HCT CO.,LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
TEL: +82-31-645-6300 FAX: +82-31-645-6401

FCC CDMA REPORT

Certification

Applicant Name:
Franklin Technology Inc.

Address:
906 JEI Platz, 186, Gasan digital 1-ro,
Geumcheon-gu, Seoul, Korea, (08502)

Date of Issue:
February 01, 2019

Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-RF-1902-FC010

FCC ID: XHG-T720

APPLICANT: Franklin Technology Inc.

Model(s):	T720
EUT Type:	Home Phone Connect
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§22, §24, §2

Mode	Tx Frequency (MHz)	Rx Frequency (MHz)	Emission Designator	ERP	
				Max. Power (W)	Max. Power (dBm)
CDMA	824.70– 848.31	869.70– 893.31	1M28F9W	0.401	26.04
CDMA EVDO_Rev.0			1M28F9W	0.401	26.03
CDMA EVDO_Rev.A			1M29F9W	0.401	26.03

Mode	Tx Frequency (MHz)	Rx Frequency (MHz)	Emission Designator	EIRP	
				Max. Power (W)	Max. Power (dBm)
PCS CDMA	1851.25– 1 908.75	1 931.25– 1 988.75	1M28F9W	0.536	27.30
PCS CDMA EVDO_Rev.0			1M28F9W	0.532	27.26
PCS CDMA EVDO_Rev.A			1M29F9W	0.532	27.26

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by : Jae Ryang Do
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1902-FC010	February 01, 2019	- First Approval Report

Table of Contents

1. GENERAL INFORMATION

Applicant Name:	Franklin Technology Inc.
Address:	906 JEI Platz, 186, Gasan digital 1-ro, Geumcheon-gu, Seoul, Korea, (08502)
FCC ID:	XHG-T720
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§22, §24, §2
EUT Type:	Home Phone Connect
Model(s):	T720
Tx Frequency:	824.70 — 848.31 MHz (CDMA BC0) 1 851.25 – 1 908.75 MHz (PCS CDMA BC1)
Rx Frequency:	869.70 — 893.31 MHz (CDMA BC0) 1 931.25 – 1 988.75 MHz (PCS CDMA BC1)
Date(s) of Tests:	December 26, 2018 ~ January 28, 2019
Peak. Ant gain:	4.876 dBi (CDMA BC0), 4.885 dBi (PCS CDMA BC1)

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a VoLTE Home Phone Connect with CDMA/EVDO Rev0/A and LTE.

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4 - ANSI C63.26-2015 – Section 5.2.6(only GSM)
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI C63.26-2015 – Section 5.2 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12

3.2 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-E-2016 Clause 2.2.17.

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points > 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Note

1. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission.
2. A half wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

   The power is calculated by the following formula;

   $$P_{d(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dB)}$$

   Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.
3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value.

   These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration
4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
5. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

3.3 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603-E-2016.

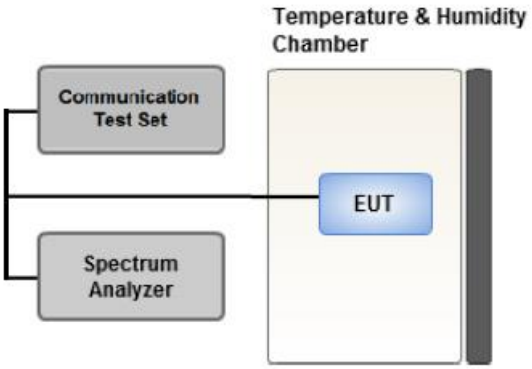
Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points > 2 x span / RBW
5. Detector = Peak
6. Trace mode = Max Hold
7. The trace was allowed to stabilize
8. Test channel : Low/ Middle/ High
9. Frequency range : We are performed all frequency to 10^{th} harmonics from 9 kHz.

Test Note

1. Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
2. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
   The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test dat

3.4 PEAK- TO- AVERAGE RATIO



Test setup

① **CCDF Procedure for PAPR**

Test Settings

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Set the measurement interval as follows:
   .- for continuous transmissions, set to 1 ms,
   .- or burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
4. Record the maximum PAPR level associated with a probability of 0.1%.

② **Alternate Procedure for PAPR**

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as P_{Pk}.

Use one of the applicable procedures presented 5.2(ANSI C63.26-2015) to measure the total average power and record as P_{Avg}. Determine the P.A.R. from:

$$P.A.R_{(dB)} = P_{Pk\ (dBm)} - P_{Avg\ (dBm)}\ (P_{Avg} = \text{Average Power} + \text{Duty cycle Factor})$$

Test Settings(Peak Power)

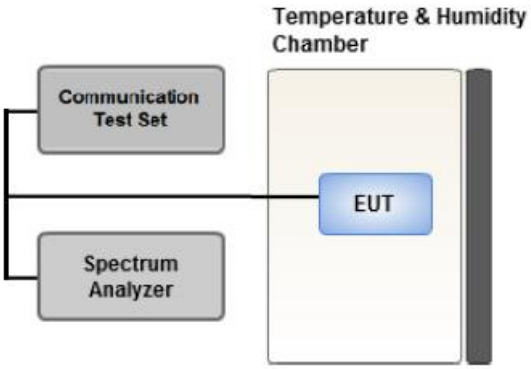
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

1. Set the RBW ≥ OBW.
2. Set VBW ≥ 3 × RBW.
3. Set span ≥ 2 × OBW.
4. Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period).
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the peak amplitude level.

Test Settings(Average Power)

1. Set span to 2 × to 3 × the OBW.
2. Set RBW ≥ OBW.
3. Set VBW ≥ 3 × RBW.
4. Set number of measurement points in sweep ≥ 2 × span / RBW.
5. Sweep time:
   Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. The transmission period is the (on + off) time.
6. Detector = power averaging (rms).
7. Set sweep trigger to “free run.”
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. (To accurately determine the average power over the on and off period of the transmitter, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.)
9. Use the peak marker function to determine the maximum amplitude level.
10. Add [10 log (1/duty cycle)] to the measured maximum power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25%.

3.5 OCCUPIED BANDWIDTH.



Test setup

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

The EUT makes a call to the communication simulator.

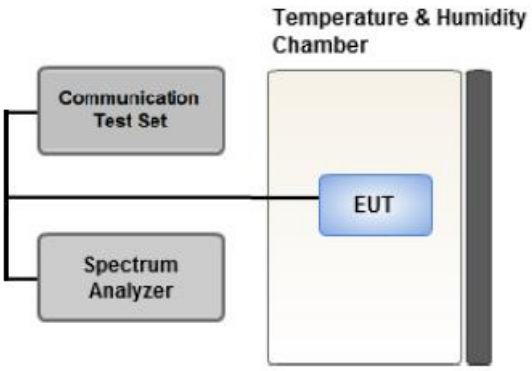
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

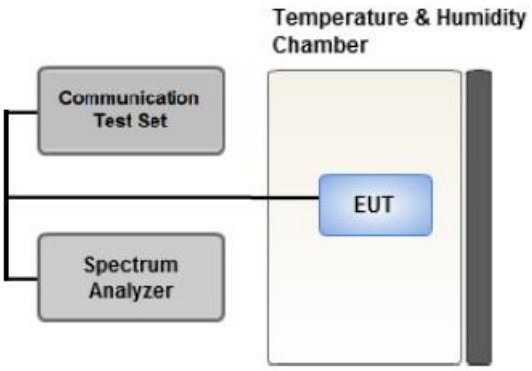
Test Settings(GSM)

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = Peak
4. Trace Mode = max hold
5. Sweep time = auto
6. Number of points in sweep ≥ 2 * Span / RBW

Test Settings(WCDMA)

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = RMS
4. Trace Mode = trace average
5. Sweep time = auto
6. Number of points in sweep ≥ 2 * Span / RBW

3.7 BAND EDGE



Test setup

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1% of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

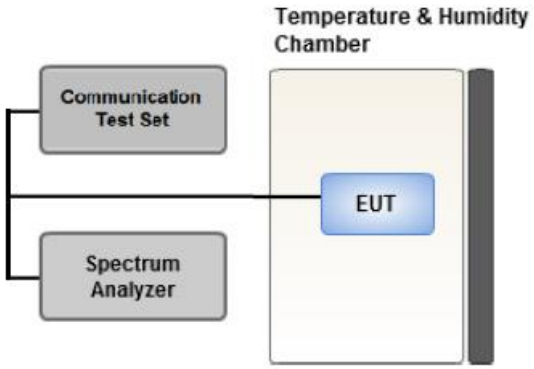
Test Notes

According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of The authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

All measurements were done at 2 channels(low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

3.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015.

The frequency stability of the transmitter is measured by:

1. Temperature:

   The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

2. Primary Supply Voltage:

   .- Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.

   .- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

3.9 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.

[Worst case]

Test Description	Modulation	Test Channel
Occupied Bandwidth	BC 0: CDMA 1xRTT 1xEVDO_Rev.0 1xEVDO_Rev.A	Low, Mid, High
	BC 1: CDMA 1xRTT 1xEVDO_Rev.0 1xEVDO_Rev.A	Low, Mid, High
Band Edge	BC 0: CDMA 1xRTT BC 1: CDMA 1xRTT	Low, High
Spurious and Harmonic Emissions at Antenna Terminal	BC 0: CDMA 1xRTT BC 1: CDMA 1xRTT	Low, Mid, High

[Test Channel]

	UplinkChannel	
	CDMA (BC0)	CDMA (PCS BC1)
Low	1013	25
Mid	384	600
High	777	1175

3.10 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.
- Please refer to the table below.
- All modes of operation were investigated and the worst case configuration results are reported.

[Worst case]

Test Description	Modulation	Axis	Test Channel
Radiated Spurious and Harmonic Emissions	CDMA BC0_1xRTT	CDMA BC0 : X CDMA BC1 : Z	Low, Mid, High
	CDMA BC1_1xRTT		

[Test Channel]

	UplinkChannel	
	CDMA (BC0)	CDMA (PCS BC1)
Low	1013	25
Mid	384	600
High	777	1175

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibration Interval	Calibration Due
REOHDE & SCHWARZ	SCU 18 / AMPLIFIER	10094	04/17/2018	Annual	04/17/2019
Wainwright	WHK1.2/15G-10EF/H.P.F	4	04/04/2018	Annual	04/04/2019
Wainwright	WHK3.3/18G-10EF/H.P.F	2	04/04/2018	Annual	04/04/2019
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	5001	06/07/2018	Annual	06/07/2019
Agilent	E3632A/DC Power Supply	KR75303243	05/09/2018	Annual	05/09/2019
Schwarzbeck	UHAP/ Dipole Antenna	557	03/31/2017	Biennial	03/31/2019
Schwarzbeck	UHAP/ Dipole Antenna	558	03/31/2017	Biennial	03/31/2019
ESPEC	SU-642 / Chamber	93000718	08/07/2018	Annual	08/07/2019
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	147	09/14/2018	Annual	09/14/2019
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	9120D-1298	10/04/2018	Annual	10/04/2019
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	04/25/2017	Biennial	04/25/2019
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	04/25/2017	Biennial	04/25/2019
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY52090906	06/08/2018	Annual	06/08/2019
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/21/2018	Annual	06/21/2019
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/22/2018	Annual	10/22/2019
Agilent	8960 (E5515C)/ Base Station	MY48360800	09/27/2018	Annual	09/27/2019
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	08/23/2018	Biennial	08/23/2020
Schwarzbeck	VULB9160/ Bilog Antenna	9160-3368	08/09/2018	Biennial	08/09/2020
Schwarzbeck	VULB9160/ Hybrid Antenna	760	04/06/2017	Biennial	04/06/2019
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/19/2018	Annual	07/19/2019
REOHDE & SCHWARZ	ESU40 / EMI TEST RECEIVER	100524	07/27/2018	Annual	07/27/2019
HCT CO., LTD.,	FCC LTE Mobile Conducted RF Automation Test Software	-	-	-	-

Note:

1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.71

6. SUMMARY OF TEST RESULTS

6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §22.917(a), §24.238(a)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Effective Radiated Power	§22.913(a)(5)	< 7 Watts max. ERP	PASS
Equivalent Isotropic Radiated Power	§24.232(c)	< 2 Watts max. EIRP	PASS
Peak- to- Average Ratio	§24.232(d)	< 13 dB	PASS
Frequency stability / variation of ambient temperature	§2.1055, § 22.355	< 2.5 ppm	PASS
	§24.235	Emission must remain in band	PASS

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Radiated Spurious and Harmonic Emissions	§2.1053, §22.917(a), §24.238(a)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

7. SAMPLE CALCULATION

Emission Designator

CDMA Emission Designator

Emission Designator = 1M27F9W

CDMA BW = 1.27 MHz

(Measured at the 99% power bandwidth)

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

EVDO Emission Designator

Emission Designator = 1M27F9W

CDMA BW = 1.27 MHz

(Measured at the 99% power bandwidth)

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

8. TEST DATA

8.1 EFFECTIVE RADIATED POWER(CDMA Mode)

· **Conducted Power (CDMA BC0)**

Band	Channel	SO2	SO2	SO55	SO55	TDSO SO32	1xEvDO Rev.0	1xEvDO Rev.0	1xEvDO Rev.A	1xEvDO Rev.A
		RC1/1 (dBm)	RC3/3 (dBm)	RC1/1 (dBm)	RC3/3 (dBm)	RC3/3 (dBm)	(FTAP)	(RTAP)	(FETAP)	(RETAP)
CDMA	1013	23.31	23.31	23.31	23.29	23.28	23.30	23.30	23.28	23.30
	384	23.18	23.14	23.15	23.08	23.12	23.07	23.12	23.09	23.14
	777	22.89	22.92	22.96	22.95	22.91	22.91	22.88	22.86	22.90

· **E.R.P (CDMA BC0)**

Band	Channel	SO2	SO2	SO55	SO55	TDSO SO32	1xEvDO Rev.0	1xEvDO Rev.0	1xEvDO Rev.A	1xEvDO Rev.A
		RC1/1 (dBm)	RC3/3 (dBm)	RC1/1 (dBm)	RC3/3 (dBm)	RC3/3 (dBm)	(FTAP)	(RTAP)	(FETAP)	(RETAP)
CDMA	1013	26.04	26.04	26.04	26.02	26.01	26.03	26.03	26.01	26.03
	384	25.91	25.87	25.88	25.81	25.85	25.80	25.85	25.82	25.87
	777	25.62	25.65	25.69	25.68	25.64	25.64	25.61	25.59	25.63

Note:

1. E.R.P = Conducted Power + Peak. Ant Gain(dBd)
2. Peak. Ant Gain(dBi) = 4.876 dBi
3. Peak. Ant Gain(dBd) = 4.876 - 2.15 = 2.726 dBd

4 Limit = 7 Watts(= 38.45 dBm)

8.2 EQUIVALENT ISOTROPIC RADIATED POWER(PCS CDMA Mode)

· Conducted Power (CDMA BC1)

Band	Channel	SO2	SO2	SO55	SO55	TDSO SO32	1xEvDO Rev.0	1xEvDO Rev.0	1xEvDO Rev.A	1xEvDO Rev.A
		RC1/1 (dBm)	RC3/3 (dBm)	RC1/1 (dBm)	RC3/3 (dBm)	RC3/3 (dBm)	(FTAP)	(RTAP)	(FETAP)	(RETAP)
PCS CDMA	25	21.89	21.91	21.90	21.80	21.92	21.85	21.98	21.87	21.86
	600	22.41	22.38	22.32	22.30	22.41	22.37	22.33	22.37	22.32
	1175	22.32	22.30	22.33	22.37	22.38	22.30	22.31	22.27	22.28

· E.I.R.P (CDMA BC1)

Band	Channel	SO2	SO2	SO55	SO55	TDSO SO32	1xEvDO Rev.0	1xEvDO Rev.0	1xEvDO Rev.A	1xEvDO Rev.A
		RC1/1 (dBm)	RC3/3 (dBm)	RC1/1 (dBm)	RC3/3 (dBm)	RC3/3 (dBm)	(FTAP)	(RTAP)	(FETAP)	(RETAP)
PCS CDMA	25	26.78	26.80	26.79	26.69	26.81	26.74	26.87	26.76	26.75
	600	27.30	27.27	27.21	27.19	27.30	27.26	27.22	27.26	27.21
	1175	27.21	27.19	27.22	27.26	27.27	27.19	27.20	27.16	27.17

Note:

1. E.I.R.P = Conducted Power + Peak. Ant Gain(dBi)
2. Peak. Ant Gain = 4.885 dBi
3. Limit = 2 Watts(= 33.01 dBm)

8.3 RADIATED SPURIOUS EMISSIONS

8.3.1 CDMA Mode

▣ MODULATION SIGNAL: CDMA

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W)

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBd)	Substitute Level [dBm]	C.L	Pol.	ERP (dBm)	Margin (dB)
1013 (824.7)	1,649.40	-49.13	7.46	-58.02	1.27	H	-53.98	40.98
	2,474.10	-51.90	8.68	-58.06	1.59	V	-53.12	40.12
	3,298.80	-56.99	10.30	-63.04	1.86	H	-56.75	43.75
384 (836.5)	1,673.00	-48.04	7.53	-57.03	1.28	H	-52.93	39.93
	2,509.50	-52.97	8.83	-59.29	1.62	V	-54.23	41.23
	3,346.00	-56.21	10.51	-62.53	1.91	H	-56.08	43.08
777 (848.3)	1,696.60	-47.28	7.71	-56.30	1.29	H	-52.03	39.03
	2,544.90	-55.97	8.86	-62.00	1.62	H	-56.91	43.91
	3,393.20	-56.94	10.56	-63.20	1.95	H	-56.74	43.74

