

Variant FCC RF Test Report

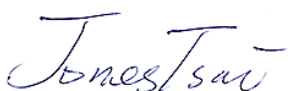
APPLICANT : Yulong Computer Telecommunication
Scientific (Shenzhen) Co., Ltd.
EQUIPMENT : Mobile Phone
BRAND NAME : Vodafone Smart 4G
MODEL NAME : Coolpad 8860U
MARKETING NAME : Vodafone Smart 4G
FCC ID : R38YL8860UO
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

This is a variant report which is only valid together with the original test report. The product was received on Aug. 29, 2013 and testing was completed on Sep. 14, 2013. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown to be compliant 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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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR340403-01B	Rev. 01	EUT is variant version of Coolpad 8860U (FCC ID: R38YL8860U which supports NFC function), and now the variant sample with FCC ID: R38YL8860UO is not support NFC function. Due to the similarity, the parent sample RF performance is representative and part of test data (Sporton Report Number FR340403B for FCC ID: R38YL8860U) is referenced; only the worst case of Spurious Emission was verified for the differences for the variant sample.	Sep. 17, 2013



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 9.85 dB at 564.470 MHz

1 General Description

1.1 Applicant

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd.

Coolpad Information Harbor, 2nd Mengxi Road, Northern Part of Science&Technology Park, Nanshan district, Shenzhen, P.R.China

1.2 Manufacturer

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd.

Coolpad Information Harbor, 2nd Mengxi Road, Northern Part of Science&Technology Park, Nanshan district, Shenzhen, P.R.China

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	Vodafone Smart 4G
Model Name	Coolpad 8860U
Marketing Name	Vodafone Smart 4G
FCC ID	R38YL8860UO
EUT supports Radios application	GSM/GPRS/EGPRS/LTE/WLAN 802.11abgn HT 20/ Bluetooth v3.0 + EDR/Bluetooth v4.0
HW Version	T3
SW Version	082.12.T3.130819.CP8860U
EUT Stage	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	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	40
Carrier Frequency of Each Channel	40 Channel(37 hopping + 3 advertising channel)
Antenna Type	PIFA Antenna
Type of Modulation	Bluetooth v4.0 - LE : GFSK

1.5 Modification of EUT

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

1.6 Testing Site

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	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	
Test Site No.	Sporton Site No.	FCC Registration No.
	03CH01-SZ	831040

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 KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
- ♦ ANSI C63.4-2003

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

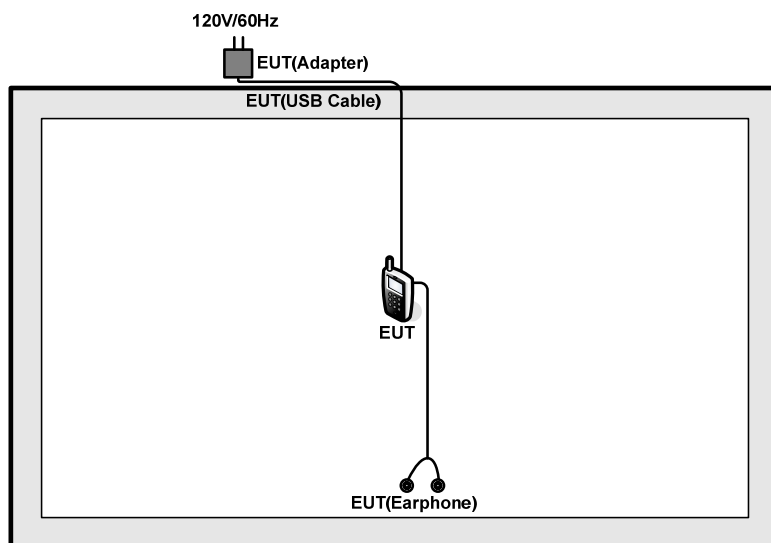
2.1 Test Mode

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 v4.0 – LE / GFSK
Radiated TCs	Mode 1: Bluetooth Tx CH39_2480 MHz_1Mbps

Remark: For Radiated TCs, all the test modes are performed with Battery 1.

2.2 Connection Diagram of Test System



2.3 Description of RF Function Operation Test Setup

For Bluetooth v4.0 – LE function, an engineering test program was provided and enabled to make EUT continuous transmit/receive.

