

BTI Wireless

TEST REPORT FOR

**1900 MHz 20W Remote Transmitting Unit
Model: mBSC1900-020-RUMF01**

Tested To The Following Standards:

FCC Part 24E

Report No.: 95156-6

Date of issue: January 10, 2014



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

TABLE OF CONTENTS

Administrative Information 3

 Test Report Information3

 Report Authorization3

 Test Facility Information4

 Software Versions.....4

 Site Registration & Accreditation Information4

 Summary of Results5

 Conditions During Testing.....5

 Equipment Under Test.....6

 Peripheral Devices6

FCC Parts 24E 7

 2.1046 RF Power Output7

 2.1049(I) Occupied Bandwidth22

 2.1051 Spurious Emissions at Antenna Terminal47

 2.1053 Field Strength of Spurious Radiation52

 Band Edge55

 Intermodulation.....72

 Out of Band Rejection.....89

Supplemental Information..... 92

 Measurement Uncertainty92

 Emissions Test Details.....92

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

BTI Wireless
6185 Phyllis Dr. Unit D
Cypress, CA 90630

REPRESENTATIVE: Raymond Shin
Customer Reference Number: 9913649

DATE OF EQUIPMENT RECEIPT:

DATE(S) OF TESTING:

REPORT PREPARED BY:

Morgan Tramontin
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 95156

November 21, 2013

November 21 – December 5, 2013

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A	US0060	SL2-IN-E-1146R	3082D-1	90473	A-0147
Brea D	US0060	SL2-IN-E-1146R	3082D-2	100638	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Parts 24E

Description	Test Procedure/Method	Results
RF Power Output	FCC Part 24E § 22.232(a) / 2.1046	Pass
Occupied Bandwidth	FCC Part 24E / 2.1049(l)	Pass
Spurious Emissions at Antenna Terminal	FCC Part 24E § 24.238(a) / 2.1051 / 2.1053	Pass
Field Strength of Spurious Radiation	FCC Part 24E § 24.236 & 24.238 / 2.1053	Pass
Band Edge		Pass
Intermodulation		Pass
Out of Band Rejection		Pass

Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

The following model has been tested by CKC Laboratories: **mBSC1900-020-RUMF01**.

The manufacturer states that the following additional model is identical electrically to the one which was tested, or any differences between them does not affect their EMC characteristics, and therefore It meets the level of testing equivalent to the tested model: **mBSC1900-020-RU*******.

EQUIPMENT UNDER TEST

1900 MHz 20W Remote Transmitting Unit

Manuf: BTI Wireless

Model: mBSC1900-020-RUMF01

Serial: 10035302000113111001

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

ESG Vector Signal Generator

Manuf: Agilent

Model: 4438C

Serial: MY45091601

Attenuator 30db Pad

Manuf: Weinschel

Model: 49-30-43

Serial: KW075

Step Attenuator 110dB pad

Manuf: HP

Model: 8496B

Serial: 1350A01241

50 ohm Load

Manuf: Generic

Model: NA

Serial: NA

Cable

Manuf: Pasternack

Model: Sucoflex 104A

Serial: 12237/4A

50 ohm Load

Manuf: Generic

Model: NA

Serial: NA

RF to Fiber Optic Converter

Manuf: BTI Wireless

Model: mBSC9351-HU

Serial: mBSC9351HU-11021029

FCC PARTS 24E

2.1046 RF Power Output

Test Conditions / Setup

Test Location: CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112

Customer:	BTI Wireless		
Specification:	RF Output Power		
Work Order #:	95156	Date:	12/5/2013
Test Type:	Conducted Emissions	Time:	14:39:38
Equipment:	1900 MHz 20W Remote Transmitting Unit	Sequence#:	4
Manufacturer:	BTI Wireless	Tested By:	Don Nguyen
Model:	mBSC1900-020-RUMF01		110V 60Hz
S/N:	10035302000113111001		

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03239	Cable	32022-2-29094K-24TC	10/30/2013	10/30/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
1900 MHz 20W Remote Transmitting Unit*	BTI Wireless	mBSC1900-020-RUMF01	10035302000113111001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601
Attenuator 30db Pad	Weinschel	49-30-43	KW075
Step Attenuator 110dB pad	HP	8496B	1350A01241
50 ohm Load	Generic	NA	NA
Cable	Pasternack	Sucoflex 104A	12237/4A
50 ohm Load	Generic	NA	NA

Test Conditions / Notes:

The EUT is placed on the test bench. RF to Fiber Optic Converter Tx1 In is connected to an ESG Signal generator via cable Sucoflex 104A. Fiber-1 port from the converter is connected to fiber port of EUT. ANT port of the EUT is connected to 30db attenuator and 110db step attenuator. A spectrum analyzer is connected to attenuators via cable 32022-2-29094K-24TC. TX out and RX in port are terminated to 50 ohm loads.

Per manufacturer, the output frequency is independent of the components used in optical converter.

EUT is a Fixed Gain Amplifier with fixed output power as set by ALC (Auto Level Control) Threshold level of 1 ± 0.5 dB higher than maximum rated output power.

The evaluation is performed at the antenna port.

Freq: 1930-1990MHz

Signal protocol: GSM, EDGE, CDMA IS95A, UMTS WCDMA 3GPP, LTE 1.4MHz, 5MHz, 20MHz.

20°C, 29%Relative Humidity

Site A

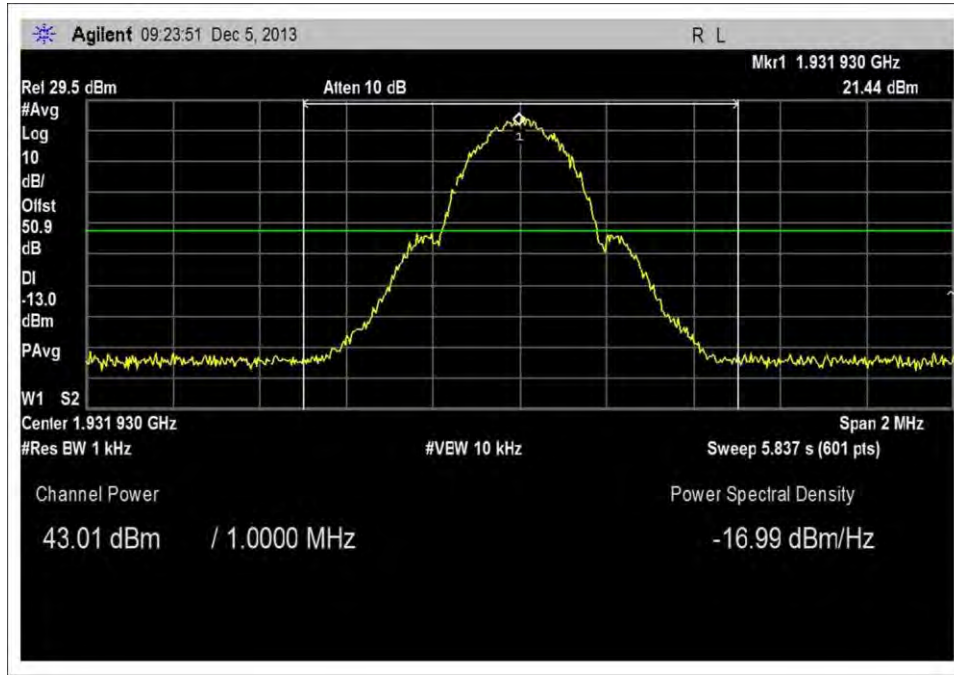
§24.232 Power and antenna height limit:

(a)(2): Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT

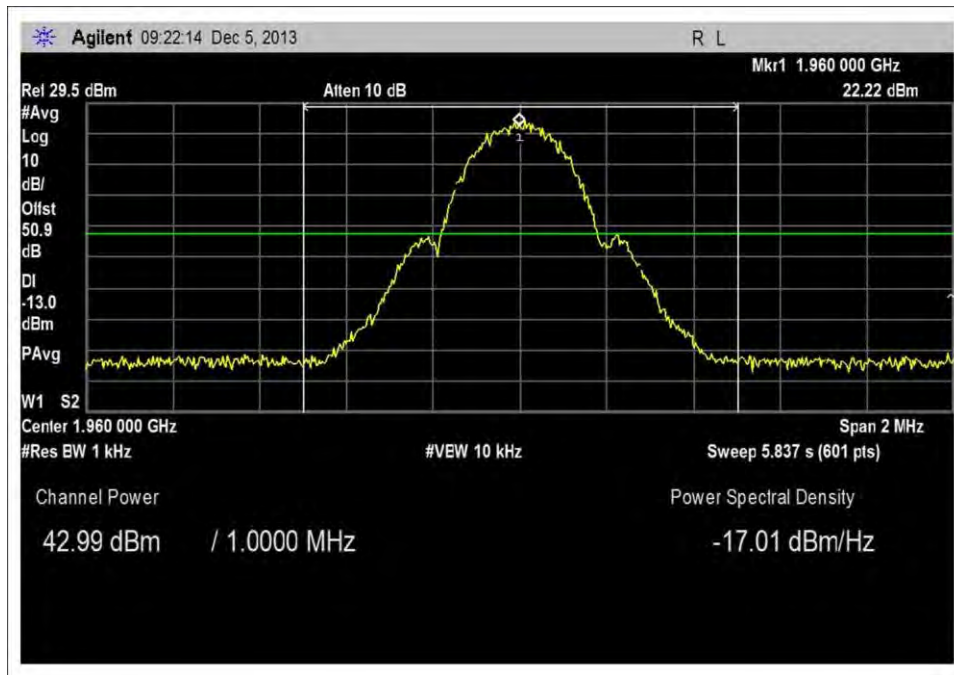
Modulation	Signal Generator Output Power (dbm)	Cable Loss (db)	Input Power (dbm)	Measured Output Power (dbm)	Measured Output Power (W)
GSM					
1931.93MHz	-0.37	1.2	-1.57	43.01	19.9986187
1960.00MHz	-0.8	1.2	-2	42.99	19.90673339
1988.07MHz	-0.38	1.2	-1.58	43.04	20.1372425
EDGE					
1931.93MHz	-0.16	1.2	-1.36	43.00	19.95262315
1960.00MHz	-0.86	1.2	-2.06	43.04	20.1372425
1988.07MHz	-0.36	1.2	-1.56	42.06	20.23019179
CDMA (IS95A)					
1932.36MHz	-0.08	1.2	-1.28	43.01	19.9986187
1960.00MHz	-0.84	1.2	-2.04	43.03	20.09092813
1987.64MHz	-0.48	1.2	-1.68	42.95	19.72422736
UMTS (WCDMA 3GPP)					
1933.75MHz	-0.28	1.2	-1.48	43.02	20.04472027
1960.00MHz	-0.94	1.2	-2.14	43.05	20.18366364
1986.25MHz	-0.78	1.2	-1.98	42.98	19.86094917

Modulation	Signal Generator Output Power (dbm)	Cable Loss (db)	Input Power (dbm)	Measured Output Power (dbm)	Measured Output Power (W)
LTE 1.4MHz					
1932.35MHz	0.08	1.2	-1.12	43.02	20.04472027
1960.00MHz	-0.88	1.2	-2.08	43.05	20.18366364
1987.65MHz	-0.52	1.2	-1.72	43.06	20.23019179
LTE 5MHz					
1933.95MHz	-0.28	1.2	-1.48	43.05	20.18366364
1960.00MHz	-9	1.2	-10.2	43.06	20.23019179
1986.05MHz	-0.6	1.2	-1.8	43.04	20.1372425
LTE 20MHz					
1940.7MHz	-0.96	1.2	-2.16	42.98	19.86094917
1960.00MHz	-1.08	1.2	-2.28	43.01	19.9986187
1979.3MHz	-1.08	1.2	-2.28	43.02	20.04472027

