



FCC Test Report

Report No: FCS20200330007W01

Issued for

Applicant:	H.S CRAFT MANUFACTURING CO.
Address:	No.9F,NO. 35, GUANG FU N, TAIPEI, TAIWAN
Product Name:	HC-TX20 remote control
Brand Name:	N/A
Model Name:	HC-TX20
Series Model:	HC-TXyy, HC-TXyy-zz, FP-TXyy, FP-TXyy-zz (y="0"- "9" or blank, denotes the product type. z="A"- "Z" or blank, denotes the position of keys.)
FCC ID:	YLIHC-TX20
Issued By: Flux Compliance Service Laboratory Add: Room 105 Floor Bao hao Technology Building 1 NO.15 Gong yeWest Road Hi-Tech Industrial, Song shan lake Dongguan Tel: 769-27280901 Fax:769-27280901 http://www.FCS-lab.com	

FCS REPORT

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Revision History

Rev.	Issue Date	Effect Page	Contents
01	14 March 2020	All	Initial Issue

TEST RESULT CERTIFICATION

Applicant's Name: H.S CRAFT MANUFACTURING CO.

Address: No.9F,NO. 35, GUANG FU N,TAIPEI,TAIWAN

Manufacture's Name: H.S CRAFT MANUFACTURING CO.

Address: No.9F,NO. 35, GUANG FU N,TAIPEI,TAIWAN

Product Description

Product Name: HC-TX20 remote control

Brand Name: N/A

Model Name: HC-TX20

Series Model: HC-TXyy, HC-TXyy-zz, FP-TXyy, FP-TXyy-zz
(y="0"- "9" or blank, denotes the product type. z="A"- "Z" or blank,denotes the position of keys.)

Test Standards: FCC Rules and Regulations Part 15 Subpart C 15.231

Test Procedure: ANSI C63.10:2013

This device described above has been tested FCS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

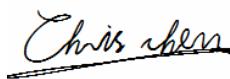
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Date of Test.....:

Date (s) of performance of tests.: 09 March 2020 ~ 14 March 2020

Date of Issue: 29 March 2020

Test Result: Pass

Prepared By : 

(Chris Chen/Engineer)

Approved By : 

(Brown Lu/EMC Manager)

1. Summary of Test Results

Standard Section	Test Item	Judgment	Remark
Section 15.203 RSS-GEN section 6.8	Antenna Requirement	Pass	
Section 15.207(a) RSS-Gen 8.8	Conduction Emissions	N/A	
Section 15.209,15.231(b) RSS-210 A1.2	Radiated Emissions	Pass	--
Section 15.231(c) RSS-Gen clause 6.7 & RSS-210 A1. 3	Occupied Bandwidth	Pass	
Section 15.231(a) (1) RSS 210 Issue 10 A1.1(a)	Transmit time	Pass	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 Test Laboratory

Company Name:	Flux Compliance Service Laboratory
Address:	Room 105 Floor Bao hao Technology Building 1 NO.15 Gong yeWest Road Hi-Tech Industrial, Song shan lake Dongguan
Telephone:	+86-769-27280901
Fax:	+86-769-27280901
A2LA Accreditation No. :	5545.01

1.2 Measurement Uncertainty

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

No.	Items	Uncertainty
1	RF output power, conducted	$\pm 0.71 \text{ dB}$
2	Unwanted Emissions, conducted	$\pm 2.988 \text{ dB}$
3	Conducted Emission (9KHz-150KHz)	$\pm 4.13 \text{ dB}$
4	Conducted Emission (150KHz-30MHz)	$\pm 4.74 \text{ dB}$
5	All emissions, radiated(<1G) 30MHz-1000MHz	$\pm 5.2 \text{ dB}$
6	All emissions, radiated(>1G) 1000MHz -3000MHz	$\pm 4.66 \text{ dB}$
7	All emissions, radiated(<1G) 3000MHz -6000MHz	$\pm 5.31 \text{ dB}$

1.3 Test Environment Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature rang:	20-26°C
Humidity range:	40-65%
Pressure range:	86-106Kpa

2. General Information

2.1 General Description of The EUT

Product Name	HC-TX20 remote control
Trade Name	N/A
Model Name	HC-TX20
Series Model	HC-TXyy, HC-TXyy-zz, FP-TXyy, FP-TXyy-zz (y="0"- "9" or blank, denotes the product type. z="A"- "Z" or blank,denotes the position of keys.)
Model Difference	Just different in model name
Operation Frequency	433.92MHz
Modulation	ASK
Antenna Type	PCB antenna, maximu PK gain: 0 dBi
Adapter	N/A
Battery	DC 3.0V from button battery
Hardware version number	N/A
Software versionnumber	N/A
Connecting I/O Port(s)	Please refer to the User's Manual
Note: For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.	

Model Difference

HC-TXyy and HC-Txyy-zz and FP-TXyy and FP-TXyy-zz				
y="0"- "9" or blank, denotes the product type. z="A"- "Z" or blank,denotes the position of keys.				
ITEM NO.	MODEL NO.	Nation	Report Type	Product description
/	HC-TX20	USA	FCC	ON/OFF type product remote control for HC
/	HC-TX20	USA	FCC	Two Function product remote control for HC
.....			
/	HC-TX10	USA	FCC	Multi Function product remote control for HC
.....			
/	HC-TX20	USA	FCC	Multi Function product remote control for HC
.....			
/	FP-TX01	USA	FCC	ON/OFF type product remote control for FP
/	FP-TX02	USA	FCC	Two Function product remote control for FP
.....			
/	FP-TX10	USA	FCC	Multi Function product remote control for FP
.....			
/	FP-TX20	USA	FCC	Multi Function product remote control for FP
.....			
/	HC-T06-A	USA	FCC	Six Function product (A)remote control for HC
.....			

2.2 Channel List

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	433.92				

2.3 Assistant Equipment Used For Test

Assistant equipment	Manufacturer	Model number
/	/	/
/	/	/

2.4 Description of The Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Data Rate/Modulation
Mode 1	TX CH00	ASK

2.5 Block Diagram Showing The Configuration of System Tested

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

NOTE: New battery is used during all test.



