

TEST REPORT

Applicant: Daimler(Hebei) Hoisting Machinery Manufacturing Co., Ltd

Address of Applicant: Donglv Industrial Park, Qingyuan District, Baoding, Hebei, China

Manufacturer/Factory: Daimler(Hebei) Hoisting Machinery Manufacturing Co., Ltd

Address of Manufacturer/Factory: Donglv Industrial Park, Qingyuan District, Baoding, Hebei, China

Equipment Under Test (EUT)

Product Name: Wireless remote control

Model No.: YT440-1, YX440-1, YX880-1, YX1320-1, YX1760-1, YX2200-1, WX440-1, WX880-1, WX1320-1, WX2200-1, YX550-2, YX1320-2, YX2200-2, WX550-2, WX880-2, WX1320-2, WX1760-2, WX2200-2, WX4400LBS-2, WX2200LBS-2, WX1100LBS-2, 330LBS, 1100LBS, 2200LBS, 2200LBS, 550LBS, 660LBS, 880LBS, 1320LBS, 1760LBS, 440LBS, PA200, PA250, PA300, PA400, PA500, PA600, PA800, PA900, PA1000, PA1200, 0.3T, 0.5T, 1T, 2T, 3T, 5T, 10T, 7.5T, 15T, 20T, 25T, 30T, 35T, 50T, 75T

FCC ID: 2BAAL-DML0312

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.231

Date of sample receipt: February 20, 2023

Date of Test: February 21, 2023-March 20, 2023

Date of report issued: March 20, 2023

Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



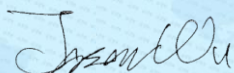
Robinson Luo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
01	March 20, 2023	Original

Prepared By:

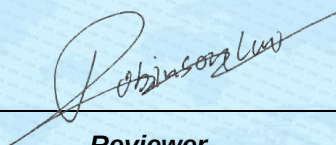


Date:

March 20, 2023

Project Engineer

Check By:



Date:

March 20, 2023

Reviewer

3 Contents

	Page
1 COVER PAGE	1
2 VERSION	2
3 CONTENTS	3
4 TEST SUMMARY	4
4.1 MEASUREMENT UNCERTAINTY	4
5 GENERAL INFORMATION	5
5.1 GENERAL DESCRIPTION OF EUT	5
5.2 TEST MODE	6
5.3 DESCRIPTION OF SUPPORT UNITS	6
5.4 TEST FACILITY.....	6
5.5 TEST LOCATION	6
5.6 OTHER INFORMATION REQUESTED BY THE CUSTOMER	6
5.7 ADDITIONAL INSTRUCTIONS.....	6
6 TEST INSTRUMENTS LIST	7
7 TEST RESULTS AND MEASUREMENT DATA.....	9
7.1 ANTENNA REQUIREMENT	9
7.2 RADIATED EMISSION METHOD	10
7.2.1 Field Strength of The Fundamental Signal	12
7.2.2 Spurious Emissions	14
7.3 20dB OCCUPY BANDWIDTH	18
7.4 DEACTIVATION TESTING.....	19
8 TEST SETUP PHOTO	20
9 EUT CONSTRUCTIONAL DETAILS	20

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203	Pass
Conduction Emission	15.207	N/A
Field strength of the Fundamental Signal	15.231 (b)	Pass
Spurious Emissions	15.231 (b)/15.209	Pass
20dB Bandwidth	15.231 (c)	Pass
Deactivation Testing	15.231 (a)(1)	Pass

Pass: The EUT complies with the essential requirements in the standard.