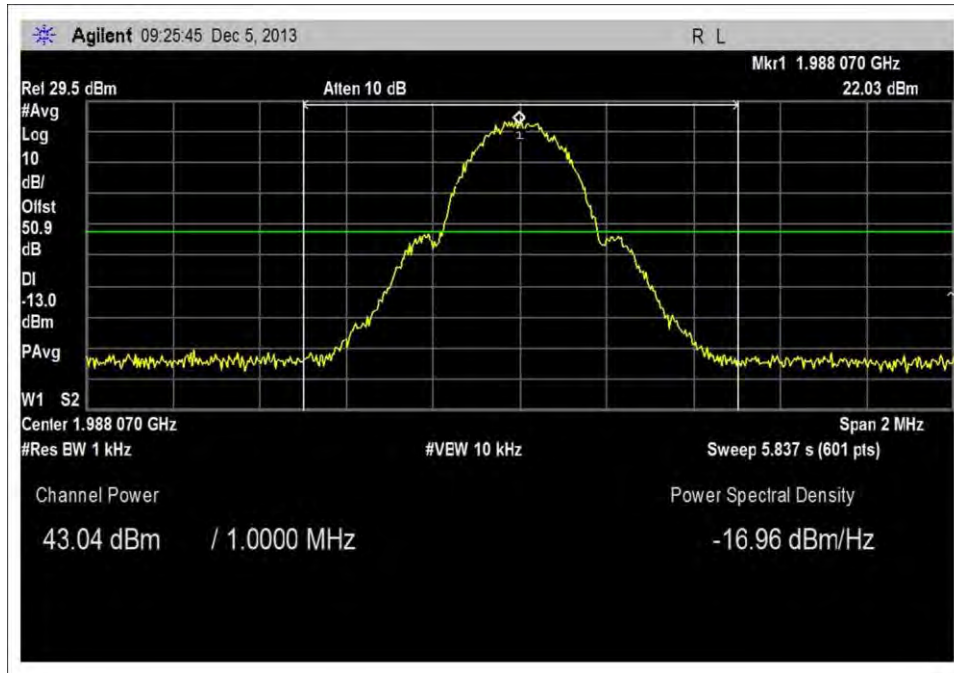
Test Data



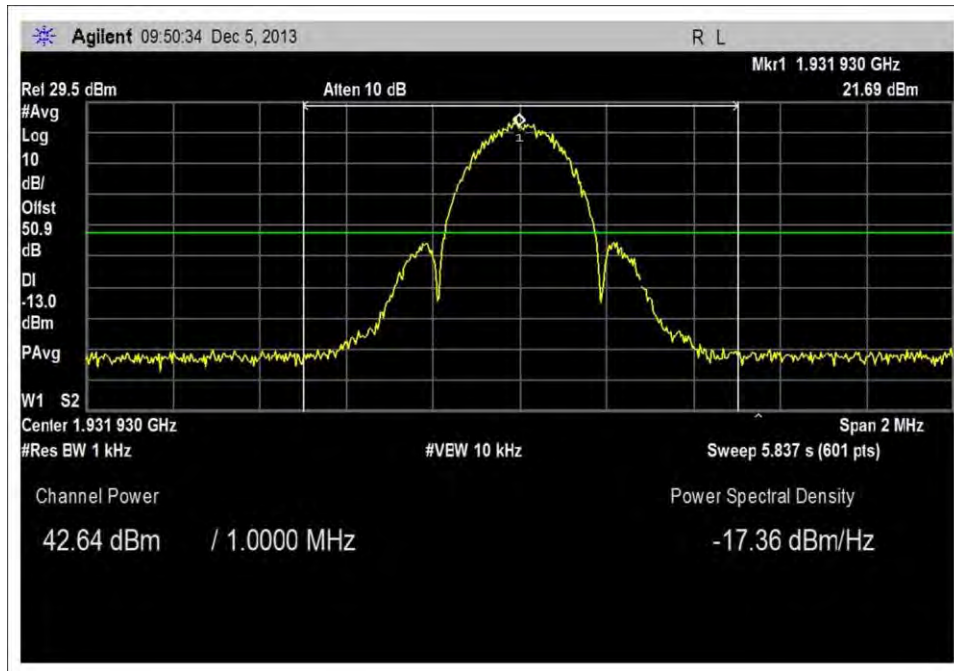
20W, GSM – Low



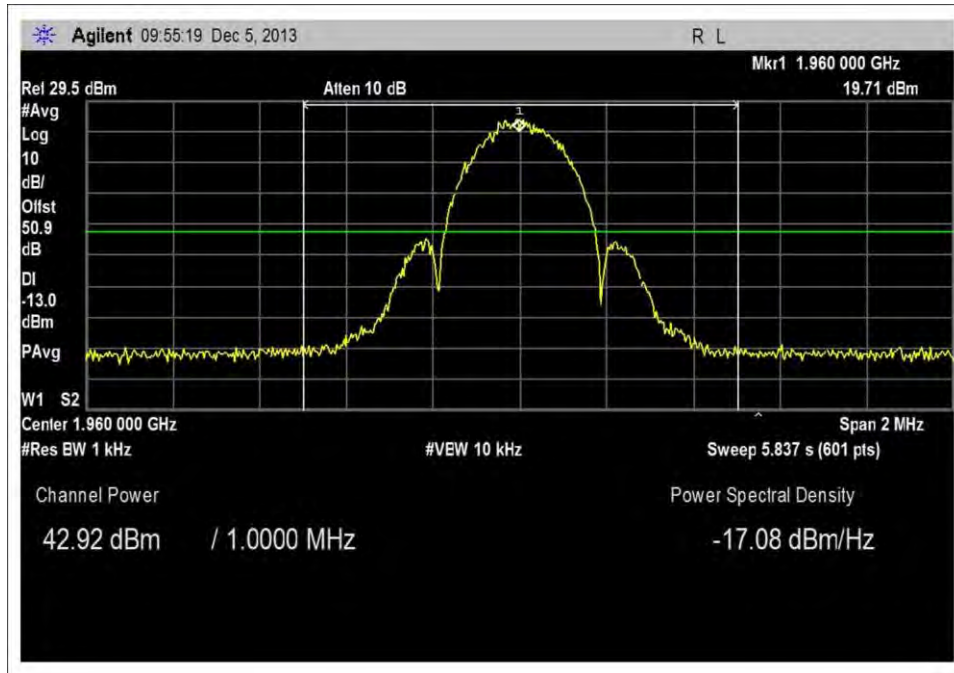
20W, GSM - Middle



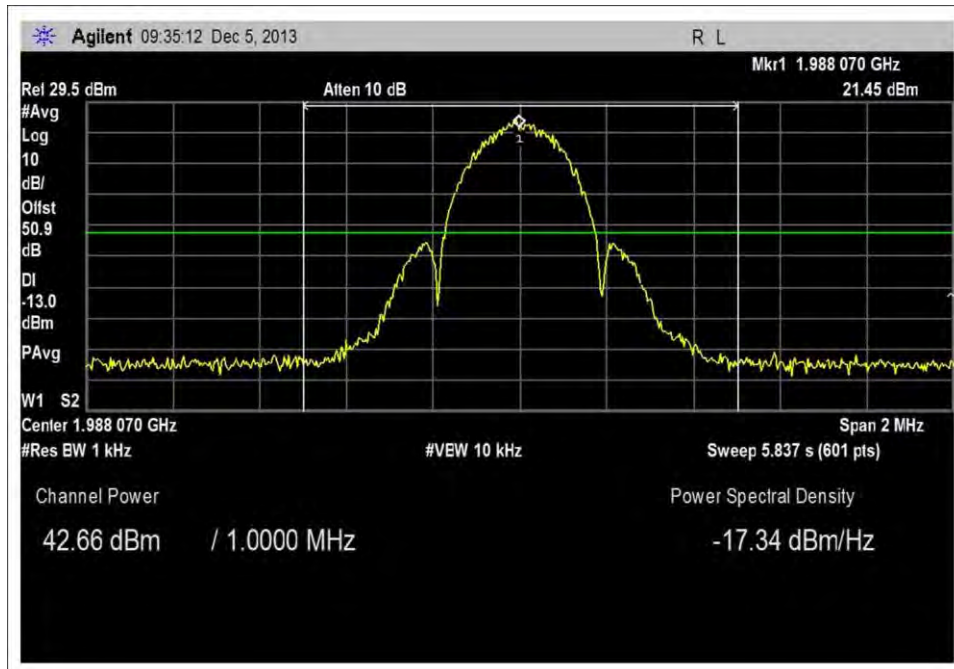
20W, GSM – High



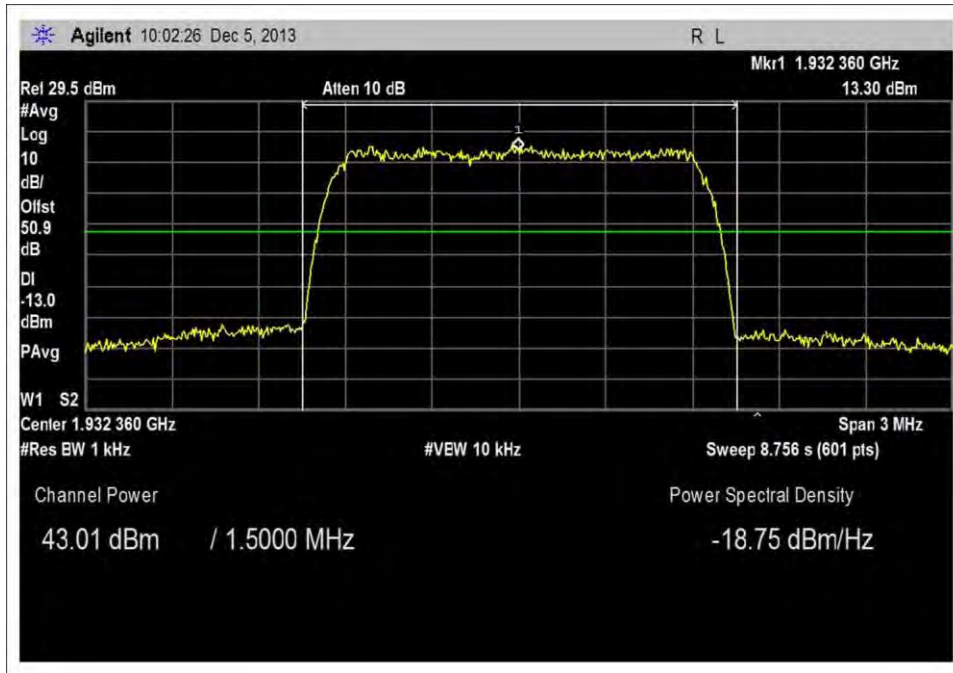
20W, EDGE – Low



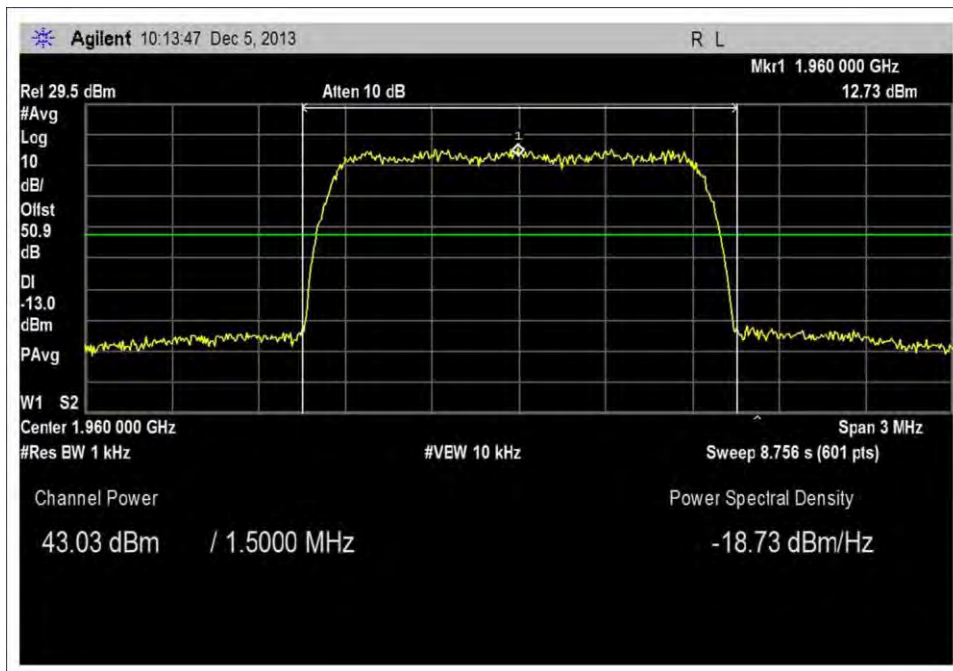
20W, EDGE – Middle



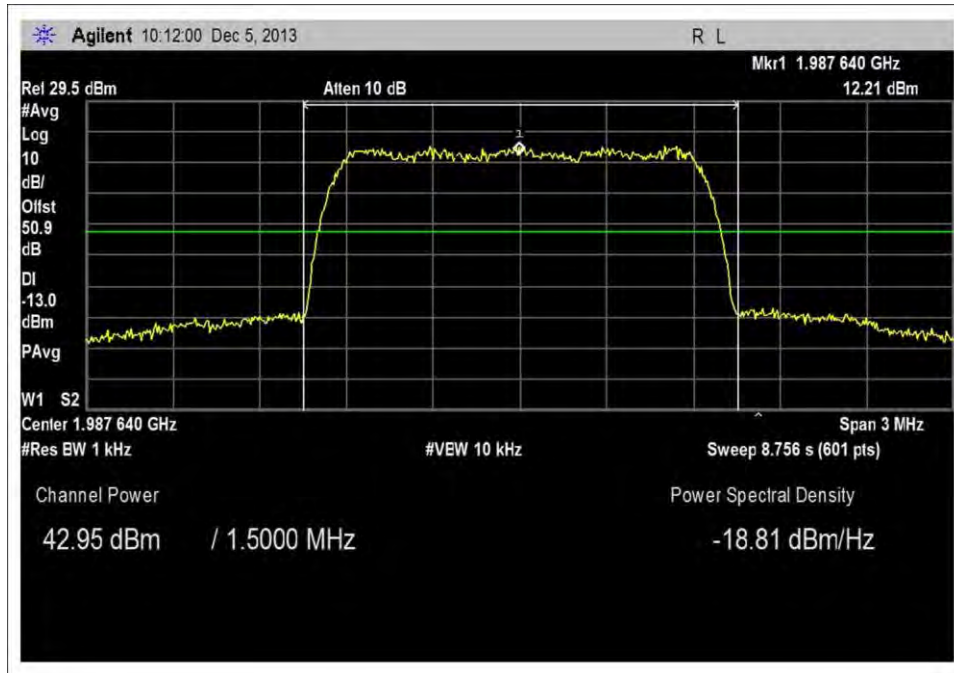
20W, EDGE - High



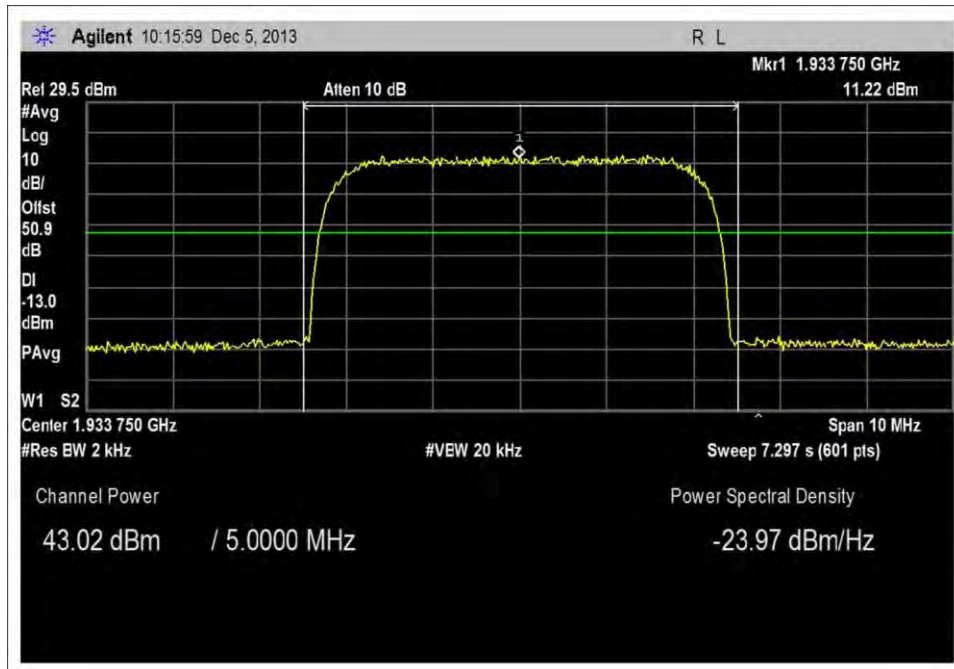
20W, CDMA IS95A - Low



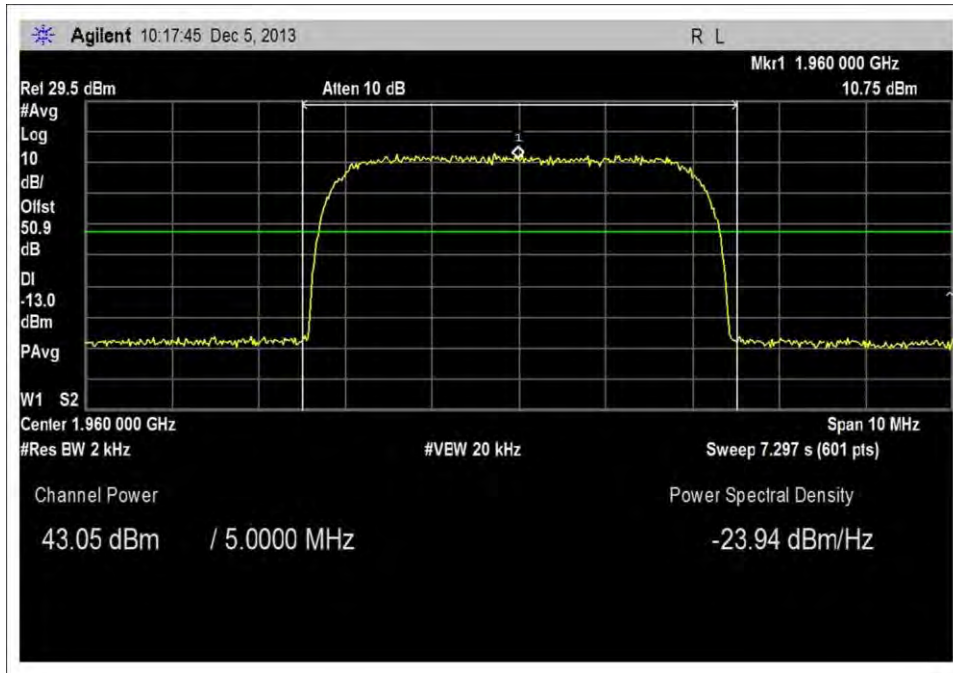
20W, CDMA IS95A - Middle



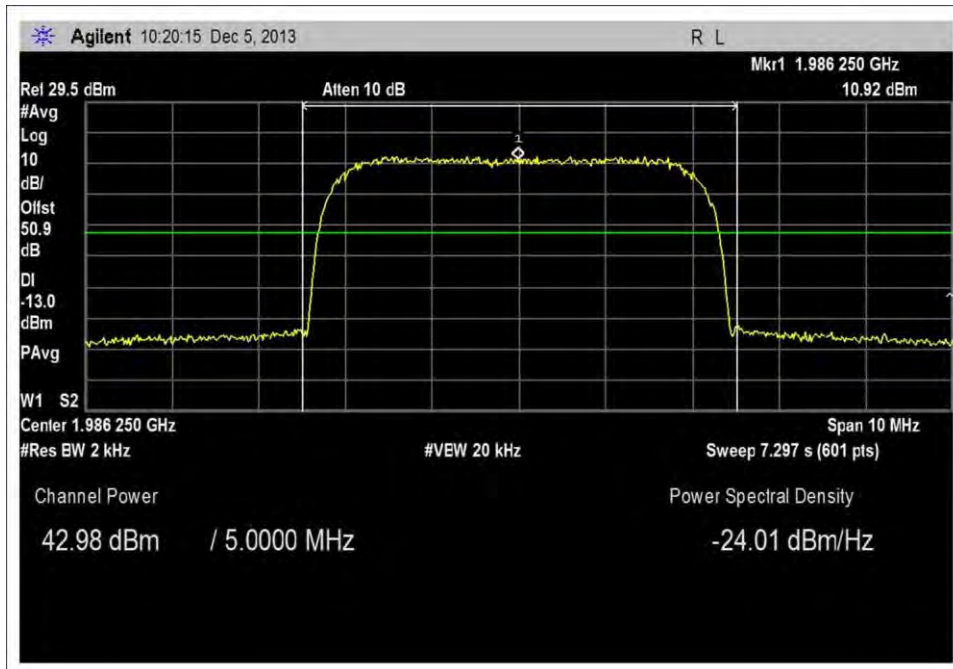
20W, CDMA IS95A - High



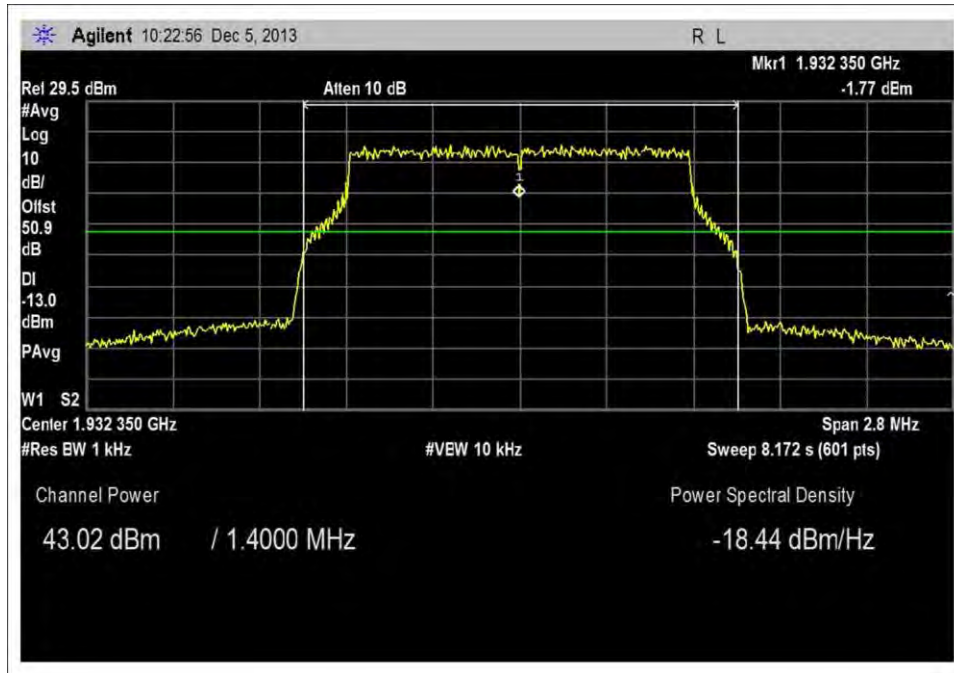
20W, WCDMA - Low



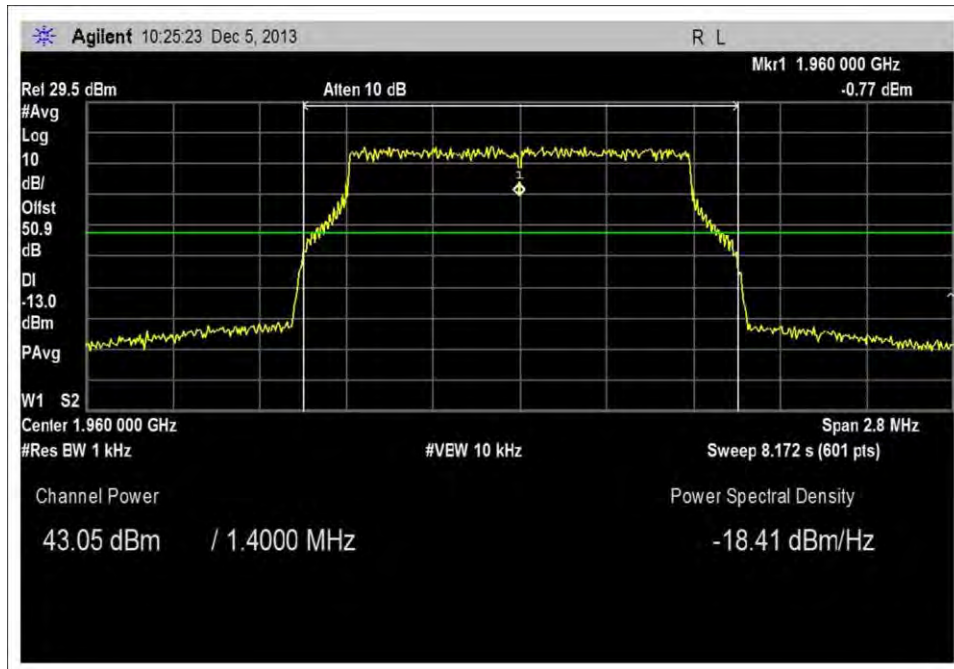
20W, WCDMA - Middle



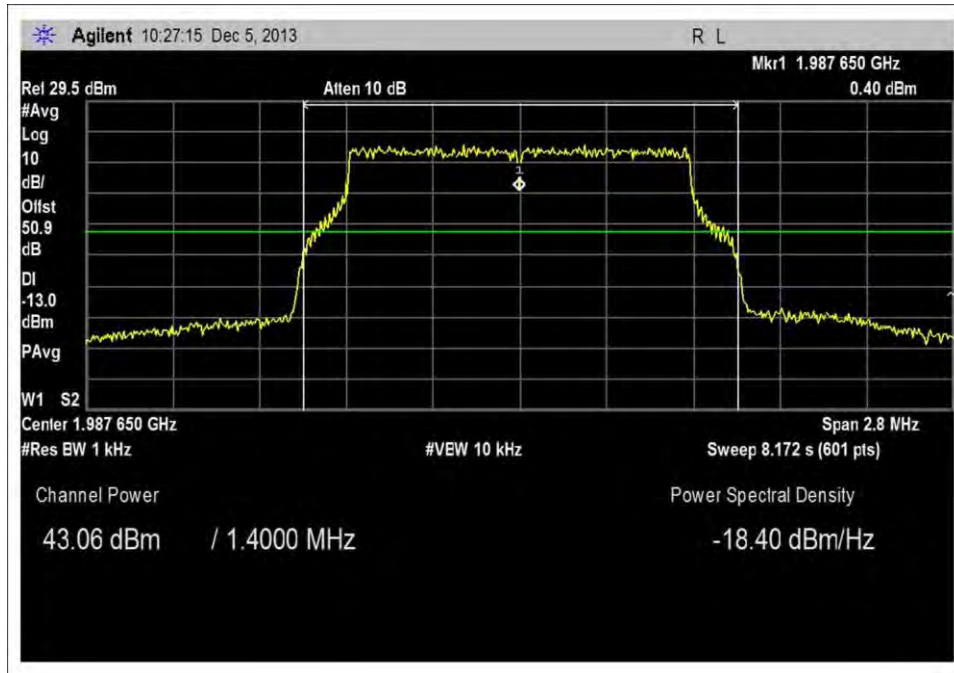
20W, WCDMA - High



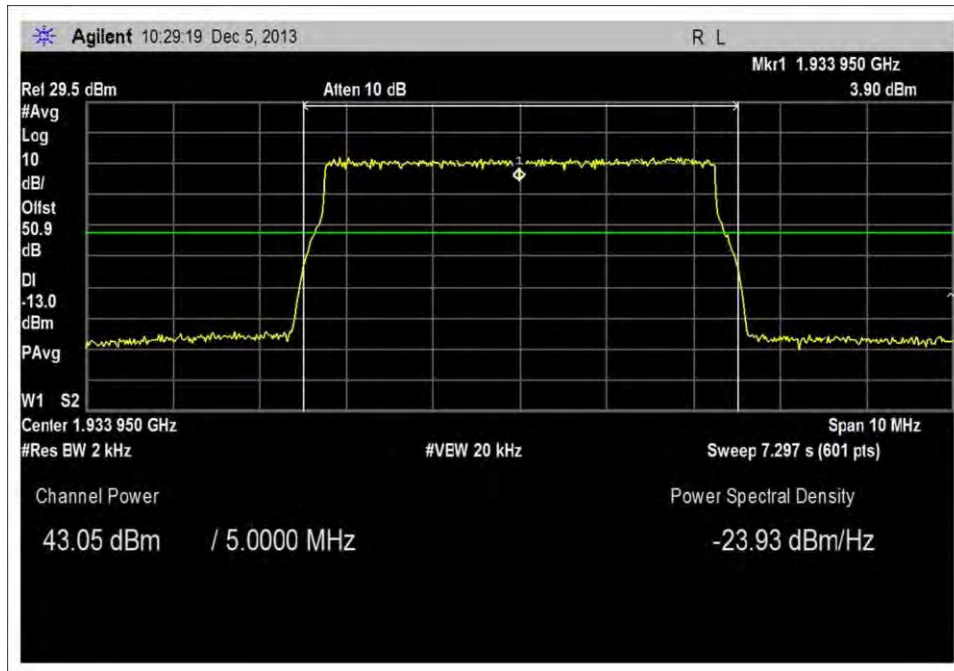
20W, LTE 1.4MHz - Low



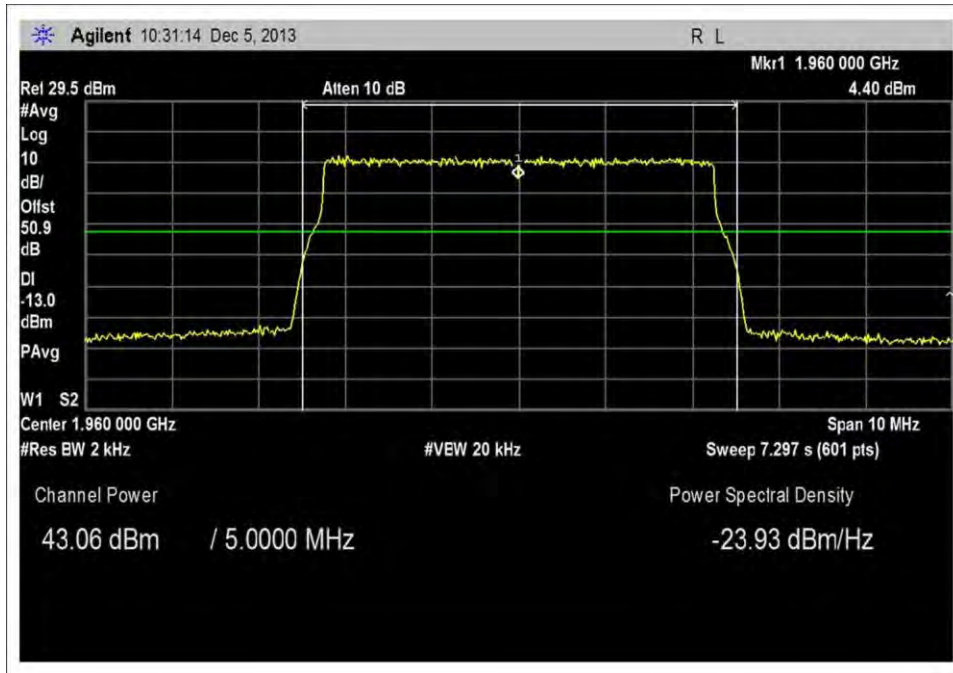
20W, LTE 1.4MHz - Middle



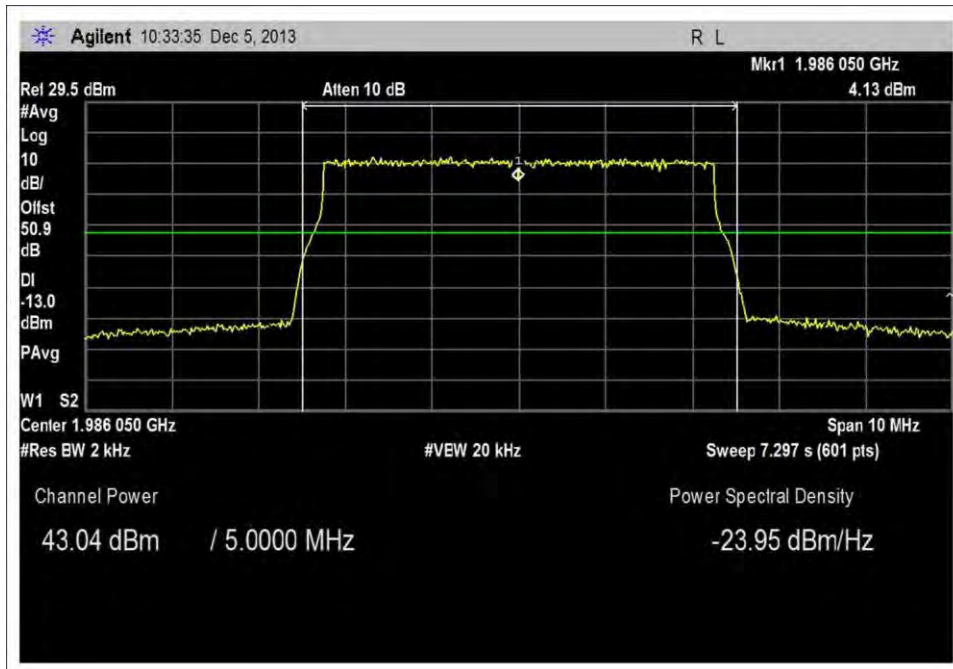
20W, LTE 1.4MHz – High



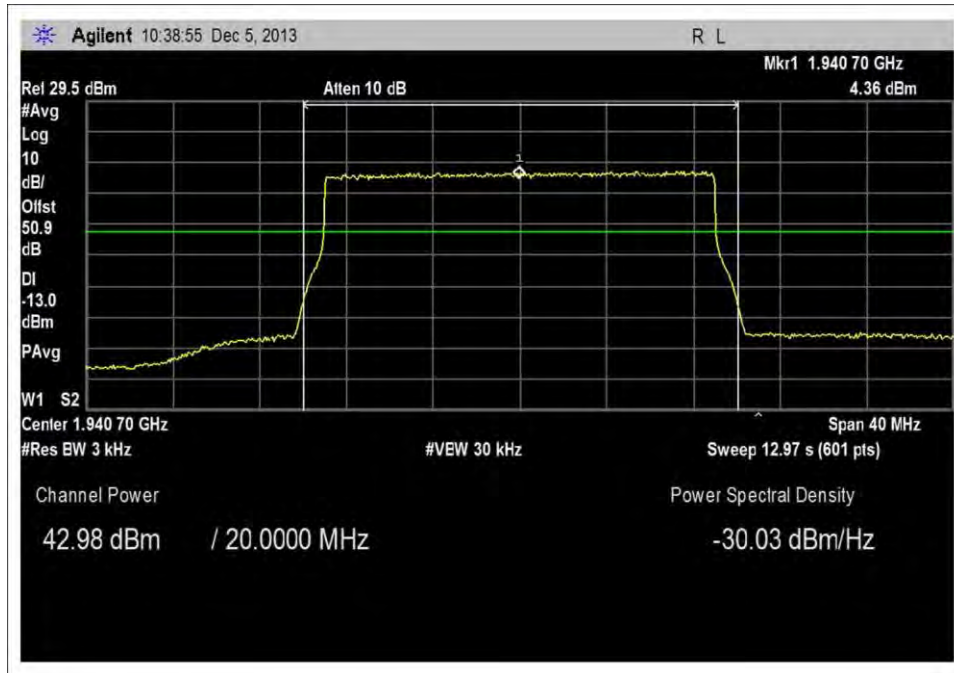
20W, LTE 5MHz – Low



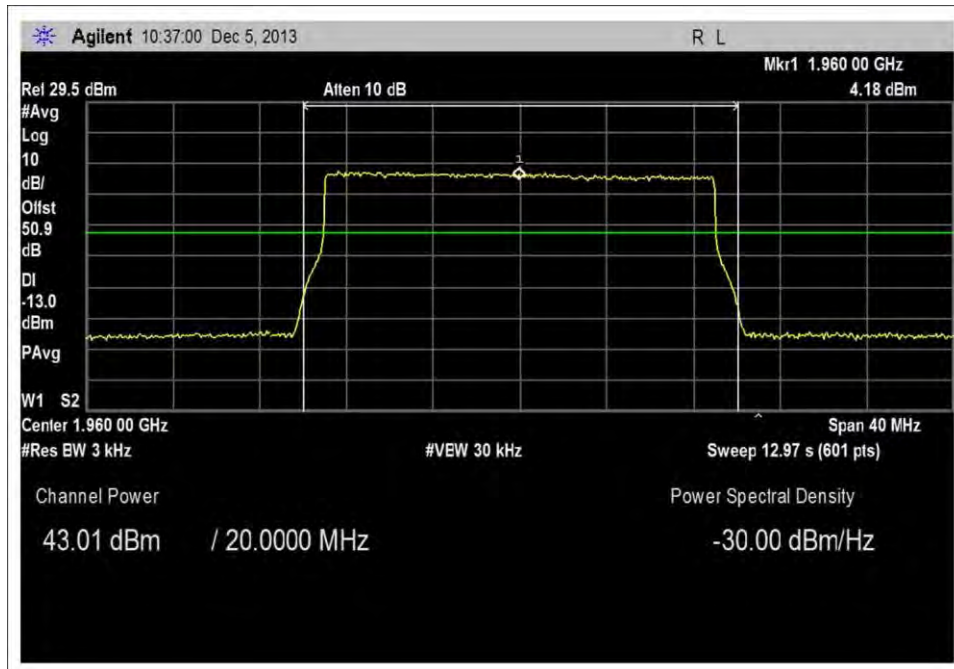
20W, LTE 5MHz – Middle



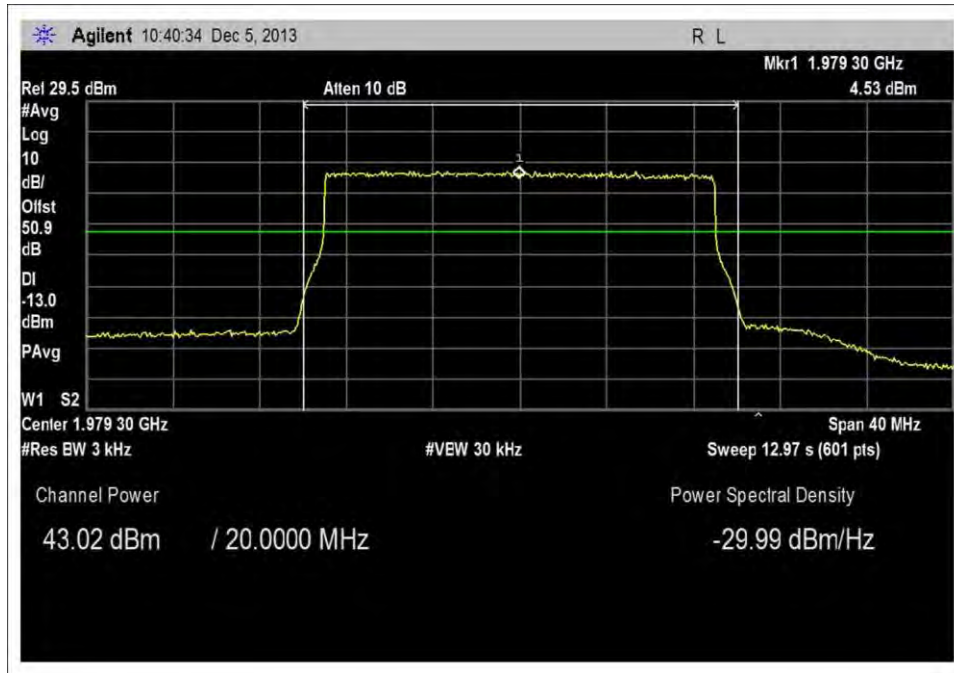
20W, LTE 5MHz – High



20W, LTE 20MHz – Low



20W, LTE 20MHz - Middle



20W, LTE 20MHz – High

Test Setup Photos



Test Setup

2.1049(I) Occupied Bandwidth

Test Conditions / Setup

Test Location: CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**
 Specification: **Input vs Output Plots**
 Work Order #: **95156** Date: 12/5/2013
 Test Type: **Conducted Emissions** Time: 14:39:38
 Equipment: **1900 MHz 20W Remote Transmitting Unit** Sequence#: 4
 Manufacturer: BTI Wireless Tested By: Don Nguyen
 Model: mBSC1900-020-RUMF01 110V 60Hz
 S/N: 10035302000113111001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03239	Cable	32022-2-29094K-24TC	10/30/2013	10/30/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
1900 MHz 20W Remote Transmitting Unit*	BTI Wireless	mBSC1900-020-RUMF01	10035302000113111001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601
Attenuator 30db Pad	Weinschel	49-30-43	KW075
Step Attenuator 110dB pad	HP	8496B	1350A01241
50 ohm Load	Generic	NA	NA
Cable	Pasternack	Sucoflex 104A	12237/4A
50 ohm Load	Generic	NA	NA

Test Conditions / Notes:

The EUT is placed on the test bench. RF to Fiber Optic Converter Tx1 In is connected to an ESG Signal generator via cable Sucoflex 104A. Fiber-1 port from the converter is connected to fiber port of EUT. ANT port of the EUT is connected to 30db attenuator and 110db step attenuator. A spectrum analyzer is connected to attenuators via cable 32022-2-29094K-24TC. TX out and RX in port are terminated to 50 ohm loads.

Per manufacturer, the output frequency is independent of the components used in optical converter.

EUT is a Fixed Gain Amplifier with fixed output power as set by ALC (Auto Level Control) Threshold level of $1\pm 0.5\text{dB}$ higher than maximum rated output power.

The evaluation is performed at the antenna port .

Freq: 1930-1990MHz

Signal protocol: GSM, EDGE, CDMA IS95A, UMTS WCDMA 3GPP, LTE 1.4MHz, 5MHz, 20MHz.

The RF output power was measured with the following power settings:

20W

Modulation	Input Power (dbm)
------------	-------------------

GSM

1931.93MHz	-1.57
------------	-------

1960MHz	-2
---------	----

1988.07MHz	-1.58
------------	-------

EDGE

1931.93MHz	-1.36
------------	-------

1960MHz	-2.06
---------	-------

1988.07MHz	-1.56
------------	-------

CDMA (IS95A)

1932.36MHz	-1.28
------------	-------

1960MHz	-2.04
---------	-------

1987.64MHz	-1.68
------------	-------

UMTS (WCDMA_3GPP)

1933.75MHz	-1.48
------------	-------

1960MHz	-2.14
---------	-------

1986.25MHz	-1.98
------------	-------

LTE 1.4MHz

1932.35MHz	-1.12
------------	-------

1960MHz	-2.08
---------	-------

1987.65MHz	-1.72
------------	-------

LTE 5MHz

1933.95MHz	-1.48
------------	-------

1960MHz	-2.1
---------	------

1986.05MHz	-1.8
------------	------

LTE 20MHz

1940.7MHz	-2.16
-----------	-------

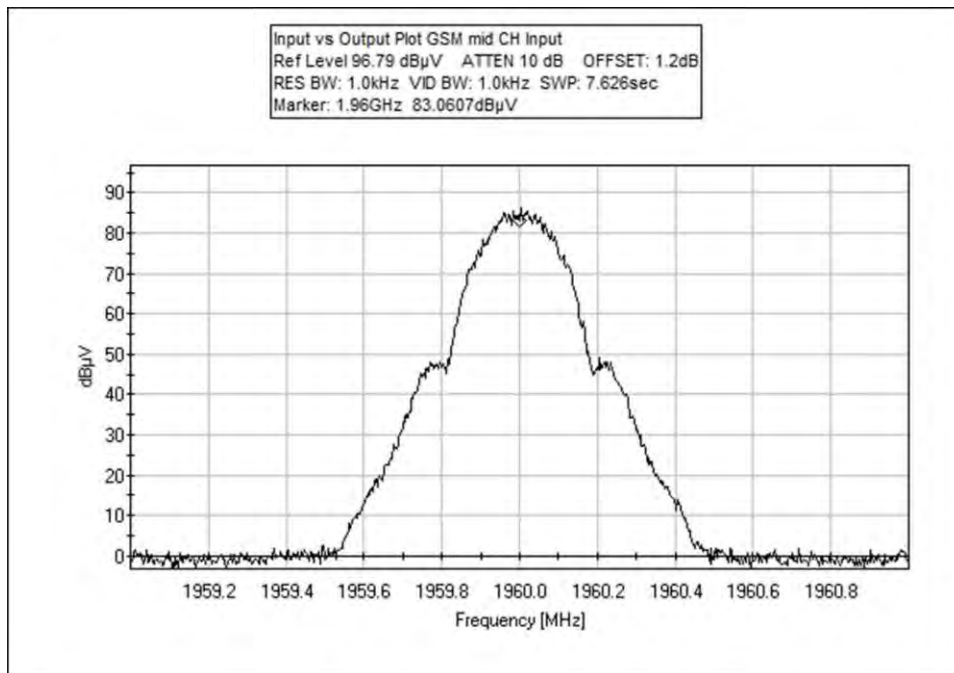
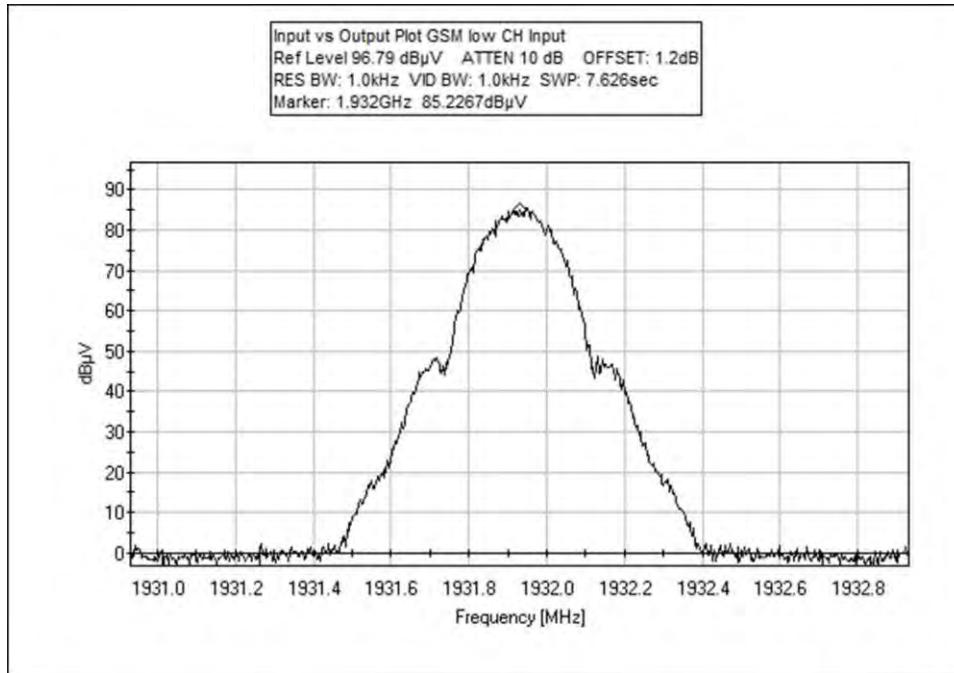
1960MHz	-2.28
---------	-------

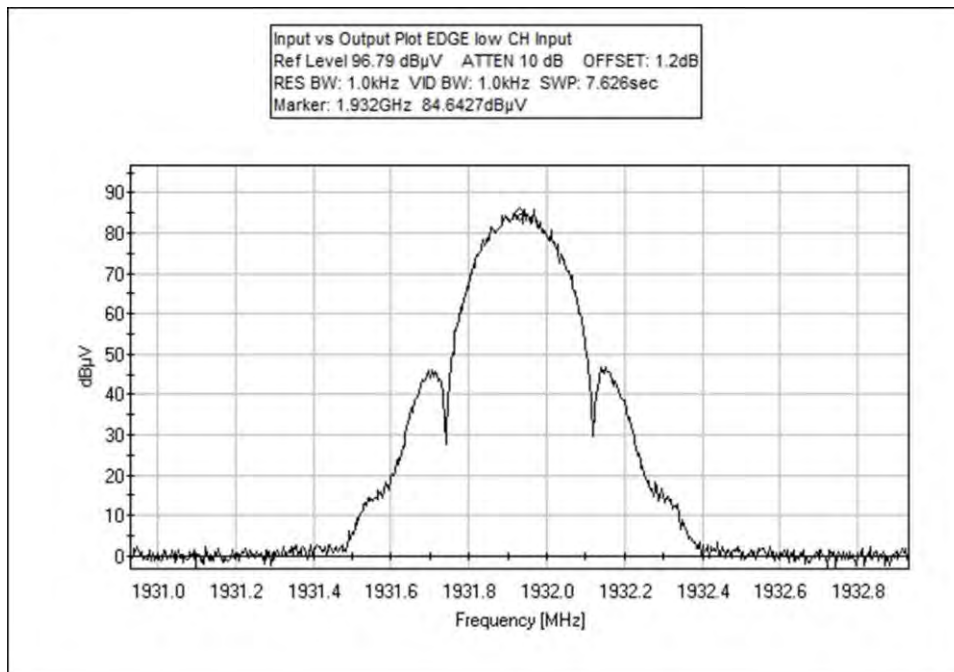
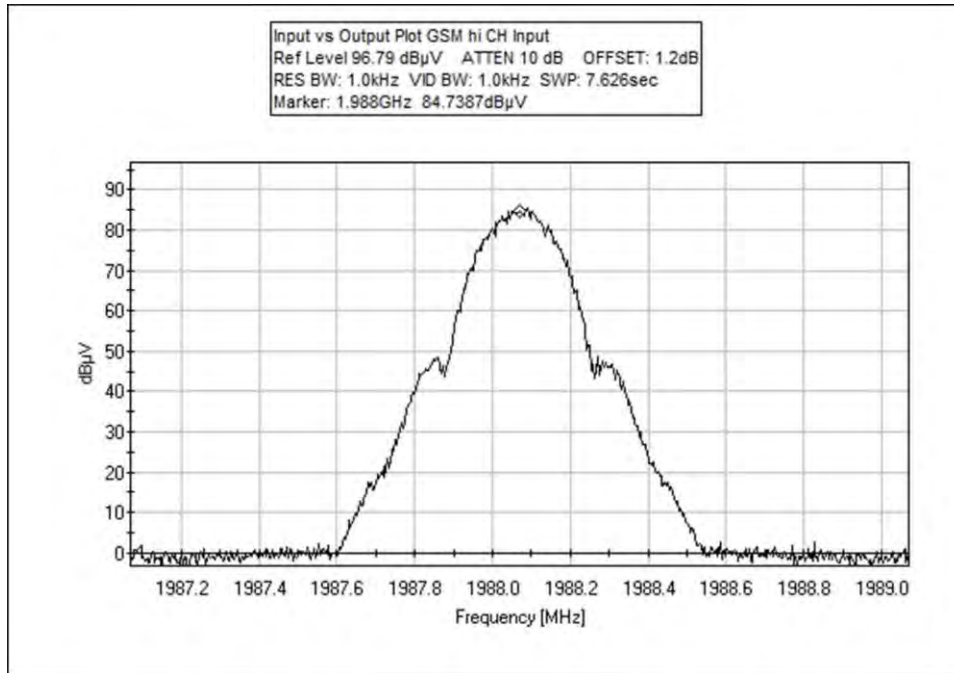
1979.3MHz	-2.28
-----------	-------

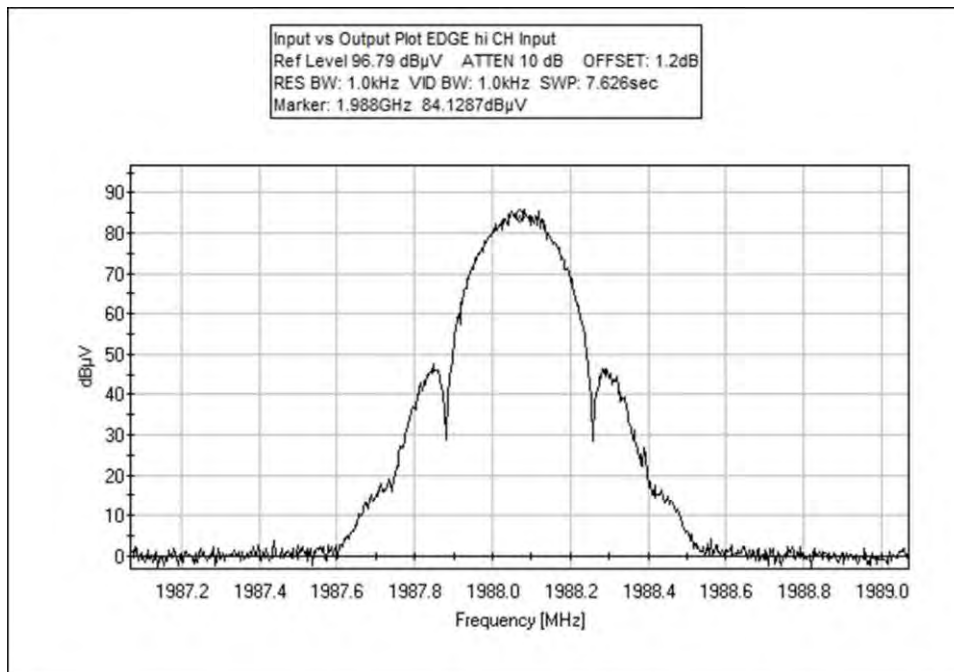
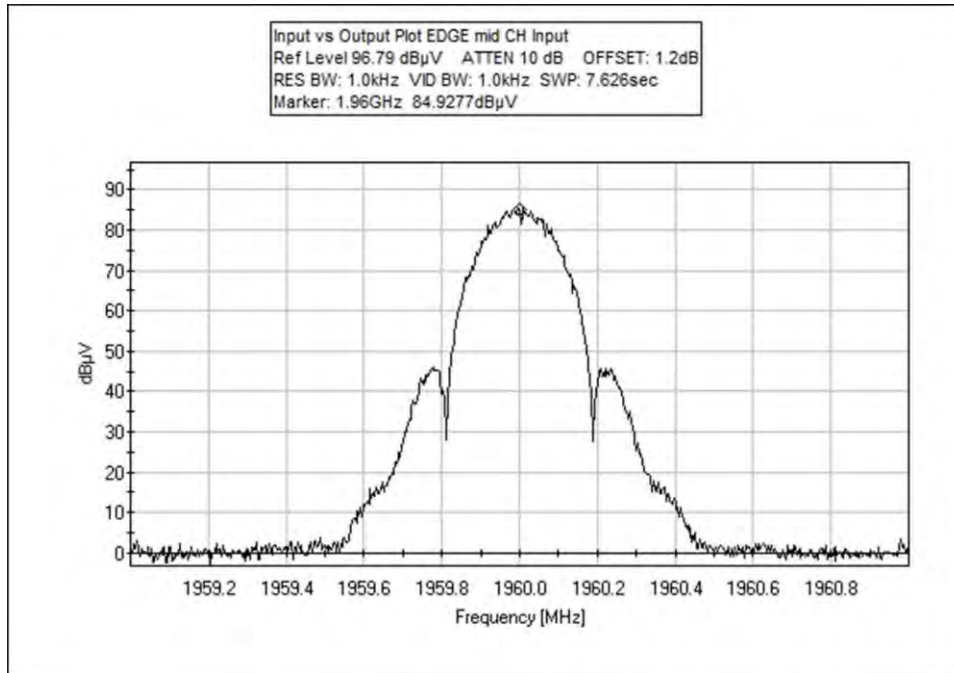
20°C, 29%Relative Humidity

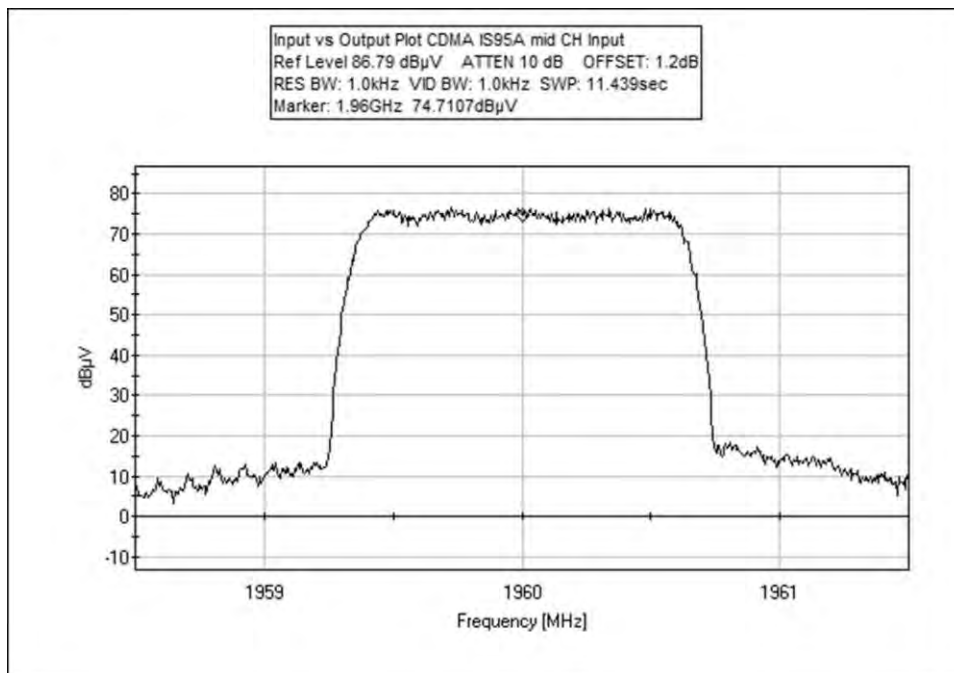
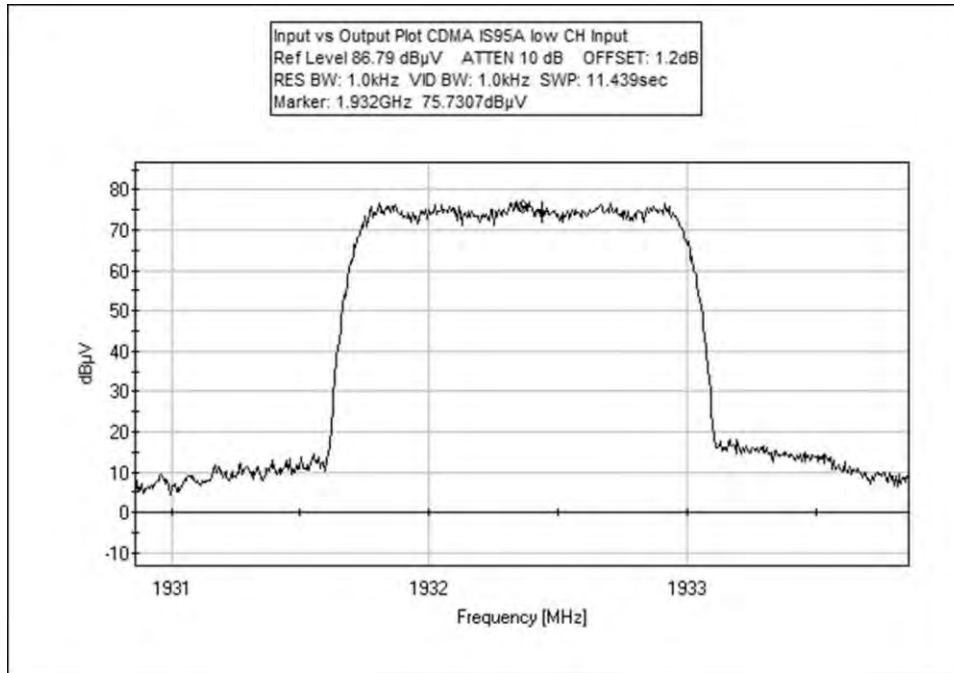
Site A

