



# FCC RF Test Report

**APPLICANT** : TCT Mobile Limited  
**EQUIPMENT** : Tablet PC  
**BRAND NAME** : ALCATEL  
**MODEL NAME** : ONE TOUCH EVO 7HD / ONE TOUCH E710  
(Module: one touch M600Q)  
**FCC ID** : RAD428  
**STANDARD** : FCC Part 15 Subpart C §15.247  
**CLASSIFICATION** : (DSS) Spread Spectrum Transmitter

The product was integrated the WWAN Module (Brand Name: ALCATEL, Model Name: one touch M600Q, FCC ID: RAD425) during test.

The product was received on Jul. 19, 2013 and completely tested on Aug. 15, 2013. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (SHENZHEN) INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



## **SPORTON INTERNATIONAL (SHENZHEN) INC.**

**No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.C.**



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### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 18.61 dB at 2483.580 MHz
3.2	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

# 1 General Description

## 1.1 Applicant

**TCT Mobile Limited**

5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203

## 1.2 Manufacturer

**TCL COMMUNICATION TECHNOLOGY HOLDINGS LIMITED**

70 Huifeng 4rd, ZhongKai Hi-tech Development District, Huizhou, Guangdong 516006 P.R.China (TCL Mobile Communication Co., LTD. Huizhou)

## 1.3 Feature of Equipment Under Test

Product Feature	
<b>Equipment</b>	Tablet PC
<b>Brand Name</b>	ALCATEL
<b>Model Name</b>	ONE TOUCH EVO 7HD / ONE TOUCH E710 (Module: one touch M600Q)
<b>FCC ID</b>	RAD428
<b>EUT supports Radios application</b>	GPRS/EGPRS/WCDMA/HSPA/HSPA+(Downlink Only)/ WLAN 11bgn / Bluetooth 3.0
<b>HW Version</b>	V6.0
<b>SW Version</b>	119
<b>EUT Stage</b>	Production Unit

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
<b>Tx/Rx Frequency Range</b>	2402 MHz ~ 2480 MHz
<b>Number of Channels</b>	79
<b>Carrier Frequency of Each Channel</b>	2402+n*1 MHz; n=0~78
<b>Antenna Type</b>	PIFA Antenna type with gain 0.9 dBi
<b>Type of Modulation</b>	Bluetooth 3.0 (1Mbps) : GFSK Bluetooth 3.0 (2Mbps) : $\pi/4$ -DQPSK Bluetooth 3.0 (3Mbps) : 8-DPSK



### 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

### 1.6 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL (SHENZHEN) INC.	
<b>Test Site Location</b>	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.C. TEL: +86-755-3320-2398	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC/IC Registration No.</b>
	03CH01-SZ	831040/4086F-1