2.6 Equipments List

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESRP 3	FCS-E001	2019.05.31	2020.05.30
Signal Analyzer	R&S	FSV40-N	FCS-E012	2019.06.05	2020.06.04
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2020.03.10	2021.03.09
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2019.03.26	2020.03.25
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2019.05.31	2020.05.30
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2019.05.31	2020.05.30
Pre-Amplifier(0.1M-3G Hz)	EMCI	EM330N	FCS-E004	2019.05.31	2020.05.30
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2020.03.02	2021.03.01
Temperature & Humidity	HTC-1	victor	FCS-E005	2019.05.31	2020.05.30

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	FCS-E020	2019.05.31	2020.05.30
LISN	R&S	ENV216	FCS-E007	2019.05.15	2020.05.14
LISN	ETS	3810/2NM	FCS-E009	2019.03.15	2020.03.14
Temperature & Humidity	HTC-1	victor	FCS-E008	2019.05.31	2020.05.30

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
MXA SIGNAL Analyzer	Keysight	N9020A	FCS-E015	2020.03.02	2021.03.01

3. Description of Test conditions

3.1 E.U.T. Operation

Power supply:	DC 3.0V from button battery (New battery)
Temperature:	20.0 -25.0 °C
Humidity:	38-50 % RH
Atmospheric Pressure:	1000 -1010 mbar
Test frequencies and frequency range:	Except where otherwise specified, measurements shall be performed for each frequency band of operation for which the radio apparatus is to be certified, with the device operating at the frequencies in each band of operation shown in the table below:
	In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least the frequency given in the table below:

Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified

Remark: Test frequency is 433.92MHz.

4. Test Result

4.1 Antenna Requirement

Standard requirement

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

RSS-GEN section 6.8

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.⁸ When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

EUT Antenna

The antenna is PCB Antenna. The maximum gain of the antenna is 0 dBi.

Test result: The unit does meet the FCC & RSS requirements.

4.2 Transmit time

APPLIED PROCEDURES / LIMIT

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

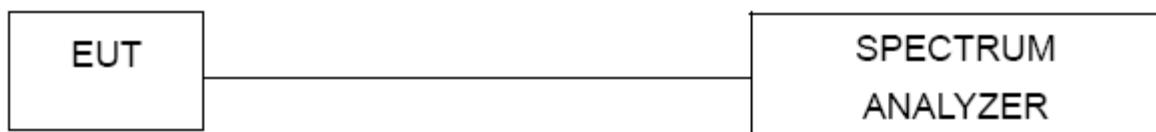
TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW=100kHz, VBW \geq RBW, Sweep time=10s, Detector Function=Peak.

DEVIATION FROM STANDARD

No deviation.

TEST SETUP



TEST RESULTS

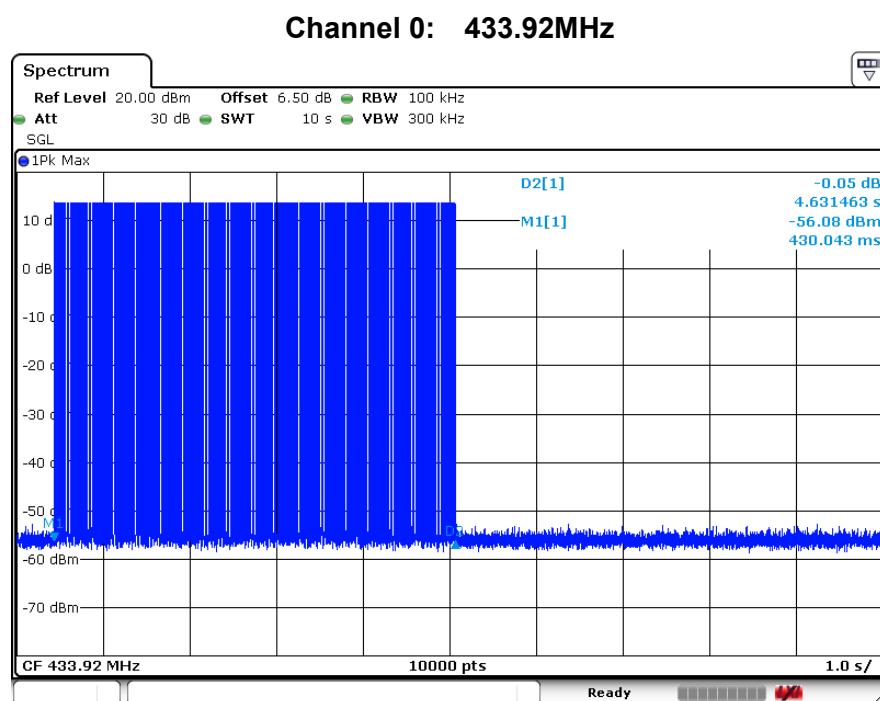
Test Date: Mar. 17, 2020

Temperature: 26°C

Atmospheric pressure: 1000 pha

Humidity: 55%

Item	Duration of each transmission (Td)	Limit
Time	4.631463s	≤5 s



4.3 Field Strength of Fundamental & Field Strength of Unwanted Emissions

Test Requirement:	Section 15.209, 15.231(b) RSS-210 A1.2	
Test Method:	ANSI C63.10: Clause 6.4, 6.5 and 6.6	
Measurement Distance:	3 m (Semi-Anechoic Chamber)	
Test Status:	Test in transmitting mode.	
Requirements:	the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:	
Fundamental Frequency MHz	Field Strength of Fundamental (dB μ V/m @ 3 m)	Field Strength of Harmonics and Spurious Emissions (dB μ V/m @ 3 m)
40.66 to 40.70	60.00	40.00
70 to 130	53.98	33.98
130 to 174	53.98 to 63.52	33.98 to 43.52
174 to 260	63.52	43.52
260 to 470	63.52 to 73.98	43.52 to 53.98
Above 470	73.98	53.98
Detector:	Peak for pre-scan	
	QP for 30MHz to 1000 MHz: 120 kHz resolution bandwidth	
	Peak for Above 1 GHz: 1 MHz resolution bandwidth	

** linear interpolations
[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μ V/m at 3 meters = $22.72727(F) - 2454.545$; for the band 260-470 MHz, μ V/m at 3 meters = $16.6667(F) - 2833.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level
The fundamental frequency of the EUT is 433.92 MHz
The limit for average or QP field strength dB μ V/m for the fundamental emission = 80.82 dB μ V/m
No fundamental is allowed in the restricted bands.
The limit for average field strength dB μ V/m for the spurious emission = 60.82 dB μ V/m (433.92MHz). Spurious in the restricted bands must be less than average field strength, whichever limit permits a higher field strength.]