Note:

1. Limit = 43 + 10 $\log_{10}$ (W) = -13.0 dBm

8.3.2 PCS Mode

▣ MODULATION SIGNAL: CDMA PCS

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log_{10} (W)

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	EIRP (dBm)	Margin (dB)
25 (1851.3)	3,702.60	-55.63	12.51	-62.43	1.98	V	-51.90	38.90
	5,553.90	-50.93	13.62	-52.21	2.72	V	-41.31	28.31
	7,405.20	-54.01	11.50	-48.86	2.93	V	-40.29	27.29
600 (1880.0)	3,760.00	-56.65	12.40	0.00	2.00	V	-52.69	39.69
	5,640.00	-50.16	13.78	-62.43	2.70	V	-39.91	26.91
	7,520.00	-57.19	11.57	-52.21	2.93	H	-43.34	30.34
1175 (1908.8)	3,817.60	-54.04	12.52	11.63	2.05	H	-49.81	36.81
	5,726.40	-49.61	13.70	-63.09	2.72	V	-38.46	25.46
	7,635.20	-55.59	11.97	-50.99	2.96	V	-41.77	28.77
	9,544.00	-54.06	11.16	-51.98	3.46	V	-37.27	24.27

Note:

1. Limit = 43 + 10 log_{10} (W) = -13.0 dBm

8.4 PEAK-TO-AVERAGE RATIO

Band	Ch.	Measured P_{Pk} (dBm)	Measured P_{Avg} (dBm)	P_{Avg} (Duty Cycle)			P.A.R. = P_{Pk} - P_{Avg} (dB)	Limit (dB)	Pass / Fail
				Tx_{Total} (ms)	Tx_{On} (ms)	Factor (dB)			
PCS	600	CCDF Procedure					3.82	13	Pass
PCS_Rev.0							4.75		
PCS_Rev.A							4.77		

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 51 ~ 53.
2. Only GSM(include EDGE) Mode was tested by alternate procedure for PAPR

   $P.A.R_{(dB)} = P_{Pk\ (dBm)} - P_{Avg\ (dBm)}$ (P_{Avg} = Average Power + Duty cycle Factor)

   Duty cycle Factor = 10 log (1/x), x = Tx_{On} / Tx_{Total}

8.5 OCCUPIED BANDWIDTH

Band	Channel	Frequency(MHz)	Data (MHz)
CDMA	1013	824.7	1.2746
	384	836.5	1.2790
	777	848.3	1.2771
CDMA EVDO_Rev.0	1013	824.7	1.2732
	384	836.5	1.2754
	777	848.3	1.2757
CDMA EVDO_Rev.A	1013	824.7	1.2734
	384	836.5	1.2768
	777	848.3	1.2763
PCS	25	1851.3	1.2824
	600	1880.0	1.2783
	1175	1908.8	1.2795
PCS EVDO_Rev.0	25	1851.3	1.2838
	600	1880.0	1.2743
	1175	1908.8	1.2793
PCS EVDO_Rev.A	25	1851.3	1.2852
	600	1880.0	1.2795
	1175	1908.8	1.2790

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 33 ~ 50.

8.6 CONDUCTED SPURIOUS EMISSIONS

Band	Channel	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result	Limit (dBm)
CDMA	1013	2.4751	27.976	-73.781	-45.805	-13.00
	384	2.5105	27.976	-75.375	-47.399	
	777	3.7059	27.976	-78.827	-50.851	
PCS	25	5.5554	28.591	-77.140	-48.549	
	600	5.6411	28.591	-77.265	-48.674	
	1175	3.6965	27.976	-78.477	-50.501	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 62 ~ 70.
2. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
3. Factor(dB) = Cable Loss + Attenuator + Power Splitter

Frequency Range (GHz)	Factor [dB]
0.03 – 1	25.270
1 – 5	27.976
5 – 10	28.591
10 – 15	29.116
15 – 20	29.489
Above 20	30.131

8.7 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 54 ~ 61.

8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

8.8.1 CDMA Mode

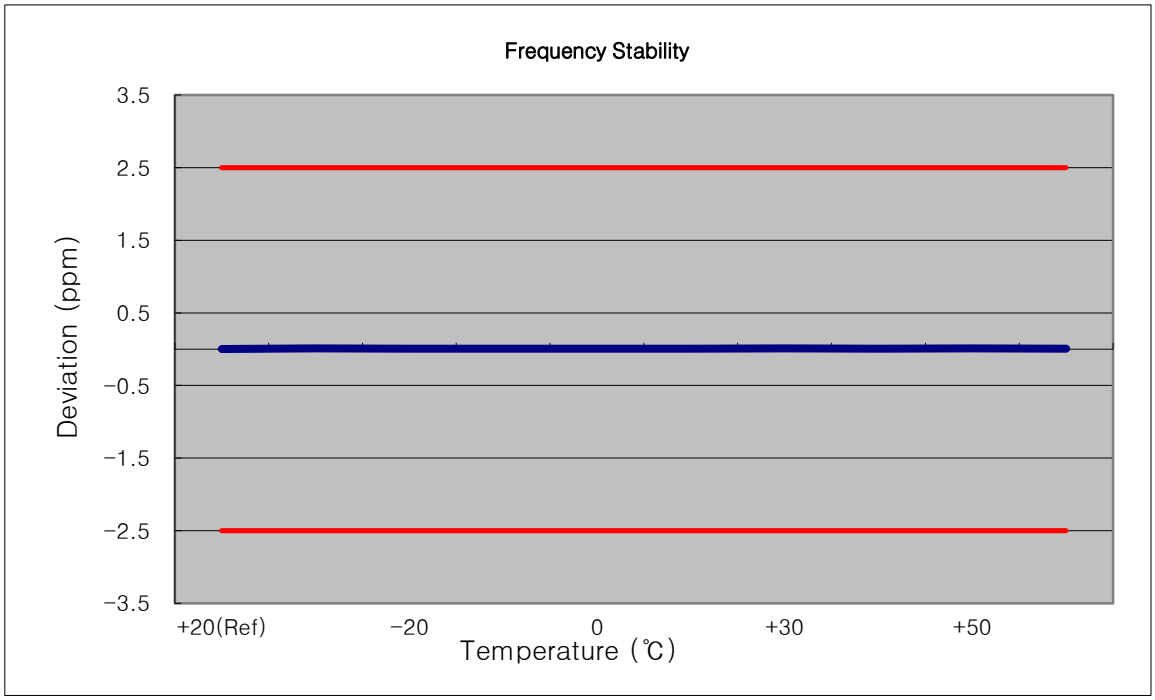
▣OPERATING FREQUENCY: 836,520,000 Hz

▣CHANNEL: 384

▣REFERENCE VOLTAGE: 3.80 VDC

▣DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	836 519 987	0.0	0.000 000	0.000
100%		-30	836 519 994	7.3	0.000 001	0.009
100%		-20	836 519 992	5.1	0.000 001	0.006
100%		-10	836 519 992	4.9	0.000 001	0.006
100%		0	836 519 991	4.3	0.000 001	0.005
100%		+10	836 519 994	6.5	0.000 001	0.008
100%		+30	836 519 994	7.1	0.000 001	0.008
100%		+40	836 519 994	6.8	0.000 001	0.008
100%		+50	836 519 994	7.3	0.000 001	0.009
Batt. Endpoint	3.40	+20	836 519 993	5.7	0.000 001	0.007



8.8.2 PCS Mode

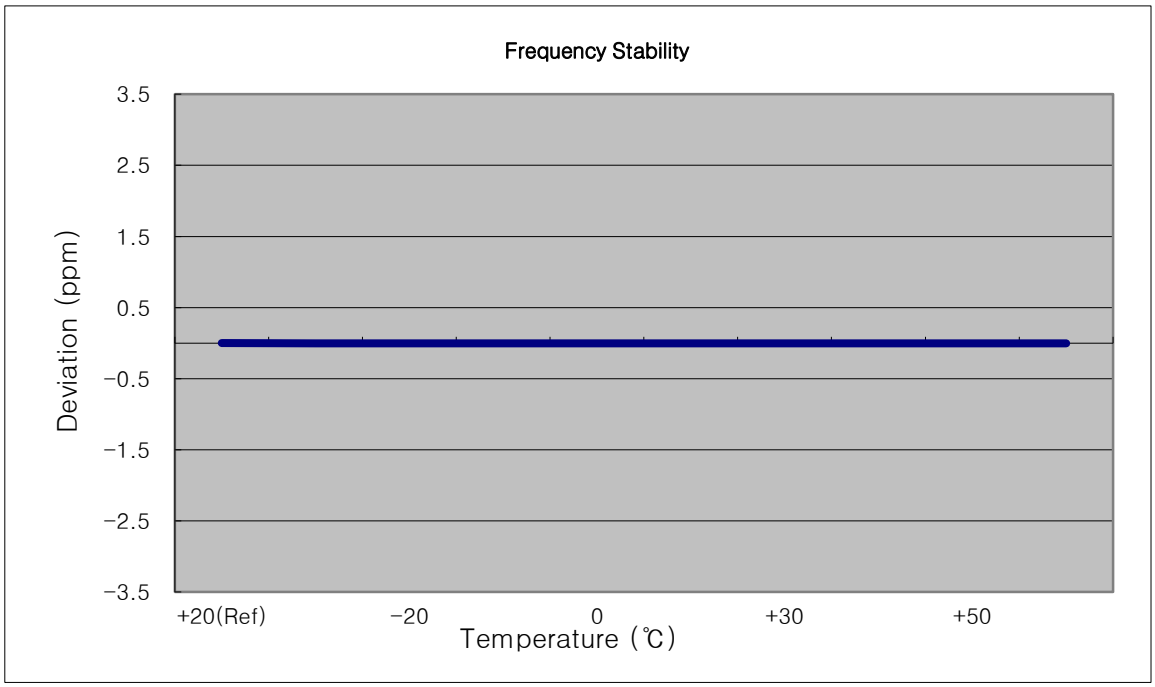
▣OPERATING FREQUENCY: 1880,000,000 Hz

▣CHANNEL: 600

▣REFERENCE VOLTAGE: 3.80 VDC

▣DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1880 000 012	0.0	0.000 000	0.000
100%		-30	1880 000 007	-4.8	0.000 000	-0.003
100%		-20	1880 000 003	-9.1	0.000 000	-0.005
100%		-10	1880 000 005	-7.3	0.000 000	-0.004
100%		0	1880 000 002	-9.8	-0.000 001	-0.005
100%		+10	1880 000 007	-5.0	0.000 000	-0.003
100%		+30	1880 000 006	-5.8	0.000 000	-0.003
100%		+40	1880 000 004	-8.2	0.000 000	-0.004
100%		+50	1880 000 005	-7.3	0.000 000	-0.004
Batt. Endpoint	3.40	+20	1880 000 004	-7.7	0.000 000	-0.004



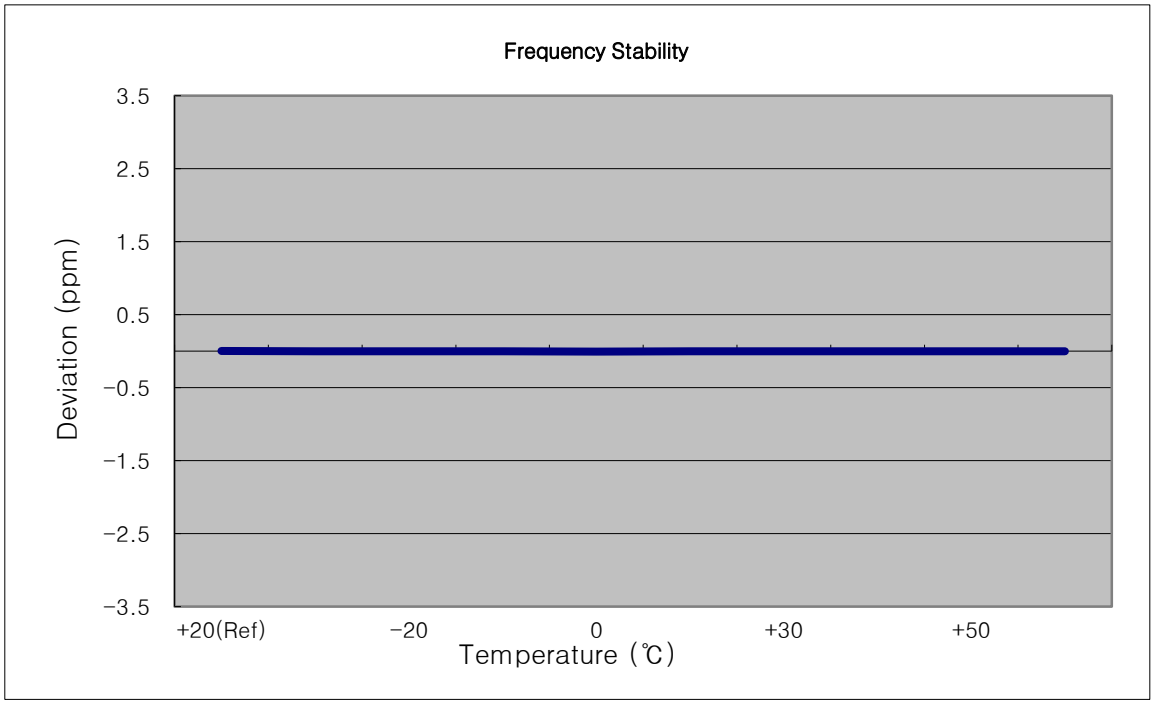
▣OPERATING FREQUENCY: 1851,250,000 Hz

▣CHANNEL: 25

▣REFERENCE VOLTAGE: 3.80 VDC

▣DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1851 250 013	0.0	0.000 000	0.000
100%		-30	1851 250 008	-5.1	0.000 000	-0.003
100%		-20	1851 250 004	-8.7	0.000 000	-0.005
100%		-10	1851 250 007	-6.3	0.000 000	-0.003
100%		0	1851 250 009	-3.8	0.000 000	-0.002
100%		+10	1851 250 011	-1.9	0.000 000	-0.001
100%		+30	1851 250 017	3.7	0.000 000	0.002
100%		+40	1851 250 018	4.5	0.000 000	0.002
100%		+50	1851 250 003	-9.8	-0.000 001	-0.005
Batt. Endpoint	3.40	+20	1851 250 010	-3.2	0.000 000	-0.002



