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FCC Carrier Aggregation REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
December 07, 2021

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

Report No.: HCT-RF-2111-FC088-R1

FCC ID: **A3LSMX808U**

APPLICANT: **SAMSUNG Electronics Co., Ltd.**

Model(s): SM-X808U
EUT Type: Tablet
FCC Classification: PCS Licensed Transmitter (PCB)
FCC Rule Part(s): §22, §2

Mode (PCC+SCC)	Tx Frequency (MHz)	Modulation	Emission Designator	ERP	
				Max. Power (dBm)	Max. Power (W)
3 MHz+5 MHz	825.6 - 846.5	QPSK	7M51G7D	0.185	22.66
		16QAM	7M51W7D	0.181	22.58
		64QAM	7M53W7D	0.178	22.49
		256QAM	7M52W7D	0.149	21.72
5 MHz+3 MHz	825.6 - 847.4	QPSK	7M49G7D	0.183	22.63
		16QAM	7M54W7D	0.180	22.55
		64QAM	7M53W7D	0.177	22.47
		256QAM	7M52W7D	0.148	21.69
5 MHz+10 MHz	826.8 - 844.0	QPSK	13M9G7D	0.169	22.27
		16QAM	13M9W7D	0.143	21.55
		64QAM	13M9W7D	0.110	20.41
		256QAM	13M9W7D	0.055	17.38
10 MHz+5 MHz	829.0 - 846.2	QPSK	13M9G7D	0.171	22.32
		16QAM	13M9W7D	0.139	21.44
		64QAM	13M9W7D	0.110	20.41
		256QAM	13M9W7D	0.053	17.25
10 MHz+10 MHz	829.0 - 844.0	QPSK	18M9G7D	0.172	22.35
		16QAM	18M8W7D	0.140	21.46
		64QAM	18M8W7D	0.111	20.44
		256QAM	18M7W7D	0.054	17.28

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)

REVIEWED BY

Report prepared by : Jae Mun Do Engineer of Telecommunication Testing Center	Report approved by : Jong Seok Lee Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

* The report shall not be reproduced except in full(only partly) without approval of the laboratory.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2111-FC088	November 29, 2021	- First Approval Report
HCT-RF-2111-FC088-R1	December 07, 2021	- Revised the limit of frequency stability - Added the note on page 20 - Revised the test method of band edge

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

Table of Contents

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMX808U
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§22, §2
EUT Type:	Tablet
Model(s):	SM-X808U
Tx Frequency:	825.6 - 846.5: 3 MHz+5 MHz 825.6 - 847.4: 5 MHz+3 MHz 826.8 - 844.0: 5 MHz+10 MHz 829.0 - 846.2: 10 MHz+5 MHz 829.0 - 844.0: 10 MHz+10 MHz
Date(s) of Tests:	September 17, 2021 ~ November 29, 2021
Serial number:	Radiated: R32R9001N1N Conducted: R32RB00CTZF
LTE CA :	CA 5B(Uplink)

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Tablet with UMTS and LTE, Sub6.

It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80/160), WIFI 6E, Bluetooth, BT LE, WPT, mmWave(n260/261).

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
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/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 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 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 1 GHz, 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;

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

   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 = 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. 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 data
3. For spurious emissions above 1 GHz, 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 spurious emissions is calculated by the following formula;

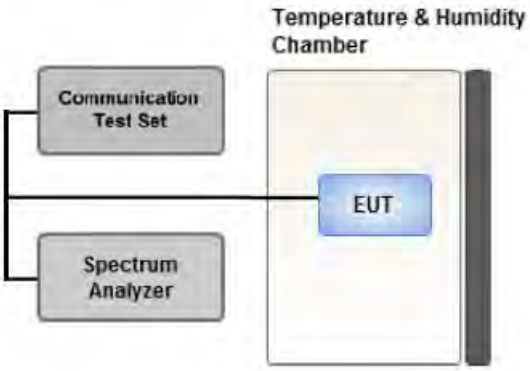
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   Where: P_g is the generator output power into the substitution antenna.

   If the fundamental frequency is below 1 GHz, RF output power has been converted to EIRP.

$$\text{EIRP}_{(dBm)} = \text{ERP}_{(dBm)} + 2.15$$

3.4 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.

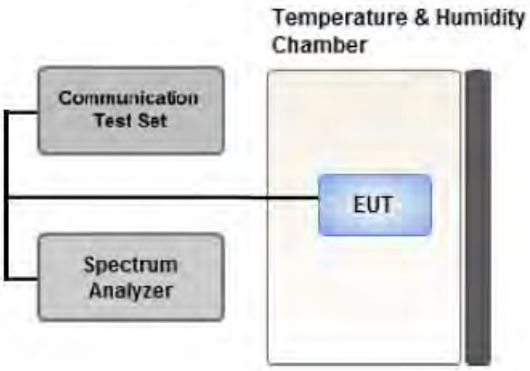
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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

3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

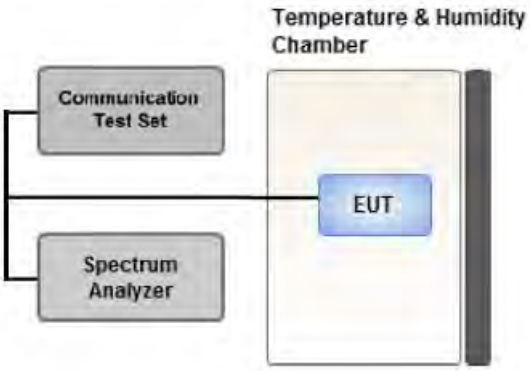
Test Overview

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 = trace average
5. Sweep time = auto
6. Number of points in sweep ≥ 2 x Span / RBW

3.6 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

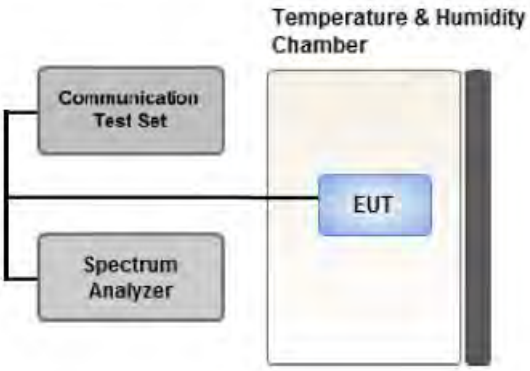
Test Notes

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.

3.7 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.

4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
H.P.F	FBSR-02B(WHK1.2/15 G-10EF)	T&M SYSTEM	-	03/02/2022	Annual
H.P.F	FBSR-02B(WHK3.3/18 G-10EF)	T&M SYSTEM	-	03/02/2022	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	11275	04/07/2022	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/28/2022	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	04/05/2023	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	04/05/2023	Biennial
Chamber	SU-642	ESPEC	93008124	03/15/2022	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/30/2022	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/15/2023	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	10/13/2022	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	02/11/2022	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	05/18/2022	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	06/01/2022	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	09/29/2022	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2022	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/19/2022	Biennial
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/03/2023	Biennial
Hybrid Antenna	VULB9168	Schwarzbeck	760	02/22/2023	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262116770	07/12/2022	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	01/07/2022	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/05/2022	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	06/02/2022	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)	1.82 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70 (Confidence level about 95 %, *k*=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05 (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)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Frequency stability / variation of ambient temperature	§2.1055, §22.355	< 2.5 ppm	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
Radiated Spurious and Harmonic Emissions	§2.1053, §22.917(a)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	PASS

7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

Ch./ Freq.		Measured	Substitute	Ant. Gain	C.L	Pol.	ERP	
channel	Freq.(MHz)	Level(dBm)	Level(dBm)	(dBd)			W	dBm
128	824.20	-21.37	38.40	-10.61	0.95	H	0.483	26.84

ERP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.

2) During the test , the turn table is rotated until the maximum signal is found.

3) Record the field strength meter's level.

4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.

5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

7.2 EIRP Sample Calculation

Ch./ Freq.		Measured	Substitute	Ant. Gain	C.L	Pol.	EIRP	
channel	Freq.(MHz)	Level(dBm)	Level(dBm)	(dBi)			W	dBm
20175	1,732.50	-15.75	18.45	9.90	1.76	H	0.456	26.59

EIRP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.

2) During the test , the turn table is rotated until the maximum signal is found.

3) Record the field strength meter's level.

4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.

5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.

7.3. 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

Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers 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 Note

1. All tests were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth.
2. Channel bandwidth is shown in the tables below based only on the channel bandwidths that were supported in this device.

Channel Bandwidth (PCC)	Channel Bandwidth (SCC)	Maximum aggregated bandwidth (MHz)
3	5	8
5	3	8
5	10	15
10	5	15
10	10	20

3. All modes of operation were investigated and the worst case configuration results are reported in this section.
   Please refer to the table below.
   - Worst case(Conducted Spurious Emissions, Band Edge)
     : We have selected higher of the Conduction Output Power.
   - Worst case(Radiated Spurious Emissions) : We have selected higher of the ERP.
   - Worst case(OBW, Frequency stability)
     : All modes of operation were investigated and the worst case configuration results are reported.
4. All 3 channels(low/mid/high) of conducted power and radiated power were investigated
   and the worst case channel results are reported.

[Worst case]

Test Description	Mod	Operating frequency	PCC					SCC				
			BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset	BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset
Conducted Spurious Emissions/ Band Edge	QPSK	Low	3	825.6	20416	1	14	5	829.5	20455	1	0
	QPSK	Mid	3	834.1	20501	1	14	5	838.0	20540	1	0
	QPSK	High	3	842.6	20586	1	14	5	846.5	20625	1	0
	QPSK	Low	3	825.6	20416	1	0	5	829.5	20455	1	24
	QPSK	Mid	3	834.1	20501	1	0	5	838.0	20540	1	24
	QPSK	High	3	842.6	20586	1	0	5	846.5	20625	1	24
	QPSK	Low	3	825.6	20416	15	0	5	829.5	20455	25	0
	QPSK	Mid	3	834.1	20501	15	0	5	838.0	20540	25	0
	QPSK	High	3	842.6	20586	15	0	5	846.5	20625	25	0
	QPSK	Low	10	829.0	20450	50	0	10	838.9	20549	50	0
	QPSK	Mid	10	831.6	20476	50	0	10	841.5	20575	50	0
	QPSK	High	10	834.1	20501	50	0	10	844.0	20600	50	0
Radiated Spurious Emissions	QPSK	Low	3	825.6	20416	1	14	5	829.5	20455	1	0
	QPSK	Mid	10	831.6	20476	1	49	10	841.5	20575	1	0
	QPSK	High	5	836.8	20528	1	24	10	244.0	20600	1	0

[Worst case]

Test Description	Mod	Operating frequency	PCC					SCC				
			BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset	BW (MHz)	Freq. (MHz)	Ch.	RB	RB Offset
OBW, PAR	QPSK, 16QAM, 64QAM, 256QAM	Mid	3	834.1	20501	15	0	5	838.0	20540	25	0
			5	835.0	20510	25	0	3	838.9	20549	15	0
			5	831.8	20478	25	0	10	839.0	20550	50	0
			10	834.0	20500	50	0	5	841.2	20572	25	0
			10	831.6	20476	50	0	10	841.5	20575	50	0
Frequency stability	QPSK	Mid	3	834.1	20501	15	0	5	838.0	20540	25	0
			5	835.0	20510	25	0	3	838.9	20549	15	0
			5	831.8	20478	25	0	10	839.0	20550	50	0
			10	834.0	20500	50	0	5	841.2	20572	25	0
			10	831.6	20476	50	0	10	841.5	20575	50	0

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8.1 Conducted Power

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	***3***	***825.6***	***20416***	***1***	***14***	***5***	***829.5***	***20455***	***1***	***0***	***24.48***
	5	826.5	20425	1	24	3	830.4	20464	1	0	24.46
	5	826.8	20428	1	24	10	834.0	20500	1	0	24.46
	10	829.0	20450	1	49	5	836.2	20522	1	0	24.31
	10	829.0	20450	1	49	10	838.9	20549	1	0	24.47
Mid	***3***	***834.1***	***20501***	***1***	***14***	***5***	***838.0***	***20540***	***1***	***0***	***24.66***
	5	835.0	20510	1	24	3	838.9	20549	1	0	24.62
	5	831.8	20478	1	24	10	839.0	20550	1	0	24.49
	10	834.0	20500	1	49	5	841.2	20572	1	0	24.33
	10	831.6	20476	1	49	10	841.5	20575	1	0	24.65
High	***3***	***842.6***	***20586***	***1***	***14***	***5***	***846.5***	***20625***	***1***	***0***	***24.93***
	5	843.5	20595	1	24	3	847.4	20634	1	0	24.83
	5	836.8	20528	1	24	10	844.0	20600	1	0	24.54
	10	839.0	20550	1	49	5	846.2	20622	1	0	24.53
	10	834.1	20501	1	49	10	844.0	20600	1	0	24.56

Note:

Modulation : QPSK(1RB)

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	***3***	***825.6***	***20416***	***15***	***0***	***5***	***829.5***	***20455***	***25***	***0***	***24.46***
	5	826.5	20425	1	24	3	830.4	20464	15	0	24.34
	5	826.8	20428	25	0	10	834.0	20500	50	0	22.70
	10	829.0	20450	50	0	5	836.2	20522	25	0	22.73
	10	829.0	20450	50	0	10	838.9	20549	50	0	22.76
Mid	***3***	***834.1***	***20501***	***15***	***0***	***5***	***838.0***	***20540***	***25***	***0***	***24.54***
	5	835.0	20510	25	0	3	838.9	20549	15	0	24.53
	5	831.8	20478	25	0	10	839.0	20550	50	0	22.85
	10	834.0	20500	50	0	5	841.2	20572	25	0	22.85
	10	831.6	20476	50	0	10	841.5	20575	50	0	22.87
High	***3***	***842.6***	***20586***	***15***	***0***	***5***	***846.5***	***20625***	***25***	***0***	***24.87***
	5	843.5	20595	25	0	3	847.4	20634	15	0	24.82
	5	836.8	20528	25	0	10	844.0	20600	50	0	22.95
	10	839.0	20550	50	0	5	846.2	20622	25	0	22.94
	10	834.1	20501	50	0	10	844.0	20600	50	0	22.98

Note:

Modulation : QPSK(Full RB)

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	3	825.6	20416	1	14	5	829.5	20455	1	0	24.36
	10	829.0	20450	1	49	10	838.9	20549	1	0	23.90
Mid	3	834.1	20501	1	14	5	838.0	20540	1	0	24.65
	10	831.6	20476	1	49	10	841.5	20575	1	0	23.92
High	3	842.6	20586	1	14	5	846.5	20625	1	0	24.89
	10	834.1	20501	1	49	10	844.0	20600	1	0	23.98
Low	3	825.6	20416	15	0	5	829.5	20455	25	0	24.40
	10	829.0	20450	50	0	10	838.9	20549	50	0	21.74
Mid	3	834.1	20501	15	0	5	838.0	20540	25	0	24.52
	10	831.6	20476	50	0	10	841.5	20575	50	0	21.86
High	3	842.6	20586	15	0	5	846.5	20625	25	0	24.86
	10	834.1	20501	50	0	10	844.0	20600	50	0	21.83

Note:

Modulation : 16QAM

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	3	825.6	20416	1	14	5	829.5	20455	1	0	24.33
	10	829.0	20450	1	49	10	838.9	20549	1	0	22.67
Mid	3	834.1	20501	1	14	5	838.0	20540	1	0	24.64
	10	831.6	20476	1	49	10	841.5	20575	1	0	22.99
High	3	842.6	20586	1	14	5	846.5	20625	1	0	24.88
	10	834.1	20501	1	49	10	844.0	20600	1	0	22.94
Low	3	825.6	20416	15	0	5	829.5	20455	25	0	24.40
	10	829.0	20450	50	0	10	838.9	20549	50	0	21.68
Mid	3	834.1	20501	15	0	5	838.0	20540	25	0	24.50
	10	831.6	20476	50	0	10	841.5	20575	50	0	21.76
High	3	842.6	20586	15	0	5	846.5	20625	25	0	24.81
	10	834.1	20501	50	0	10	844.0	20600	50	0	21.75

Note:

Modulation : 64QAM

Operating frequency	PCC					SCC					Conducted. Power [dBm]
	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	Bandwidth [MHz]	Freq. (MHz)	Channel	RB	RB Offset	
Low	3	825.6	20416	1	14	5	829.5	20455	1	0	24.47
	10	829.0	20450	1	49	10	838.9	20549	1	0	19.92
Mid	3	834.1	20501	1	14	5	838.0	20540	1	0	24.58
	10	831.6	20476	1	49	10	841.5	20575	1	0	19.95
High	3	842.6	20586	1	14	5	846.5	20625	1	0	24.89
	10	834.1	20501	1	49	10	844.0	20600	1	0	19.94
Low	3	825.6	20416	15	0	5	829.5	20455	25	0	24.39
	10	829.0	20450	50	0	10	838.9	20549	50	0	19.69
Mid	3	834.1	20501	15	0	5	838.0	20540	25	0	24.51
	10	831.6	20476	50	0	10	841.5	20575	50	0	19.77
High	3	842.6	20586	15	0	5	846.5	20625	25	0	24.82
	10	834.1	20501	50	0	10	844.0	20600	50	0	19.83

Note:

Modulation : 256QAM

8.2 Equivalent Radiated Power

	PCC			SCC			Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol.	E.R.P	
	BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset						W	dBm
Low	***3***	***20416***	***1/14***	***5***	***20455***	***1/0***	***-28.79***	***34.29***	***-10.23***	***1.40***	***H***	***0.185***	***22.66***
	5	20425	1/24	3	20464	1/0	-28.89	34.26	-10.23	1.40	H	0.183	22.63
	5	20428	1/24	10	20500	1/0	-29.12	33.89	-10.22	1.40	H	0.169	22.27
	10	20450	1/49	5	20522	1/0	-29.13	33.93	-10.21	1.40	H	0.171	22.32
	10	20450	1/49	10	20549	1/0	-29.14	33.81	-10.20	1.40	H	0.166	22.21
Mid	3	20501	1/14	5	20540	1/0	-29.22	33.66	-10.19	1.41	H	0.161	22.06
	5	20510	1/24	3	20549	1/0	-29.22	33.98	-10.19	1.41	H	0.173	22.38
	5	20478	1/24	10	20550	1/0	-29.26	33.76	-10.20	1.41	H	0.164	22.15
	10	20500	1/49	5	20572	1/0	-29.48	33.52	-10.19	1.41	H	0.155	21.92
	10	***20476***	***1/49***	***10***	***20575***	***1/0***	***-29.09***	***33.95***	***-10.19***	***1.41***	***H***	***0.172***	***22.35***
High	3	20586	1/14	5	20625	1/0	-29.64	33.46	-10.16	1.42	H	0.154	21.88
	5	20595	1/24	3	20634	1/0	-29.52	33.59	-10.15	1.42	H	0.159	22.02
	5	***20528***	***1/24***	***10***	***20600***	***1/0***	***-29.33***	***33.80***	***-10.18***	***1.41***	***H***	***0.166***	***22.21***
	10	20550	1/49	5	20622	1/0	-29.52	33.54	-10.17	1.41	H	0.157	21.96
	10	20501	1/49	10	20600	1/0	-29.47	33.55	-10.18	1.41	H	0.157	21.96

Note:

1. Modulation : QPSK
2. Limit : < 2 Watts

PCC			SCC			Measured	Substitute	Ant.			E.R.P	
BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset	Level (dBm)	Level (dBm)	Gain (dBd)	C.L	Pol.	W	dBm
3	20416	1/14	5	20455	1/0	-28.87	34.21	-10.23	1.40	H	0.181	22.58
5	20425	1/24	3	20464	1/0	-28.97	34.18	-10.23	1.40	H	0.180	22.55
5	20428	1/24	10	20500	1/0	-29.84	33.17	-10.22	1.40	H	0.143	21.55
10	20450	1/49	5	20522	1/0	-30.01	33.05	-10.21	1.40	H	0.139	21.44
10	20450	1/49	10	20549	1/0	-29.92	33.03	-10.20	1.40	H	0.139	21.43
10	20476	1/49	10	20575	1/0	-29.98	33.06	-10.19	1.41	H	0.140	21.46
5	20528	1/24	10	20600	1/0	-30.11	33.02	-10.18	1.41	H	0.139	21.43

Note:

1. Modulation : 16QAM

2. Limit : < 2 Watts

PCC			SCC			Measured	Substitute	Ant.			E.R.P	
BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset	Level (dBm)	Level (dBm)	Gain (dBd)	C.L	Pol.	W	dBm
3	20416	1/14	5	20455	1/0	-28.96	34.12	-10.23	1.40	H	0.178	22.49
5	20425	1/24	3	20464	1/0	-29.05	34.10	-10.23	1.40	H	0.177	22.47
5	20428	1/24	10	20500	1/0	-30.98	32.03	-10.22	1.40	H	0.110	20.41
10	20450	1/49	5	20522	1/0	-31.04	32.02	-10.21	1.40	H	0.110	20.41
10	20450	1/49	10	20549	1/0	-31.01	31.94	-10.20	1.40	H	0.108	20.34
10	20476	1/49	10	20575	1/0	-31.00	32.04	-10.19	1.41	H	0.111	20.44
5	20528	1/24	10	20600	1/0	-31.14	31.99	-10.18	1.41	H	0.110	20.40

Note:

1. Modulation : 64QAM

2. Limit : < 2 Watts

PCC			SCC			Measured	Substitute	Ant.			E.R.P	
BW [MHz]	Channel	RB/ Offset	BW [MHz]	Channel	RB/ Offset	Level (dBm)	Level (dBm)	Gain (dBd)	C.L	Pol.	W	dBm
3	20416	1/14	5	20455	1/0	-29.73	33.35	-10.23	1.40	H	0.149	21.72
5	20425	1/24	3	20464	1/0	-29.83	33.32	-10.23	1.40	H	0.148	21.69
5	20428	1/24	10	20500	1/0	-34.01	29.00	-10.22	1.40	H	0.055	17.38
10	20450	1/49	5	20522	1/0	-34.20	28.86	-10.21	1.40	H	0.053	17.25
10	20450	1/49	10	20549	1/0	-34.18	28.77	-10.20	1.40	H	0.052	17.17
10	20476	1/49	10	20575	1/0	-34.16	28.88	-10.19	1.41	H	0.054	17.28
5	20528	1/24	10	20600	1/0	-34.29	28.84	-10.18	1.41	H	0.053	17.25

Note:

1. Modulation : 256QAM

2. Limit : < 2 Watts

8.3 Conducted Spurious Emissions

Operating frequency	PCC				SCC				Measurement Maximum Frequency (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)
	BW [MHz]	Ch.	Freq. (MHz)	RB/ Offset	BW [MHz]	Ch.	Freq. (MHz)	RB/ Offset				
Low	3	20416	825.6	1/14	5	20455	829.5	1/0	3.7094	29.776	-71.09	-41.31
Mid	3	20501	834.1	1/14	5	20540	838.0	1/0	3.6825	29.776	-71.17	-41.40
High	3	20586	842.6	1/14	5	20625	846.5	1/0	3.7224	29.776	-71.42	-41.64
Low	3	20416	825.6	1/0	5	20455	829.5	1/24	3.6830	29.776	-71.35	-41.58
Mid	3	20501	834.1	1/0	5	20540	838.0	1/24	3.6935	29.776	-71.24	-41.46
High	3	20586	842.6	1/0	5	20625	846.5	1/24	3.7064	29.776	-71.14	-41.37
Low	3	20416	825.6	15/0	5	20455	829.5	25/0	3.6930	29.776	-70.95	-41.18
Mid	3	20501	834.1	15/0	5	20540	838.0	25/0	3.7049	29.776	-70.74	-40.97
High	3	20586	842.6	15/0	5	20625	846.5	25/0	3.6860	29.776	-71.35	-41.57
Low	10	20450	829.0	50/0	10	20549	838.9	50/0	3.7089	29.776	-71.24	-41.47
Mid	10	20476	831.6	50/0	10	20575	841.5	50/0	3.7029	29.776	-70.94	-41.17
High	10	20501	834.1	50/0	10	20600	844.0	50/0	3.6865	29.776	-70.92	-41.15

Note:

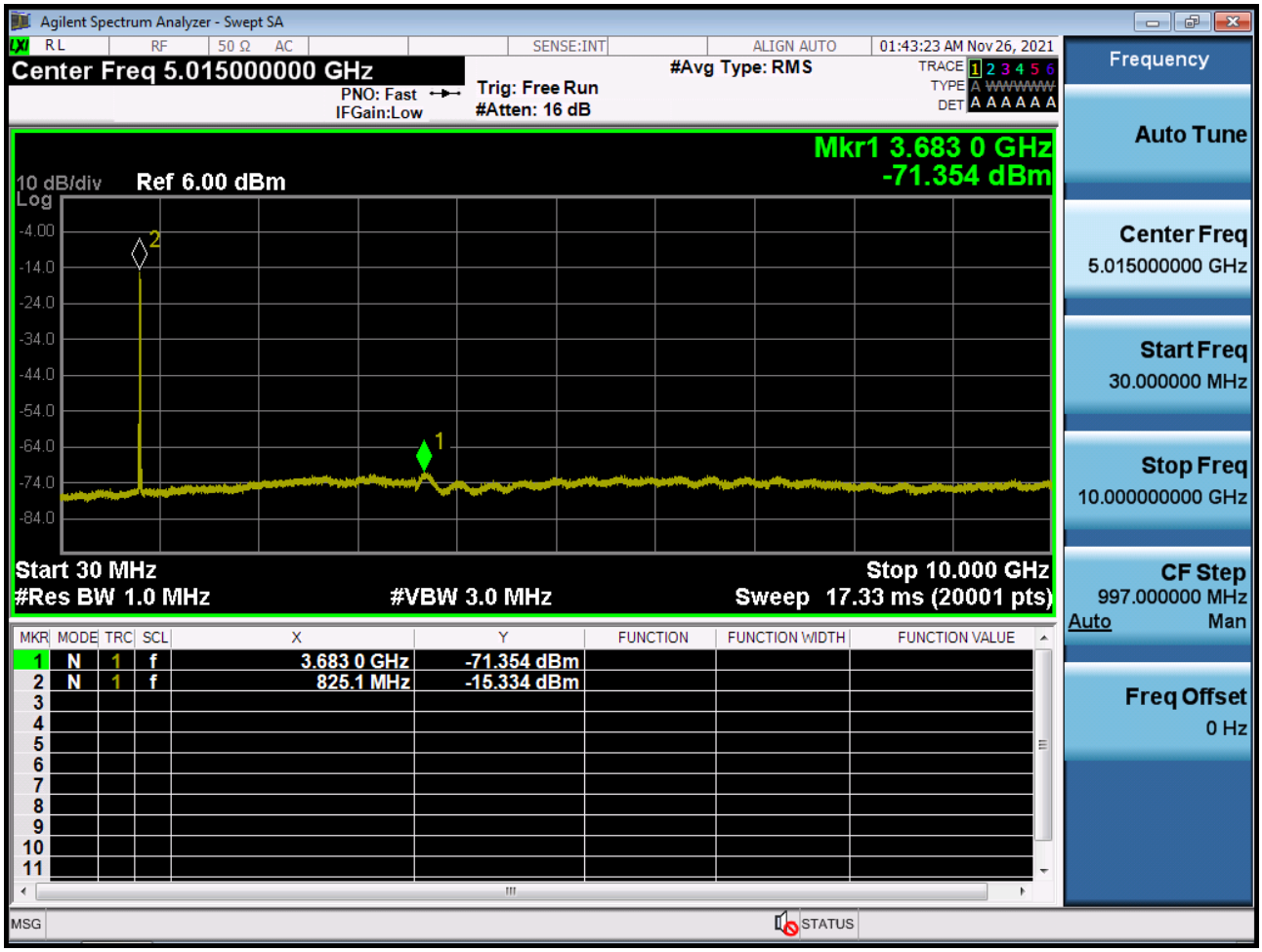
1. Modulation : QPSK
2. Factor(dB) = Cable Loss + Ext. Attenuator + Power Splitter
3. Factors for frequency :

Frequency Range (GHz)	Factor [dB]
0.03 – 1	27.070
1 – 5	29.776
5 – 10	30.391
10 – 15	30.916
15 – 20	31.289
Above 20(26.5)	31.931

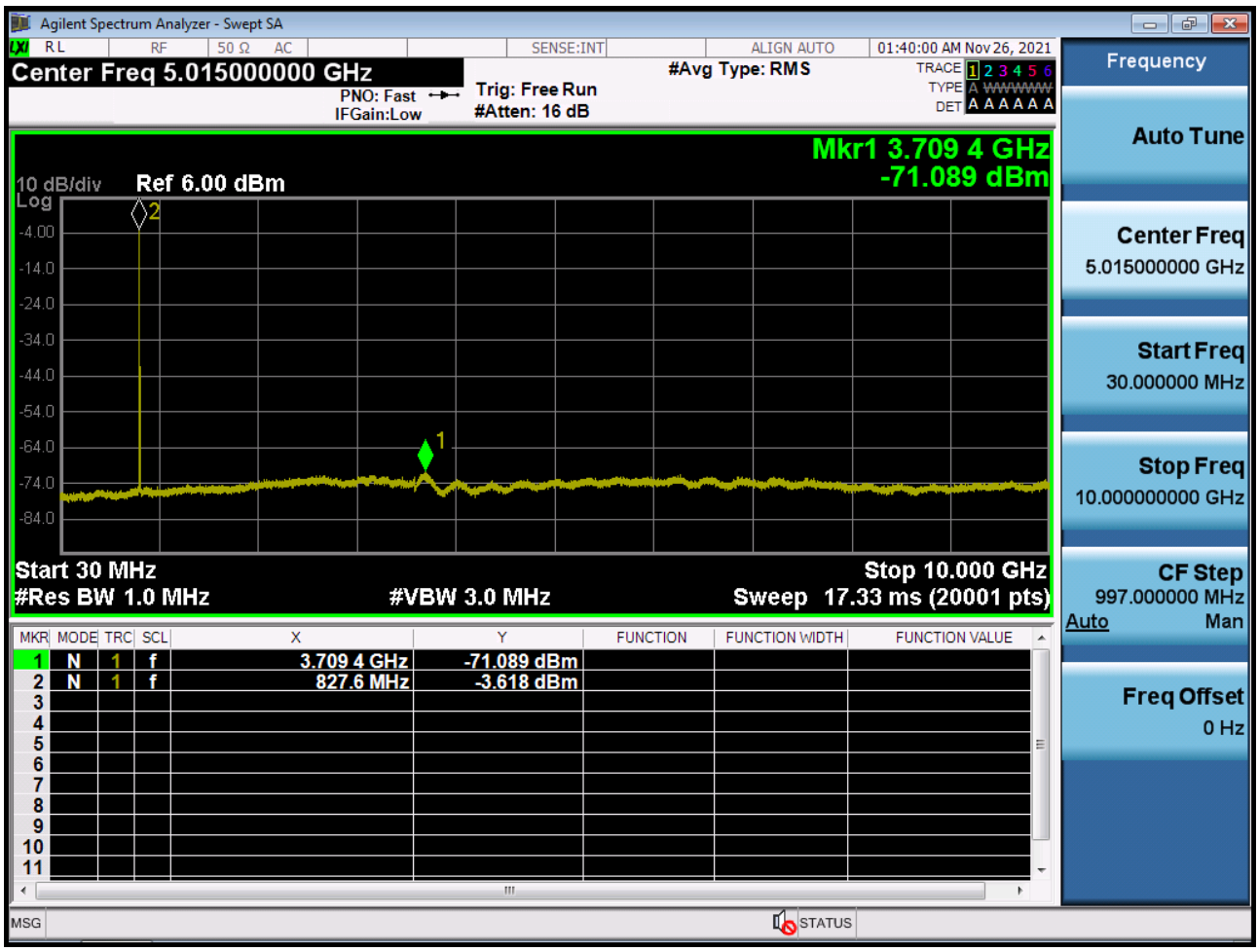
4. Limit : -13.0 dBm

Frequency Range : 30 MHz ~ 10 GHz

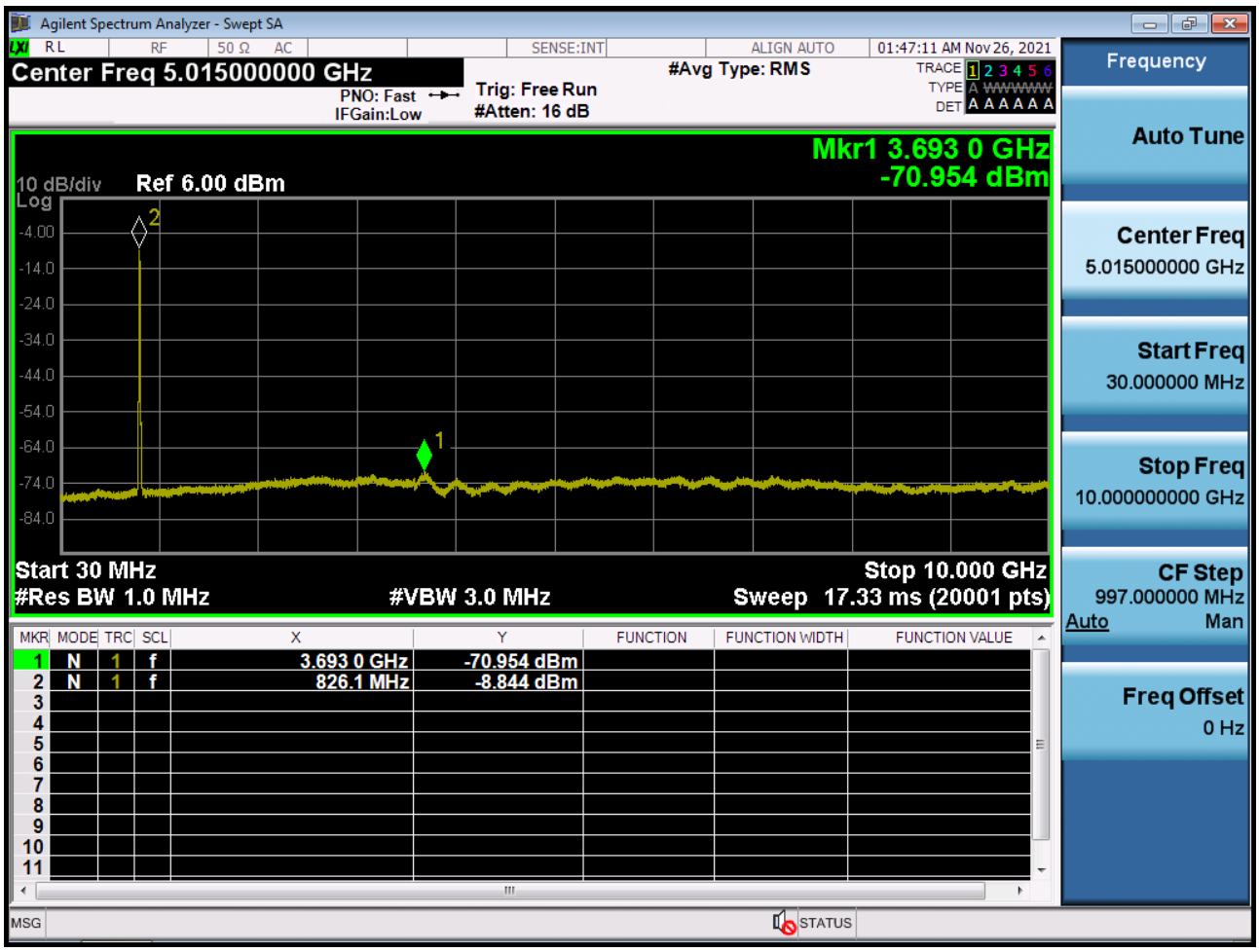
PCC 3 MHz Ch20416 RB1 Offset0 SCC 5 MHz Ch20455 RB1 Offset24



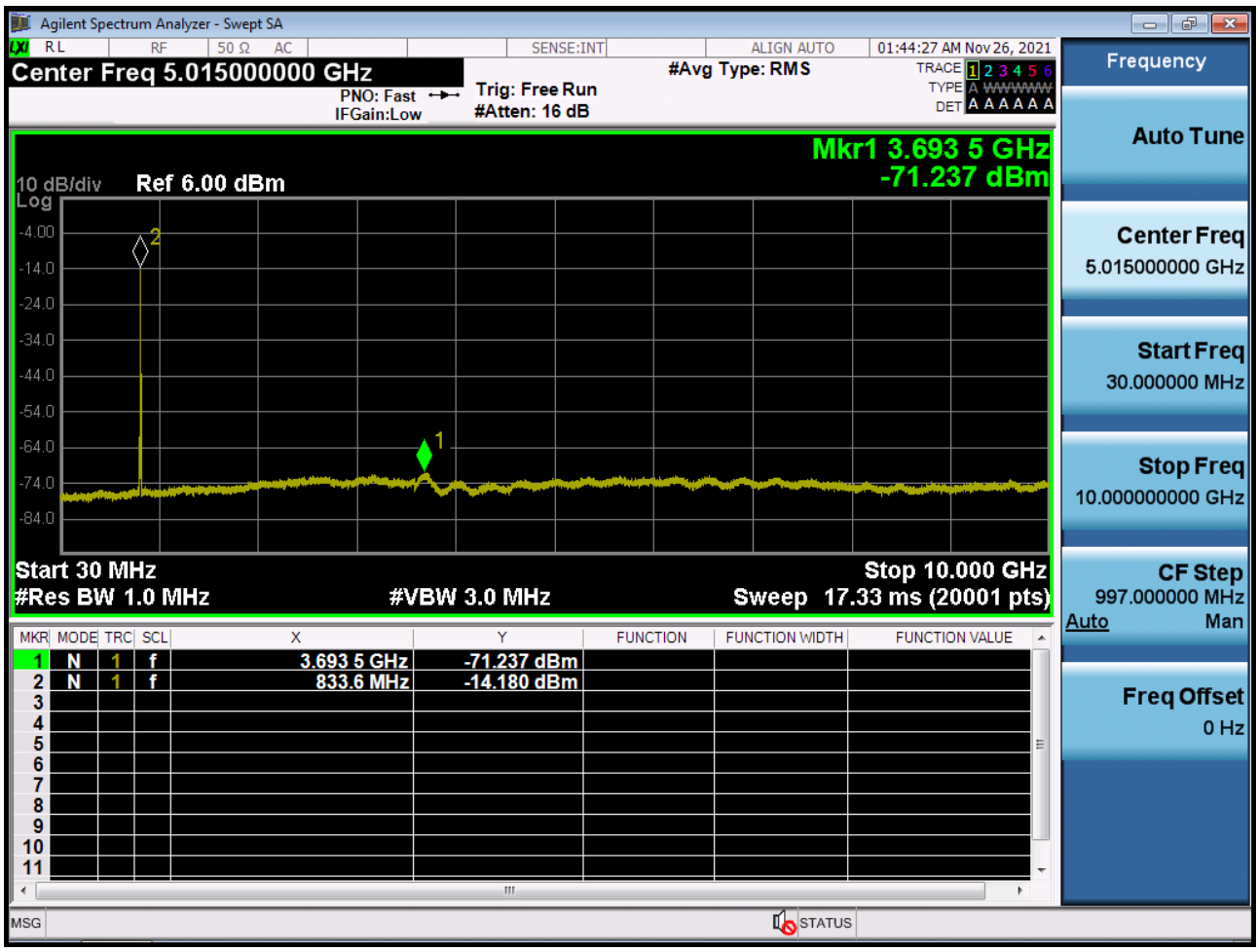
PCC 3 MHz Ch20416 RB1 Offset14 SCC 5 MHz Ch20455 RB1 Offset0



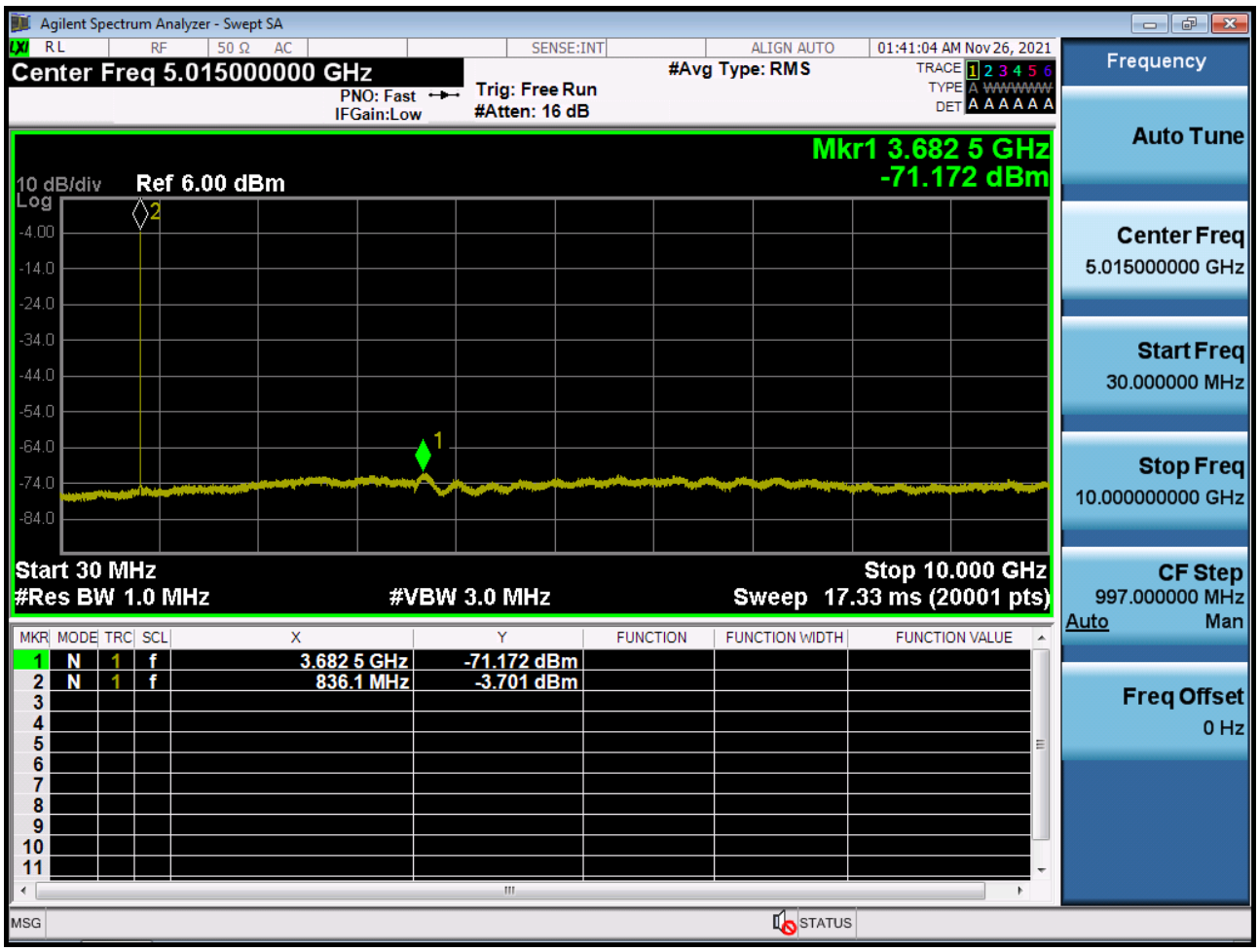
PCC 3 MHz Ch20416 RB15 Offset0 SCC 5 MHz Ch20455 RB25 Offset0



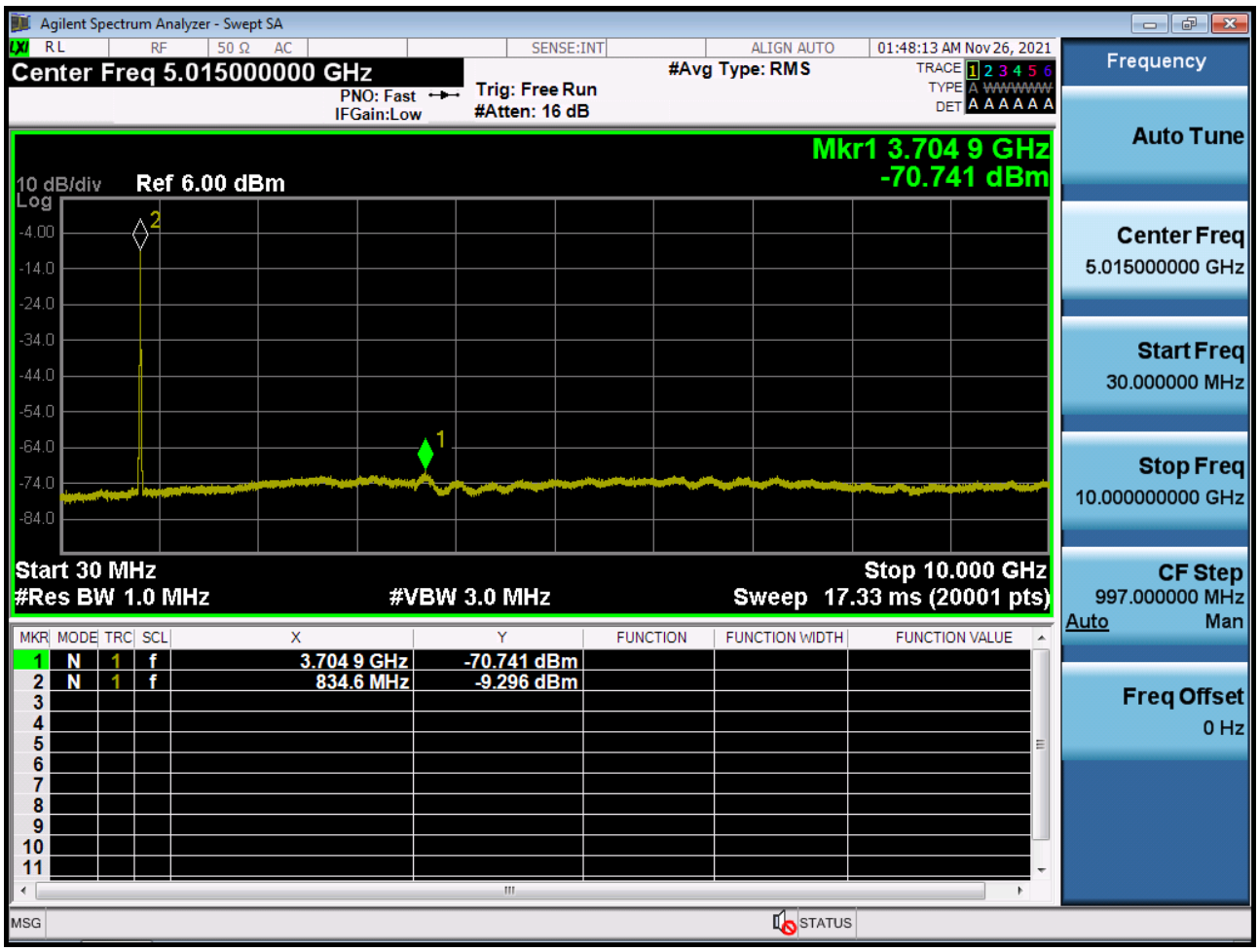
PCC 3 MHz Ch20501 RB1 Offset0 SCC 5 MHz Ch20540 RB1 Offset24



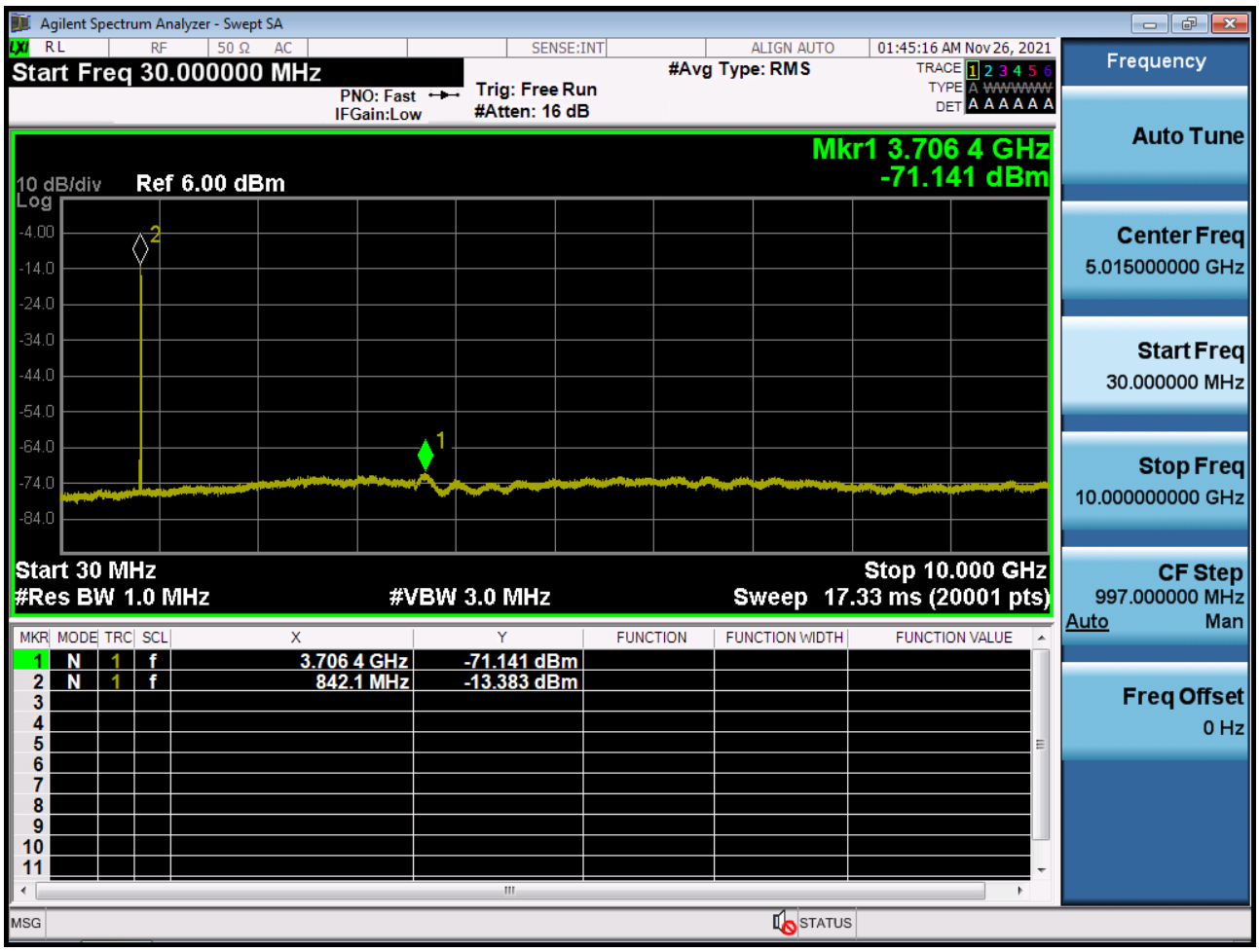
PCC 3 MHz Ch20501 RB1 Offset14 SCC 5 MHz Ch20540 RB1 Offset0



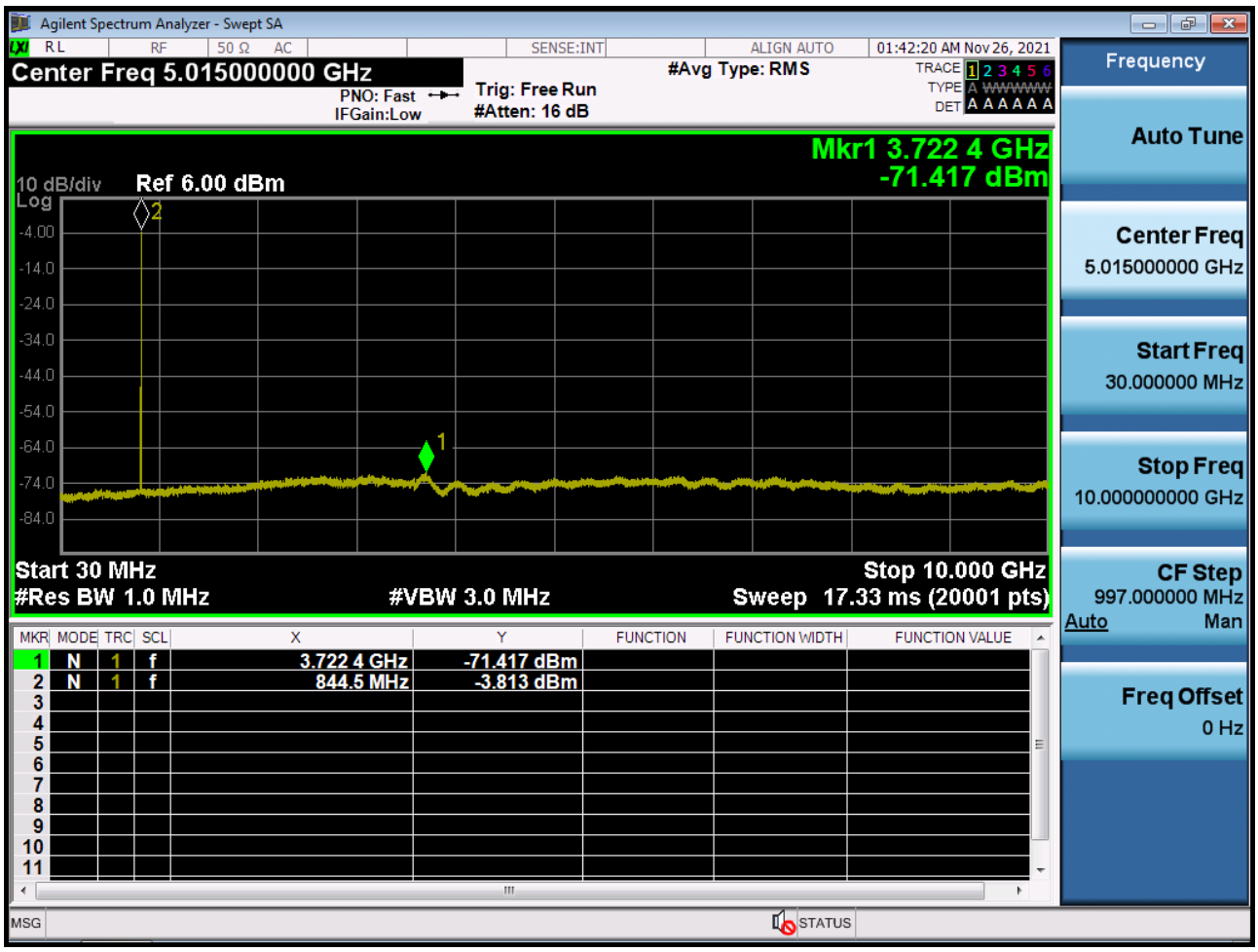
PCC 3 MHz Ch20501 RB15 Offset0 SCC 5 MHz Ch20540 RB25 Offset0



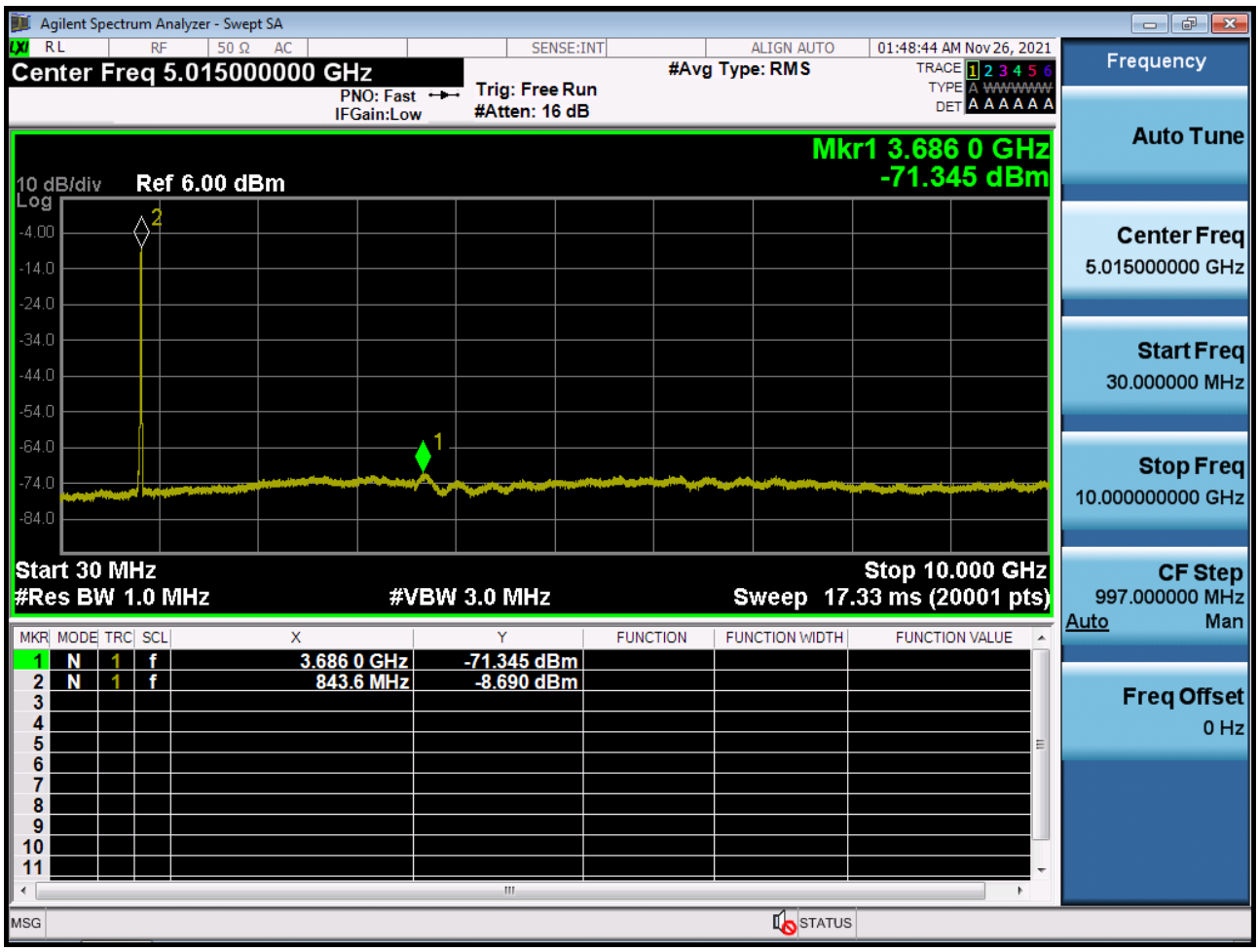
PCC 3 MHz Ch20586 RB1 Offset0 SCC 5 MHz Ch20625 RB1 Offset24



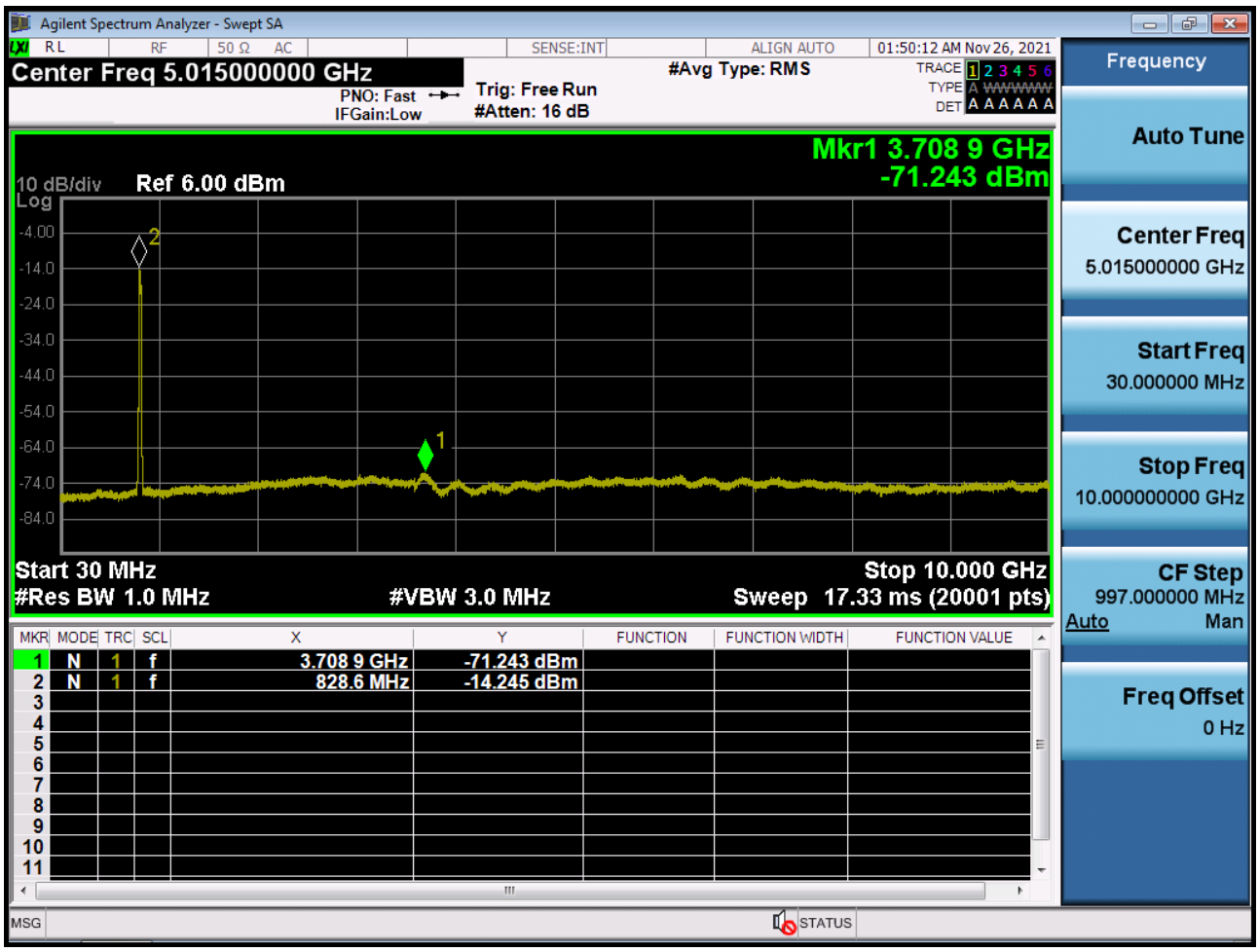
PCC 3 MHz Ch20586 RB1 Offset14 SCC 5 MHz Ch20625 RB1 Offset0



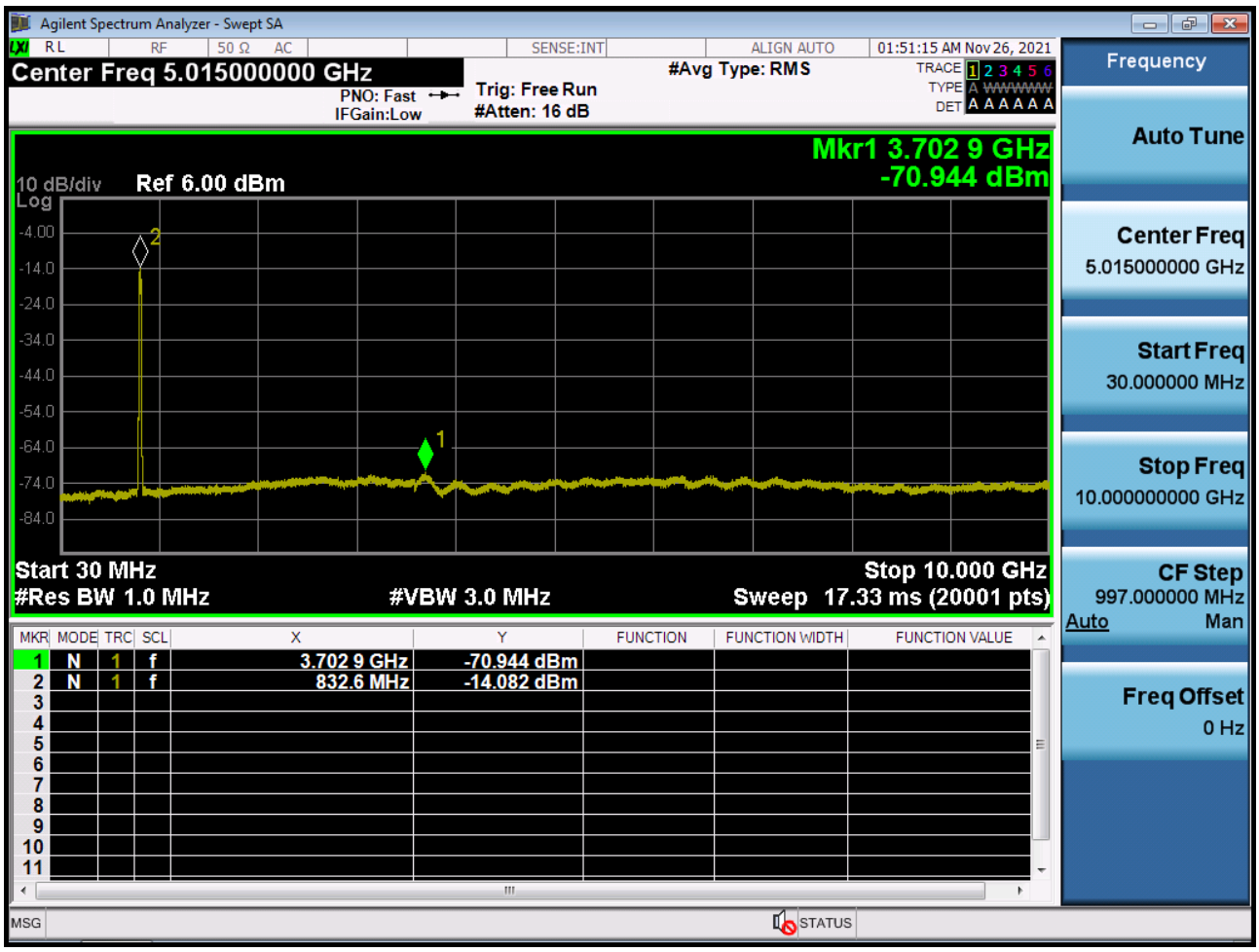
PCC 3 MHz Ch20586 RB15 Offset0 SCC 5 MHz Ch20625 RB25 Offset0



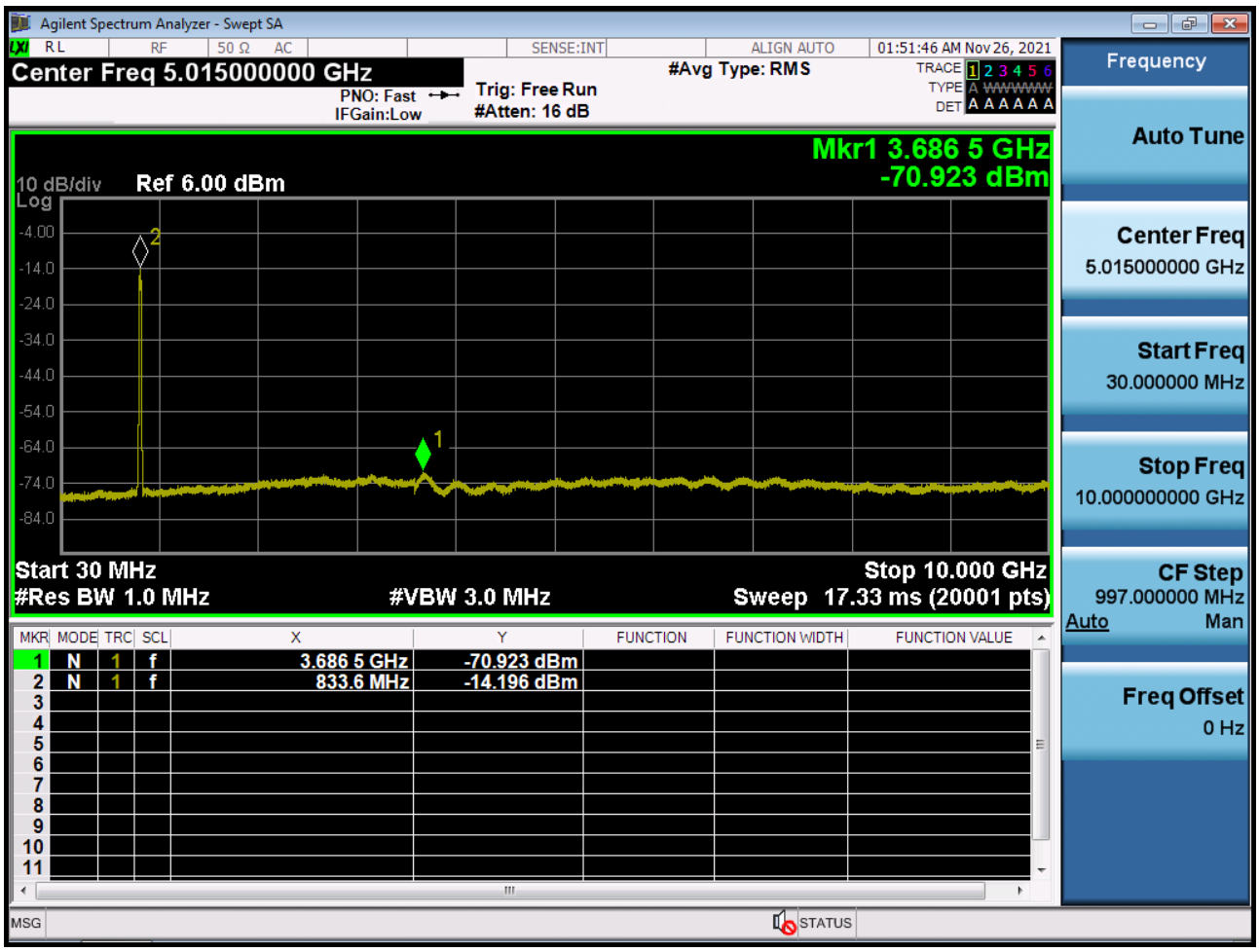
PCC 10 MHz Ch20450 RB50 Offset0 SCC 10 MHz Ch20549 RB50 Offset0



PCC 10 MHz Ch20476 RB50 Offset0 SCC 10 MHz Ch20575 RB50 Offset0

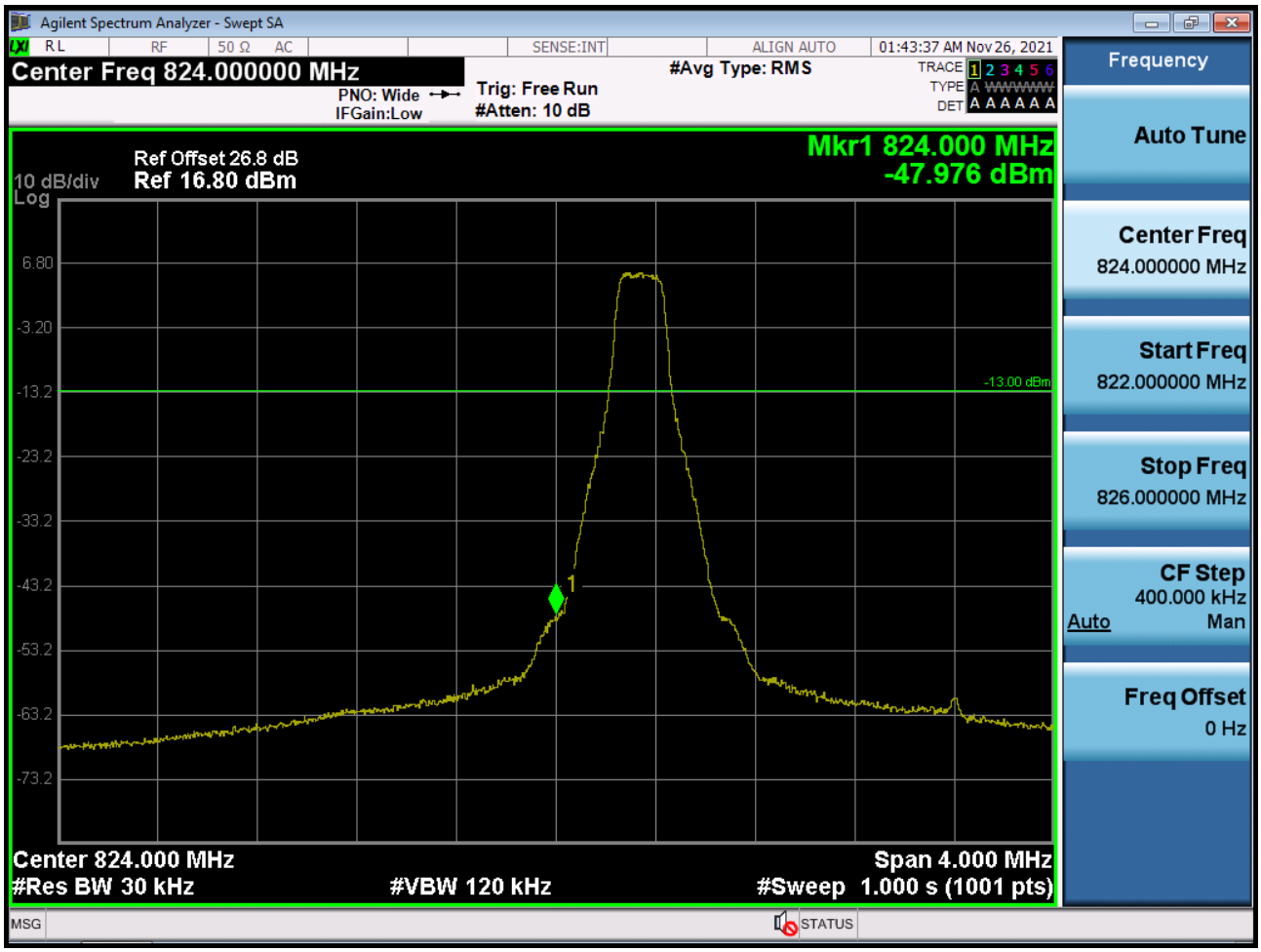


PCC 10 MHz Ch20501 RB50 Offset0 SCC 10 MHz Ch20600 RB50 Offset0



8.4 Band Edge

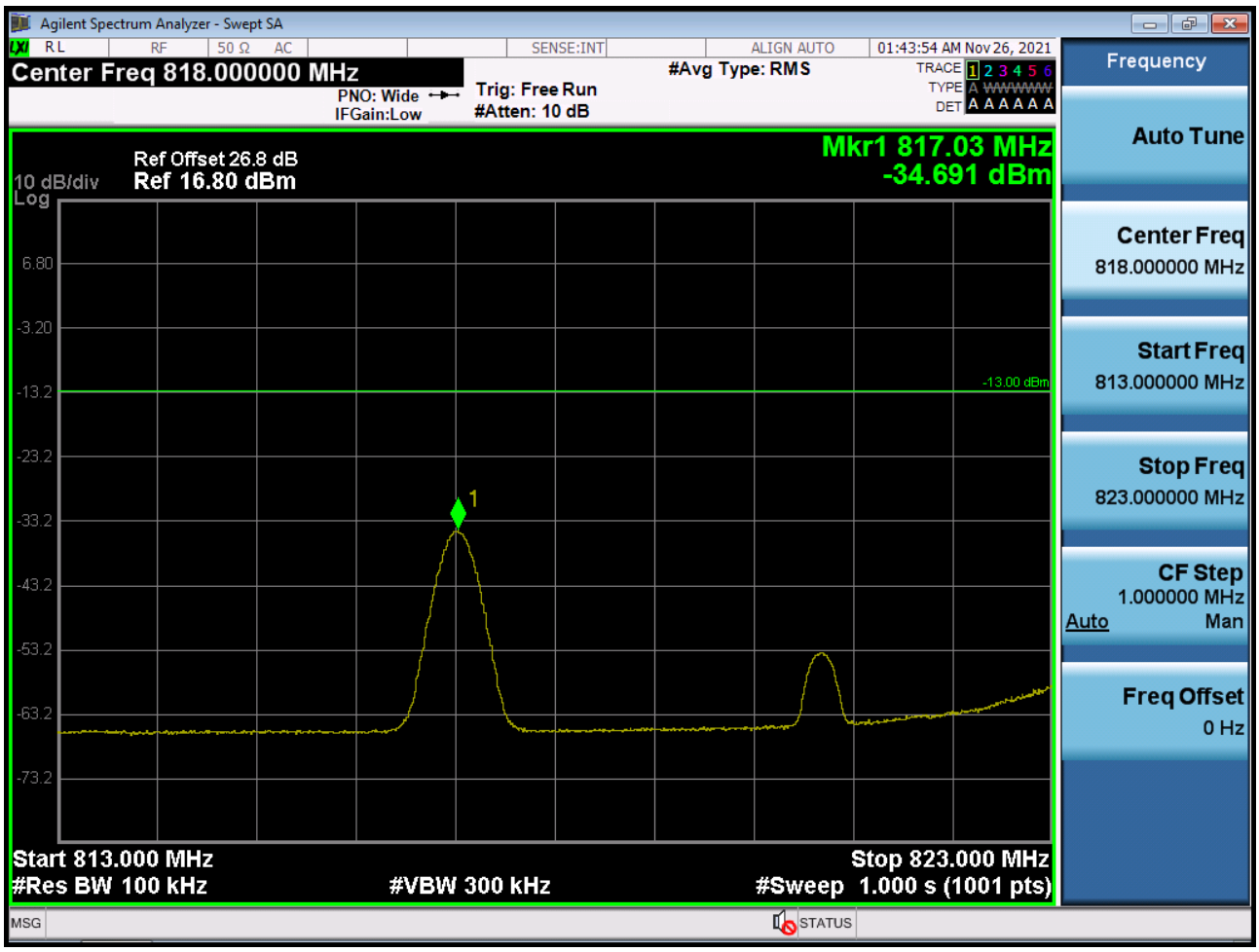
Lowest Channel_PCC 3 MHz Ch20416 RB1 Offset0 SCC 5 MHz Ch20455 RB1 Offset24(1)