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.

Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.

Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

The average correction factor is computed by analyzing the on time in 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train, therefore the average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle), where the duty factor is calculated from following formula:

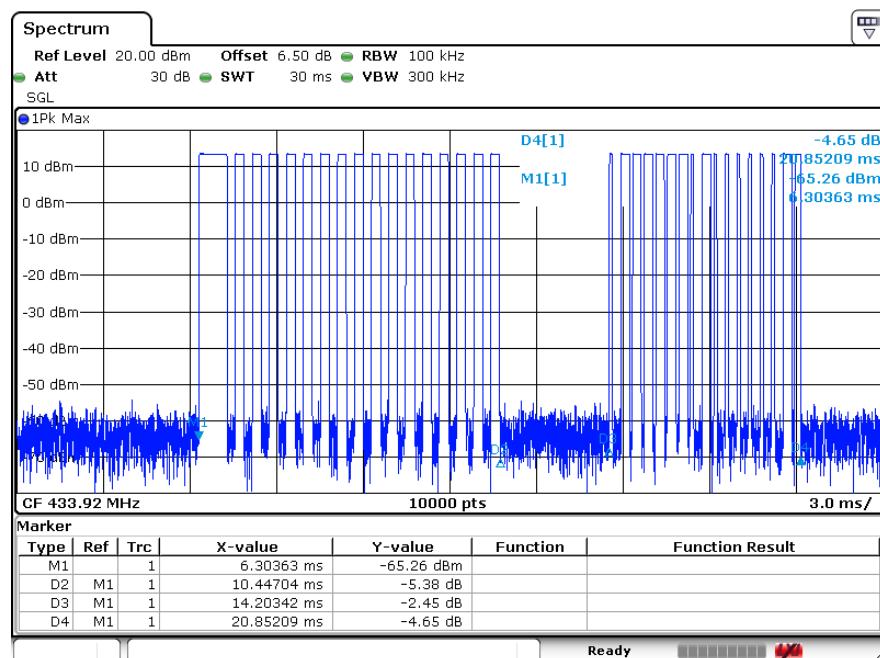
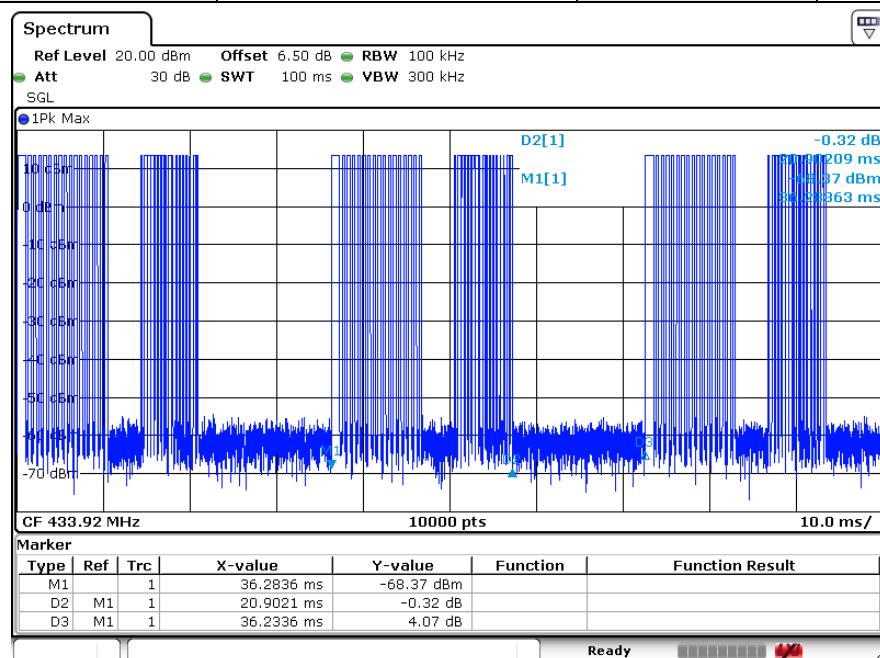
For 433.92 MHz:

