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# Report On

FCC Testing of the The Boeing Company Black Smartphone In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22 (WCDMA)

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FCC ID: H8V-BLK1

Document 75923267 Report 03 Issue 2

December 2013



**Product Service** 

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**REPORT ON** 

FCC Testing of the The Boeing Company Black Smartphone In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22 (WCDMA)

Document 75923267 Report 03 Issue 2

December 2013

PREPARED FOR

The Boeing Company 7700 Boston Blvd Springfield VA 22153

PREPARED BY

Natalie Bennett Senior Administrator (Technical)

**APPROVED BY** 

Mark Jenkins Authorised Signatory

DATED

19 December 2013

This report has been up issued to Issue 2 to amend the Applicant Name and Address and Product Name

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler



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# **SECTION 1**

# **REPORT SUMMARY**

FCC Testing of the The Boeing Company Black Smartphone In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22 (WCDMA)



### 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the The Boeing Company Black Smartphone to the requirements of FCC CFR 47 Part 2 and FCC CFR 47 Part 22.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	The Boeing Company
Model Number(s)	Black Smartphone
Serial Number(s)	XCV23200852 XCV23200791
Number of Samples Tested	2
Test Specification/Issue/Date	FCC CFR 47 Part 2 (2012) FCC CFR 47 Part 22 (2012)
Incoming Release Date	Application Form 13 December 2013
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	48774 01 July 2013
Start of Test	21 July 2013
Finish of Test	29 August 2013
Name of Engineer(s)	A Galpin G Lawler
Related Document(s)	ANSI C63.4: 2009



### 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22 is shown below.

Section	Spec Clause		Test Description	Regult	Comments/Base Standard
Section	Pt 2	Pt 22	Test Description		
WCDMA F	DD V - QPSK Moo	dulation			
2.1	2.1051	22.905	Spurious Emissions at Band Edge	Pass	
2.2	-	22.913 (a)	Effective Radiated Power	Pass	
2.3	2.1046	22.913 (a)	Maximum Peak Output Power - Conducted	Pass	
2.4	-	22.917	Emission Limitations for Cellular Equipment	Pass	
2.5	2.1051	22.917 (a)	Conducted Spurious Emissions	Pass	
2.6	2.1049 (h)	22.917 (b)	Occupied Bandwidth	Pass	
2.7	2.1047 (d)	-	Modulation Characteristics	-	Customer Declaration
2.8	2.1055	22.355	Frequency Stability	Pass	



### 1.3 APPLICATION FORM

APPLICANT'S DETAILS			
COMPANY NAME :The Boeing Company ADDRESS : 7700 Boston Blvd. Springfield, VA 22153			
NAME FOR CONTACT PURPOSES : Brian Chapman			
TELEPHONE NO: 703.270.6714FAX NO: E-MAIL	; brian.s.chapman@boeing.com		
EQUIPMENT INFOR	RMATION		
Equipment designator:			
Model name/number Identification number			
Supply Voltage:			
[       ]       AC mains       State AC voltage	and AC frequency Hz and DC current A and Battery typeLi-Polymer		
Frequency characteristics:			
Frequency range 826.4 MHz to 846,6 MHz	Channel spacing 200kHz (if channelized)		
Designated test frequencies: Bottom: 826.4 MHz Middle: 836.6 MHz	Top: 846.6 MHz		
Power characteristics:			
Maximum transmitter power 0.25W (24dBm)	Minimum transmitter power W		
[X]       Continuous transmission         []       Intermittent transmission         State duty cycle       If intermittent, can transmitter be set to continuous transmit test mode?			
Antenna characteristics:			
[       ]       Antenna connector         [       X       ]       Temporary antenna connector         [       X       ]       Integral antenna	State impedance ohm State impedance 50 ohm State gain (peak) -1.5dBi		
Modulation characteristics:			
[ ] Amplitude [ ] Frequency [ X ] Phase	[ ] Other Details:		
Can the transmitter operate un-modulated? ¥/N ITU Class of emission:			
Extreme conditions:			
Maximum temperature 55 °C Maximum supply voltage 4.2 V	Minimum temperature -10 °C Minimum supply voltage 3.6 V		

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

	VII I
Signature :	ACh
Name :	Brian Chapman
Position held :	Program Mainager
Date :	12/13/13



### 1.4 **PRODUCT INFORMATION**

### 1.4.1 Technical Description

The Equipment Under Test (EUT) was a The Boeing Company Black Smartphone. A full technical description can be found in the manufacturer's documentation.

