

### **Intentional Radiator Test Report**

For the

Wilson Electronics.

#### **Quint Band Bi-Directional Amplifier Model # 460025**

Tested under

FCC Part 20

For Direct Connect Consumer Signal Booster

#### **Prepared for:**

Wilson Electronics

3301 E. Desert Drive,

St. George, UT 8479085224

**Prepared By:** 

H.B. Compliance Solutions

5005 S. Ash Avenue, Suite # A-10

Tempe, Arizona 85282

**Reviewed By:** 

Hoosamuddin Bandukwala



Cert # ATL-0062-E

Engineering Statement: The measurements shown in this report were made in accordance with the procedure indicated, I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.



# **Report Status Sheet**

Revision #	Report Date	Reason for Revision
Ø	January 16, 2015	Initial Issue
1	March 30, 2015	TCB Comments
2 May 06, 2015		Corrected RSSI values in Table 24



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# 1. Testing Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 20. All tests were conducted using measurement procedure from FCC Signal Booster Measurement KDB 935210 D03 v02r01 July 24, 2014 as appropriate.

Test Name	Test	Result	Comments
	Method/Standard		
Authorized Frequency	20.21(e)(3)	Pass	
Band			
Maximum Power &	20.21(e)(8)(i)(B)	Pass	
Booster Gain	20.21(e)(8)(i)(C)		
	20.21(e)(8)(i)(D)		
Intermodulation	20.21(e)(8)(i)(F)	Pass	
Out-of-Band Emissions	20.21(e)(8)(i)(E)	Pass	
Conducted Spurious	2.1051	Pass	
Emissions			
Noise Limits	20.21(e)(8)(i)(A)	Pass	If noise is less than -70dBm/MHz then
	20.21(e)(9)(i)(l)		EUT will not shut off therefore following
			1) Variable Unlink Noise Power
			Test
			2) Noise Timing Test
Uplink Inactivity	20.21(e)(8)(i)(l)	N/A	Since noise is less than -70dBm/MHz in
	20.21(e)(9)(i)(J)		normal mode the EUT will not exceed
			this level after 5 mins when not serving
			are N/A
Variable Booster Gain	20.21(e)(8)(i)(C)	Pass	
Occupied Bandwidth	2.1049	Pass	
Oscillation Detection	20.21(e)(8)(ii)(A)	Pass	
Radiated Spurious	2.1053	Pass	
Emissions			
Spectrum Block Filtering	20.21(e)(8)(i)(B)	N/A	Applies to devices utilizing
			spectrum block filtering, In this
			case this is not applicable



# **EQUIPMENT CONFIGURATION**

# 1. Overview

H.B Compliance Solutions was contracted by Wilson Electronics to perform testing on the Bi-Directional Amplifier Model # 460025 under the purchase order number PO460025.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Wilson Electronics, Bi-Directional Amplifier Model # 460025.

The tests were based on FCC Part 20 Rules. The tests described in this document were formal tests as described with the objective of the testing was to evaluate compliance of the Equipment Under Test (EUT) to the requirements of the aforementioned specifications. Wilson Electronics should retain a copy of this document and it should be kept on file for at least five years after the manufacturing of the EUT has been permanently discontinued. The results obtained relate only to the item(s) tested.

Product Name:	Quint Band Bi-Directional Amplifier				
Model(s) Tested:	460025				
FCC ID:	None				
Supply Voltage Input:	Primary Power : 5.0 Vdc				
Frequency Range:	Uplink 698-716, 776-787MHz, 824-849MHz,				
	1710-1755 & 1850-1915MHz,				
	Downlink 728-746MHz, 746-757MHz, 869-894MHz,				
	1930-1995MHz & 2110-2155MHz				
No. of Channels:	N/A				
Type(s) of Modulation:	CDMA, GSM, EDGE, HSPA, EVDO, LTE				
Range of Operation Power:	0.206 – 0.339W				
Emission Designator:	F9W, GXW, G7W & G7D				
Channel Spacing(s)	N/A				
Test Item:	Pre-Production				
Type of Equipment :	Direct Connect				
Antenna Requirement	External				
Environmental Test	Temperature: 15-35°C				
Conditions:	Humidity: 30-60%				
	Barometric Pressure: 860-1060 mbar				
Modification to the EUT:	None				
Evaluated By:	Staff at H.B. Compliance Solutions				
Test Date(s):	12/15/14 till 01/15/15				



Radiated Emission testing was performed at Artesyn Embedded Technologies. This facility is located at 2900 S. Diablo Way, Suite 190, Tempe, AZ 85282. All equipment used in making physical determination is accurate and bears recent traceability to the National Institute of Standards and Technology.

Test facility at Emerson Network power is an A2LA accredited test site. The A2LA certificate number is 2716.01. The scope of accreditation covers the FCC Method - 47 CFR Part 15, ICES-003, CISPR 22, AS/NZS 3548 and VCCI.

Conducted testing was performed at H.B. Compliance Solutions. This facility is located at 5005 S. Ash Avenue, Suite # A-10, Tempe AZ 85282.

Radiated Emissions measurements were performed in a semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at Emerson Network Power.

# 3. Description of Test Sample

The Wilson Electronics is a quint band bi-directional amplifier used for enhancing the range of cell phones and data communication devices in in-building applications. The components are contained in a metal enclosure. It runs off 5 volt DC power

# 4. Equipment Configuration

Ref. ID	Name / Description	Model Number	Serial Number
#1	Quint Band Bi-Directional Amplifier	460025	N/A

Table 1. Equipment Configuration

### 5. Support Equipment

All support equipment supplied is listed in the following Support Equipment List.

Ref ID	Name / Description	Manufacturer	Model #	Serial #
N/A	-	-	-	-

Table 2. Support Equipment



# 6. Ports and Cabling Information

Ref ID	Port name on the EUT	Cable Description	Qty.	Length (m)	Shielded? (Y/N)	Termination Box ID & Port ID
#2	Power	2 wire	1	1	N	DC Power Supply

Table 3. Ports and Cabling Information

# 7. Method of Monitoring EUT Operation

A test receiver will be used to monitor the data transmission from the EUT.

# 8. Mode of Operation

The EUT will be configured as defined in the FCC KDB 935210 D03 guidance document. These settings were created for testing purpose only.

# 9. Modifications

9.1 Modifications to EUT

No modifications were made to the EUT

9.2 Modifications to Test Standard

No Modifications were made to the test standard.

# **10. Disposition of EUT**

The test sample including all support equipment submitted to H.B Compliance Solutions for testing will be returned to Wilson Electronics upon completion of testing & certification



# **Criteria for Intentional Radiators**

# **1. Authorized Frequency Band**

Test Requirement(s):	§20.21(e)(3)	Test Engineer(s):	Hoosam B.
Test Results:	Pass	Test Date(s):	Dec/15/14

Test Procedures:As required by 47 CFR §20.21(e)(3), Authorized frequency band<br/>measurements were made at the RF output terminals of the EUT.

The EUT was connected through an attenuator to a Spectrum Analyzer. A signal generator was used for the input to the EUT to provide a CW signal tuned to the center channel of each uplink and downlink operational band. Measurements were made at the low and high channels of each uplink and downlink frequency band.

#### **Test Setup:**



Figure 1 – Band Verification





Plot 1 – 698-716MHz Band – Uplink



#### Plot 2 – 776-787MHz Band – Uplink









#### Plot 4 – 1710-1755MHz Band – Uplink





Plot 5 – 1850-1915MHz Band – Uplink









Plot 7 – 746-757MHz Band – Downlink



#### Plot 8 – 869-894MHz Band – Downlink





Plot 9 – 1930-1995MHz Band – Downlink







# 2. Maximum Power and Gain

Test	§20.21(e)(8)(i)(D)	Test Engineer(s):	Hoosam B.
Requirement(s):			
Test Results:	Pass	Test Date(s):	Dec/16/15

**Test Procedure:** As required by 47 CFR 20.21(e)(8)(i)(D): Maximum power measurements were made at the RF output terminals of the EUT.

The EUT was connected as per Figure 1 through an attenuator to a Spectrum Analyzer. A signal generator was used for the input to the EUT to provide a GSM & AWGN with 4.1MHz bandwidth signal tuned to the highest frequency measured in Authorized frequency band test of each uplink and downlink operational band.

KDB Procedure 935210 D03 §7.2.2 and §7.3 was used to measure the maximum power and to calculate the maximum gain.

#### Test Results:

Frequency (MHz)	Input Level (dBm)	Output Power (dBm)	Lower Limit (dBm)	Upper Limit (dBm)
698-716 GSM	9	23.44	17	30
698-716 AWGN	10	23.15	17	30
776-787 GSM	11	24.3	17	30
776-787 GSM	11	23.54	17	30
824-849 GSM	10	24.27	17	30
824-849 AWGN	10	23.25	17	30
1710-1755 GSM	13	25.3	17	30
1710-1755 AWGN	11	23.2	17	30
1850-1915 GSM	10	23.14	17	30
1850-1915 AWGN	9	21.16	17	30

Table 1. Uplink Max Power Test Results



Frequency (MHz)	Input Level (dBm)	Output Power (dBm)	Upper Limit (dBm)
728-746 GSM	-17	-4.37	17
728-746 AWGN	-17	-4.14	17
746-757 GSM	-17	-4.09	17
746-757 AWGN	-17	-4.21	17
869-894 GSM	-17	-3.84	17
869-894 AWGN	-17	-3.76	17
1930-1995 GSM	-17	-4.67	17
1930-1995 AWGN	-17	-4.7	17
2110-2155 GSM	-17	-4.73	17
2110-2155 AWGN	-17	-4.7	17

Table 2. Downlink Max Power Test Results

Modulation	Uplink Frequency (MHz	Downlink Frequency (MHz)	Uplink Gain (dB)	Uplink Limit (dB)	Downlink Gain (dB)	Downlink Limit (dB)	UL Gain - DL Gain (Delta in dB	Limit (dB)	Margin (dB)
GSM	699.0	745.92	14.44	15	12.63	15	1.81	9	-7.19
AWGN	699.0	745.92	13.15	15	12.86	15	0.29	9	-8.71
GSM	776.125	747.60	13.3	15	12.91	15	0.39	9	-8.61
AWGN	776.125	747.60	12.54	15	12.79	15	-0.25	9	-9.25
GSM	832.45	879.0	14.27	15	13.16	15	1.11	9	-7.89
AWGN	832.45	879.0	13.25	15	13.24	15	0.01	9	-8.99
GSM	1721.7	1960.87	12.3	15	12.33	15	-0.03	9	-9.03
AWGN	1721.7	1960.87	12.2	15	12.3	15	-0.1	9	-9.1
GSM	1884.77	2124.75	13.14	15	12.27	15	0.87	9	-8.13
AWGN	1884.77	2124.75	12.16	15	12.3	15	-0.14	9	-9.14

Table 3. Maximum Booster Gain Test Results



### 3. Intermodulation

Test Requirement(s):	CFR §20.21(e)(8)(i)(F)	Test Engineer(s):	Hoosam B.
Test Results:	Pass	Test Date(s):	Dec/17/14

**Test Procedures:** As required by 47 CFR §20.21(e)(8)(i)(F), Intermodulation measurements were made at the RF output terminals of the EUT.