**Note:** The test site complies with ANSI C63.4 2003 requirement.

### 1.7 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC Public Notice DA 00-705
- ♦ ANSI C63.10-2009

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



## 2 Test Configuration of Equipment Under Test

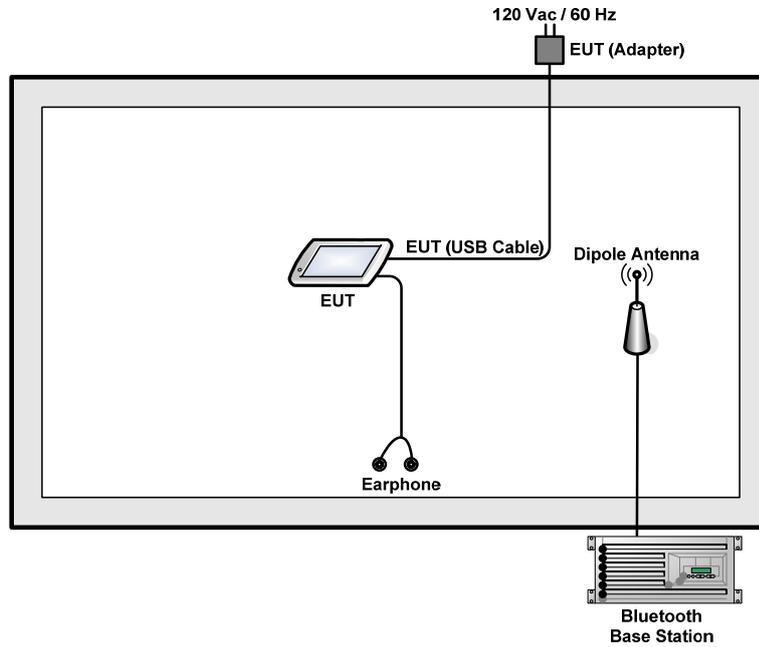
### 2.1 Descriptions of Test Mode

### 2.2 Test Mode

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth BR 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Radiated	Bluetooth BR 1Mbps GFSK		
Test Cases	Mode 1: CH78_2480 MHz		

### 2.3 Connection Diagram of Test System



### 2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Base Station	R&S	CBT	FCC DoC	N/A	Unshielded, 1.8m
2.	Earphone	INTOPIC	Jazz-278	FCC DoC	Shielded, 2.2 m	N/A

### 2.5 EUT Operation Test Setup

For Bluetooth function, programmed RF utility, execute “adbtool” software to make the EUT provides functions like channel selection and power level for continuous transmitting and receiving signals.

### 3 Test Result

#### 3.1 Radiated Band Edges and Spurious Emission Measurement

##### 3.1.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

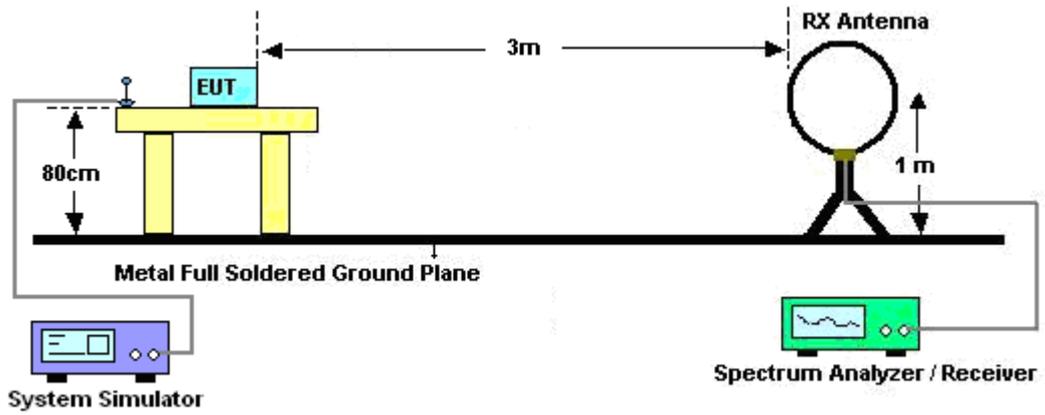
### 3.1.3 Test Procedures

1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines and the guidelines in ANSI C63.10-2009.
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for  $f < 1$  GHz, RBW=1MHz for  $f > 1$ GHz ; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
  - (3) For average measurement: use duty cycle correction factor method per 15.35(c).  
Duty cycle = On time/100 milliseconds  
On time =  $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$   
Where  $N_1$  is number of type 1 pulses,  $L_1$  is length of type 1 pulses, etc.  
Average Emission Level = Peak Emission Level +  $20 * \log(\text{Duty cycle})$
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

