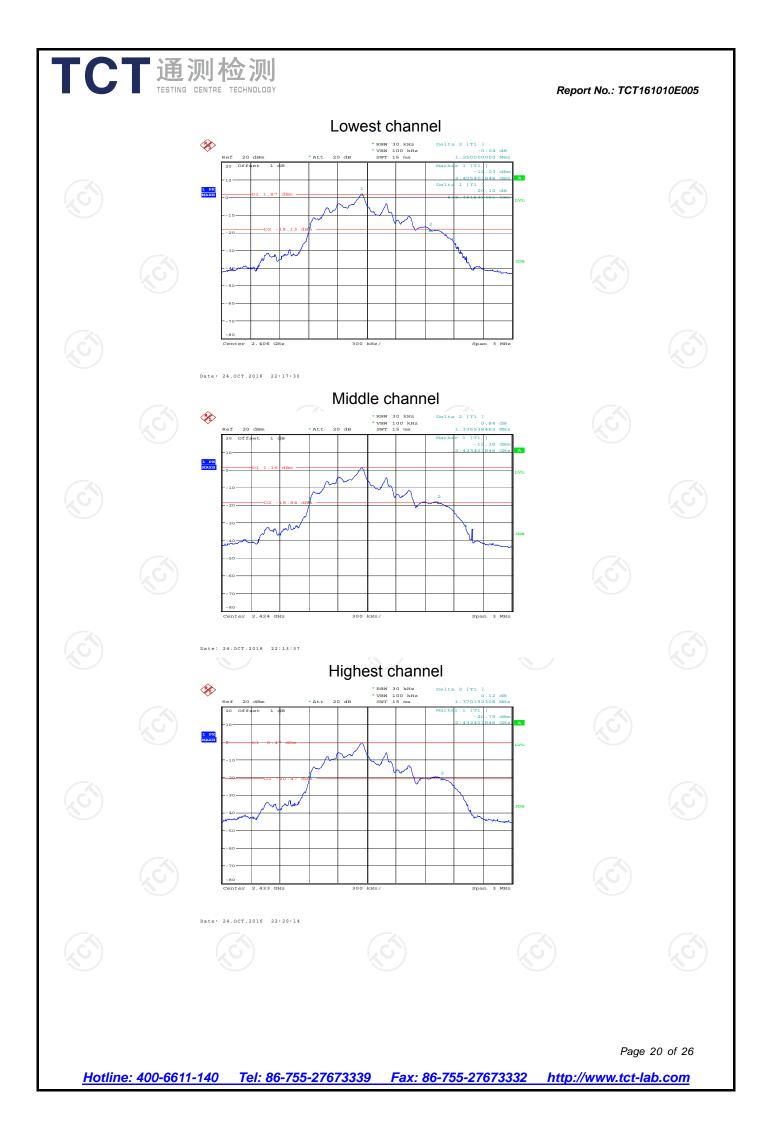


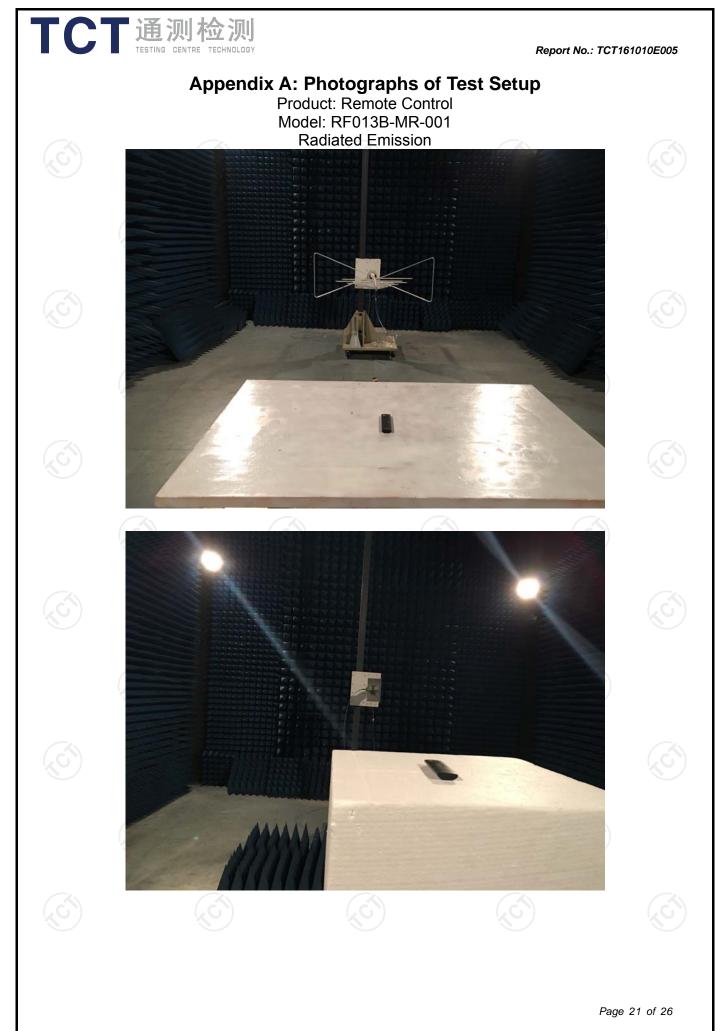
#### 6.4.3. Test data

Test Channel	20dB Occupy Bandwidth (kHz)	Limit	Conclusion	
Lowest	1250	6	PASS	
Middle	1336.54		PASS	
Highest	1370.19		PASS	
Tost plots as follows:				

Test plots as follows:

