



卓時檢測  
TIMEWAY TESTING LABORATORY



NO.L2292

ISO/IEC17025 Accredited Lab.

Report No: FCC 0811202  
File reference No: 2008-12-19

Applicant: Shenzhen ART-TECH R/C Hobby Co.,Ltd.

Product: 2.4GHz Radio Control System

Model No: ETC61-2.4GHz, ETC62-2.4GHz

Trademark: E-FLY

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: Dec 19,2008

**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**

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Shenzhen,CHINA.

Tel (755) 83448688

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### **Special Statement:**

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

### 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,  
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Telephone: (755) 83448688  
Fax: (755) 83442996  
Site on File with the Federal Communications Commission – United States  
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: Shenzhen ART-TECH R/C Hobby Co., Ltd  
Address: 3/F, No.1 Wanyelong Industrial Park, Liyuan Industrial Area, Tangtou Village, Shiyan Town,  
Baoan District, Shenzhen City, China  
Telephone: +86-755-29810925  
Fax: +86-755-29810957

### 1.3 Description of EUT

Product: 2.4GHz Radio Control System  
Manufacturer: Shenzhen ART-TECH R/C Hobby Co.,Ltd  
Brand Name: E-FLY  
Model Number: ETC61-2.4GHz  
Additional Model Name: ETC62-2.4GHz  
Additional Trade Name: N/A  
Rating: DC12V (8 pcs AA Batteries)  
Power Supply: Model: HNK12120125U, Input: 100-240V~, 50-60Hz, Output: 12.0VDC, 1.25A  
Type of Modulation: DSSS  
Frequency range: 2402-2480MHz  
Number of Channel: 79  
Air Data Rate: 125kbps  
Antenna type: Dipole antenna

### 1.4 Submitted Sample: 2 Sample

### 1.5 Test Duration

2008-11-25 to 2008-12-19

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## 1.6 Test Uncertainty

Conducted Emissions Uncertainty =3.6dB

Radiated Emissions Uncertainty =4.7dB

## 1.7 Test Engineer &amp; verify Engineer

Test Engineer

The sample(s) tested by \_\_\_\_\_

Print Name: Henry Ding/ Engineer

Verify Engineer

The report verified by \_\_\_\_\_

Print Name: Terry Tang/ EMC Manager

2.0	Test Equipments				
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	2008-12-06	2009-12-05
Absorbing Clamp	ROHDE&SCHWARZ	MDS-21	100126	2008-12-06	2009-12-05
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100294	2008-12-06	2009-12-05
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100253	2008-12-06	2009-12-05
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	2008-12-06	2009-12-05
ESDV Test Receiver	ROHDE&SCHWARZ	ESDV	100008	2008-04-26	2009-04-25
4-WIRE ISN	ROHDE&SCHWARZ	ENY 41	830663/044	2008-02-18	2009-02-17
GG ENY22 Double 2-Wire ISN	ROHDE&SCHWARZ	ENY22	83066/016	2008-02-18	2009-02-17
Impuls-Begrenzer	ROHDE&SCHWARZ	ESH3-Z2	100281	2008-02-18	2009-02-17
System Controller	CT	SC100	-	2008-02-18	2009-02-17
Printer	EPSON	PHOTO EX3	CFNH234850	2008-02-18	2009-02-17
FM-AM Signal Generator	JUNGJIN	SG-150M	389911177	2008-02-18	2009-02-17

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Color TV Pattern Generator	PHILIPS	PM5418	LO621747	2008-02-18	2009-02-17
Computer	IBM	8434	1S8434KCE99BLX LO*	-	-
Oscillator	KENWOOD	AG-203D	3070002	2008-02-18	2009-02-17
Power meter	Anritsu	ML2487A	6K00003613	2008-02-18	2009-02-17
Power sensor	Anritsu	MA2491A	32263	2008-02-18	2009-02-17
Spectrum Analyzer	HAMEG	HM5012	-	2008-04-26	2009-04-25
Power Supply	LW	APS1502	-	-	-
5K VA AC Power Source	California Instruments	5001iX	56060	2008-02-18	2009-02-17
CDN	EM TEST	CDN M2/M3	-	2008-02-18	2009-02-17
Attenuation	EM TEST	ATT6/75	-	2008-02-18	2009-02-17
Resistance	EM TEST	R100	-	2008-02-18	2009-02-17
Electromagnetic Injection Clamp	LITTHI	EM101	35708	2008-02-18	2009-02-17
Signal Generator	ROHDE&SCHWARZ	SMT03	100029	2008-02-18	2009-02-17
Power Amplifier	AR	150W1000	300999	2008-02-18	2009-02-17
Field probe	Holaday	HI-6005	105152	2008-02-18	2009-02-17
Bilog Antenna	Chase	CBL6111C	2576	2008-02-18	2009-02-17
ESPI Test Receiver	ROHDE&SCHWARZ	ESI26	838786/013	2008-02-18	2009-02-17
3m OATS	--	--	N/A	2008-02-18	2009-02-17
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170265	2008-08-18	2009-08-17
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-631	2008-04-26	2009-04-25

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### 3.0 Technical Details

#### 3.1 Summary of test results

The EUT has been tested according to the following specifications:			
Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107 & 15.207	Conducted Emission Test	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.247(a)(2) Limit	Spectrum bandwidth of a Orthogonal Frequency Division Multiplex System Limit: 6dB bandwidth>500kHz	PASS	Complies
FCC Part 15, Paragraph 15.247(b)	Maximum peak output power Limit: max. 30dBm	PASS	Complies
FCC Part 15, Paragraph 15.109,15.205 & 15.209	Transmitter Radiated Emission Limit: Table 15.209	PASS	Complies
FCC Part 15, Paragraph 15.247(d)	Power Spectral Density Limit: max. 8dBm	PASS	Complies
FCC Part 15, Paragraph 15.247(c)	Out of Band Emission and Restricted Band Radiation Limit: 20dB less than peak value of fundamental frequency Restricted band limit: Table 15.209	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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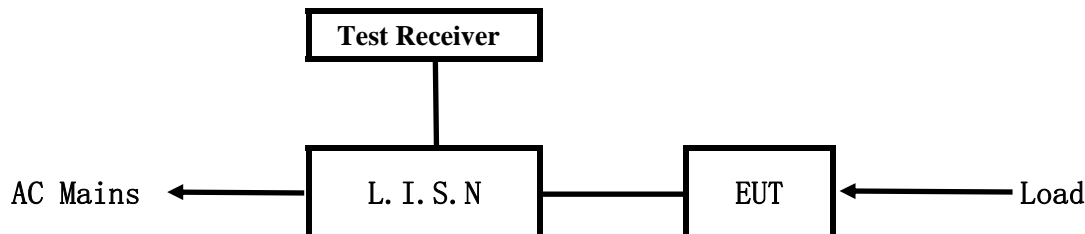
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## 5. Power Line Conducted Emission Test

### 5.1 Schematics of the test

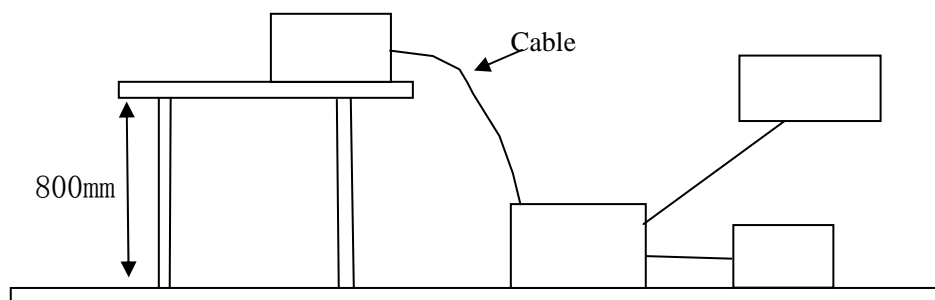


EUT: Equipment Under Test

### 5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2003. 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 –2003.

Block diagram of Test setup



### 5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2003. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

#### A. EUT

Device	Manufacturer	Model	FCC ID
2.4GHz Radio Control system	Shenzhen ART-TECH R/C Hobby Co. ,Ltd.	ETC61-2.4GHz	WL9-ETC

#### B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

#### C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
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N/A				
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#### 5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2003.

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

Frequency (MHz)	Class A Limits (dB $\mu$ V)		Class B Limits (dB $\mu$ V)	
	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.

**Note: After pre-scanning, the model ETC62-2.4GHz was selected to conduct the final test. It's was the worse case.**

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## TEST REPORT

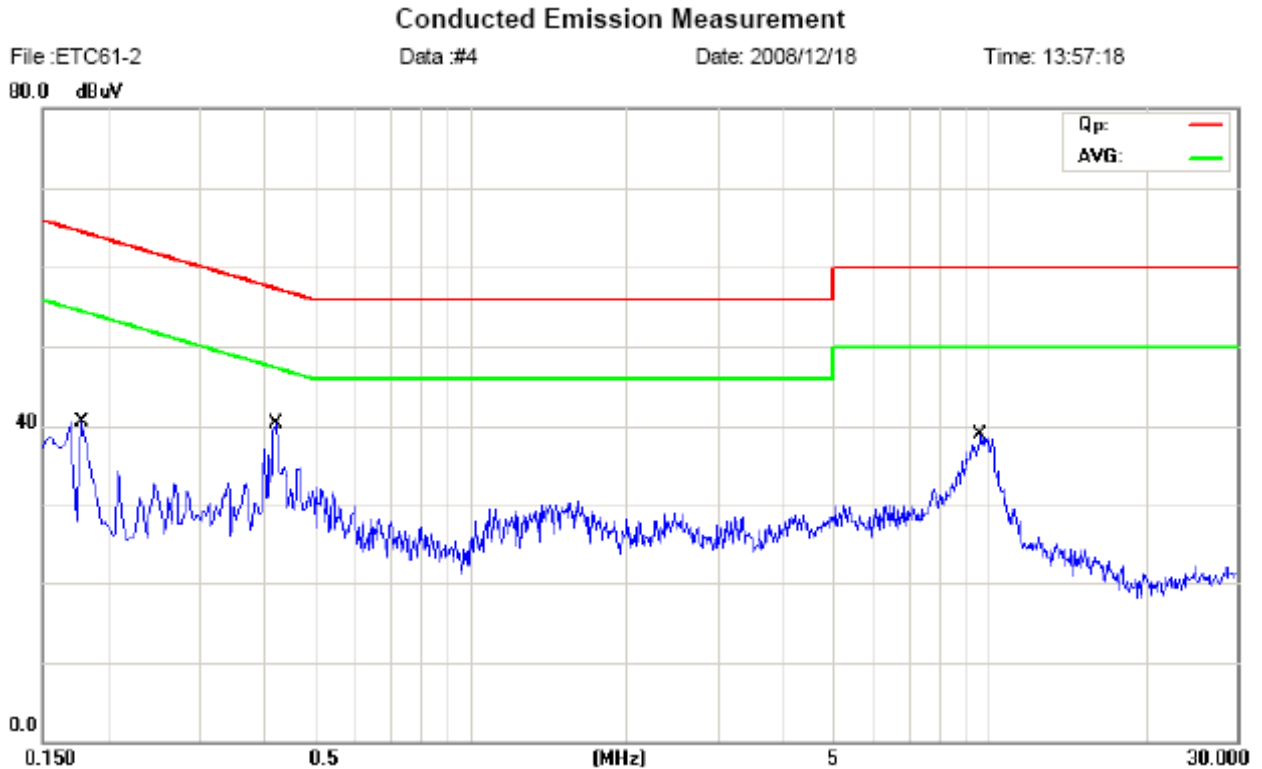
### A Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

EUT set Condition: Transmitting mode

Results: Pass

Test Voltage 120V~,60Hz

Please refer to following diagram for individual



Frequency (MHz)	Reading(dB μ V)				Limit	
	Neutral		Line		(dB μ V)	
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.1778	30.83	24.23	--	--	64.59	54.59
0.4207	31.49	21.49	--	--	57.43	47.43
9.6788	32.73	26.63	--	--	60.00	50.00

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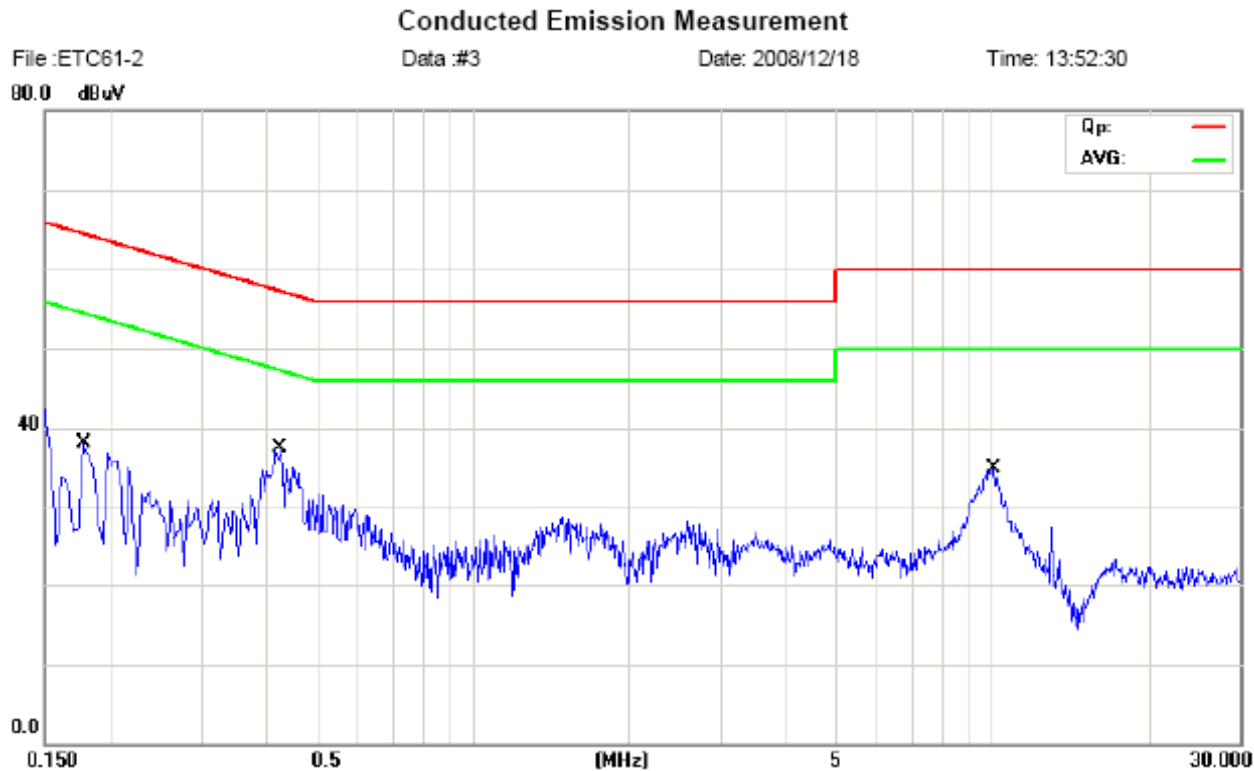
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**B Conducted Emission on Live Terminal of the power line (150kHz to 30MHz)**

