

# Compliance Testing, LLC

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http://www.ComplianceTesting.com info@ComplianceTesting.com

# **Test Report**

Prepared for: Wilson Electronics, Inc.

Model: 460008

**Description: Quint Band Mobile Signal Booster** 

FCC ID: PWO460008

То

### FCC Part 20

Date of Issue: January 20, 2014

On the behalf of the applicant:

Wilson Electronics, Inc. 3301 E Deseret Drive St. George, UT 84790

To the attention of:

Pat Cook, Sr. Electrical Engineer Ph: (435) 673-5021 Email: pcook@infowest.com

Prepared By Compliance Testing, LLC 3356 N San Marcos PI, Suite 107 Chandler, AZ 85225-7176 (866) 311-3268 phone / (480) 926-3598 fax <u>www.compliancetesting.com</u> Project No: p1350021

Areg Corbin

Greg Corbin Project Test Engineer

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Test Report	Revision	History
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Revision	Date	Revised By	Reason for Revision
1.0	October 26, 2013	Greg Corbin	Original Document
2.0	November 27, 2013	Greg Corbin	Corrected typo in gain chart on page 83
3.0	January 6, 2014	Greg Corbin	Added additional spurious emissions data on pages 56, 57, 68, 69, 70, 71
4.0	January 9, 2014	Greg Corbin	Updated Conducted Emissions rule sections in the test summary table on page 6 and 57 to match the eCFR rule sections dated January 7, 2014.
5.0	January 20, 2014	Greg Corbin	Added test details to test procedure on page 20 for the Uplink Noise Timing plots. Added MSCL values to the tables on pages 88 and 89.
6.0	January 28, 2014	Greg Corbin	Corrected rule sections in the test summary table for Noise Limits and Uplink Inactivity on page 6.



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### ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated January 2009)

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to http://www.compliancetesting.com/labscope.html for current scope of accreditation.

Testing Certificate Number: 2152.01



FCC OATS Reg, #933597

IC Reg. #2044A-1

Non-accredited tests contained in this report:

N/A

#### **Test and Measurement Data**

Subpart 2.1033(c)(14):

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Part 2, Subpart J and the following individual Parts: 20.21 in conjunction with latest version of Draft KDB 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516.

#### **Standard Test Conditions and Engineering Practices**

Except as noted herein, the following conditions and procedures were observed during the testing.

In accordance with ANSI/C63.4-2009, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Environmental Conditions							
Temp (ºC)	Humidity (%)	Pressure (mbar)					
23.6 - 28.4	25.4 - 43.9	958.1 – 974.8					

Measurement results, unless otherwise noted, are worst-case measurements.

### **EUT Description**

Model: 460008

Description: Quint Band Mobile Signal Booster

Firmware: A460008A

**Software:** 460008A

### Additional Information:

The EUT is a **mobile** bi-directional amplifier for the boosting of cellular phone signals and data communication devices. The frequency bands listed in the table below are the bands used by the EUT.

The modulation types and emission designators listed in the tables below represent the modulations that the cell phone providers use for each frequency band. GSK, CDMA, and WCDMA represent all the modulation types (phase and amplitude or a combination thereof) utilized within the industry. EDGE, HSPA, LTE etc. are all protocols or multiplexing techniques using the base modulations.

	Frequency Band (MHz)											
Uplink	704 - 716	776 - 787	824 - 849	1850 - 1915	1710 – 1755							
Downlink	734 - 746	746 - 757	869 - 894	1930 - 1995	2110 - 2155							
Modulation Type	LI	ΓE		MA, EDGE, VDO, LTE	CDMA, HSPA, LTE, EDGE, EVDO							

Emission Designators									
CDMA	HSPA	LTE	EVDO	EDGE	GSM				
F9W	F9W	G7D	F9W	G7W	GXW				

#### **EUT Operation during Tests**

The EUT was in a normal operating condition.



### **Test Result Summary**

Specification	Test Name	Pass, Fail, N/A	Comments
20.21(e)(3)	Authorized Frequency Band	Pass	
20.21(e)(8)(i)(B) 20.21(e)(8)(i)(C) 20.21(e)(8)(i)(D)	Maximum Power and Gain	Pass	
20.21(e)(8)(i)(F)	Intermodulation	Pass	
20.21(e)(8)(i)(E)	Out-of-Band Emissions	Pass	
2.1051 22.917(a) 24.238((a) 27.53(c) 27.53(e) 27.53(f) 27.53(g)	Conducted Spurious Emissions	Pass	
20.21(e)(8)(i)(A)	Noise Limits	Pass	
20.21(e)(8)(i)(I)	Uplink Inactivity	Pass	
21(e)(8)(i)(C)	Variable Gain	Pass	
2.1049	Occupied Bandwidth	Pass	
20.21(e)(8)(ii)(A)	Oscillation Detection	Pass	
2.1053	Radiated Spurious	Pass	
20.21(e)(8)(i)(B)	Spectrum Block Filtering	N/A	This device does not use spectrum block filtering

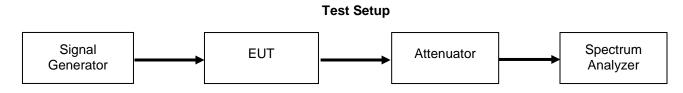


### Authorized Frequency Band Name of Test: Test Equipment Utilized:

Authorized Frequency Band i00424, SMU 200A - S/N:101369 Engineer: Greg Corbin Test Date: 9/23/13

**Test Procedure** 

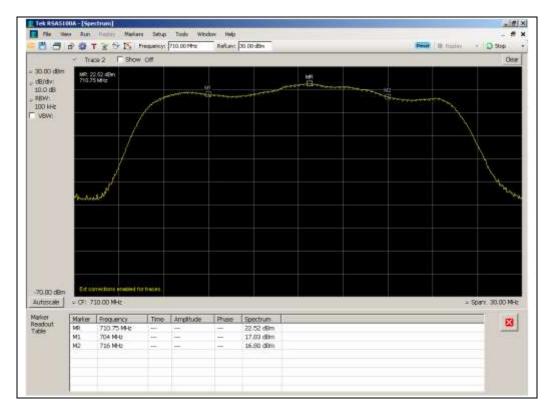
The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as necessary to ensure accurate readings were obtained. A signal generator was utilized to produce a CW input signal tuned to the center channel of the operational band. The RF input level was increased to a point just prior to the AGC being in control of the power. The Signal generator was set to sweep across 2X the operational band of the EUT while the spectrum analyzer was set to MAX HOLD. Two markers were placed at the edges of the operational band and a third marker was placed at the highest point within the band no closer than 2.5 MHz from the band edge.





#### **Uplink Test Results**



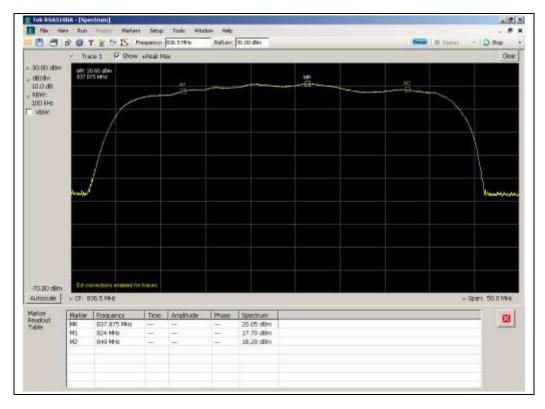


#### Tek #SAS100A - [Spectrum] - # × Me New Run Ficture Markers Setup Tools Witchev Help . # X 💾 🗇 😰 T 😨 😚 🎼 Frequency: 761.50745 Rollary: 50.00 days Freid | D. Hussey - | D. Stop . F Show +Peak Man Gear Tricke 1 30.00 dBm M2 21 27 dBm 778.5 MHz dB/dv: 10.0 dB NPM. MINV: 100 kHz VEW: ٨. -70.00 dBm Edit convictions ensered for traces Autoscale = CF: 781-50 MHz > Spare 38.00 MHz Marker Readout Table Marker Frequency Time Amplitude Phase Spectrum 83 MR M1 M2 M3 778.05 MHz 776 MHz 21.36 dBm 20.00 dBm E -787 MHz 778.5 MHz 15.61 dBm 21.27 dBm

776 - 787 MHz Band



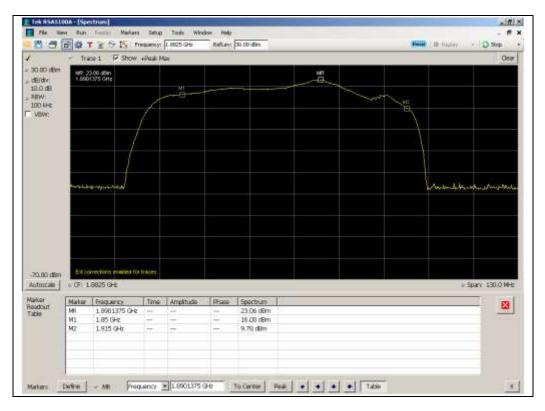
#### 824 - 849 MHz Band



#### 1710 - 1755 MHz Band

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	M1 M2	1.71 GHz 1.755 GHz		-	-	20.91 dBm 19.53 dBm				
	14	1.755 GHz		-	- 2	19/23 (2011)				





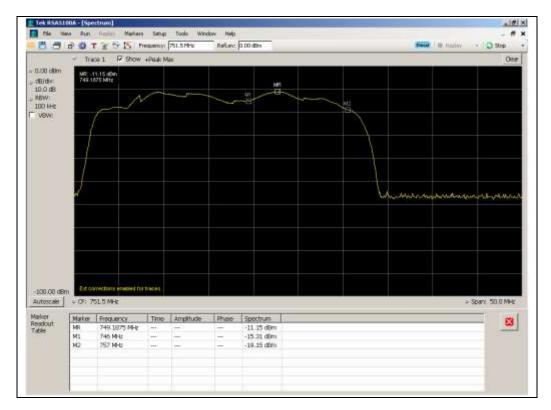
#### 1850 - 1915 MHz Band

#### **Downlink Test Results**

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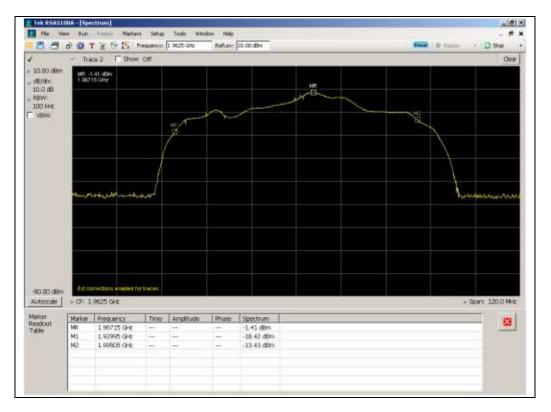
746 - 757 MHz Band



#### 869 - 894 MHz Band

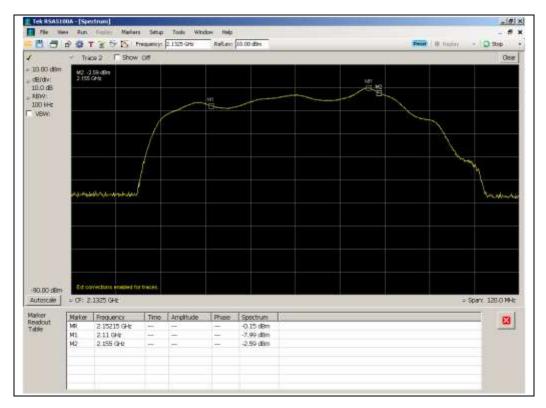
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1000	ML	809 M-tz	-	-	<u> </u>	-11.33 d9m				
	M2	894 MHz				-12.86 dBm				





1930 - 1995 MHz Band

#### 2110 - 2155 MHz Band





### Maximum Power and Gain Name of Test: Test Equipment Utilized:

Maximum Power and Gain i00424, SMU 200A - S/N:101369 Engineer: Greg Corbin Test Date: 10/22/2013

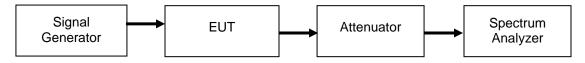
#### **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as necessary to ensure accurate readings were obtained. The spectrum analyzer and signal generator were tuned to the frequency with the maximum gain in the band as determined by the Authorized Frequency Band test. The RF input level was increased to a point just prior to the AGC being in control of the power with both a pulsed single time slot GSM and 4.1 MHz AWGN modulation. The maximum power was measured and verified to meet the minimum and maximum levels allowed with the maximum gain being computed from these values.

This is a mobile device with the maximum gain limit fixed at 50 dB for all bands.

The uplink and downlink gain under each condition was verified to be within 9 dB of each other.

### **Test Setup**



### Uplink Power Test Results

Frequency Band (MHz)	Input Level (dBm)	Output Power (dBm)	Lower Limit (dBm)	Upper Limit (dBm)	Result
704 - 716 MHz Pulsed GSM	-23.0	25.7	17	30	Pass
704 - 716 MHz AWGN	-30.5	18.9	17	30	Pass
776 - 787 MHz Pulsed GSM	-24.0	24.4	17	30	Pass
776 - 787 MHz AWGN	-30.7	18.2	17	30	Pass
824 - 849 MHz Pulsed GSM	-21.8	25.1	17	30	Pass
824 - 849 MHz AWGN	-30.5	18.1	17	30	Pass
1710 - 1755 MHz Pulsed GSM	-20.5	23.8	17	30	Pass
1710 - 1755 MHz AWGN	-27.0	18.8	17	30	Pass
1850 - 1915 MHz Pulsed GSM	-22.5	25.2	17	30	Pass
1850 - 1915 MHz AWGN	-29.5	19.6	17	30	Pass



Frequency Band (MHz)	Input Level (dBm)	Output Power (dBm)	Upper Limit (dBm)	Result
734 - 746 MHz Pulsed GSM	-53.0	-4.3	17	Pass
734 - 746 MHz AWGN	-61.8	-12.1	17	Pass
746 - 757 MHz Pulsed GSM	-51.6	-4.1	17	Pass
746 - 757 MHz AWGN	-60.0	-11.9	17	Pass
869 - 894 MHz Pulsed GSM	-49.9	-1.2	17	Pass
869 - 894 MHz AWGN	-57.3	-7.7	17	Pass
1930 - 1995 MHz Pulsed GSM	-44.7	4.0	17	Pass
1930 - 1995 MHz AWGN	-53.0	-3.2	17	Pass
2110 - 2155 MHz Pulsed GSM	-39.8	5.6	17	Pass
2110 - 2155 MHz AWGN	-47.5	-1.1	17	Pass

### **Downlink Power Test Results**

### Uplink and Downlink Gain Test Results

Modulation	Uplink Frequency (MHz)	Downlink Frequency (MHz)	Uplink Gain (dB)	Uplink Limit (dB)	Downlink Gain (dB)	Downlink Limit (dB)	Delta (dB)	Limit (dB)	Margin (dB)
Pulsed GSM	710.75	736.5	48.7	50	48.7	50	0	9	-9
AWGN	710.75	736.5	49.4	50	49.7	50	0.3	9	-8.7
Pulsed GSM	778.5	749.1875	48.4	50	47.5	50	0.9	9	-8.1
AWGN	778.5	749.1875	48.9	50	48.1	50	0.8	9	-8.2
Pulsed GSM	837.875	879.0625	46.9	50	48.7	50	1.8	9	-7.2
AWGN	837.875	879.0625	48.6	50	49.6	50	1	9	-8
Pulsed GSM	1746.5	2152.15	44.3	50	45.4	50	1.1	9	-7.9
AWGN	1746.5	2152.15	45.8	50	46.4	50	0.6	9	-8.4
Pulsed GSM	1890.1375	1967.15	47.7	50	48.7	50	1	9	-8
AWGN	1890.1375	1967.15	49.1	50	49.8	50	0.7	9	-8.3



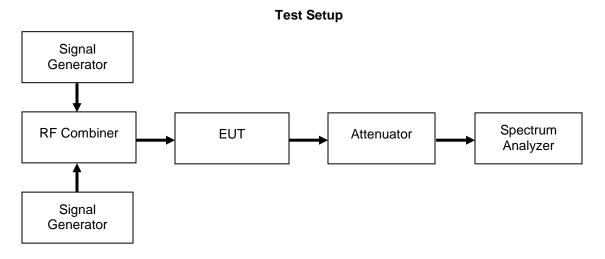
Intermodulation

#### Name of Test: Test Equipment Utilized:

Intermodulation i00424, SMU 200A - S/N:101369 Engineer: Greg Corbin Test Date: 9/24/2013

#### **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator. Two signal generators were utilized to produce two CW signals 600 kHz apart and centered in the operational band. Attenuator and cable insertion loss correction factors were input to either the signal generator or the spectrum analyzer as required to ensure accurate measurements were recorded. The input power was set at the maximum allowable power and the RMS intermodulation products were measured to ensure they were less than -19 dBm in a 3 kHz RBW. The uplink and downlink intermodulation products were plotted with the levels being listed in the summary tables.



#### **Uplink Test Results**

Frequency Band (MHz)	Intermodulation Level (dBm)	Limit (dBm)	Result
704 - 716 MHz	-23.5	-19	Pass
776 - 787 MHz	-24.7	-19	Pass
824 - 849 MHz	-25.2	-19	Pass
1710 - 1755 MHz	-21.5	-19	Pass
1850 - 1915 MHz	-22.6	-19	Pass

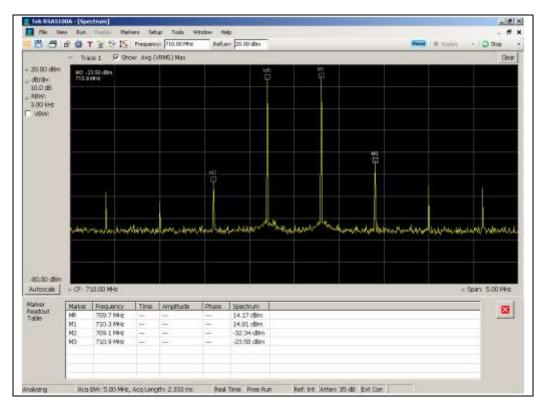
### **Downlink Test Results**

Frequency Band (MHz)	Intermodulation Level (dBm)	Limit (dBm)	Result
734 - 746 MHz	-70.2	-19	Pass
746 - 757 MHz	-70.8	-19	Pass
869 - 894 MHz	-70.7	-19	Pass
1930 - 1995 MHz	-69.8	-19	Pass
2110 - 2155 MHz	-64.8	-19	Pass



#### **Uplink Test Results**



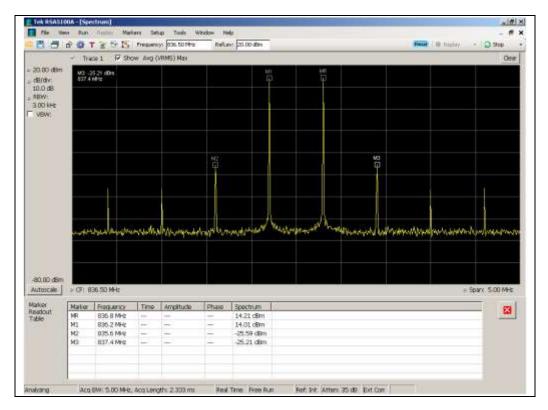


#### 776 - 787 MHz Band

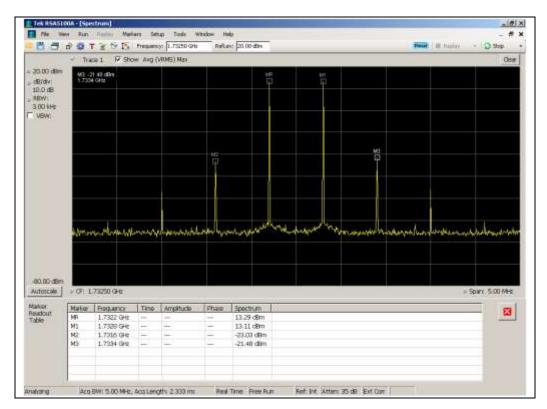
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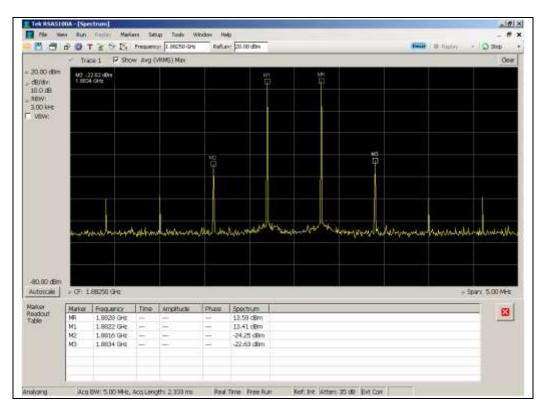




1710 - 1755 MHz Band







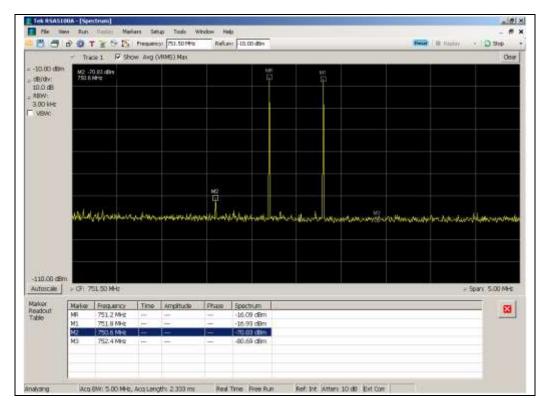
#### 1850 - 1915 MHz Band

#### **Downlink Test Results**

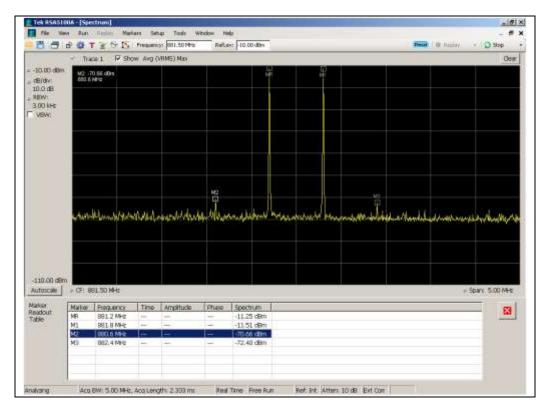
#### 734 - 746 MHz Band Tek #SAS100A - [Spectrum] . # × Mainare Satup Toole Window Halp File Many Rapy film # \* 💾 🗇 🖗 T 🔮 🖓 🎼 frequency: [M0.00191s - 2 Sep RefLex: -10.00 dBm Peter 10 Hauley . Trace 1 P Show Avg (VRMS) Max Oem -10.00 dBm M2 -70 24 dBrs 729.1 MFg dB/dv: 10.0 dB 3.00 kHz VEW: 10 A MA where on have when a served have -110.00 cEm Autoscale > CF: 740.00 MHz = Sparx, 5.00 MHz Marker Readout Table Marker Hequency Time Amplitude Phase Spectrum 8 9R M3 740.3 MHz 739.7 MHz -16.75 dBm -16.77 dBm 70.21 dBm мę: 739.1 MHz MB 740.9 MHz -75.78 dBm Aca EW: 5.00 MHz, Aca Length: 2.333 ms Real Time. Free Run Ref. Int. Atten: 10 dB. Ent. Con grovena