### 1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 3.8 V DC supply.

FCC Accreditation 90987 Octagon House, Fareham Test Laboratory

### 1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard were made during testing.

### 1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.



**SECTION 2** 

**TEST DETAILS** 

FCC Testing of the The Boeing Company Black Smartphone In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22 (WCDMA)



### 2.1 SPURIOUS EMISSIONS AT BAND EDGE

### 2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051 FCC CFR 47 Part 22, Clause 22.905

### 2.1.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200852 - Modification State 0

### 2.1.3 Date of Test

29 August 2013

### 2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.1.5 Test Procedure

In accordance with 22.917, any emissions outside of the block edges shall be attenuated by at least 43 + 10 log (P). The measurements are shown to  $\pm 1$  MHz from the block edges. The plots shown under the Spurious Emissions sections covers the required range of 9 kHz to 9 GHz.

The reference power and path losses of all channels used for testing in each frequency block were measured. Having entered the reference level offset, a limit line was displayed, showing the -13 dBm (43 + 10 log (P)), limit. A measurement RBW of at least 1% of the Occupied Bandwidth is specified. In this instance, a smaller RBW was used and the Reference Level Offset was corrected by 10log(1% of Occupied Bandwidth/RBW). The EUT was operated at maximum power with QPSK modulation schemes.

#### 2.1.6 Environmental Conditions

Ambient Temperature	23.7°C
Relative Humidity	56.0%



### 2.1.7 Test Results

### 3.8 V DC Supply

Frequency Block (MHz)	Mode	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A :(824.0 – 835.0)	WCDMA	Channel : 4132 Frequency : 826.4 MHz	N/A
B :(846.5 – 849.0)	WCDMA	N/A	Channel : 4233 Frequency : 846.6MHz

### Frequency Block A





Frequency Block B



Limit Clause

-13 dBm at block edge.



### 2.2 EFFECTIVE RADIATED POWER

### 2.2.1 Specification Reference

FCC CFR 47 Part 22, Clause 22.913 (a)

### 2.2.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200791 - Modification State 0

### 2.2.3 Date of Test

21 July 2013 & 22 July 2013

### 2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

#### 2.2.5 Test Procedure

Measurements of the fundamental from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The fundamental frequency was maximised by adjusting the antenna height, antenna polarisation and turntable azimuth. A peak detector was used with the trace set to max hold. The maximum result was recorded.

The EUT was then removed from the chamber and replaced with a substitution antenna. Using a signal generator the level was adjusted to achieve the same value on the measuring instrument as previously recorded with the EUT. The final result (ERP) was determined by a calculation using the signal generator level, antenna gain and cable loss.

The substitution result was corrected to account for the Spectrum Analyser measurement bandwidth using a Peak Power Analyser.

The measurements were performed at a 3m distance unless otherwise stated.

### 2.2.6 Environmental Conditions

Ambient Temperature	18.9 - 19.4°C
Relative Humidity	39.0 - 43.0%



### 2.2.7 Test Results

### <u>826.4 MHz</u>



Date: 21.JUL.2013 10:05:54

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### 836.6 MHz



Date: 21.JUL.2013 10:21:34

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### <u>846.6 MHz</u>



Date: 21.JUL.2013 10:29:13

### Limit Clause

Mobile - 7 W or 38.45 dBm



### 2.3 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

### 2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046 FCC CFR 47 Part 22, Clause 22.913 (a)

### 2.3.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200852 - Modification State 0

### 2.3.3 Date of Test

29 August 2013

### 2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.3.5 Test Procedure

Using a Peak Power Meter in conjunction with an attenuator, the output power of the EUT was measured at the antenna terminals on Bottom, Middle and Top channels on maximum output power.

The EUT supports WCDMA with QPSK modulation in the uplink and was tested in this mode of operation.

### 2.3.6 Environmental Conditions

Ambient Temperature23.7°CRelative Humidity56.0%



### 2.3.7 Test Results

3.8 V DC Supply

### <u>826.4 MHz</u>

Mode	Result (dBm)	Result (W)
WCDMA	28.07	0.642

### 836.6 MHz

Mode	Result (dBm)	Result (W)
WCDMA	27.63	0.579

### <u>846.6 MHz</u>

Mode	Result (dBm)	Result (W)
WCDMA	27.31	0.538

### Limit Clause

Mobile - 7 W or 38.45 dBm



### 2.4 EMISSION LIMITATIONS FOR CELLULAR EQUIPMENT

2.4.1 Specification Reference

FCC CFR 47 Part 22, Clause 22.917

### 2.4.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200791 - Modification State 0

### 2.4.3 Date of Test

21 July 2013 & 22 July 2013

### 2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

#### 2.4.5 Test Procedure

A preliminary profile of the Spurious Radiated Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, the list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

The EUT was set to transmit on maximum power with modulation. The EUT was tested on bottom, middle and top channels at maximum power.