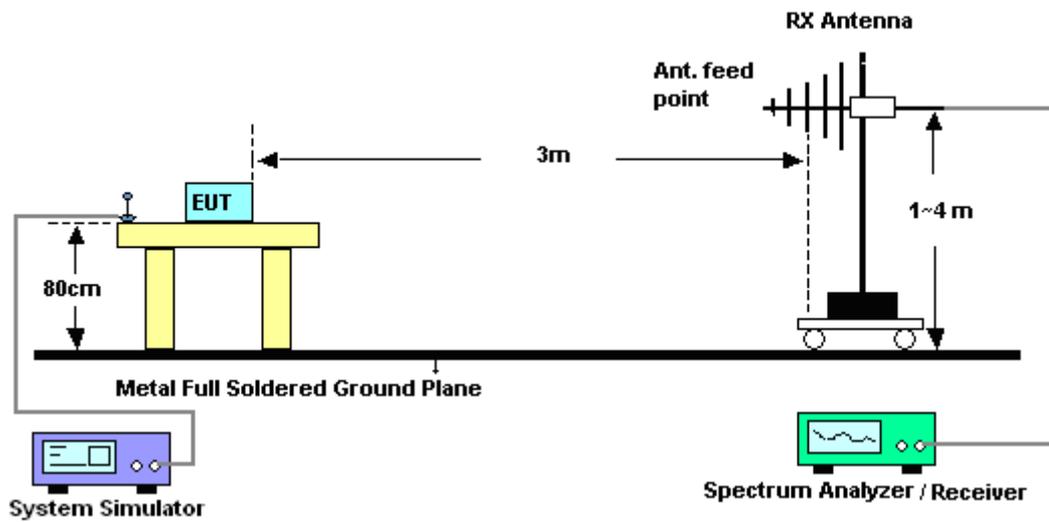
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (24.82dB) derived from  $20 \log(\text{dwell time}/100\text{ms})$ .

### 3.1.4 Test Setup

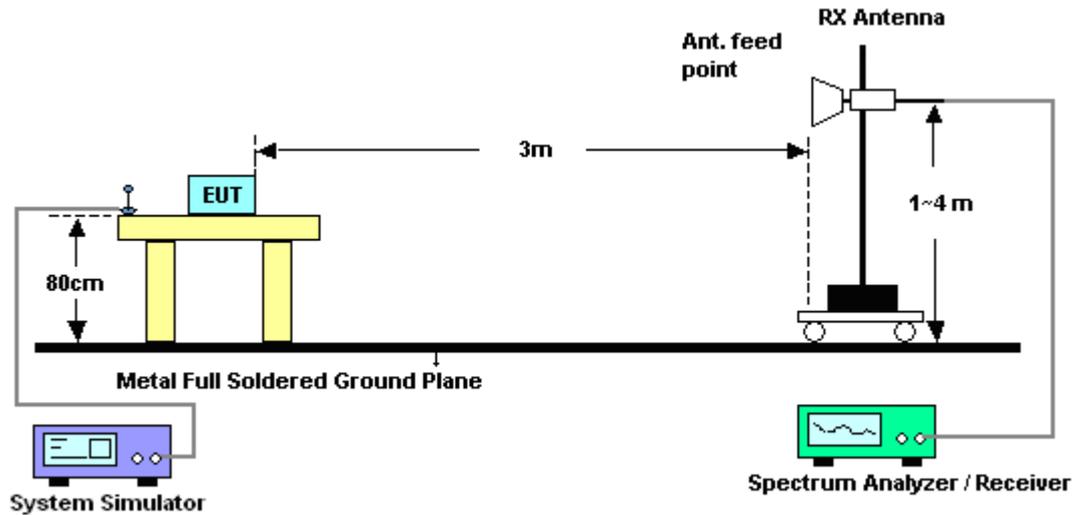
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

