

FCC COMPLIANCE REPORT  
for  
TiMOTION Technology Co., Ltd.  
Wireless Remote Control  
Model Number: TH8

Prepared for : TiMOTION Technology Co., Ltd  
Address : Shiyong Mining Industrial Zone, Hengli Town, DongGuan City,  
GuangDong,China

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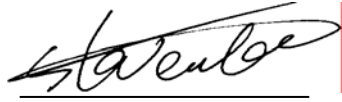
Report Number : NSE-F09032948  
Date of Test : Feb.25~28, 2009  
Date of Report : Mar. 3, 2009

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# NS Technology Co., Ltd.

<b>Applicant:</b> <b>Address:</b>	TiMOTION Technology Co., Ltd Shiyong Mining Industrial Zone, Hengli Town, DongGuan City, GuangDong,China		
<b>Manufacturer:</b> <b>Address:</b>	TiMOTION Technology Co., Ltd Shiyong Mining Industrial Zone, Hengli Town, DongGuan City, GuangDong,China		
<b>E.U.T:</b>	Wireless Remote Control		
<b>Model Number:</b>	TH8		
<b>Trade Name:</b>	-----	<b>Operating Frequency:</b>	315MHz
<b>Date of Receipt:</b>	Feb.17, 2009	<b>Date of Test:</b>	Feb.25~28, 2009
<b>Test Specification:</b>	FCC Part 15 Subpart C: July. 10, 2008 ANSI C63.4:2003		
<b>Test Result:</b>	The equipment under test was found to be compliance with the requirements of the standards applied.		
		<b>Issue Date: Mar. 6,2009</b>	
<b>Tested by:</b>	<b>Reviewed by:</b>	<b>Approved by:</b>	
			
David / Engineer	Iceman Hu / Supervisor	Steven Lee / Manager	
<b>Other Aspects:</b>	None.		
<i>Abbreviations: OK/P=passed    fail/F=failed    n.a/N=not applicable    E.U.T=equipment under tested</i>			
<i>This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of NS Technology Co., Ltd.</i>			

# 1. GENERAL PRODUCT INFORMATION

## 1.1. Product Function

The EUT is used to transmit control command only. The operation frequency is 315MHz. Press the button on remote transmitter, can set the Program MEMORY / MASSAGE / BED ADJUST Continuous Pilot button. Please refer to the user's manual for the details.

## 1.2. Description of Device (EUT)

E.U.T.	: Wireless Remote Control
Model No.	: TH8
Operating Frequency	: 315MHz
Number of Channels	: 1 Channels
Type of Modulation	: ASK
Antenna Type	: Integral
System Input Voltage	: Nominal Voltage: DC 3V(Battery)
Temperature Range(Operating)	: 0 ~+ 40°C

## 1.3. Difference between Model Numbers

None.

## 1.4. Independent Operation Modes

The basic operation modes are: TX mode

## 2. TEST SITES

### 2.1. Test Facilities

EMC Lab : Certificated by TUV Rheinland, Germany.  
Date of registration: July 28, 2003

Certificated by FCC, USA  
Registration No.: 897109  
Date of registration: October 10, 2003

Certificated by VCCI, Japan  
Registration No.: R-1798 & C-1926  
Date of registration: January 30, 2004

Certificated by CNAL, CHINA  
Registration No.: L1744  
Date of registration: November 25, 2004

Certificated by Intertek ETL SEMKO  
Registration No.: TMP-013  
Date of registration: June 11, 2005

Certificated by TUV/PS, Hong Kong  
Date of registration: December 1, 2005

Certificated by Industry Canada  
Registration No.: 5936  
Date of registration: March 24, 2006

Certificated by ATCB, America  
Date of registration: August 03, 2006

Name of Firm : NS Technology Co., Ltd.

Site Location : Chenwu Industrial Zone, Houjie Town, Dongguan City,  
Guangdong, China

## 2.2. List of Test and Measurement Instruments

### 2.2.1. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Test Receiver	R&S	ESCS30	100340	May 25,08	May 25,09
Spectrum Analyzer	HP	8593E	3448U00806	May 25,08	May 25,09
Amplifier	HP	8447D	2944A10488	May 2,08	May 2,09
Amplifier	BURGEON	PEC-38-30M18G -12-SEF	B001	Jun.02,08	Jun.02,09
Bilog Antenna	Teseq	CBL 6111D	25758	Oct. 15,08	Oct. 15,09
Horn Antenna	EMCO	3117	00062558	May 02,08	May 2,09

### 2.2.2. For 20dB Occupied Bandwidth test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	R/S	ESPI	1142.8007.03	Mar.20,08	Mar.20,09
Bilog Antenna	Teseq	CBL 6111D	25758	Oct. 15,08	Oct. 15,09

### 2.2.3. For Deactivate time&Duty cycle test

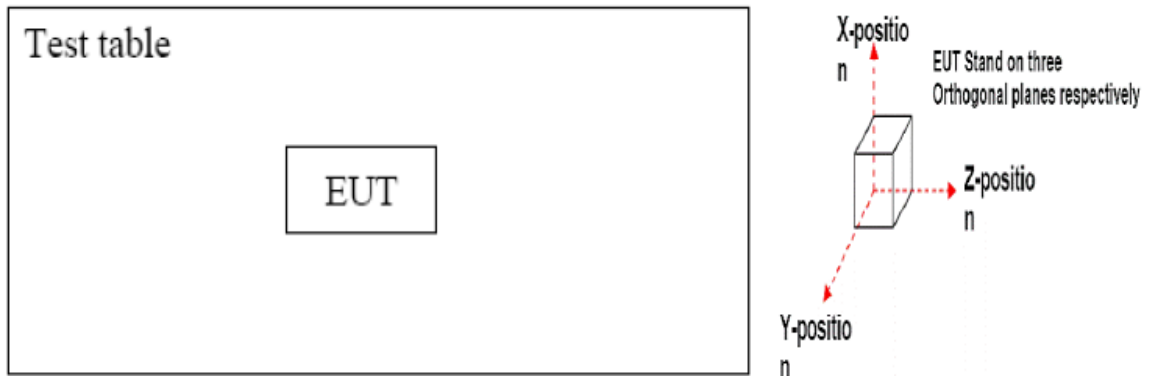
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	R/S	ESPI	1142.8007.03	Mar.20,08	Mar.20,09
Bilog Antenna	Teseq	CBL 6111D	25758	Oct. 15,08	Oct. 15,09

### 3. TEST SET-UP AND OPERATION MODES

#### 3.1. Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its highest possible radiated level. The test modes were adapted accordingly in reference to the Operating Instructions.