The EUT was connected through an attenuator to a Spectrum Analyzer. Signal generator was setup for a two tone CW signal with 300kHz offset below and above the operational band frequency. Measurements were made as per KDB 935210 D03 §7.4 procedure.

Detector Setting	Resolution Bandwidth	Video Bandwidth	Span			
RMS	3kHz	≤3 x RBW	5MHz			
Table A Analyzar Sattings						

Table 4 – Analyzer Settings

Frequency Band (MHz)	Intermodulation Level (dBm)	Limit (dBm)	Margin (dB)
698-716	-23.37	-19	-4.37
776-787	-26.54	-19	-7.54
824-849	-21.52	-19	-2.52
1710-1755 -20.48		-19	-1.48
1850-1915	-20.96	-19	-1.96

Table 5. Summary Uplink Intermodulation, Test Results

Frequency (MHz)	Intermodulation Level (dBm)	Limit (dBm)	Margin (dB)
728-746	-66.42	-19	-47.42
746-757	-70.71	-19	-51.71
869-894	-66.47	-19	-47.47
1930-1995	-67.60	-19	-48.6
2110-2155	-71.69	-19	-52.69

 Table 6. Summary Downlink Intermodulation Test Results





Plot 11 698-716MHz Band – Uplink













Plot 14 – 1710-1755MHz Band – Uplink



















Plot 18 – 869-894MHz Band – Downlink









Plot 20 – 2110-2155MHz Band – Downlink



# 4. Out-of-band emissions

Test	§20.21§(8)(i)(E)	Test Engineer(s):	Hoosam B.	
Requirement(s):				
Test Results:	Pass	Test Date(s):	Dec/29/14	

Test Procedures:As required by 47 CFR §20.21(8)(i)(E), Out-of-band emissions<br/>measurements were made at the RF output terminals of the EUT.The EUT was connected through an attenuator to a Spectrum<br/>Analyzer as per figure 1. Signal generator was setup to produce<br/>GSM, LTE & CDMA signals for all uplink and downlink bands.<br/>Measurements were made as per procedure defined in KDB<br/>935210 D03 §7.5.Out of Band Emission Limits = P1 - 6 - (43 \_ 10log (P2) = -19dBm

Where P1 = Power in dBm and P2 = Power in Watts

Frequency Band	Band Edge	Measured Level	Limit (dBm)
		(ubiii)	
698-716	Lower	-24.09	-19
698-716	Upper	-26.79	-19
776-787	776-787 Lower -2		-19
776-787	Upper	-26.4	-19
824-849	Lower	-38.86	-19
824-849	Upper	-41.19	-19
1710-1755	Lower	-39.2	-19
1710-1755	Upper	-40.1	-19
1850-1915	Lower	-38.99	-19
1850-1915	Upper	-43.61	-19

Table 7. GSM Uplink – Out-of band Emissions, Test Results



Frequency Band	Band Edge	Measured Level	Limit (dBm)
(MHz)		(dBm)	
698-716	Lower	-25.02	-19
698-716	Upper	-39.62	-19
776-787	Lower	-23.36	-19
776-787	Upper	-22.57	-19
824-849	Lower	-32.39	-19
824-849	Upper	-34.66	-19
1710-1755	Lower	-32.22	-19
1710-1755	Upper	-32.55	-19
1850-1915	Lower	-32.99	-19
1850-1915	Upper	-44.53	-19

Table 8. CDMA Uplink – Out-of band Emissions, Test Results

Frequency Band	Band Edge	Measured Level	Limit
(MHz)		(dBm)	(dBm)
698-716	Lower	-36.09	-19
698-716	Upper	-41.36	-19
776-787	Lower	-33.57	-19
776-787	Upper	-31.16	-19
824-849	Lower	-34.72	-19
824-849	Upper	-34.41	-19
1710-1755	Lower	-36.32	-19
1710-1755	Upper	-35.85	-19
1850-1915	Lower	-32.47	-19
1850-1915	Upper	-33.52	-19

Table 9. LTE Uplink – Out-of band Emissions, Test Results



Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)
728-746	Lower	-55.5	-19
728-746	Upper	-51.99	-19
746-757	Lower	-54.17	-19
746-757	Upper	-55.69	-19
869-894	Lower	-66.1	-19
869-894	Upper	-67.04	-19
1930-1995	Lower	-69.06	-19
1930-1995	Upper	-67.23	-19
2110-2155	Lower	-66.93	-19
2110-2155	Upper	-68.62	-19

Table 10. GSM Downlink – Out-of band Emissions, Test Results

Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)
728-746	Lower	-73.2	-19
728-746	Upper	-67.24	-19
746-757	Lower	-68.42	-19
746-757	Upper	-73.34	-19
869-894	Lower	-73.0	-19
869-894	Upper	-73.0	-19
1930-1995	Lower	-74.95	-19
1930-1995	Upper	-73.72	-19
2110-2155	Lower	-74.91	-19
2110-2155	Upper	-76.07	-19

Table 11. CDMA Downlink – Out-of band Emissions, Test Results



Frequency Band	Band Edge	Measured Level	Limit
(MHz)		(dBm)	(dBm)
728-746	Lower	-39.63	-19
728-746	Upper	-32.87	-19
746-757	746-757 Lower -32.9		-19
746-757	Upper	-36.77	-19
869-894	Lower	-30.46	-19
869-894	Upper	-30.69	-19
1930-1995	Lower	-33.18	-19
1930-1995	Upper	-31.96	-19
2110-2155	Lower	-29.3	-19
2110-2155	Upper	-32.17	-19

Table 12. LTE Downlink – Out-of band Emissions, Test Results









### Plot 22 - 698-716MHz Band – GSM Uplink Upper Band Edge





Plot 23 – 776-787MHz Band – GSM Uplink Lower Band Edge



Plot 24 – 776-787MHz Band – GSM Uplink Upper Band Edge



🔆 Ag	jilent 13	3:02:54 De	ec 26, 2014	1				RT		
Ref -0.2	2 dBm		А	tten 5 dB				Mkr	1 823.981 -38.	25 MHz 86 dBm
Avg Log 10										
dB/ Offst 20.8 dB										
DI -19.0 dBm	mm	mm	hm	inn	mm	www	mum	Maria	www	And the
PAvg 100										
S3 FC										
Start 8/ #Res B	23.7 MHz W 3 kHz				VBW 10 k	Hz		Sweep 54	Stop .25 ms (40	824 MHz )1 pts)





# Plot 26 – 824-849MHz Band – GSM Uplink Upper Band Edge



🔆 Ag	ilent 13	3:09:10 De	ec 26, 2014	1				RT		
Ref -0.2	2 dBm		А	tten 5 dB				Mkr	1 1.70999 -39	25 GHz .2 dBm
Avg Log 10 dB/ Offst 20.8 dB DI -19.0										
dBm PAvg 100 W1 S2 S3 FC	www	har war war war war war war war war war w	Ann Marana Ma	w-~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mmm	www.www	WAT AD MAN	
Start 1. #Res B	707 GHz W 3 kHz				VBW 10 ki	Hz		Sweep 54	Stop 1 2.5 ms (40	.71 GHz )1 pts)





Plot 27 – 1710-1755MHz Band – GSM Uplink Upper Band Edge



🔆 Ag	jilent 1	3:12:54 De	ec 26, 2014	1			RT		
Ref -0.2	2 dBm		А	tten 5 dB			Mkr	1 1.85000 _38.9	00 GHz 99 dBm
Avg Log 10 dB/ Offst 20.8 dB									
DI -19.0 dBm PAvg 100 W1 S2				~~~~	wwwwww		 	www.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
S3 FC	·····								
Start 1. #Res B	.847 GHz W 3 kHz				VBW 10 k	Hz	Sweep 54	Stop 1 2.5 ms (40	.85 GHz )1 pts)





Plot 29 – 1850-1915MHz Band – GSM Uplink Upper Band Edge



🔆 Ag	jilent i	13:23:19 De	ec 26, 2014	4			RT				
Ref 13.	8 dBm			Mkr1 697.96400 MHz -25.02 dBm							
Avg Log 10 dB/ Offst 20.8 dB											
DI -19.0 dBm PAvg 100				**_*~~~~~~	man man	<u>k-mapha-</u>	Minin		<u>~~</u> ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
W1 S2 S3 FC AA											
Start 69 #Res B	97.7 MHz W 30 kH	  z			/BW 100 k	Hz		Swee	Stop	698 MHz 01 pts)	
#Res B	VV 30 KH	Z			/BVV 100 K	HZ		Swee	ep 8 ms (4	01 pts)	

#### Plot 30 – 698-716MHz Band – CDMA Uplink Lower Band Edge



### Plot 31 – 698-716MHZ Band – CDMA Uplink Upper Band Edge



🔆 Ag	jilent 13	3:27:41 De	ec 26, 2014	1				RТ			
Ref 13.	8 dBm		А	tten 5 dB		Mkr1 775.95275 MHz -23.36 dBm					
Avg Log 10											
dB/ Offst 20.8											
ab DI -19.0 dBm				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m		ym ne	- èn	dan man	
PAvg 100											
S3 FC											
Start 7 #Res B	75.7 MHz W 30 kHz			\	/BW 100 k	Hz		Swee	Stop ep 8 ms (4	776 MHz 01 pts)	