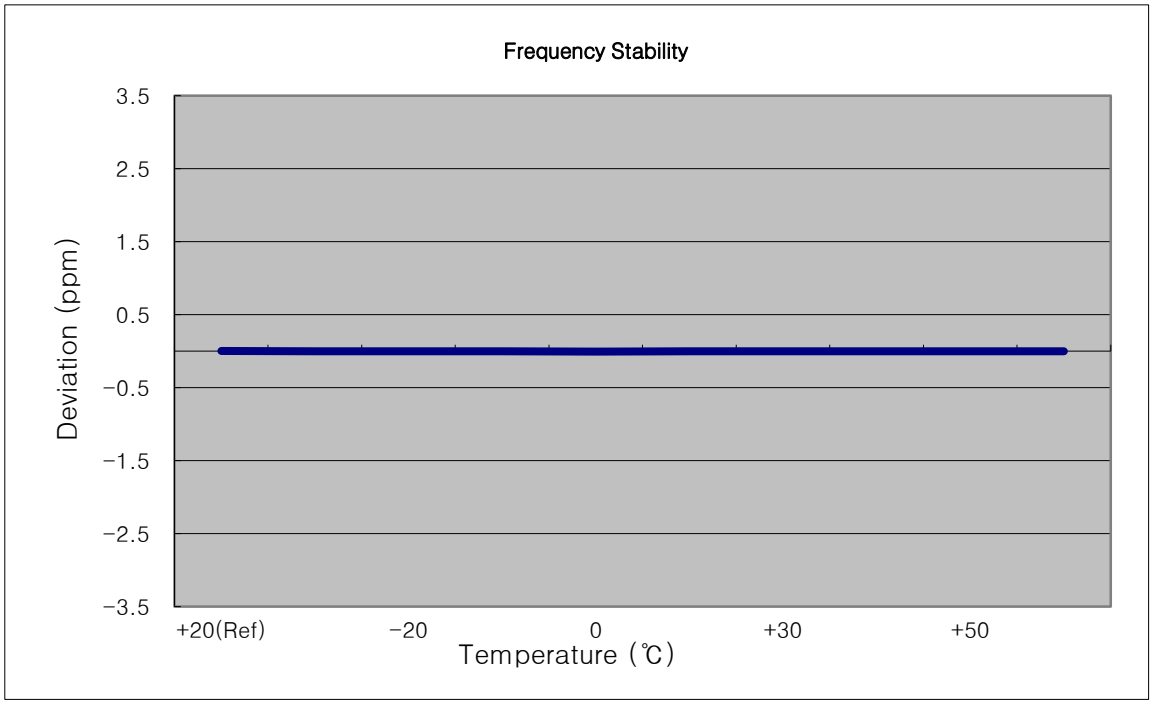
▣OPERATING FREQUENCY: 1908,750,000 Hz

▣CHANNEL: 1175

▣REFERENCE VOLTAGE: 3.80 VDC

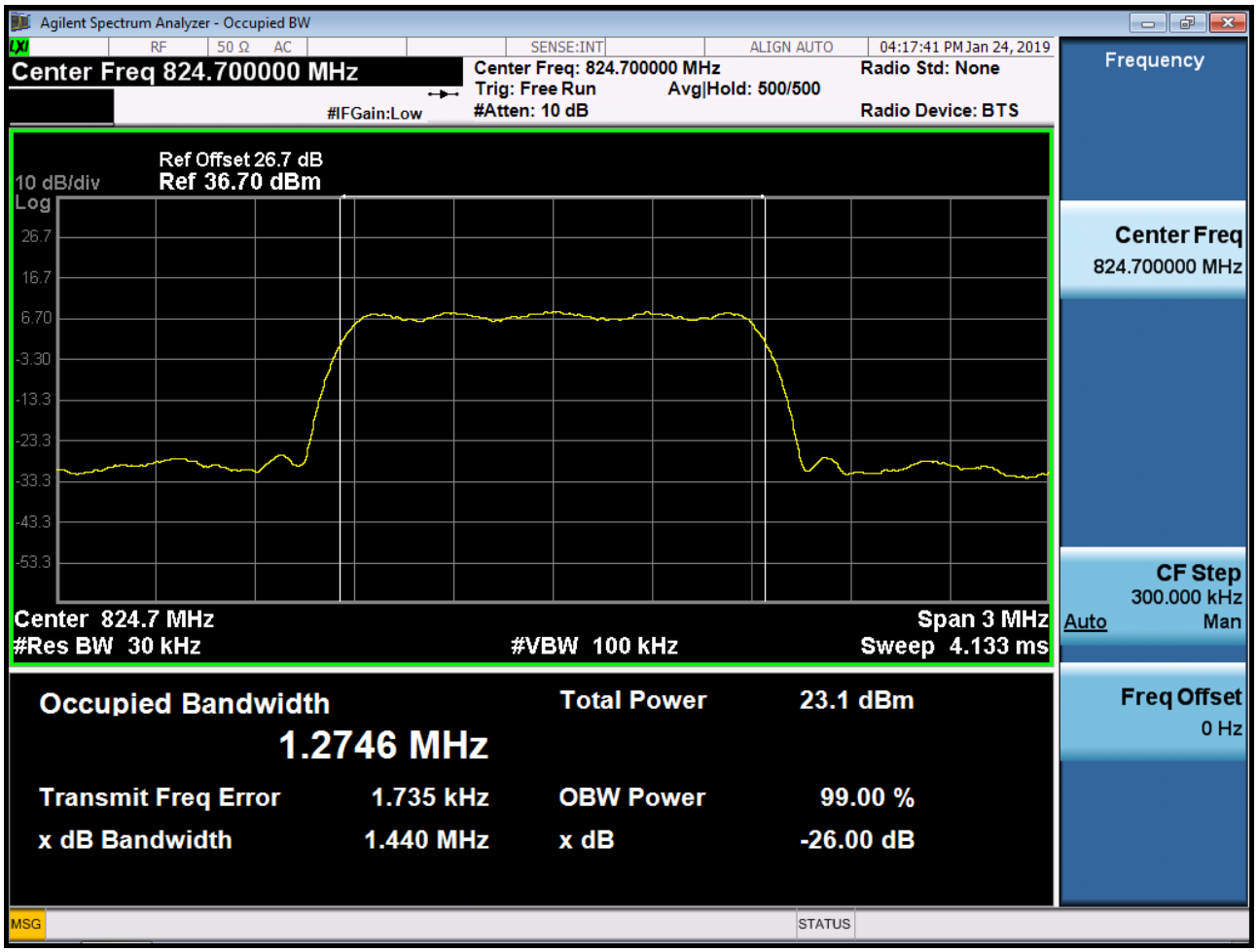
▣DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1908 749 987	0.0	0.000 000	0.000
100%		-30	1908 749 979	-8.5	0.000 000	-0.004
100%		-20	1908 749 980	-7.3	0.000 000	-0.004
100%		-10	1908 749 976	-11.5	-0.000 001	-0.006
100%		0	1908 749 977	-10.3	-0.000 001	-0.005
100%		+10	1908 749 981	-6.1	0.000 000	-0.003
100%		+30	1908 749 981	-5.9	0.000 000	-0.003
100%		+40	1908 749 984	-2.8	0.000 000	-0.001
100%		+50	1908 749 990	3.1	0.000 000	0.002
Batt. Endpoint	3.40	+20	1908 749 978	-8.7	0.000 000	-0.005

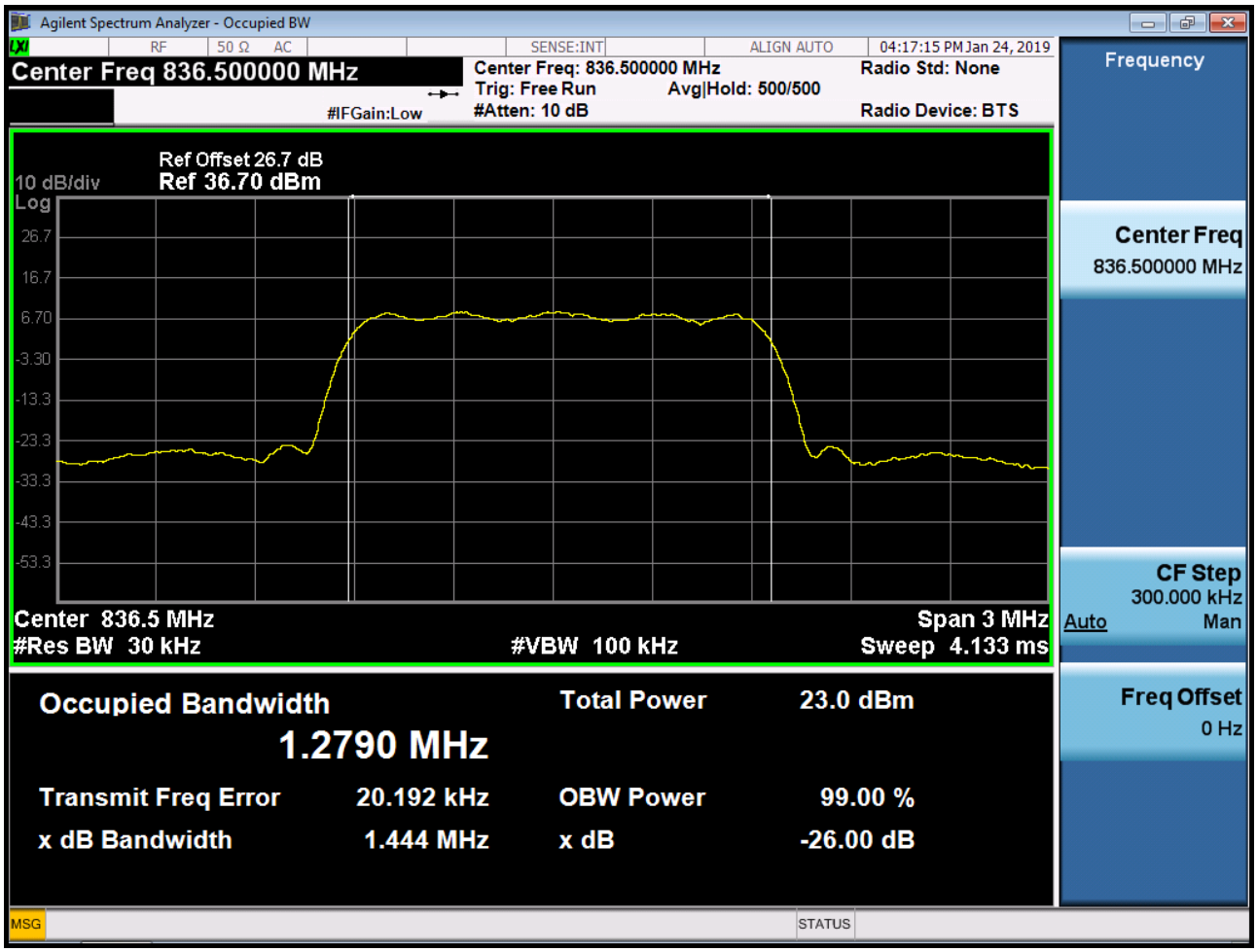


9. TEST PLOTS

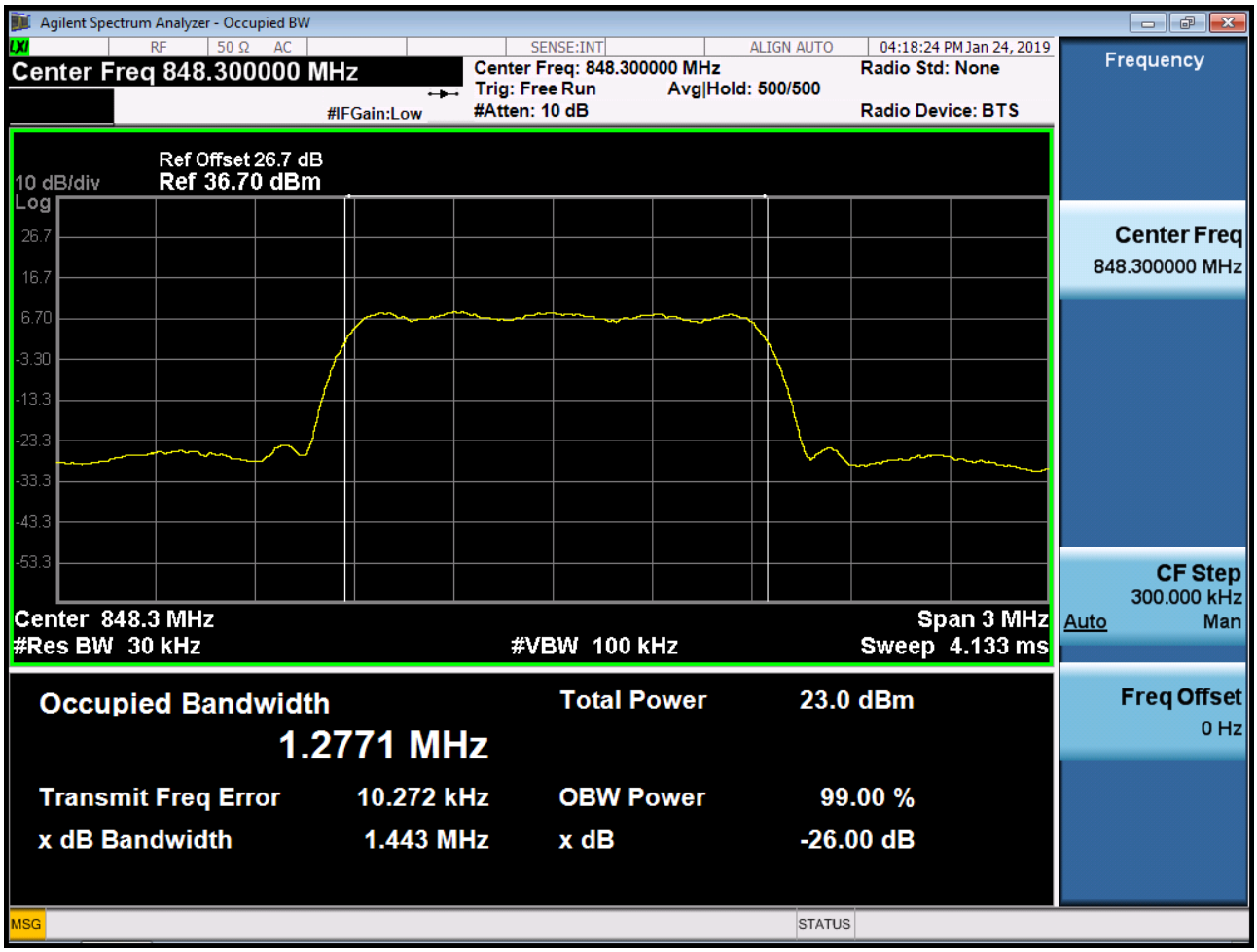
■ CDMA MODE (1013 CH.) Occupied Bandwidth



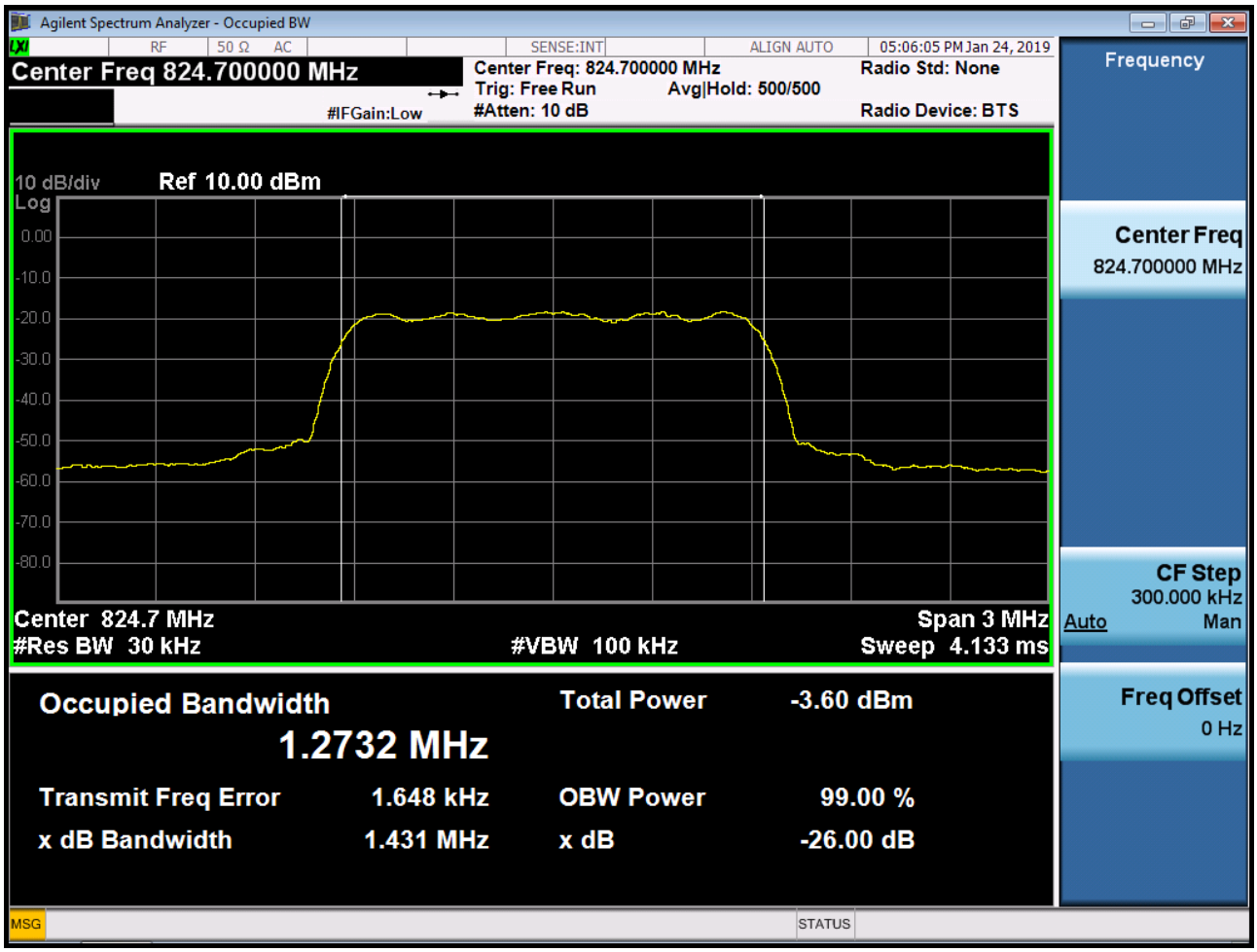
■ CDMA MODE (384 CH.) Occupied Bandwidth