#### 3.2. Block Diagram of Test Set-up



*(EUT: Wireless Remote Control)*

*Note: We test X-axis, Y-axis, and Z-axis,. The Y-axis is the worst mode, so only the worst mode test data was included in the report.*

#### 3.3. Test Operation Mode and Test Software

Refer to clause 1.4

#### 3.4. Special Accessories and Auxiliary Equipment

None.

#### 3.5. Countermeasures to Achieve EMC Compliance

None.

## 4. TEST SUMMARY

### Test Items and Result Lists

<b>No.</b>	<b>Item</b>	<b>Specification</b>	<b>Results</b>
1	Conducted emissions	FCC Part15.207	N/A
2	Radiated emissions	FCC Part 15.231(b)	PASS
3	20dB Occupied Bandwidth	FCC Part 15.231(c)	PASS
4	Deactivate time	FCC Part 15.231(a)	PASS



## 5. EMISSION TEST RESULTS

### 5.1. Conducted Emissions

According to paragraph(f) of FCC Part 15 Section 15.207, measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation, and which do not operate from the AC power lines or contain provision for operation while connected to the AC power.

### 5.2. Radiated emissions

#### 5.2.1. Applied Standard

According to 15.231(b), the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

Fundamental Frequencies (MHz)	Field strength of Fundamental (uV/meter at 3m)	Unwanted emissions (uV/meter at 3m)
40.66-40.70	2250	225
70-130	1250(470nW)	125
130-174	1250 to 3750**	125 to 375**
174-260	3750(4.2uW)	375
260-470	3750 to 12500**	375 to 1250**
Above470	12500(47uW)	1250

\*\*Linear interpolation with frequency F in MHz

For the band 130-174MHz: Field strength= $56.81818(F)-6136.3636$

For the band 260-470MHz: Field strength= $41.6667(F)-7083.3333$

The maximum permitted unwanted emissions level is 20dB below the maximum permitted fundamental level

The field strength of spurious emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209 as following:

Frequencies (MHz)	Field strength uV/meter	Measurement distance (meters)
0.009-0.490	$2400/F(\text{kHz})$	300
0.490-1.705	$24000/F(\text{kHz})$	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

According to 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

### 5.2.2. Test procedure

The EUT was placed on a turn table which was 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on a antenna tower. At the frequency band of 30MHz to 1GHz, The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 to 4 m for horizontal and vertical polarizations. The broadband antenna (calibrated by dipole antenna) was used as a receiving antenna. At the frequency band of 1GHz to 5GHz, The measuring antenna moved from 1 to 4 m for horizontal and vertical polarization. The horn antenna was used as a receiving antenna.

The resolution bandwidth and video bandwidth of the test receiver was 120 KHz and 300KHz for Quasi-peak detection at frequency below 1GHz.

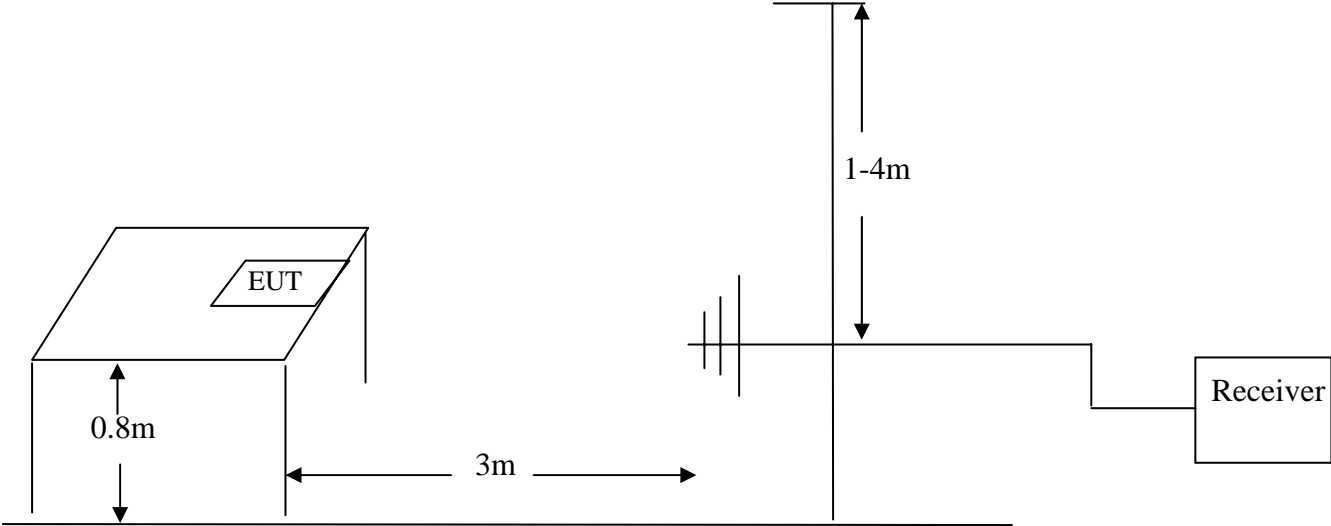
The resolution bandwidth and video bandwidth of the test receiver was 1MHz and 1MHz for Peak detection at frequency above 1GHz.