EUT set Condition: Transmitting mode  
**Results:** Pass  
**Test Voltage** 120V~,60Hz  
Please refer to following diagram for individual



Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Neutral		Line			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
0.1780	--	--	29.73	26.03	64.58	54.58
0.4271	--	--	31.59	22.69	57.31	47.31
10.0932	--	--	29.10	23.90	60.00	50.00

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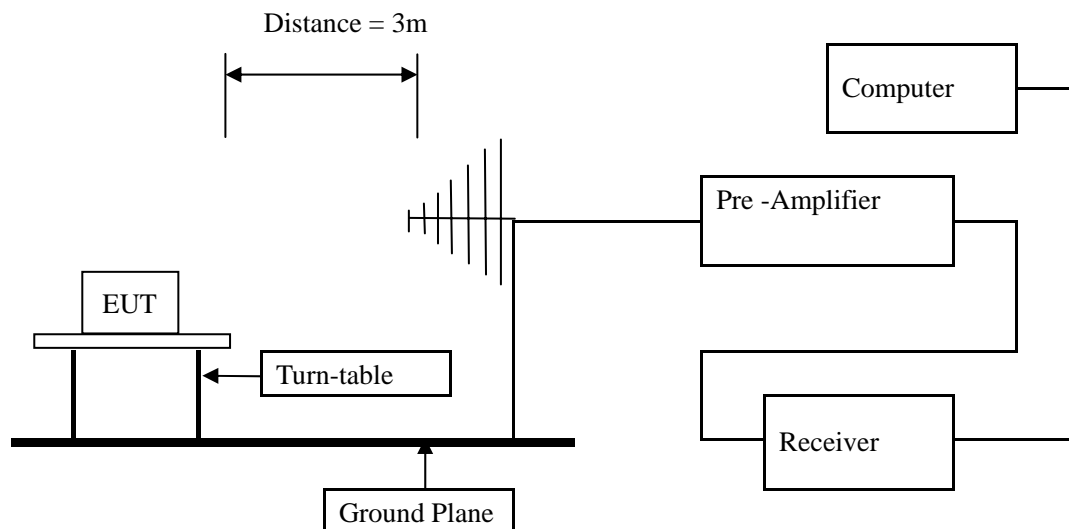


## 6 Radiated Emission Test

### 6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.4 –2003. The radiated test was performed at Timeway Laboratory. This site is on file with the FCC laboratory division, Registration No.899988
- (2) 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 is according to ANSI C63.4-2003.
- (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.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (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.
- (6) The antenna polarization : Vertical polarization and Horizontal polarization.

#### Block diagram of Test setup



### 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.

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#### 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 and RSS-210**

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 Voltage ( $\mu$ V)
  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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**Test result**

**General Radiated Emission Data and Harmonics Radiated Emission Data**

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

EUT set Condition: Tx under transmitting mode

**Results:** Pass

Model: ETC62-2.4GHz

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
151.2	40.23	V	43.50
198.96	38.73	V	43.50
366.04	39.13	V	46.00
445.64	39.84	V	46.00
198.92	40.83	H	43.50
230.76	36.54	H	46.00
326.24	39.02	H	46.00
334.20	42.62	H	46.00

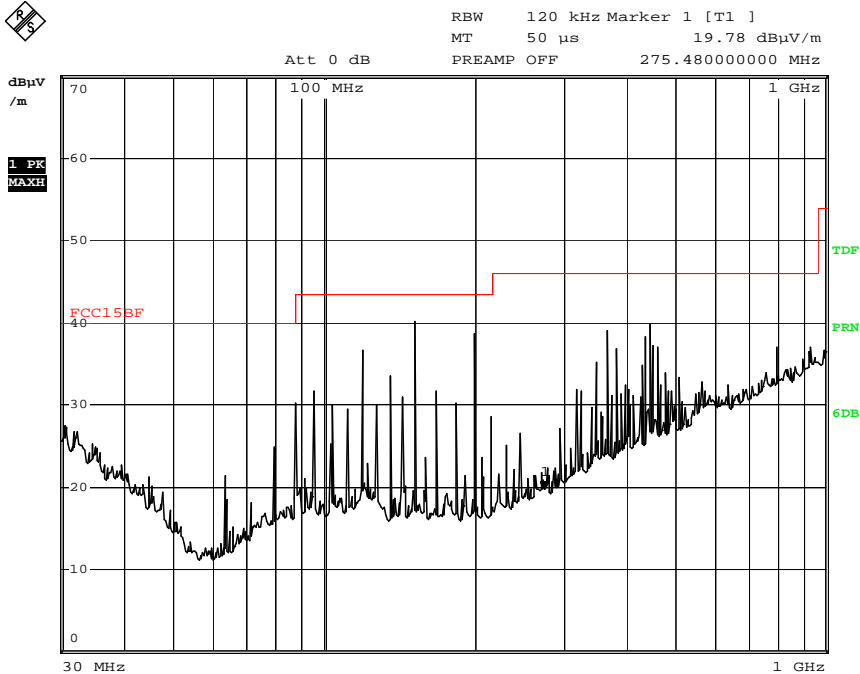
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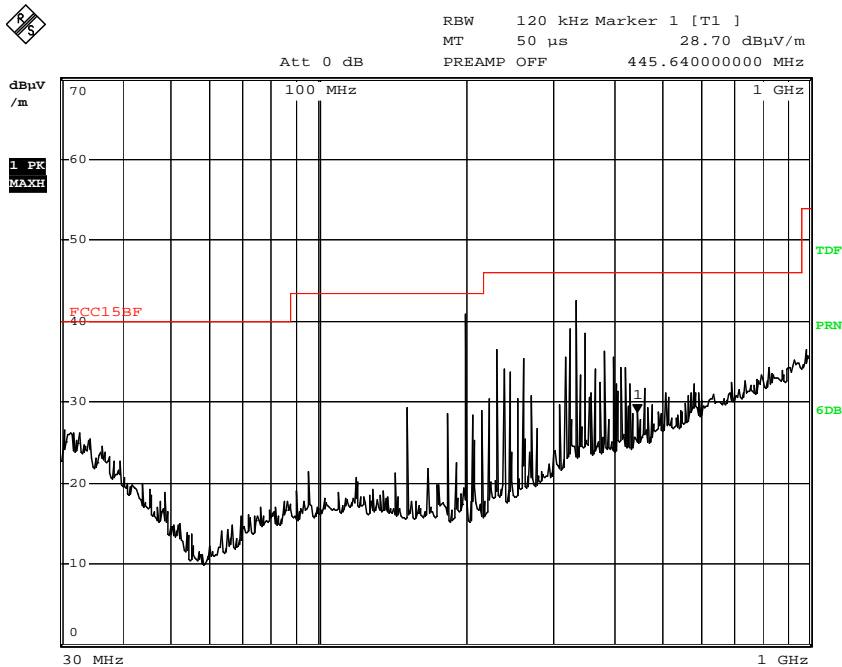
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Test Figure: transmitting mode



Date: 9.DEC.2008 11:01:14



Date: 9.DEC.2008 11:04:54

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

EUT set Condition: Tx under transmitting mode

**Results:** Pass

Model: ETC61-2.4GHz

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
119.36	32.01	H	43.50
294.44	35.23	H	46.00
350.16	35.30	H	46.00
34.64	38.62	V	40.00
119.36	38.51	V	43.50
294.44	37.17	V	43.50

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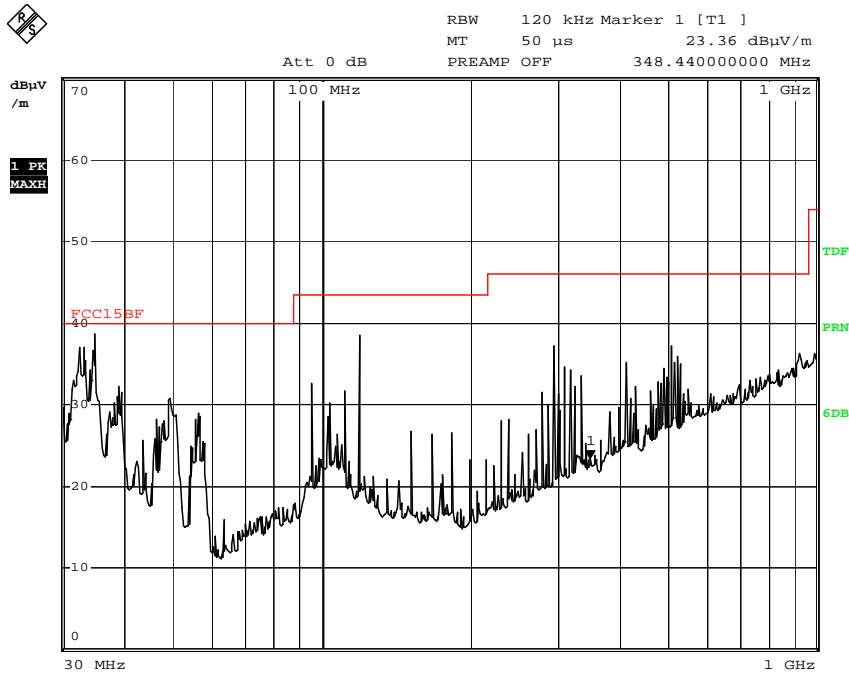
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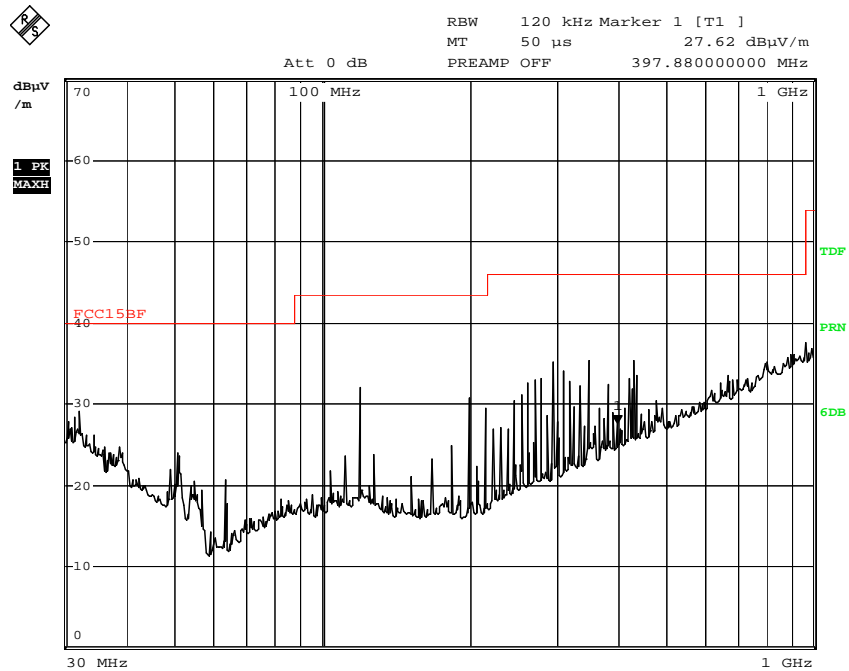


Test Figure: transmitting mode



Date: 19.DEC.2008 15:11:41

H



Date: 19.DEC.2008 15:08:11

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**Operation Mode: Transmitting under Low Channel**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2402.00	93.8 (PK) /78.3 (AV)	H	Fundamental Frequency
2402.00	97.6 (PK) /82.5 (AV)	V	
4804.00	--	H/V	74(Peak)/ 54(AV)
7206.00	--	H/V	74(Peak)/ 54(AV)
9608.00	--	H/V	74(Peak)/ 54(AV)
12010	--	H/V	74(Peak)/ 54(AV)
14412	--	H/V	74(Peak)/ 54(AV)
16814	--	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**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2440.00	96.2 (PK) /81.2 (AV)	H	Fundamental Frequency
2440.00	100.3 (PK) /84.6 (AV)	V	
4880.00	--	H/V	74(Peak)/ 54(AV)
7320.00	--	H/V	74(Peak)/ 54(AV)
9760.00	--	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)
2480.00	92.1 (PK) /76.3 (AV)	H	Fundamental Frequency
2480.00	95.3 (PK) /81.6 (AV)	V	
4960	--	H/V	74(Peak)/ 54(AV)
7440	--	H/V	74(Peak)/ 54(AV)
9920	--	H/V	74(Peak)/ 54(AV)
12400	--	H/V	74(Peak)/ 54(AV)
14880	--	H/V	74(Peak)/ 54(AV)
17360	--	H/V	74(Peak)/ 54(AV)
19840	--	H/V	74(Peak)/ 54(AV)
22320	--	H/V	74(Peak)/ 54(AV)
24800	--	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

5. Because the two models employ the same RF module, the model of ETC62-2.4GHz, producing the worse case after pre-scanning, is selected to conduct test for radiated emissions above 1G.