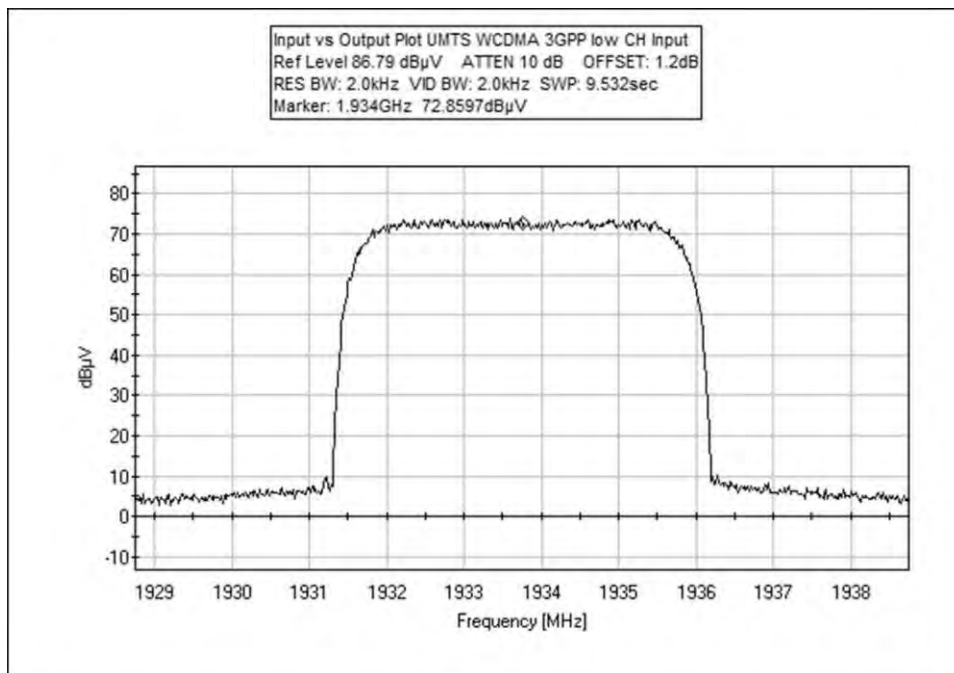
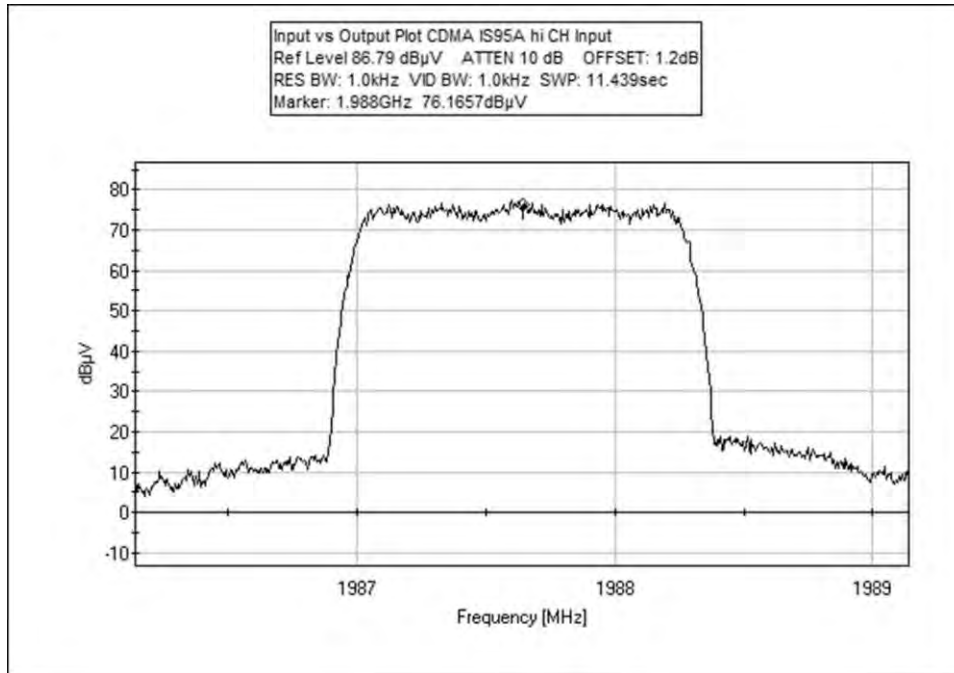
Test Data

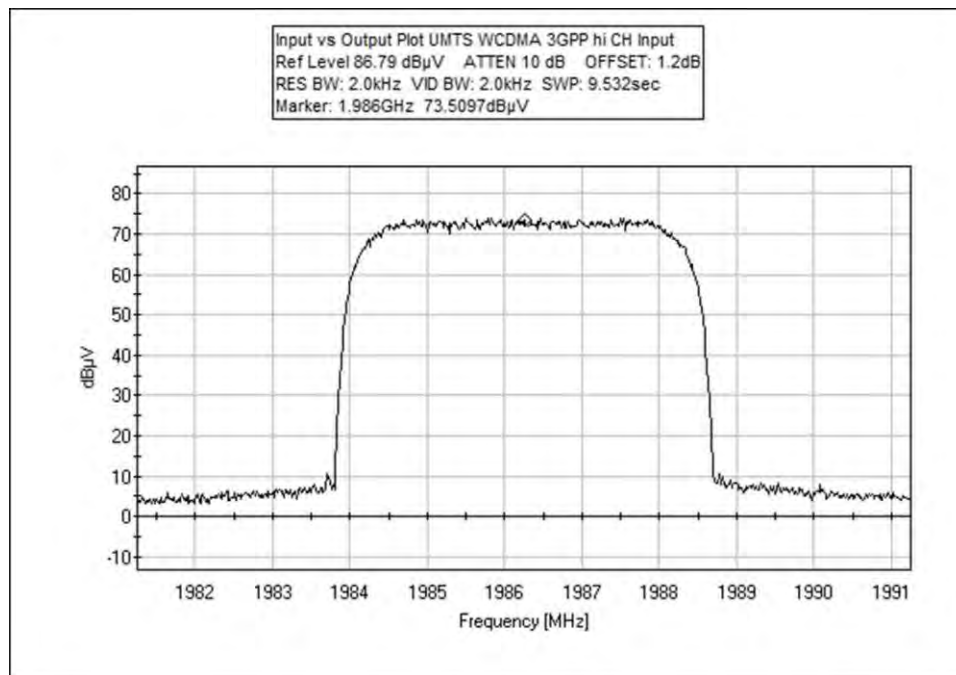
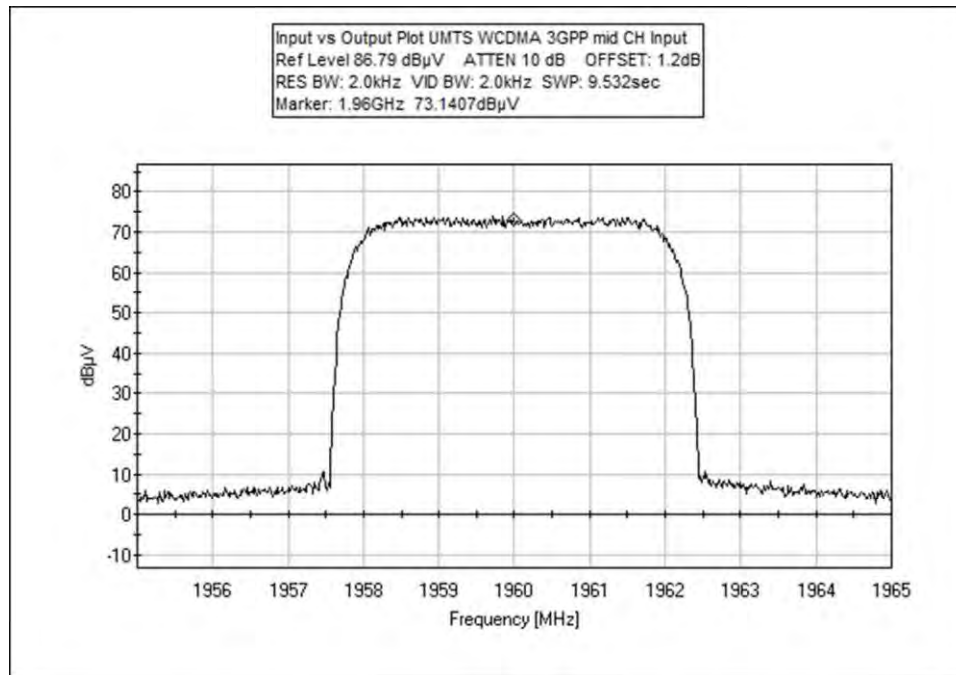


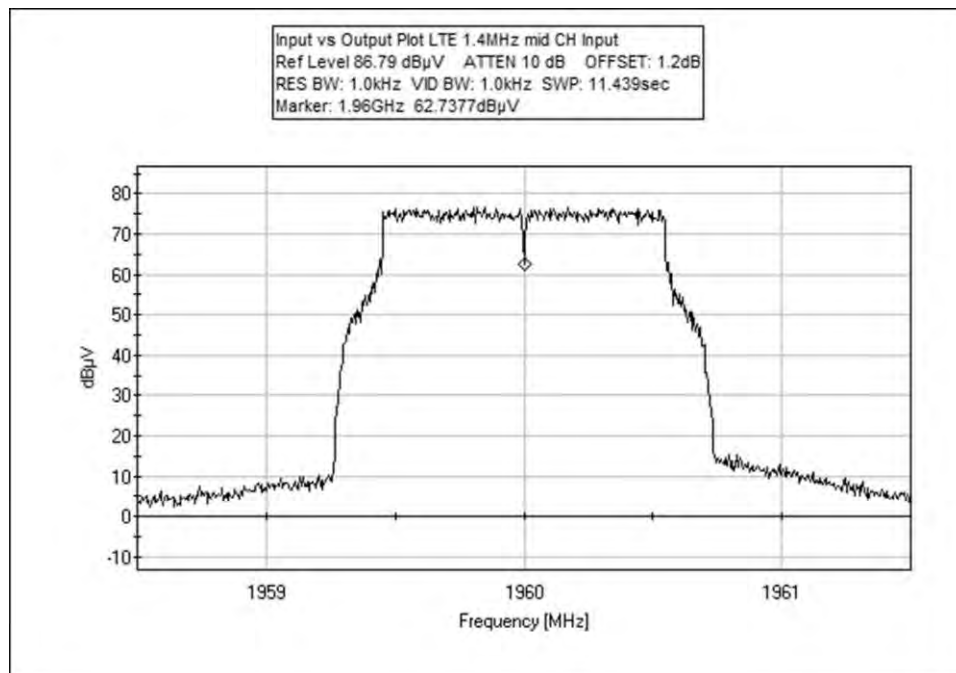
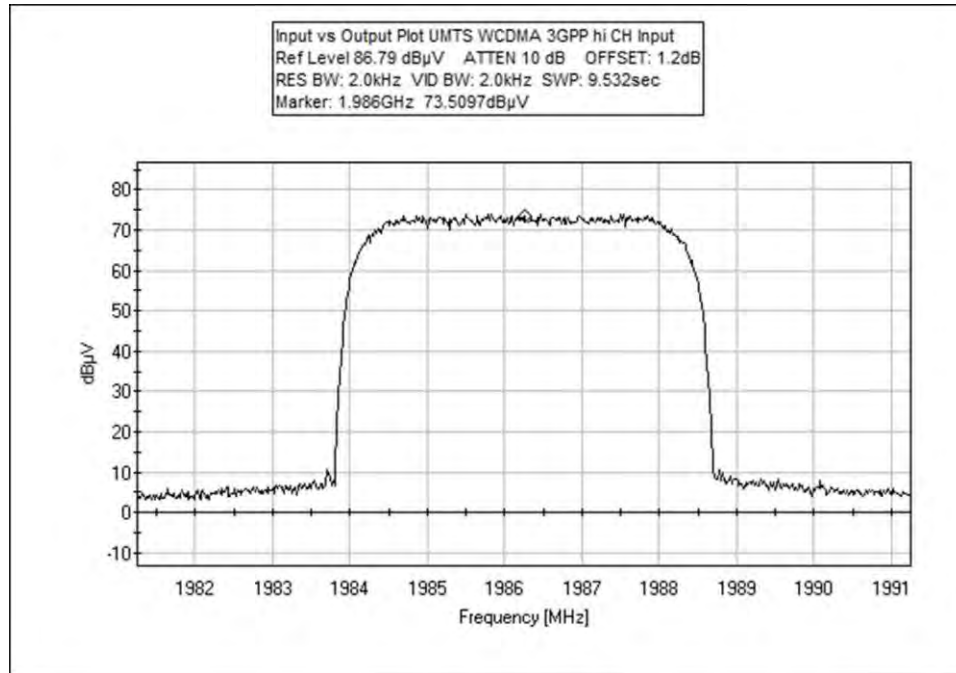


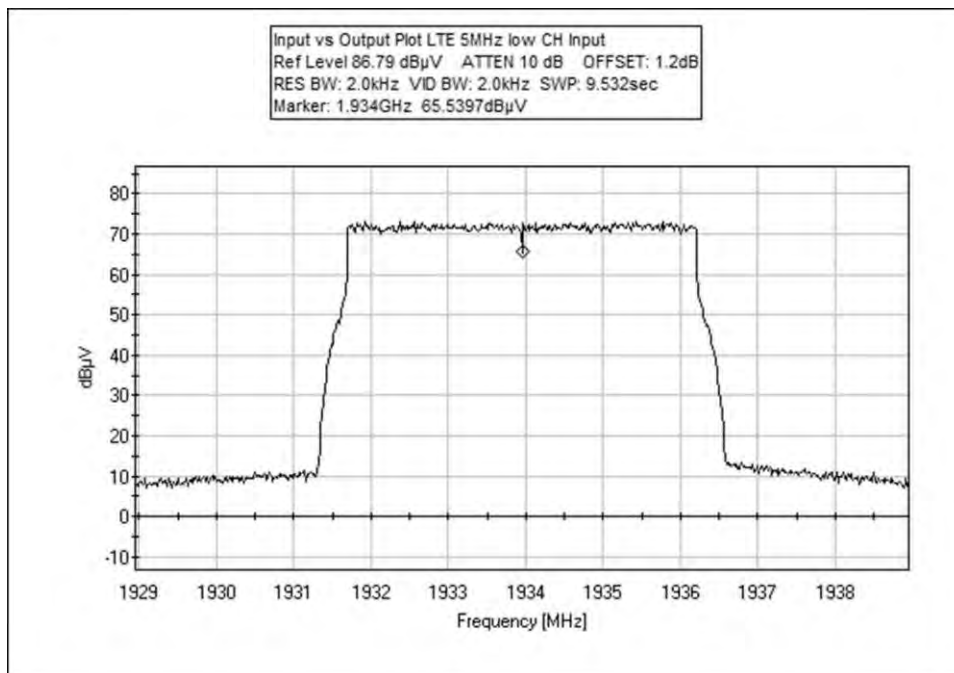
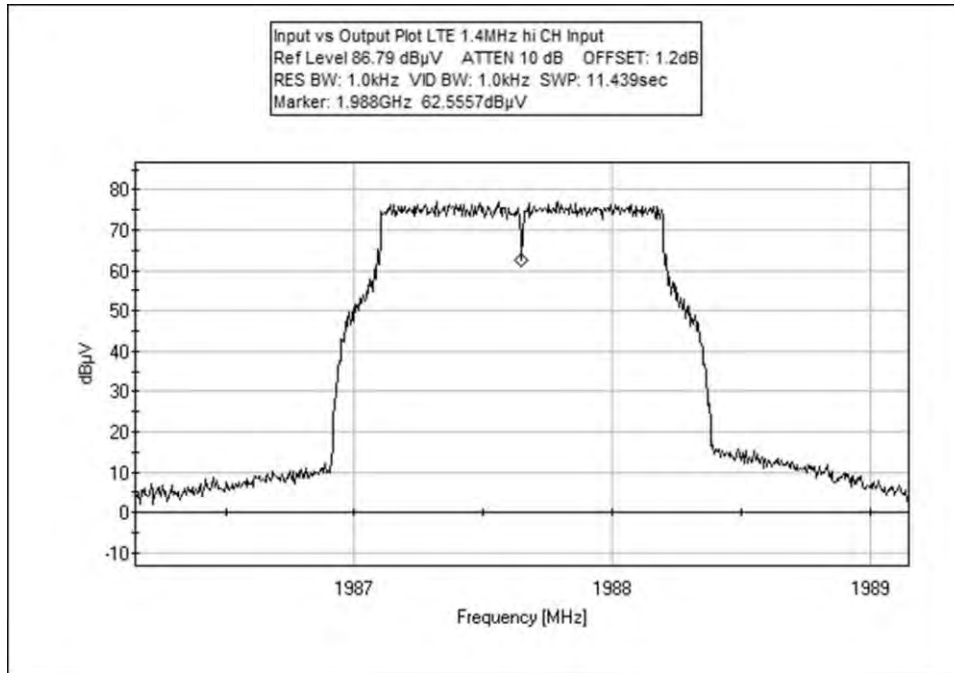


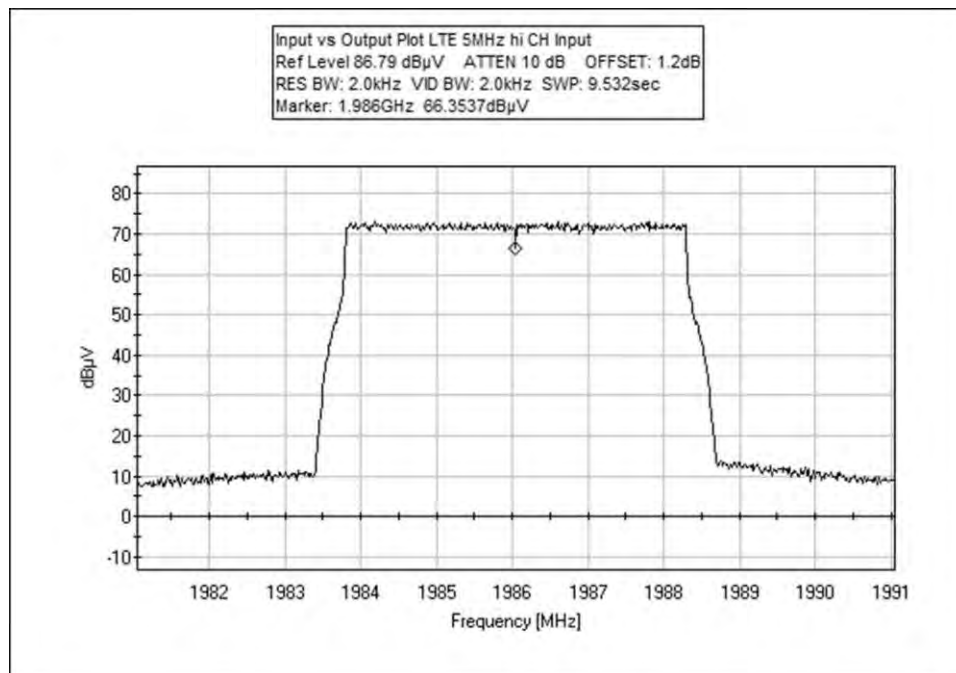
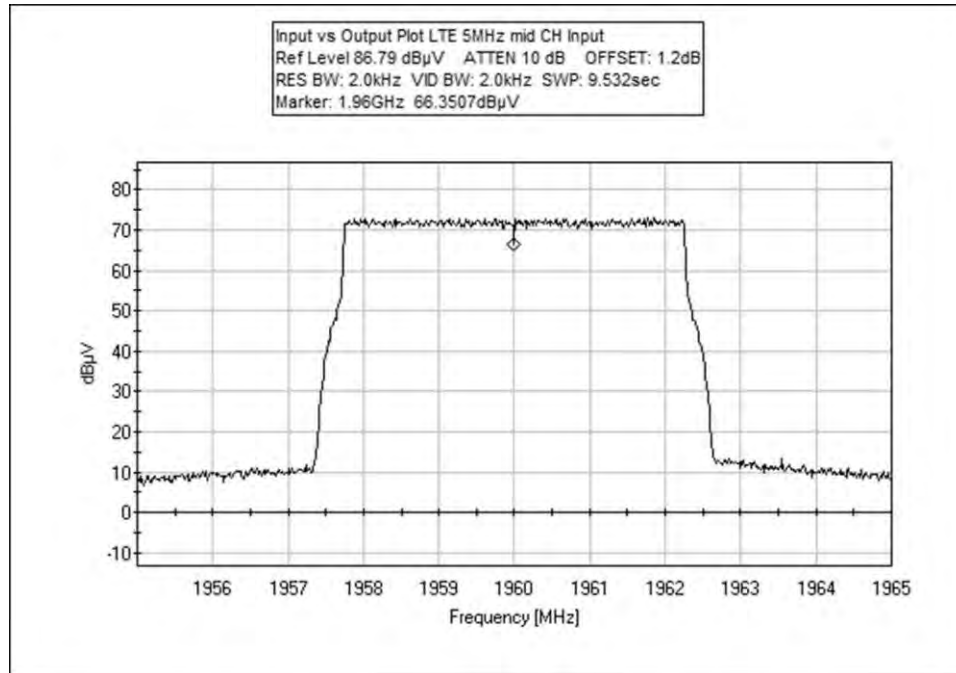


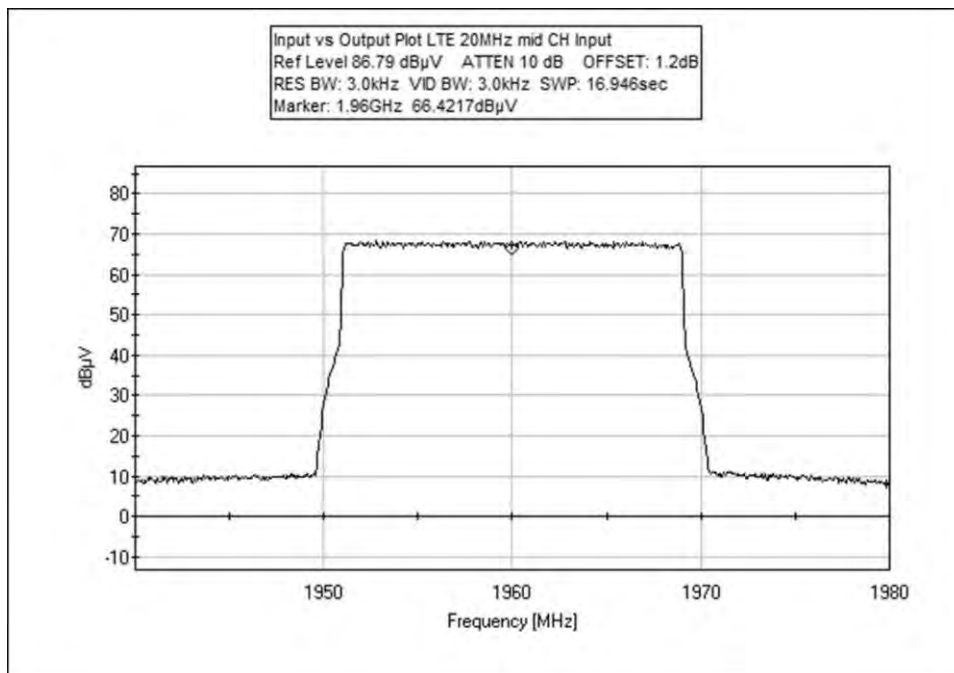
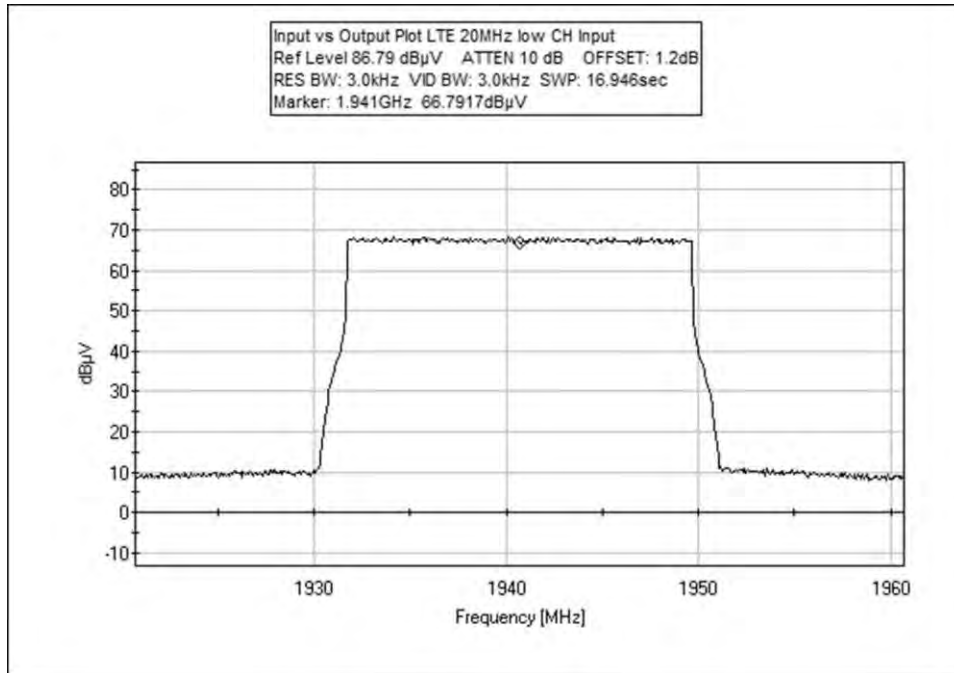


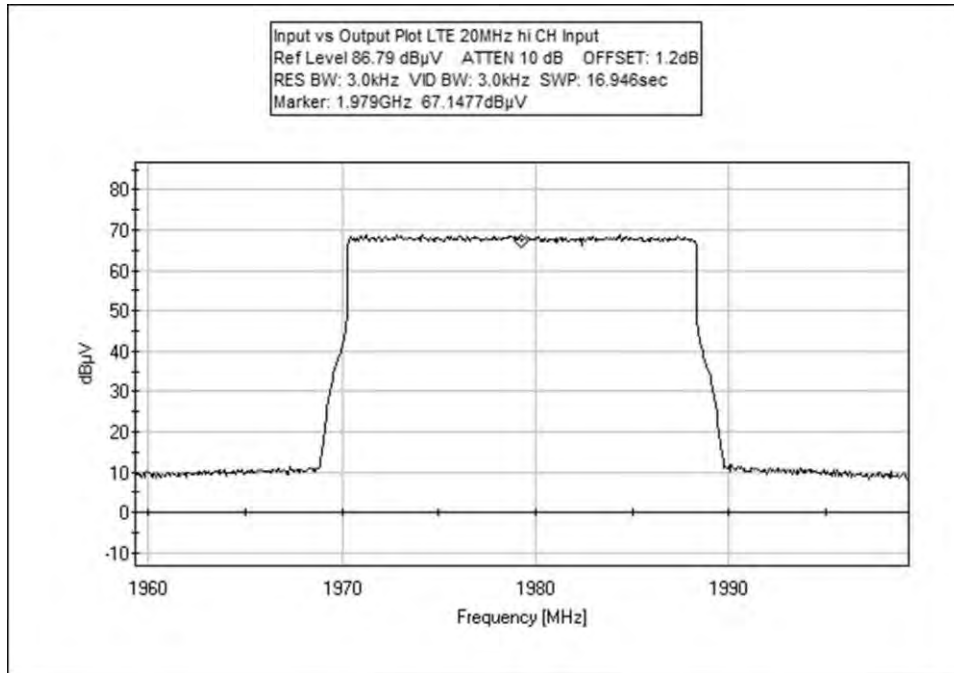


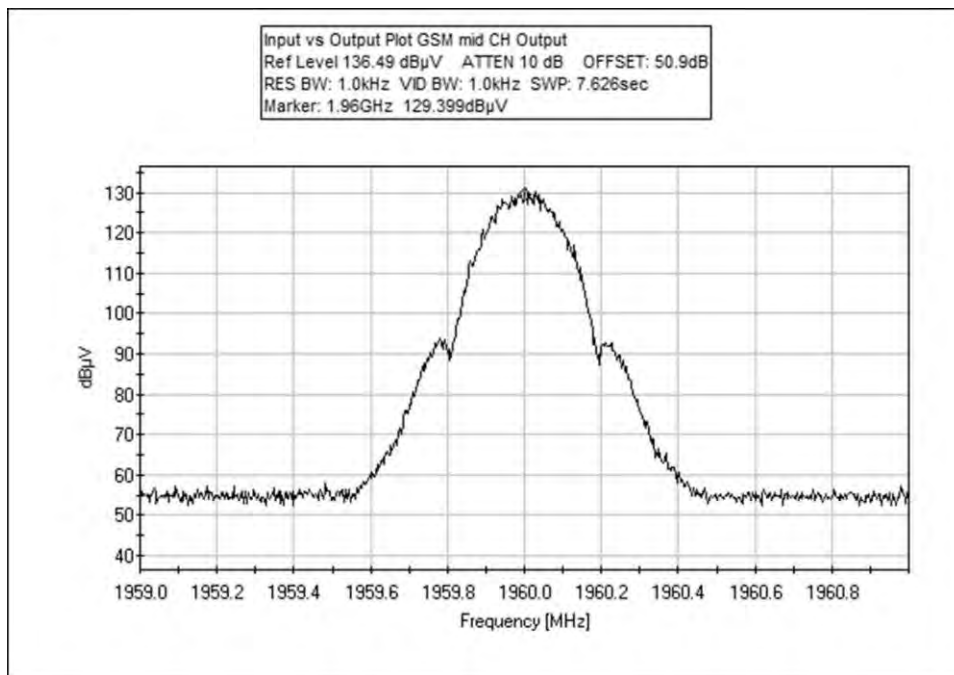
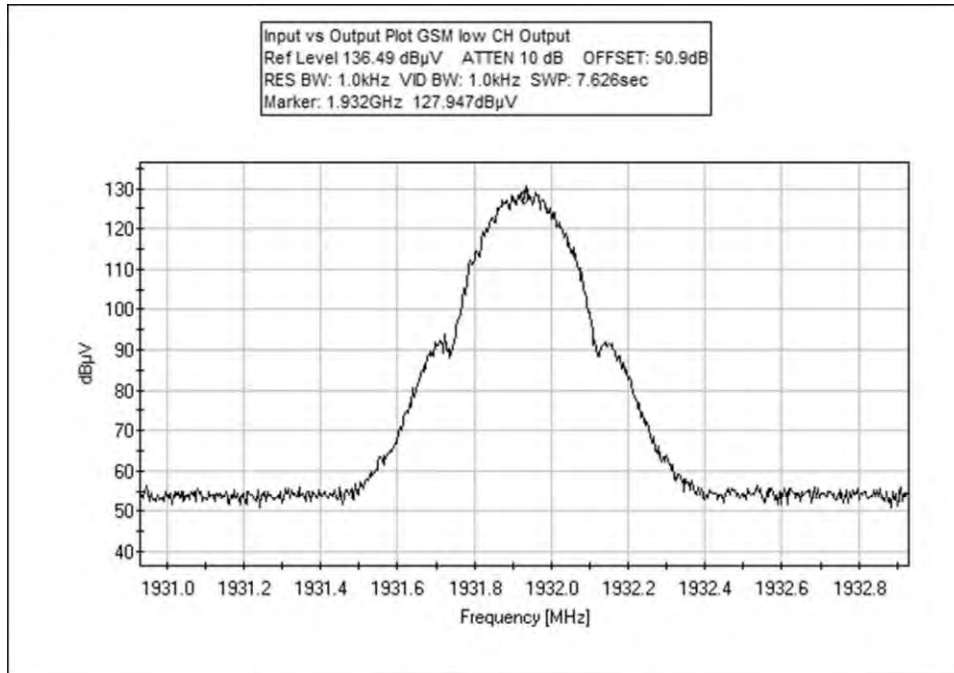


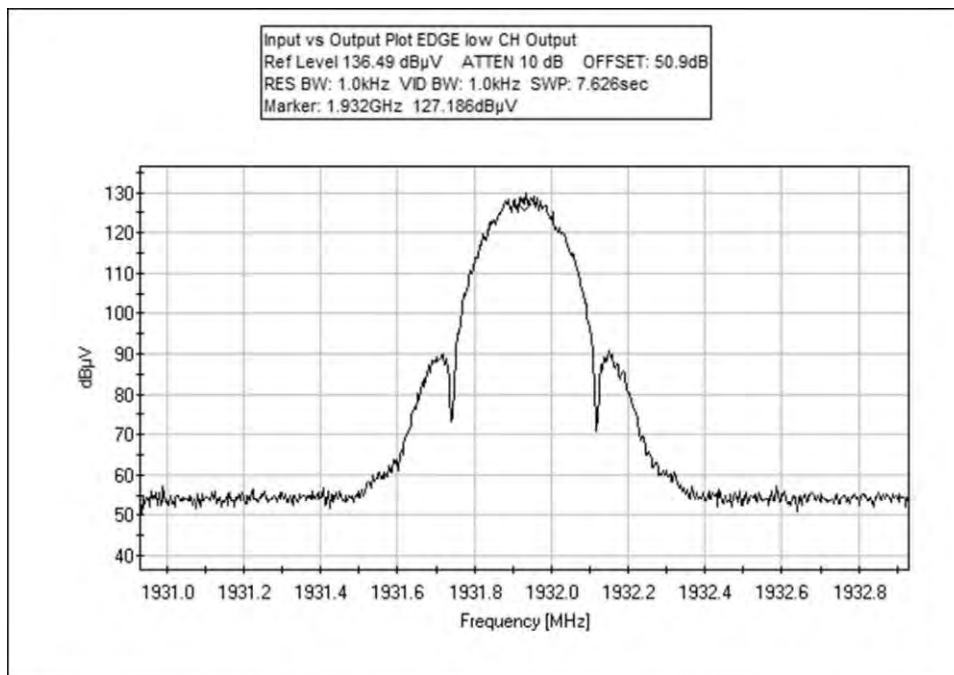
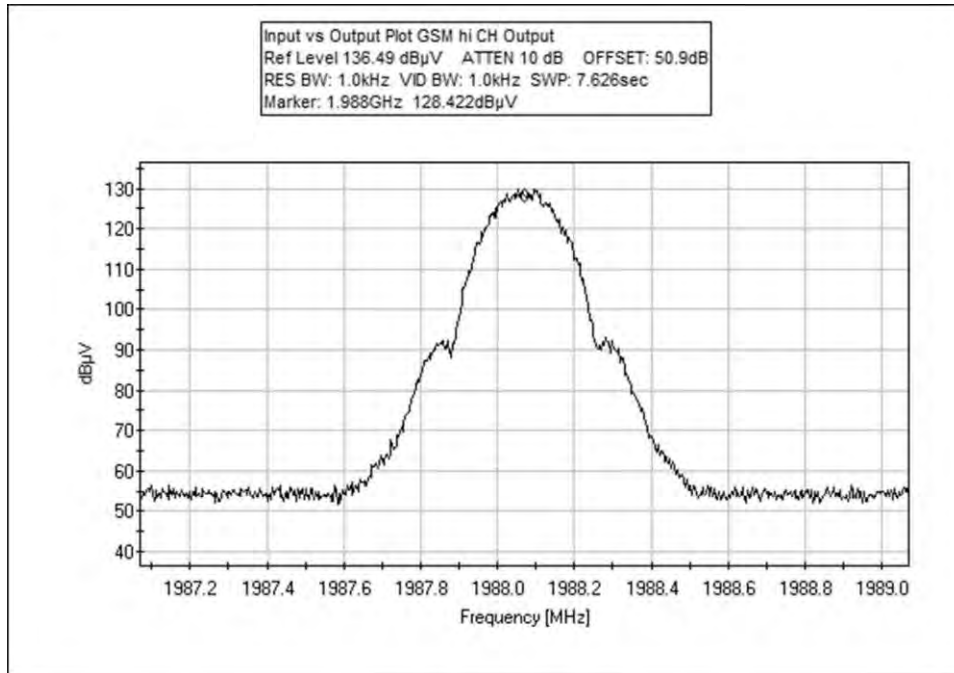