N/A: Not applicable.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

5 General Information

5.1 General Description of EUT

Product Name:	Wireless remote control
Model No.:	YT440-1, YX440-1, YX880-1, YX1320-1, YX1760-1, YX2200-1, WX440-1, WX880-1, WX1320-1, WX2200-1, YX550-2, YX1320-2, YX2200-2, WX550-2, WX880-2, WX1320-2, WX1760-2, WX2200-2, WX4400LBS-2, WX2200LBS-2, WX1100LBS-2, 330LBS, 1100LBS, 2200LBS, 2200LBS, 550LBS, 660LBS, 880LBS, 1320LBS, 1760LBS, 440LBS, PA200, PA250, PA300, PA400, PA500, PA600, PA800, PA900, PA1000, PA1200, 0.3T, 0.5T, 1T, 2T, 3T, 5T, 10T, 7.5T, 15T, 20T, 25T, 30T, 35T, 50T, 75T
Test Model No:	YT440-1
Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are appearance color and model name for commercial purpose.	
S/N:	YT440-1
Test sample(s) ID:	GTS2023020245-1
Sample(s) Status:	Engineer sample
Operation Frequency:	868.3MHz
Modulation technology:	FSK
Antenna Type:	Copper Spring Antenna
Antenna gain:	2.5dBi(declare by applicant)
Power supply:	DC 3V(2*1.5V Size“AAA” Battery)

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting mode. The new battery used
-------------------	---

Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which only the worst case was shown in this test report and defined as follows:

868.3MHz	Axis	X	Y	Z
	Field Strength(dBuV/m)	87.23	87.58	86.85

5.3 Description of Support Units

None.

5.4 Test Facility

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

- **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 381383.

- **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A.

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
No.123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone,
Xixiang Road, Baoan District, Shenzhen, Guangdong, China
Tel: 0755-27798480
Fax: 0755-27798960

5.6 Other Information Requested by the Customer

None.

5.7 Additional Instructions

EUT Software Settings:

Mode	Continuously transmitter by manufacturer, power set default
------	---

6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventor y No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July 02, 2020	July 01, 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	April 22, 2022	April 21, 2023
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	March 21, 2022	March 20, 2023
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June 12, 2022	June 11, 2023
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 23, 2022	June 22, 2023
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	April 22, 2022	April 21, 2023
9	Coaxial Cable	GTS	N/A	GTS211	April 22, 2022	April 21, 2023
10	Coaxial cable	GTS	N/A	GTS210	April 22, 2022	April 21, 2023
11	Coaxial Cable	GTS	N/A	GTS212	April 22, 2022	April 21, 2023
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	April 22, 2022	April 21, 2023
13	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 23, 2022	June 22, 2023
14	Band filter	Amindeon	82346	GTS219	June 23, 2022	June 22, 2023
15	Power Meter	Anritsu	ML2495A	GTS540	June 23, 2022	June 22, 2023
16	Power Sensor	Anritsu	MA2411B	GTS541	June 23, 2022	June 22, 2023
17	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	April 22, 2022	April 21, 2023
18	Splitter	Agilent	11636B	GTS237	June 23, 2022	June 22, 2023
19	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 29, 2022	Nov. 28, 2023
20	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	April 22, 2022	April 21, 2023
21	Breitband hornantenna	SCHWARZBECK	BBHA 9170	GTS579	Oct. 16, 2022	Oct. 15, 2023
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 16, 2022	Oct. 15, 2023
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 16, 2022	Oct. 15, 2023
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June 23, 2022	June 22, 2023
25	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	April 22, 2022	April 21, 2023

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	April 22, 2022	April 21, 2023
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 22, 2022	April 21, 2023
3	Spectrum Analyzer	Agilent	E4440A	GTS536	April 22, 2022	April 21, 2023
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	April 22, 2022	April 21, 2023
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	April 22, 2022	April 21, 2023
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	April 22, 2022	April 21, 2023
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	April 22, 2022	April 21, 2023
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	April 22, 2022	April 21, 2023

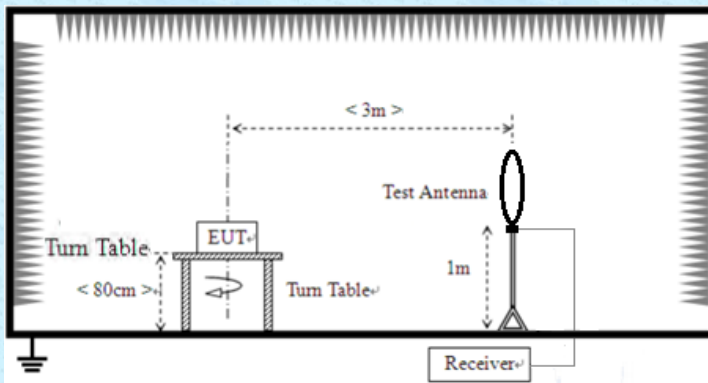
General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	April 25, 2022	April 24, 2023
2	Barometer	KUMAO	SF132	GTS647	July 26, 2022	July 25, 2023

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
EUT Antenna:	
The antenna is copper spring antenna, reference to the appendix II for details.	