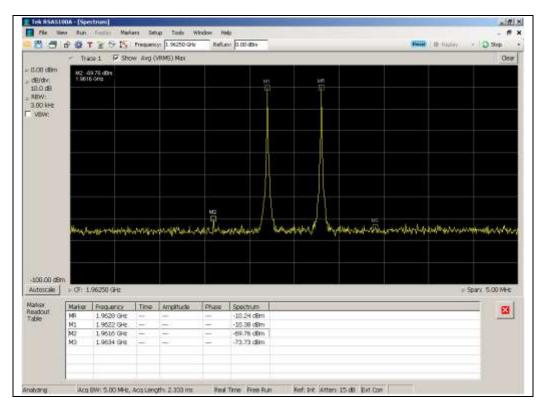
746 - 757 MHz Band



869 - 894 MHz Band

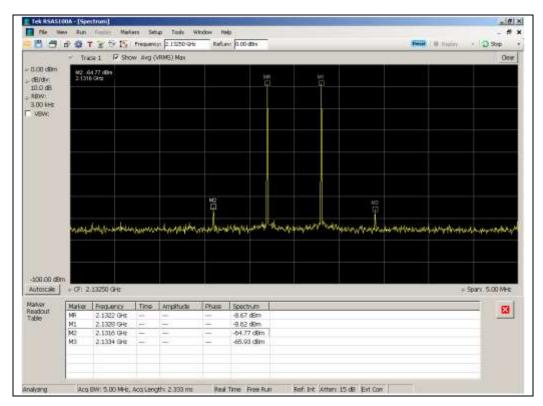






1930 - 1995 MHz Band

2110 - 2155 MHz Band





Out-of-Band Emissions Name of Test: Test Equipment Utilized:

Out-of-Band Emissions i00424, SMU 200A - S/N:101369 Engineer: Greg Corbin Test Date: 9/30/13

#### **Test Procedure**

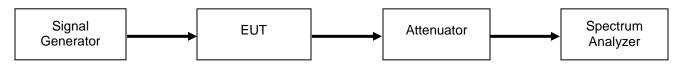
The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as necessary to ensure accurate readings were obtained. A signal generator was utilized to produce the following signals; GSM, CDMA, and WCDMA tuned to the lowest allowable upper and lower channel within the EUT operational band for each respective modulation type. The RF input level was increased to a point just prior to the AGC being in control of the power. For each modulation type the Out of Band Emissions was measured ensuring the meet the requirements.

The following formula is used for calculating the limits.

Limit (dBm) = -6 + (P2 - (43 + 10\*LogP1))

P1 = Output Power in watts P2 = Output Power in dBm







Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
704 - 716	Lower	-70.8	-19	Pass
704 - 716	Upper	-30.9	-19	Pass
776 - 787	Lower	-31.9	-19	Pass
776 - 787	Upper	-30.4	-19	Pass
824 - 849	Lower	-34.7	-19	Pass
824 - 849	Upper	-33.1	-19	Pass
1710 - 1755	Lower	-33	-19	Pass
1710 - 1755	Upper	-34.2	-19	Pass
1850 - 1915	Lower	-32.2	-19	Pass
1850 - 1915	Upper	-38.8	-19	Pass

### **GSM Uplink Test Results**

### **CDMA Uplink Test Results**

Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
704 - 716	Lower	-71.4	-19	Pass
704 - 716	Upper	-41.3	-19	Pass
776 - 787	Lower	-39.9	-19	Pass
776 - 787	Upper	-39.7	-19	Pass
824 - 849	Lower	-48.4	-19	Pass
824 - 849	Upper	-42.5	-19	Pass
1710 - 1755	Lower	-37.3	-19	Pass
1710 - 1755	Upper	-39.2	-19	Pass
1850 - 1915	Lower	-40.1	-19	Pass
1850 - 1915	Upper	-50.9	-19	Pass



Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
704 - 716	Lower	-70.5	-19	Pass
704 - 716	Upper	-41.7	-19	Pass
776 - 787	Lower	-41.2	-19	Pass
776 - 787	Upper	-40.9	-19	Pass
824 - 849	Lower	-48.8	-19	Pass
824 - 849	Upper	-35.3	-19	Pass
1710 - 1755	Lower	-35.4	-19	Pass
1710 - 1755	Upper	-35.9	-19	Pass
1850 - 1915	Lower	-36.9	-19	Pass
1850 - 1915	Upper	-48.8	-19	Pass

### WCDMA Uplink Test Results

#### **GSM** Downlink Test Results

Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
734 - 746	Lower	-78.4	-19	Pass
734 - 746	Upper	-55.8	-19	Pass
746 - 757	Lower	-57.5	-19	Pass
746 - 757	Upper	-58.2	-19	Pass
869 - 894	Lower	-63	-19	Pass
869 - 894	Upper	-62.3	-19	Pass
1930 - 1995	Lower	-63.2	-19	Pass
1930 - 1995	Upper	-55.7	-19	Pass
2110 - 2155	Lower	-54.2	-19	Pass
2110 - 2155	Upper	-52.7	-19	Pass



CDMA	Downlink	Test Results
------	----------	--------------

Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
734 - 746	Lower	-78.3	-19	Pass
734 - 746	Upper	-70.9	-19	Pass
746 - 757	Lower	-76.7	-19	Pass
746 - 757	Upper	-78	-19	Pass
869 - 894	Lower	-76	-19	Pass
869 - 894	Upper	-76.7	-19	Pass
1930 - 1995	Lower	-78.5	-19	Pass
1930 - 1995	Upper	-77.5	-19	Pass
2110 - 2155	Lower	-77.3	-19	Pass
2110 - 2155	Upper	-76.5	-19	Pass

#### WCDMA Downlink Test Results

Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
734 - 746	Lower	-78.5	-19	Pass
734 - 746	Upper	-71.6	-19	Pass
746 - 757	Lower	-77.3	-19	Pass
746 - 757	Upper	-78.1	-19	Pass
869 - 894	Lower	-71.6	-19	Pass
869 - 894	Upper	-71.7	-19	Pass
1930 - 1995	Lower	-73.1	-19	Pass
1930 - 1995	Upper	-77.1	-19	Pass
2110 - 2155	Lower	-77	-19	Pass
2110 - 2155	Upper	-72.1	-19	Pass



### **GSM Uplink Test Plots**

### 704 - 716 MHz Band

### Lower Band Edge

	ency: 007.9500 MHz RefLex: 0.00 dBin		10
Trace 1 P Show Av	g (VRMS) Avg	 	1
0 cBm wiR ,70 70 cBm divi SSR Mitz 0.dB Vi			
Dikete svv:			

### Upper Band Edge

the second s		ellars Settap Dools		-		and a second	
	and the second se		tte RefLevs 20.00 db		 and in the	Hudey - 10 See	_
	Trace 1 🖗 St	sow Avg (vRMS) Avg			 		Oe
30.00 dBm	MR: -20.96 40m						
dB/dv: 10.0 dB	715 MHz						
IDV:							
30-0 kHz							
VEW;							
	R:						

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### 776 - 787 MHz Band

### Lower Band Edge

	9 <b># T</b> 3 6			mercans por o	o user	 	 ID Housey	- And
	- Trace 1. F	Show Ang (V	RMS) Avg					Oem
00.00 d8m d8/dW 10.0 d8 st0W	MR: -21.93 albri 776 MHz							
30.0 kHz VBW;								

	the second s	Frequency: 787.05007			Report - 10 Step
	- Trace 1 P St	iow ang (VRMS) ang	 	 	Cer
10.00 dBm dB/dW: t0.0 dB t0.W: 30.0 kHz	MRC - 200 346 dBlan 7827 Metz				
VBW:					
	3				



### 824 - 849 MHz Band

### Lower Band Edge

	9 <b>9</b> T 3 6				 	(B. Hudey)	
	- Trace 1 F	Show Ang (M	RMS) Avg	 	 		Oem
0.00 dBm dB/dv: 10.0 dB NDV: 3.00 kHz	NR: -34.76 dBm 023.90075 MHz 111 Ang (VR)031	Arg 100					
VBW:							
							1

	P D T 2 5 15 Inser			Freid ( D. Hauter,	
	- Trace 1 P Show Avg	WRMS) Avg			Oer
30.00 dBm dB/dv: 10.0 dB	MR: 30.06 dBm 649.005 MRz				
NERVI: 3.00 kHz VEVV:	11 Ang (VBNS) Ang 100				
	*				
	Y				
		miner manipures	montaininte	en anter a second and a second s	quest 600-00



### 1710 - 1755 MHz Band

### Lower Band Edge

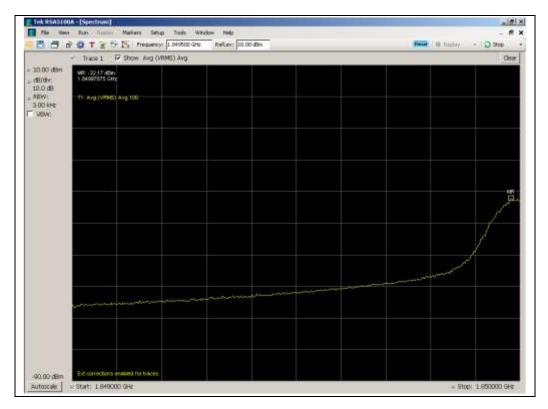
	₽ <b>₽</b> Т¥5				 	 D. Hauley	
	- Trice 1 F	Show Ang ()	RMS) Avg	 	 	 	Oem
30.00 d8m d8/dW 10.0 d8 .10.0 d8	MR: .23.00 dBm 1.70969 GHz						
3.00 kHz VBW:	Thi Ang (VRHQ)	Avg 100					
							HPI

	P 🛊 T 😤 😚 🎼 Frequencys (1.755		 Everal ID Hauter	
	<ul> <li>Trace 1. P Show Avg (VRMS) A</li> </ul>	40	 	Oer
10.00 dBm 18/dw: 10.0 dB	MR: 34 25 dBn 1 755010135 GHz			
lenv: 1.00 kHz VSvv:	T1 Avg (V5H5) Avg 100			
	Ext corrections enabled for traces			



#### 1850 - 1915 MHz Band

#### Lower Band Edge



### **Upper Band Edge**

	P O T 3 5 15 Hear		10.00 001	 Energy ( 10 Houses	
	Trace 1 P Show Avg	(VRMS) Avg		 	Oes
10.00 dBm dB/dV: 10.0 dB 80V:	MR: 38/02 dBm 1.91501375 GHz				
3.00 kHz VBW:					
	54				
	1				
	Elit conlections enabled for trac				

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### **CDMA Uplink Test Plots**

### 704 - 716 MHz Band

#### Lower Band Edge

000	© ∰ T 😤 😚 🖾   fease	mays \$500,9500 PHts	Reflev: 0.00 dbm		Detail.	D. Haday.	Di Stop
	Trace 1 F Show Arg	(VRMS) Avg					Oem
0.00 dBm dB/dm 10.0 dB 10.0 dB	MR: 371.62 dBm 697 Shine						
30.0 kHz VBW:							
	R						
100.00 dBm	Ext corrections enabled for trac						

### Upper Band Edge

	POTYS			mercent por or	o uzeri	 	 D. Hudey	
	- Trace 1 F	Show Ang (N	RMS) Avg			 		Oer
30.00 d8m d8/dv: 10.0 d8 80W:	MR: 141.20 dDm 716 MHz							
30.0 kHz VBW:								
	1							

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### 776 - 787 MHz Band Lower Band Edge

	P∰T¥⊕I			Hesters 150.0	57.44.01	 	 Huter - 123	
	- Trace 1 🖓	show Ang (AR	OMS) Avg			 	 	Oem
30.00 dBm dB/dv: 10.0 dB ABW: 30.0 kHz	MR: -38.98 dBn 775.950375 MHz							
VBW:								
	-							
	_							

	the state of the s	n 767.0500 MHz Refuest 20.00 dan	 Freid I Banter - D Sop
	Trace 1. IF Show Avg 0	RMS) Avg	 Qe
30.00 dBm dB/dv: 10.0 dB 80vv:	MP: -39.09.40m 787.MHz		
30.0 kHz VSW:			