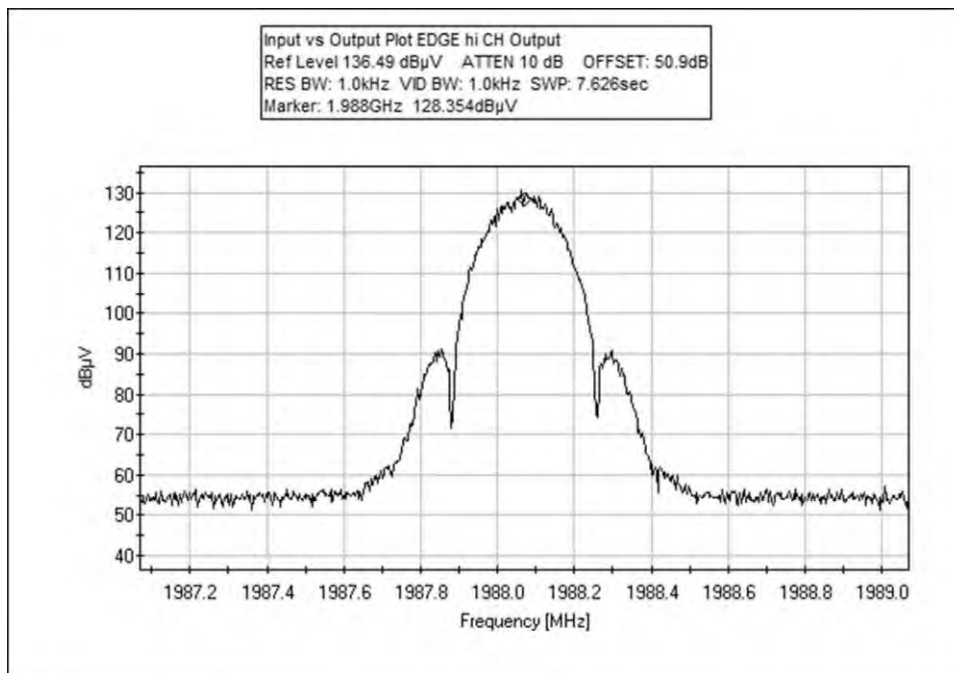
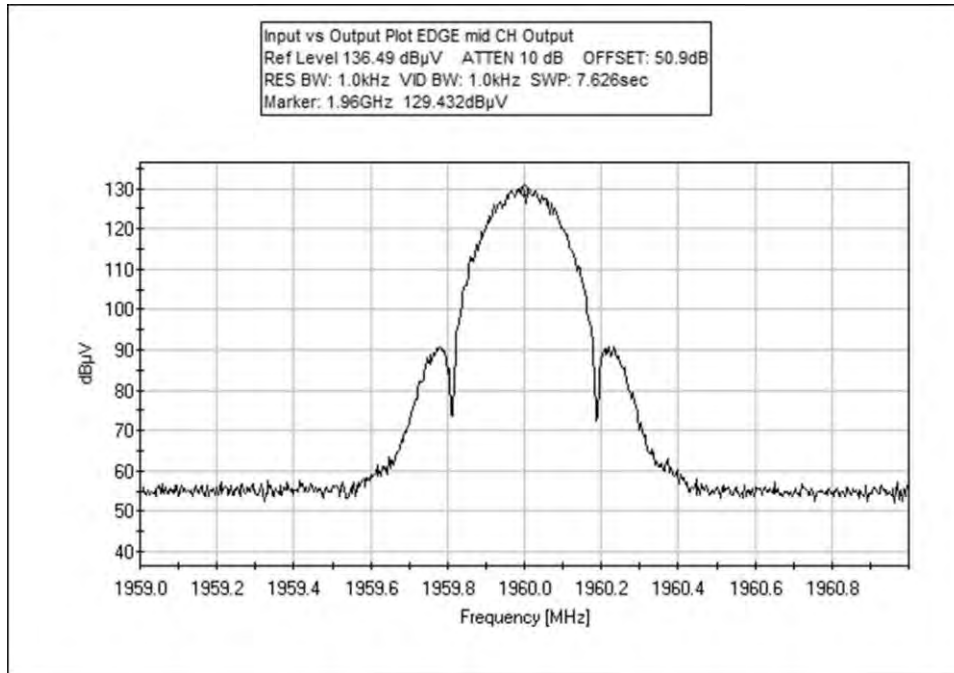


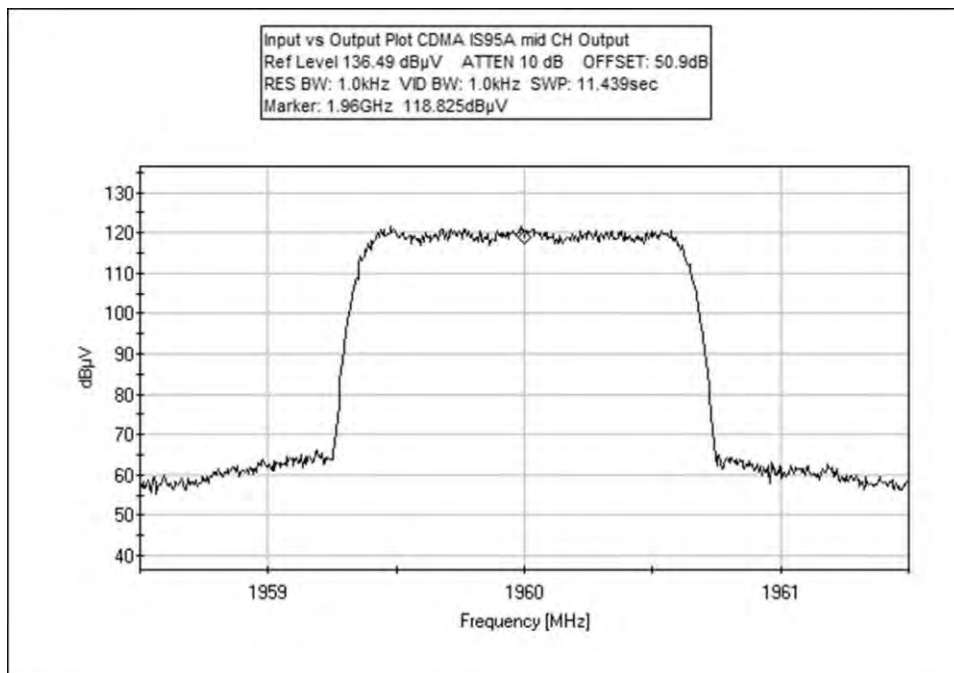
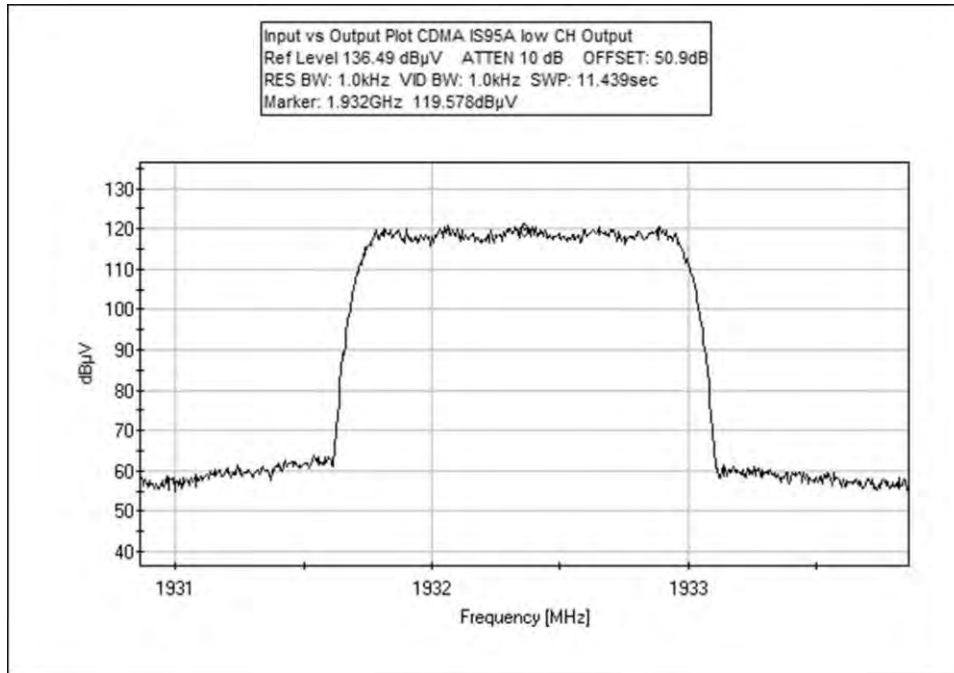


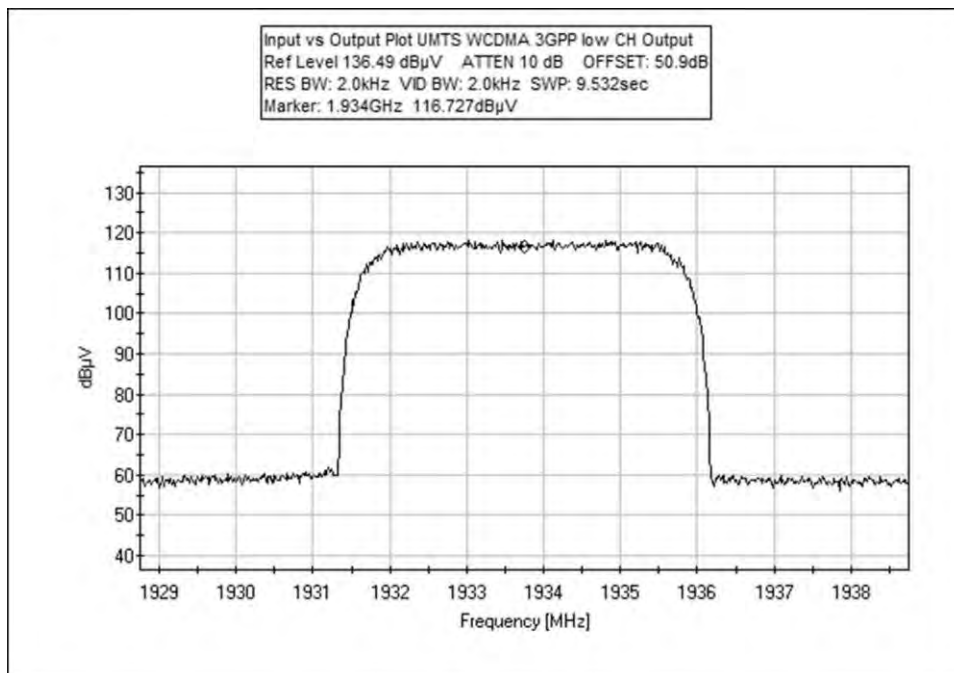
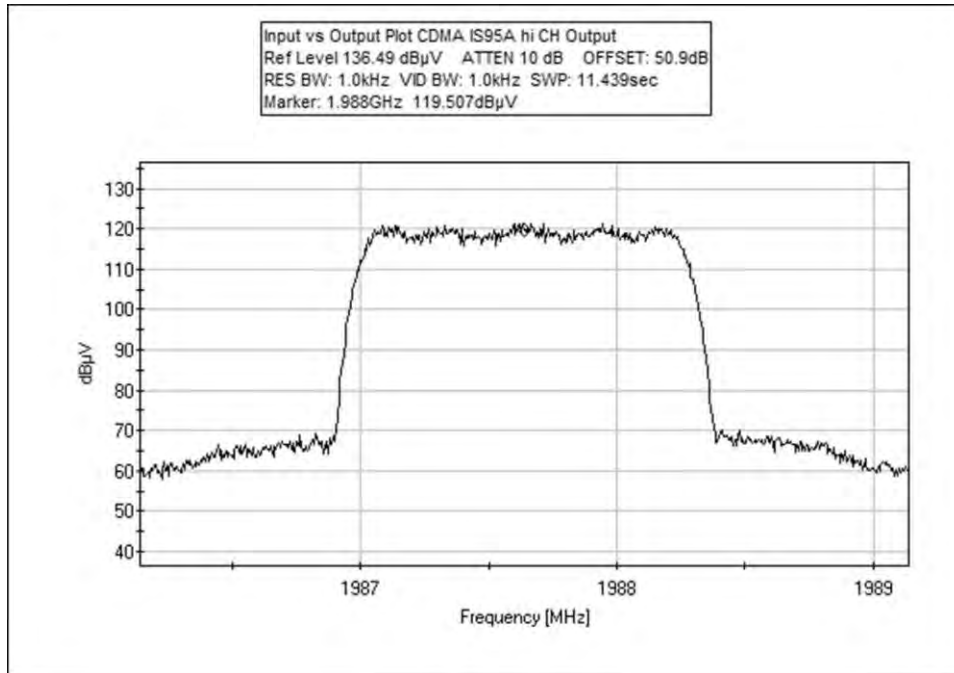


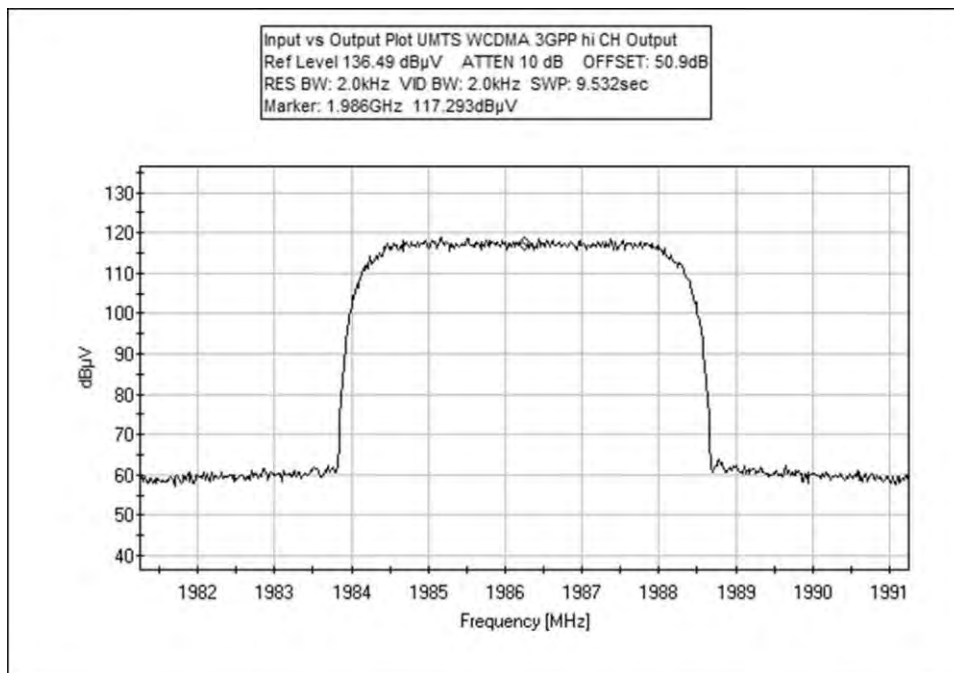
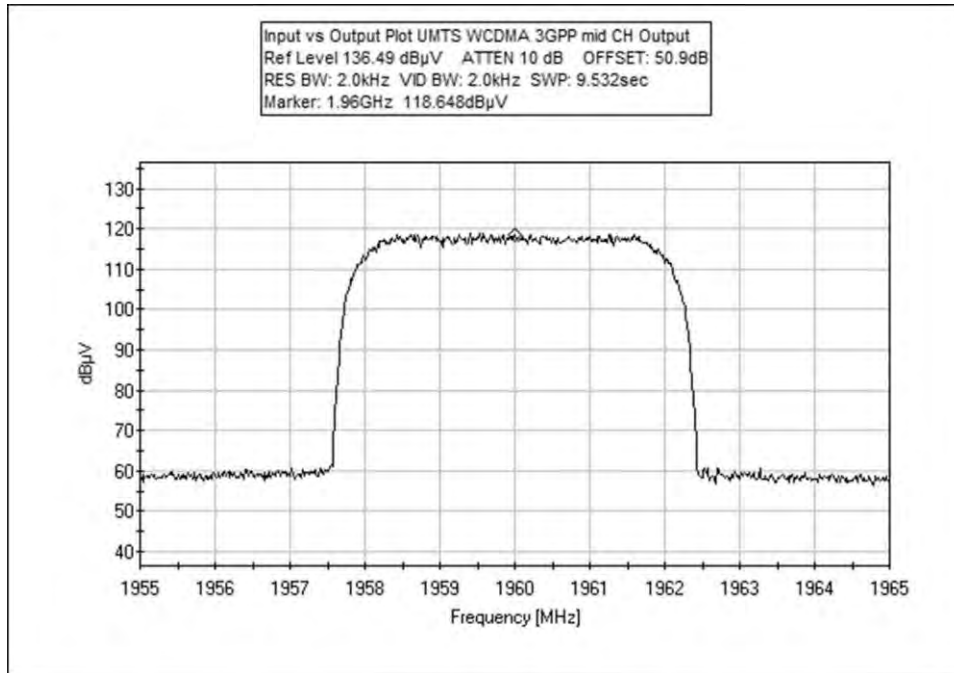


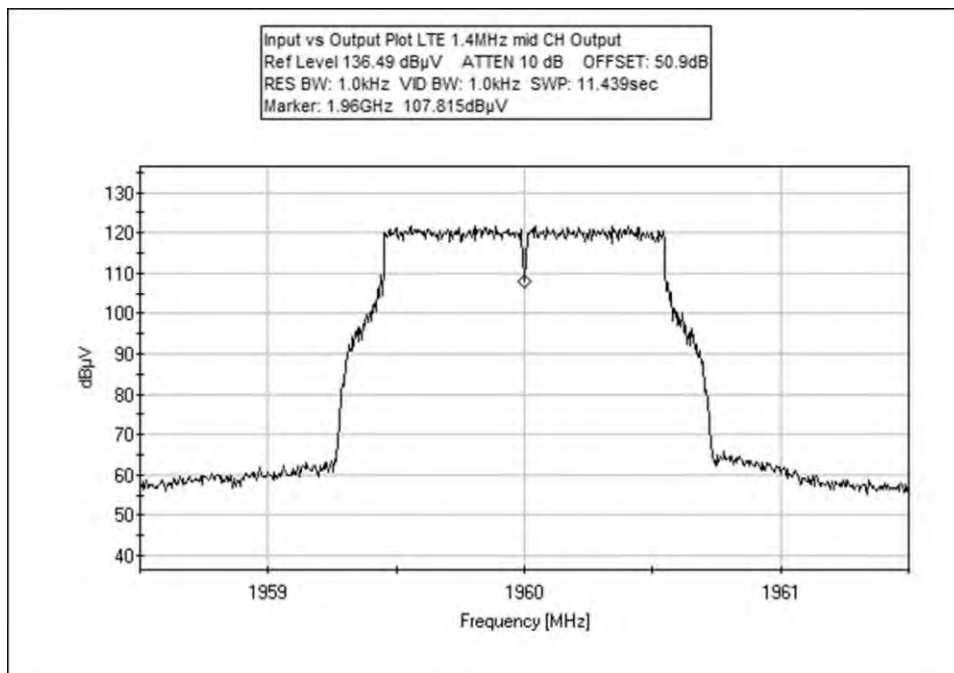
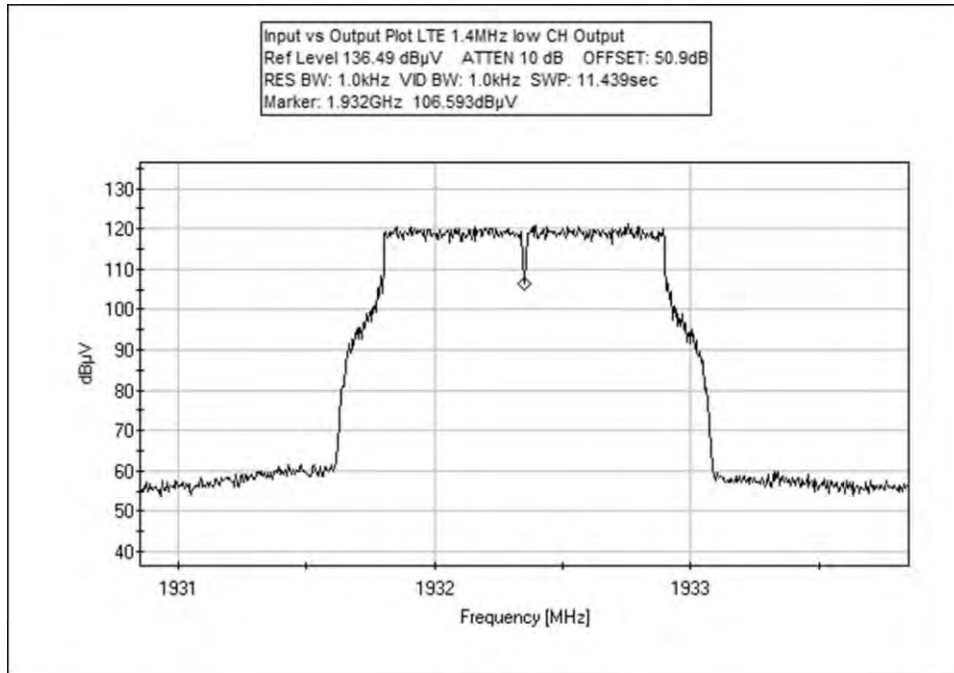


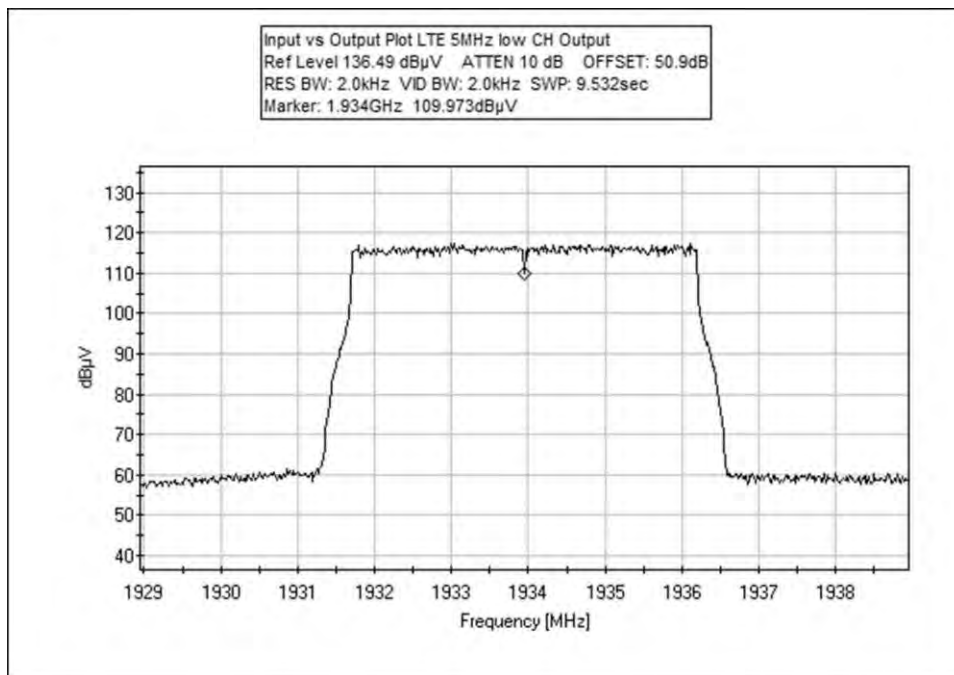
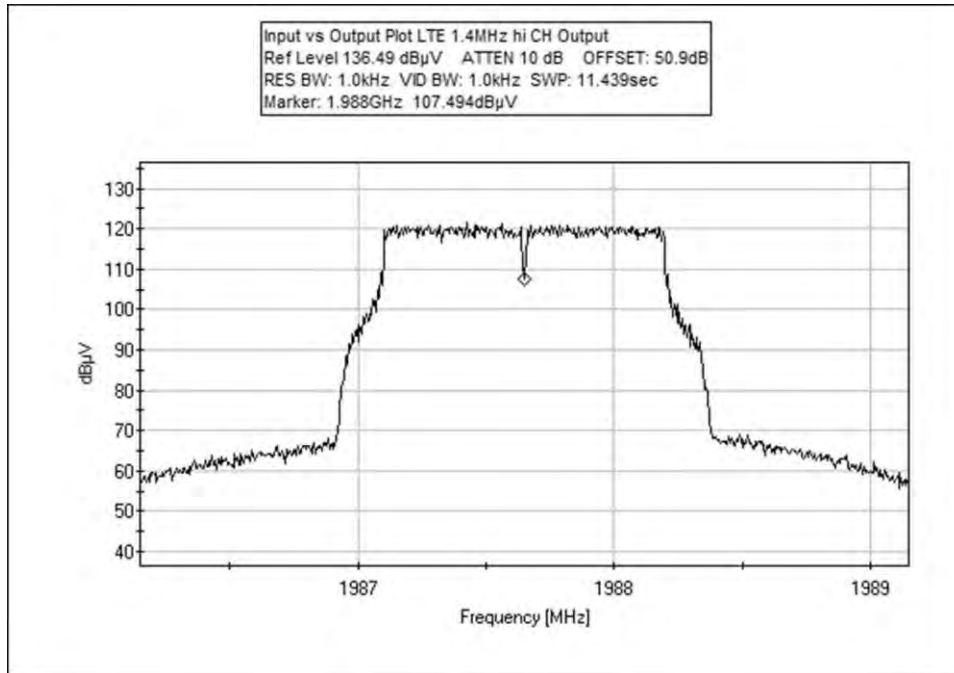


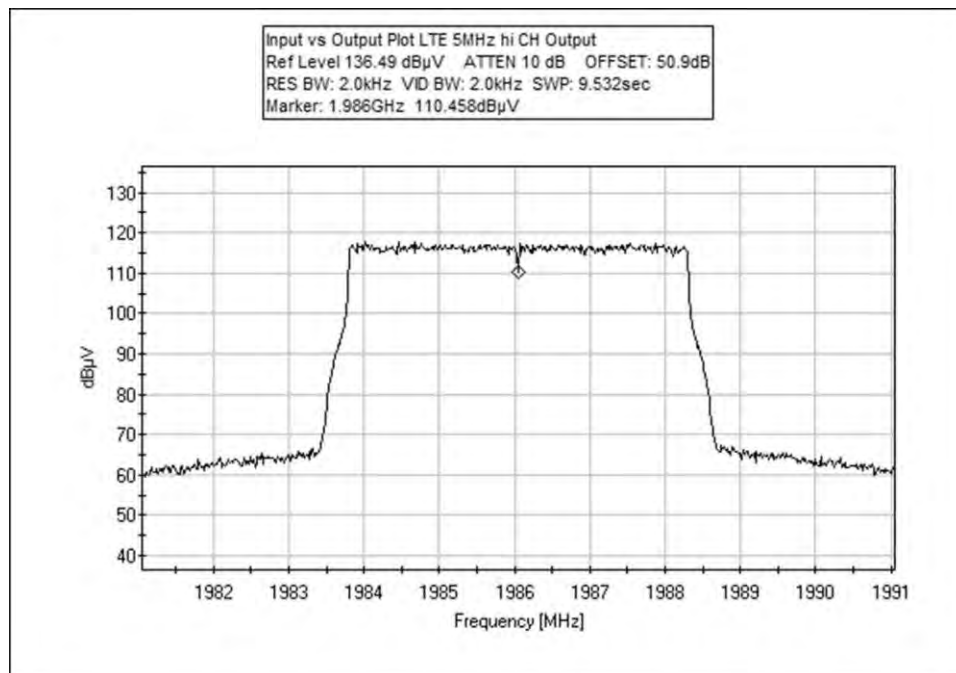
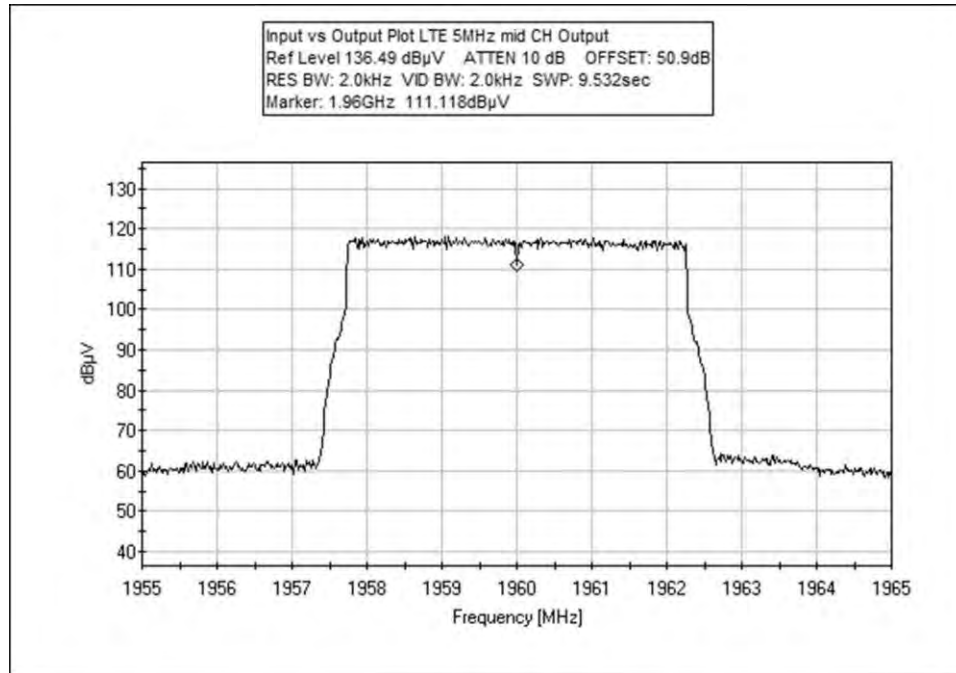


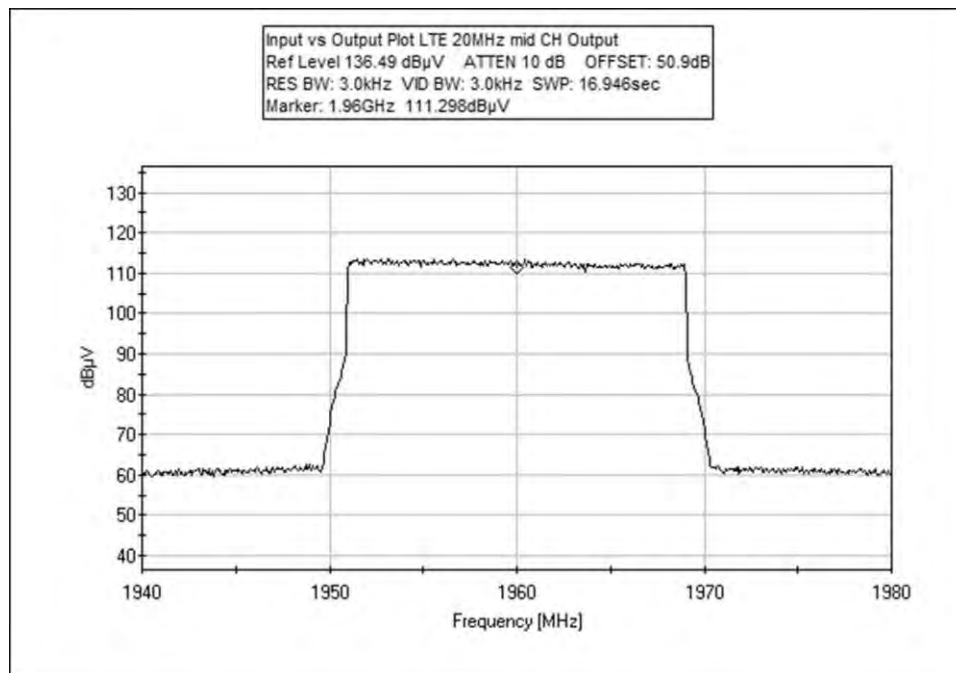
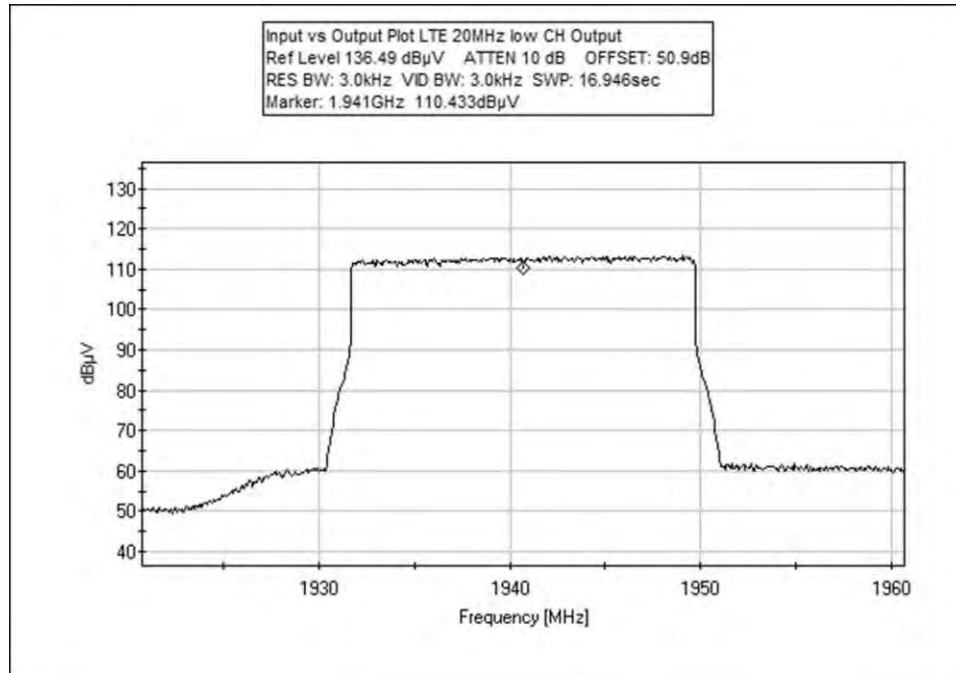


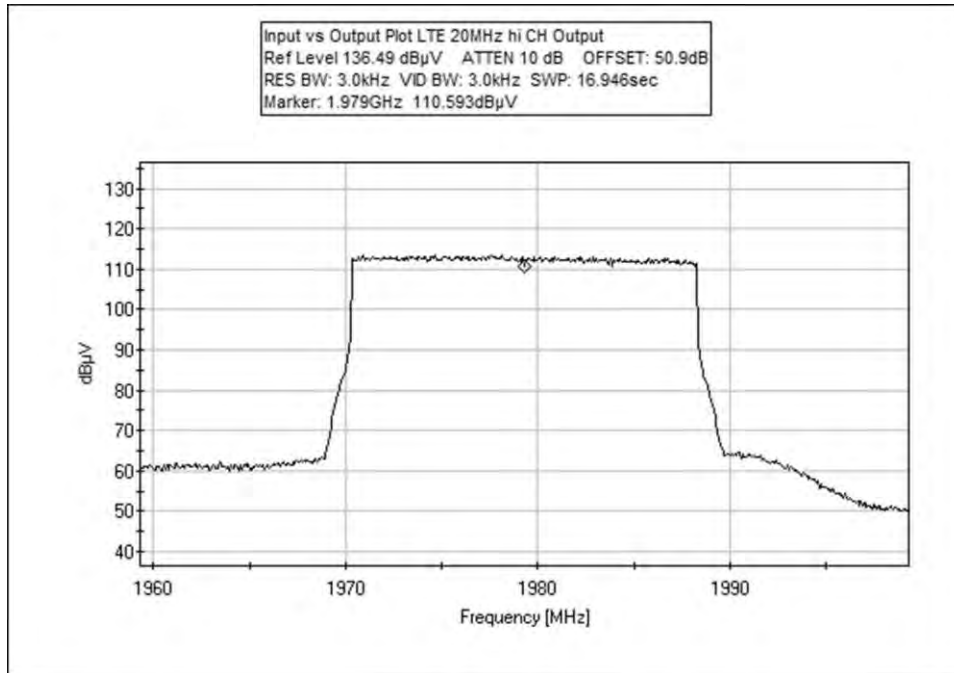












Test Setup Photos



Test Setup

2.1051 Spurious Emissions at Antenna Terminal

Test Data Sheets

Test Location: CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**
 Specification: **24.238 (a) Broadband PCS Conducted Spurious Emission**
 Work Order #: **95156** Date: 12/5/2013
 Test Type: **Conducted Emissions** Time: 14:39:38
 Equipment: **1900 MHz 20W Remote Transmitting Unit** Sequence#: 4
 Manufacturer: BTI Wireless Tested By: Don Nguyen
 Model: mBSC1900-020-RUMF01 110V 60Hz
 S/N: 10035302000113111001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03239	Cable	32022-2-29094K-24TC	10/30/2013	10/30/2015
	AN03385	High Pass Filter	11SH10-3000/T10000-O/O	6/5/2013	6/5/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
1900 MHz 20W Remote Transmitting Unit*	BTI Wireless	mBSC1900-020-RUMF01	10035302000113111001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601
Attenuator 30db Pad	Weinschel	49-30-43	KW075
Step Attenuator 110dB pad	HP	8496B	1350A01241
50 ohm Load	Generic	NA	NA
Cable	Pasternack	Sucoflex 104A	12237/4A
50 ohm Load	Generic	NA	NA
RF to Fiber Optic Converter	BTI Wireless	mBSC9351-HU	mBSC9351HU-11021029

Test Conditions / Notes:

The EUT is placed on the test bench. RF to Fiber Optic Converter Tx1 In is connected to an ESG Signal generator via cable Sucoflex 104A. Fiber-1 port from the converter is connected to fiber port of EUT. ANT port of the EUT is connected to 30db attenuator and 110db step attenuator. A spectrum analyzer is connected to attenuators via cable 32022-2-29094K-24TC. TX out and RX in port are terminated to 50 ohm loads.