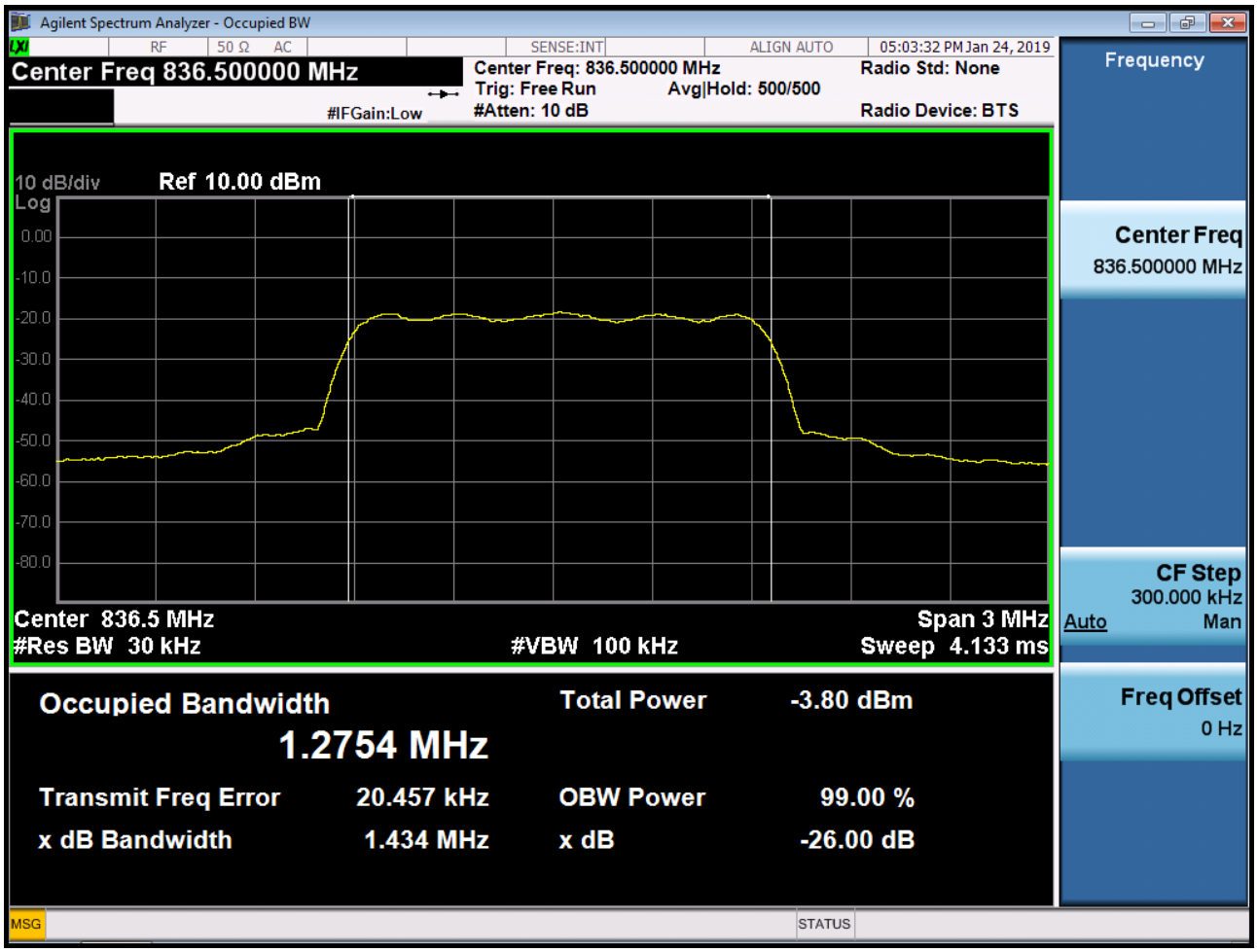
■ CDMA MODE (777 CH.) Occupied Bandwidth



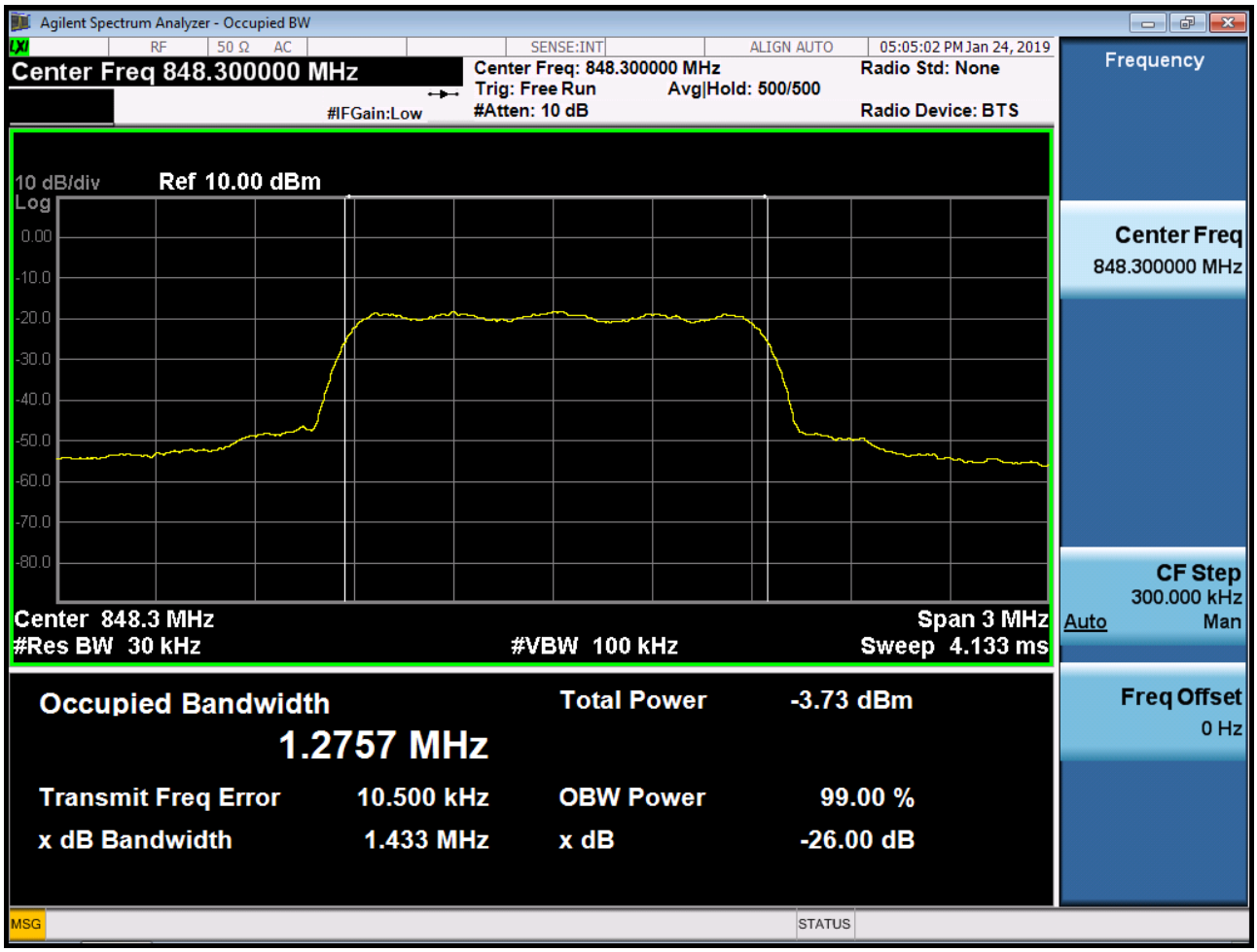
■ CDMA EVDO_Rev.0 MODE (1013 CH.) Occupied Bandwidth



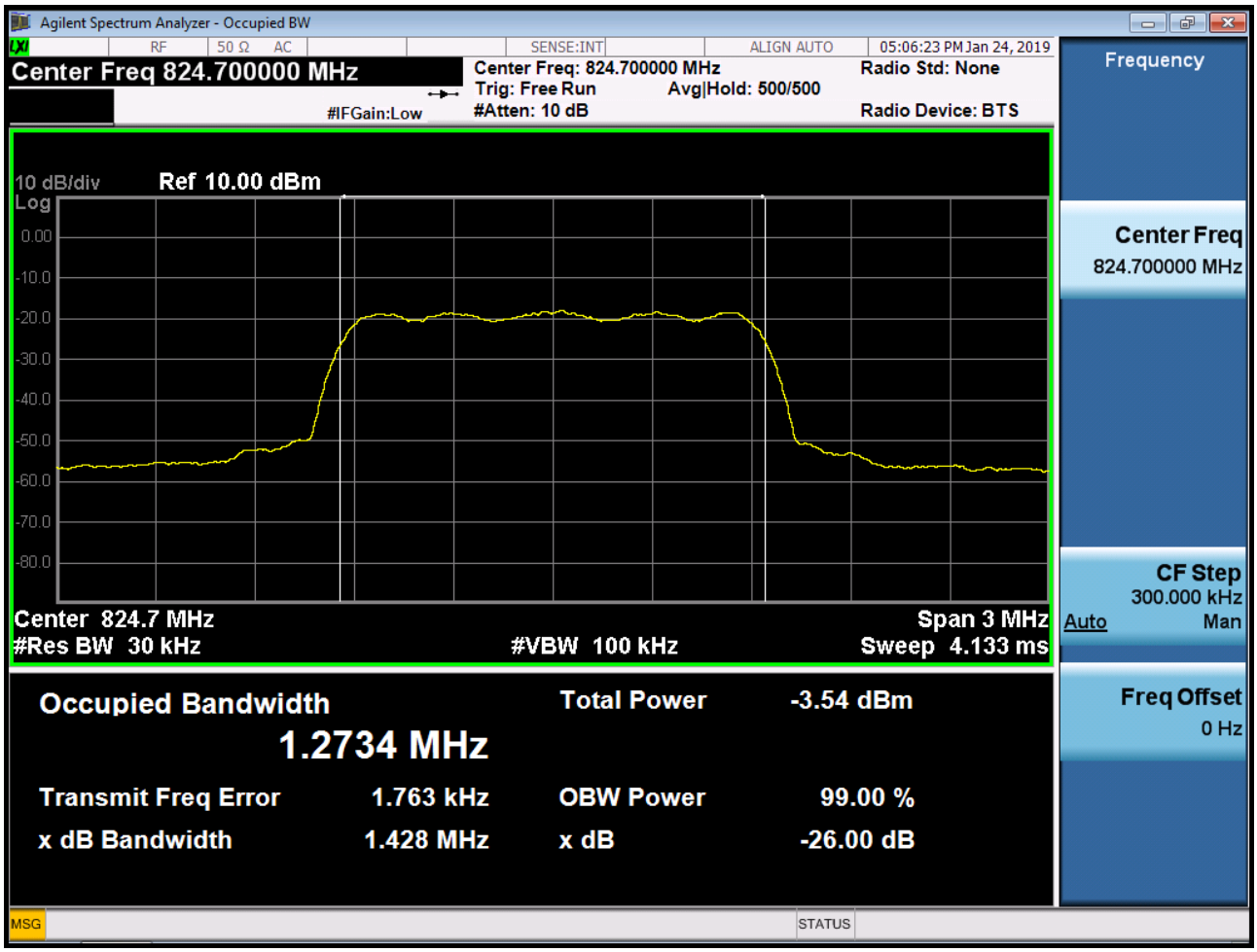
■ CDMA EVDO_Rev.0 MODE (384 CH.) Occupied Bandwidth



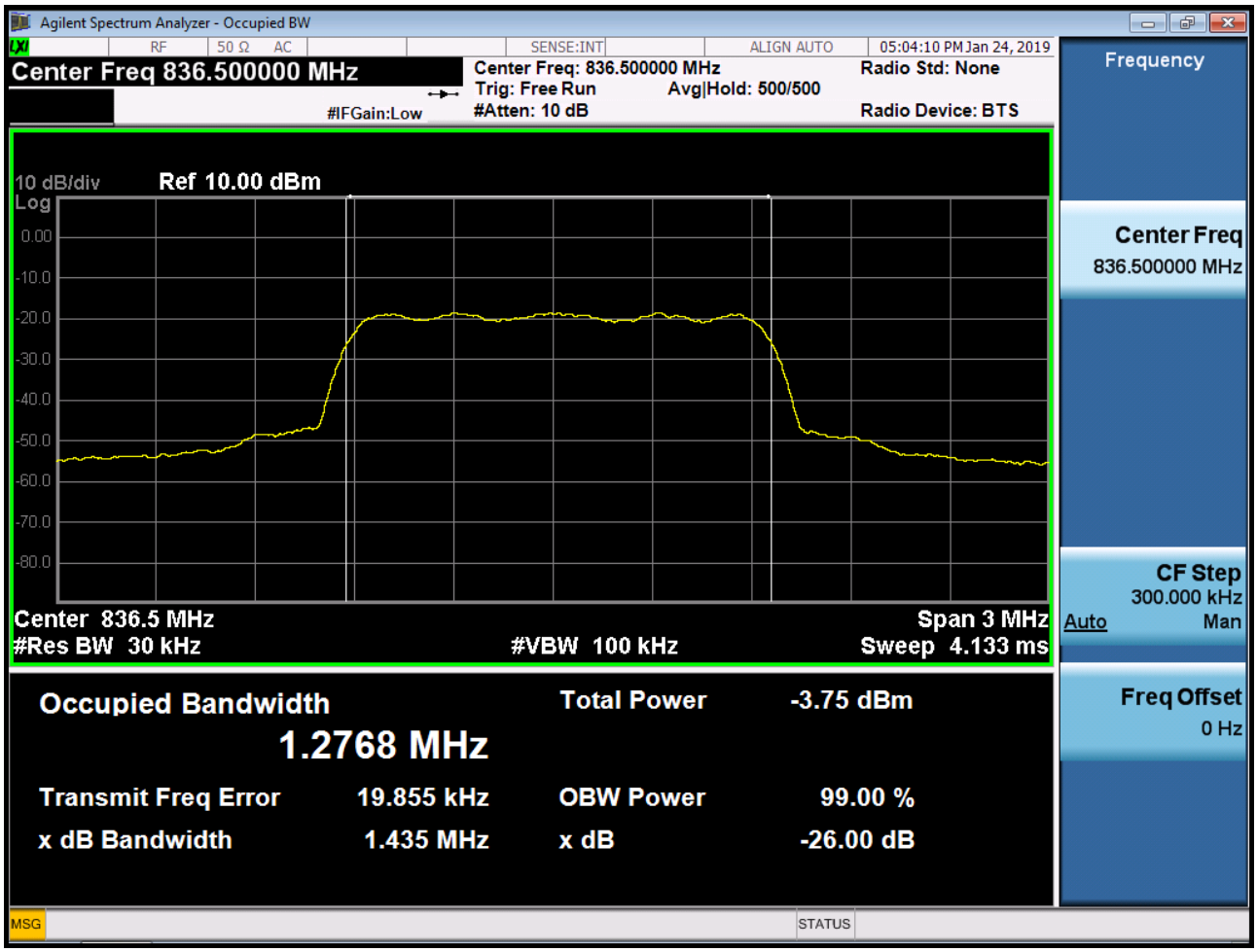
■ CDMA EVDO_Rev.0 MODE (777 CH.) Occupied Bandwidth



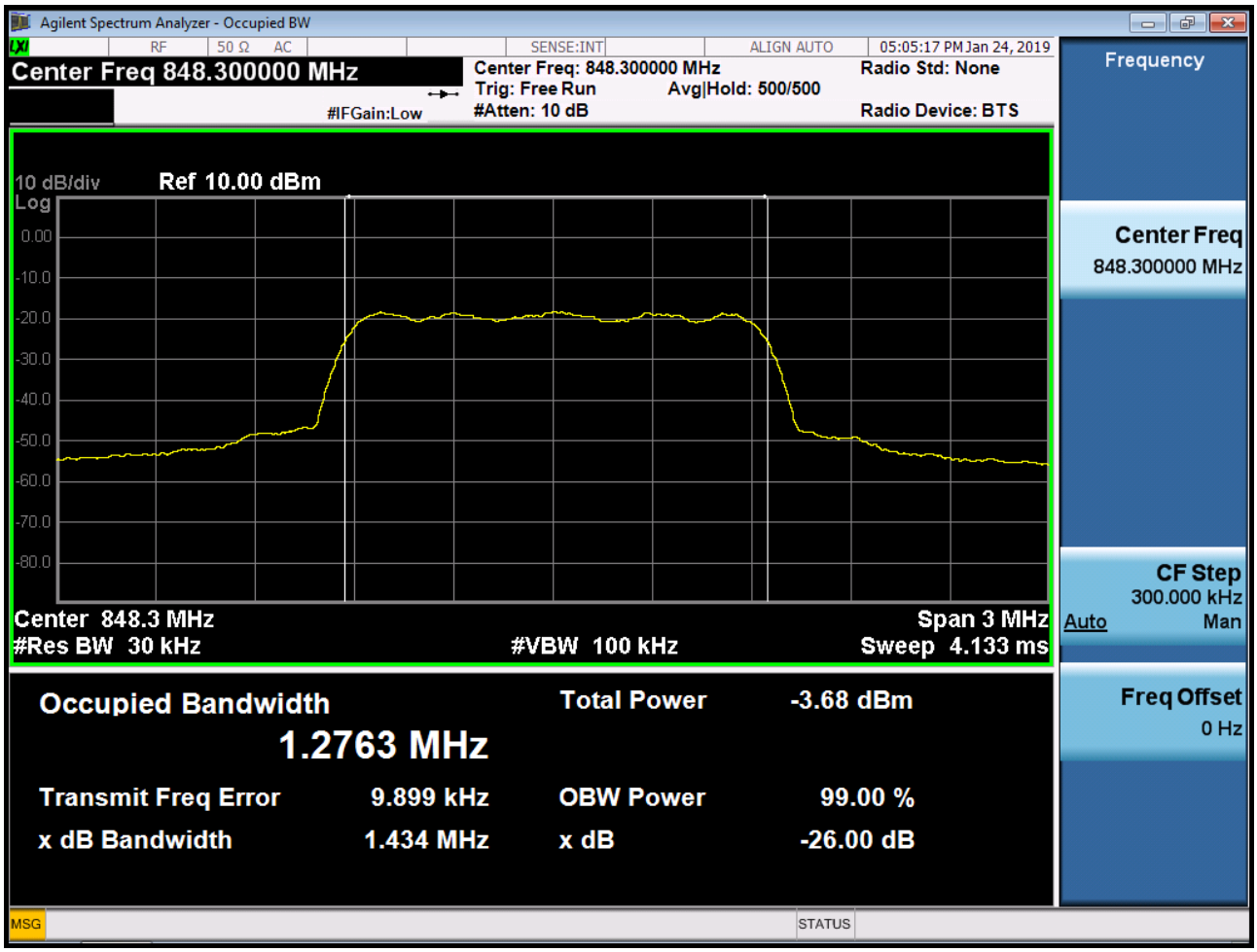
■ CDMA EVDO_Rev.A MODE (1013 CH.) Occupied Bandwidth