Plot 32 – 776-787MHz Band – CDMA Uplink Lower Band Edge



# Plot 33 – 776-787MHz Band – CDMA Uplink Upper Band Edge



🔆 Ag	jilent 1	13:30:55 De	ec 26, 2014	4	RT				
Ref 13.	8 dBm		А	tten 5 dB	Mkr1 823.98800 MF -32.39 dBr				
Avg Log 10 dB/ Offst 20.8 dB DI -19.0 dBm							 		
PAvg 100 W1 S2 S3 FC AA									
Start 82 #Res B	23.7 MHz W 30 kH	Z		١	/BW 100 k	Hz	Swee	Stop ep 8 ms (4	824 MHz 01 pts)

# Plot 34 – 824-849MHz Band – CDMA Uplink Lower Band Edge

🔆 Ag	jilent 1	3:32:09 De	ec 26, 2014	1			RT		
Ref 13.	8 dBm		А	tten 5 dB			Mkr	1 849.030 -34.0	00 MHz 66 dBm
Avg Log 10									
dB/ Offst 20.8									
dB DI									
dBm PAvg	•••••	*	mmm	<u>~~~~</u>	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		 	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and the
100 W1 S2 S3 FC									
AA									
Start 84 #Res B	49 MHz W 30 kH	z		١	/BW 100 k	Hz	Swee	Stop 84 p 8 ms (4	9.3 MHz 01 pts)

# Plot 35 – 824-849MHz Band – CDMA Uplink Upper Band Edge



🔆 Ag	* Agilent 13:34:55 Dec 26, 2014 R T										
Ref 13.	8 dBm		А	tten 5 dB			Mkr1 1.7099925 GH -32.22 dBn				
Avg Log 10 dB/ Offst 20.8											
DI -19.0 dBm PAvg 100									~~~~~		
W1 S2 S3 FC AA					wenter						
Start 1. #Res B	.707 GHz W 30 kHz			١	/BW 100 k	Hz		Swee	Stop 1 ep 8 ms (4	.71 GHz 01 pts)	





### Plot 37 – 1710-1755MHz Band – CDMA Uplink Upper Band Edge



🔆 Ag	jilent 13	3:37:38 De	ec 26, 2014	1		RT				
Ref 13.	8 dBm		А		Mkı	1 1.84997 -32.9	′00 GHz 99 dBm			
Avg Log 10 dB/ Offst 20.8 dB DI -19.0										
dBm PAvg 100 W1 S2 S3 FC AA			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		we want	nt m		
Start 1. #Res B	.847 GHz W 30 kHz				/BW 100 k	Hz		Swee	Stop 1 ep 8 ms (4	.85 GHz 01 pts)





Plot 39 – 1850-1915MHz Band – CDMA Uplink Upper Band Edge



🔆 Ag	jilent 13	3:59:55 De	ec 26, 2014	1			RT				
Ref 13.	8 dBm		А	tten 5 dB			Mkr1 697.99100 MH -36.09 dBn				
Avg Log 10 dB/ Offst 20.8 dB											
-19.0 dBm PAvg 100 W1 S2 S3 FC AA	·······					***********	 *		1 		
Start 69 #Res B	97.7 MHz W 30 kHz			\ \	/BW 100 k	Hz	Swe	Stop eep 8 ms (4	698 MHz 01 pts)		





#### Plot 41 – 698-716MHz Band – LTE Uplink Upper Band Edge


🔆 Ag	jilent	14:04:36 D	ec 26, 2014	1			R T			
Ref 13.	8 dBm		А	tten 5 dB			I	Mkr1	775.986 _33.	50 MHz 57 dBm
Avg Log 10 dB/ Offst 20.8 dB										
DI -19.0 dBm PAvg 100			~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		······································	 	~~~		 
S3 FC										
Start 77 #Res B	75.7 MH W 30 kH	z Iz		\\	/BW 100 k	Hz	Sv	wee	Stop p 8 ms (4	776 MHz 01 pts)

### Plot 42 – 776-787MHz Band – LTE Uplink Lower Band Edge



## Plot 43 – 776-787MHz Band – LTE Uplink Upper Band Edge



🔆 Ag	jilent 1	4:11:33 De	ec 26, 2014	4				RT		
Ref 13.	8 dBm		А	tten 5 dB				Mkr	1 823.957 -34.7	25 MHz 72 dBm
Avg Log 10 dB/ Offst 20.8										
dB DI -19.0 dBm PAva			manan	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	de Marris M.M	mm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	m	<u>~~~~</u>
100 W1 S2 S3 FC AA										
Start 82 #Res B	23.7 MHz W 100 kł	lz		١	/BW 300 k	Hz		Swee	Stop p 8 ms (4	824 MHz 01 pts)



🔆 Ag	ilent i	14:12:28 De	ec 26, 2014	t				RT		
Ref 13.	8 dBm		А	tten 5 dB				Mkr	1 849.039 -34.4	00 MHz 41 dBm
Avg Log 10 dB/ Offst 20.8										
dB DI -19.0 dBm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1 \$		~			***	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~	
PAvg 100 W1 S2 S3 FC AA										
Start 84	19 MHz								Stop 84	9.3 MHz
#Res B	W 100 k	Hz		\	/BW 300 k	Hz		Swee	ep 8 ms (4	01 pts)

# Plot 45 – 824-849MHz Band – LTE Uplink Upper Band Edge



🔆 Ag	jilent 1	4:14:08 De	ec 26, 2014	1			RТ		
Ref 13.	8 dBm		А	tten 5 dB			Mkr	1 1.70987 _36.:	25 GHz 32 dBm
Avg Log 10							 		
dB/ Offst 20.8 dB									
DI -19.0 dBm									1 •
PAvg 100 W1 S2	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				*	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	 		
S3 FC AA									
Start 1. #Res B	.707 GHz W 100 kH	łz		١	/BW 300 k	Hz	Swee	Stop 1 p 8 ms (4	.71 GHz 01 pts)

Plot 46 – 1710-1755MHz Band – LTE Uplink Lower Band Edge



## Plot 47 – 1710-1755MHz Band – LTE Uplink Upper Band Edge



🔆 Ag	jilent 1	4:17:18 De	ec 26, 2014	1				RT		
Ref 13.	8 dBm		А	tten 5 dB				Mkr	1 1.84989 -32.4	50 GHz 47 dBm
Avg Log 10 dB/ Offst 20.8 dB										
DI -19.0 dBm PAvg 100 W1 S2				·····			m		·······	 
S3 FC AA										
Start 1. #Res B	.847 GHz W 100 kH	 z		\	/BW 300 k	Hz		Swee	Stop 1 ∋p 8 ms (4	.85 GHz 01 pts)





## Plot 49 – 1850-1915MHz Band – LTE Uplink Upper Band Edge









Plot 51 – 728-746MHz Band – GSM Downlink Upper Band Edge









Plot 53 – 746-757MHz Band – GSM Downlink Upper Band Edge



🔆 Ag	jilent 14	l:42:10 D€	ec 26, 2014	4				RT		
Ref 0 d	Bm		А	tten 5 dB				Mk	r1 868.994 -66	.1 dBm
Avg Log 10 dB/ Offst 20.8 dB DI 19.0										
-19.0 dBm PAvg 100 W1 S2										Å
53 FC AA		·~~~~	mmm	VV	www	v~~~vw	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			***
Start 86 #Res B	68.7 MHz W 3 kHz	1	1	,	VBW 10 k	Hz	1	Sweep 5	Stop 4.25 ms (40	869 MHz 01 pts)





Plot 55 – 869-894MHz Band – GSM Downlink Upper Band Edge



🔆 Ag	jilent 14	4:43:42 De	ec 26, 2014	1				R T		
Ref 0 d	Bm		А	tten 5 dB				M	kr1 1.9300 -69.	000 GHz 06 dBm
Avg Log 10 dB/ Offst 20.8										
dB DI -19.0 dBm										
PAvg 53 W1 S2 S3 FC										
AA				~~~~~~			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Mar	www.www
Start 1. #Res B	.927 GHz W 3 kHz	I		,	VBW 10 k	Hz	I	Sweep :	Stop <sup>-</sup> 542.5 ms (4	1.93 GHz 01 pts)





Plot 57 – 1930-1995MHz Band – GSM Downlink Upper Band Edge



🔆 Ag	jilent 1	4:47:28 D	ec 26, 2014	4			R T			
Ref 0 d	Bm		А	tten 5 dB				/kr1	2.10997 -66.9	75 GHz 93 dBm
Avg Log 10 dB/ Offst 20.8 dB DI -19.0 dBm										
PAvg 46 W1 S2 S3 FC AA							 	~~~~		**************************************
Start 2. #Res B	.107 GHz W 3 kHz				VBW 10 k	Hz	Sweep	542	Stop 2 .5 ms (40	.11 GHz )1 pts)

#### Plot 58 – 2110-2155MHz Band – GSM Downlink Lower Band Edge



Plot 59 – 2110-2155MHz Band – GSM Downlink Upper Band Edge



🔆 🔆 Ag	jilent 14	4:55:26 De	ec 29, 2014	1			R	Т		
Ref 0 d	Bm		А	tten 5 dB				Mkr1	727.946 -73	75 MHz .2 dBm
Avg Log 10 dB/ Offst 20.8 dB										
DI -19.0 dBm PAvg 100 W1 S2										
S3 FC AA				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			 	~~~	1 &	
Start 72 #Res B	27.7 MHz W 30 kHz			\	/BW 100 k	(Hz		Swee	Stop p 8 ms (4	728 MHz 01 pts)

### Plot 60 – 728-746MHz Band – CDMA Downlink Lower Band Edge



#### Plot 61 – 728-746MHz Band – CDMA Downlink Upper Band Edge



Mkr1 745.97225 MHz         Ref 0 dBm       Atten 5 dB       -68.42 dBm         Avg	🔆 Ag	jilent 14	4:58:34 De	ec 29, 2014	1				RT		
Avg	Ref 0 d	Bm		А	tten 5 dB				Mk	r1 745.972 -68.	25 MHz 42 dBm
Abin     AA     AA	Avg Log 10 dB/ Offst 20.8 dB DI -19.0 dBm										
	PAvg 100 W1 S2 S3 FC AA					·····		- <u>^</u>			1 \$
Start 745.7 MHz         Stop 746 MHz           #Res BW 30 kHz         VBW 100 kHz         Sweep 8 ms (401 pts)	Start 74 #Res B	45.7 MHz W 30 kHz				/BW 100 k	Hz		Swe	Stop ep 8 ms (4	746 MHz 01 pts)