Per manufacturer, the output frequency is independent of the components used in optical converter.

EUT is a Fixed Gain Amplifier with fixed output power as set by ALC (Auto Level Control) Threshold level $1\text{Å}\pm 0.5\text{dB}$ higher than maximum rated output power.

The evaluation is performed at the antenna port .

Freq: 1930-1990MHz

Signal protocol: GSM, EDGE, CDMA IS95A, UMTS WCDMA 3GPP, LTE 1.4MHz, 5MHz, 20MHz.

The RF output power was measured with the following power settings:

20W

Modulation	Input Power (dbm)	
GSM		
1931.93MHz	-1.57	
1960MHz		-2
1988.07MHz	-1.58	
EDGE		
1931.93MHz		-1.36
1960MHz		-2.06
1988.07MHz	-1.56	
CDMA (IS95A)		
1932.36MHz	-1.28	
1960MHz	-2.04	
1987.64MHz	-1.68	
UMTS (WCDMA_3GPP)		
1933.75MHz	-1.48	
1960MHz	-2.14	
1986.25MHz	-1.98	
LTE 1.4MHz		
1932.35MHz	-1.12	
1960MHz		-2.08
1987.65MHz	-1.72	
LTE 5MHz		
1933.95MHz	-1.48	
1960MHz	-2.1	
1986.05MHz	-1.8	
LTE 20MHz		
1940.7MHz	-2.16	
1960MHz		-2.28
1979.3MHz	-2.28	

Frequency range of measurement = 9kHz- 20GHz.
 9 kHz -150 kHz;RBW=200 Hz,VBW=200 Hz;150 kHz-30 MHz;RBW=9 kHz,VBW=9 kHz;30 MHz-1000 MHz;RBW=120 kHz,VBW=120 kHz,1000 MHz-20000 MHz;RBW=1 MHz,VBW=1 MHz.

20°C, 29%RH

Site A

No emission was found above 1GHz. Data represents the worst case power settings.

Ext Attn: 0 dB

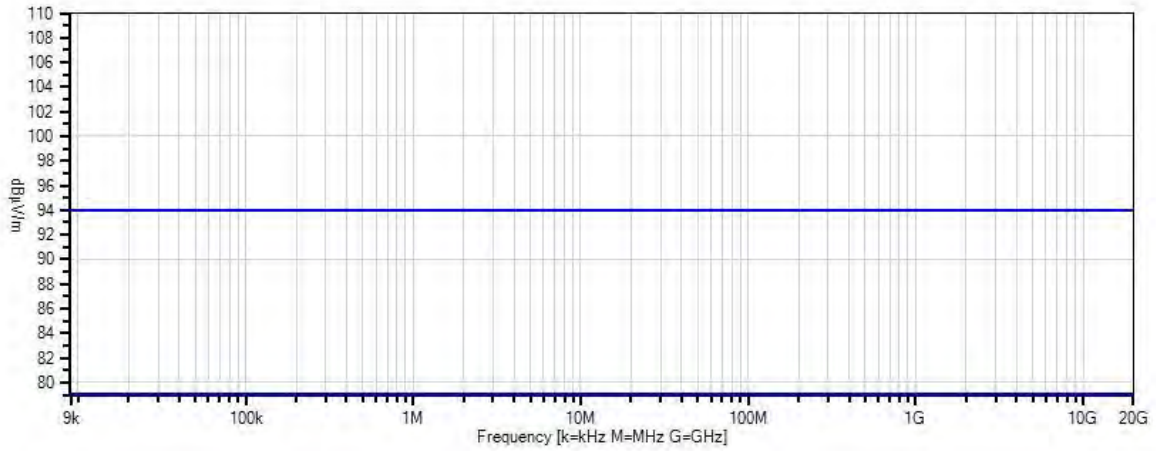
Measurement Data:

Reading listed by margin.

Test Lead: Ant Port

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	dB	dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	639.200k Ave	46.6	+0.0	+0.2			+0.0	46.8	94.0	-47.2	Ant P
									20W LTE 1.4MHz, low CH, input power= -1.12dbm		
2	829.000k Ave	42.0	+0.0	+0.2			+0.0	42.2	94.0	-51.8	Ant P
									20W LTE 1.4MHz, low CH, input power= -1.12dbm		
3	2.672M Ave	36.2	+0.0	+0.1			+0.0	36.3	94.0	-57.7	Ant P
									20W LTE 1.4MHz, low CH, input power= -1.12dbm		
4	54.980k Ave	33.5	+0.0	+0.0			+0.0	33.5	94.0	-60.5	Ant P
									20W LTE 1.4MHz, low CH, input power= -1.12dbm		
5	13.277M Ave	33.2	+0.0	+0.2			+0.0	33.4	94.0	-60.6	Ant P
									20W LTE 1.4MHz, low CH, input power= -1.12dbm		

CKC Laboratories Inc. Date: 12/5/2013 Time: 14:39:38 BTI Wireless WO#: 95156
 24.238 (a) Broadband PCS Conducted Spurious Emission Test Lead: Ant Port 110V 60Hz Sequence#: 4 Ext
 ATTN: 0 dB



- Sweep Data
- Readings
- Peak Readings
- ⊗ QP Readings
- * Average Readings
- ▼ Ambient
- 1 - 24.238 (a) Broadband PCS Conducted Spurious Emission

Test Setup Photos



2.1053 Field Strength of Spurious Radiation

Test Data Sheet

Test Location: CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**
 Specification: **FCC 24.238 (a) Broadband PCS Radiated Spurious Emission**
 Work Order #: **95157** Date: 12/23/2013
 Test Type: **Maximized Emissions** Time: 09:55:27
 Equipment: **1900 MHz 20W Remote Transmitting Unit** Sequence#: 7
 Manufacturer: BTI Wireless Tested By: Don Nguyen
 Model: mBSC1900-020-RUSSF01
 S/N:

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	6/29/2012	6/29/2014
T1	AN00010	Preamp	8447D	3/29/2012	3/29/2014
T2	AN00851	Biconilog Antenna	CBL6111C	5/16/2012	5/16/2014
T3	ANP04382	Cable	LDf-50	8/30/2012	8/30/2014
T4	ANP05555	Cable	RG223/U	6/19/2012	6/19/2014
T5	ANP05569	Cable	RG-214/U	6/19/2012	6/19/2014
	AN02672	Spectrum Analyzer	E4446A	9/4/2012	9/4/2014
	AN02945	Cable	32022-2-2909K-36TC	10/30/2013	10/30/2015
	AN00787	Preamp	83017A	5/31/2013	5/31/2015
	AN01646	Horn Antenna	3115	4/13/2012	4/13/2014
	ANP06360	Cable	L1-PNMMN-48	8/29/2012	8/29/2014
	AN01413	Horn Antenna-ANSI C63.5 (dB/m)	84125-80008	11/9/2012	11/9/2014

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
1900 MHz 20W Remote Transmitting Unit*	BTI Wireless	mBSC1900-020-RUMF01	10035302000113111001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601
Attenuator 30db Pad	Weinschel	49-30-43	KW075
Attenuator 20db Pad	Weinschel	33-20-24	BJ7479
50 ohm Load	Generic	NA	NA
RF to Fiber Optic Converter	BTI Wireless	mBSC9351-HU	mBSC9351HU-11021029
50 ohm Load	Generic	NA	NA
Power Sensor	Agilent	E4412A	MY41502826
Power Meter	HP	EPM-441A	GB37170458

Test Conditions / Notes:

The EUT is mounted on metal stand. RF to Fiber Optic Converter Tx1 In is connected to an ESG Signal generator located remotely. Fiber-1 port from the converter is connected to fiber port of EUT. ANT port of the EUT is connected to support power meter via 30db attenuator and 20db attenuator. TX out and RX in port are terminated to 50 ohm loads.

Power meter is used to verify output power at antenna port.

Freq: 1930 - 1990MHz

Signal protocol: GSM, EDGE, CDMA IS95A, UMTS WCDMA 3GPP, LTE 1.4MHz, 5MHz, 20MHz.

Highest rating power : 20 W

Frequency range of measurement = 9 kHz- 20GHz.

9 kHz -150 kHz;RBW=200 Hz,VBW=200 Hz;150 kHz-30 MHz;RBW=9 kHz,VBW=9 kHz;30 MHz-1000 MHz;RBW=120 kHz,VBW=120 kHz,1000 MHz-20000 MHz;RBW=1 MHz,VBW=1 MHz.

19°C, 63%Relative Humidity

Site D

No emission found above 1GHz. Data is presented in the worst case scenario.

Operating Frequency: 1930-1990MHz
Channels: LTE 1.4MHz Low CH
Highest Measured Output
Power: 43.00 (dBm)= 20 (Watts)
Distance: 3 meters
Limit: 43+10Log(P)= 56.01 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
253.05	-61.31029996	Horiz	104.31
253.05	-68.61029996	Vert	111.61
273.05	-65.41029996	Horiz	108.41
273.05	-65.71029996	Vert	108.71

Test Setup Photos



Band Edge

Test Conditions / Setup

Test Location: CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**
 Specification: **Band Edge Plots**
 Work Order #: **95156** Date: 12/5/2013
 Test Type: **Conducted Emissions** Time: 14:39:38
 Equipment: **1900 MHz 20W Remote Transmitting Unit** Sequence#: 4
 Manufacturer: BTI Wireless Tested By: Don Nguyen
 Model: mBSC1900-020-RUMF01 110V 60Hz
 S/N: 10035302000113111001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03239	Cable	32022-2-29094K-24TC	10/30/2013	10/30/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
1900 MHz 20W Remote Transmitting Unit*	BTI Wireless	mBSC1900-020-RUMF01	10035302000113111001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601
Attenuator 30db Pad	Weinschel	49-30-43	KW075
Step Attenuator 110db pad	HP	8496B	1350A01241
50 ohm Load	Generic	NA	NA
Cable	Pasternack	Sucoflex 104A	12237/4A
50 ohm Load	Generic	NA	NA

Test Conditions / Notes:

The EUT is placed on the test bench. RF to Fiber Optic Converter Tx1 In is connected to an ESG Signal generator via cable Sucoflex 104A. Fiber-1 port from the converter is connected to fiber port of EUT. ANT port of the EUT is connected to 30db attenuator and 110db step attenuator. A spectrum analyzer is connected to attenuators via cable 32022-2-29094K-24TC. TX out and RX in port are terminated to 50 ohm loads.

Per manufacturer, the output frequency is independent of the components used in optical converter.

EUT is a Fixed Gain Amplifier with fixed output power as set by ALC (Auto Level Control) Threshold level of 1±0.5dB higher than maximum rated output power.

The evaluation is performed at the antenna port.

Freq: 1930-1990MHz
 Signal protocol: GSM, EDGE, CDMA IS95A, UMTS WCDMA 3GPP, LTE 1.4MHz, 5MHz, 20MHz.

The RF output power was measured with the following power settings:

20W

Modulation	Input Power (dbm)
------------	-------------------

GSM

1931.93MHz	-1.57
------------	-------

1960MHz	-2
---------	----

1988.07MHz	-1.58
------------	-------

EDGE

1931.93MHz	-1.36
------------	-------

1960MHz	-2.06
---------	-------

1988.07MHz	-1.56
------------	-------

CDMA (IS95A)

1932.36MHz	-1.28
------------	-------

1960MHz	-2.04
---------	-------

1987.64MHz	-1.68
------------	-------

UMTS (WCDMA_3GPP)