### 824 - 849 MHz Band

### Lower Band Edge

De

		Alext 0.00 dBm	
	<ul> <li>Trace 1. IF Show Avg (VRMS) Avg</li> </ul>		Oe
0.00 dBm dB/dv: 10.0 dB 80vv:	MP: 412-52 #Bm 543 Mitz 11: Avg (VPMS) Avg 100		
30.0 kHz VBW:	The Ang (VARIA Ang ILO		
		~~~~	



### 1710 - 1755 MHz Band

#### Lower Band Edge

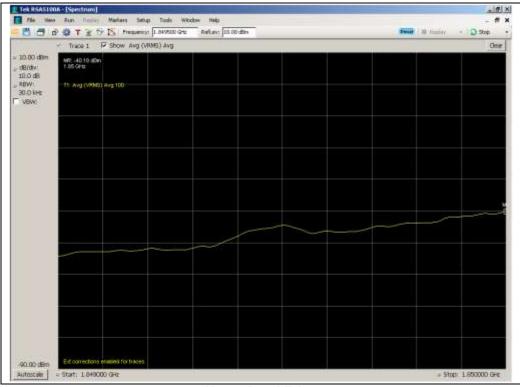
			Ha RefLeys 30.00				Os				
	Trace 1. M Show Ang										
0.00 d8m 8/dw: 1.0 d8 0W:	MR: .27.29 dBm 1.70665575 GHz 11. Avg (V/SHE) Avg 100										
1,0 kHz XBW:											

	P & T 2 P	The summery	The service and	Hereby puro	o dane	 	stear.	(ID. House)	- Prop
	- Trisse 1 F	Show Avg (A	WE) Avg						Oe
20.00 dBm dB/dv: 10.0 dB H(nv) 30.0 kHz VSw;	997: 39:19:400 1.355 GHz 11: Avg (V290)	Avg 100							
						3			



#### 1850 - 1915 MHz Band

#### Lower Band Edge



### Upper Band Edge

0.0.1	5 🕸 L 3 0	Pa Frequence	n 1.915800 GHE	RefLevt 0.00	dðn		Preset.	(ID. Housey)	- D Skop
	- Trace 1	Show Aig ()	RMS) Avg						Oem
0L00 cBm dB/dw; 10.0 dB	MR: (50.95 (8)) 1.915 CHtz								
agov 30.0 kHz VSW:	-11 Avg (V996)	Avg 100							
	2								

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### WCDMA Uplink Test Plots 704 - 716 MHz Band Lower Band Edge

			Mitz RefLext 0.00 dBm			Oea				
	Trace 1 M S	how Avg (VRMS) Avg								
0.00 dBm dB/dw; 10.0 dB 10.0 dB	MR: 70.46 dBn G97 963675 MHz									
30.0 kHz VBW:										

### Upper Band Edge

				RefLeys 30.00					D. Hudey.		
	Trace 1 P Show Ang (VRMS) Ang									Oes	
30.00 d8m d8/dw 10.0 d8 10.0 d8	MR: -4170.40m 715.1 Minz										
30.0 kHz VBW:											
	_										
	_										
	_										

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### 776 - 787 MHz Band

### Lower Band Edge

		er Refuers 20.00 dan		 Event, 10. Hautry	
Trace 1 IF Show	Avg (VRMS) Avg			 	1
0 dtim Mr. 775 952075 Mitz dB					
kHe N					
			M*3		

### Upper Band Edge

		and the second second	RefLevs 20.00 dBm		uter - Q.Sep
	- Trace 1 P Show /	uig (VRMS) Avg			Oe
30.00 d8m d8/dv: 10.0 d8 80w:	MR: 40.00 dBn 787.000125 MHz				
30.0 kHz VBW:					

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## 824 - 849 MHz Band

# Lower Band Edge

	OT 2 9 15 Heave		RefLevi 0.00 c	 	 -	( ID: Hautey)	
and the second second	Trace 1 F Show Avg	(VRMS) Avg		 			Oe
dBm Vi dB	MR: 48.81 dBm 804 MHz						
e e	11 Avg (VRHS) Avg 100						
6							
00 dBm	Extraorrections enabled for trace	4					

# Upper Band Edge

			n 049.500 MHz	Harrest bolo	/ dors	 	 (AD. Housey)	. Protob
	- Trace 1.	Show Ang (A	RMS) Avg					Oer
30.00 d8m d8/dw: 10.0 d8	MR: -26:32 dBm 549 Mitz							
NEW: 100 kHz	TI ANJ (VIDE)	Arg 100						
VBW:								
	_							
		maties for baces						

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## 1710 - 1755 MHz Band

# Lower Band Edge

Trace 1. If Show Avg ( MR: 05.63 dbm 1.7020046	vities) avg	Trace 1 P Show Avg (VRMS) Avg											
1 7099 GHz													
TL Avg (VRNS) Avg 100													
	Th Ang (1996) Ang 110	Th. Avg (VPHE) Avg 100	Th. Ang (VPMG) Ang 100	Th. Ang (VPMG) Ang 100	The Avg (0.996) Avg 100								

0.0		3 6 15 ma			mercen, pos	100 441	 	 D. Hastey	
-	- Trico	≥1 P Show As	g (ARMS)	) Avg					Cea
dB/dv;	MT - 35 1.7551	Gitz							
10.0 dB MINV 100 kHz VSW:	TI 44	g (VRMS) Avg 100							
	9		S D						
-80.00 dBmi 1	Eitop	vectors statised for the	tes.						
Autoscale	= Start:	1.755000 GHz						= Stop:	1.755500 GHt
Marker		Frequency		Amplitude	Phase	Spectrum			
Readout Table		1.755016875 GHz 1.7551 GHz	-	5	-	-35.45 dBm -35.66 dBm			



## 1850 - 1915 MHz Band

## Lower Band Edge

	♥ T ≥ S IS Inser		Harder 10.00	(dore	 	Darre .	D. Hautey	
1 March 1993 - 14	Trisse 1. P Show Avg	(VRMS) Avg			 			0
0 dBm Av: dB	MR: 38.90 dBn 1.85 OHb							
后相	TL Avg (VPME) Avg 100							
WC.								
		_						
	Eit correctors enabled for bace							

# Upper Band Edge

	P 🕸 T 😵 😚	In frequence	n 1.915500 GHE	RefLevt 0.00	dðin		Preset.	D. Hudey. C.	Q Skep
	- Trace 1 F	Show Avg (v	RMS) Avg						Oeur
0.00 dBm dB/dW 10.0 dB 80W 100 kHz	MR: -40.02 dBm 1.01506375 GHz 11. Avg (VRH01								
VBW:									

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### GSM Downlink Test Plots 734 - 746 MHz Band Lower Band Edge

	Q T 3 9			 	 	-	(ID: Housey) 1	
	Trace 1. F	Show Ang ()	RMS) Avg	 	 			Oer
-30.00 dBm dB/dv; 10.0 dB	MR .78.42 dBn 727.940125 Mitz							
NDV: 30.0 kHz VSW:	TI AVI (VENE)	Avg 100						
		nabled for traces						

0 0 0	TER	Pressures: 746.0500 PHz	RefLext 0.00 dBm	 Freid, 10. Hautry	- Distop
	Trace 1 P Show	w Avg (VRMS) Avg			Oer
0.00 dBm dB/dw; 10.0 dB	MR: -55.04 dDm 745 Mitz				
NDW: 30.0 kHz VBW;	11 Avg (VRND) Avg 10				
	5				
100.00 dBm	Elé conjections enviced i				



## 746 - 757 MHz Band

# Lower Band Edge

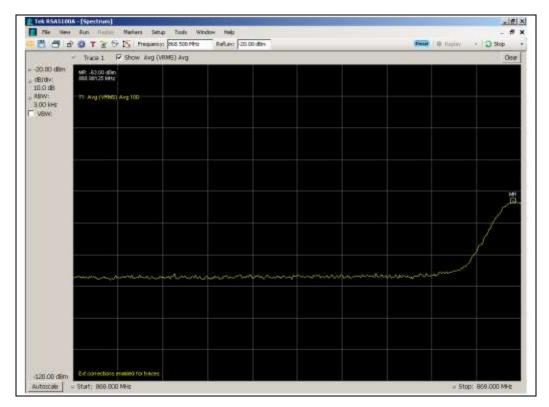
		Street Party March Street		Oem
	Trace 1. P Show	and council and		 - Udate
-20.00 dBm dB/dW 10.0 dB	MR: -67.52 dBm 746 MHz			
ngow: 30.0 kHz	TI AVE (VENE) AVE 100			
VSW;				

C	d? 😳 T 😤 🖓 🎼 freez		Hereit providen	 	 ID Housey	
	- Trace 1. IF Show Aug	(VIME) Avg		 		Oe
0.00 dBm dB/dw 10.0 dB 10.0 dB	NR: - GR 25 dBm 757 MHz Th Ang (V2061 Ang					
30.0 kHz VBW:						



### 869 - 894 MHz Band

## Lower Band Edge

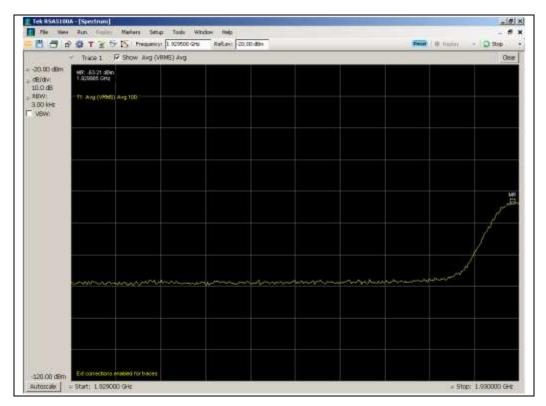


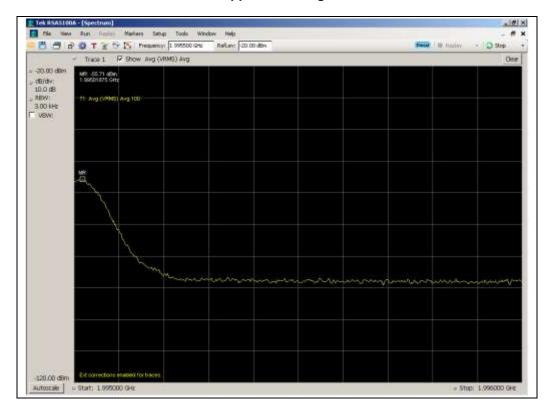
	POTYS						 	(ID House)	
	Trice 1	Show Aig (	RMS) Avg				 		Oe
-20100 dBm dB/dW 10.0 dB NINV:	MR 452.26 dBm 694 01375 MHz 11 Avg (VPHD)	Arg 100							
3.00 kHz VBW:									
	S.								
	1								
		t.		in the second second	www.	verseni		NADIES MARINA	minni
	-								



### 1930 - 1995 MHz Band

### Lower Band Edge







## 2110 - 2155 MHz Band

# Lower Band Edge

	Q T 2 0				 	 (A) Having	
	Trice 1 F	Show Ang (A	RMS) Avg	 	 	 	Oear
-10.00 dBH dB/dH 10.0 dB	MR: -54.22 (Eller) 2.109986125 GH	Ŧ					
RENV 3.00 kHz VSW:	TI AVY (VENS)	Arg 100					

	P Q T 2 5			The section of the		 	(ID: Housey)	
	Trace 1	Show Aig ()	RMS) Avg		 	 		Oer
-10.00 dBH dB/dV: 10.0 dB 10.0 dB	MR: -52.69 dBm 2.1520115 GHz							
3.00 kHz VBW:	TI ANI (VANG)	Arg 100						
		we 0						



## **CDMA Downlink Test Plots**

### 734 - 746 MHz Band Lower Band Edge

_	T 2 5 15 Inner			 	C. D. Hastey.	
	Trace 1 P Show Avg	(VRMS) Avg	 	 		08
00 d8m dv: 0 d8	MR: -78-33 dBm 727 5/7275 MHz					
W: DikHe RW:	-11 Avg (VPMS) Avg 100					
				ve D		

# Upper Band Edge

	P <b>@</b> T ≩ 5	12 Transmiss	n presidente Perur	RefLext 0.004	D1	 	Detar	(.49. Housey);	• Qistop
	- Trace 1	Show Ang (V	RMS) Avg						Oem
0.00 dBm dB/dw 10.0 dB	MR: -70.95 dBm 745 Mitz								
agow: 30.0 kHz VSW:	TI ANI (VAND)	Avg 100							
	-								
	4								
	_								

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## 746 - 757 MHz Band