Plot 63 – 746-757MHz Band – CDMA Downlink Upper Band Edge



🔆 🔆 Ag	jilent 15	5:01:06 De	ec 29, 2014	1				R T	Г		
Ref 0 d	Bm		А	tten 5 dB					Mkr1	868.979 -7	75 MHz 3 dBm
Avg Log 10 dB/ Offst 20.8 dB DI -19.0 dBm PAvg											
100 W1 S2 S3 FC AA					·	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~	v	~~~~~		1 \$
Start 80 #Res B	68.7 MHz W 30 kHz			\\	/BW 100 k	Hz			Swee	Stop p 8 ms (4	869 MHz 01 pts)

### Plot 64 – 869-894MHz Band – CDMA Downlink Lower Band Edge



#### Plot 65 – 869-894MHz Band – CDMA Downlink Upper Band Edge



🔆 Aç	gilent 15	5:09:45 De	ec 29, 2014	4				RT		
Ref 0 d	IBm		А	tten 5 dB				Mk	r1 1.92997 .74.	'00 GHz 95 dBm
Avg Log 10 dB/ Offst 20.8 dB										
DI -19.0 dBm PAvg 100 W1 S2										
S3 FC AA			~~~~~		·····	······································	~~~~~		······	 
Start 1. #Res B	.927 GHz W 30 kHz			\\	/BW 100 k	Hz		Swee	Stop 1 ep 8 ms (4	.93 GHz 01 pts)





Plot 67 – 1930-1955MHz Band – CDMA Downlink Upper Band Edge



🔆 Agilent	15:12:10 D	ec 29, 2014	Ļ			R	Т		
Ref 0 dBm		A	tten 5 dB				Mkr1	2.10990 -74.9	25 GHz 91 dBm
Avg									
PAvg 00 W1 S2 53 FC AA	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					 			1 \$
Start 2.107 G #Res BW 30	GHz kHz			/BW 100 k	Hz		Swee	Stop 2 2 8 ms (4	.11 GHz 01 pts)

### Plot 68 – 2110-2155MHz Band – CDMA Downlink Lower Band Edge



### Plot 69 – 2110-2155MHz Band – CDMA Downlink Upper Band Edge



🔆 Ag	jilent 15	5:17:55 De	ec 29, 2014	1			R	Т		
Ref 0 d	Bm		А	tten 5 dB				Mkr1	727.997 -39.0	00 MHz 63 dBm
Avg Log 10 dB/ Offst 20.8 dB										
DI -19.0 dBm PAvg 100 W1 S2			and the second				 			~~~~ <b>~</b>
S3 FC AA										
Start 72 #Res B	L 27.7 MHz W 30 kHz			١	/BW 100 k	Hz		Swee	Stop p 8 ms (4	728 MHz 01 pts)





Plot 71 – 728-746MHz Band – LTE Downlink Upper Band Edge



🔆 Ag	jilent 15	5:19:59 De	ec 29, 2014	1			RT		
Ref 0 d	Bm		А	tten 5 dB			Mkr	1 745.999 -32.9	25 MHz 95 dBm
Avg Log 10 dB/ Offst 20.8 dB									
DI -19.0 dBm PAvg 100			******	~~~~~			 		
W1 S2 S3 FC AA									
Start 74 #Res B	45.7 MHz W 30 kHz			\\	/BW 100 k	Hz	Swee	Stop ep 8 ms <mark>(</mark> 4	746 MHz 01 pts)





## Plot 73 – 746-757MHz Band – LTE Downlink Upper Band Edge



🔆 Ag	jilent 15	5:22:42 De	ec 29, 2014	1			RТ		
Ref 0 d	Bm		А	tten 5 dB			Mkr	1 868.992 -30.4	250 MHz 46 dBm
Avg Log 10 dB/									
Offst 20.8 dB						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	 		1 •
.19.0 dBm									
PAvg 100 W1 S2 S3 FC									
AA									
Start 868.7 MHz         Stop 869 MI           #Res BW 100 kHz         VBW 300 kHz         Sweep 8 ms (401 pts)						869 MHz 01 pts)			



₩ Agilent 15:24:44 Dec 29, 2014 R T										
Ref 0 d	Bm		А	tten 5 dB				Mkr	1 894.001 -30.0	50 MHz 69 dBm
Avg Log 10 dB/										
Offst 20.8 dB	±	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						
DI -19.0 dBm							<u> </u>	~~~~~~	- Annon	
PAvg 100 W1 S2 S3 FC										
AA										
Start 9									Stop 20	4 2 MHz
#Res BW 100 kHz				VBW 300 kHz				Sweep 8 ms (401 pts)		
ļ										_

Plot 75 – 869-894MHz Band – LTE Downlink Upper Band Edge



🔆 Ag	jilent 15	5:25:58 De	ec 29, 2014	1			RT		
Ref 0 d	Bm		А	tten 5 dB			Mk	r1 1.93000 _33.	)00 GHz 18 dBm
Avg Log 10 dB/ Offst									
20.8 dB DI -19.0									
PAvg 100 W1 S2									
				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~		 		
Start 1. #Res B	.927 GHz W 100 kH	z		\\	/BW 300 k	Hz	Swe	Stop 1 ep 8 ms (4	1.93 GHz 01 pts)

Plot 76 – 1930-1995MHz Band – LTE Downlink Lower Band Edge



### Plot 77 – 1930-1995MHz Band – LTE Downlink Upper Band Edge



🔆 Ag	gilent 15	5:29:10 De	ec 29, 2014	1			RT		
Ref 0 d	IBm		А	tten 5 dB			Mk	r1 2.10999 -29	25 GHz .3 dBm
Avg Log 10 dB/ Offst 20.8									
dB DI -19.0 dBm PAvg 100 W(1 \$2									
S3 FC					v		 		
Start 2. #Res B	.107 GHz W 100 kH	z		١	/BW 300 k	Hz	Swee	Stop 2 ep 8 ms (4	2.11 GHz 01 pts)





Plot 79 – 2110-2155MHz Band – LTE Downlink Upper Band Edge



# **5. Conducted Spurious Emissions**

Test	§2.1051	Test Engineer(s):	Hoosam B.
Requirement(s):			
Test Results:	Pass	Test Date(s):	Dec/30/14

**Test Procedures:** As required by 47 CFR §2.1051, Spurious emissions measurements were made at antenna terminals in accordance with the procedures of the KDB 935210 D03.

The EUT was connected through an attenuator to a spectrum analyzer. A signal generator was used at the input of the EUT to produce a 4.1MHz AWGN signal at the center of each CMRS operating band. Measurements were made at the low and high frequency of the uplink and downlink operational band.

Frequency	Measured Frequency	Measured		
Band (MHz)	(MHz)	Level (dBm)	Limit (dBm)	Margin
698-716	697	-38.48	-13	-25.48
776-787	788	-32.04	-13	-19.04
824-849	2506	-41.42	-13	-28.42
1710-1755	1756	-44.59	-13	-31.59
1850-1915	830	-48.71	-13	-35.71

Table 13 – Conducted Spurious Emission Data – Uplink Summary

Frequency Band (MHz)	Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin
728-746	5573	-42.37	-13	-29.37
746-757	6683	-42.20	-13	-29.20
869-894	6620	-42.53	-13	-29.53
1930-1995	16380	-40.03	-13	-27.03
2110-2155	21540	-39.87	-13	-26.87

 Table 14 – Conducted Spurious Emission Data – Downlink Summary



Per FCC § 27.53 (C) for frequency operating in 746 – 758MHz and 776-788MHz band following additional requirements apply

As per § 27.53 (C)(4) On all frequencies between 763-775MHz and 793-895MHz, by a factor not less than 65 + 10log (P) dB in a 6.25kHz band segment, for mobile and portable stations.

BW correction for 6.25kHz to 10kHz RBW is following

BW correction factor = 10log B1/B2

Therefore BW correction factor = 10log 6.25/10 = -2.04

Frequency Range (MHz)	Measured Frequency (MHz)	Measured Level (dBm)	RBW correction Factor (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
763-775	774.88	-42.33	-2.04	-44.37	-35	-9.37
793-805	793.03	-56.82	-2.04	-58.86	-35	-23.86

 Table 15 – Conducted Spurious Emission Data – 776-787MHz Uplink Band Summary

Frequency Range (MHz)	Measured Frequency (MHz)	Measured Level (dBm)	RBW correction Factor (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
763-775	766.39	-83.63	-2.04	-85.67	-35	-50.67
793-805	796.75	-83.47	-2.04	-85.51	-35	-50.51

Table 16 – Conducted Spurious Emission Data – 746-757MHz Downlink Band Summary



Per FCC § 27.53 (f) for frequency operating in 746 – 763MHz and 775-793MHz emissions in the band 1559-1610MHz shall be limited to -70dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80dBW EIRP for discrete emissions of less than 700Hz bandwidth.

Since the limit is in EIRP, the MSCL (Cable Loss) & Antenna Kitting (gain/loss) information supplied by manufacturer is added along with the bandwidth correction factor.