1933.75MHz	-1.48
------------	-------

1960MHz	-2.14
---------	-------

1986.25MHz	-1.98
------------	-------

LTE 1.4MHz

1932.35MHz	-1.12
------------	-------

1960MHz	-2.08
---------	-------

1987.65MHz	-1.72
------------	-------

LTE 5MHz

1933.95MHz	-1.48
------------	-------

1960MHz	-2.1
---------	------

1986.05MHz	-1.8
------------	------

LTE 20MHz

1940.7MHz	-2.16
-----------	-------

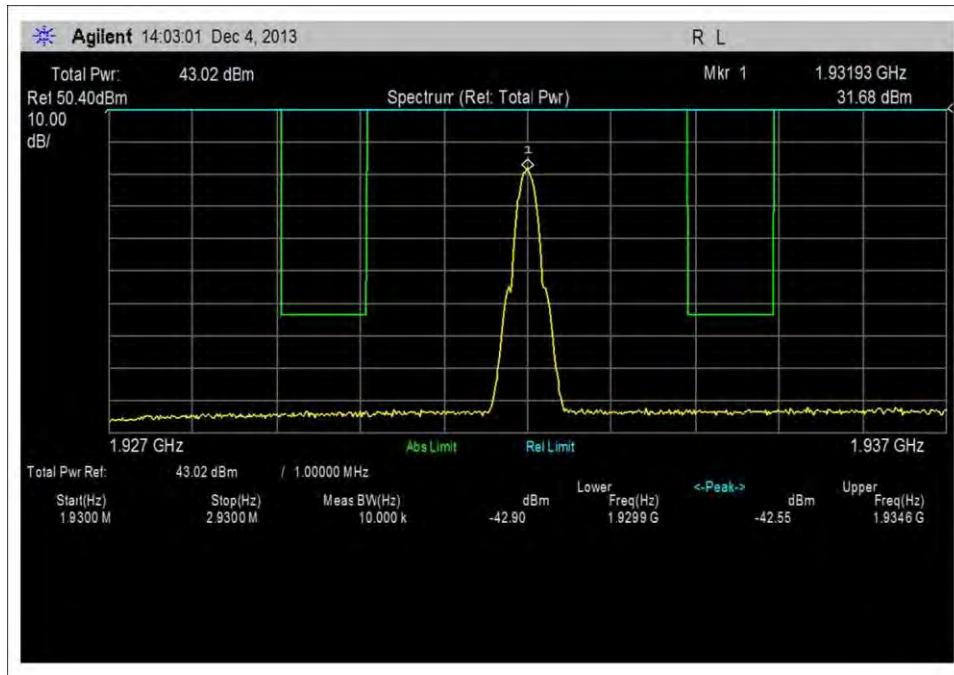
1960MHz	-2.28
---------	-------

1979.3MHz	-2.28
-----------	-------

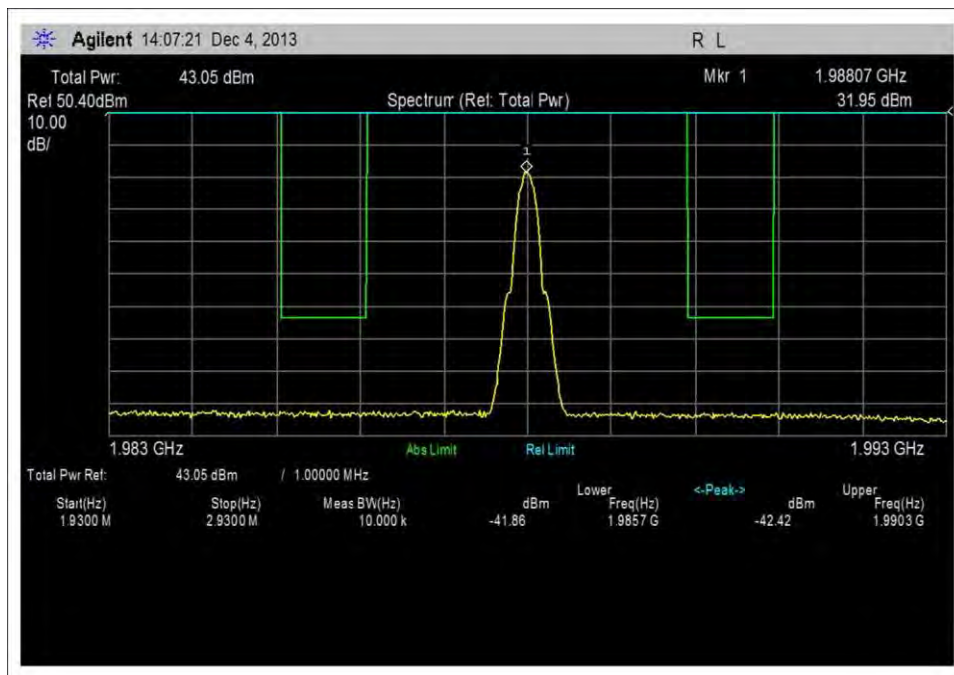
20°C, 29%RH

Site A

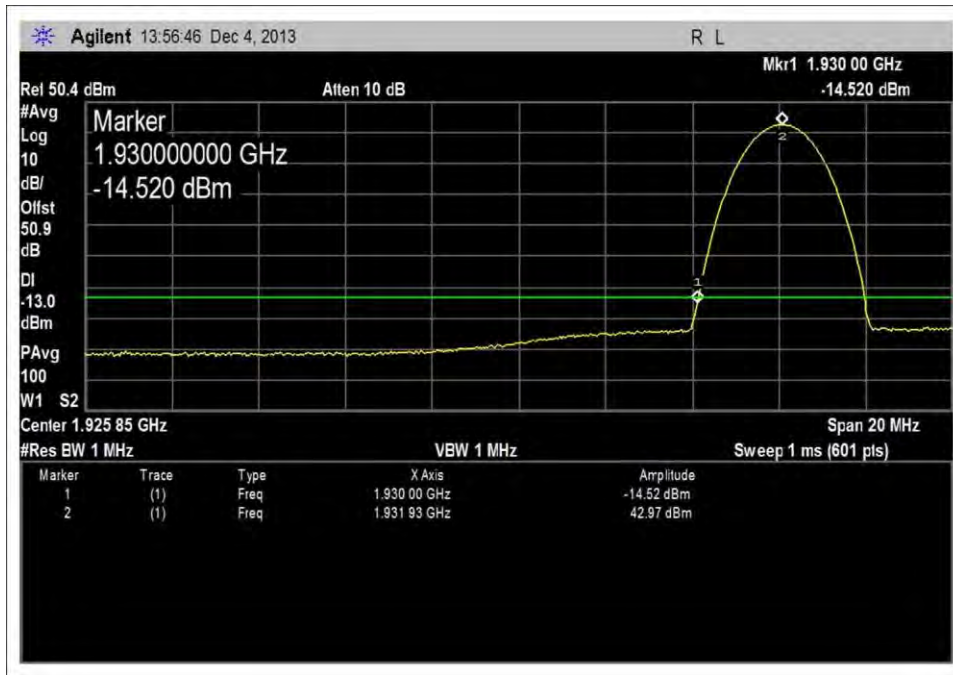
Test Data



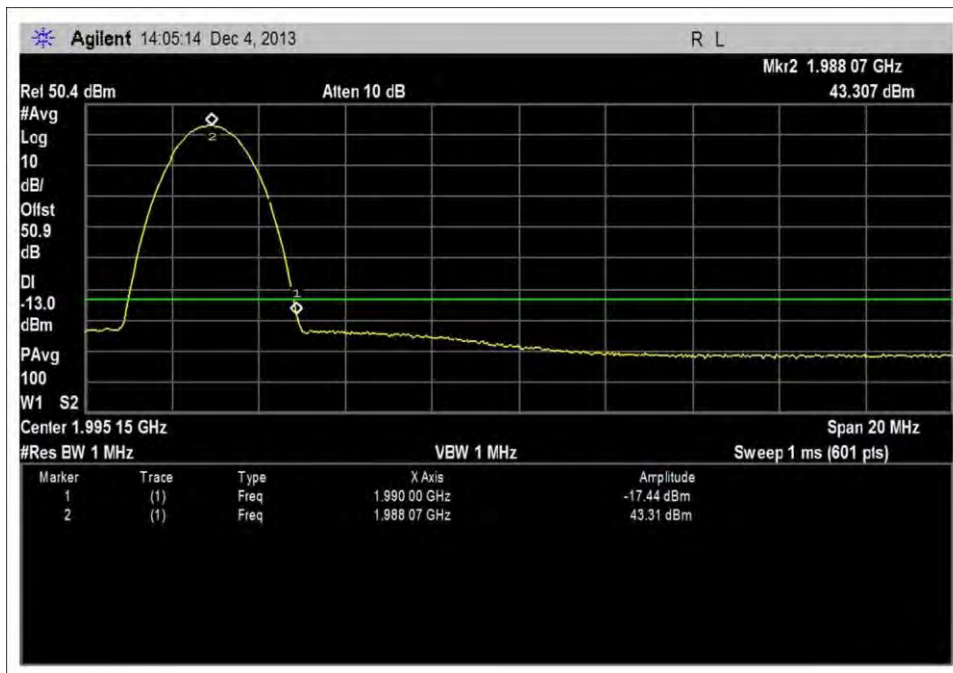
10kHz, GSM - Low



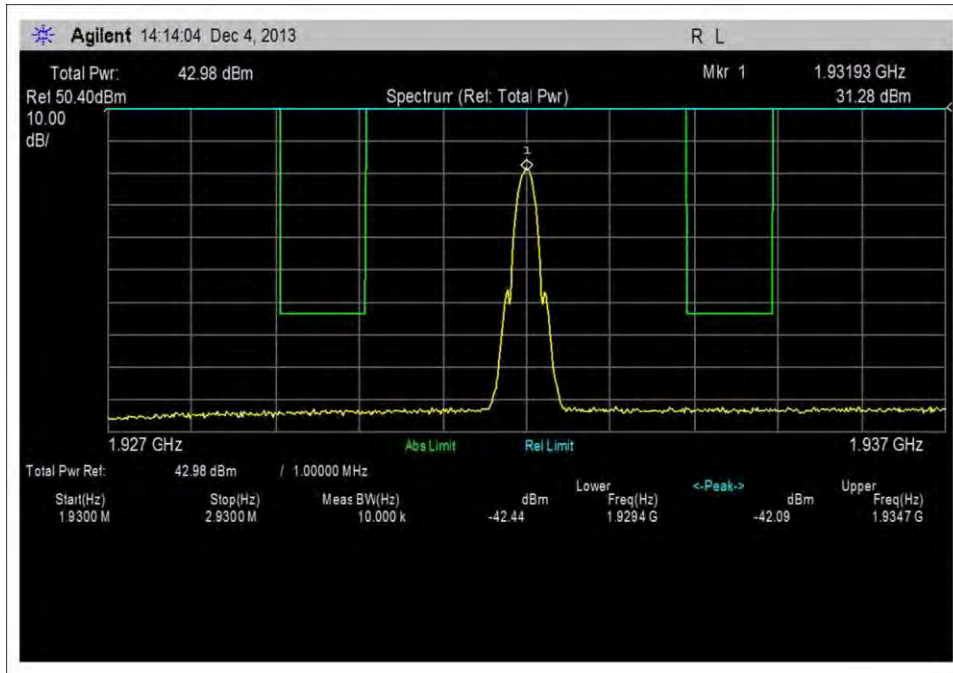
10kHz, GSM - High



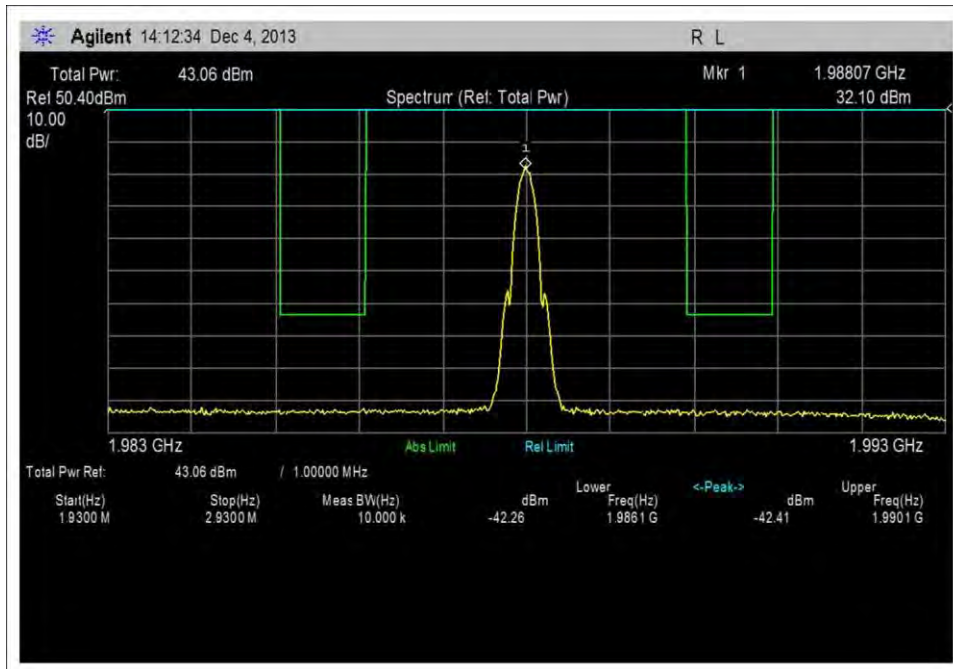
1MHz, GSM – Low



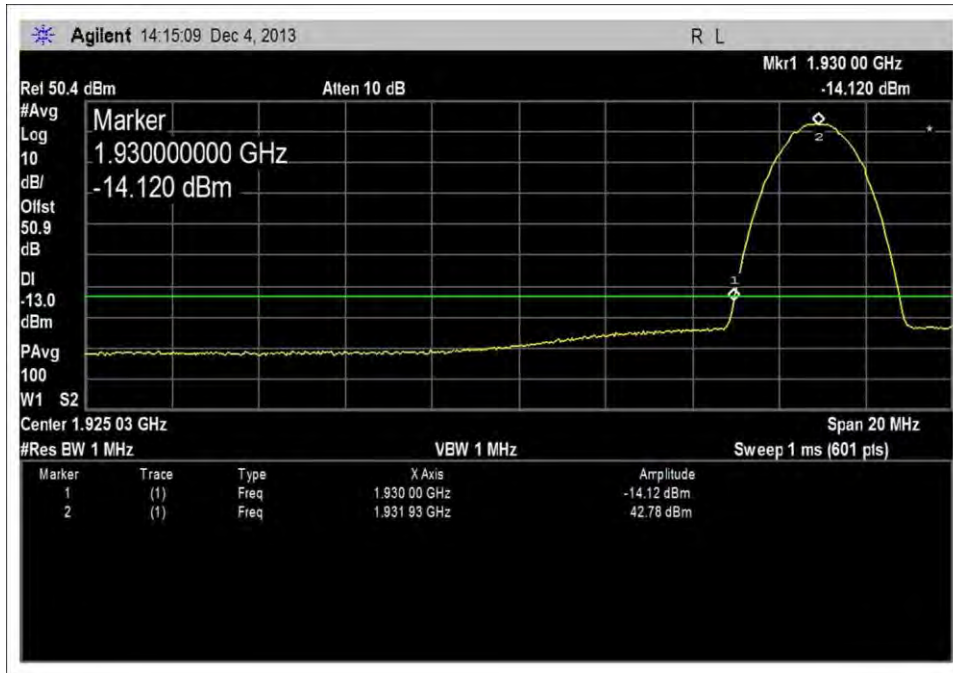
1MHz, GSM - High



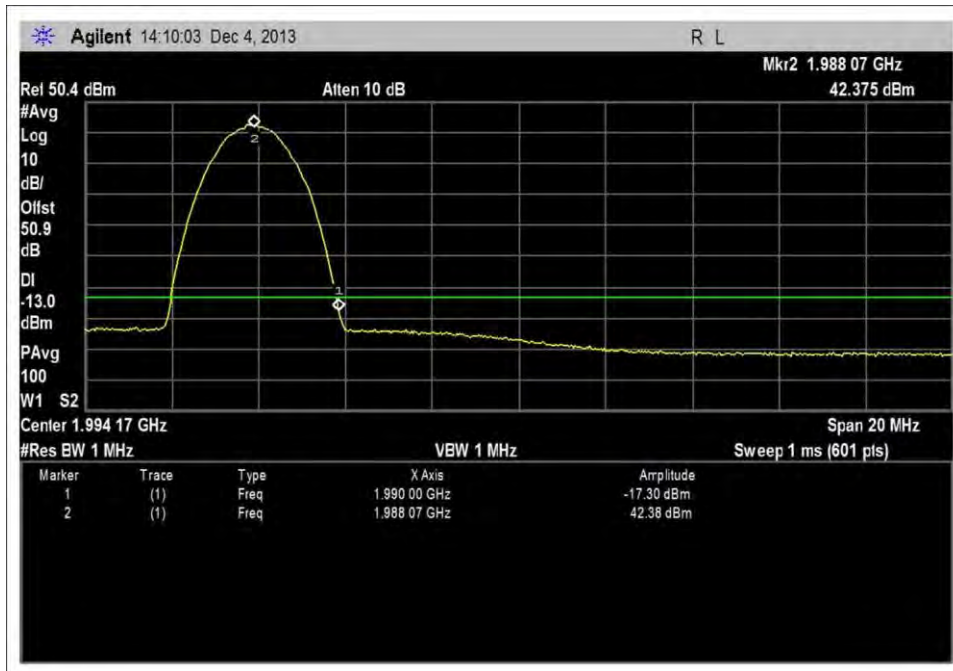
10kHz, EDGE – Low



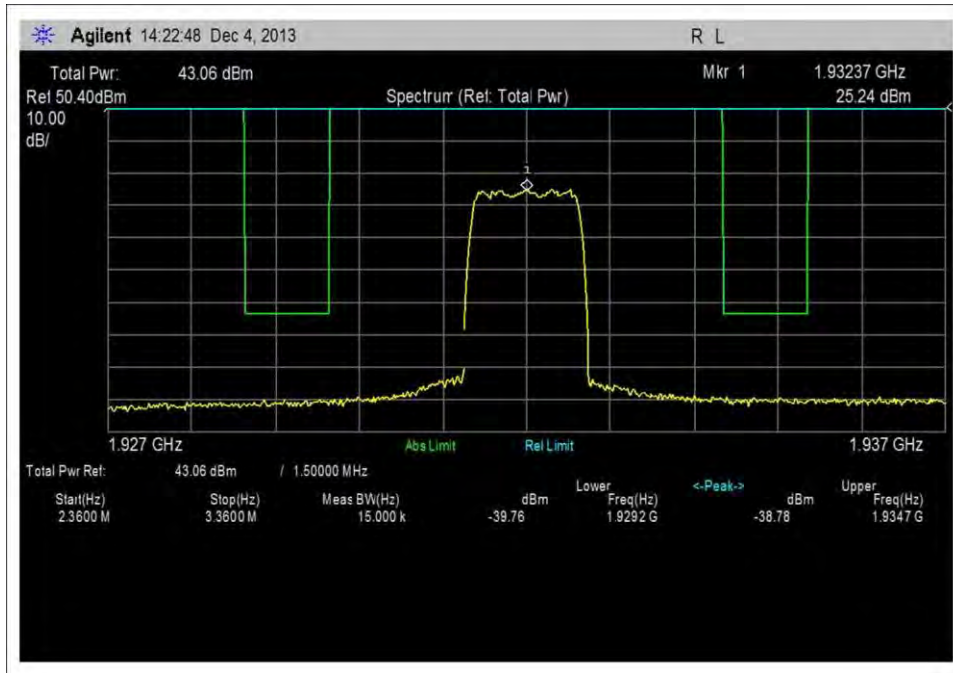
10kHz, EDGE - High



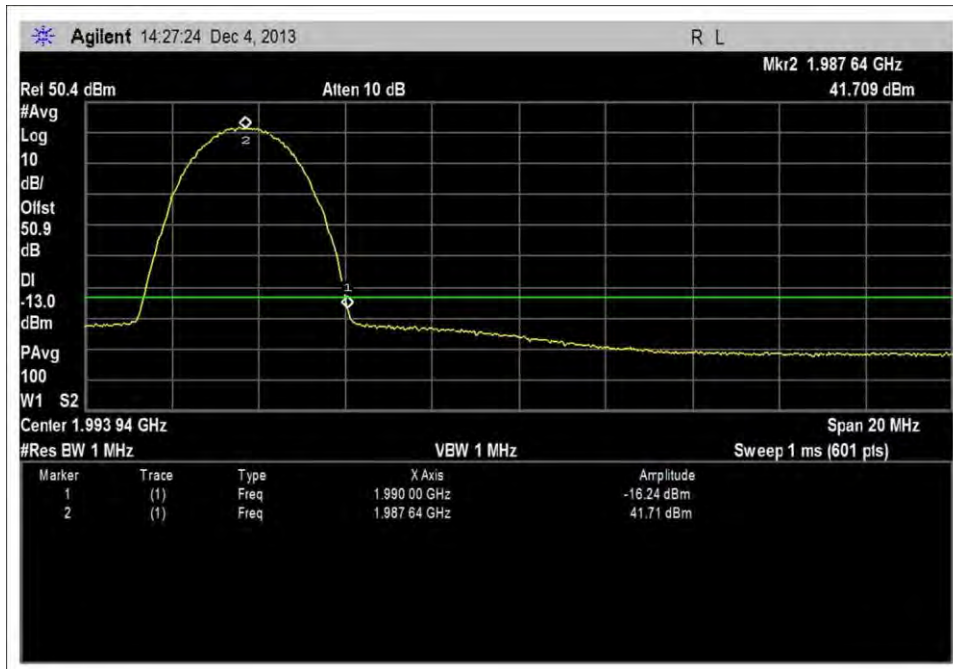
1MHz, EDGE – Low



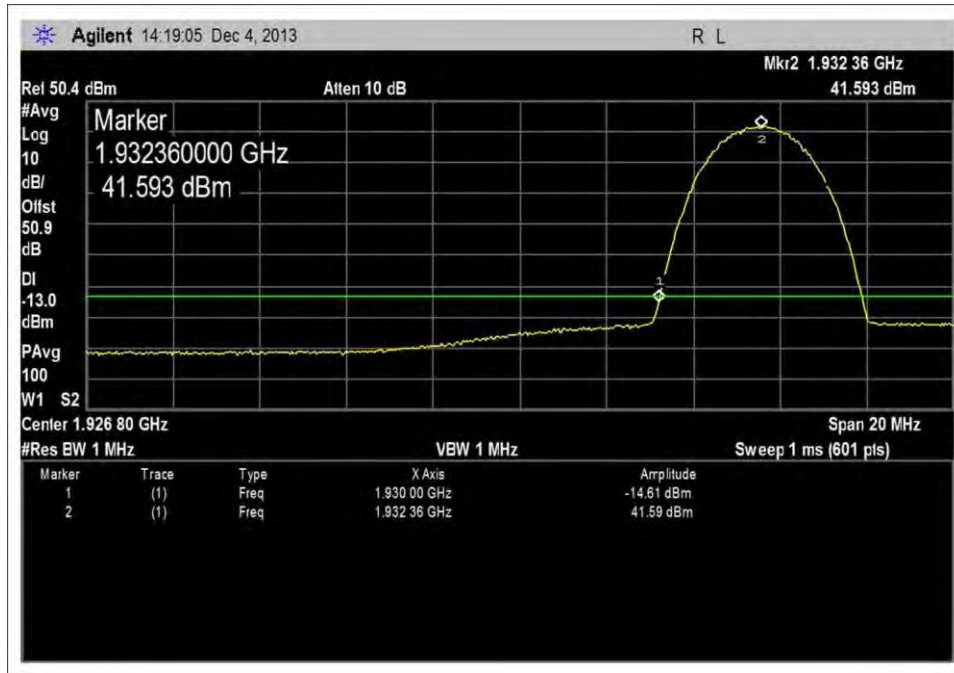
1MHz, EDGE – High



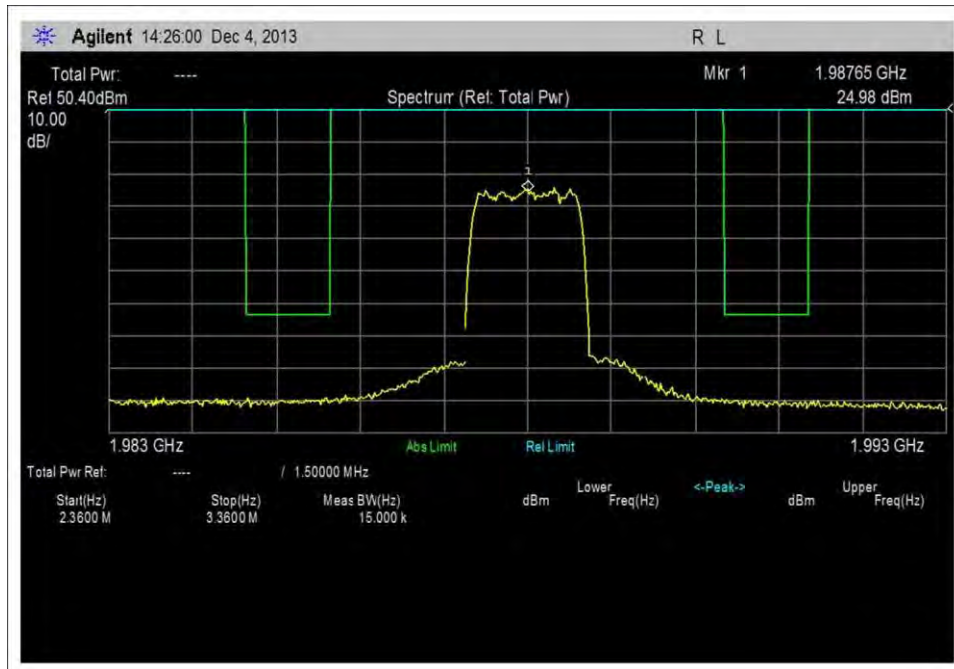
15kHz, CDMA – Low



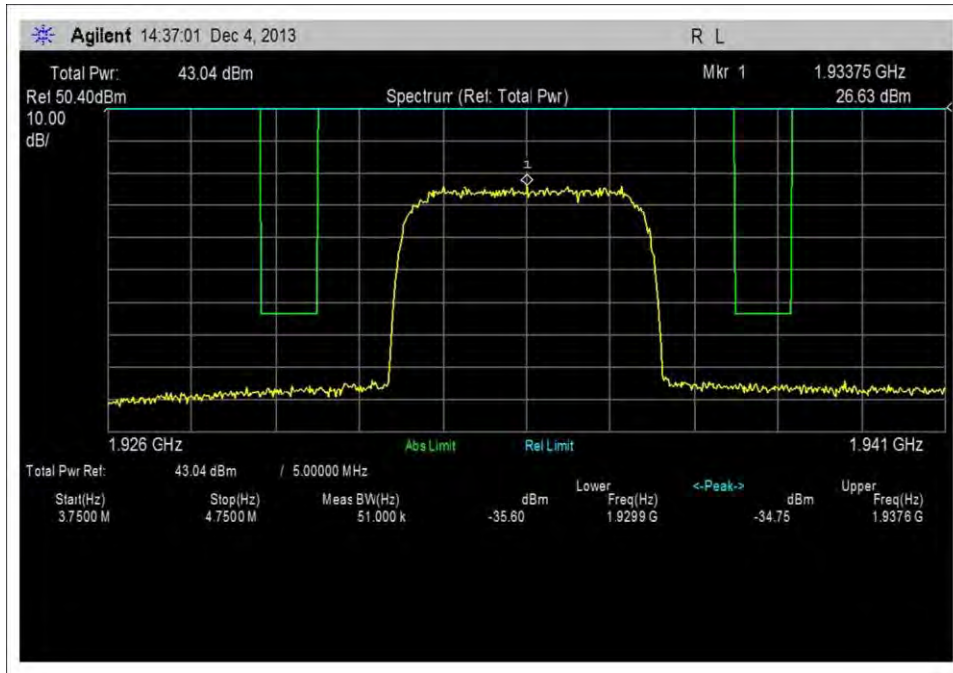
15kHz, CDMA - High



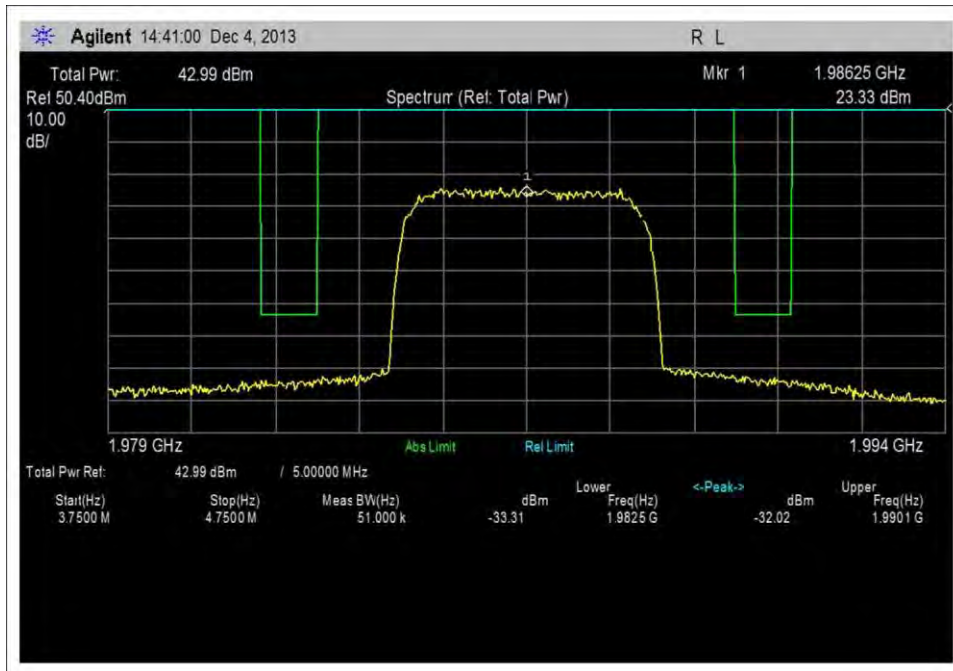
1MHz, CDMA – Low



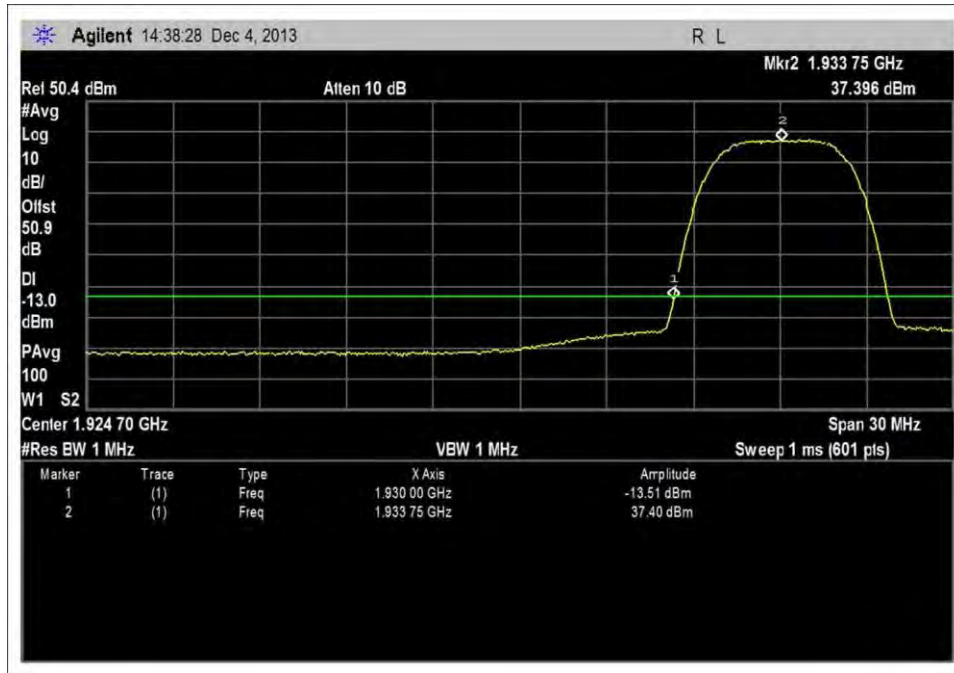
1MHz, CDMA - High



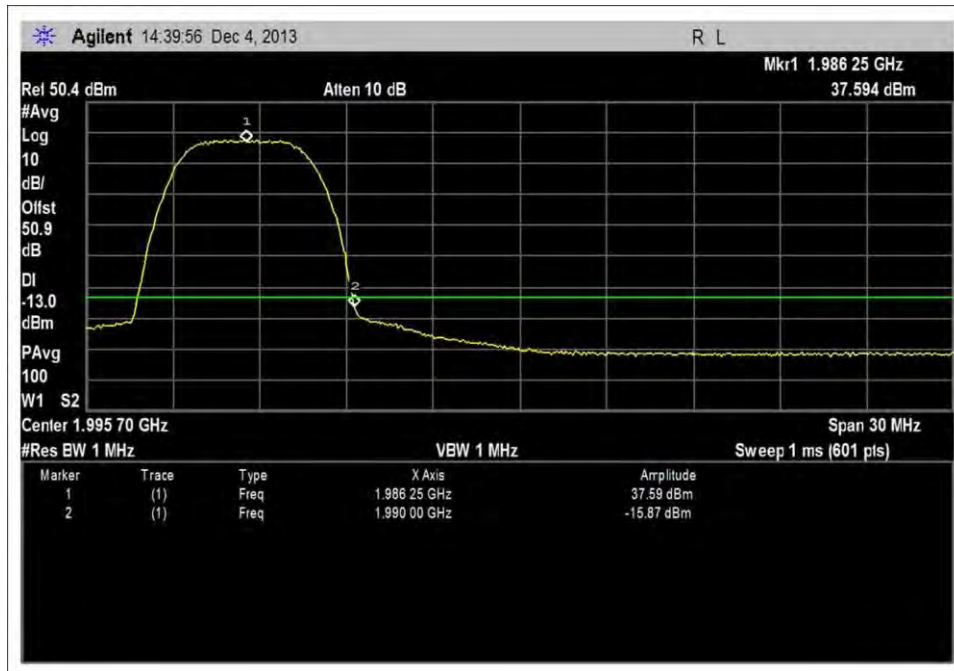
51kHz, WCDMA – Low



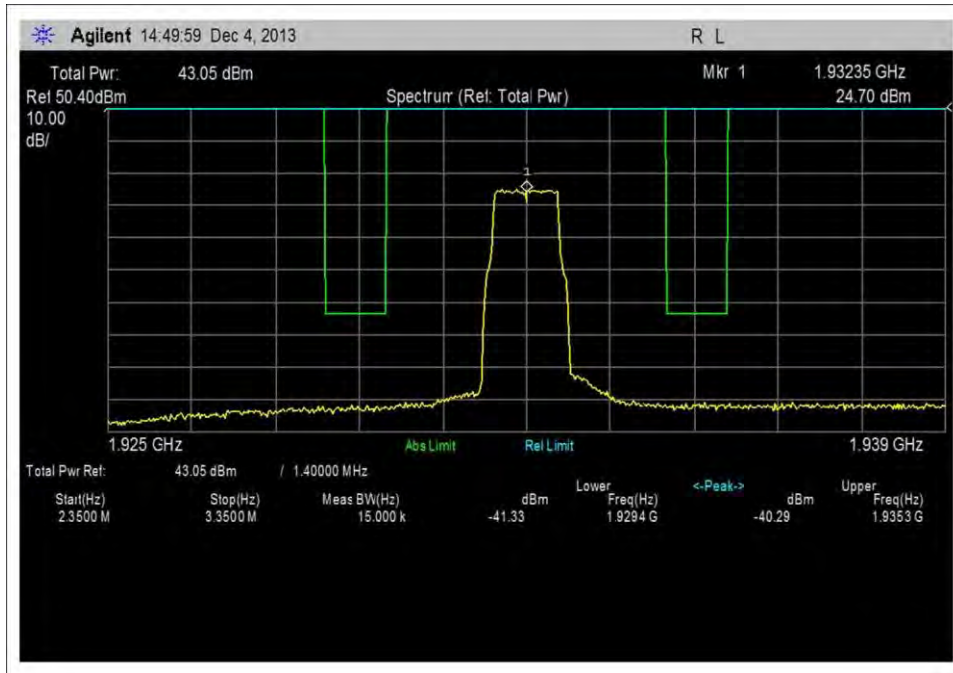
51kHz, WCDMA - High



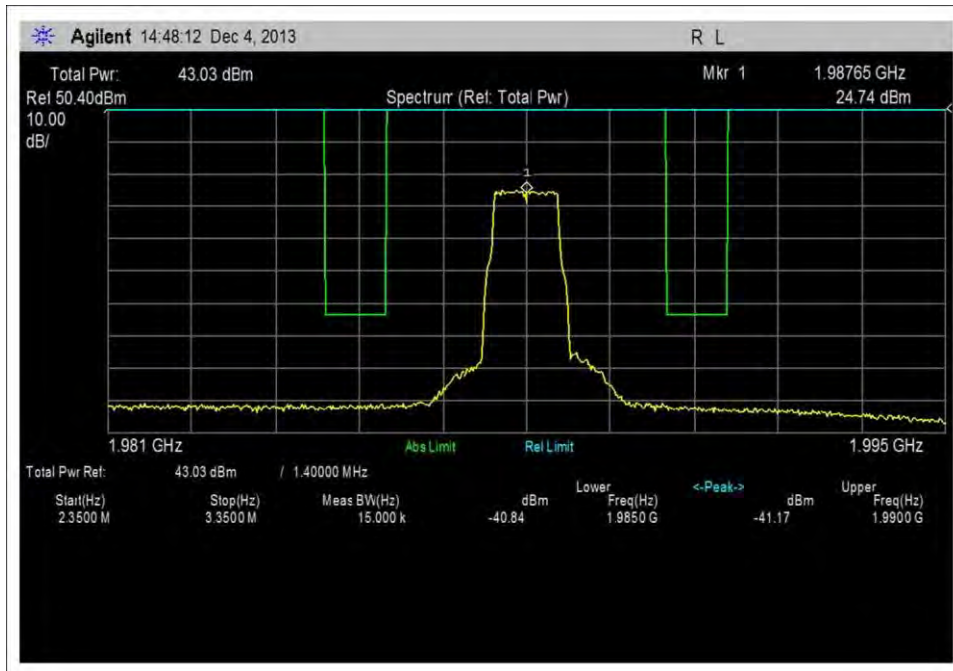
1MHz, WCDMA – Low



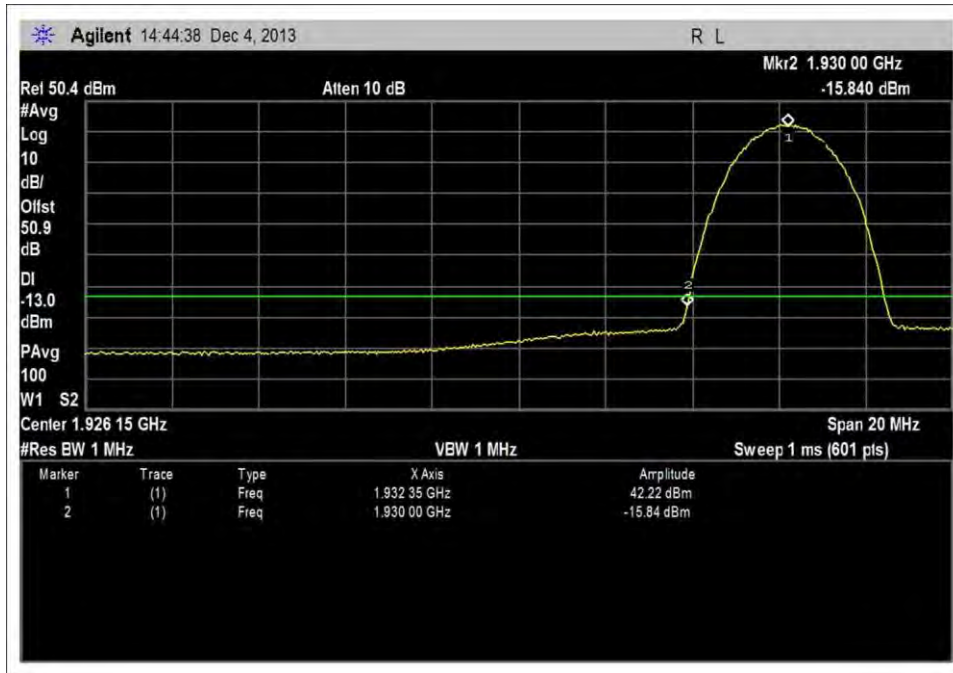
1MHz, WCDMA - High



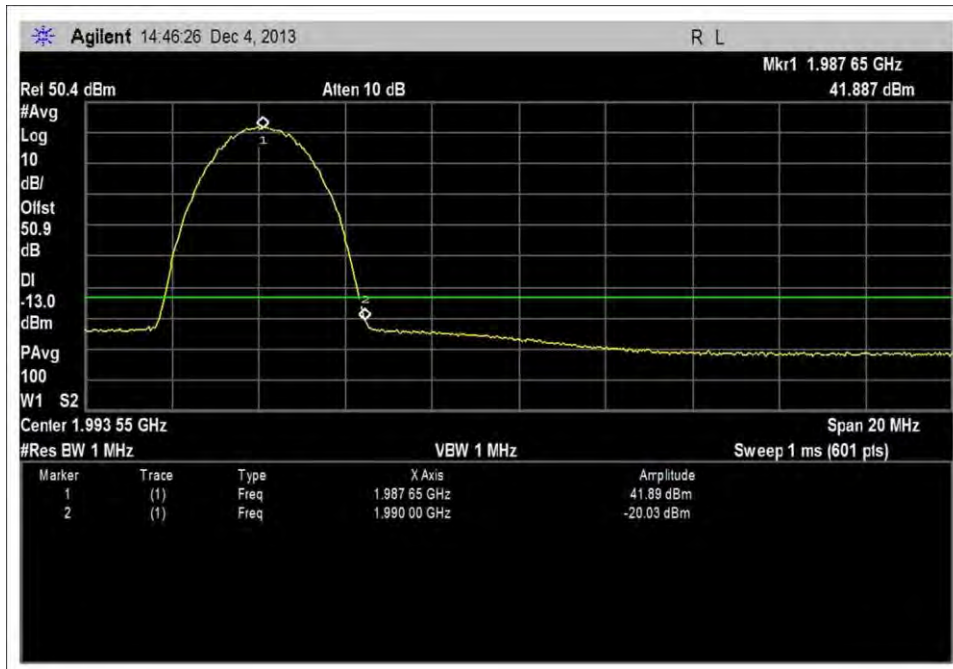
15kHz, LTE 1.4MHz – Low



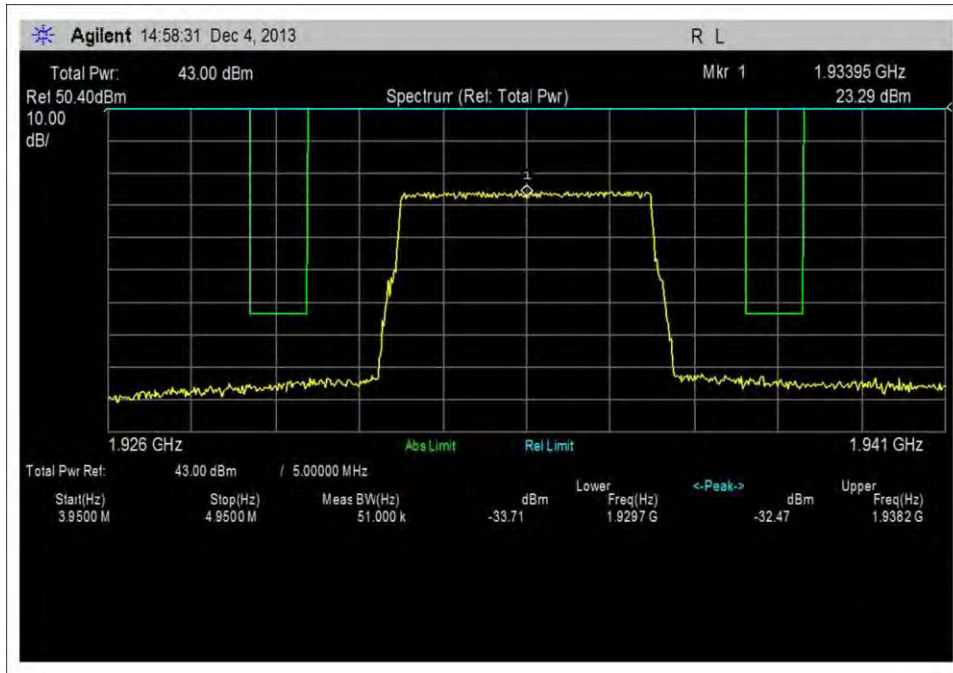
15kHz, LTE 1.4MHz - High



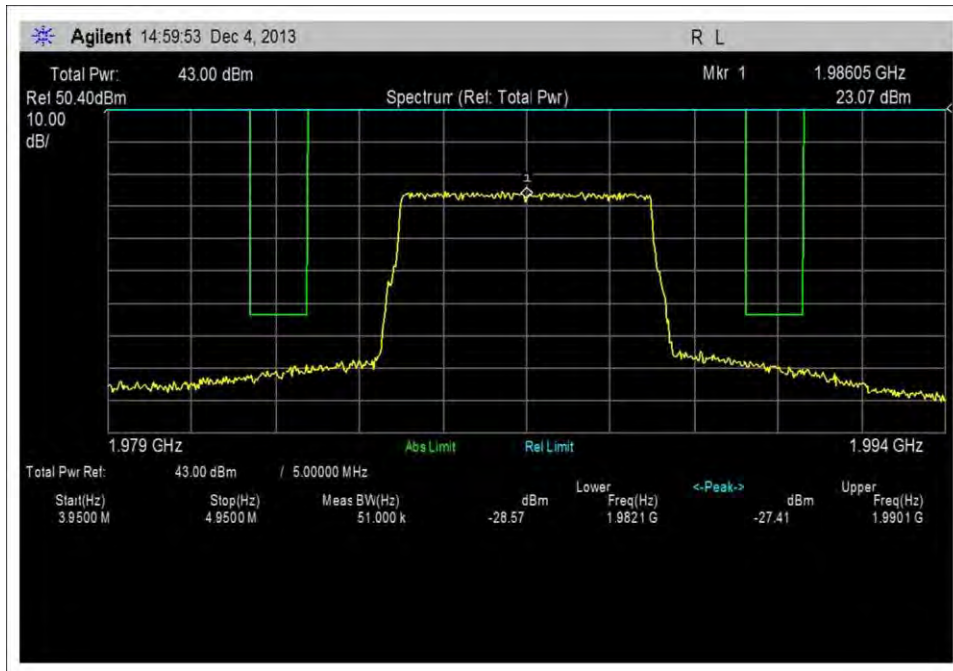
1MHz, LTE 1.4MHz – Low



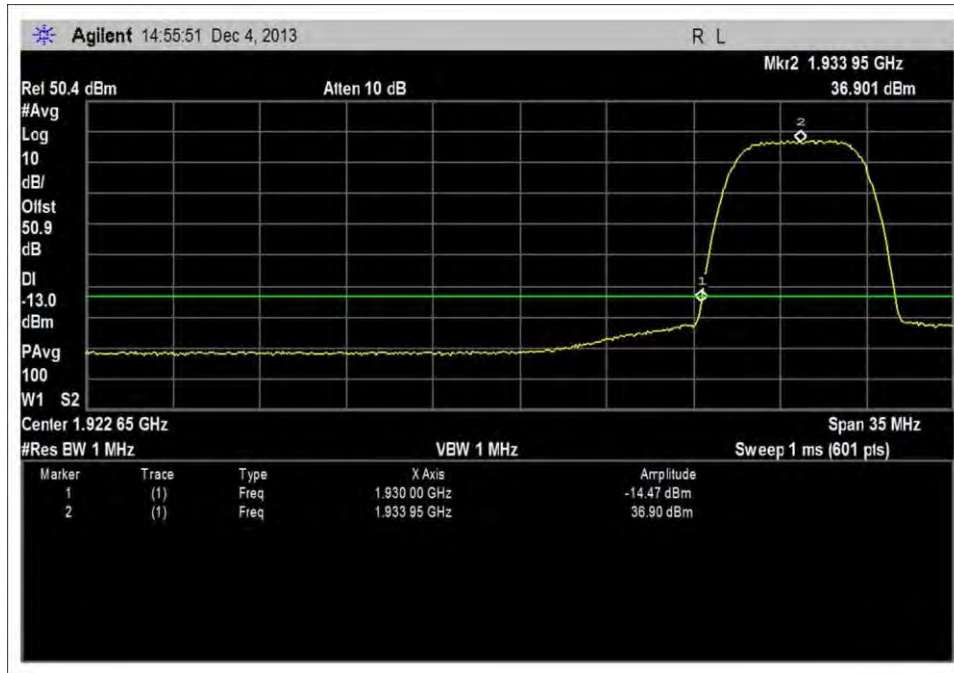
1MHz, LTE 1.4MHz - High



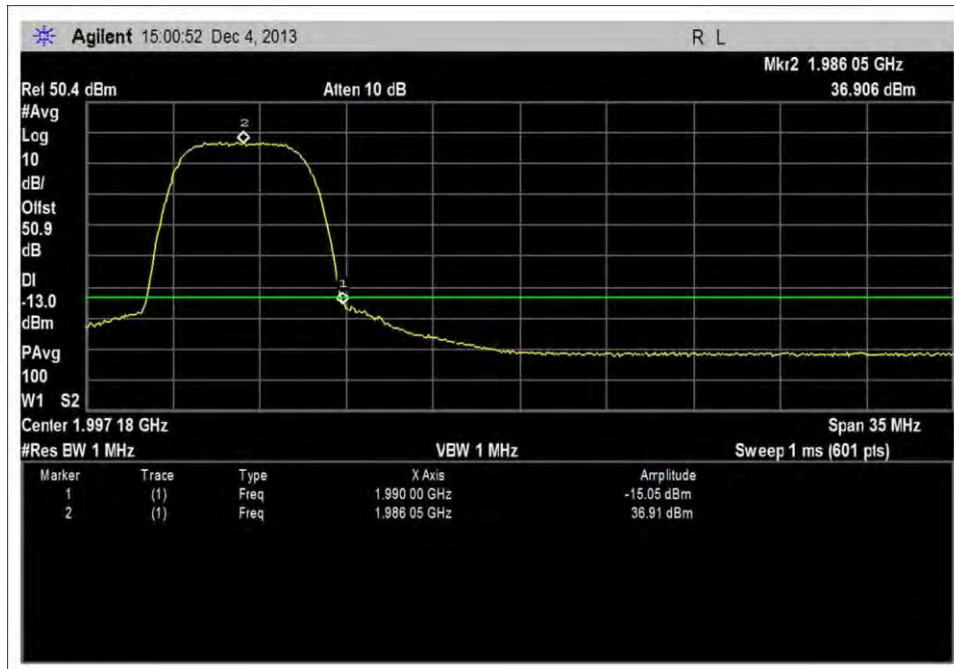
51kHz, LTE 5MHz - Low



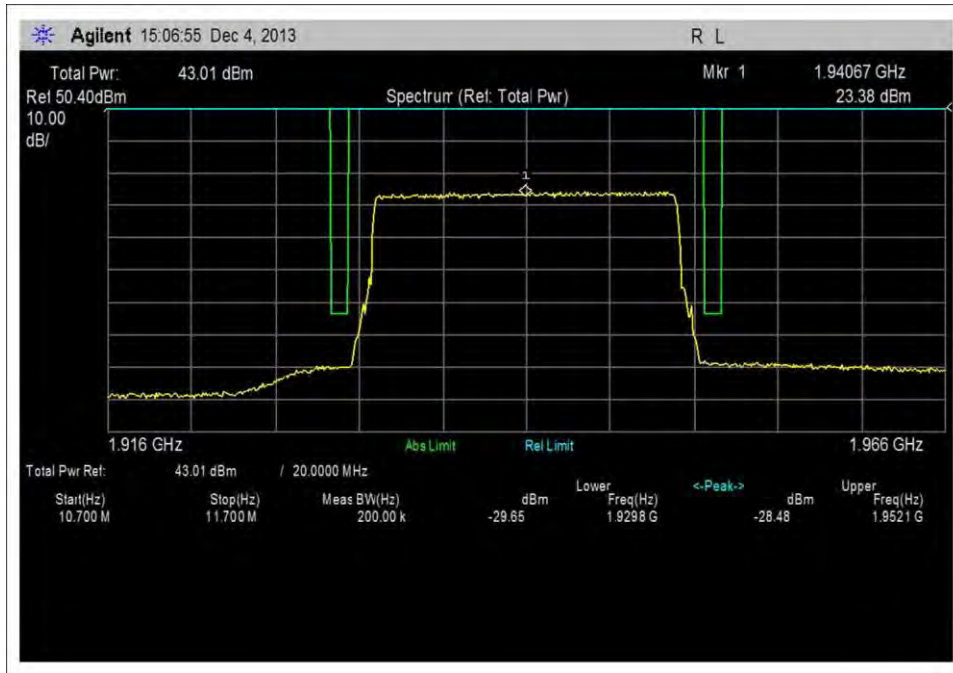
51kHz, LTE 5MHz - High



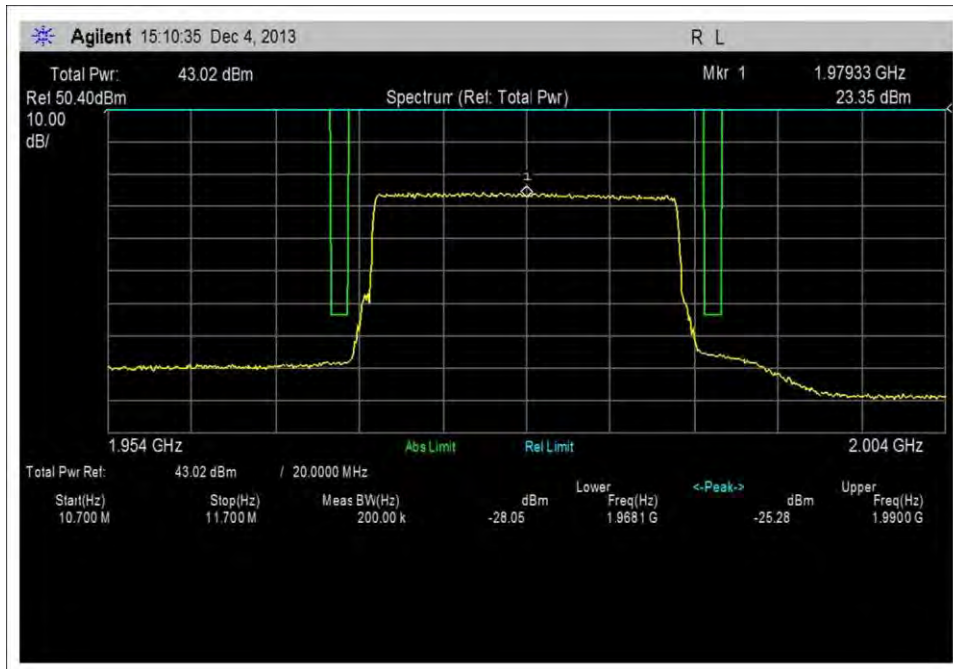
1MHz, LTE 5MHz – Low



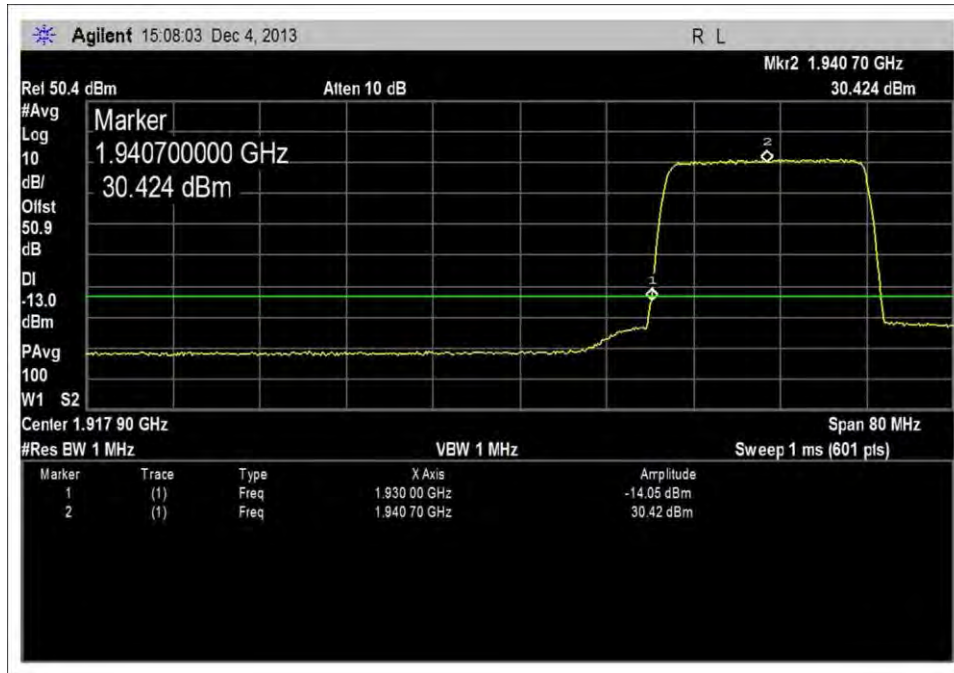
1MHz, LTE 5MHz - High



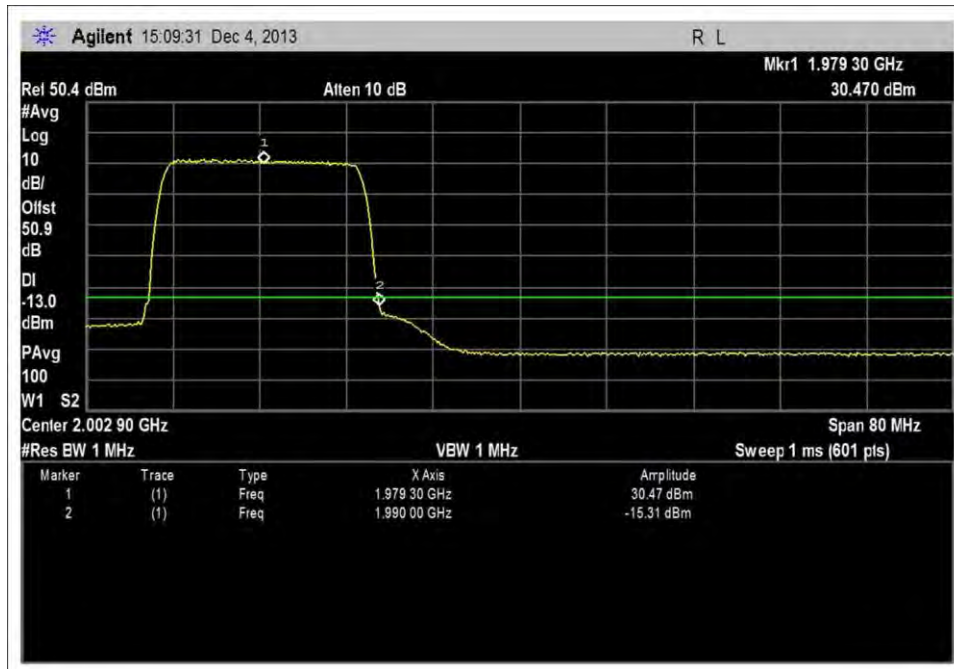
200kHz, LTE 20MHz – Low



200kHz, LTE 20MHz - High



1MHz, LTE 20MHz – Low



1MHz, LTE 20MHz - High

Test Setup Photos



Test Setup

Intermodulation

Test Conditions / Setup

Test Location: CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**

Specification: **Intermodulation Plots**

Work Order #: **95156**

Date: 12/5/2013

Test Type: **Conducted Emissions**

Time: 14:39:38

Equipment: **1900 MHz 20W Remote Transmitting Unit**

Sequence#: 4

Manufacturer: BTI Wireless

Tested By: Don Nguyen

Model: mBSC1900-020-RUMF01

110V 60Hz

S/N: 10035302000113111001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03239	Cable	32022-2-29094K-24TC	10/30/2013	10/30/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
1900 MHz 20W Remote Transmitting Unit*	BTI Wireless	mBSC1900-020-RUMF01	10035302000113111001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601
Attenuator 30db Pad	Weinschel	49-30-43	KW075
Step Attenuator 110db pad	HP	8496B	1350A01241
50 ohm Load	Generic	NA	NA
Cable	Pasternack	Sucoflex 104A	12237/4A
50 ohm Load	Generic	NA	NA
Power Divider	Anaren	44000	NA

Test Conditions / Notes:

The EUT is placed on the test bench. Tx In of Fiber Optic Converter is connected to two ESGs via a power divider. Fiber-1 port from the converter is connected to fiber port of EUT. ANT port of the EUT is connected to 30db attenuator and 110db step attenuator. A spectrum analyzer is connected to attenuators via cable 32022-2-29094K-24TC. TX out and RX in port are terminated to 50 ohm loads.

Per manufacturer, the output frequency is independent of the components used in optical converter.

EUT is a Fixed Gain Amplifier with fixed output power as set by ALC (Auto Level Control) Threshold level of 1±0.5dB higher than maximum rated output power.

The evaluation is performed at the antenna port .

Freq: 1930-1990MHz

Signal protocol: GSM, EDGE, CDMA IS95A, UMTS WCDMA 3GPP, LTE 1.4MHz, 5MHz, 20MHz.

The RF output power was measured with the following power settings:

20W

Modulation	Input Power (dbm)
------------	-------------------

GSM

1931.93MHz	-1.57
------------	-------

1960MHz	-2
---------	----

1988.07MHz	-1.58
------------	-------

EDGE

1931.93MHz	-1.36
------------	-------

1960MHz	-2.06
---------	-------

1988.07MHz	-1.56
------------	-------

CDMA (IS95A)

1932.36MHz	-1.28
------------	-------

1960MHz	-2.04
---------	-------

1987.64MHz	-1.68
------------	-------

UMTS (WCDMA_3GPP)