# Lower Band Edge

				RefLey: 20.0			- O Skep
	Trace 1	CONTRACTOR OF THE PARTY OF	wore) and			 	Oear
-20.00 dBm dB/dW 10.0 dB	MR: -76.70 dBn 745.9465 Mitz						
itinw: 30,0 kHz VSW:	11 ANJ (1996)	Avg 100					
					86		

		15 Pressenses 75		 	 	(ID Haviny)	
	Trice 1	Show Avg (VRMS	) Avg	 	 		OK
-20100 dBm dB/dW; 10.0 dB	MR: .78.02 dBm 757.083635 MHz						
ngrwi: 30-0 kHz	TT AND (VRMC) A	krg 100					
VSW:	_						
	-						
							ME D



## 869 - 894 MHz Band

# Lower Band Edge

	POTES			 	 	 ( B. Hulley)	
	- Trice 1	Show Avg (A	RMS) Avg	 	 		Oem
-30.00 dBm dB/dv: 10.0 dB	055.0025 Netz						
, staw: 30.0 kHz VSW:	Thi Ang (vite)	Arg 100					
	-						

	POTYS			and a low a	 	 	D. Hudey	
	Trice 1	Show Ang (V	RMS) Avg		 	 		Oe
-20.00 dBH dB/dW 10.0 dB	MR: 76.75 dBn 894.3625 Mitz							
ntow: 30-0 kHz	TI ANI (VANG)	Avg 100						
VBW;								
				38				



## 1930 - 1995 MHz Band

# Lower Band Edge

	P∰ T ≩ B			 	 	Peak   .0. Hautey	
	Trace 1 F	Show Ang (	(RMS) Avg	 	 		Oem
-20100 dBH dB/dV: 10.0 dB #0W:	MR: .70.51 dDn 1.92947875 GHz						
30-0 kHz VBW:		HILE 100					
				WR.			
		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		B			

	POTS BIN				 Rater - D Sop
	Trace 1 P Show As	g (VRMS) Avg			 Oer
-20100 dBm dB/dW; 10.0 dB	MR: .77.40 dBn 1.99547375 G4tz				
NUTW: 30.0 kHz	11 Avg (VRH5) Avg 100				
VBW;					
			2		
				R 3	



## 2110 - 2155 MHz Band

# Lower Band Edge

	POTES			 	 	 ID Housey.	
	Trace 1	Show Ang (	vRMS) Avg	 	 	 	Oem
-10.00 dBm dB/dw; 10.0 dB	MR: .77.31 dBm 2.1059 GHz						
allow: 30-0 kHz VSW:	The Avg (VPHC)	Arg 100					

<ul> <li>Trace 1 P Show Ang (VIMS) Ang</li> <li>Store 24 at Sing</li> <li>Store 24 a</li></ul>	Oeu
#B(dv)         2.1020(7272.04);           ID.0.48	
мя. С	



# WCDMA Downlink Test Plots

## 734 - 746 MHz Band

### Lower Band Edge

		0.9500 PHu: Refuest 3	 		· O.Skep
And a second second second second second	Show Aug (VRMS	) Avg	 		Oe
00 dBm MR .70 AD dv: 727.97667	dBm Mitz				
idB .					
VI. TI ANIO	RMST Avg 100				
NVC					
				. Let	
			 	0	

# Upper Band Edge

Pile Merry	Ran - Denier	Mailars Sitta	s Doole Windo	sv Halp					1 de 1
85.	9 <b>9 T</b> 2 5	15 Pressents	746.0500 PHz	RefLev: 0.00	dDn		Deter	DR HILLY	- D Skep
	- Trace 1	Show Ang 0.4	(MS) Avg						Oer
(5.00 cBm	MR -71.63 dBm			-					Interior
dB/dv:	745.01775.MHz								
10.0 dB									
agov: 30-0 kHz	TT AND WENCE	Avg 100							
VBW;									
	-								
		WR D							
100.00 dBm	Elé conections e	maked for baces.							

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## 746 - 757 MHz Band

# Lower Band Edge

	\$T39				 	 (ID House)	
	Trace 1. F	Show Avg (	(RMS) Avg				Cem
-20100 dBm dB/dW 10.0 dB	MR -77.33 dBn 745.983125 MHz						
atrivi 30.0 kHz VSW;	TI ANI (VANS)	Avg 100					
1011							
	-						
							MR.

	P # T 2 5			 	 	 (A) Haday	
	- Trice 1	P show Ang (V	TUNE) AVG	 	 	 	08
-20100 dBm dB/dW 10.0 dB	MR: -70.07 dBn 757.0005 Mitz						
NDW: 30.0 kHz VSW:	TI ANI (VENS)	A-1					
	-						
						ыя П	



## 869 - 894 MHz Band

# Lower Band Edge

	Trace 1							Oem
-20.00 dBm	and the second second	of and any literative	and the second sec	-	_	_	_	[ COOR
dBidv	MR: -31.63 dBm 858 72375 MHz							
10.0 dB								
100 kHz	TI ANI (VMMG)	Arg 100						
VBW:								
	-							
	-							
	_							

	POTES				 	 ID: Hauley	
	- Trace 1	Show Ang fu	RMS) Avg	 	 	 	Oe
20.00 dBH dB/dV; tD.0 dB	MR: -71.75 dBm 694.005 MHz						
NEW: 100 KHz VEW;	TI Avg (VPHS)	Avg 100					
	e		-				



## 1930 - 1995 MHz Band

# Lower Band Edge

			n 1.909900 GHE		 	 Car constant of	- O Stop
	Trice 1	Show Airg (V	RMS) Avg	 	 	 _	Oem
20.00 dBm - dB/dv: 10.0 dB - #87W 100 kHz	MR 373-13 slim 1.929 GHz 11 Avg (VRM3)						
VBW:	_						
	-						
	i				 		

			RefLet: 20.00 dbm	 	R ( ID Hauley)	
	Trace 1 IF Show Au	(VRMS) Avg		 		De
-20.00 dBm dB(dv; 10.0 dB 10.0 dB	MR: 37.15 dBn 1.995215 GHz 11. Avg (V/2461 Avg 100					
30.0 kHz VBW(						
			ыя 	 		



## 2110 - 2155 MHz Band

# Lower Band Edge

		Show Avg (VRMS) Avg		 	Oem
-10.00 dBm		prove well (supply set	Ę.		 Cont
dB/dv: 10.0 dB	MR: .77.02 dBm 2.109957125 GHz				
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		1.3.6.15 14						Preset. (1)		
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-20100 dBm dB/dW 10.0 dB	MR: -3 2.155	2:14:a0m 1:04:::								
100 kHz 100 kHz VSW:	11.4	Ag (VPDHS) Avg 100								
			¥0		-2-3					
120.00 dBn	Editor	mechans enabled for	Dacies.							
Autoscale	> Start:	2.155000 GHz							= Stop:	2.155500 GH
Marker Readout Table	MR	Proquency 2 1551 GHz	Time	-	-	Spectrum -72.14 dBm				8
	M1	2.1551 GH	-	-		-72.14 dim				



### **Conducted Spurious Emissions**

Name of Test: Test Equipment Utilized: Conducted Spurious Emissions i00424, SMU 200A - S/N:101369 Engineer: Greg Corbin Test Date: 10/1/2013

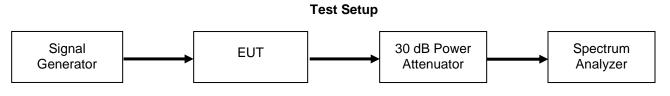
### **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as necessary to ensure accurate readings were obtained. A signal generator was utilized to produce a 4.1 MHz AWGN signal operating at the maximum allowable power. The conducted spurious emissions from 30 MHz to 10 times the highest tunable frequency for each operational band was measured excluding the band defined by the Out of band emissions test. The emissions were plotted and the highest level was recorded in the summary table.

The following formulas are used for calculating the limits.

Conducted Spurious Emissions Limit (dBm) = P2 - (43 + 10\*LogP1)

P1 = Output Power in watts P2 = Output Power in dBm



### **Uplink Test Results**

Frequency Band (MHz)	Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
704 - 716	716.1	-22.9	-13	Pass
776 - 787	775.9	-26.2	-13	Pass
824 - 849	59.88	-32.2	-13	Pass
1710 - 1755	13802.6	-31.1	-13	Pass
1850 - 1915	14927.6	-29.6	-13	Pass

#### **Downlink Test Results**

Frequency Band (MHz)	Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
734 - 746	39.58	-32.3	-13	Pass
746 - 757	41.59	-32.1	-13	Pass
869 - 894	32.01	-32	-13	Pass
1930 - 1995	19875.9	-30	-13	Pass
2110 - 2155	21048.1	-30	-13	Pass



### For the 746 – 758 downlink and 776 – 788 Uplink bands of operation, the following additional spurious emissions requirements apply.

### FCC 27.53(c)

For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

The test is performed using a 10 kHz RBW. Since the limit is referenced to a 6.25 kHz BW, the following correction factor is applied to the measured data.

BW correction Factor = 10Log B1/B2 BW correction Factor =10Log 6.25 / 10 = - 2.0 dB

Final Value (dBm) = conducted measurement +BW correction factor

Spurious Frequency Range (MHz)	Measured Frequency (MHz)	Measured Value (dB)	Bandwidth Correction Factor (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
