



Registration
No.788871

TEST REPORT FOR CDMA TESTING

Report No.: SRTC2018-9004(F)-18030601(P)

Product Name: Mobile Phone

Product Model: H1A1000

Applicant: RED Technologies LLC

Manufacturer: RED Technologies LLC

Specification: FCC Part 24E, Part 22H, Part 2 (2018)

FCC ID: 2AOYWH1A1000

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30, Shixing Street, Shijingshan District,

Beijing, P.R.China

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1. GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).

The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, P.R.China
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Liu Jia
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1.3 Applicant's details

Company:	RED Technologies LLC
Address:	34 Parker, Irvine, California, United States
City:	Irvine
Country or Region:	United States
Contacted person:	Doug Kwon
Tel:	9492067900 ext 7794
Fax:	---
Email:	Doug.kwon@Red.com

1.4 Manufacturer's details

Company:	RED Technologies LLC
Address:	34 Parker, Irvine, California, United States
City:	Irvine
Country or Region:	United States
Contacted person:	Doug Kwon
Tel:	9492067900 ext 7794
Fax:	---
Email:	Doug.kwon@Red.com

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2018-03-06
Testing Start Date:	2018-03-08
Testing End Date:	2018-07-19

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	30
Maximum Extreme	55	---
Minimum Extreme	-10	---

Normal Supply Voltage (V d.c.):	3.85
Maximum Extreme Supply Voltage (V d.c.):	4.30
Minimum Extreme Supply Voltage (V d.c.):	3.65

2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

Frequency Range	BC0: Tx:824.70~848.31MHz Rx:869.70~893.31MHz BC1: Tx:1851.25~1908.75MHz Rx:1931.25~1988.75MHz
Rated Output Power	24.0dBm
Modulation Type	CDMA2000 1x:QPSK CDMA2000 1Xevdo:QPSK/8PSK
Duplex Mode	FDD
Duplex Spacing	45MHz
Antenna Type	PIFA Antenna
Power Supply	Battery/AC adapter
HW Version	EVT2.1
SW Version	HiA1000.005ho.01.00.01d.403
IMEI	355929090014854

2.2 Support Equipment

The following support equipment was used to exercise the DUT during testing:

Equipment	Charger
Manufacturer	TEN PAO INDUSTRIAL CO., LTD
Model Number	S018CDU1200150
Serial Number	---

Equipment	Battery
Manufacturer	DONGGUAN DRN NEW ENERGY CO.,LTD
Model Number	RED-A2H-4500
Serial Number	---

There are two SIM (SIM1/2) of EUT. The relevant tests have been performed in order to verify in which combination case the EUT would have the worst features. So all the tests shown in this test report are performed when the EUT use SIM 1.

2.3 Summary table.

FCC Rule Part	Frequency Range(MHz)	Conducted (Average)(dBm)	Antenna Gain	EIRP(W)	Frequency Tolerance (ppm)	Emission Designator
22H	824.70-848.31	23.57	-2.43	0.130	0.017	1M29F9W
24E	1851.25-1908.75	23.45	-0.61	0.192	0.023	1M28F9W

3 REFERENCE SPECIFICATION

Specification	Version	Title
2.1046	2018	Measurements required: RF power output.
2.1049	2018	Measurements required: Occupied bandwidth.
2.1051	2018	Measurements required: Spurious emissions at antenna terminals.
2.1053	2018	Measurements required: Field strength of spurious radiation.
2.1055	2018	Measurements required: Frequency stability.
22.355	2018	Frequency tolerance.
22.913	2018	Effective radiated power limits.
22.917	2018	Emission limitations for cellular equipment.
24.232	2018	Power and antenna height limits.
24.235	2018	Frequency stability.
24.238	2018	Emission limitations for Broadband PCS equipment.
ANSI C63.26	2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 971168 D01	April 9, 2018	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

4 KEY TO NOTES AND RESULT CODES

The following are the definition of the test result.

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
N/T	Test case is not tested.
NTC	Nominal voltage, Normal Temperature
HV	High voltage, Normal Temperature
LV	Low voltage, Normal Temperature
HTHV	high voltage, High Temperature
LTHV	High voltage, Low Temperature
HTLV	Low voltage, High Temperature
LTLV	Low voltage, Low Temperature

5 RESULT SUMMARY

No.	Test case	FCC reference	Verdict
1	RF Power Output	2.1046	Pass
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913(a)/24.232(c)	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Emission Bandwidth	22.917(b)/24.238(b)	Pass
5	Spurious Emissions at antenna terminals	2.1051/22.917(a)/24.238(a)	Pass
6	Band Edges Compliance	2.1051/22.917(a)/24.238(a)	Pass
7	Frequency Stability	2.1055/22.355/24.235	Pass
8	Radiated Spurious Emissions	2.1053/22.917(a)/24.238(a)	Pass
9	Peak-Average Ratio	24.232(d)	Pass

This Test Report Is Issued by: Mr. Peng Zhen	Checked by: Mr. Li Bin
Tested by: Mr. HeDengshun	Issued date: 20180719

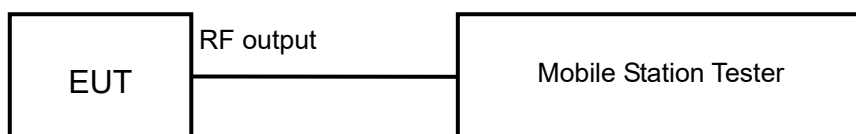
6 TEST RESULT

6.1 RF Power Output-FCC Part 2.1046

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



CDMA BC0

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.

Limits	≤33.0dBm
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CDMA BC1

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.

Limits	≤30.0dBm
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Test result:

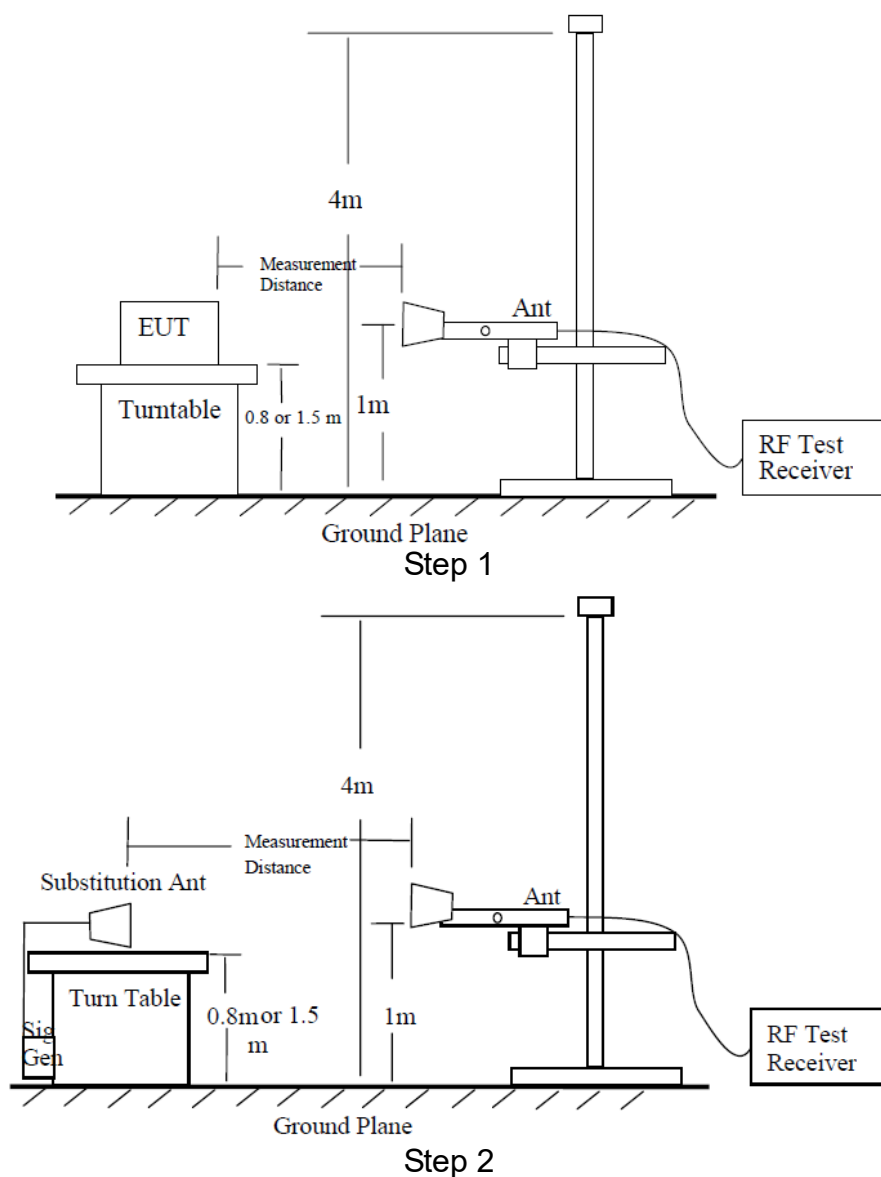
The test results are shown in Appendix A.

6.2 Effective Radiated Power-FCC Part 22.913(a)/Part 24.232(c)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test setup:



CDMA BC0

Test procedure:

The measurements procedures in TIA-603C-2004 are used.

Step 1:

The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 3MHz. Then the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. And the maximum value of the receiver should be recorded as (Pr).

Step 2:

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A "reference path loss" should be calculated after test. The attenuation of "reference path loss" is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{\text{mea}} + P_{\text{ca}} + G_{\text{a}}$$

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, $\text{ERP} = \text{EIRP} - 2.15 \text{ (dB)}$.

Limits:

Operation Mode	E.R.P. (dBm)
CDMA	≤38.45

CDMA BC1

Test procedure:

The measurements procedures in TIA-603C-2004 are used.

Step 1:

The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 3MHz. Then the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. And the maximum value of the receiver should be recorded as (Pr).

Step 2:

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

A power (P_{mea}) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (P_{mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A "reference path loss" should be calculated after test. The attenuation of "reference path loss" is the cable loss between the Signal Source with the Substitution Antenna (P_{ca}) and the Substitution Antenna Gain (G_a).

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{\text{mea}} + P_{\text{ca}} + G_{\text{a}}$$

Limits:

Operation Mode	E.R.P. (dBm)
CDMA	≤33.0

Test result:

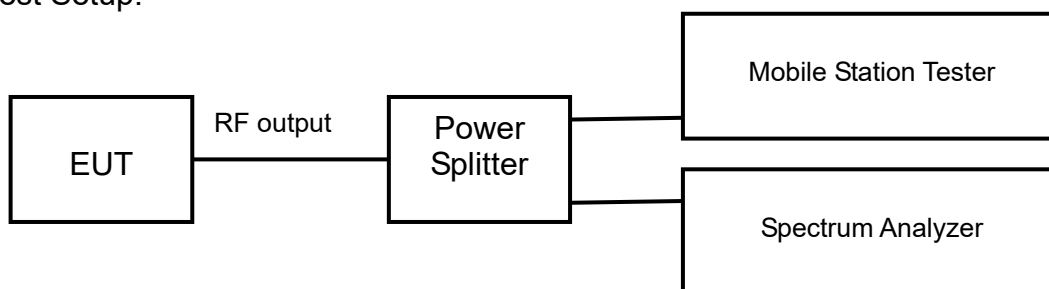
The test results are shown in Appendix B.

6.3 Occupied Bandwidth-FCC Part 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



CDMA BC0

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 3kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer.

Limits: No specific occupied bandwidth requirements in part 2.1049

CDMA BC1

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 3kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer.

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

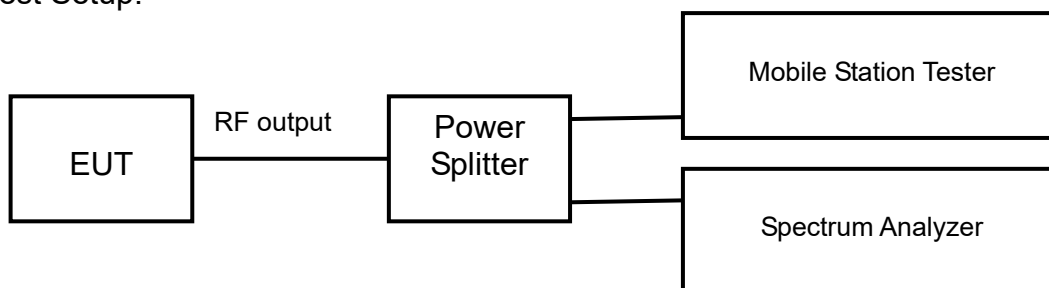
The test results are shown in Appendix A.

6.4 Emission Bandwidth-FCC Part 22.917(b)/Part 24.238(b)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



CDMA BC0

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The emission bandwidth is measured using spectrum analyzer. RBW is set to 3kHz on spectrum analyzer. The bandwidth of -26dB transmitter power can be read on spectrum analyzer.

Limits: No specific emission bandwidth requirements in part 22.917(b)

CDMA BC1

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The emission bandwidth is measured using spectrum analyzer. RBW is set to 3kHz on spectrum analyzer. The bandwidth of -26dB transmitter power can be read on spectrum analyzer.

Limits: No specific emission bandwidth requirements in part 24.238(b)

Test result:

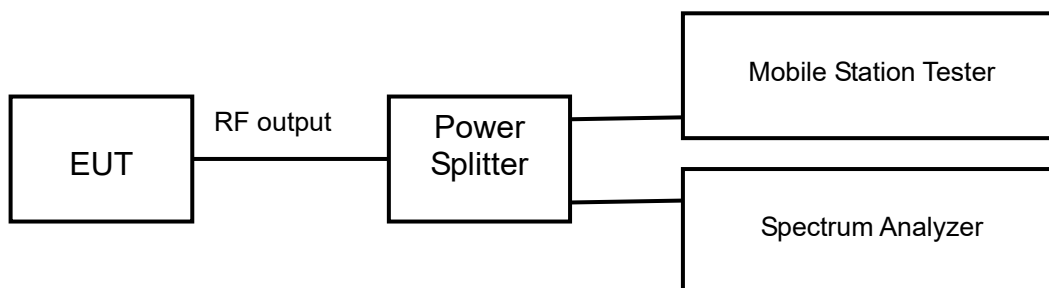
The test results are shown in Appendix A.

6.5 Spurious Emissions at antenna terminal-FCC Part 2.1051/ 22.917(a) /Part 24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



CDMA BC0

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 9GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer.

Limits	≤-13dBm
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CDMA BC1

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer.

Limits	≤-13dBm
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Test result:

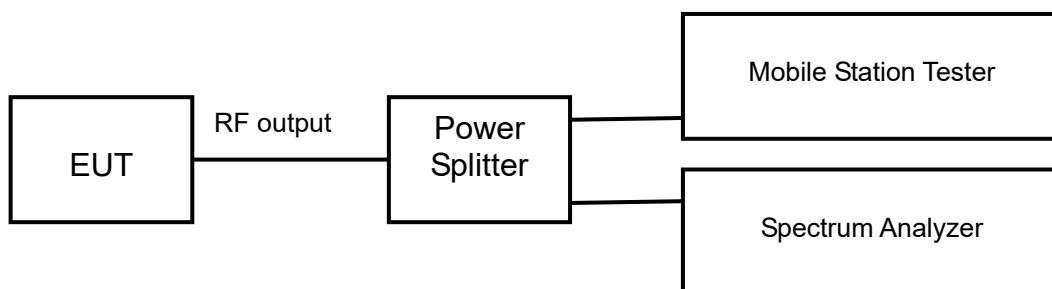
The test results are shown in Appendix A.

6.6 Band Edges Compliance- FCC Part 2.1051/ 22.917(a) /Part 24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



CDMA BC0

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The peak detector is used and RBW is set to at least 1% of the emission bandwidth on spectrum analyzer.

Limits	$\leq -13\text{dBm}$
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CDMA BC1

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The peak detector is used and RBW is set to at least 1% of the emission bandwidth on spectrum analyzer.

Limits	$\leq -13\text{dBm}$
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Test result:

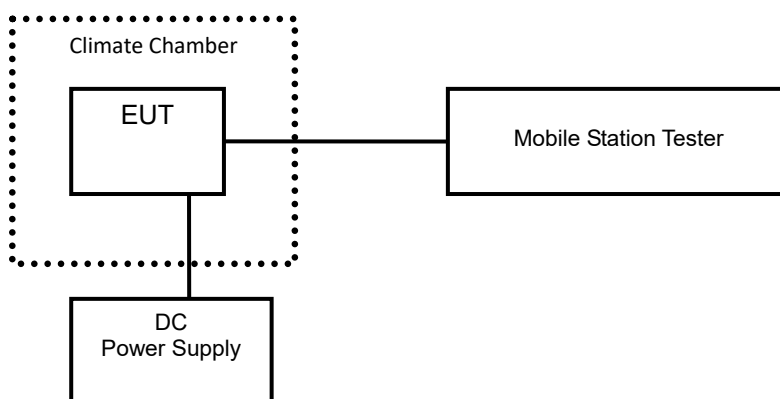
The test results are shown in Appendix A.

6.7 Frequency Stability- FCC Part 2.1055/22.355 /Part 24.235

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test setup:



CDMA BC0

Test Procedure:

A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50°C in 10°C step size, and also the DC power supply voltage to the EUT is varied from LV to HV. The measurement will be conducted at three

Limits: No specific frequency stability requirements in part 2.1055 and part 22.355.

CDMA BC1

Test Procedure:

A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50°C in 10°C step size, and also the DC power supply voltage to the EUT is varied from LV to HV. The measurement will be conducted at three

Limits: No specific frequency stability requirements in part 2.1055 and part 24.235.

Test result:

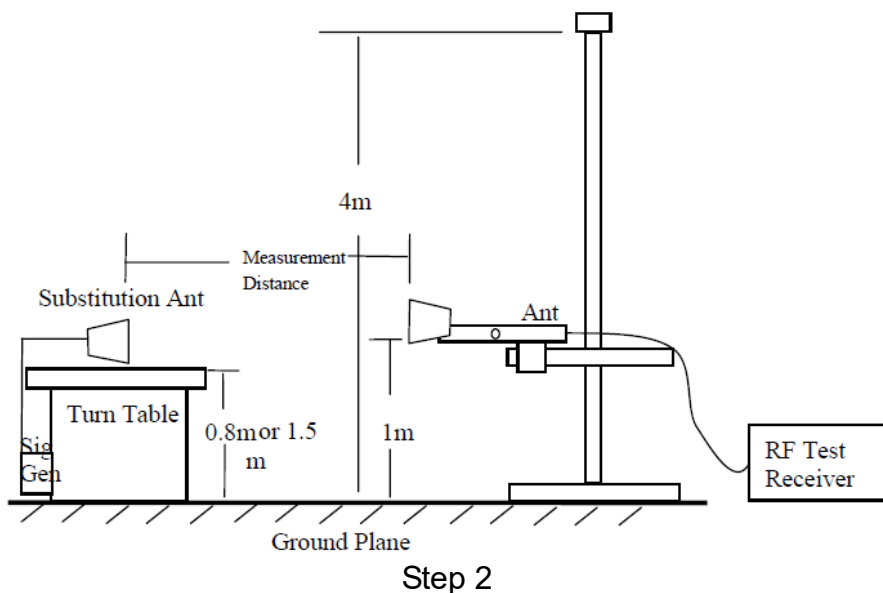
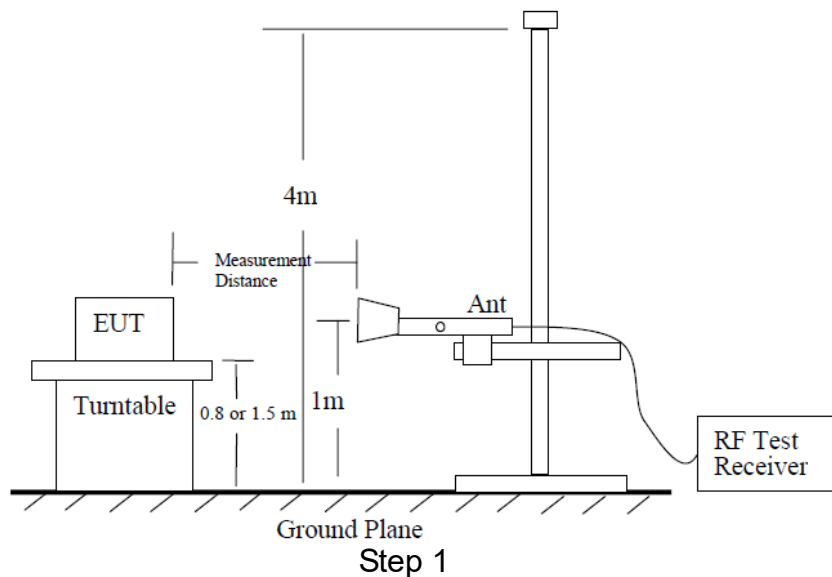
The test results are shown in Appendix A.

6.8 Radiated Spurious Emissions-FCC Part2.1053/ 22.917(a)/Part 24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



CDMA BC0

Test procedure:

The measurements procedures in TIA-603C-2004 are used.

The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.

Step 1:

The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meter high non-conductive table at a 3 meter test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

A power (P_{mea}) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A "reference path loss" should be calculated after test. The attenuation of "reference path loss" is the cable loss between the Signal Source with the Substitution Antenna (P_{ca}) and the Substitution Antenna Gain (G_a).