1933.75MHz	-1.48
------------	-------

1960MHz	-2.14
---------	-------

1986.25MHz	-1.98
------------	-------

LTE 1.4MHz

1932.35MHz	-1.12
------------	-------

1960MHz	-2.08
---------	-------

1987.65MHz	-1.72
------------	-------

LTE 5MHz

1933.95MHz	-1.48
------------	-------

1960MHz	-2.1
---------	------

1986.05MHz	-1.8
------------	------

LTE 20MHz

1940.7MHz	-2.16
-----------	-------

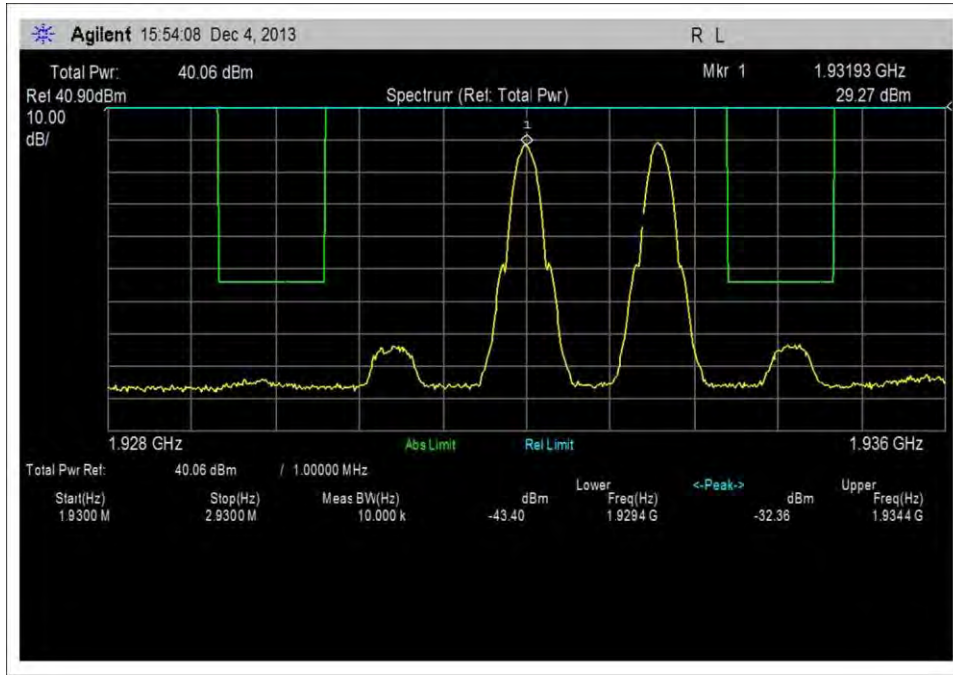
1960MHz	-2.28
---------	-------

1979.3MHz	-2.28
-----------	-------

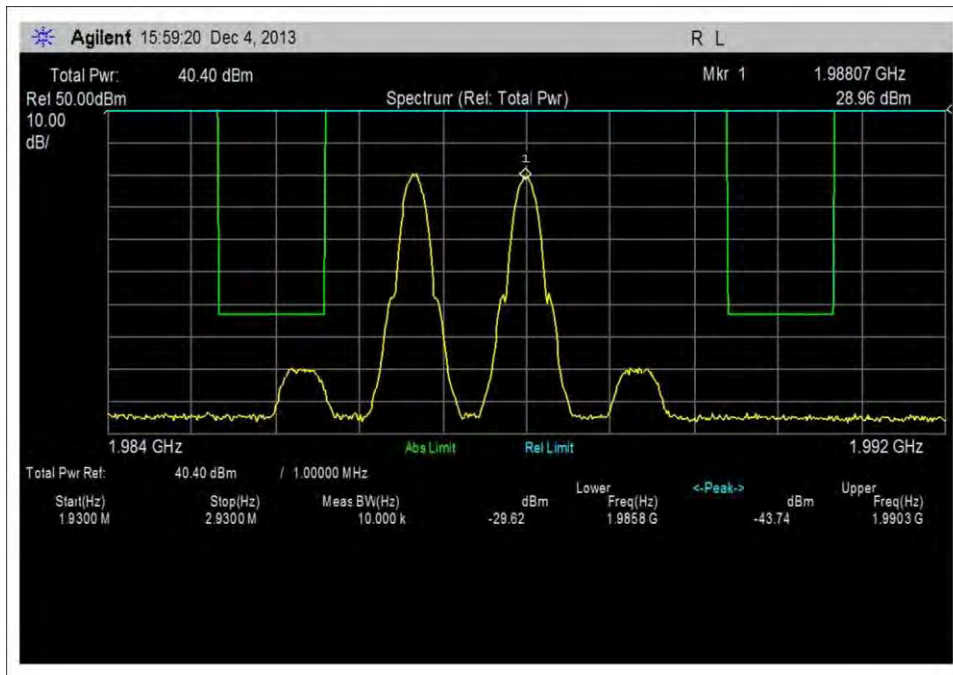
20°C, 29%Relative Humidity

Site A

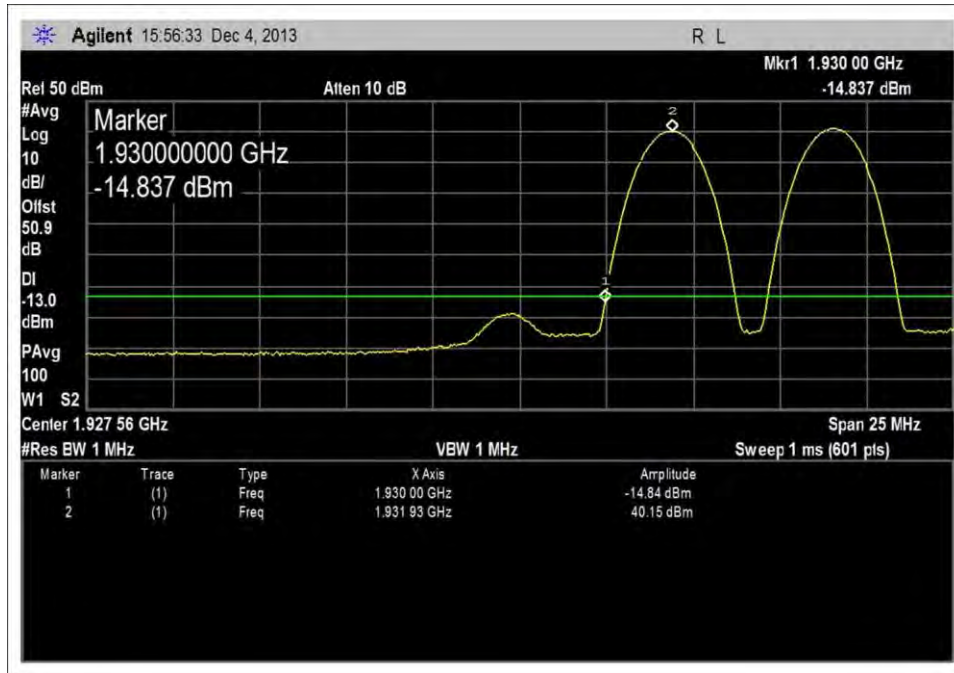
Test Data



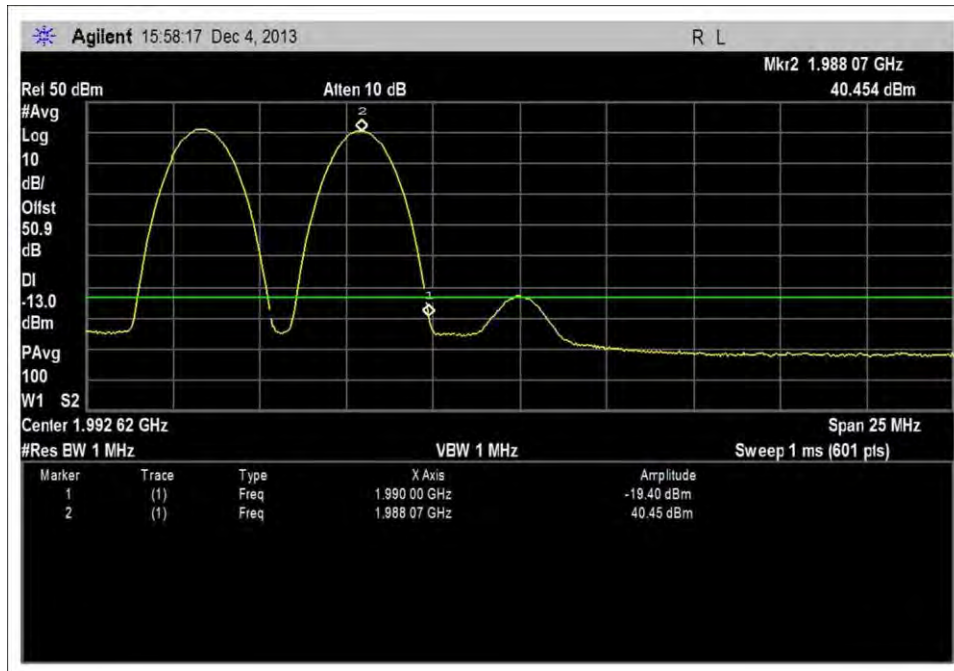
10kHz, GSM - Low



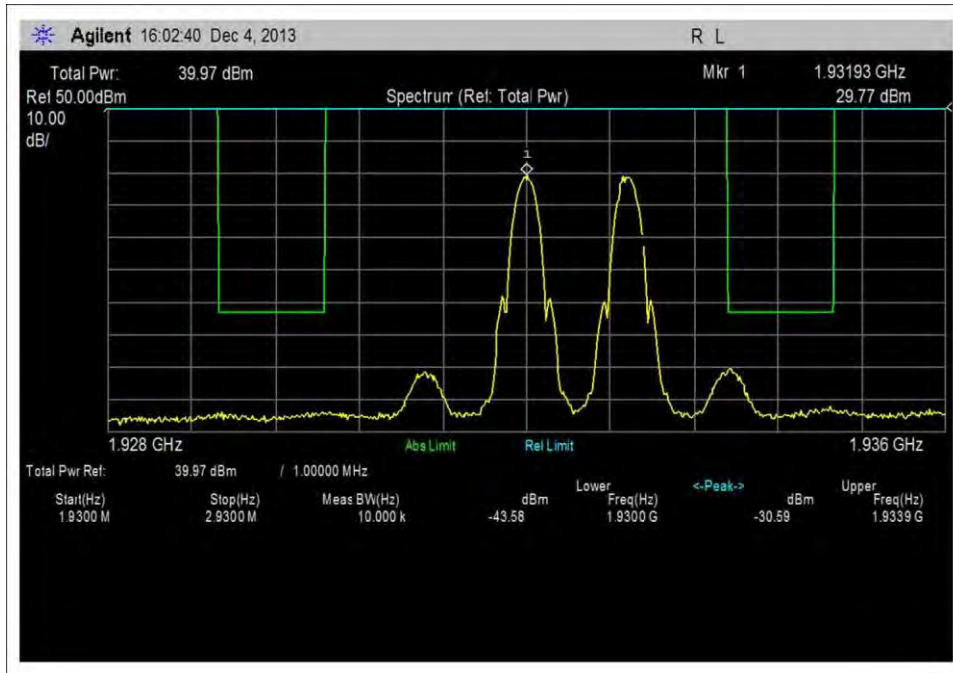
10kHz, GSM - High



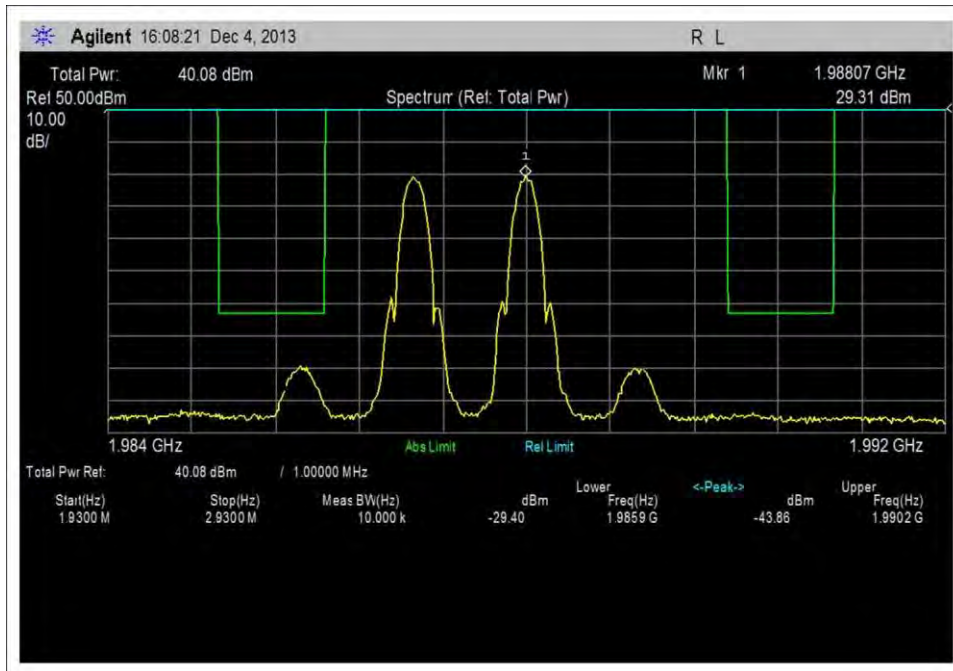
1MHz, GSM – Low



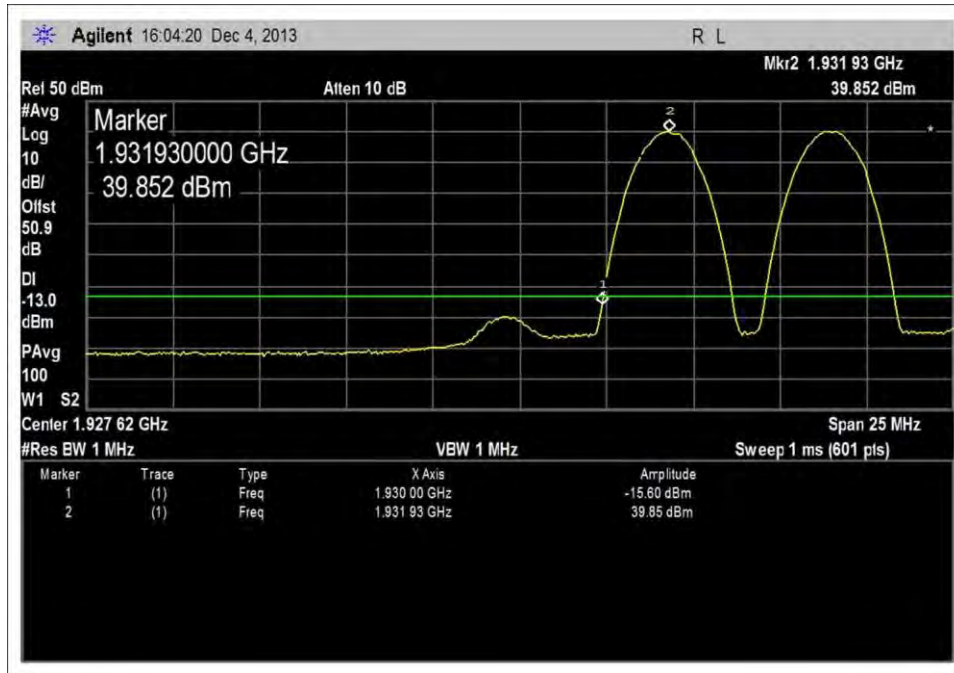
1MHz, GSM – High



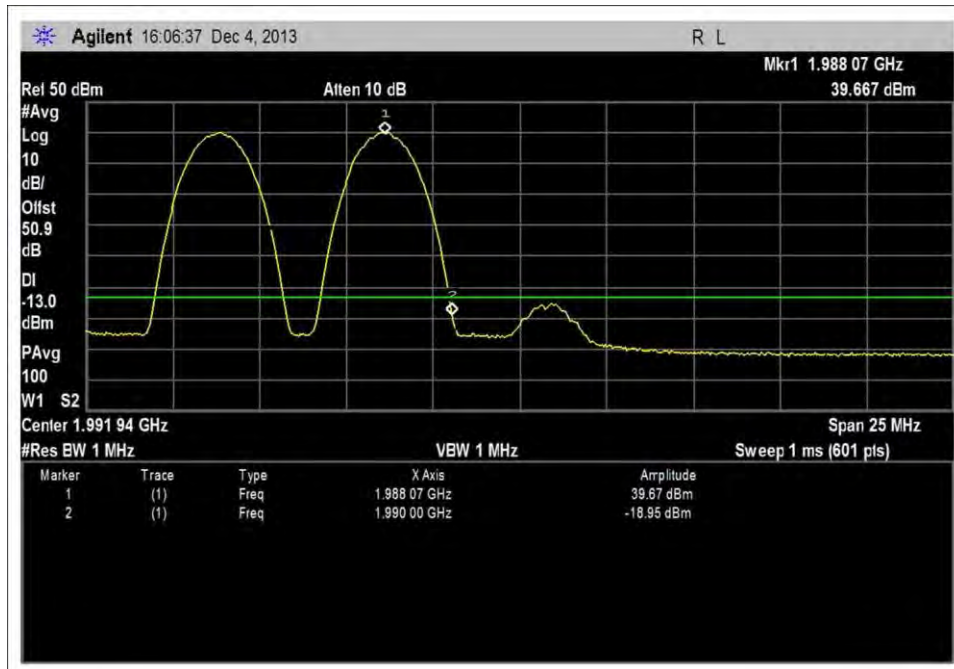
10kHz, EDGE – Low



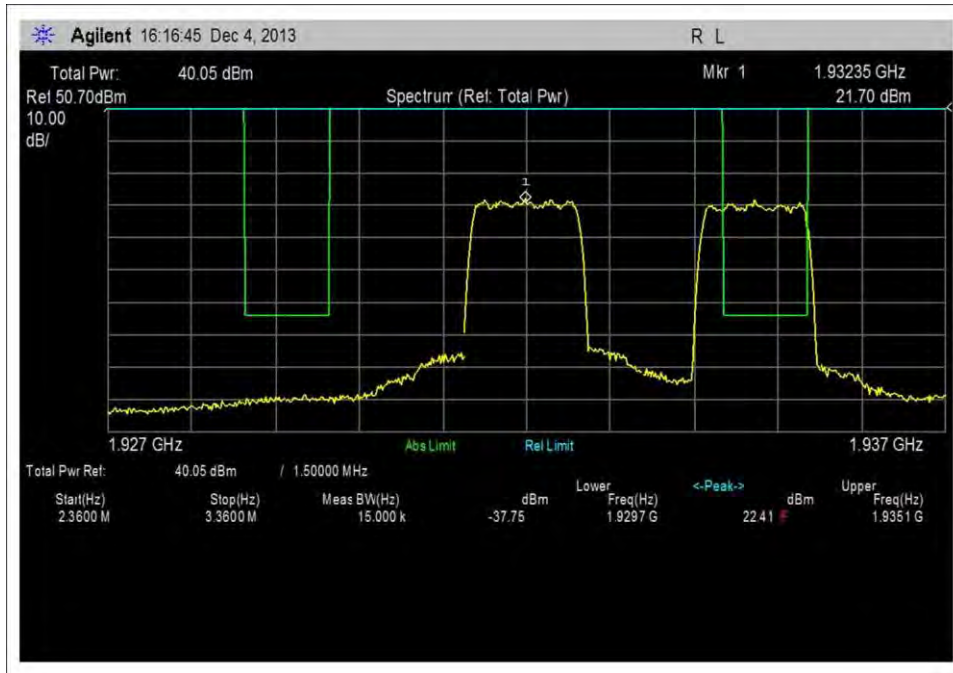
10kHz, EDGE – High



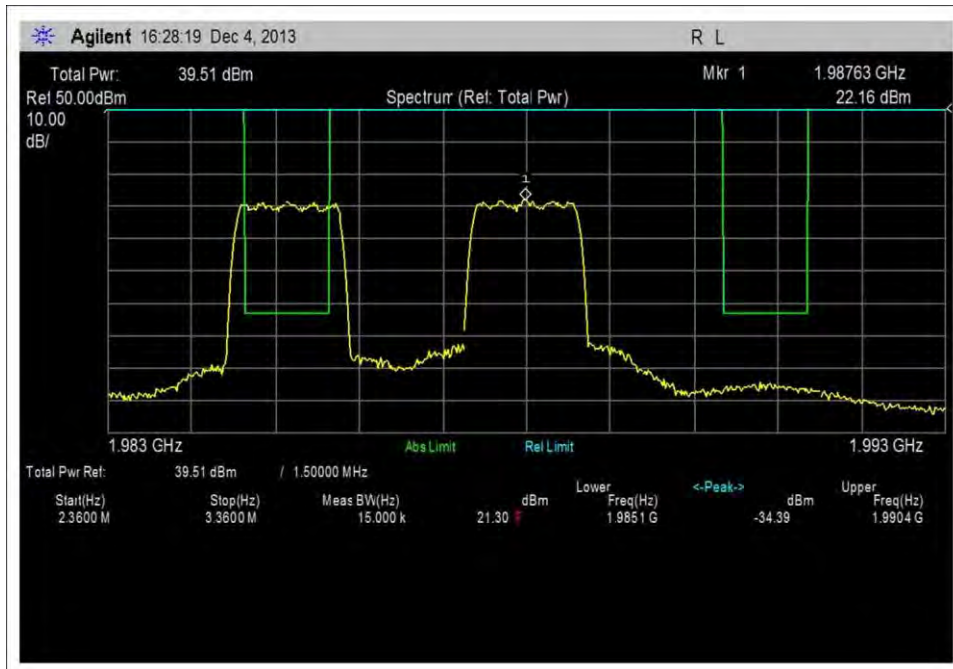
1MHz, EDGE – Low



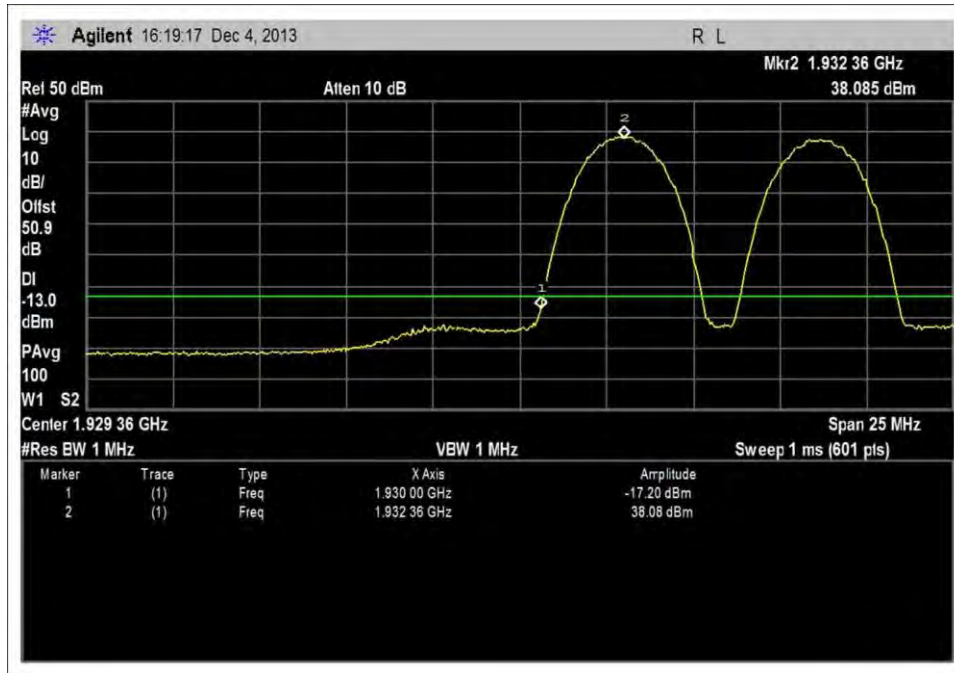
1MHz, EDGE – High



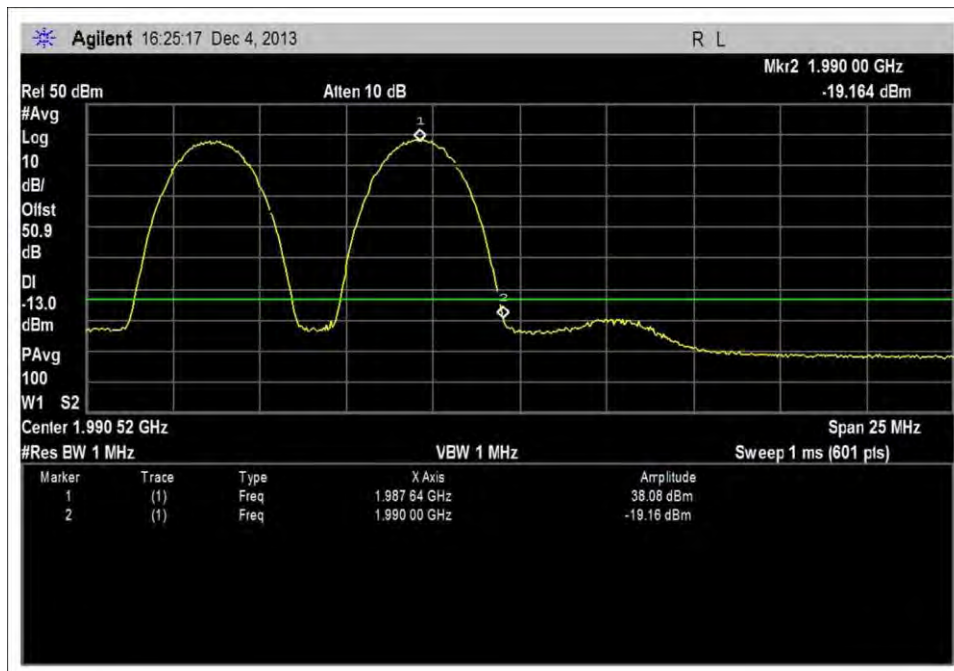
15kHz, CDMA – Low



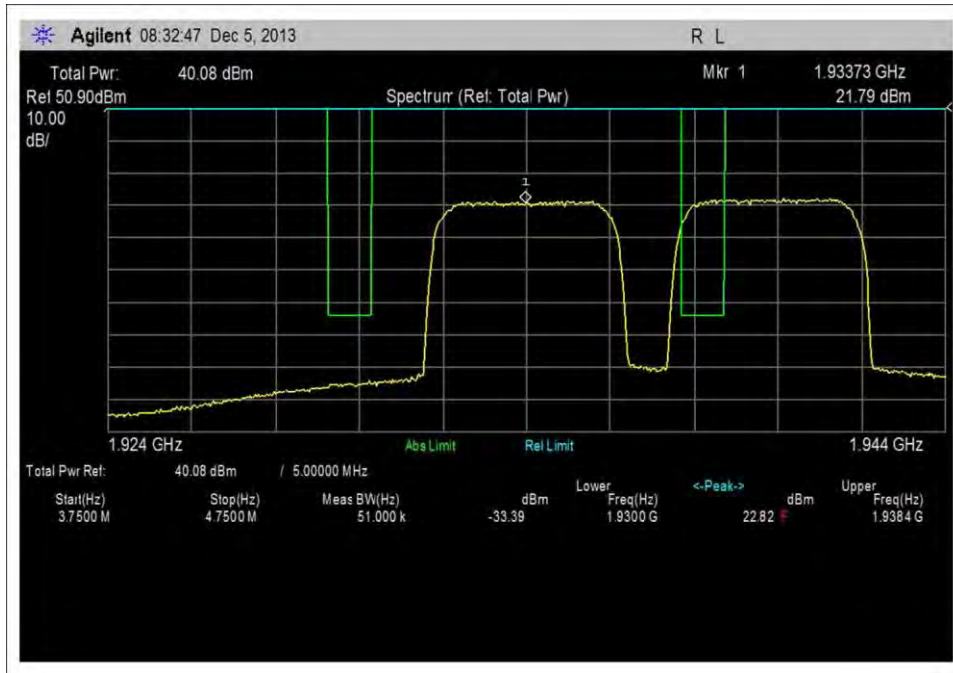
15kHz, CDMA – High



1MHz, CDMA – Low



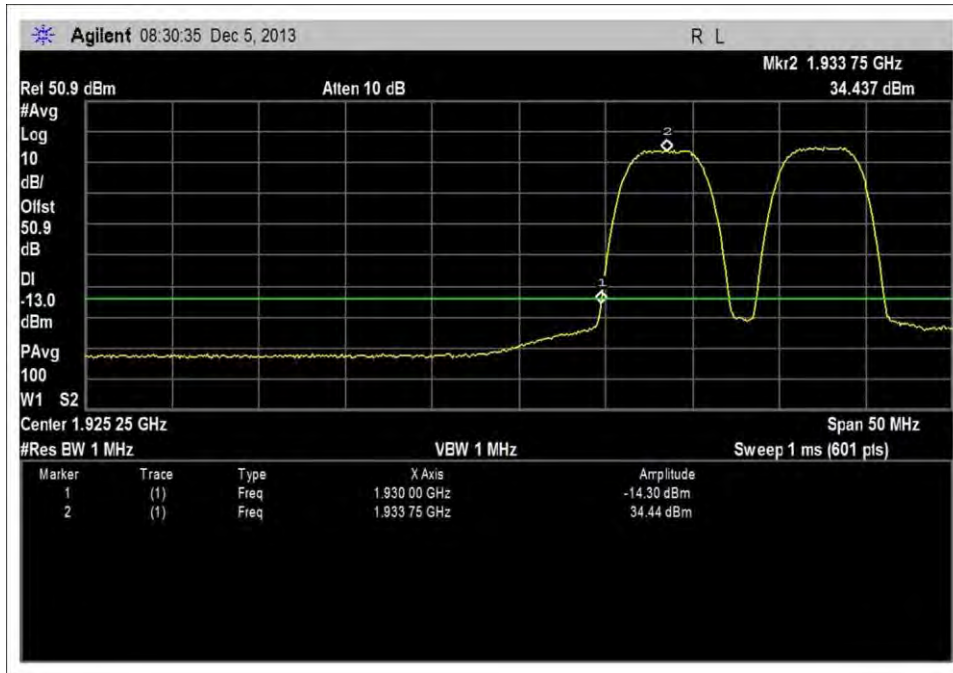
1MHz, CDMA – High



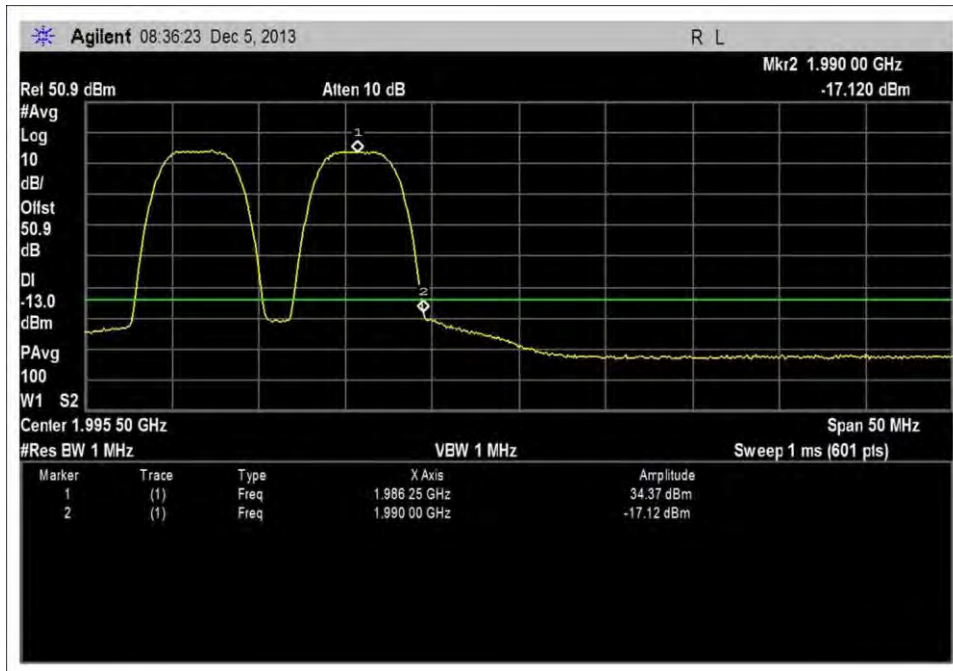
51kHz, WCDMA – Low



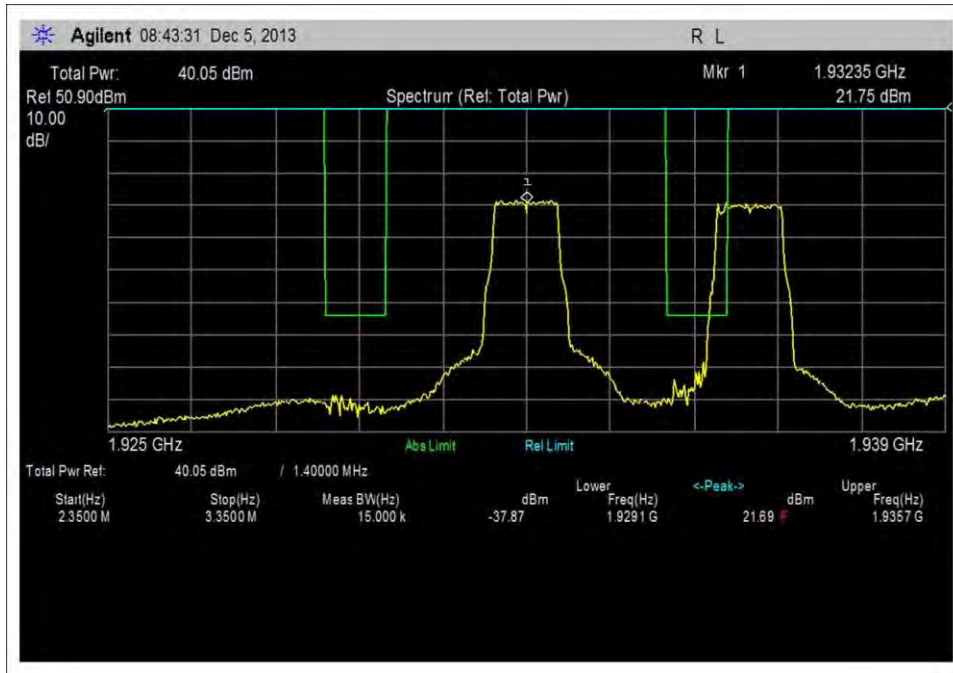
51kHz, WCDMA – High



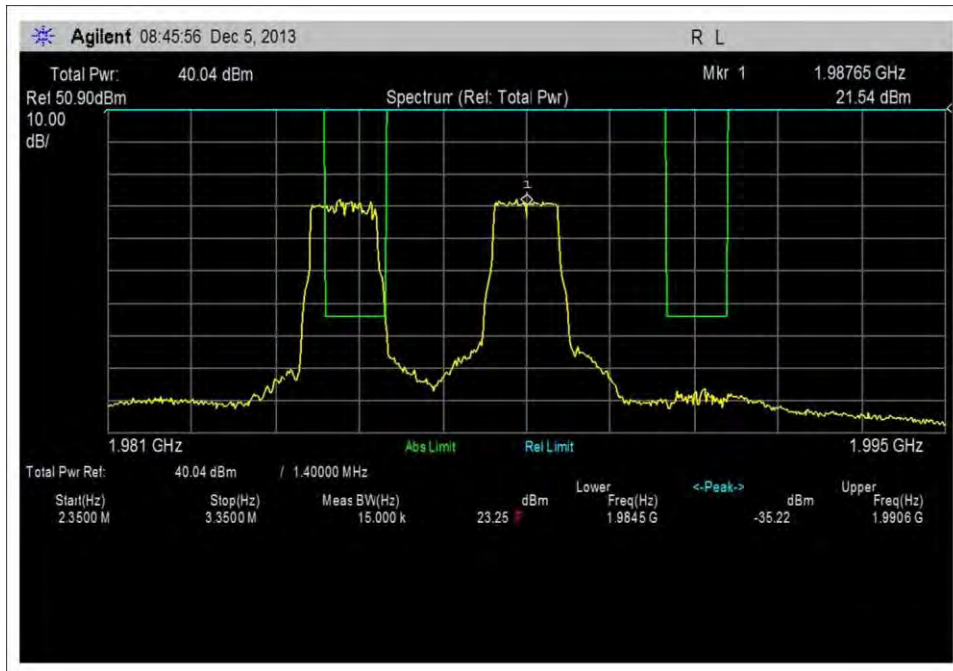
1MHz, WCDMA – Low



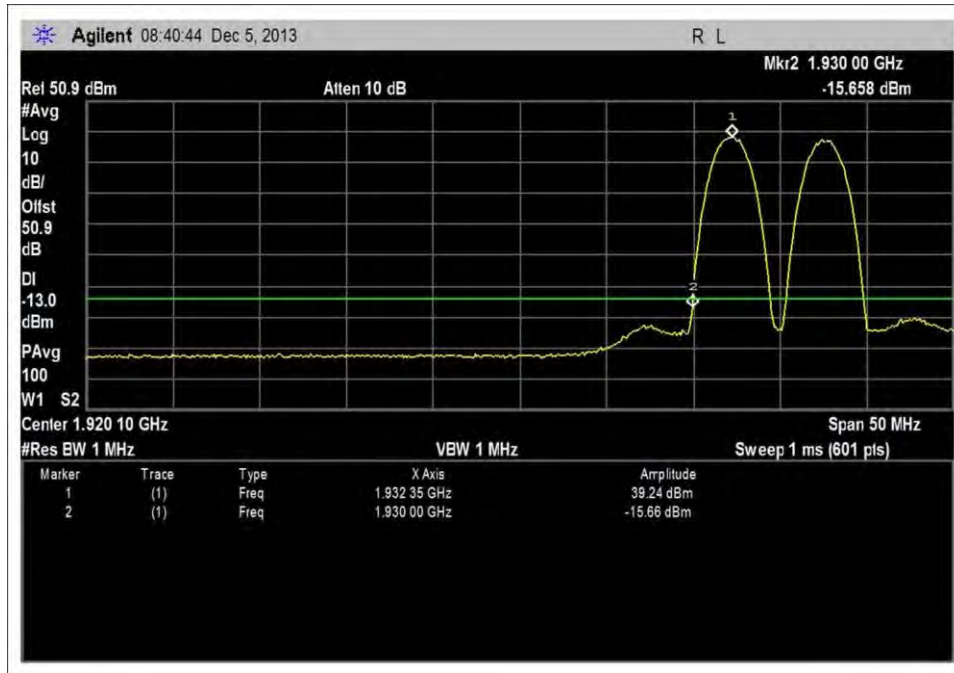
1MHz, WCDMA – High



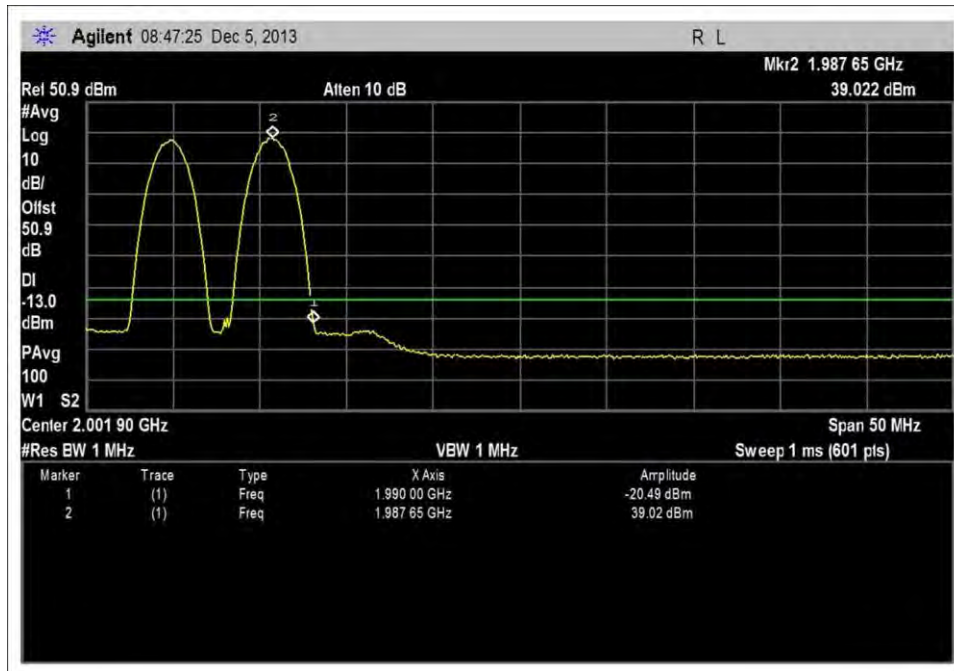
15kHz, LTE 1.4MHz – Low



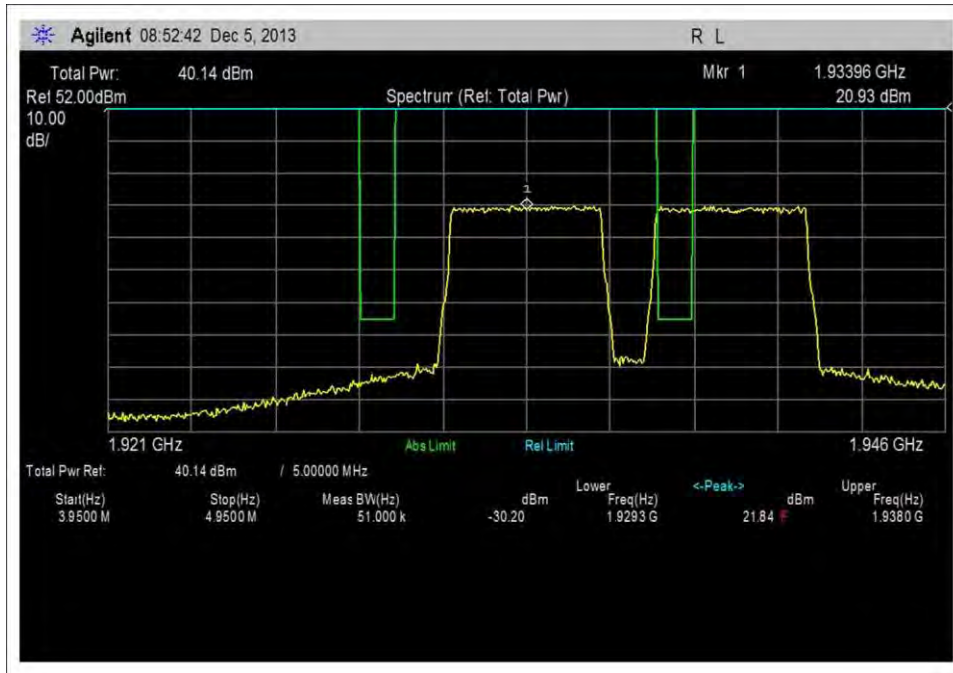
15kHz, LTE 1.4MHz – High



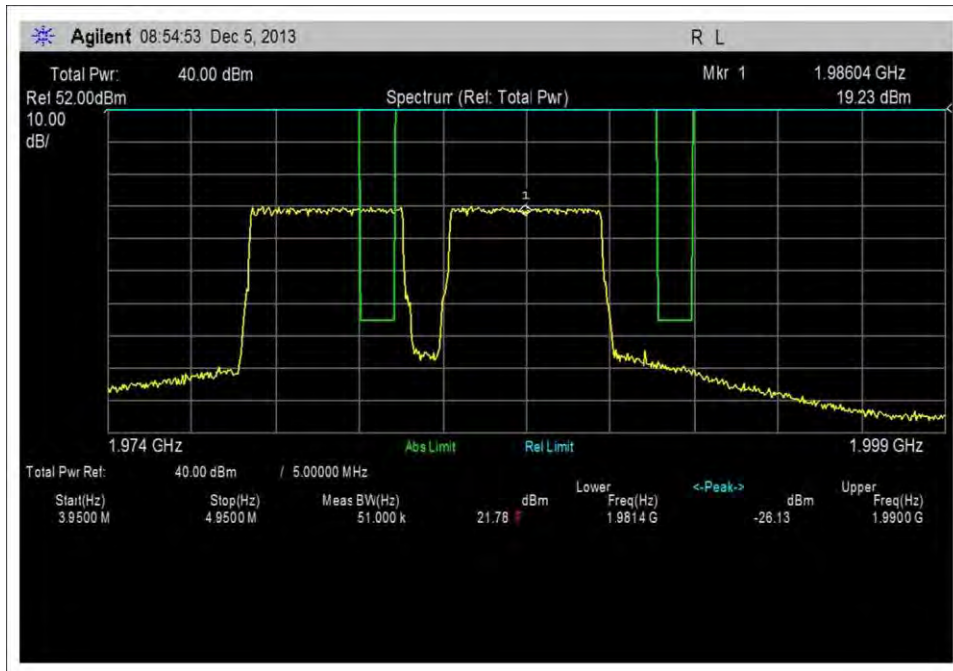
1MHz, LTE 1.4MHz – Low



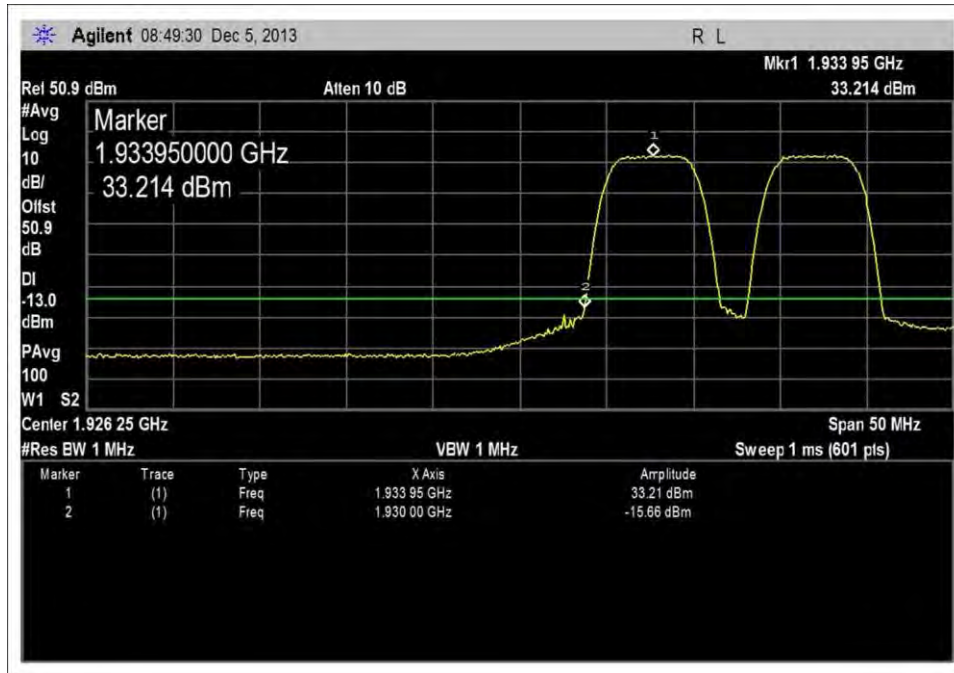
1MHz, LTE 1.4MHz – High



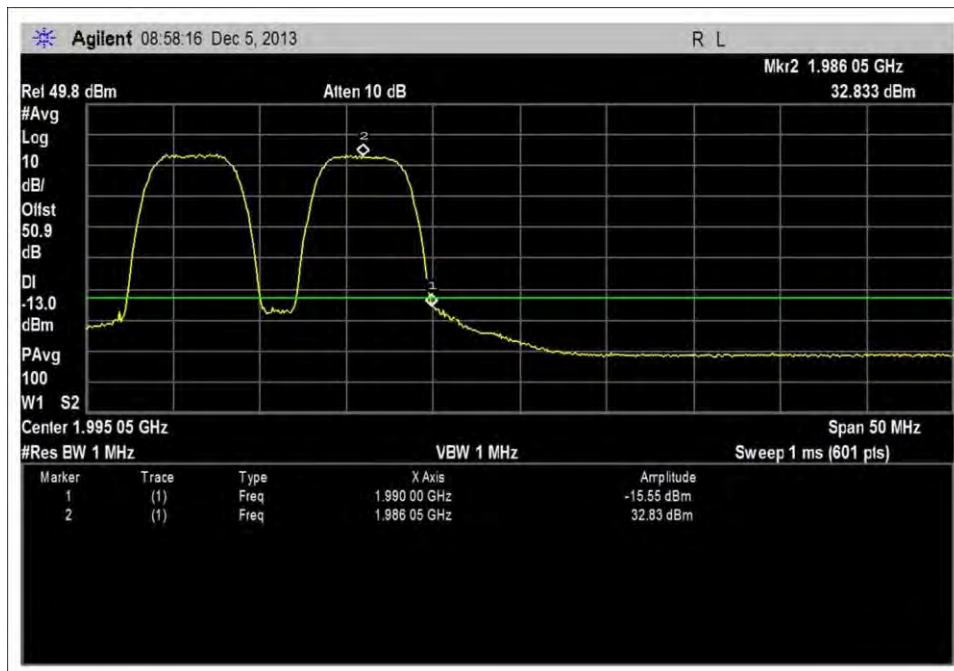
51kHz, LTE 5MHz – Low



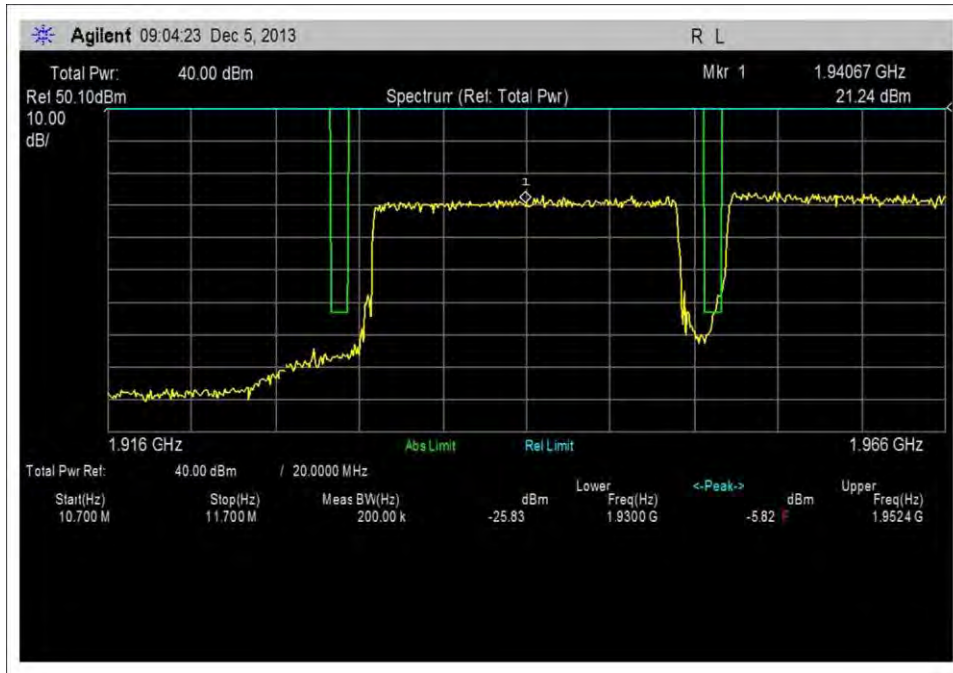
51kHz, LTE 5MHz – High



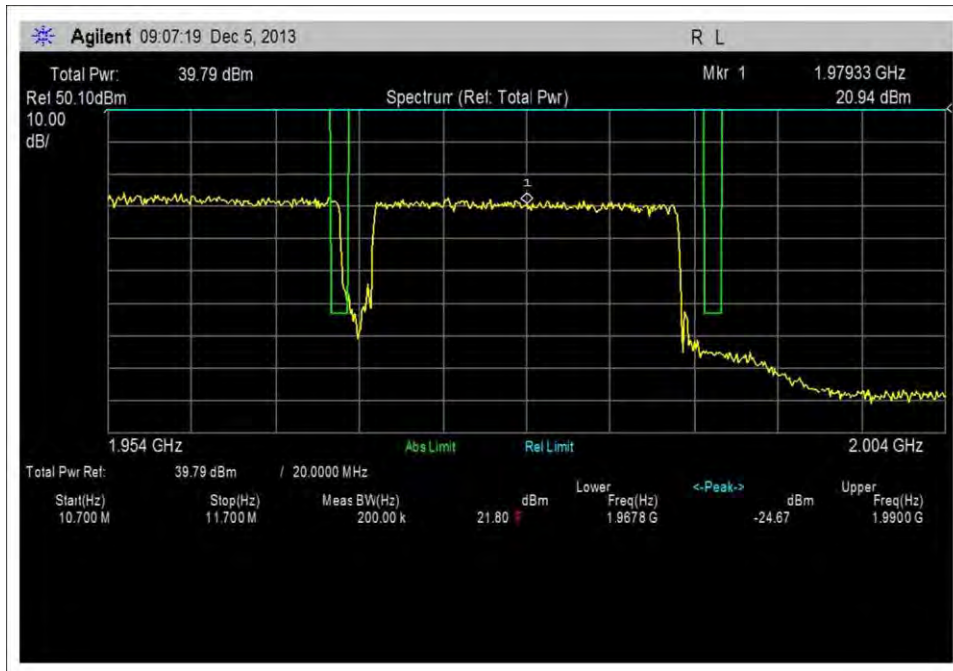
1MHz, LTE 5MHz – Low



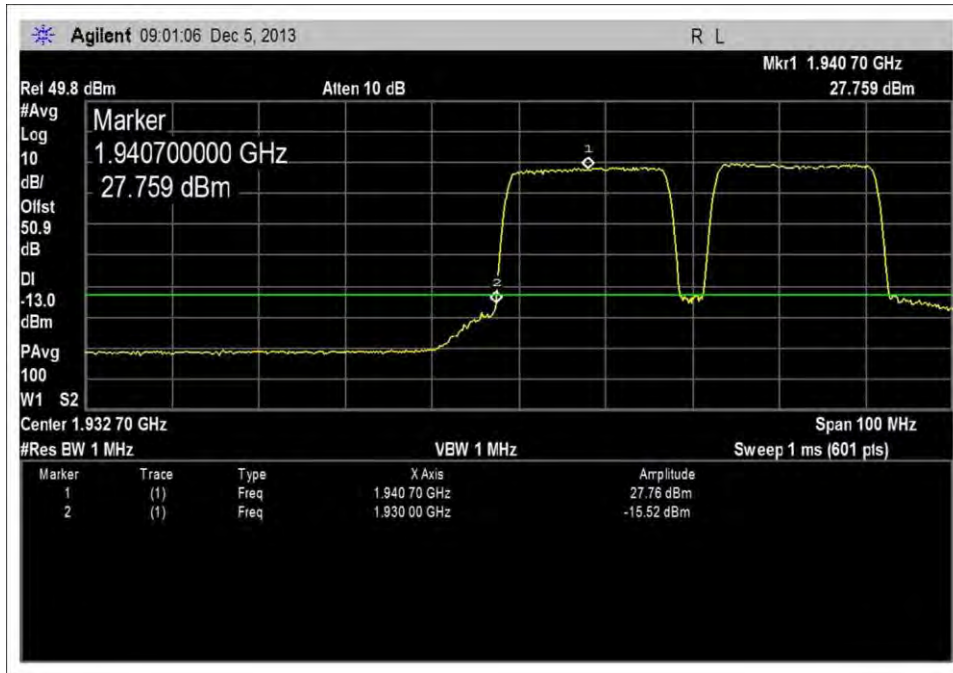
1MHz, LTE 5MHz - High



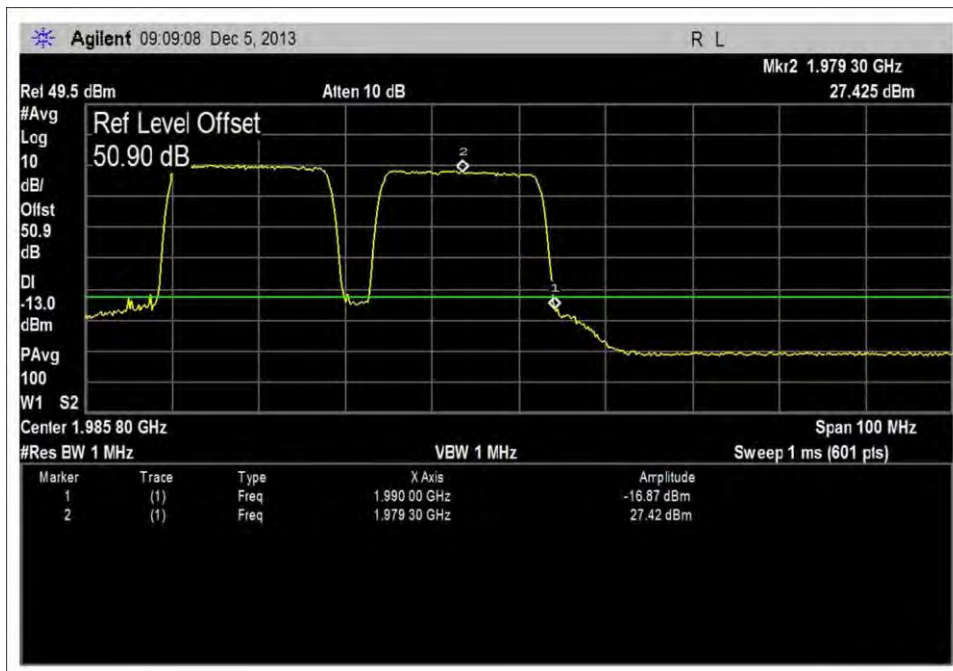
200kHz, LTE 20MHz – Low



200kHz, LTE 20MHz - High



1MHz, LTE 20MHz – Low



1MHz, LTE 20MHz - High

Test Setup Photos