For any emissions found the EUT was then removed from the chamber and replaced with a substitution antenna. Using a signal generator the level was adjusted to achieve the same value on the measuring instrument as previously recorded with the EUT. The final result was determined by a calculation using the signal generator level, antenna gain and cable loss.

The measurements were performed at a 3m distance unless otherwise stated.

### 2.4.6 Environmental Conditions

Ambient Temperature	18.9 - 19.4°C
Relative Humidity	39.0 - 43.0%



### 2.4.7 Test Results

### <u>826.4 MHz</u>

30 MHz to 1 GHz



Date: 22.JUL.2013 19:43:30



Date: 21.JUL.2013 10:15:59



### 8 GHz to 10 GHz



Date: 21.JUL.2013 15:04:40

### 836.6 MHz

### 30 MHz to 1 GHz



Date: 22.JUL.2013 19:46:29



### 1 GHz to 8 GHz



Date: 21.JUL.2013 10:18:13





Date: 21.JUL.2013 15:07:21

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### 846.6 MHz



Date: 22.JUL.2013 19:49:21



### 1 GHz to 8 GHz

Date: 21.JUL.2013 10:37:44



### 8 GHz to 10 GHz



Date: 21.JUL.2013 15:10:57

### Limit Clause

43+10log(P) or -13 dBm



### 2.5 CONDUCTED SPURIOUS EMISSIONS

### 2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051 FCC CFR 47 Part 22, Clause 22.917 (a)

### 2.5.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200852 - Modification State 0

#### 2.5.3 Date of Test

29 August 2013

### 2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.5.5 Test Procedure

In accordance with Part 2.1051 and 22.917, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 9 kHz to the 10th harmonic. The EUT was set to transmit on full power with QPSK modulation. The EUT was tested on Bottom, Middle and Top channels for maximum power. The resolution and video bandwidths were set to 1 MHz and 3 MHz thus meeting the requirements of Part 22.917(b). The spectrum analyser detector was set to max hold.

From 9 kHz to 4 GHz, an attenuator was used. For measuring the range 1.5 GHz to 9 GHz an attenuator and high pass filter were used. This was to reduce saturation effects in the spectrum analyser.

The maximum path loss across the measurement bands were used as reference level offsets to ensure worst case.

### 2.5.6 Environmental Conditions

Ambient Temperature	23.7°C
Relative Humidity	56.0%



### 2.5.7 Test Results

### <u>826.4 MHz</u>

9 kHz to 1.5 GHz

₩ Agilent 16:03:15 Aug 29, 2013											
Ref 16	.98 dBm		#At	ten 10 di	3	\$				Mkr1 24	829 MHz .36 dBm
Peak Log 10											
⊥ø dB∕											Ext Ref
Offst 17 dB											
–13.0 dBm											
			a	mm	* Andrew	And I	h		-hand	hunter	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
V1 S2 S3 FS											
ÂÂ											
Center #Res B	750 MHz W 1 MHz				₩VBW 3 M	Hz			Swee	Span p4ms(4	1.5 GHz 01 pts)



### 1.5 GHz to 9 GHz



### 836.6 MHz

9 kHz to 1.5 GHz





### 1.5 GHz to 9 GHz



### <u>846.6 MHz</u>

9 kHz to 1.5 GHz



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### 1.5 GHz to 9 GHz



### Limit Clause

43+10log(P) or -13 dBm



### 2.6 OCCUPIED BANDWIDTH

### 2.6.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049 (h) FCC CFR 47 Part 22, Clause 22.917 (b)

### 2.6.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200852 - Modification State 0

### 2.6.3 Date of Test

29 August 2013

### 2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.6.5 Test Procedure

The EUT was transmitting at maximum power, with modulation. Using a resolution bandwidth of 10 kHz and a video bandwidth of 30 kHz, the -26 dBc points were established and the emission bandwidth determined.

The plots on the following pages show the resultant display from the Spectrum Analyser.