The EUT position(X.-axis, Y-axis, Z-axis) were checked and worse case was happened in Y-axis position. So Y-axis position was chose for find measurement.

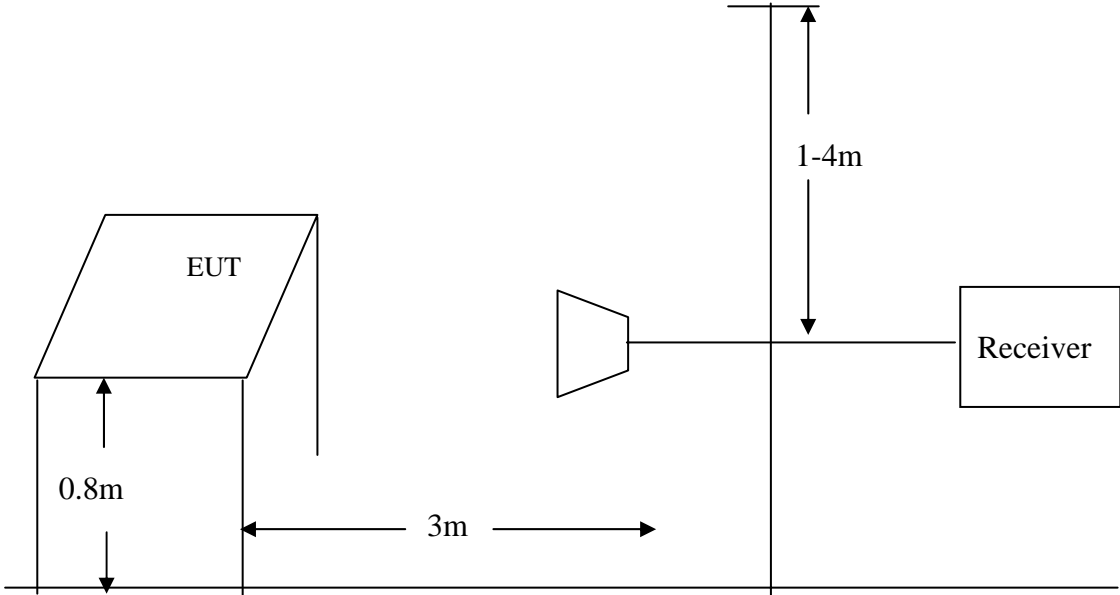
The EUT was tested in Chamber Site.

5.2.3. Test Setup Diagram

For frequency range: 30MHz-1000MHz



For frequency range: 1 GHz -5GHz



5.2.4. Test result

**Pass.**

Test Data ( worst mode: Y-axis)

EUT	:	Wireless Remote Control	Temperature:	25.4°C
Model No.	:	TH8	Humidity	: 55%
Test Mode	:	TX mode	Test Engineer	: David

For Frequency range: 30MHz-1000MHz

Frequency MHz	Antenna Factor dB	Cable Loss dB	Meter Reading dBμV	Emission Level dBμV/m	Over Limits dB	Limits @3m dBμV/m	Polarity	Detector
94.99	11.51	0.68	3.29	15.48	-28.02	43.5	H	QP
426.73	17.80	1.18	11.77	30.75	-15.25	46.0	H	QP
877.78	24.44	1.72	8.14	34.30	-11.70	46.0	H	QP
315.00	11.32	1.04	64.05	76.41	-19.19	95.6	H	Peak
<b>315.00</b>	<b>11.32</b>	<b>1.04</b>	<b>57.32</b>	<b>69.68</b>	<b>-5.92</b>	<b>75.6</b>	<b>H</b>	<b>Average</b>
630.00	22.06	1.40	30.17	53.63	-21.97	75.6	H	Peak
630.00	22.06	1.40	23.44	46.90	-8.70	55.6	H	Average
945.00	26.38	1.83	23.84	52.05	-23.55	75.6	H	Peak
945.00	26.38	1.83	17.11	45.32	-10.28	55.6	H	Average
36.79	14.63	0.54	7.95	23.12	-16.88	40.0	V	QP
426.73	17.80	1.18	11.63	30.61	-15.39	46.0	V	QP
749.74	22.00	1.53	11.92	35.45	-10.55	46.0	V	QP
315.00	11.32	1.04	60.04	72.40	-25.20	95.6	V	Peak
315.00	11.32	1.04	53.31	65.67	-9.93	75.6	V	Average
630.00	22.06	1.40	33.25	56.71	-18.89	75.6	V	Peak
<b>630.00</b>	<b>22.06</b>	<b>1.40</b>	<b>26.52</b>	<b>49.98</b>	<b>-5.62</b>	<b>55.6</b>	<b>V</b>	<b>Average</b>
945.00	26.38	1.83	23.87	52.08	-23.32	75.6	V	Peak
945.00	26.38	1.83	17.14	45.35	-10.25	55.6	V	Average

Remark: The worst emission was detected at **315.00MHz** with corrected signal level of **69.68dBμV/m**(Limit is **75.6 dBμV/m**) when the antenna was at **Horizontal** polarization and at **2.2m** high and the turn table was at **172°**

Remark: The worst emission was detected at **630.00MHz** with corrected signal level of **49.98dBμV/m** (Limit is **55.6dBμV/m**) when the antenna was at **Vertical** polarization and at **1.1m** high and the turn table was at **36°** .

Remark:

1. Emission Level = Antenna Factor + Cable Loss + Meter Reading
2. Peak Limit=Average Limit+20dB
3. Test uncertainty: ±4.76dB at a level of confidence of 95%.
4. The average value of fundamental frequency is :  
Average value = Peak value +20log(Duty cycle)  
20log(Duty cycle) = 20log(46.1%)= -6.73dB  
Please see page 17 for Duty Cycle Test.