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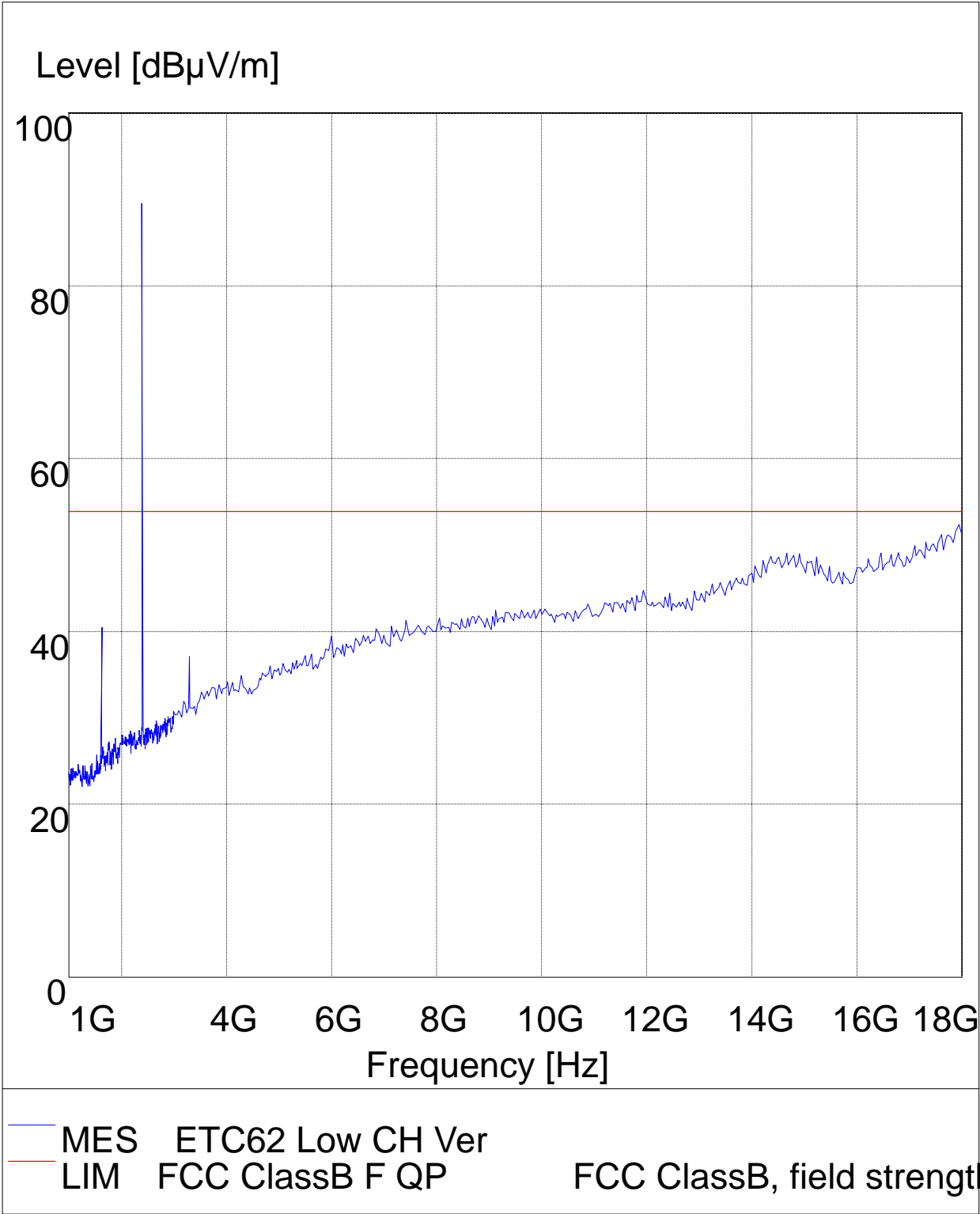
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Please refer to the following test plots for details:

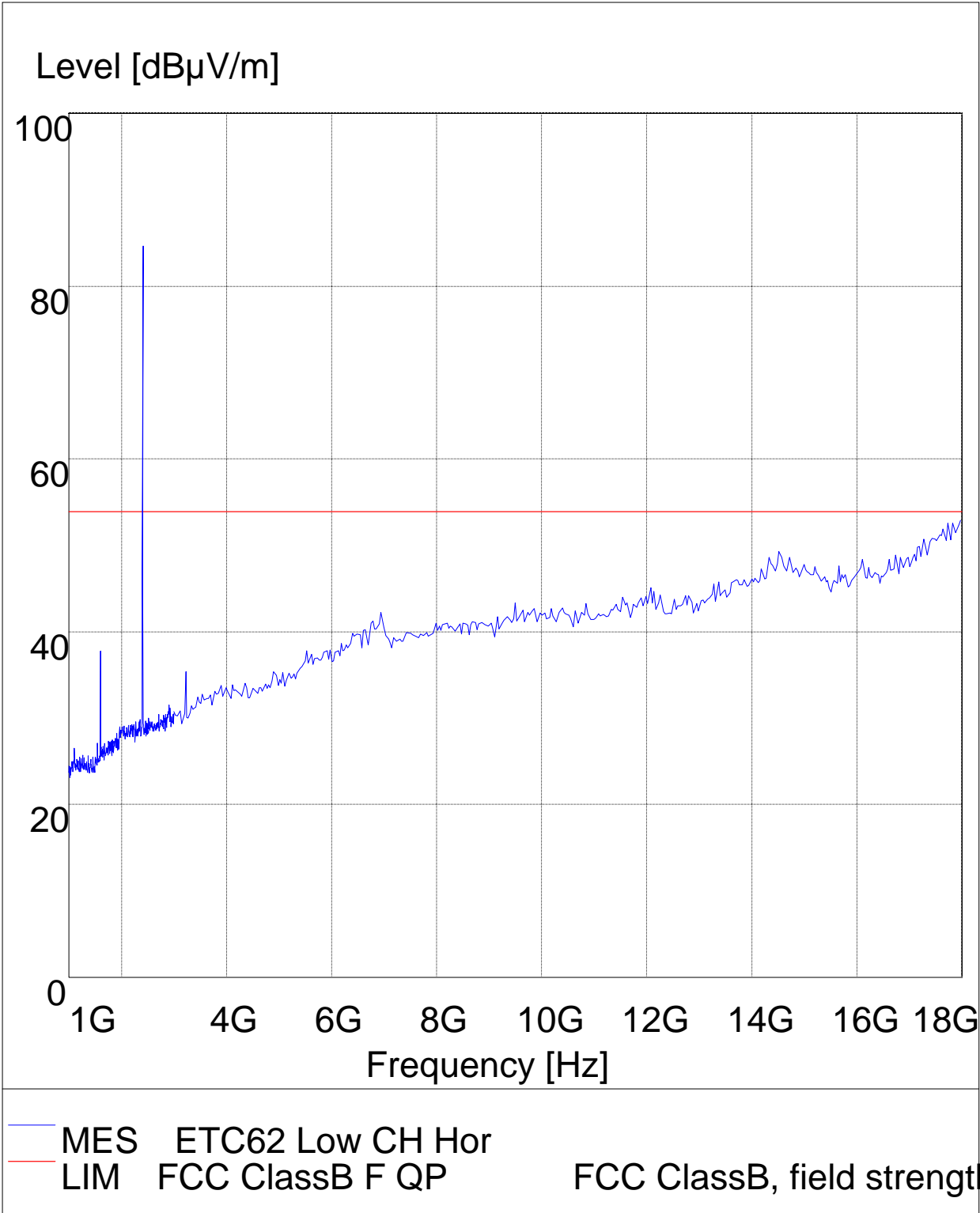
**Low Channel: Vertical**



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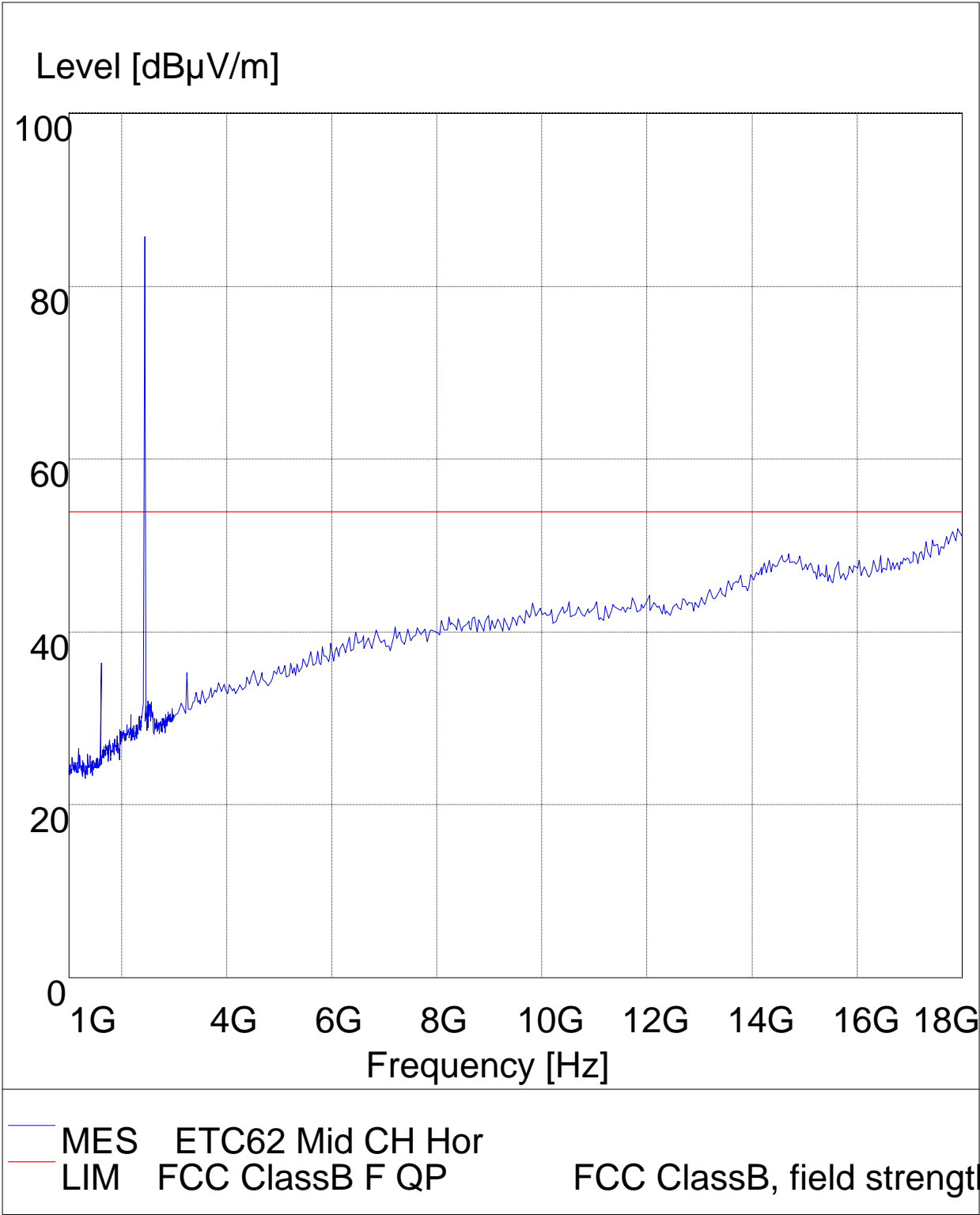
Low Channel : Horizontal



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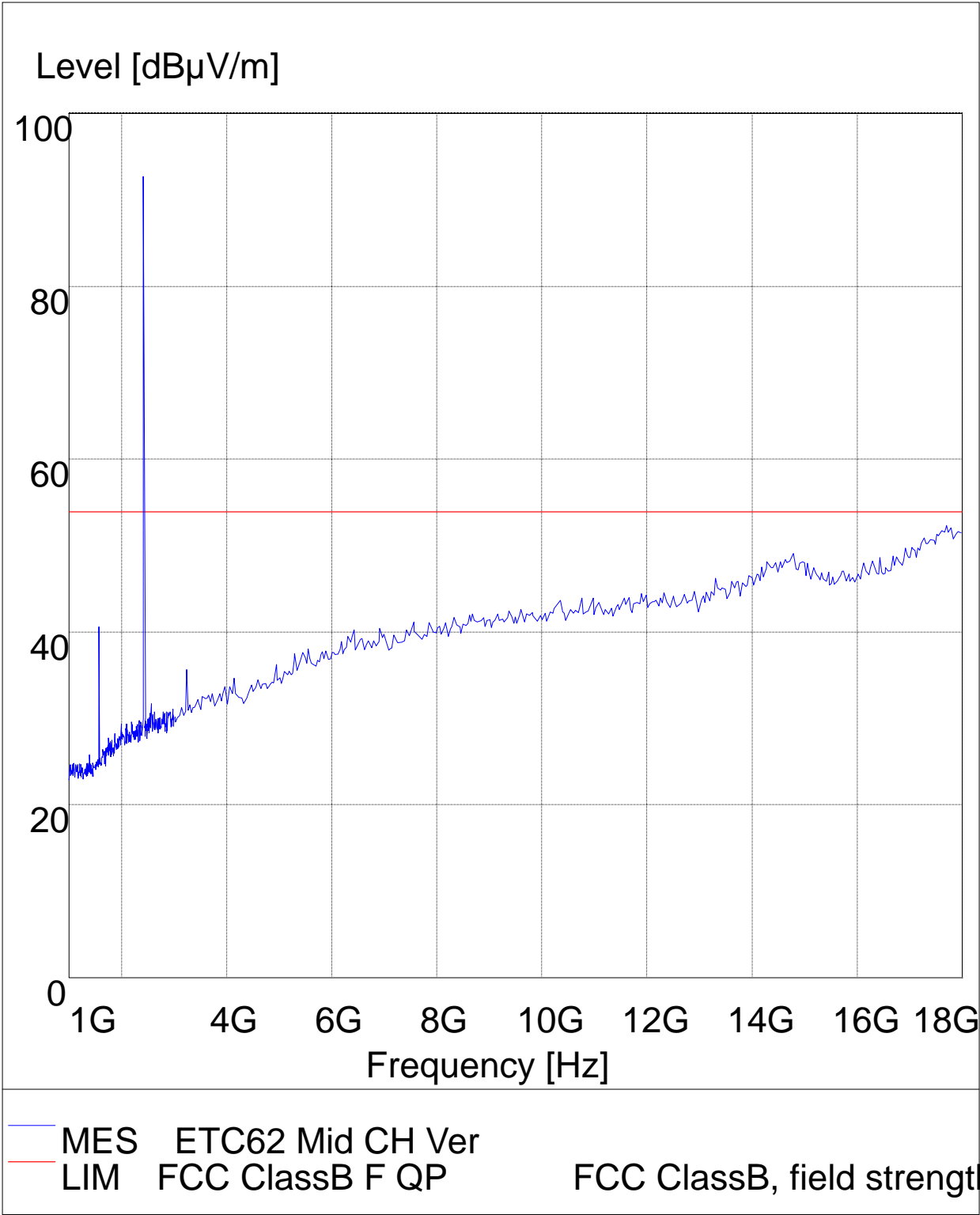
Middle Channel : Horizontal