### 2.6.6 Environmental Conditions

Ambient Temperature	23.7°C
Relative Humidity	56.0%



### 2.6.7 Test Results

3.8 V DC Supply

826.4 MHz

Mode	Occupied Bandwidth (kHz)
WCDMA	4121.88



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### <u>836.6 MHz</u>

Mode	Occupied Bandwidth (kHz)
WCDMA	4120.335

* Agilent 16:13: Ch Freq	37 Aug 29, 2013 836.6 MHz	500	R T Ext Ref Trig Free	
Uccupied Bandwidth		Hverages: 500		
Ref 25.55 dBm	Atten 20 d	B		
#Peak Log 10 dB/				Ext Ref
0ffst 16.7 dB				
Center 836.6 MHz Res BW 30 kHz		/BW 300 kHz	Sweep 5.57	Span 5 MHz 74 ms (401 pts)
	Occupied Band 4.	width 1203 MHz	OCC BW % Pi x (	<b>₩r</b> 99.00 % d <b>B</b> –26.00 dB
	Transmit Freq Error x dB Bandwidth	r -5.292 kHz 4.682 MHz		

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### <u>846.6 MHz</u>

Mode	Occupied Bandwidth (kHz)
WCDMA	4119.982

🔆 Agile	nt 16:2	2:45 Aug	9 29, 2013	3			R	T t Ref		
	Ch Fre	<b>a</b> 846	.6 MHz				Trig F	ree		
Occupied	Bandwidt	:h			Average	s: 500				
Ref 25.46	∂dBm		Atten	20 dB						
#Peak ⊨										
Log										~
dB/	$\angle$ $+$									Ext Ref
Offst 🗌										
16.7										
Center 8	46.6 MHz								Sc	ian 5 MHz
Res BW 3	0 kHz			VB	3W 300 ki	Hz	Swe	eep 5.57	4 ms (	(401 pts)
		Осси	upied E	Bandw 4.1	idth 200 м	Hz	Occ	BW % P⊮ × d	ir B	99.00 % 26.00 dB
		Trang	mit Eroa	Error	017					
		x dB	Bandwidt	th	4.675	MHz				

### Limit Clause

The occupied bandwidth, that is the frequency bandwidth such that, below is lower and above is upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.



### 2.7 MODULATION CHARACTERISTICS

2.7.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1047 (d)

### 2.7.2 Equipment Under Test

**Black Smartphone** 

### 2.7.3 Test Results

850 MHz – WCDMA Modulation Characterisitcs - QPSK

🚯 WCDMA UE T)	(Measurement - )	/3.2.11					WCDMA
UL Frequency:	ation TPC   826.4000000 MH;	Measurement   z Ref. Level: 35.4	OPRACH	RF1COM M	leas. Period: Full Si	ot	Multi Evaluation <mark>RUN</mark>
dBm		Slot		Slot CDP	vs Slot	Slot	RF Settings
Phase Discon	ntinuity	Hz Stor	cy Error	Slot Rela	ative CDE	Slot	Trigger
Error Vector I	Magnitude	Slot	hip	Chip	Monitor		
Phase Error		Slot Phase Er	ror vs Chip 🔳	Chip ACL	R	Ch	Display
Magnitude Er	tor <b>Milli</b>	Slot Magnitud	le Error vs Chip	Chip Chip	ssion Mask		
TX Measurement Current UE Power 22.39 dBm EVM RMS 2.91 % CF Error -0.84 Hz OBW 4.07 MHz							Signaling Parameter
HSDFA CS: Call Established PS: ON Power In Range In Sync							WCDMA-UE Signaling ON
Trigger Source	Trigger Slope	Trigger Threshold	Trigger Delay	Trigger Timeout	Minimum Trigger Gap		Config



### <u>1900 MHz – WCDMA Modulation Characterisitcs – QPSK</u>

🚯 WCDMA UE TX Measu	rement - V3.2.11					WCDMA
Multi Evaluation UL Frequency: 1880.000	OTPC Measure	ment PRACH	RF1COM Me	eas. Period: Full SI	ot ,	Multi Evaluation
UE Power	F	ower Steps	CDP	vs Slot		
dBm	Slot	dB	Slot dB		Slot	RF Settings
Phase Discontinuity	F F F F F F	requency Error 🛛 🔳	Rela	tive CDE		
	Slor	Hz	Slot dB		Slot	Trigger
Error Vector Magnitu	ıde E	VM vs Chip 🔳	CD N	lonitor		
1	Slot	Landerson and the second	Chip			
Phase Error	EXCLUSION F	hase Error vs Chip 🛛 💷	ACLI	R		
<b>a</b>	Slot	a	Chip dBm	i i I	Ch	Display
Magnitude Error		Aagnitude Error vs Chip 🛙	Emis	sion Mask		
*	Slot	1	Chip dB		kille	
TX Measurement C UE Power 21.74	urrent dBm E∨M RM:	5 <b>3.68</b> % CF Er	ror -2.47 H	z OBW	4.10 MHz	Signaling Parameter
Select View						WCDMA-UE
Overview	- Establi	shed PS: 💆	Attached	Pov In S	ver in Kange Sync	Signaling ON
Select View			Select Trace PhErr Chip	Y Scale PhErr Chip	X Scale PhErr Chip	Config