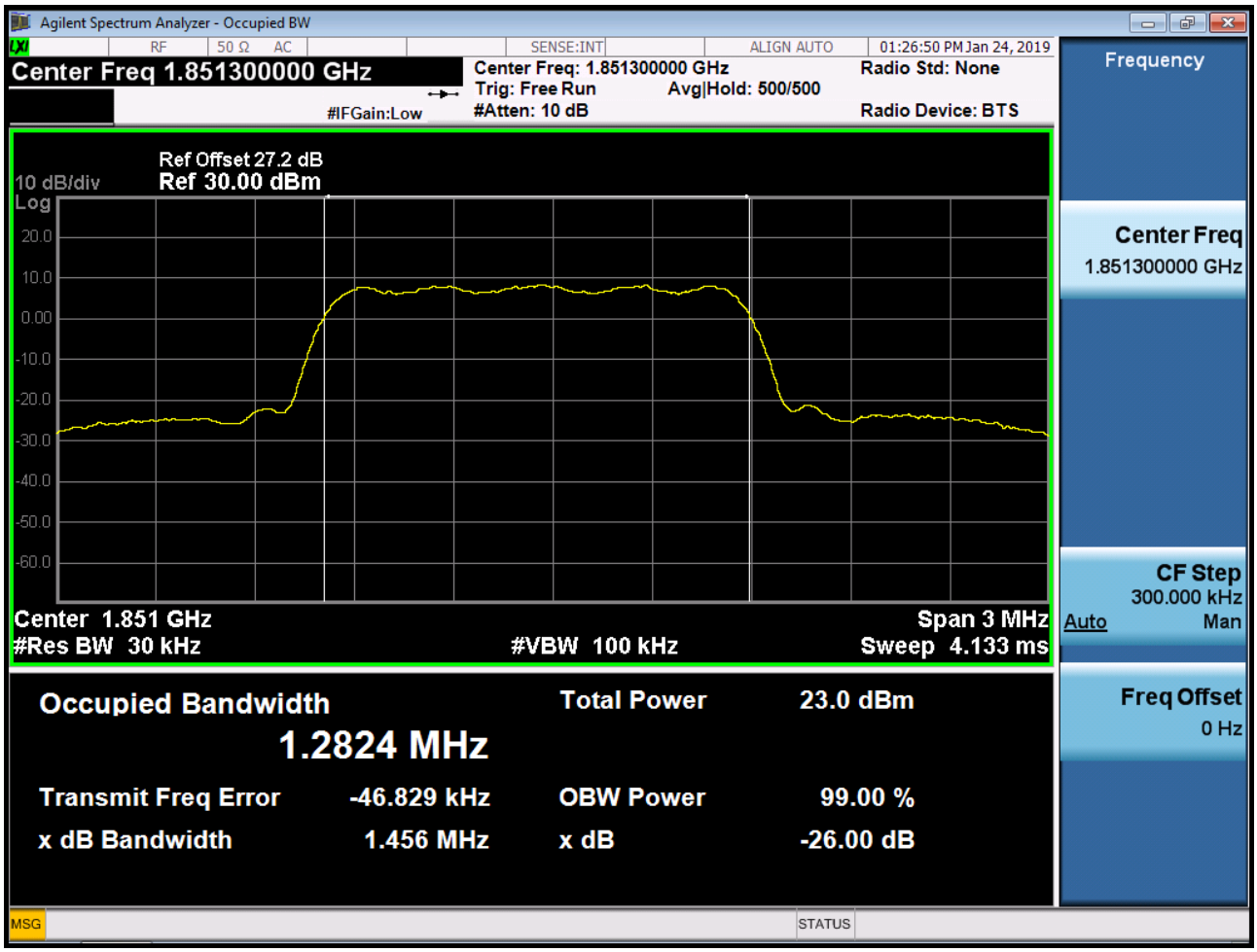
■ CDMA EVDO_Rev.A MODE (384 CH.) Occupied Bandwidth



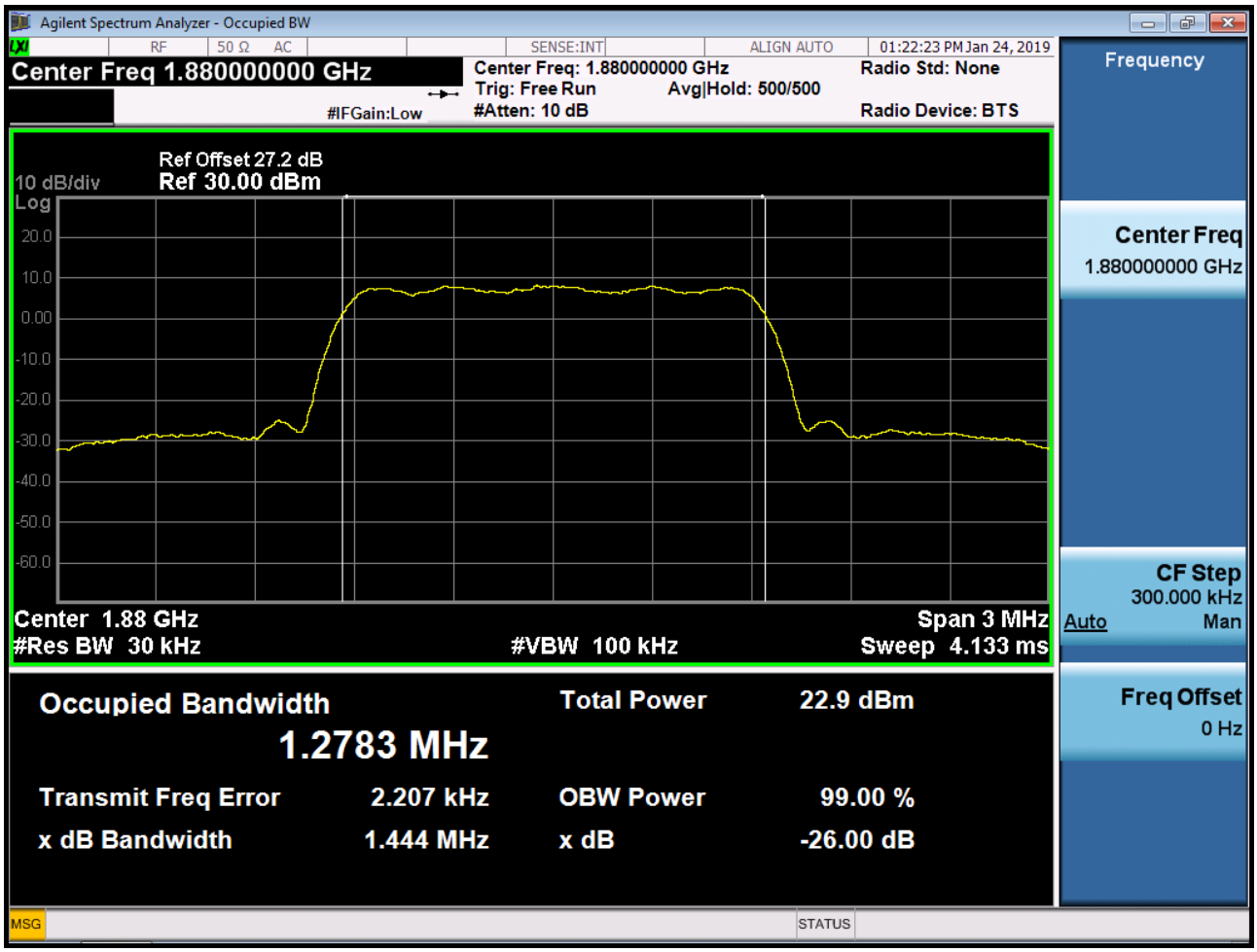
■ CDMA EVDO_Rev.A MODE (777 CH.) Occupied Bandwidth



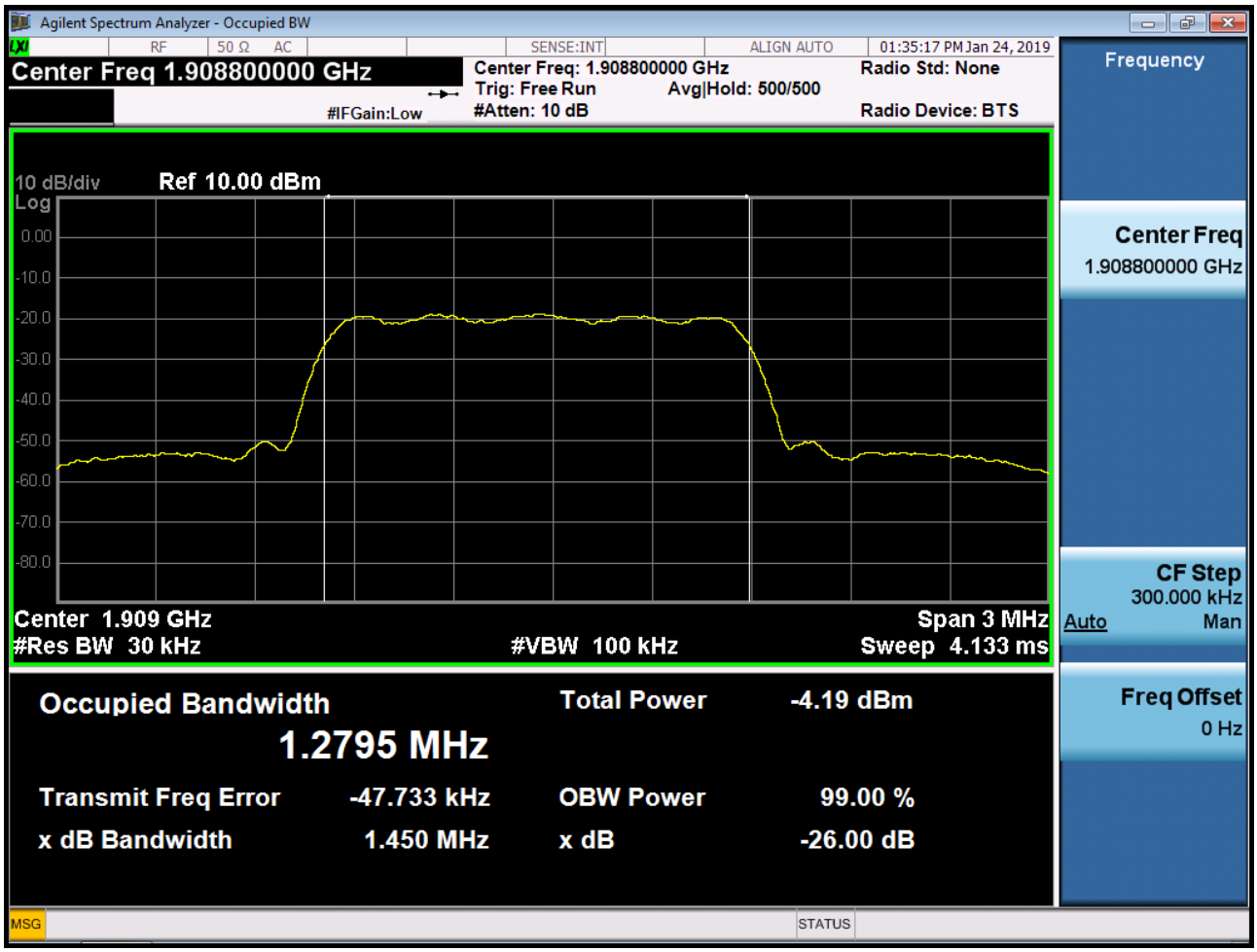
■ PCS MODE (25 CH.) Occupied Bandwidth



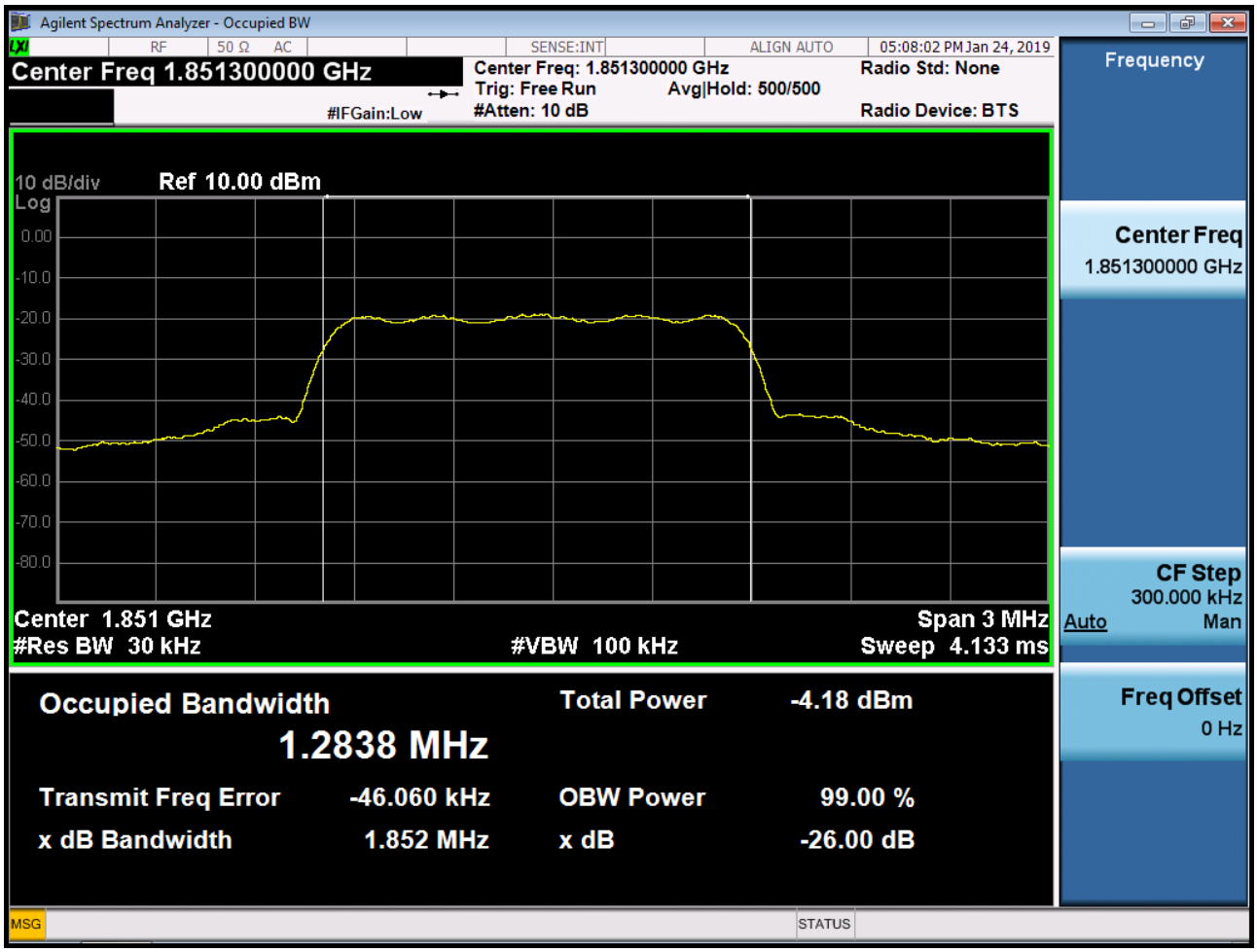
■ PCS MODE (600 CH.) Occupied Bandwidth



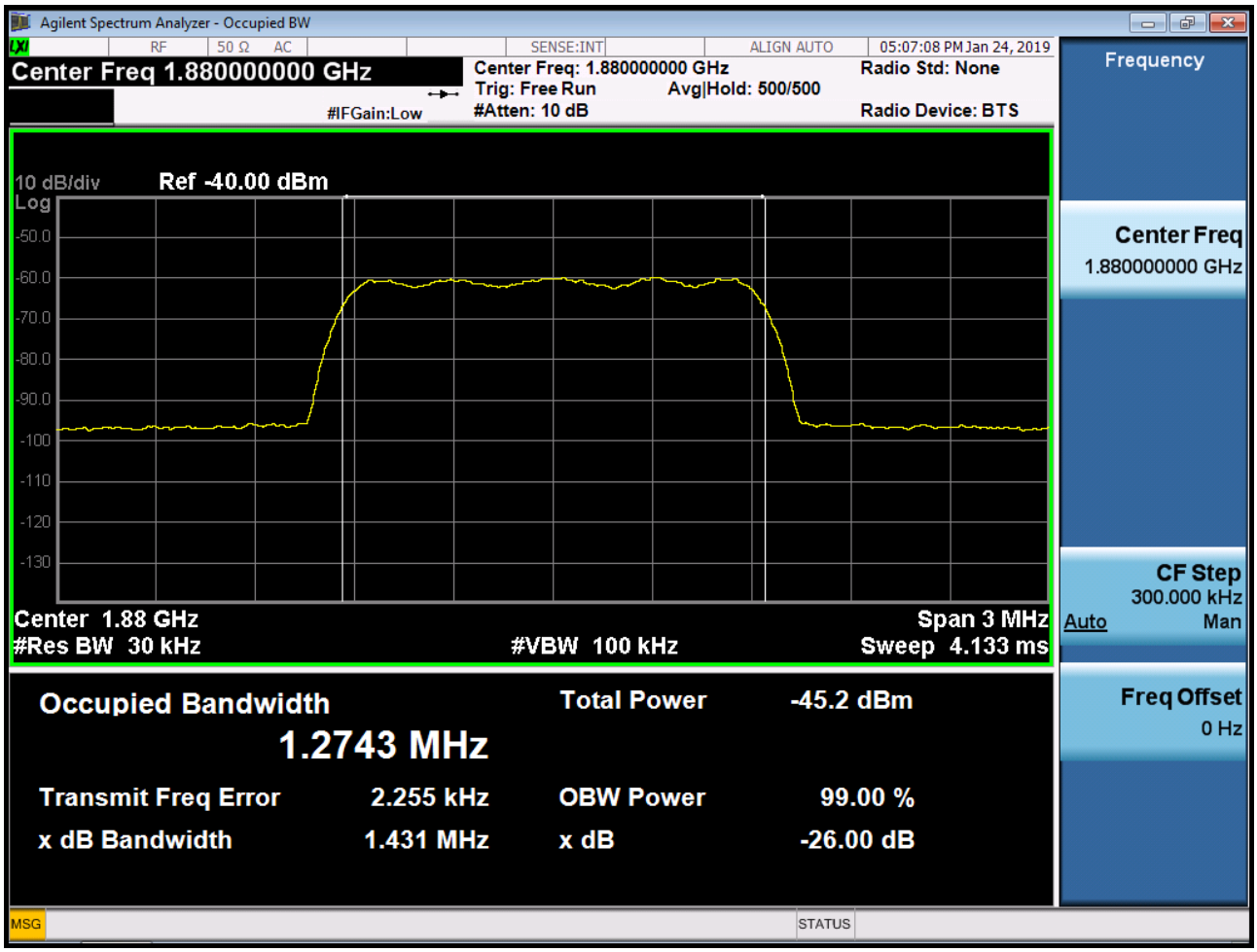
■ PCS MODE (1175 CH.) Occupied Bandwidth