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. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. 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

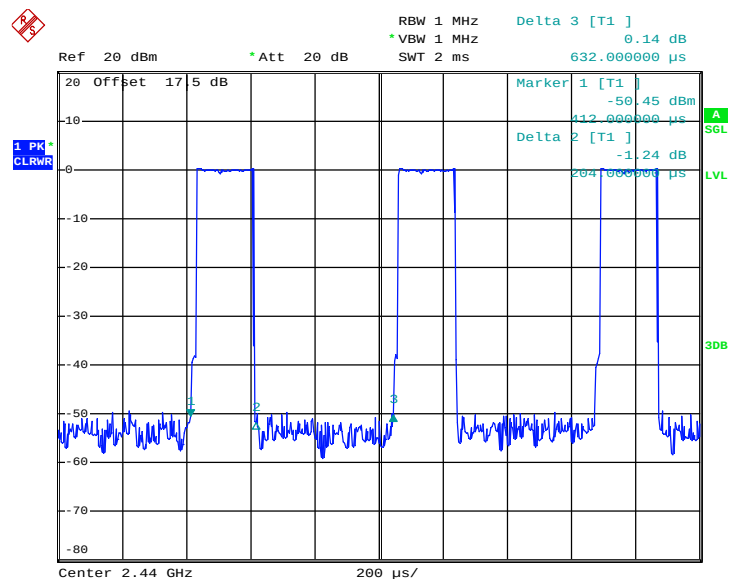
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. 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; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Bluetooth v4.0 - LE	32.28	0.204	4.90	10kHz

Bluetooth v4.0_LE Duty Cycle

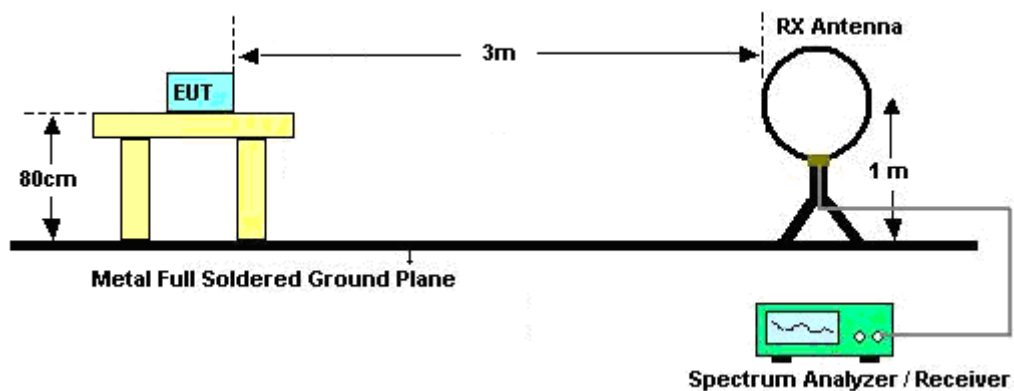


Note:

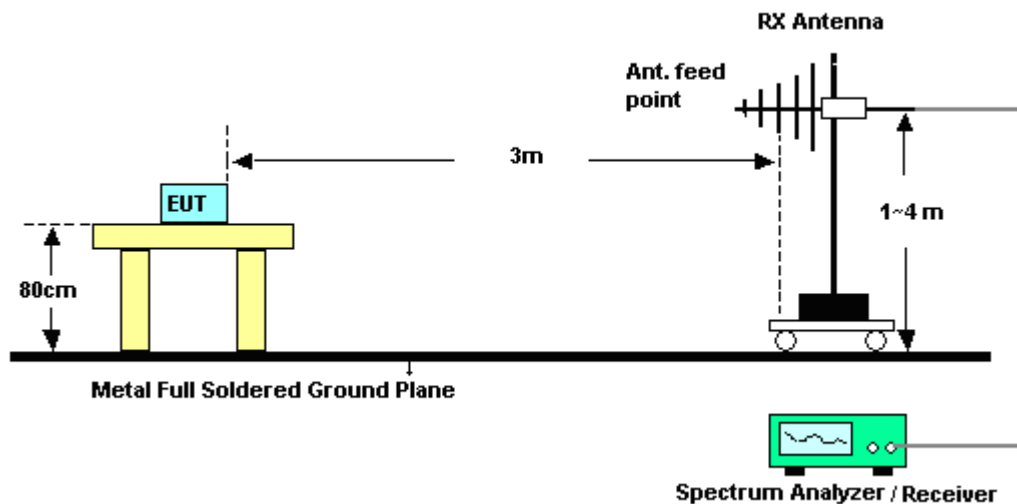
The total loss is 17.5dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

3.1.4 Test Setup

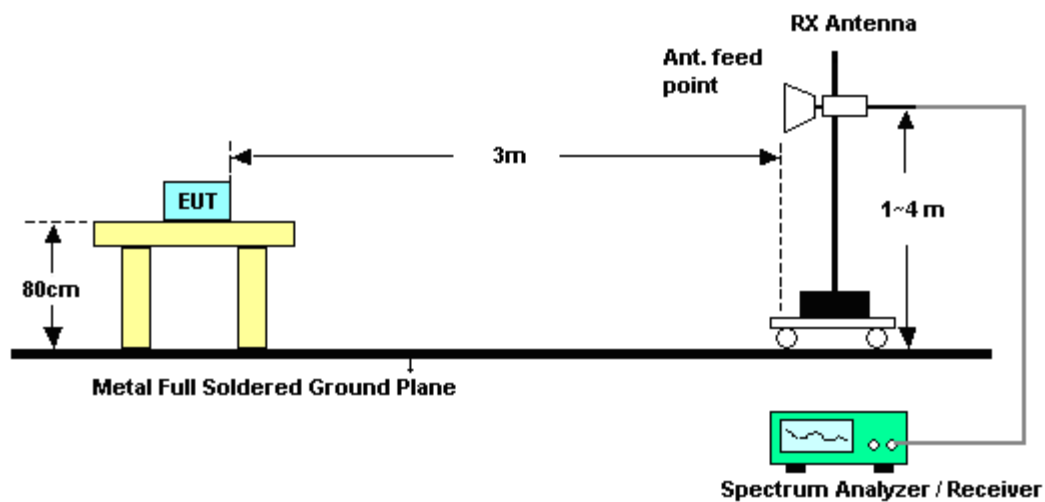
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.1.5 Test Results of Radiated Spurious 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 Test Result of Radiated Spurious at Band Edges