7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.231 (b)& Section 15.209					
Test Method:	ANSI C63.10:2013					
Test Frequency Range:	9kHz to 6000MHz					
Test site:	Measurement Distance: 3m					
Receiver setup:	Frequency	Detector	RBW	VBW	Value	
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak	
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak	
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak	
	Above 1GHz	Peak	1MHz	3MHz	Peak	
		Peak	1MHz	10Hz	Average	
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark		
	868.3MHz	101.94		Peak Value		
		81.94		Average Value		
Limit: (Spurious Emissions)	Fundamental Frequency (MHz)		Field Strength of fundamental (microvolts/meter)		Field Strength of Unwanted Emissions (microvolts/meter)	
	40.66-40.70		2250		225	
	70-130		1250		125	
	130-174		1250 to 3750**		125 to 735	
	174-260		3750		375	
	260-470		3750 to12500		375 to 1250	
	Above 470		12500		1250	
	Frequency (MHz)		Class B(dBuV/m @3m)			
			Peak		Average	
	Above 1000		74		54	
	Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits higher field strength.					
	Test setup:	Below 30MHz				
						
	Below 1GHz					

Measurement data:

7.2.1 Field Strength of The Fundamental Signal

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
868.3	89.32	23.53	4.73	30	87.58	101.94	-14.36	Horizontal
868.3	87.64	23.53	4.73	30	85.90	101.94	-16.04	Vertical

Average value:

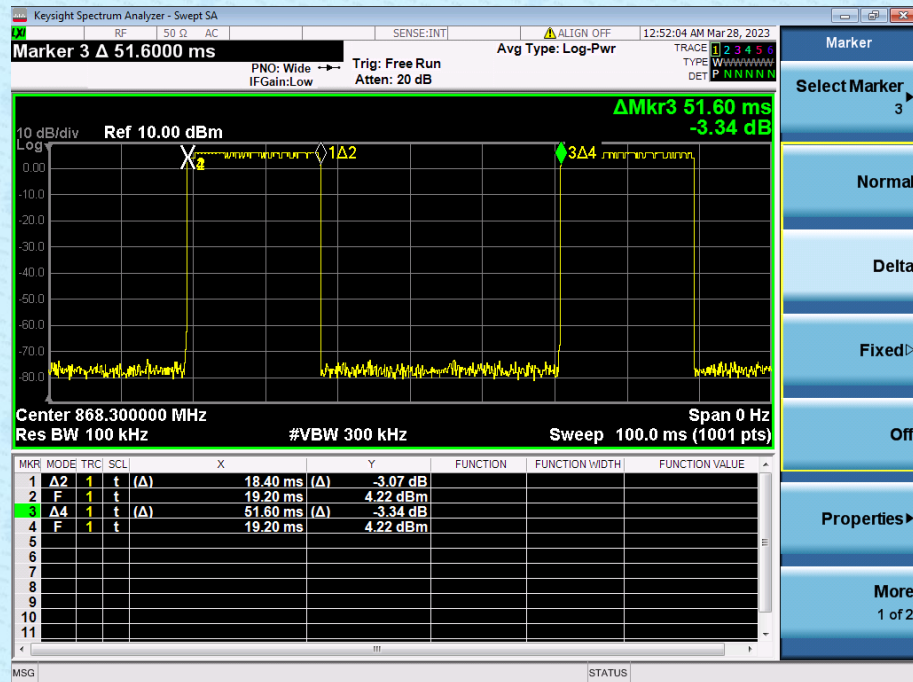
Frequency (MHz)	Peak Value (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
868.3	87.58	-8.96	78.62	81.94	-3.32	Horizontal
868.3	85.90	-8.96	76.94	81.94	-5.00	Vertical

Remarks:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*

Average value:	
Calculate Formula:	Average value=Peak value + Duty Cycle Factor
	Duty cycle factor=20 log(Duty cycle)
	Duty cycle=on time/100 milliseconds or period, whichever is less
Test data:	T on time =18.4(ms)
	T period =51.6(ms)
	Duty cycle=0.357
	duty cycle factor=-8.96

Test plot as follows:



7.2.2 Spurious Emissions

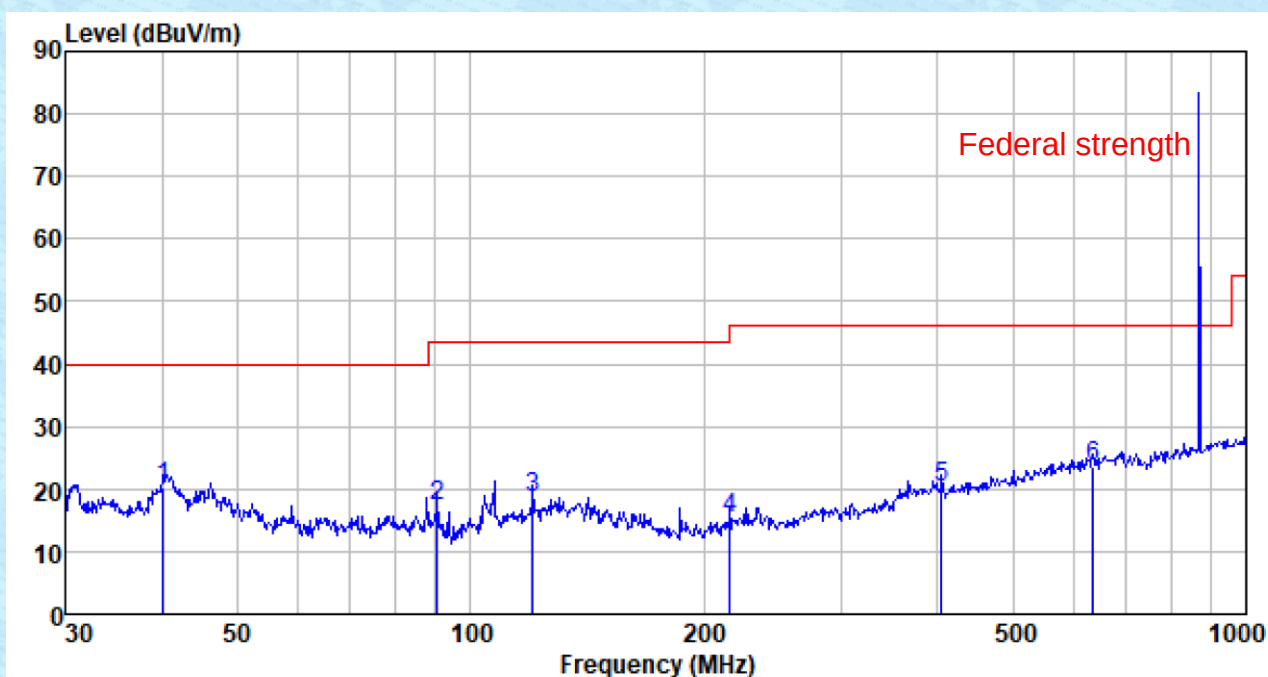
Measurement data:

9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

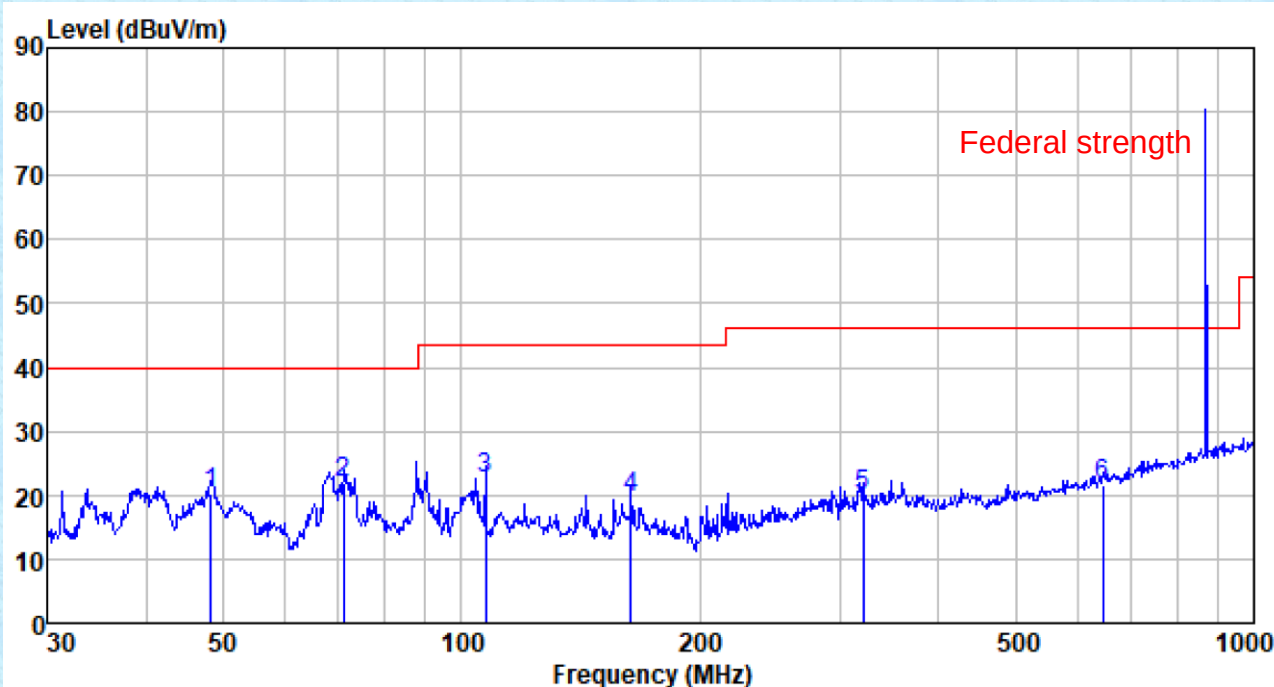
Below 1GHz:

Mode:	Transmitting mode	Polarization:	Horizontal
-------	-------------------	---------------	------------



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
40.135	36.20	13.50	0.66	30.00	20.36	40.00	-19.64	QP
90.537	37.46	8.66	1.11	30.00	17.23	43.50	-26.27	QP
120.277	35.96	11.22	1.36	30.00	18.54	43.50	-24.96	QP
216.024	33.11	10.09	1.93	30.00	15.13	46.00	-30.87	QP
404.667	31.63	15.80	2.88	30.00	20.31	46.00	-25.69	QP
633.907	29.80	19.83	3.85	30.00	23.48	46.00	-22.52	QP

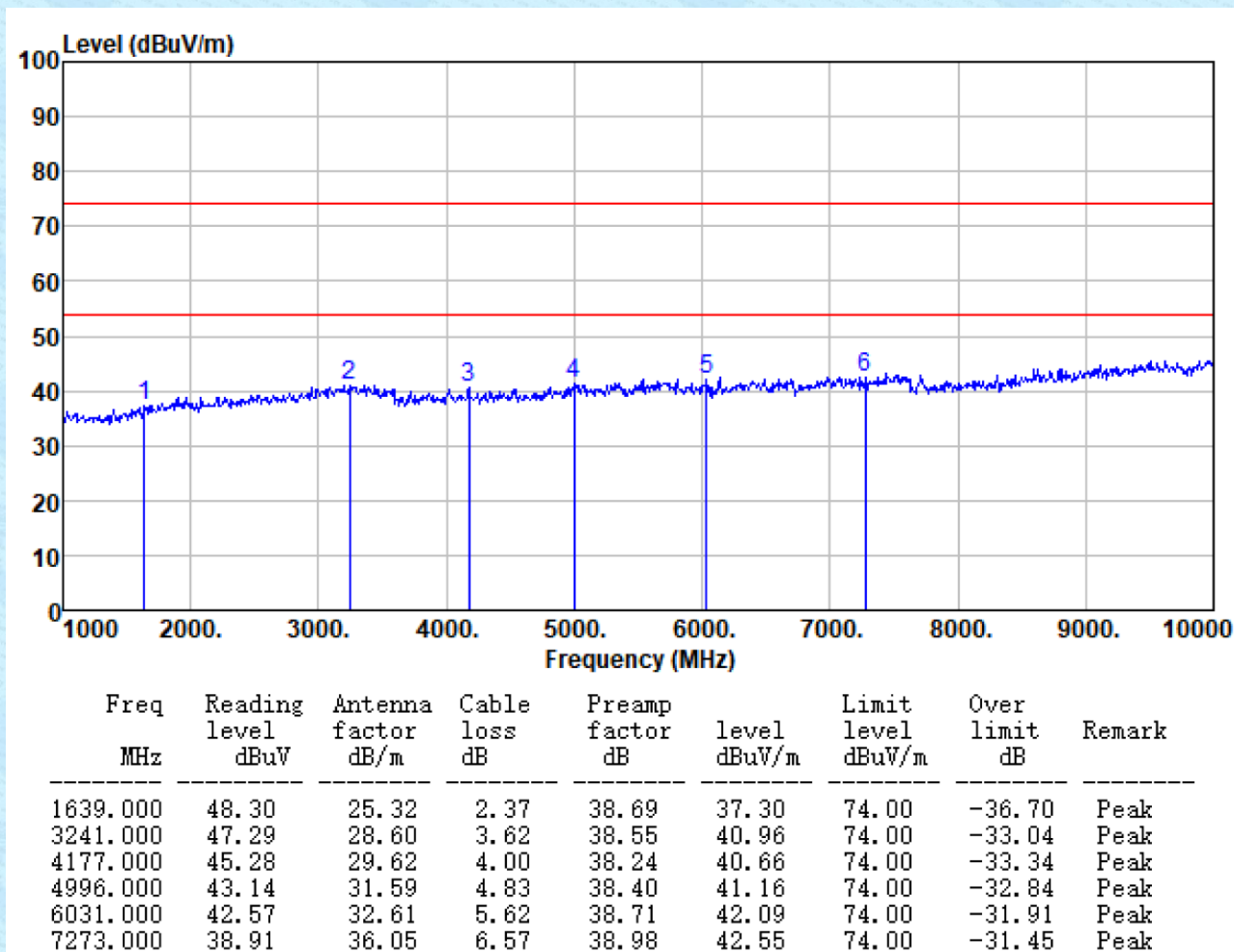
Mode: Transmitting mode Polarization: Vertical