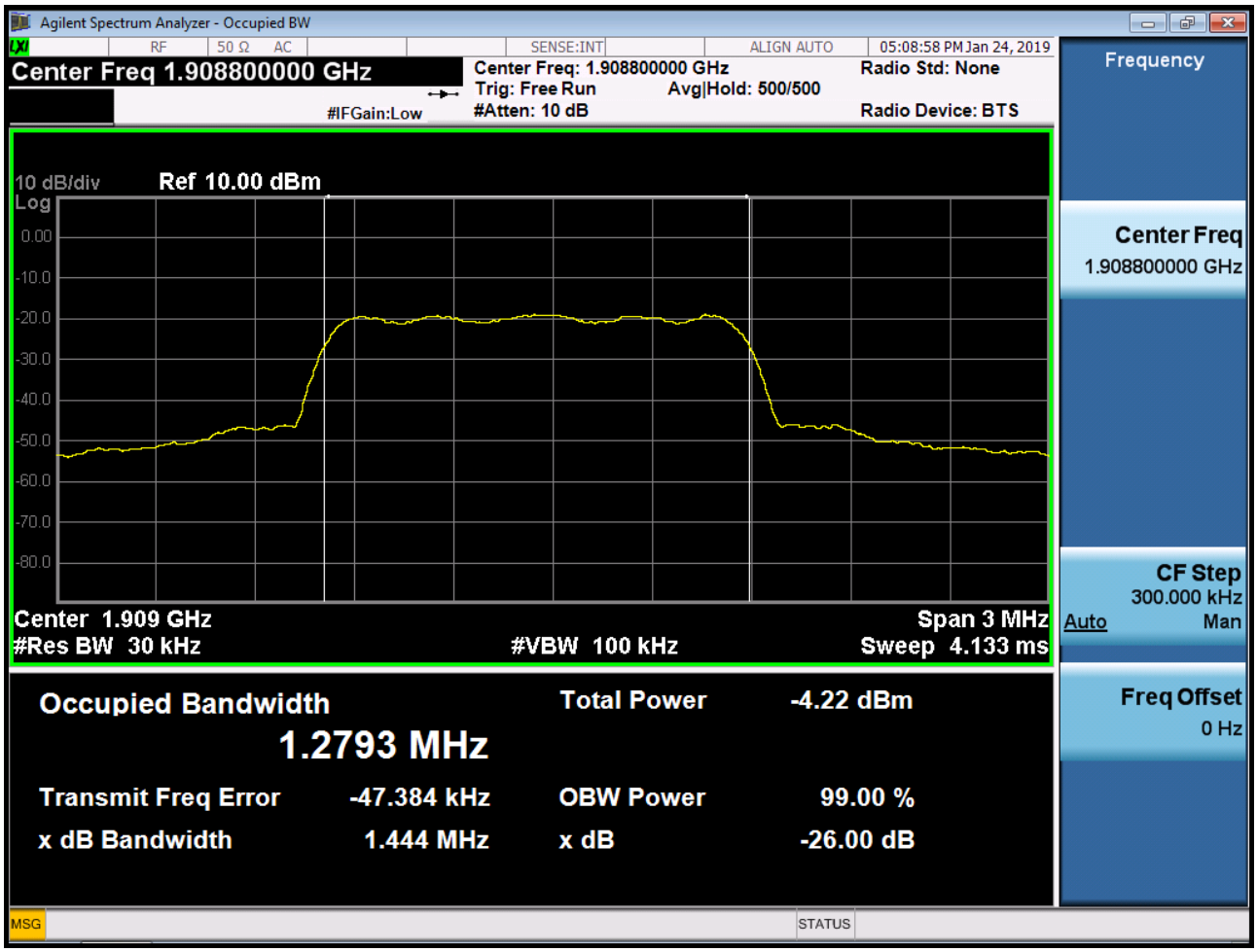
■ PCS EVDO_Rev.0 MODE (25 CH.) Occupied Bandwidth



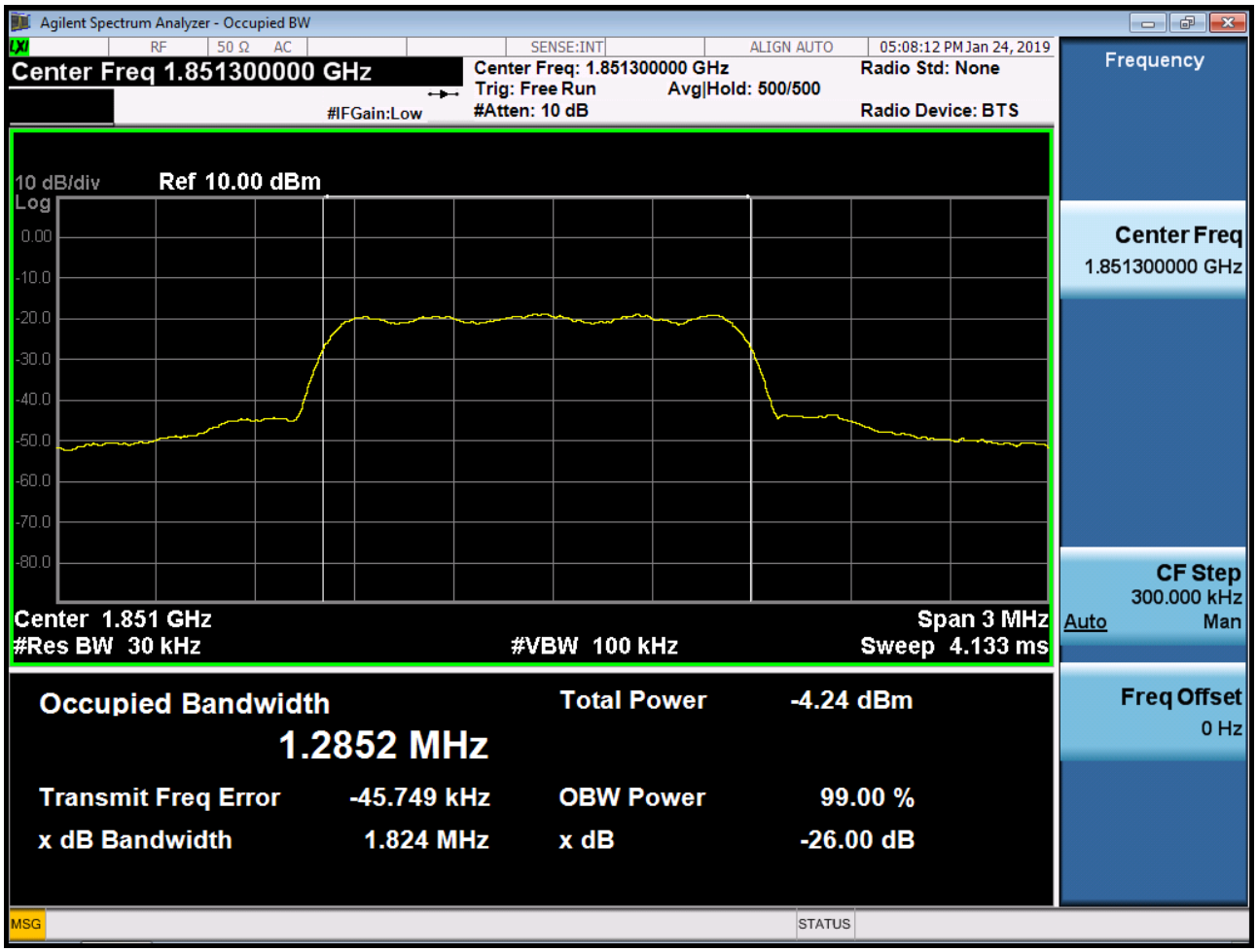
■ PCS EVDO_Rev.0 MODE (600 CH.) Occupied Bandwidth



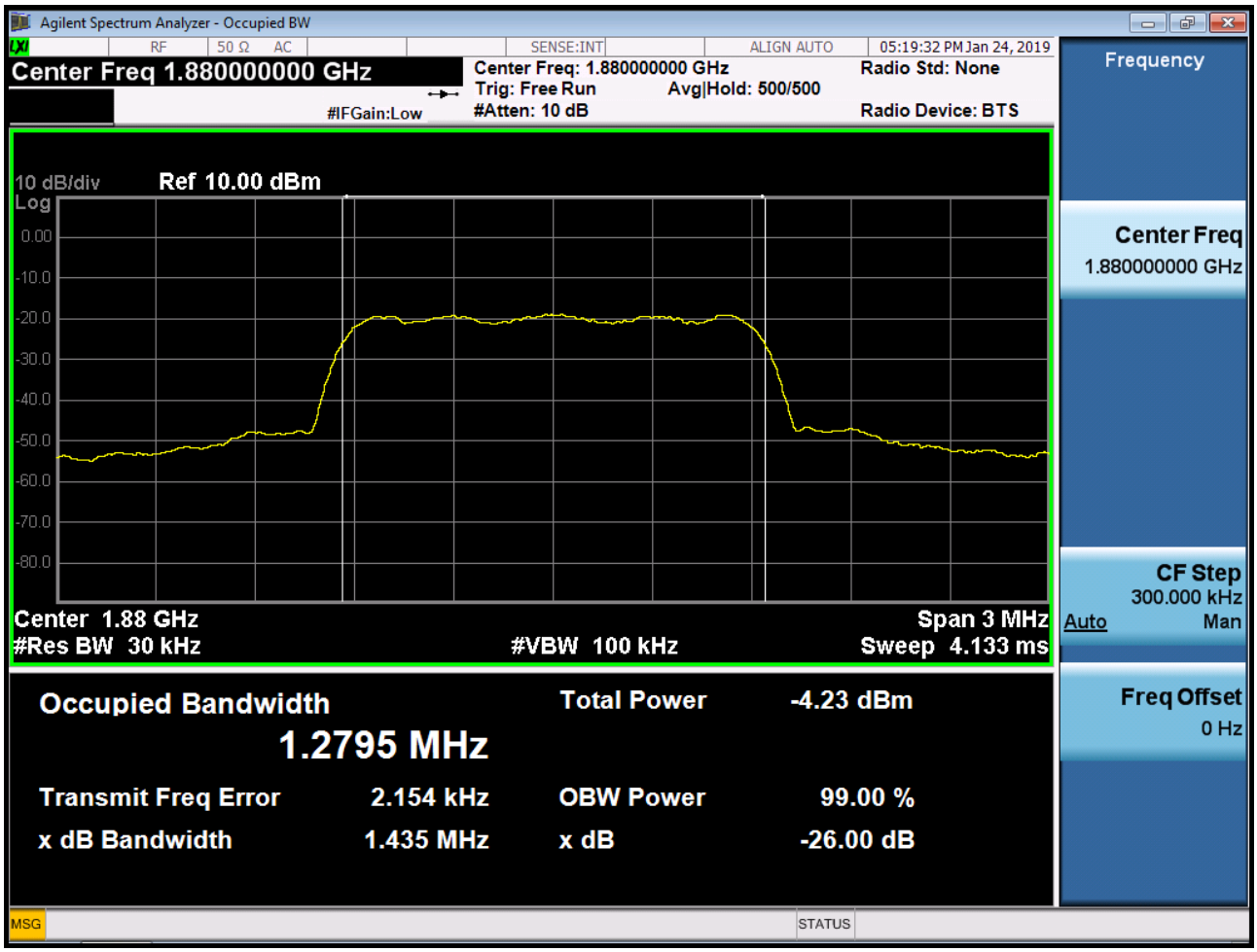
■ PCS EVDO_Rev.0 MODE (1175 CH.) Occupied Bandwidth



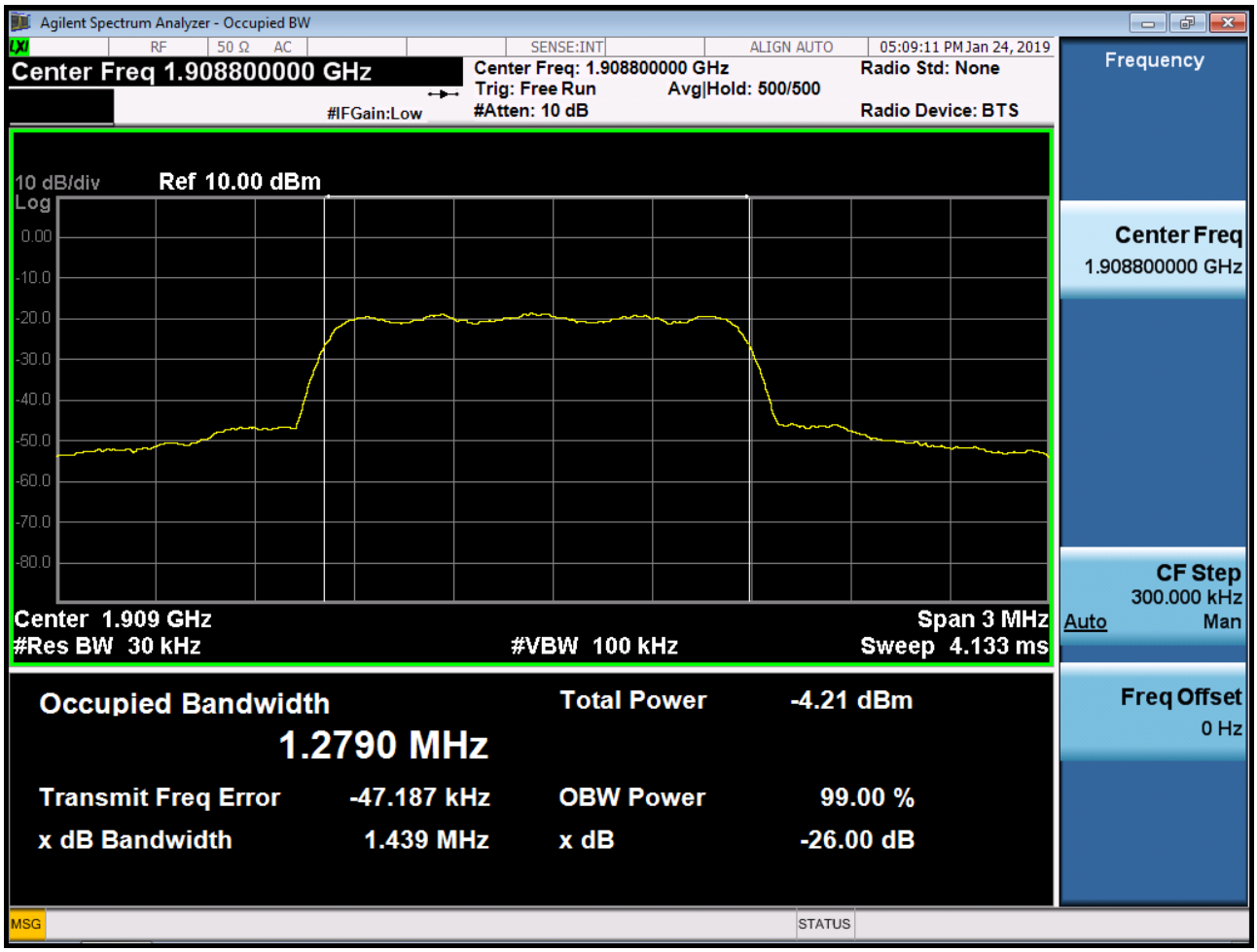
■ PCS EVDO_Rev.A MODE (25 CH.) Occupied Bandwidth