Test Data ( worst mode: Y-axis)

EUT	:	<u>Wireless Remote Control</u>	Temperature:	<u>25.4°C</u>
Model No.	:	<u>TH8</u>	Humidity	<u>55%</u>
Test Mode	:	<u>TX mode</u>	Test Engineer	<u>David</u>

For Frequency range: 1000MHz-5000MHz

Frequency MHz	Antenna Factor dB	Cable Loss dB	Meter Reading dBμV	Emission Level dBμV/m	Over Limits dB	Limits @3m dBμV/m	Polarity	Detector
1260.00	27.47	2.13	19.32	48.92	-26.68	75.6	H	Peak
1260.00	27.47	2.13	12.59	42.19	-13.41	55.6	H	Average
1575.00	28.20	2.16	15.37	45.73	-28.27	74.0	H	Peak
1575.00	28.20	2.16	8.02	38.38	-15.62	54.0	H	Average
2607.76	32.31	2.25	15.84	50.40	-23.60	74.0	H	Peak
<b>2607.76</b>	<b>32.31</b>	<b>2.25</b>	<b>9.31</b>	<b>43.87</b>	<b>-10.13</b>	<b>54.0</b>	<b>H</b>	<b>Average</b>
3762.04	33.05	2.31	14.67	50.03	-23.97	74.0	H	Peak
3762.04	33.05	2.31	7.54	42.90	-11.10	54.0	H	Average
1260.00	27.47	2.13	18.84	48.44	-27.16	75.6	V	Peak
1260.00	27.47	2.13	12.11	41.71	-13.89	55.6	V	Average
1575.00	28.20	2.16	15.42	45.78	-28.22	74.0	V	Peak
1575.00	28.20	2.16	8.04	38.40	-15.60	54.0	V	Average
3421.60	32.31	2.25	14.37	48.93	-25.07	74.0	V	Peak
<b>3421.60</b>	<b>32.31</b>	<b>2.25</b>	<b>7.91</b>	<b>42.47</b>	<b>-11.53</b>	<b>54.0</b>	<b>V</b>	<b>Average</b>
3762.04	33.05	2.31	15.33	50.69	-23.31	74.0	V	Peak
3762.04	33.05	2.31	7.01	42.37	-11.63	54.0	V	Average

Remark: The worst emission was detected at **2607.76MHz** with corrected signal level of **43.87μV/m**(Limit is **54.00 dBμV/m**) when the antenna was at **Horizontal** polarization and at **3.2m** high and the turn table was at **165°**

Remark: The worst emission was detected at **3421.60MHz** with corrected signal level of **42.47dBμV/m** (Limit is **54.00 dBμV/m**) when the antenna was at **Vertical** polarization and at **1.2m** high and the turn table was at **41°**.

Remark:

1. Emission Level = Antenna Factor + Cable Loss + Meter Reading
2. Peak Limit=Average Limit+20dB
3. Test uncertainty: ±4.76dB at a level of confidence of 95%.
4. The average value of fundamental frequency is :  
Average value = Peak value +20log(Duty cycle)  
20log(Duty cycle) = 20log(46.1%)= -6.73dB  
Please see page 17 for Duty Cycle Test.

### 5.3. 20dB Occupied Bandwidth

#### 5.3.1. Applied Standard

According to 15.231(c), 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.

#### 5.3.2. Test procedure

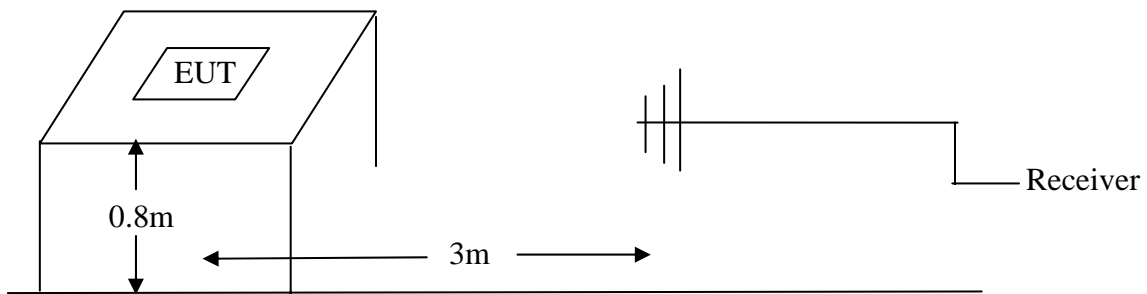
Step 1: The EUT was placed on a table which is 0.8m above ground plane.

Step 2: EUT was set to transmit continuously.

Step 3: Set SA Center Frequency = fundamental frequency , RBW=100kHz,VBW=300kHz

Step 4: Set SA trace max hold, then view.

#### 5.3.3. Test Setup Diagram



#### 5.3.4. Test Result

**Pass.**

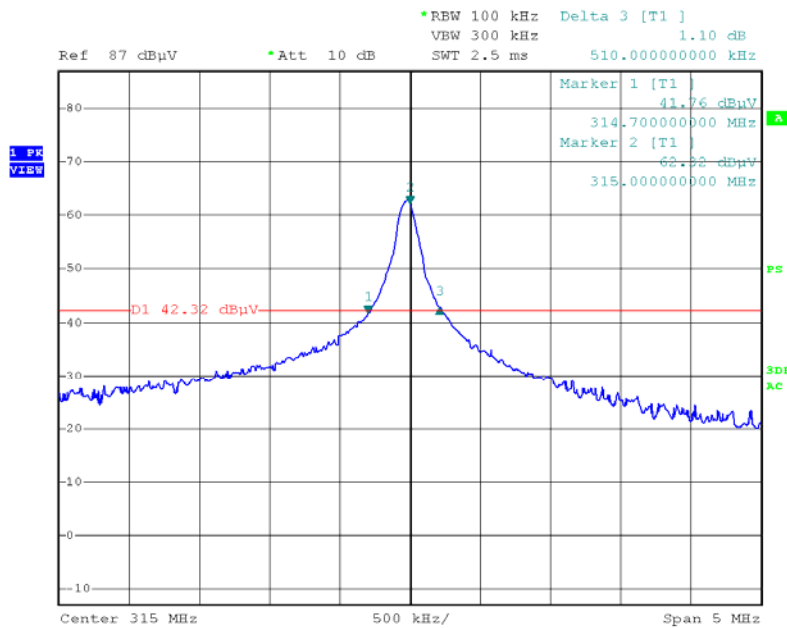
##### Test Data

EUT	: <u>Wireless Remote Control</u>	Temperature:	<u>25.4°C</u>
Model No.	: <u>TH8</u>	Humidity	: <u>55%</u>
Test Mode	: <u>TX mode</u>	Test Engineer	: <u>David</u>