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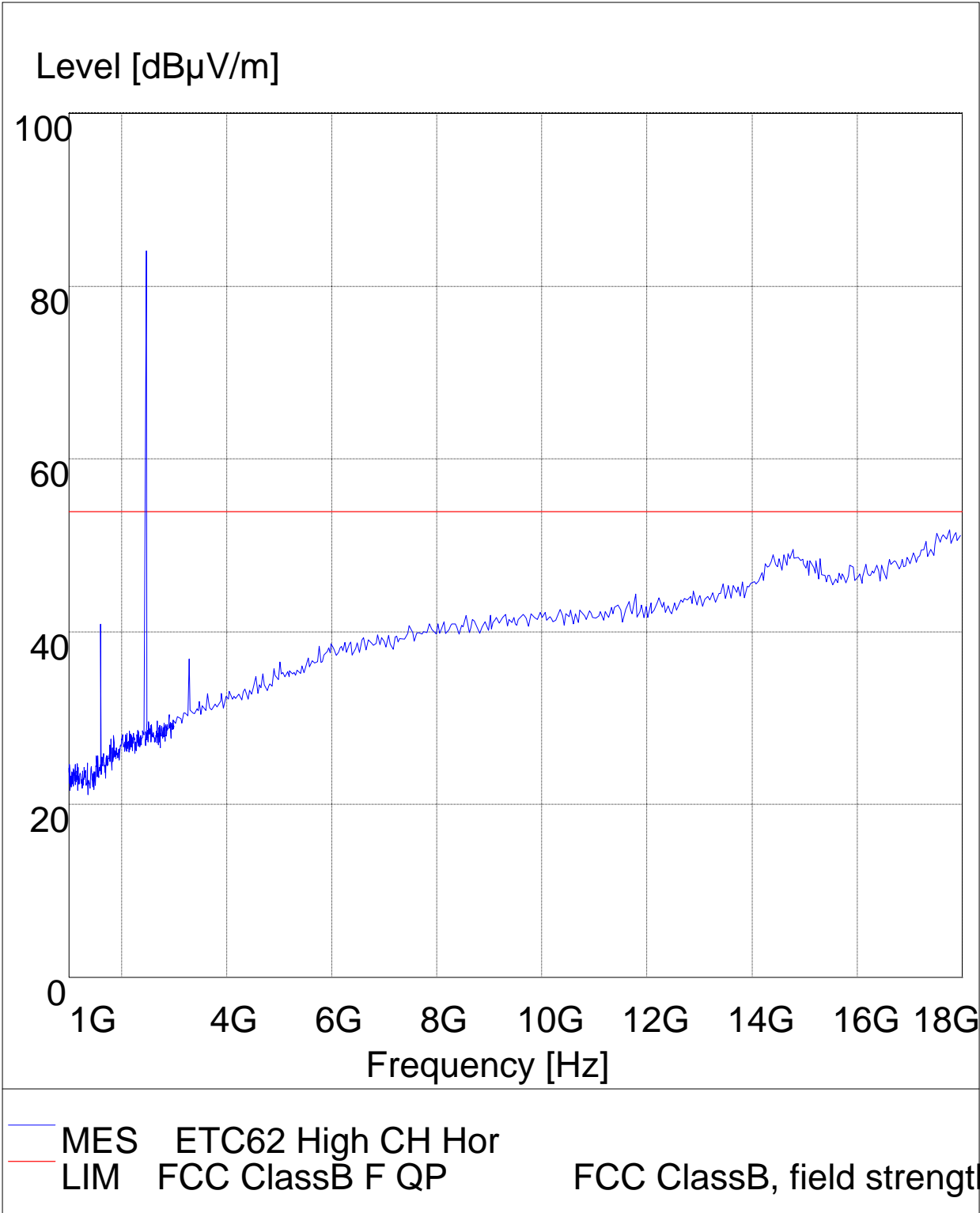
Middle Channel : Vertical



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High Channel : Horizontal

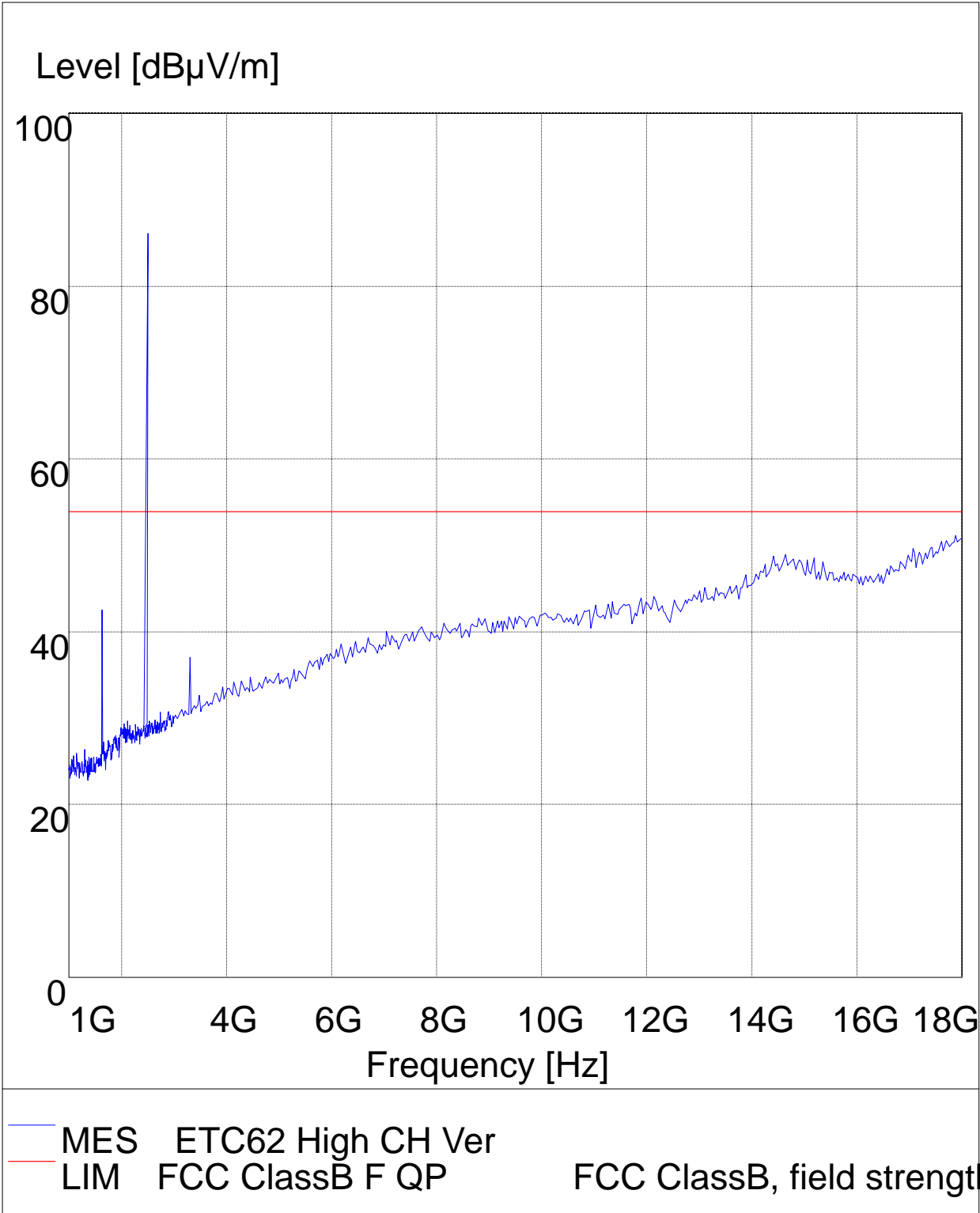


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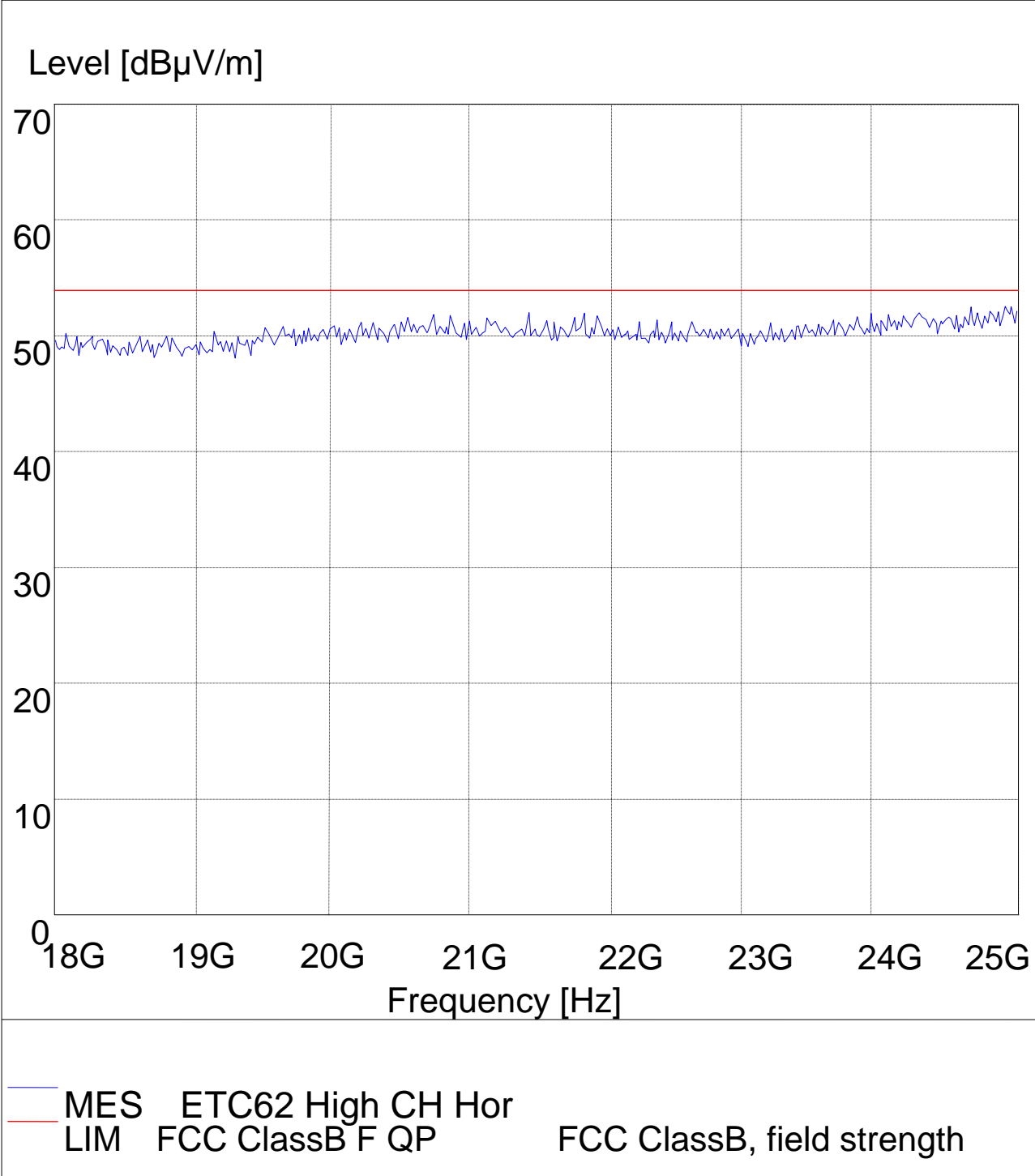
High Channel : Vertical



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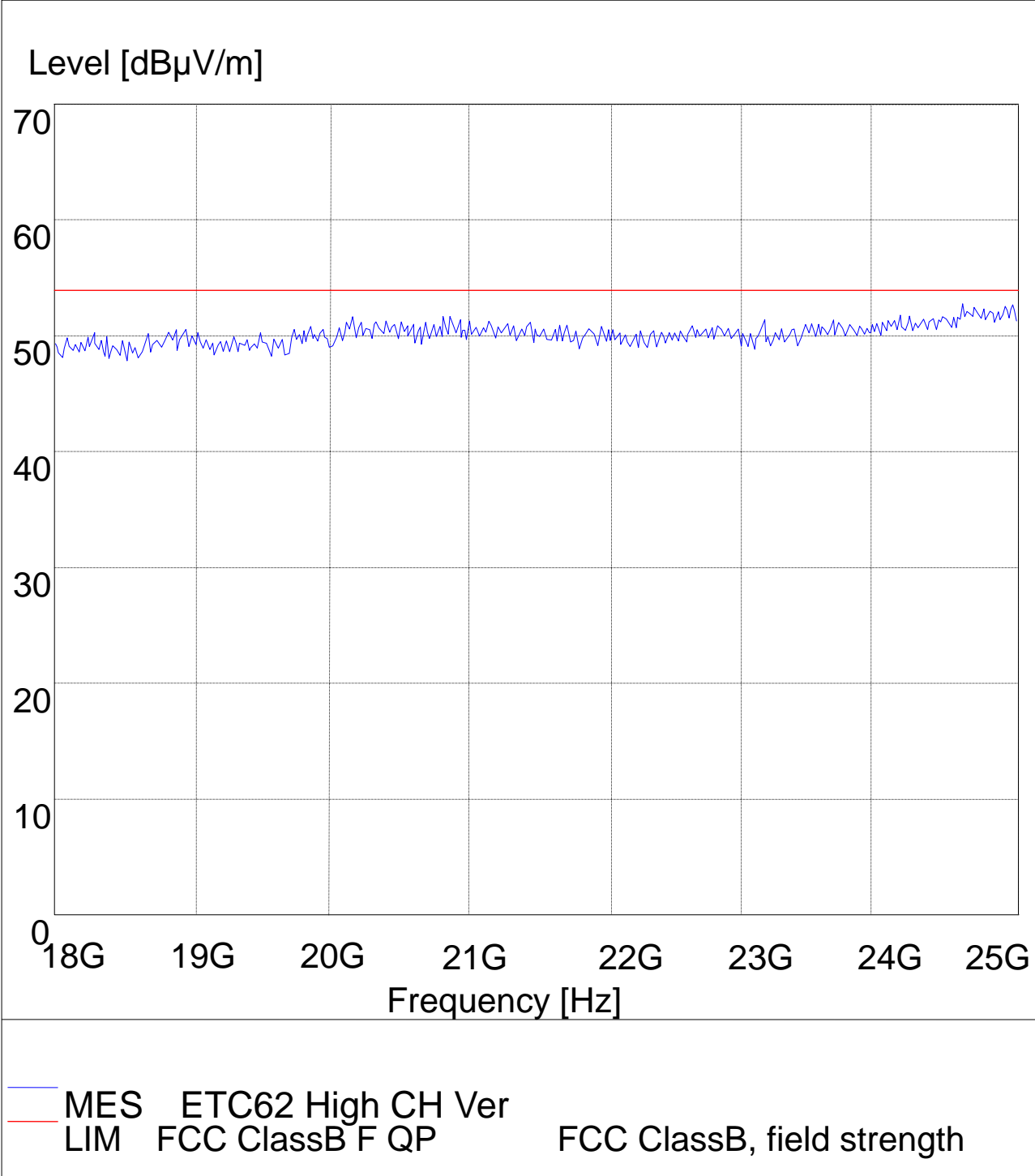
18-25G  
CH High Horizontal



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18-25G  
CH High Vertical

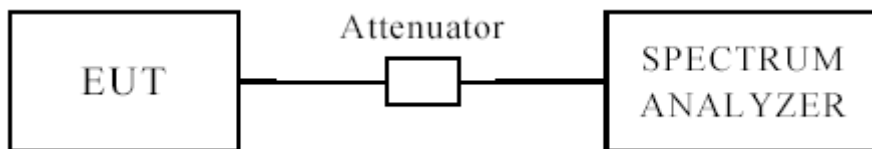


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## 7.0 6dB Bandwidth Measurement

### 7.1 Test Setup



### 7.2 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is >500KHz

### 7.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator.

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 100 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

### 7.4 Test Result

EUT		2.4GHz Radio Control System		Model		ETC62-2.4GHz	
Mode		Keep Transmitting		Input Voltage		DC 12V	
Temperature		24 deg. C,		Humidity		56% RH	
Channel	Channel Frequency (MHz)		6 dB Bandwidth (MHz)		Minimum Limit (MHz)		Pass/ Fail
Low	2402		0.951		0.5		Pass
Mid	2440		0.931		0.5		Pass
High	2480		0.941		0.5		Pass

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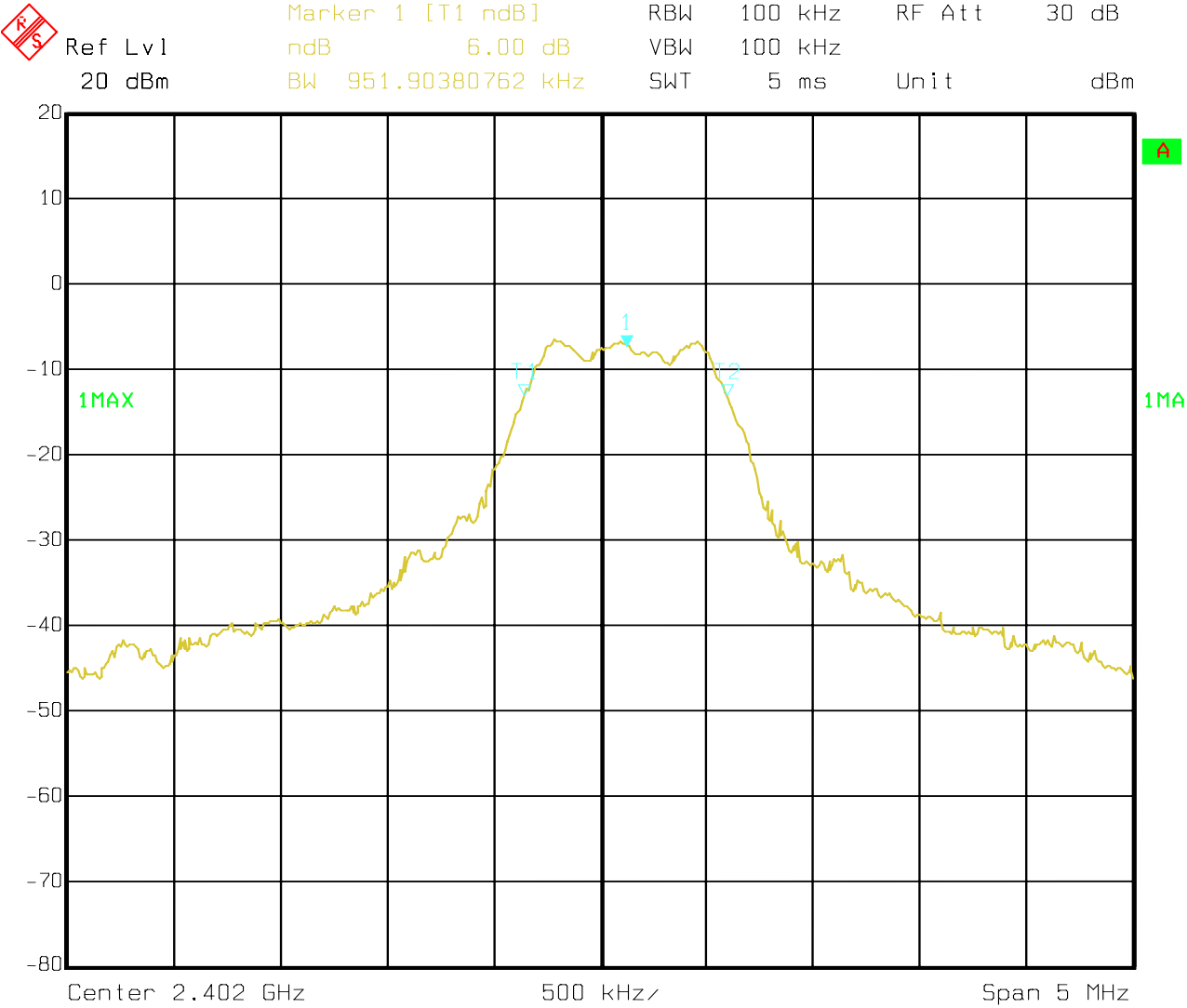
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**TEST REPORT**

**Test Plots:**

**1. CH Low**



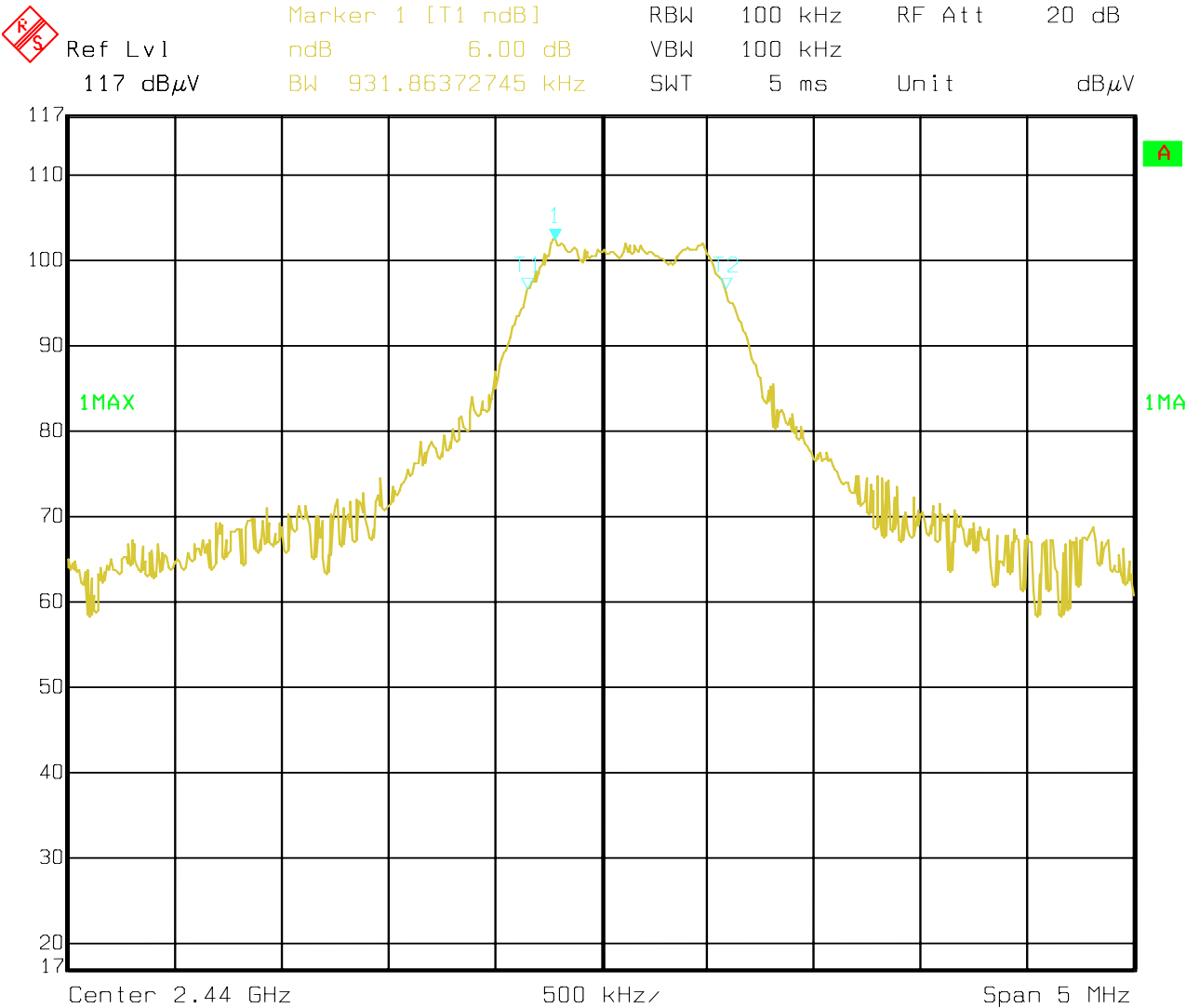
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TEST REPORT

2. CH Mid

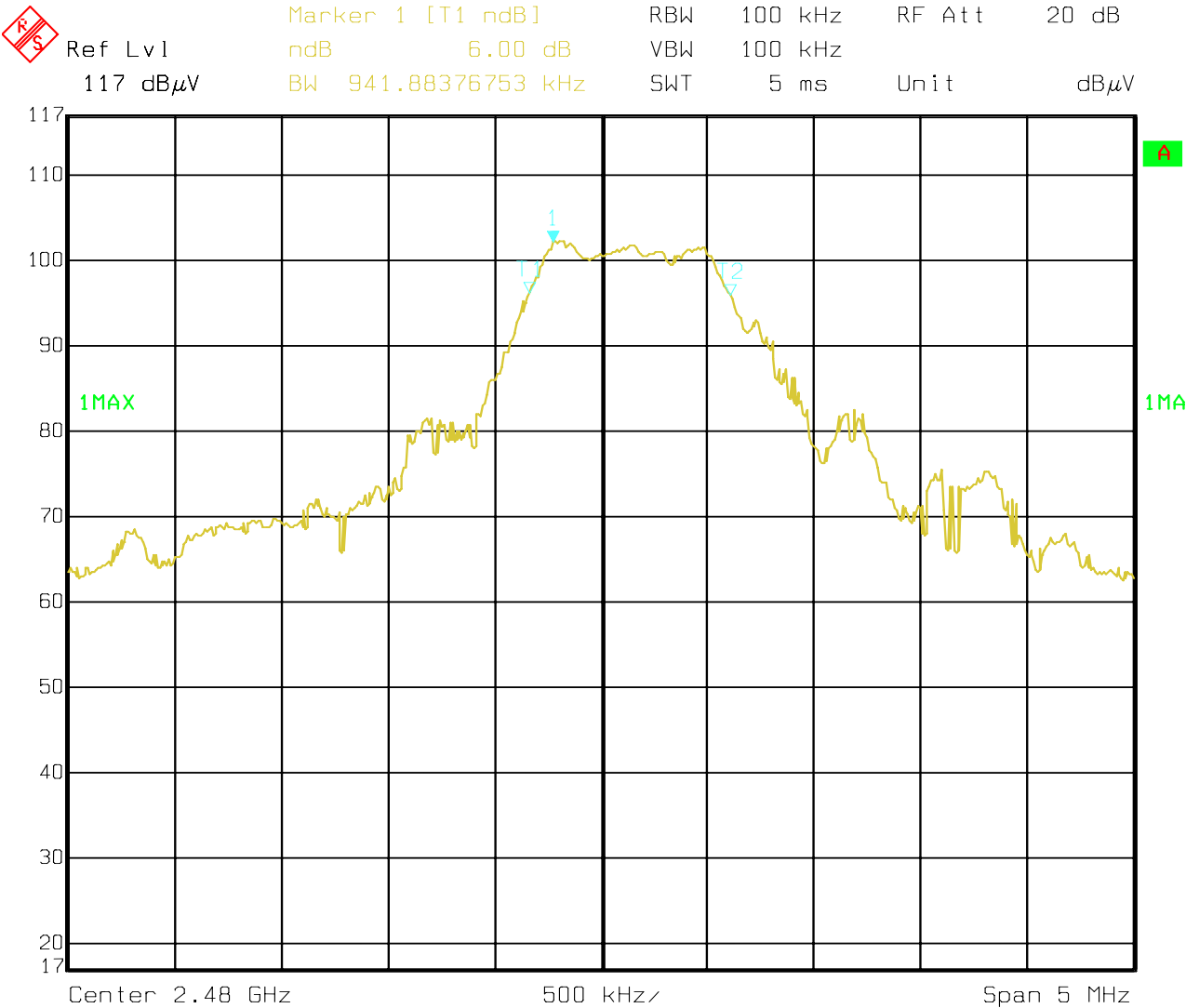


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3. CH High



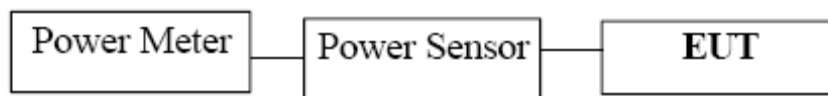
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## 8. Maximum Peak Output Power

### 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.

### 8.4 Test Results

EUT		2.4GHz Radio Control System		Model		ETC62-2.4GHz	
Mode		Keep Transmitting		Input Voltage		DC 12V	
Temperature		24 deg. C,		Humidity		56% RH	
Channel	Channel Frequency (MHz)		Peak Power Output (dBm)		Peak Power Limit (dBm)		Pass/ Fail
Low	2402		-5.26		30		Pass
Mid	2440		-3.18		30		Pass
High	2480		-3.58		30		Pass

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

2. The result basic equation calculation as follow:

$$\text{Peak Power Output} = \text{Peak Power Reading} + \text{Cable loss} + \text{Attenuator}$$

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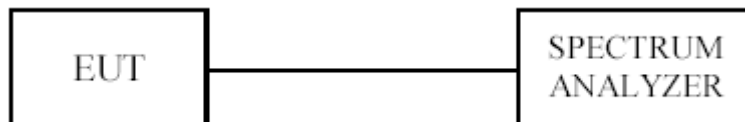
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## 9. Power Spectral Density Measurement

### 9.1 Test Setup



### 9.2 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density Measurement is 8dBm.

### 9.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3KHz RBW and 10kHz VBW, set sweep time=500s

The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span / 3KHz for a full response of the mixer in the spectrum analyzer.

### 9.4 Test Result

EUT		2.4GHz Radio Control System		Model		ETC62-2.4GHz	
Mode		Keep Transmitting		Input Voltage		DC 12V	
Temperature		24 deg. C,		Humidity		56% RH	
Channel	Channel Frequency (MHz)		Final RF Power Level in 3kHz BW (dBm)		Maximum Limit (dBm)		Pass/ Fail
Low	2402		-17.51		8		Pass
Mid	2440		-15.34		8		Pass
High	2480		-16.97		8		Pass

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

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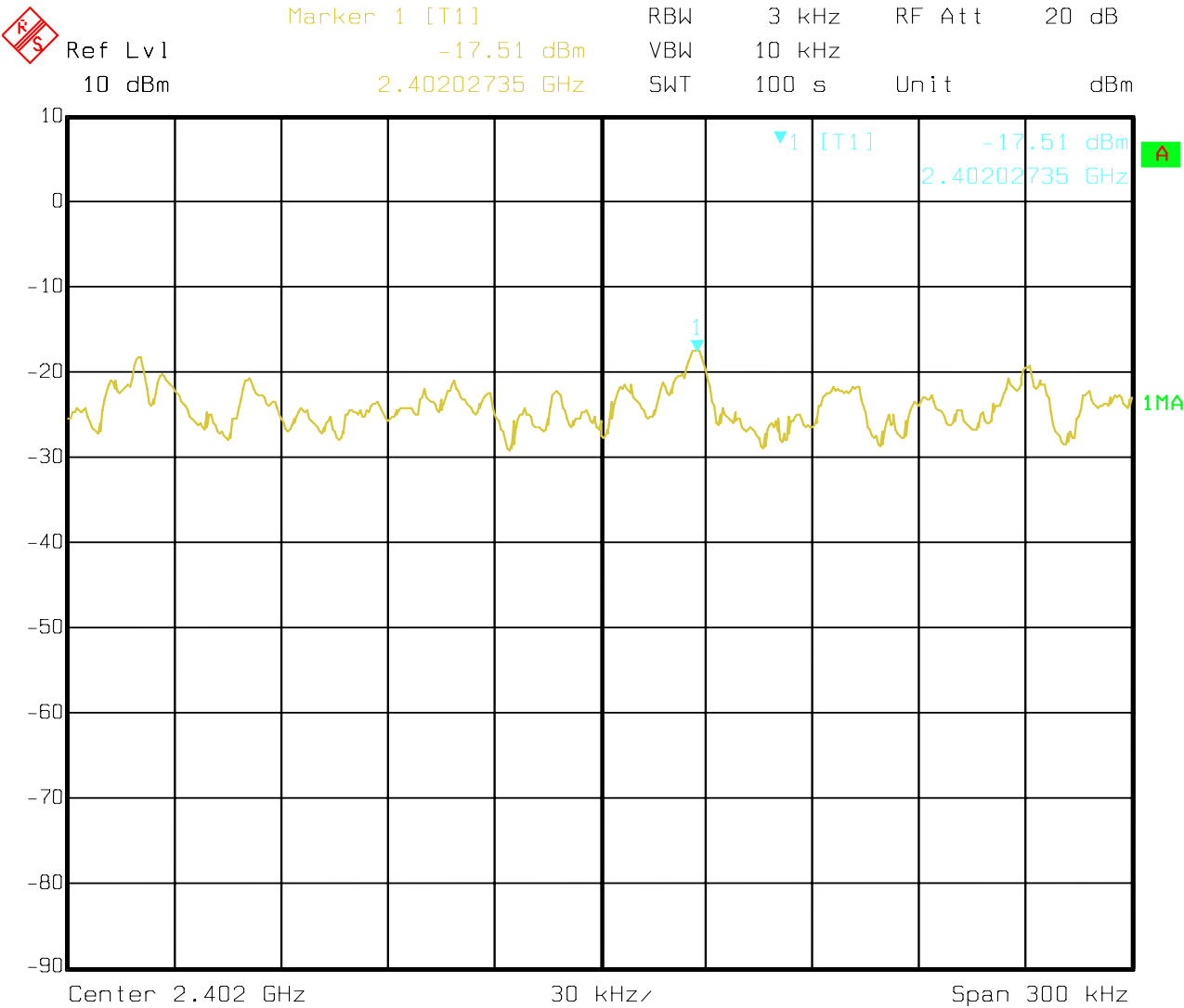
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9.5Photo of Power Spectral Density Measurement

1.CH Low



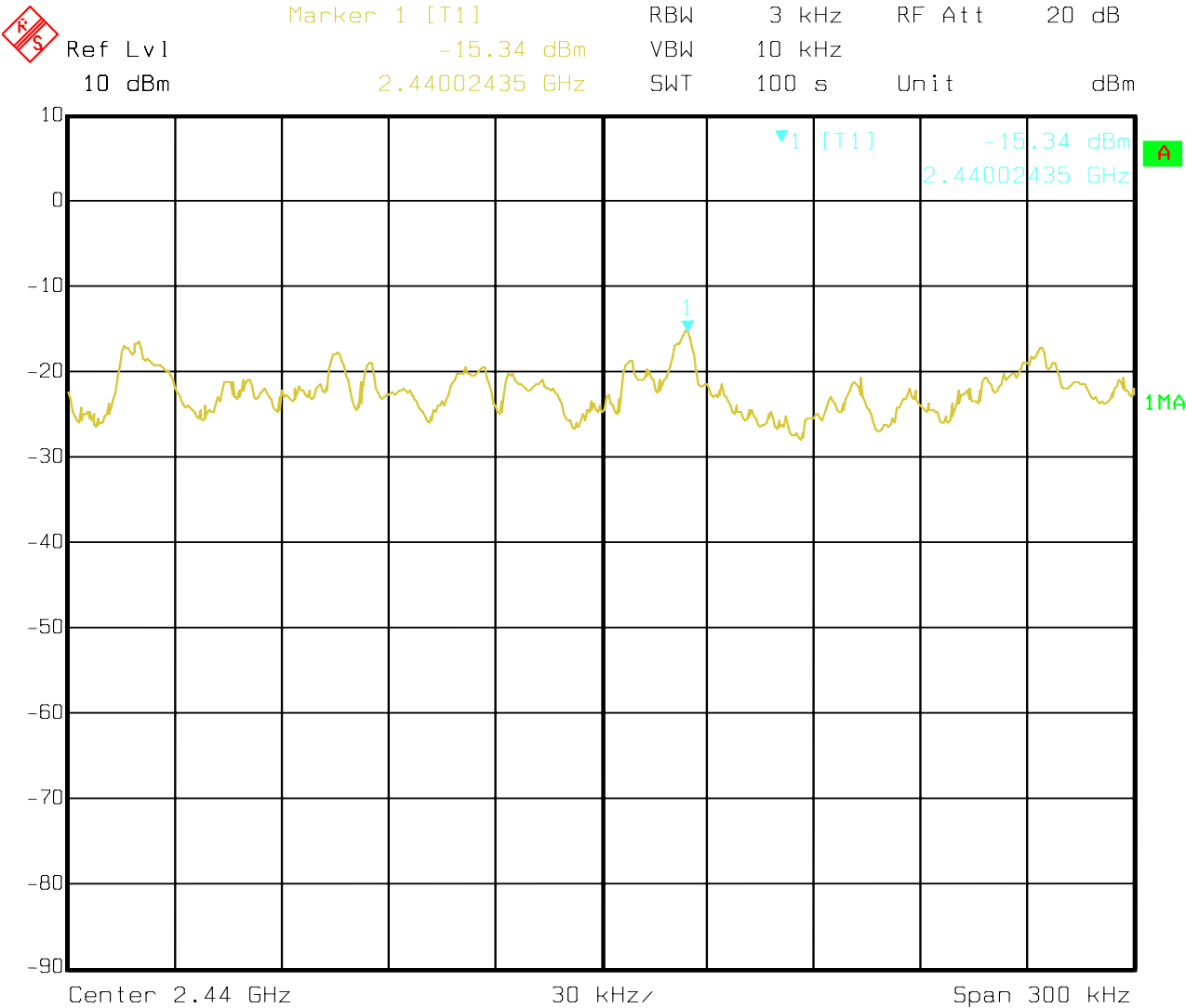
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TEST REPORT

2. CH Mid



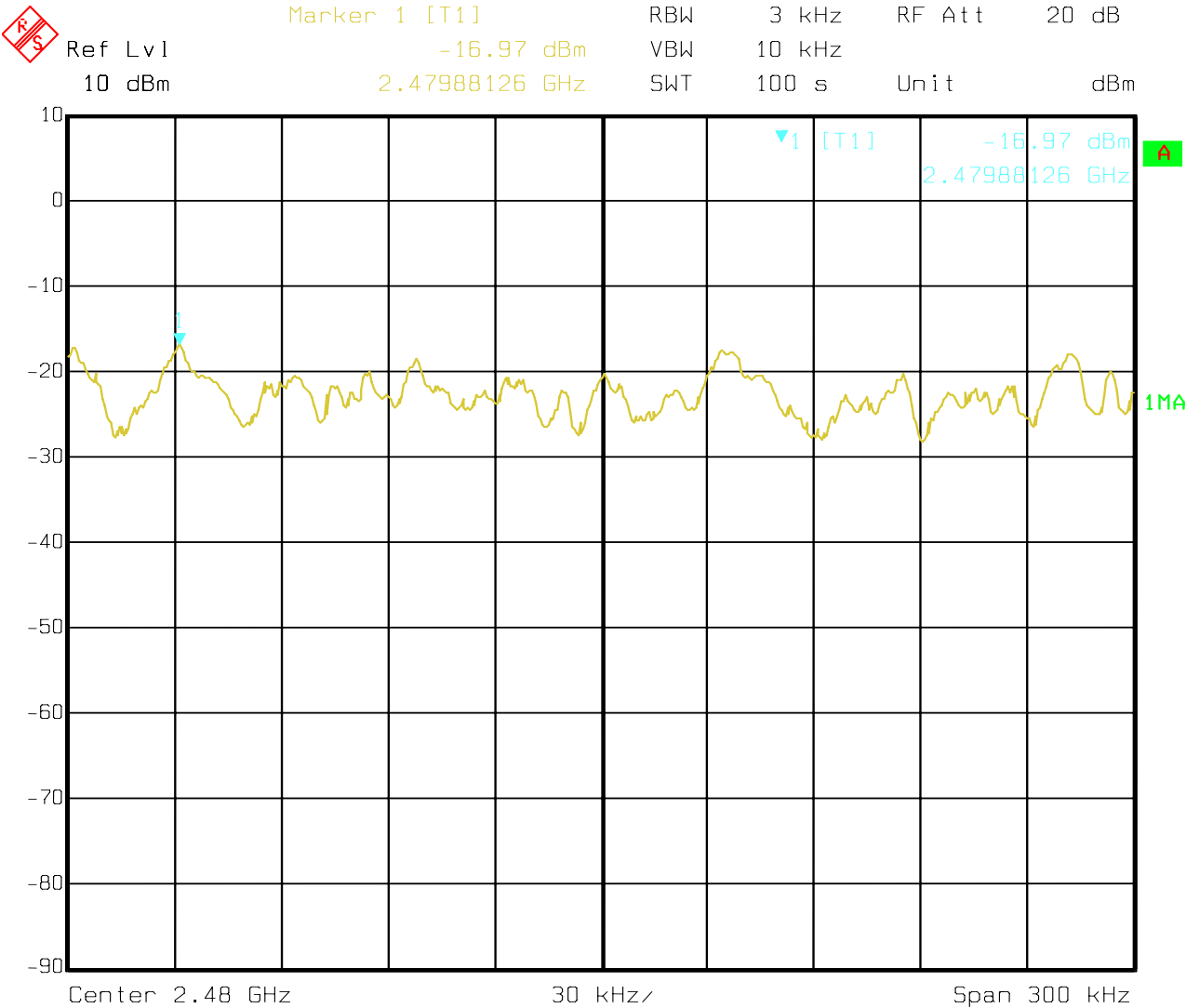
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TEST REPORT

3. CH High



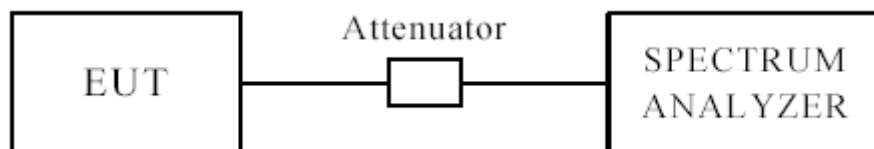
Date: 04.DEC.2008 16:33:26

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## 10 Out of Band Measurement

### 10.1 Test Setup



### 10.2 Limits of Out of Band Emissions Measurement

1. Below  $-20\text{dB}$  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

### 10.3 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 field 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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## TEST REPORT

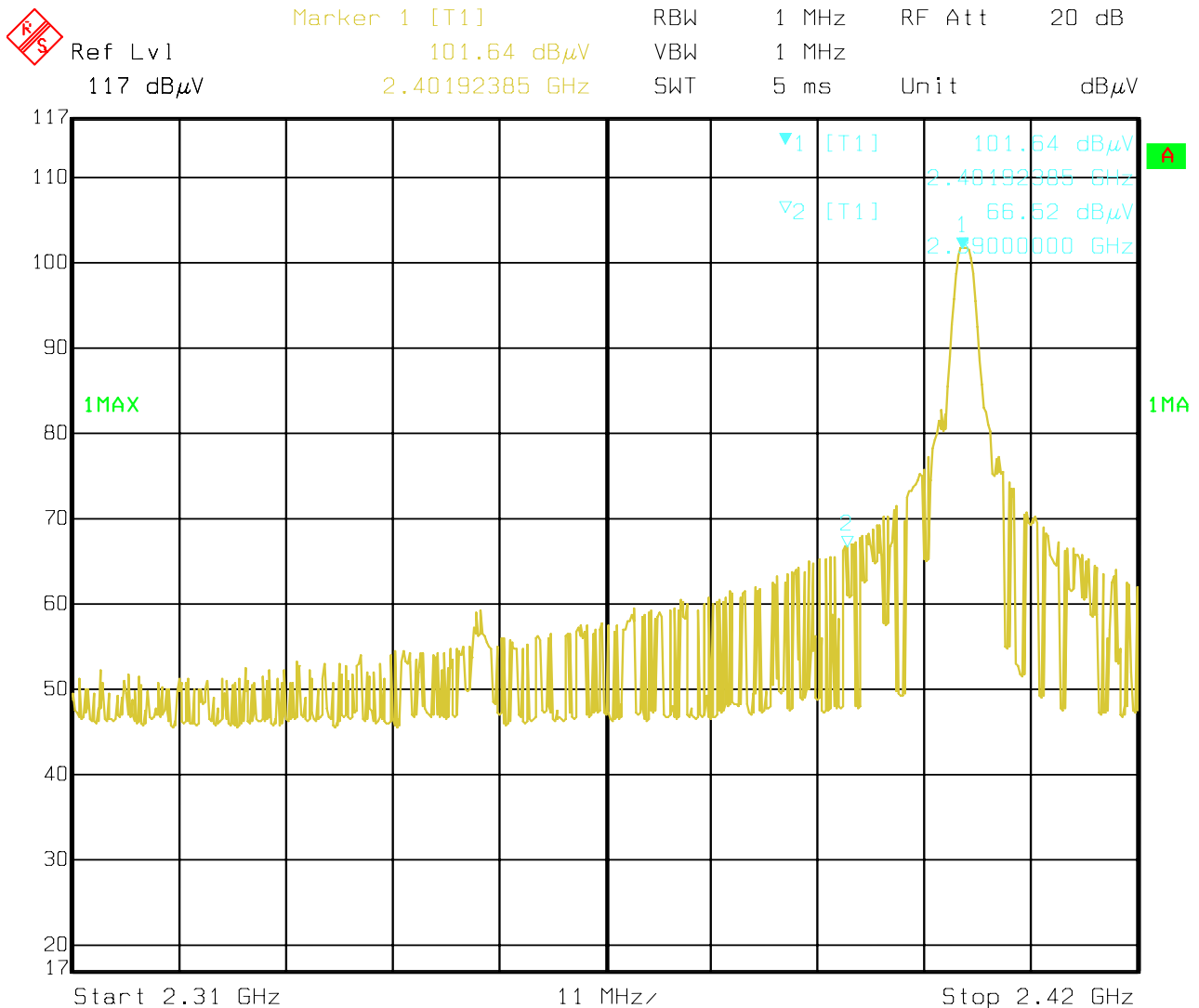
### 10.4 Test Result

CH Low

#### 10.4 Out of Band Test Result

Product:	2.4GHz Radio Control System		Test Mode:	CH Low
Mode	Keep Transmitting		Input Voltage	DC 12V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in Restrict Band	PK (dB $\mu$ V/m)	62.1(V)/57.2(H)	Limit	74(dB $\mu$ V/m)
	AV(dB $\mu$ V/m)	48.9(V)/43.6(H)		54(dB $\mu$ V/m)

#### Test Figure:



Date: 04.DEC.2008 16:11:11

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

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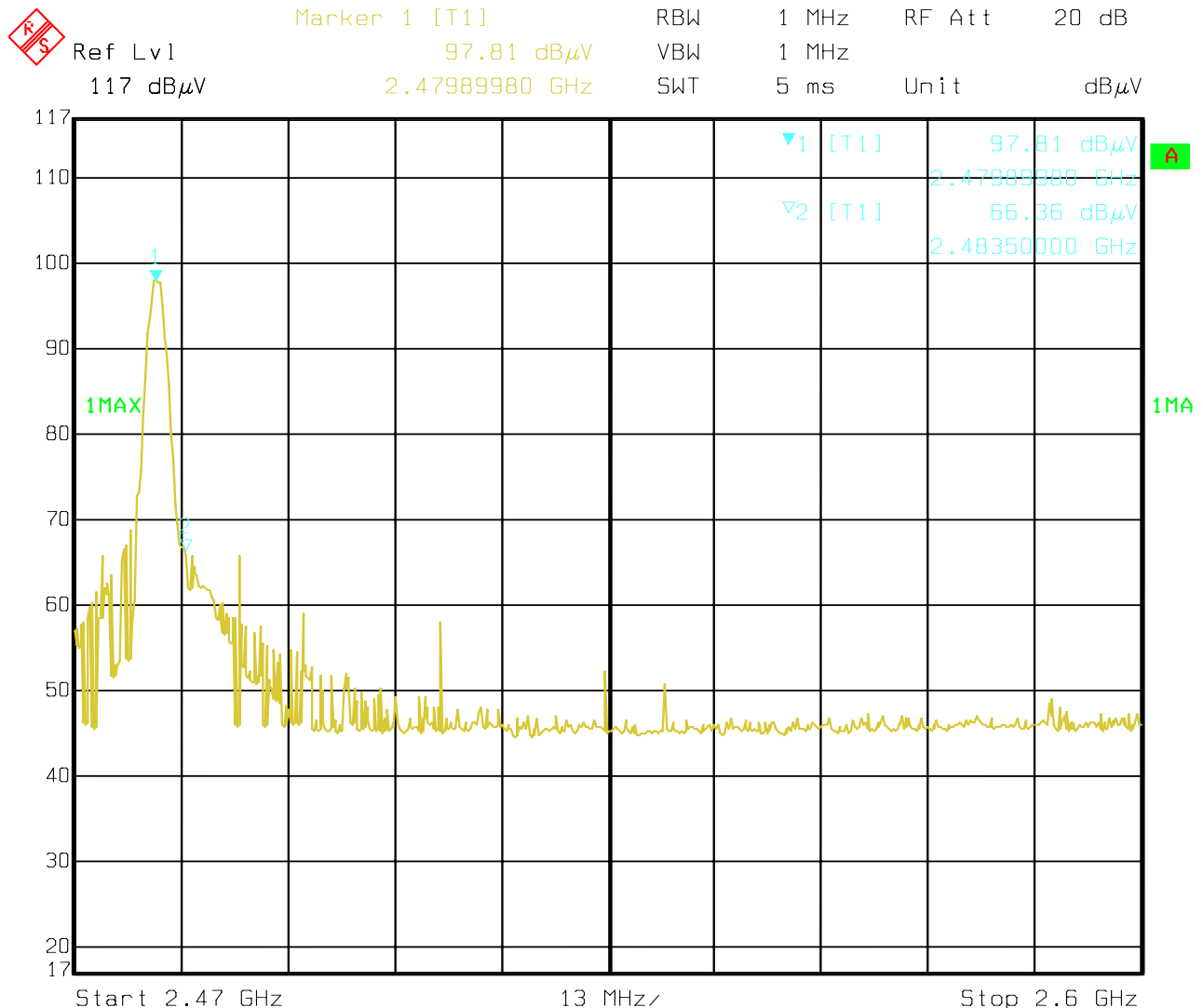
## TEST REPORT

CH High

### 10.4 Out of Band Test Result

Product:	2.4GHz Radio Control System		Test Mode:	CH High
Mode	Keep Transmitting		Input Voltage	DC 12V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in Restrict Band	PK (dBμV/m)	63.5(V)/59.2(H)	Limit	74(dBμV/m)
	AV(dBμV/m)	49.7(V)/43.8(H)		54(dBμV/m)

### Test Figure:



Date: 04.DEC.2008 16:38:25

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

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## **11.0 Antenna Requirement**

### **11.1 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 amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **11.2 Antenna Connected construction**

The antenna is Dipole antenna. The maximum Gain of this antenna is 2.0dBi

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## 12.0 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   <sup>2</sup> ,   H   <sup>2</sup> 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   <sup>2</sup> ,   H   <sup>2</sup> 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

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

**E** = Electric Field (V/m)

**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

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

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.

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### Calculated Result and Limit

Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
1.585	-3.18	0.4808	0.0001	1	Compiles

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### 13.0 FCC ID Label

#### FCC ID: WL9-ETC

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:



FCC ID Label Location

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#### 14.0 Photo of testing

##### 14.1 Emission Radiated test View--



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Conducted Emissions test View



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#### 14.2 Photo for the EUT

Outside View (Model: ETC62-2.4GHz)



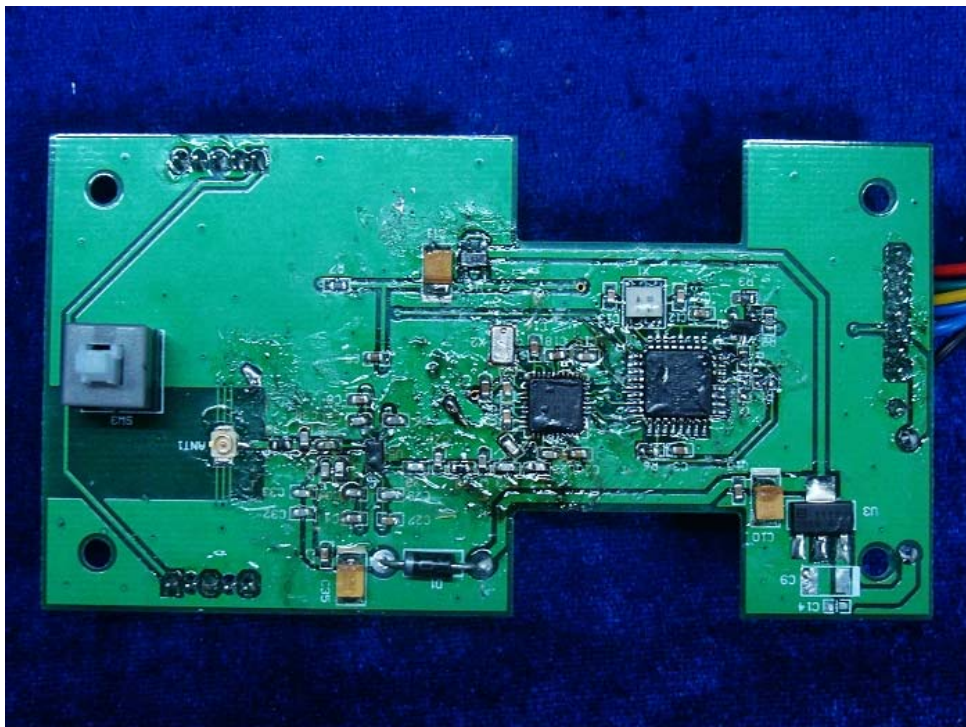
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Interior View (Model: ETC62-2.4GHz)



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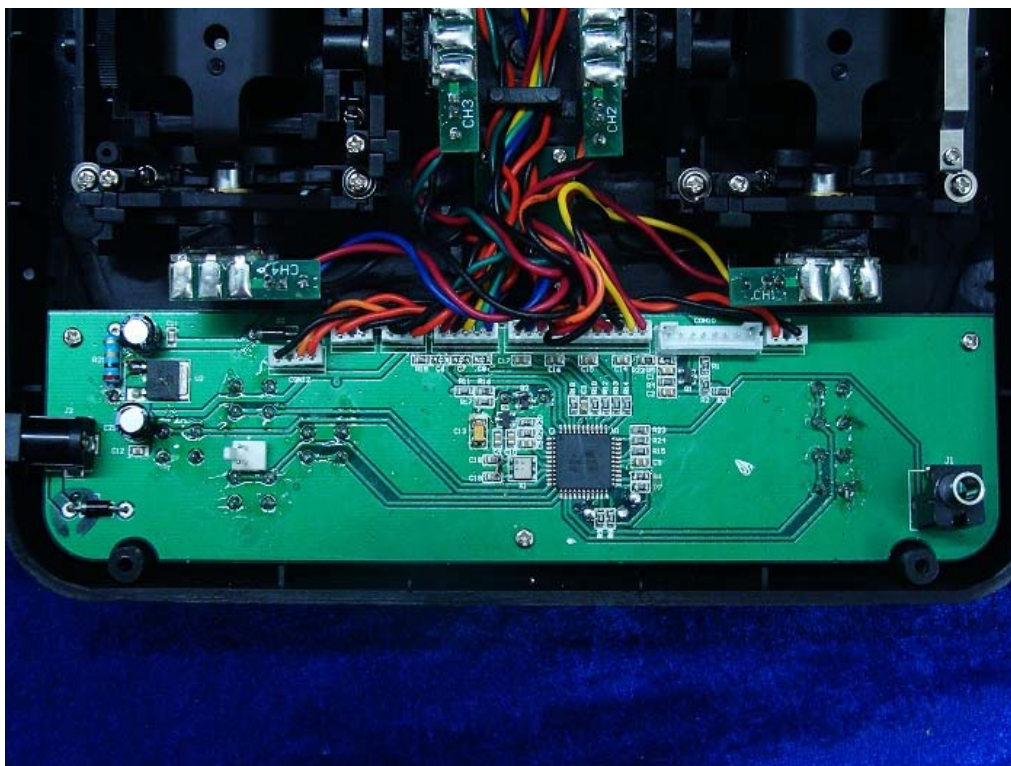
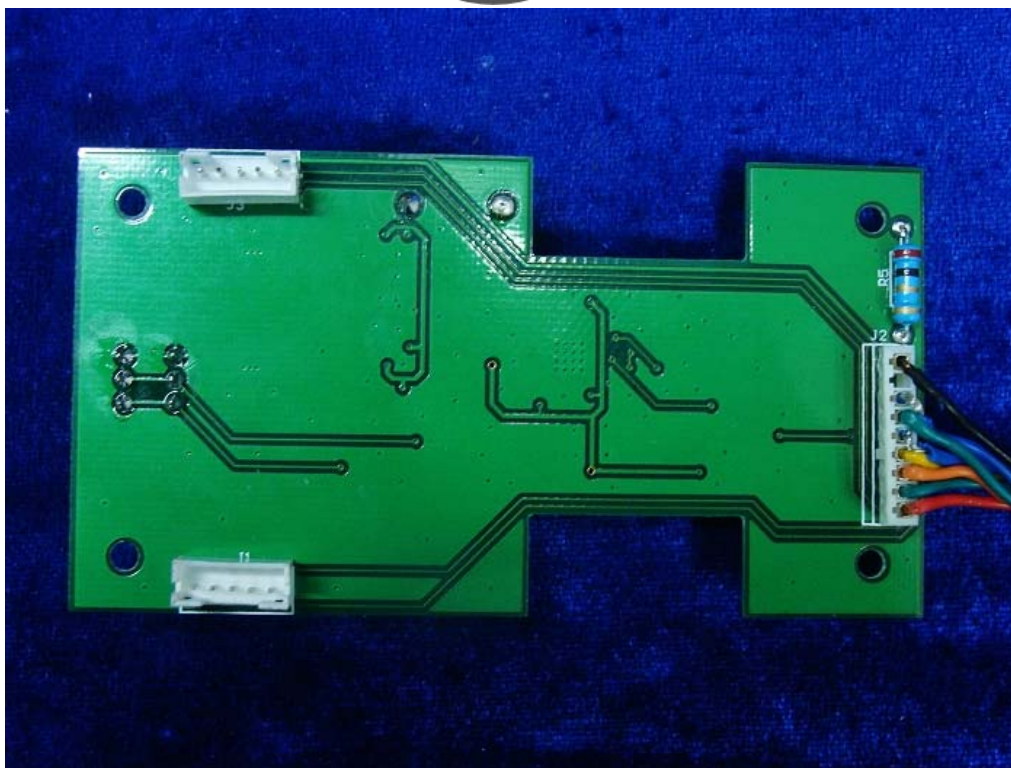
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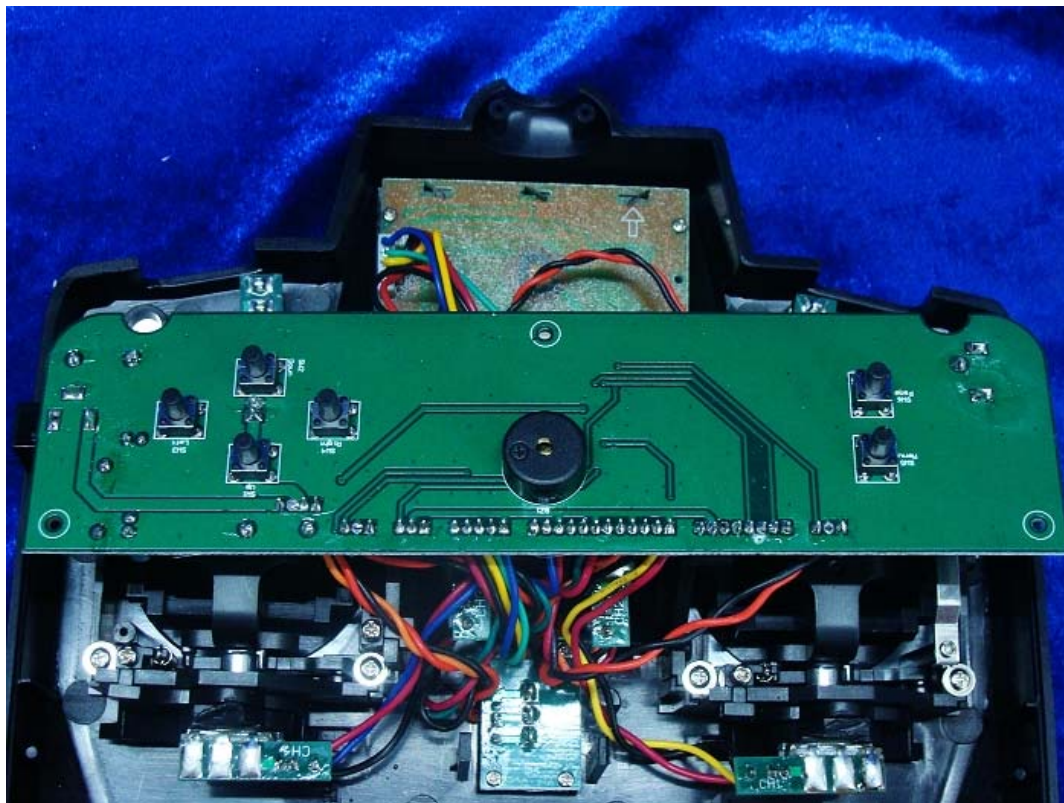
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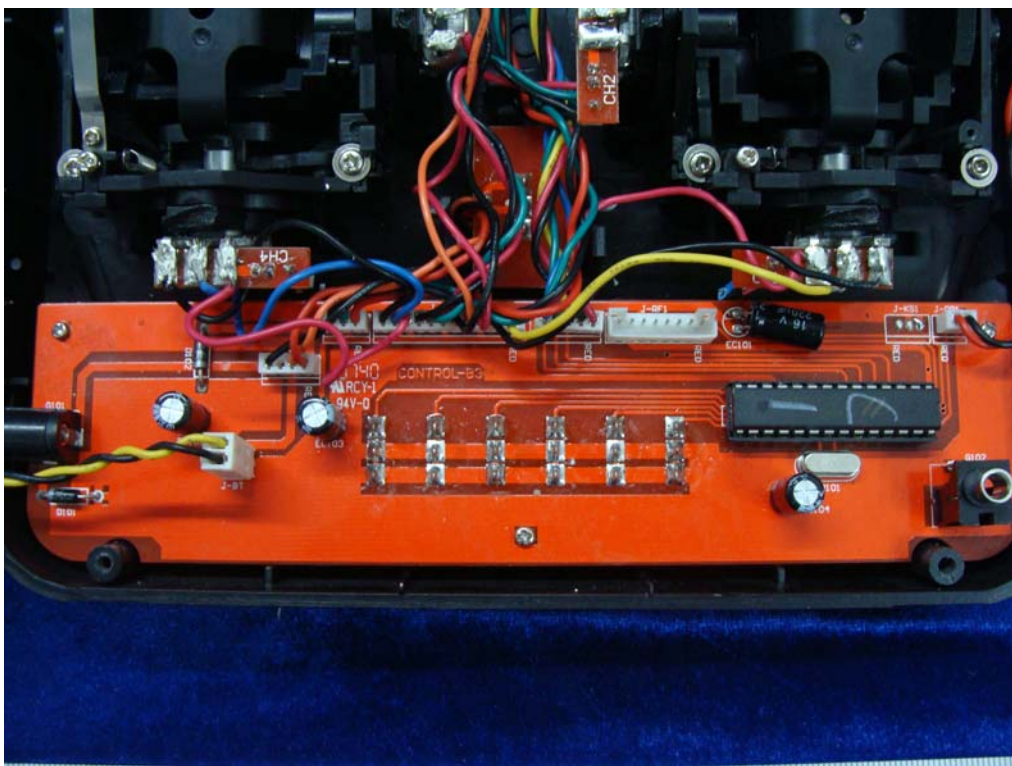
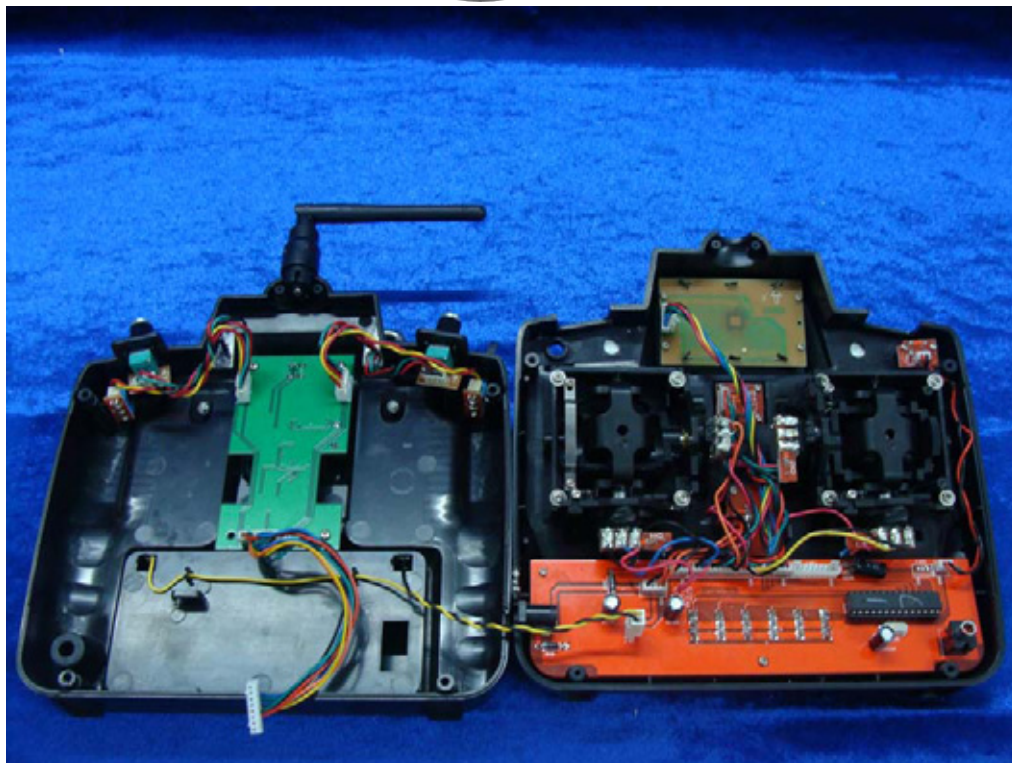
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Interior View (Model: ETC61-2.4GHz)



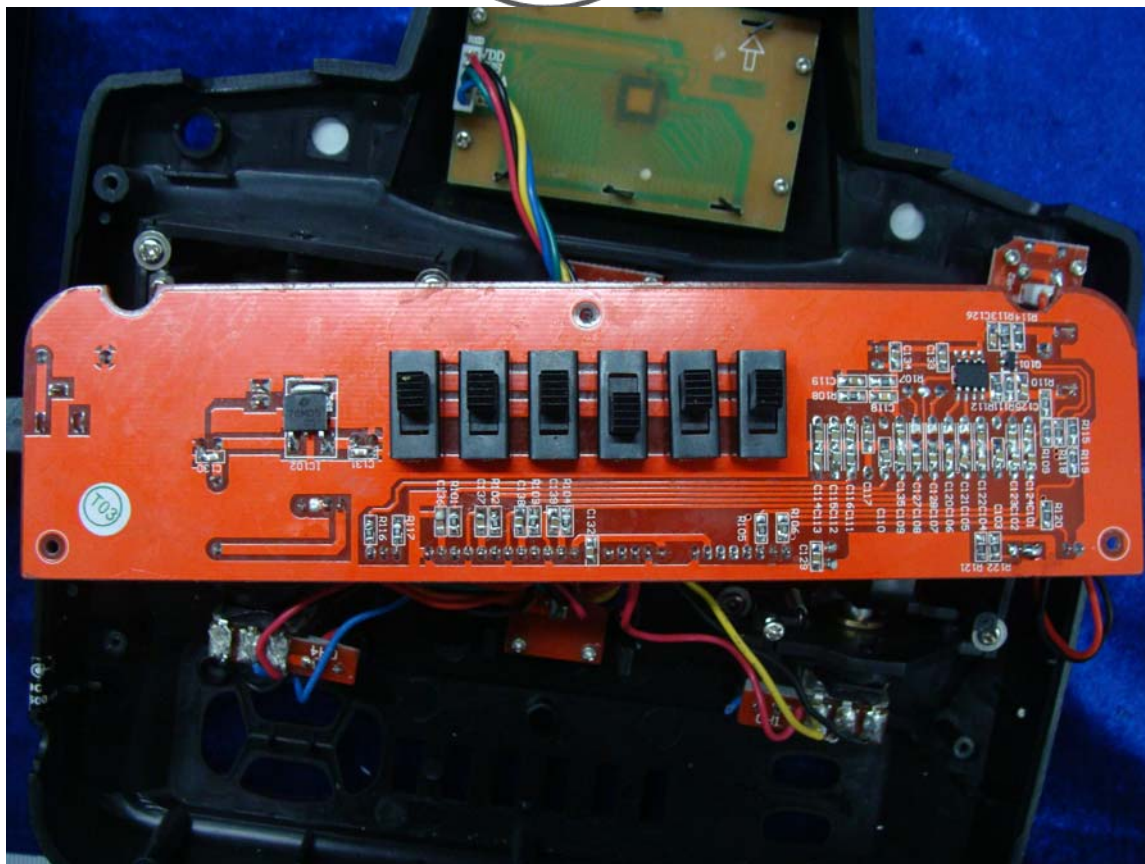
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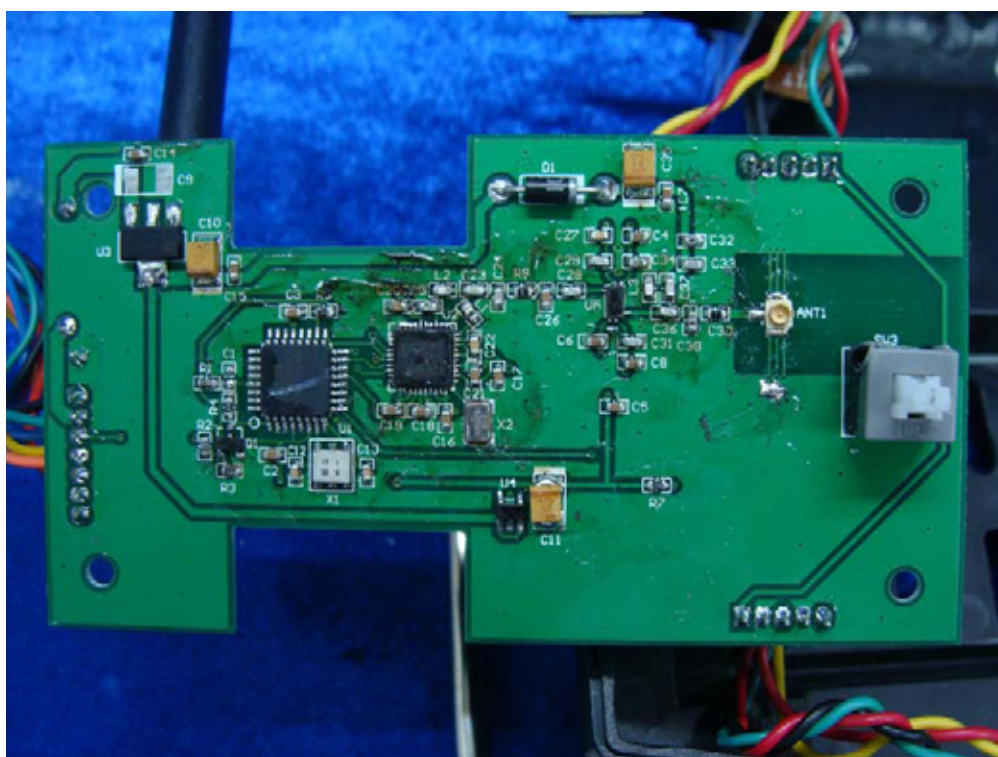
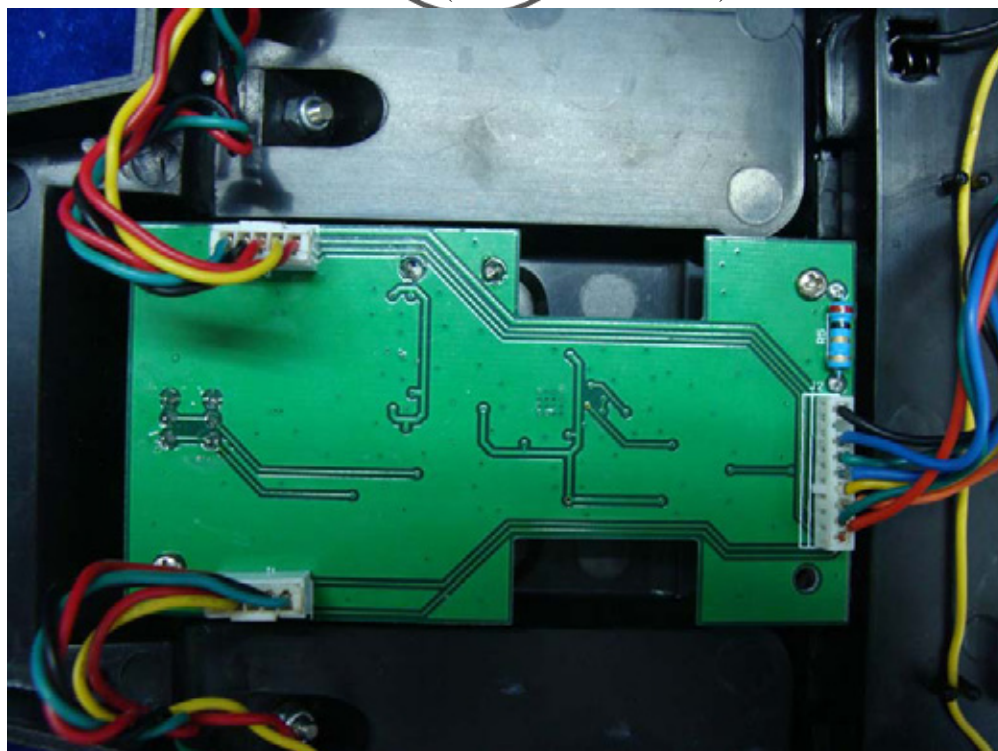
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Interior View (Model: ETC61-2.4GHz)



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