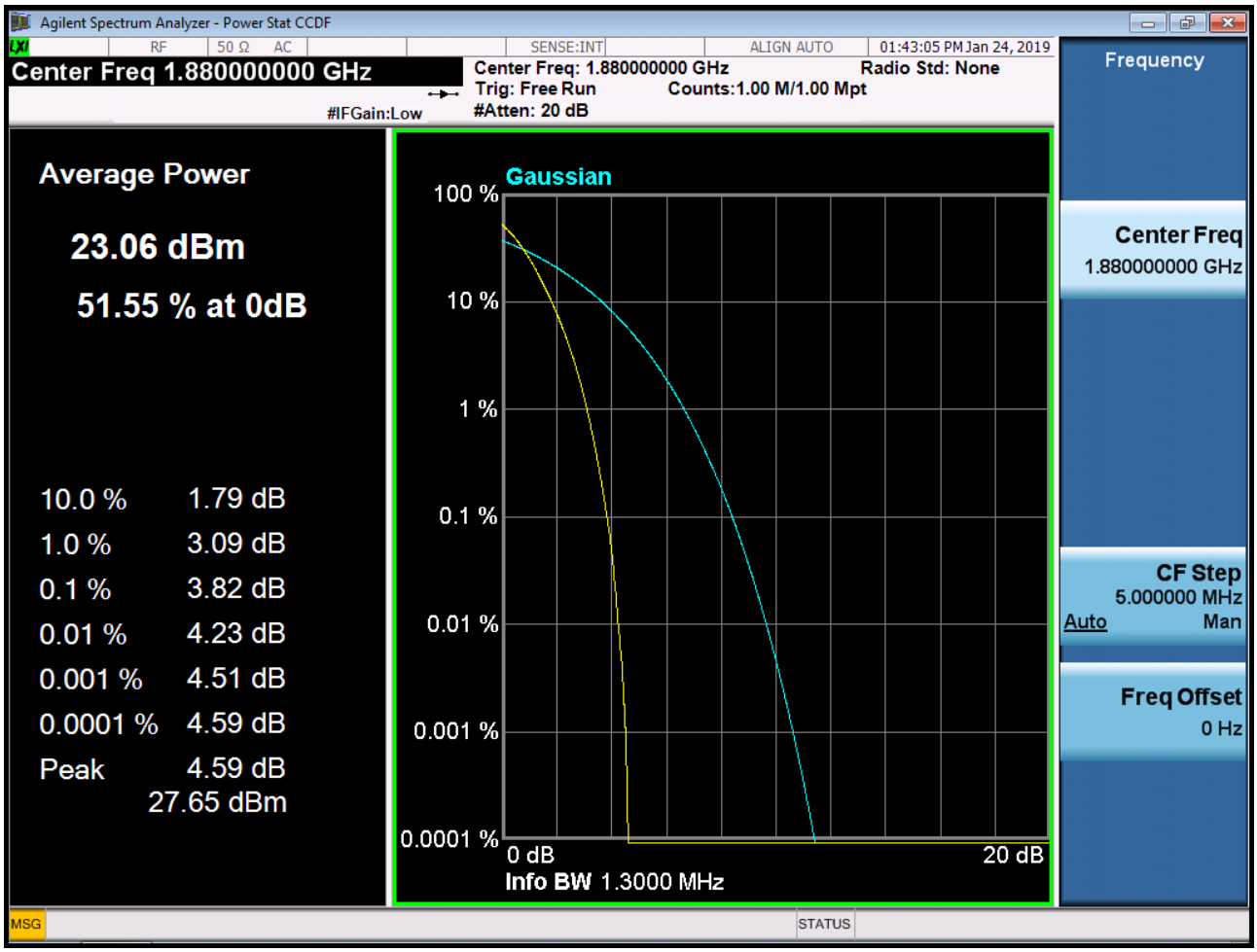
■ PCS EVDO_Rev.A MODE (600 CH.) Occupied Bandwidth



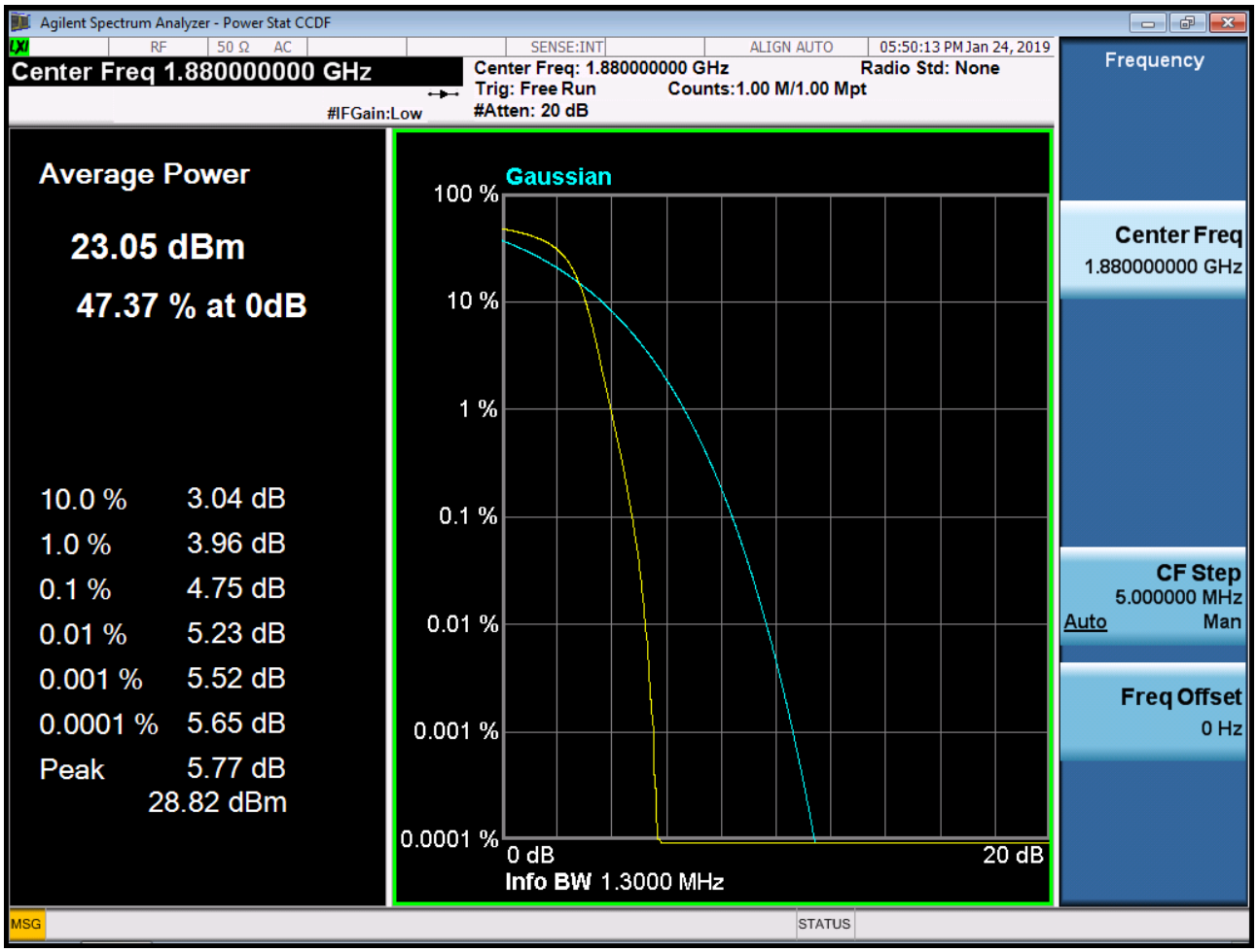
■ PCS EVDO_Rev.A MODE (1175 CH.) Occupied Bandwidth



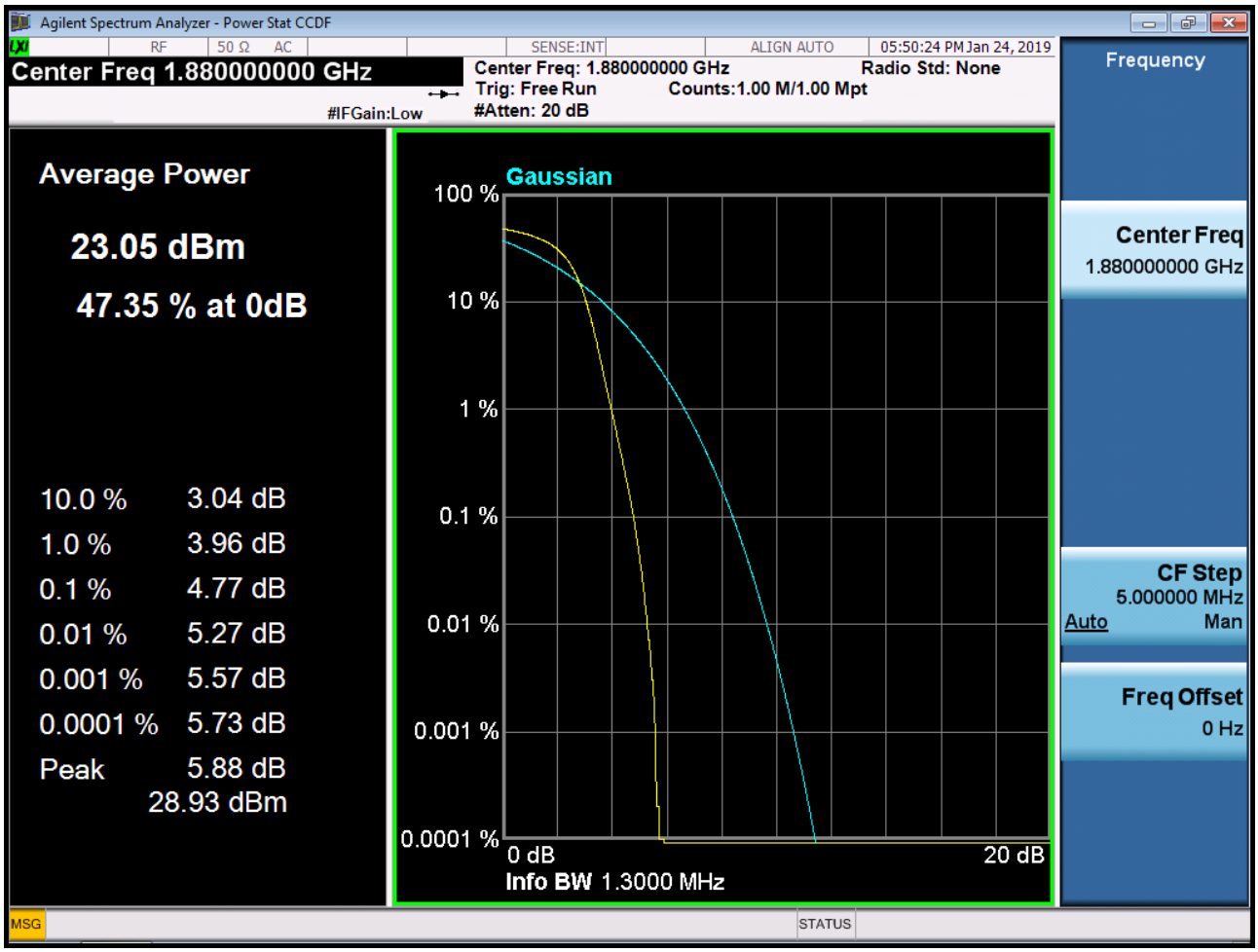
■ PCS CDMA MODE (600 CH.) Peak-to-Average Ratio