763 – 775	774.979	-56.3	-2.0	-58.34	-35	-22.34
793 – 805	798.859	-72.5	-2.0	-74.54	-35	-38.54

# 787 MHz Unlink Band

#### 746 - 756 MHz Downlink Band

Spurious Frequency Range (MHz)	Measured Frequency (MHz)	Measured Value (dB)	Bandwidth Correction Factor (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
763 – 775	771.379	-72.4	-2.0	-74.44	-35	-38.44
793 – 805	799.75	-71.9	-2.0	-73.94	-35	-37.94

### FCC 27.53(e)

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Since the limit is referenced to EIRP, the final data is computed using the Conducted Spurious Emission data and adding the BW correction factor and the final gain/loss data from the antenna kitting information supplied by the manufacturer.

For the Narrowband measurement, the test is performed using a 10 kHz RBW. Since the limit is referenced to a 700 Hz BW, the following correction factor is applied to the measured data.

BW correction Factor = 10Log B1/B2 BW correction Factor =10Log 700 / 10000 = - 11.55 dB

Final Value (dBm) = conducted measurement +BW correction factor + final gain/loss from Antenna Kitting document

The Limit for discreet (narrowband) emissions is -80dBW (-50 dBm) in 700 MHz BW. The Limit for (wideband Emissions) is -70 dBW (-40 dBm) in a 1 MHz BW

Spurious Frequency Range (MHz)	Measured Frequency (MHz)	Measured Value (dBm)	Bandwidth Correction Factor (dB)	Gain/Loss from Antenna Kitting Information (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
1559 – 1610 (Wideband)	1560.109	-50.5	0	-0.3	-50.80	-40	-10.80
1559 – 1610 (Narrowband)	1561.69	-70	-11.55	-0.3	-81.85	-50	-31.85

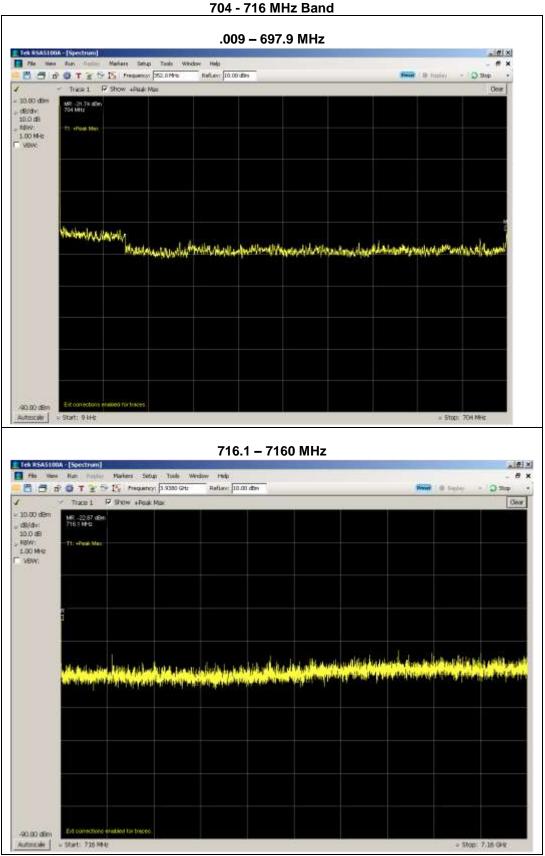
### 777 – 787 MHz Uplink Band

#### 746 - 756 MHz Downlink Band

Spurious Frequency Range (MHz)	Measured Frequency (MHz)	Measured Value (dBm)	Bandwidth Correction Factor (dB)	Gain/Loss from Antenna Kitting information (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
1559 – 1610 (Wideband)	1562.85	-52	0	-0.3	-52.30	-40	-12.30
1559 – 1610 (Narrowband)	1588.401	-71.7	-11.55	-0.3	-83.55	-50	-33.55



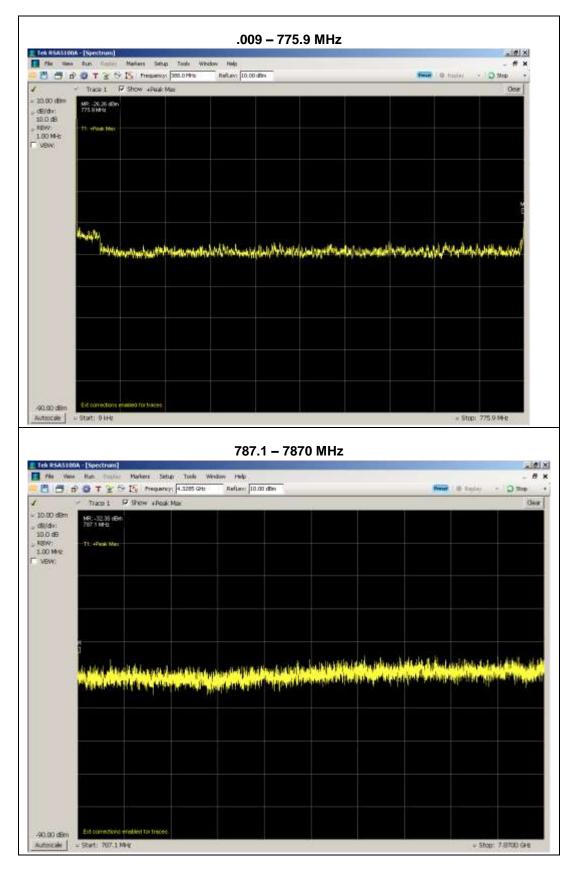
### **Uplink Test Plots**



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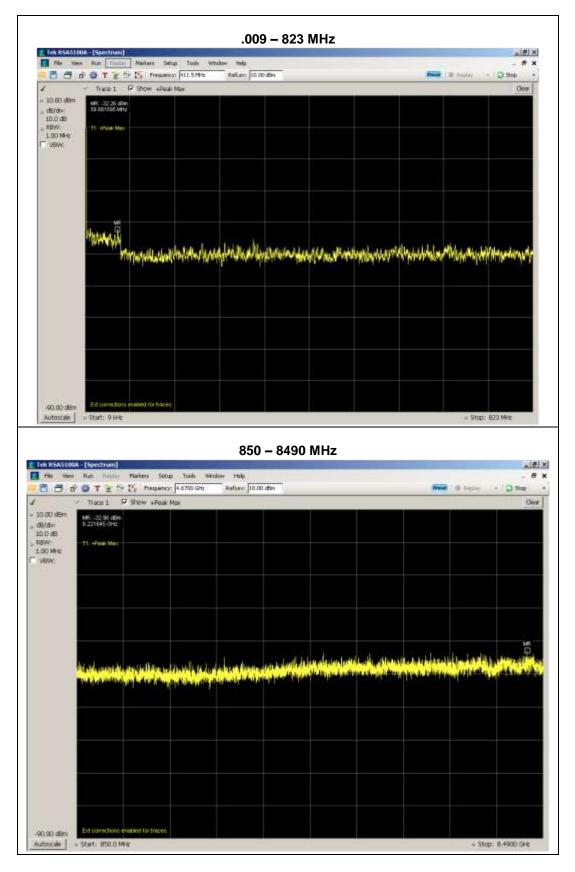


776 - 787 MHz Band



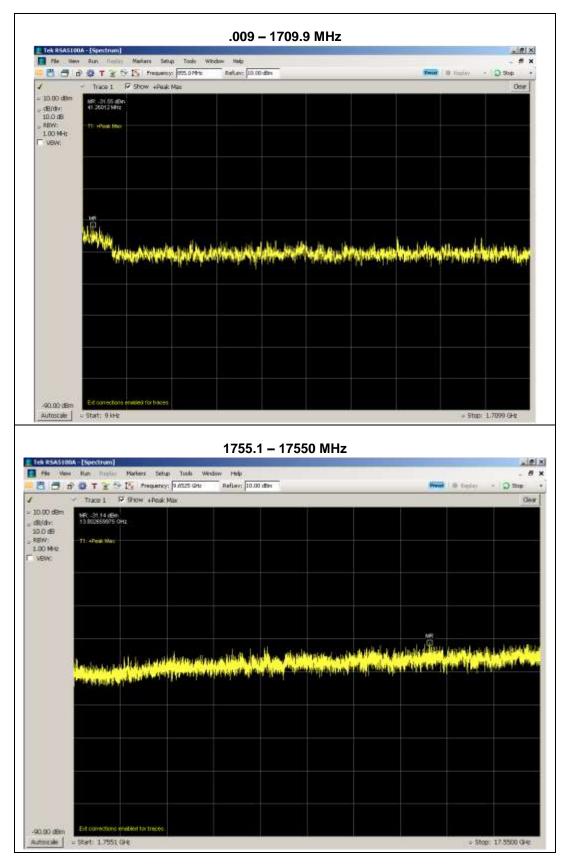


#### 824 - 849 MHz Band



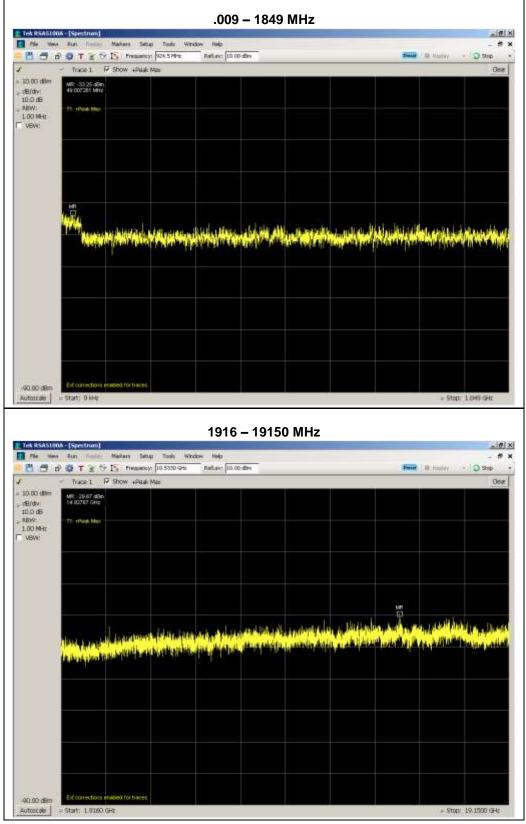








## 1850 - 1915 MHz Band

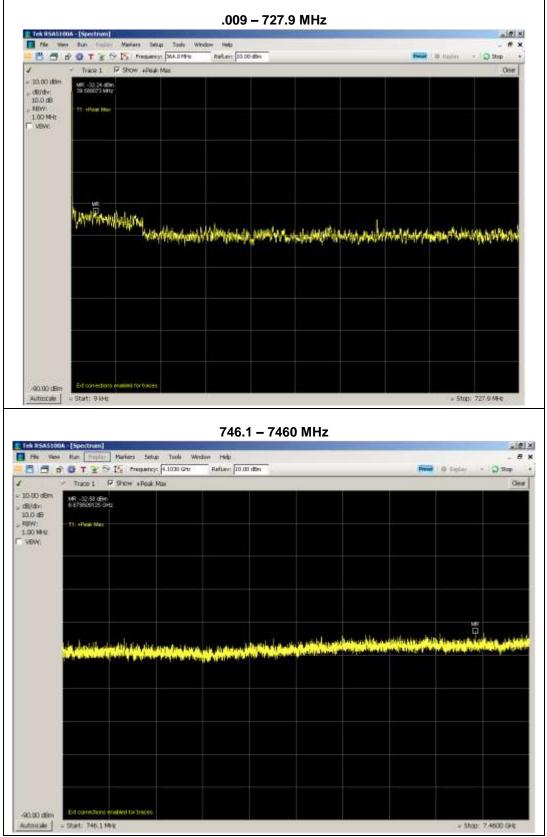


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## **Downlink Test Plots**

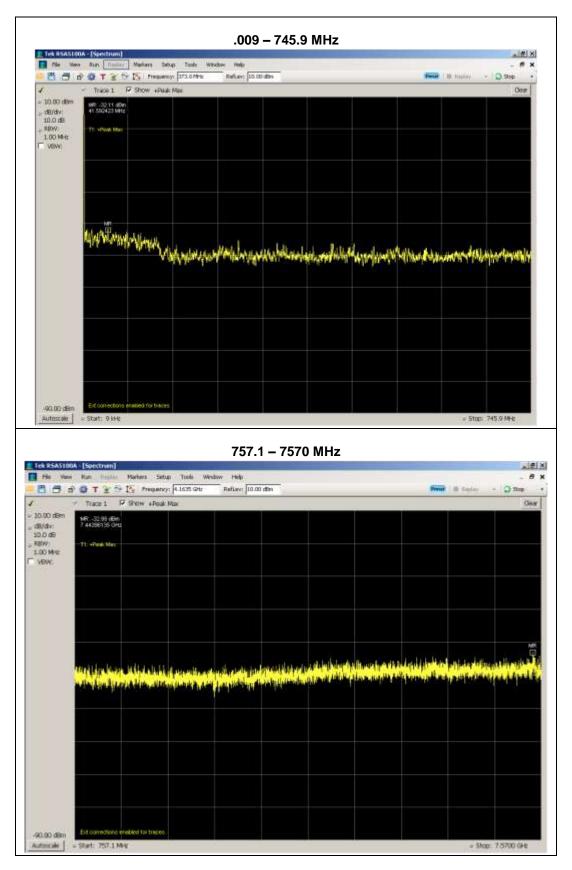
#### 734 - 746 MHz Band



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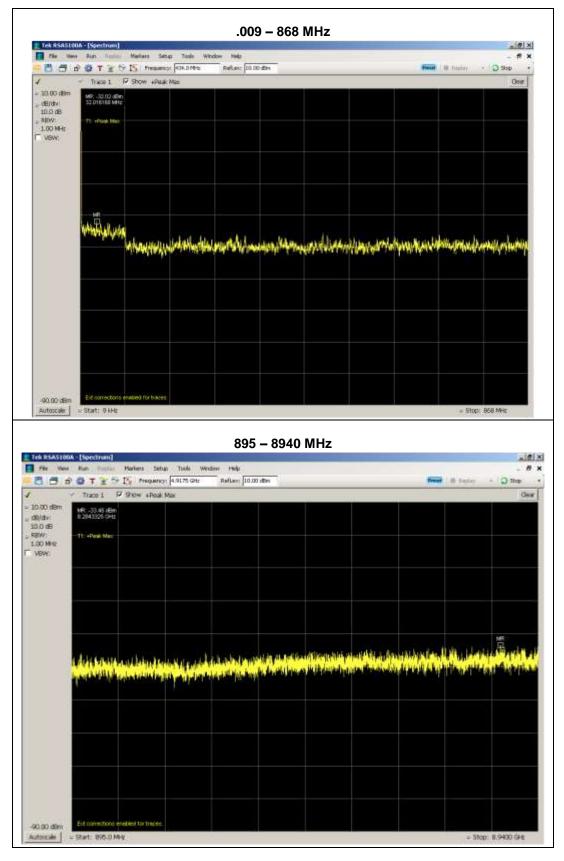


746 - 757 MHz Band



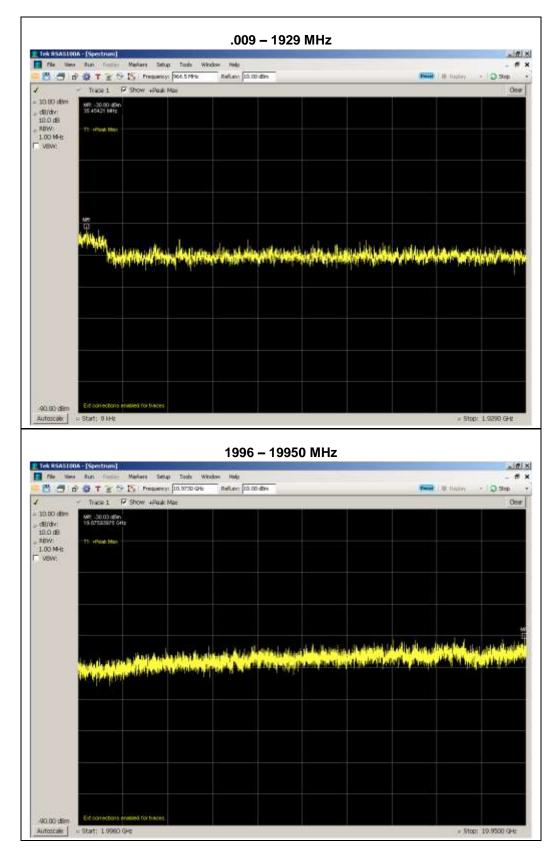


869 - 894 MHz Band



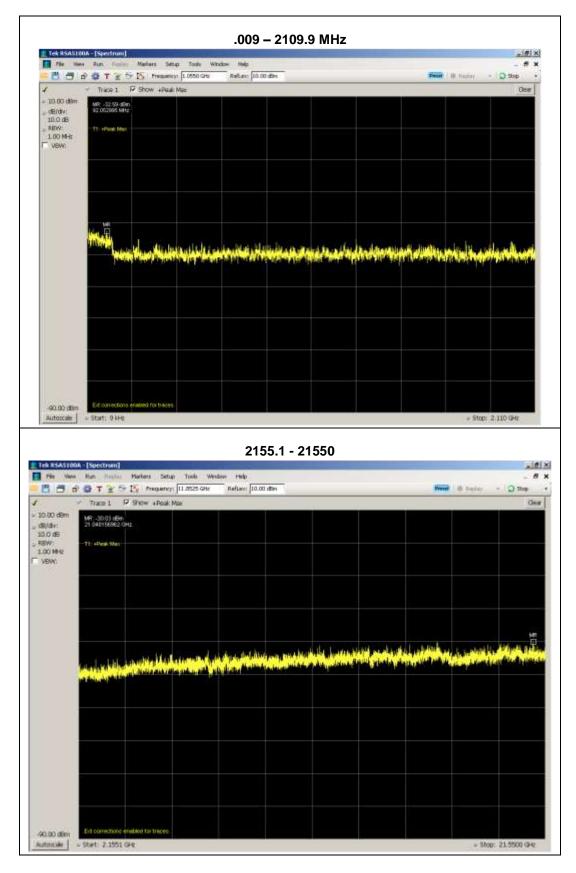


1930 - 1995 MHz Band



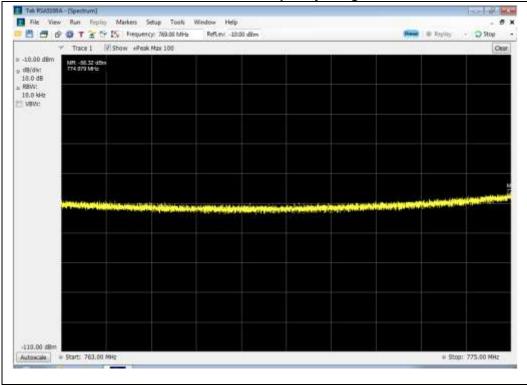


## 2110 - 2155 MHz Band



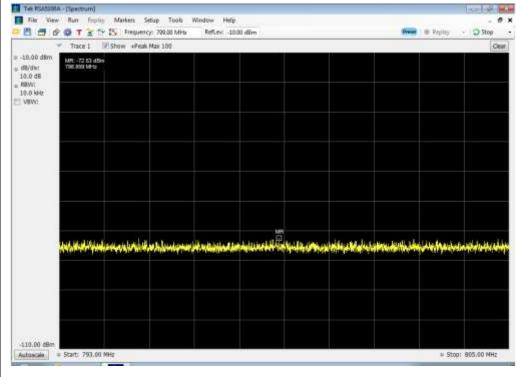


## 777 - 787 MHz Uplink Test Plots for the



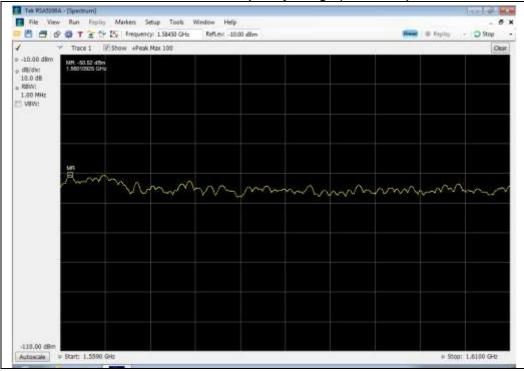
### 763 - 775 MHz Frequency Range

## 793 - 805 MHz Frequency Range



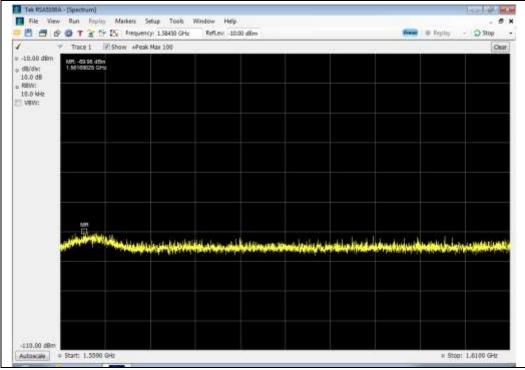


## 777 - 787 MHz Uplink Test Plots for the



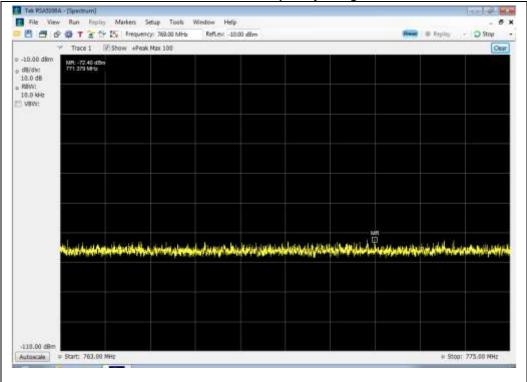
1559 - 1610 MHz Frequency Range (Wideband)

### 1559 - 1610 MHz Frequency Range (Narrowband)



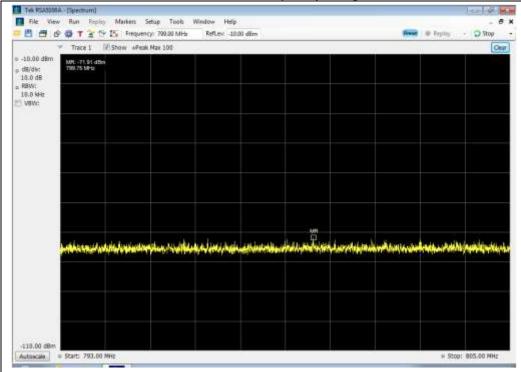


## 746 – 756 MHz Downlink Test Plots for the



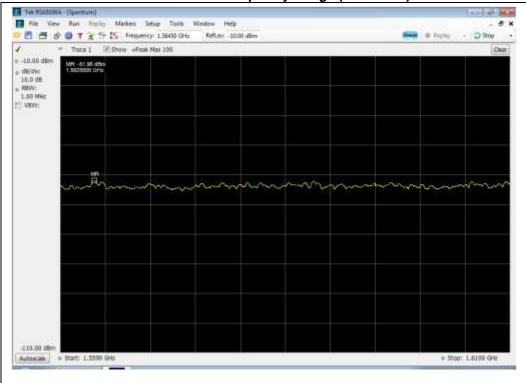
## 763 - 775 MHz Frequency Range







### 746 – 756 MHz Downlink Test Plots for the



## 1559 - 1610 MHz Frequency Range (Wideband)

### 1559 - 1610 MHz Frequency Range (Narrowband)

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**Noise Limits** 

Name of Test: Test Equipment Utilized:

Noise Limits i00424, SMU 200A - S/N:101369 Engineer: Greg Corbin Test Date: 11/8/2013

### **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as necessary to ensure accurate readings were obtained. A series of three tests are performed to measure the maximum uplink and downlink noise and the variable noise for the uplink and downlink in the presence of a downlink signal. The detailed procedures from KDB 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516c were followed.

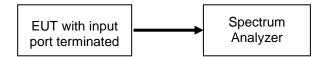
For the Uplink Noise Timing plots, the first marker (MR) is the reference marker where the Downlink signal level was increased and marker (M1) is the time it took the booster to react to the increase in the Downlink signal level per KDB 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516c.

The EUT is a mobile booster.

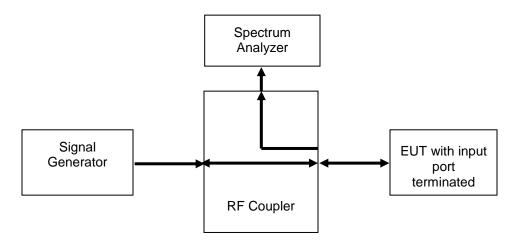
The noise power limit is fixed at -59 dBm for mobile boosters.

### **Test Setup**

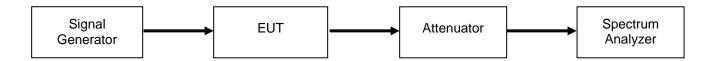
#### Maximum Noise Power



### Variable Uplink Noise Power and Timing



#### Variable Downlink Noise Power and Timing





Frequency Band (MHz)	Measured Noise (dBm)	Limit (dBm)	Margin (dB)	Result
704 - 716	-60.3	-59.0	-1.3	Pass
776 - 787	-59.2	-59.0	-0.2	Pass
824 - 849	-60.3	-59.0	-1.3	Pass
1710 - 1755	-60.3	-59.0	-1.3	Pass
1850 - 1915	-59.4	-59.0	-0.4	Pass

# Maximum Uplink Noise Test Results

# Maximum Downlink Noise Test Results

Frequency Band (MHz)	Measured Noise (dBm)	Limit (dBm)	Margin (dB)	Result
734 - 746	-61.4	-59.0	-2.4	Pass
746 - 757	-67.2	-59.0	-8.2	Pass
869 - 894	-64.7	-59.0	-5.7	Pass
1930 - 1995	-61.9	-59.0	-2.9	Pass
2110 - 2155	-62.2	-59.0	-3.2	Pass

# **Uplink Noise Timing Test Results**

Frequency Band (MHz)	Measured Timing (Seconds)	Limit (Seconds)	Result
704 - 716	0.800	1.0	Pass
776 - 787	0.663	1.0	Pass
824 - 849	0.313	1.0	Pass
1710 - 1755	0.525	1.0	Pass
1850 - 1915	0.538	1.0	Pass



# Variable Uplink Noise Limit Test Results

704 - 716 MHz				
RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)	
-69.0	-59.0	-59.5	-0.5	
-68.0	-59.0	-59.5	-0.5	
-67.0	-59.0	-59.5	-0.5	
-66.0	-59.0	-59.5	-0.5	
-58.0	-59.0	-60.5	-1.5	
-57.0	-59.0	-60.9	-1.9	

### 776 - 787 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-62.0	-59.0	-61.8	-2.8
-59.0	-59.0	-61.8	-2.8
-58.0	-59.0	-62	-3.0
-56.0	-59.0	-61.9	-2.9
-51.0	-59.0	-63.5	-4.5
-50.0	-59.0	-64.2	-5.2

## 824 - 849 MHz

024 040 MILE				
RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)	
-59.0	-59.0	-59.8	-0.8	
-58.0	-59.0	-59.8	-0.8	
-57.0	-59.0	-59.8	-0.8	
-56.0	-59.0	-59.8	-0.8	
-54.0	-59.0	-61	-2.0	
-53.0	-59.0	-62.8	-3.8	

#### 1710 - 1755 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-84.0	-59.0	-59.7	-0.7
-83.0	-59.0	-59.7	-0.7
-82.0	-59.0	-59.7	-0.7
-81.0	-59.0	-59.7	-0.7
-35.0	-68.0	-69.3	-1.3
