Report No: GTSE11030016001

FCC REPORT

Applicant:	TECHKO ROBOTICS INDUSTRIAL LIMITED
Address of Applicant:	1201 Connaught Commercial Building, 185 Wan Chai Road, Hongkong

Equipment Under Test (EUT)

Product Name:	Remote Control
Model No.:	S201
FCC ID:	ZJGS201
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.231:2010
Date of sample receipt:	29 Apr., 2011
Date of Test:	04 May to 17 May 2011
Date of report issue:	19 May 2011
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*2011-05-19*	*Original*

Prepared By: *Collin.He* ***Date:*** *2011-05-19*

Project Engineer

Check By: *Hans.Hu* ***Date:*** *2011-05-19*

Reviewer

3 Contents

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Field strength of the fundamental signal	15.231 (b)	Pass
Spurious emissions	15.231 (b)/15.209	Pass
20dB Bandwidth	15.231 (c)	Pass
Dwell time	15.231 (a)	Pass

Remark:

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

5 General Information

5.1 Client Information

Applicant:	TECHKO ROBOTICS INDUSTRIAL LIMITED
Address of Applicant:	1201 Connaught Commercial Building, 185 Wan Chai Road, Hongkong
Manufacturer:	Shenzhen Techko Robotics Technology Ltd.
Address of Manufacturer:	No.52, Huangpu Road, Shangliao Village, Shajing Town, Baoan District ,Shenzhen City, China

5.2 General Description of E.U.T.

Product Name:	Remote Control
Model No.:	S201
Operation Frequency:	433.99MHz
Modulation type:	ASK
Antenna Type:	Integral (Rod antenna)
Antenna gain:	2dBi
Power supply:	Battery 12V (“27A” size)

5.3 Test mode

Transmitting mode:	Keep the EUT in transmitting mode with modulation.

Pre-Test Mode:

GTS has 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 was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	70.51	77.97	72.15

Final Test Mode:

According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup”:

Y axis (see the test setup photo)

5.4 Test Facility

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

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, July 20, 2010.

● **Industry Canada (IC)**

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-1.

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China
Tel: 0755-27798480
Fax: 0755-27798960

5.6 Other Information Requested by the Customer

None.

5.7 Test Instruments list

Radiated Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (dd-mm-yy)**	**Cal.Due date (dd-mm-yy)**
1	3m Semi-Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	TU201	Mar. 30 2011	Mar. 30 2012
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	TU202	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	TU203	Sept. 10 2010	Sept. 10 2011
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	TU204	Feb. 26 2011	Feb. 26 2012
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	TU205	June 30 2010	June 30 2011
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Coaxial Cable	TU	N/A	TU400	Apr. 01 2011	Apr. 01 2012
8	Coaxial Cable	TU	N/A	TU401	Apr. 01 2011	Apr. 01 2012
9	Coaxial cable	TU	N/A	TU402	Apr. 01 2011	Apr. 01 2012
10	Coaxial Cable	TU	N/A	TU407	Apr. 01 2011	Apr. 01 2012
11	Coaxial Cable	TU	N/A	TU408	Apr. 01 2011	Apr. 01 2012
12	Amplifier(100KHz-3GHz)	HP	8347A	GTS210	Aug. 03 2010	Aug. 03 2011
13	Amplifier(2GHz-20GHz)	HP	8349B	GTS224	Aug. 03 2010	Aug. 03 2011
14	Turntable & Antenna Positioner Controller	C&C	CC-C-IF	TU211	N/A	N/A
15	Printer	HP	LaserJet 1007	TU212	N/A	N/A
16	Color monitor	SUNSPO	SP-14C	TU213	N/A	N/A
17	Color monitor	SUNSPO	SP-14C	TU214	N/A	N/A