BW correction for 700Hz to 10kHz RBW is following

BW correction factor = 10log B1/B2

Therefore BW correction factor = 10log 700/1000 = -11.55

Frequency Range (MHz)	Measured Frequency (MHz)	Measured Level (dBm)	RBW correction Factor (dB)	Gain/Loss (dB) from Antenna Kitting Info (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1559-1610	1563.34	-55.82	0	4.2	-51.62	-40	-11.62
(Wideband)							
1559-1610	1563.34	-72.32	-11.55	4.2	-79.67	-50	-29.67
(Narrowban							
d)							

Table 17 – Conducted Spurious Emission Data – 776-787MHz Uplink Band Summary

Frequency Range (MHz)	Measured Frequency (MHz)	Measured Level (dBm)	RBW correction Factor (dB)	MSCL (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1559-1610	1591.9	-62.07	0	3	-59.07	-40	-19.07
(Wideband)							
1559-1610	1589.6	-83.11	-11.55	3	-91.66	-50	-41.66
(Narrowband)							

 Table 18 – Conducted Spurious Emission Data – 746-757MHz Downlink Band Summary



₩ Agilent 15:55:49 Dec 29, 2014 R T										
Ref 0 d	Bm		А	tten 5 dB					Mkr1 69 -38.4	7.0 MHz 13 dBm
Avg Log 10 dB/ Offst 20.8 dB DI -13.0 dBm										
PAvg 10 W1 S2 S3 FC AA			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	many	wmm	-berto-vitery	an tom			
Start 30 #Res B	0 MHz W 1 MHz				VBW 3 M	Hz		Swee	Stop ep 8 ms (4	697 MHz 01 pts)











Plot 82 – 698-716MHz Band – Uplink







₩ Agilent 15:57:23 Dec 29, 2014 R T										
Ref 0 dBm Atten 5 dB									Mkr1 78 -32	8.00 MHz .04 dBm
Avg Log 10 dB/ Offst 20.8 dB DI -13.0 dBm PAvg 10 W1 S2 S3 FC AA										
Start /88 MHz     Stop 3 G       #Res BW 1 MHz     VBW 3 MHz     Sweep 8 ms (401 pts								top 3 GHz 401 pts)		





Plot 85 – 776-787MHz Band – Uplink



🔆 Ag	* Agilent 15:58:58 Dec 29, 2014 R T											
Ref 0 d	Bm		А	tten 5 dB					Mkr1 82 -47.1	3.0 MHz 14 dBm		
Avg Log 10 dB/ Offst 20.8 dB												
DI -13.0 dBm PAva									M	M		
10 W1 S2 S3 FC AA	vmuv	mmh	shame		m	www.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	med his	~~~~↓/ 		
Start 30 MHz     Stop 823 M       #Res BW 1 MHz     VBW 3 MHz     Sweep 8 ms (401 pt)									823 MHz 01 pts)			





Plot 87 – 824-849MHz Band –Uplink





Plot 88 - 824-849MHz Band – Uplink



Plot 89 – 1710-1755MHz Band – Uplink



🔆 Ag	jilent 10	5:01:54 De	ec 29, 2014	014 F				RT			
Ref 0 d	Bm		А	tten 5 dB					Mkr1 1. -44.	756 GHz 59 dBm	
Avg Log 10 dB/ Offst 20.8 dB DI -13.0 dBm PAvg 10											
W1 S2 S3 FC AA			Munn	www.~~			my	and when the second			
Start 1. #Res B	.756 GHz W 1 MHz			VBW 3 MHz					Stop 3 GHz Sweep 8 ms (401 pts)		

Plot 90 – 1710-1755MHz Band – Uplink



Plot 91 - 1710-1755MHz Band – Uplink





Plot 92 - 1710-1755MHz Band – Uplink



Plot 93 – 1850-1915MHz Band – Uplink



🔆 Ag	gilent 10	6:05:47 De	ec 29, 2014	1			RT			
Ref 0 d	IBm		А	Atten 5 dB					Mkr1 1	.91600 GHz 53.67 dBm
Avg Log 10 dB/ Offst 20.8 dB DI -13.0 dBm PAvg										
10 W1 S2 S3 FC AA		www		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	n			~~~~	sw.mk	
Start 1. #Res B	.916 GHz W 1 MHz				VBW 3 M	Hz		Swe	eep 8 m	Stop 3 GHz s (401 pts)

Plot 94 – 1850-1915MHz Band – Uplink



Plot 95 – 1850-1915MHz Band – Uplink





Plot 96 – 1850-1915MHz Band – Uplink







₩ Agilent 15:21:34 Dec 30, 2014 R T												
Ref 0 d	IBm		А	tten 5 dB					Mkr1 2. -51.	Mkr1 2.966 GHz -51.57 dBm		
#Avg Log 10 dB/												
20.8 dB DI												
dBm	man	www	nhanna	mmm	madant	man	man	mpm	humme	r		
M1 S2 S3 FC AA												
Start 74 #Res B	47 MHz SW 1 MHz				VBW 3 M	Hz		Swe	Sto ep 8 ms (4	op 3 GHz 01 pts)		

Plot 98 – 728-746MHz Band – Downlink



Plot 99 – 728-746MHz Band – Downlink



₩ Agilent 15:23:24 Dec 30, 2014 R T										
Ref 0 d	Bm		А	tten 5 dB					Mkr1 30 -51.8	8.9 MHz 89 dBm
#Avg Log 10 dB/ Offst										
20.8 dB DI										
-13.0 dBm			A . A				a augebau	n Marada		Mr. Marliner
M1 S2 S3 FC				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						
AA										
Start 2									Stop.	745 MU-
#Res B	W 1 MHz			VBW 3 MHz				Sweep 8 ms (401 pts)		

Plot 100 – 746-757MHz Band – Downlink









Plot 102 – 746-757MHz Band – Downlink







₩ Agilent 15:28:21 Dec 30, 2014 R T										
Ref 0 d	Bm		А	tten 5 dB					Mkr1 2. -51.7	595 GHz 79 dBm
#Avg Log 10 dB/ Offst										
20.8 dB DI -13.0 dBm									1	
M1 S2 S3 FC AA	un and a second	hmin		un production and the second s	Mmmm	warden and	~~~~~		hanna	
Start 89 #Res B	95 MHz W 1 MHz				VBW 3 M	Hz		Swee	Sto ep 8 ms (4	op 3 GHz 01 pts)

Plot 104 – 869-894MHz Band – Downlink



Plot 105 – 869-894MHz Band – Downlink



🔆 Ag	* Agilent 15:31:37 Dec 30, 2014 R T											
Ref 0 d	Ref 0 dBm Atten 5 dB											
#Avg Log 10 dB/ Offst												
20.8 dB DI -13.0 dBm								1				
M1 S2 S3 FC	mana		······	~~~~~	man	~~~~M*~	-hr-nu-wa	han har	m			
AA												
Start 30 MHz     Stop 1.929 GH       #Res BW 1 MHz     VBW 3 MHz     Sweep 8 ms (401 pts)									929 GHz 01 pts)			





#### Plot 107 – 1930-1995MHz Band – Downlink


ATTEN	10dE	3			M	KR -	-42.20dBm		
RL	2 <b>0.</b> 8dBm		100	iB/	з.	035GHz			
<u> </u>									
<u> </u>									
<u> </u>									
Ŷ					a charlen h				. I
	and the second second second	manne	Muhampan	man	"These seconds	and the second second	- man and and a	and the second s	mangener
<u> </u>									
START	3.99	OGHZ			STOP	<b>,</b> 1	0.000GH-		
	0.00				0.0	-			

Plot 108 – 1930-1995MHz Band – Downlink



Plot 109 – 1930-1995MHz Band – Downlink



🔆 Ag	gilent 15	5:33:26 De	ec 30, 2014	4		RΤ				
Ref 0 d	IBm		А	tten 5 dB					Mkr1 1. -51.	865 GHz 53 dBm
#Avg Log 10 dB/ Offst 20.8										
dB DI -13.0 dBm	www.		mm	man	mm	mm	wwwww		1 	Am
M1 S2 S3 FC AA										
Start 3 #Res B	0 MHz W 1 MHz				VBW 3 M	Hz		Swe	Stop 2. ep 8 ms (4	109 GHz 01 pts)

Plot 110 – 2110-2155MHz Band – Downlink



Plot 111 –2110-2155MHz Band – Downlink



ATTE	N	10dB	•			M	KR	-39.87dВм		
RL	20	.8dBm		100	iB/	21	.54GHz			
								_		
										~
			mus how	hungerstall	mucha My	Amount	more	and a second and	non obride above	hubbertund
Amer			A Manager Mar							
								-		
STAR	т	10.0	ØGHz			STOP	•	22.00GHz		
						_				

Plot 112 –2110-2155MHz Band – Downlink









#### Plot 114 – 27.53c4 – Uplink



🔆 Ag	₩ Agilent 14:55:31 Dec 30, 2014 R T										
Ref -19	.2 dBm		А	tten 5 dB					Mkr1 1. -7	56334 GHz /2.34 dBm	
#Avg Log 10 dB/ Offst											
20.8 dB DI -40.0 dBm											
M1 S2 S3 FC	, mê		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	an san sa	~~~~~		_n ~hu	v		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
AA											
Start 1. #Res B	.559 GHz W 10 kHz				VBW 30 k	Hz		Sweep 8	Sto 35.4 ms	p 1.61 GHz (401 pts)	









🔆 Ag	jilent 1	5:03:20 De	ec 30, 2014	1				RТ			
Ref -19	.2 dBm		А	tten 5 dB					Mkr1 '	1.599 -83.1	955 GHz 11 dBm
#Avg Log 10 dB/ Offst 20.8											
dB DI -50.0 dBm											
PAvg 10 W1 S2 S3 FC									1 0	~~~~	
АА											
Start 1. #Res B	Start 1.559 GHz Stop 1.61   #Res BW 10 kHz VBW 30 kHz Sweep 835.4 ms (401 p							.61 GHz )1 pts)			









🔆 Ag									
Ref -19	.2 dBm		А	tten 5 dB				Mkr1 7 -8	66.39 MHz 3.63 dBm
#Avg Log 10 dB/ Offst									
20.8 dB DI									
-35.0 dBm PAvg 10									
W1 S2 S3 FC AA	~~~~~	· · · · · ·	~~~~ <b>~</b>				 		
Start 76 #Res B	63 MHz W 10 kHz	I	1	,	VBW 30 k	Hz	Sweep 1	Sto 96.6 ms	p 775 MHz 401 pts)









# 6. Noise Limits

Test	§20.21(e)(8)(i)(A	Test Engineer(s):	Hoosam B.
Requirement(s):			
Test Results:	Pass	Test Date(s):	Dec/16/14

Test Procedures:As required by 47 CFR §20.21(e)(8)(i)(A), Noise limits measurements<br/>were made as per the FCC KDB 935210 D03 procedures defined in §7.7.

The EUT was set up as per Figure 2 and 3.

