







# ISO/IEC17025Accredited Lab.

Report No: FCC 1111210
File reference No: 2012-01-18

Applicant: Guangzhou Chiyuan Electronic Co., Ltd.

Product: 3CH Radio Control

Model No: X-3S

Trademark: XINYI/HISKY

Test Standards: FCC Part 15 Subpart C, Paragraph 15.247

Test result:

It is herewith confirmed and found to comply with the

requirements set up by ANSI C63.4&FCC Part 15 Subpart C, Paragraph 15.247 regulations for the evaluation of

electromagnetic compatibility

Approved By

Jack Chung

Jack Chung Manager

Dated: Jan 18, 2012

Results appearing herein relate only to the sample tested The technical reports is issued errors and omissions exempt and is subject to withdrawal at

# SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO., LTD

5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao, FuTian District, Shenzhen, CHINA.

Tel (755) 83448688 Fax (755) 83442996

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# **Special Statement:**

Date: 2012-01-18

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAL. This approval result is accepted by MRA of APLAC.

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

# **CNAL-LAB Code: L2292**

The EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of testing Laboratories.

# FCC-Registration No.: 899988

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 899988.

# IC- Registration No.: IC5205A-01

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration IC No.: 5205A-01.



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#### 1.0 General Details

Date: 2012-01-18

#### 1.1 Test Lab Details

Name: SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO., LTD

Address: 5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao, FuTian District,

Shenzhen, CHINA.

Telephone: (755) 83448688 Fax: (755) 83442996

Site on File with the Federal Communications Commission – United Sates

Registration Number: 899988

For 3m & 10 m OATS

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A-01

For 3m & 10 m OATS

#### 1.2 Applicant Details

Applicant: Guangzhou Chiyuan Electronic Co., Ltd.

Address: 2/F., No.1Bldg., Boyi Industrial Garden, 4th Gongye Rd.Zhicun Dashi Street, Panyu Dis.,

Guangzhou, China

Telephone: 020-34796226/34797226 Fax: 020-34796226/34797226

# 1.3 Description of EUT

Product: 3CH Radio Control

Manufacturer: Guangzhou Chiyuan Electronic Co., Ltd.

Address: 2/F., No.1Bldg., Boyi Industrial Garden, 4th Gongye Rd.Zhicun Dashi Street,

Panyu Dis., Guangzhou, China

Brand Name: XINYI/HISKY

Model Number: X-3S Additional Model Name N/A Additional Trade Name N/A

Rating: DC6.0V (4 pcs AA Batteries)

Power Supply: N/A
Type of Modulation GFSK

Frequency range 2402-2477MHz

Number of Channel 76

Air Data Rate 125kbps

Antenna type Dipole antenna

#### 1.4 Submitted Sample: 3 Samples

The report refers only to the sample tested and does not apply to the bulk.

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1 –	Tr 4	D .
	1001	Duration

2011-11-21 to 2012-01-18

1.6 Test Uncertainty

Conducted Emissions Uncertainty = 3.6dB Radiated Emissions Uncertainty =4.7dB

1.7 Test Engineer &verify Engineer

Test Engineer	brown Lu
The sample(s) tested by	
	Print Name: Brown Lu/ Engineer
Verify Engineer The report verified by	Terry Tong
	Print Name: Terry Tang/ EMC Manager

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2.0		Test Equi	ipments		
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	2011-04-26	2012-04-25
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100294	2011-04-26	2012-04-25
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100253	2011-04-26	2012-04-25
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	2011-04-26	2012-04-25
ESDV Test Receiver	ROHDE&SCHWARZ	ESDV	100008	2011-04-26	2012-04-25
Impuls-Begrenzer	ROHDE&SCHWARZ	ESH3-Z2	100281	2011-04-26	2012-04-25
System Controller	CT	SC100	-	2011-04-26	2012-04-25
Printer	EPSON	РНОТО ЕХЗ	CFNH234850	2011-04-26	2012-04-25
Computer	IBM	8434	1S8434KCE99BLX LO*	-	-
Bilog Antenna	Chase	CBL6111C	2576	2011-04-26	2012-04-25
Loop Antenna	EMCO	6502	00042960	2011-04-26	2012-04-25
ESPI Test Receiver	ROHDE&SCHWARZ	ESI26	838786/013	2011-04-26	2012-04-25
3m OATS			N/A	2011-04-26	2012-04-25
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170265	2011-04-26	2012-04-25
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-631	2011-04-26	2012-04-25
Power meter	Anritsu	ML2487A	6K00003613	2011-04-26	2012-04-25
Power sensor	Anritsu	MA2491A	32263	2011-04-26	2012-04-25
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2011-04-26	2012-04-25
LISN	AFJ	LS16C	10010947251	2011-04-26	2012-04-25
LISN (Three Phase)	Schwarebeck	NSLK 8126	8126453	2011-04-26	2012-04-25
9*6*6 Anechoic			N/A	2011-04-26	2012-04-25
EMI Test Receiver	RS	ESCS30	100139	2011-04-26	2012-04-25
LISN	AFJ	LS16C	10010947251	2011-04-26	2012-04-25
LISN (Three Phase)	Schwarebeck	NSLK 8126	8126453	2011-04-26	2012-04-25

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# 3.0 Technical Details

# 3.1 Summary of test results

The EUT has	been tested	l according to	o the following	specifications:
			· ·	D D C C

Standard	Test Type	Result	Notes
Antenna Requirement	15.203, 15.247(b)(4)	PASS	Complies
Maximum Peak Out Power	15.247 (b)(1), (4)	PASS	Complies
Carrier Frequency Separation	15.247(a)(1)	PASS	Complies
20dB Channel Bandwidth	15.247 (a)(1)	PASS	Complies
Number of Hopping Channels	15.247(a)(iii), 15.247(b)(1)	PASS	Complies
<b>Time of Occupancy (Dwell Time)</b>	15.247(a)(iii)	PASS	Complies
Spurious Emission, Band Edge,	15.247(d),15.205(a),	PASS	Complies
and Restricted bands	15.209 (a),15.109		
<b>Conducted Emissions</b>	15.207(a), 15.107	PASS	Complies
RF Exposure	15.247(i), 1.1307(b)(1)	PASS	Complies

# 3.2 Test Standards

FCC Part 15 Subpart & Subpart C, Paragraph 15.247

## 4.0 EUT Modification

No modification by Shenzhen Timeway Technology Consulting Co.,Ltd

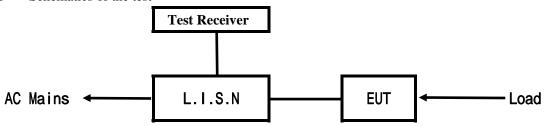
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# 5. Power Line Conducted Emission Test

## 5.1 Schematics of the test

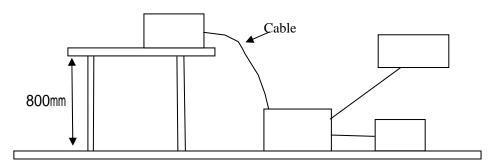


**EUT: Equipment Under Test** 

#### 5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2009. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2009.