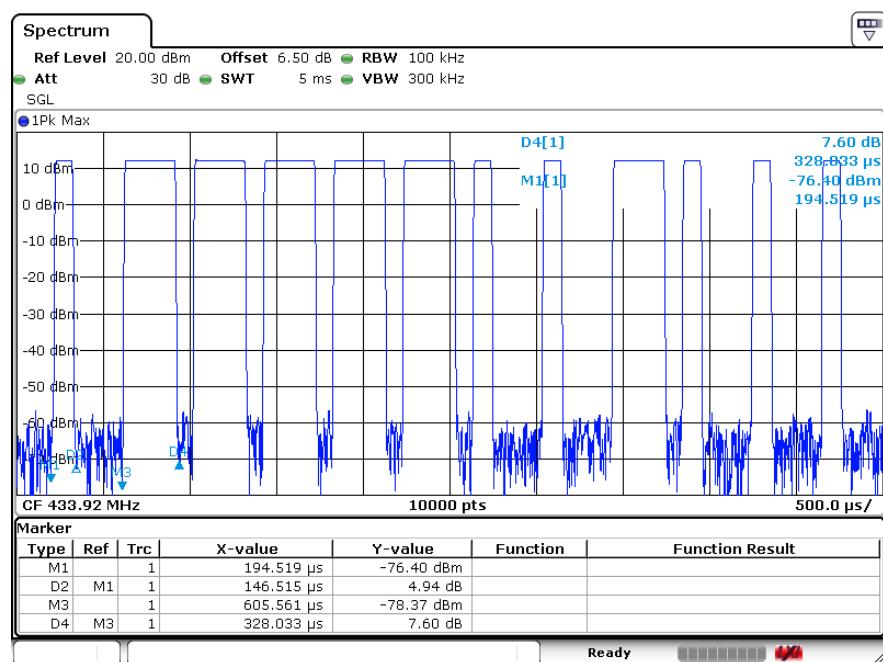
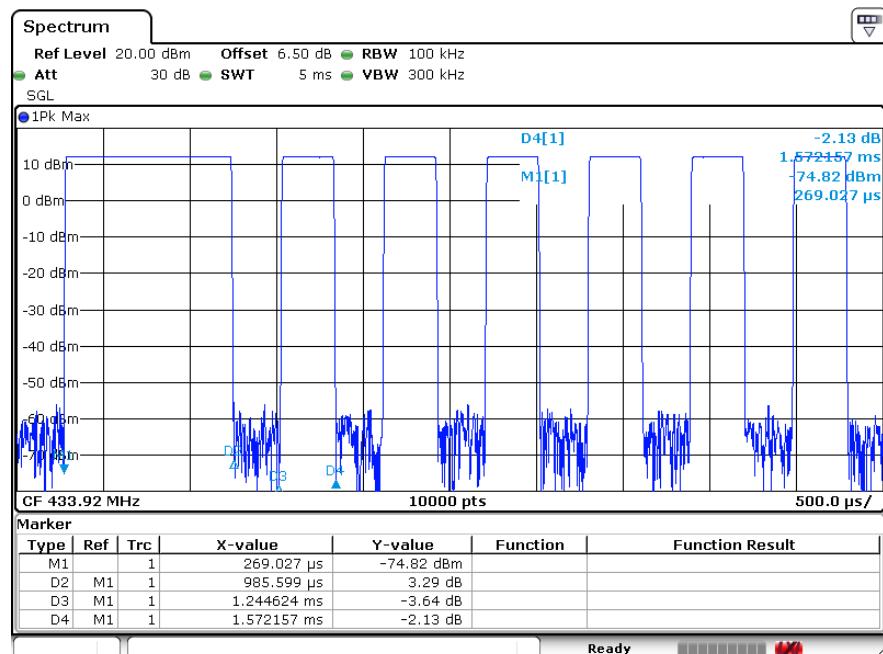
$$20\log(\text{Duty cycle}) = 20\log(\frac{T_{pulse}}{36.2336}) = 20\log(0.28566) = -10.88\text{dB}$$

$$\text{Here } T_{pulse} = 0.146515 \times 8 + 0.328033 \times 9 + 0.985599 + 0.327533 \times 16 = 1.17212 + 2.952297 + 0.985599 + 5.24052 \\ 8 = 10.350544 \text{ (ms)}$$

Please refer to below plots for more details.

EUT :	HC-TX20 remote control	Model Name :	HC-TX20
Temperature :	23 °C	Test Data	2020-03-17
Pressure :	1010 hPa	Relative Humidity :	60%
Test Mode :	TX CH00	Test Voltage :	DC 3.0 V





TEST PROCEDURE

Test Procedure:

1) 9 kHz to 30 MHz emissions:

For testing performed with the loop antenna, testing was performed in accordance to ANSI C63.10. The centre of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

2) 30 MHz to 1 GHz emissions:

For testing performed with the bi-log type antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

3) 1 GHz to 5 GHz emissions:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2007 was used to perform radiated emission test above 1 GHz.

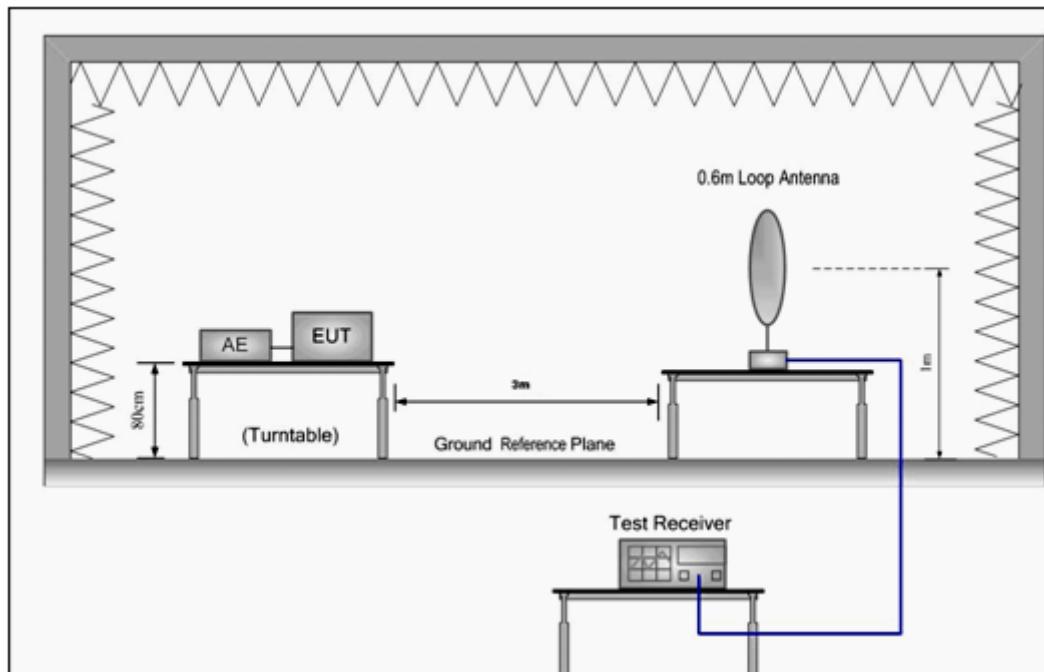
For testing performed with the horn antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360°, the antenna height scan between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

For the radiated emission test above 1GHz:

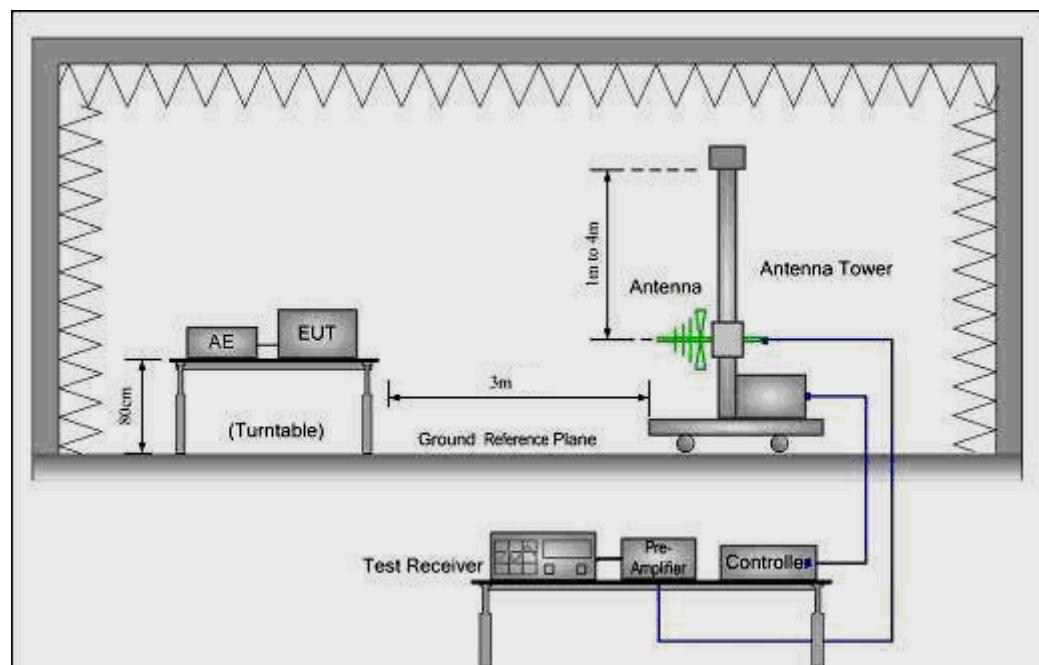
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

Test Configuration:

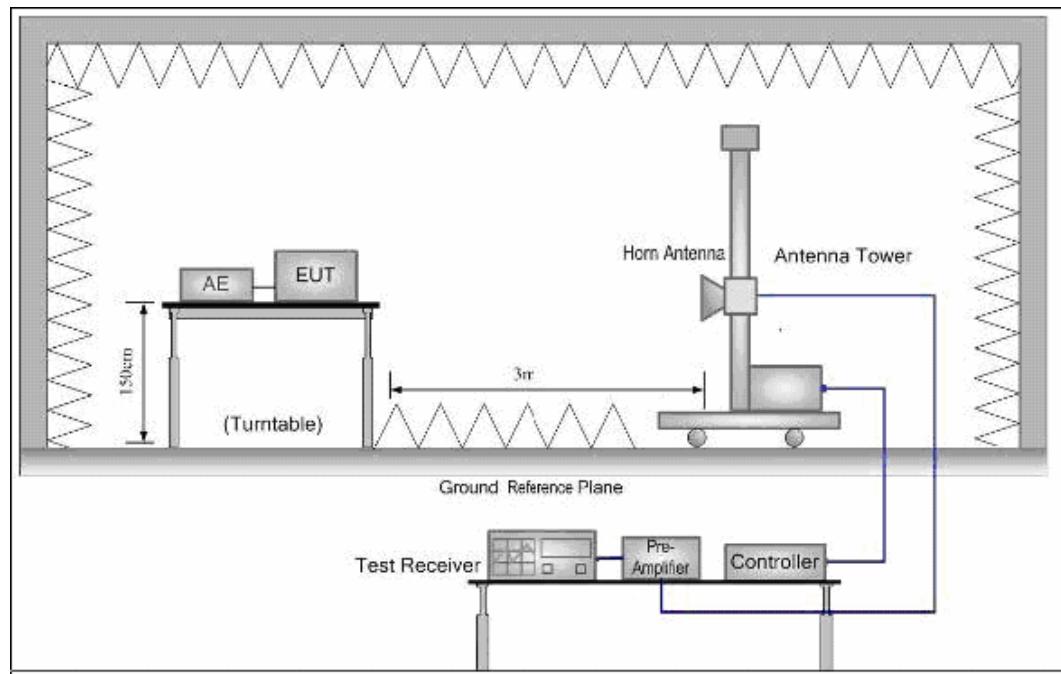
- 1) 9 kHz to 30 MHz emissions:



- 2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 5 GHz emissions:



The field strength is calculated by adding the Antenna Factor, Cable Loss & Per-amplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna, Factor + Cable Loss – Preamplifier Factor

EUT :	HC-TX20 remote control	Model Name :	HC-TX20
Temperature :	23 °C	Test Data	2020-03-17
Pressure :	1010 hPa	Relative Humidity :	60%
Test Mode :	TX CH00	Test Voltage :	DC 3.0 V
Measurement Distance	3 m	Frenqucy Range	30MHz to 1GHz
RBW/VBW	100KHz / 300KHz for spectrum, RBW=120KHz for receiver.		

Antenna polarization: Horizontal:

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
433.920	69.21	1.74	70.95	100.82	-29.87	Peak
869.1301	46.83	6.98	53.81	80.82	-27.01	Peak
1302.060	69.00	-10.33	58.67	80.82	-22.15	Peak
1733.995	51.94	-9.53	42.41	80.82	-38.41	Peak
2168.725	53.86	-7.68	46.18	80.82	-34.64	Peak
2605.477	48.52	-4.16	44.36	80.82	-36.46	Peak
3040.803	54.11	-1.58	52.53	80.82	-28.29	Peak
4620.835	46.16	5.07	51.23	80.82	-29.59	Peak

Frequency (MHz)	20log (Duty cycle) (dB)	Peak Level (dB μ V)	Average Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector Type
433.92	-10.88	70.95	60.07	80.82	-20.75	AVG

Antenna polarization: Vertical:

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
433.920	86.05	1.74	87.79	100.82	-13.03	Peak
869.1301	54.21	6.98	61.19	80.82	-19.63	Peak
1299.966	59.46	-10.33	49.13	80.82	-31.69	Peak
1903.654	49.37	-9.51	39.86	80.82	-40.96	Peak
2716.817	45.02	-3.46	41.56	80.82	-39.26	Peak
3040.803	48.15	-1.58	46.57	80.82	-34.25	Peak
4036.519	45.73	3.89	49.62	80.82	-31.20	Peak
4703.370	46.41	5.06	51.47	80.82	-29.35	Peak

Frequency (MHz)	20log (Duty cycle) (dB)	Peak Level (dB μ V)	Average Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector Type
433.92	-10.88	87.79	76.91	80.82	-3.91	AVG
869.1301	-10.88	61.19	50.31	60.82	-10.51	AVG

Y: rotate EUT by 90° vertically.