**Test Setup:** 



Figure 2 – Noise Limit



Figure 3 – Uplink Noise power in presence of a downlink signal



Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)
698-716	-78.62	-59	-19.62
776-787	-80.76	-59	-21.76
824-849	-80.58	-59	-21.58
1710-1755	-79.81	-59	-20.81
1850-1915	-78.92	-59	-19.92

Table 19 – Maximum Uplink Noise Summary



₩ Agilent 16:15:40 Dec 16, 2014								RΤ		
Ref -32	.2 dBm		#A	tten 0 dB					Mkr1 70 -78.	)9.0 MHz 62 dBm
#Avg Log 10 dB/ Offst 0.8 dB DI										
-45.5 dBm							man			
PAvg 100 W1 S2 S3 FC AA										
#Res B	W 1 MHz	: :			VBW 3 M	Hz		Swe	Spa ep 8 ms (4	n 40 MHz 01 pts)





# Plot 122 – 776-787MHz Band – Maximum Uplink Noise



🔆 Aç	jilent 👘	16:20:52 D	ec 16, 2014	1			R T			
Ref -33	.2 dBm		#A	tten 0 dB				Mkr1	831.0 -80.5	00 MHz 58 dBm
#Avg Log 10 dB/ Offst 0.8 dB										
DI -41.1 dBm PAvg 100	and the second			, <sup>1</sup>	······		 			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
S3 FC										
Center #Res B	836.5 M W 1 MHz	Hz 2			VBW 3 M	Hz	Sw	eep 8	Spar ms (4	n 50 MHz 01 pts)





Plot 124 – 1710-1755MHz Band – Maximum Uplink Noise



🔆 Ag	jilent 1	6:23:47 De	ec 16, 2014	1				RT		
Ref -33	.2 dBm		#A	tten 0 dB				М	kr1 1.8642 -78.9	275 GHz 92 dBm
#Avg										
Log										
10										
dB/										
Offst										
0.8										
dB										
DI										
-37.0										
dBm	m			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						$\sim$
PAvg										the second
100										
W1 S2										
S3 FC										
AA										
Center	1.883 GI	IZ							Spar	1 90 MHz
#Res B	W 1 MHz			VBW 3 MHz				Sweep 8 ms (401 pts)		

Plot 125 – 1850-1915MHz Band – Maximum Uplink Noise



# 7. Variable Booster Gain

Test	§20.21(e)(8)(i)(c)(1)	Test Engineer(s):	Hoosam B.
Requirement(s):			
Test Results:	Pass	Test Date(s):	Jan/08/15

Test Procedures:As required by 47 §20.21(e)(8)(i)(c)(1), Variable Booster Gain<br/>measurements were made as per FCC KDB procedures 935210 D03<br/>defined in §7.9.

The EUT was set up as per Figure 4.

Gain limits are based on §20.21(e)(8)(i)(C)(2)

Gain Limit = -34-RSSI+MSCL, where MSCL = 3



## **Test Setup:**

#### Figure 4 – Variable Gain

Detector Setting	Resolution Bandwidth	Video Bandwidth	Sweep Time					
RMS	100 kHz	300 kHz	Auto					
Table 20 Analyzer Sattings								

Table 20 – Analyzer Settings



RSSI (dBm)	Gain Limit (dBm)	P(in) (dBm)	P(out) dBm	Gain (dB)	Margin (dB)
-30	-1	5	-2.6	-7.6	-6.6
-32	1	5	2.74	-2.26	-3.26
-36	5	5	6.13	1.13	-3.87
-38	7	5	6.5	1.5	-5.5
-39	8	5	6.4	1.4	-6.6
-50	15	5	17.1	12.1	-2.9

Table 21 – 698-716MHz Band – Uplink Data

RSSI (dBm)	Gain Limit (dBm)	P(in) (dBm)	P(out) dBm	Gain (dB)	Margin (dB)
-30	-1	6	-0.6	-6.6	-5.6
-32	1	6	2	-4	-5.0
-35	4	6	2.5	-3.5	-7.5
-37	6	6	5.4	-0.6	-6.6
-39	8	6	7.2	1.2	-6.8
-43	12	6	12.4	6.4	-5.6

Table 22 – 776-787MHz Band – Uplink Data

RSSI (dBm)	Gain Limit (dBm)	P(in) (dBm)	P(out) dBm	Gain (dB)	Margin (dB)
-30	-1	5	-4.2	-9.2	-8.2
-34	3	5	0.9	-4.1	-7.1
-35	4	5	2.5	-2.5	-6.5
-36	5	5	3.5	-1.5	-6.5
-37	6	5	4.7	-0.3	-6.3
-41	10	5	10.6	5.6	-4.4

Table 23 – 824-849MHz Band – Uplink Data



RSSI (dBm)	Gain Limit (dBm)	P(in) (dBm)	P(out) dBm	Gain (dB)	Margin (dB)
-30	-1	6	-1.12	-7.12	-6.12
-33	2	6	2.78	-3.22	-5.22
-35	4	6	5.2	-0.8	-4.8
-39	8	6	10.08	4.08	-3.92
-42	11	6	13.3	7.3	-3.7
-46	15	6	17.7	11.7	-3.3

Table 24 – 1710-1755MHz Band – Uplink Data

RSSI (dBm)	Gain Limit (dBm)	P(in) (dBm)	P(out) dBm	Gain (dB)	Margin (dB)
-30	-1	4	-5.4	-9.4	-8.4
-32	1	4	-2.98	-6.98	-7.98
-33	2	4	-1.5	-5.5	-7.5
-35	4	4	1.06	-2.94	-6.94
-36	5	4	2.4	-1.6	-6.6
-41	10	4	8.5	4.5	-5.5

Table 25 – 1850-1915MHz Band – Uplink Data

Frequency Band	Measured Timing	Limit (Seconds)	Margin	
(MHz)	(Seconds)		(Seconds)	
698-716	0.675	1.0	-0.325	
776-787	0.425	1.0	-0.575	
824-849	0.775	1.0	-0.225	
1710-1755	0.725	1.0	-0.275	
1850-1915	0.750	1.0	-0.250	

Table 26 – Variable Uplink Gain Timing - Summary Table

The following pages show measurements of Variable Booster Gain Timing plots:



🔆 Ag	🔆 Agilent 11:15:45 Jan 8, 2015						R T	Г		
Ref 30.	8 dBm		#A	tten 5 dB					Mkr1 ∆ -9	675 ms 9.927 dB
Peak Log 10			18							
dB/ Offst 30.8 dB		· · ·	- Q	1 \$						
V1 S2 S3 FC										
AA										
Center	699 MH2	<u>z</u>								Span 0 Hz
Res BV	/ 100 kH	z		\	/BW 300 k	Hz		Swe	ep 10 s (4	101 pts)

## Plot 126 – 698-716MHz Band – Uplink Gain Timing



# Plot 127 – 776-787MHz Band – Uplink Gain Timing



🔆 🔆 Ag	ilent 11	I:22:13 Ja	n 8, 2015	R T				RТ		
Ref 30.8	8 dBm		#A	tten 5 dB					Mkr1 ∆ -1	775 ms 2.84 dB
Peak Log 10 dB/		1R	~							
Offst 30.8 dB		۲ ۲	1 •							
S3 FC										
Center	832.5 MH	z								Span 0 Hz
Res BW	/ 100 kHz			۱	/BW 300 k	Hz		Swe	ep 10 s (4	01 pts)

# Plot 128 – 824-849MHz Band – Uplink Gain Timing



# Plot 129 – 1710-1755MHz Band – Uplink Gain Timing



🔆 Agilent 11:32:48 Jan 8, 2015								R T			
									Mkr1 ∆	750 ms	
Ref 30.	8 dBm		#A	tten 5 dB						-12.5 dB	
Peak											
Log											
10			IB								
dB/			\$								
Offst			۲.								
30.8			1								
dB											
	L										
	L										
V1 S2											
S3 FC	<u> </u>										
AA											
	<u> </u>									_	
	<u> </u>										
Center	1.885.0	Hz			1	1	1			Span 0 Hz	
Res BV	Res BW 100 kHz				VBW 300 kHz			Sw	Sweep 10 s (401 pts)		

Plot 130 – 776-787MHz Band – Uplink Gain Timing



# 8. Occupied Bandwidth

Test	§2.1049	Test Engineer(s):	Hoosam B.
Requirement(s):			
Test Results:	Pass	Test Date(s):	Jan/03/15

Test Procedures:As required by CFR47 §2.1049, Occupied Bandwidth were made at the RF<br/>antenna output terminals of the EUT. Measurements were made as per<br/>the FCC KDB 935210 D03 procedures defined in §7.10

The EUT output was connected directly to a spectrum analyzer through an attenuator. A signal generator was connected to the EUT to produce GSM, CDMA & LTE signals to show the input and output signals were similar.

The following pages show measurements of Occupied Bandwidth plots:

Detector Setting	Detector Resolution Setting Bandwidth		Sweep Time	Span	
Peak	1% - 5%	≥3 x RBW	Auto	As per Modulation Type	