# Block diagram of Test setup



## 5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2009. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

# A. EUT

Device	Manufacturer	Model	FCC ID
3CH Radio Control	Guangzhou Chiyuan Electronic Co., Ltd.	X-3S	V6KX-3S

### B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

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# C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
N/A				

## 5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2009.

- A Setup the EUT and simulators as shown on follow
- B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207

	8 81						
Frequency		Class A Lim	its (dB µ V)	Class B Limits (dB µ V)			
	(MHz)	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level		
	0.15 ~ 0.50	79.0	66.0	66.0 ~ 56.0*	56.0 ~ 46.0*		
	0.50 ~ 5.00	73.0	60.0	56.0	46.0		
	5.00 ~ 30.00	73.0	60.0	60.0	50.0		

Notes:

- 1. \*Decreasing linearly with logarithm of frequency.
- 2. The tighter limit shall apply at the transition frequencies

## 5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

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# A: Conducted Emission on Live Terminal (150kHz to 30MHz)

**EUT Operating Environment** 

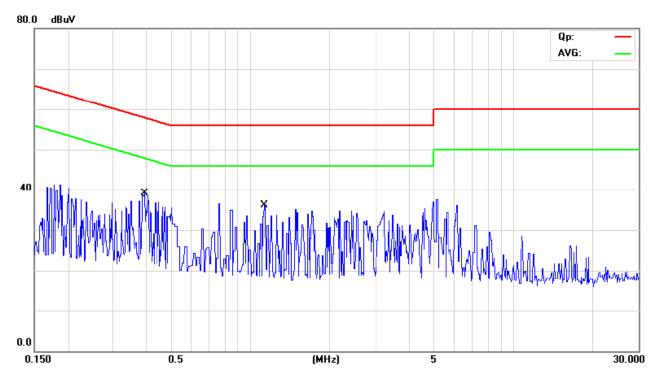
Temperature: 26 Humidity: 65%RH Atmospheric Pressure: 101 KPa

**EUT set Condition: Charging Mode** 

**Equipment Level: Class B** 

**Results: PASS** 

Please refer to following diagram for individual



Frequency	Line	$Reading(dB\mu V)$		Limit(dBµV)	
(MHz)	Line	Quasi-peak	Average	Quasi-peak	Average
0.3923	Live	36.02	24.52	58.01	48.01
1.1300	Live	34.07	22.87	56.00	46.00

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# B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)

**EUT Operating Environment** 

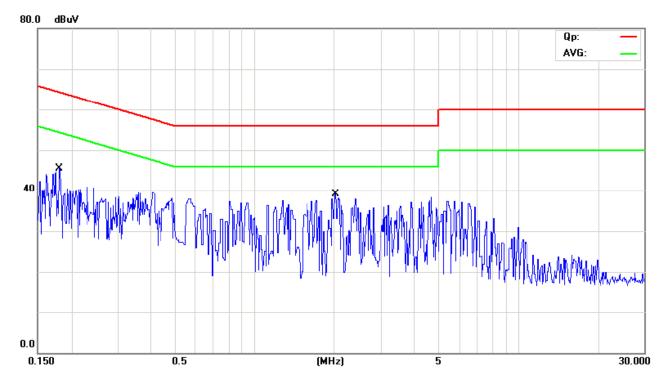
Temperature: 26 Humidity: 65%RH Atmospheric Pressure: 101 KPa

**EUT set Condition: Charging Mode** 

**Equipment Level: Class B** 

**Results: Pass** 

Please refer to following diagram for individual



Frequency Line		Reading(dBµV)		Limit(dBµV)	
(MHz)	Line	Quasi-peak	Average	Quasi-peak	Average
0.1806	Neutral	42.56	35.36	64.46	54.46
2.0187	Neutral	36.11	24.71	56.00	46.00

Note: As when exported, no supply was included. During the tests, a power supply selected by Timeway was used to do the relative test.

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#### 6 **Radiated Emission Test**

- 6.1 Test Method and test Procedure:
- (1) The EUT was tested according to ANSI C63.4 -2009. The radiated test was performed at Timeway Laboratory. This site is on file with the FCC laboratory division, Registration No.899988
- The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up (2) is according to ANSI C63.4-2009.
- (3) The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz. Measurements were made at 3 meters.
- The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency. (4)
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "**QP**" in the data table.
- The antenna polarization: Vertical polarization and Horizontal polarization. (6)

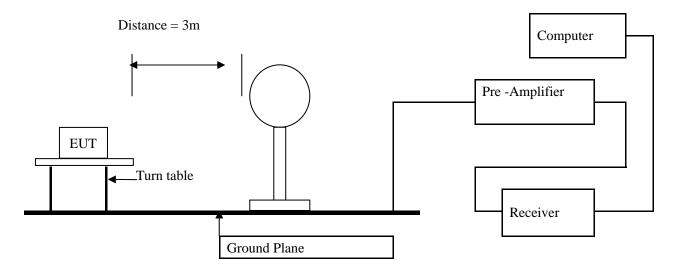
# **Block diagram of Test setup** Distance = 3mComputer Pre -Amplifier **EUT** Turn-table Receiver Ground Plane

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Block diagram of Test setup for frequency below 30MHz



- 6.2 Configuration of The EUT

  Same as section 5.3 of this report
- 6.3 EUT Operating Condition

  Same as section 5.4 of this report.
- 6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.209

Frequency Range (MHz)	Distance (m)	Field strength (dB $\mu$ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

- 1. RF Voltage  $(dBuV) = 20 \log RF \text{ Voltage } (uV)$
- 2. In the Above Table, the higher limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT

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# General Radiated Emission Data and Harmonics Radiated Emission Data

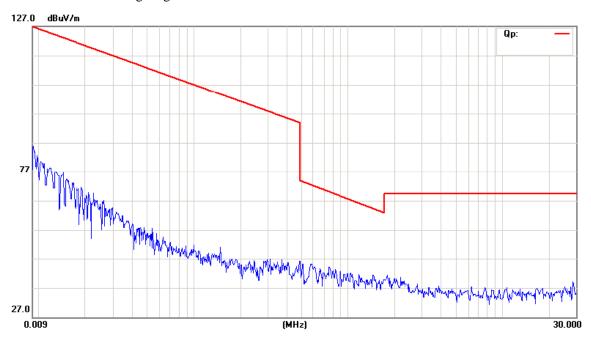
## Radiated Emission In Horizontal (0.009MHz----30MHz)

EUT set Condition: Transmitting (Low CH)

#### **Results:** Pass

Date: 2012-01-18

Please refer to following diagram for individual



Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Limit@3m (dB $\mu$ V/m)
	1	1

<sup>-</sup>The test data shows much less than the limit, no necessary take down the records.