Fundamental frequency (MHz)	Bandwidth Measurement (kHz)	Limit (kHz)	Result
315MHz	510.0kHz	787.5 kHz	PASS

Note: Limit= Fundamental frequency × 0.25% = 315 × 0.25% = 787.5kHz

The test plots as following:



Date: 12.MAR.2009 20:14:42

## 5.4. Deactivation time

### 5.4.1. Applied Standard

According to 15.231(a), A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. A transmitter activated automatically shall cease transmission within 5 seconds after activation.

### 5.4.2. Test procedure

- Step 1: The EUT was placed on a table which is 0.8m above ground plane.
- Step 2: Set EUT as normal operation.
- Step 3: Set SA Center Frequency = fundamental frequency , RBW=100kHz,VBW=300kHz
- Step 4: Set SA trace max hold, then view.

### 5.4.3. Test Setup Diagram

Refer to clause 5.3.3

5.4.4. Test Result

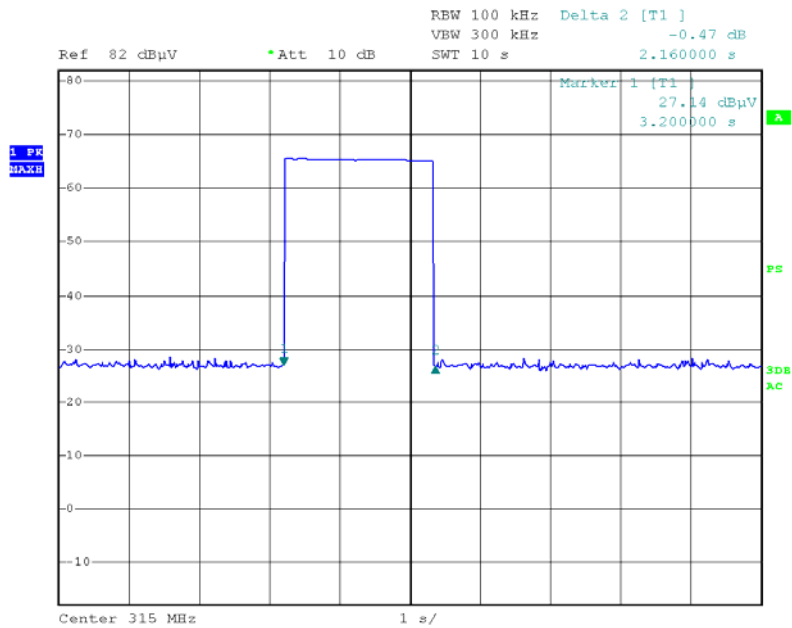
**Pass.**

Test Data

EUT	: <u>Wireless Remote Control</u>	Temperature:	<u>25.4°C</u>
Model No.	: <u>TH8</u>	Humidity	: <u>55%</u>
Test Mode	: <u>TX mode</u>	Test Engineer	: <u>David</u>

Fundamental frequency (MHz)	Transmission time (ms)	Limit (s)	Result
315MHz	2.16s	5s	PASS

The test plots as following:



Date: 5.MAR.2009 21:00:23



## 5.5. Duty Cycle

### 5.5.1. Test procedure&condition

Step 1: The EUT was placed on a table which is 0.8m above ground plane.

Step 2: EUT was set to transmit continuously.

Step 3: Set SA Center Frequency = fundamental frequency , RBW=100kHz,VBW=300kHz

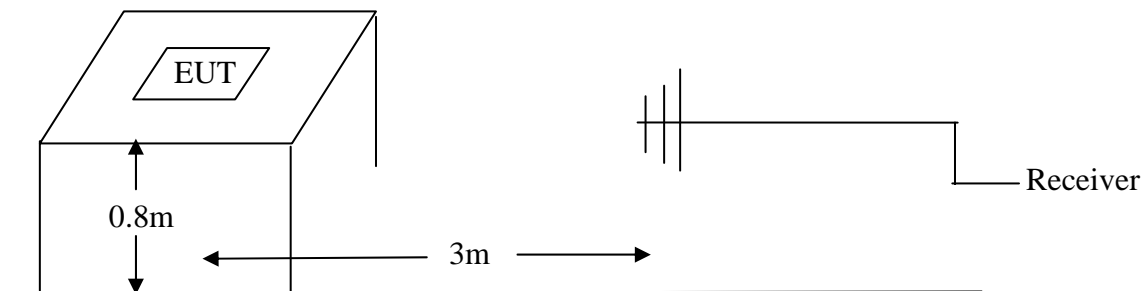
Step 4: Set SA trace max hold, then view.

The duty cycle was determined by the following equation :

$$\text{Duty Cycle(\%)} = \frac{(\text{Total On Interval in a Complete Pulse Train})}{(\text{Length of a Complete Pulse Train or 100ms})} \times 100\%$$

Note: Length of a Complete Pulse Train or 100ms, whichever is less.

### 5.5.2. Test Setup Diagram



### 5.5.3. Test Data

EUT	: <u>Wireless Remote Control</u>	Temperature:	<u>25.4°C</u>
Model No.	: <u>TH8</u>	Humidity	: <u>55%</u>
Test Mode	: <u>TX mode</u>	Test Engineer	: <u>David</u>

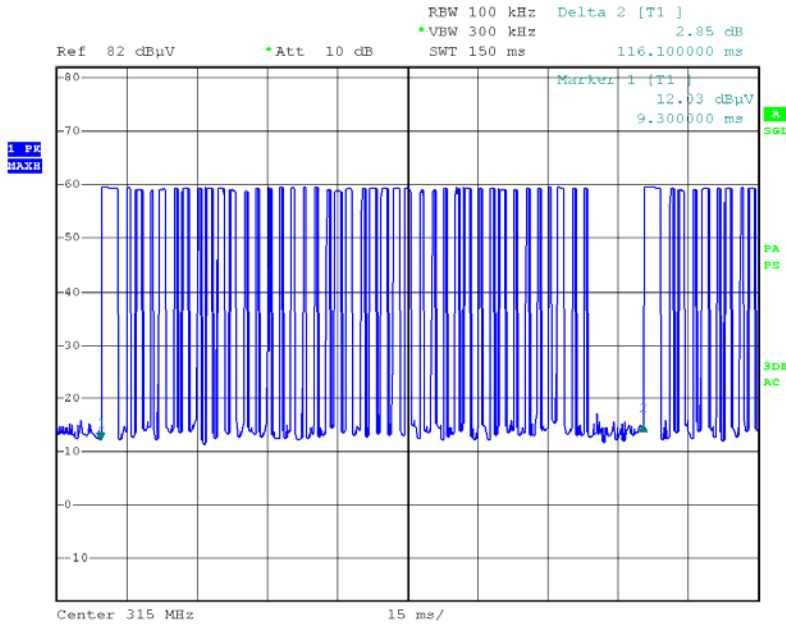
Pulse Train	Number of Pulse	T(ms)	Total Time
Pulse1	1	3.7ms	3.7ms
Pulse2	15	1.6ms	24ms
Pulse3	23	0.8ms	18.4ms
Total ON interval in a complete pulse train(ms)			46.1ms

$$\text{Duty Cycle(\%)} = \frac{46.1\text{ms}}{100\text{ms}} \times 100\% = 46.1\%$$

$$\begin{aligned} \text{Pulse Desensitization Correction Factor(PDCF)} &= 20 \times \log(\text{Duty Cycle}) \\ &= 20 \times \log(46.1\%) = -6.73 \end{aligned}$$

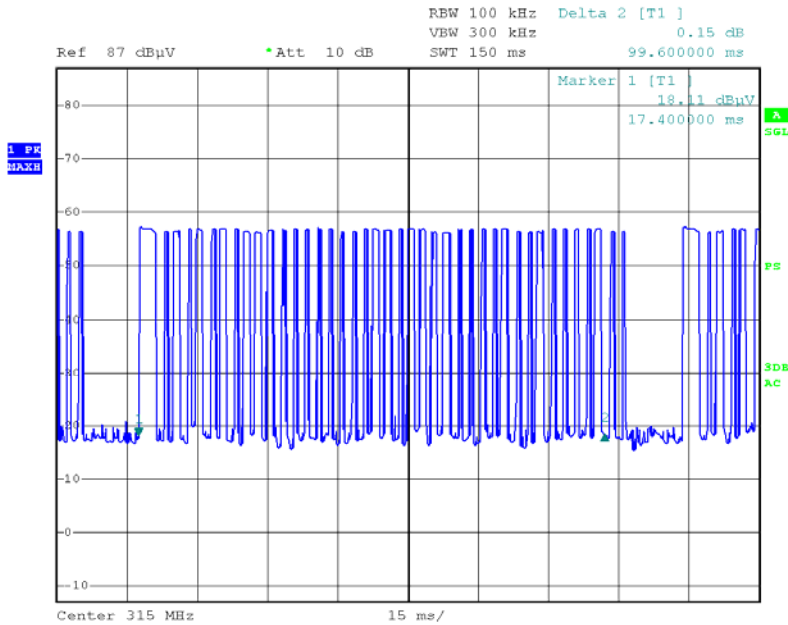
The test plots as following:

Length of a Complete Pulse Train



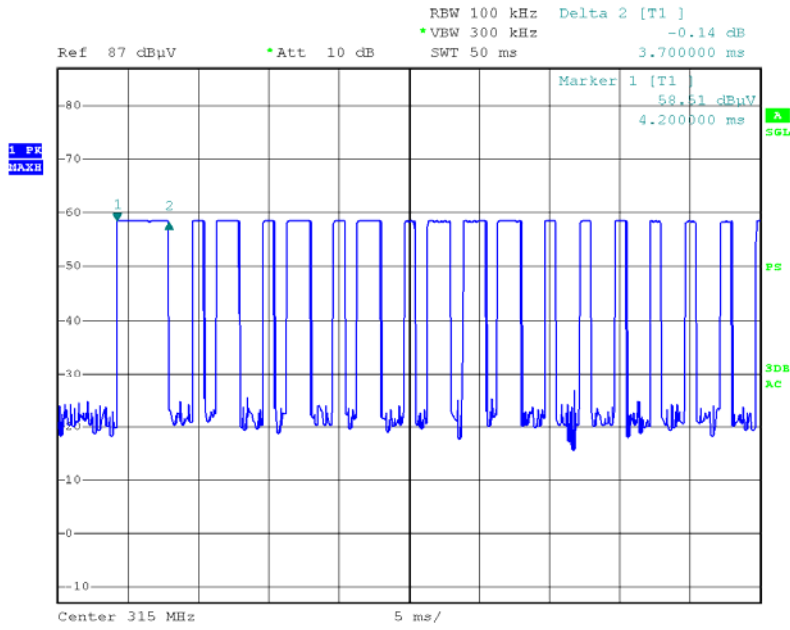
Date: 12.MAR.2009 19:47:37

Number of pulse(100ms)



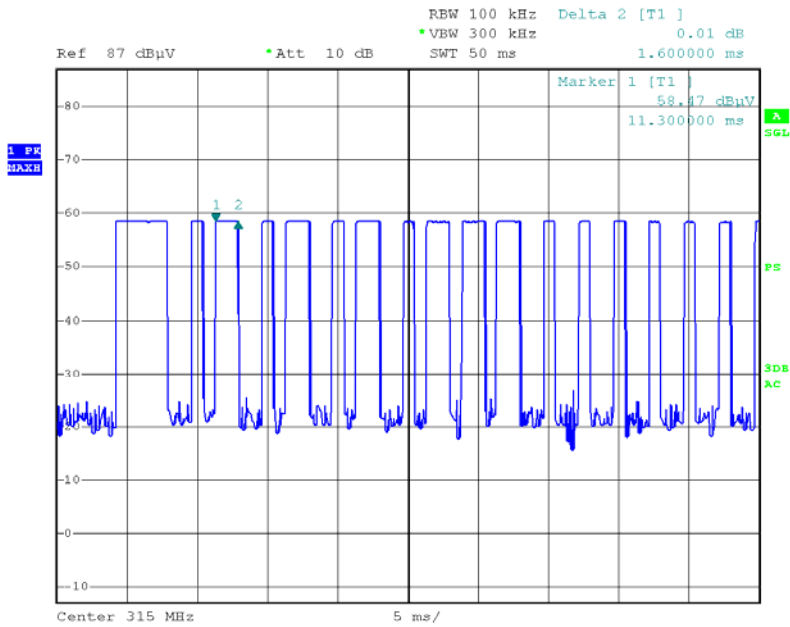
Date: 1.APR.2009 16:53:40

### Pulse1



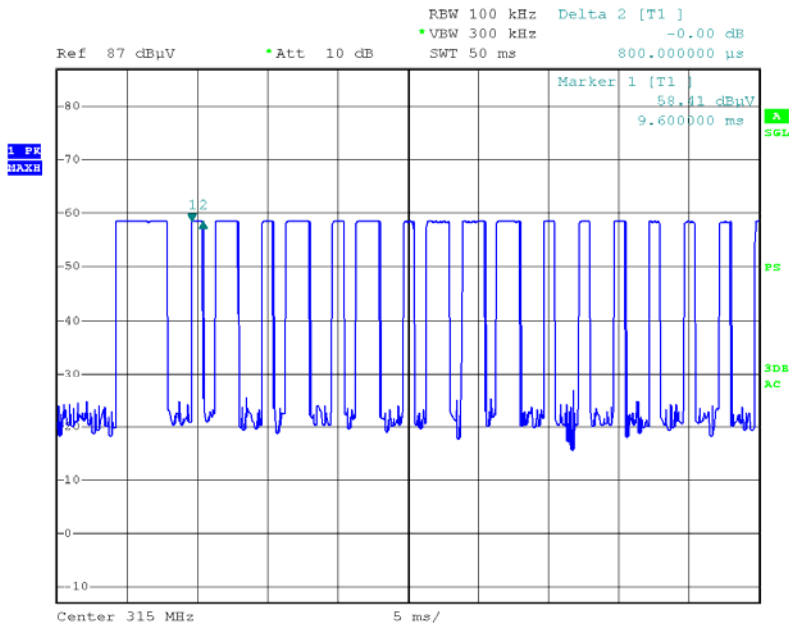
Date: 5.MAR.2009 21:28:53

### Pulse2



Date: 5.MAR.2009 21:29:26

### Pulse3



Date: 5.MAR.2009 21:30:09

**6. PHOTOGRAPHS OF TEST SET-UP**

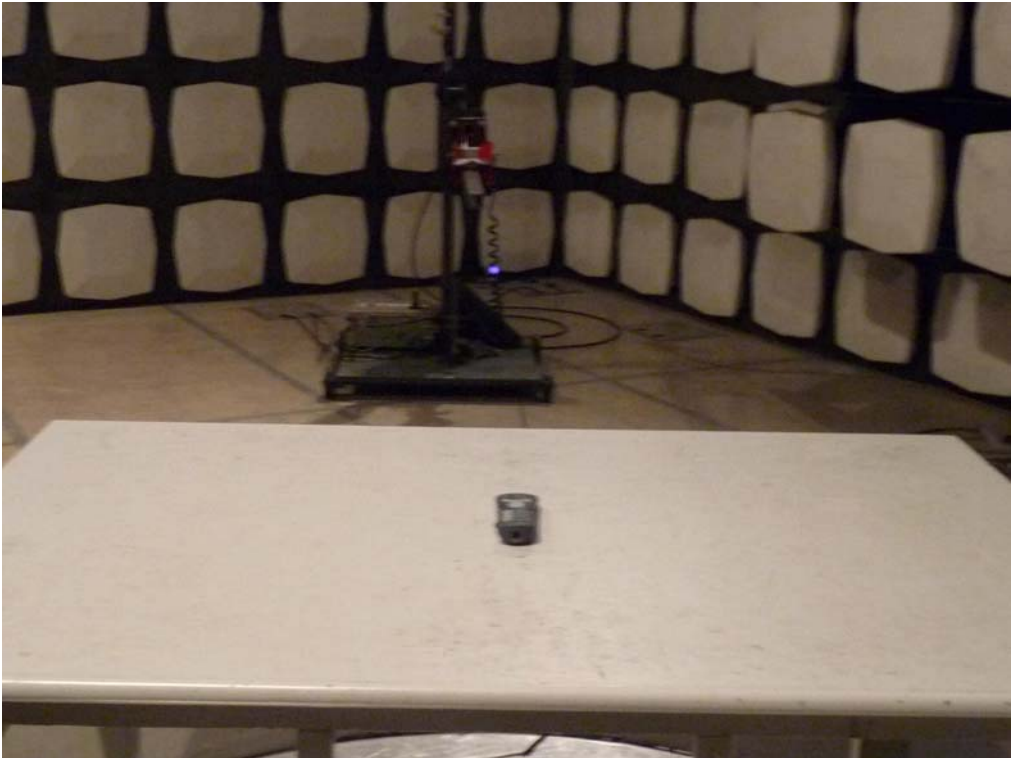
**Figure 1**

Set-up for radiated measurements (30MHz to 1000MHz)



**Figure 2**

Set-up for radiated measurements (1000MHz to 5000MHz)



## 7. PHOTOGRAPHS OF THE EUT

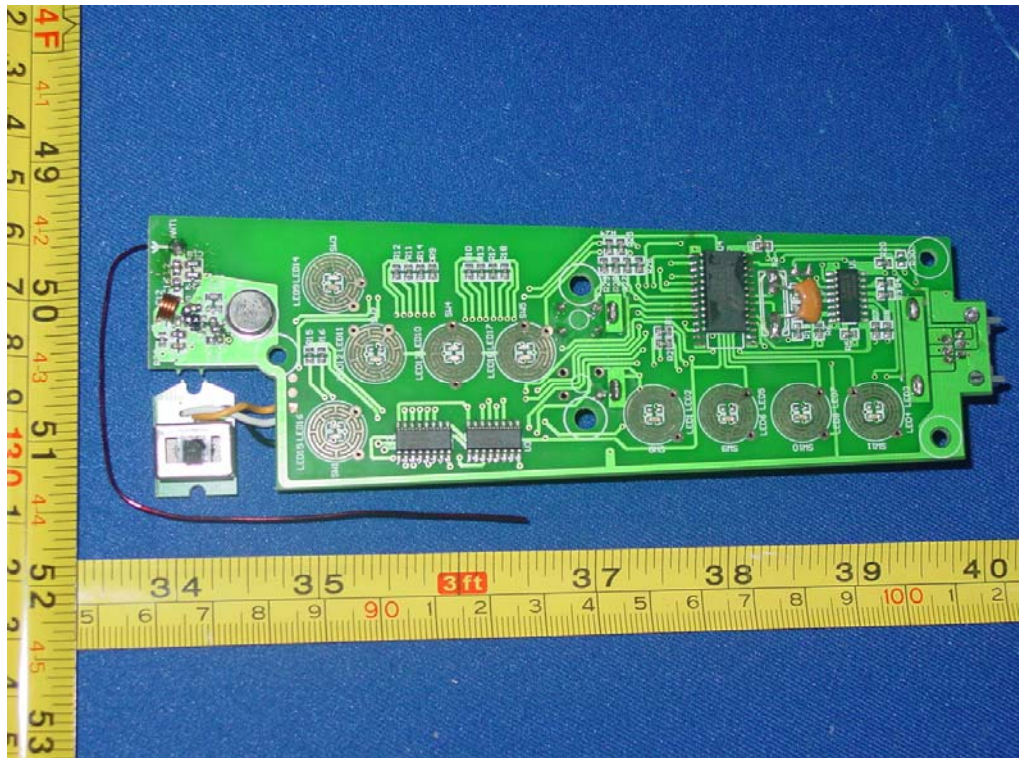
**Figure 1**  
General Appearance of the EUT



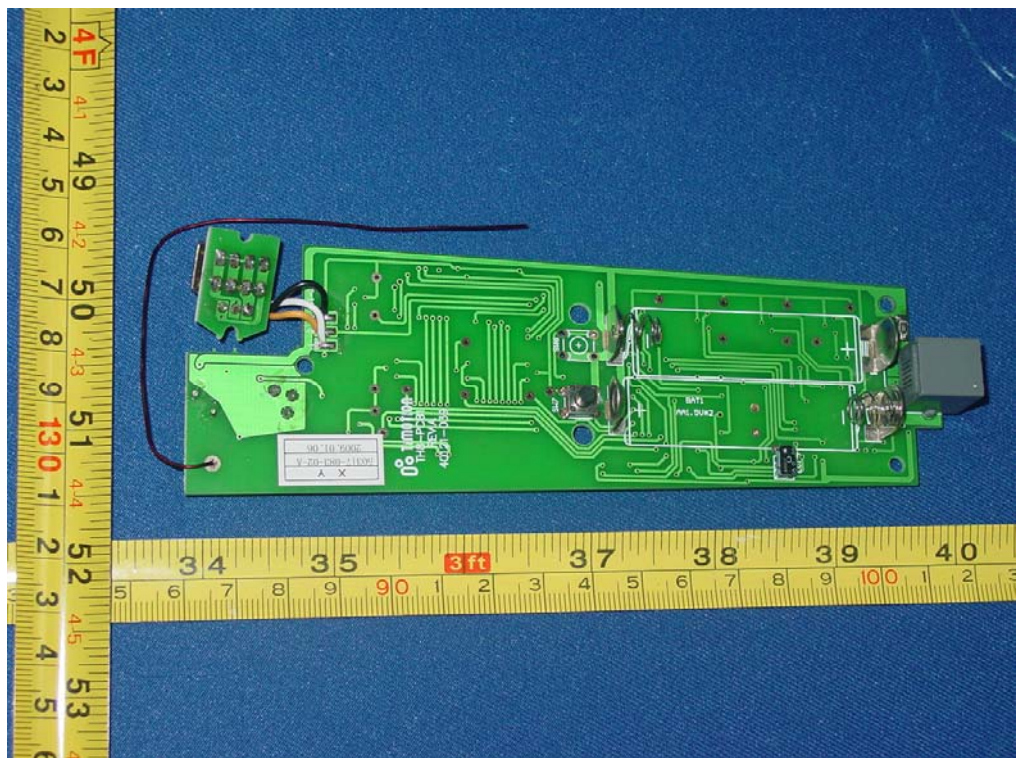
**Figure 2**  
General Appearance of the EUT



**Figure 3**  
General Appearance of the PCB



**Figure 4**  
General Appearance of the PCB



**Figure 5**  
General Appearance of the EUT