Table 27 – Analyzer Settings



🔆 Agilent 12:04:41 Jan 3, 2015







#### Plot 132 – 698-716MHz Band – Uplink Output – GSM



🔆 Agilent 11:58:58 Jan 3, 2015







## Plot 134 – 776-787MHz Band – Uplink Output – GSM



🔆 Agilent 12:00:16 Jan 3, 2015











12:02:05 Jan 3, 2015 🔆 Agilent







## Plot 138 – 1710-1755MHz Band – Uplink Output – GSM



🔆 Agilent 12:03:19 Jan 3, 2015







## Plot 140 – 1850-1915MHz Band – Uplink Output – GSM



#### 🔆 Agilent 12:07:16 Jan 3, 2015







#### Plot 142 – 728-746MHz Band – Downlink Output – GSM



🔆 Agilent 12:07:58 Jan 3, 2015







Plot 144 – 746-757MHz Band – Downlink Output – GSM



🔆 Agilent 12:08:46 Jan 3, 2015







#### Plot 146 – 869-894MHz Band – Uplink Output – GSM



🔆 Agilent 12:09:49 Jan 3, 2015



Plot 147 – 1930-1995MHz Band – Downlink Input – GSM



Plot 148 – 1930-1995MHz Band – Downlink Output – GSM



🔆 Agilent 12:10:27 Jan 3, 2015







Plot 150 - 2110-2155MHz Band - Downlink Output - GSM



🔆 Agilent 👘 12:18:04 Jan 3, 2015

R T







## Plot 152 – 698-716MHz Band – Uplink Output – CDMA



12:20:13 Jan 3, 2015 🔆 Agilent







# Plot 154 – 776-787MHz Band – Uplink Output – CDMA



🔆 Agilent 12:21:00 Jan 3, 2015

R T







#### Plot 156 – 824-849MHz Band – Uplink Output – CDMA



12:22:12 Jan 3, 2015 🔆 Agilent







#### Plot 158 – 1710-1755MHz Band – Uplink Output – CDMA



🔆 Agilent 12:23:23 Jan 3, 2015







## Plot 160 – 1850-1915MHz Band – Uplink Output – CDMA



🔆 Agilent 12:26:19 Jan 3, 2015







## Plot 162 – 728-746MHz Band – Downlink Output – CDMA



🔆 Agilent 12:26:51 Jan 3, 2015



Plot 163 – 746-757MHz Band – Downlink Input – CDMA



## Plot 164 – 746-757MHz Band – Downlink Output – CDMA


🔆 Agilent 12:27:30 Jan 3, 2015







Plot 166 – 869-894MHz Band – Downlink Output – CDMA



🔆 Agilent 12:27:59 Jan 3, 2015







Plot 168 – 1930-1995MHz Band – Downlink Output – CDMA



🔆 Agilent 12:28:39 Jan 3, 2015







### Plot 170 – 2110-2155MHz Band – Downlink Output – CDMA



12:34:12 Jan 3, 2015 🔆 Agilent



Plot 171 – 698-716MHz Band – Uplink Input – LTE



### Plot 172 – 698-716MHz Band – Uplink Output – LTE



12:34:59 Jan 3, 2015 🔆 Agilent



Plot 173 – 776-787MHz Band – Uplink Input – LTE



### Plot 174 – 776-787MHz Band – Uplink Output – LTE



🔆 Agilent 12:35:54 Jan 3, 2015







### Plot 176 – 824-849MHz Band – Uplink Output – LTE



🔆 Agilent 12:36:54 Jan 3, 2015

Peak	Ref 14.	8 dBm		А	tten 5 dB						
10      dB/        Offst      20.8        dB	Peak Log							L			
Offst  20.8    dB  dB    M1 S2  M1 S2    S3 FC  M1 S2    AA  M1 S2    Center 1.732 GHz  Span 10 MHz	10 dB/			- American	www	Mark Mark	mohn	wallow	www		
dB	Offst 20.8			1							
M1 S2 S3 FC AA Center 1.732 GHz W1 M2 M2 M2 M4 T Support A reg (401 pt )	dB			/							
M1 S2 S3 FC AA				/							
M1 S2											
AA AA AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	M1 S2 S3 FC	www.w	wand							MANN	manny
Center 1.732 GHz Span 10 MHz	AA										
Center 1.732 GHz Span 10 MHz #Dea PW 100 kHz Sween 4 mc (401 ptc)											
Center 1.732 GHz Span 10 MHz #Dea PW 100 kHz Sweep 4 mg (401 pt)											
#Res biv 100 kHz VDV 500 kHz Sweep 4 His (401 pts)	Center 1.732 GHz #Res BW 100 kHz				VBW 300 kHz				Span 10 MHz Sweep 4 ms (401 pts)		

R T

Plot 177 – 1710-1755MHz Band – Uplink Input – LTE



### Plot 178 – 1710-1755MHz Band – Uplink Output – LTE



🔆 Agilent 12:38:00 Jan 3, 2015







### Plot 180 – 1850-1915MHz Band – Uplink Output – LTE



🔆 Agilent 12:40:59 Jan 3, 2015



Plot 181 – 728-746MHz Band – Downlink Input – LTE



Plot 182 – 728-746MHz Band – Downlink Output – LTE



🔆 Agilent 12:41:27 Jan 3, 2015



Plot 183 – 746-757MHz Band – Downlink Input – LTE



#### Plot 184 – 746-757MHz Band – Downlink Output – LTE



🔆 Agilent 👘 12:41:55 Jan 3, 2015

R T







#### Plot 186 – 869-894MHz Band – Downlink Output – LTE



#### 12:42:24 Jan 3, 2015 🔆 Agilent



Plot 187 – 1930-1995MHz Band – Downlink Input – LTE



Plot 188 – 1930-1995MHz Band – Downlink Output – LTE



🔆 Agilent 12:42:54 Jan 3, 2015



Center 2.132 GHz Span 10 MHz #Res BW 100 kHz VBW 300 kHz Sweep 4 ms (401 pts)





#### Plot 190 – 2110-2155MHz Band – Downlink Output – LTE



### 9. Oscillation Detection

Test	§20.21(e)(8)(ii)(A	Test Engineer(s):	Hoosam B.
Requirement(s):			
Test Results:	Pass	Test Date(s):	Jan/15/15

**Test Procedures:** As required by 47 §20.21(e)(8)(ii)(A), Oscillation detection measurement were made at the RF antenna output terminals of the EUT.

The EUT output was connected to the spectrum analyzer through a 10dB coupled directional coupler. The measurements were made as per procedure defined in KDB 935210 D03 §7.11.

Detector Setting	Resolution	Video Bandwidth	Sweep Time					
	Bandwidth							
Peak	≥1 MHz	>3X RBW	Auto					

Table 28 – Analyzer settings

**Test Setup:** 



Figure 4 – Oscillation detection



Frequency Band (MHz)	Measured Time (mS)	Limit (mS)
698-716	77.5	300
776-787	78.75	300
824-849	79.5	300
1710-1755	77.5	300
1850-1915	53.25	300

Table 29 – Uplink Detection Time – Summary

Frequency	Measured Time	Limit
Band (MHz)	(Second)	(Second)
728-746	0.126	1.0
746-757	0.131	1.0
869-894	0.131	1.0
1930-1995	0.098	1.0
2110-2155	0.130	1.0

Table 30 – Downlink Detection Time – Summary

Frequency	Measured Time	Limit		
Band (MHz)	(Second)	(Second)		
698-716	70.0	≥60		
776-787	69.75	≥60		
824-849	69.75	≥60		
1710-1755	69.75	≥60		
1850-1915	69.75	≥60		

Table 31 – Uplink Restart Time – Summary



Frequency	Measured Time	Limit		
Band (MHz)	(Second)	(Second)		
728-746	69.75	≥60		
746-757	69.75	≥60		
869-894	69.75	≥60		
1930-1995	69.75	≥60		
2110-2155	69.75	≥60		

Table 32 – Downlink Restart Time – Summary

Frequency Band (MHz)	Restart	Limit
698-716	5	≤5
776-787	5	≤5
824-849	5	≤5
1710-1755	5	≤5
1850-1915	5	≤5

Table 33 – Uplink Restart Count – Summary

Frequency Band (MHz)	Restart	Limit
728-746	5	≤5
746-757	5	≤5
869-894	5	≤5
1930-1995	5	≤5
2110-2155	5	≤5

Table 34 – Downlink Restart Count – Summary



🔆 🔆 Agil	lent 12	2:29:13 Ja	n 8, 2015				I	RТ		
Ref 38 d	Bm		Att	ten 35 dB					Mkr1 ∆ 	77.5 ms 52.06 dB
Peak Log 10 dB/ Offst 10 dB		·								
V1 S2 S3 FC AA	www		2 \$							
Center 7 Res BW	704.9 MH: 1 MHz	z			VBW 3 M	Hz		Sweep	500 ms (	Span 0 Hz 401 pts)

### Plot 191 – 698-716MHz Band – Uplink Oscillation Detection Time



### Plot 191 – 776-787MHz Band – Uplink Oscillation Detection Time



🔆 Agilent 12:25:38 Jan 8, 2015				R T				RΤ		
Ref 38	dBm		Att	en 35 dB					Mkr1 ∆	79.5 ms 53.32 dB
Peak Log 10 dB/ Offst 10 dB						1R <b>&gt;</b>	^			
V1 S2 S3 FC AA									L L L L L L L L L L L L L L L L L L L	••••••••
Center Res BV	839.3 MH V 1 MHz	z			VBW 3 M	Hz		Sweep	) 300 ms (	Span 0 Hz 401 pts)

### Plot 192 – 824-849MHz Band – Uplink Oscillation Detection Time



### Plot 193 – 1710-1755MHz Band – Uplink Oscillation Detection Time



🔆 Agilent 12:48:01 Jan 8, 2015				R				RT		
Ref 38	dBm		Att	ten 35 dB					Mkr1∆ 5 -4€	3.25 ms 5.38 dB
Peak Log 10 dB/ Offst										
10 dB										
V1 S2 S3 FC AA			~		1 \$******~~~	·····	~~~~~		**	
Center	1.872 GH:	z			VBW 3 M	47		Sween	S 300 ms (4)	pan 0 Hz
								encep		

### Plot 194 – 1850-1915MHz Band – Uplink Oscillation Detection Time



### Plot 195 – 728-746MHz Band – Downlink Oscillation Detection Time



🔆 Ag	jilent 1	5:39:24 Ja	n 15, 2015				RT		
Ref 25.	8 dBm		Att	en 25 dB				Mkr1 ∆ -3	126 ms 5.52 dB
Peak Log 10 dB/ Offst 10.8		1R \$		~					
dB						1			
V1 S2 S3 FC AA									
Center Res BV	750.5 MH V 1 MHz	z			VBW 3 MI	Hz	Sweep	S 300 ms (4	pan 0 Hz 01 pts)





### Plot 197 – 869-894MHz Band – Downlink Oscillation Detection Time



🔆 Ag	jilent 10	6:12:05 Ja	n 15, 2015	i		RT					
Ref 15.	8 dBm		Att	ten 15 dB						Mkr1 ∆ 9 -4	98.75 ms 5.06 dB
Peak Log 10 dB/ Offst 10.8 dB								\$ 	R		
M1 S2 S3 FC AA	<u></u>			······							
Center Res BV	1.955 GH V 1 MHz	z			VBW 3 M	Hz		Sw	veep	500 ms (4	Span 0 Hz 401 pts)

### 198 – 1930-1995MHz Band – Downlink Oscillation Detection Time



#### Plot 199 – 2110-2155MHz Band – Downlink Oscillation Detection Time



🔆 🔆 Ag	jilent	13:47:19 Ja	in 9, 2015				RT				
Ref 35	dBm		Att	en 35 dB						Mkr1 ∆ -0.	70 s 727 dB
Peak Log 10 dB/ Offst 10 dB											
W1 S2 S3 FS AA		×		<u></u>					#0.000cc	0 * 0	
Center Res BV	704.9 M V 1 MHz	IHz			VBW 3 M	Hz		S	wee	Sı p 100 s (40	pan 0 Hz 1 pts)





### Plot 201 – 776-787MHz Band –Uplink Restart Time



🔆 Ag	jilent 1	3:57:46 Ja	in 9, 2015					RT		
									Mkr1 ∆	69.75 s
Ref 25	dBm		Att	en 35 dB					0	.097 dB
Peak Log 10	11	R. >						1 \$		
dB/										
						·····				
W1 S2 S3 FS										
AA										
Center Res BV	839.3 Mi V 1 MHz	lz			VBW 3 M	Span 0 Hz Sweep 100 s (401 pts)				