-32.0	-71.0	-71.4	-1.4

## 1850 - 1915 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-36.0	-67.0	-67.2	-0.2
-33.0	-70.0	-70.4	-0.4
-37.0	-66.0	-66.5	-0.5
-34.0	-69.0	-69.5	-0.5
-52.0	-59.0	-59.5	-0.5
-51.0	-59.0	-59.5	-0.5



## Variable Downlink Noise Limit Test Results

734 - 746 MHz				
RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)	
-69.0	-59.0	-59.8	-0.8	
-68.0	-59.0	-59.8	-0.8	
-67.0	-59.0	-59.8	-0.8	
-66.0	-59.0	-59.8	-0.8	
-60.0	-59.0	-60.7	-1.7	
-59.0	-59.0	-60.8	-1.8	

#### 746 - 757 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-60.0	-59.0	-60.3	-1.3
-59.0	-59.0	-60.5	-1.5
-58.0	-59.0	-60.5	-1.5
-81.0	-59.0	-60.9	-1.9
-56.0	-59.0	-62.8	-3.8
-55.0	-59.0	-63.4	-4.4

## 869 - 894 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)	
-84.0	-59.0	-59.1	-0.1	
-83.0	-59.0	-59.1	-0.1	
-82.0	-59.0	-59.1	-0.1	
-81.0	-59.0	-59.1	-0.1	
-55.0	-59.0	-60.1	-1.1	
-54.0	-59.0	-60.2	-1.2	

#### 1930 - 1995 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-51.0	-59.0	-61.0	-2.0
-55.0	-59.0	-61.4	-2.4
-67.0	-59.0	-61.5	-2.5
-66.0	-59.0	-61.5	-2.5
-36.0	-67.0	-69.7	-2.7
-39.0	-64.0	-67.1	-3.1

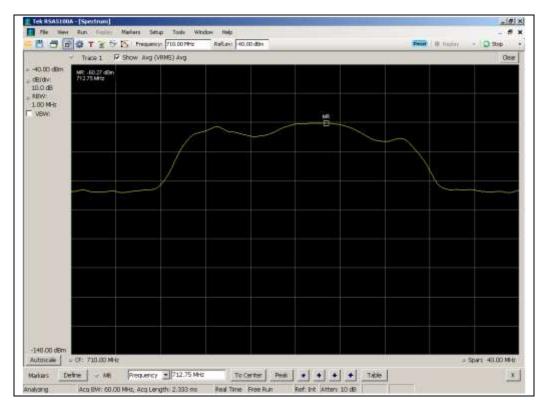
### 2110 - 2155 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-33.0	-70.0	-71.8	-1.8
-32.0	-70.0	-72.2	-2.2
-30.0	-70.0	-72.9	-2.9
-41.0	-62.0	-64.9	-2.9
-31.0	-70.0	-73.0	-3.0
-39.0	-64.0	-67.4	-3.4

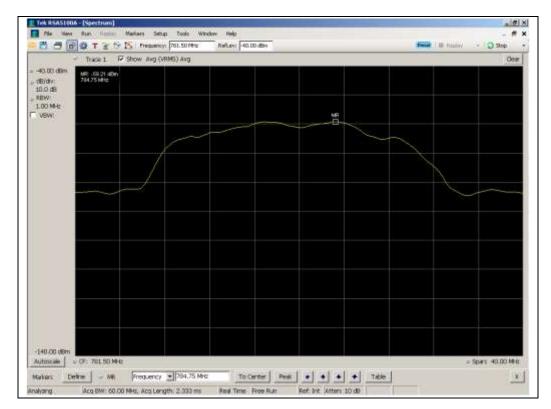


## Maximum Uplink Noise Test Plots

### 704 - 716 MHz Band

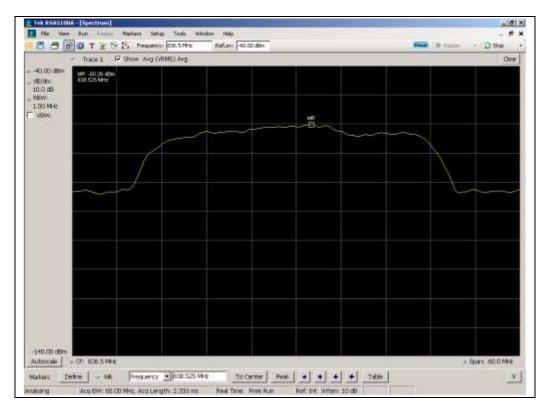


776 - 787 MHz Band

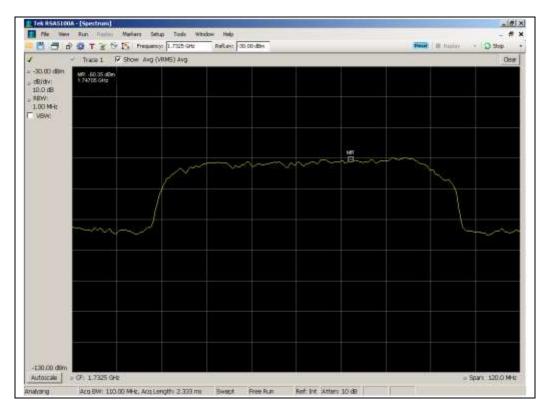




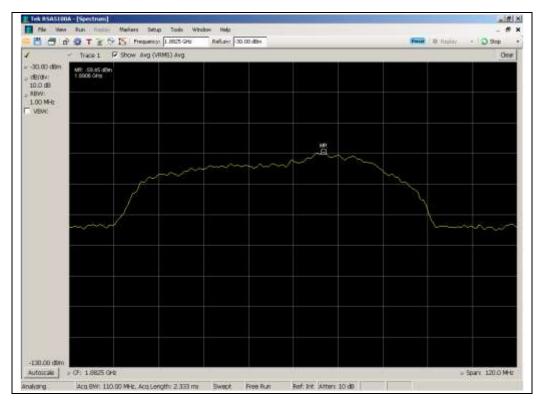




1710 - 1755 MHz Band



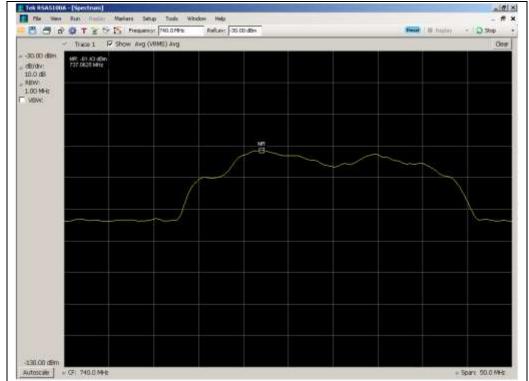




## 1850 - 1915 MHz Band

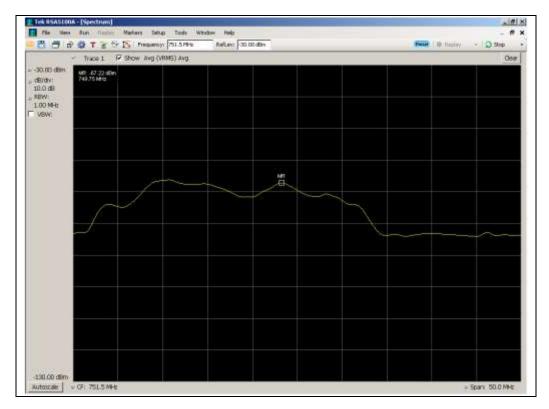
Maximum Downlink Noise Test Plots



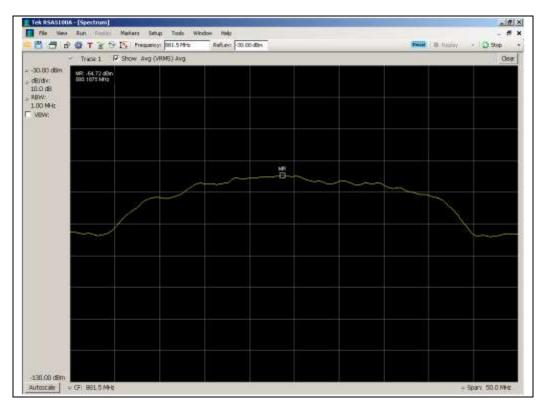




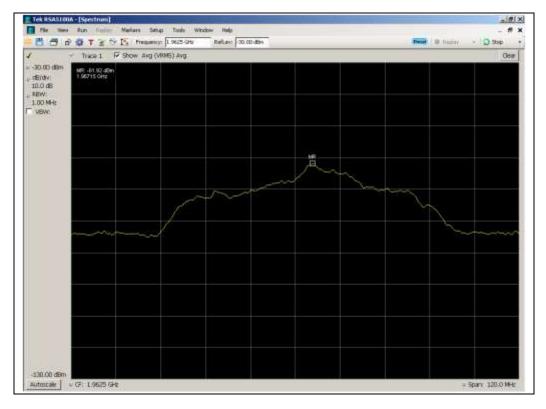




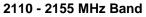


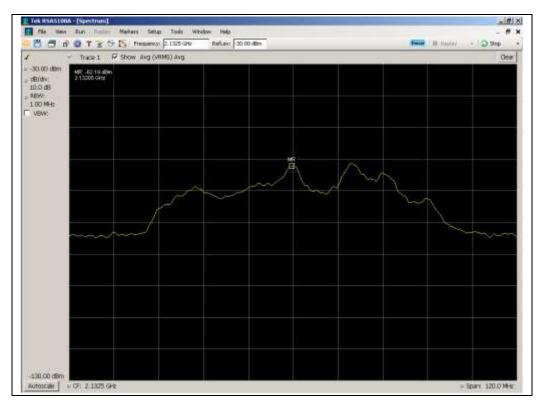






### 1930 - 1995 MHz Band

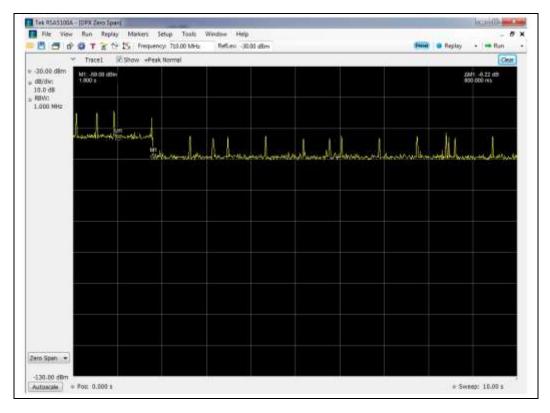




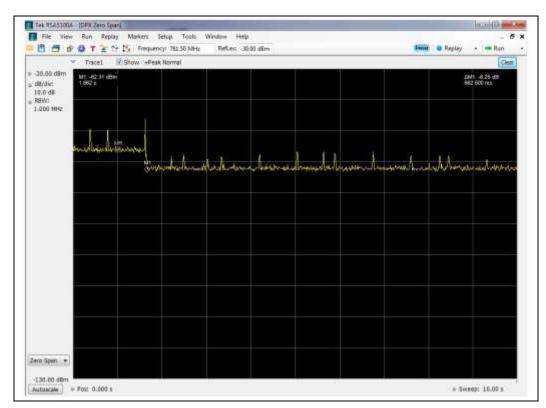


## **Uplink Noise Timing Test Plots**

## 704 - 716 MHz Band

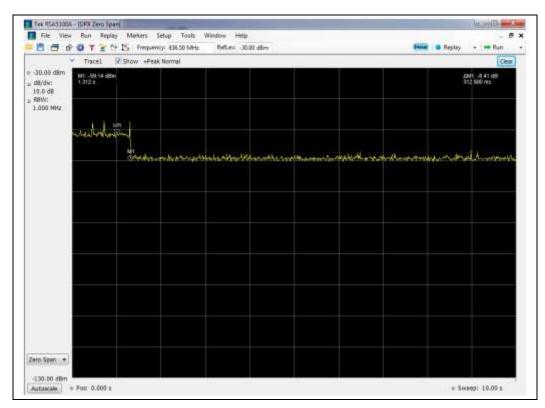


#### 776 - 787 MHz Band

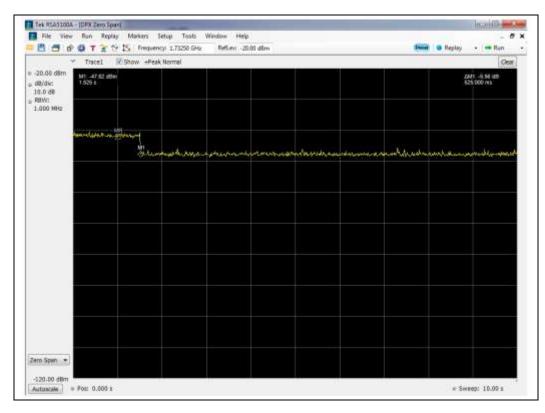




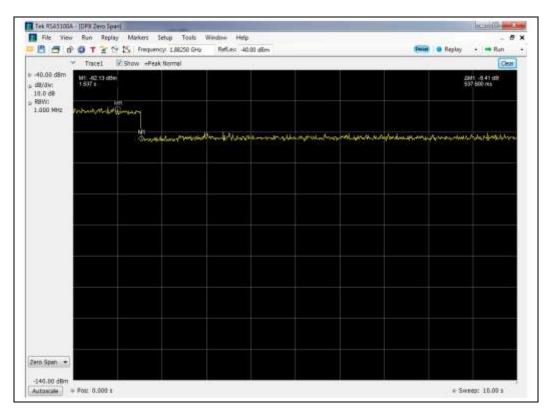




## 1710 - 1755 MHz Band







#### 1850 - 1915 MHz Band



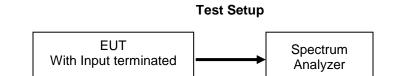
**Uplink Inactivity** 

## Name of Test: Test Equipment Utilized:

Uplink Inactivity i00424, SMU 200A - S/N:101369 Engineer: Greg Corbin Test Date: 9/27/2013

**Test Procedure** 

The EUT was connected directly to a spectrum analyzer set to operate in the center of the EUT operational uplink and downlink bands. The span was set to 0 Hz with a sweep time of 330 seconds and MAX HOLD operation. The EUT was powered on and the time for the uplink to return to an inactive state was measured using the DELTA MARKER method which was utilized to ensure it was less than 300 seconds. The noise level after the return to an inactive state was less than -70 dBm/MHz.



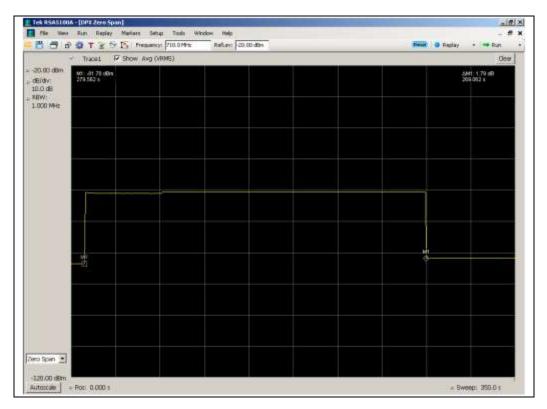
## **Uplink Test Results**

Frequency Band (MHz)	Measured Time (Seconds)	Limit (Seconds)	Result
704 - 716	269	300	Pass
776 - 787	269	300	Pass
824 - 849	269	300	Pass
1710 - 1755	269.5	300	Pass
1850 - 1915	269	300	Pass



## **Uplink Inactivity Test Results**

## 704 - 716 MHz

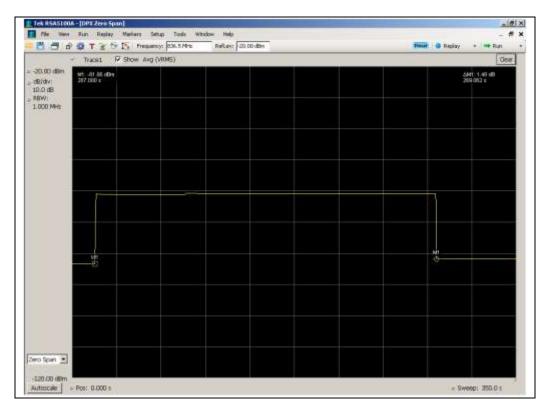


776 - 787 MHz

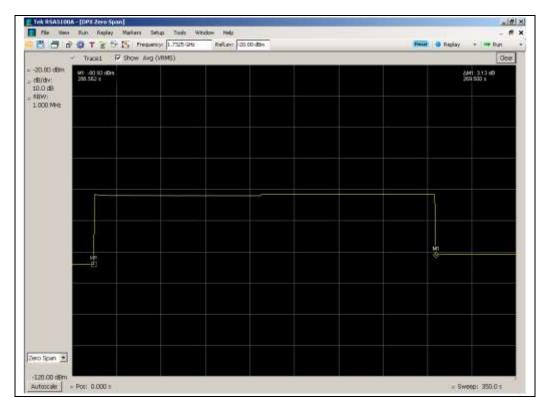
	QT 2 9 15 In		RefLet: 20.00 dBm	 	play = 👐 Pun
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20.00 dBm dB/dW 10.0 dB MIW;	MT - 42.54 dBm 203.907 x				5441:0.85 mB 209.052 e
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o Span 💌					



824 - 849 MHz

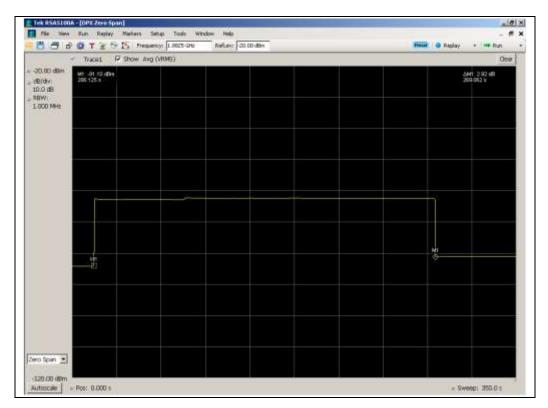


### 1710 - 1755 MHz





1850 - 1915 MHz





Variable Gain

Name of Test: **Test Equipment Utilized:** 

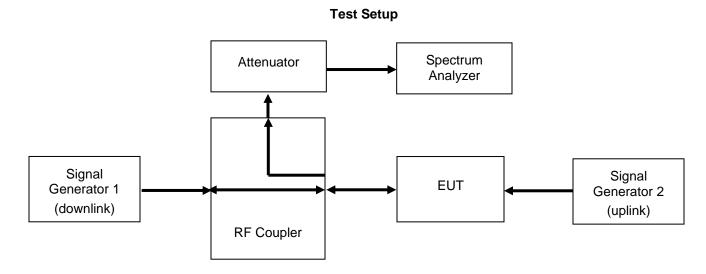
Variable Gain i00424, SMU 200A - S/N:101369 Engineer: Greg Corbin Test Date: 10/26/2013

## **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as necessary to ensure accurate readings were obtained. The uplink gain in the presence of a downlink signal was measured for each operational uplink band using the detailed procedures from KDB 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516.

The following formula is used for calculating the limits.

Variable Gain = -34 dB - RSSI +MSCL



#### **Uplink Test Results**

704 - 716 MHz								
RSSI (dBm)	MSCL (dB)	Gain Limit (dBm)	P(in) (dBm)	P(out) (dBm)	Gain (dB)	Margin (dB)		
-66.0	25.5	50.0	-35.5	13.9	49.4	-0.6		
-65.0	25.5	50.0	-35.5	13.9	49.4	-0.6		
-64.0	25.5	50.0	-35.5	13.9	49.4	-0.6		
-63.0	25.5	50.0	-35.5	13.9	49.4	-0.6		
-56.0	25.5	47.5	-35.5	10.4	45.9	-1.6		
-54.0	25.5	45.5	-35.5	8.4	43.9	-1.6		

776 - 787 MHz									
RSSI (dBm)	MSCL (dB)	Gain Limit (dBm)	P(in) (dBm)	P(out) (dBm)	Gain (dB)	Margin (dB)			
-43.0	26.5	35.5	-35.7	-0.5	35.2	-0.3			
-40.0	26.5	32.5	-35.7	-3.6	32.1	-0.4			
-55.0	26.5	47.5	-35.7	11.4	47.1	-0.4			
-42.0	26.5	34.5	-35.7	-1.7	34.0	-0.5			
-41.0	26.5	33.5	-35.7	-2.7	33.0	-0.5			
-39.0	26.5	31.5	-35.7	-4.7	31.0	-0.5			

# -- ---



024 - 049 10112							
RSSI (dBm)	MSCL (dB)	Gain Limit (dBm)	P(in) (dBm)	P(out) (dBm)	Gain (dB)	Margin (dB)	
-41.0	29.1	36.1	-35.5	-0.6	34.9	-1.2	
-40.0	29.1	35.1	-35.5	-1.6	33.9	-1.2	
-32.0	29.1	27.1	-35.5	-9.6	25.9	-1.2	
-30.0	29.1	25.1	-35.5	-11.7	23.8	-1.3	
-27.0	29.1	22.1	-35.5	-15.2	20.3	-1.8	
-48.0	29.1	43.1	-35.5	5.7	41.2	-1.9	

## 824 - 849 MHz

# 29.1

### 1710 - 1755 MHz

RSSI (dBm)	MSCL (dB)	Gain Limit (dBm)	P(in) (dBm)	P(out) (dBm)	Gain (dB)	Margin (dB)
-41.0	37.1	44.1	-32.0	10.5	42.5	-1.6
-34.0	37.1	37.1	-32.0	2.7	34.7	-2.4
-38.0	37.1	41.1	-32.0	6.6	38.6	-2.5
-31.0	37.1	34.1	-32.0	-0.4	31.6	-2.5
-30.0	37.1	33.1	-32.0	-1.4	30.6	-2.5
-29.0	37.1	32.1	-32.0	-2.6	29.4	-2.7

### 1850 - 1915 MHz

		1000 13				
RSSI (dBm)	MSCL (dB)	Gain Limit (dBm)	P(in) (dBm)	P(out) (dBm)	Gain (dB)	Margin (dB)
-31.0	36.3	33.3	-34.5	-2.0	32.5	-0.8
-24.0	36.3	26.3	-34.5	-9.1	25.4	-0.9
-22.0	36.3	24.3	-34.5	-11.6	22.9	-1.4
-38.0	36.3	40.3	-34.5	4.2	38.7	-1.6
-40.0	36.3	42.3	-34.5	6.1	40.6	-1.7
-39.0	36.3	41.3	-34.5	5.1	39.6	-1.7

# **Uplink Gain Timing Test Results**

Frequency Band (MHz)	Measured Timing (Seconds)	Limit (Seconds)	Result
704 - 716	0.80	1.0	Pass
777 - 78	0.25	1.0	Pass
824 - 849	0.83	1.0	Pass
1710 - 1755	0.25	1.0	Pass
1850 - 1915	0.80	1.0	Pass

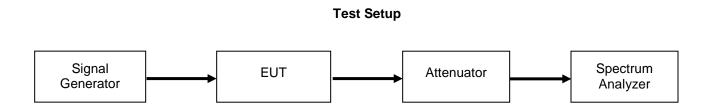


## **Occupied Bandwidth**

Name of Test: Test Equipment Utilized: Occupied Bandwidth i00424, SMU 200A - S/N:101369 Engineer: Greg Corbin Test Date: 9/26/2013