■ PCS CDMA EVDO_Rev.0 MODE (600 CH.) Peak-to-Average Ratio



■ PCS CDMA EVDO_Rev.A MODE (600 CH.) Peak-to-Average Ratio



■ CDMA MODE (1013 CH.) Block Edge

■ CDMA MODE (1013 CH.) 4 MHz Span

■ CDMA MODE (777 CH.) Block Edge

■ CDMA MODE (777 CH.) 4 MHz Span

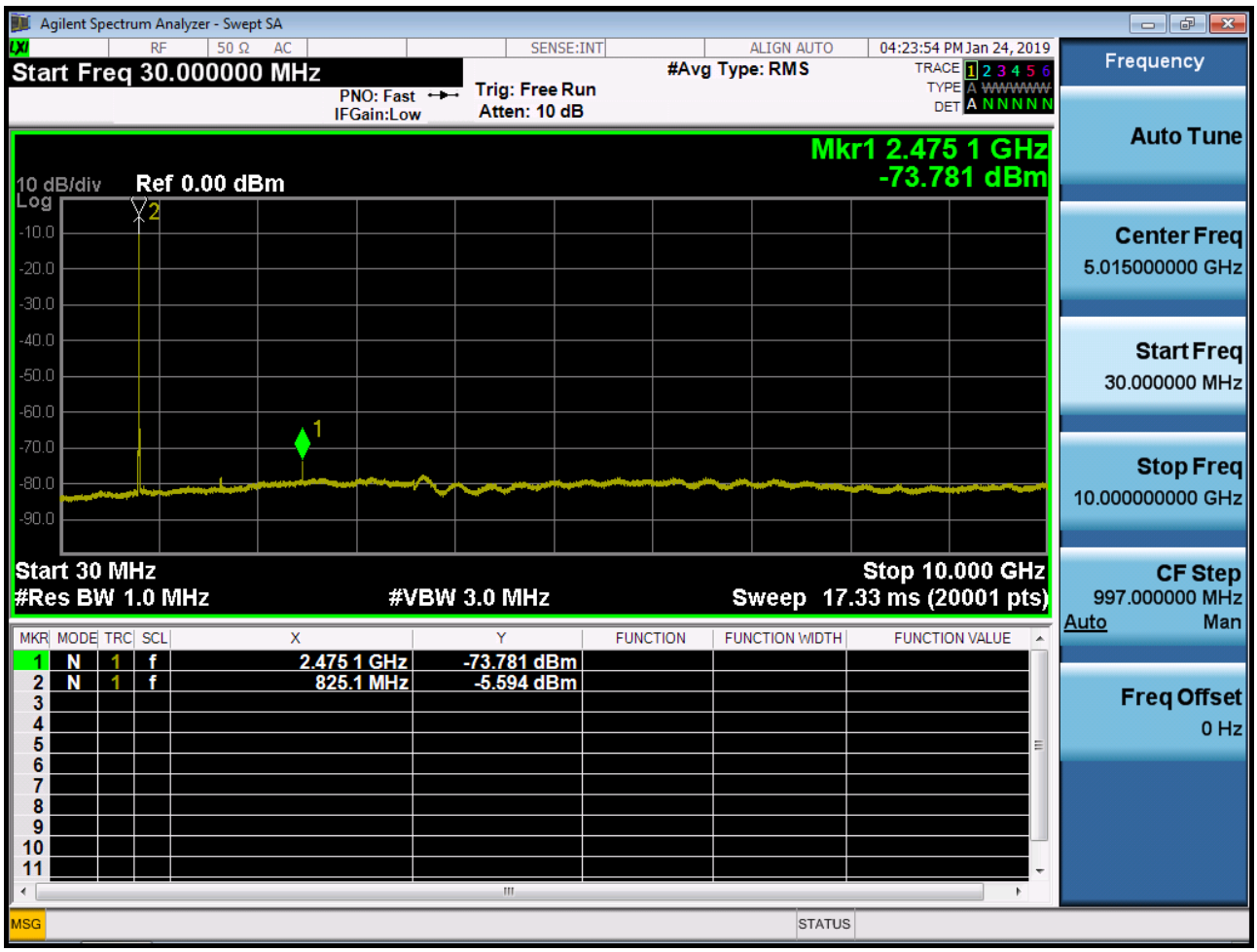
■ PCS MODE (25 CH.) Block Edge pan

■ PCS MODE (25 CH.) 4 MHz Span

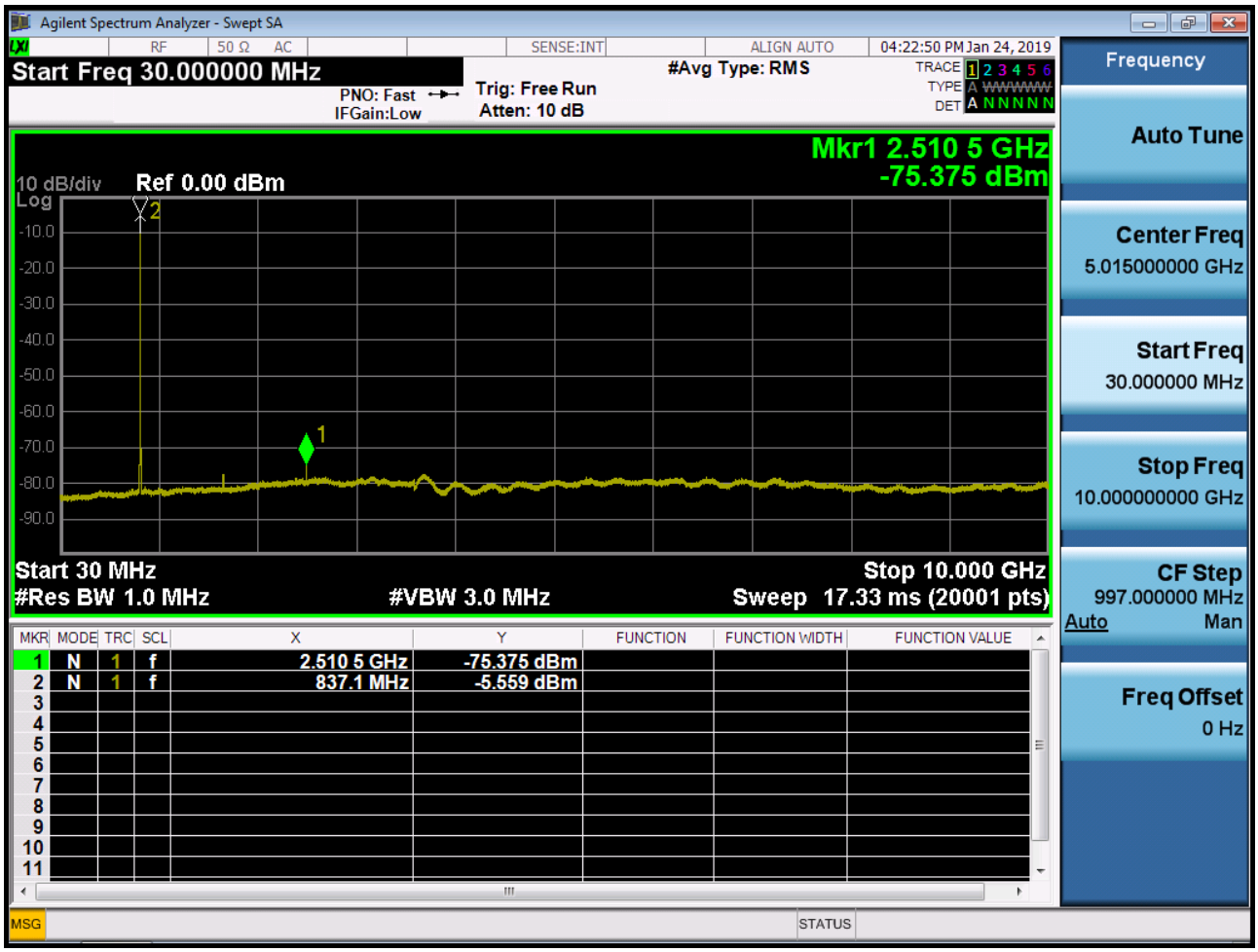
■ PCS MODE (1175 CH.) Block Edge

■ PCS MODE (1175 CH.) 4 MHz Span

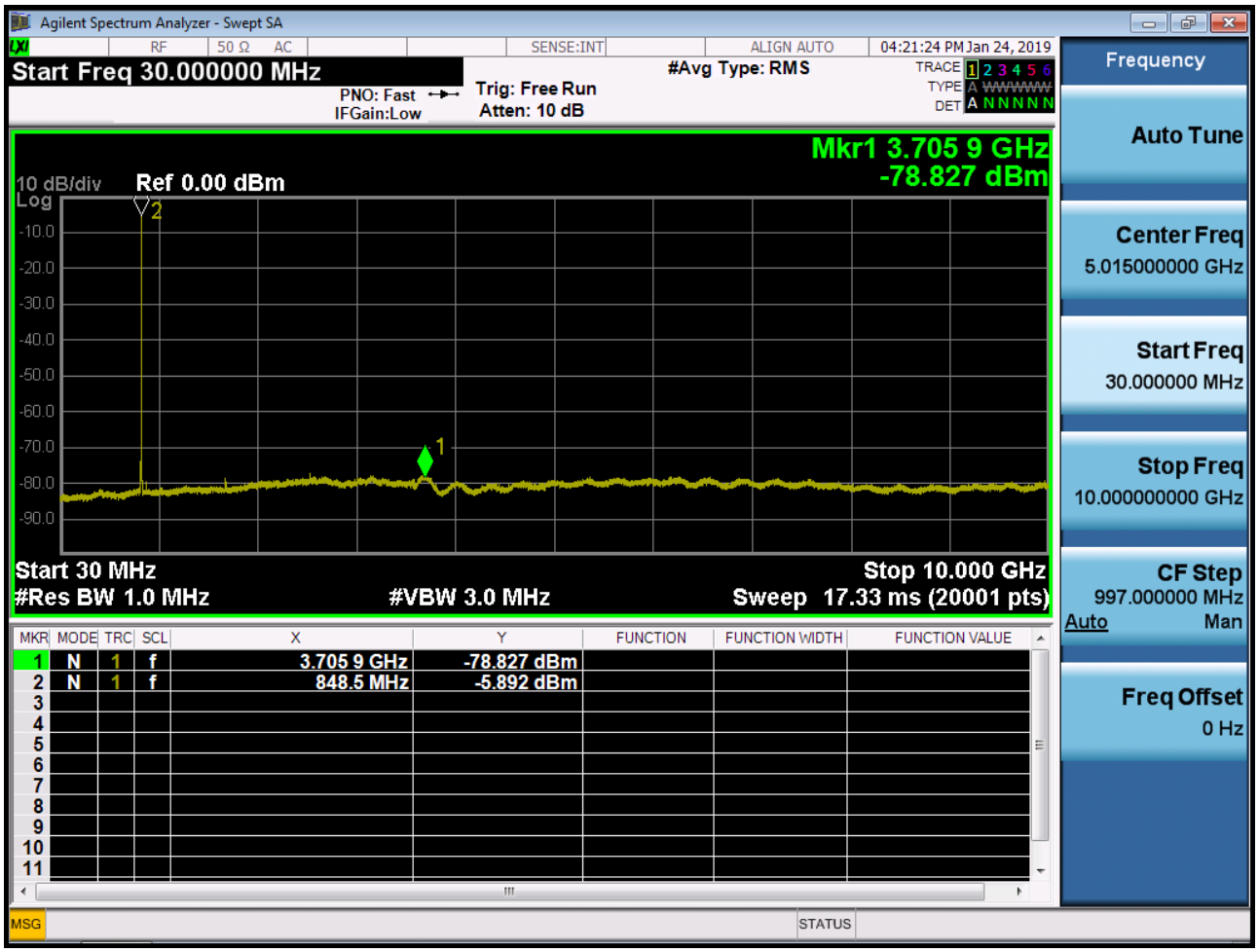
■ CDMA MODE (1013 CH.) Conducted Spurious Emissions



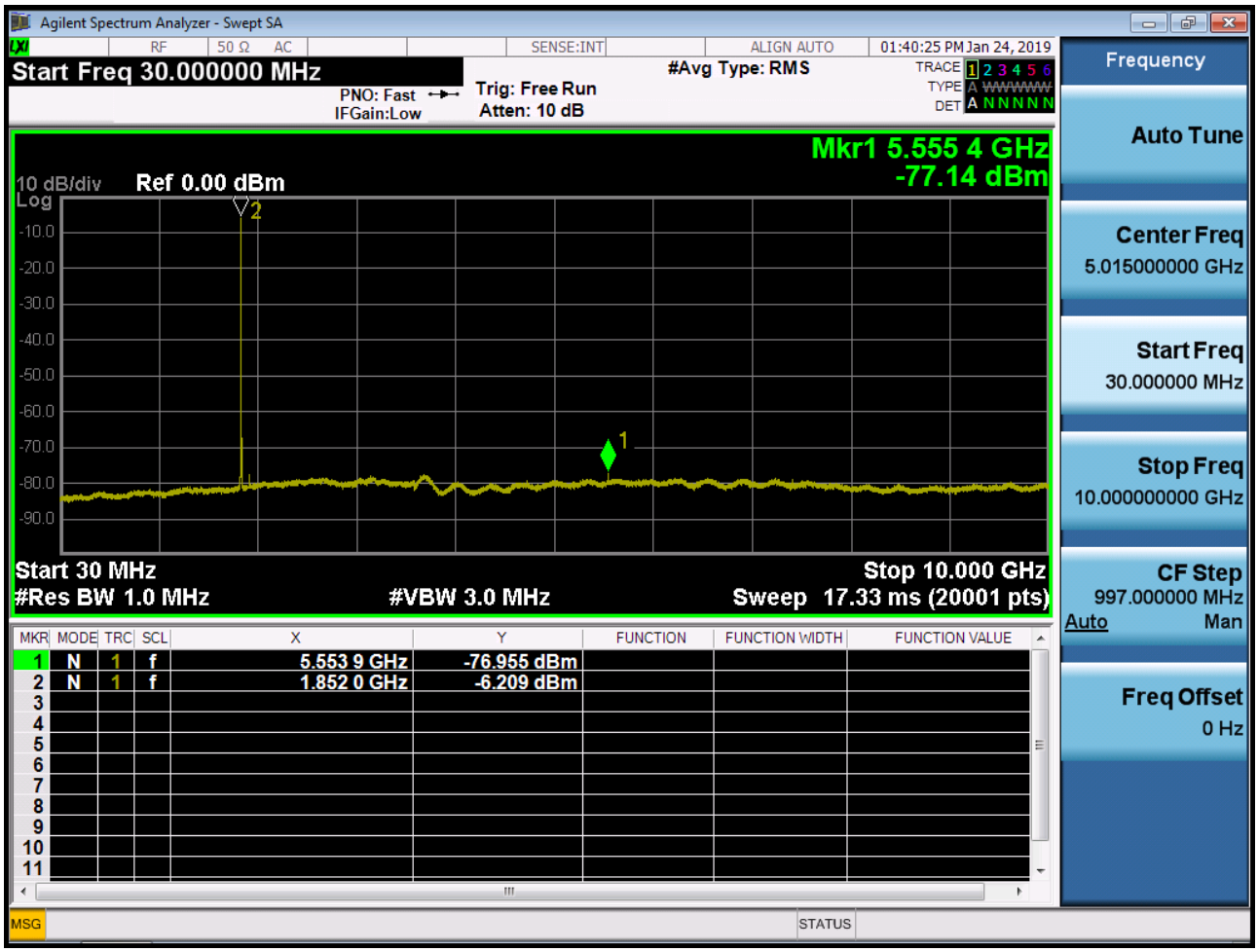
■ CDMA MODE (384 CH.) Conducted Spurious Emissions



■ CDMA MODE (777 CH.) Conducted Spurious Emissions

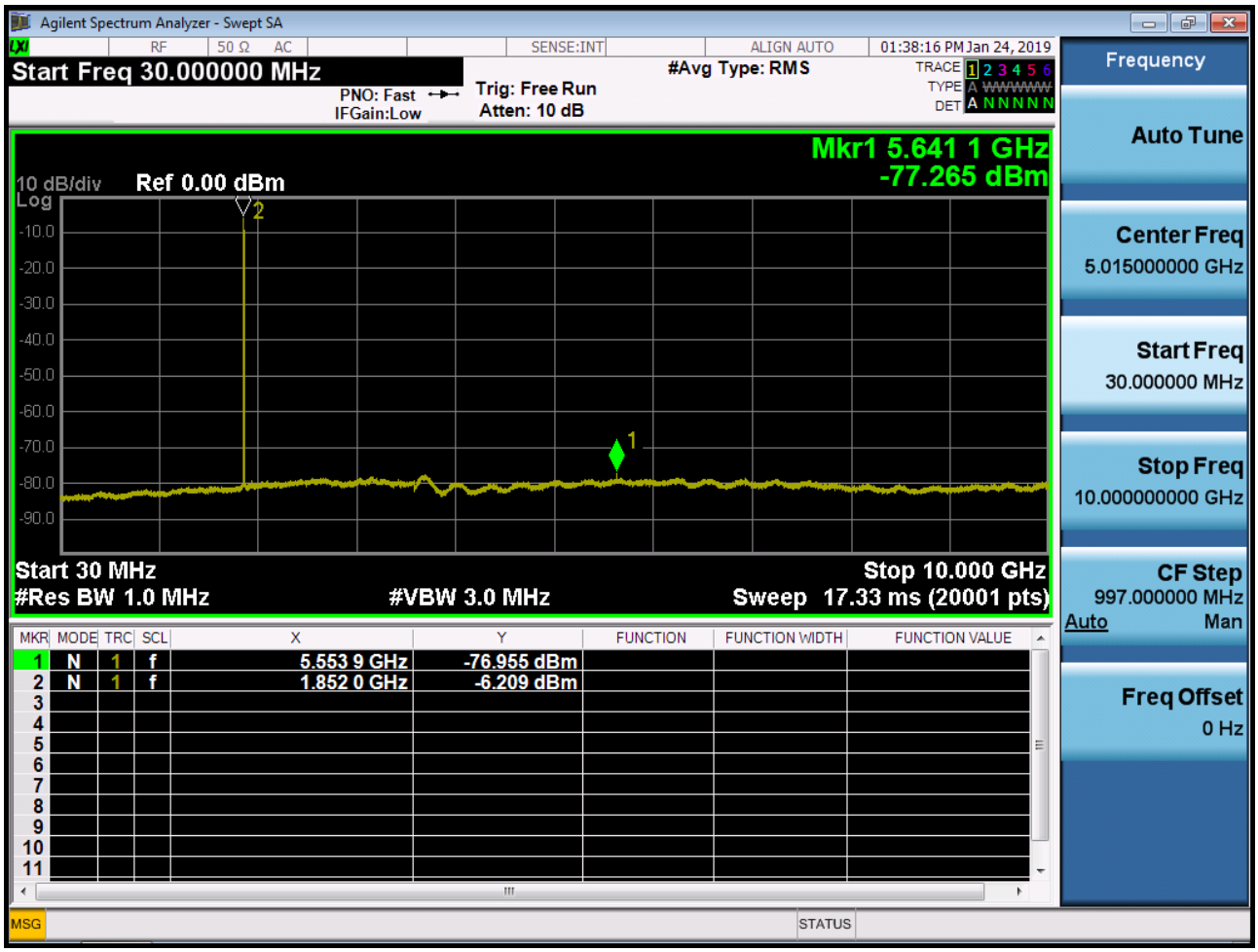


■ PCS MODE (25 CH.) Conducted Spurious Emissions -1



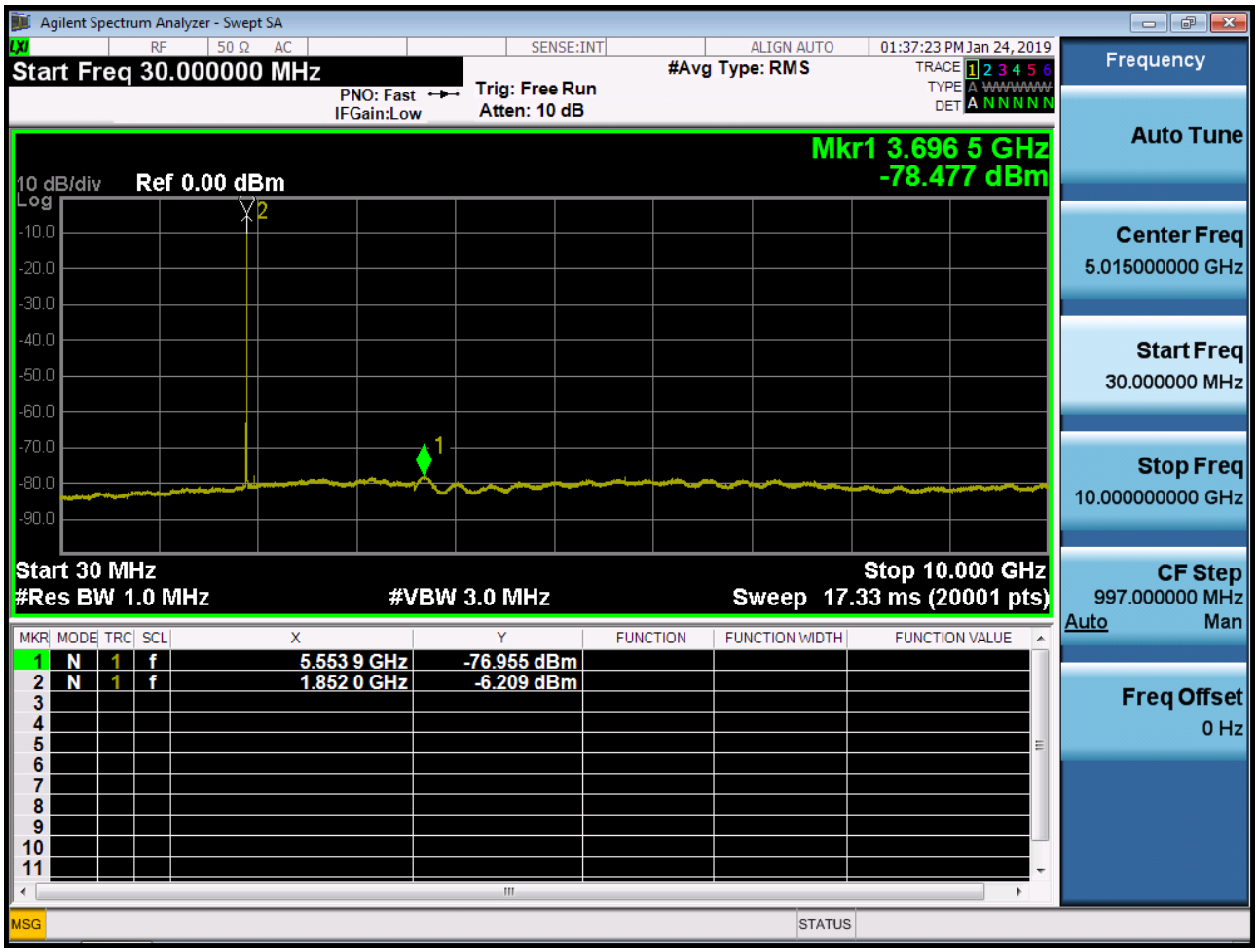
■ PCS MODE (25 CH.) Conducted Spurious Emissions -2

■ PCS MODE (600 CH.) Conducted Spurious Emissions -1



■ PCS MODE (600 CH.) Conducted Spurious Emissions -2

■ PCS MODE (1175 CH.) Conducted Spurious Emissions -1



■ PCS MODE (1175 CH.) Conducted Spurious Emissions -2

10. Annex A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-1902-FC006-P
2	HCT-RF-1902-FC007-P
3	HCT-RF-1902-FC008-P
4	HCT-RF-1902-FC009-P
5	HCT-RF-1902-FC010-P