X: rotate EUT by 90° clockwise.

Z: EUT as Radiated Emission test setup photograph of this report.

Remark: Radiated Emission test setup photograph of this report is the worst case and reported.

Other emissions:

The receive was scanned from the lowest frequency generated within the EUT to 5 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. The worst case emissions were reported.

An initial pre-scan was performed in the 3 m chamber using the spectrum analyzer in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bilog antenna with 2 orthogonal polarities.

The field strength is calculated by adding the Antenna Factor, Cable Factor & Peramplifier. The basic equation with a sample calculation is as follows:

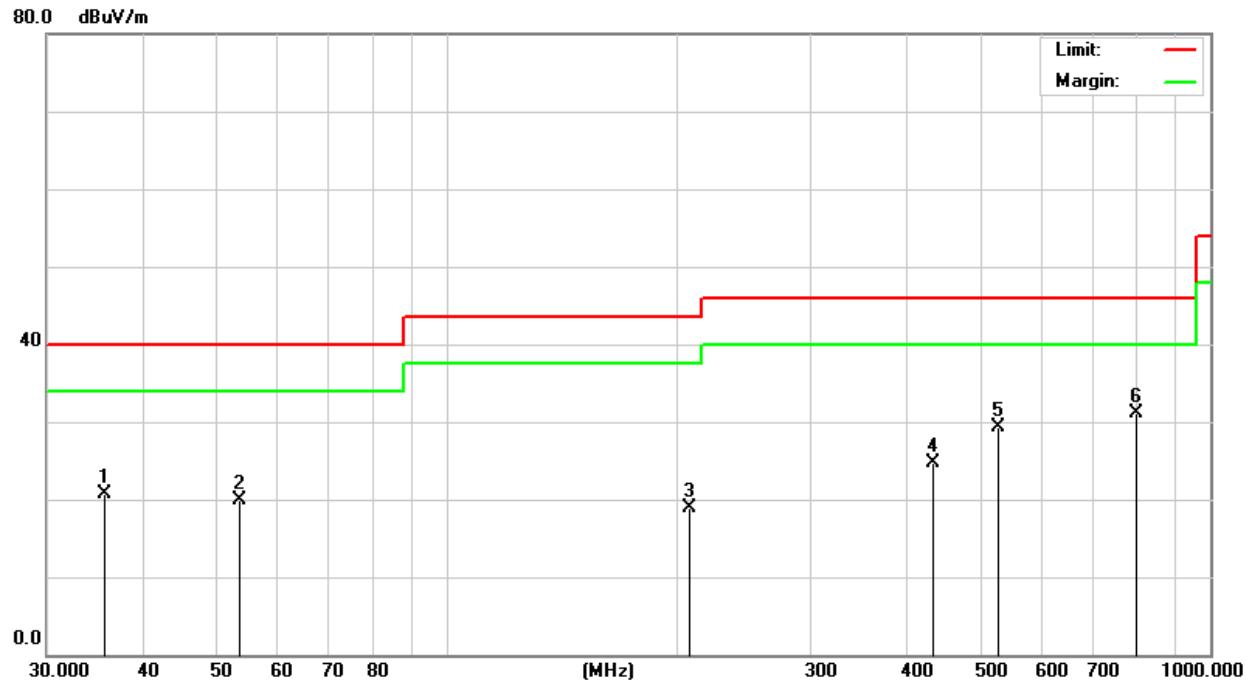
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Peramplifier Factor.

The following test results were performed on the EUT.

Since the peak emission level is lower than the average limit, the average emission level does not need to show.

Test the EUT in transmitting mode.

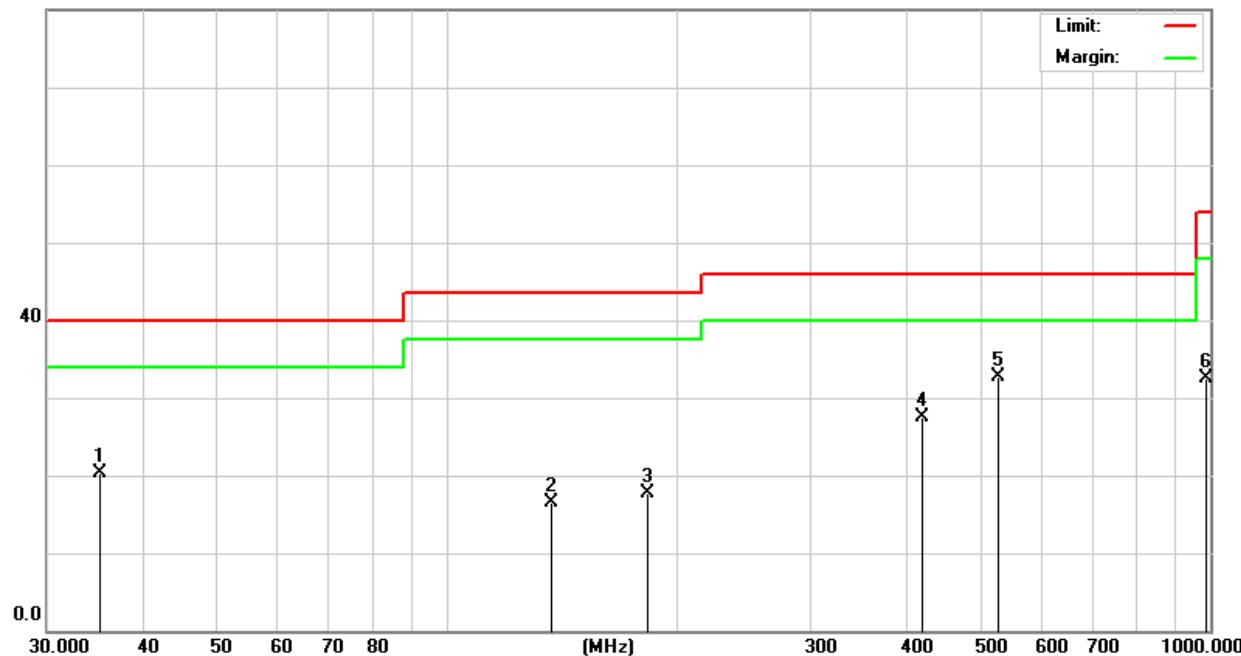
Power	:	DC 3.0V from battery	Pol/Phase	:	VERTICAL
Test Mode 1	:	TX CH00	Temperature	:	22 °C
Memo	:		Humidity	:	59%