**Test Procedure** 

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as necessary to ensure accurate readings were obtained. A signal generator was utilized to produce the following signals: GSM, CDMA, and WCDMA tuned to the center channel of each of the EUT's operational uplink and downlink band with the RF level set to a point just prior to the AGC being in control of the power. For each modulation type the input and output signal was measured and plotted to ensure that the signals were similar.

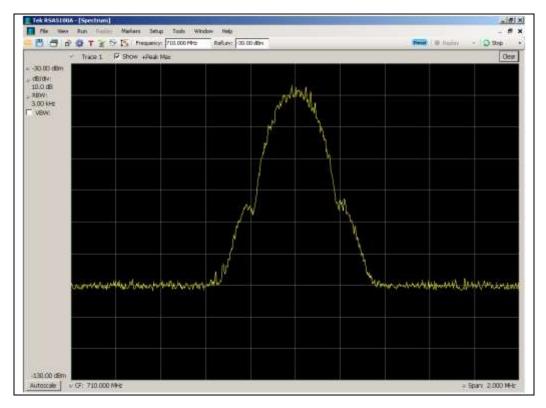


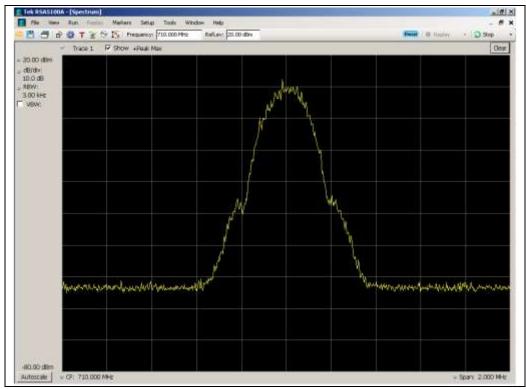


## **GSM Uplink Test Plots**

## 704 - 716 MHz Band

#### Input

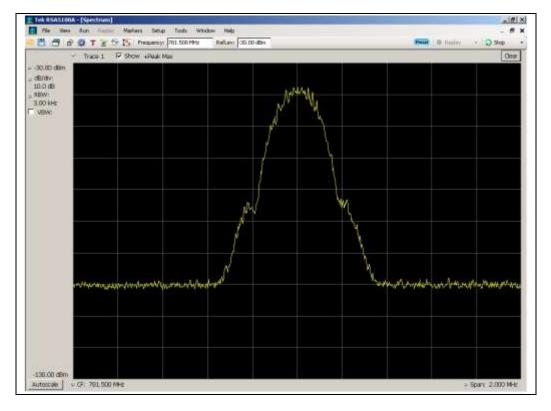




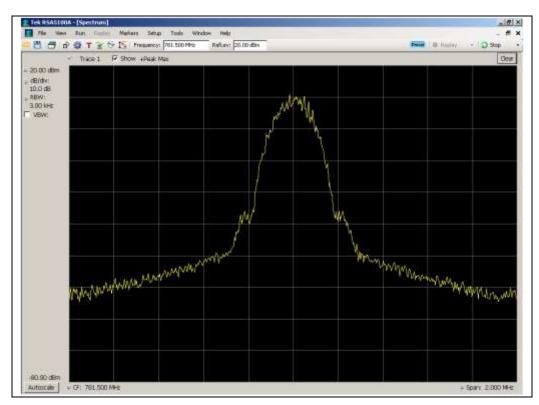
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## 776 - 787 MHz Band

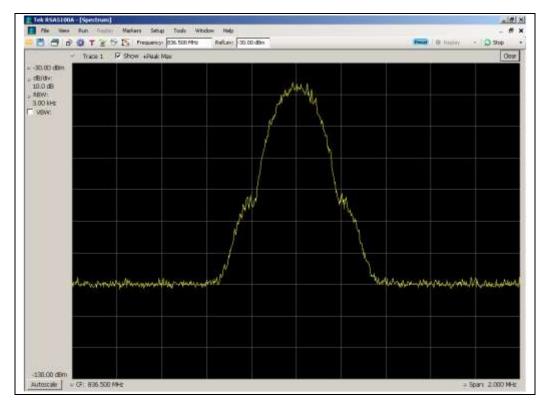




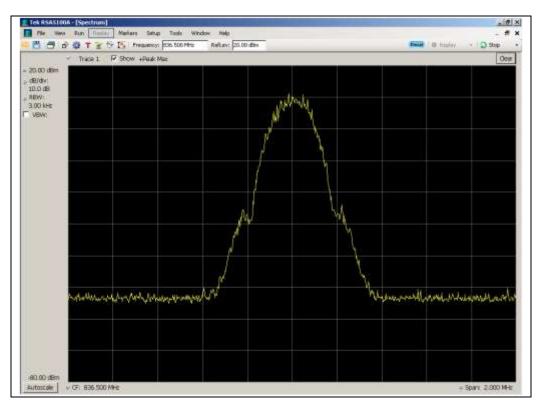




## 824 - 849 MHz Band

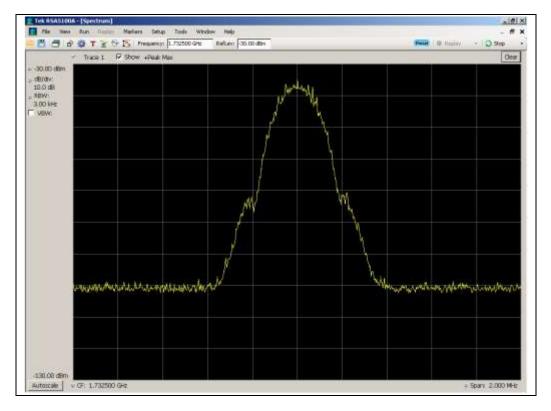




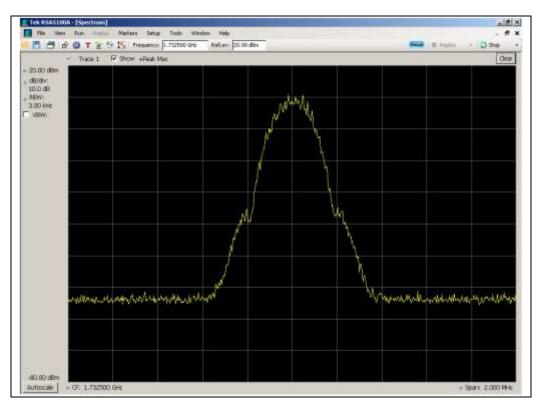




## 1710 - 1755 MHz Band

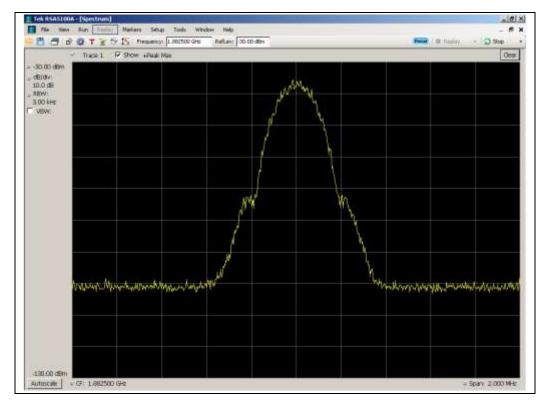




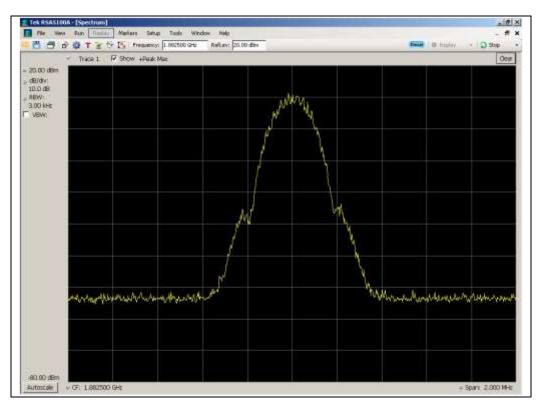




## 1850 - 1915 MHz Band





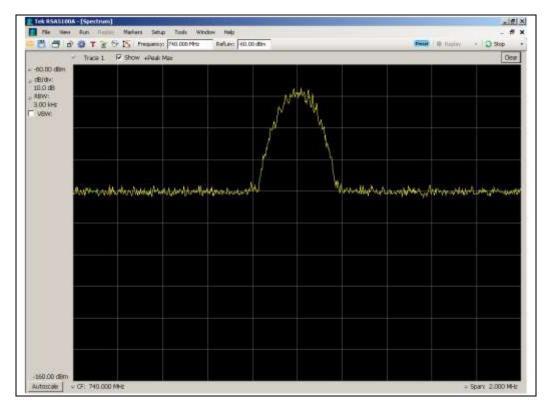




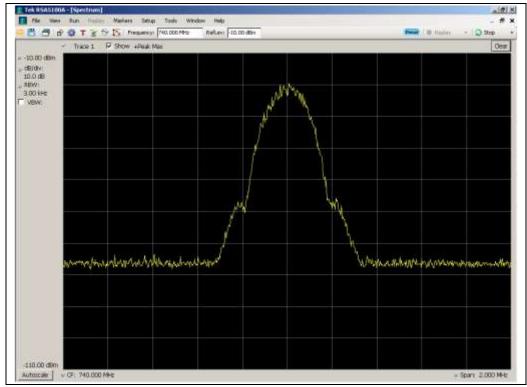
## **GSM Downlink Test Plots**

## 734 - 746 MHz Band

#### Input



Output

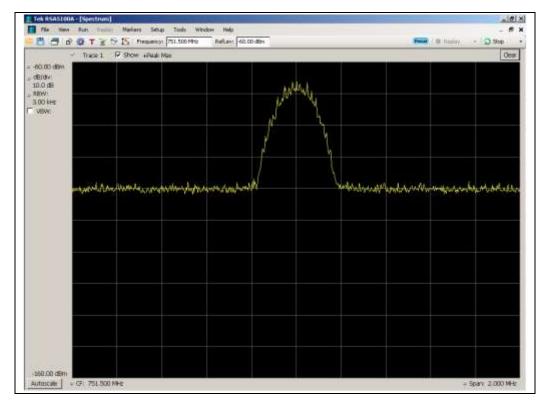


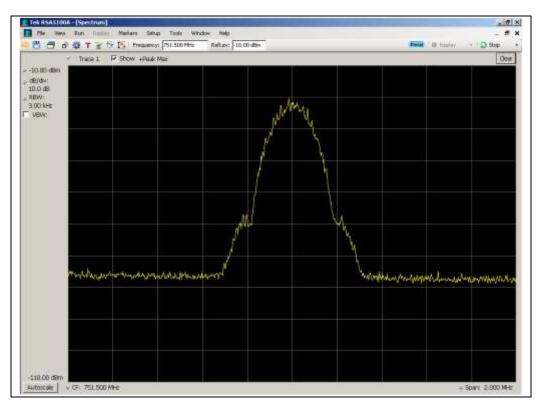
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## 746 - 757 MHz Band

#### Input

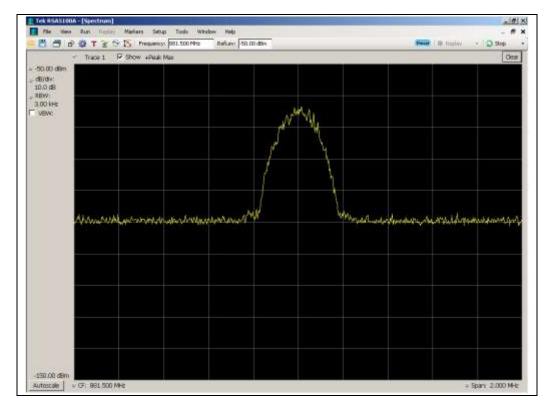


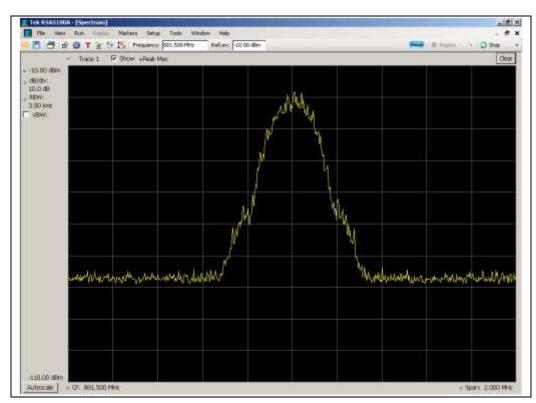




## 869 - 894 MHz Band

#### Input

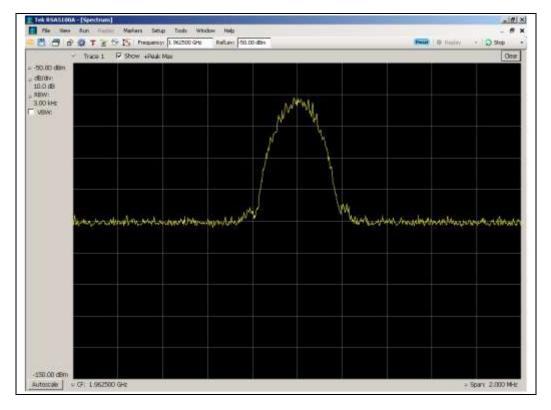


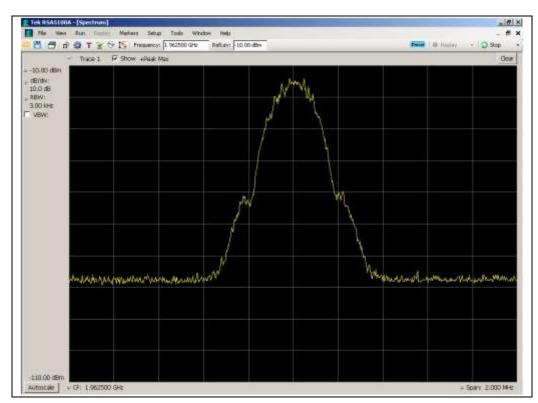




## 1930 - 1995 MHz Band

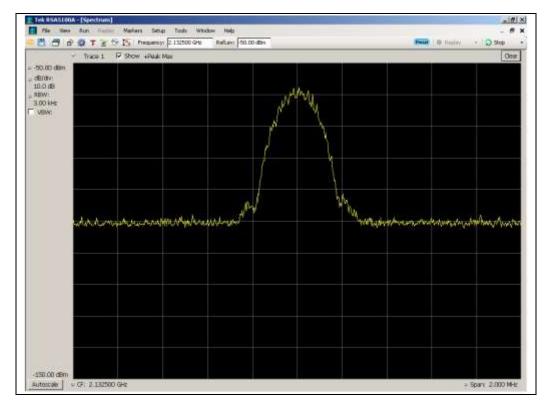
#### Input



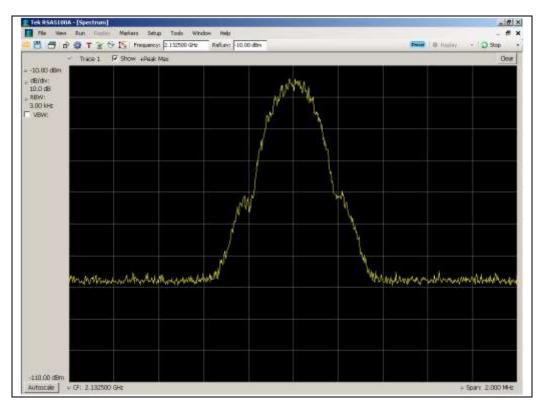




## 2110 - 2155 MHz Band



Output
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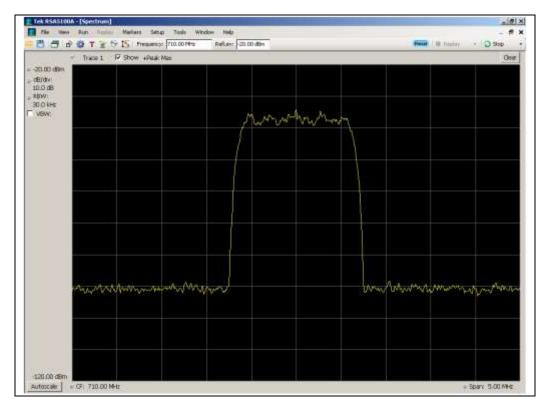




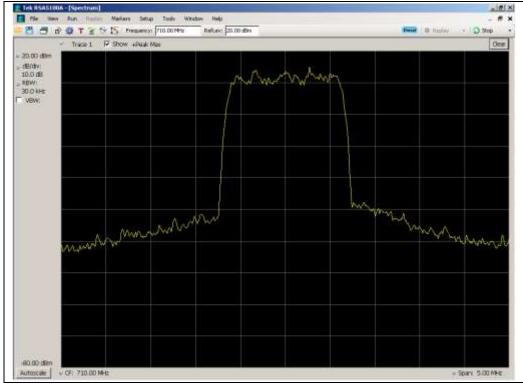
## CDMA Uplink Test Plots

## 704 - 716 MHz Band

#### Input



Output

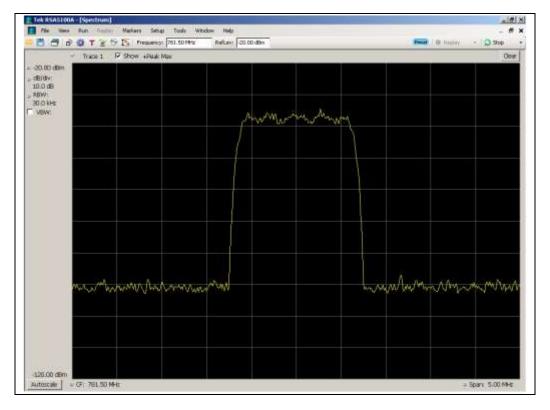


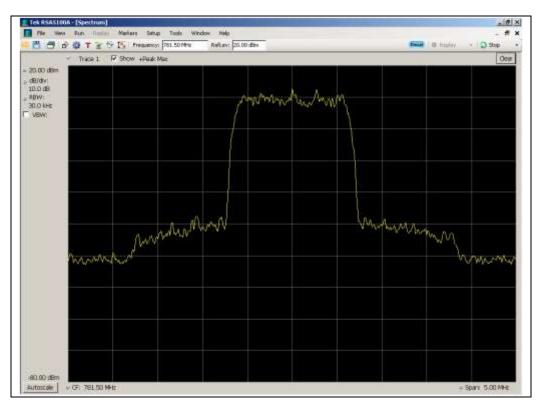
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## 776 - 787 MHz Band

#### Input

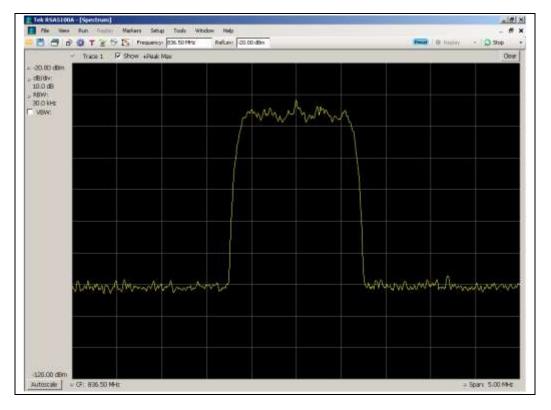


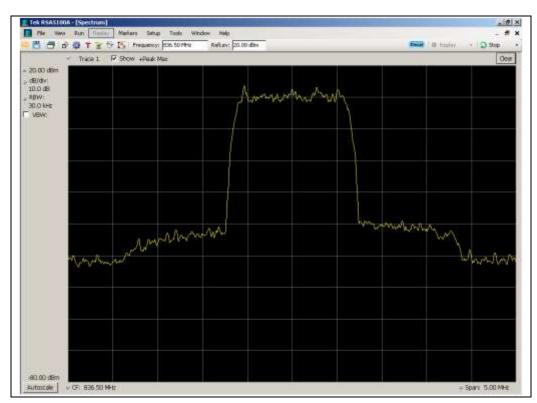




## 824 - 849 MHz Band

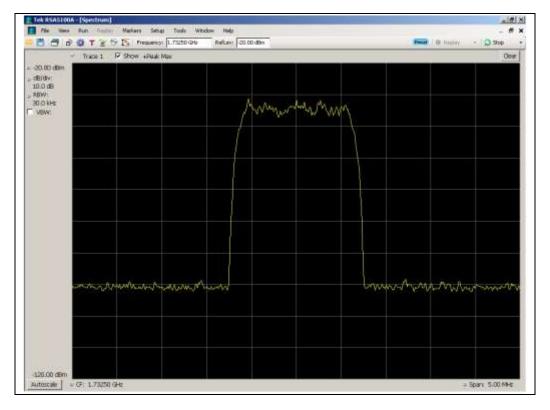
#### Input



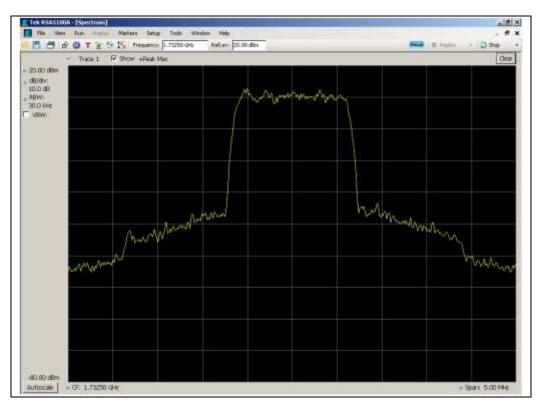




## 1710 - 1755 MHz Band

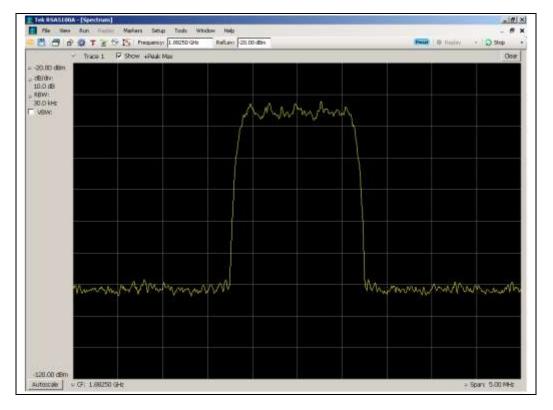




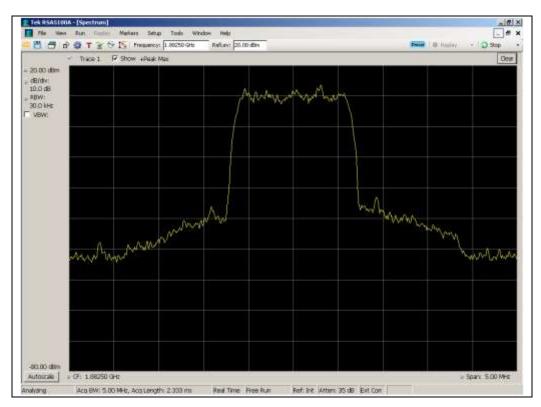




## 1850 - 1915 MHz Band





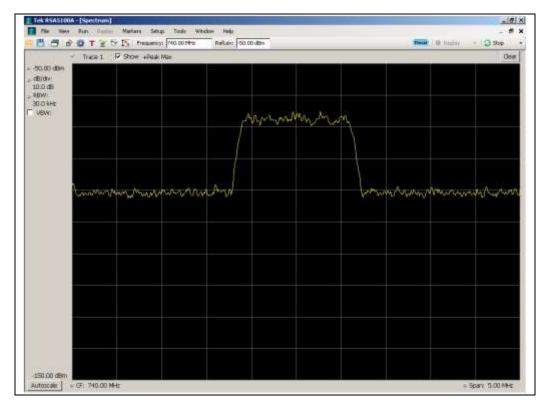




## **CDMA Downlink Test Plots**

# 734 - 746 MHz Band

#### Input



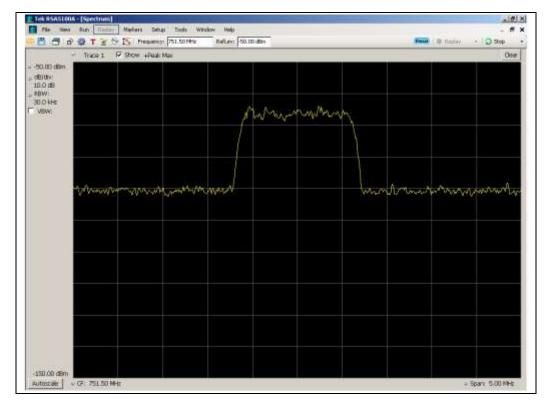
Output

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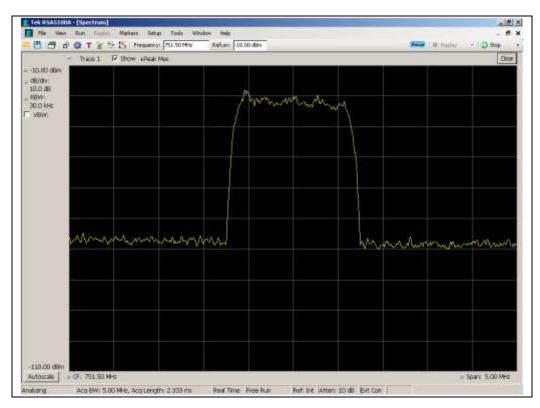
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## 746 - 757 MHz Band



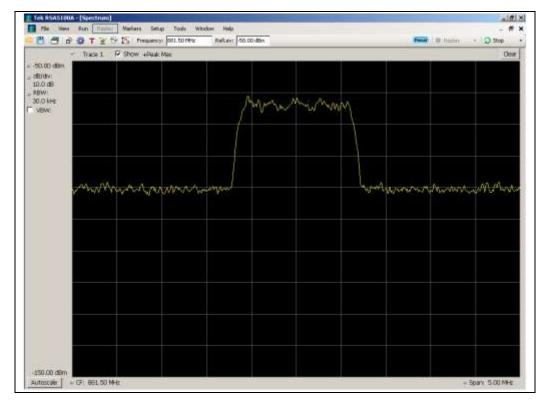


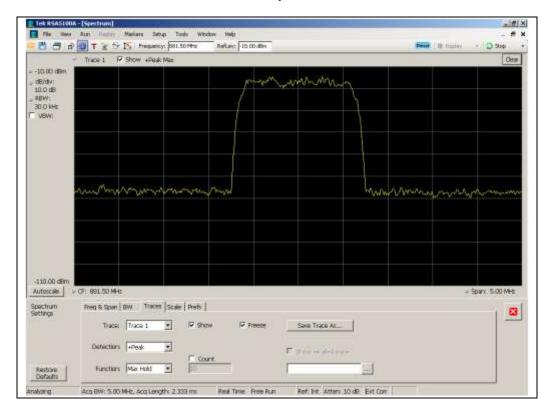




### 869 - 894 MHz Band

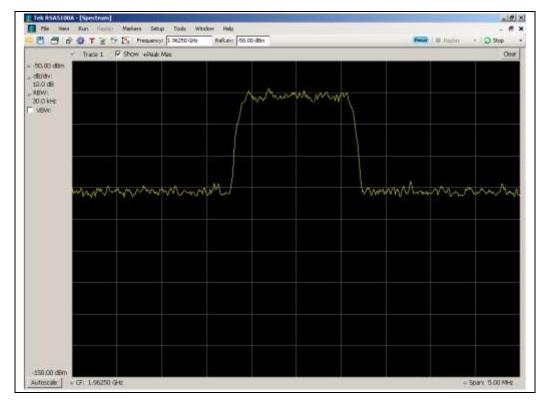
#### Input







## 1930 - 1995 MHz Band



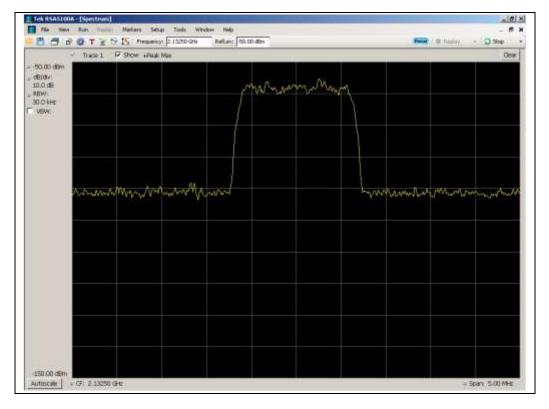
Output
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-100.00 d0m					
Autoscale	(F: 1.96250 GHz				Span 5.00 MHz



## 2110 - 2155 MHz Band

#### Input



## Output

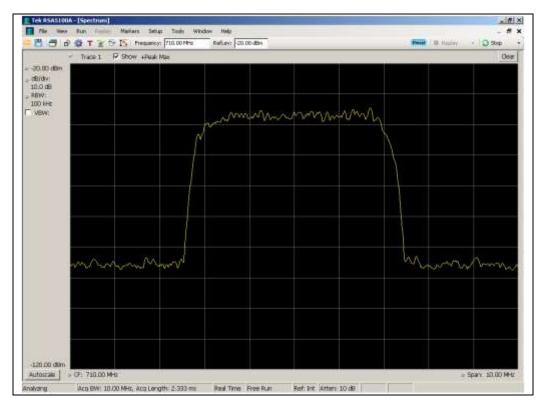
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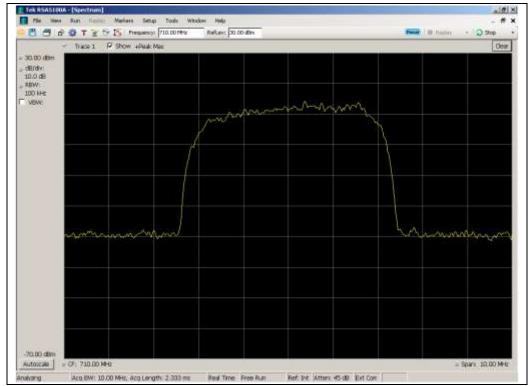


# WCDMA Uplink Test Plots

# 704 - 716 MHz Band

#### Input



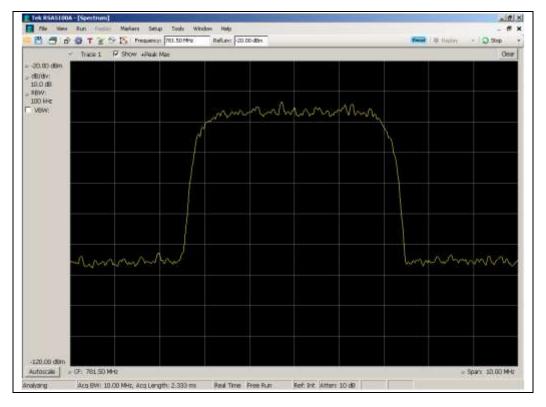


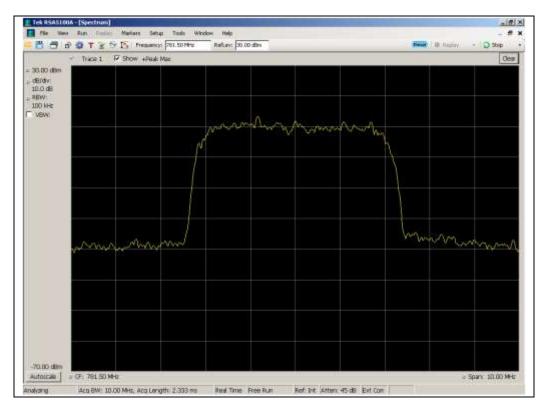
Output

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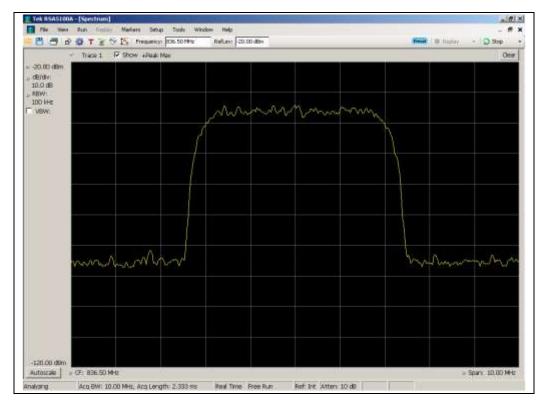
## 776 - 787 MHz Band

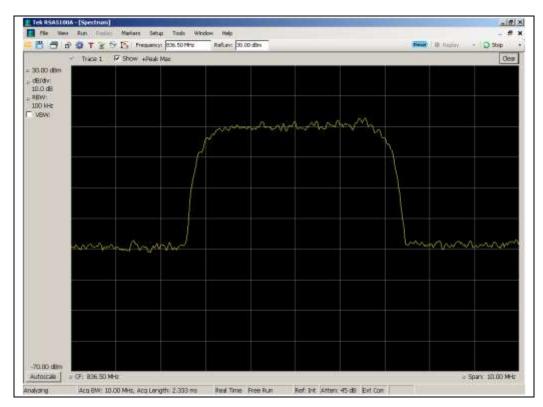






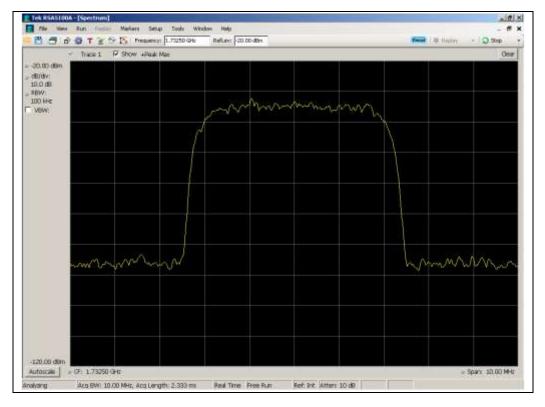
### 824 - 849 MHz Band



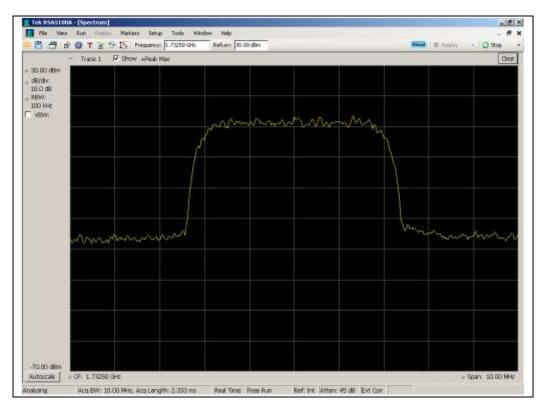




## 1710 - 1755 MHz Band

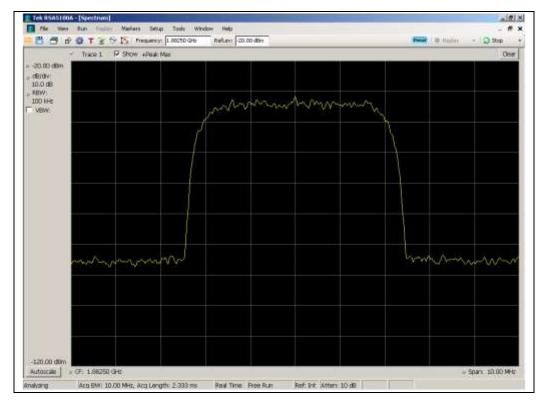


Output
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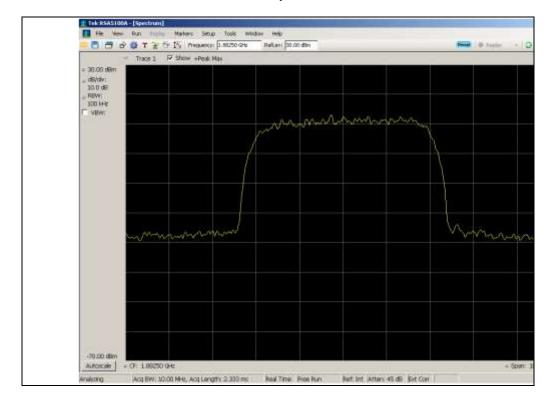




## 1850 - 1915 MHz Band



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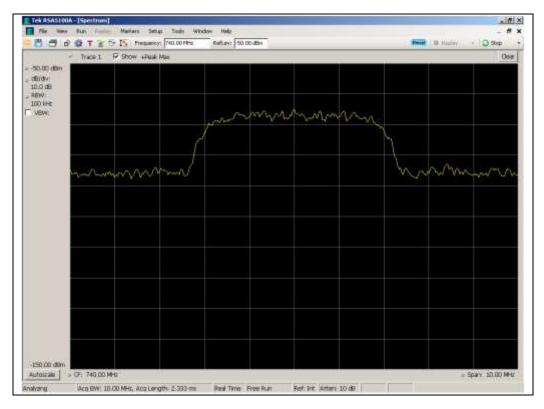


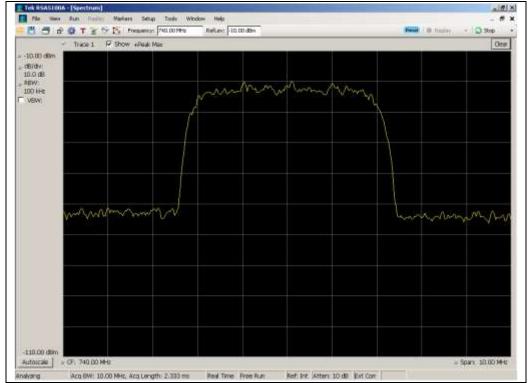


# WCDMA Downlink Test Plots

# 734 - 746 MHz Band

#### Input





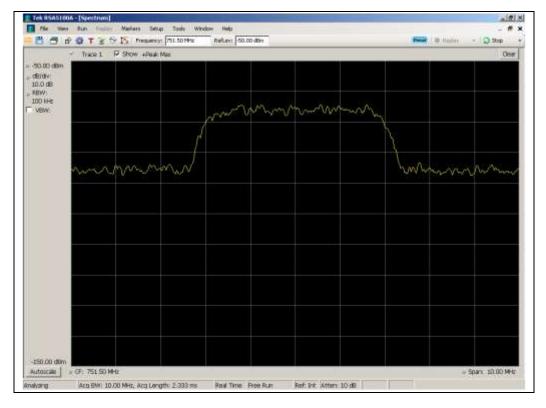
Output

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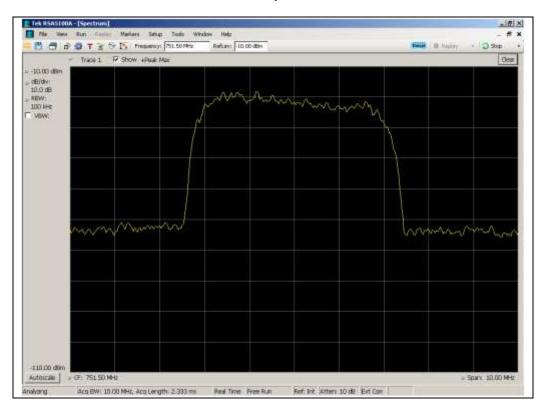


### 746 - 757 MHz Band

#### Input

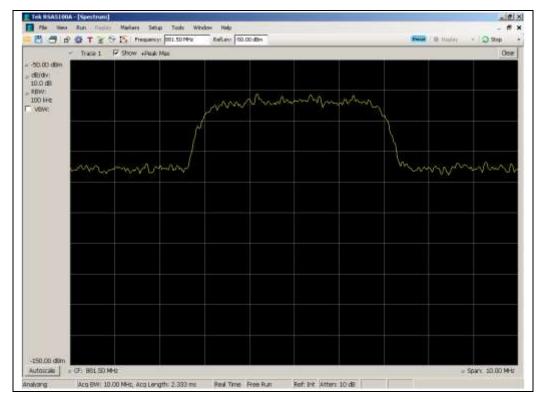


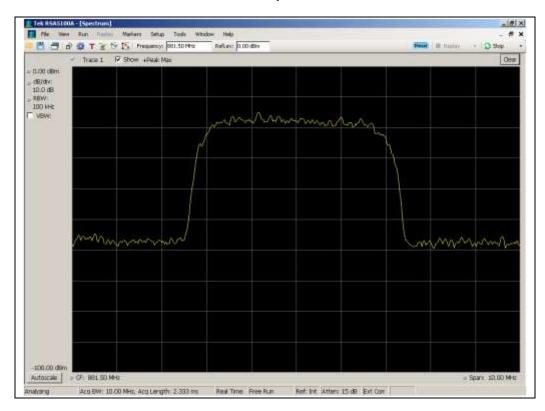
#### Output





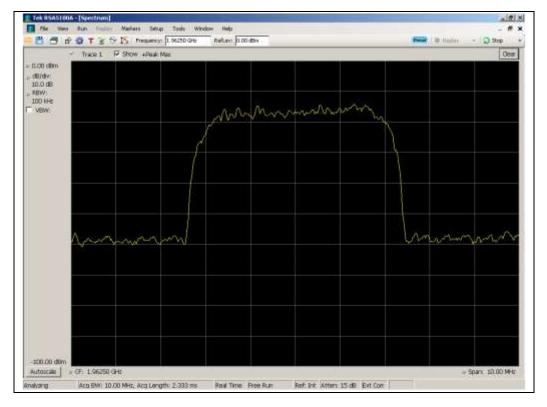
### 869 - 894 MHz Band



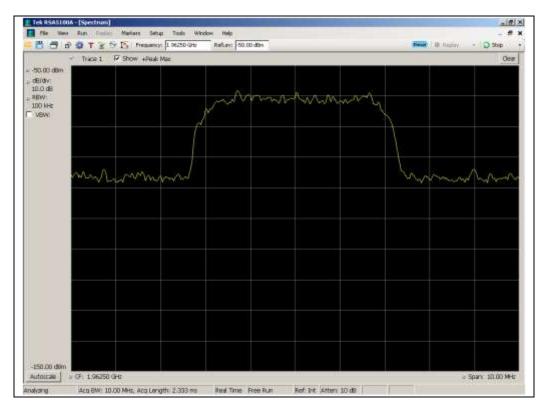




### 1930 - 1995 MHz Band



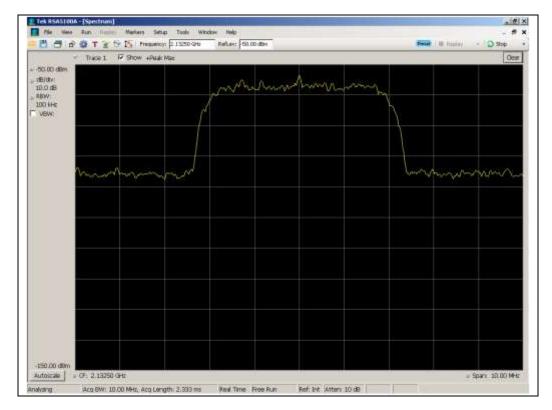
Output
--------



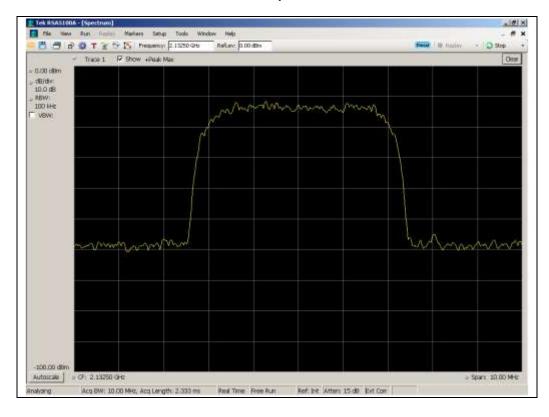


### 2110 - 2155 MHz Band

#### Input



### Output





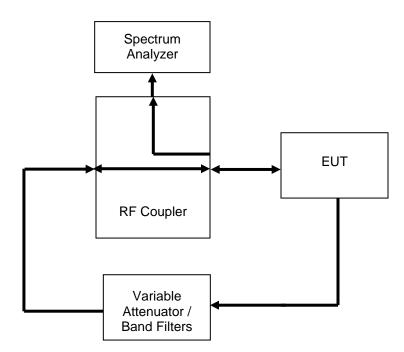
**Oscillation Detection** 

Name of Test: Test Equipment Utilized: Oscillation Detection i00411, i00413, i00424 Engineer: Greg Corbin Test Date: 9/29/2013

**Test Procedure** 

The EUT was connected to a spectrum analyzer set for 0 Hz operation. The EUT uplink and downlink were fed back upon each other through a selectable band pass filter and variable attenuator. The EUT uplink and downlink were tested to ensure that the presence of oscillation was detected and that the EUT output turned off within 300 mS for the Uplink and 1 second for the Downlink and remained off for 1 minute. An EUT with test software was utilized to ensure that the EUT only had a maximum of 5 attempts at restart from oscillation before permanently shutting off.

# **Test Setup**



# **Uplink Detection Time Test Results**

Frequency Band (MHz)	Measured Time (mS)	Limit (mS)	Result	
704 - 716	17.5	300	Pass	
776 - 787	108.75	300	Pass	
824 - 849	193.75	300	Pass	
1710 - 1755	130	300	Pass	
1850 - 1915	130	300	Pass	

### **Downlink Detection Time Test Results**

Frequency Band Measured Time Limit Beau			
(MHz)	(mS)	(S)	Result
734 - 746	223.75	1	Pass
746 - 757	140	1	Pass
869 - 894	266.25	1	Pass
1930 - 1995	51.25	1	Pass
2110 - 2155	56.25	1	Pass



Frequency Band (MHz)	Measured Time (S)	Limit (S)	Result	
704 - 716	65.75	≥60	Pass	
776 - 787	65.63	≥60	Pass	
824 - 849	65.75	≥60	Pass	
1710 - 1755	65.63	≥60	Pass	
1850 - 1915	65.5	≥60	Pass	

# **Uplink Restart Time Test Results**

# Downlink Restart Time Test Results

Frequency Band (MHz)	Measured Time (mS)	Limit (mS)	Result
734 - 746	65.75	≥60	Pass