Calculation procedure:

The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:

$$\text{Power(EIRP)} = P_{mea} + P_{ca} + G_a$$

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15 \text{ (dB)}$.

Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.

$$P=P_{\text{mea}}+P_{\text{ca}}+G_a=(-20\text{dBm})+(-30\text{dB})+(11\text{dB})=-39\text{dBm}$$

CDMA BC1

Test procedure:

The measurements procedures in TIA-603C-2004 are used.

The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.

Step 1:

The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meter high non-conductive table at a 3 meter test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

A power (P_{mea}) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A "reference path loss" should be calculated after test. The attenuation of "reference path loss" is the cable loss between the Signal Source with the Substitution Antenna (P_{ca}) and the Substitution Antenna Gain (G_a).

Calculation procedure:

The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and

antenna gain. The basic equation with a sample calculation is as followed:

$$\text{Power(EIRP)} = P_{\text{mea}} + P_{\text{ca}} + G_a$$

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, $\text{ERP} = \text{EIRP} - 2.15 \text{ (dB)}$.

Assumed the power of signal source record is -20dBm. A cable loss of -30dB and an antenna gain of 11dB are added.

$$P = P_{\text{mea}} + P_{\text{ca}} + G_a = (-20\text{dBm}) + (-30\text{dB}) + (11\text{dB}) = -39\text{dBm}$$

Test result:

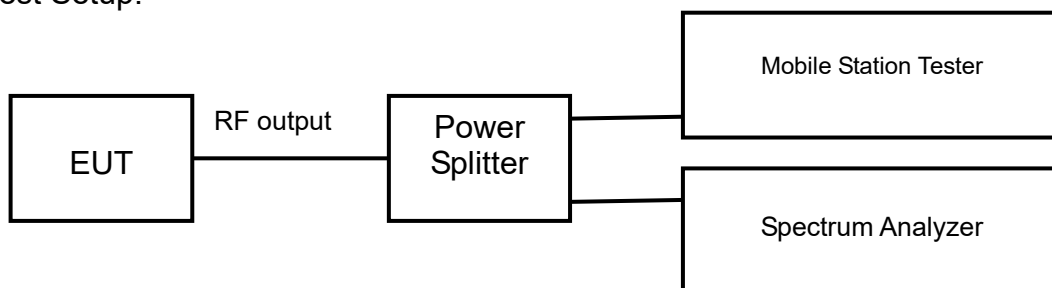
The test results are shown in Appendix B.

6.9 Peak-Average Ratio -FCC Part 24.232(d)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The Peak-Average Ratio is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The Peak-Average Ratio can be read on spectrum analyzer.

Limits: the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test result:

The test results are shown in Appendix A

7 MEASUREMENT UNCERTAINTIES

Items	Uncertainty	
Occupied Bandwidth	3kHz	
Peak power output	0.67dB	
Band edge compliance	1.20dB	
Spurious emissions	30MHz~1GHz	2.83dB
	1GHz~12.75GHz	2.50dB
	12.75GHz~25GHz	2.75dB

8 TEST EQUIPMENTS

No.	Name/Model	Manufacturer	S/N	Calibration Date	Calibration Due Date
1	E5515C(8960) Mobile Station Tester	Agilent	MY50266302	2017.8.20	2018.8.19
2	N9020A Spectrum Analyzer	Agilent	MY48010771	2017.8.20	2018.8.19
3	DC Power Supply E3645A	Agilent	MY40000741	2018.3.01	2019.2.28
5	Temperature chamber SH241	ESPEC	92013758	2017.8.20	2018.8.19
6	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	---	---	---
7	Turn table Diameter:1m	HD	---	---	---
8	Antenna master FAC(MA4.0)	MATURO	---	---	---
9	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	2017.8.20	2018.8.19
10	HL562 Ultra log antenna	R&S	100016	2017.8.20	2018.8.19
11	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2017.8.20	2018.8.19
12	ESI 40 EMI test receiver	R&S	100015	2017.8.20	2018.8.19
13	Radio tester	CMU 200	114667	2017.8.20	2018.8.19

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

Please refer to the attachment.

APPENDIX B – TEST DATA OF RADIATED EMISSION

Please refer to the attachment.

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

RF Power Output-FCC Part2.1046

3G-CDMA Mode		Conducted Power (dBm)-BC0		
Radio Configuration (RC)	Service Option (SO)	CH 1013 (824.7MHz)	CH 384 (836.52MHz)	CH 777 (848.31MHz)
RC1	2(Loopback)	23.48	23.43	23.42
	55(Loopback)	23.46	23.46	23.46
RC2	9(Loopback)	23.42	23.43	23.47
	55(Loopback)	23.47	23.51	23.42
RC3	2(Loopback)	23.53	23.57	23.56
	55(Loopback)	23.47	23.52	23.48
RC4	2(Loopback)	23.42	23.48	23.42
	55(Loopback)	23.42	23.47	23.47
RC5	9(Loopback)	23.47	23.36	23.43
	55(Loopback)	23.51	23.47	23.45

3G-CDMA Mode		Conducted Power (dBm)-BC1		
Radio Configuration (RC)	Service Option (SO)	CH 25 (1851.25MHz)	CH 600 (1880.00MHz)	CH1175 (1908.75MHz)
RC1	2(Loopback)	23.25	23.31	23.24
	55(Loopback)	23.24	23.24	23.25
RC2	9(Loopback)	23.31	23.25	23.21
	55(Loopback)	23.26	23.26	23.22
RC3	2(Loopback)	23.41	23.44	23.45
	55(Loopback)	23.36	23.36	23.37
RC4	2(Loopback)	23.31	23.24	23.23
	55(Loopback)	23.24	23.27	23.25
RC5	9(Loopback)	23.26	23.31	23.24
	55(Loopback)	23.25	23.26	23.26

Occupied Bandwidth-FCC Part2.1049

CDMA BC0:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
824.70	1013	1.2924
836.52	384	1.2840
848.31	777	1.2759

CDMA BC1:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1851.25	25	1.2807
1880.00	600	1.2818
1908.75	1175	1.2821

Emission Bandwidth-FCC Part 22.917(b)/Part 24.238(b)

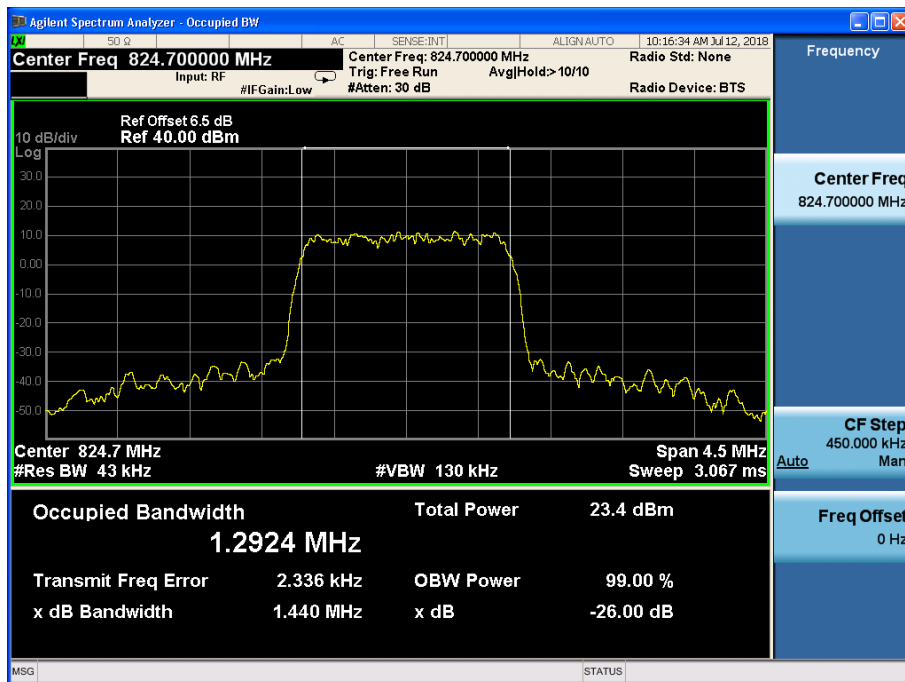
CDMA BC0:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (MHz)
824.70	1013	1.440
836.52	384	1.436
848.31	777	1.439

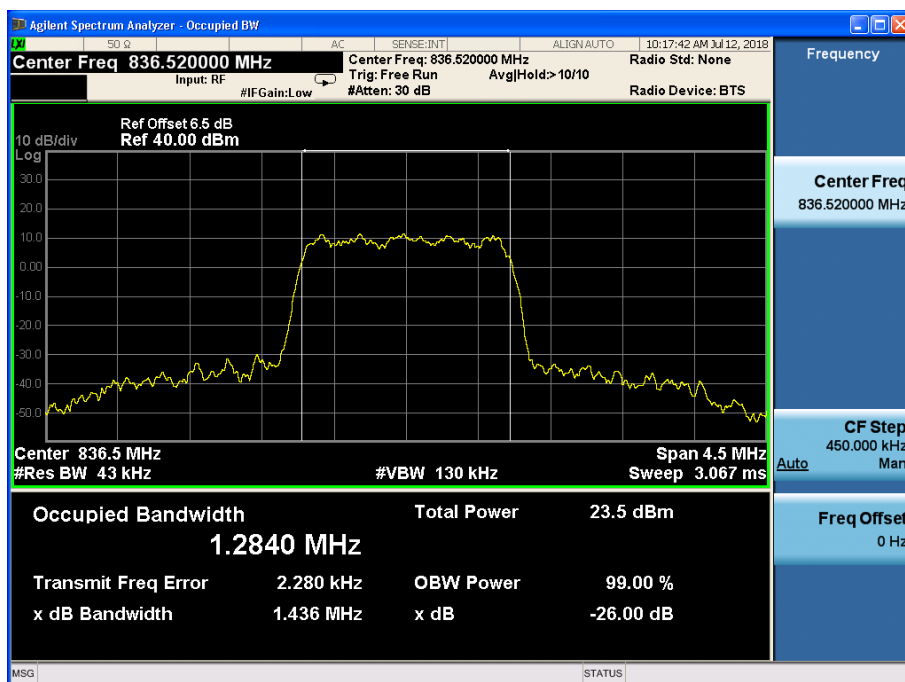
CDMA BC1:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (MHz)
1851.25	25	1.427
1880.00	600	1.445
1908.75	1175	1.444

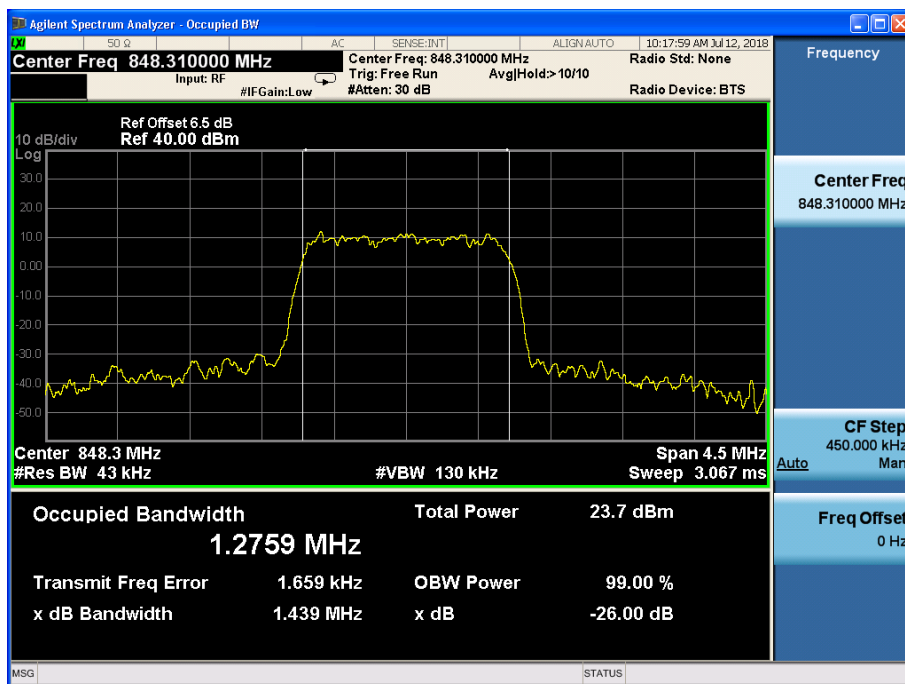
CDMA BC0



Channel 1013

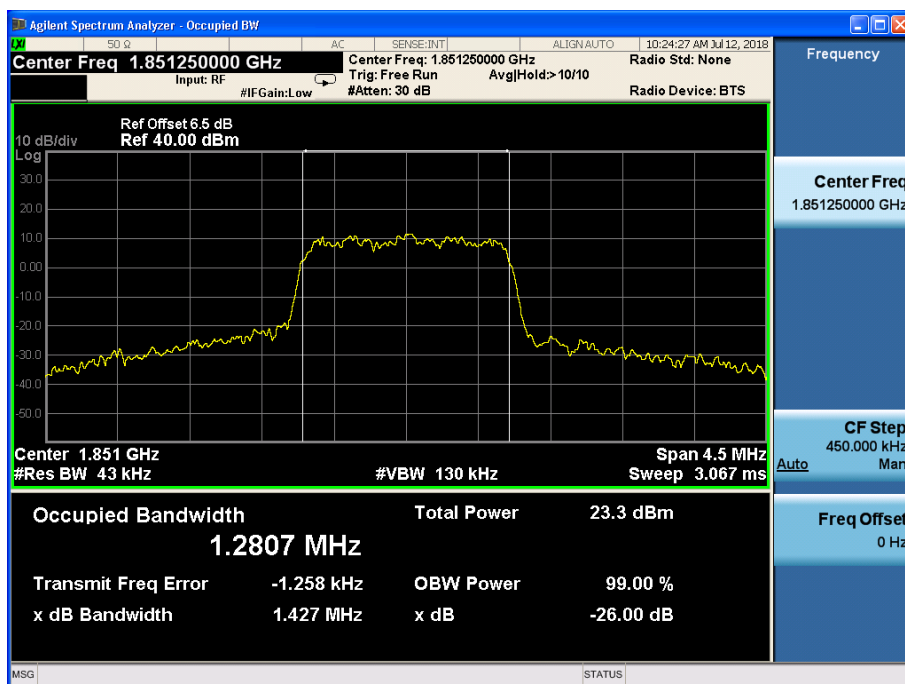


Channel 384

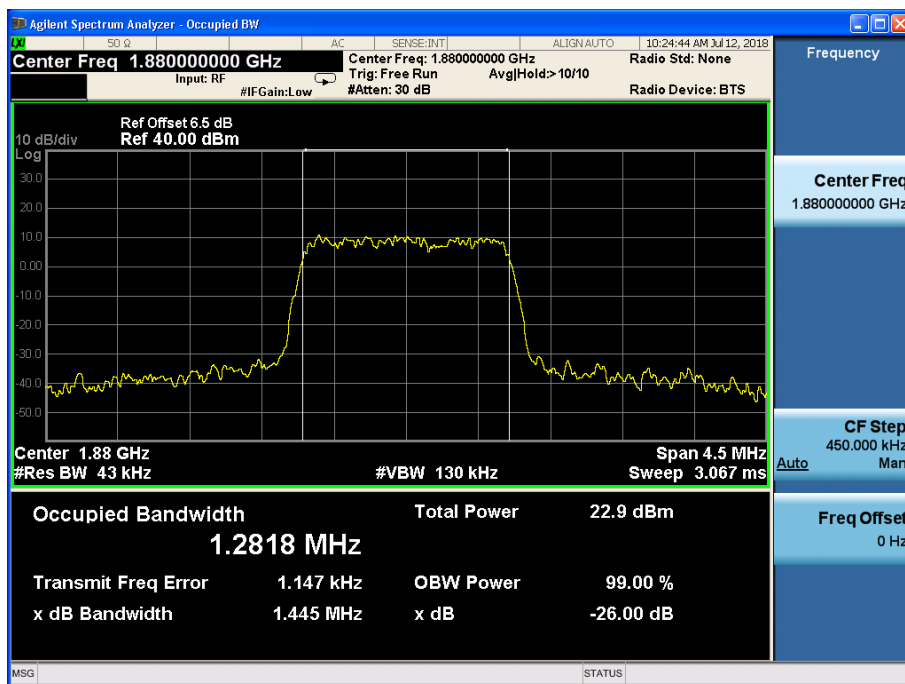


Channel 777

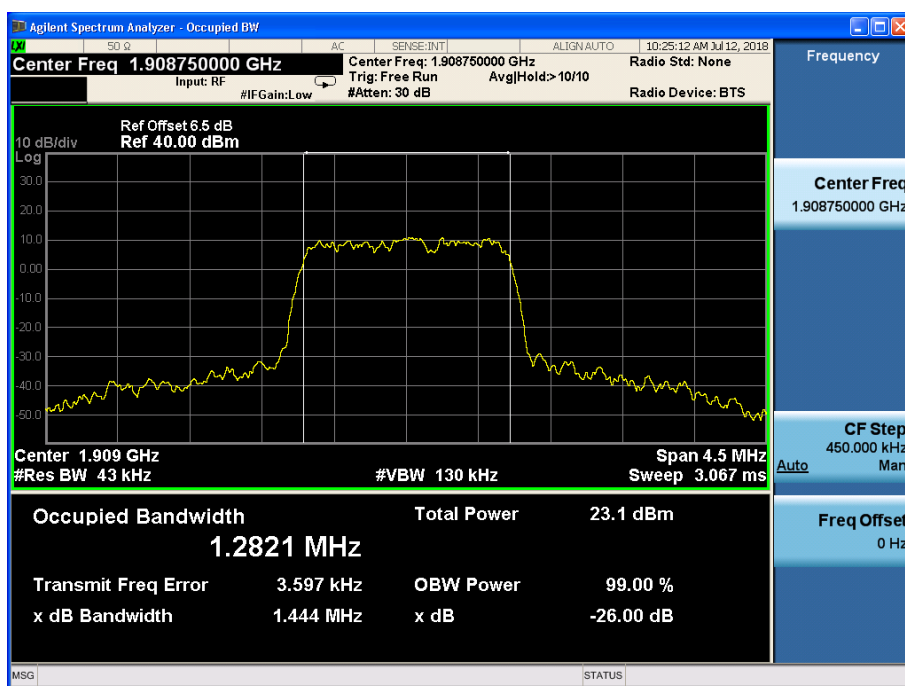
CDMA BC1:



Channel 25



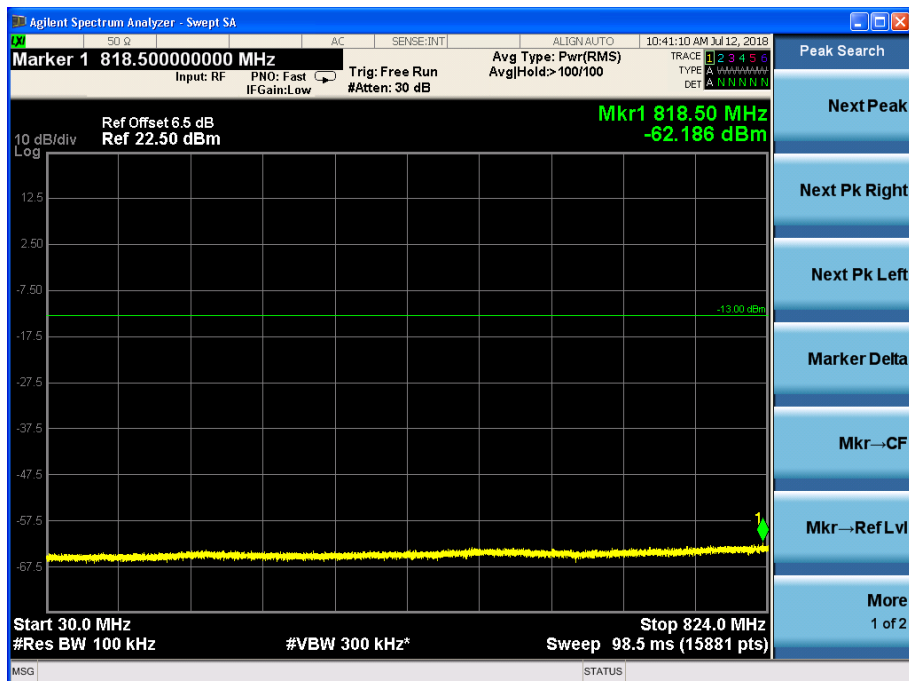
Channel 600



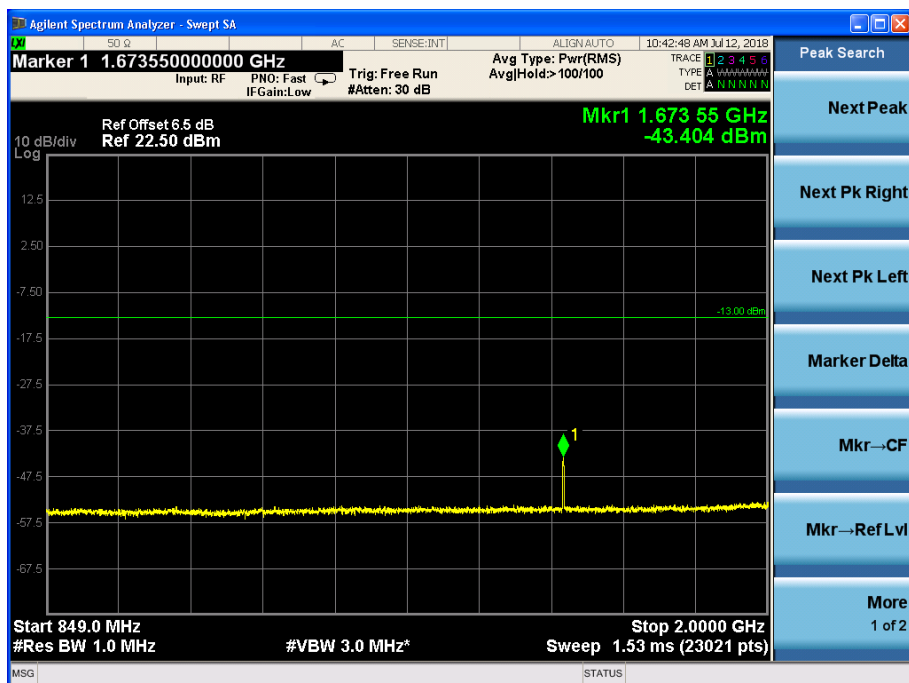
Channel 1175

Spurious Emissions at antenna terminal- FCC Part 2.1051/ 22.917(a) /Part 24.238(a)