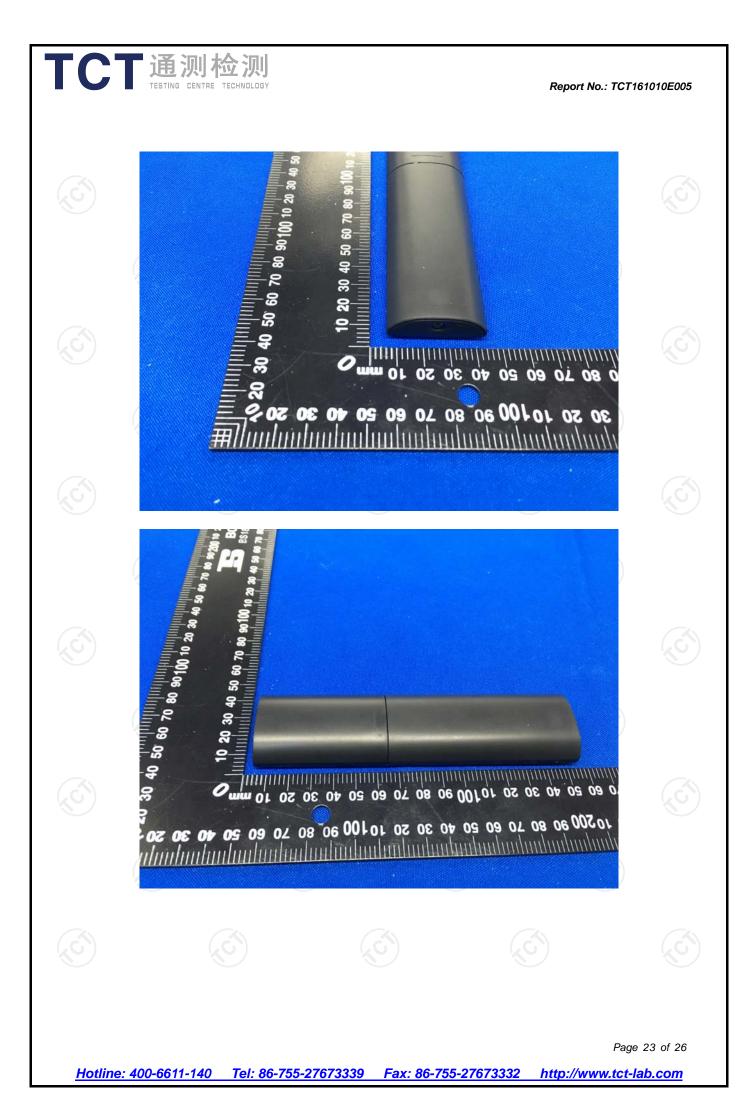
Test plots as follows:									
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Page 19 of 26 <u>Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com</u>									

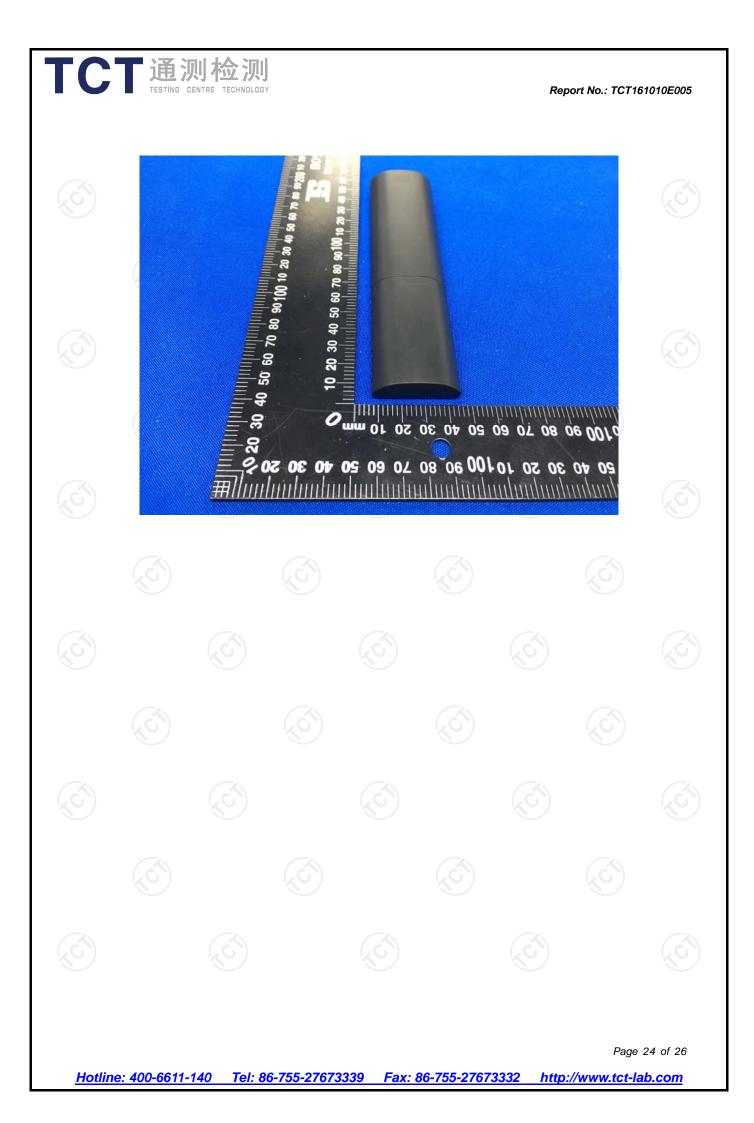






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