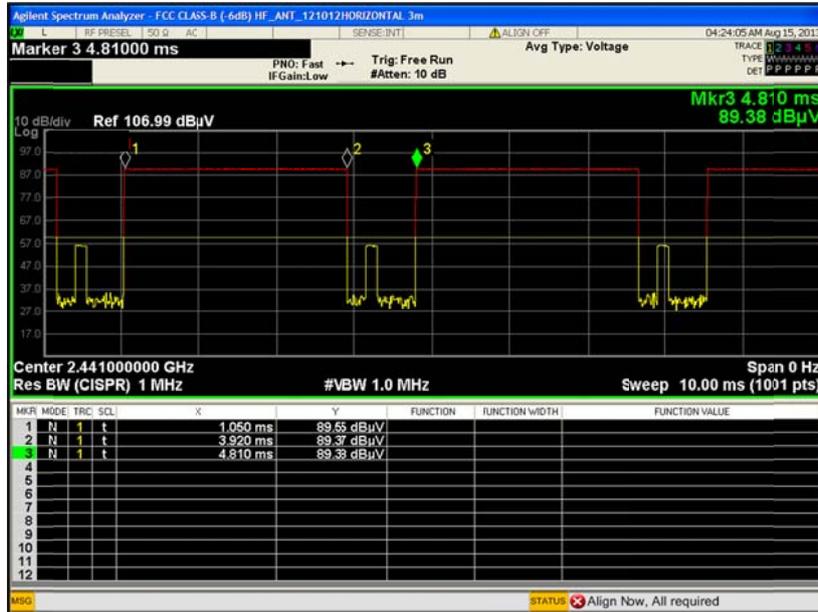


### 3.1.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

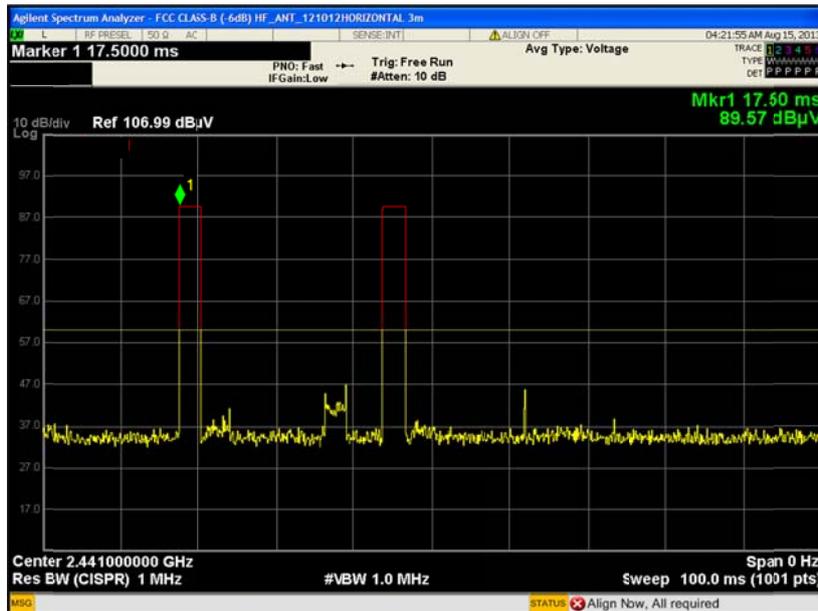
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

### 3.1.6 Duty cycle correction factor for average measurement

DH5 on time (One Pulse) Plot on Channel 39



DH5 on time (Count Pulses) Plot on Channel 39



**Note:**

1. Worst case Duty cycle = on time/100 milliseconds =  $2 * 2.87 / 100 = 5.74 \%$
2. Worst case Duty cycle correction factor =  $20 * \log(\text{Duty cycle}) = -24.82 \text{ dB}$
3. DH5 has the highest duty cycle worst case and is reported.

**Duty Cycle Correction Factor Consideration for AFH mode:**

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the period to have DH5 packet completing one hopping sequence is

$$2.87 \text{ ms} \times 20 \text{ channels} = 57.4 \text{ ms}$$

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period.  $[100\text{ms} / 57.6\text{ms}] = 2$  hops

Thus, the maximum possible ON time:

$$2.87 \text{ ms} \times 2 = 5.74 \text{ ms}$$

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

$$20 \times \log(5.74 \text{ ms}/100\text{ms}) = -24.82 \text{ dB}$$



3.1.7 Test Result of Radiated Band Edges

Test Mode :	1Mbps	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	49~53%
		Test Engineer :	Gavin Zhang

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.7	55.14	-18.86	74	46.92	32.27	5.71	29.76	117	340	Peak
2483.7	30.32	-23.68	54	-	-	-	-	-	-	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.58	55.39	-18.61	74	47.17	32.27	5.71	29.76	117	341	Peak
2483.58	30.57	-23.43	54	-	-	-	-	-	-	Average



3.1.8 Test Result of Radiated Emission (30 MHz ~ 10<sup>th</sup> Harmonic)

Test Mode :	1Mbps	Temperature :	23~25°C
Test Channel :	78	Relative Humidity :	49~53%
Test Engineer :	Gavin Zhang	Polarization :	Horizontal
Remark :	1. 2480 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
108.57	17.12	-26.38	43.5	34.38	12.07	1.31	30.64	-	-	Peak
279.29	17.25	-28.75	46	32.37	13	1.95	30.07	-	-	Peak
480.08	22.65	-23.35	46	32.37	17.2	2.48	29.4	-	-	Peak
616.85	24.35	-21.65	46	31.67	19.04	2.81	29.17	-	-	Peak
749.74	26.1	-19.9	46	31.24	20.8	3.06	29	125	145	Peak
960.23	31.73	-22.27	54	35.22	21.8	3.43	28.72	-	-	Peak
2480	102.62	-	-	94.4	32.27	5.71	29.76	117	340	Peak
2480	77.8	-	-	-	-	-	-	-	-	Average
4960	38.95	-35.05	74	53.47	34.01	8.49	57.02	118	289	Peak
7440	41.42	-32.58	74	53	35.37	10.04	56.99	158	273	Peak

Note: Other harmonics are lower than background noise.



<b>Test Mode :</b>	1Mbps	<b>Temperature :</b>	23~25°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	49~53%
<b>Test Engineer :</b>	Gavin Zhang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	1. 2480 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
110.51	19.49	-24.01	43.5	36.6	12.2	1.32	30.63	-	-	Peak
247.28	16.97	-29.03	46	33.07	12.23	1.85	30.18	-	-	Peak
451.95	21.29	-24.71	46	31.49	16.88	2.41	29.49	-	-	Peak
624.61	24.02	-21.98	46	31.32	19.05	2.82	29.17	-	-	Peak
796.3	27.33	-18.67	46	32.66	20.46	3.15	28.94	120	145	Peak
960.23	30.8	-23.2	54	34.29	21.8	3.43	28.72	-	-	Peak
2480	102.47	-	-	94.25	32.27	5.71	29.76	117	341	Peak
2480	77.65	-	-	-	-	-	-	-	-	Average
4960	39.16	-34.84	74	53.68	34.01	8.49	57.02	125	214	Peak
7440	41.16	-32.84	74	52.74	35.37	10.04	56.99	154	234	Peak

**Note:** Other harmonics are lower than background noise.



## **3.2 Antenna Requirements**

### **3.2.1 Standard Applicable**

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

### **3.2.2 Antenna Connected Construction**

Non-standard connector used.

### **3.2.3 Antenna Gain**

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
ESCI TEST Receiver	R&S	ESCI	100724	9kHz-3GHz	Mar. 28, 2013	Aug. 15, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
Spectrum Analyzer	R&S	FSP30	101362	9kHz~30GHz	Oct. 11, 2012	Aug. 15, 2013	Oct. 10, 2013	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 12, 2012	Aug. 15, 2013	Oct. 11, 2013	Radiation (03CH01-SZ)
Bilog Antenna	SCHAFFNER	CBL6112B	2614	30MHz~2GHz	Nov. 03, 2012	Aug. 15, 2013	Nov. 02, 2013	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz-3000MHz GAIN 30db	Mar. 28, 2013	Aug. 15, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	Mar. 28, 2013	Aug. 15, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz-30MHz	Oct. 22, 2012	Aug. 15, 2013	Oct. 21, 2013	Radiation (03CH01-SZ)
Turn Table	EM Electronice	EM 1000	N/A	0 ~ 360 degree	N/A	Aug. 15, 2013	N/A	Radiation (03CH01-SZ)
Antenna Mast	EM Electronice	EM 1000	N/A	1 m - 4 m	N/A	Aug. 15, 2013	N/A	Radiation (03CH01-SZ)



## 5 Uncertainty of Evaluation

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.54
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.72
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## **Appendix B. Product Equality Declaration**