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over
			Level	Factor	ment		
		MHz	dB _{uV}	dB	dB _{uV/m}	dB _{uV/m}	dB
1		35.7490	25.55	-4.92	20.63	40.00	-19.37
2		53.6931	26.56	-6.67	19.89	40.00	-20.11
3		208.5801	23.20	-4.28	18.92	43.50	-24.58
4		434.0649	25.54	-0.84	24.70	46.00	-21.30
5		528.2458	29.11	0.22	29.33	46.00	-16.67
6	*	798.9796	23.51	7.59	31.10	46.00	-14.90

Power	: DC 3.0V from battery	Pol/Phase	: HORIZONTAL
Test Mode 1	: TX CH00	Temperature	: 22 °C
Memo		Humidity	: 59 %

80.0 dBuV/m



No.	Mk.	Freq.	Reading	Correct Factor	Measure- ment	Limit	Over	
			Level					
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		35.2511	24.02	-3.75	20.27	40.00	-19.73	peak
2		137.4201	23.90	-7.35	16.55	43.50	-26.95	peak
3		183.2005	23.04	-5.31	17.73	43.50	-25.77	peak
4		420.5803	26.15	1.35	27.50	46.00	-18.50	peak
5	*	528.2458	28.90	3.73	32.63	46.00	-13.37	peak
6		986.0716	24.12	8.38	32.50	54.00	-21.50	peak

All the modulation modes were tested, the data of the worst mode are recorded in the above pages and the others modulation methods do not exceed the limits.

Remark:

- 1). The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Measurement Level = Reading Level + Factor

Average Correct Factor= Ant Factor + Cable Loss+ Averaging factor

Factor=Ant Factor + Cable Loss

- 2). As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.
- 3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

Test result: The unit does meet the FCC&RSS requirements.

4.4 Occupied Bandwidth & Band Edge

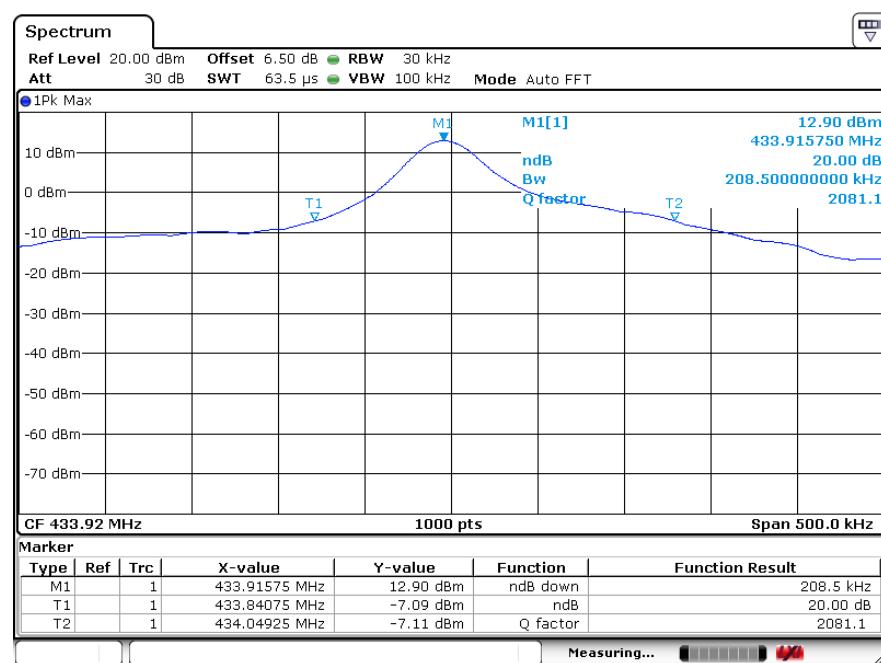
Test Requirement:	Section 15.231(c)& RSS-Gen clause 6.7 & RSS-210 A.1.3
	<p>For the purpose of Section A1.1, the 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.</p> <p>Bandwidth (20dB) Limit = 0.25% * f(MHz) = 0.25% * 433.92MHz = 1084.8kHz</p>
Test Method:	Section 15.231(c) RSS-Gen clause 6.7 & ANSI C63.10: Clause 6.9, RSS-210 A.1.3 & ANSI C63.10: Clause 6.4, 6.5, 6.6
	Operation within the band 433.92 MHz
Method of measurement:	A small sample of the transmitter output was fed into the Spectrum Analyzer and the attached plot was taken.

EUT :	HC-TX20 remote control	Model Name :	HC-TX20
Temperature :	23 °C	Relative Humidity :	60%
Pressure :	1010 hPa	Test Power :	DC 3.0V
TX Mode :	TX mode		

TX Mode	Channel	Frequency (MHz)	20db Bandwidth (MHz)
TX	00	433.92	0.2085

20db bandwidth

Channel: 0



4.5 Conducted Emissions at Mains Terminals 150 kHz to 30 MHz

Test Requirement: Section 15.207(a)&RSS-Gen 8.8

Test Method: Section 15.207(a)&RSS-Gen clause 8.8 & ANSI C63.10: Clause 6.2

Frequency Range: 150 kHz to 30 MHz

Detector: Peak for pre-scan (9 kHz Resolution Bandwidth)