746 - 757	65.75	≥60	Pass
869 - 894	65.75	≥60	Pass
1930 - 1995	65.75	≥60	Pass
2110 - 2155	65.75	≥60	Pass

### Uplink Restart Count Test Results

Frequency Band (MHz)	Restarts	Limit	Result
704 - 716	5	≤5	Pass
776 - 787	5	≤5	Pass
824 - 849	5	≤5	Pass
1710 - 1755	5	≤5	Pass
1850 - 1915	5	≤5	Pass

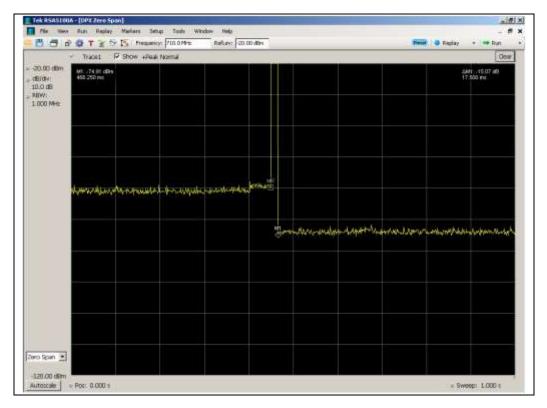
# Downlink Restart Count Test Results

Frequency Band (MHz)	Restarts	Limit	Result
734 - 746	5	≤5	Pass
746 - 757	5	≤5	Pass
869 - 894	5	≤5	Pass
1930 - 1995	5	≤5	Pass
2110 - 2155	5	≤5	Pass

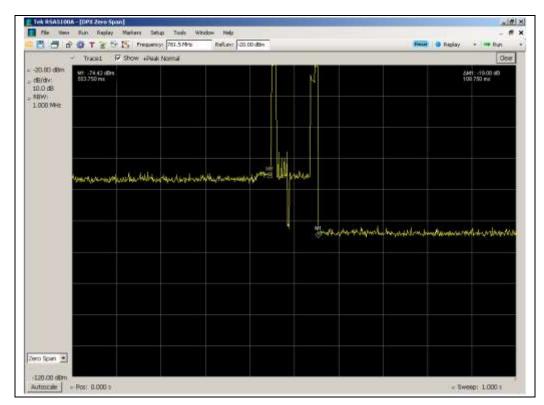


# **Uplink Detection Time Test Results**



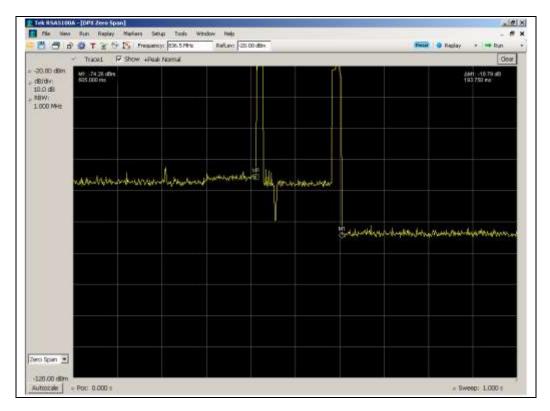


## 776 - 787 MHz Band

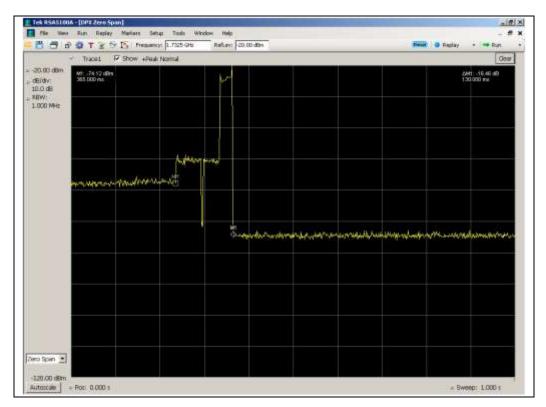




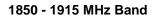
### 824 - 849 MHz Band

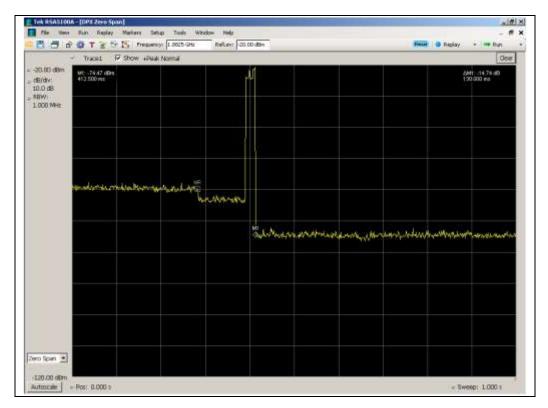


## 1710 - 1755 MHz Band









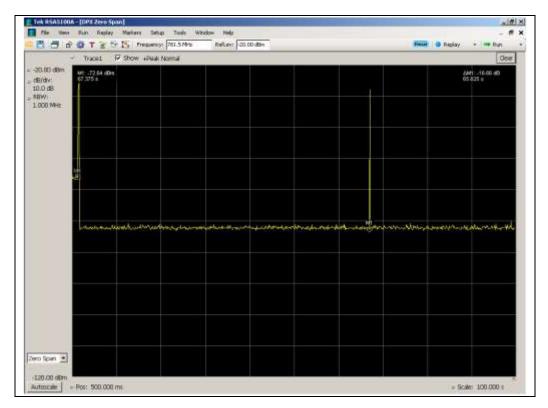
**Uplink Restart Time Test Results** 

704 - 716	MHz Band
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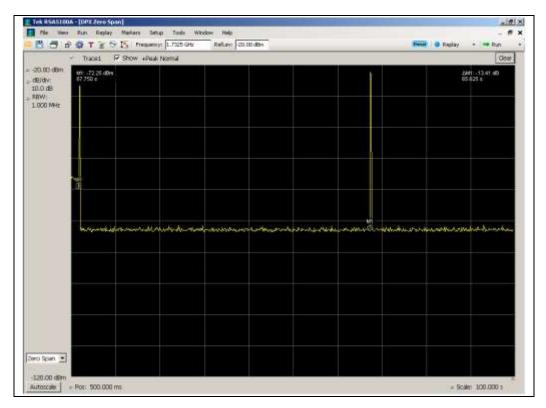


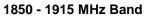
824 - 849 MHz Band

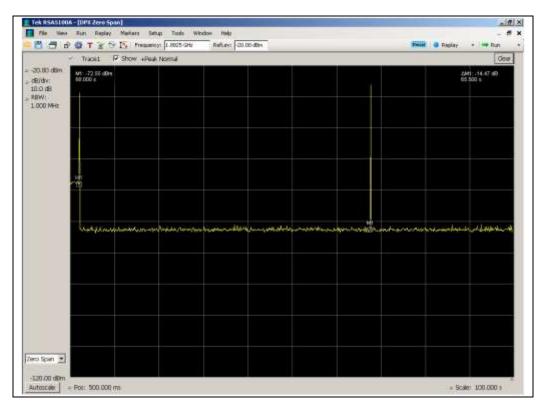
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	Traces	Show +Peak	Normal		 			Oper.					
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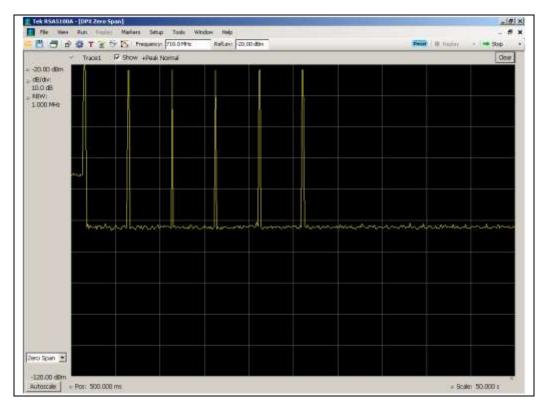




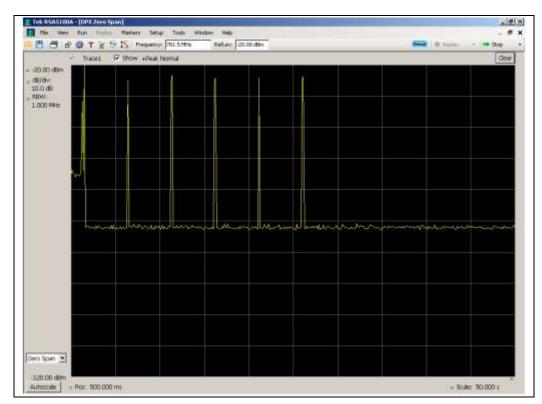


# **Uplink Restart Count Test Results**

# 704 - 716 MHz Band

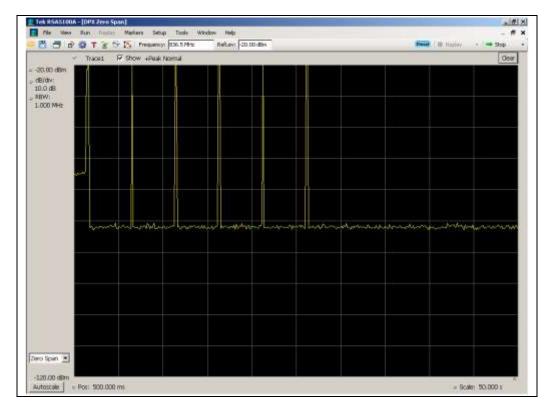


## 776 - 787 MHz Band

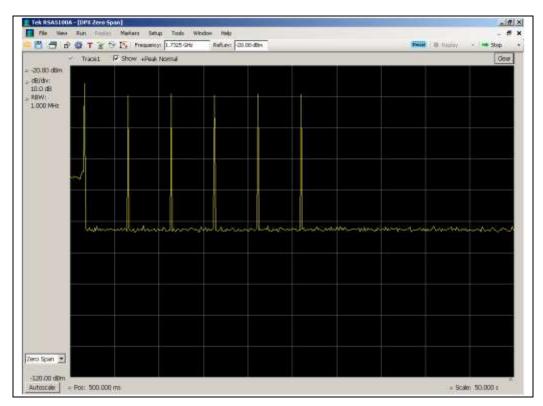




824 - 849 MHz Band

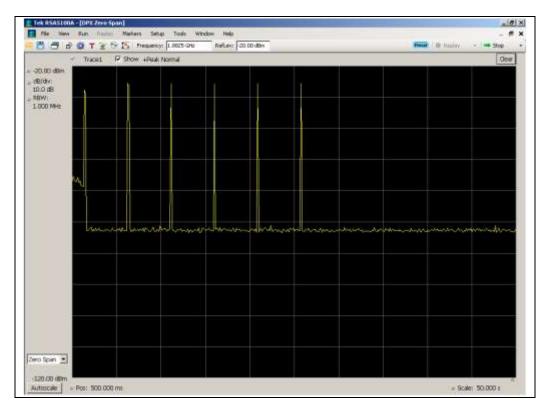


1710 - 1755 MHz Band









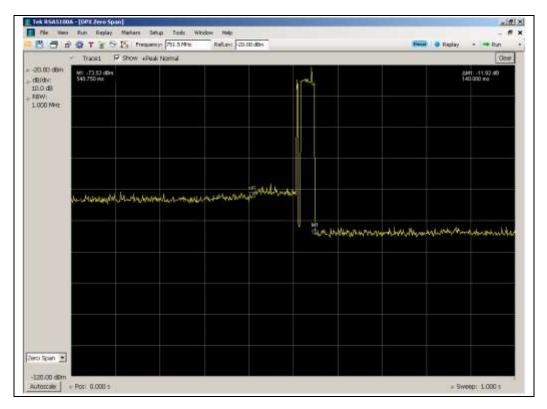
**Downlink Detection Time Test Results** 

734 - 746 MHz Ba	and
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# 746 - 757 MHz Band

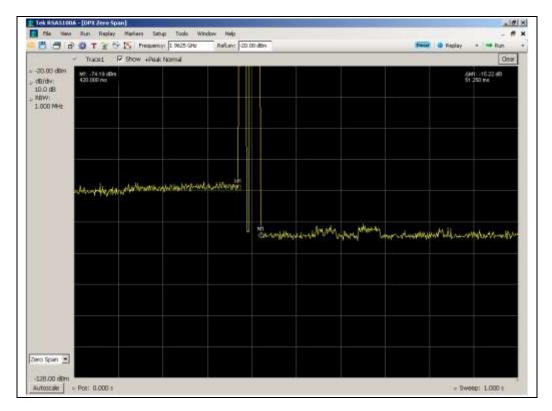


### 869 - 894 MHz Band

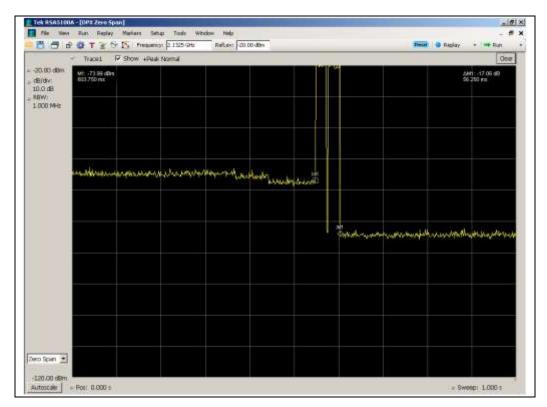
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1930 - 1995 MHz Band



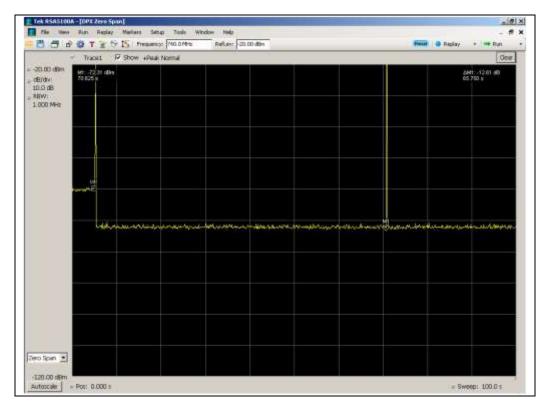
2110 - 2155 MHz Band





# **Downlink Restart Time Test Results**

# 734 - 746 MHz Band

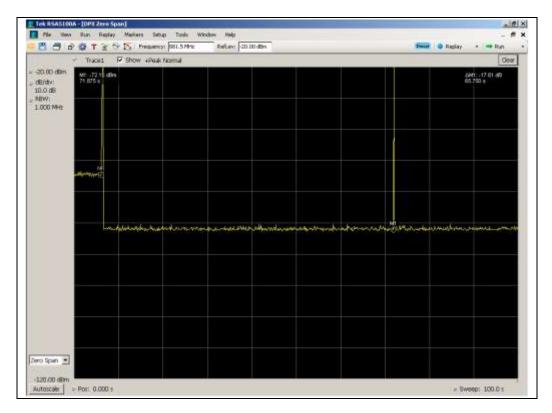


### 746 - 757 MHz Band

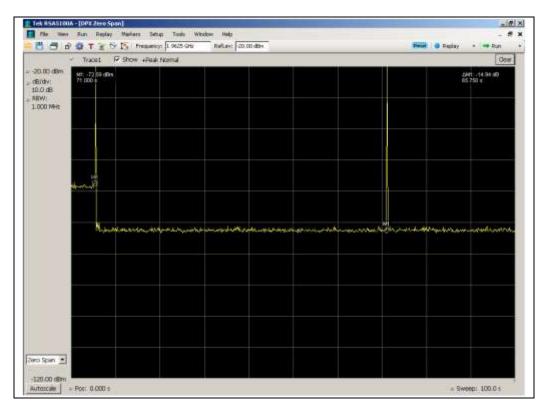
8.5	P ∰ T ∦ 17 IS frequency (751.579% Refues: (20.00.00) → Tracel IP Show «Paak Normal	Dealery + HP Run Open
-20.00 dBm dB/dw 10.0 dB MIW 1.000 MHz	VEL. 12 (0 din VEL. 12 (0 din 71 122 z	(JHT: -14.35 df) 65.750 s
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### 869 - 894 MHz Band

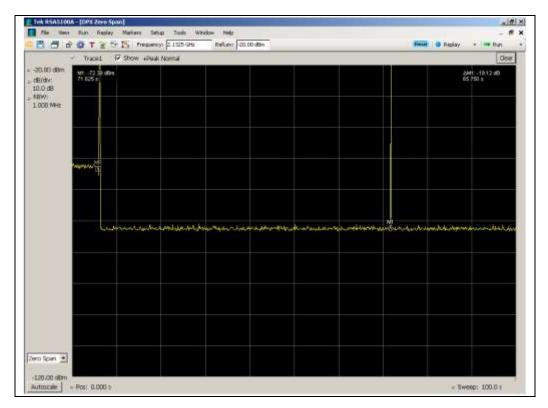


### 1930 - 1995 MHz Band



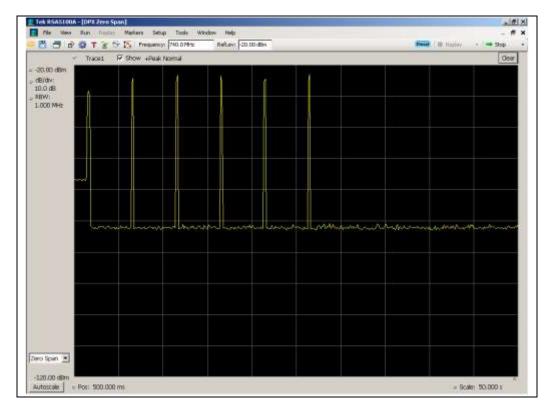






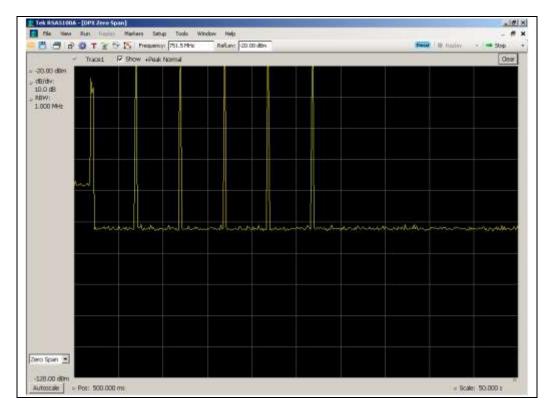
**Downlink Restart Count Test Results** 

734 - 746 MHz Ba	and
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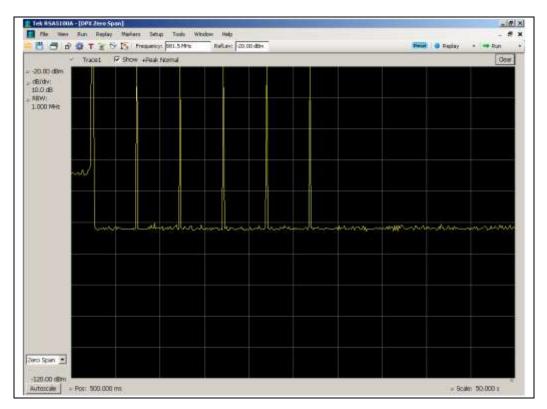




746 - 757 MHz Band

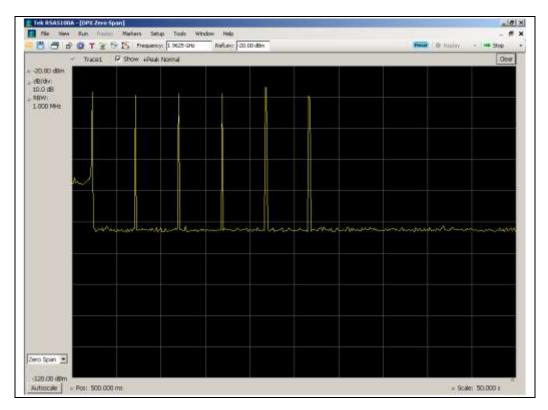


869 - 894 MHz Band

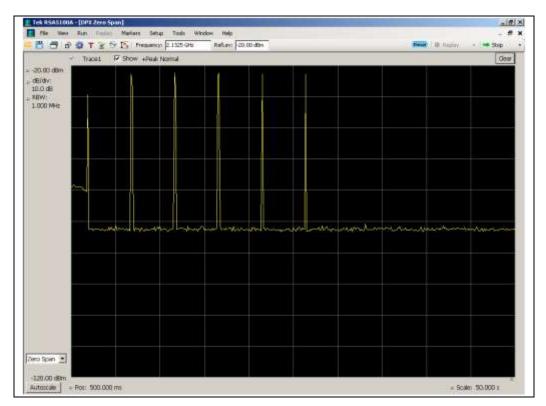








2110 - 2155 MHz Band





# **Radiated Spurious**

Name of Test:

Test Equipment Utilized:

Radiated Spurious i00103, i00334, i00379, SMU 200A - S/N:101369 Engineer: Greg Corbin Test Date: 11/6/2013

Test Procedure

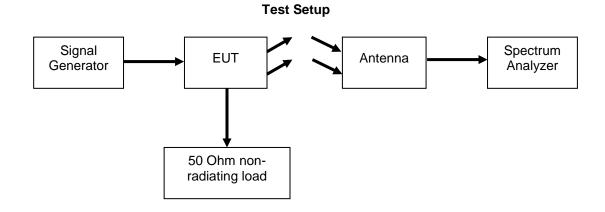
The EUT was tested in an Open Area Test Site (OATS) set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360 degrees with the antennas in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure the signal levels were maximized. All cable and antenna correction factors were input into the spectrum analyzer ensuring an accurate measurement in ERP/EIRP with the resultant power in dBm. A signal generator was used to provide a CW signal tuned to the frequency of maximum gain as measured in the Maximum Power and Gain section of this test report for each operational uplink and downlink band. The EUT output was terminated into a 50 Ohm non-radiating load.

The following formulas are used for calculating the limits.

Radiated Spurious Emissions Limit (dBm) = P2 - (43 + 10\*LogP1)

P1 = Output Power in watts

P2 = Output Power in dBm





### **Uplink Test Results**

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1421.5	-47.7	-13	Pass
2132.25	-39.7	-13	Pass
2843	-37.7	-13	Pass

# 704 - 716 MHz Band\_710.75 MHz Tuned Frequency

### 776 - 787 MHz Band\_778.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1557	-45.2	-13	Pass
2335.5	-41.6	-13	Pass
3114	-35.6	-13	Pass

### 824 - 849 MHz Band\_837.875 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1675.75	-45.1	-13	Pass
2513.625	-39.7	-13	Pass
3351.5	-37.2	-13	Pass

### 1710 - 1755 MHz Band\_1746.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
3493	-36.7	-13	Pass
5239.5	-35.2	-13	Pass
6986	-34.2	-13	Pass

### 1850 - 1915 MHz Band\_1890.1375 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
3780.275	-37.0	-13	Pass
5670.4125	-33.7	-13	Pass
7560.55	-33.6	-13	Pass



### **Downlink Test Results**

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1473	-49.6	-13	Pass
2209.5	-44.7	-13	Pass
2946	-42.3	-13	Pass

#### 734 - 746 MHz Band 736.5 MHz Tuned Frequency

### 746 - 757 MHz Band 749.1875 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1498.375	-50.8	-13	Pass
2247.5625	-44.1	-13	Pass
2996.75	-39.7	-13	Pass

#### 869 - 894 MHz Band 879.0625 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1758.125	-49.0	-13	Pass
2637.1875	-42.9	-13	Pass
3516.25	-39.8	-13	Pass

# 1930 - 1995 MHz Band 1967.15 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
3934.3	-40.9	-13	Pass
5901.45	-37.0	-13	Pass
7868.6	-28.4	-13	Pass

#### 2110 - 2155 MHz Band 2152.15 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
4304.3	-39.6	-13	Pass
6456.45	-36.3	-13	Pass
8608.6	-27.1	-13	Pass

No other emissions were detected. All emissions were lower than -13 dBm. All emissions were system noise floor.



# **Test Equipment Utilized**

Description	Manufacturer	Model Number	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna	EMCO	3115	i00103	12/11/2012	12/11/2014
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	12/4/12	12/4/13
Voltmeter	Fluke	75111	i00320	2/1/13	2/1/14
Non-radiating load	Termaline	8201	i00334	N/A	
EMI Analyzer	Agilent	E7405A	i00379	11/21/12	11/21/13
Tunable Band Pass Filter	Wilson Electronics	Variable attenuator / Bandpass Filter Switch Assembly	i00411	Verified on: 9/24/2013	
RF Directional Coupler	Меса	CS06-1.500V	i00413	Verified on: 9/24/13	
Signal Generator	Rohde & Schwarz	SMU200A	S/N:101369	6/24/13	6/24/16
Spectrum Analyzer	Textronix	RSA5126A	i00424	9/22/13	9/22/14

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT