On your side

고 객 비 밀
CUSTOMER SECRET

TEST REPORT

FCC 2G3G Test for TFGMEIBBCD4
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2310-FC001

DATE OF ISSUE
October 5, 2023

Tested by
Jung Ki Lim

Technical Manager
Jong Seok Lee

HCT CO., LTD.
BongJai Huh / CEO

HCT CO., LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si,
Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 Fax. +82 31 645 6401

고 객 비 밀
CUSTOMER SECRET

HCT Co., Ltd.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 Fax. +82 31 645 6401

TEST REPORT

FCC 2G3G Test for TFGMEIBBCD4

REPORT NO.
HCT-RF-2310-FC001

DATE OF ISSUE
October 05, 2023

Additional Model
TFGMEIBBCD5, TFGMEIBBCD6, TFGMEIBBCD7, TFGMEIBBCD8, TFGMEIBBCD9, TFGMEIBBCDA, TFGMEIBBCDB, TFGMEIBBCDC

Applicant	**LG Electronics Inc.** 10, MagokJungang-ro, Gangseo-gu, Seoul 07796, Republic of Korea
Eut Type Model Name	GM Onstar Gen12 ROW TFGMEIBBCD4
FCC ID	BEJTFGMEIBBCD4
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 22, § 24, § 27, § 2

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	October 05, 2023	Initial Release

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)

Test Report Statement:
The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme) / A2LA(American Association for Laboratory Accreditation), which signed the ILAC-MRA.

If this report is required to confirmation of authenticity, please contact to www.hct.co.kr

CONTENTS

1. GENERAL INFORMATION 5
1.1. MAXIMUM OUTPUT POWER 6
2. INTRODUCTION 7
2.1. DESCRIPTION OF EUT 7
2.2. MEASURING INSTRUMENT CALIBRATION 7
2.3. TEST FACILITY 7
3. DESCRIPTION OF TESTS 8
3.1 TEST PROCEDURE 8
3.2 CONDUCTED OUTPUT POWER 9
3.3 RADIATED TEST 10
3.3.1 RADIATED POWER 11
3.3.2 RADIATED SPURIOUS EMISSIONS 12
3.4 PEAK- TO- AVERAGE RATIO 14
3.5 OCCUPIED BANDWIDTH. 16
3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL 17
3.7 BAND EDGE 18
3.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE 19
3.9 WORST CASE(CONDUCTED TEST) 20
3.10 WORST CASE(RADIATED TEST) 21
4. LIST OF TEST EQUIPMENT 23
5. MEASUREMENT UNCERTAINTY 25
6. SUMMARY OF TEST RESULTS 26
7. EMISSION DESIGNATOR 27
8. TEST DATA 28
8.1 Conducted Output Power 28
8.2 EFFECTIVE RADIATED POWER 30
8.2.1 External Antenna 30
8.2.2 Internal Antenna 30
8.3 EQUIVALENT ISOTROPIC RADIATED POWER 31
8.3.1 External Antenna 31
8.3.2 Internal Antenna 32
8.4 RADIATED SPURIOUS EMISSIONS 33
8.4.1 External Antenna 33
8.4.2 Internal Antenna 38
8.5 PEAK-TO-AVERAGE RATIO 43
8.6 OCCUPIED BANDWIDTH 44
8.7 CONDUCTED SPURIOUS EMISSIONS 45
8.8 BAND EDGE 45
8.9 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE 46
9. TEST PLOTS 57
10. ANNEX A_ TEST SETUP PHOTO 146

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	LG Electronics Inc.
Address:	10, Magok Jungang-ro, Gangseo-gu, Seoul 07796, Republic of Korea
FCC ID:	BEJTFGMEIBBCD4
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 22, § 24, § 27, § 2
EUT Type:	GM Onstar Gen12 ROW
Model(s):	TFGMEIBBCD4
Additional Model:	TFGMEIBBCD5,TFGMEIBBCD6,TFGMEIBBCD7,TFGMEIBBCD8, TFGMEIBBCD9, TFGMEIBBCDA, TFGMEIBBCDB, TFGMEIBBCDC
Tx Frequency:	824.20 - 848.80 MHz (GSM850) 826.40 - 846.60 MHz (WCDMA850) 1 850.20 - 1 909.80 MHz (GSM1900) 1 852.4 – 1 907.6 MHz (WCDMA1900) 1 712.4 – 1 752.6 MHz (WCDMA1700)
Rx Frequency:	869.20 - 893.80 MHz (GSM850) 871.40 - 891.60 MHz (WCDMA850) 1 930.20 - 1 989.80 MHz (GSM1900) 1 932.4 – 1 987.6 MHz (WCDMA1900) 2 112.4 – 2 152.6 MHz (WCDMA1700)
Date(s) of Tests:	February 27, 2023 ~ October 05, 2023
Serial number:	Radiated - External Antenna : EBR36018942_#30 (GSM 850, WCDMA B2,5), EBR42280001K_#17 (GSM 1900) EBR42280001K_#16 (WCDMA B4) - Internal Antenna : EBR36018942K_#14 (GSM 850, WCDMA B5), EBR42280001K_#17 (GSM 1900, WCDMA B4), EBR36018942_#30 (WCDMA B2) Conducted : EBR36018829_#75
External Antenna Information	ANT5 : 86531607 ANT4 : 86575530 DUT4 : 85608774

1.1. MAXIMUM OUTPUT POWER

Mode	Tx Frequency (MHz)	Rx Frequency (MHz)	Emission Designator	ERP External Antenna		ERP Internal Antenna	
				Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)
GSM850	824.2 – 848.8	869.2 – 893.8	249KGXW	2.080	33.18	3.327	35.22
GSM850 EDGE			249KG7W	0.495	26.95	0.857	29.33
WCDMA850	826.4 – 846.6	871.4 – 891.6	4M16F9W	0.290	24.62	0.440	26.43

Mode	Tx Frequency (MHz)	Rx Frequency (MHz)	Emission Designator	EIRP External Antenna		EIRP Internal Antenna	
				Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)
GSM1900	1850.2 – 1909.8	1930.2 – 1989.8	242KGXW	0.444	26.47	1.400	31.46
GSM1900 EDGE			248KG7W	0.404	26.06	1.334	31.25
WCDMA1900	1852.4 – 1907.6	1932.4 – 1987.6	4M15F9W	0.465	26.67	0.565	27.52
WCDMA1700	1712.4 – 1752.6	2112.4 – 2152.6	4M16F9W	0.384	25.85	0.743	28.71

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a GM Onstar Gen12 ROW with GSM/GPRS/EGPRS/UMTS and LTE, Sub6.

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

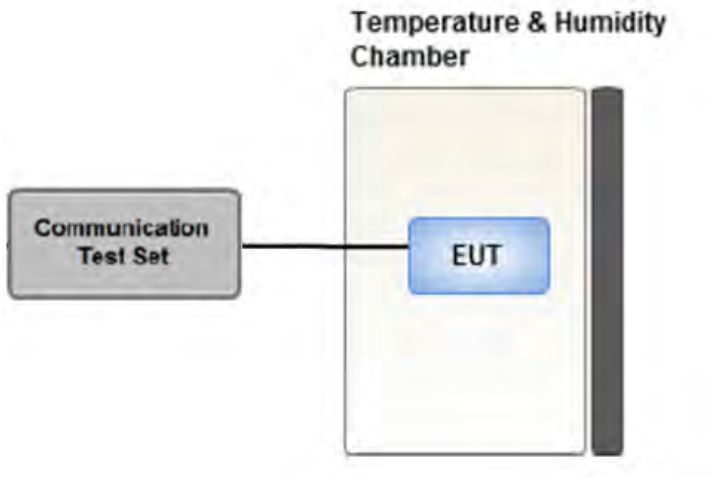
The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.**

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
Conducted Output Power	- KDB 971168 D01 v03r01 – Section 5.2
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 CONDUCTED OUTPUT POWER



Test setup

Test Overview

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurements be performed only over durations of active transmissions at maximum output power level applies.

Conducted Output Power was tested in accordance with KDB971168 D01 Power Meas License Digital Systems v03r01, Section 5.2.

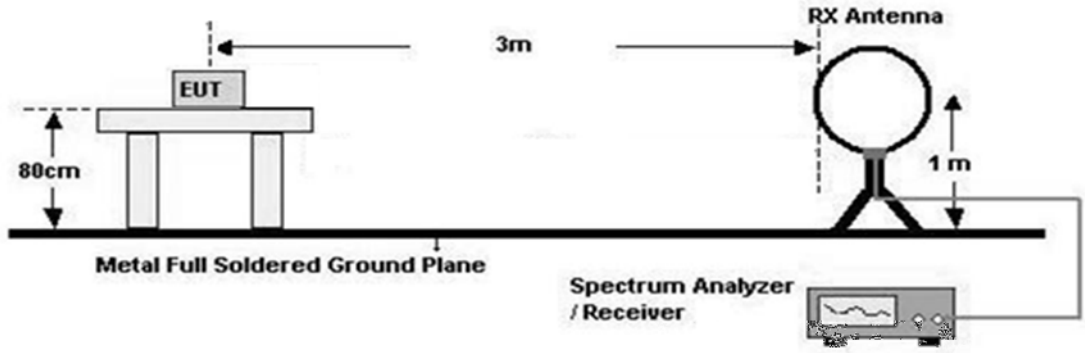
3.3 RADIATED TEST

Test Overview

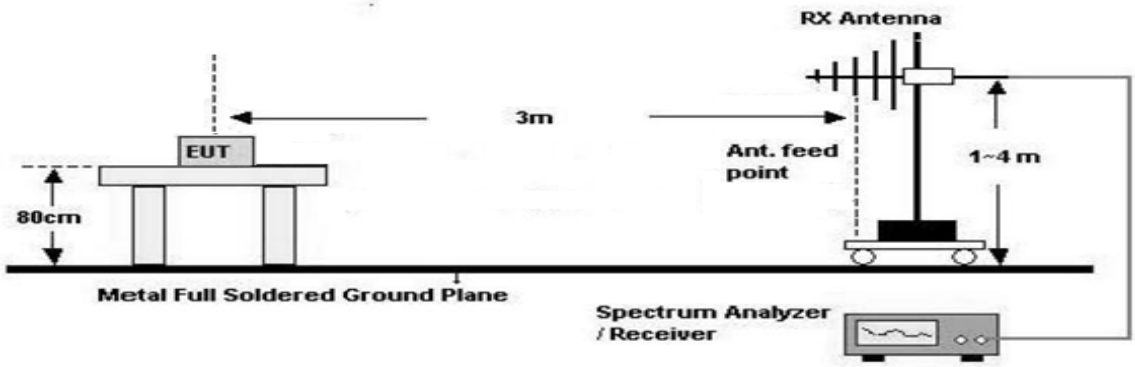
Radiated tests are performed in the semi-anechoic chamber. The equipment under test is placed on a non-conductive table on semi-anechoic chamber.

Test Configuration

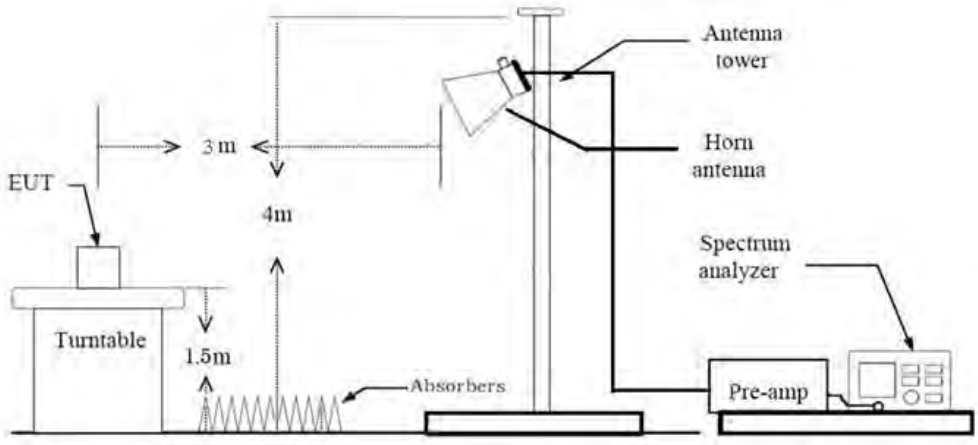
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



3.3.1 RADIATED POWER

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 1 MHz
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 EUT is placed on a turntable, which is 0.8 m above ground plane. (Below 1 GHz)
2. The EUT is placed on a turntable, which is 1.5 m above ground plane. (Above 1 GHz)
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
6. 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.
7. Total(dBμV/m) = Measured Value(dBμV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F)
8. EIRP (dBm)
   = Total (dBμV/m) + 20 log D − 104.8 (where D is the measurement distance in meters. D=3)
   = Total (dBμV/m) - 95.2(dB)
9. ERP(dBm) = EIRP(dBm) - 2.15(dB)

3.3.2 RADIATED SPURIOUS EMISSIONS

Test Settings

1. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
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 10th harmonics from 9 kHz.

Test Note

1. 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 data
2. 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.

Below 30 MHz

1. The loop antenna was placed at a location 3 m from the EUT
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
6. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
8. EIRP (dBm)
   = Total (dBμV/m) + 20 log D − 104.8 (where D is the measurement distance in meters. D=3)
   = Total (dBμV/m) - 95.2(dB)
9. ERP(dBm) = EIRP(dBm) - 2.15(dB)

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

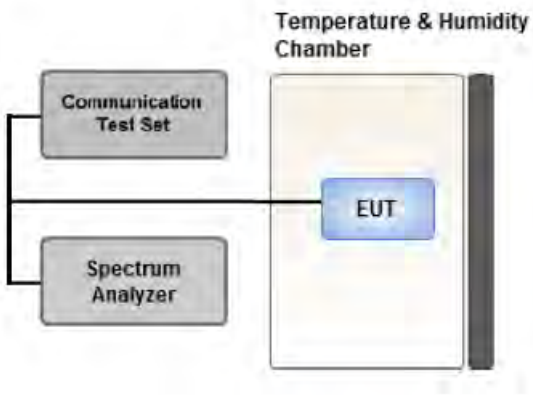
Below 1 GHz

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
7. Total(dBμV/m) = Measured Value(dBμV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F)
8. EIRP (dBm)
   = Total (dBμV/m) + 20 log D − 104.8 (where D is the measurement distance in meters. D=3)
   = Total (dBμV/m) - 95.2(dB)
9. ERP(dBm) = EIRP(dBm) - 2.15(dB)

Above 1 GHz

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Total(dBμV/m) = Measured Value(dBμV) + Cable Loss(dB) + Antenna Factor(dB/m) + Distance Factor(D.F)
   + H.P.F(dB) - Amp Gain(dB)
8. EIRP (dBm)
   = Total (dBμV/m) + 20 log D − 104.8 (where D is the measurement distance in meters. D=3)
   = Total (dBμV/m) - 95.2(dB)

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 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:

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

Test Settings(Peak Power)

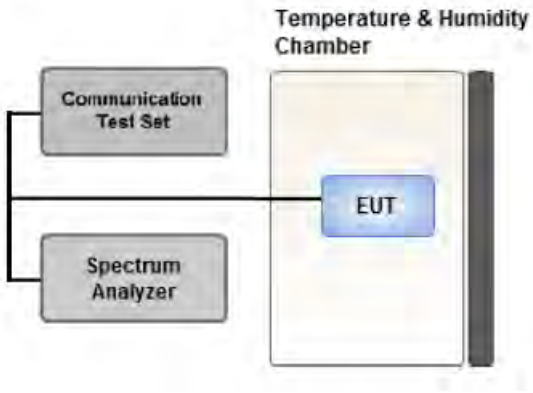
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

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

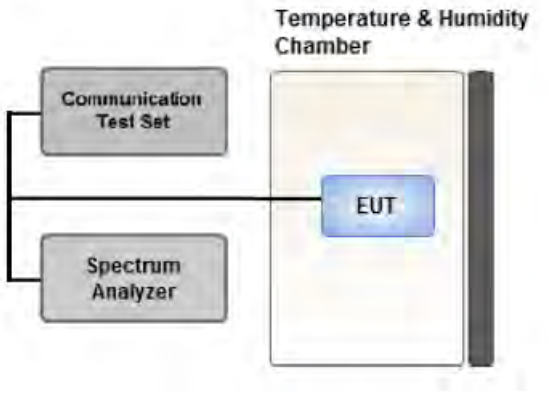
The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

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 26 dB 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

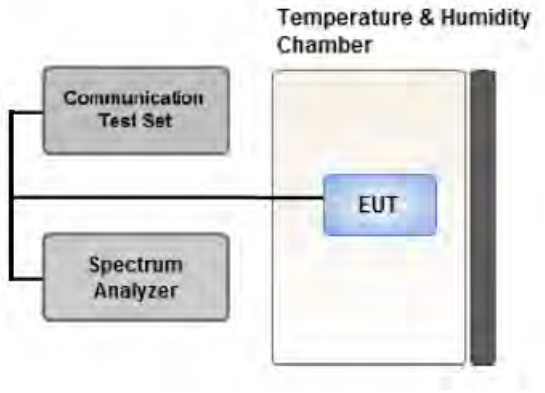
Test Overview

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

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = RMS
4. Trace Mode = Average
5. Sweep time = auto
6. Number of points in sweep ≥ 2 x 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

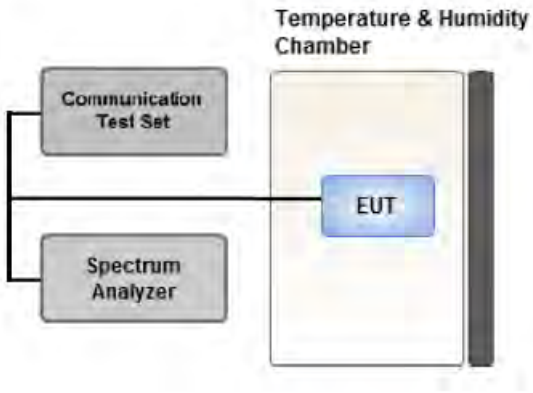
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1 % of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
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 x 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.

Where Margin < 1 dB the emission level is either corrected by 10 log(1 MHz/ RB) or the emission is integrated over a 1 MHz bandwidth to determine the final result. When using the integration method the integration window is either centered on the emission or, for emissions at the band edge, centered by an offset of 500 kHz from the block edge so that the integration window is the 1 MHz adjacent to the block edge.

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.
- TFGMEIBBCD4 & additional models were tested and the worst case results are reported.
  (Worst case : TFGMEIBBCD4)

[Worst case]

Test Description	Modulation	Test Channel
Occupied Bandwidth	GSM : Voice & EDGE(1 TX Slot) WCDMA : QPSK(RMC)	Low, Mid, High
Band Edge	GSM : Voice & EDGE(1 TX Slot) WCDMA : QPSK(RMC)	Low, High
Peak-To-Average Ratio	GSM : Voice & EDGE(1 TX Slot) WCDMA : QPSK(RMC)	Mid
Spurious and Harmonic Emissions at Antenna Terminal	GSM : Voice WCDMA : QPSK(RMC)	Low, Mid, High

[Test Channel]

	Uplink Channel				
	2G (GSM850)	**2G (GSM1900)**	**3G (WCDMA B2)**	**3G (WCDMA B4)**	**3G (WCDMA B5)**
Low	128	512	9262	1312	4132
Mid	190	661	9400	1412	4183
High	251	810	9538	1513	4233

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.

  Mode : Internal Antenna, External Antenna (ANT 5, ANT 4, DUT 4)

  Worst case
  - Internal Antenna
  - External Antenna (ANT 5) : GSM850, GSM1900, WCDMA B2, WCDMA B5
  - External Antenna (ANT 4) : WCDMA B4
- 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.
- TFGMEIBBCD4 & additional models were tested and the worst case results are reported.

  (Worst case : TFGMEIBBCD4)

[External Antenna Worst case_3G]

Test Description	Modulation	Paging Service	Axis	Test Channel
Effective Radiated Power, Effective Isotropic Radiated Power	QPSK (WCDMA)	12.2 kbps RMC	WCDMA B2 : Only X WCDMA B4 : Only X WCDMA B5 : Only X	Low, Mid, High
Radiated Spurious and Harmonic Emissions	QPSK (WCDMA)	12.2 kbps RMC	WCDMA B2 : Only X WCDMA B4 : Only X WCDMA B5 : Only X	Low, Mid, High

[External Antenna Worst case_2G]

Test Description	Mod	Axis	Test Channel
Effective Radiated Power, Effective Isotropic Radiated Power	Voice	GSM850 : Only X GSM1900 : Only X	Low, Mid, High
	EDGE(1 TX Slot)	GSM850 : Only X GSM1900 : Only X	GSM 850 : High GSM1900 : Mid
Radiated Spurious and Harmonic Emissions	Voice	GSM850 : Only X GSM1900 : Only X	Low, Mid, High

[Internal Antenna Worst case_3G]

Test Description	Modulation	Paging Service	Axis	Test Channel
Effective Radiated Power, Effective Isotropic Radiated Power	QPSK (WCDMA)	12.2 kbps RMC	WCDMA B2 : Y WCDMA B4 : Y WCDMA B5 : Z	Low, Mid, High
Radiated Spurious and Harmonic Emissions	QPSK (WCDMA)	12.2 kbps RMC	WCDMA B2 : Y WCDMA B4 : Z WCDMA B5 : Z	Low, Mid, High

[Internal Antenna Worst case_2G]

Test Description	Mod	Axis	Test Channel
Effective Radiated Power, Effective Isotropic Radiated Power	Voice	GSM850 : Z GSM1900 : Y	Low, Mid, High
	EDGE(1 TX Slot)	GSM850 : Z GSM1900 : Y	GSM 850 : Mid GSM1900 : Mid
Radiated Spurious and Harmonic Emissions	Voice	GSM850 : Y GSM1900 : Y	Low, Mid, High

[Test Channel]

	UplinkChannel				
	2G (GSM850)	**2G (GSM1900)**	**3G (WCDMA B2)**	**3G (WCDMA B4)**	**3G (WCDMA B5)**
Low	128	512	9262	1312	4132
Mid	190	661	9400	1412	4183
High	251	810	9538	1513	4233

4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Antenna Position Tower	MA4640/800-XP-ET	Innco systems	N/A	N/A	N/A
Turn Table	DS2000-S	Innco systems	N/A	N/A	N/A
Turn Table	Turn Table	Ets	N/A	N/A	N/A
Controller (Antenna mast & Turn Table)	CO3000	Innco systems	CO3000/1251/48920320/P	N/A	N/A
Amp & Filter Bank Switch Controller	FBSM-01B	TNM system	TM20090002	N/A	N/A
RF Switch System	TMX0132C	TNM System	TM21100002	N/A	N/A
RF Switch System	FBSR-04C(3G HPF+LNA)	TNM System	S4L1	08/18/2024	Annual
RF Switch System	FBSR-04C(LNA)	TNM System	S4L4	08/18/2024	Annual
RF Switch System	FBSR-04C(Thru)	TNM System	S4L6	08/18/2024	Annual
HIGHPASS FILTER	WHKX10-900-1000-15000-40SS	WAINWRIGHT INSTRUMENTS	16	08/01/2024	Annual
HIGHPASS FILTER	WHNX6.0/26.5G-6SS	WAINWRIGHT INSTRUMENTS	1	01/19/2024	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/01/2023	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/02/2024	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/17/2024	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120	Schwarzbeck	937	02/13/2025	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/09/2025	Biennial
Hybrid Antenna	VULB9160	Schwarzbeck	760	02/24/2025	Biennial
Trilog Broadband Antenna	VULB 9168	Schwarzbeck	895	08/16/2024	Biennial
Chamber	SU-642	ESPEC	93008124	02/22/2024	Annual
Power Splitter(DC~26.5 GHz)	11667B	Hewlett Packard	11275	03/02/2024	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/23/2024	Annual
4-Way Divider	ZC4PD-K1844+	Mini-Circuits	942907	09/27/2023	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/19/2024	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	101436	02/22/2024	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/10/2024	Annual
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262287701	05/22/2024	Annual
Wideband Radio Communication Tester	MT8000A	Anritsu Corp.	6262302511	05/23/2024	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	06/22/2024	Annual

Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/20/2024	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/24/2024	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

Note:

1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
2. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

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)	1.90 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.82 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.74 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.52 (Confidence level about 95 %, k=2)

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), § 27.53(h)	< 43 + 10 x log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§ 2.1046	N/A	PASS
Peak- to- Average Ratio	§ 22.913(d), § 24.232(d), § 27.50(d)(5)	< 13 dB	PASS
Frequency stability / variation of ambient temperature	§ 2.1055, § 22.355	< 2.5 ppm	PASS
	§ 24.235, § 27.54	Emission must remain in band	PASS

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§ 22.913(a)(5)	< 7 Watts max. ERP	PASS
Equivalent Isotropic Radiated Power	§ 24.232(c), § 27.50(d)(4)	< 2 Watts max. EIRP < 1 Watts max. EIRP	PASS
Radiated Spurious and Harmonic Emissions	§ 2.1053, § 22.917(a), § 24.238(a), § 27.53(h)	< 43 + 10 x log10 (P[Watts]) for all out-of band emissions	PASS

7. EMISSION DESIGNATOR

GSM Emission Designator

Emission Designator = 249KGXW

GSM BW = 249 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W

GSM BW = 249 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W

WCDMA BW = 4.17 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D

LTE BW = 4.48 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

QAM Modulation

Emission Designator = 4M48W7D

LTE BW = 4.48 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

8. TEST DATA

8.1 Conducted Output Power

Band	Channel	GPRS Data				EDGE Data			
		GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
Target Power		32.50	30.00	28.00	27.00	26.50	23.50	22.00	21.50
GSM 850	128	32.52	30.68	28.41	27.28	26.66	23.58	22.10	21.51
	190	32.70	30.11	27.71	26.63	26.60	23.62	22.07	21.57
	251	32.49	29.60	27.10	26.02	26.55	23.37	21.91	21.32
Target Power		29.50	27.00	25.00	24.00	25.50	23.00	22.00	21.00
GSM 1900	512	29.17	27.73	25.20	24.27	25.24	22.80	21.73	20.68
	661	29.40	27.60	25.05	23.85	25.48	23.10	22.00	21.18
	810	29.02	27.20	24.54	23.07	25.12	22.70	21.61	20.74

Band	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			MPR Target	Target Value	3GPP Release Version
		DL Channel	9662	9800	9938			
		UL Channel	9262	9400	9538			
WCDMA1900	WCDMA	12.2 kbps RMC	24.31	24.32	24.36	0	24.0	99
	WCDMA	12.2 kbps AMR	24.34	24.31	24.38	0	24.0	99
	HSDPA	Subtest 1	23.19	23.22	23.29	0	23.0	2
		Subtest 2	23.16	23.17	23.24	0	23.0	5
		Subtest 3	22.64	22.64	22.70	0.5	22.5	5
		Subtest 4	22.57	22.62	22.68	0.5	22.5	5
	HSUPA	Subtest 1	23.08	23.09	23.18	0	23.0	6
		Subtest 2	21.08	21.10	21.19	2	21.0	6
		Subtest 3	22.03	22.04	22.11	1	22.0	6
		Subtest 4	21.07	21.09	21.17	2	21.0	6
		Subtest 5	23.08	23.10	23.19	0	23.0	6

Band	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			MPR Target	Target Value	3GPP Release Version
		DL Channel	1537	1637	1738			
		UL Channel	1312	1412	1513			
WCDMA1700	WCDMA	12.2 kbps RMC	23.62	23.73	23.69	0	24.0	99
	WCDMA	12. kbps AMR	23.60	23.73	23.73	0	24.0	99
	HSDPA	Subtest 1	22.46	22.61	22.54	0	23.0	2
		Subtest 2	22.47	22.63	22.59	0	23.0	5
		Subtest 3	21.93	22.13	22.03	0.5	22.5	5
		Subtest 4	21.86	22.04	21.98	0.5	22.5	5
	HSUPA	Subtest 1	22.39	22.54	22.48	0	23.0	6
		Subtest 2	20.36	20.52	20.46	2	21.0	6
		Subtest 3	21.33	21.47	21.42	1	22.0	6
		Subtest 4	20.38	20.49	20.43	2	21.0	6
		Subtest 5	22.36	22.52	22.46	0	23.0	6

Band	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			MPR Target	Target Value	3GPP Release Version
		DL Channel	4357	4408	4458			
		UL Channel	4132	4183	4233			
WCDMA850	WCDMA	12.2 kbps RMC	24.24	24.30	24.20	0	24.0	99
	WCDMA	12. kbps AMR	24.22	24.27	24.22	0	24.0	99
	HSDPA	Subtest 1	23.00	23.06	23.03	0	23.0	2
		Subtest 2	23.01	23.07	23.04	0	23.0	5
		Subtest 3	22.54	22.58	22.53	0.5	22.5	5
		Subtest 4	22.50	22.56	22.51	0.5	22.5	5
	HSUPA	Subtest 1	23.01	23.08	23.00	0	23.0	6
		Subtest 2	21.01	21.07	21.02	2	21.0	6
		Subtest 3	21.99	22.05	21.98	1	22.0	6
		Subtest 4	21.01	21.07	21.01	2	21.0	6
		Subtest 5	23.00	23.06	23.01	0	23.0	6

8.2 EFFECTIVE RADIATED POWER

8.2.1 External Antenna

Mode	Ch./ Freq.		Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP	
	channel	Freq.(MHz)					W	W	dBm
GSM850	128	824.2	99.38	29.98	129.36	V	< 7.00	1.589	32.01
	190	836.6	100.54	29.98	130.52	V		2.075	33.17
	251	848.8	100.47	30.06	130.53	V		2.080	33.18
EDGE	251	848.8	94.34	29.96	124.30	V		0.495	26.95

Mode	Ch./ Freq.		Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP	
	channel	Freq.(MHz)					W	W	dBm
WCDMA850	4132	826.4	91.41	29.98	121.39	V	< 7.00	0.254	24.04
	4183	836.6	91.40	29.98	121.38	V		0.253	24.03
	4233	846.6	91.90	30.07	121.97	V		0.290	24.62

8.2.2 Internal Antenna

Mode	Ch./ Freq.		Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP	
	channel	Freq.(MHz)					W	W	dBm
GSM850	128	824.2	100.50	29.98	130.48	H	< 7.00	2.056	33.13
	190	836.6	102.59	29.98	132.57	H		3.327	35.22
	251	848.8	102.04	30.06	132.10	H		2.985	34.75
EDGE	190	836.6	96.70	29.98	126.68	H		0.857	29.33

Mode	Ch./ Freq.		Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	ERP	
	channel	Freq.(MHz)					W	W	dBm
WCDMA850	4132	826.4	93.28	29.98	123.26	H	< 7.00	0.390	25.91
	4183	836.6	93.80	29.98	123.78	H		0.440	26.43
	4233	846.6	93.15	30.07	123.22	H		0.386	25.87

8.3 EQUIVALENT ISOTROPIC RADIATED POWER

8.3.1 External Antenna

Mode	Ch./ Freq.		Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP	
	channel	Freq.(MHz)					W	W	dBm
GSM1900	512	1850.2	88.76	32.45	121.21	V	< 2.00	0.399	26.01
	661	1880.0	88.90	32.77	121.67	V		0.444	26.47
	810	1909.8	86.54	33.14	119.68	V		0.281	24.48
EDGE	661	1880.0	88.34	32.92	121.26	V		0.404	26.06

Mode	Ch./ Freq.		Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP	
	channel	Freq.(MHz)					W	W	dBm
WCDMA1900	9262	1852.4	88.95	32.45	121.40	V	< 2.00	0.417	26.20
	9400	1880.0	89.10	32.77	121.87	V		0.465	26.67
	9538	1907.6	88.29	33.11	121.40	V		0.417	26.20

Mode	Ch./ Freq.		Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP	
	channel	Freq.(MHz)					W	W	dBm
WCDMA1700	1312	1712.4	88.34	32.15	120.49	V	< 1.00	0.338	25.29
	1412	1732.4	88.65	32.40	121.05	V		0.384	25.85
	1513	1752.6	88.62	32.24	120.86	V		0.368	25.66

8.3.2 Internal Antenna

Mode	Ch./ Freq.		Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP	
	channel	Freq.(MHz)					W	W	dBm
GSM1900	512	1850.2	93.25	32.45	125.70	H	< 2.00	1.122	30.50
	661	1880.0	93.89	32.77	126.66	H		1.400	31.46
	810	1909.8	92.64	33.14	125.78	H		1.143	30.58
EDGE	661	1880.0	93.84	32.61	126.45	H		1.334	31.25

Mode	Ch./ Freq.		Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP	
	channel	Freq.(MHz)					W	W	dBm
WCDMA1900	9262	1852.4	90.27	32.45	122.72	H	< 2.00	0.565	27.52
	9400	1880.0	88.50	32.77	121.27	H		0.405	26.07
	9538	1907.6	86.30	33.11	119.41	H		0.264	24.21

Mode	Ch./ Freq.		Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol	Limit	EIRP	
	channel	Freq.(MHz)					W	W	dBm
WCDMA1700	1312	1712.4	91.30	32.15	123.45	H	< 1.00	0.668	28.25
	1412	1732.4	91.51	32.40	123.91	H		0.743	28.71
	1513	1752.6	90.60	32.24	122.84	H		0.580	27.64

8.4 RADIATED SPURIOUS EMISSIONS

8.4.1 External Antenna

▣ MODULATION SIGNAL: GSM850

▣ DISTANCE: 3 meters

Ch.	Freq.(MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F-A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit
128 (824.2)	1 648.40	60.55	-18.58	41.97	V	-53.23	-13.00
	2 472.60	62.71	-15.14	47.57	V	-47.63	-13.00
	3 296.80	54.55	-13.40	41.15	V	-54.05	-13.00
	4 121.00	53.94	-11.01	42.94	V	-52.27	-13.00
	4 945.20	51.63	-8.08	43.55	V	-51.65	-13.00
190 (836.6)	1 673.20	62.41	-18.56	43.85	V	-51.35	-13.00
	2 509.80	64.05	-14.87	49.18	V	-46.02	-13.00
	3 346.40	54.91	-13.55	41.36	V	-53.84	-13.00
	4 183.00	53.20	-10.79	42.41	V	-52.79	-13.00
	5 019.60	51.15	-7.79	43.37	V	-51.84	-13.00
251 (848.8)	1 697.60	62.32	-18.54	43.78	V	-51.42	-13.00
	2 546.40	68.95	-14.82	54.13	V	-41.07	-13.00
	3 395.20	54.93	-13.25	41.68	V	-53.52	-13.00
	4 244.00	52.49	-10.59	41.90	V	-53.30	-13.00
	5 092.80	51.94	-7.16	44.78	V	-50.42	-13.00

▣ MODULATION SIGNAL: GSM1900

▣ DISTANCE: 3 meters

Ch.	Freq.(MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F-A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit
512 (1850.2)	3 700.40	56.61	-11.66	44.95	V	-50.25	-13.00
	5 550.60	52.55	-7.25	45.30	V	-49.90	-13.00
	7 400.80	48.33	-0.66	47.67	V	-47.53	-13.00
	9 251.00	47.73	3.76	51.49	V	-43.71	-13.00
	11 101.20	47.38	5.91	53.29	V	-41.91	-13.00
661 (1880.0)	3 760.00	57.07	-11.57	45.50	V	-49.70	-13.00
	5 640.00	51.64	-6.88	44.76	V	-50.44	-13.00
	7 520.00	48.41	-0.82	47.59	V	-47.61	-13.00
	9 400.00	49.09	3.50	52.59	V	-42.61	-13.00
	11 280.00	47.32	5.54	52.86	V	-42.35	-13.00
810 (1909.8)	3 819.60	57.17	-11.45	45.72	V	-49.48	-13.00
	5 729.40	51.30	-6.65	44.66	V	-50.55	-13.00
	7 639.20	48.72	-1.14	47.58	V	-47.62	-13.00
	9 549.00	48.88	3.76	52.64	V	-42.56	-13.00
	11 458.80	46.02	5.98	52.00	V	-43.20	-13.00

▣ MODULATION SIGNAL: WCDMA850

▣ DISTANCE: 3 meters

Ch.	Freq.(MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F-A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit
4 132 (826.4)	1 652.80	58.47	-18.57	39.90	V	-55.30	-13.00
	2 479.20	59.24	-15.09	44.15	V	-51.05	-13.00
	3 305.60	54.05	-13.43	40.62	V	-54.58	-13.00
	4 132.00	53.39	-11.01	42.39	V	-52.82	-13.00
	4 958.40	51.44	-8.03	43.41	V	-51.79	-13.00
4 183 (836.6)	1 673.20	57.23	-18.56	38.67	V	-56.53	-13.00
	2 509.80	60.96	-14.87	46.09	V	-49.11	-13.00
	3 346.40	55.02	-13.54	41.48	V	-53.72	-13.00
	4 183.00	53.09	-11.80	41.29	V	-53.91	-13.00
	5 019.60	51.87	-7.78	44.09	V	-51.11	-13.00
4 233 (846.6)	1 693.20	58.76	-18.55	40.21	V	-54.99	-13.00
	2 539.80	64.06	-14.82	49.24	V	-45.96	-13.00
	3 386.40	55.56	-13.39	42.17	V	-53.03	-13.00
	4 233.00	53.22	-10.58	42.64	V	-52.56	-13.00
	5 079.60	51.76	-7.38	44.38	V	-50.82	-13.00

▣ MODULATION SIGNAL: WCDMA1900

▣ DISTANCE: 3 meters

Ch.	Freq.(MHz)	Measured Level (dBµV)	A.F+C.L+D.F+H.P.F-A.G (dB/m)	Total (dBµV/m)	Pol.	Result (dBm)	Limit
9262 (1852.4)	3 704.80	61.56	-11.65	49.91	V	-45.29	-13.00
	5 557.20	62.08	-7.25	54.83	V	-40.37	-13.00
	7 409.60	50.28	-0.65	49.63	V	-45.57	-13.00
	9 262.00	48.19	3.82	52.01	V	-43.19	-13.00
	11 114.40	47.88	5.84	53.72	V	-41.48	-13.00
9400 (1880.0)	3 760.00	63.94	-11.56	52.38	V	-42.82	-13.00
	5 640.00	59.92	-6.86	53.06	V	-42.14	-13.00
	7 520.00	49.15	-0.82	48.33	V	-46.87	-13.00
	9 400.00	48.74	3.50	52.24	V	-42.96	-13.00
	11 280.00	48.48	5.53	54.01	V	-41.19	-13.00
9538 (1907.6)	3 815.20	64.86	-11.43	53.43	V	-41.77	-13.00
	5 722.80	58.57	-6.67	51.91	V	-43.30	-13.00
	7 630.40	49.93	-1.13	48.80	V	-46.40	-13.00
	9 538.00	48.86	3.75	52.61	V	-42.59	-13.00
	11 445.60	47.18	5.98	53.16	V	-42.04	-13.00

▣ MODULATION SIGNAL: WCDMA1700

▣ DISTANCE: 3 meters

Ch.	Freq.(MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F-A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit
1312 (1712.4)	3 424.80	56.96	-12.56	44.41	V	-50.80	-13.00
	5 137.20	55.19	-7.11	48.08	V	-47.12	-13.00
	6 849.60	48.24	-2.88	45.36	V	-49.84	-13.00
	8 562.00	48.91	0.94	49.86	V	-45.35	-13.00
	10 274.40	47.58	5.30	52.88	V	-42.32	-13.00
1412 (1732.4)	3 464.80	55.21	-12.38	42.83	V	-52.37	-13.00
	5 197.20	54.45	-7.39	47.06	V	-48.14	-13.00
	6 929.60	49.36	-2.58	46.78	V	-48.42	-13.00
	8 662.00	48.13	1.33	49.46	V	-45.74	-13.00
	10 394.40	47.10	5.39	52.49	V	-42.71	-13.00
1513 (1752.6)	3 505.20	54.81	-12.18	42.63	V	-52.57	-13.00
	5 257.80	55.66	-7.58	48.08	V	-47.12	-13.00
	7 010.40	48.83	-2.27	46.56	V	-48.64	-13.00
	8 763.00	48.14	1.55	49.69	V	-45.51	-13.00
	10 515.60	47.23	5.53	52.76	V	-42.44	-13.00

8.4.2 Internal Antenna

▣ MODULATION SIGNAL: GSM850

▣ DISTANCE: 3 meters

Ch.	Freq.(MHz)	Measured Level (dBμV)	A.F+C.L+D.F (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit
128 (824.2)	1 648.40	66.16	-18.58	47.58	V	-47.62	-13.00
	2 472.60	88.29	-15.14	73.15	V	-22.05	-13.00
	3 296.80	55.45	-13.40	42.05	V	-53.15	-13.00
190 (836.6)	1 673.20	68.15	-18.56	49.59	V	-45.61	-13.00
	2 509.80	93.80	-14.87	78.93	V	-16.27	-13.00
	3 346.40	54.77	-13.55	41.22	V	-53.98	-13.00
251 (848.8)	1 697.60	69.30	-18.54	50.76	V	-44.44	-13.00
	2 546.40	86.36	-14.82	71.54	H	-23.66	-13.00
	3 395.20	53.85	-13.25	40.60	H	-54.60	-13.00

▣ MODULATION SIGNAL: GSM1900

▣ DISTANCE: 3 meters

Ch.	Freq.(MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F-A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit
512 (1850.2)	3 700.40	60.00	-11.66	48.34	V	-46.86	-13.00
	5 550.60	53.99	-7.25	46.74	V	-48.46	-13.00
	7 400.80	52.86	-0.66	52.20	V	-43.00	-13.00
	9 251.00	50.49	3.76	54.25	V	-40.95	-13.00
	11 101.20	48.97	5.91	54.88	V	-40.32	-13.00
661 (1880.0)	3 760.00	57.69	-11.57	46.12	H	-49.08	-13.00
	5 640.00	55.14	-6.88	48.26	V	-46.94	-13.00
	7 520.00	51.71	-0.82	50.89	V	-44.31	-13.00
	9 400.00	50.16	3.50	53.66	H	-41.54	-13.00
	11 280.00	50.30	5.54	55.84	H	-39.37	-13.00
810 (1909.8)	3 819.60	56.07	-11.45	44.62	H	-50.58	-13.00
	5 729.40	55.59	-6.65	48.95	H	-46.26	-13.00
	7 639.20	50.98	-1.14	49.84	H	-45.36	-13.00
	9 549.00	48.89	3.76	52.65	V	-42.55	-13.00
	11 458.80	48.92	5.98	54.90	H	-40.30	-13.00

▣ MODULATION SIGNAL: WCDMA850

▣ DISTANCE: 3 meters

Ch.	Freq.(MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F-A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit
4 132 (826.4)	1 652.80	57.42	-18.57	38.85	V	-56.35	-13.00
	2 479.20	59.87	-15.09	44.78	H	-50.42	-13.00
	3 305.60	55.96	-13.43	42.53	V	-52.67	-13.00
4 183 (836.6)	1 673.20	54.90	-18.56	36.34	V	-58.86	-13.00
	2 509.80	58.19	-14.87	43.32	H	-51.88	-13.00
	3 346.40	54.88	-13.54	41.34	V	-53.86	-13.00
4 233 (846.6)	1 693.20	57.06	-18.55	38.51	H	-56.69	-13.00
	2 539.80	59.65	-14.82	44.83	V	-50.37	-13.00
	3 386.40	56.81	-13.39	43.42	H	-51.78	-13.00

▣ MODULATION SIGNAL: WCDMA1900

▣ DISTANCE: 3 meters

Ch.	Freq.(MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F-A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit
9262 (1852.4)	3 704.80	62.54	-11.65	50.89	V	-44.31	-13.00
	5 557.20	61.28	-7.25	54.03	H	-41.17	-13.00
	7 409.60	55.63	-0.65	54.98	H	-40.22	-13.00
9400 (1880.0)	3 760.00	63.50	-11.56	51.94	H	-43.26	-13.00
	5 640.00	60.75	-6.86	53.89	H	-41.31	-13.00
	7 520.00	54.63	-0.82	53.81	H	-41.39	-13.00
9538 (1907.6)	3 815.20	65.63	-11.43	54.20	H	-41.00	-13.00
	5 722.80	56.74	-6.67	50.08	H	-45.13	-13.00
	7 630.40	52.42	-1.13	51.29	H	-43.91	-13.00

▣ MODULATION SIGNAL: WCDMA1700

▣ DISTANCE: 3 meters

Ch.	Freq.(MHz)	Measured Level (dBμV)	A.F+C.L+D.F+H.P.F-A.G (dB/m)	Total (dBμV/m)	Pol.	Result (dBm)	Limit
1312 (1712.4)	3 424.80	55.09	-12.56	42.54	H	-52.67	-13.00
	5 137.20	54.78	-7.11	47.67	H	-47.53	-13.00
	6 849.60	51.50	-2.88	48.62	H	-46.58	-13.00
	8 562.00	51.82	0.94	52.77	H	-42.44	-13.00
	10 274.40	50.27	5.30	55.57	H	-39.63	-13.00
1412 (1732.4)	3 464.80	53.06	-12.38	40.68	V	-54.52	-13.00
	5 197.20	54.91	-7.39	47.52	V	-47.68	-13.00
	6 929.60	51.71	-2.58	49.13	V	-46.07	-13.00
	8 662.00	50.22	1.33	51.55	H	-43.65	-13.00
	10 394.40	48.72	5.39	54.11	V	-41.09	-13.00
1513 (1752.6)	3 505.20	53.07	-12.18	40.89	V	-54.31	-13.00
	5 257.80	55.89	-7.58	48.31	V	-46.89	-13.00
	7 010.40	51.75	-2.27	49.48	V	-45.72	-13.00
	8 763.00	49.01	1.55	50.56	V	-44.64	-13.00
	10 515.60	49.25	5.53	54.78	H	-40.42	-13.00

8.5 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)			
GSM1900	661	29.720	19.94	4.6160	0.5475	9.26	0.52	13	Pass
GSM1900 EDGE	661	28.871	15.42	4.6160	0.5475	9.26	4.19		
GSM850	190	CCDF Procedure					3.05		
GSM850 EDGE	190						5.84		
WCDMA850	4408						2.69		
WCDMA1900	9400						2.90		
WCDMA1700	1412						2.90		

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 75 ~ 85.
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 x log (1/X), $X = Tx_{On} / Tx_{Total}$

8.6 OCCUPIED BANDWIDTH

Band	Channel	Frequency(MHz)	Data (GSM: kHz / WCDMA : MHz)
GSM850	128	824.20	248.19
	190	836.60	248.54
	251	848.80	246.12
GSM850 EDGE	128	824.20	245.55
	190	836.60	245.27
	251	848.80	248.63
GSM1900	512	1,850.20	239.19
	661	1,880.00	242.04
	810	1,909.80	240.81
GSM1900 EDGE	512	1,850.20	243.14
	661	1,880.00	247.84
	810	1,909.80	244.36
WCDMA850	4132	826.40	4.1564
	4183	836.60	4.1595
	4233	846.60	4.1612
WCDMA1900	9262	1852.40	4.1499
	9400	1880.00	4.1473
	9538	1907.60	4.1364
WCDMA1700	1312	1712.40	4.1473
	1412	1732.40	4.1329
	1513	1752.60	4.1634

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 58 ~ 74.

8.7 CONDUCTED SPURIOUS EMISSIONS

Band	Channel	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result	(dBm)
GSM850	128	2.7204	27.976	-58.102	-30.126	-13.00
	190	3.7254	27.976	-58.316	-30.340	
	251	3.7079	27.976	-58.260	-30.284	
GSM1900	512	18.90897	29.489	-53.044	-23.555	
	661	18.64522	29.489	-52.626	-23.137	
	810	16.61167	29.489	-52.690	-23.201	
WCDMA850	4132	3.7139	27.976	-76.620	-48.644	
	4183	2.5075	27.976	-77.240	-49.264	
	4233	2.5439	27.976	-76.599	-48.623	
WCDMA1900	9262	18.9357	29.489	-73.018	-43.529	
	9400	18.9077	29.489	-72.938	-43.449	
	9538	18.9147	29.489	-72.919	-43.430	
WCDMA1700	1312	18.88547	29.489	-72.977	-43.488	
	1412	16.64467	29.489	-72.902	-43.413	
	1513	18.91672	29.489	-72.662	-43.173	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 122 ~ 145.
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(26.5)	30.131

8.8 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 86 ~ 121.

8.9 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ MODE: GSM850

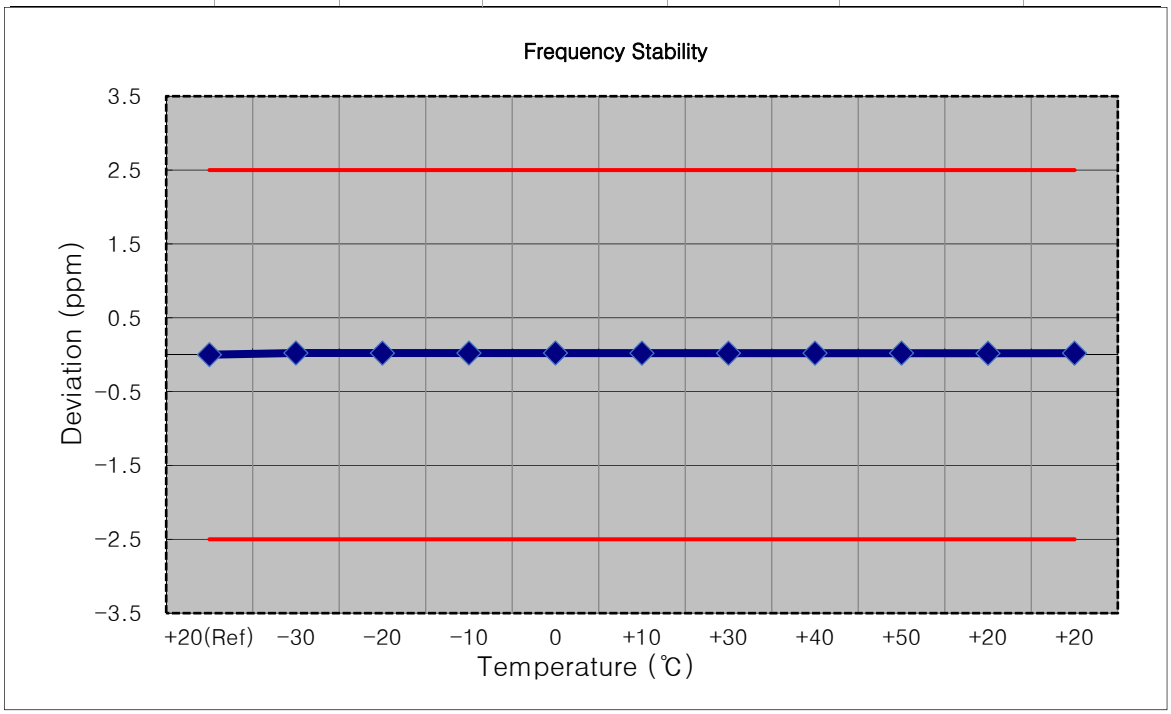
▣ OPERATING FREQUENCY: 836,600,000 Hz

▣ CHANNEL: 190

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	
100 %	13.500	+20(Ref)	836 600 019	0.0	0.000 000	0.0000
100 %		-30	836 600 038	19.2	0.000 002	0.0229
100 %		-20	836 600 037	17.9	0.000 002	0.0214
100 %		-10	836 600 037	18.1	0.000 002	0.0216
100 %		0	836 600 038	18.8	0.000 002	0.0225
100 %		+10	836 600 036	17.2	0.000 002	0.0206
100 %		+30	836 600 036	16.9	0.000 002	0.0202
100 %		+40	836 600 036	16.9	0.000 002	0.0202
100 %		+50	836 600 036	17.6	0.000 002	0.0210
85 %	11.475	+20	836 600 035	16.1	0.000 002	0.0192
115 %	15.525	+20	836 600 036	16.9	0.000 002	0.0202



▣ Mode: GSM1900

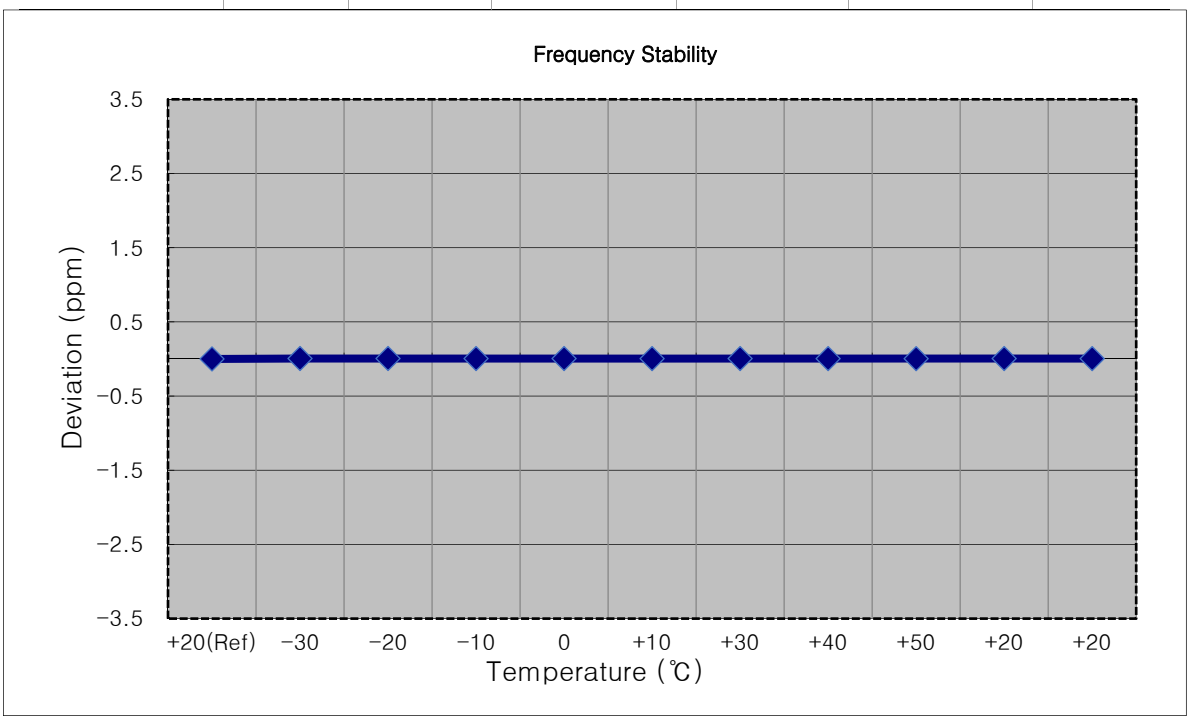
▣ OPERATING FREQUENCY: 1850,200,000 Hz

▣ CHANNEL: 512

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	Error (Hz)	(%)	
100 %	13.500	+20(Ref)	1850 200 012	0.0	0.000 000	0.0000
100 %		-30	1850 200 023	10.4	0.000 001	0.0056
100 %		-20	1850 200 022	10.4	0.000 001	0.0056
100 %		-10	1850 200 022	9.5	0.000 001	0.0051
100 %		0	1850 200 021	9.3	0.000 001	0.0050
100 %		+10	1850 200 020	8.3	0.000 000	0.0045
100 %		+30	1850 200 021	9.1	0.000 000	0.0049
100 %		+40	1850 200 020	8.1	0.000 000	0.0044
100 %		+50	1850 200 019	7.1	0.000 000	0.0038
85 %	11.475	+20	1850 200 021	9.4	0.000 001	0.0051
115 %	15.525	+20	1850 200 020	8.4	0.000 000	0.0045



▣ Mode: GSM1900

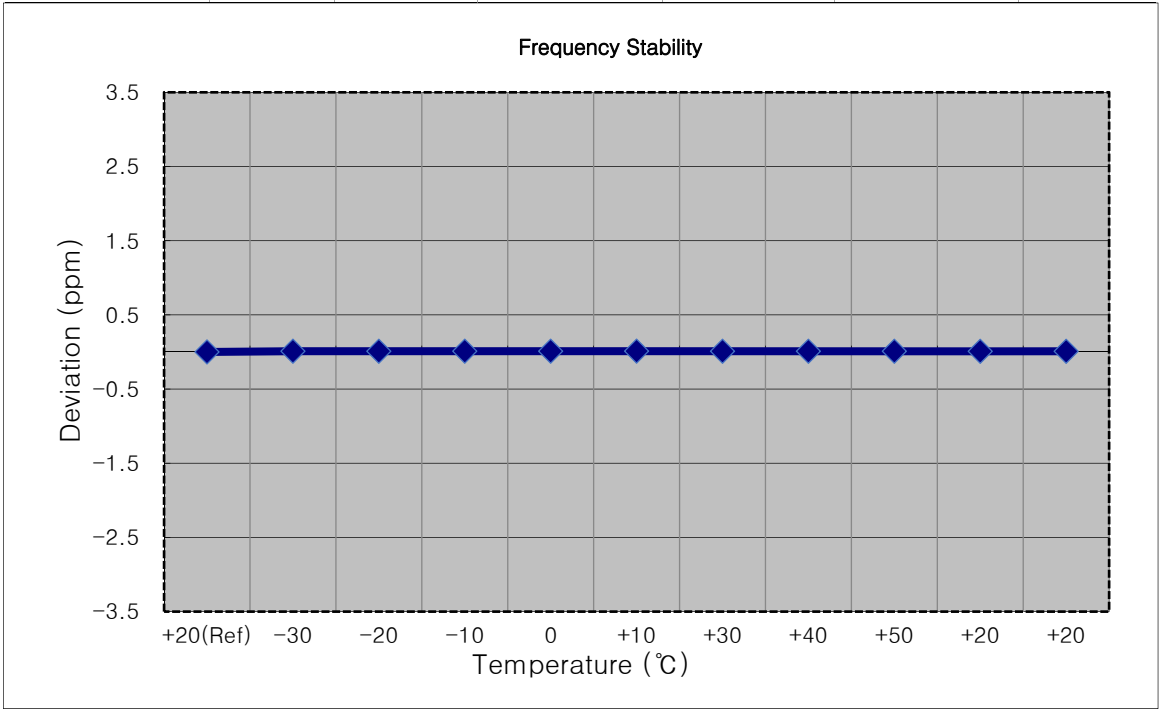
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 661

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	Error (Hz)	(%)	
100 %	13.500	+20(Ref)	1880 000 018	0.0	0.000 000	0.000
100 %		-30	1880 000 037	18.5	0.000 001	0.010
100 %		-20	1880 000 036	18.1	0.000 001	0.010
100 %		-10	1880 000 038	19.5	0.000 001	0.010
100 %		0	1880 000 037	18.6	0.000 001	0.010
100 %		+10	1880 000 038	19.6	0.000 001	0.010
100 %		+30	1880 000 036	17.2	0.000 001	0.009
100 %		+40	1880 000 035	17.0	0.000 001	0.009
100 %		+50	1880 000 036	17.4	0.000 001	0.009
85 %	11.475	+20	1880 000 028	15.5	0.000 001	0.008
115 %	15.525	+20	1880 000 029	16.8	0.000 001	0.009



▣ Mode: GSM1900

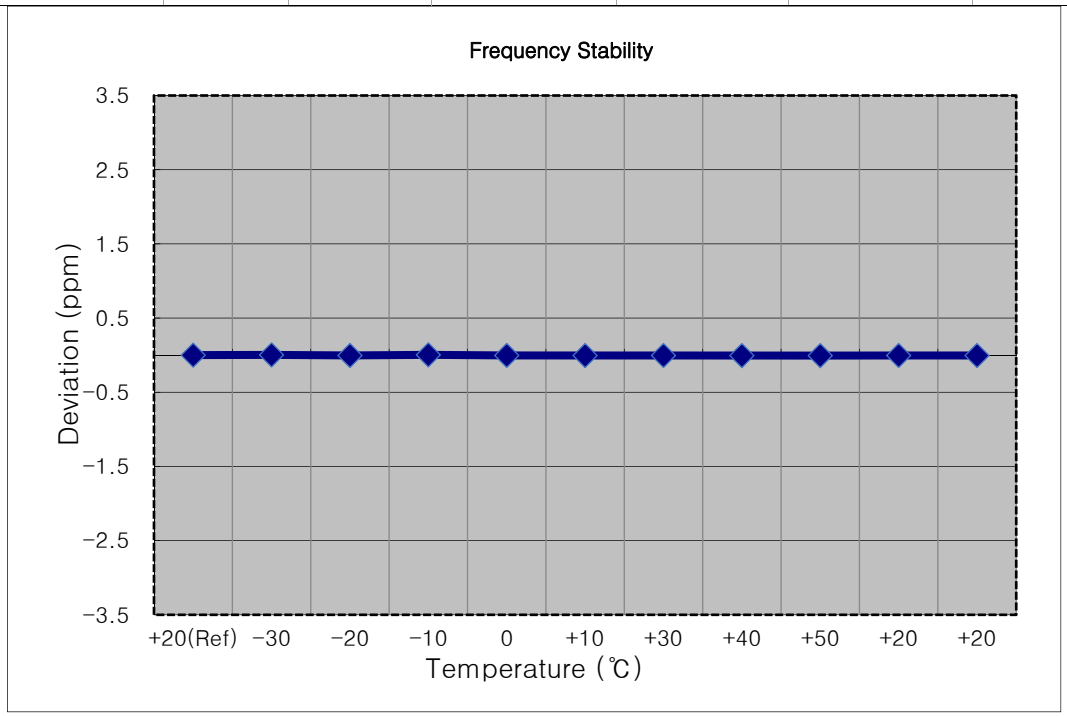
▣ OPERATING FREQUENCY: 1909,800,000 Hz

▣ CHANNEL: 810

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.500	+20(Ref)	1909 799 993	0.0	0.000 000	0.000
100 %		-30	1909 799 999	6.1	0.000 000	0.003
100 %		-20	1909 799 985	-8.0	0.000 000	-0.004
100 %		-10	1909 800 001	8.2	0.000 000	0.004
100 %		0	1909 799 986	-7.6	0.000 000	-0.004
100 %		+10	1909 799 984	-9.7	-0.000 001	-0.005
100 %		+30	1909 799 984	-8.9	0.000 000	-0.005
100 %		+40	1909 799 982	-10.9	-0.000 001	-0.006
100 %		+50	1909 799 982	-11.2	-0.000 001	-0.006
85 %	11.475	+20	1909 799 983	-8.8	0.000 000	-0.005
115 %	15.525	+20	1909 799 983	-9.4	0.000 000	-0.005



▣ Mode: WCDMA850

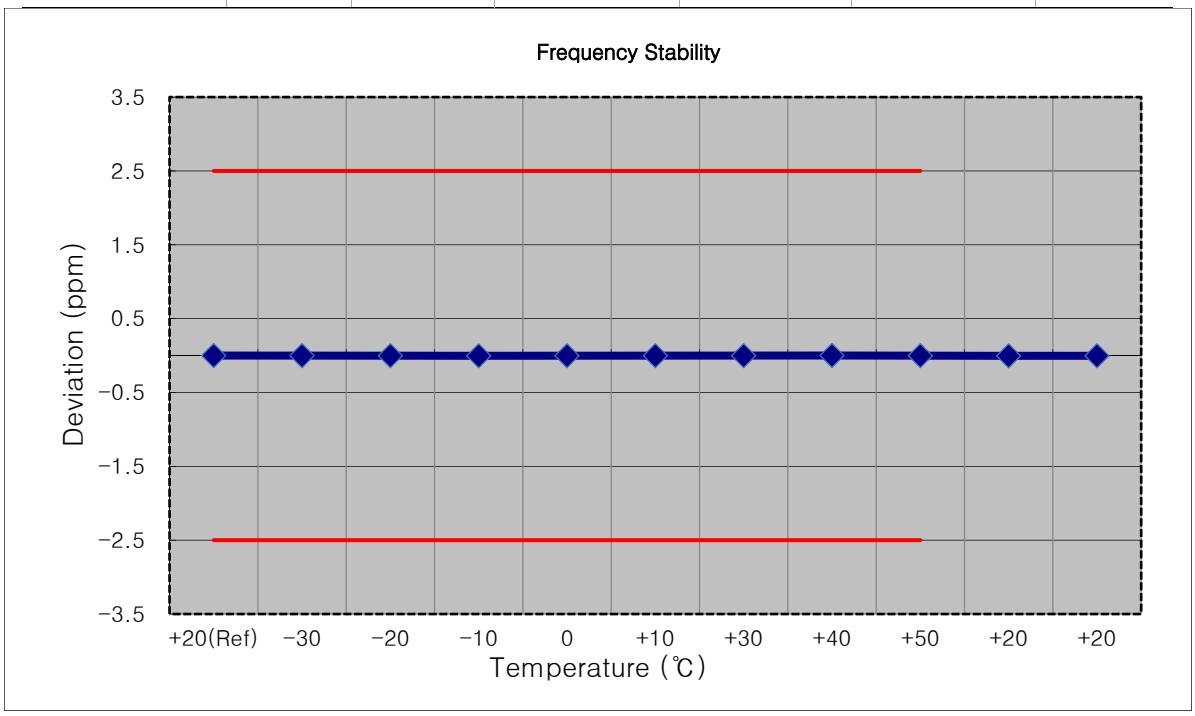
▣ OPERATING FREQUENCY: 836,600,000 Hz

▣ CHANNEL: 4183

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.500	+20(Ref)	836 599 998	0.0	0.000 000	0.0000
100 %		-30	836 599 997	-1.1	0.000 000	-0.0013
100 %		-20	836 599 996	-1.6	0.000 000	-0.0020
100 %		-10	836 599 996	-2.2	0.000 000	-0.0026
100 %		0	836 599 996	-1.8	0.000 000	-0.0022
100 %		+10	836 599 997	-1.2	0.000 000	-0.0014
100 %		+30	836 599 997	-1.4	0.000 000	-0.0016
100 %		+40	836 599 999	1.2	0.000 000	0.0014
100 %		+50	836 599 997	-1.0	0.000 000	-0.0012
85 %	11.475	+20	836 599 994	-3.1	0.000 000	-0.0037
115 %	15.525	+20	836 599 994	-2.5	0.000 000	-0.0030



▣ Mode: WCDMA1900

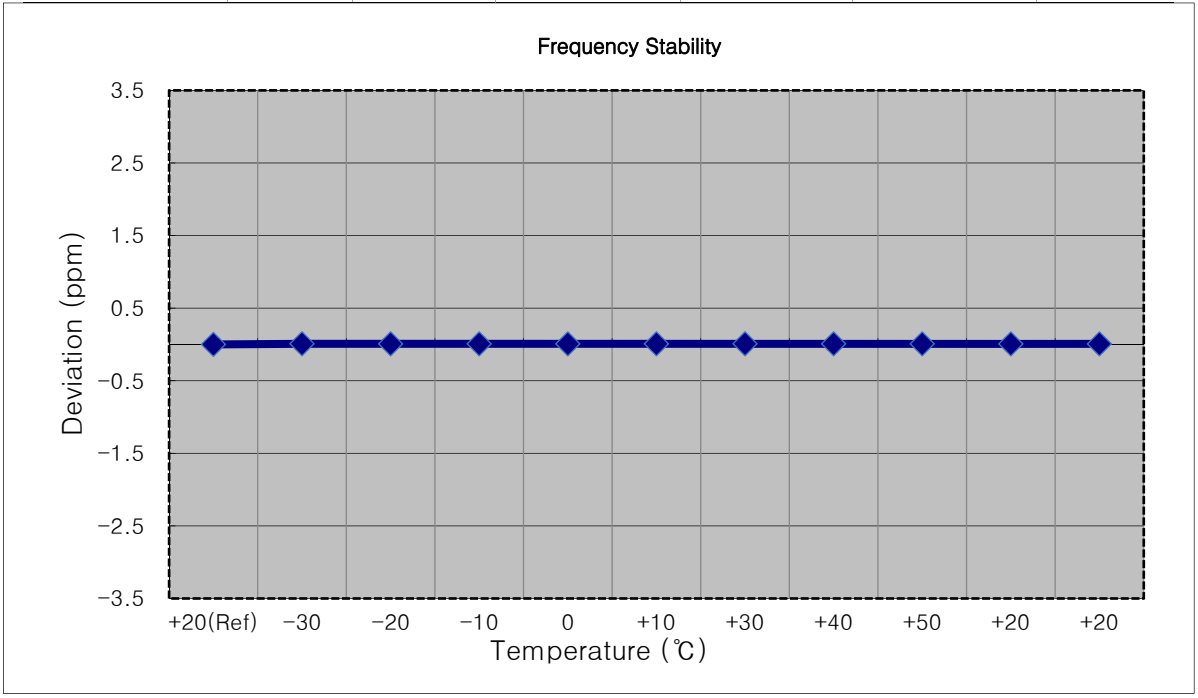
▣ OPERATING FREQUENCY: 1,852,400,000 Hz

▣ CHANNEL: 9262

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(℃)	(Hz)	Error (Hz)	(%)	
100 %	13.500	+20(Ref)	1852 400 014	0.0	0.000 000	0.0000
100 %		-30	1852 400 030	16.1	0.000 001	0.0087
100 %		-20	1852 400 029	14.5	0.000 001	0.0078
100 %		-10	1852 400 029	14.7	0.000 001	0.0079
100 %		0	1852 400 030	15.3	0.000 001	0.0083
100 %		+10	1852 400 029	14.8	0.000 001	0.0080
100 %		+30	1852 400 030	16.2	0.000 001	0.0087
100 %		+40	1852 400 029	15.0	0.000 001	0.0081
100 %		+50	1852 400 029	14.3	0.000 001	0.0077
85 %	11.475	+20	1852 400 027	13.3	0.000 001	0.0072
115 %	15.525	+20	1852 400 028	13.8	0.000 001	0.0074



▣ Mode: WCDMA1900

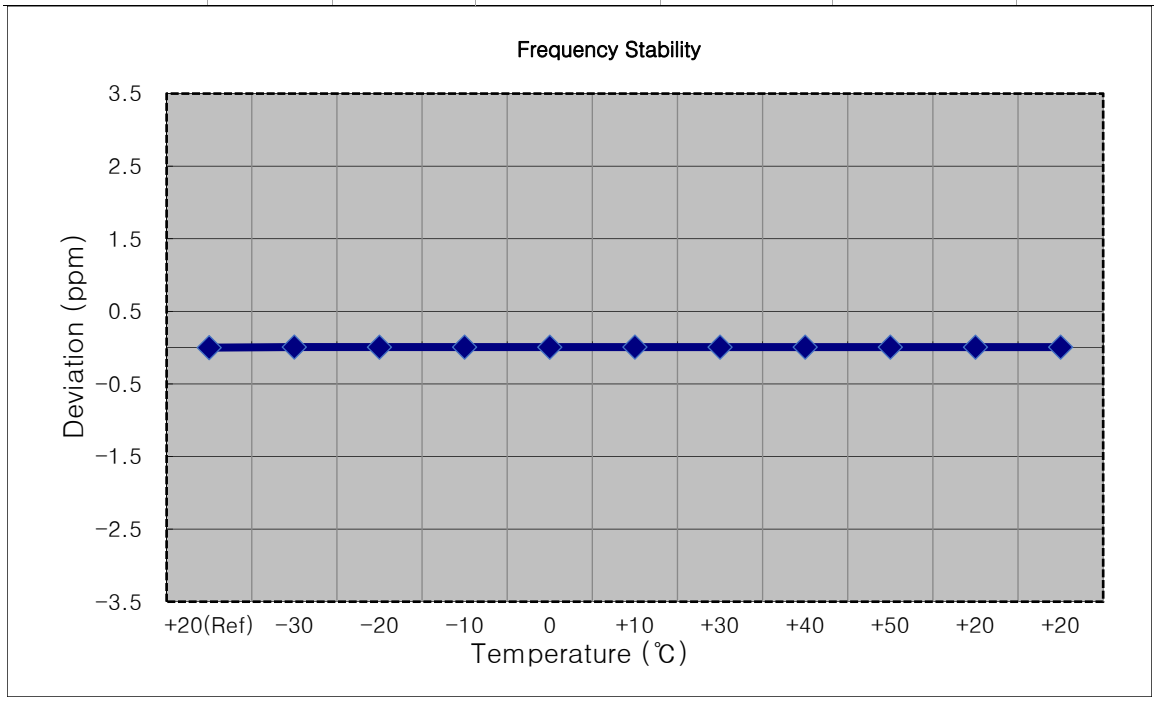
▣ OPERATING FREQUENCY: 1,880,000,000 Hz

▣ CHANNEL: 9400

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.500	+20(Ref)	1880 000 013	0.0	0.000 000	0.0000
100 %		-30	1880 000 027	14.6	0.000 001	0.0077
100 %		-20	1880 000 025	12.0	0.000 001	0.0064
100 %		-10	1880 000 026	13.1	0.000 001	0.0070
100 %		0	1880 000 025	12.8	0.000 001	0.0068
100 %		+10	1880 000 027	14.6	0.000 001	0.0078
100 %		+30	1880 000 025	12.9	0.000 001	0.0069
100 %		+40	1880 000 027	14.1	0.000 001	0.0075
100 %		+50	1880 000 026	13.4	0.000 001	0.0071
85 %	11.475	+20	1880 000 027	12.5	0.000 001	0.0066
115 %	15.525	+20	1880 000 027	13.1	0.000 001	0.0070



▣ Mode: WCDMA1900

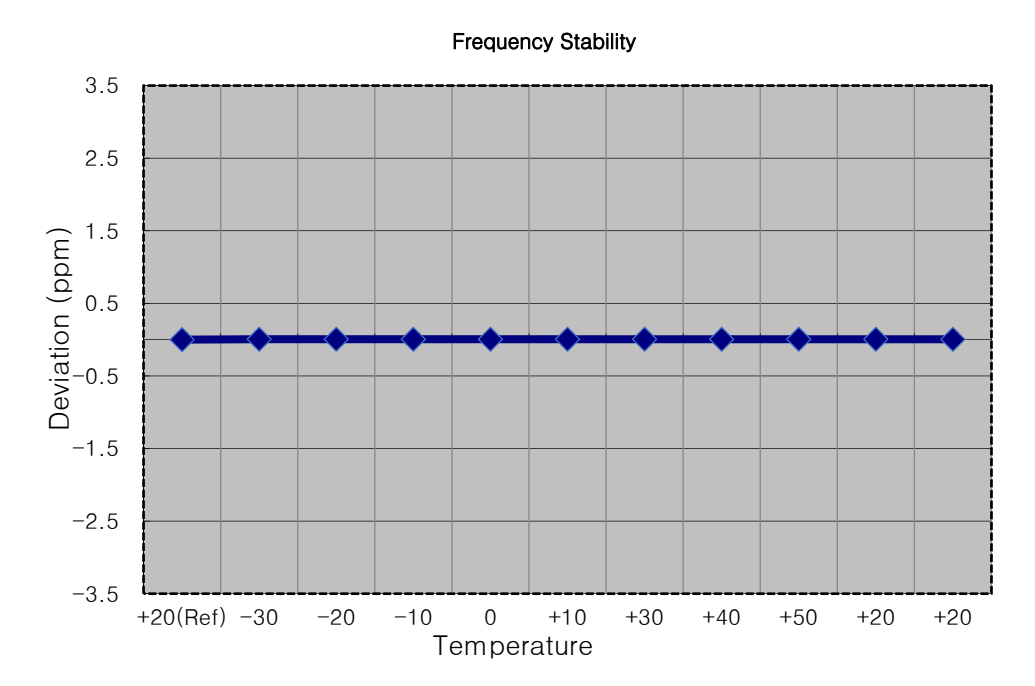
▣ OPERATING FREQUENCY: 1,907,600,000 Hz

▣ CHANNEL: 9538

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	
100 %	13.500	+20(Ref)	1907 600 010	0.0	0.000 000	0.0000
100 %		-30	1907 600 020	10.3	0.000 001	0.0054
100 %		-20	1907 600 019	9.5	0.000 000	0.0050
100 %		-10	1907 600 019	9.4	0.000 000	0.0049
100 %		0	1907 600 020	10.0	0.000 001	0.0053
100 %		+10	1907 600 019	9.0	0.000 000	0.0047
100 %		+30	1907 600 020	10.3	0.000 001	0.0054
100 %		+40	1907 600 019	9.6	0.000 001	0.0050
100 %		+50	1907 600 021	10.7	0.000 001	0.0056
85 %	11.475	+20	1907 600 019	9.5	0.000 000	0.0050
115 %	15.525	+20	1907 600 019	8.8	0.000 000	0.0046



▣ Mode: WCDMA1700

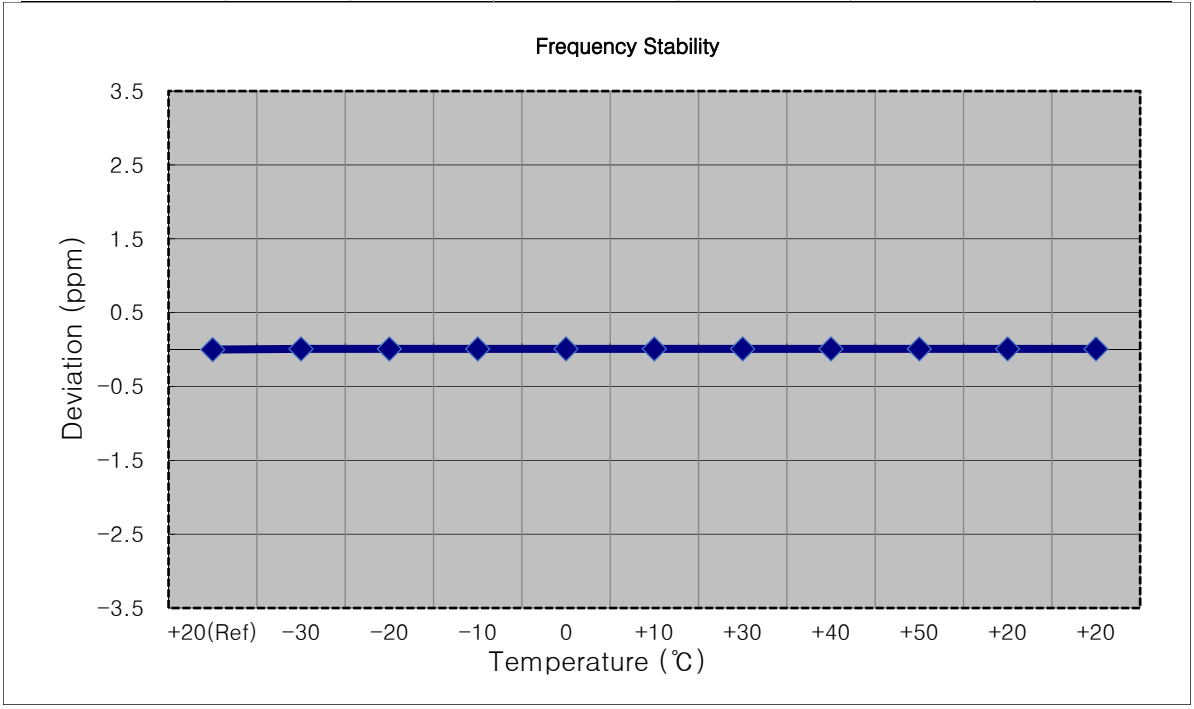
▣ OPERATING FREQUENCY: 1,712,400,000 Hz

▣ CHANNEL: 1312

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	13.500	+20(Ref)	1712 400 015	0.0	0.000 000	0.0000
100 %		-30	1712 400 030	15.1	0.000 001	0.0088
100 %		-20	1712 400 031	15.3	0.000 001	0.0089
100 %		-10	1712 400 031	15.2	0.000 001	0.0089
100 %		0	1712 400 031	16.0	0.000 001	0.0094
100 %		+10	1712 400 031	15.2	0.000 001	0.0089
100 %		+30	1712 400 031	15.7	0.000 001	0.0092
100 %		+40	1712 400 031	15.6	0.000 001	0.0091
100 %		+50	1712 400 030	14.9	0.000 001	0.0087
85 %	11.475	+20	1712 400 045	15.2	0.000 001	0.0089
115 %	15.525	+20	1712 400 045	14.5	0.000 001	0.0085



▣ Mode: WCDMA1700

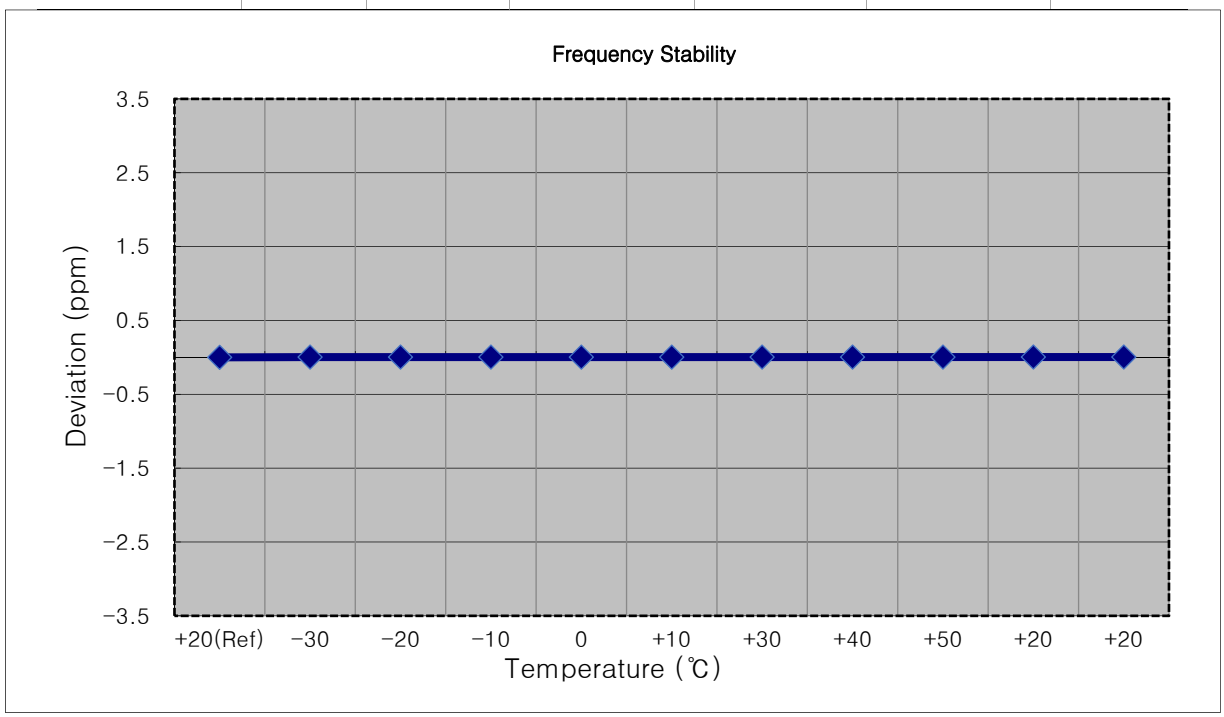
▣ OPERATING FREQUENCY: 1,732,400,000 Hz

▣ CHANNEL: 1412

▣ REFERENCE VOLTAGE: 13.500 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	
100 %	13.500	+20(Ref)	1732 400 006	0.0	0.000 000	0.0000
100 %		-30	1732 400 012	6.6	0.000 000	0.0038
100 %		-20	1732 400 013	6.9	0.000 000	0.0040
100 %		-10	1732 400 012	6.3	0.000 000	0.0036
100 %		0	1732 400 011	5.6	0.000 000	0.0032
100 %		+10	1732 400 012	5.7	0.000 000	0.0033
100 %		+30	1732 400 012	6.5	0.000 000	0.0037
100 %		+40	1732 400 012	6.0	0.000 000	0.0035
100 %		+50	1732 400 012	6.3	0.000 000	0.0036
85 %	11.475	+20	1732 400 020	8.1	0.000 000	0.0047
115 %	15.525	+20	1732 400 019	7.3	0.000 000	0.0042



▣ Mode: WCDMA1700

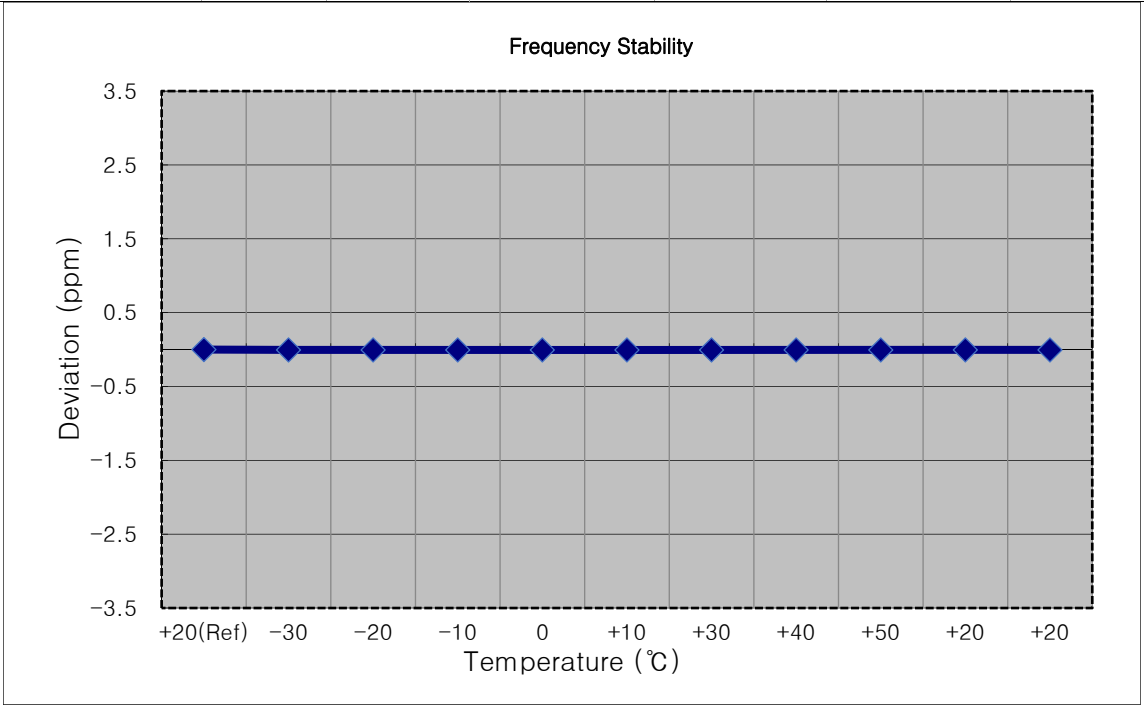
▣ OPERATING FREQUENCY: 1,752,600,000 Hz

▣ CHANNEL: 1513

▣ REFERENCE VOLTAGE: 13.500 VDC

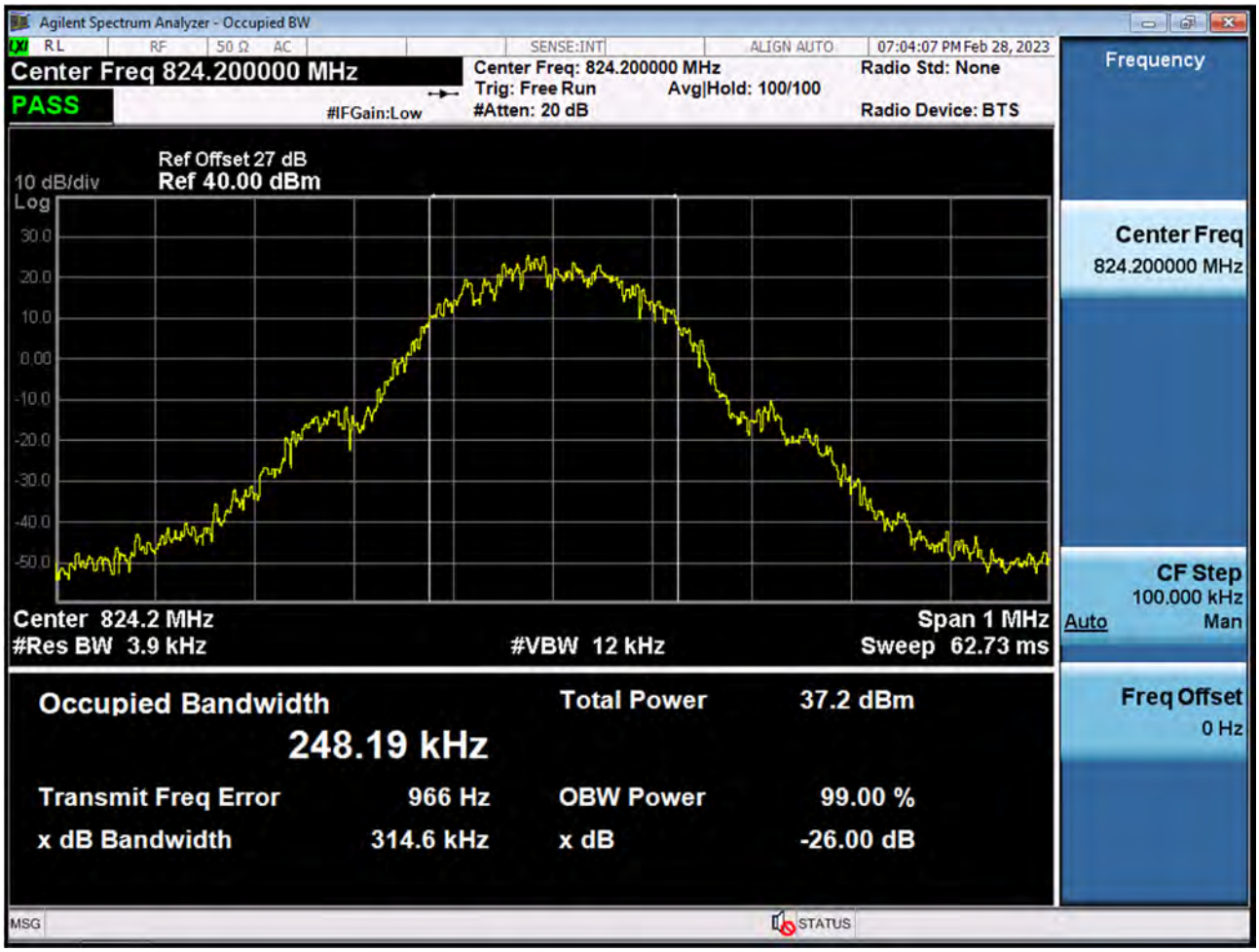
▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	
100 %	13.500	+20(Ref)	1752 599 991	0.0	0.000 000	0.0000
100 %		-30	1752 599 982	-8.7	0.000 000	-0.0050
100 %		-20	1752 599 982	-8.5	0.000 000	-0.0049
100 %		-10	1752 599 982	-9.0	-0.000 001	-0.0051
100 %		0	1752 599 982	-8.9	-0.000 001	-0.0051
100 %		+10	1752 599 982	-9.2	-0.000 001	-0.0052
100 %		+30	1752 599 982	-9.0	-0.000 001	-0.0051
100 %		+40	1752 599 982	-9.3	-0.000 001	-0.0053
100 %		+50	1752 599 982	-9.1	-0.000 001	-0.0052
85 %	11.475	+20	1752 599 974	-7.4	0.000 000	-0.0042
115 %	15.525	+20	1752 599 973	-8.3	0.000 000	-0.0047

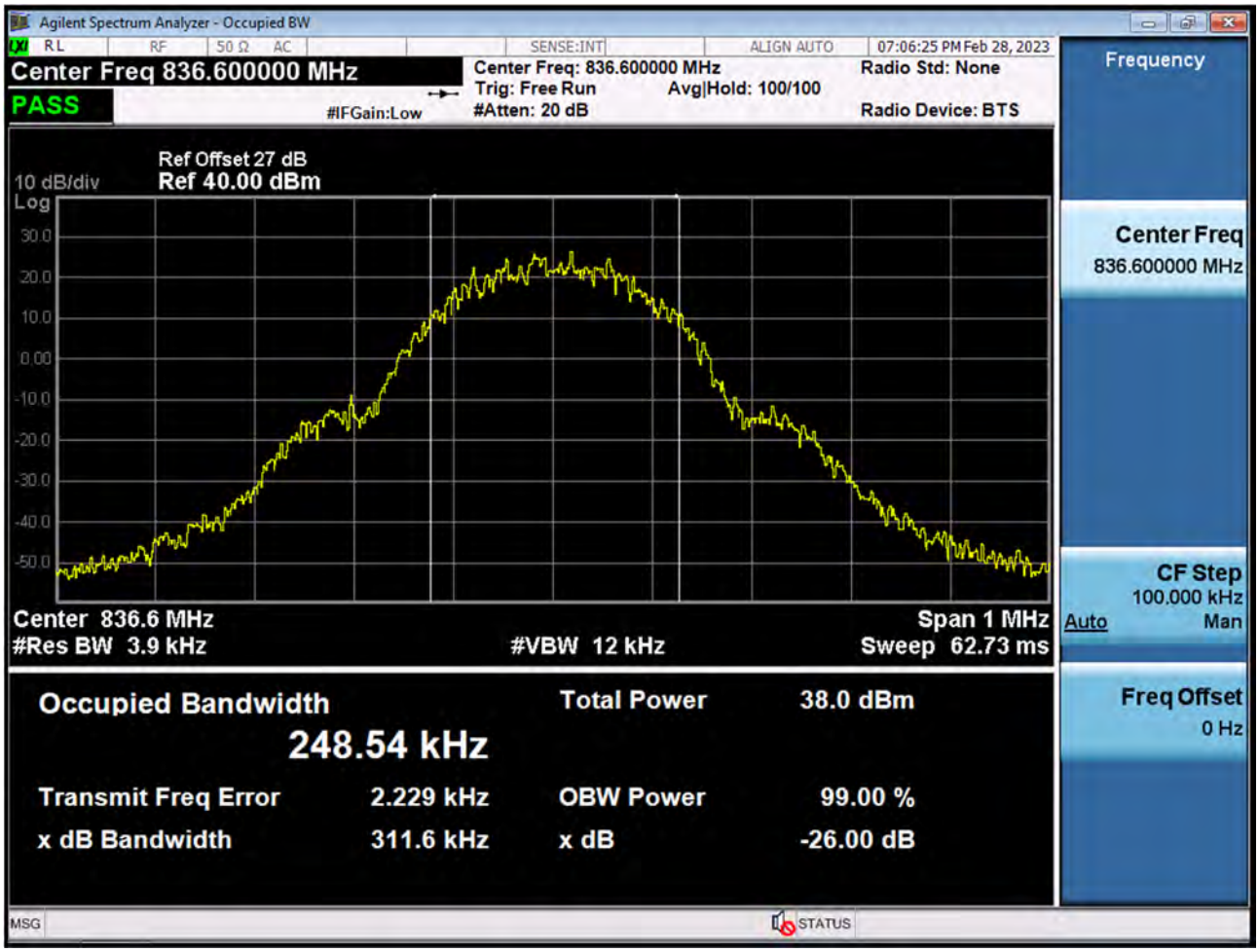


9. TEST PLOTS

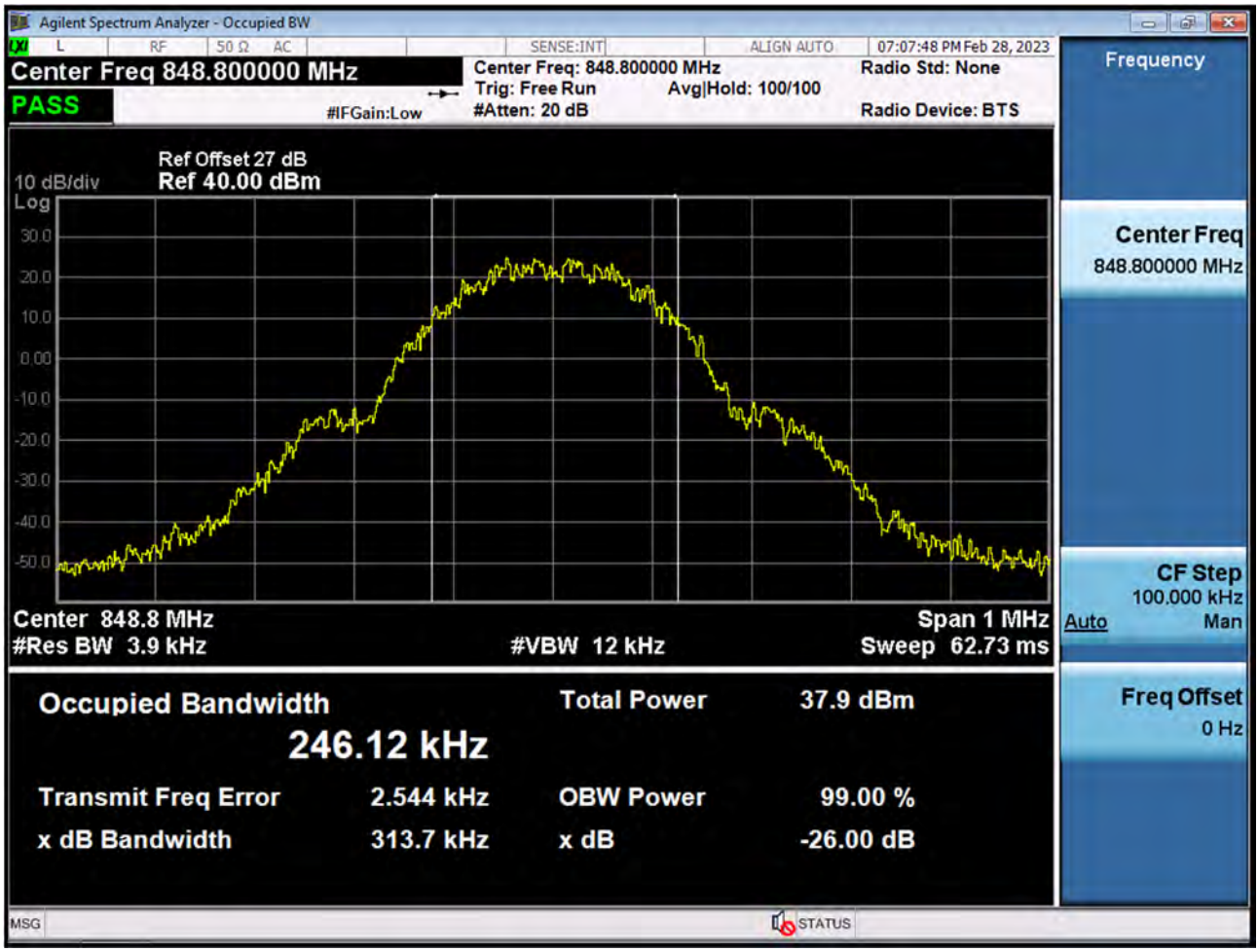
■ GSM850 MODE (128 CH.) Occupied Bandwidth



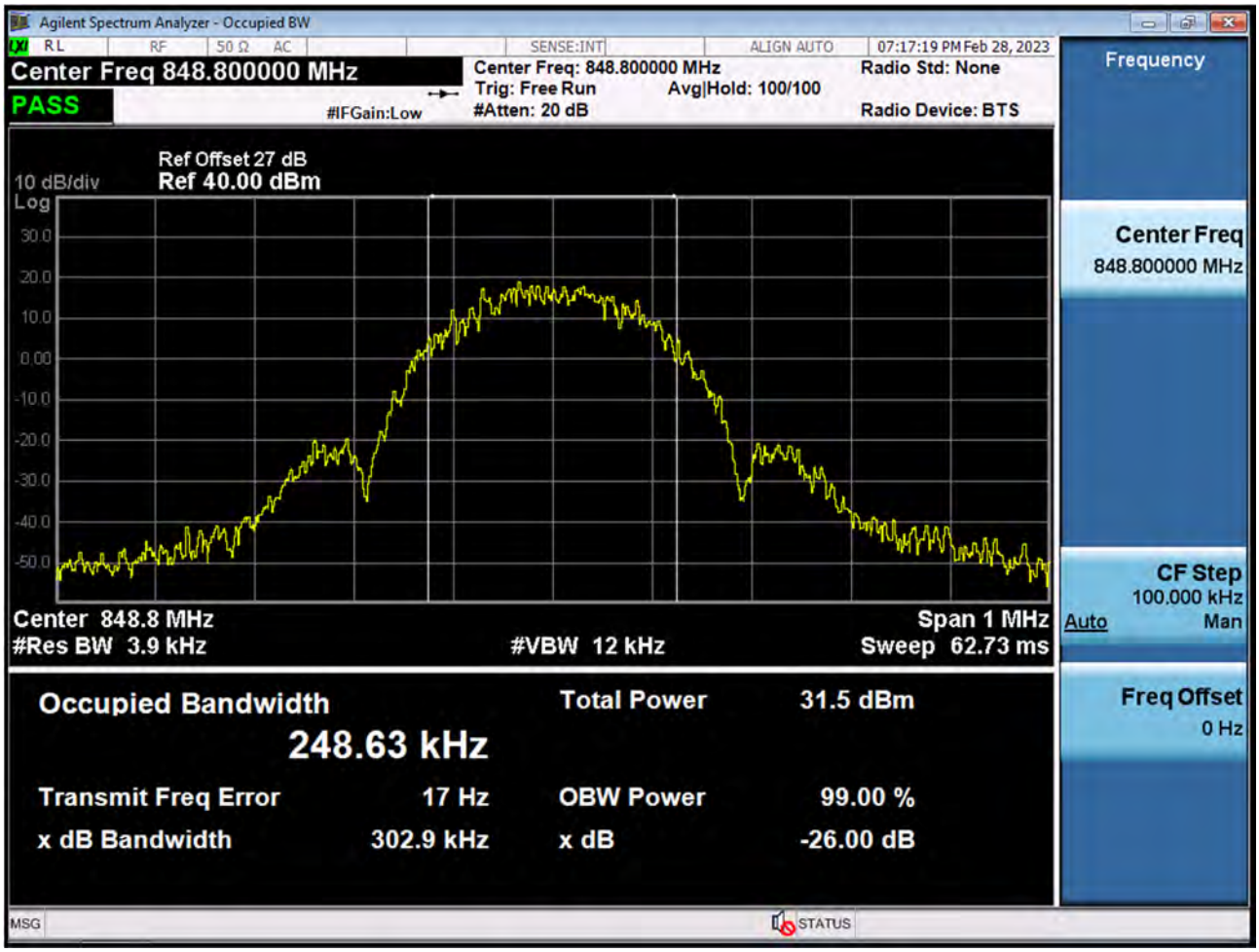
■ GSM850 MODE (190 CH.) Occupied Bandwidth



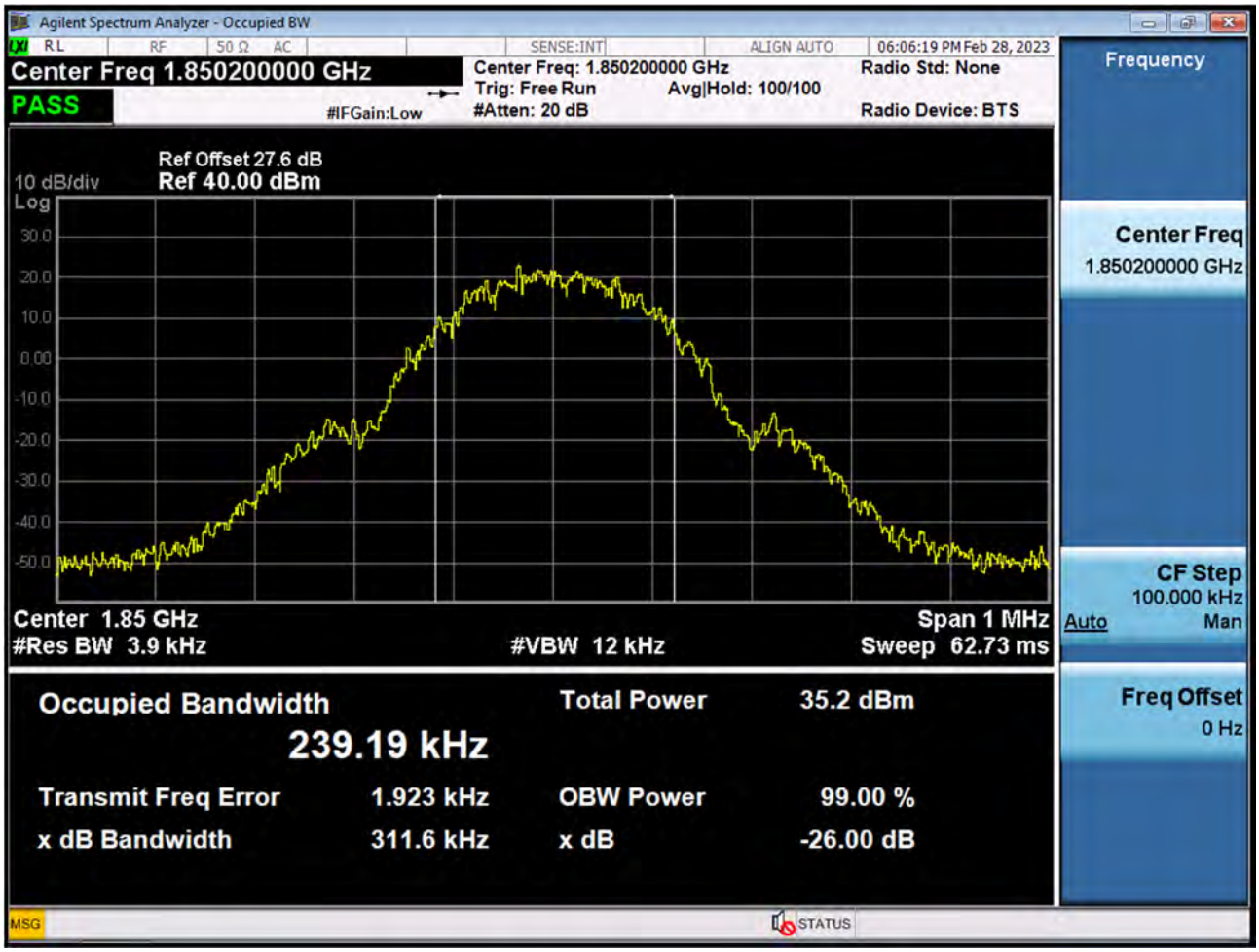
■ GSM850 MODE (251 CH.) Occupied Bandwidth



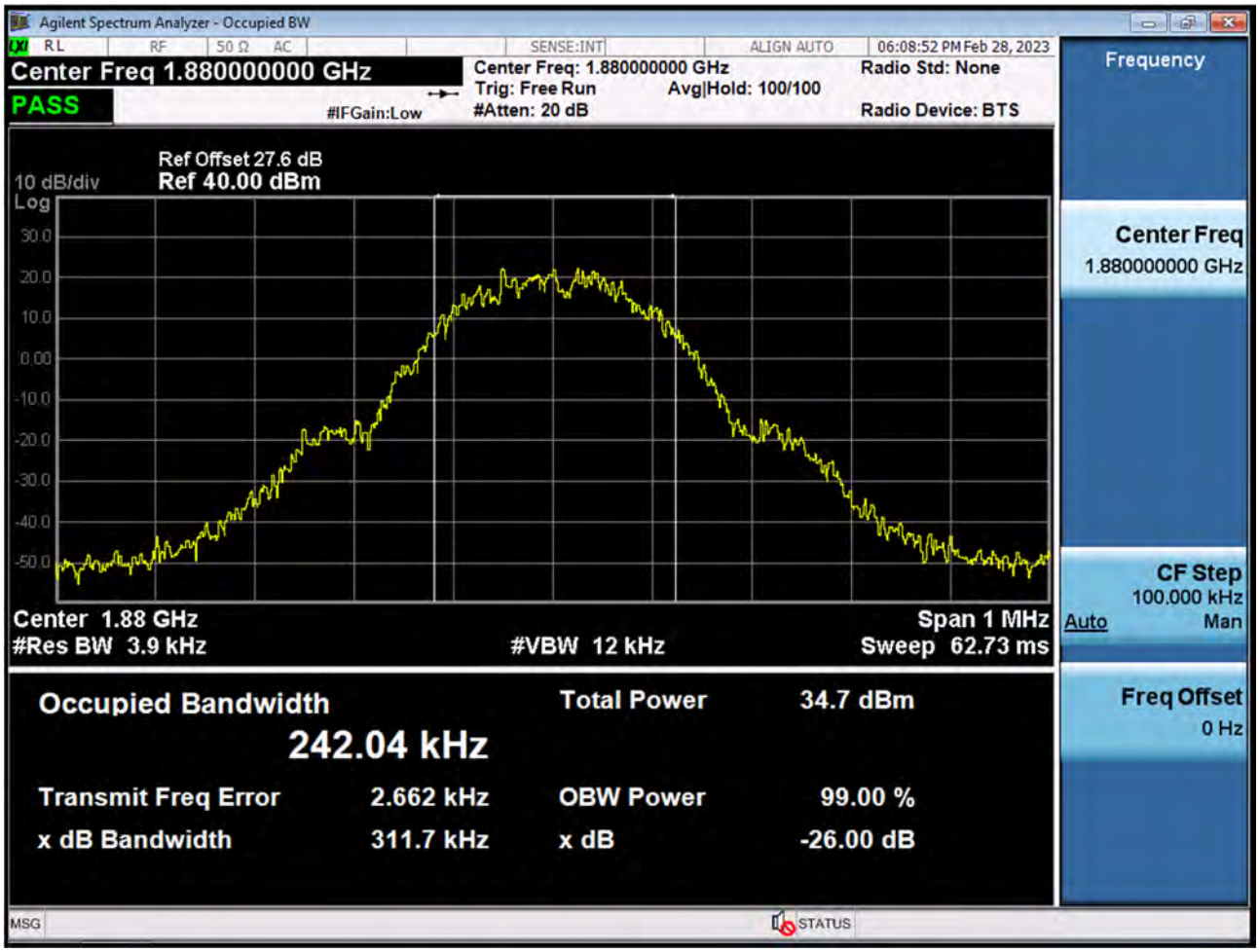
■ GSM850 EDGE (251 CH.) Occupied Bandwidth



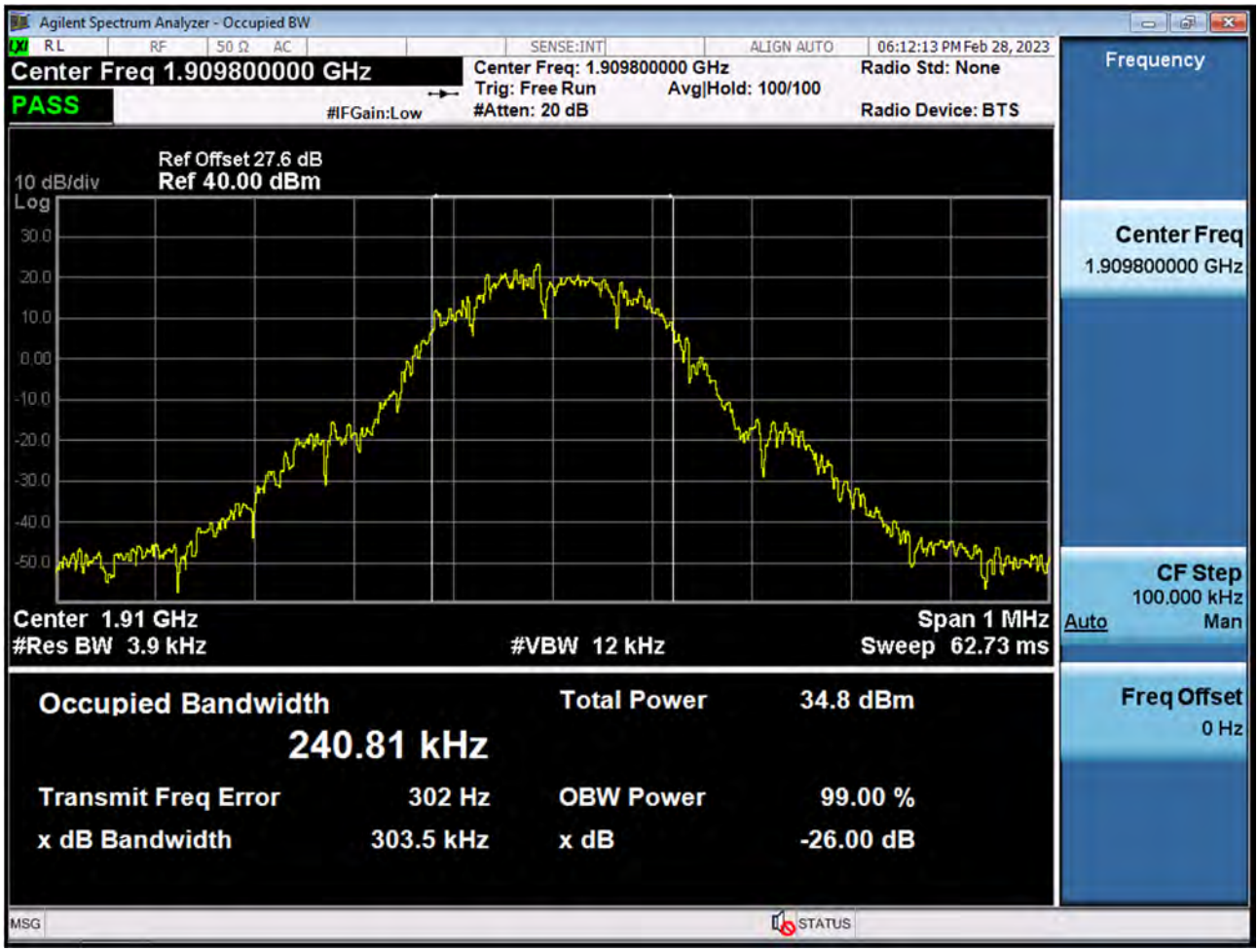
■ GSM1900 MODE (512 CH.) Occupied Bandwidth



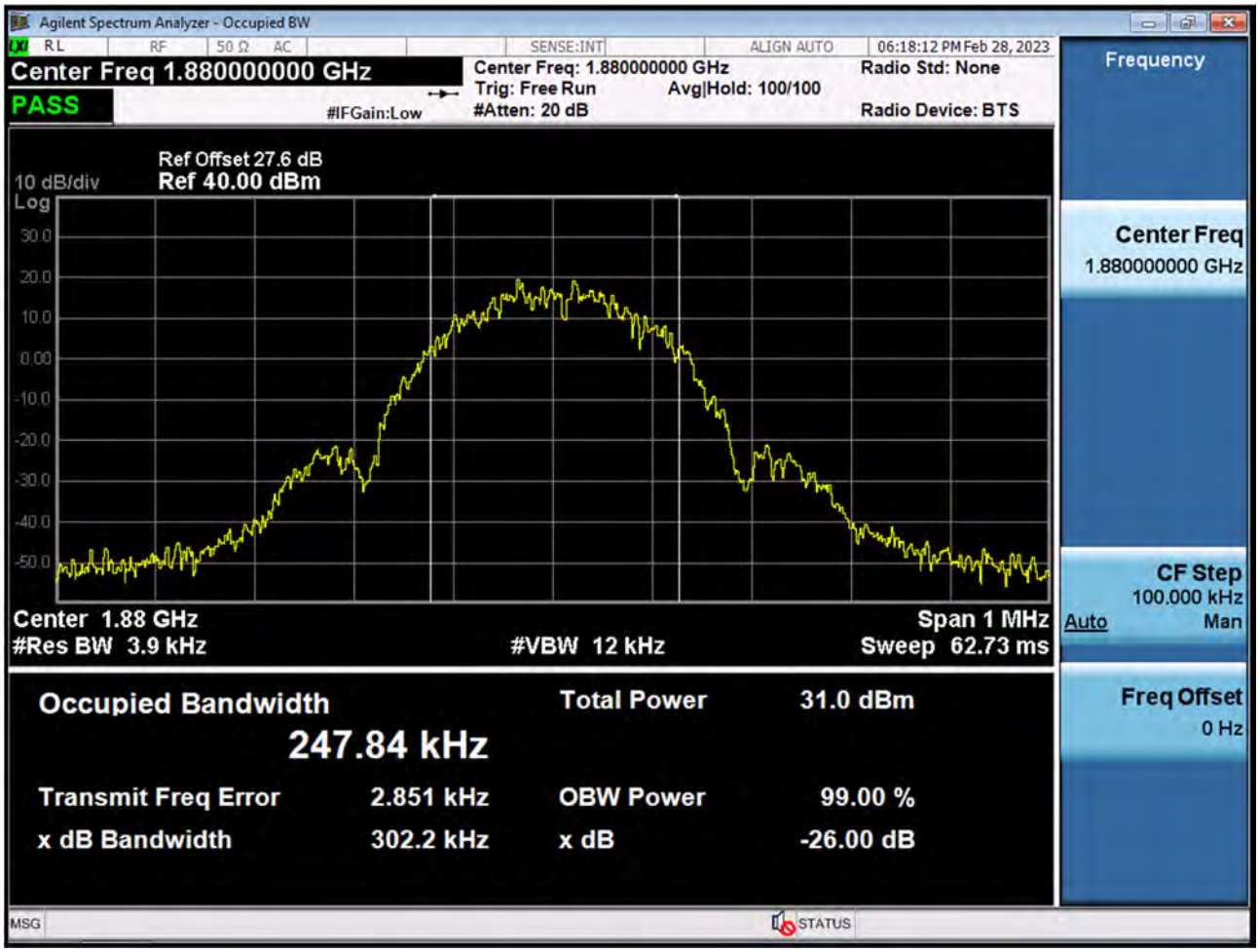
■ GSM1900 MODE (661 CH.) Occupied Bandwidth



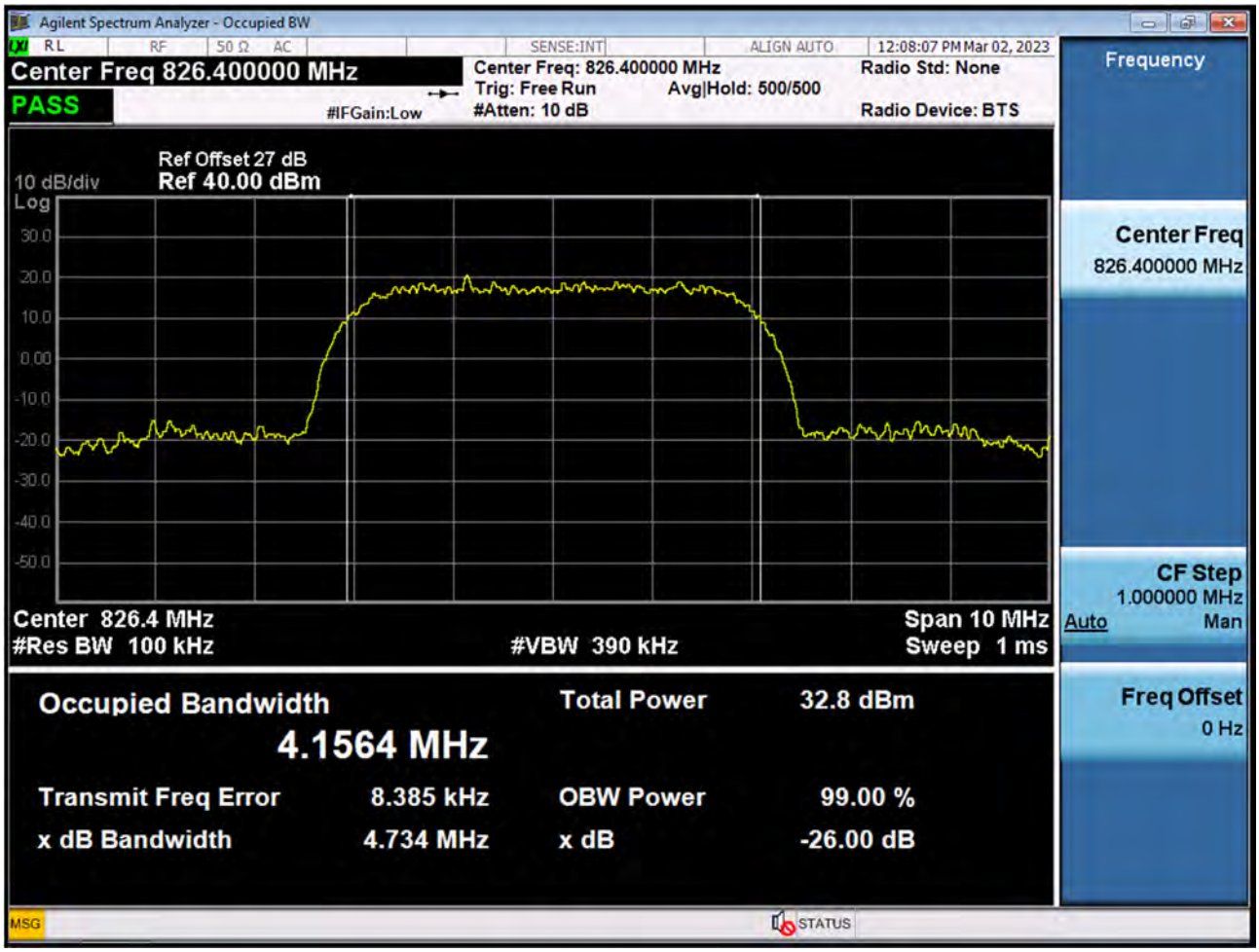
■ GSM1900 MODE (810 CH.) Occupied Bandwidth



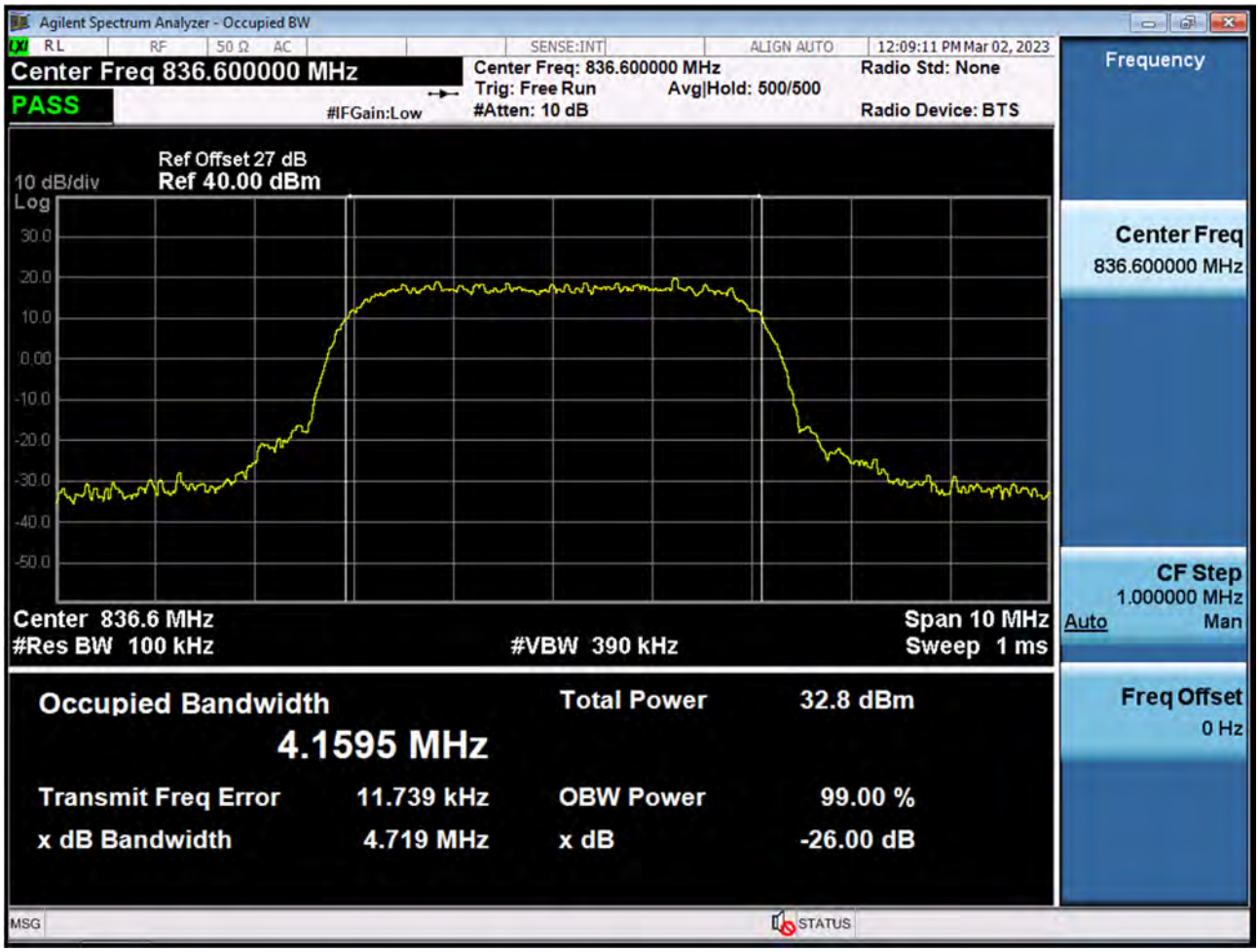
■ GSM1900 EDGE (661.) Occupied Bandwidth



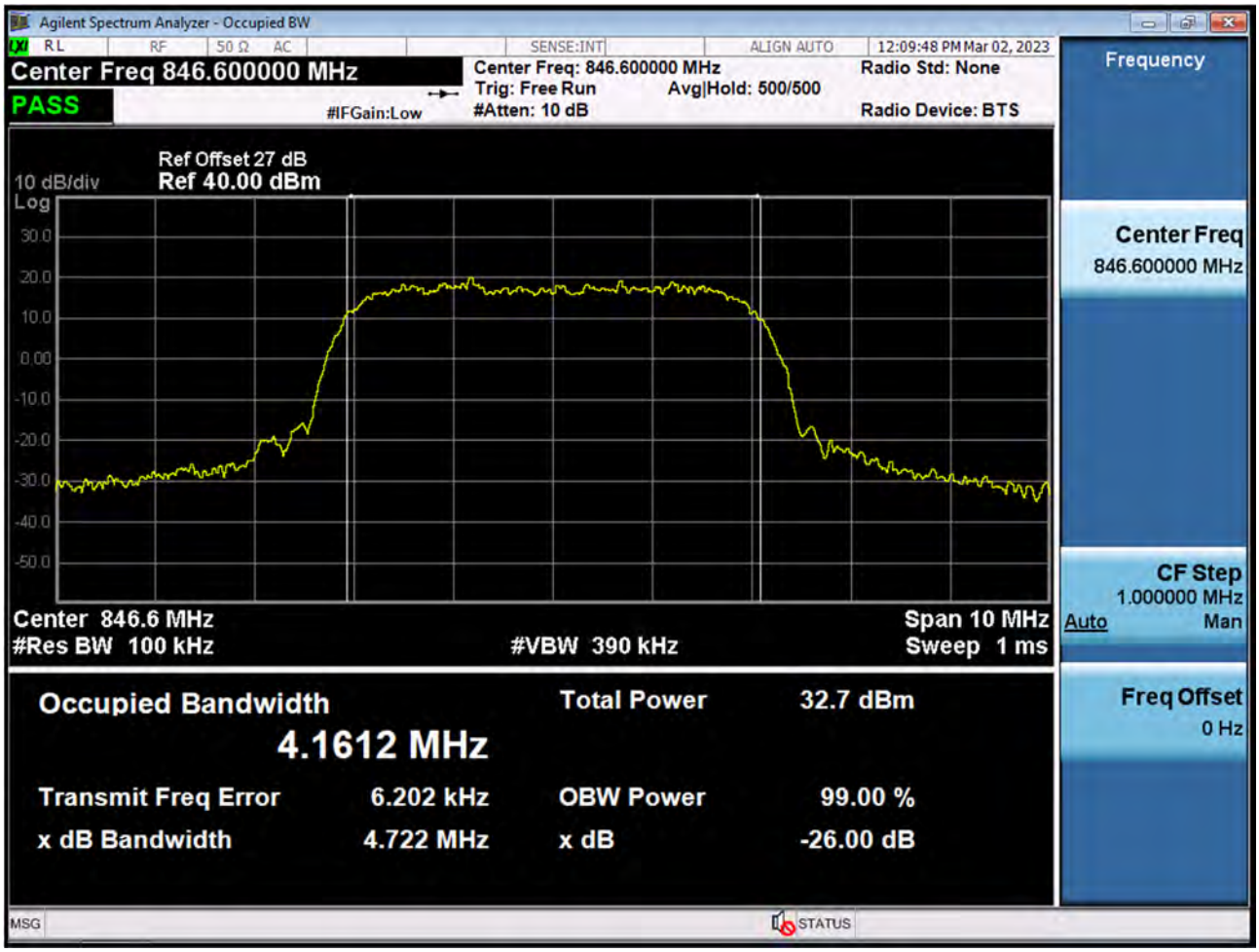
■ WCDMA850 MODE (4132 CH.) Occupied Bandwidth



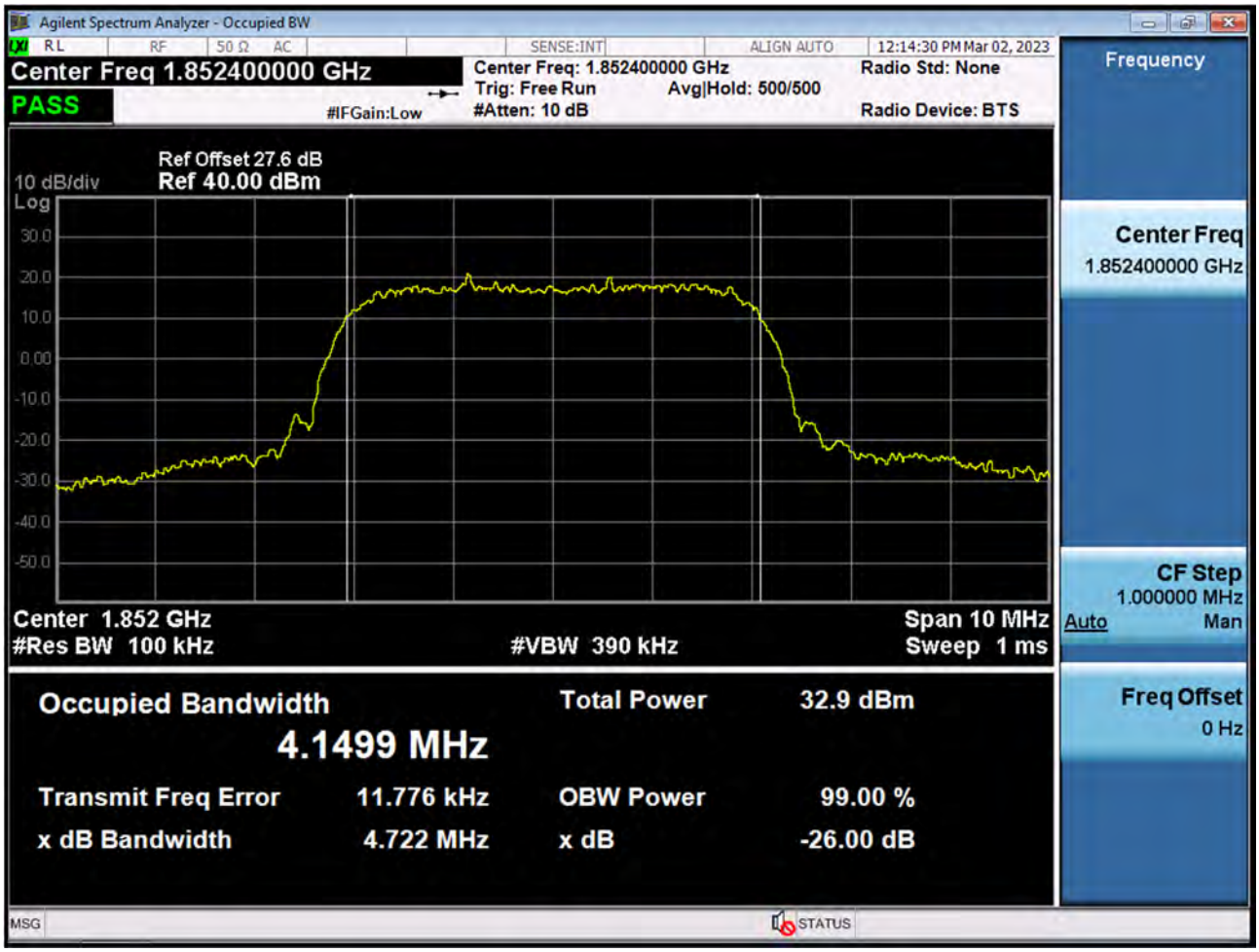
■ WCDMA850 MODE (4183 CH.) Occupied Bandwidth



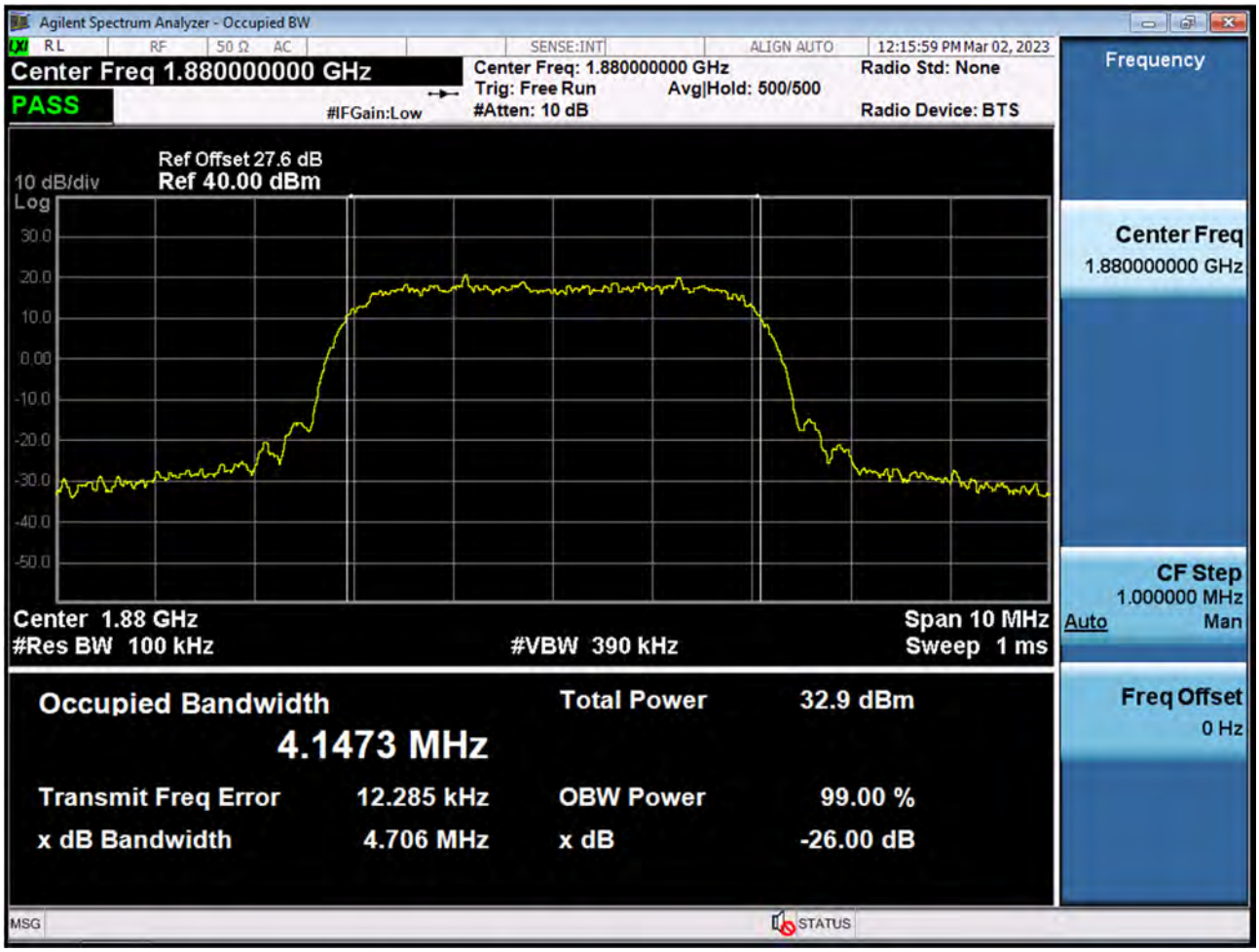
■ WCDMA850MODE (4233 CH.) Occupied Bandwidth



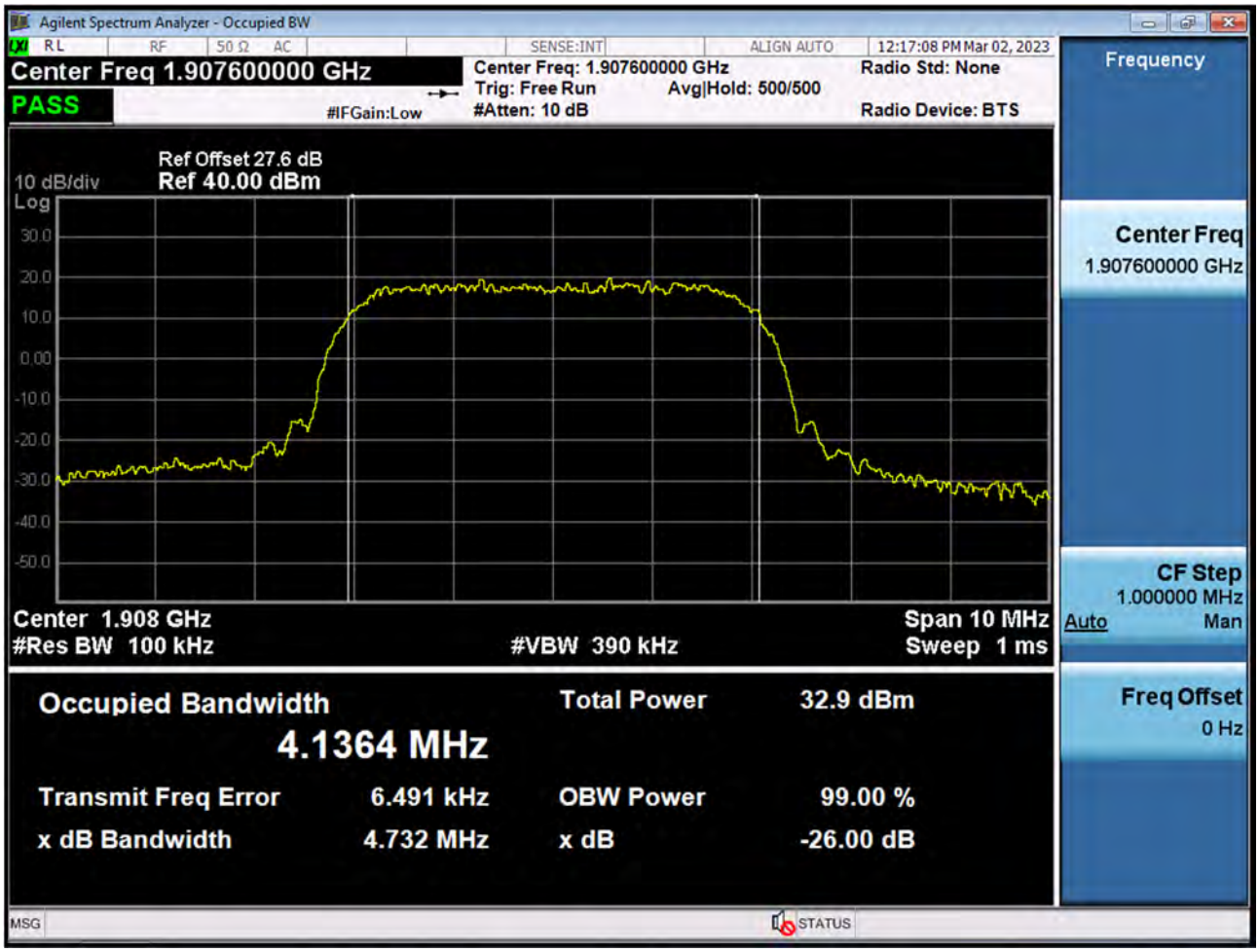
■ WCDMA1900 MODE (9262 CH.) Occupied Bandwidth



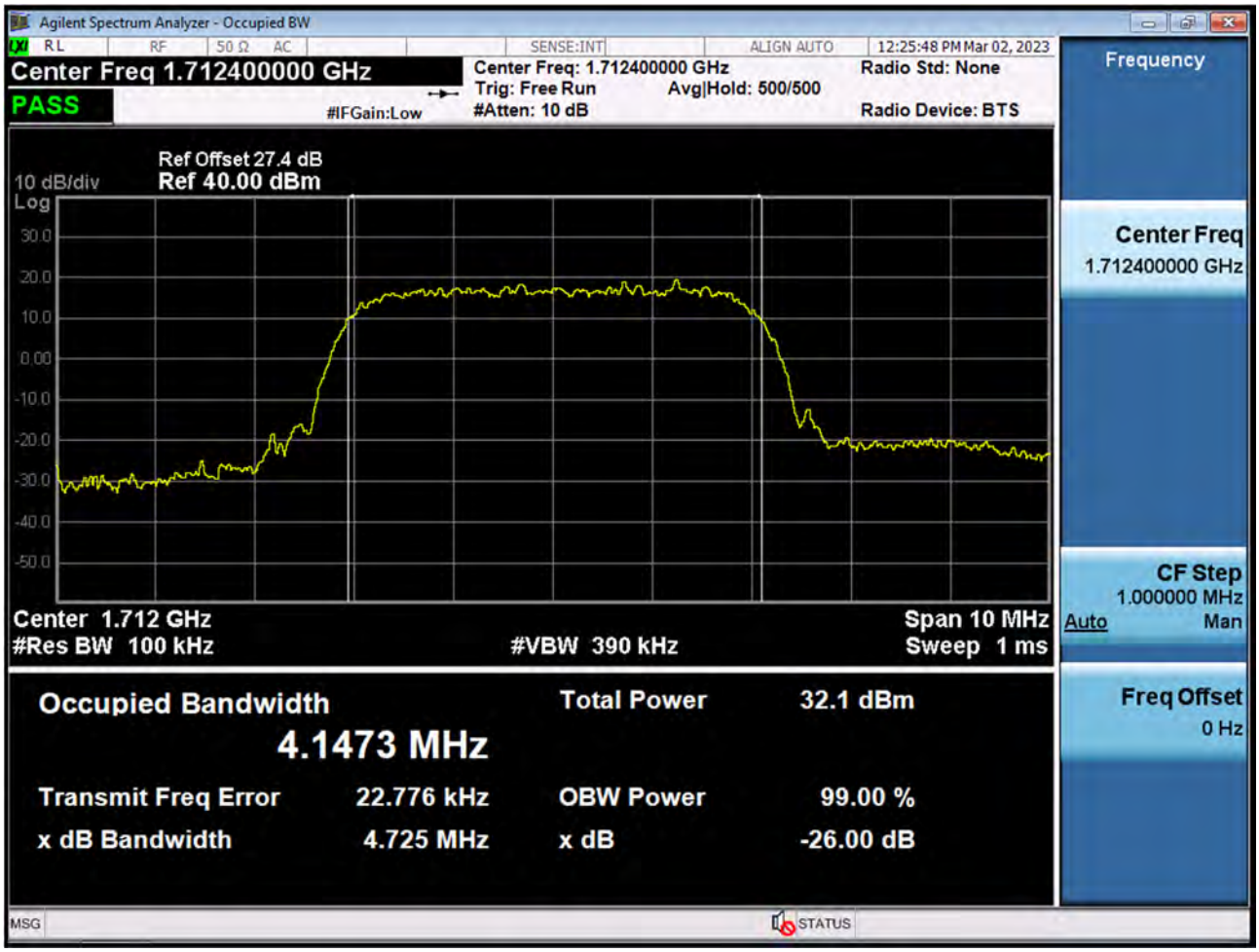
■ WCDMA1900 MODE (9400 CH.) Occupied Bandwidth



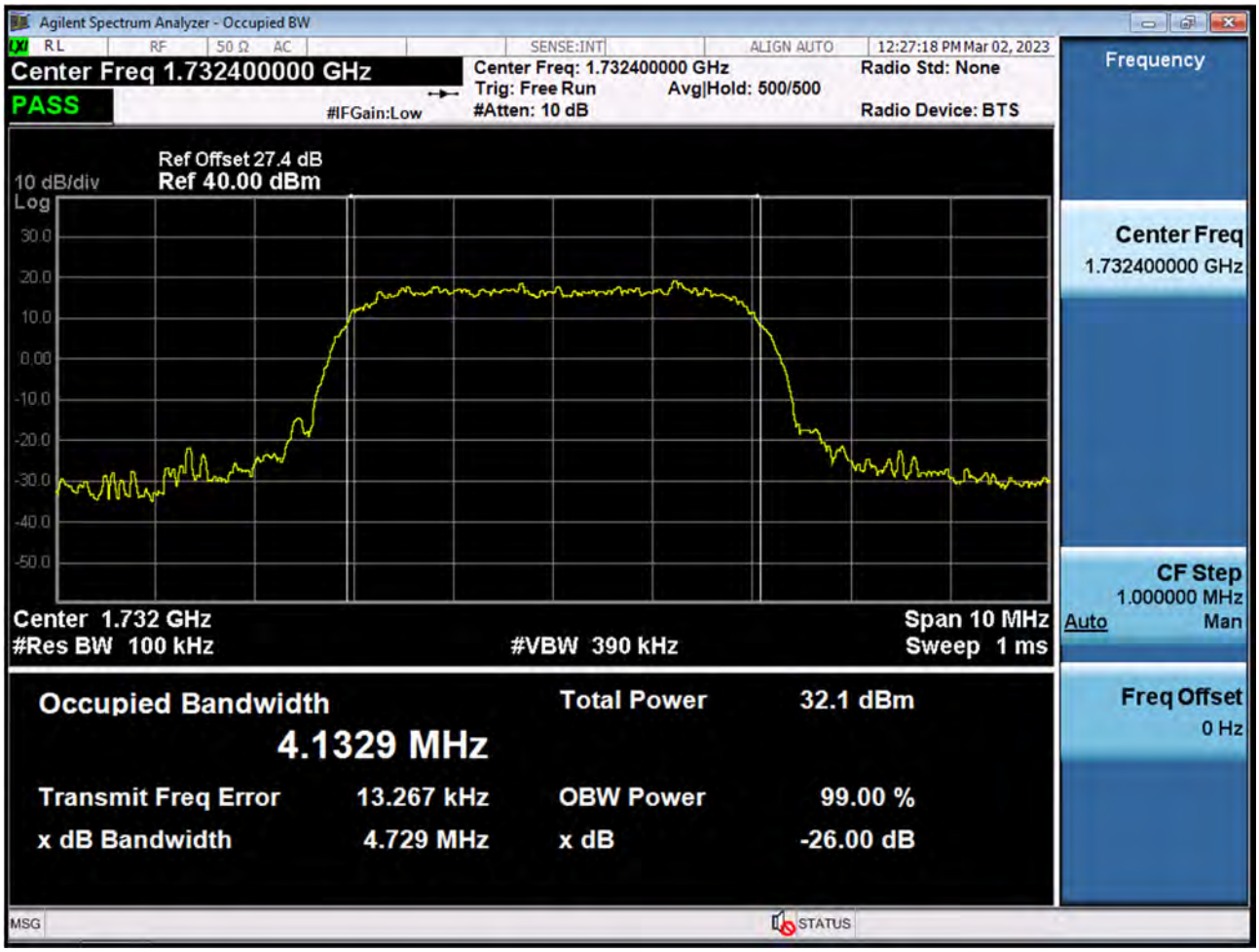
■ WCDMA1900 MODE (9538 CH.) Occupied Bandwidth



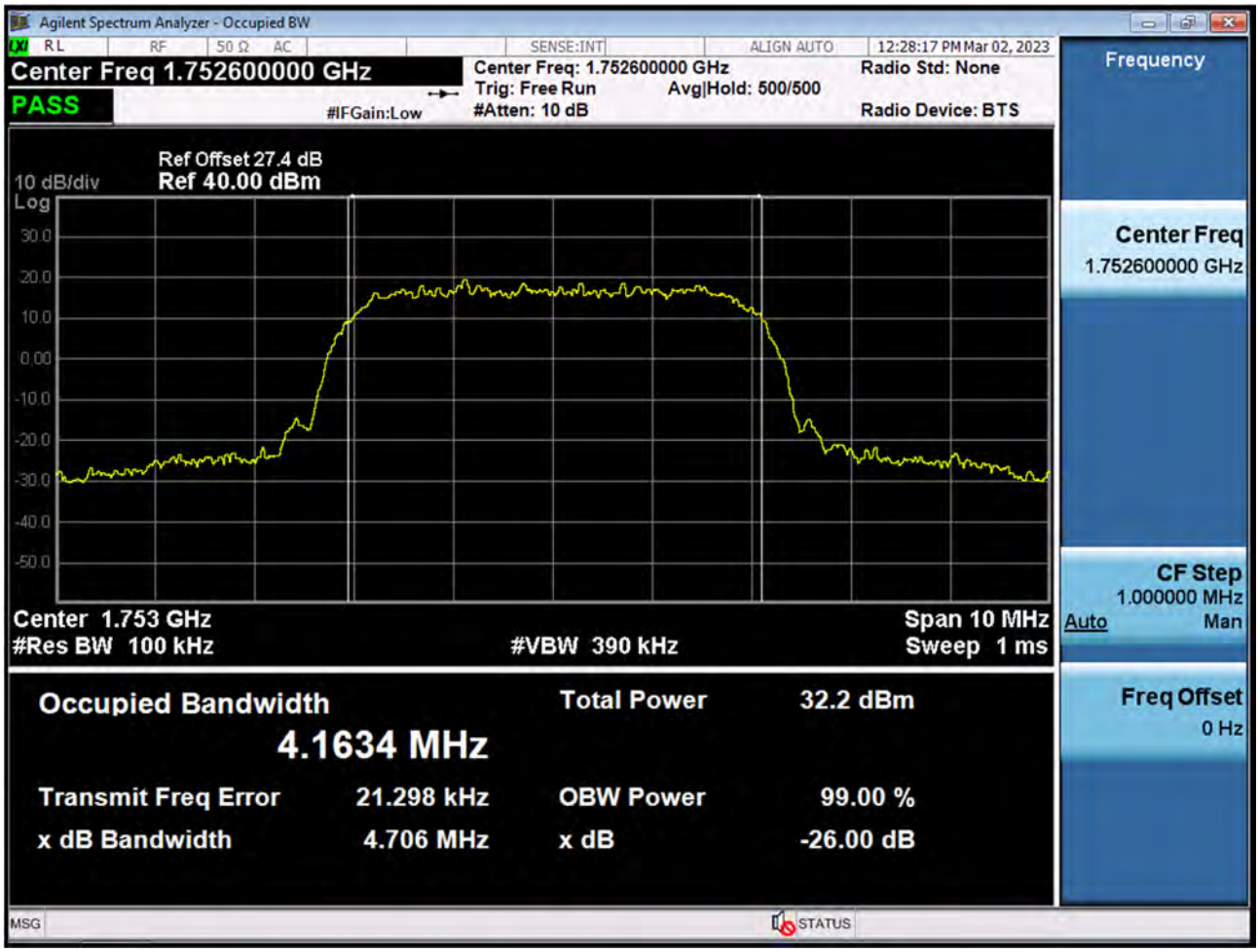
■ WCDMA1700 MODE (1312 CH.) Occupied Bandwidth



■ WCDMA1700 MODE (1412 CH.) Occupied Bandwidth

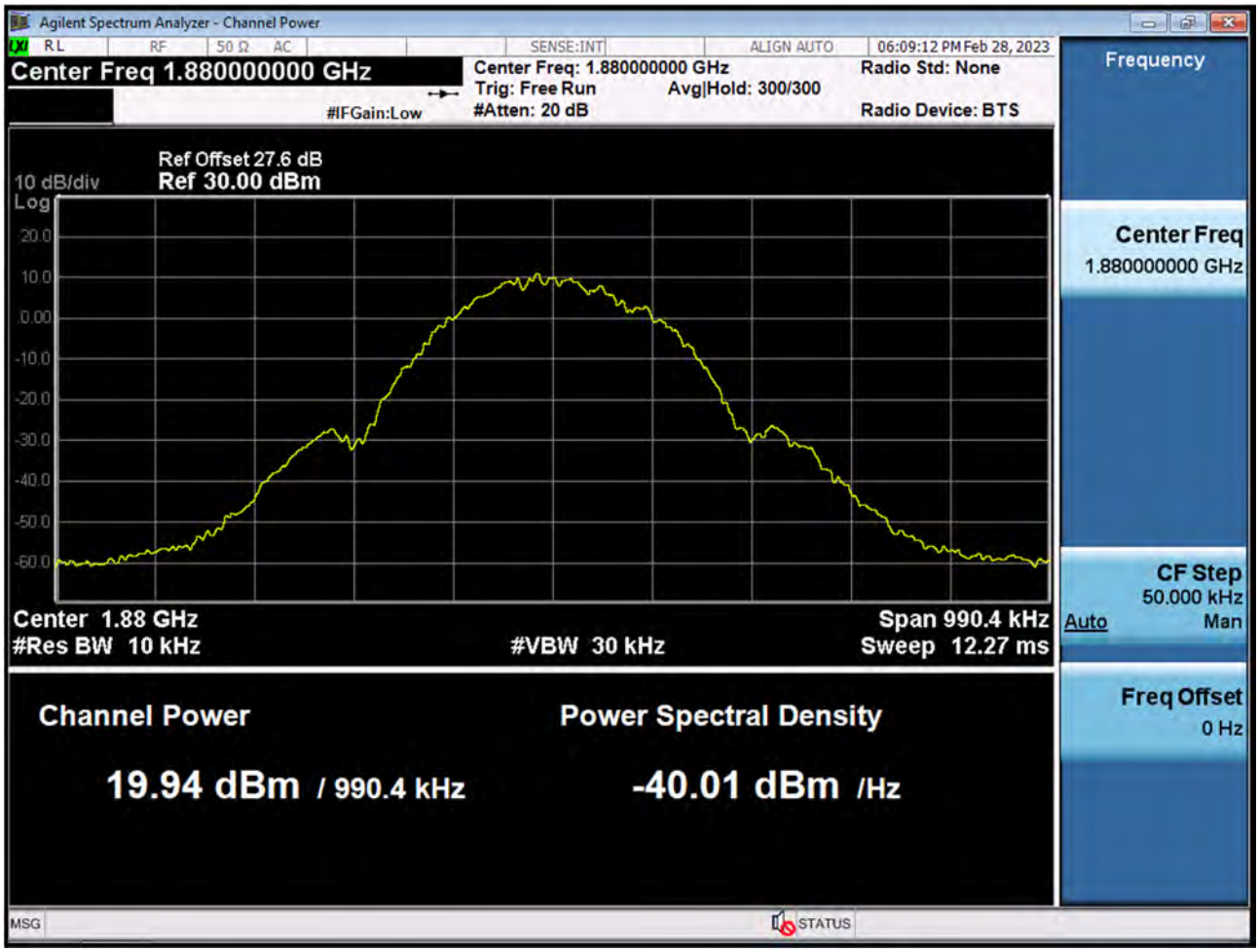


■ WCDMA1700 MODE (1513 CH.) Occupied Bandwidth

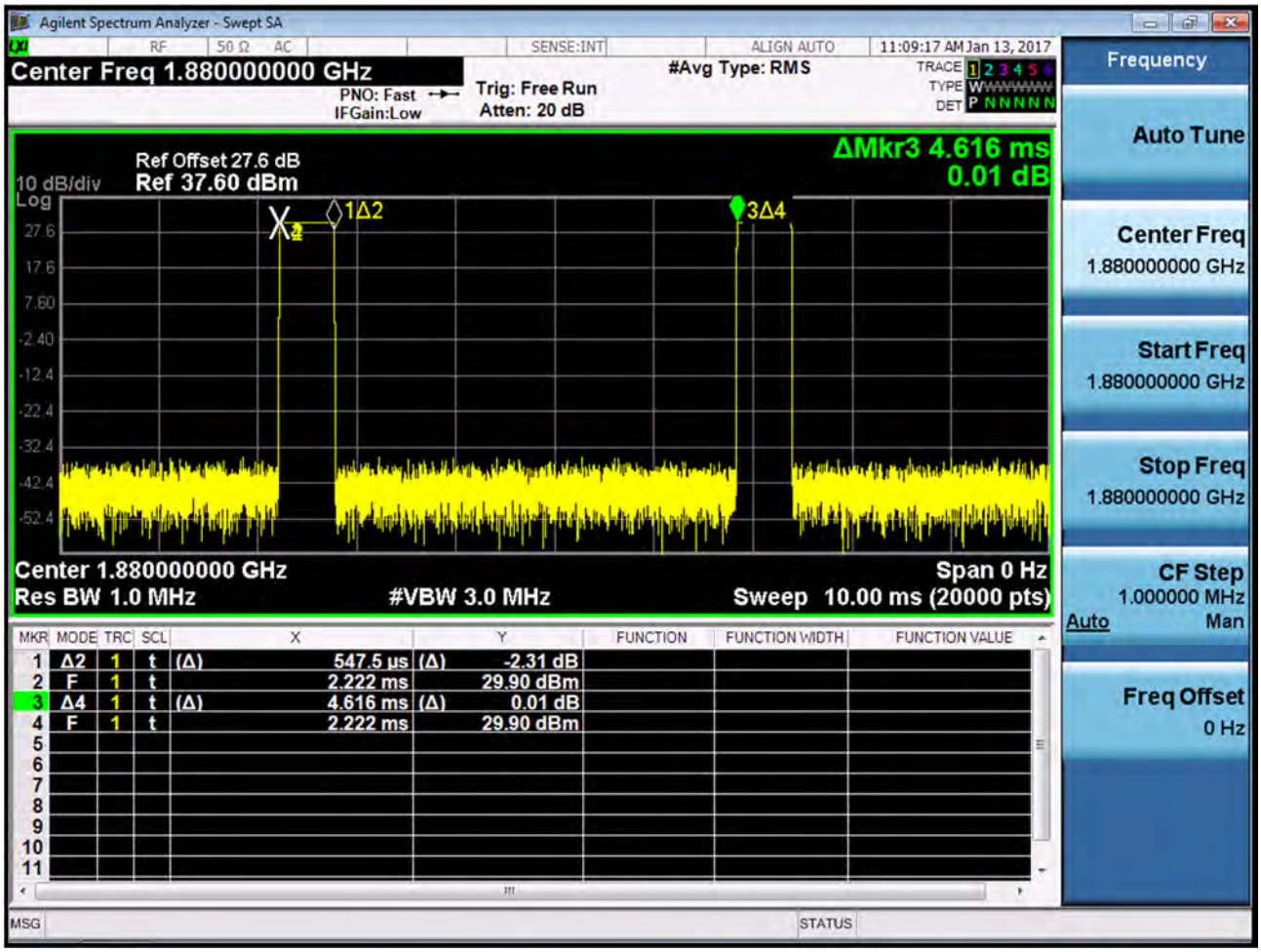


■ GSM1900 MODE (661 CH.) Peak-to-Average Ratio P_{Pk}

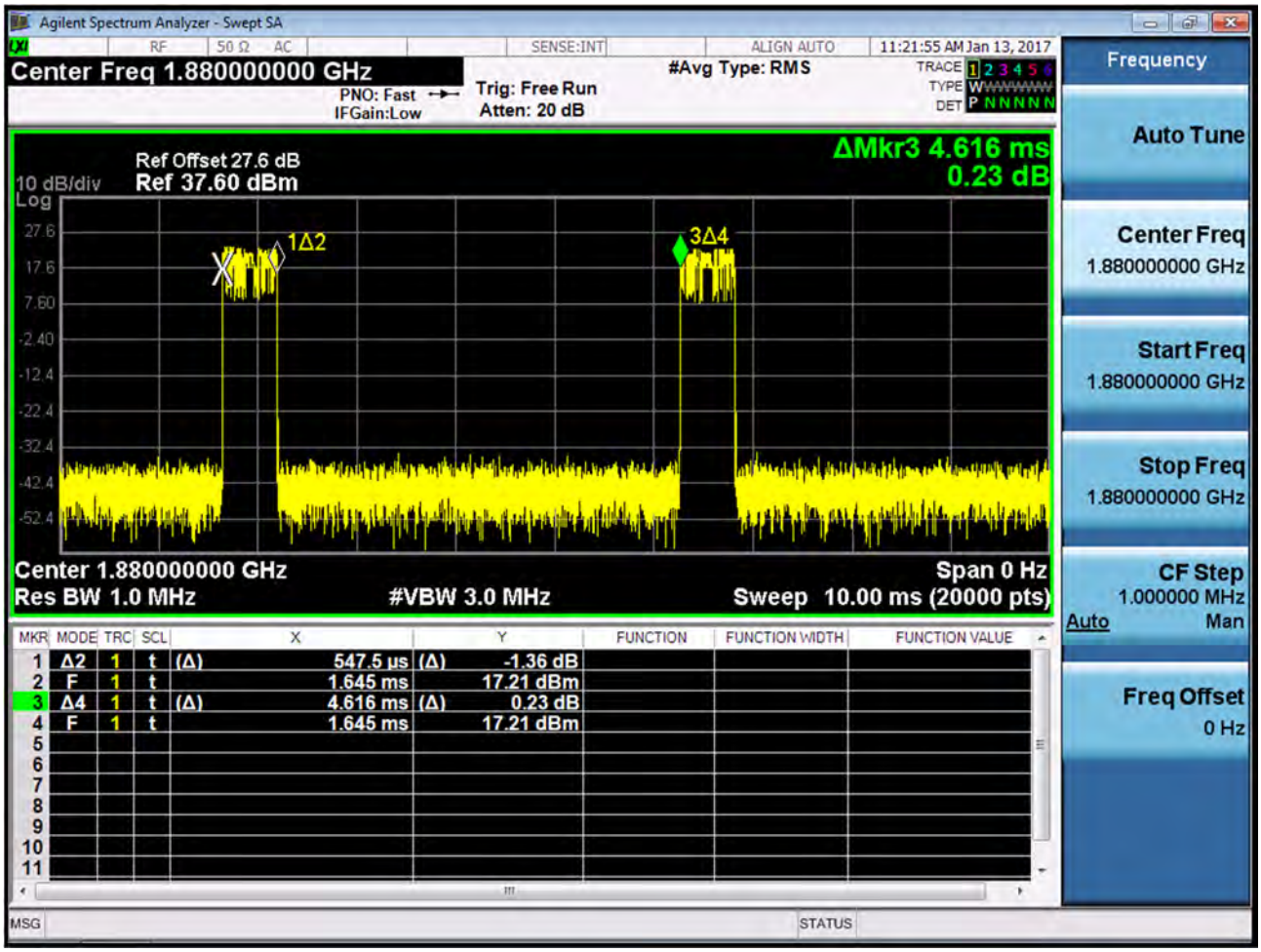
■ GSM1900 MODE (661 CH.) Peak-to-Average Ratio P_{Avg}



■ GSM1900 MODE (661 CH.) Peak-to-Average Ratio Duty

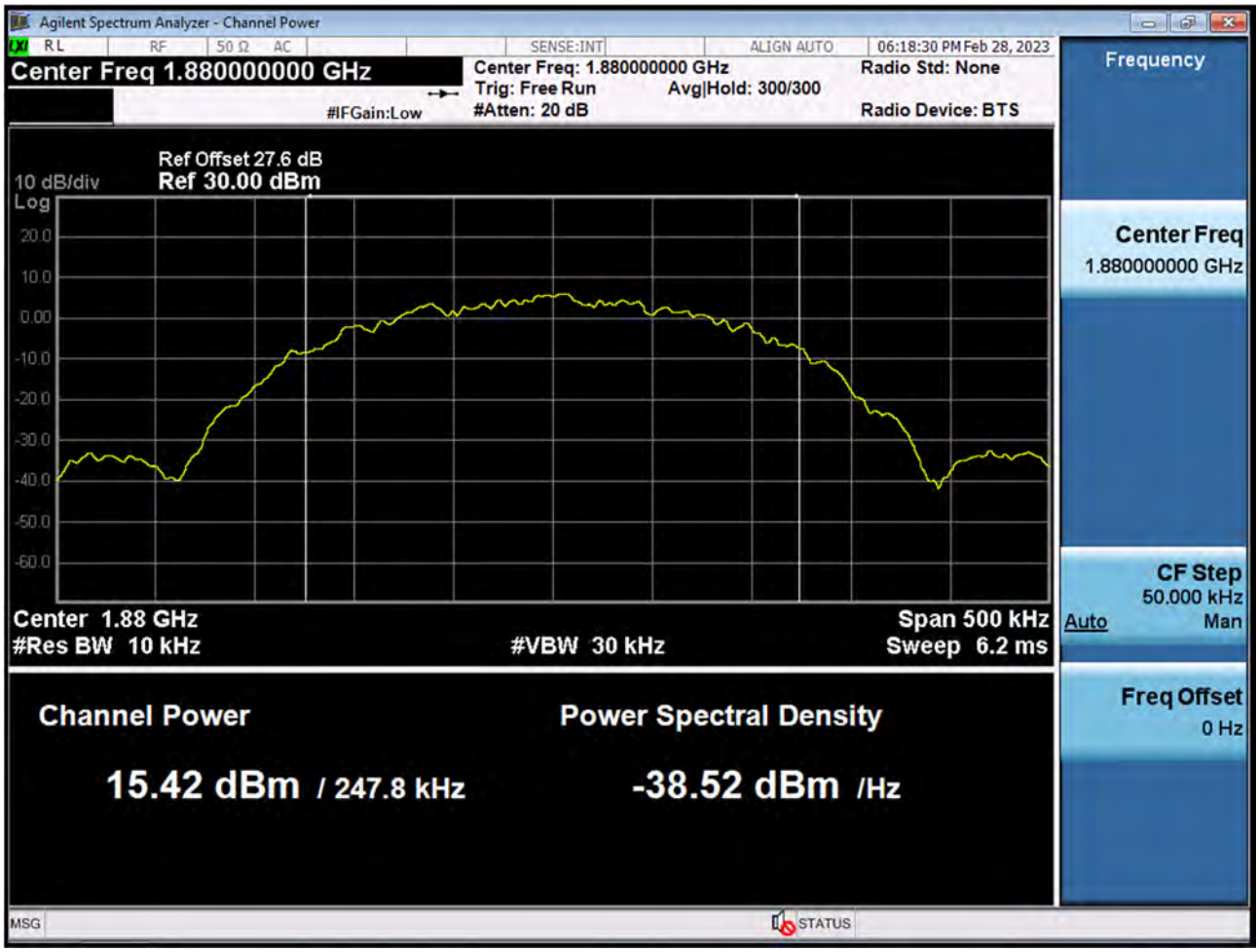


■ GSM1900 EDGE (661 CH.) Peak-to-Average Ratio Duty

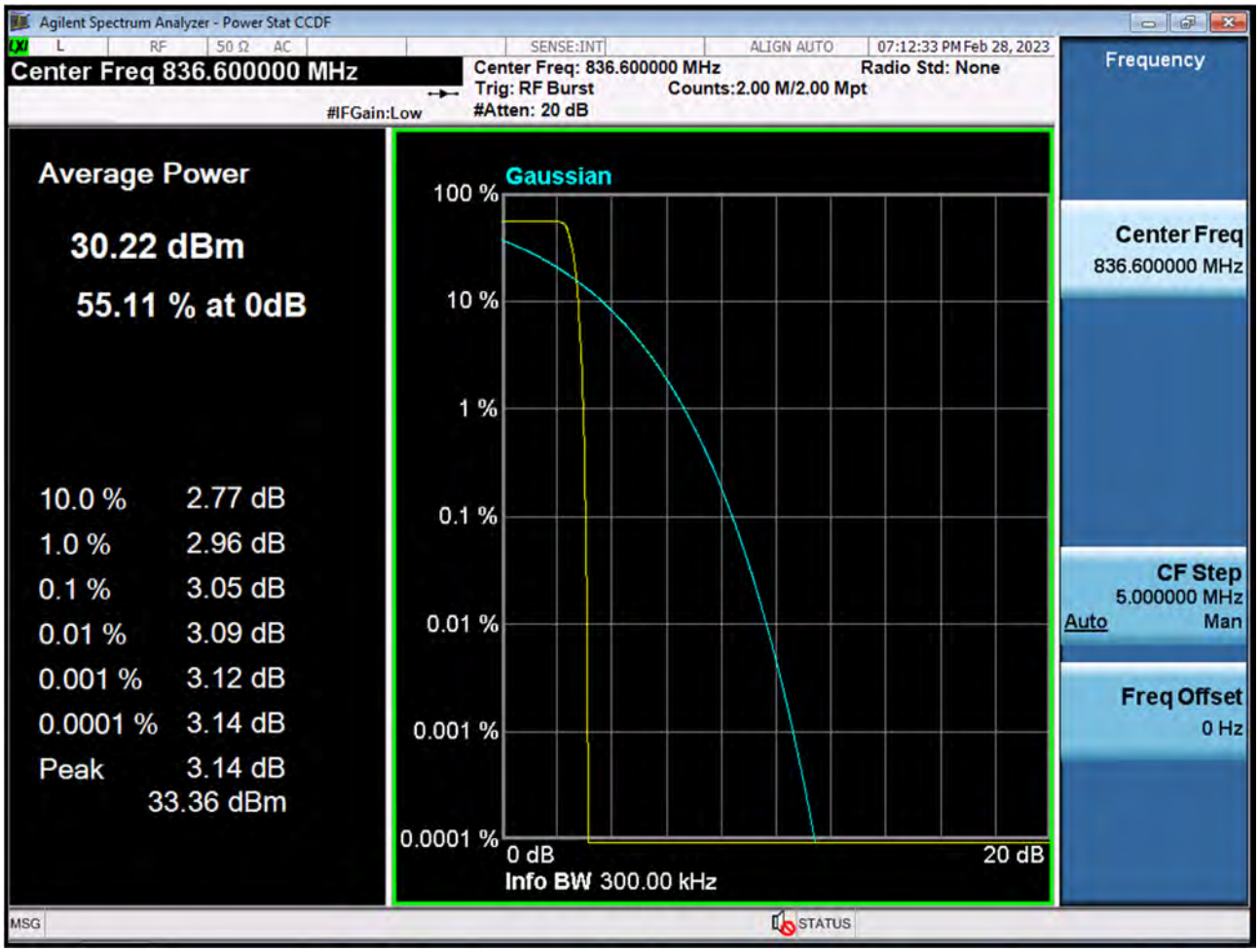


■ GSM1900 EDGE (661 CH.) Peak-to-Average Ratio P_{Pk}

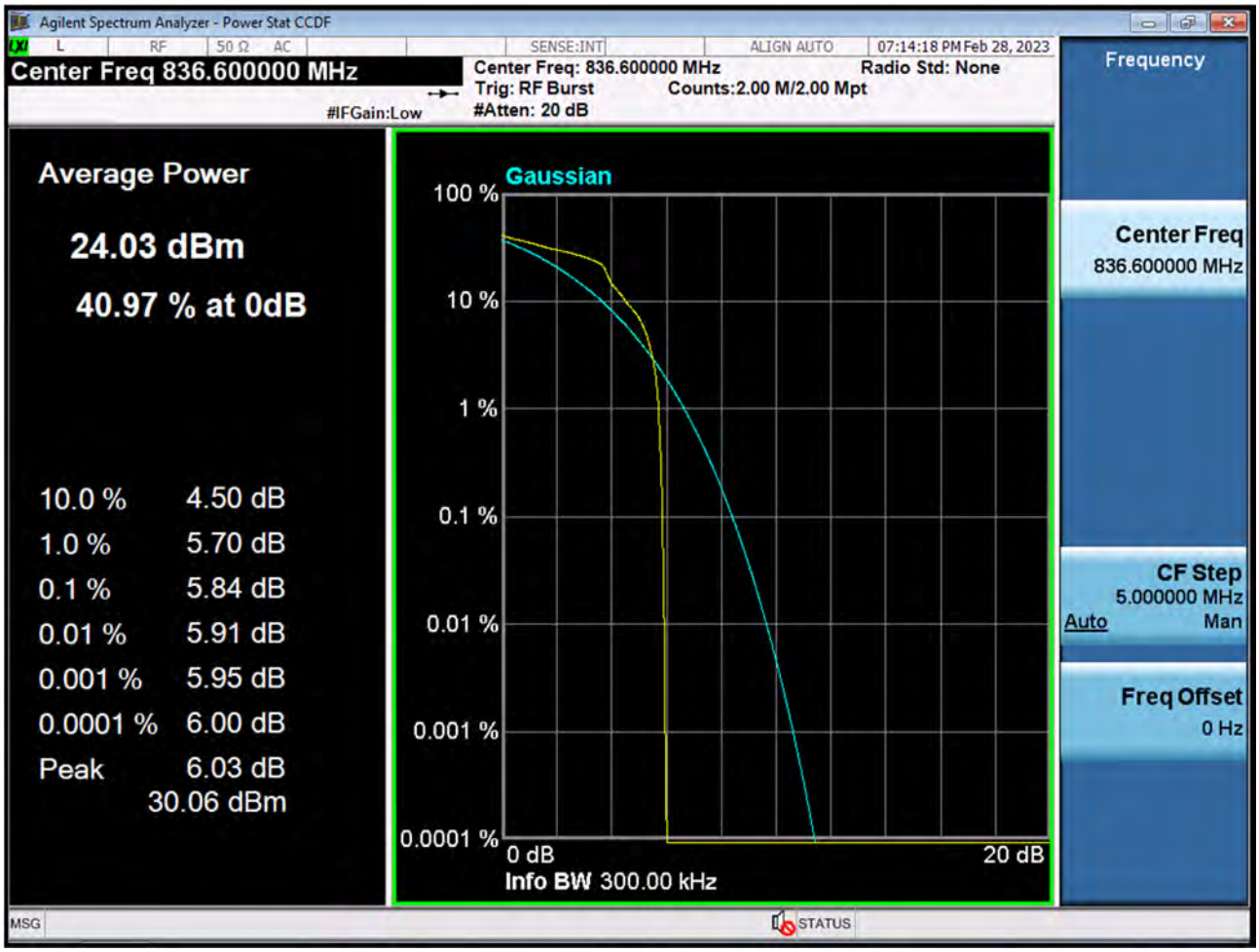
■ GSM1900 EDGE (661 CH.) Peak-to-Average Ratio P_{Avg}



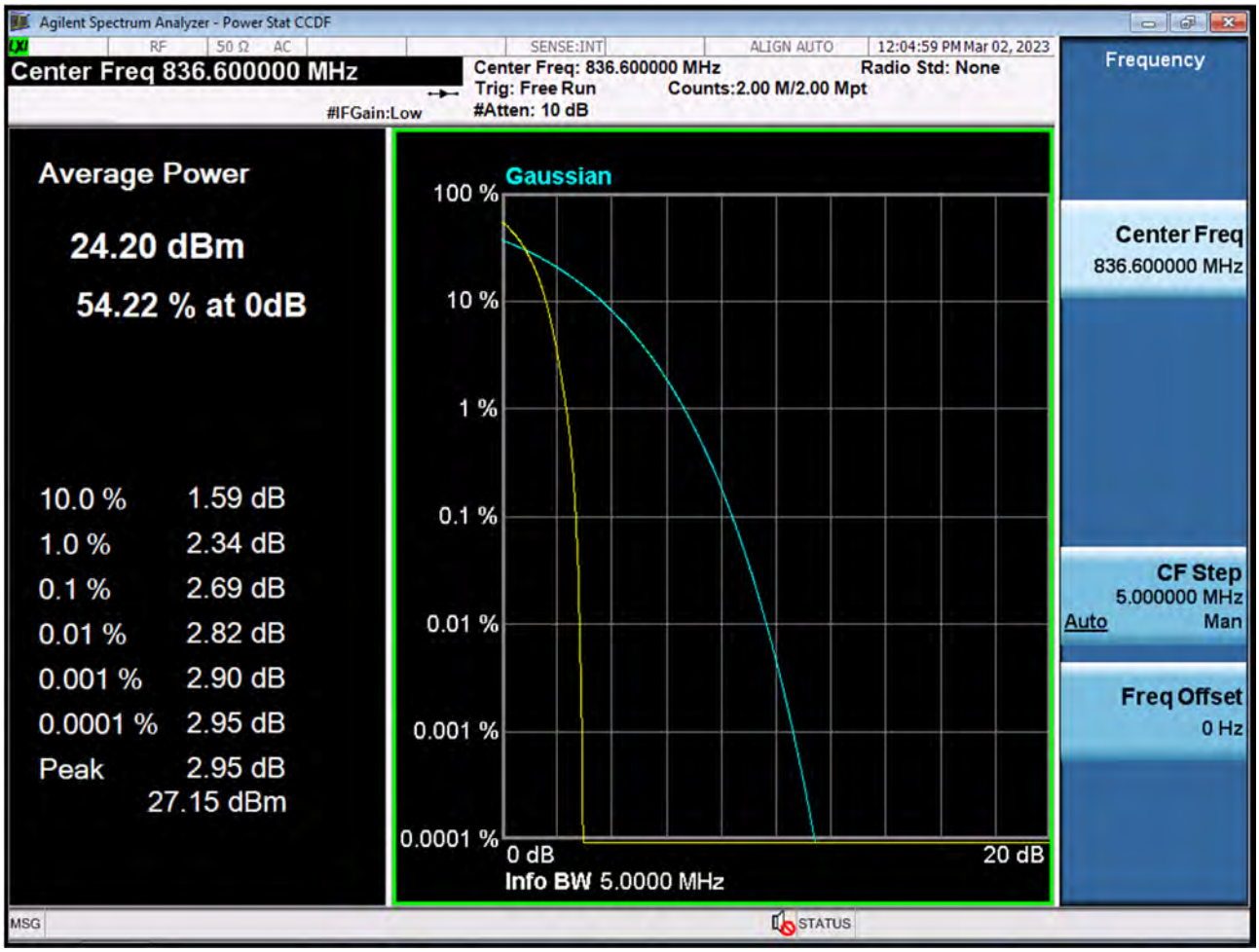
■ GSM850 MODE (190 CH.) Peak-to-Average Ratio



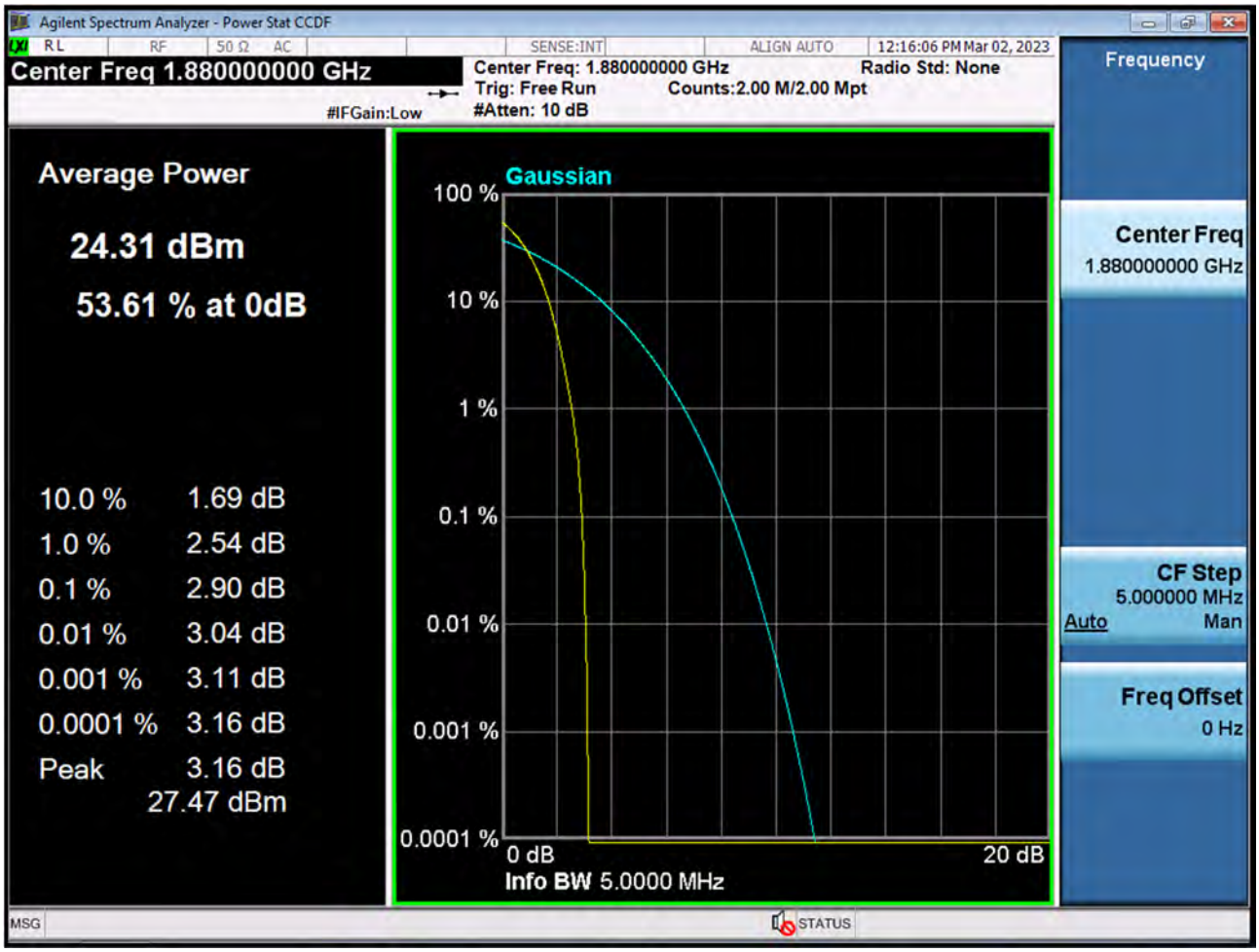
■ GSM850 EDGE (190 CH.) Peak-to-Average Ratio



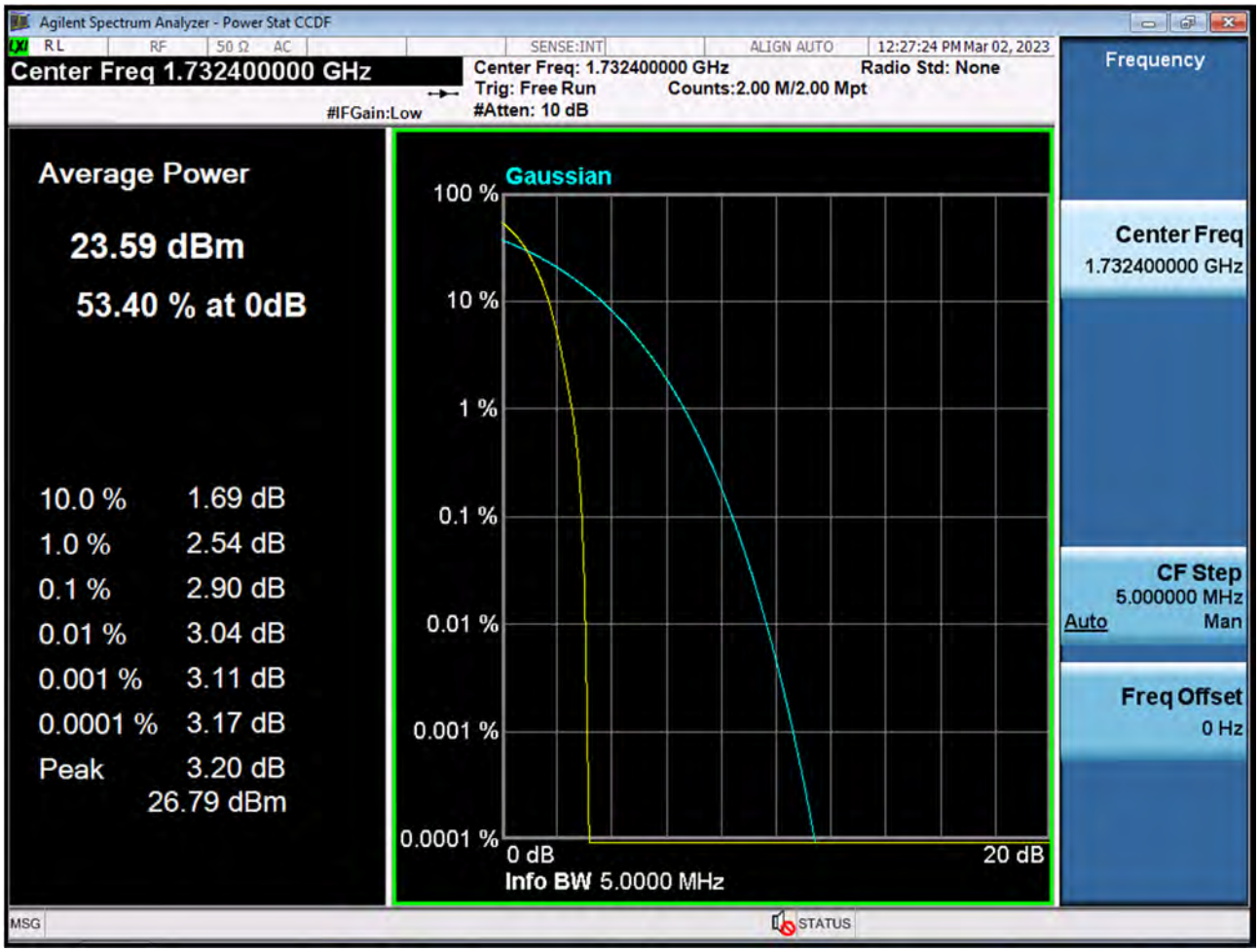
■ WCDMA850 MODE (4408 CH.) Peak-to-Average Ratio



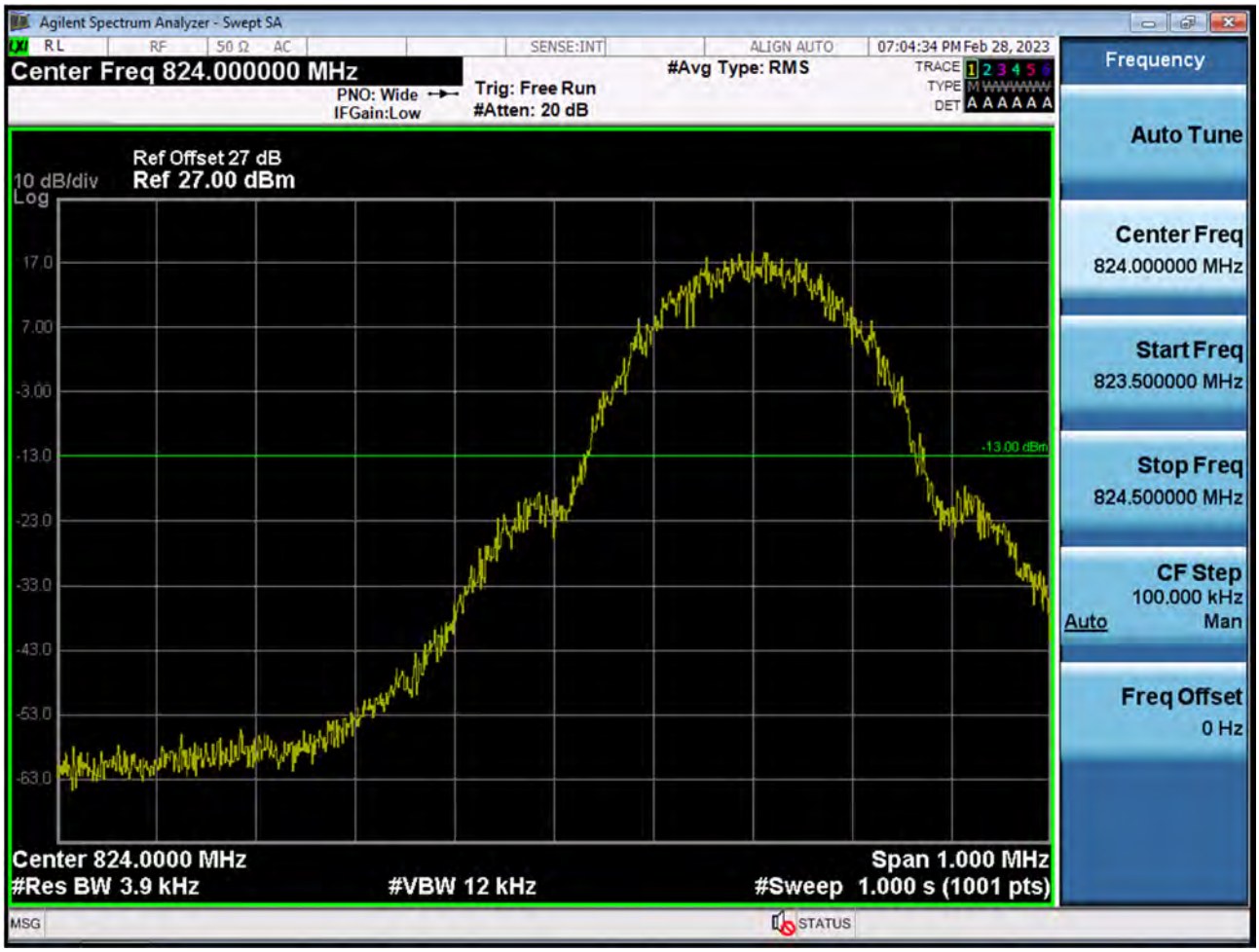
■ WCDMA1900 MODE (9400 CH.) Peak-to-Average Ratio



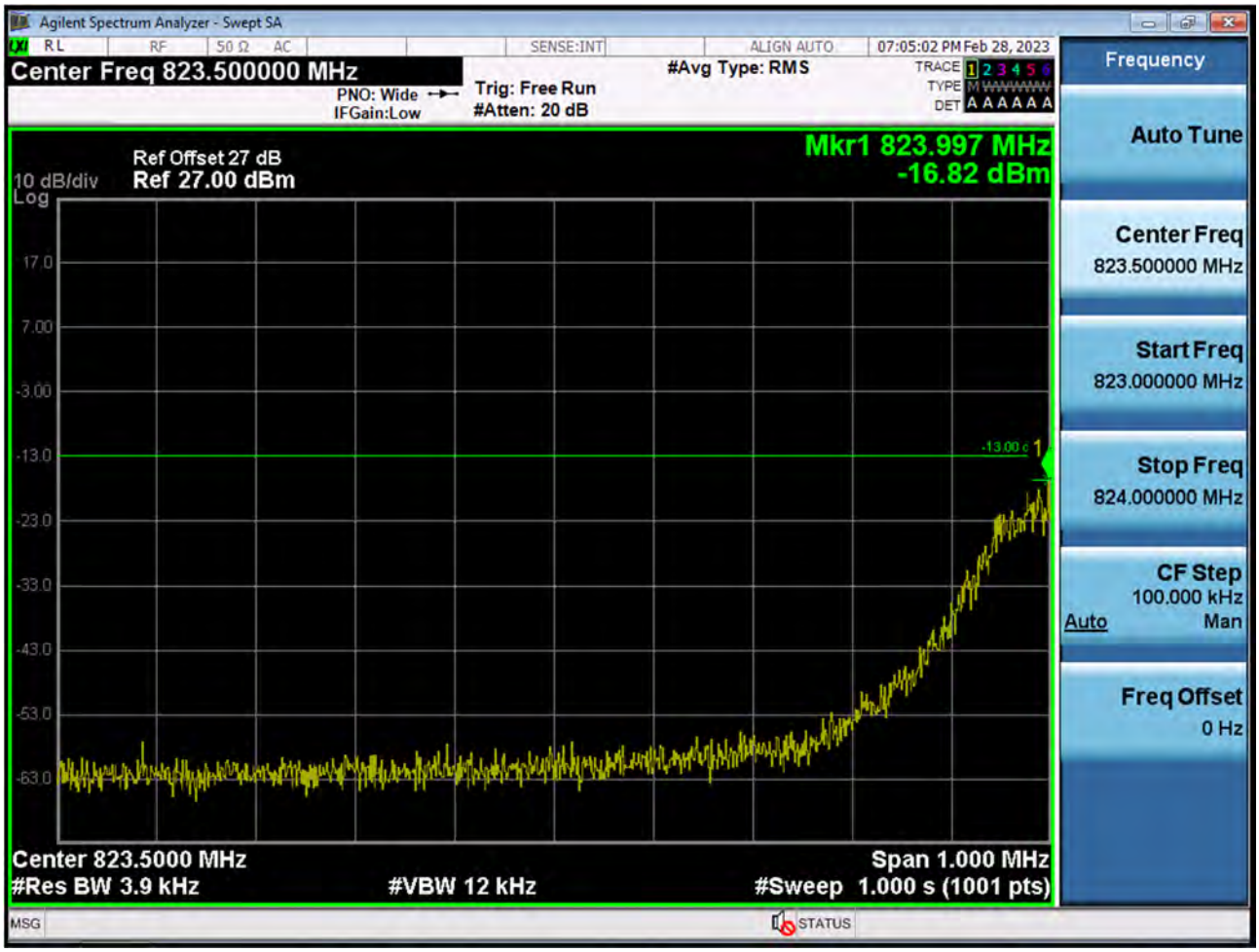
■ WCDMA1700 MODE (1412 CH.) Peak-to-Average Ratio



■ GSM850 MODE (128 CH.) Block Edge 1



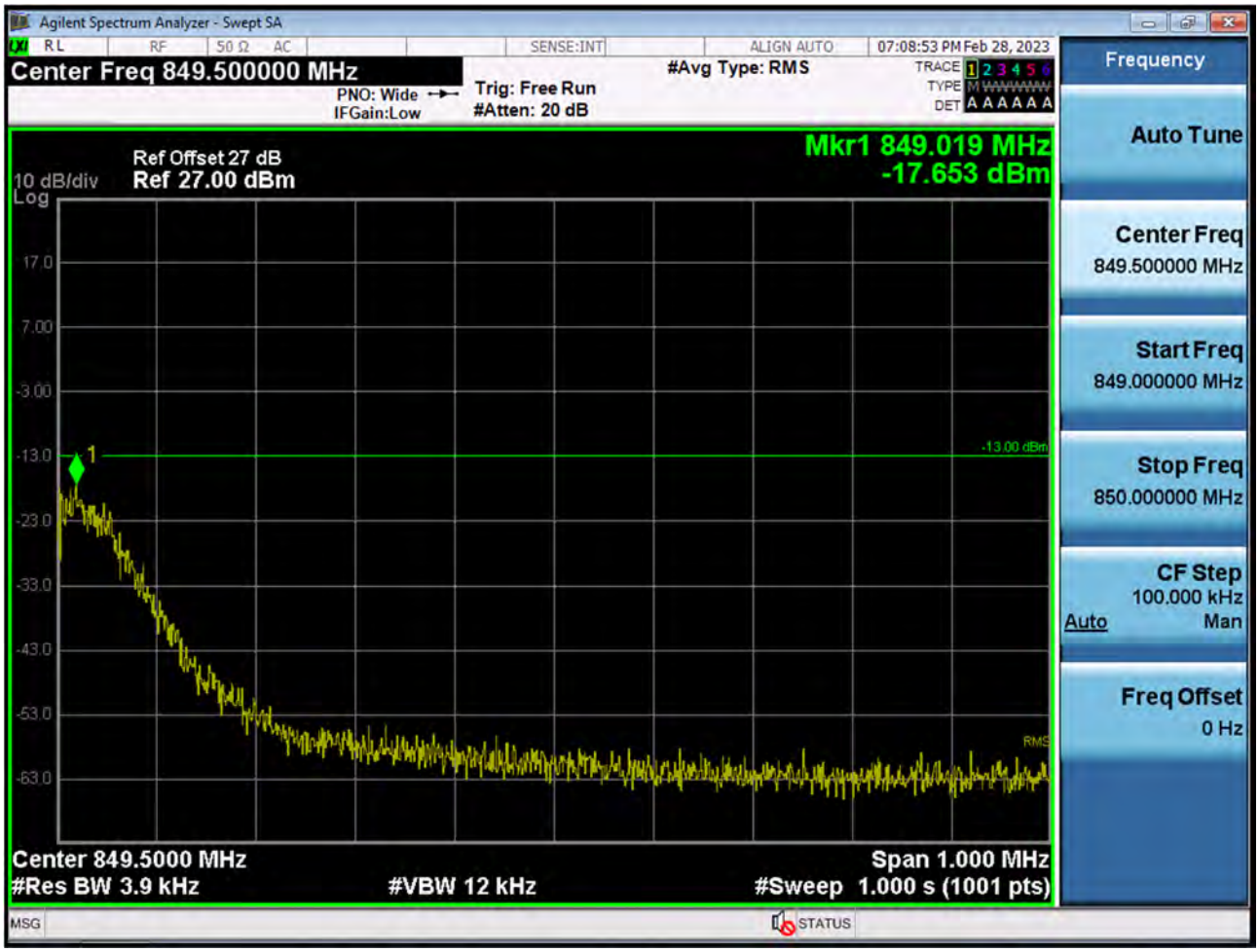
■ GSM850 MODE (128 CH.) Block Edge 2



■ GSM850 MODE (128 CH.) Block Edge 3

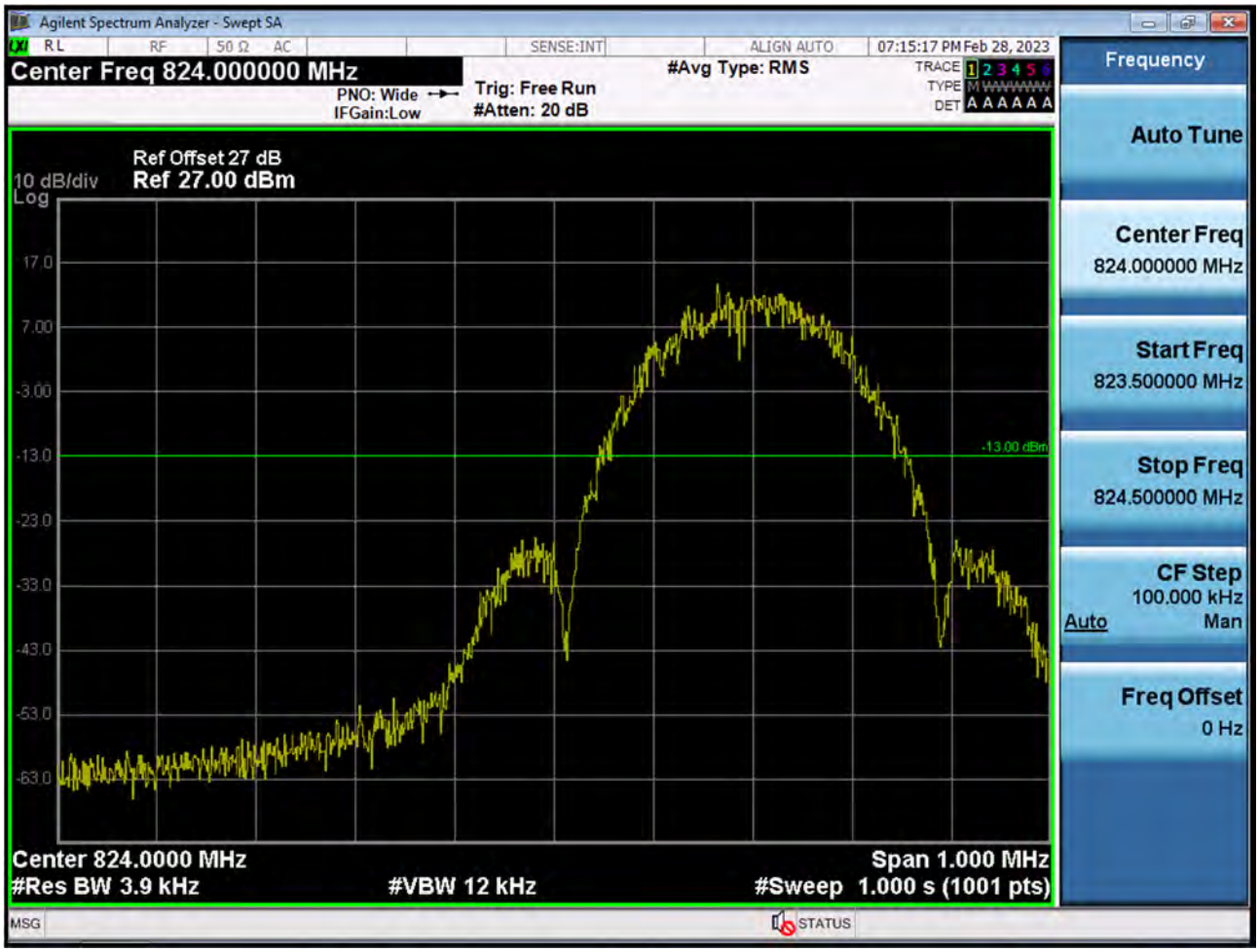
■ GSM850 MODE (251 CH.) Block Edge 1

■ GSM850 MODE (251 CH.) Block Edge 2

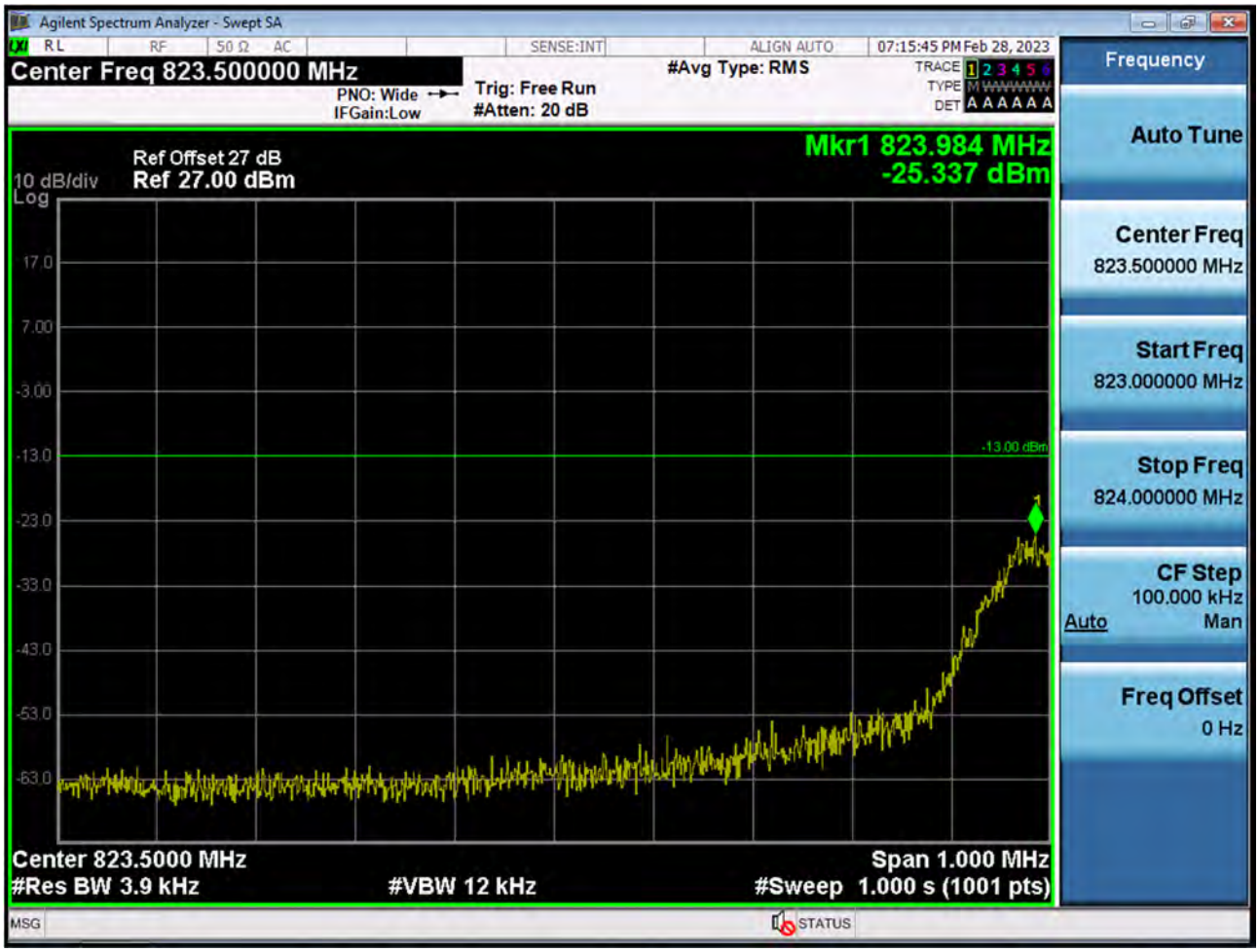


■ GSM850 MODE (251 CH.) Block Edge 3

■ EDGE MODE (128 CH.) Block Edge 1



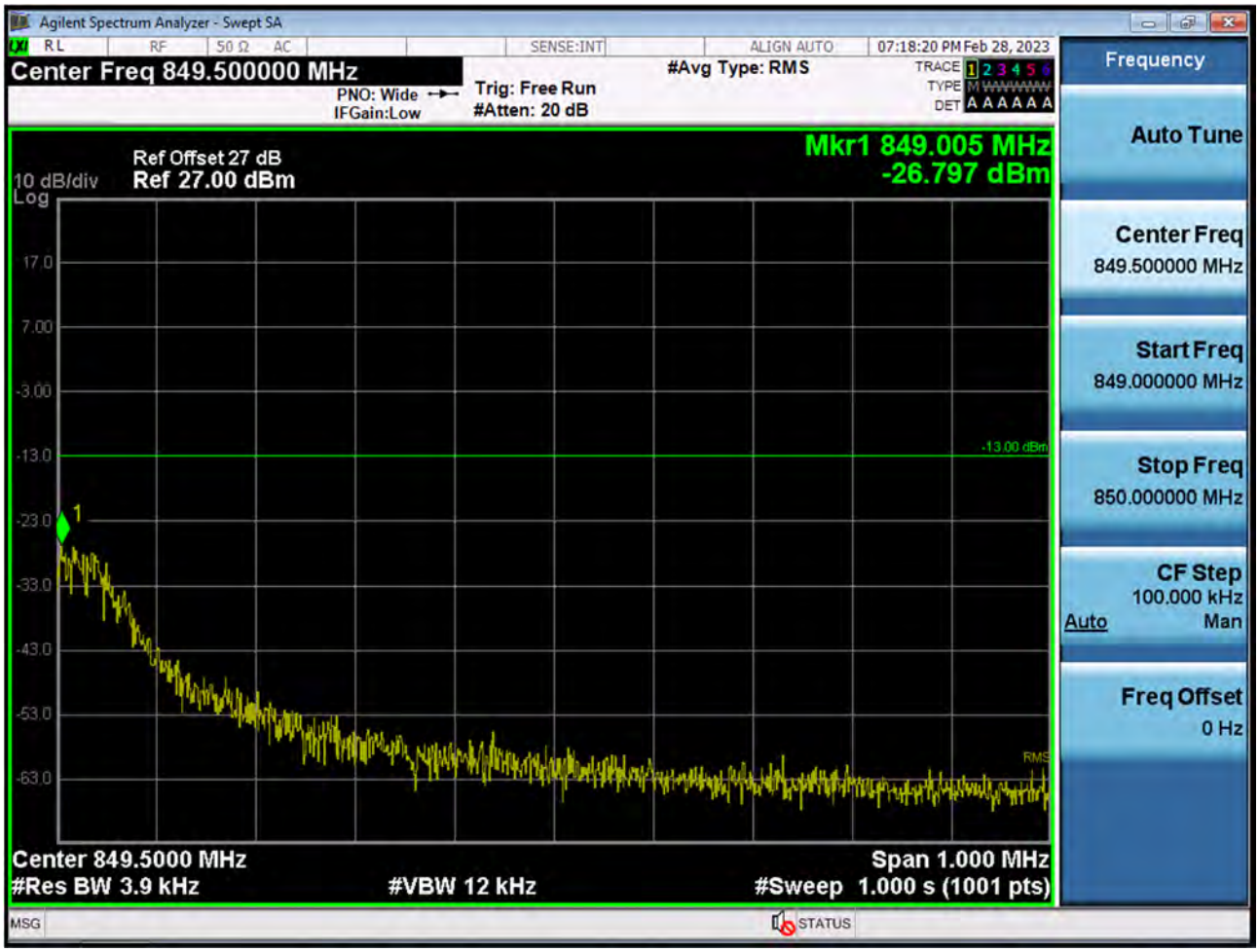
■ EDGE MODE (128 CH.) Block Edge 2



■ EDGE MODE (128 CH.) Block Edge 3

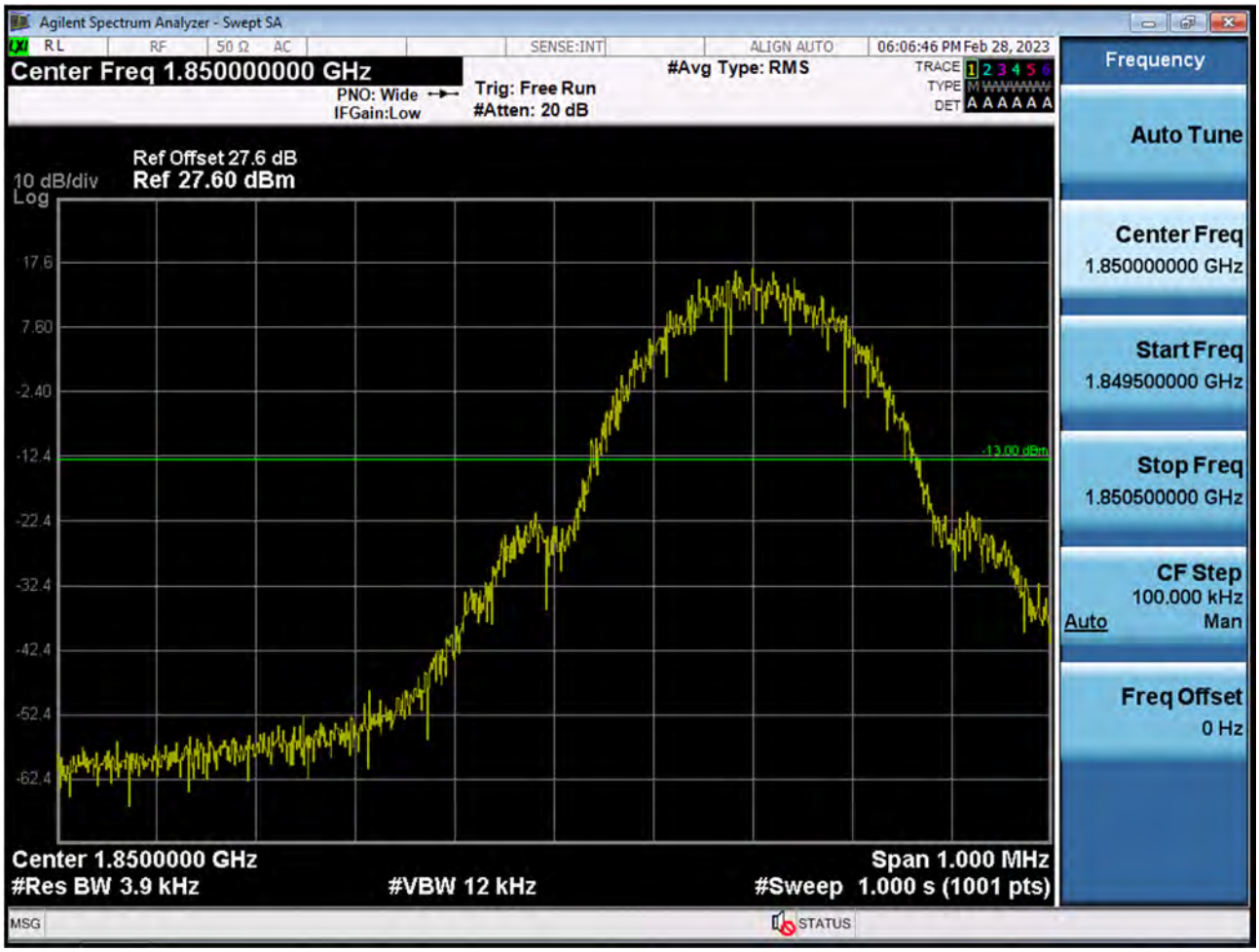
■ EDGE MODE (251 CH.) Block Edge 1

■ EDGE MODE (251 CH.) Block Edge 2

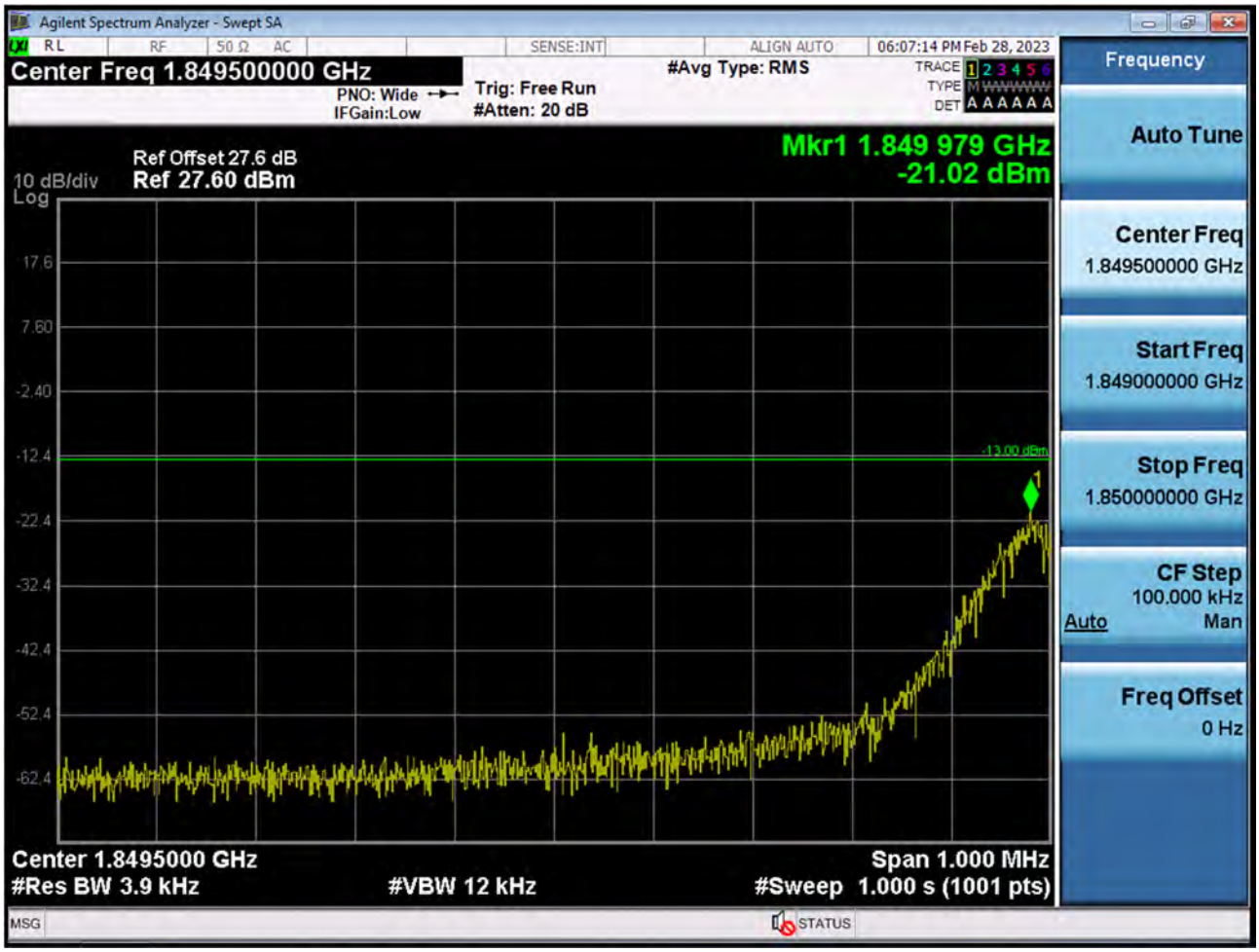


■ EDGE MODE (251 CH.) Block Edge 3

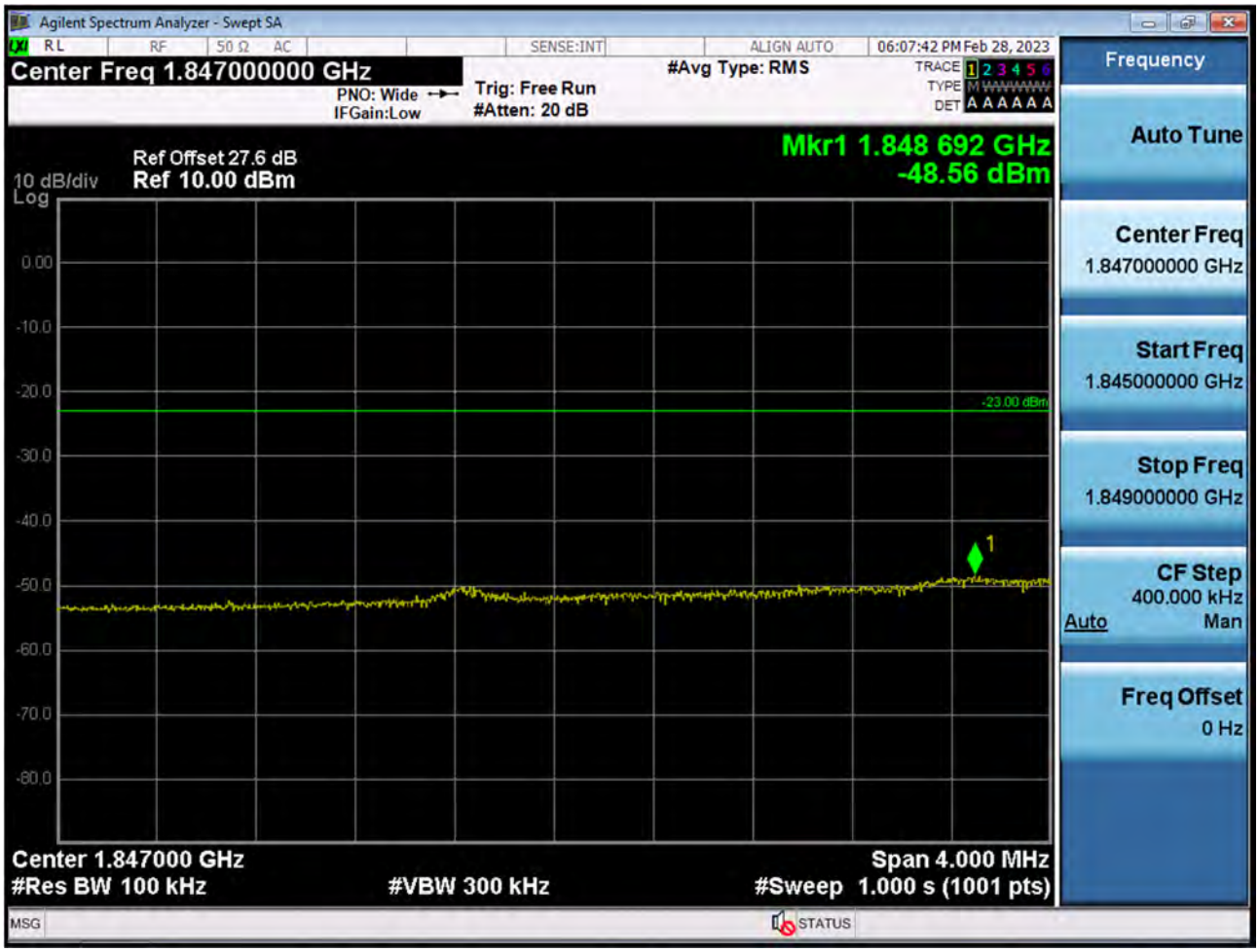
■ GSM1900 MODE (512 CH.) Block Edge 1



■ GSM1900 MODE (512 CH.) Block Edge 2



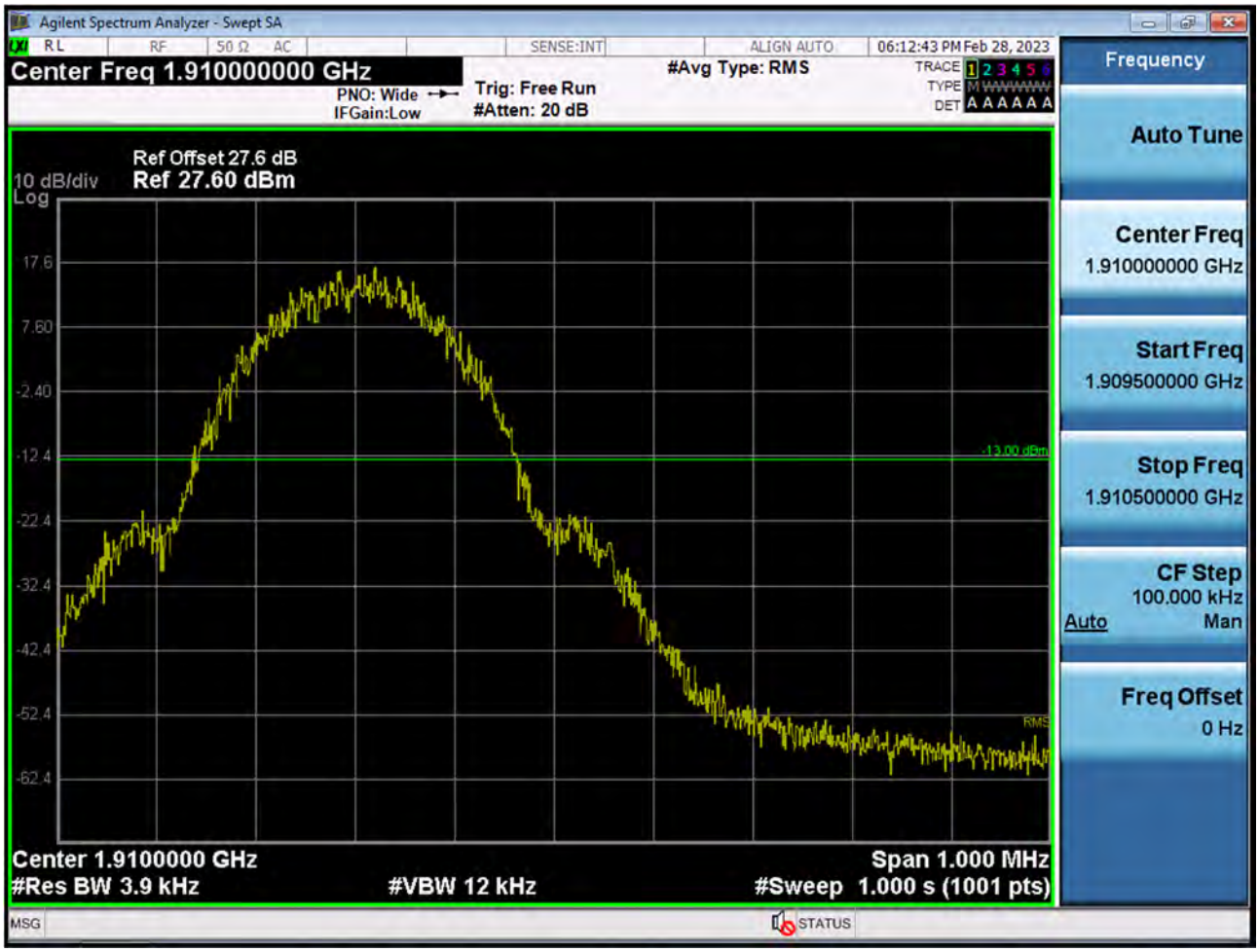
■ GSM1900 MODE (512 CH.) Block Edge 3



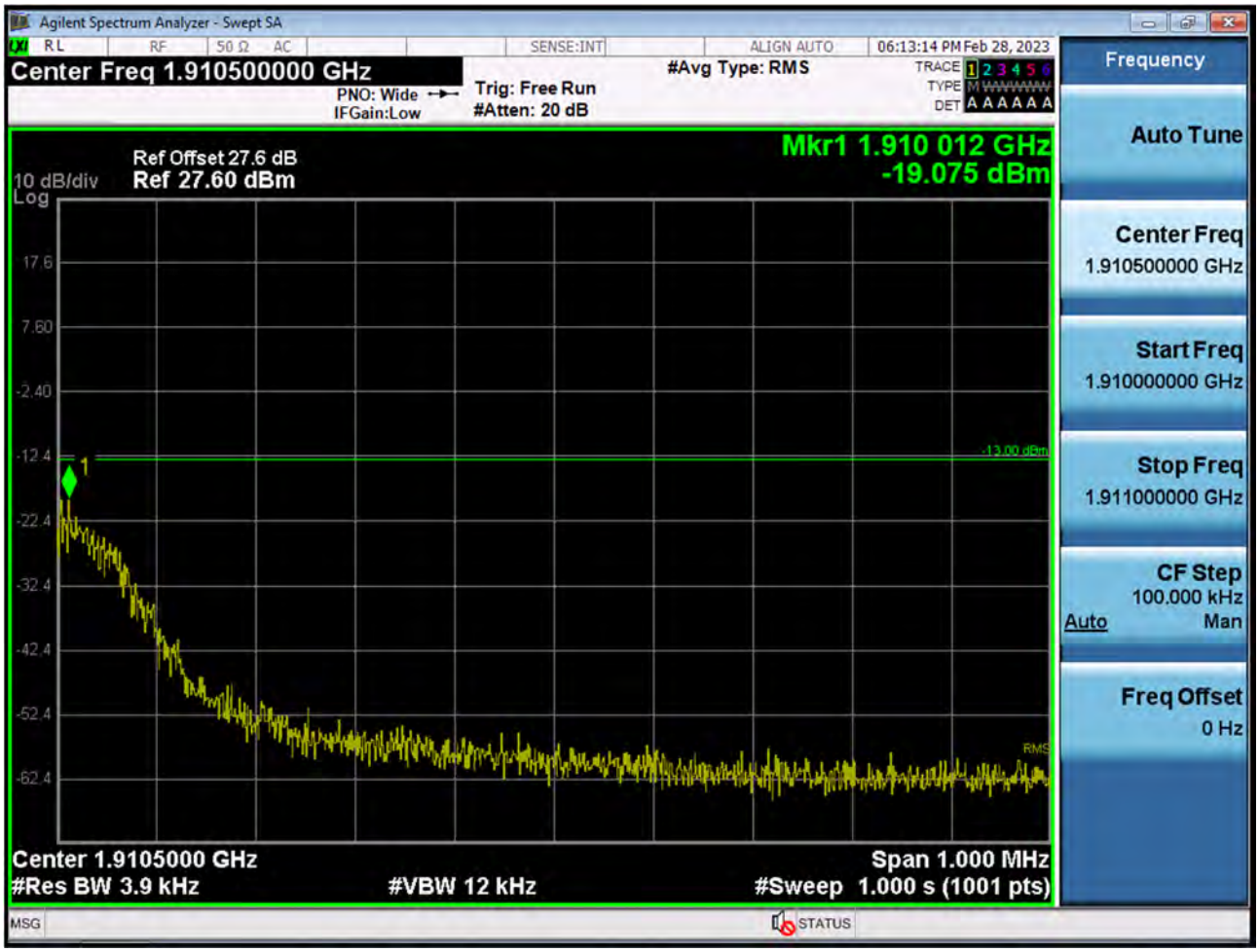
Note : We used a narrower RBW in order to increase accuracy.

Calculation = Reading Value + 10 x log(1 MHz/100 kHz) dB = -48.56 dBm + 10 dB = -38.56 dBm

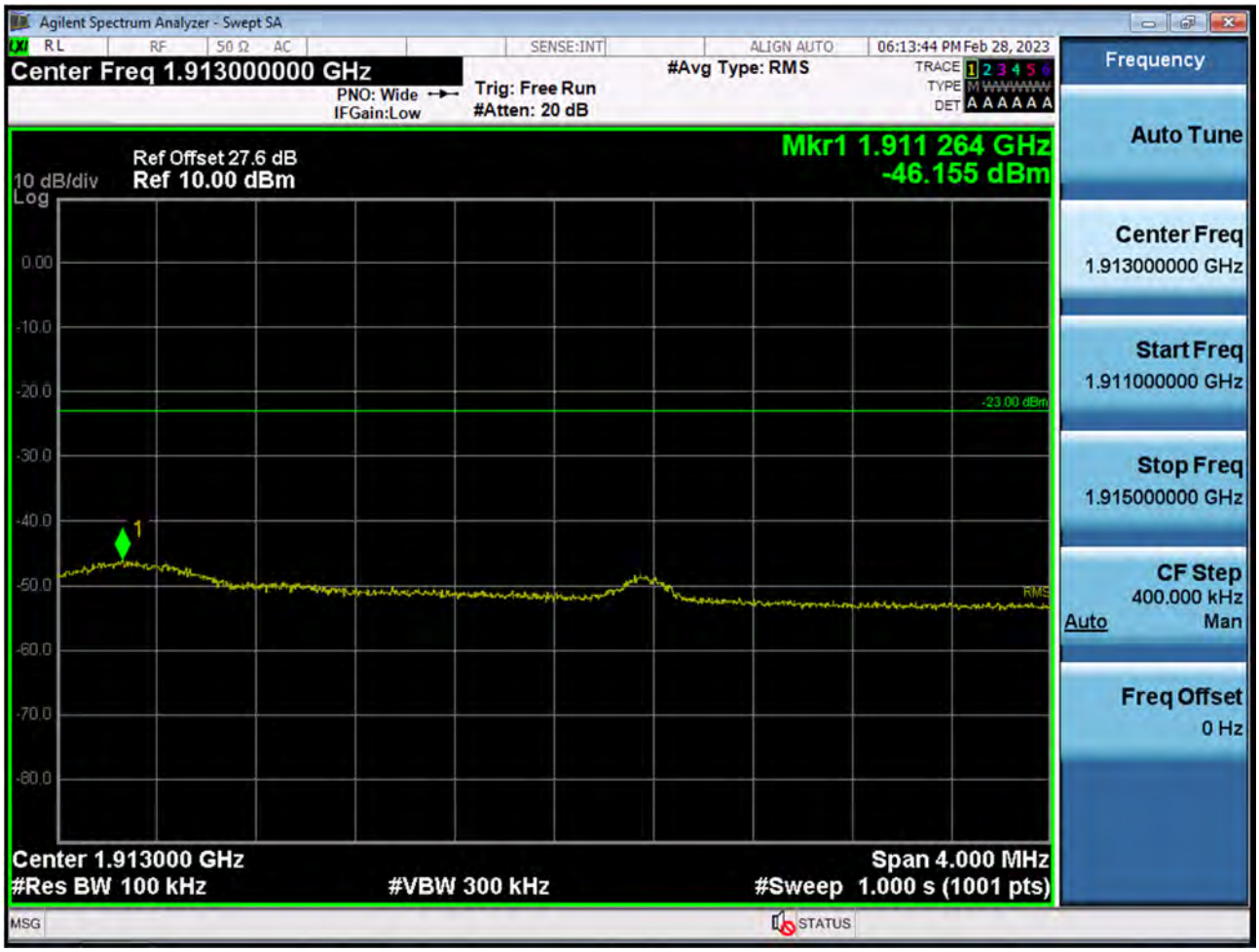
■ GSM1900 MODE (810 CH.) Block Edge 1



■ GSM1900 MODE (810 CH.) Block Edge 2



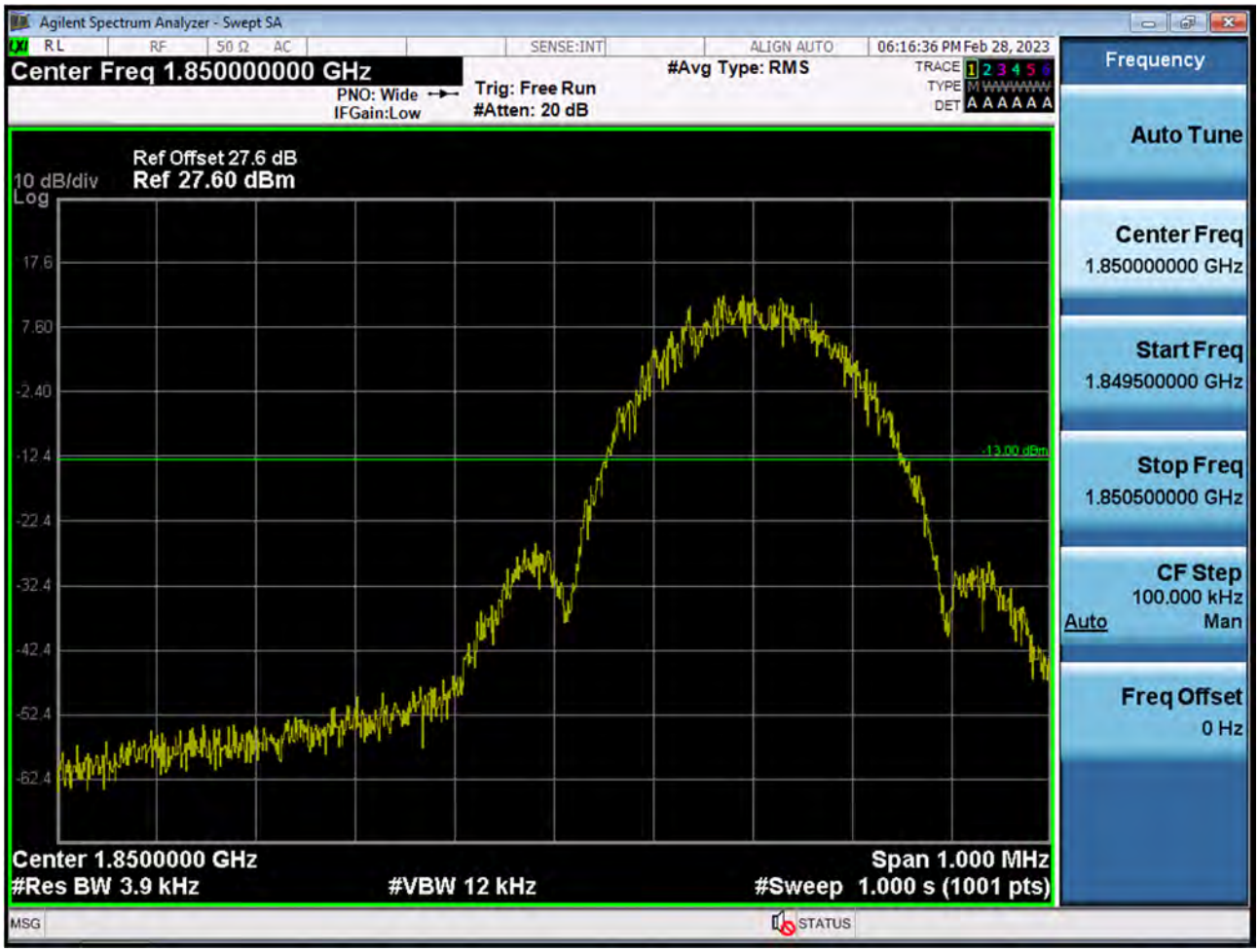
■ GSM1900 MODE (810 CH.) Block Edge 3



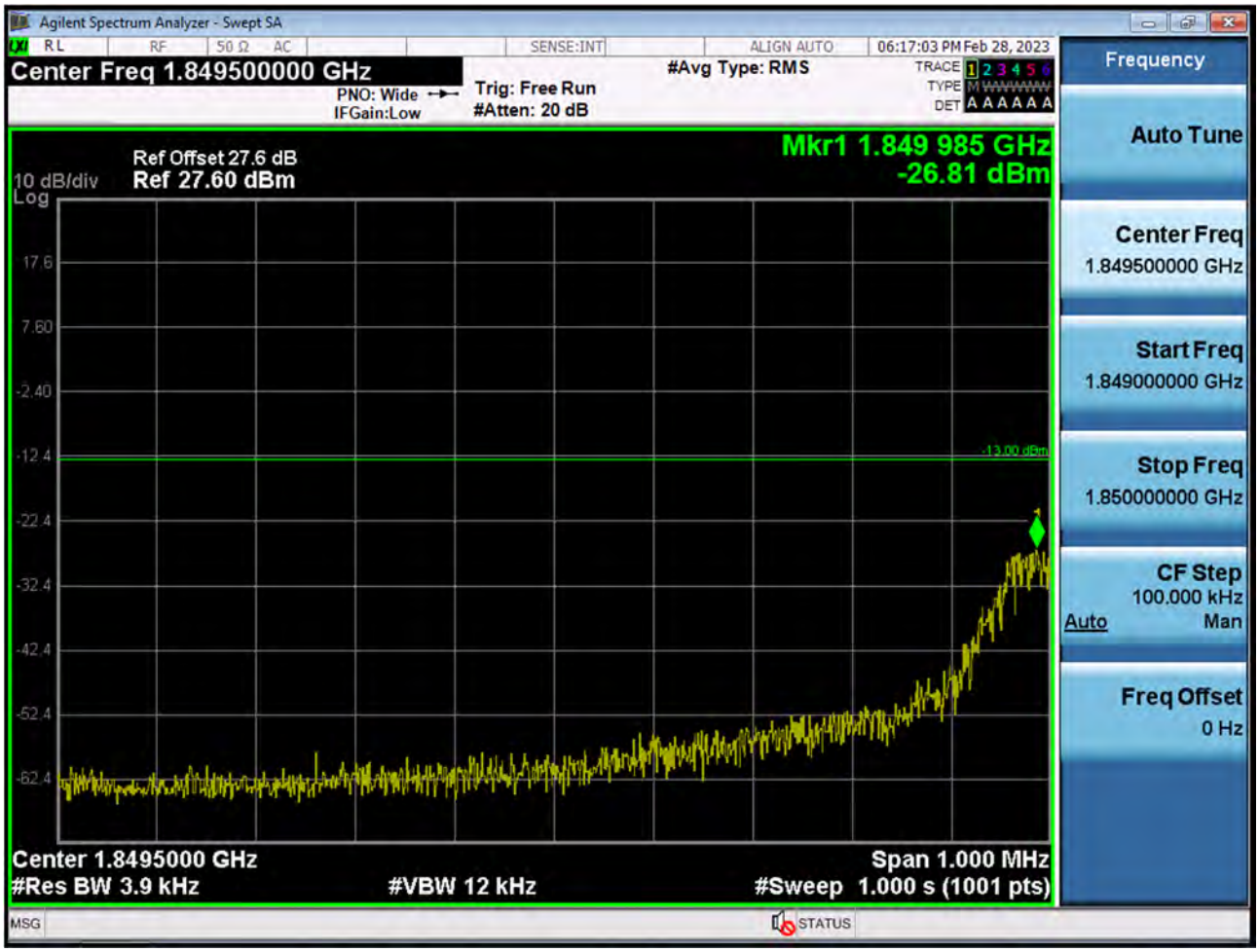
Note : We used a narrower RBW in order to increase accuracy.

Calculation = Reading Value + 10 x log(1 MHz/100 kHz) dB = -46.155 dBm + 10 dB = -36.155 dBm

■ EDGE MODE (512 CH.) Block Edge 1



■ EDGE MODE (512 CH.) Block Edge 2

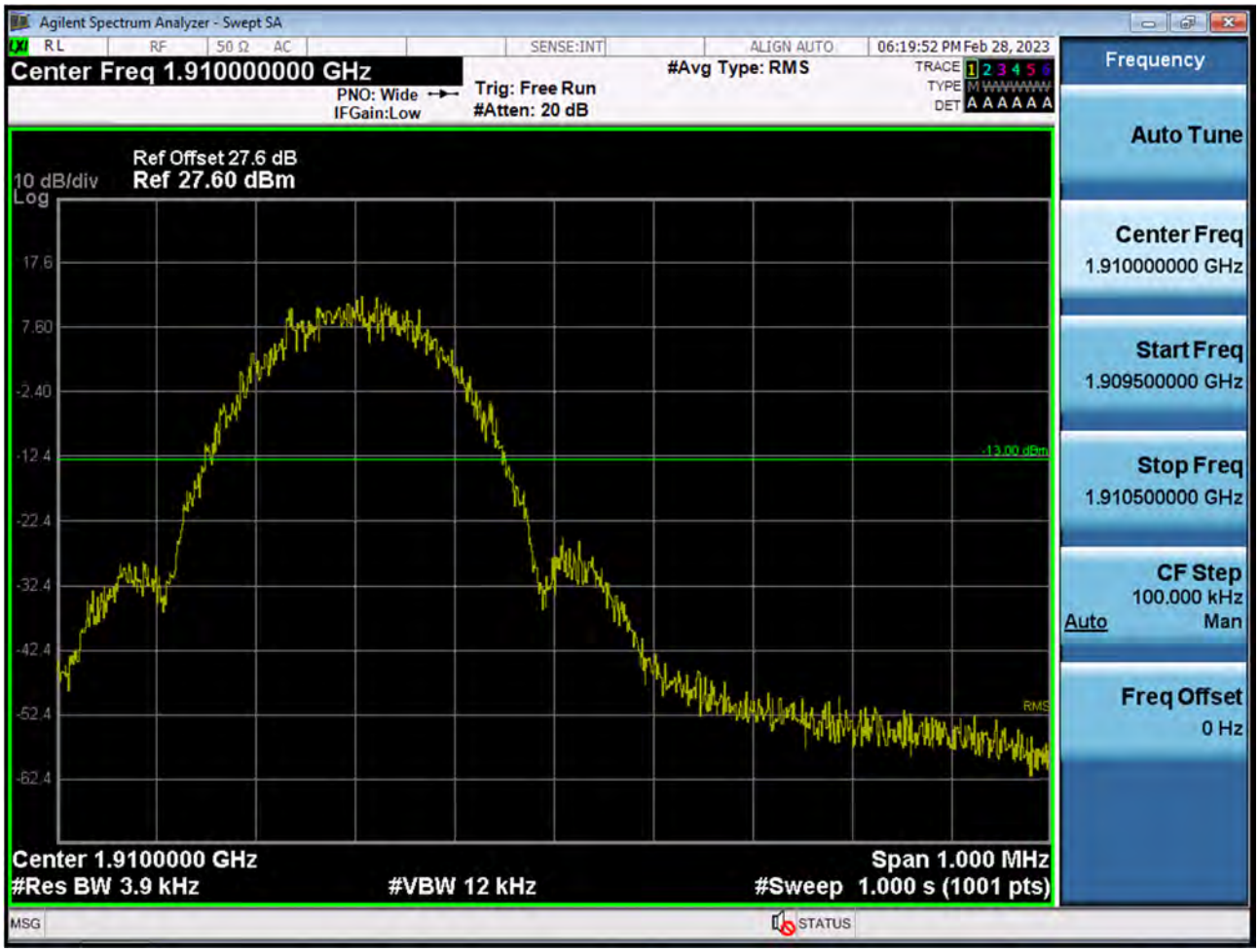


■ EDGE MODE (512 CH.) Block Edge 3

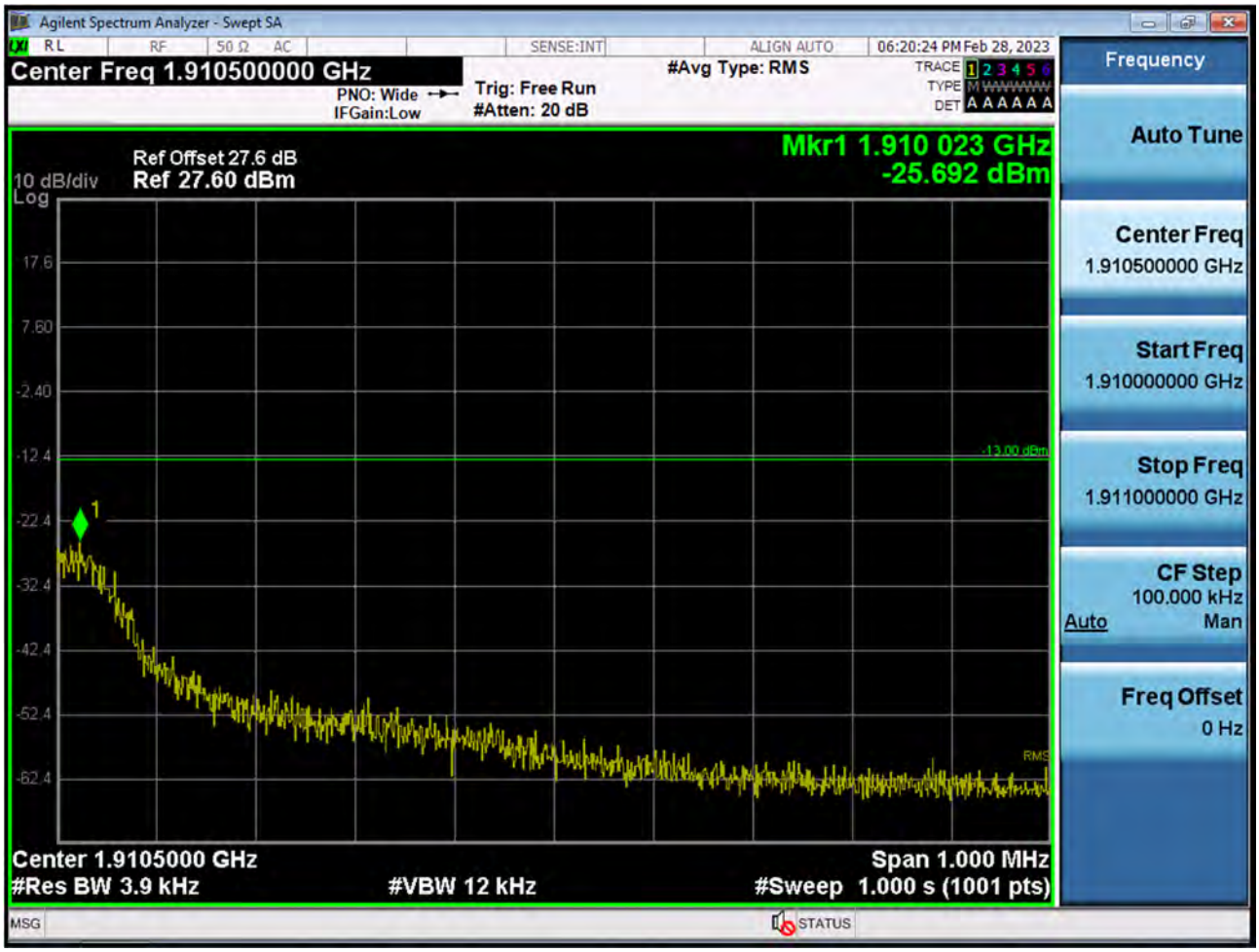
Note : We used a narrower RBW in order to increase accuracy.

Calculation = Reading Value + 10 x log(1 MHz/100 kHz) dB = -49.12 dBm + 10 dB = -39.12 dBm

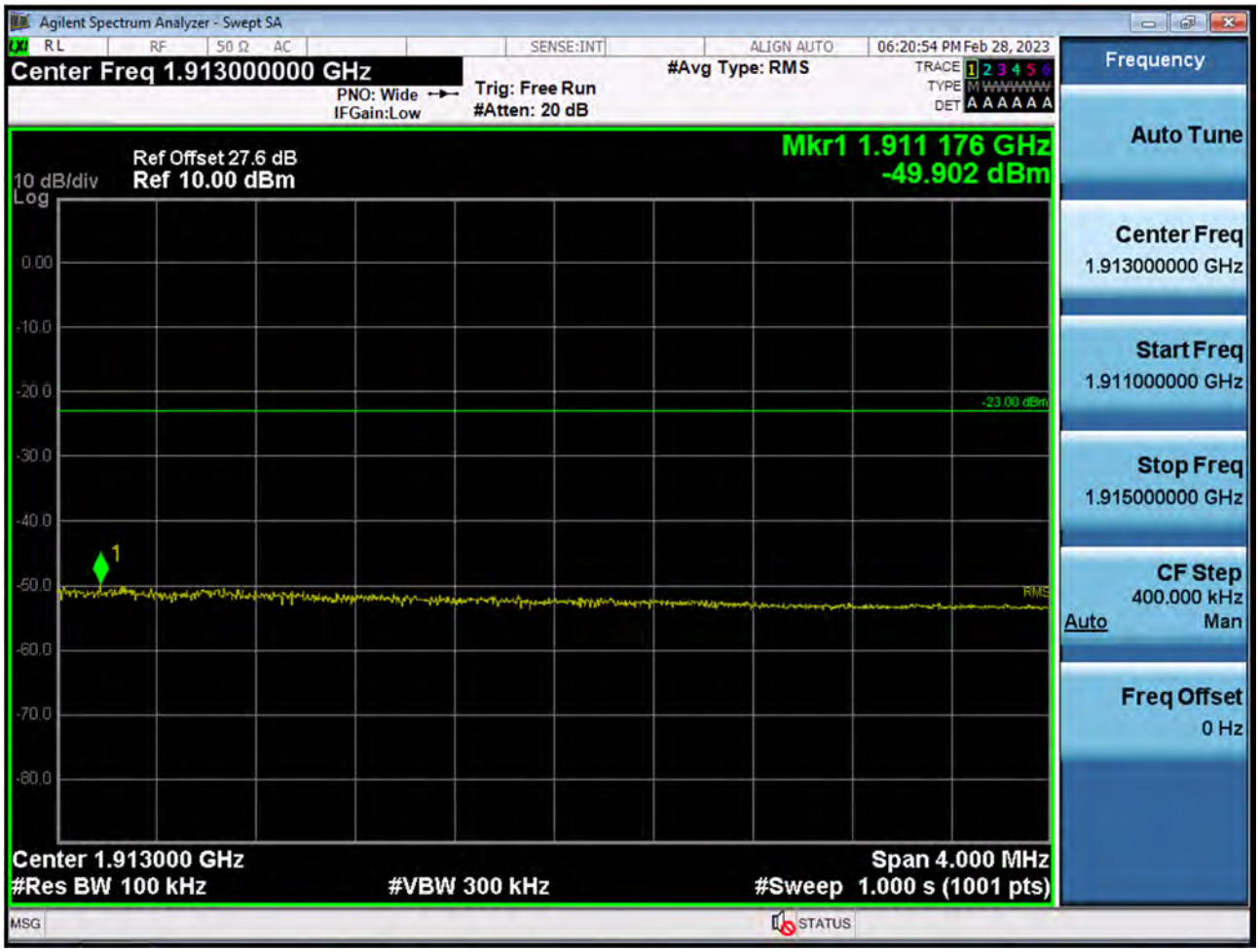
■ EDGE MODE (810 CH.) Block Edge 1



■ EDGE MODE (810 CH.) Block Edge 2



■ EDGE MODE (810 CH.) Block Edge 3



Note : We used a narrower RBW in order to increase accuracy.

Calculation = Reading Value + 10 x log(1 MHz/100 kHz) dB = -49.902 dBm + 10 dB = -39.902 dBm

■ WCDMA850 MODE (4132 CH.) Block Edge

■ WCDMA850 MODE (4132 CH.) – 4 MHz Span

■ WCDMA850MODE (4233 CH.) Block Edge

■ WCDMA850MODE (4233 CH.) – 4 MHz Span

■ WCDMA1900 MODE (9262 CH.) Block Edge

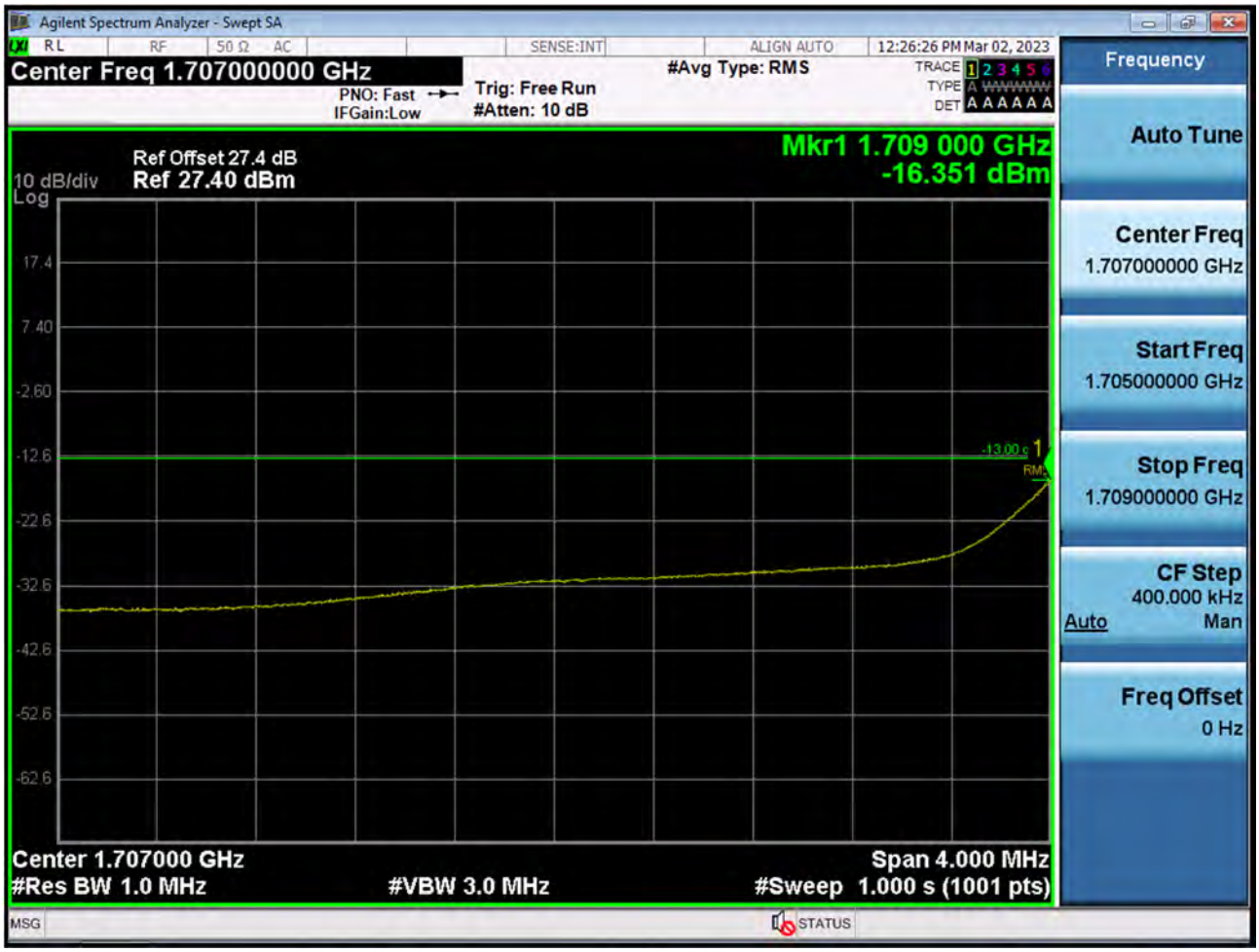
■ WCDMA1900 MODE (9262 CH.) – 4 MHz Span

■ WCDMA1900 MODE (9538 CH.) Block Edge

■ WCDMA1900 MODE (9538 CH.) – 4 MHz Span

■ WCDMA1700 MODE (1312 CH.) Block Edge

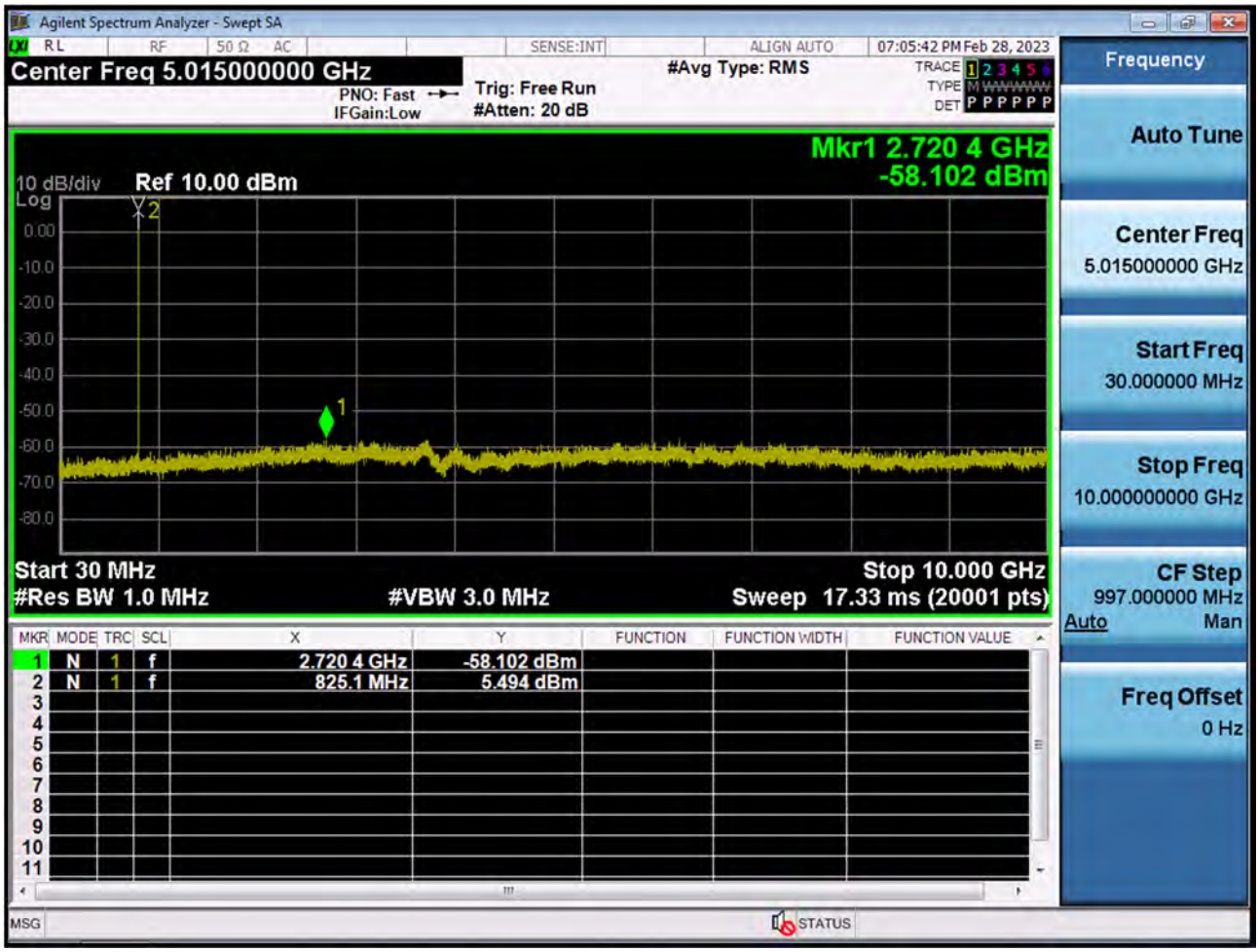
■ WCDMA1700 MODE (1312 CH.) – 4 MHz Span



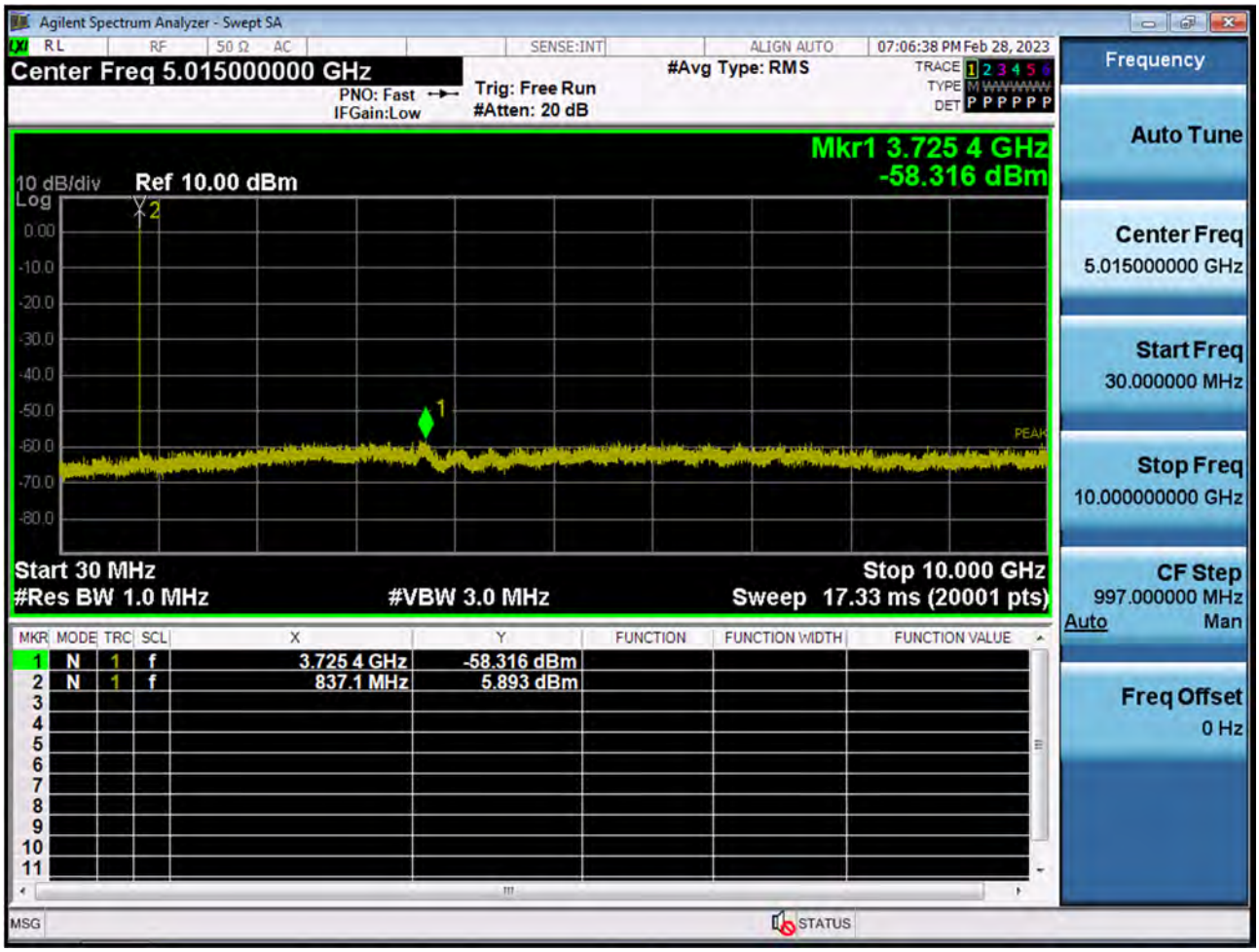
■ WCDMA1700 MODE (1513 CH.) Block Edge

■ WCDMA1700 MODE (1513 CH.) – 4 MHz Span

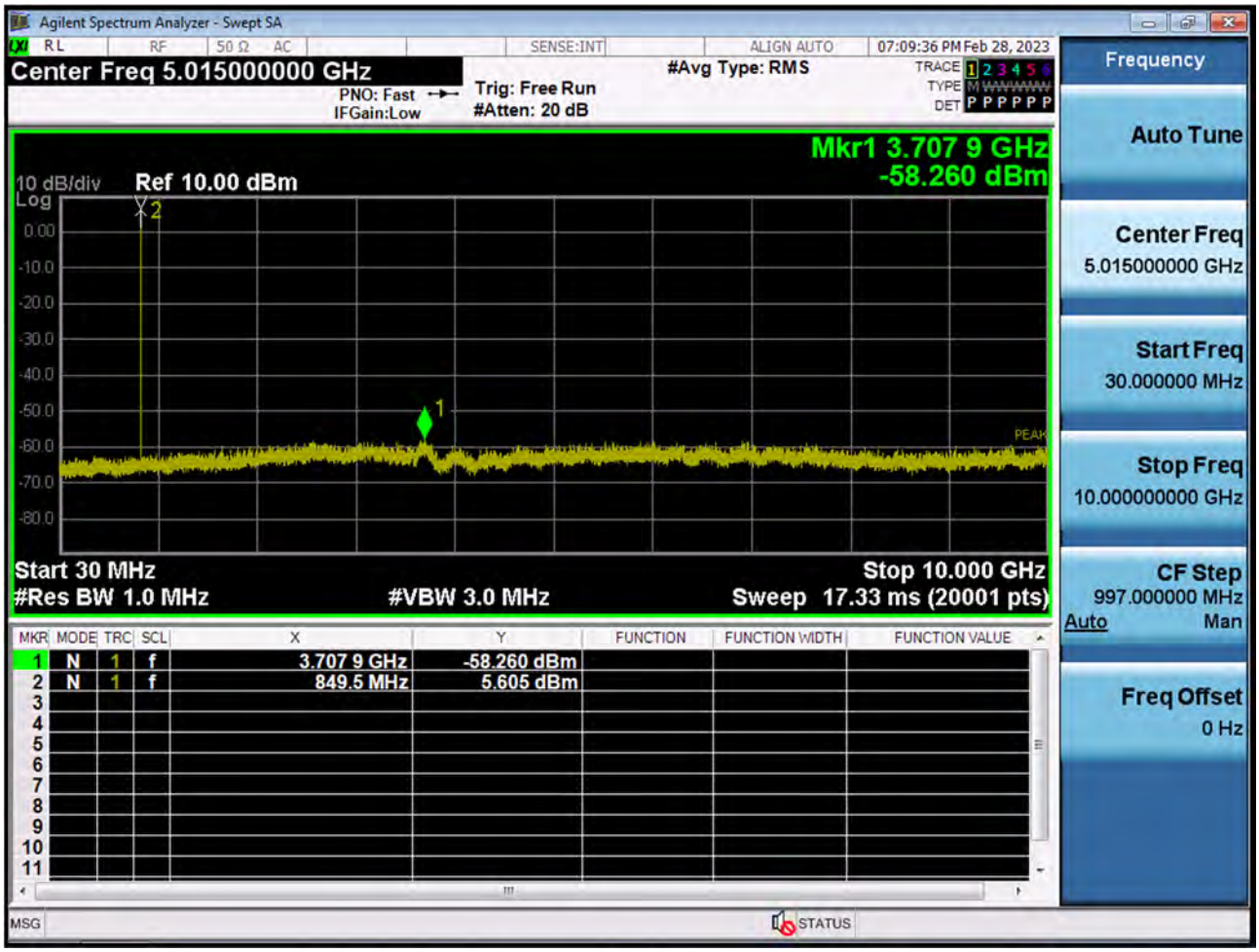
■ GSM850 MODE (128 CH.) Conducted Spurious Emissions



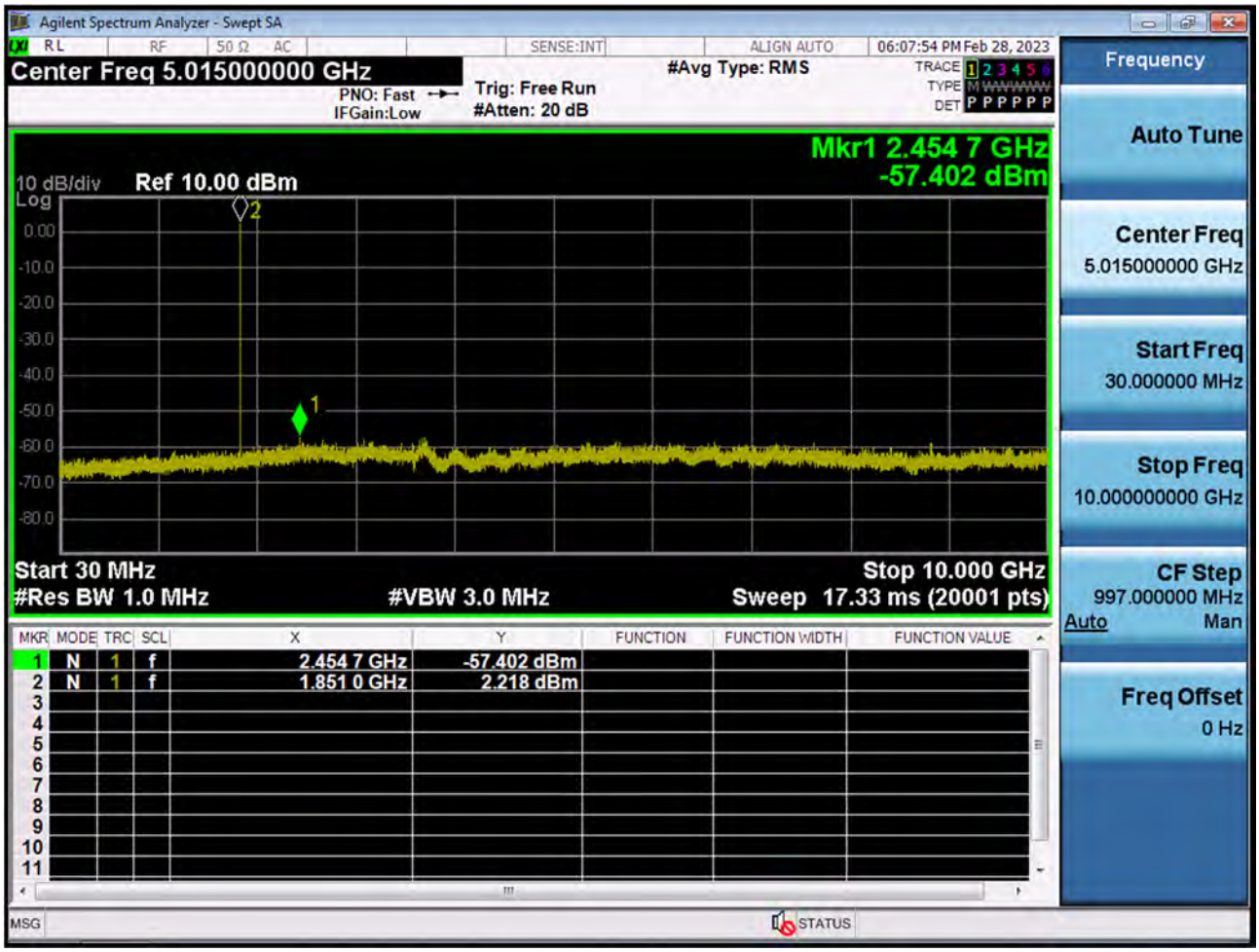
■ GSM850 MODE (190 CH.) Conducted Spurious Emissions



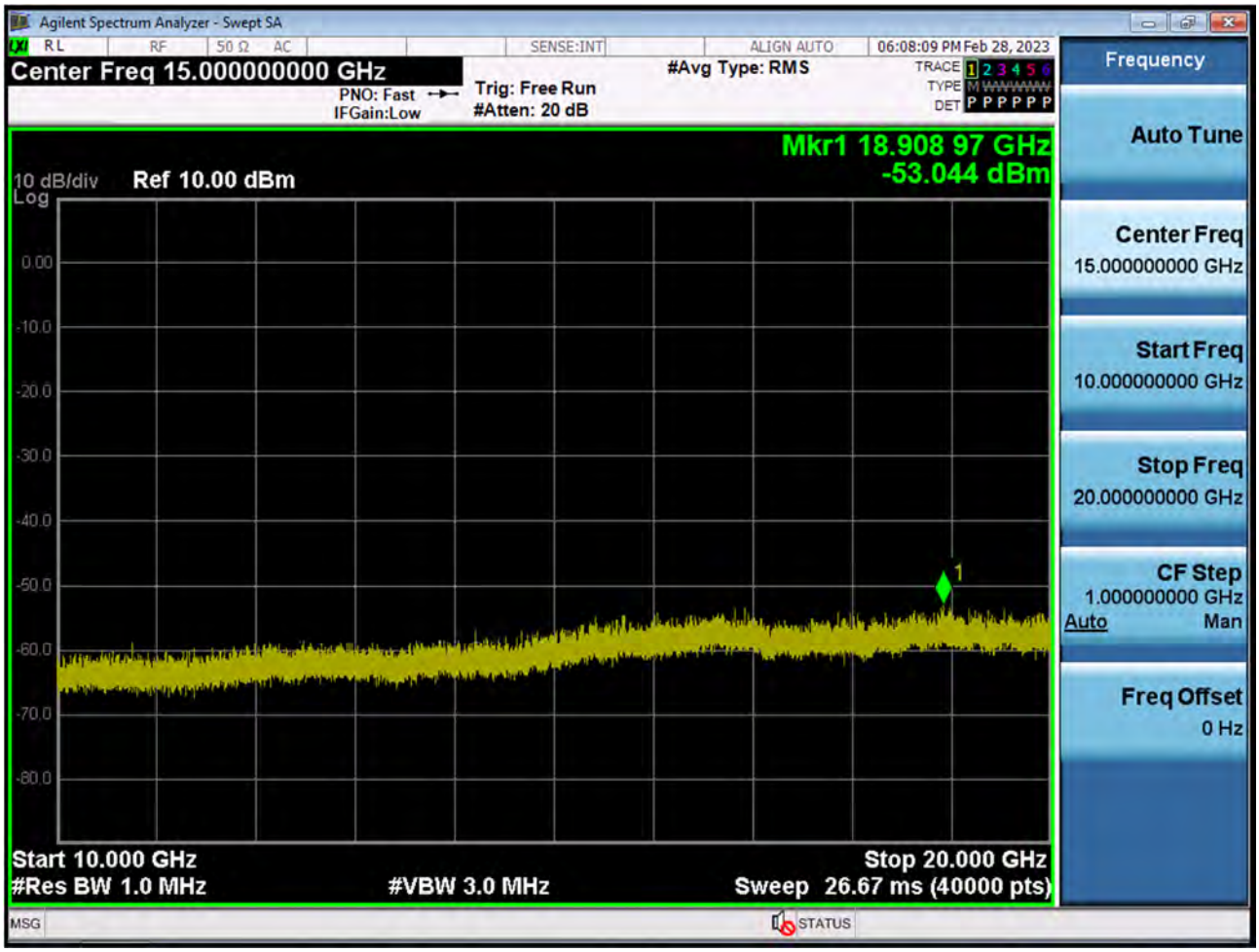
■ GSM850 MODE (251 CH.) Conducted Spurious Emissions



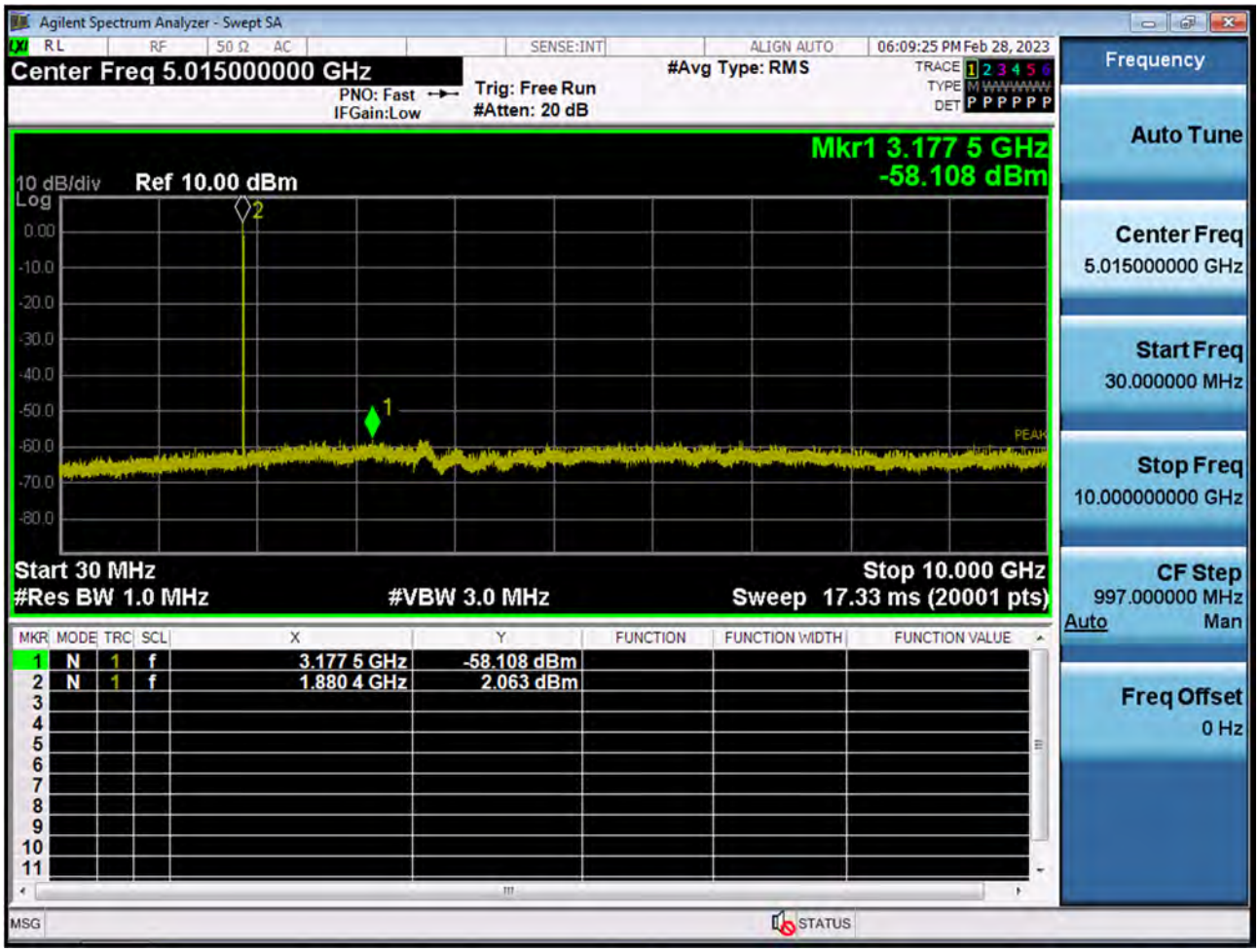
■ GSM1900 MODE (512 CH.) Conducted Spurious Emissions1



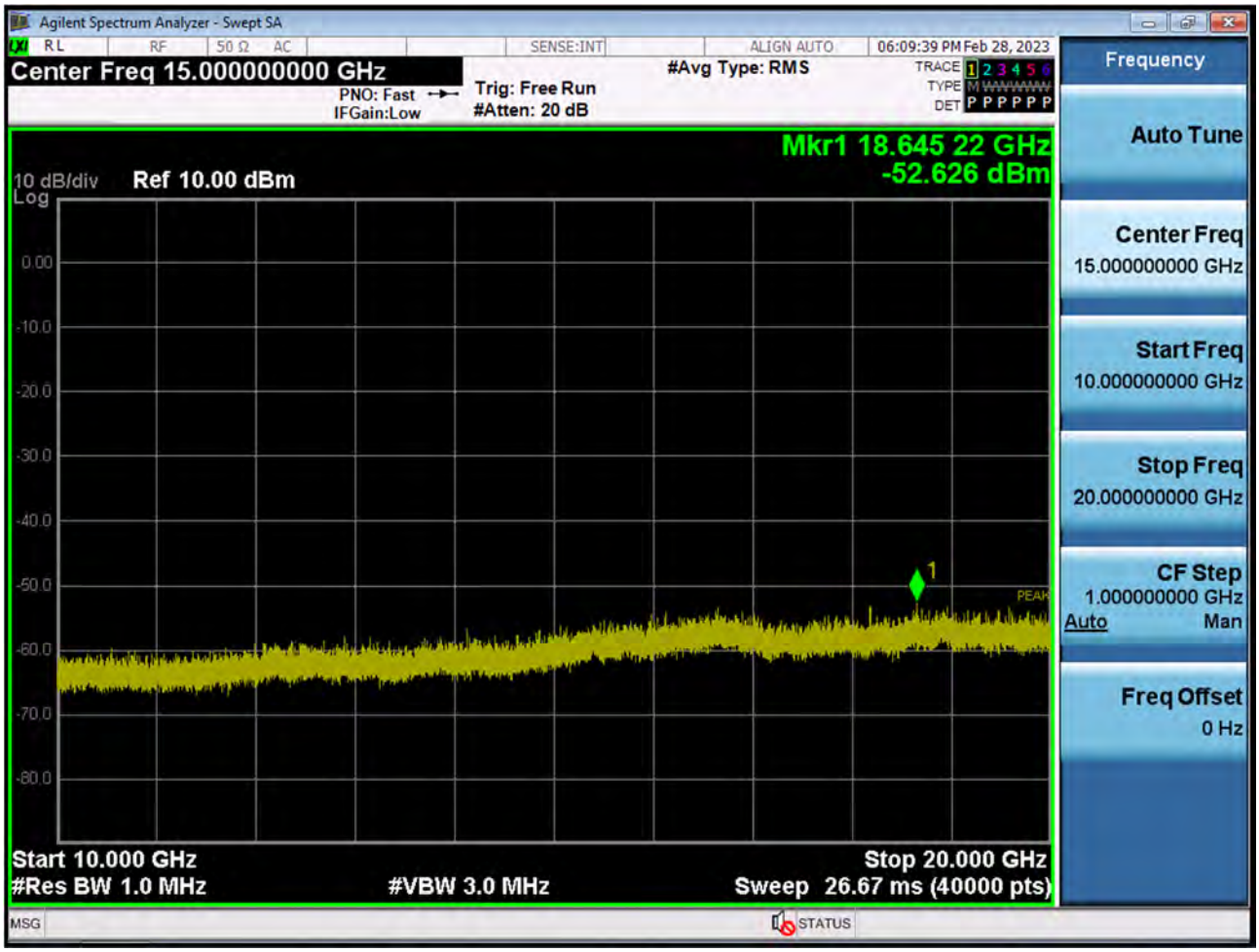
■ GSM1900 MODE (512 CH.) Conducted Spurious Emissions2



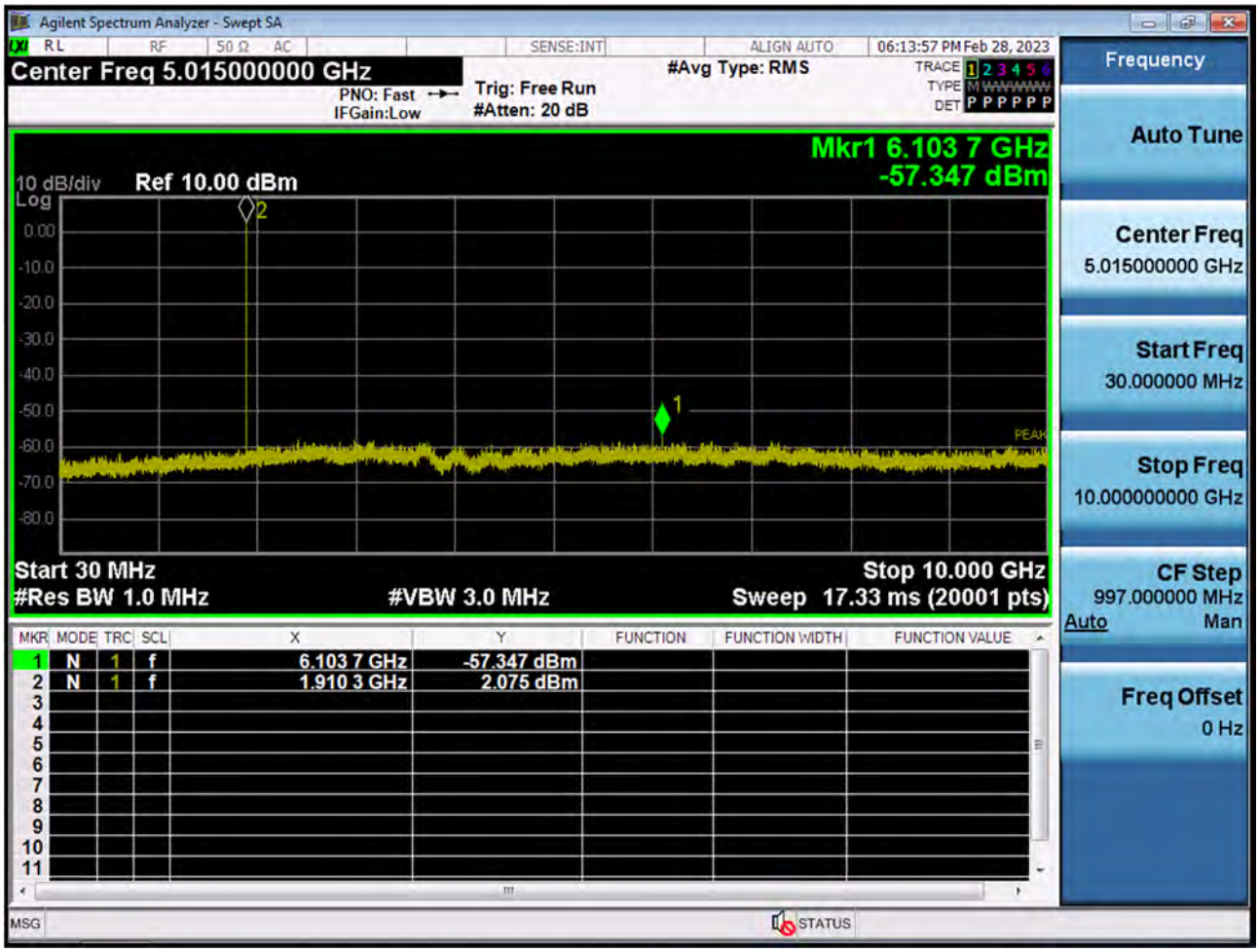
■ GSM1900 MODE (661 CH) Conducted Spurious Emissions1



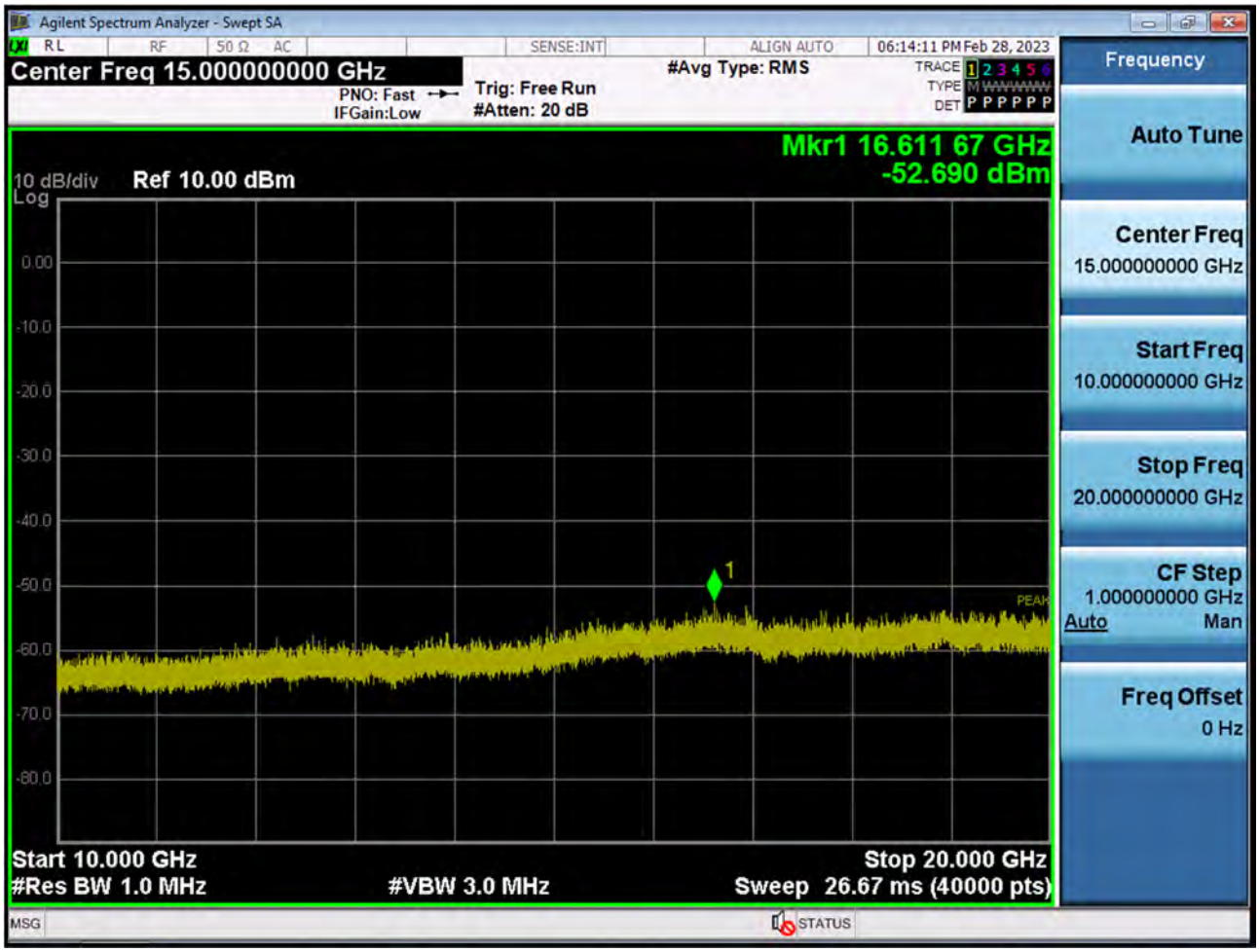
■ GSM1900 MODE (661 CH.) Conducted Spurious Emissions2



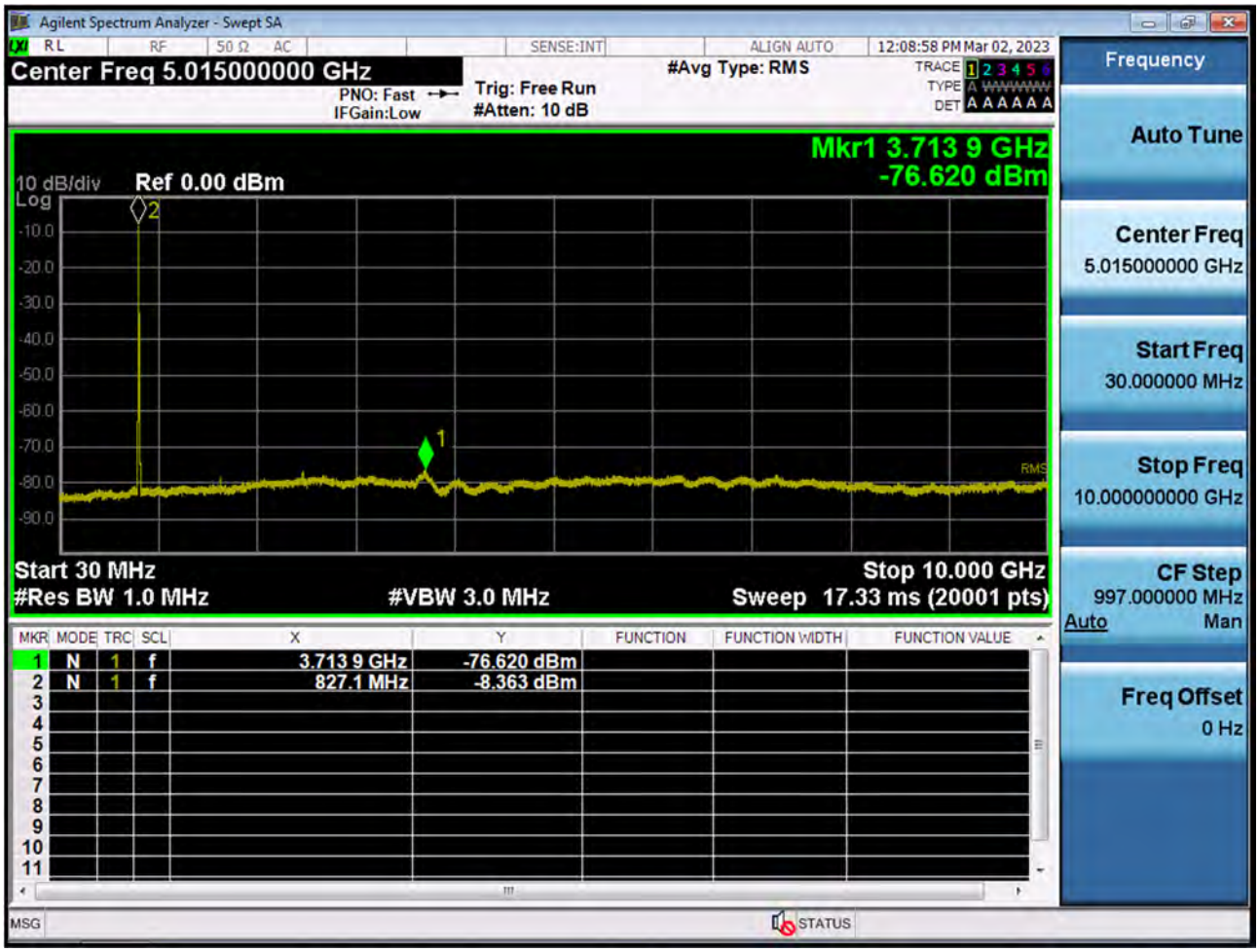
■ GSM1900 MODE (810 CH.) Conducted Spurious Emissions1



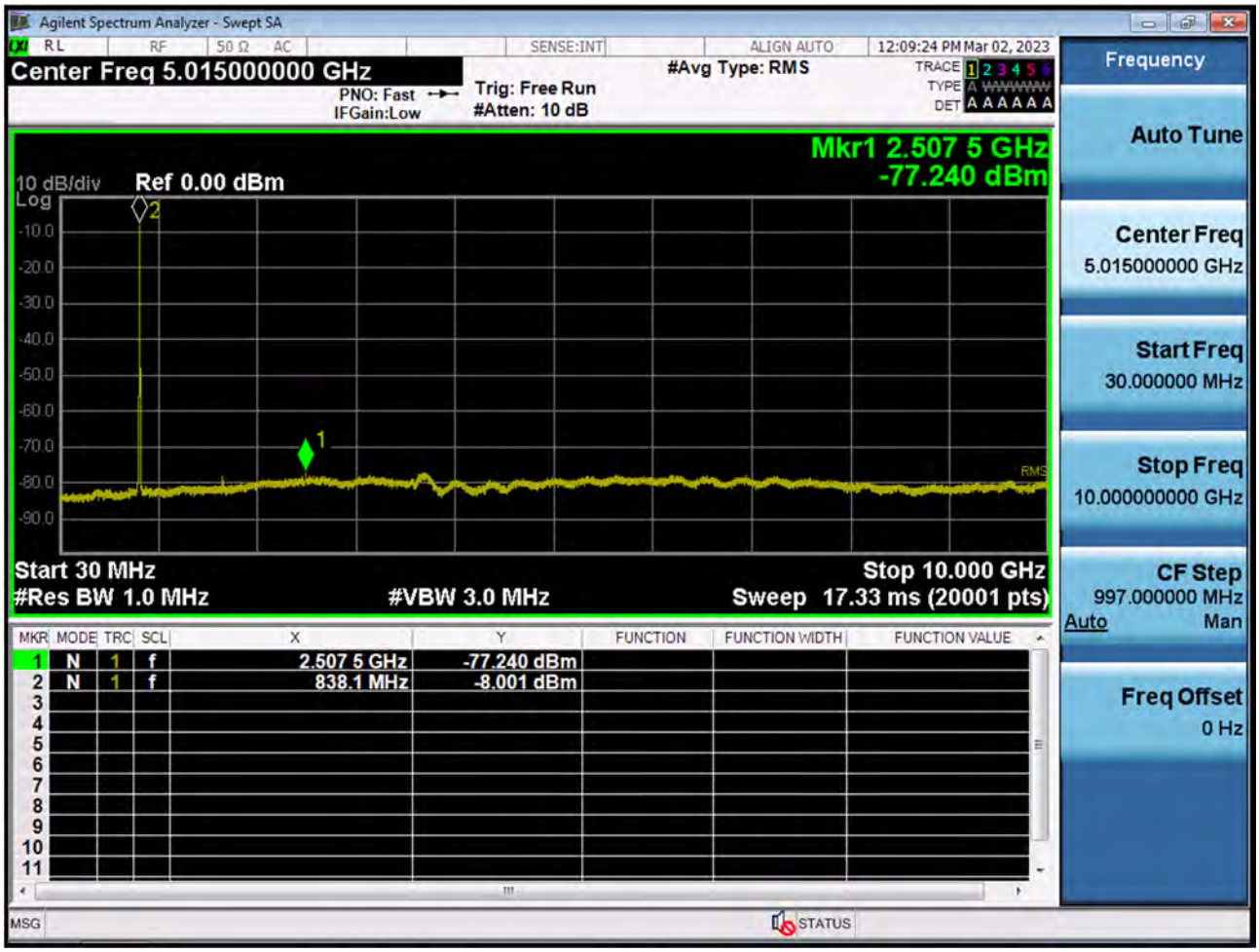
■ GSM1900 MODE (810 CH.) Conducted Spurious Emissions2



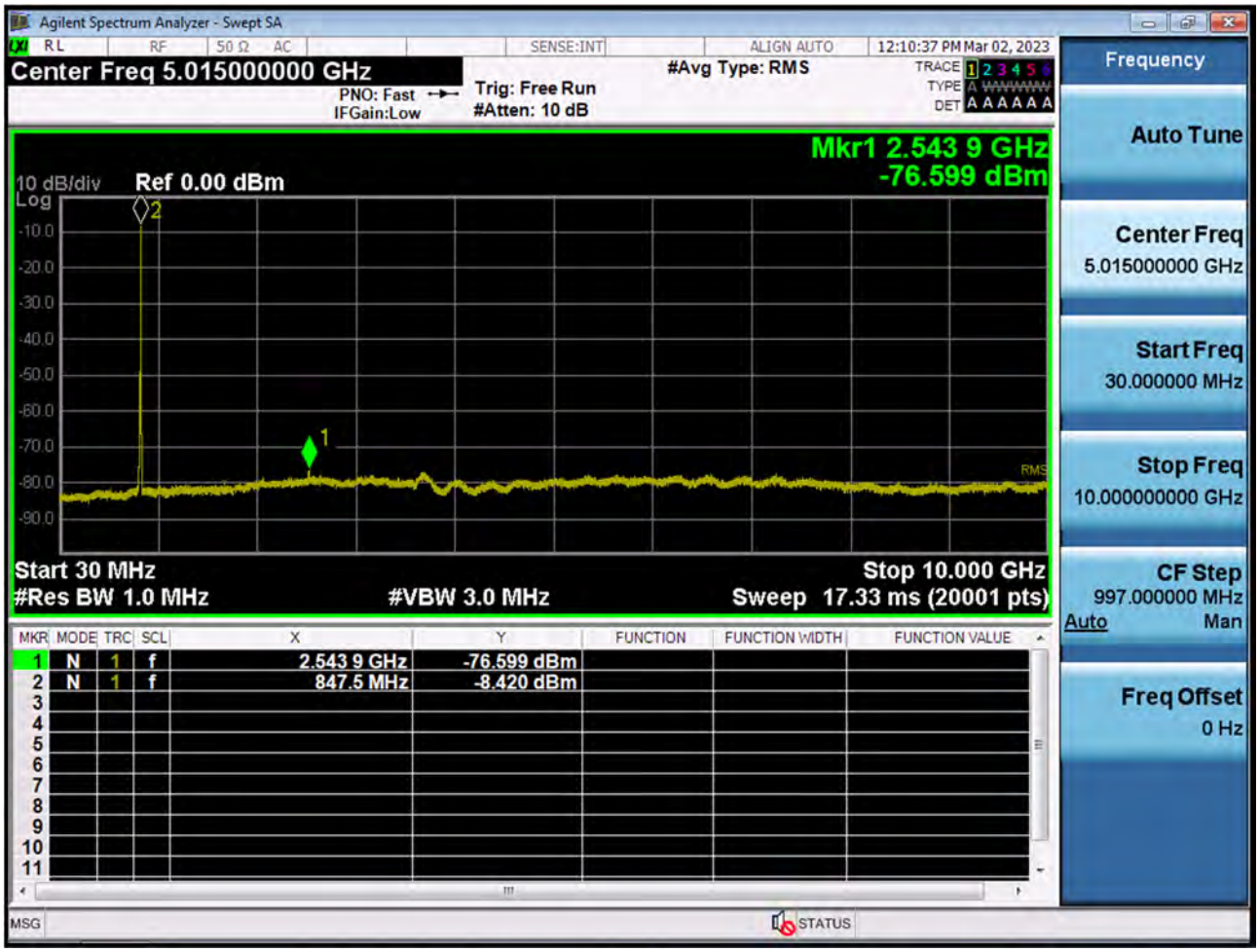
■ WCDMA850 MODE (4132 CH.) Conducted Spurious Emissions



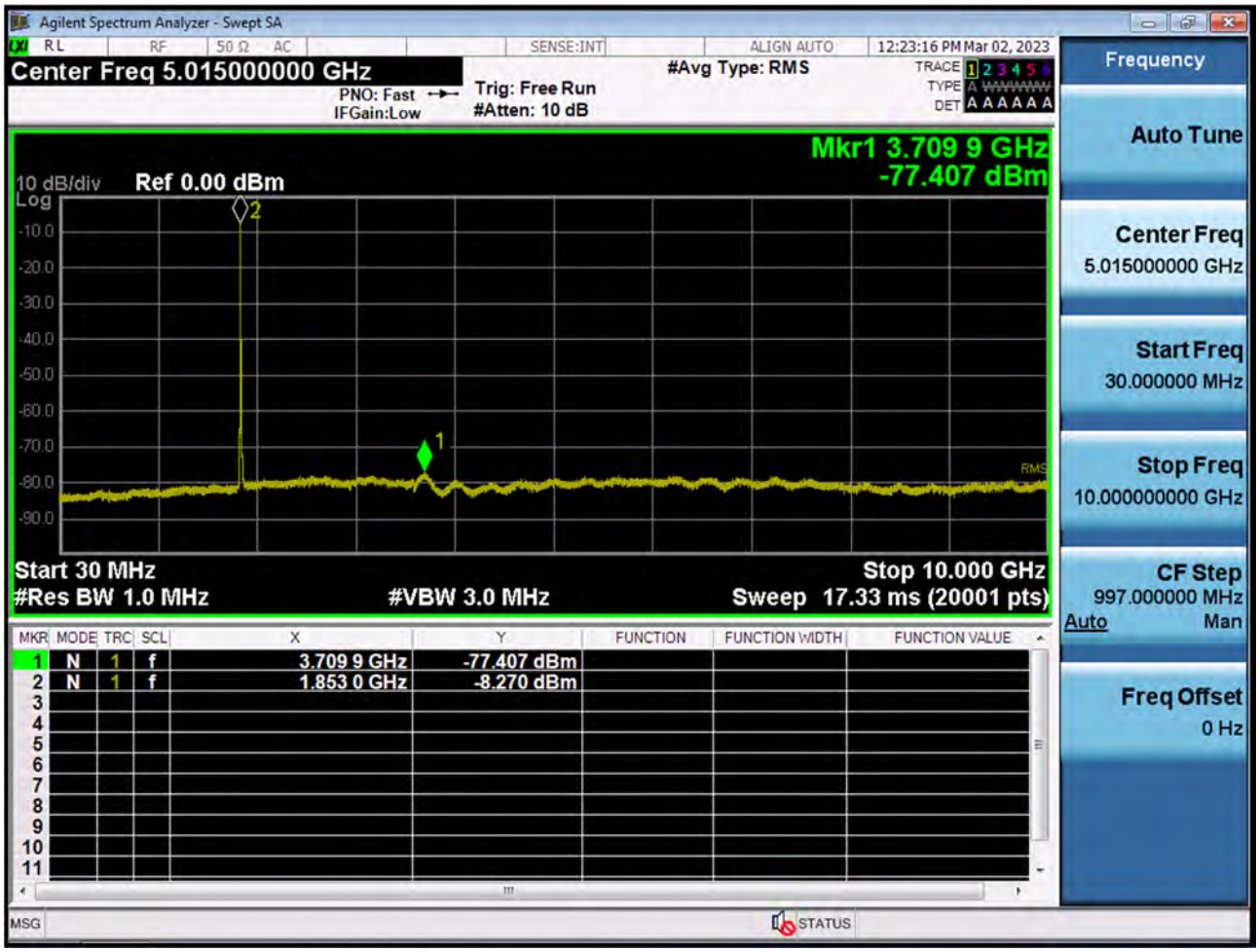
■ WCDMA850 MODE (4183 CH.) Conducted Spurious Emissions



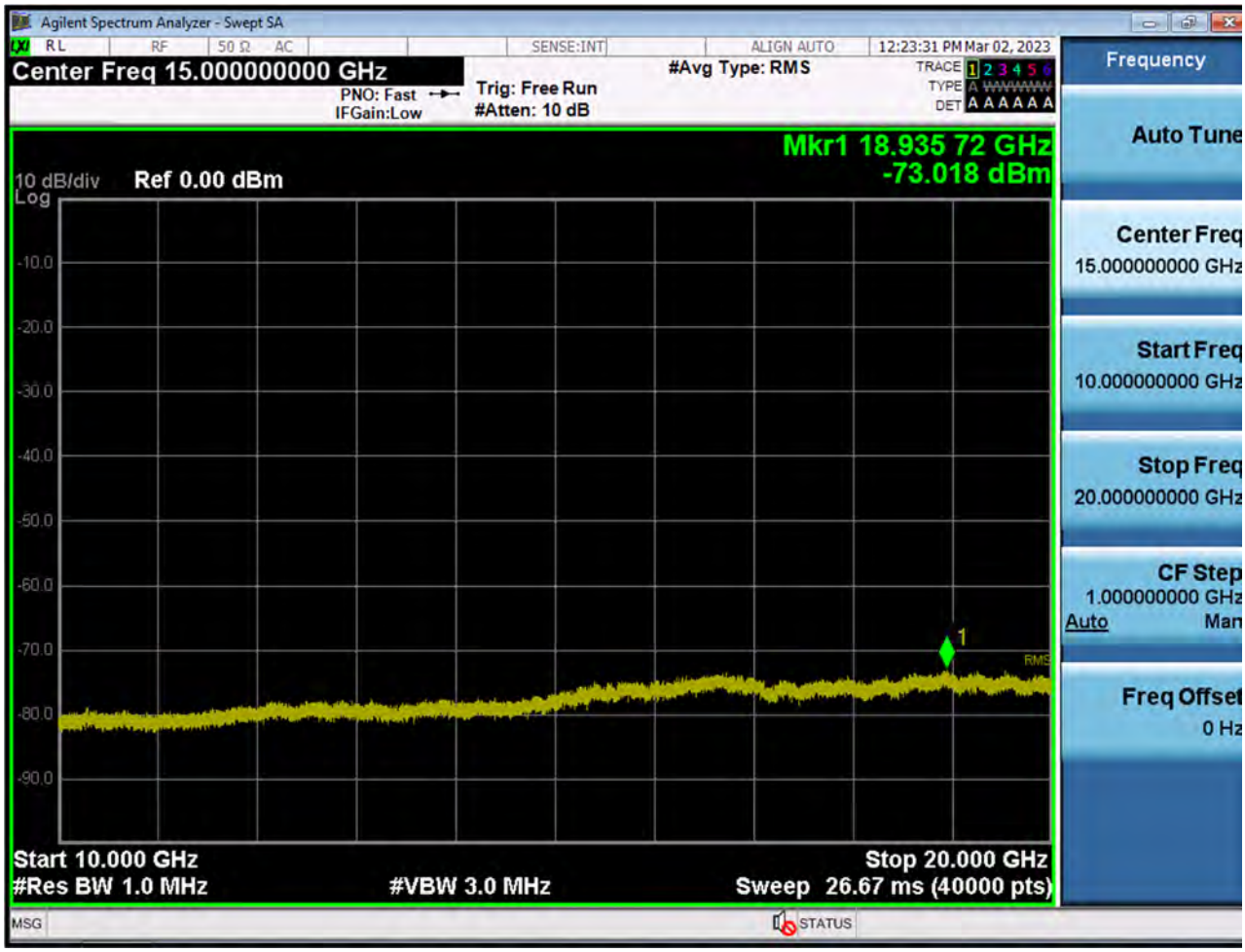
■ WCDMA850MODE (4233 CH.) Conducted Spurious Emissions



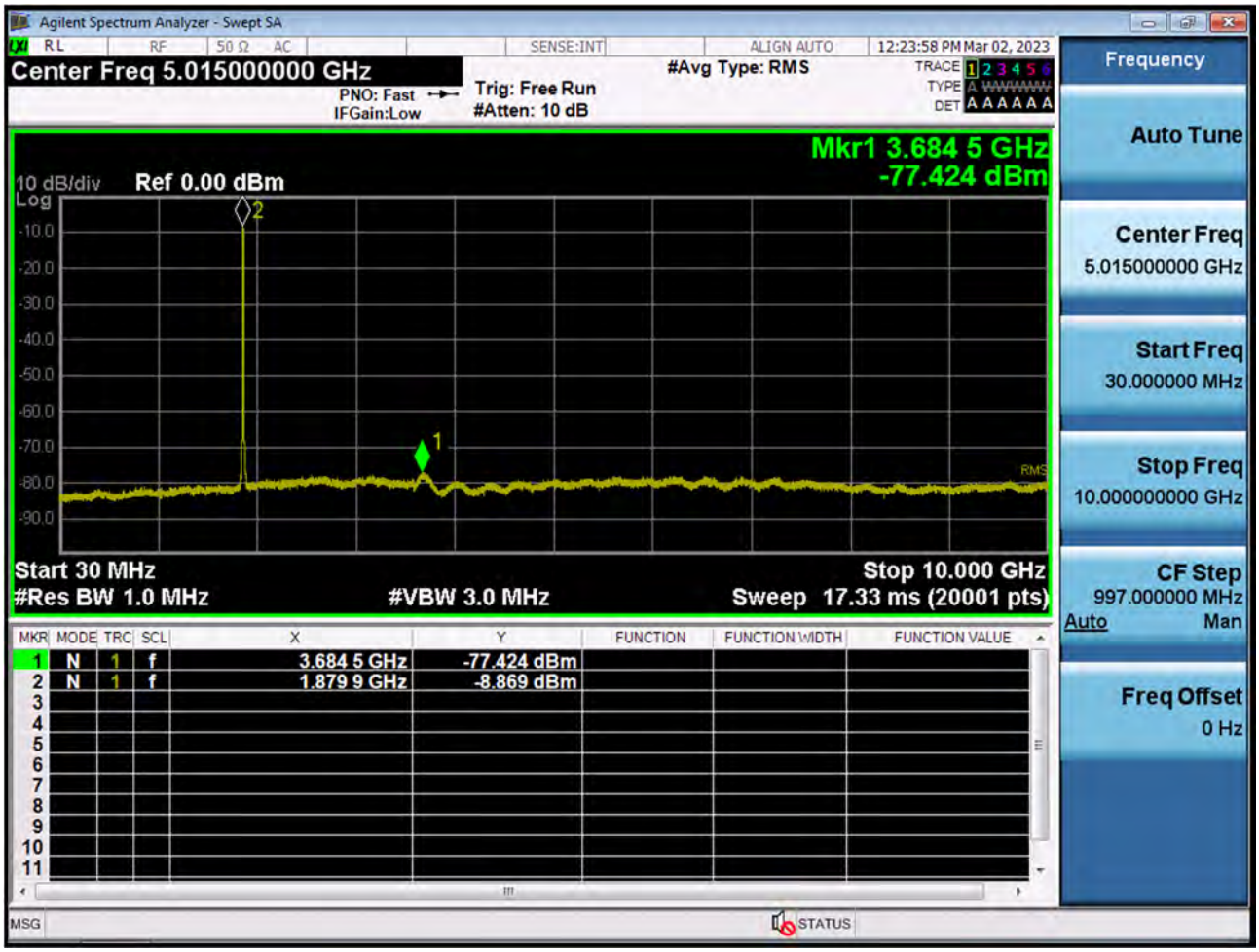
■ WCDMA1900 MODE (9262 CH.) Conducted Spurious Emissions1



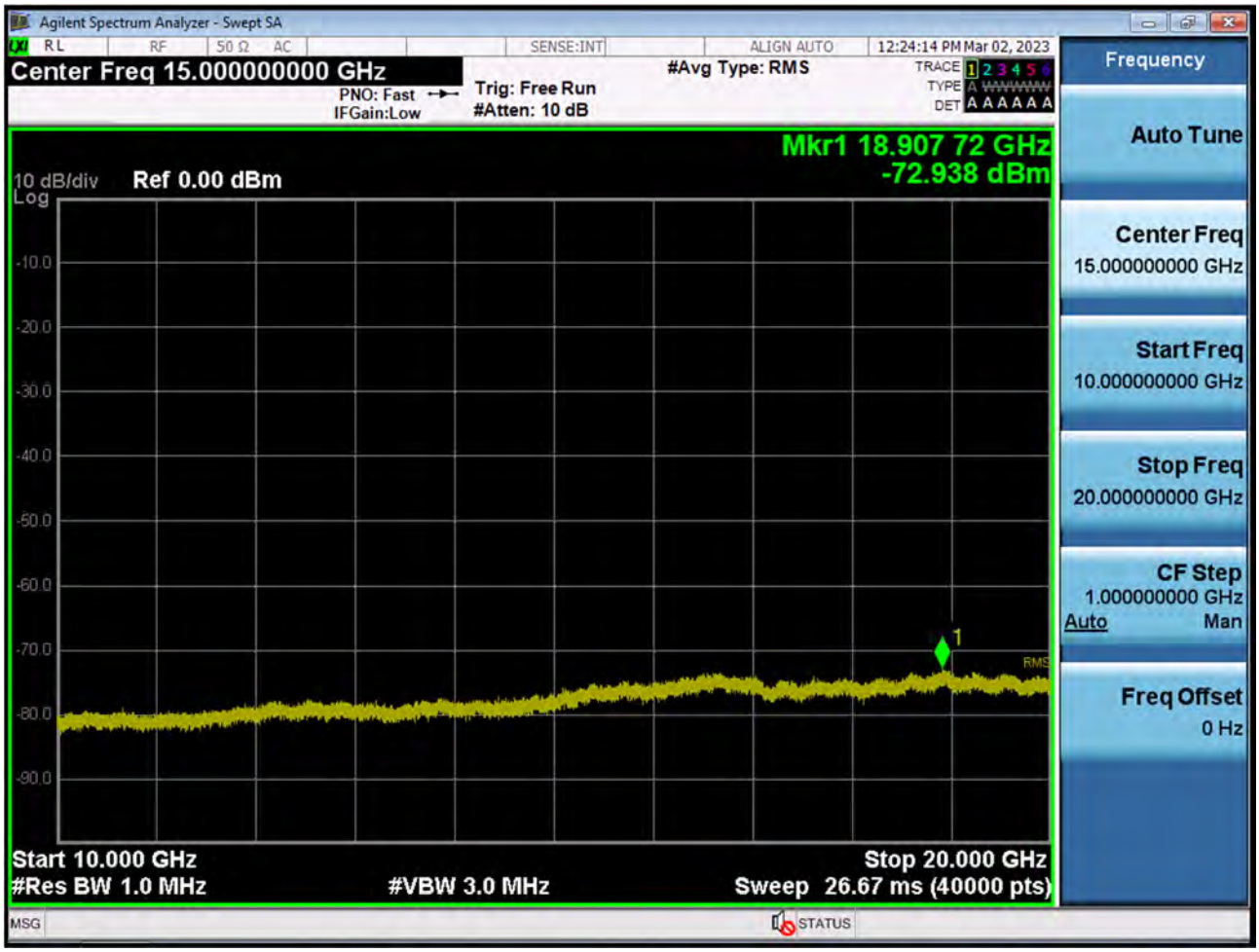
■ WCDMA1900 MODE (9262 CH.) Conducted Spurious Emissions2



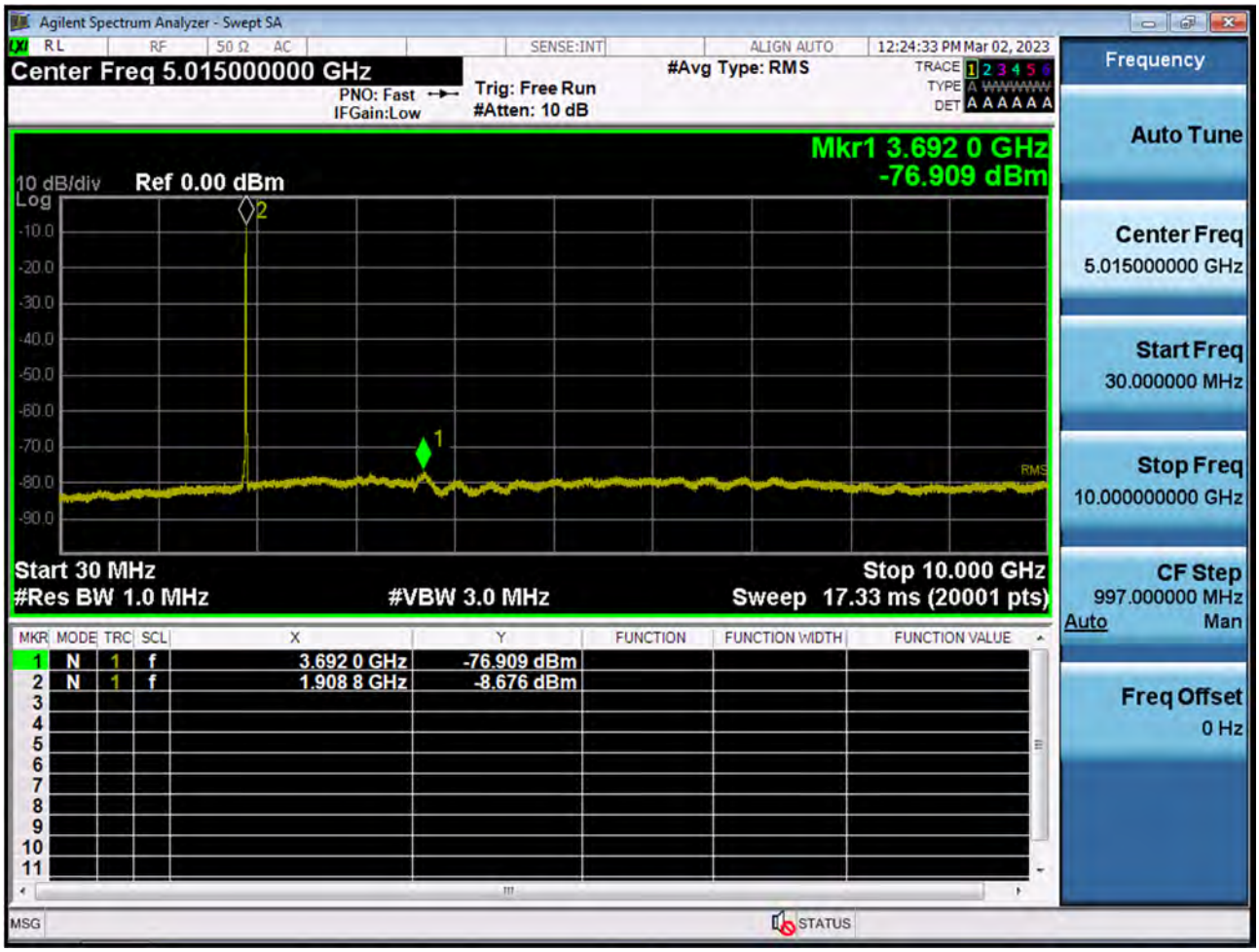
■ WCDMA1900 MODE (9400 CH.) Conducted Spurious Emissions1



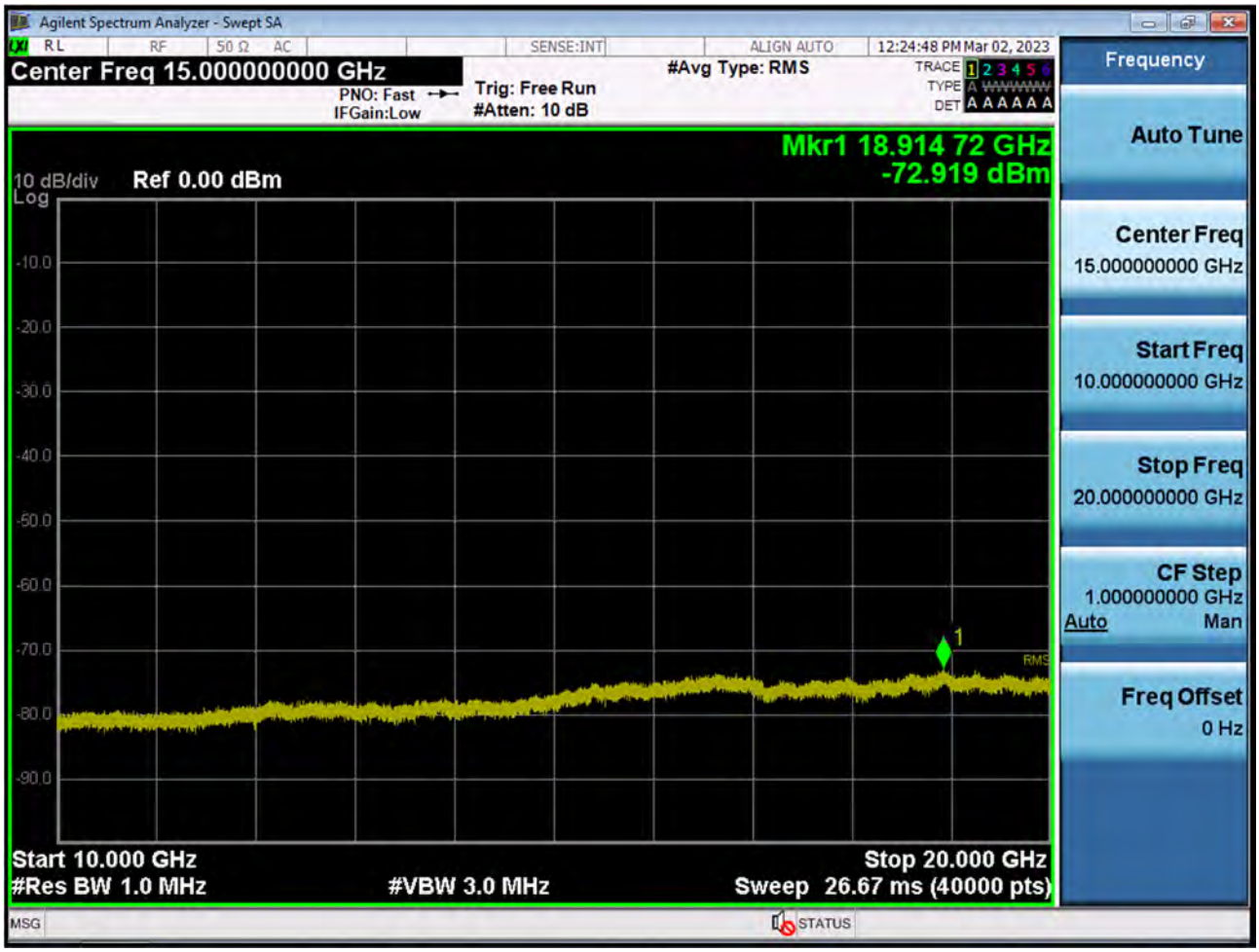
■ WCDMA1900 MODE (9400 CH.) Conducted Spurious Emissions2



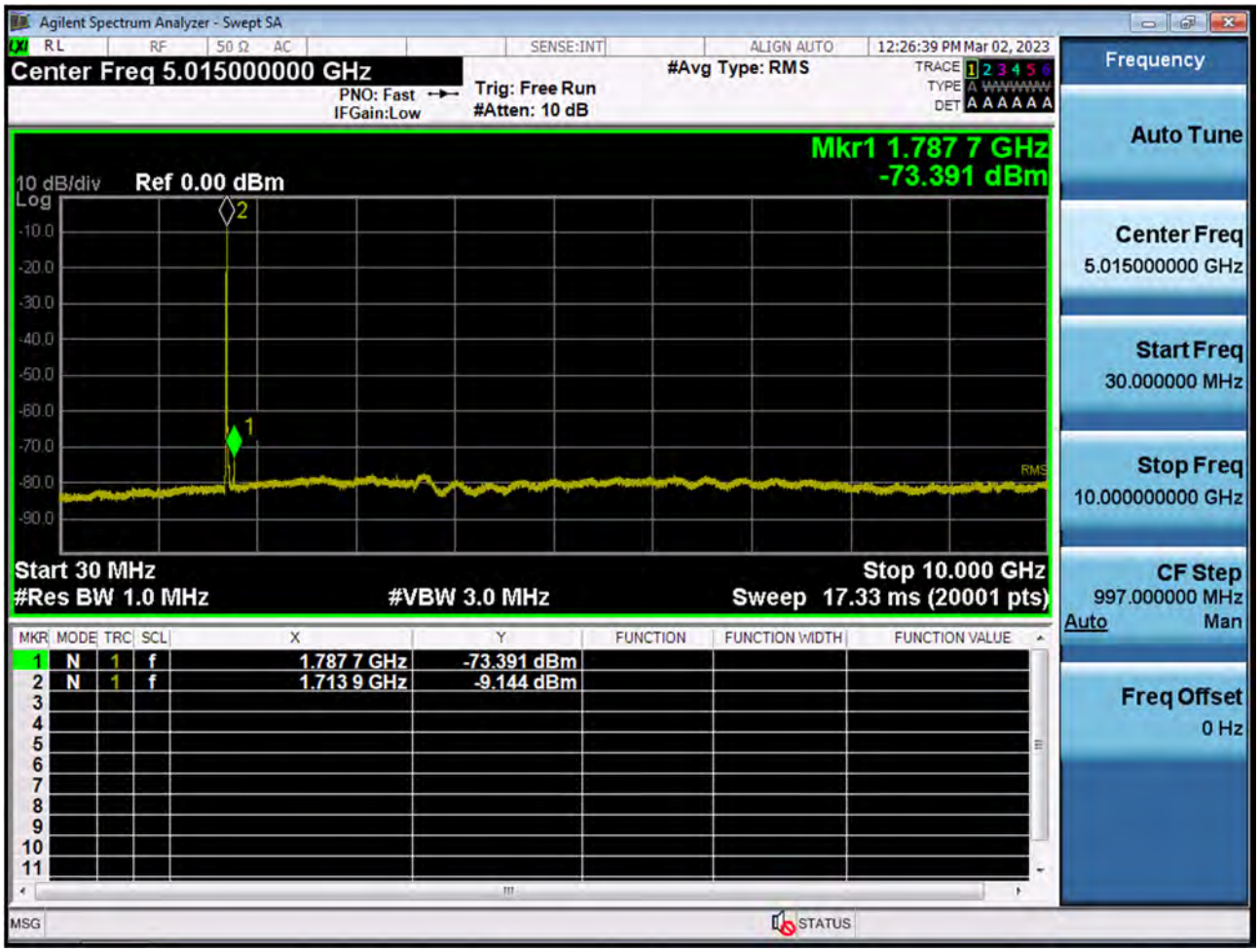
■ WCDMA1900 MODE (9538 CH.) Conducted Spurious Emissions1



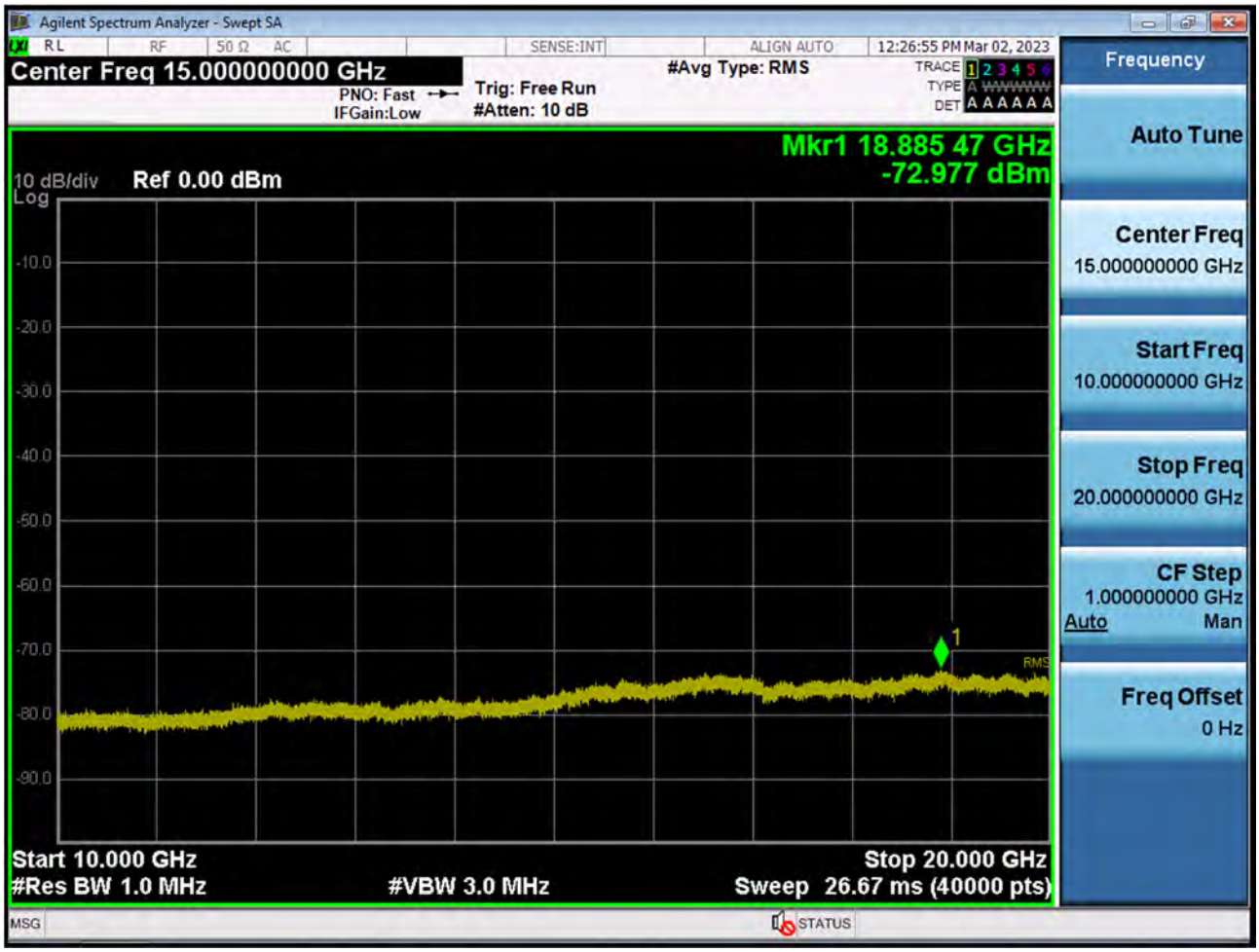
■ WCDMA1900 MODE (9538 CH.) Conducted Spurious Emissions2



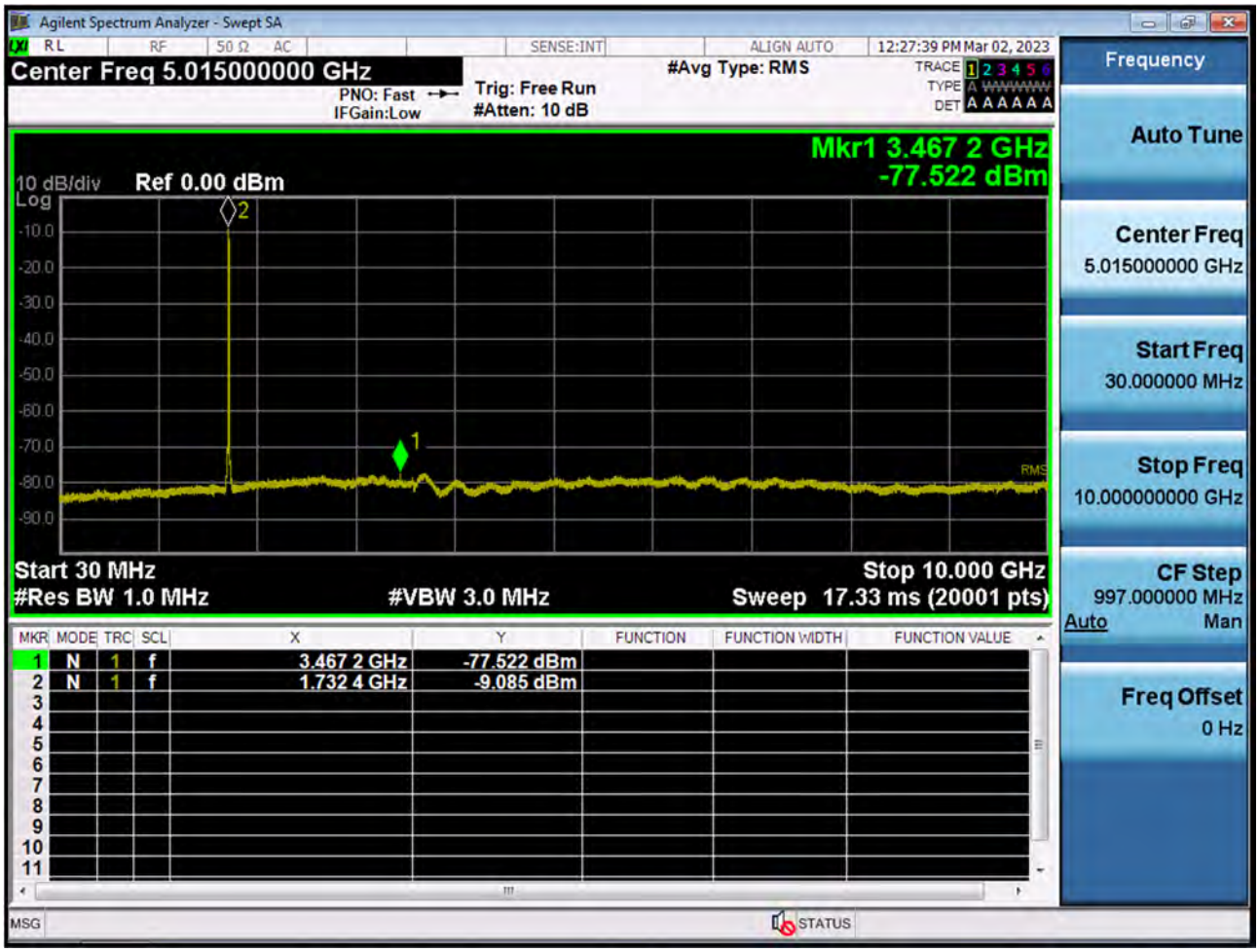
■ WCDMA1700 MODE (1312 CH.) Conducted Spurious Emissions1



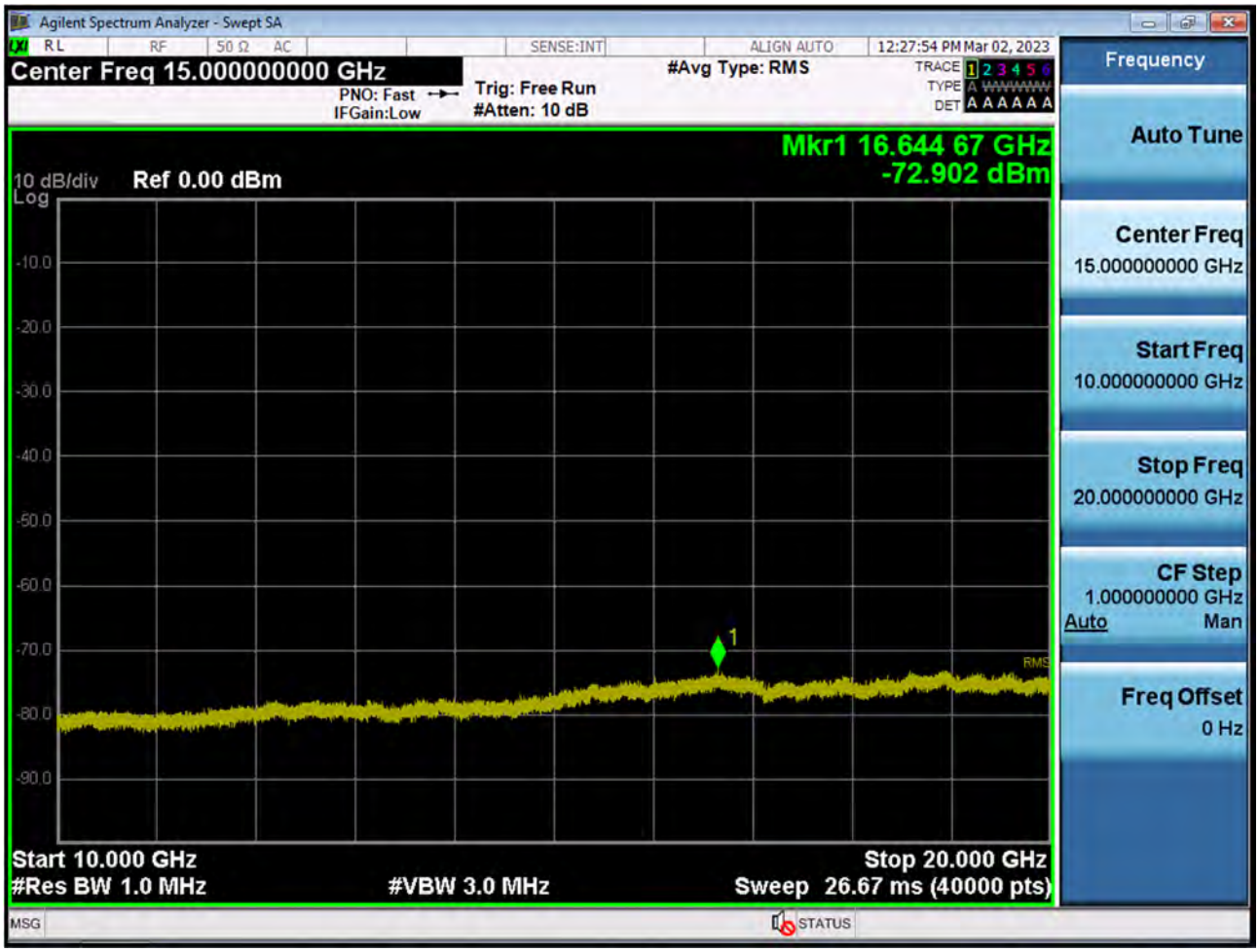
■ WCDMA1700 MODE (1312 CH.) Conducted Spurious Emissions2



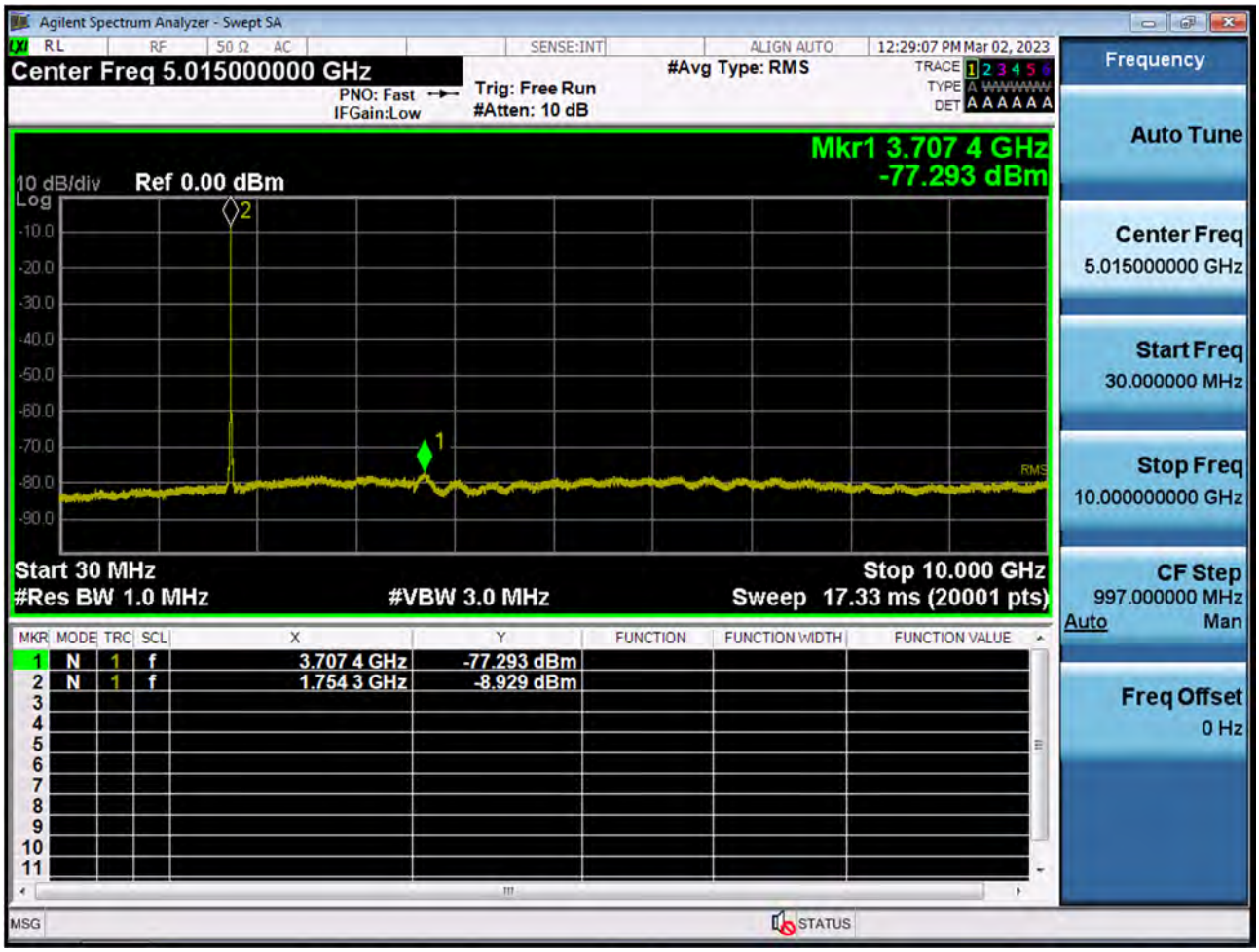
■ WCDMA1700 MODE (1412 CH.) Conducted Spurious Emissions1



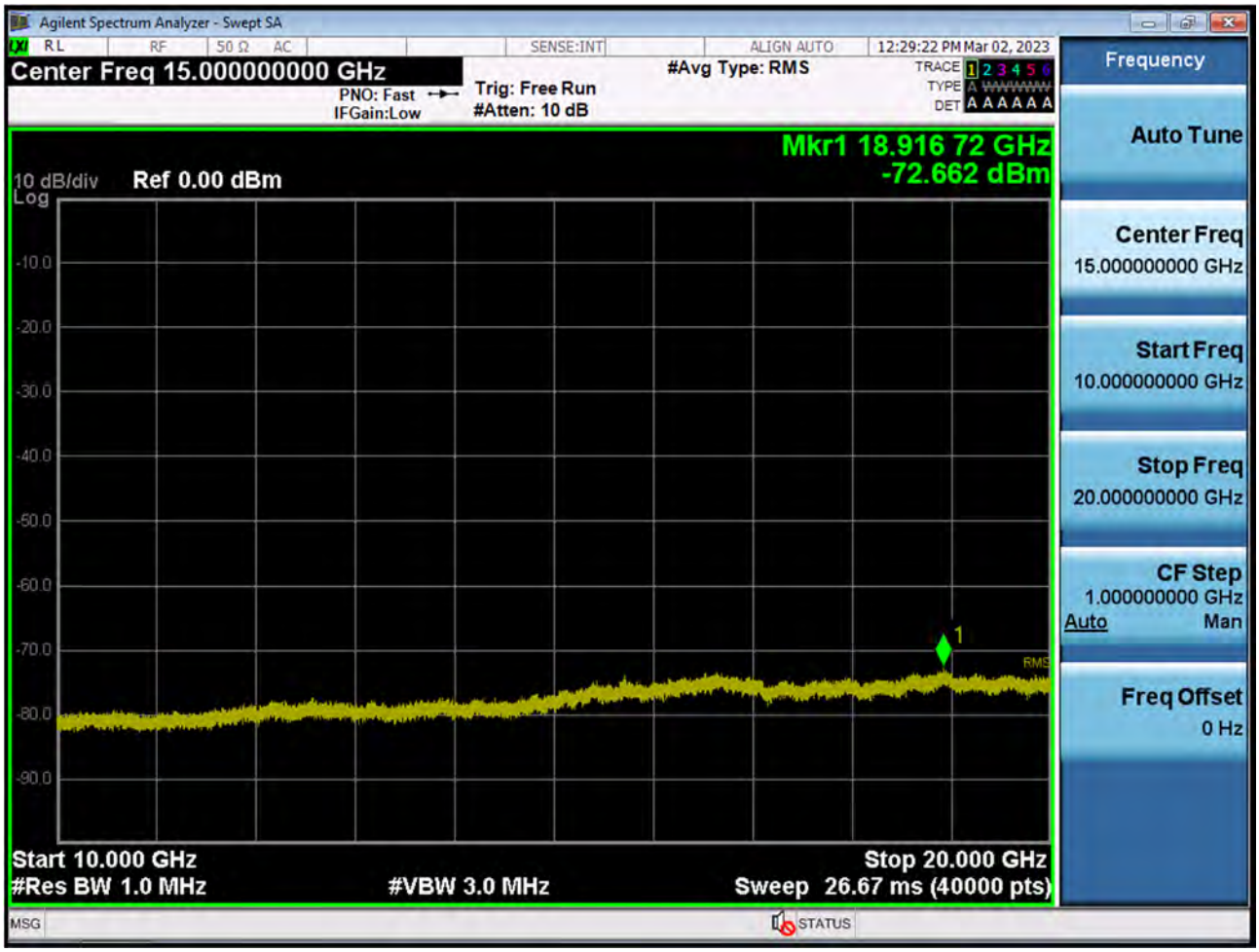
■ WCDMA1700 MODE (1412 CH.) Conducted Spurious Emissions2



■ WCDMA1700 MODE (1513 CH.) Conducted Spurious Emissions1



■ WCDMA1700 MODE (1513 CH.) Conducted Spurious Emissions2



10. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2310-FC001-P