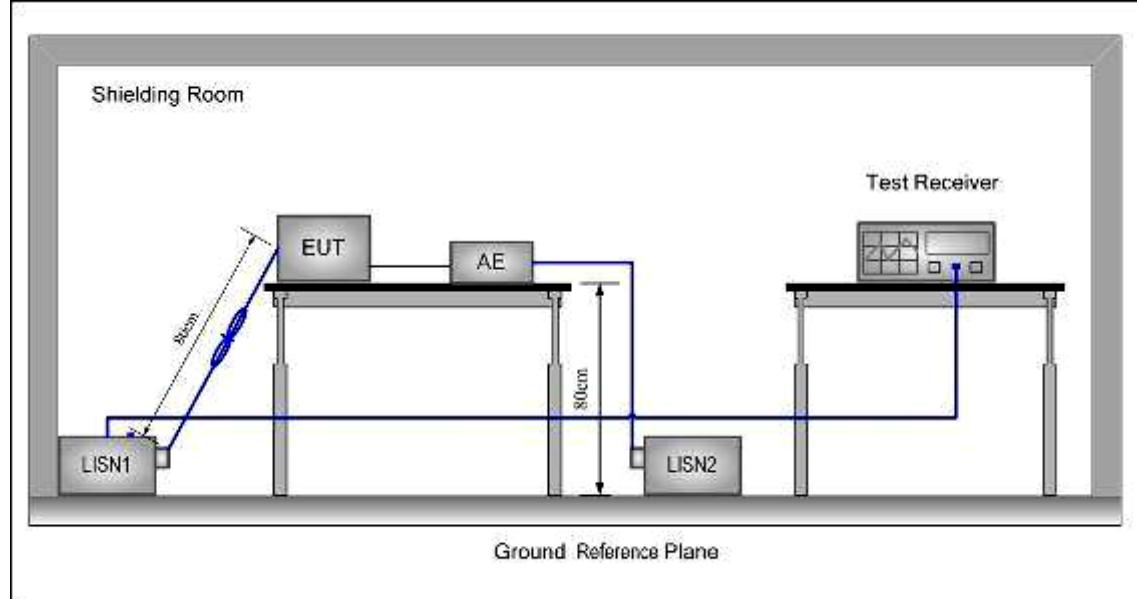
Test Limit

Limits for conducted disturbance at the mains ports of class B

Frequency Range (MHz)	Class B Limit dB(µV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

EUT Operation: Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Test Configuration:**Test procedure:**

1. The mains terminal disturbance voltage test was conducted in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

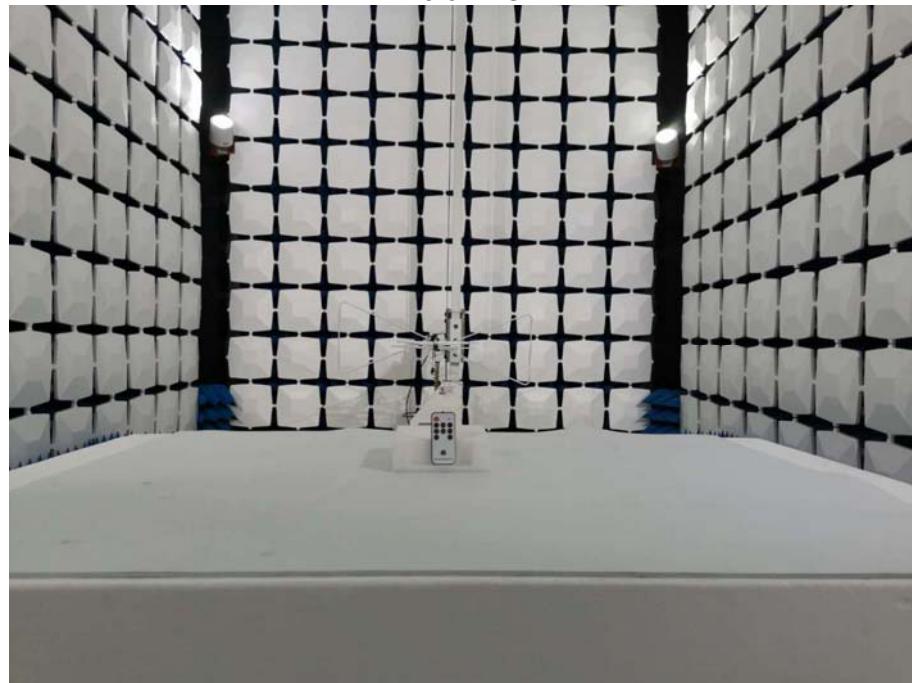
TEST RESULT

Because the EUT only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Measurements to demonstrate compliance with the conducted limits are not required for devices.

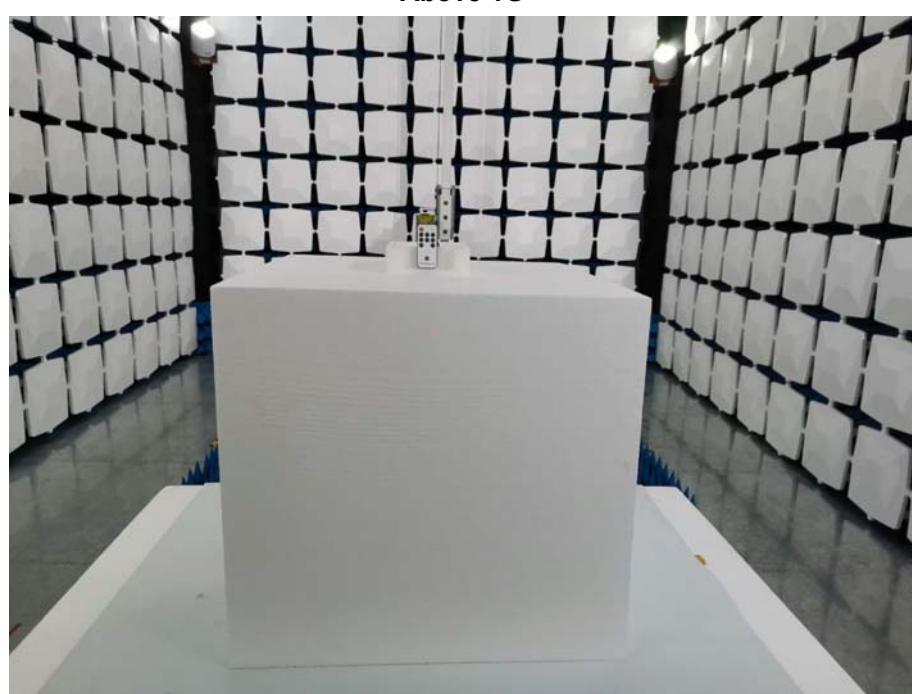
5. Photographs

5.1 Radiated Emission Test Setup

Below 1G



Above 1G



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