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## Test result

Date: 2012-01-18

# General Radiated Emission Data and Harmonics Radiated Emission Data

# Radiated Emission In Horizontal (30MHz----1000MHz)

**EUT** set Condition: Tx under transmitting mode

**Results: Pass** 

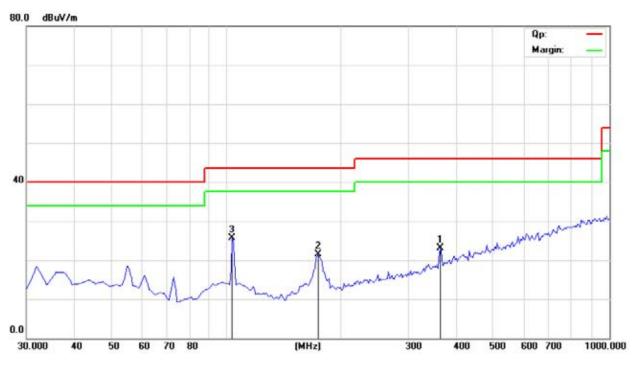
Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
362.404	23.03	V	46.00
173.847	21.59	V	43.50
103.867	25.71	V	43.50
103.867	16.90	Н	43.50
55.270	17.58	Н	40.00

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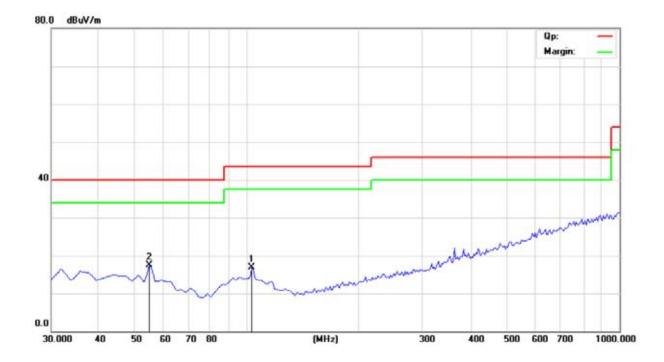


Test Figure: transmitting mode

# Vertical



# Horizontal



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# **Operation Mode: Transmitting under Low Channel**

Frequency (MHz)	Level@3m (dB \mu V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
2402	98.42 ( PK )	Н	
2402	98.87 ( PK )	V	
4804	49.40 ( PK )	Н	74(Peak)/ 54(AV)
4804	49.28 ( PK )	V	74(Peak)/ 54(AV)
7206	1	H/V	74(Peak)/ 54(AV)
9608	1	H/V	74(Peak)/ 54(AV)
12010	1	H/V	74(Peak)/ 54(AV)
14412	1	H/V	74(Peak)/ 54(AV)
16814	1	H/V	74(Peak)/ 54(AV)
19216		H/V	74(Peak)/ 54(AV)
21618		H/V	74(Peak)/ 54(AV)
24020		H/V	74(Peak)/ 54(AV)

# **Operation Mode: Transmitting under CH Mid**

	Ü		
Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2440	99.36 ( PK )	Н	
2440	95.36 ( PK )	V	
4880	51.44 ( PK )	Н	74(Peak)/ 54(AV)
4880	48.94 ( PK )	V	74(Peak)/ 54(AV)
7320		H/V	74(Peak)/ 54(AV)
9760		H/V	74(Peak)/ 54(AV)
12200		H/V	74(Peak)/ 54(AV)
14640		H/V	74(Peak)/ 54(AV)
17080		H/V	74(Peak)/ 54(AV)
19520		H/V	74(Peak)/ 54(AV)
21960		H/V	74(Peak)/ 54(AV)
24400		H/V	74(Peak)/ 54(AV)

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# Operation Mode: Transmitting under CH High

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB \(\mu\)V/m)
2477	98.98 (PK)	Н	
2477	99.82(PK)	V	
4954	48.36(PK)	Н	74(Peak)/ 54(AV)
4954	49.97(PK)	V	74(Peak)/ 54(AV)
7431		H/V	74(Peak)/ 54(AV)
9908		H/V	74(Peak)/ 54(AV)
12385		H/V	74(Peak)/ 54(AV)
14862		H/V	74(Peak)/ 54(AV)
17339		H/V	74(Peak)/ 54(AV)
19816		H/V	74(Peak)/ 54(AV)
22293		H/V	74(Peak)/ 54(AV)
24770		H/V	74(Peak)/ 54(AV)

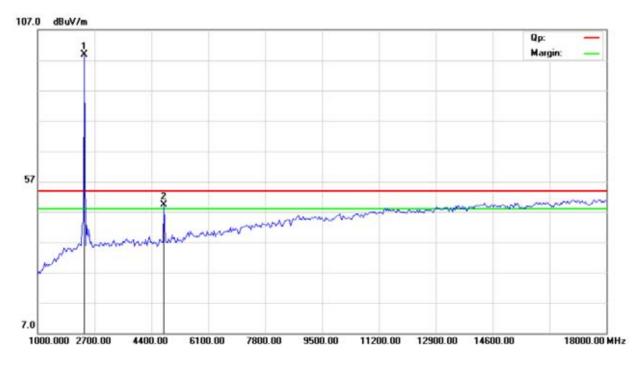
Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

- 2. Remark "---" means that the emissions level is too low to be measured
- 3. Margin=Emission-Limits
- 4.According to section 15.35(b), the peak limit is 20dB higher than the average limit Please refer to the following test plots for details:

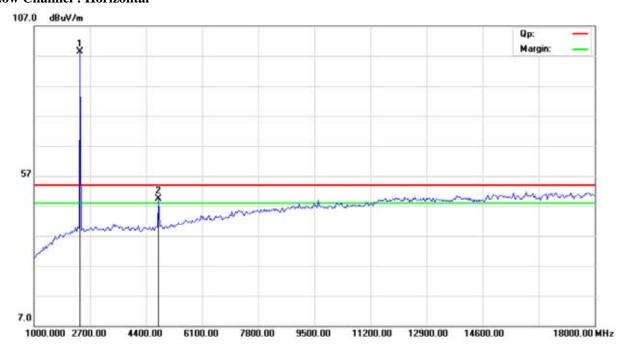
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## Low Channel: Vertical