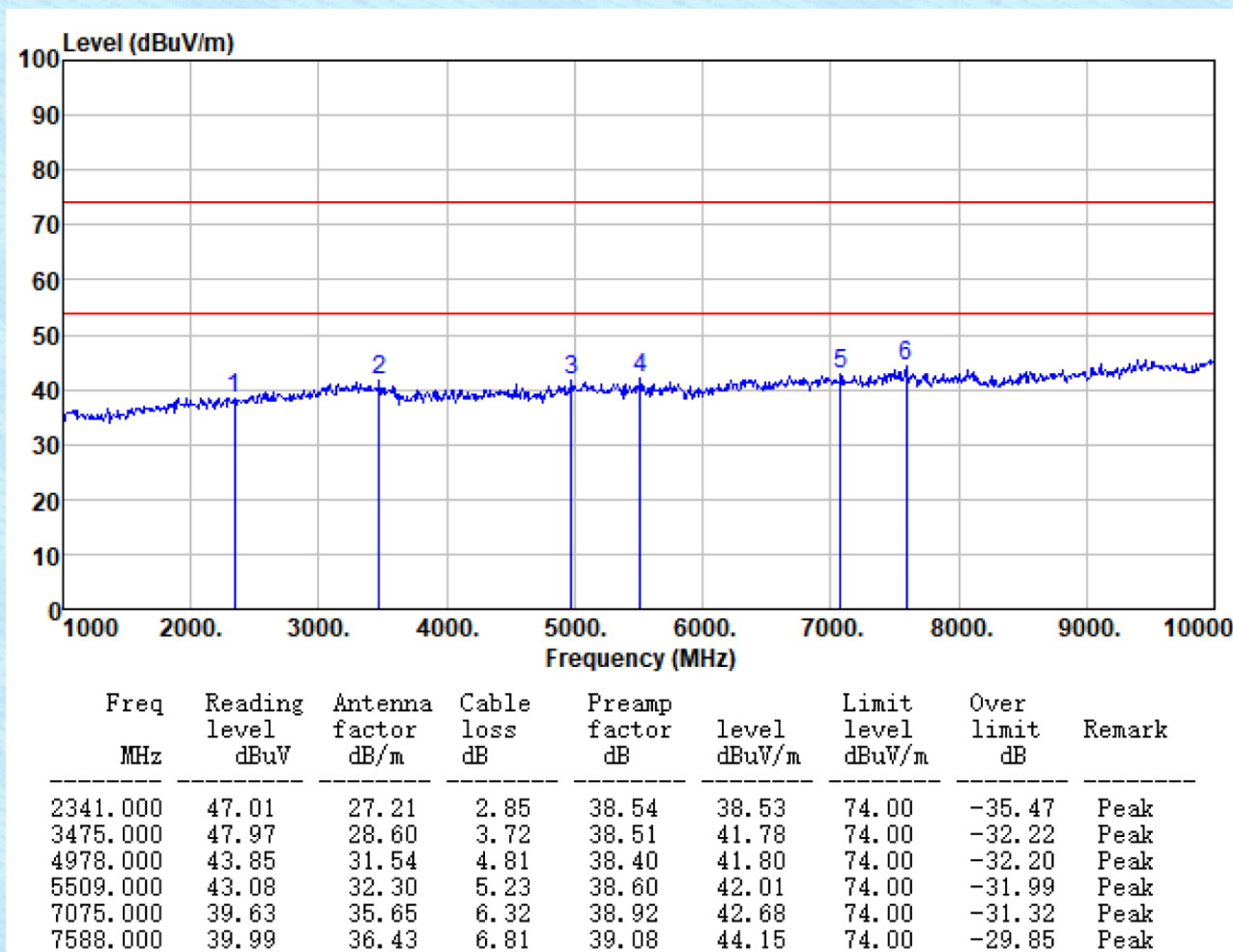
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
48.332	36.20	13.25	0.75	30.00	20.20	40.00	-19.80	QP
71.080	40.76	10.32	0.95	30.00	22.03	40.00	-17.97	QP
107.134	40.90	10.27	1.25	30.00	22.42	43.50	-21.08	QP
163.755	35.76	12.15	1.65	30.00	19.56	43.50	-23.94	QP
321.061	34.38	13.18	2.47	30.00	20.03	46.00	-25.97	QP
645.120	27.79	20.01	3.89	30.00	21.69	46.00	-24.31	QP

Above 1G:

Mode:	Transmitting mode	Polarization:	Horizontal
-------	-------------------	---------------	------------



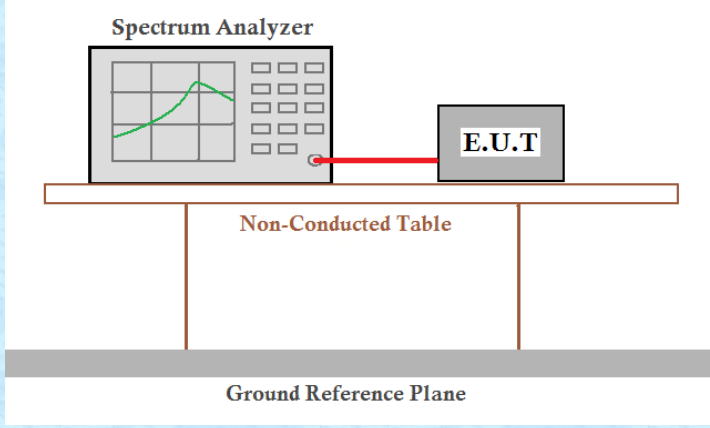
Mode:	Transmitting mode	Polarization:	Vertical
-------	-------------------	---------------	----------



Remarks:

2. $Final\ Level = Receiver\ Read\ level + Antenna\ Factor + Cable\ Loss - Preamplifier\ Factor$

7.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.10:2013
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