### 2.8 FREQUENCY STABILITY

### 2.8.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055 FCC CFR 47 Part 22, Clause 22.355

### 2.8.2 Equipment Under Test and Modification State

Black Smartphone S/N: XCV23200852 - Modification State 0

### 2.8.3 Date of Test

29 August 2013

#### 2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.8.5 Test Procedure

The EUT was set to transmit on maximum power with modulation. A CMU200 Communications Analyser, was used to measure the frequency error. The maximum result was taken over 200 bursts. The temperature was adjusted between -30°C and +50°C in 10° steps as per 2.1055 and the frequency error was measured at each temperature interval.

In addition, the frequency error was measured at voltage extremes at 20°C.

### 2.8.6 Environmental Conditions

Ambient Temperature	23.6 - 23.9°C
Relative Humidity	53.6 - 56.9%



### 2.8.7 Test Results

Temperature Interval (°C)	Mode	Modulation	Deviation (ppm)
-30	WCDMA	QPSK	-0.015568862
-20	WCDMA	QPSK	-0.021556886
-10	WCDMA	QPSK	0.026347305
0	WCDMA	QPSK	-0.020359281
+10	WCDMA	QPSK	-0.019161677
+20	WCDMA	QPSK	-0.010778443
+30	WCDMA	QPSK	-0.008383234
+40	WCDMA	QPSK	-0.008383234
+50	WCDMA	QPSK	0.011976048

### Limit Clause

Frequency Range (MHz)	Base, Fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20	20	50
50 to 450	5	5	50
450 to 512	2.5	5	5
821 to 896	1.5	2.5	2.5
928 to 929	5.0	-	-
929 to 960	1.5	-	-
2110 to 2220	10	-	-



### Under Voltage Variations

<u>836.6 MHz</u>

DC Voltage (V)	Mode	Modulation	Deviation (ppm)
3.8 V DC	WCDMA	QPSK	-0.010778443
3.6 V DC	WCDMA	QPSK	-0.009580838
4.2 V DC	WCDMA	QPSK	0.009580838

### Limit Clause

Frequency Range (MHz)	Base, Fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20	20	50
50 to 450	5	5	50
450 to 512	2.5	5	5
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10	n/a	n/a



**SECTION 3** 

## TEST EQUIPMENT USED



### 3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due	
Section 2.1 - Spurious Emission	ons at Band Edge					
Antenna (Bilog)	Schaffner	CBL6143	287	24	18-Jan-2014	
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	18-Oct-2013	
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014	
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013	
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU	
Power Supply	Hewlett Packard	6104A	1948	-	TU	
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	30-Nov-2013	
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	12	1-Feb-2014	
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013	
'2.92mm' - '2.92mm' RF Cable	Rhophase	KPS-1503-2000-	3694	12	25-Oct-2013	
(2m)		KPS				
'2.92mm' - '2.92mm' RF Cable	Rhophase	KPS-1503-2000-	3695	12	15-Oct-2013	
(2m)		KPS				
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-	3791	-	TU	
Tilt Antonno Moot	moturo Cmbh		2016		тн	
Maat Cantrallar	mature Cmbh		3910	-		
Do 40CHz Dowor Splittor		1524	3917	-	10 O/D Mon	
1 Matra SMA Cabla	Aeroliex / Weinschei	200 10014 1000	3960	-		
T Metre SMA Cable	Rilophase	3PS-1001A-1000-	4099	12	20-001-2013	
Section 2.2 - Effective Radiate	d Power	0.0				
Antenna (Double Ridge Guide.	EMCO	3115	234	12	3-Apr-2014	
1GHz-18GHz)				.=	o / .po	
Signal Generator (10MHz to	Rohde & Schwarz	SMR40	1002	12	6-Sep-2013	
40GHz)						
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013	
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU	
Antenna (Log Periodic)	Schaffner	UPA6108	3108	12	5-Apr-2014	
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013	
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU	
Mast Controller	maturo Gmbh	NCD	3917	-	TU	
Wideband Radio	Rohde & Schwarz	CMW 500	4144	12	17-Jul-2014	
Communication Tester						
Section 2.3 - Maximum Peak Output Power - Conducted						
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	18-Oct-2013	
Power Supply	Hewlett Packard	6104A	1948	-	TU	
Radio Communications Test	Rohde & Schwarz	CMU 200	3035	12	6-Dec-2013	
Set						
ESA-E Series Spectrum	Agilent Technologies	E4402B	3348	12	13-Jun-2014	
Analyser	0					
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	31-Aug-2013	
Combiner/Splitter	Weinschel	1506A	3877	12	19-Mar-2014	
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-	4099	12	26-Oct-2013	
		3PS				