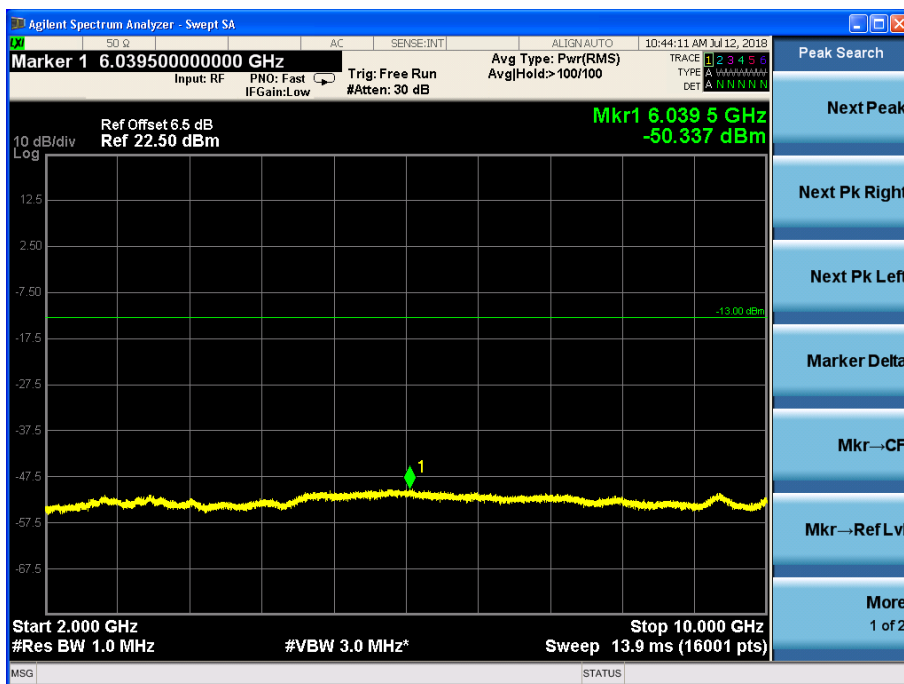
CDMA BC0:



Channel 384, 30MHz~824MHz

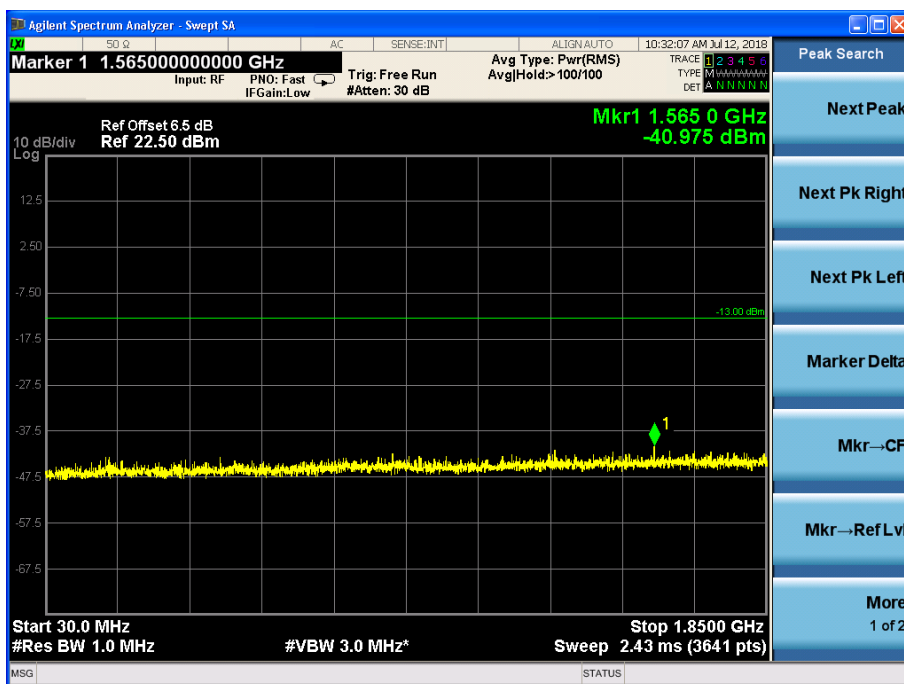


Channel 384, 849MHz~2GHz

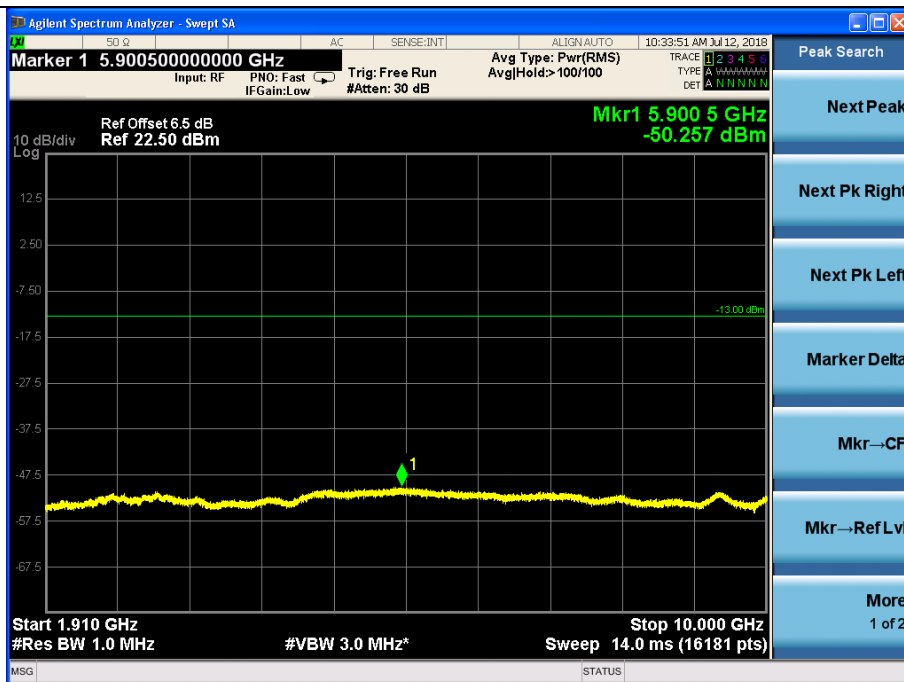


Channel 384, 2GHz~10GHz

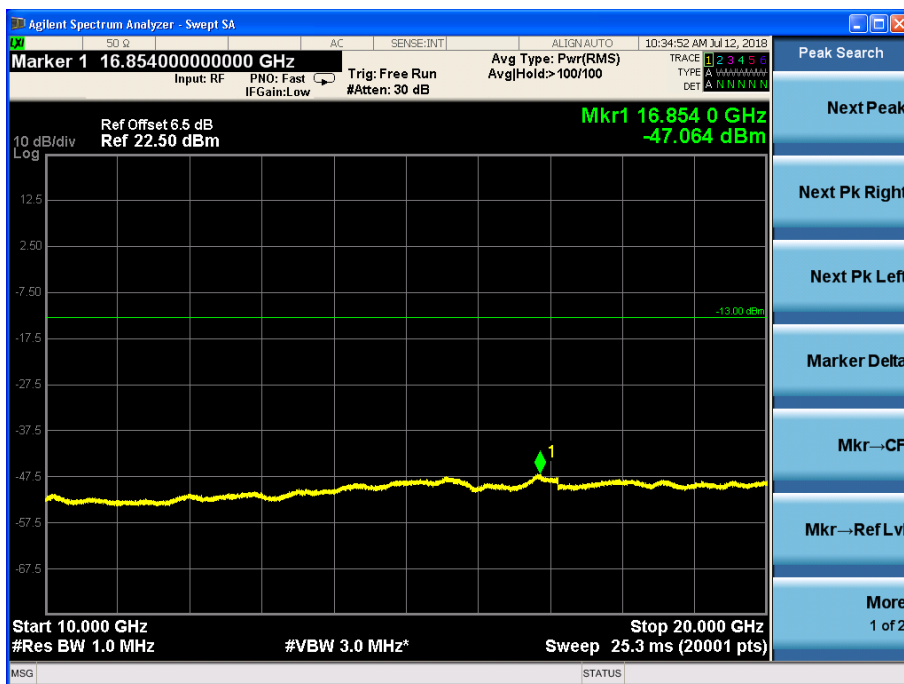
CDMA BC1:



Channel 600, 30MHz~1850MHz



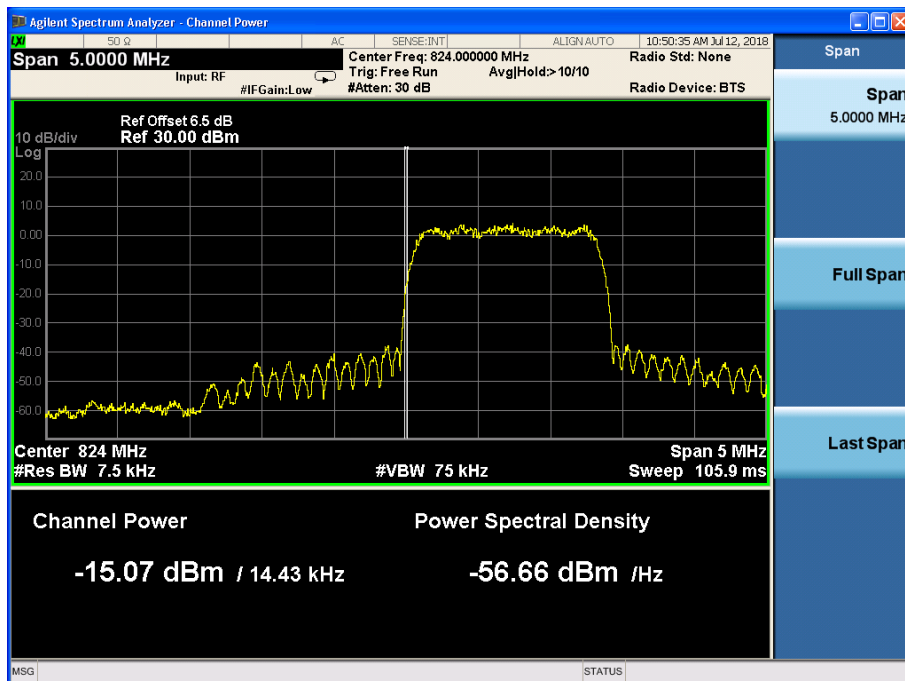
Channel 600, 1910MHz~10GHz



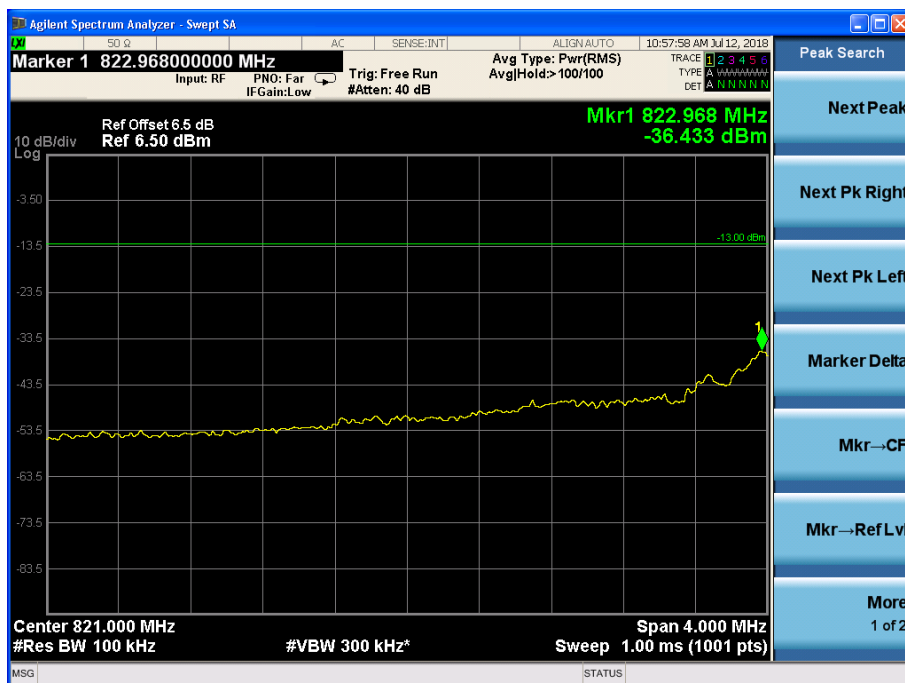
Channel 600, 10GHz~20GHz

Band Edges Compliance- FCC Part 2.1051/ 22.917(a) /Part 24.238(a)

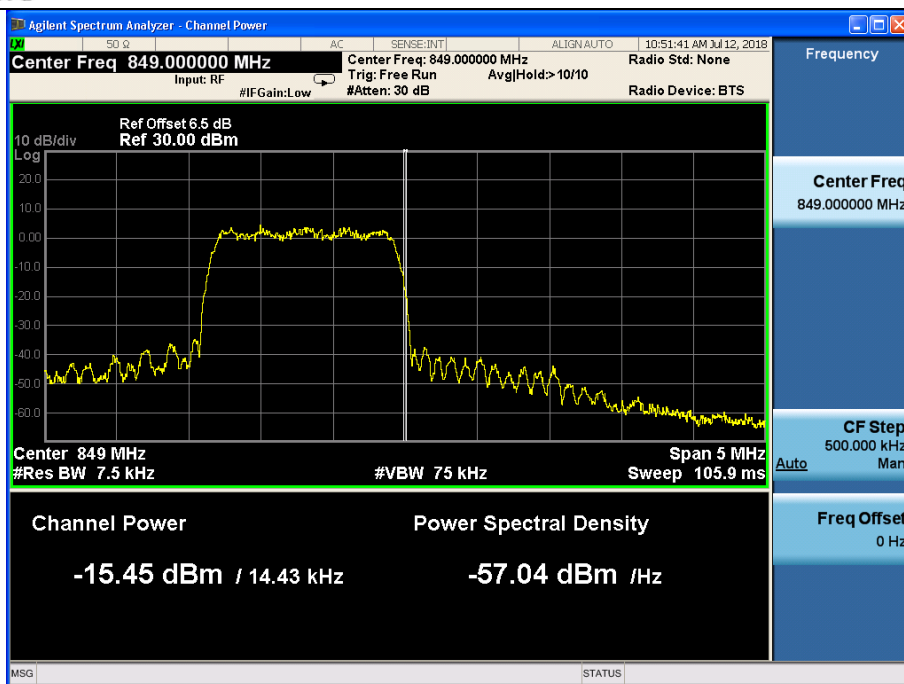
CDMA BC0:



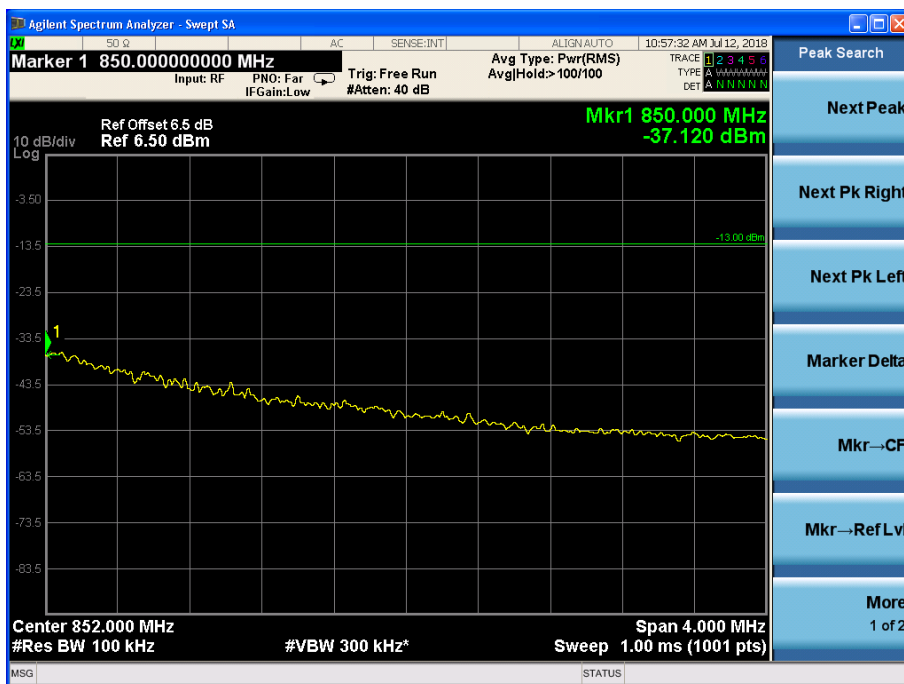
Channel 1013



Channel 1013

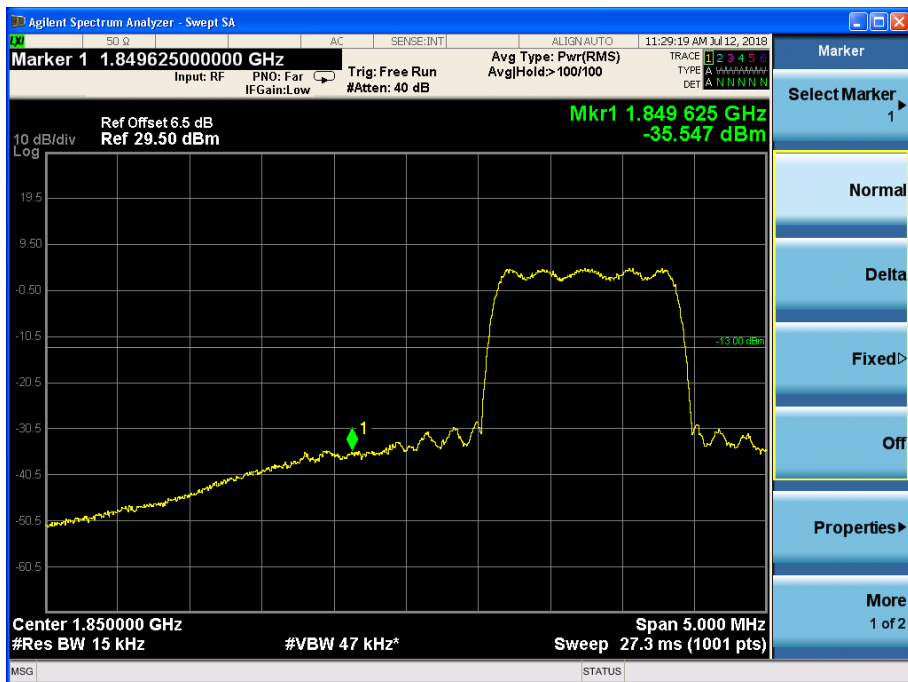


Channel 777

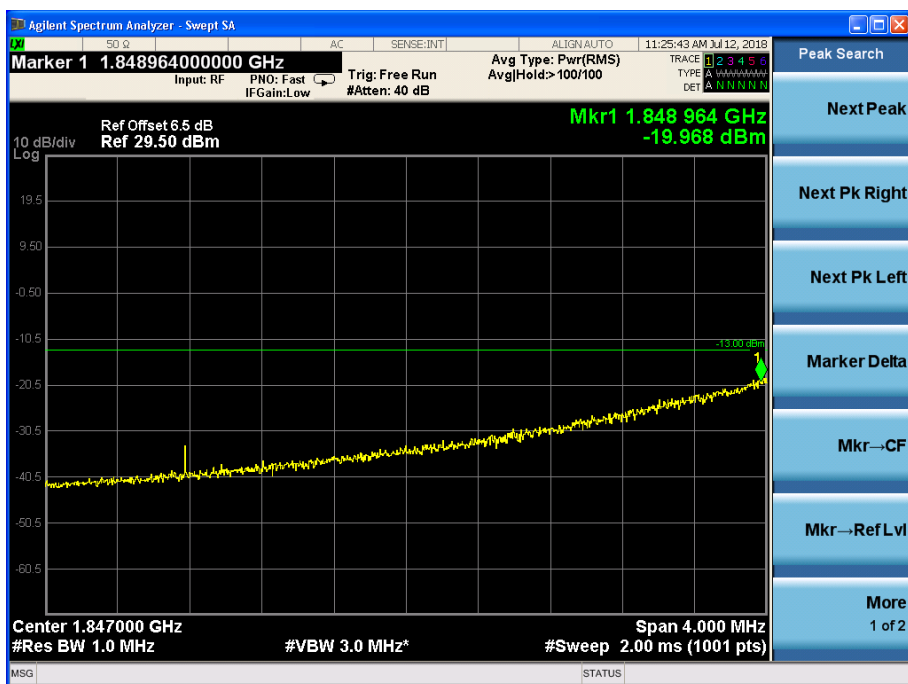


Channel 777

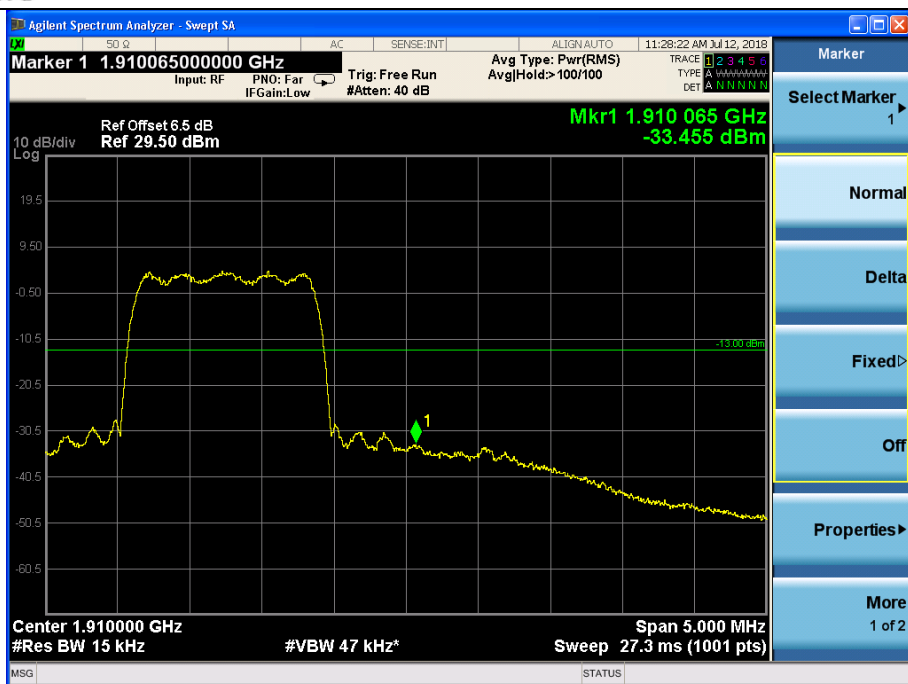
CDMA BC1:



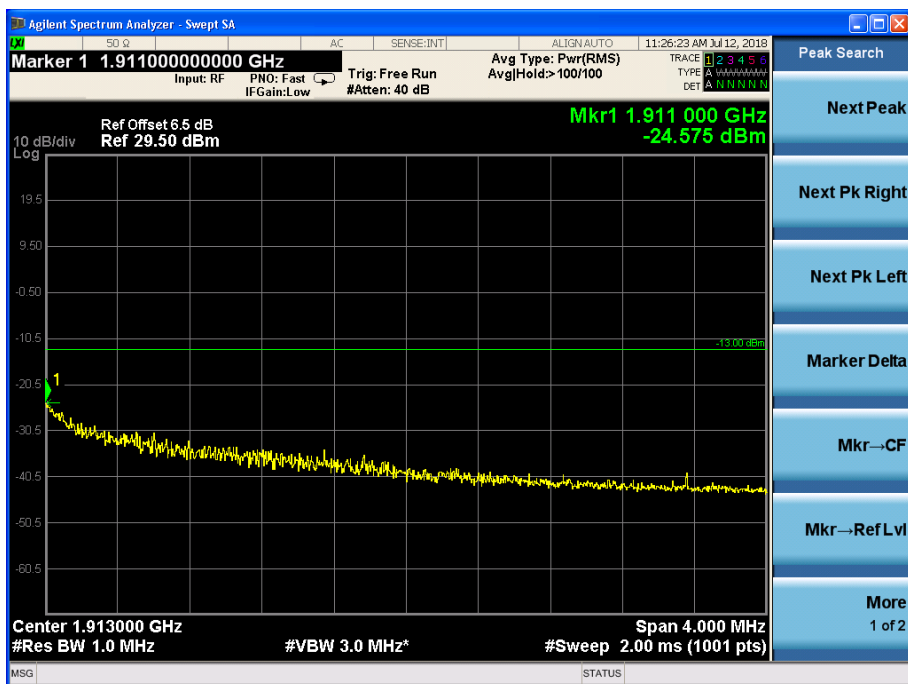
Channel 25



Channel 25



Channel 1175



Channel 1175

Frequency Stability- FCC Part 2.1055/22.355 /Part 24.235

CDMA BC0:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 1013	Channel 384	Channel 777
-10	0.011	0.013	0.013
0	0.007	0.011	0.013
+10	0.008	0.015	0.012
+20	0.009	0.017	0.012
+30	0.010	0.012	0.015
+40	0.014	0.011	0.011
+50	0.012	0.010	0.012
+55	0.012	0.010	0.012

Voltage	Test Result (ppm)@NT		
	Channel 1013	Channel 384	Channel 777
LV	0.010	0.009	0.012
HV	0.013	0.009	0.011

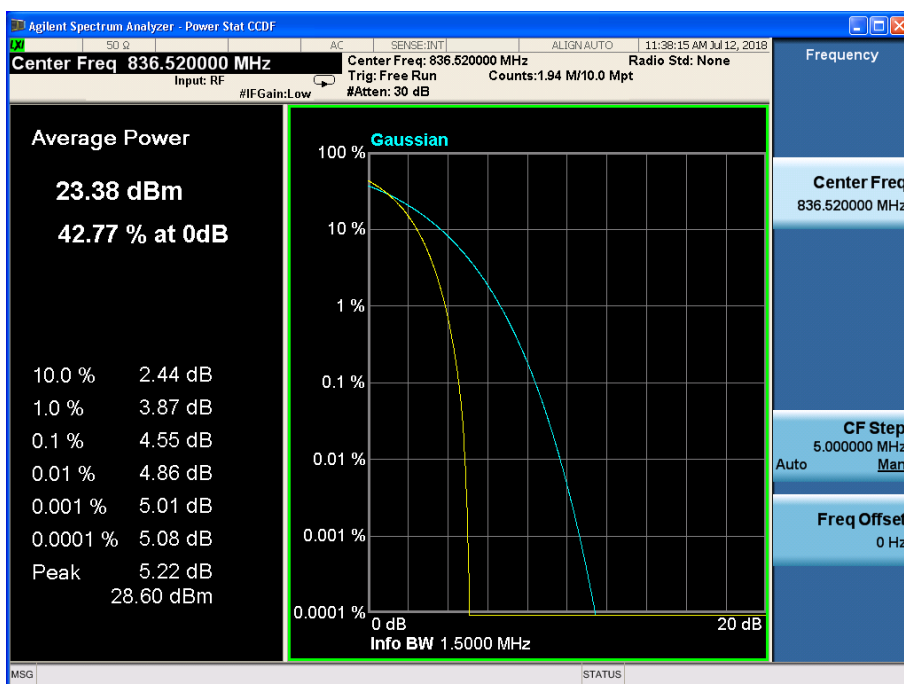
CDMA BC1:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 25	Channel 600	Channel 1175
-10	0.011	0.013	0.023
0	0.007	0.011	0.013
+10	0.006	0.015	0.012
+20	0.009	0.012	0.009
+30	-0.010	0.012	0.015
+40	0.012	0.011	0.011
+50	0.012	-0.010	0.012
+55	0.012	0.010	0.012

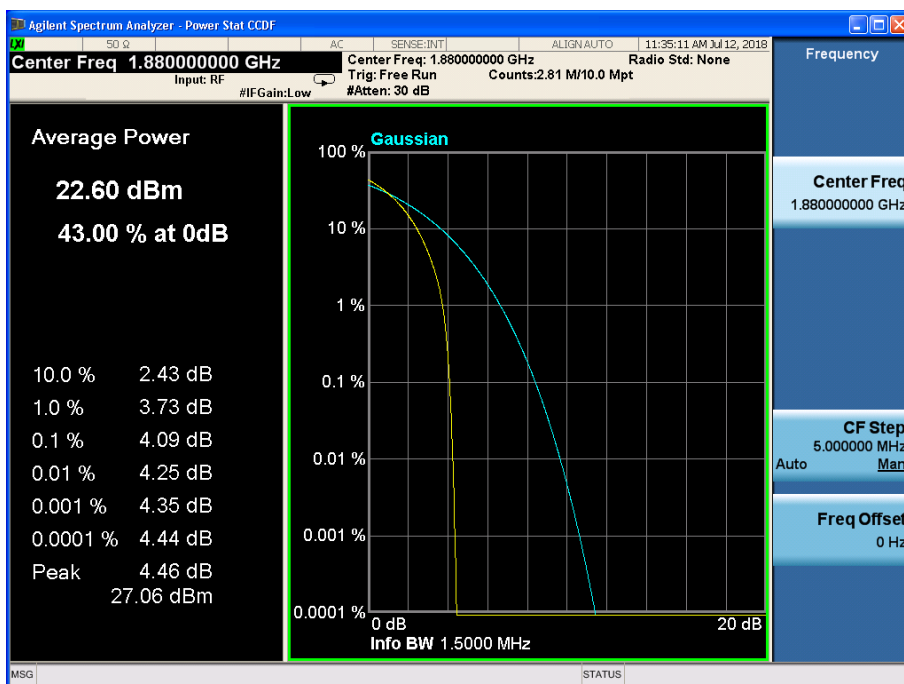
Voltage	Test Result (ppm)@NT		
	Channel 25	Channel 600	Channel 1175
LV	0.011	0.010	0.012
HV	0.008	0.016	0.013

Peak-Average Ratio -FCC Part 24.232(d)

CDMA BC0:



CDMA BC1:



RF Power Output-FCC Part2.1046

1X EVDO

1X EVDO R0 BC0:

Carrier frequency (MHz)	Channel No.	Conducted Power (dBm)
824.70	1013	23.23
836.52	384	23.45
848.31	777	23.24

1X EVDO RA BC0:

Carrier frequency (MHz)	Channel No.	Conducted Power (dBm)
824.70	1013	23.24
836.52	384	23.26
848.31	777	23.27

1X EVDO R0 BC1:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1851.25	25	23.32
1880.00	600	23.21
1908.75	1175	23.25

1X EVDO RA BC1:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1851.25	25	23.24
1880.00	600	23.31
1908.75	1175	23.28

Occupied Bandwidth-FCC Part2.1049

1X EVDO R0 BC0:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
824.70	1013	1.2753
836.52	384	1.2715
848.31	777	1.2810

1X EVDO RA BC0:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
824.70	1013	1.2703
836.52	384	1.2818
848.31	777	1.2791

1X EVDO R0 BC1:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
1851.25	25	1.2861
1880.00	600	1.2825
1908.75	1175	1.2822

1X EVDO RA BC1:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
1851.25	25	1.2809
1880.00	600	1.2800
1908.75	1175	1.2799

Emission Bandwidth-FCC Part 22.917(b)/Part 24.238(b)

1X EVDO R0 BC0:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (MHz)
824.70	1013	1.430
836.52	384	1.435
848.31	777	1.431

1X EVDO RA BC0:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (MHz)
824.70	1013	1.436
836.52	384	1.433
848.31	777	1.447

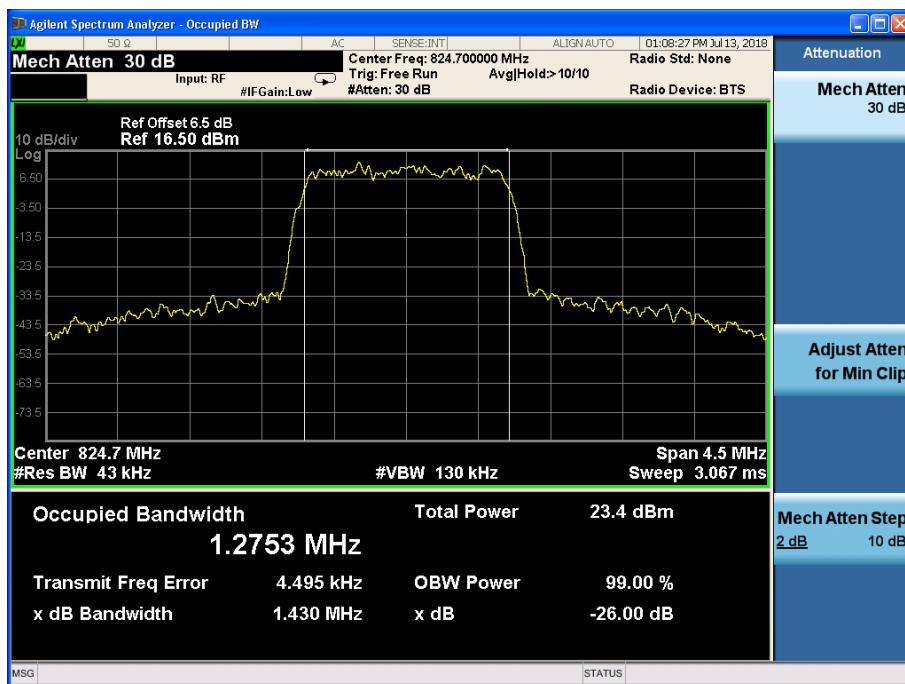
1X EVDO R0 BC1:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (MHz)
1851.25	25	1.442
1880.00	600	1.439
1908.75	1175	1.439

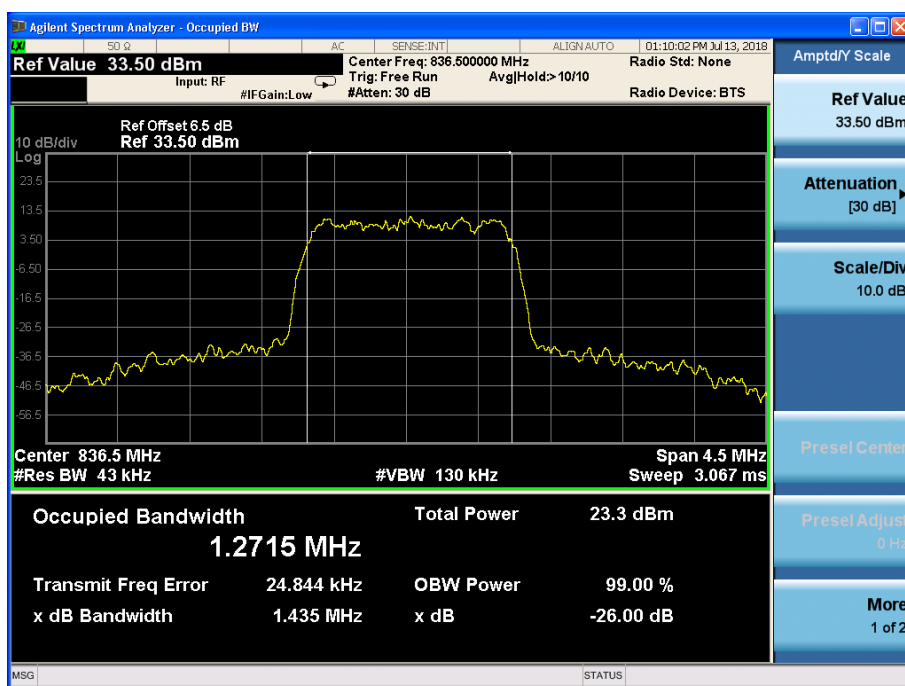
1X EVDO RA BC1:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (MHz)
1851.25	25	1.434
1880.00	600	1.438
1908.75	1175	1.439

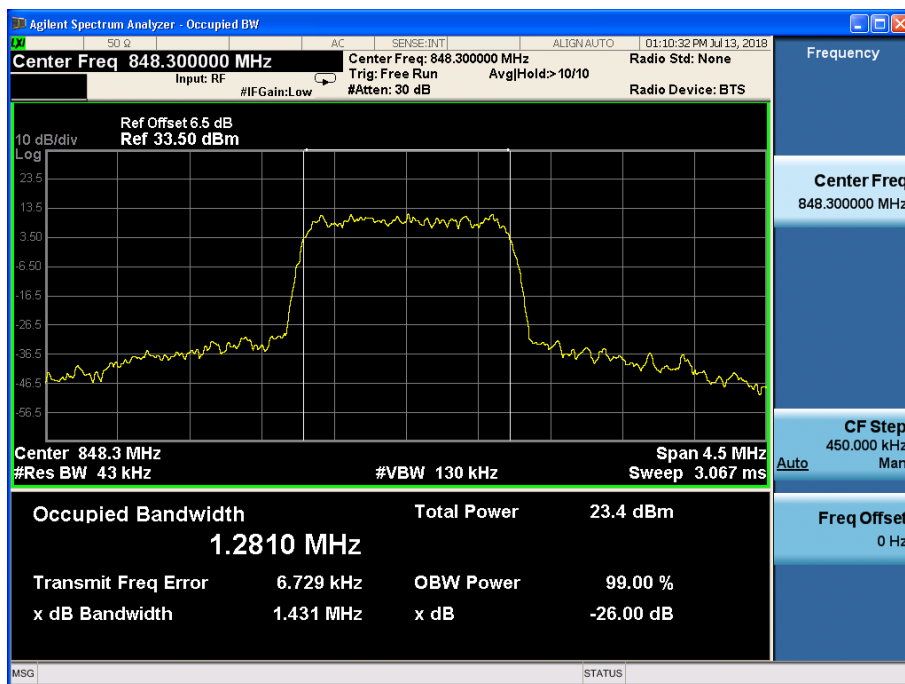
1X EVDO R0 BC0



Channel 1013

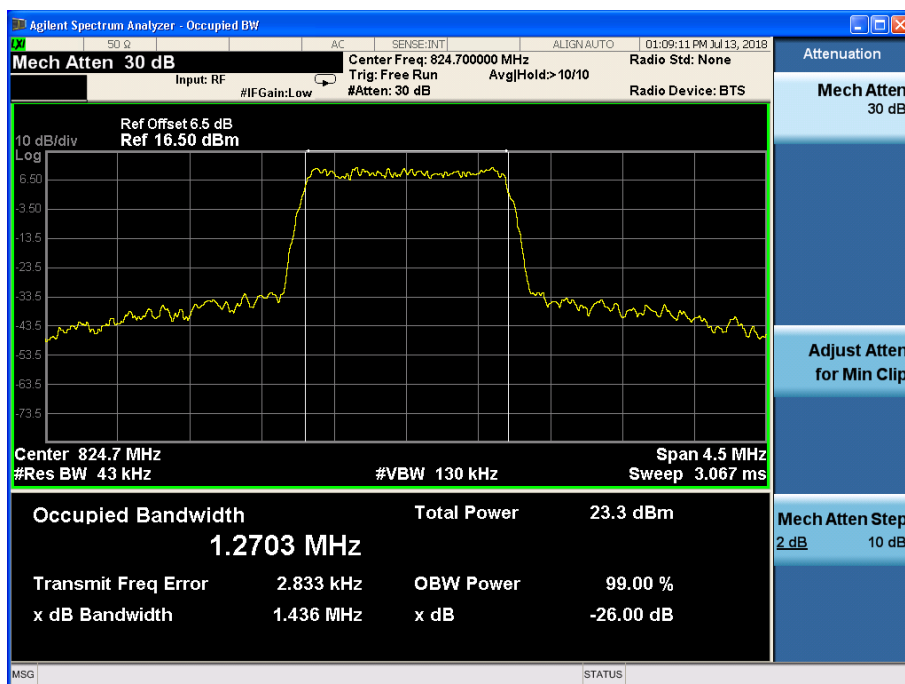


Channel 384

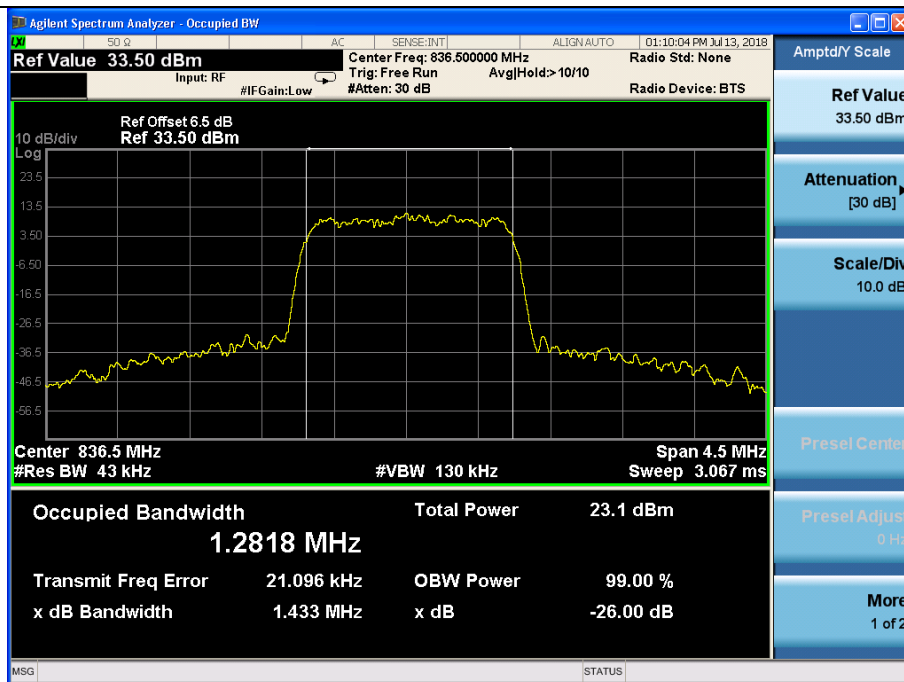


Channel 777

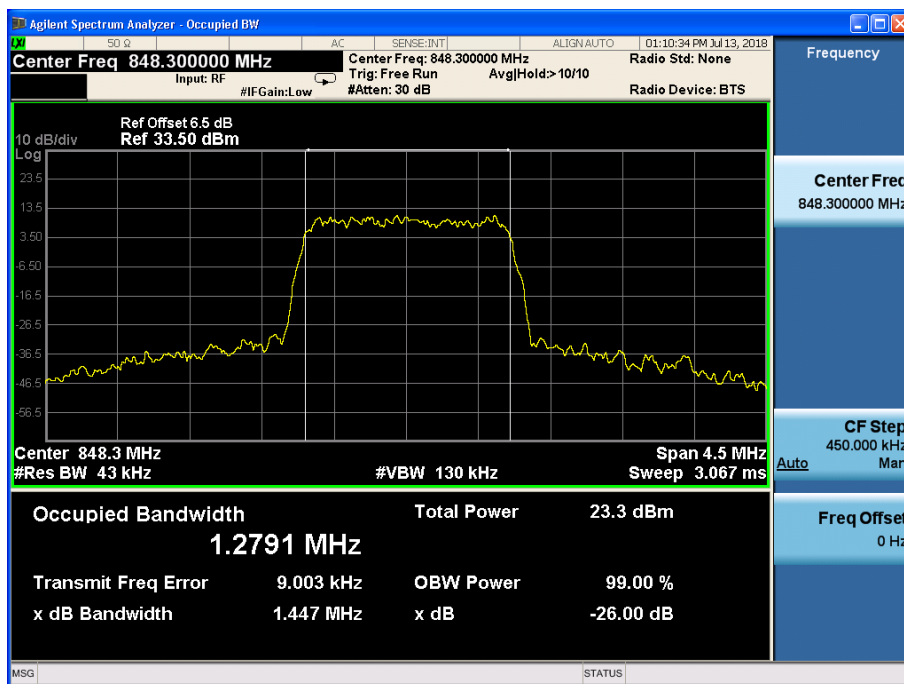
1X EVDO RA BC0



Channel 1013

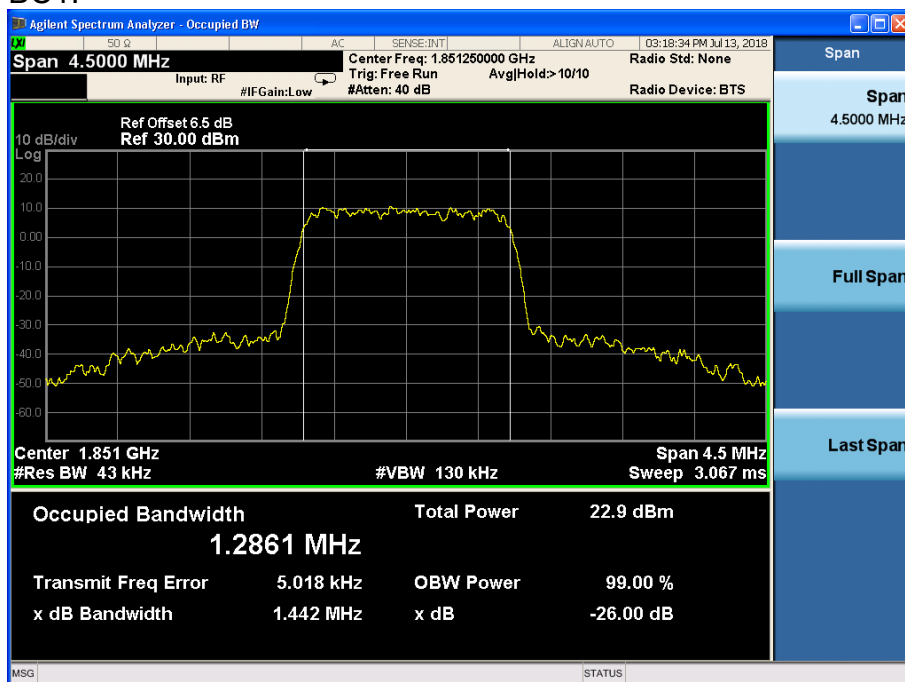


Channel 384

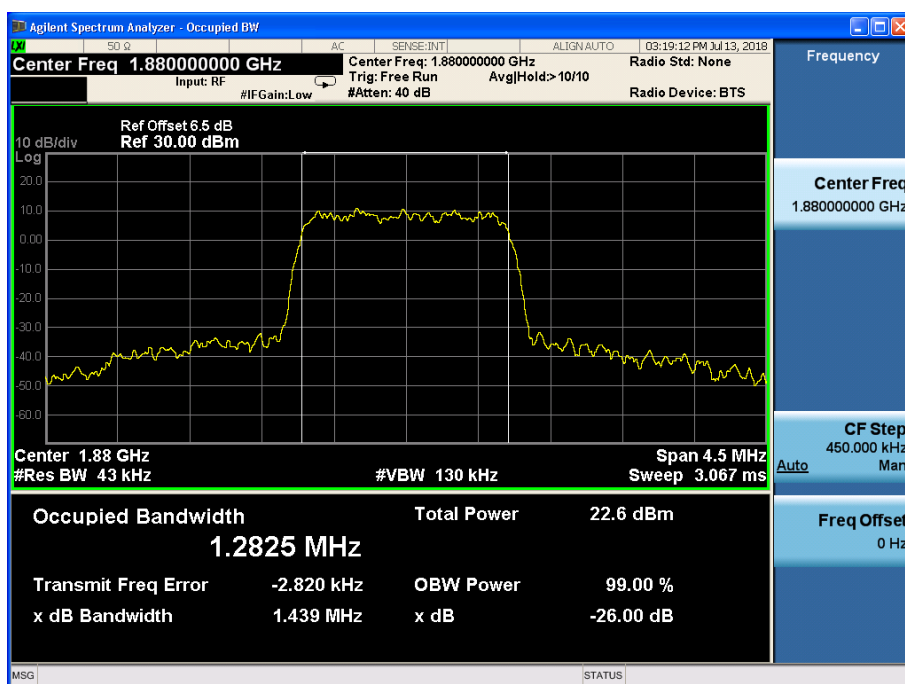


Channel 777

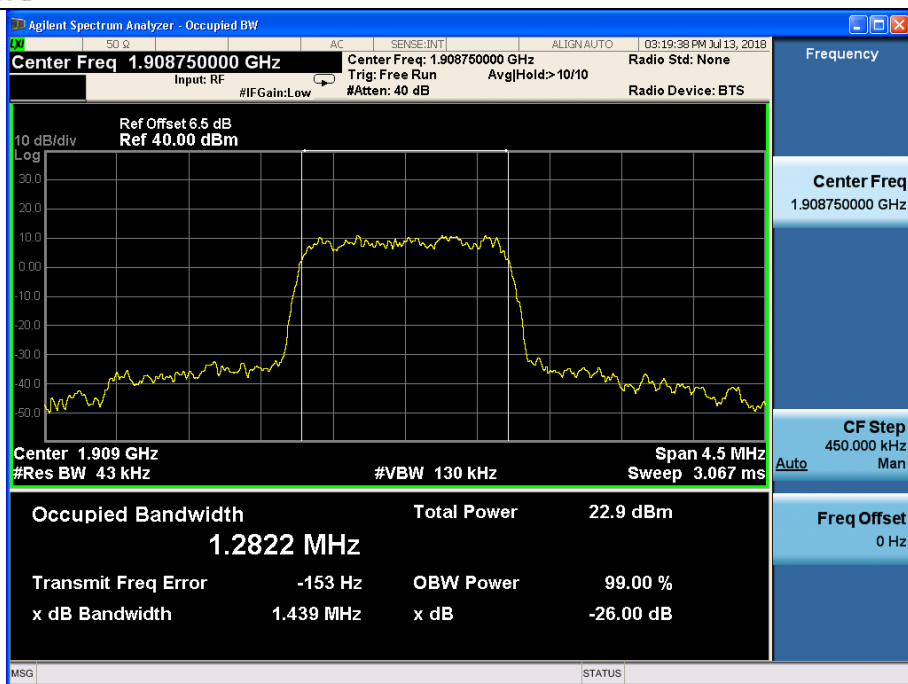
1X EVDO R0 BC1:



Channel 25

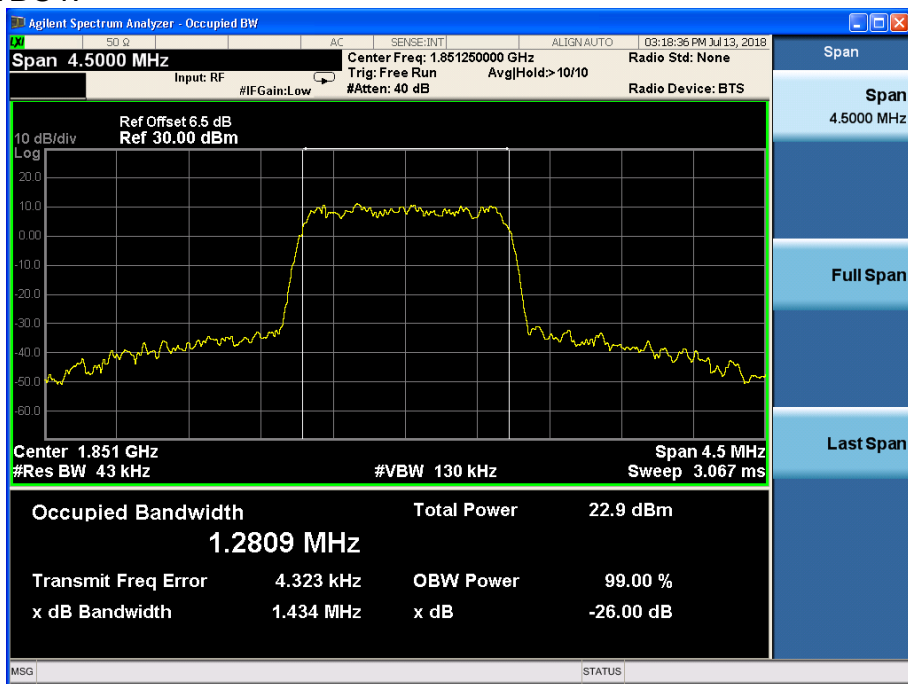


Channel 600

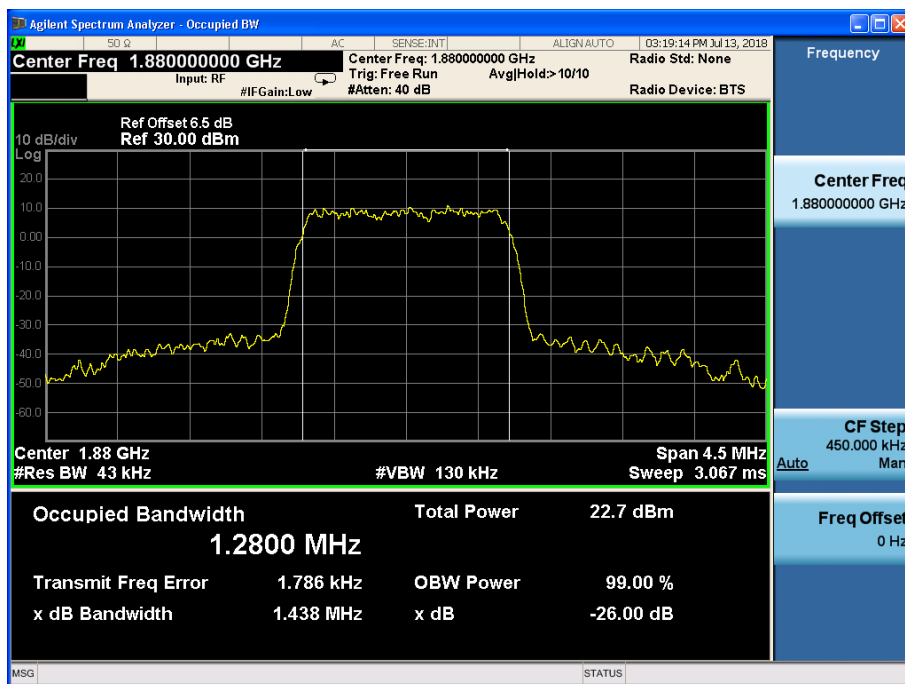


Channel 1175

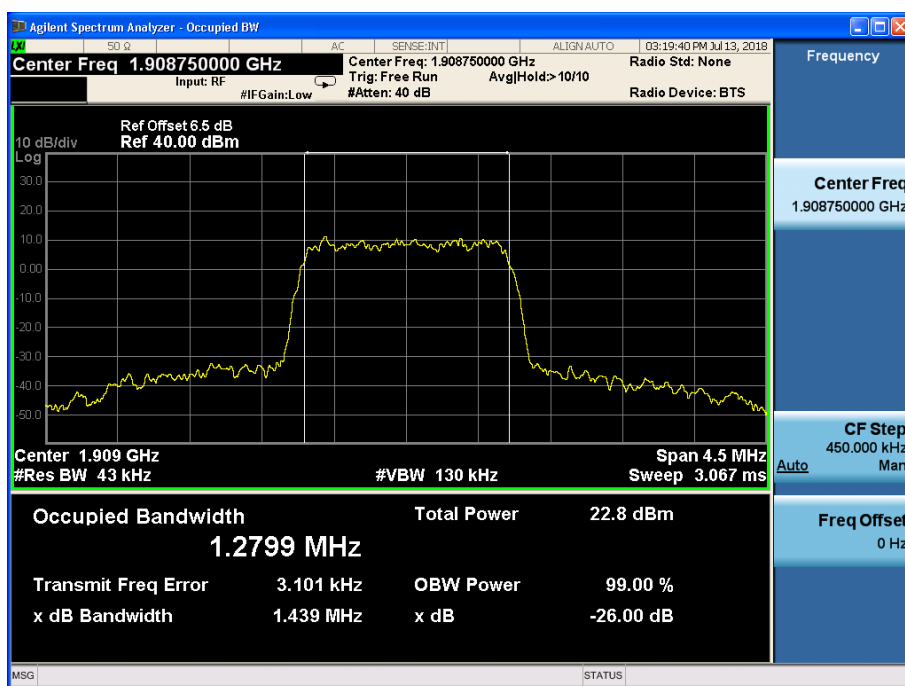
1X EVDO RA BC1:



Channel 25



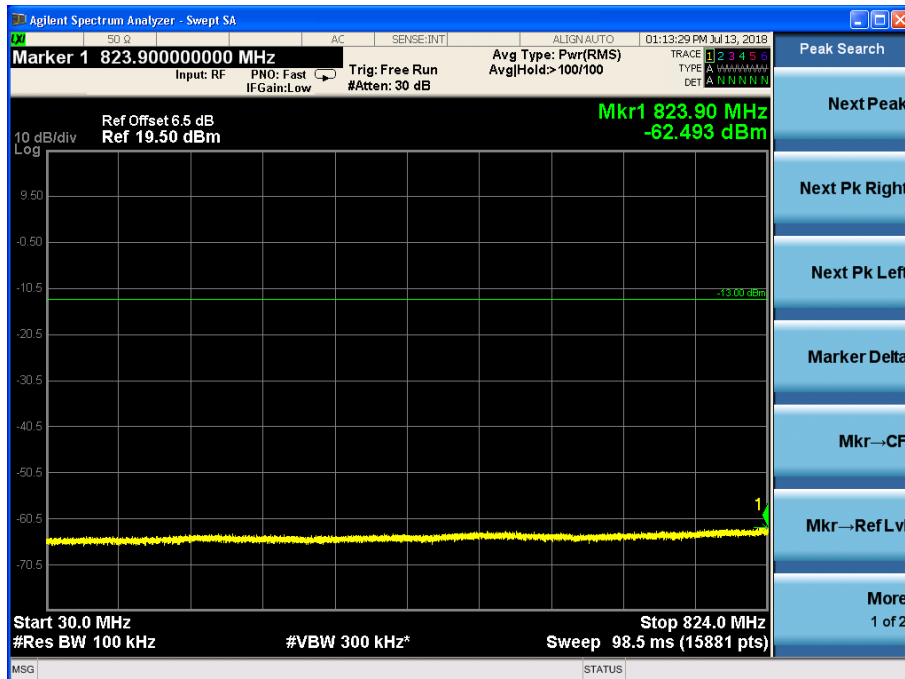
Channel 600



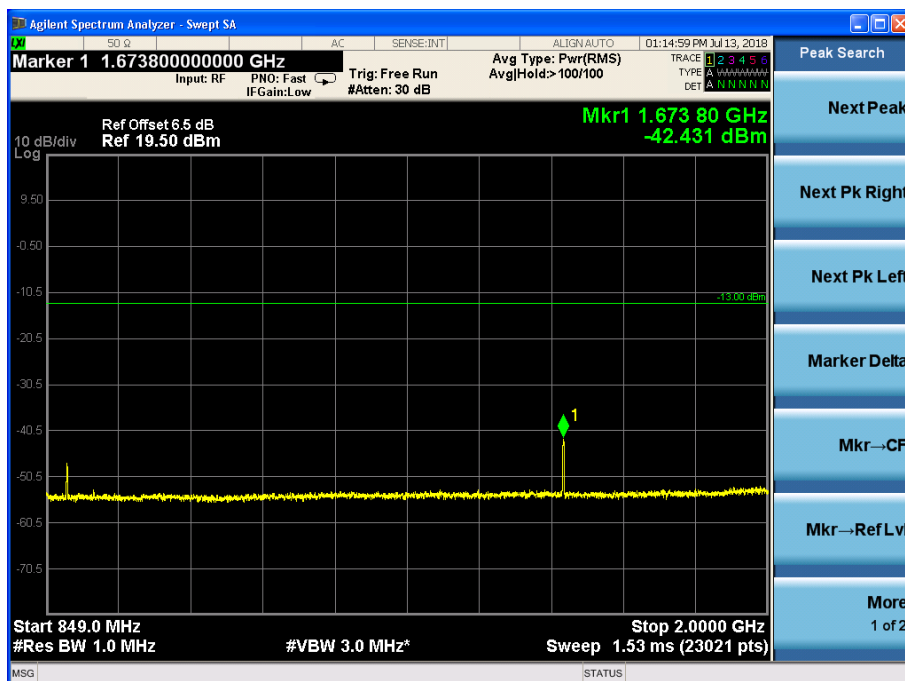
Channel 1175

Spurious Emissions at antenna terminal- FCC Part 2.1051/ 22.917(a) /Part 24.238(a)

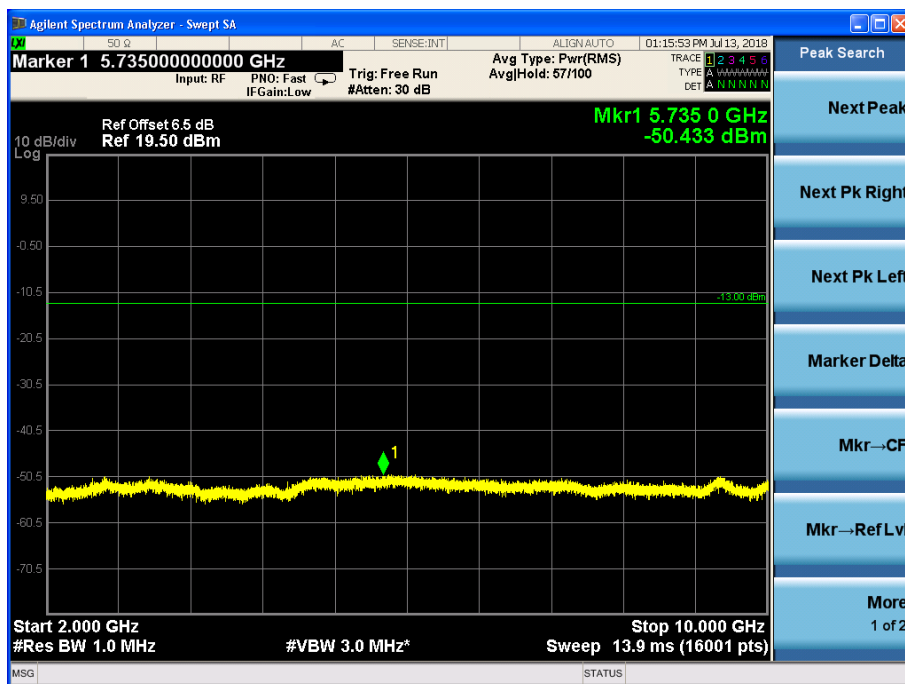
1X EVDO R0 BC0:



Channel 384, 30MHz~824MHz

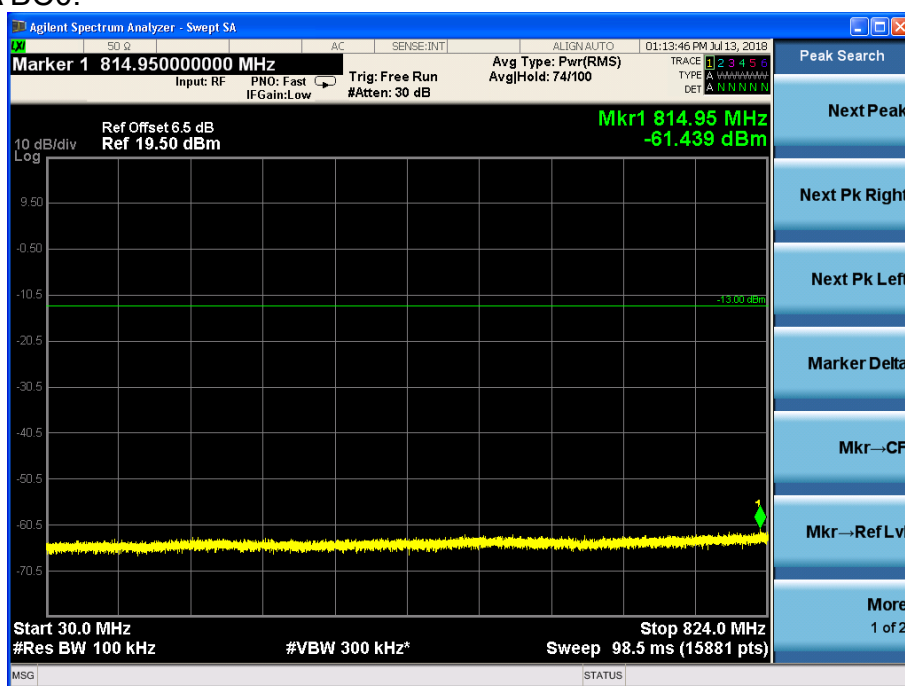


Channel 384, 849MHz~2GHz

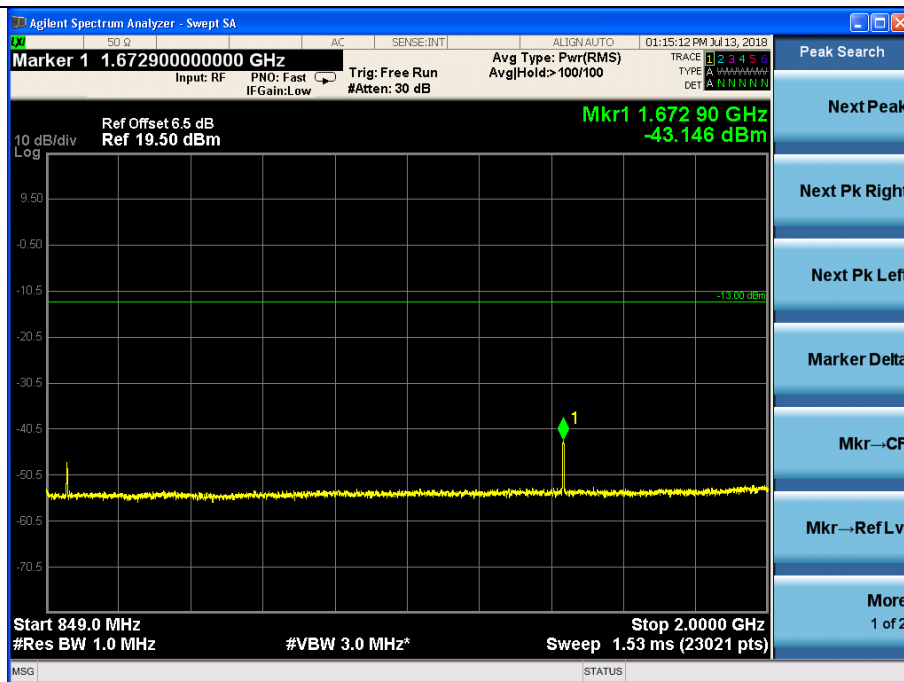


Channel 384, 2GHz~10GHz

1X EVDO RA BC0:



Channel 384, 30MHz~824MHz

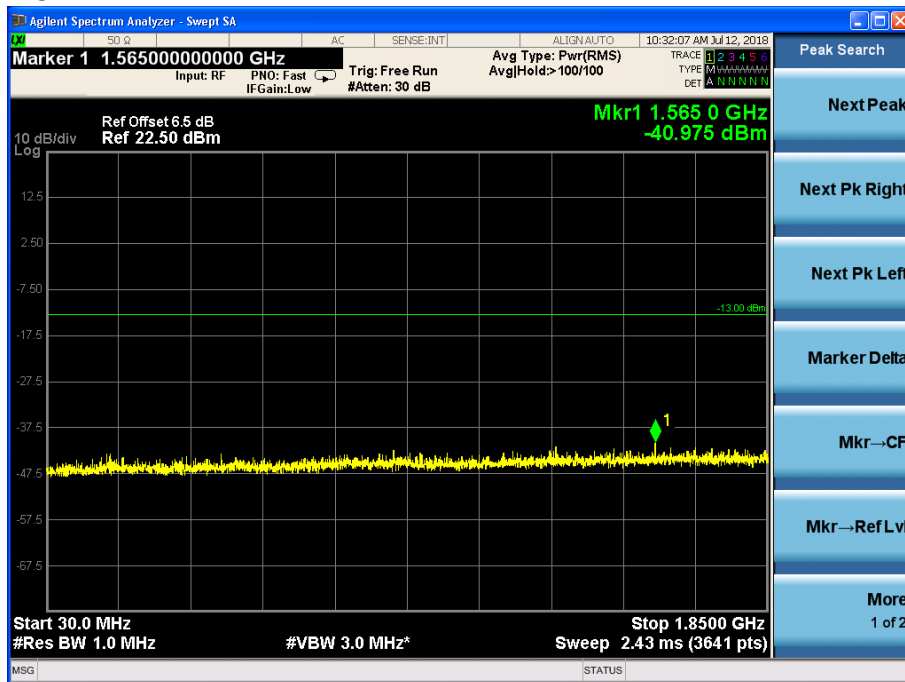


Channel 384, 849MHz~2GHz

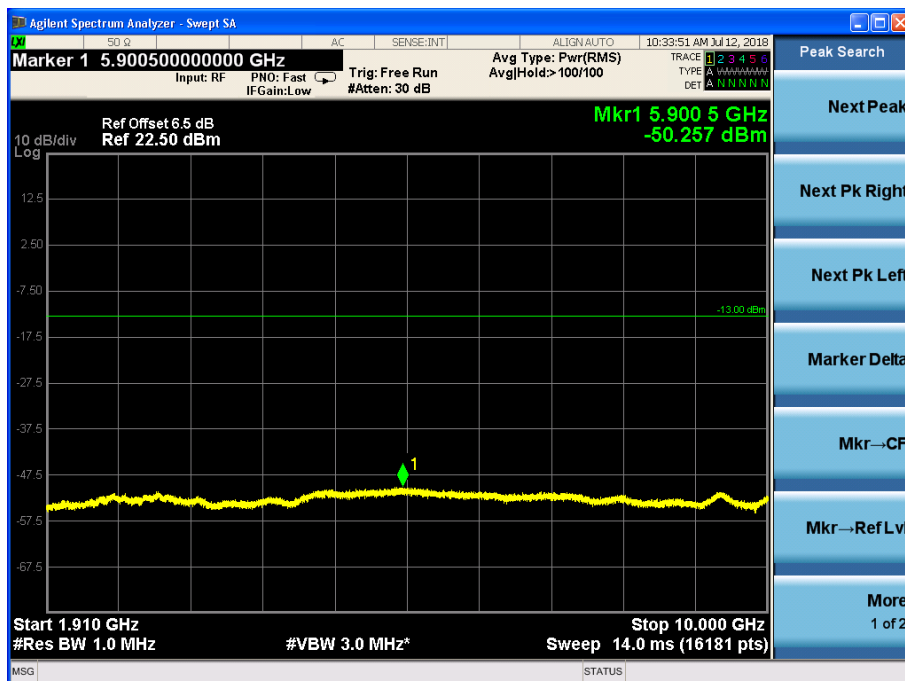


Channel 384, 2GHz~10GHz

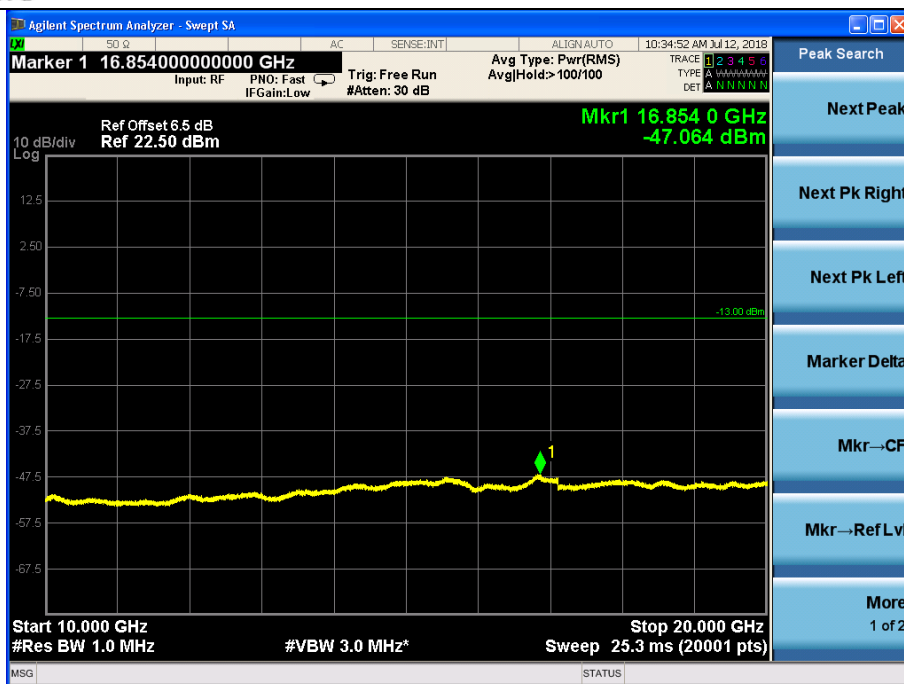
1X EVDO R0 BC1:



Channel 600, 30MHz~1850MHz

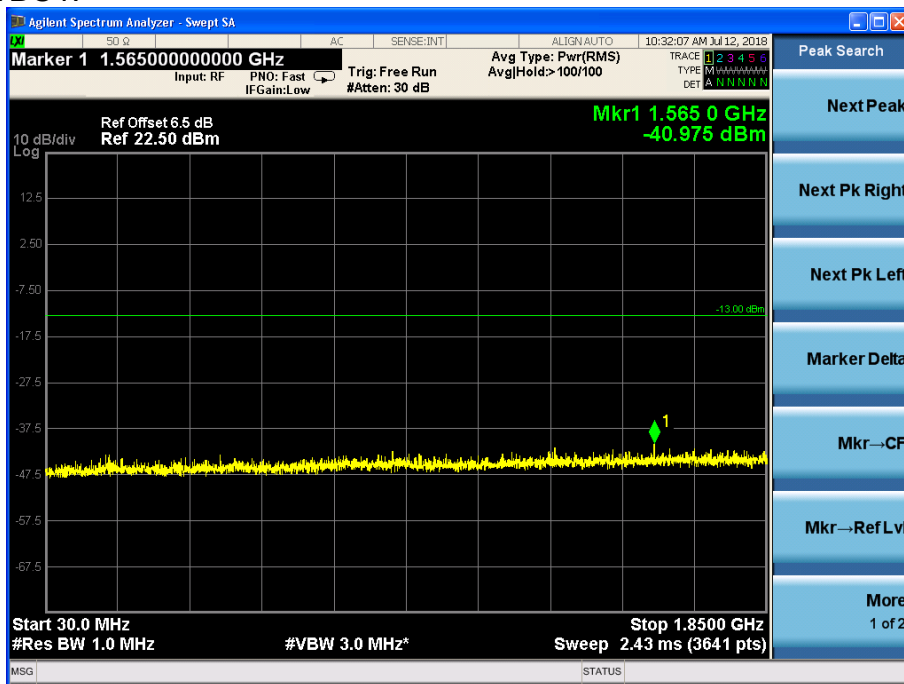


Channel 600, 1910MHz~10GHz

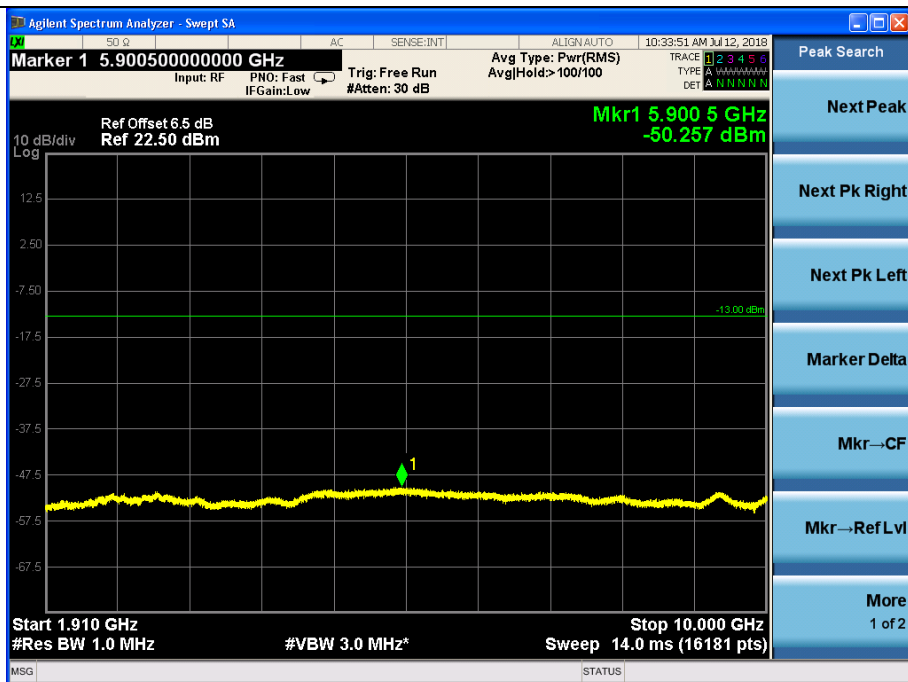


Channel 600, 10GHz~20GHz

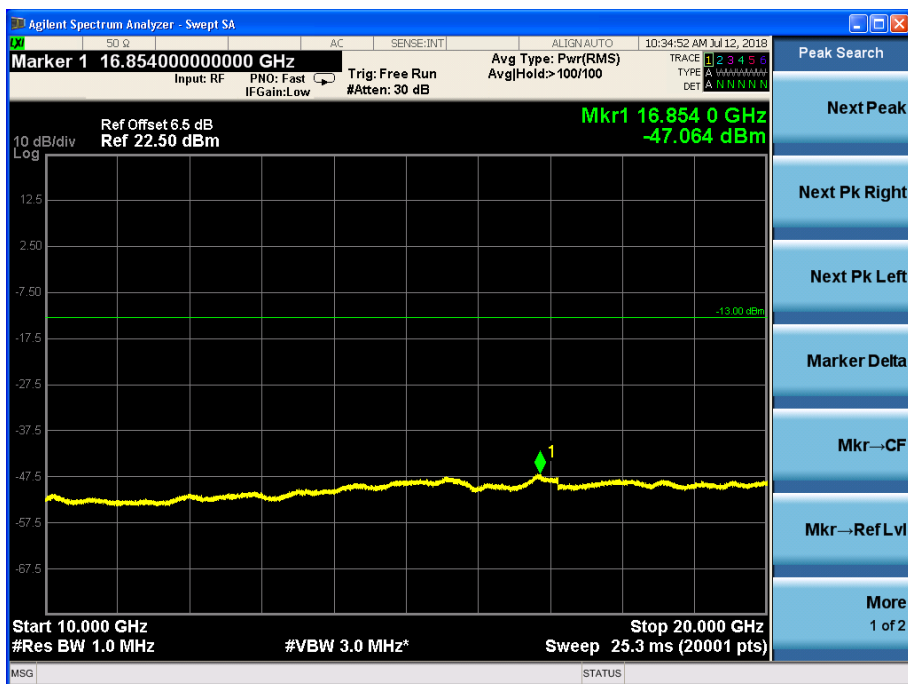
1X EVDO RA BC1:



Channel 600, 30MHz~1850MHz



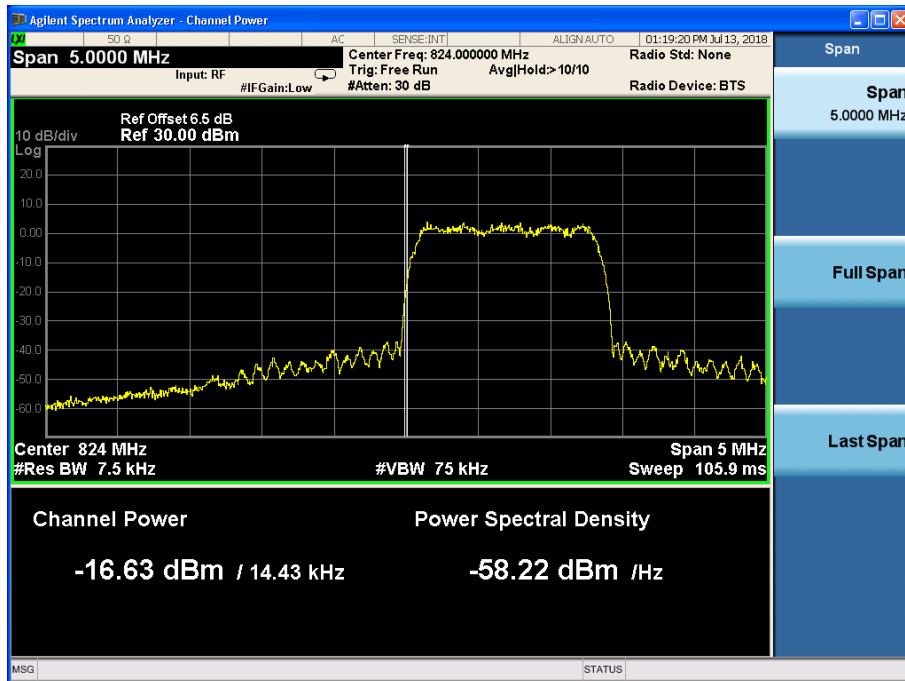
Channel 600, 1910MHz~10GHz



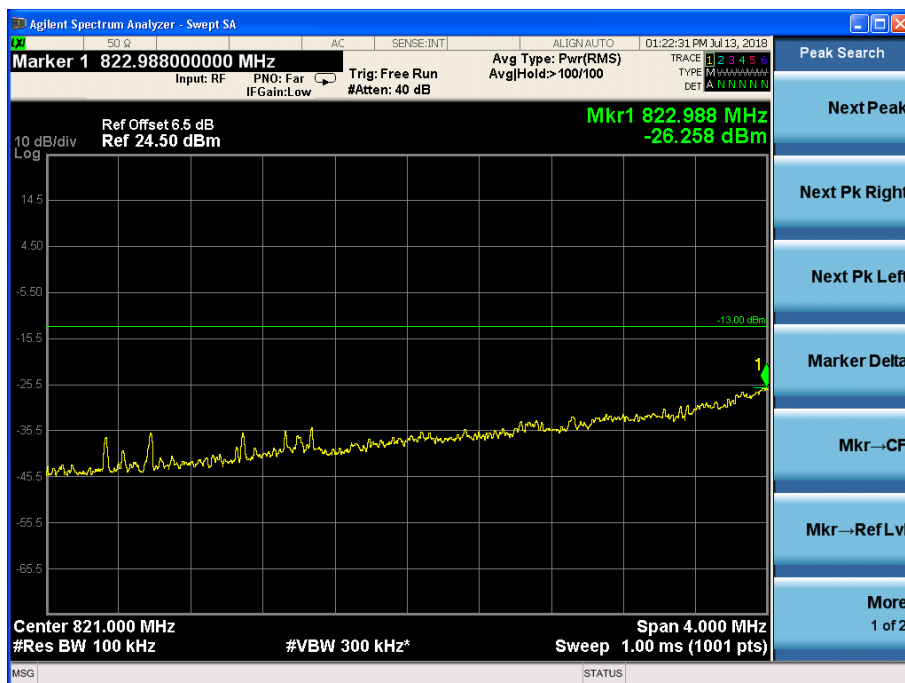
Channel 600, 10GHz~20GHz

Band Edges Compliance- FCC Part 2.1051/ 22.917(a) /Part 24.238(a)

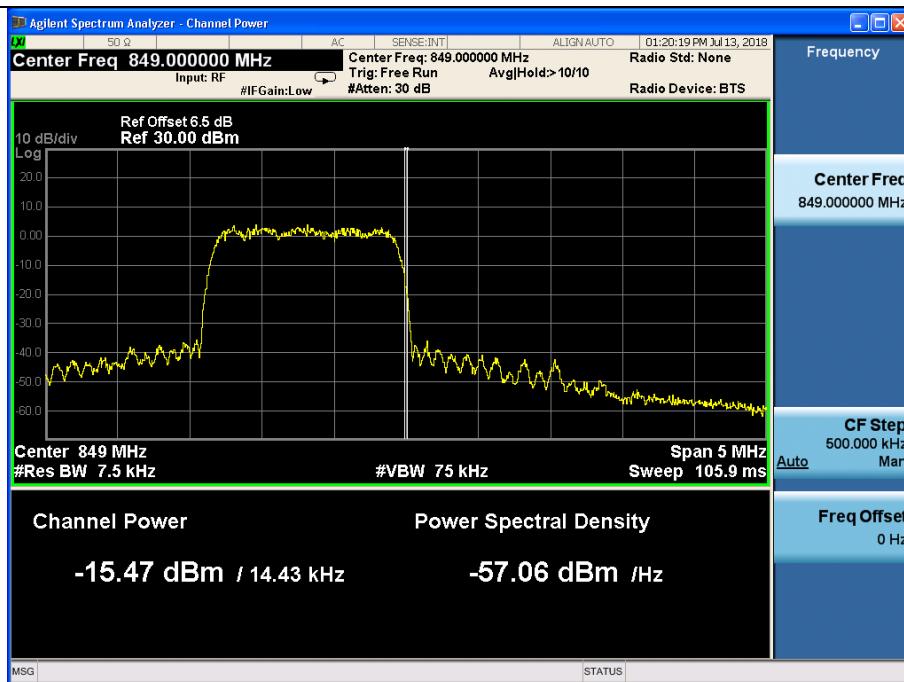
1X EVDO R0 BC0:



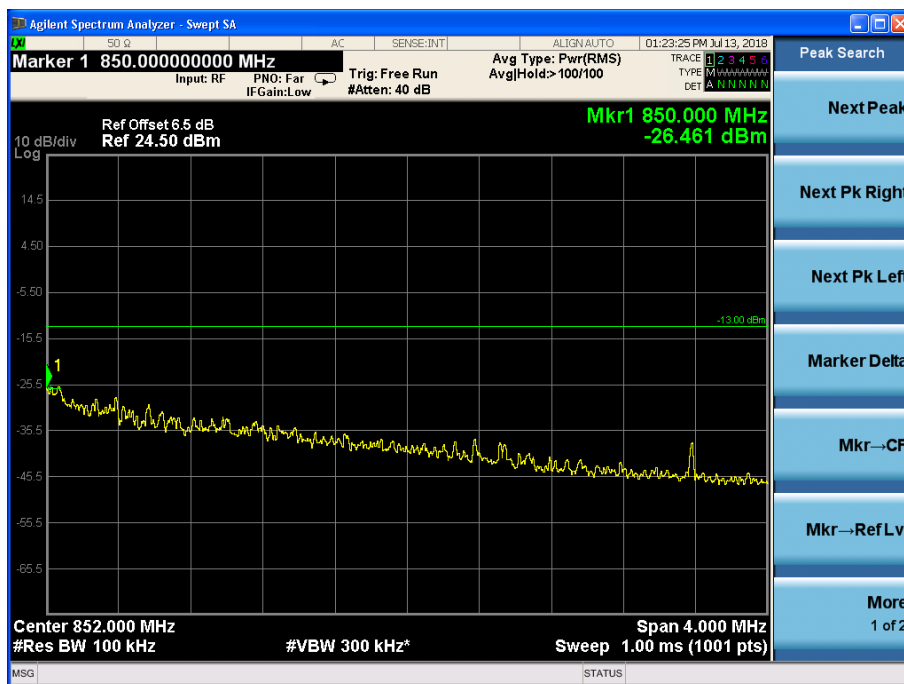
Channel 1013



Channel 1013

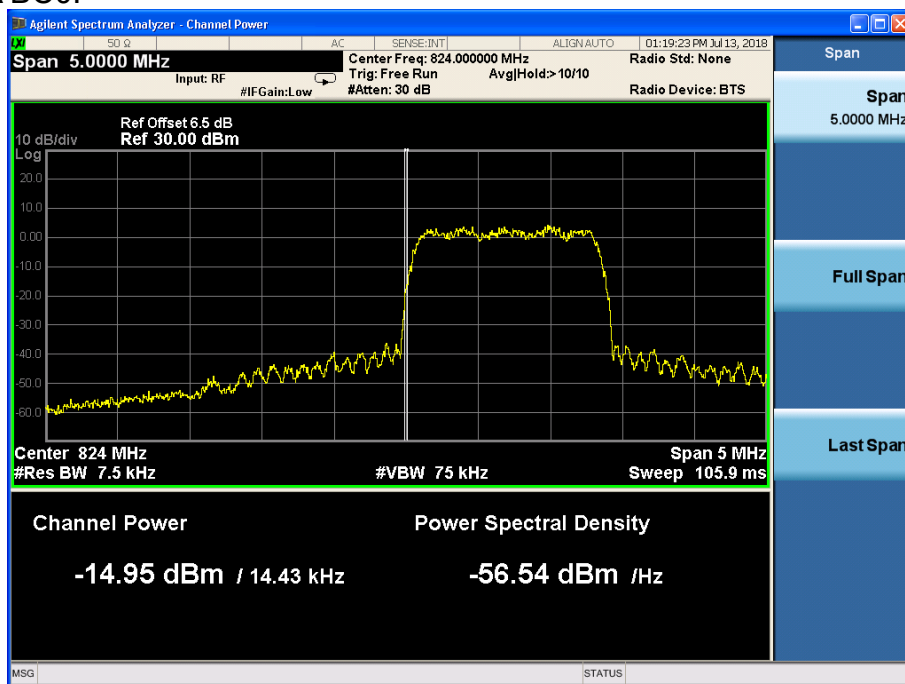


Channel 777

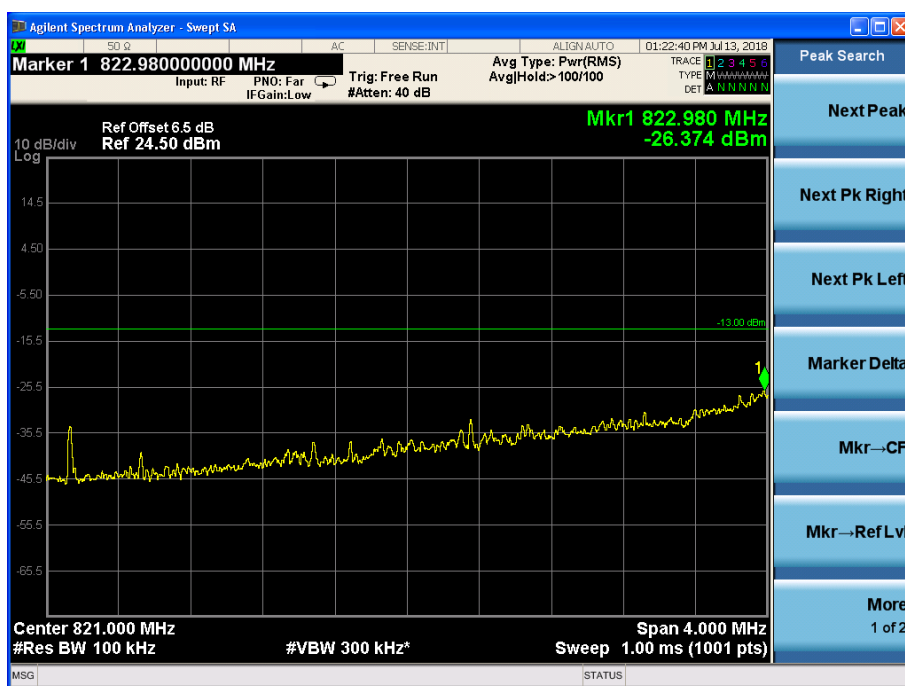


Channel 777

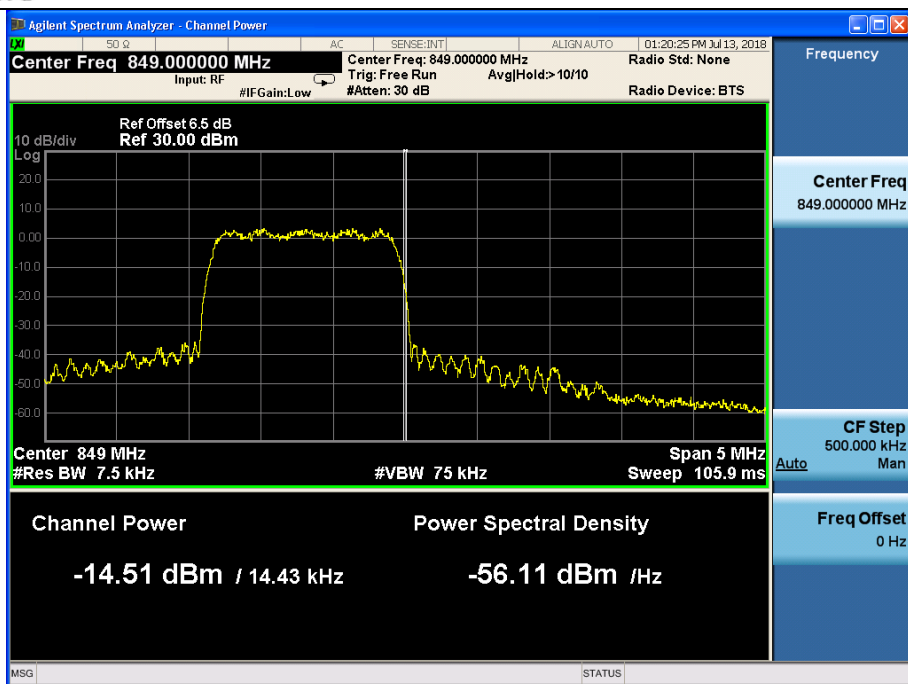
1X EVDO RA BC0:



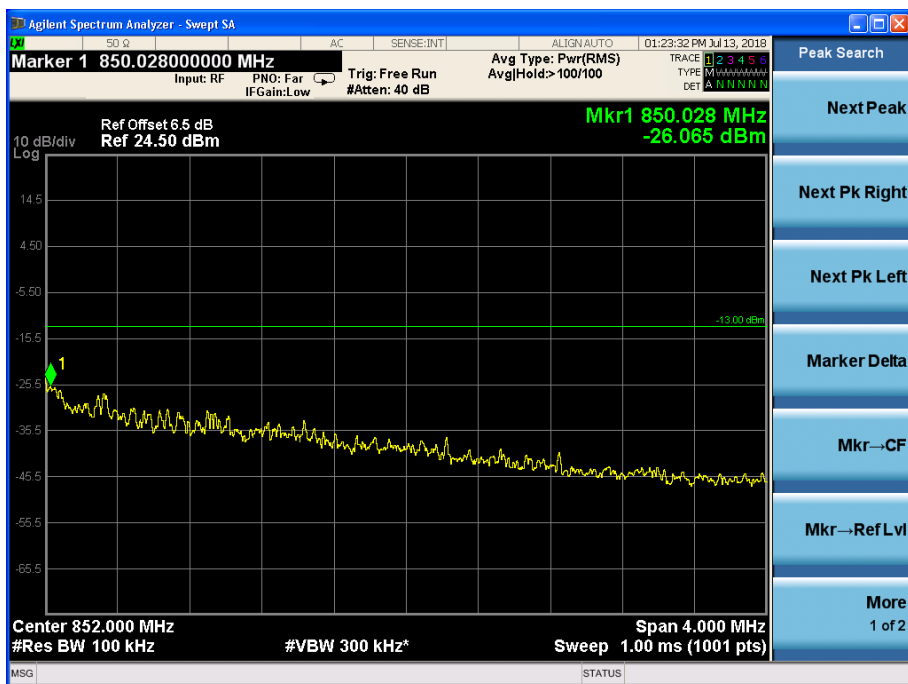
Channel 1013



Channel 1013

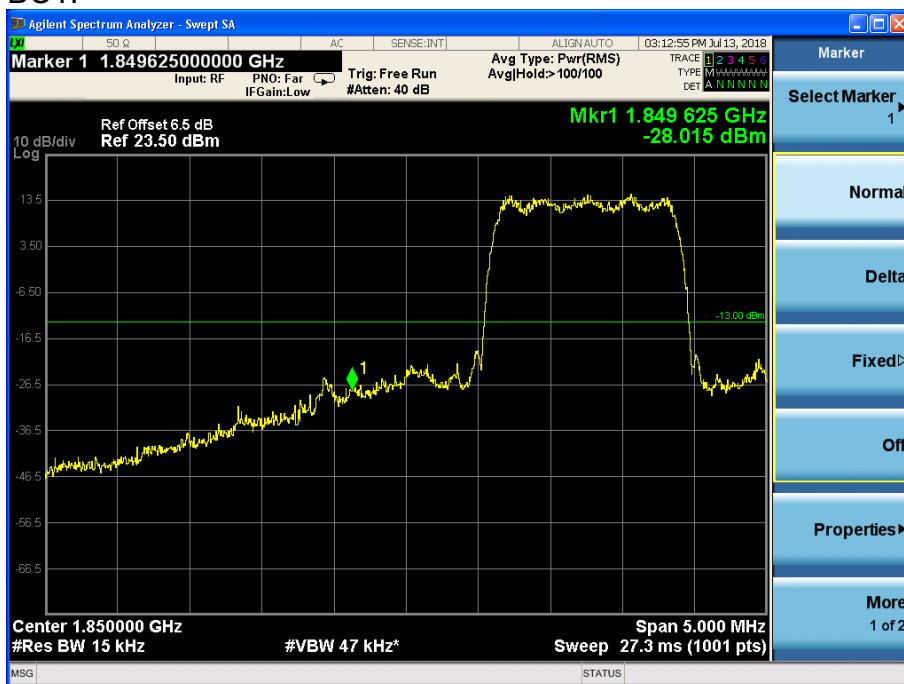


Channel 777

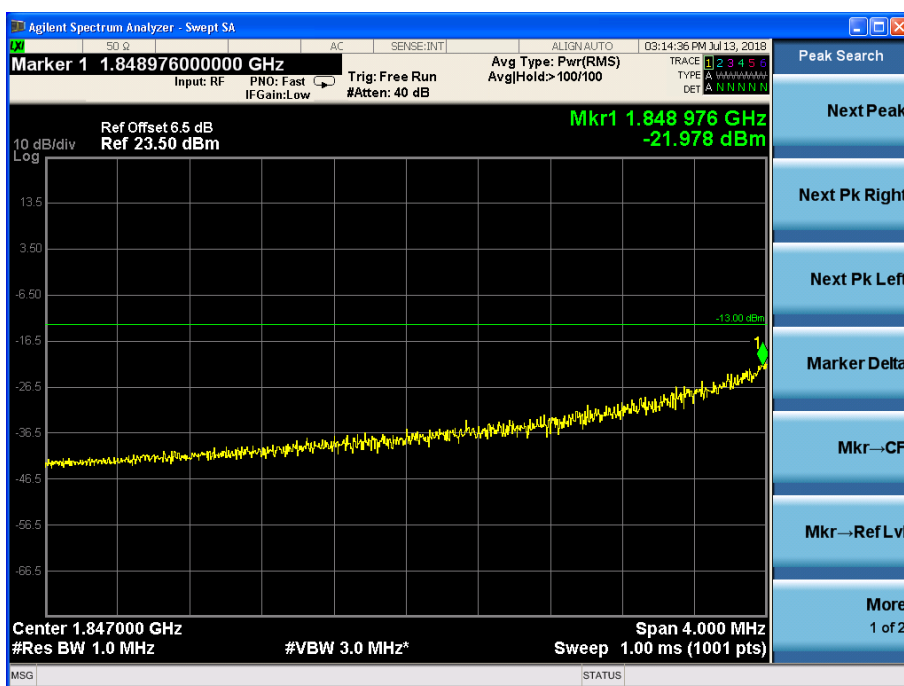


Channel 777

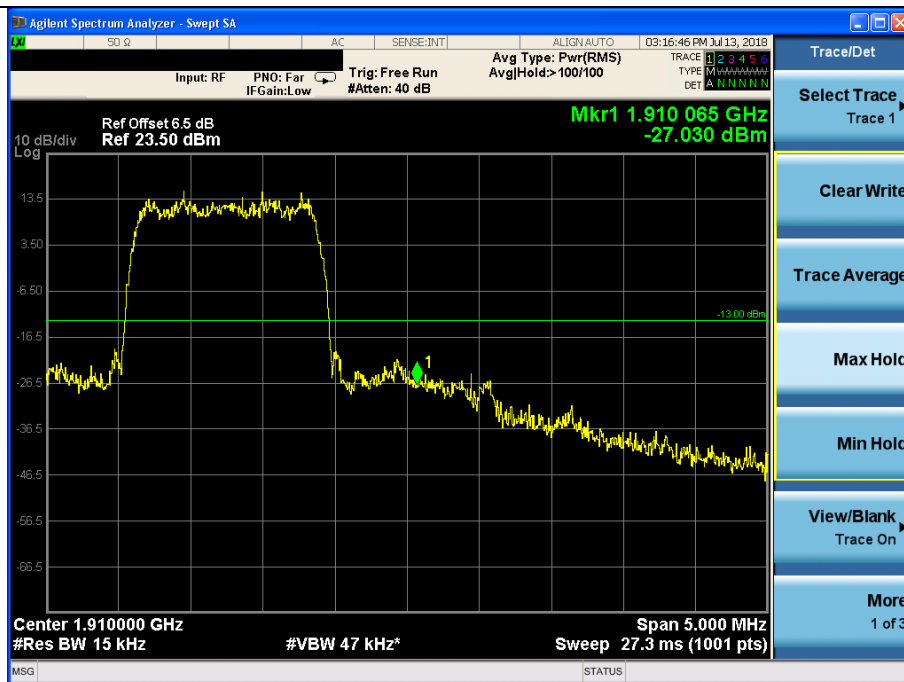
1X EVDO R0 BC1:



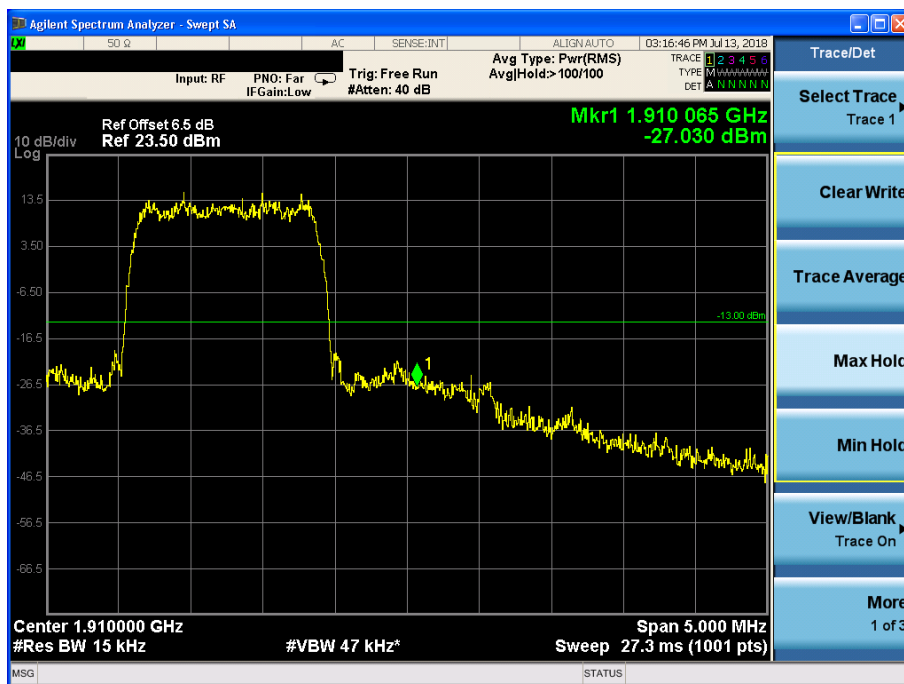
Channel 25



Channel 25

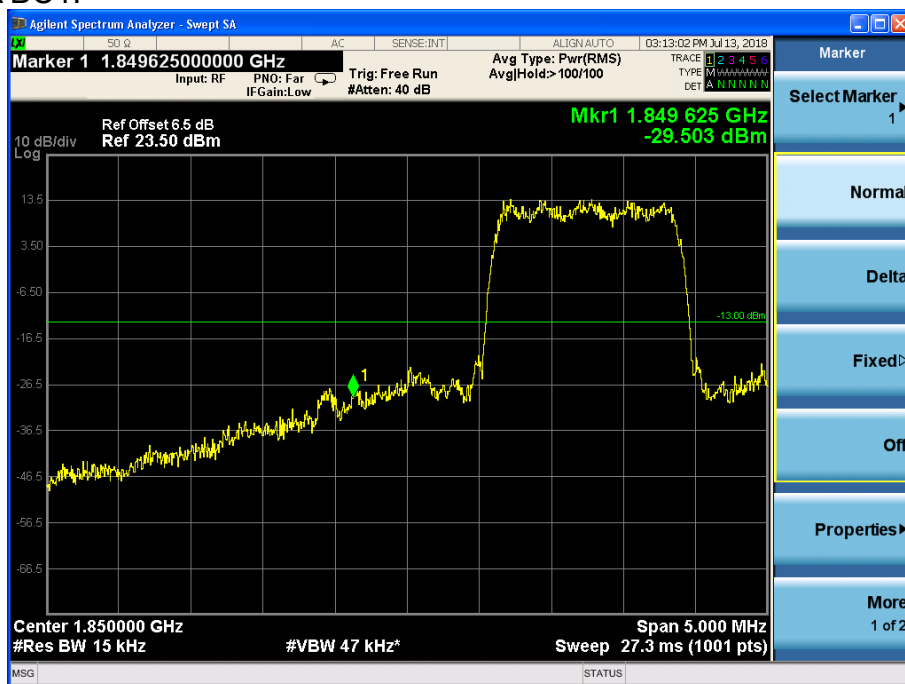


Channel 1175

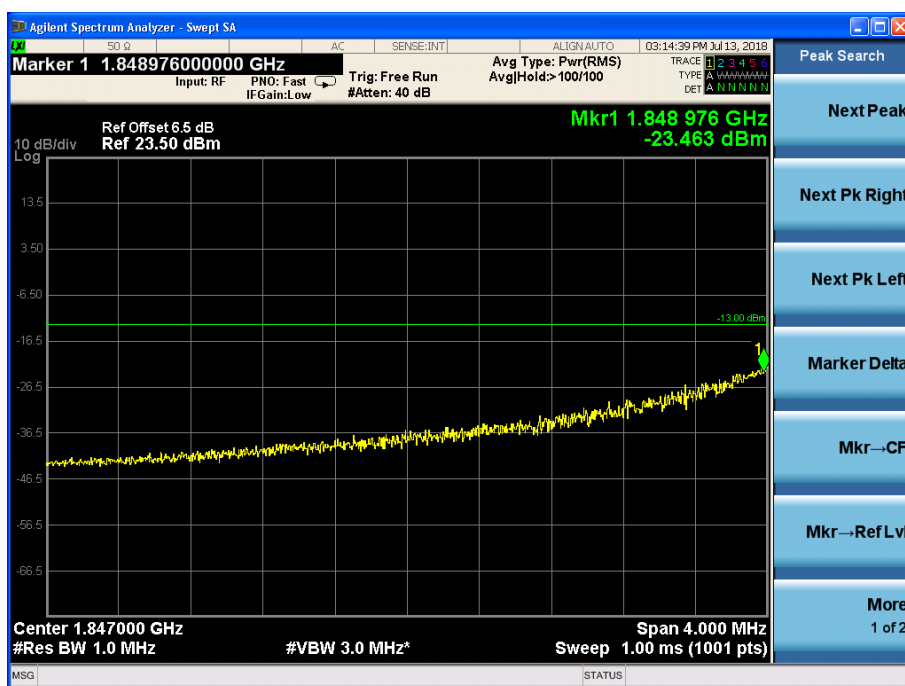


Channel 1175

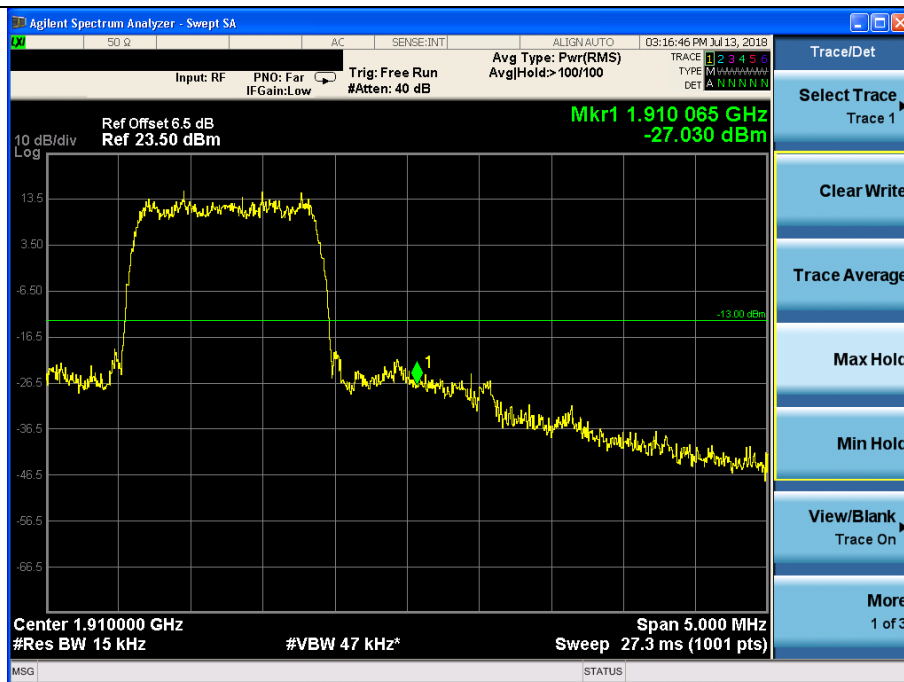
1X EVDO RA BC1:



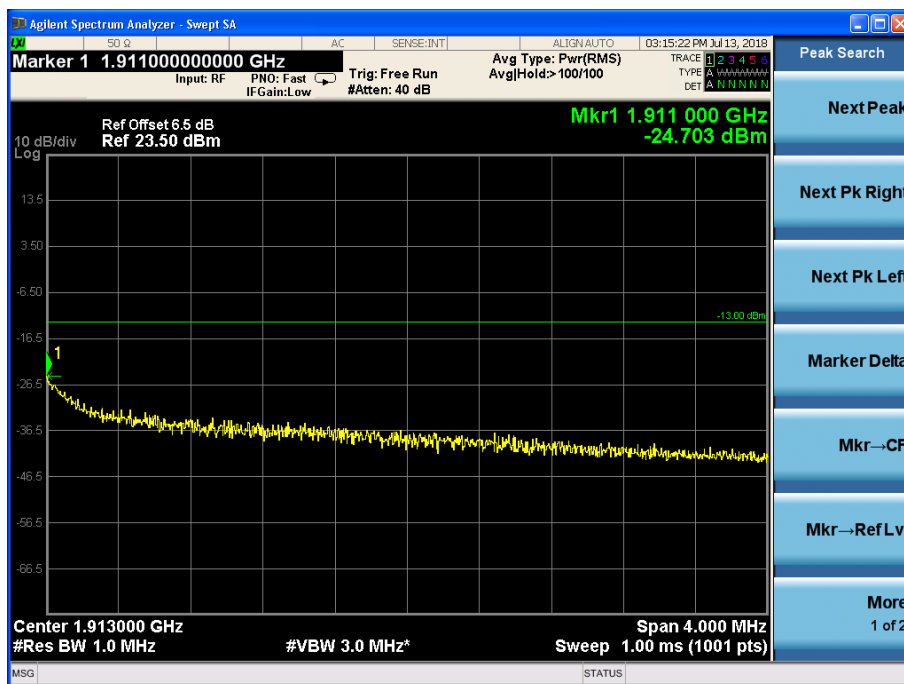
Channel 25



Channel 25



Channel 1175



Channel 1175

Frequency Stability- FCC Part 2.1055/22.355 /Part 24.235

1X EVDO R0 BC0:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 1013	Channel 384	Channel 777
-10	0.011	0.013	0.013
0	0.007	0.011	0.013
+10	0.008	0.015	0.012
+20	0.009	0.017	0.012
+30	0.010	0.012	0.015
+40	0.014	0.011	0.011
+50	0.012	0.010	0.012
+55	0.012	0.010	0.012

Voltage	Test Result (ppm)@NT		
	Channel 1013	Channel 384	Channel 777
LV	0.010	0.009	0.012
HV	0.013	0.009	0.011

1X EVDO RA BC0:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 1013	Channel 384	Channel 777
-10	0.011	0.013	0.013
0	0.007	0.011	0.013
+10	0.008	0.015	0.012
+20	0.009	0.017	0.012
+30	0.010	0.012	0.015
+40	0.014	0.011	0.011
+50	0.012	0.010	0.012
+55	0.012	0.010	0.012

Voltage	Test Result (ppm)@NT		
	Channel 1013	Channel 384	Channel 777
LV	0.010	0.009	0.012
HV	0.013	0.009	0.011

1X EVDO R0 BC1:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 25	Channel 600	Channel 1175
-10	0.011	0.013	0.023
0	0.007	0.011	0.013
+10	0.006	0.016	0.012
+20	0.009	0.012	0.009
+30	-0.010	0.012	0.015
+40	0.012	0.011	0.011
+50	0.012	-0.010	0.012
+55	0.012	0.010	0.012

Voltage	Test Result (ppm)@NT		
	Channel 25	Channel 600	Channel 1175
LV	0.011	0.010	0.012
HV	0.008	0.016	0.013

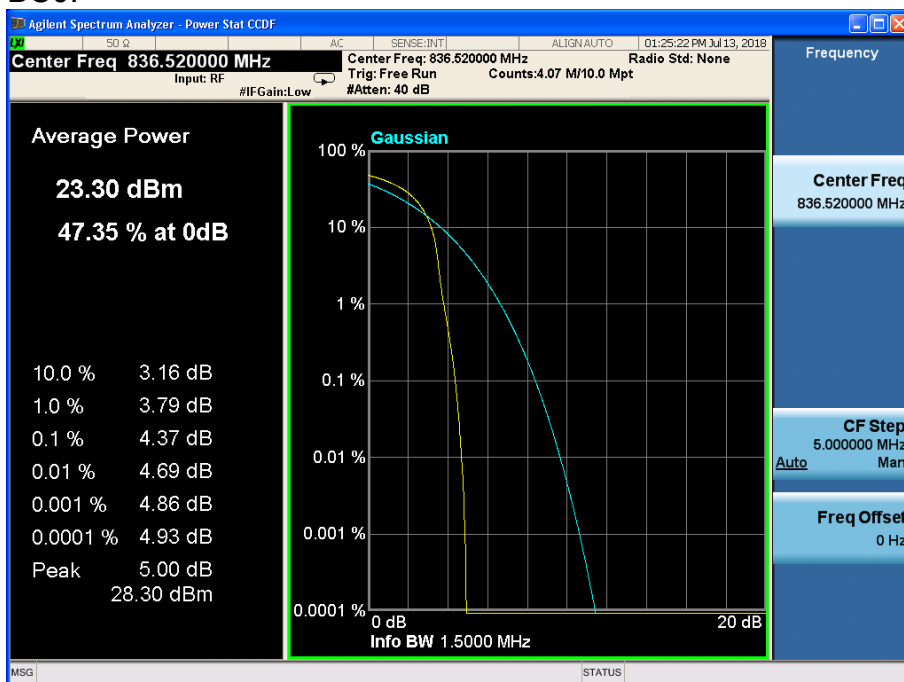
1X EVDO RA BC1:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 25	Channel 600	Channel 1175
-10	0.011	0.013	0.023
0	0.007	0.011	0.013
+10	0.012	0.012	0.012
+20	0.009	0.012	0.013
+30	-0.010	0.012	0.015
+40	0.012	0.011	0.011
+50	0.012	-0.010	0.012
+55	0.012	0.010	0.012

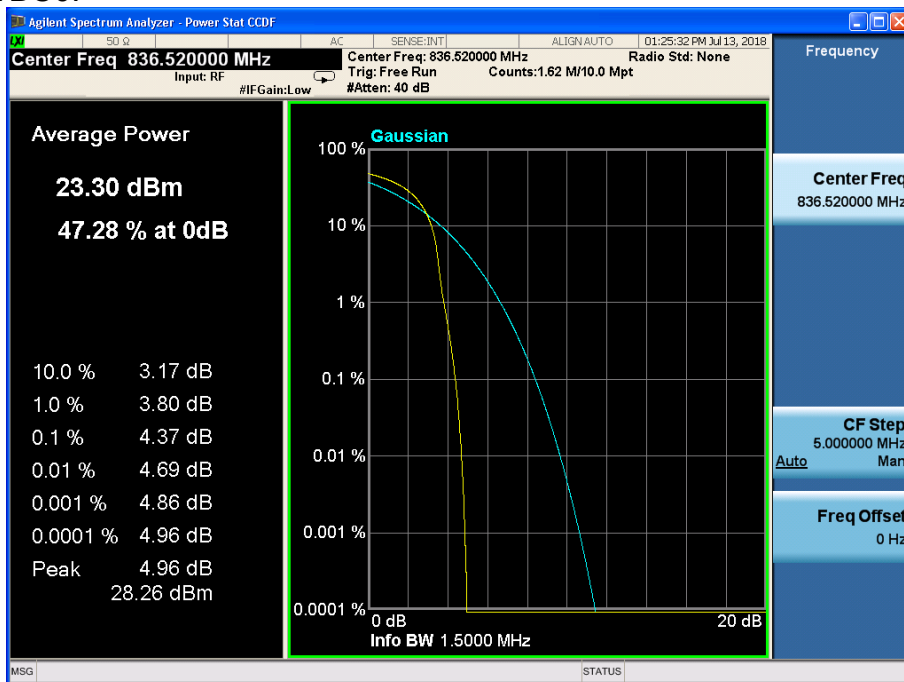
Voltage	Test Result (ppm)@NT		
	Channel 25	Channel 600	Channel 1175
LV	0.011	0.010	0.012
HV	0.008	0.016	0.013

Peak-Average Ratio -FCC Part 24.232(d)

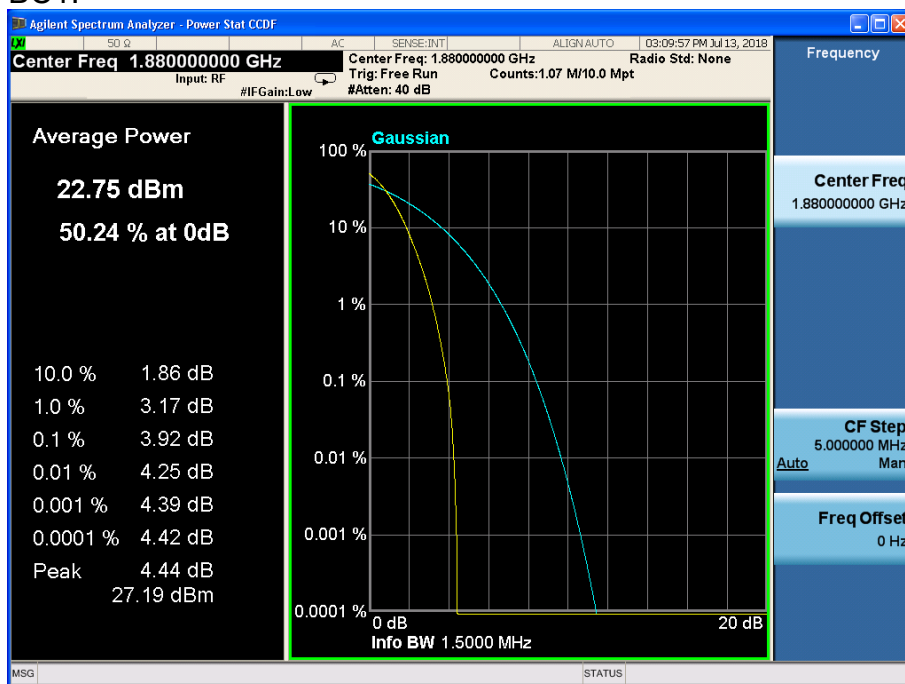
1X EVDO R0 BC0:



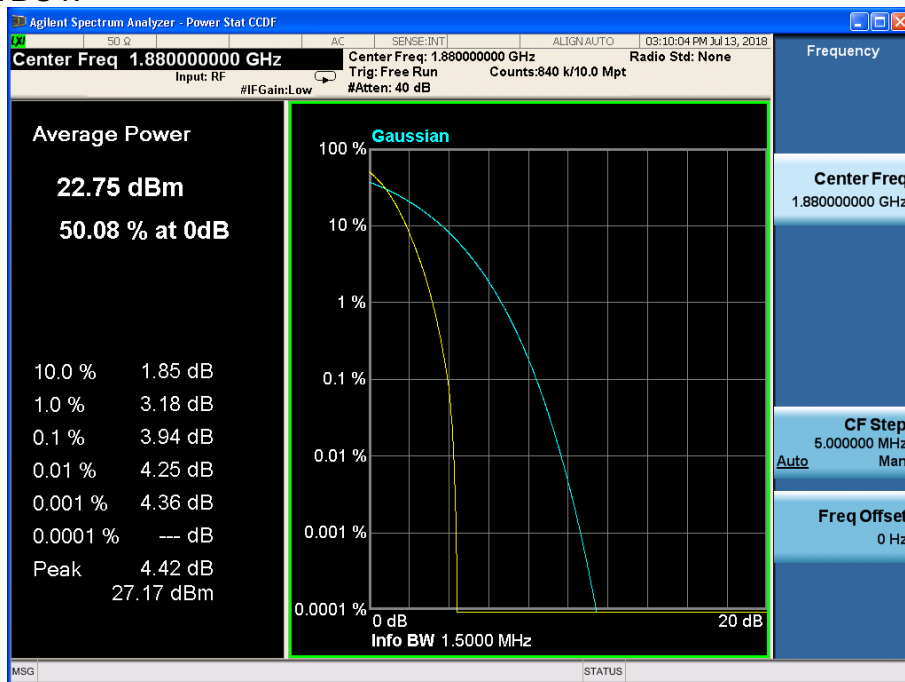
1X EVDO RA BC0:



1X EVDO R0 BC1:



1X EVDO RA BC1:



APPENDIX B – TEST DATA OF RADIATED EMISSION

Effective Radiated Power-FCC Part22.913(a)

Test result:

CDMA R0 Mode:

Channel 1013

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1647.55	-53.11	-13	Vertical
1665.98	-51.62	-13	Horizontal
2535.63	-44.25	-13	Vertical
2576.33	-43.87	-13	Vertical
8962.10	-39.84	-13	Vertical
9969.67	-35.89	-13	Vertical

Channel 384

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1646.56	-52.53	-13	Vertical
1667.00	-51.21	-13	Vertical
2532.84	-44.13	-13	Vertical
2576.68	-44.29	-13	Vertical
8961.33	-39.85	-13	Vertical
9973.45	-36.15	-13	Horizontal

Channel 777

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1647.66	-53.01	-13	Vertical
1668.51	-51.50	-13	Vertical
2535.74	-44.07	-13	Vertical
2575.91	-43.68	-13	Vertical
8963.49	-39.23	-13	Vertical
9971.42	-36.61	-13	Vertical

CDMA RA Mode: Channel 1013

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1646.71	-52.88	-13	Vertical
1668.55	-51.09	-13	Horizontal
2532.56	-44.36	-13	Vertical
2578.76	-43.88	-13	Vertical
8964.24	-39.55	-13	Vertical
9971.47	-35.88	-13	Vertical

Channel 384

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1649.08	-53.41	-13	Vertical
1668.51	-51.02	-13	Vertical
2533.65	-44.10	-13	Vertical
2579.02	-44.57	-13	Vertical
8961.79	-39.47	-13	Vertical
9971.97	-36.74	-13	Horizontal

Channel 777

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1647.91	-53.46	-13	Vertical
1666.53	-51.44	-13	Vertical
2534.81	-44.04	-13	Vertical
2575.85	-44.24	-13	Vertical
8962.93	-39.18	-13	Vertical
9973.27	-36.32	-13	Vertical

CDMA Band0

Test result:

CMDA R0 Mode:

Frequency (MHz)	Peak EIRP(dBm)	Pca Cable loss	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1851.25	23.28	-3.8	8.6	18.48	Vertical
1880.00	23.30	-3.8	8.6	18.50	Vertical
1908.75	23.44	-3.8	8.6	18.64	Vertical

CMDA RA Mode:

Frequency (MHz)	Peak EIRP(dBm)	Pca Cable loss	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1851.25	23.34	-3.8	8.6	18.54	Vertical
1880.00	23.34	-3.8	8.6	18.54	Vertical
1908.75	23.41	-3.8	8.6	18.61	Vertical

Test result:

CMDA R0 Mode:

Channel 25

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2457.73	-48.97	-13	Vertical
2779.97	-47.17	-13	Vertical
3724.90	-40.46	-13	Vertical
6676.84	-39.22	-13	Horizontal
9962.93	-37.38	-13	Vertical
17818.44	-34.01	-13	Vertical

Channel 600

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2461.20	-48.89	-13	Vertical
2781.35	-47.87	-13	Vertical
3724.86	-40.99	-13	Horizontal
6678.77	-39.81	-13	Vertical
9960.01	-36.97	-13	Vertical
17819.56	-34.25	-13	Vertical

Channel 1175

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2459.32	-49.28	-13	Vertical
2781.84	-47.83	-13	Vertical
3726.07	-40.79	-13	Vertical
6677.29	-39.49	-13	Vertical
9961.16	-37.12	-13	Vertical
17819.48	-34.20	-13	Vertical

CMDA RA Mode:

Channel 25

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2460.53	-49.06	-13	Vertical
2780.97	-47.26	-13	Vertical
3725.08	-40.84	-13	Vertical
6678.76	-40.13	-13	Vertical
9959.72	-37.08	-13	Vertical
17821.53	-34.18	-13	Vertical

Channel 600

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2460.75	-48.63	-13	Vertical
2779.63	-47.29	-13	Horizontal
3725.07	-40.68	-13	Vertical
6675.45	-39.64	-13	Vertical
9962.46	-36.95	-13	Vertical
17820.48	-33.67	-13	Vertical

Channel 1175

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2459.26	-48.88	-13	Vertical
2781.84	-47.16	-13	Vertical
3727.09	-41.32	-13	Vertical
6675.10	-39.62	-13	Vertical
9960.45	-37.34	-13	Horizontal
17819.96	-33.94	-13	Vertical

---End of Test Report---