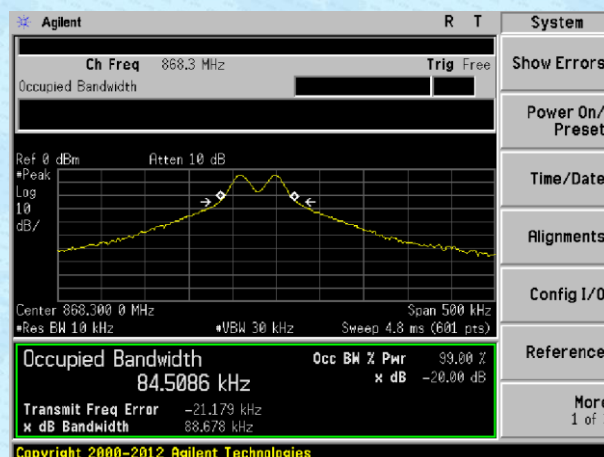
Measurement Data

Test Frequency (MHz)	20dB bandwidth (kHz)	Limit (MHz)	Result
868.3	88.678	2.1708	Pass

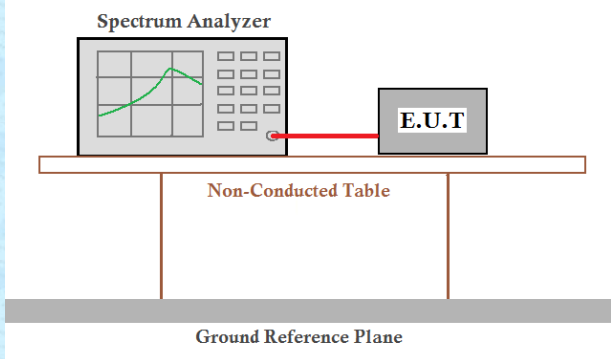
Note: Limit= Fundamental frequency×0.25%

$$868.3 \times 0.25\% = 2.1708 \text{ MHz}$$

Test plot as follows:



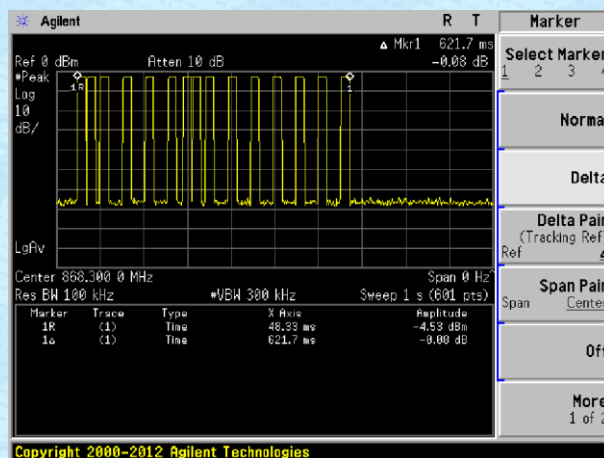
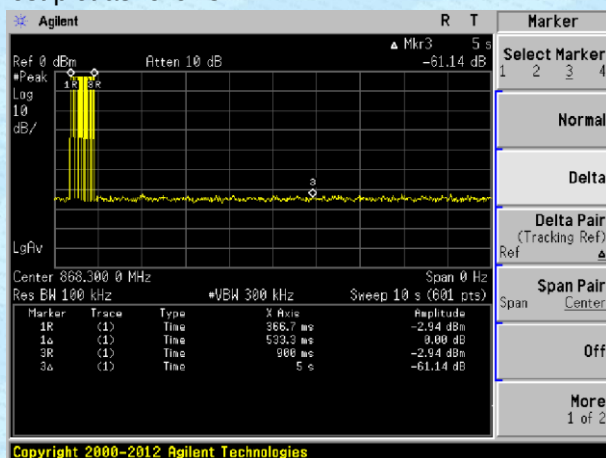
7.4 Deactivation Testing

Test Requirement:	FCC Part15 C Section 15.231 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=1MHz, span=0Hz, detector: Peak
Limit:	Not more than 5 seconds
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Frequency (MHz)	Duration of each TX (ms)	Limit (second)	Result
868.3	621.7	<5.0	Pass

Test plot as follows:



8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

----- End -----