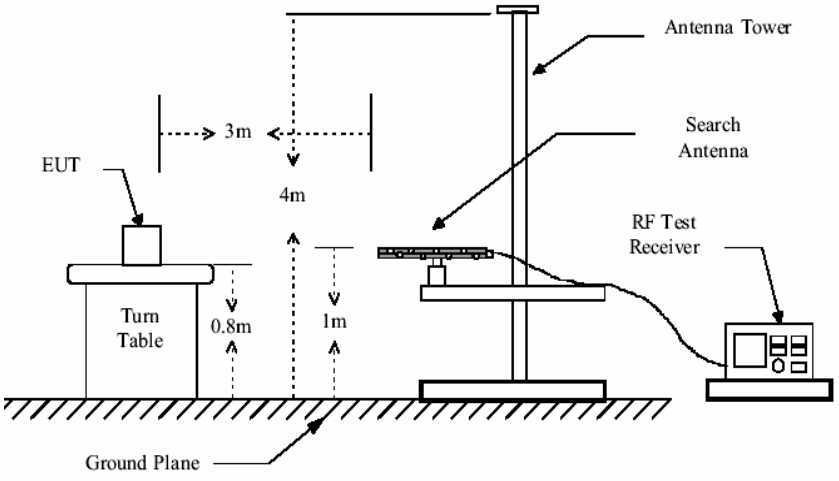
6 Test results and Measurement Data

6.1 Antenna requirement:

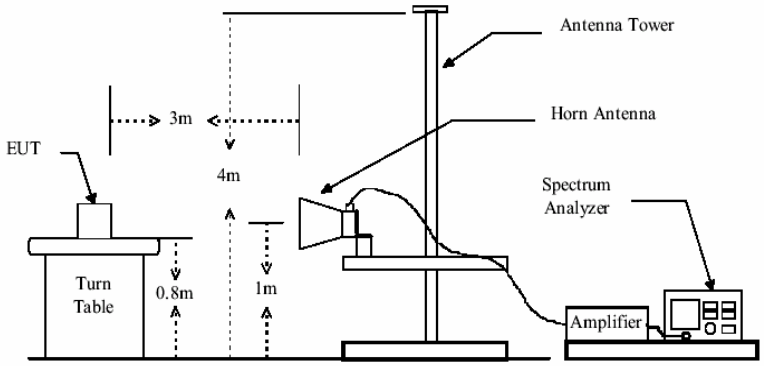
Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: *An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling 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.*	
E.U.T Antenna:	
The EUT make use of an external rod antenna,The typical gain of the antenna is 2dBi.	

6.2 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.231(b) and 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4:2003</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 5000MHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td>Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:
(Field strength of the fundamental signal)</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td rowspan="2">433.99MHz</td><td>80.8</td><td>Average Value</td></tr>
<tr><td>100.8</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:
(Spurious Emissions)</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table>
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits a higher field strength.
</td></tr>
<tr><td>Test Procedure:</td><td>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</td></tr>
<tr><td>Test setup:</td><td>Below 1GHz</td></tr>
</table>



Above 1GHz



Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Note:

1. *The signal bandwidth was measured and less then 100KHz RBW so PDCF factor is not required to correct the fundamental signal peak result*
2. *The peak field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:*
   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

Measurement Data

6.2.1 Field Strength Of The Fundamental Signal

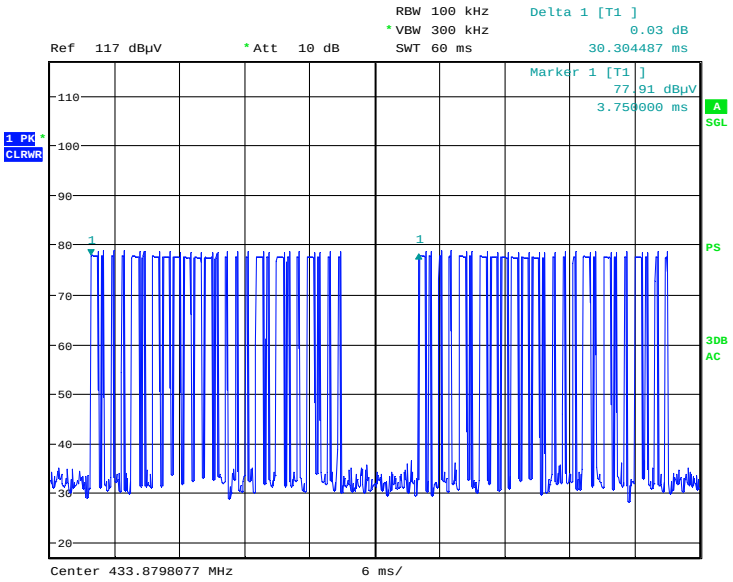
Peak value:								
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
433.99	89.11	18.62	2.31	32.07	77.97	104.00	-26.03	Horizontal
433.99	75.29	15.53	2.31	32.07	61.06	104.00	-42.94	Vertical

Average value:						
Frequency (MHz)	Level (dBuV/m)	Duty Cycle Factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.99	77.97	-9.13	68.84	80.80	-11.96	Horizontal
433.99	61.06	-9.13	51.93	80.80	-28.87	Vertical

Average value:	
Calculate Formula:	Average value=Peak value + Duty Cycle Factor
	Duty Cycle Factor =20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time = 11*753(us)+14*165(us)=10.593(ms)
	T period =30.30ms
	Duty cycle=34.96%
	Duty Cycle Factor = 20 log(Duty cycle)= -9.13

Test plot as follows:

T period:



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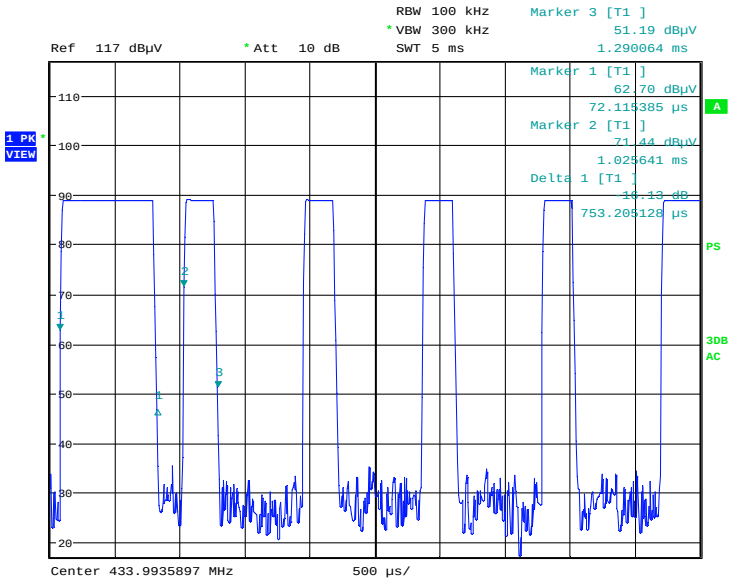
T on time slot-1:



Date: 4.MAY.2011 09:46:19

6.2.2 Spurious Emissions

Below 1GHz:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
39.58	0.64	15.54	25.73	25.45	15.90	40.00	-24.10	Horizontal
104.54	1.19	12.18	25.66	26.40	14.11	43.50	-29.39	Horizontal
199.29	1.77	11.44	25.62	26.54	14.13	43.50	-29.37	Horizontal
270.38	2.00	13.57	25.59	25.39	15.37	46.00	-30.63	Horizontal
684.75	2.89	26.78	25.53	24.55	28.69	46.00	-17.31	Horizontal
763.38	3.07	29.62	25.52	24.73	31.90	46.00	-14.10	Horizontal
31.84	0.61	13.64	25.75	30.05	18.55	40.00	-21.45	Vertical
36.13	0.63	14.29	25.74	28.46	17.64	40.00	-22.36	Vertical
96.44	1.12	14.18	25.67	27.45	17.08	43.50	-26.42	Vertical
176.89	1.67	14.07	25.63	26.92	17.03	43.50	-26.47	Vertical
317.70	2.11	16.76	25.58	26.66	19.95	46.00	-26.05	Vertical
747.48	3.03	23.52	25.52	26.58	27.61	46.00	-18.39	Vertical

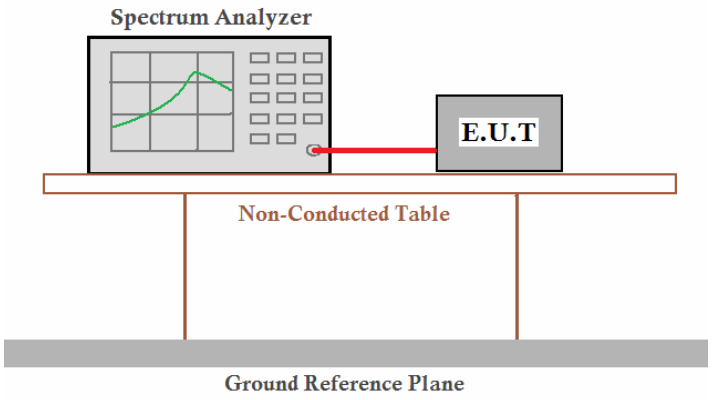
Above 1GHz:

Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1301.97	56.48	28.60	4.19	31.76	57.51	74.00	-16.49	Horizontal
1735.96	54.61	30.78	4.96	31.21	59.14	80.80	-21.66	Horizontal
2169.95	50.34	33.42	5.39	31.33	57.82	80.80	-22.98	Horizontal
2603.94	45.67	36.28	5.73	31.05	56.63	80.80	-24.17	Horizontal
1301.97	59.42	28.34	4.19	31.76	60.19	74.00	-13.81	Vertical
1735.96	55.18	31.03	4.96	31.21	59.96	80.80	-20.84	Vertical
2169.95	50.38	33.31	5.39	31.33	57.75	80.80	-23.05	Vertical
2603.94	43.69	36.22	5.73	31.05	54.59	80.80	-26.21	Vertical

Average value:						
Frequency (MHz)	Level (dBuV/m)	Duty Cycle Factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
867.98	58.10	-9.13	48.97	60.80	-11.83	Horizontal
1301.97	57.51	-9.13	48.38	54.00	-5.62	Horizontal
1735.96	59.14	-9.13	50.01	60.80	-10.79	Horizontal
2169.95	57.82	-9.13	48.69	60.80	-12.11	Horizontal
2603.94	56.63	-9.13	47.50	60.80	-13.30	Horizontal
867.98	63.85	-9.13	54.72	60.80	-6.08	Vertical
1301.97	60.19	-9.13	51.06	54.00	-2.94	Vertical
1735.96	59.96	-9.13	50.83	60.80	-9.97	Vertical
2169.95	57.75	-9.13	48.62	60.80	-12.18	Vertical
2603.94	54.59	-9.13	45.46	60.80	-15.34	Vertical

Remark, The emission levels of above 7th Harmonic are very lower than the limit and not show in test report.

6.3 20dB Bandwidth

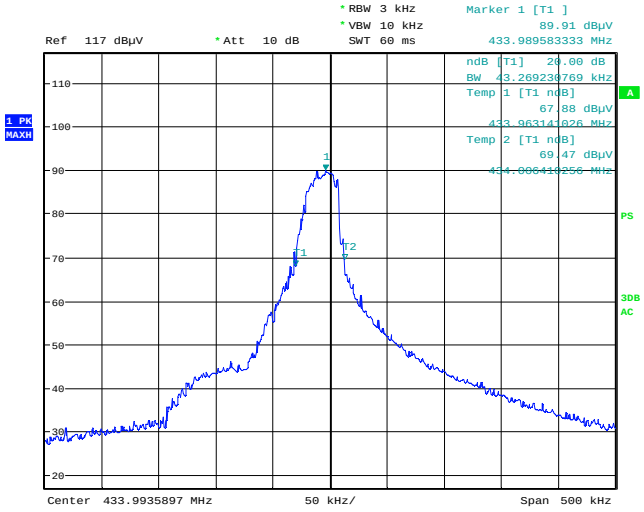
Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=3KHz, VBW=10KHz, detector: Peak
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 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 mode:	Transmitting mode
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test results:	Passed

Measurement Data

20dB bandwidth (MHz)	Limit (MHz)	Results
0.043MHz	1.085	Passed

Note: Limit= Fundamental frequency×0.25%=433.99×0.25%=1.085MHz

Test plot as follows:



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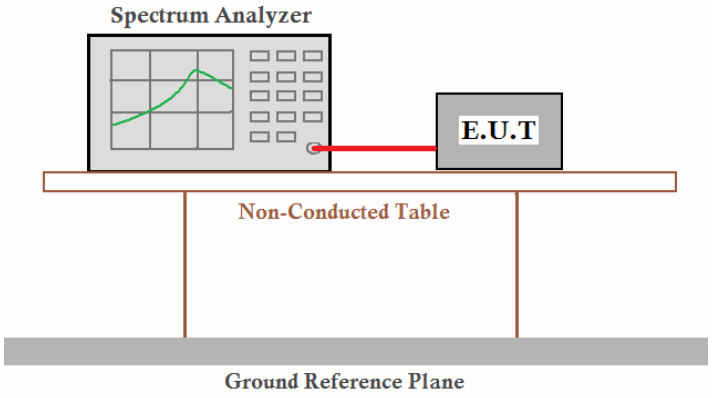
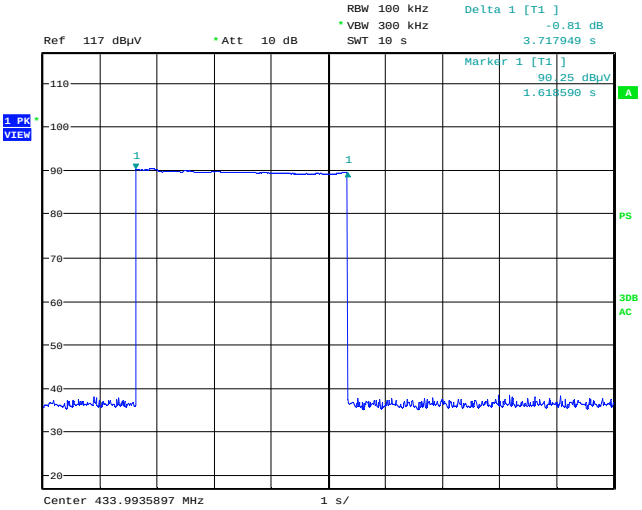
6.4 Dwell Time:

Test Requirement:	FCC Part15 C Section 15.231 (a)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100KHz, VBW=300KHz, span=0Hz, detector: Peak
Limit:	Not more than 5 seconds
Test mode:	Transmitting mode
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Single scan the transmit, and read the transmission time.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test results:	Passed

Measurement Data

Test item	Test data	Limit (second)	Result
Transmitting time	3.718s	<5s	Pass

Test plot as follows:


RBW 100 kHz
VBW 300 kHz
SWT 10 s
Delta 1 [T1]
-0.81 dB
3.717949 s
Marker 1 [T1]
90.25 dBµV
1.618590 s
Ref 117 dBµV
Att 10 dB
1 PK VIEW
A
PS
3DB AC
Center 433.9935897 MHz
1 s/
Date: 4.MAY.2011 09:47:14