#### Plot 202 – 824-849MHz Band –Uplink Restart Time



### Plot 203 – 1710-1755MHz Band –Uplink Restart Time



🔆 🔆 Ag	🔆 Agilent 14:10:12 Jan 9, 2015								RT			
Ref 17	dBm			Att	en 30 dB					~	Mkr1 ∆ 4	69.75 s .995 dB
Peak Log 10 dB/												
W1 S2 S3 FS AA								····· ·····				
Center Res BV	1.872 ( V 1 MH	GH; z	z			VBW 3 M	Hz		Sw	ee	S p 100 s (40	pan 0 Hz )1 pts)





### Plot 205 – 728-746MHz Band –Downlink Restart Time



🔆 Ag	jilent -	15:41:49 Ja	n 15, 2015	i i			R T		
Ref 25.	8 dBm		Att	ten 25 dB				Mkr1 Δ	69.75 s 0.901 dB
Peak Log									*
10 dB/	1R						1		
10.8 dB	ĽŤ								
W1 S2			<u> </u>	~~~~~~		 na ann	مالم		minh
S3 FS AA									_
Center Res BV	750.5 M V 1 MHz	Hz			VBW 3 M	Sw	Span 0 Hz Sweep 100 s (401 pts)		

#### Plot 206 – 746-757MHz Band – Downlink Restart Time



#### Plot 207 – 869-894MHz Band – Downlink Restart Time



🔆 Ag	jilent 1	6:14:38 Ja	in 15, 2015	5			R T				
Dof 15	9 dBm		<b>A</b> 44	ton 15 dB					Mkr1 ∆	69.75 s	
Rei 15.			Au						2	.347 uD	
Log								1			
10 dB/	\$							Ŷ			
Offst 10.8											
dB											
			hanne	m							
W1 S2											
Center	1.955 GH	Iz	-						S	pan 0 Hz	
Res BV	V 1 MHz			VBW 3 MHz					Sweep 100 s (401 pts)		





### Plot 209 – 2110-2155MHz Band –Downlink Restart Time



🔆 Agi	ilent 14	4:27:57 Ja	n 15, 2015				RT			
Ref 20.8	8 dBm		А	tten 5 dB					<b>Mkr1</b> ∆ 0	70.15 s .502 dB
Peak Log 10										
Offst 30.8 dB		1R	1							
		<b>\$</b>	¢	•						
W4 62		mlm	المحمد	·····			~~~~~~			
S3 FS										
Center Res BW	712.7 MH / 1 MHz	z			VBW 3 M	Hz		Swee	Sp 460 s (40	pan 0 Hz )1 pts)





### Plot 211 – 776-787MHz Band – Uplink # of Restart Time



🔆 Ag	ilent 15	5:14	:15 Ja	n 15, 2	015						R	Т		
													Mkr1 ∆	70.15 s
Ref 25.	8 dBm				Att	ten 25 dB					 		0	.215 dB
Peak			2		Ŷ									
Log		<u> </u>	R							4				
10														
dB/					_		<u> </u>			∔				
Offst														
10.8 dB								<u> </u>		╢	 	<u> </u>		
uD														
										╢	 			
					- 1					Ш		1		
										₩				
W/1 C2	und a start of the	h	berne fam		~~~		m			1			man	*****
C2 EC														
33 1 3														
~~														
										$\downarrow$				
Center	831.4 MH	Z											S	pan 0 Hz
Res BV	VIMHZ						VBV	N 3 M	Hz		Sweep 460 s (401 pts)			JT pts)





### Plot 213 – 1710-1755MHz Band – Uplink # of Restart Time



Ref 12.8 dBm Peak Log 10	lR ♦	Atten 5 dB				Mkr1 ∆ -9.	70.15 s 925 dB
Peak Log 10							
dB/ Offst 30.8 dB							
W1 S2 S3 FS AA					 ~N		
Center 1.863 GHz Res BW 1 MHz	I		VBW 3 MI	Hz	Swe	S ep 460 s (40	pan 0 Hz )1 pts)

### Plot 214 – 1850-1915MHz Band – Uplink # of Restart Time



#### Plot 215 – 728-746MHz Band – Downlink # of Restart Time



🔆 Ag	ilent 1	5:50:3	31 Ja	n 15, 2015	i					R	Т		
Ref 25.	8 dBm			Att	ten 25 dB							Mkr1 ∆ 0	70.15 s .108 dB
Peak Log													
dB/ Offst		1	R	د ۲									
10.8 dB													
				~~~~~~	mann		L				L		
W1 S2 S3 FS													
AA													
Center	750.5 MF	  z										S	pan 0 Hz
Res BV	V 1 MHz				VBW 3 MHz						Sweep 460 s (401 pts)		

#### Plot 216 – 746-757MHz Band – Downlink # of Restart Time



#### Plot 217 – 869-894MHz Band – Downlink # of Restart Time



🔆 Ag	₩ Agilent 16:22:56 Jan 15, 2015 R T												
												Mkr1 ∆	70.15 s
Ref 15.	8 dBm			A	tten 15 dB							0	.145 dB
Peak													
Log		1	R		과 O								
dB/			ſ		1								
Offst													
10.8											1		
dB													
					1								
											1		
	Looper and		L								L	Land	
W1 52		<u> </u>				-							
S3 FS													
AA													
Center	1.955 GH	z								_		S	pan 0 Hz
Res BV	V 1 MHz				VBW 3 MHz					Sweep 460 s (401 pts)			





### Plot 219 – 2110-2155MHz Band – Downlink # of Restart Time



## **10. Radiated Spurious Emissions**

Test	§2.1053	Test Engineer(s):	Jerry M.
Requirement(s):			
Test Results:	Pass	Test Date(s):	Jan/17/15

Test Procedures:As required by 47 §2.1053, Radiated Spurious Emissions measurement<br/>were made in accordance with the procedures of TIA-603 and KDB<br/>935210 D03 §7.12.

The EUT was placed on a wooden table inside a 3 meter semi-anechoic chamber. The EUT was transmitting into a  $50\Omega$  non-radiating load which was directly connected to the EUT antenna port as shown in figure 4.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3 orthogonal axis. The frequency range up to the 10<sup>th</sup> harmonic was investigated.

Spurious attenuation limit in dB = P1-  $(43 + 10 \log_{10} (P2) = -13 dBm)$ 

Where P1 = Transmitter Power in dBm and P2= Power in Watt

**Test Setup:** 



Figure 5 – Radiated Spurious Emission Test Setup



Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dBm)
1673	-65.87	-13	-52.87
2509	-64.33	-13	-51.33
3346	-62.2	-13	-49.2

Table 35 – 824-849MHz Uplink Band – Radiated Spurious Test Data

Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dBm)
3765	-61.91	-13	-48.91
5647	-62.25	-13	-49.25
7530	-58.93	-13	-45.93

Table 36 – 1850-1915MHz Uplink Band – Radiated Spurious Test Data

Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dBm)
3465	-66.03	-13	-53.02
5197	-66.61	-13	-53.61

Table 37 – 1710-1755MHz Uplink Band – Radiated Spurious Test Data

Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dBm)
1414	-62.83	-13	-49.83
2121	-39.36	-13	-26.36
2828	-62.83	-13	-49.83

Table 38 – 698-716MHz Uplink Band – Radiated Spurious Test Data

Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dBm)
1563	-60.17	-13	-47.17
2344	-59.0	-13	-46.0
3126	-64.17	-13	-51.17

Table 39 – 776-787MHz Uplink Band – Radiated Spurious Test Data



Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dBm)
1763	-63.83	-13	-50.83
2644	-60.46	-13	-47.46
3526	-58.58	-13	-45.58

Table 40 – 869-894MHz Downlink Band – Radiated Spurious Test Data

Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dBm)
3925	-55.39	-13	-42.39
5887	-53.83	-13	-40.83
7850	-50.67	-13	-37.67

Table 41 – 1930-1995MHz Downlink Band – Radiated Spurious Test Data

Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dBm)
4265	-56.06	-13	-43.06
6397	-54.73	-13	-41.73
8530	-49.28	-13	-36.28

Table 42 – 2110-2155MHz Downlink Band – Radiated Spurious Test Data

Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dBm)
1474	-62.5	-13	-49.5
2211	-61.29	-13	-48.29
2948	-60.13	-13	-47.13

Table 43 – 728-7	746MHz Downlink	Band – Radiated	<b>Spurious Test Data</b>
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Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dBm)
1503	-65.1	-13	-52.1
2254	-60.3	-13	-47.3
3006	-58.07	-13	-45.07

Table 44 – 746-757MHz Downlink Band – Radiated Spurious Test Data

NOTE: There were no detectable emissions above the  $2^{nd}$  harmonic. Measurement was made above  $2^{nd}$  harmonic to show the Receiver Noise Floor (N.F)



# I. Test Equipment

Equipment	Manufacturer	Model	Serial #	Last Cal	Cal Due
				Date	Date
Spectrum	Agilent	E4402B	US41192757	Dec/10/14	Dec/10/15
Analyzer					
Temperature	Control	4184	122670346	Nov/15/13	Nov/15/15
Meter	Company				
Spectrum	Hewlett	8563E	3821A09316	Sep/19/14	Sep/19/15
Analyzer	Packard				
Directional	Andrew	C-10-CPUS-N	150503142544	NCR	None
Coupler					
Attenuator 20dB	Weinschel	41-20-12	86332	NCR	None
**Variable	JFW	50DR-061	223632-9740	NCR	None
Attenuator					
Signal Generator	Agilent	E4432B	US40053021	NCR	None
Signal Generator	Hewlett	8340B	2804A00782	NCR	None
	Packard				
Horn Antenna	Com-Power	AHA-118	071150	Sep/13/13	Sep/13/15
Bilog Antenna	Chase	CBL6140	1040	Oct/28/14	Oct/28/15
Attenuator 10dB	Huber+Suhner	6810.17.A	747300	NCR	None
Digital	Fluke	77 III	72550270	Jan/04/14	Jan/04/15
Multimeter					
Power Supply	Hewlett	6236B	2735A-19608	NCR	None
	Packard				

Table 46 – Test Equipment List

\*\* Customer supplied Equipment

\*Statement of Traceability: Test equipment is maintained and calibrated on a regular basis. All calibrations have been performed by a 17025 accredited test facility, traceable to National Institute of Standards and Technology (NIST)

## END OF TEST REPORT