### COMMERCIAL-IN-CONFIDENCE



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Instrument	Manufacturer	Туре No.	TE NO.	Calibration	Calibration Due
				(months)	
Section 2.4 – Emission Limitat	ions for Cellular Equipm	l		(month)	
Antenna (Double Ridge Guide	EMCO	3115	235	12	9-Nov-2013
1GHz-18GHz)	LINGO	0110	200	12	01101 2010
Antenna (Bilog)	Schaffner	CBL6143	287	24	18-Jan-2014
Communications Tester	Rohde & Schwarz	CMU 200	442	12	1-Nov-2013
Pre-Amplifier	Phase One	PS04-0086	1533	12	27-Sep-2013
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Amplifier (1 - 8GHz)	Phase One	PS06-0060	3175	-	O/P Mon
Amplifier (8 - 18GHz)	Phase One	PS06-0061	3176	-	O/P Mon
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
3 GHz High Pass Filter	K&L Microwave	11SH10-	3552	12	1-Feb-2014
-		3000/X18000-O/O			
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-	3791	-	O/P Mon
		NPS			
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Section 2.5- Conducted Spurio	ous Emissions				
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	18-Oct-2013
Spectrum Analyser	Agilent Technologies	E7405A	1410	12	11-Sep-2013
Power Supply	Hewlett Packard	6104A	1948	-	TU
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	12	1-Feb-2014
Filter	Daden Anthony Ass	MH-1500-7SS	2778	-	O/P Mon
Radio Communications Test	Rohde & Schwarz	CMU 200	3035	12	6-Dec-2013
Set					
ESA-E Series Spectrum	Agilent Technologies	E4402B	3348	12	13-Jun-2014
Analyser				10	
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	31-Aug-2013
Combiner/Splitter	Weinschel	1506A	3877	12	19-Mar-2014
1 Metre SMA Cable	Rhophase	3PS-1801A-1000- 3PS	4099	12	26-Oct-2013
1 Metre K Type Cable	Rhophase	KPS-1501A-1000-	4106	12	25-Oct-2013
	Talophaoo	KPS	1100		20 000 2010
Section 2.6 - Occupied Bandwidth					
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	18-Oct-2013
Power Supply	Hewlett Packard	6104A	1948	-	TU
Radio Communications Test	Rohde & Schwarz	CMU 200	3035	12	6-Dec-2013
Set					
ESA-E Series Spectrum	Agilent Technologies	E4402B	3348	12	13-Jun-2014
Analyser					
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	31-Aug-2013
Combiner/Splitter	Weinschel	1506A	3877	12	19-Mar-2014
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-	4099	12	26-Oct-2013
		3PS			

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Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.7- Frequency Stabilit	y				
Multimeter	White Gold	WG022	190	12	30-Oct-2013
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Power Supply Unit	Farnell	D302T	609	-	O/P Mon
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	6-Dec-2013
Thermocouple Thermometer	Fluke	51	3173	12	23-Aug-2013
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	11-Dec-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000- NPS	4103	12	11-Jun-2014

TU – Traceability Unscheduled

O/P MON - Output Monitored with Calibrated Equipment



### 3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU	
Maximum Peak Output Power - Conducted	± 0.70 dB	
Emission Limitations for Cellular Equipment	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB	
Conducted Spurious Emissions	± 3.454 dB	
Effective Radiated Power	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB	
Spurious Emissions at Band Edge	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB	
Occupied Bandwidth	± 16.74 kHz	
Modulation Characteristics	-	
Frequency Stability	± 46.70 Hz	



**SECTION 4** 

# ACCREDITATION, DISCLAIMERS AND COPYRIGHT



### 4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

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