Test Setup

Out of Band Rejection

Test Data

Test Location: CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **BTI Wireless**
 Specification: **Out of Band Rejection Plots**
 Work Order #: **95156** Date: 12/5/2013
 Test Type: **Conducted Emissions** Time: 14:39:38
 Equipment: **1900 MHz 20W Remote Transmitting Unit** Sequence#: 4
 Manufacturer: BTI Wireless Tested By: Don Nguyen
 Model: mBSC1900-020-RUMF01 110V 60Hz
 S/N: 10035302000113111001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03239	Cable	32022-2-29094K-24TC	10/30/2013	10/30/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
1900 MHz 20W Remote Transmitting Unit*	BTI Wireless	mBSC1900-020-RUMF01	10035302000113111001

Support Devices:

Function	Manufacturer	Model #	S/N
ESG Vector Signal Generator	Agilent	4438C	MY45091601
Attenuator 30db Pad	Weinschel	49-30-43	KW075
Step Attenuator 110dB pad	HP	8496B	1350A01241
50 ohm Load	Generic	NA	NA
Cable	Pasternack	Sucoflex 104A	12237/4A
50 ohm Load	Generic	NA	NA

Test Conditions / Notes:

The EUT is placed on the test bench. RF to Fiber Optic Converter Tx1 In is connected to an ESG Signal generator via cable Sucoflex 104A. Fiber-1 port from the converter is connected to fiber port of EUT. ANT port of the EUT is connected to 30db attenuator and 110db step attenuator. A spectrum analyzer is connected to attenuators via cable 32022-2-29094K-24TC. TX out and RX in port are terminated to 50 ohm loads.

Per manufacturer, the output frequency is independent of the components used in optical converter.

EUT is a Fixed Gain Amplifier with fixed output power as set by ALC (Auto Level Control) Threshold level of $1 \pm 0.5\text{dB}$ higher than maximum rated output power.

The evaluation is performed at the antenna port.

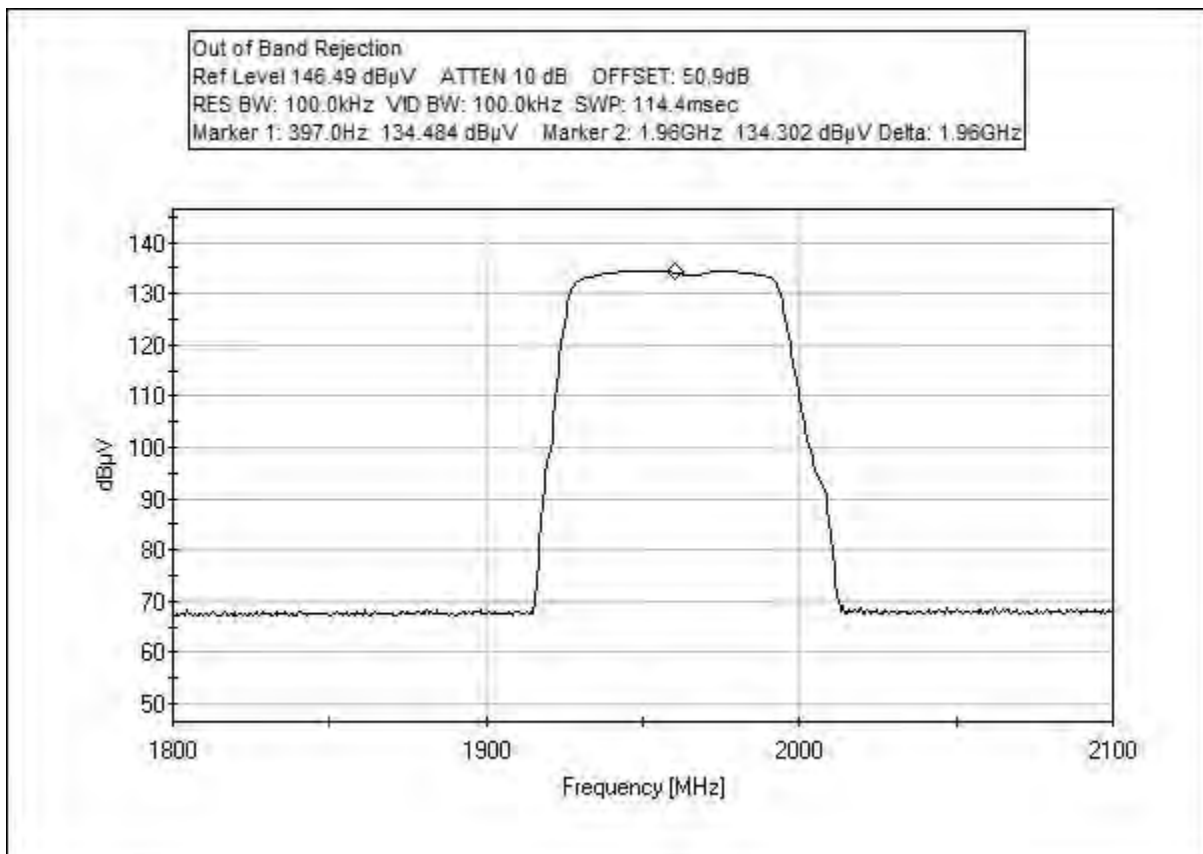
Signal generator is set to sweep from 1800 – 2100 MHz

Freq: 1930-1990MHz

Power output: 20W

20°C, 29%Relative Humidity

Site A



Test Setup Photos



SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBμV/m, the spectrum analyzer reading in dBμV was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	(dB μ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB μ V/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or carrot ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.