Test Mode :	Mode 1	Temperature :	24~25°C
Test Channel :	39	Relative Humidity :	49~52%
		Test Engineer :	Leo Liao

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
2489.95	46.74	-27.26	74	38.5	32.29	5.71	29.76	100	352	Peak
2493.79	37.53	-16.47	54	29.25	32.29	5.74	29.75	100	352	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
2491.15	46.24	-27.76	74	38	32.29	5.71	29.76	192	360	Peak
2491.75	37.4	-16.6	54	29.16	32.29	5.71	29.76	192	360	Average

3.1.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Test Mode :	Mode 1	Temperature :	24~25°C
Test Channel :	39	Relative Humidity :	49~52%
Test Engineer :	Leo Liao	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
173.56	23.6	-19.9	43.5	42.96	9.47	1.59	30.42	-	-	Peak
259.89	25.63	-20.37	46	40.17	13.7	1.89	30.13	-	-	Peak
399.57	33.34	-12.66	46	44.22	16.5	2.29	29.67	-	-	Peak
583.87	36.07	-9.93	46	43.92	18.64	2.73	29.22	105	235	Peak
717.73	34.87	-11.13	46	40.98	19.94	2.99	29.04	-	-	Peak
864.2	26.74	-19.26	46	31.05	21.24	3.3	28.85	-	-	Peak
2480	93.42	-	-	85.2	32.27	5.71	29.76	100	352	Peak
2480	92.01	-	-	83.79	32.27	5.71	29.76	100	352	Average
4960	38.45	-35.55	74	52.97	34.01	8.49	57.02	100	360	Peak
7440	39.32	-34.68	74	50.9	35.37	10.04	56.99	175	260	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	Mode 1	Temperature :	24~25°C
Test Channel :	39	Relative Humidity :	49~52%
Test Engineer :	Leo Liao	Polarization :	Vertical
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
188.11	21.79	-21.71	43.5	41.07	9.45	1.64	30.37	-	-	Peak
352.04	26.38	-19.62	46	39.38	14.68	2.15	29.83	-	-	Peak
399.57	30.04	-15.96	46	40.92	16.5	2.29	29.67	-	-	Peak
564.47	36.15	-9.85	46	44.05	18.66	2.69	29.25	105	352	Peak
667.29	35.32	-10.68	46	42.31	19.22	2.9	29.11	-	-	Peak
868.08	28.7	-17.3	46	32.97	21.28	3.29	28.84	-	-	Peak
2480	88.7	-	-	80.48	32.27	5.71	29.76	192	360	Peak
2480	87.02	-	-	78.8	32.27	5.71	29.76	192	360	Average
4960	38.85	-35.15	74	53.37	34.01	8.49	57.02	150	135	Peak
7440	39.95	-34.05	74	51.53	35.37	10.04	56.99	175	260	Peak

Note: Other harmonics are lower than background noise.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	Apr. 04, 2013	Sep. 14, 2013	Apr. 03, 2014	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 12, 2012	Sep. 14, 2013	Oct. 11, 2013	Radiation (03CH01-SZ)
Bilog Antenna	SCHAFFNER	CBL6112B	2614	30MHz ~2GHz	Nov. 03, 2012	Sep. 14, 2013	Nov. 02, 2013	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9 kHz-3000MHz GAIN 30db	Mar. 28, 2013	Sep. 14, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	Mar. 28, 2013	Sep. 14, 2013	Mar. 27, 2014	Radiation (03CH01-SZ)
SHF-EHF-Horn	Schwarzbeck	BBHA9170	BBHA9170249	14GHz ~40GHz	Nov. 23, 2012	Sep. 14, 2013	Nov. 22, 2013	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz-30MHz	Oct. 22, 2012	Sep. 14, 2013	Oct. 21, 2013	Radiation (03CH01-SZ)
Turn Table	EM Electronice	EM 1000	N/A	0 ~ 360 degree	N/A	Sep. 14, 2013	N/A	Radiation (03CH01-SZ)
Antenna Mast	EM Electronice	EM 1000	N/A	1 m - 4 m	N/A	Sep. 14, 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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