# **Low Channel: Horizontal**



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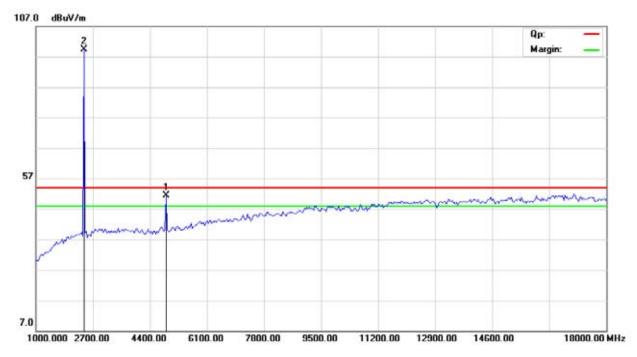
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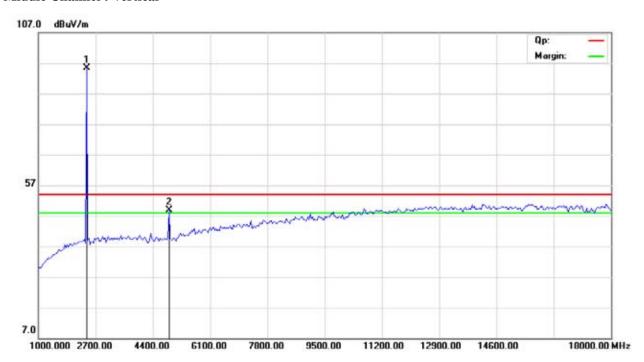
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#### **Middle Channel: Horizontal**



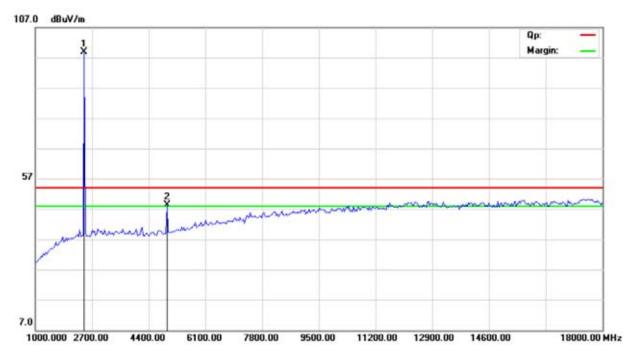
#### Middle Channel: Vertical



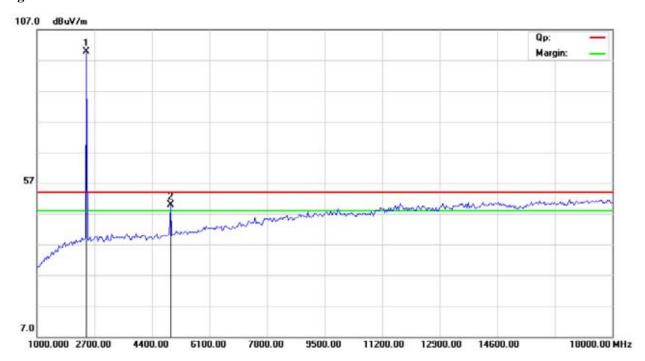
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# **High Channel: Horizontal**



# **High Channel: Vertical**



For Radiated Emission From 18-25GHz, it was the floor noises which meet the FCC rule.

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## 7.0 20dB Bandwidth Measurement

# 7.1 Regulation

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Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, 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.

## 7.2 Limits of 20dB Bandwidth Measurement

N/A

#### 7.3 Test Procedure.

- 1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span =5MHz, VBW = RBW=100kHz, Sweep = auto Detector function = peak, Trace = max hold
- 3. Measure the highest amplitude appearing on spectral display and record the level to calculate results. 6. Repeat above procedures until all frequencies measured were complete.

#### 7.4 Test Result

EUT		3CH R	3CH Radio Control Model X-3		Model		S				
Mode		Keep '	Transmitting Input Voltage DC6		eep Transmitting Input Voltage DC6.		Input Voltage		Input Voltage		0 <b>V</b>
Temperat	ure	24	4 deg. C, Humidity		24 deg. C, Humidity		Humidity		RH		
Channel		el Frequency (MHz)	20 dB Bandw (MHz)			Minimum Limit (MHz)					
Low		2402	0.613	0.613			Pass				
Mid		2440	0.511				Pass				
High		2477	0.529				Pass				

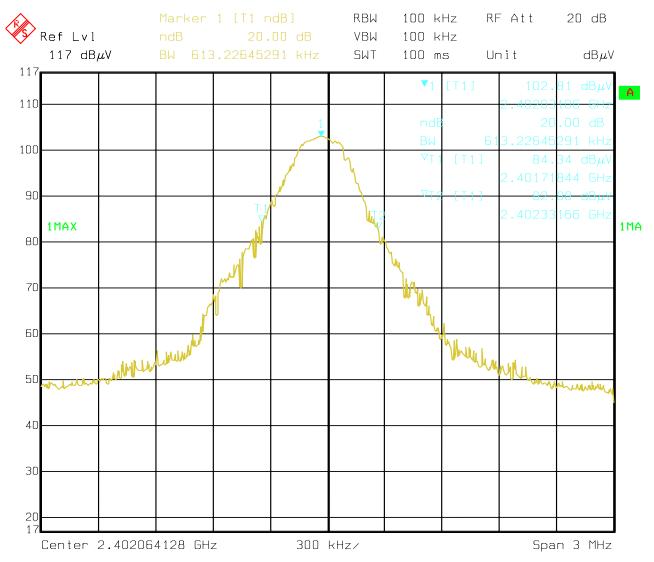
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## **Test Plots:**

## 1. CH Low



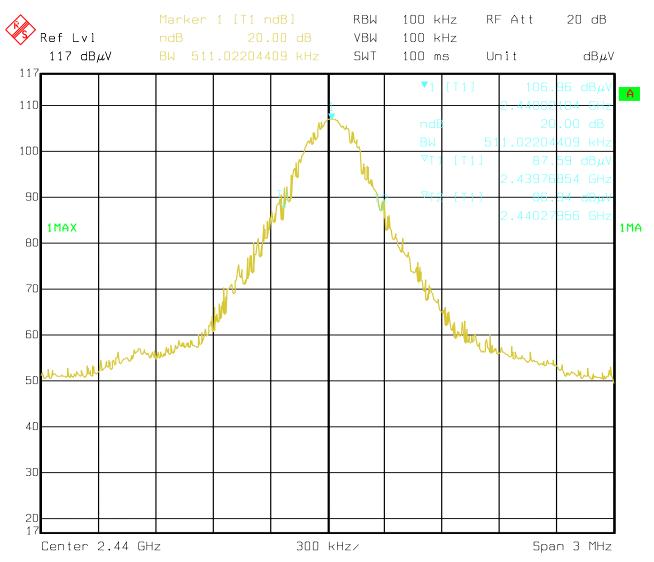
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## 2. CH Mid



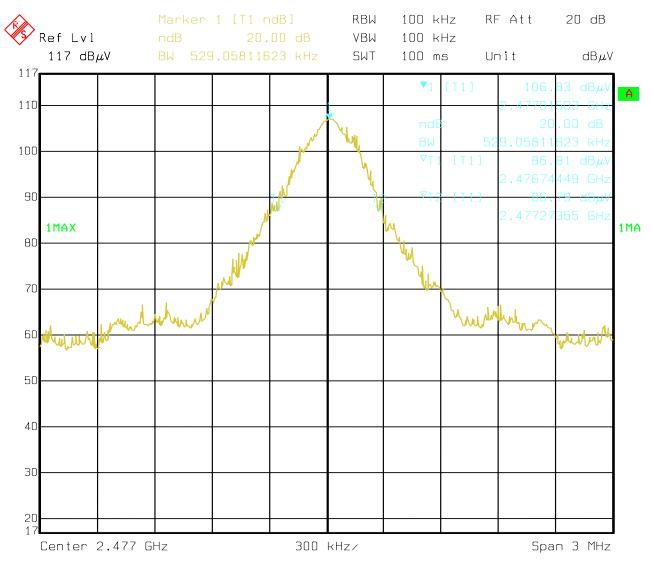
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# 3. CH High



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# 8. Maximum Peak Output Power

# 8.1 Test Setup



# 8.2 Limits of Maximum Peak Output Power

The Maximum Peak Output Power Measurement is 30dBm.

#### 8.3 Test Procedure

The RF power output was measured with a Power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate centre frequency.

## **8.4Test Results**

EUT		3CH Radio	Control	Model			X-3S				
Mode		Keep Tran	Keep Transmitting Input Voltage I		Input Voltage		Input Voltage		tting Input Voltage		C 6.0V
Temperature	e	24 deg	g. C Humidity		leg. C Humidity		24 deg. C Humidity 56		Humidity		5% RH
Channel	Cha	annel Frequency (MHz)	Peak Power Output (dBm)		Peak Power Limit (dBm)		Pass/ Fail				
Low		2402	18.3		30	)	Pass				
Mid		2440	17.6		30	)	Pass				
High		2477	17.7		30	)	Pass				

Note: 1. At finial test to get the worst-case emission for CH Low, CH Mid and CH High

2. The result basic equation calculation as follow:

Peak Power Output = Peak Power Reading + Cable loss + Attenuator

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# 9. Carrier Frequency Separation

# 9.1 Regulation

Date: 2012-01-18

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

# 9.2 Limits of Carrier Frequency Separation

The Maximum Power Spectral Density Measurement is 25kHz or two-thirds of the 20dB bandwidth of the hopping Channel which is great.

#### 9.3 Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW) 1% of the span; Video (or Average) Bandwidth (VBW) RBW; Sweep = auto; Detector function = peak; Trace = max hold
- 3. Measure the separation between the peaks of the adjacent channels using the marker-delta function.
- 4. Repeat above procedures until all frequencies measured were complete.

# 9.4Test Result

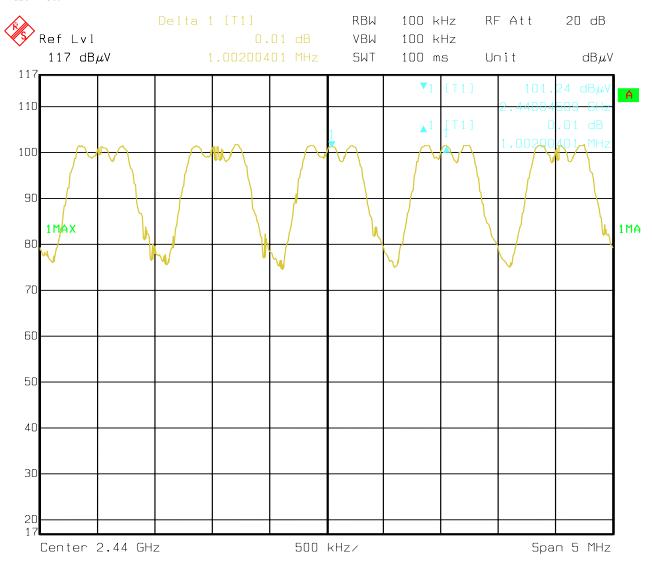
EUT	UT 3CH Radio Control Model		X-3S								
Mode		Keep Tran	Keep Transmitting Input Voltage		Input Voltage		Input Voltage		Input Voltage		C 6.0V
Temperature	perature 24 deg. C Humidity		g. C Humidity		Humidity		5% RH				
Channel	Cha	annel Frequency (MHz)	Carrier Frequ Separatio	•	Limit		Pass/ Fail				
Middle	2440		1MHz		25kl two-third 20dB bar of the ho Channel is gro	ndwidth opping which	Pass				

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## **Test Plot:**



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# 10. Number of Hopping Channels

# 10.1 Regulation

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

# 10.2 Limits of Number of Hopping Channels

The frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels.

#### **10.3 Test Procedure**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = the frequency band of operation; RBW 1% of the span; VBW RBW; Sweep = auto; Detector function = peak; Trace = max hold
- 3. Record the number of hopping channels.

#### 10.4Test Result

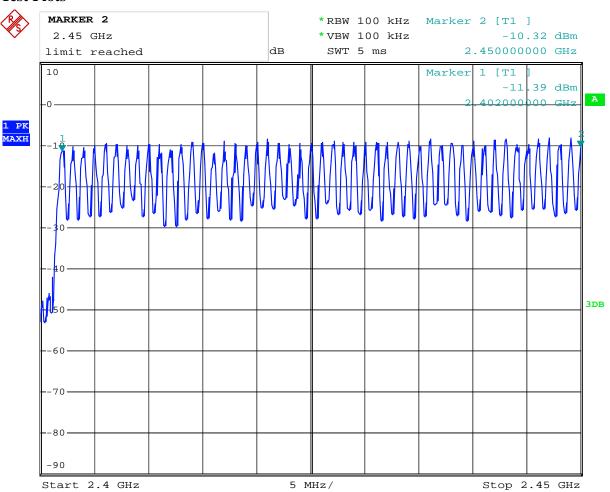
EUT		3CH Radio Control	Model			X-3S
Mode		Keep Transmitting	Input Voltage D		C 6.0V	
Temperature	24 deg. C,		Humidity		56% RH	
Operating Frequ	iency	Number of hopping channels Lin		nit	Pass/ Fail	
2402-2477MHz		76		≥ 1	.5	Pass

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# **Test Plots**

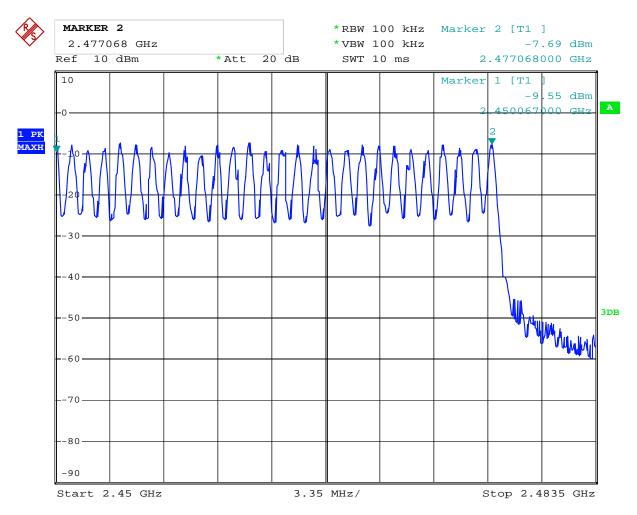


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# 11. Time of Occupancy (Dewell Time)

# 11.1 Regulation

Date: 2012-01-18

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

# 11.2 Limits of Carrier Frequency Separation

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed

#### 11.3 Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold
- 3. Measure the dwell time using the marker-delta function.
- 4. Repeat above procedures until all frequencies measured were complete.
- 5. Repeat this test for different modes of operation (e.g., data rate, modulation format, etc.), if applicable.

EUT		3CH Radio Control	Model		X-3S		
Mode		Keep Transmitting	Input Voltage		Input Voltage		DC 6.0V
Temperature	e	24 deg. C,	Humidity		56% RH		
Channel		Actual		Limit			
Middle		0.01402s		0.4s			

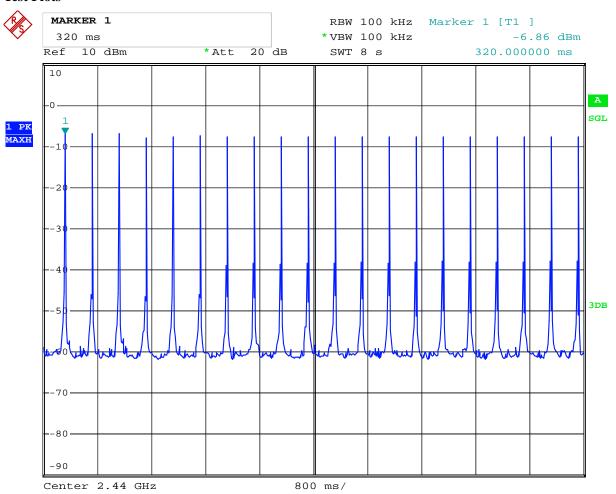
Actual =  $(0.701+0.701) \times 20 = 14.02$ ms

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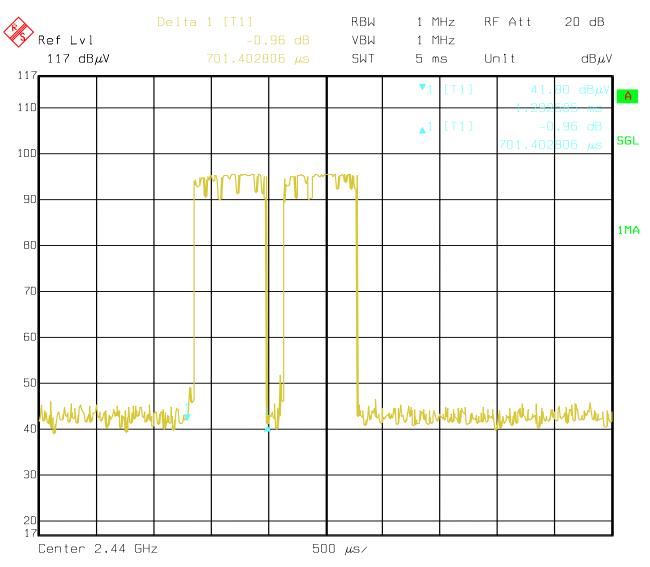
## **Test Plots**



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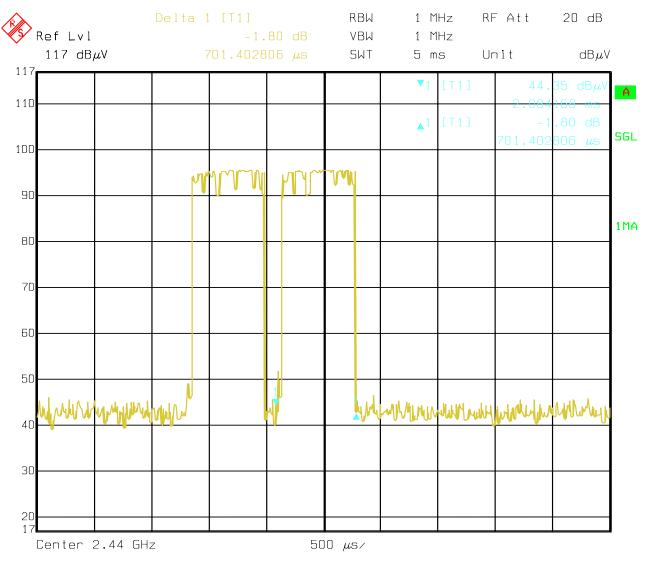
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Date: 25.DEC.2011 19:08:22

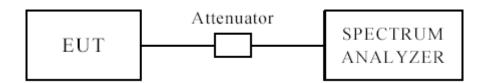
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# 12 Out of Band Measurement

# 12.1 Test Setup



#### 12.2 Limits of Out of Band Emissions Measurement

- 1. Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
- 2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209

#### 12.3 Test Procedure

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of the amplitude of the spurious emissions with respect to the intentional signals. The relative amplitude, in dBc, was applied to the average and peak filed strength of the intentional signal made on the OATS to calculate the field strength of the unintentional signals.

The spectrum plots (Peak RBW=VBW=1MHz; Average RBW=1MHz, VBW=10Hz) are attached on the following pages.

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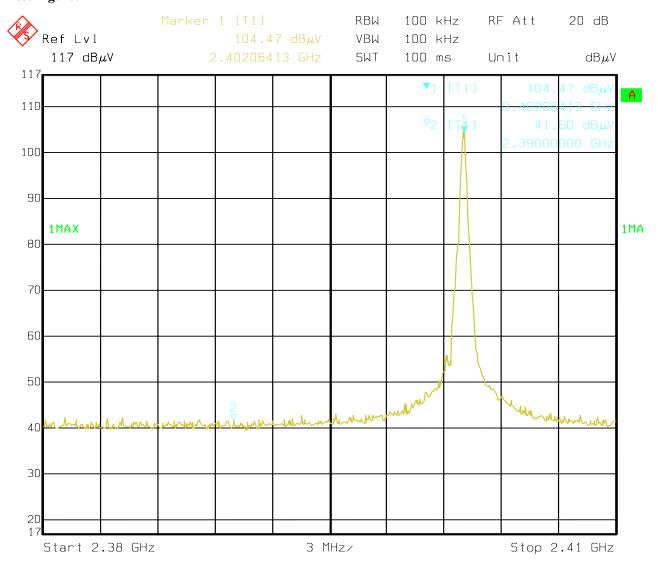
## 12.4Test Result

CH Low

## 12.4 Band Edge Test Result

Product:	3CH Radio Control	Test Mode:	X-3S
Mode	Keep Transmitting	Input Voltage	DC 6.0V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

# **Test Figure:**



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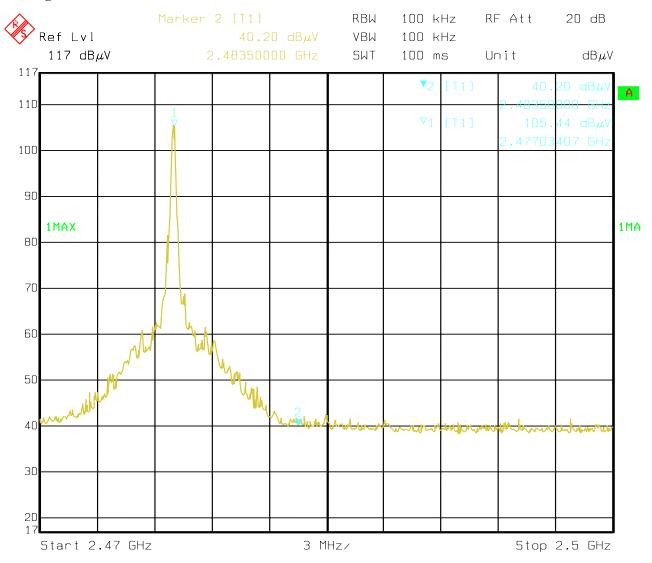
## 12.4Test Result

CH High

## **12.4** Band Edge Test Result

Product:	3CH Radio Control	Test Mode:	X-3S
Mode	Keep Transmitting	Input Voltage	DC 6.0V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

# **Test Figure:**



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## 12.4Test Result

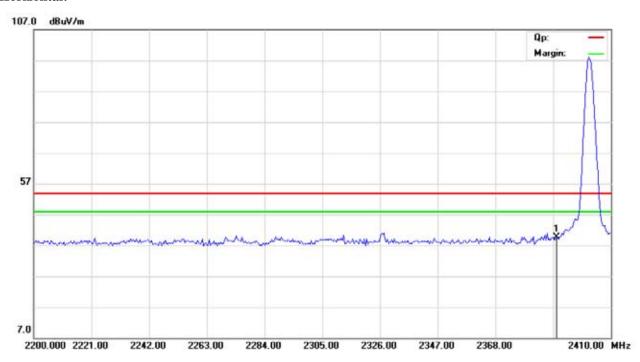
CH Low

#### 12.4 Restrict Band Test Result

Product:	3CH Radio Control		Test Mode:	X-3S
Mode	Keep Transmitting		Input Voltage	DC 6.0V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2390	PK (dBμV/m) 39.58		Limit	$74(dB\mu V/m)$
	AV(dBμV/m)			54(dBμV/m)

## **Test Figure:**

## **Horizontal:**



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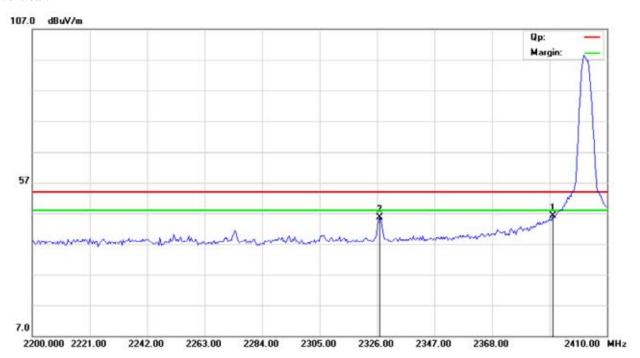


#### 12.4 Restrict Band Test Result

Product:	3CH Radio Control		Test Mode:	X-3S
Mode	Keep Transmitting		Input Voltage	DC6.0V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2390	PK (dBμV/m) 46.05		Limit	$74(dB\mu V/m)$
	AV(dBμV/m)			54(dBµV/m)
2327.094	PK (dBμV/m) 45.58		Limit	$74(dB\mu V/m)$
	AV(dBμV/m)			54(dBµV/m)

# **Test Figure:**

#### **Vertical:**



Note: 1. The Max. FS in Restrict Band are measured in conventional method.

- 2. Final Level = Reading + AF + Cable Preamp
- 3. RBW=VBW=1MHz

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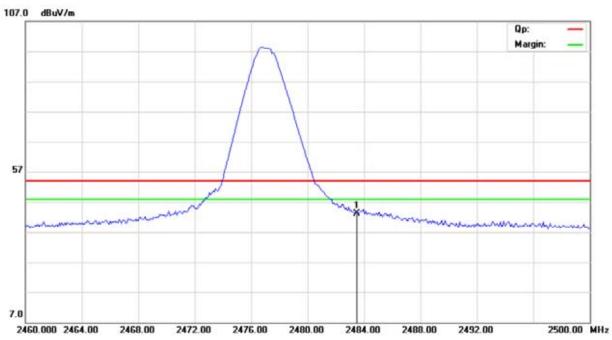
# CH High

#### 12.4 Restrict Band Test Result

Product:	3CH Radio Control		Test Mode:	X-3S
Mode	Keep Transmitting		Input Voltage	DC 6.0V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.500	PK (dBμV/m) 43.10		Limit	$74(dB\mu V/m)$
	AV(dBμV/m)			$54(dB\mu V/m)$

## **Test Figure:**

## **Horizontal:**



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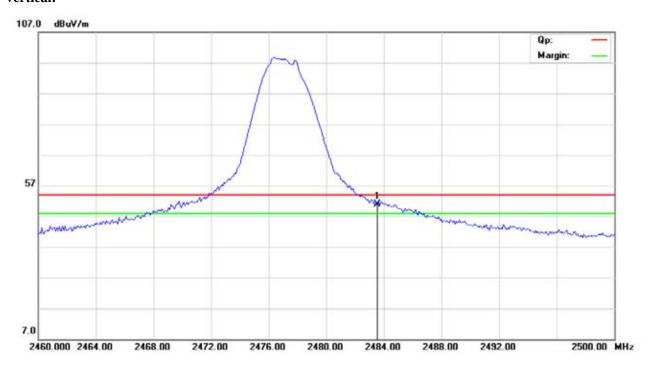


## 12.4 Restrict Band Test Result

Product:	3CH Radio Control		Test Mode:	X-3S
Mode	Keep Transmitting		Input Voltage	DC6.0V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.500	PK (dBμV/m) 50.98		Limit	$74(dB\mu V/m)$
	AV(dBμV/m)			$54(dB\mu V/m)$

## **Test Figure:**

#### Vertical:



Note: 1. The Max. FS in Restrict Band are measured in conventional method.

- 2. Final Level = Reading + AF + Cable Preamp
- 3. RBW=VBW=1MHz

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# 13.0 Antenna Requirement

## 13.1 Standard Applicable

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 transmitter antennas of directional gain greater than 6 dBi

are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

## 13.2 Antenna Connected construction

The antenna is Dipole antenna. The maximum Gain of this antenna is 2.5dBi

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# 14.0 Maximum Permissible Exposure

## **Applicable Standard**

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

## (a) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Times   E   2 ,   H   2 or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100000			5	6

## (b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Times   E   2 ,   H   2 or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100000			1.0	30

Note: f=frequency in MHz; \*Plane-wave equivalent power density

#### **MPE Calculation Method**

 $E(V/m) = (30*P*G)^{0.5}/d$  Power Density:  $Pd(W/m^2) = E^2/377$ 

 $\mathbf{E} = \text{Electric Field (V/m)}$ 

 $\mathbf{P}$  = Peak RF output Power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

 $Pd = (30*P*G) / (377*d^2)$ 

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

The report refers only to the sample tested and does not apply to the bulk.

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## **Calculated Result and Limit**

Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
1.778	18.3	67.608	0.0239	1	Compiles

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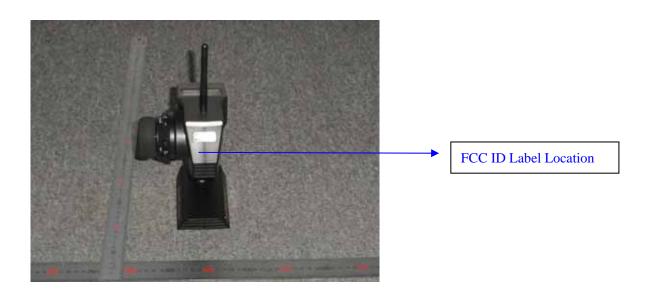
#### 15.0 FCC ID Label

## FCC ID: V6KX-3S

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

#### **Mark Location:**



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# 16.0 Photo of testing

## 16.1 Emission Radiated test View--





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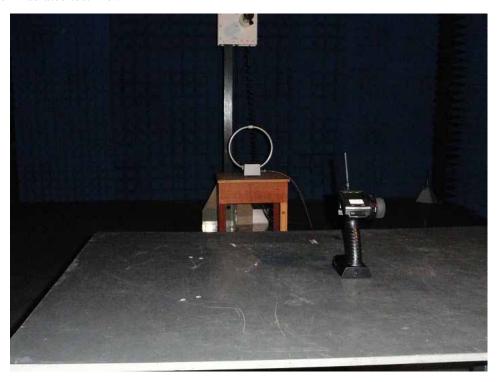
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#### 16.3 Emission Radiated test View--



#### 16.4 Conducted Emission test View--



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## Photo for the EUT

## Outside View-TX





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Outside View-TX





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Outside View-TX





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## Interior View-TX





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Interior View-TX





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Interior View-TX





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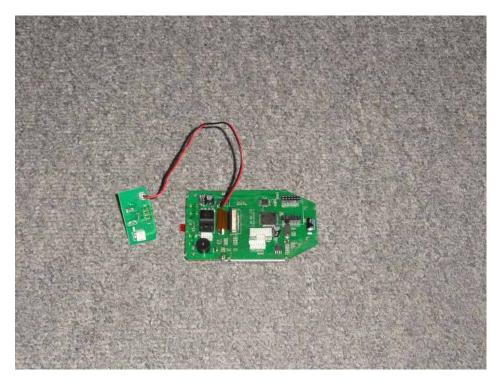
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Interior View-TX





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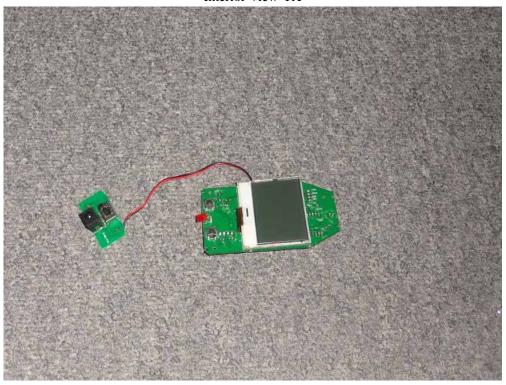
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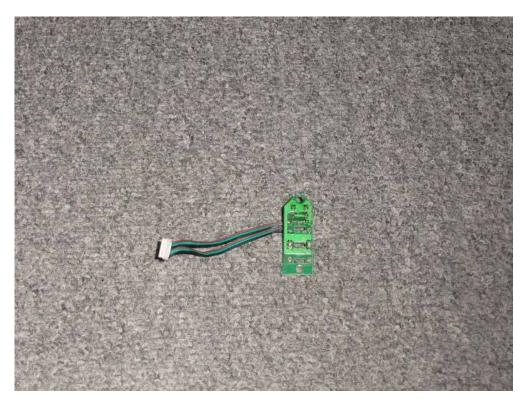
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Interior View-TX





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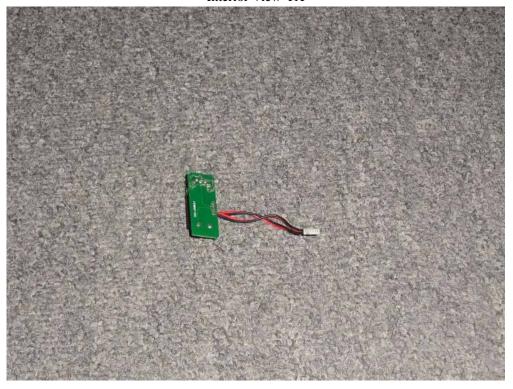
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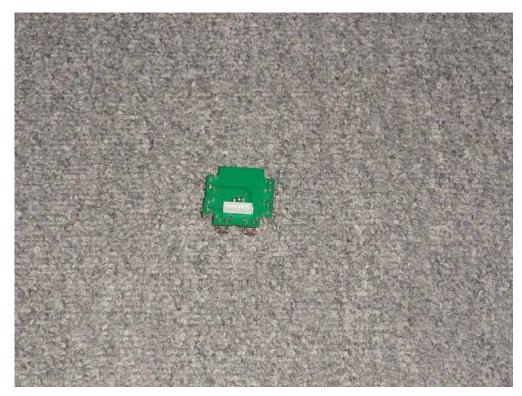
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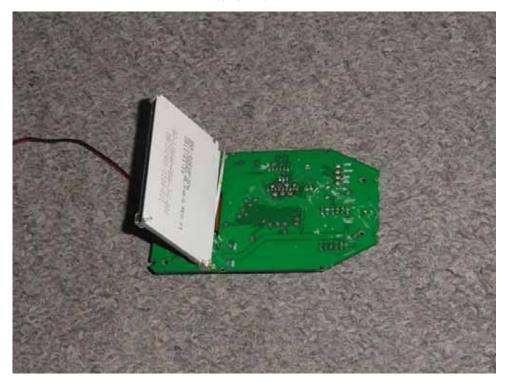
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## Interior View-TX



-End of the report