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

Calculation = Reading Value + 10 x log(80 kHz/30 kHz) dB = -47.976 dBm + 4.260 dB = -43.716 dBm

Lowest Channel_PCC 3 MHz Ch20416 RB1 Offset0 SCC 5 MHz Ch20455 RB1 Offset24(2)



Lowest Channel_PCC 3 MHz Ch20416 RB1 Offset14 SCC 5 MHz Ch20455 RB1 Offset0(1)

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

Calculation = Reading Value + 10 x log(80 kHz/30 kHz) dB = -50.694 dBm + 4.260 dB = -46.434 dBm

Lowest Channel_PCC 3 MHz Ch20416 RB1 Offset14 SCC 5 MHz Ch20455 RB1 Offset0(2)

Lowest Channel_PCC 3 MHz Ch20416 RB15 Offset0 SCC 5 MHz Ch20455 RB25 Offset0(1)

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

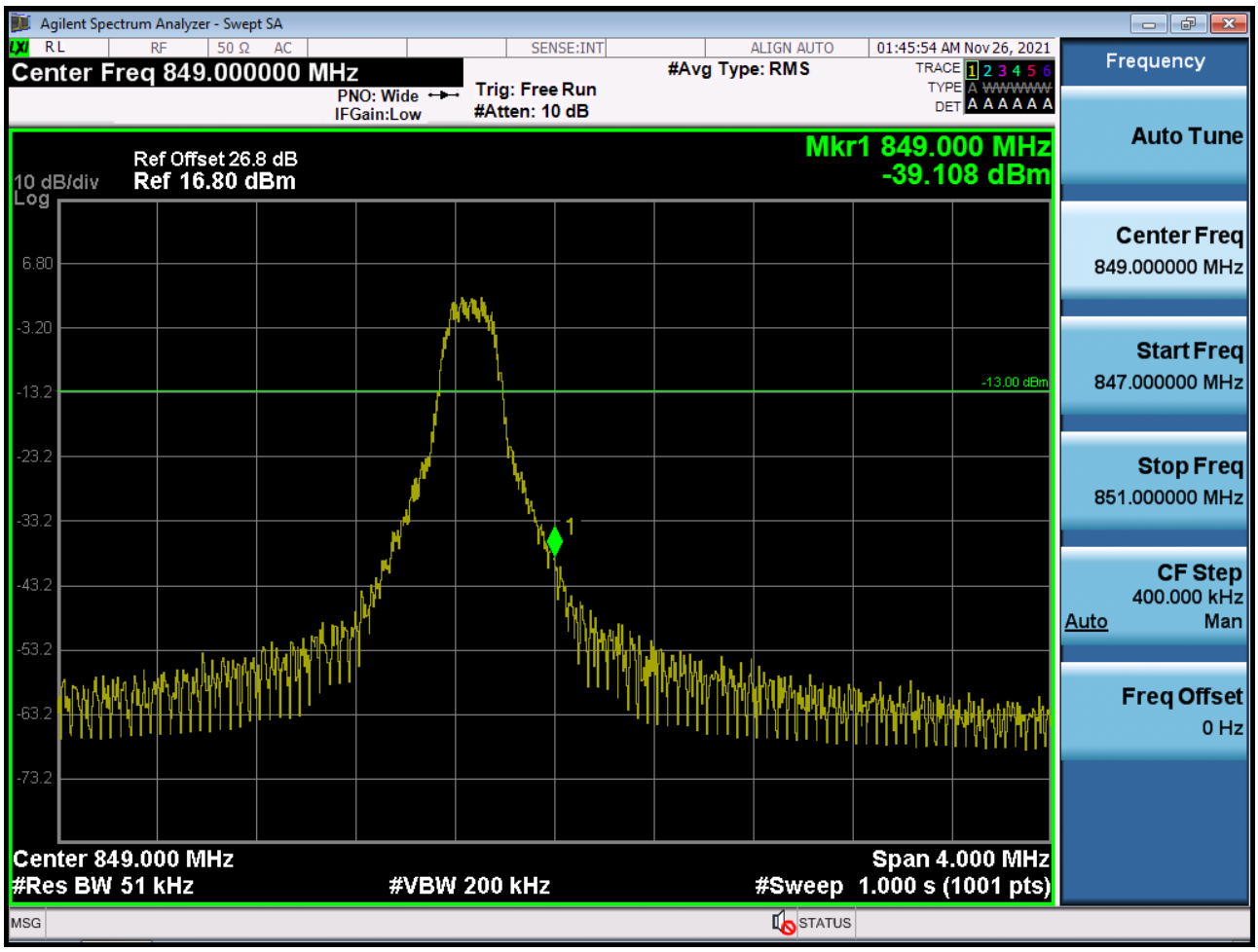
Calculation = Reading Value + 10 x log(80 kHz/30 kHz) dB = -26.384 dBm + 4.260 dB = -22.124 dBm

Lowest Channel_PCC 3 MHz Ch20416 RB15 Offset0 SCC 5 MHz Ch20455 RB25 Offset0(2)

Lowest Channel_PCC 10 MHz Ch20450 RB50 Offset0 SCC 10 MHz Ch20549 RB50 Offset0(1)

Lowest Channel_PCC 10 MHz Ch20450 RB50 Offset0 SCC 10 MHz Ch20549 RB50 Offset0(2)

Highest Channel_PCC 3 MHz Ch20586 RB1 Offset0 SCC 5 MHz Ch20625 RB1 Offset24(1)



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

Calculation = Reading Value + 10 x log(80 kHz/51 kHz) dB = -39.108 dBm + 1.955 dB = -37.153 dBm

Highest Channel_PCC 3 MHz Ch20586 RB1 Offset0 SCC 5 MHz Ch20625 RB1 Offset24(2)

Highest Channel_PCC 3 MHz Ch20586 RB1 Offset14 SCC 5 MHz Ch20625 RB1 Offset0(1)

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

Calculation = Reading Value + 10 x log(80 kHz/51 kHz) dB = -59.571 dBm + 1.955 dB = -57.616 dBm

Highest Channel_PCC 3 MHz Ch20586 RB1 Offset14 SCC 5 MHz Ch20625 RB1 Offset0(2)

Highest Channel_PCC 3 MHz Ch20586 RB15 Offset0 SCC 5 MHz Ch20625 RB25 Offset0(1)

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

Calculation = Reading Value + 10 x log(80 kHz/51 kHz) dB = -23.968 dBm + 1.955 dB = -22.013 dBm

Highest Channel_PCC 3 MHz Ch20586 RB15 Offset0 SCC 5 MHz Ch20625 RB25 Offset0(2)

Highest Channel_PCC 10 MHz Ch20501 RB50 Offset0 SCC 10 MHz Ch20600 RB50 Offset0(1)

Highest Channel_PCC 10 MHz Ch20501 RB50 Offset0 SCC 10 MHz Ch20600 RB50 Offset0(2)

8.5 Frequency Stability / Variation Of Ambient Temperature

- ▣ PCC Channel: 20501
- ▣ PCC Frequency: 834.1 MHz
- ▣ PCC BandWidth: 3 MHz
- ▣ SCC Channel: 20540
- ▣ SCC Frequency: 838.0 MHz
- ▣ SCC BandWidth: 5 MHz
- ▣ Voltage : 3.860 VDC
- ▣ LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.860	+20(Ref)	0.053	0.053	834.10004	838.00004
100 %		-30	0.053	-0.050	834.10004	837.99996
100 %		-20	0.061	0.061	834.10005	838.00005
100 %		-10	0.047	0.052	834.10004	838.00004
100 %		0	0.049	0.050	834.10004	838.00004
100 %		10	0.047	0.050	834.10004	838.00004
100 %		30	0.047	0.049	834.10004	838.00004
100 %		40	0.056	0.044	834.10005	838.00004
100 %		50	0.051	0.057	834.10004	838.00005
Batt. Endpoint	3.400	20	0.057	0.048	834.10005	838.00004

- ▣ PCC Channel: 20510
- ▣ PCC Frequency: 835.0 MHz
- ▣ PCC BandWidth: 5 MHz
- ▣ SCC Channel: 20549
- ▣ SCC Frequency: 838.9 MHz
- ▣ SCC BandWidth: 3 MHz
- ▣ Voltage : 3.860 VDC
- ▣ LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.860	+20(Ref)	0.057	0.049	835.00005	838.90004
100 %		-30	0.057	0.049	835.00005	838.90004
100 %		-20	0.045	0.055	835.00004	838.90005
100 %		-10	-0.062	-0.055	834.99995	838.89995
100 %		0	0.063	0.050	835.00005	838.90004
100 %		10	0.058	0.054	835.00005	838.90005
100 %		30	0.050	0.053	835.00004	838.90004
100 %		40	0.060	0.050	835.00005	838.90004
100 %		50	0.052	0.045	835.00004	838.90004
Batt. Endpoint	3.400	20	-0.048	0.053	834.99996	838.90004

- ▣ PCC Channel: 20478
- ▣ PCC Frequency: 831.8 MHz
- ▣ PCC BandWidth: 5 MHz
- ▣ SCC Channel: 20550
- ▣ SCC Frequency: 839.0 MHz
- ▣ SCC BandWidth: 10 MHz
- ▣ Voltage : 3.860 VDC
- ▣ LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.860	+20(Ref)	0.057	0.058	831.80005	839.00005
100 %		-30	0.058	-0.062	831.80005	838.99995
100 %		-20	0.051	0.045	831.80004	839.00004
100 %		-10	-0.055	0.060	831.79995	839.00005
100 %		0	0.044	-0.050	831.80004	838.99996
100 %		10	0.057	0.046	831.80005	839.00004
100 %		30	0.054	0.050	831.80005	839.00004
100 %		40	0.051	-0.050	831.80004	838.99996
100 %		50	0.056	0.049	831.80005	839.00004
Batt. Endpoint	3.400	20	-0.052	0.051	831.79996	839.00004

▣ PCC Channel: 20500
▣ PCC Frequency: 834.0 MHz
▣ PCC BandWidth: 10 MHz
▣ SCC Channel: 20572
▣ SCC Frequency: 841.2 MHz
▣ SCC BandWidth: 5 MHz
▣ Voltage : 3.860 VDC
▣ LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.860	+20(Ref)	0.053	-0.049	834.00004	841.19996
100 %		-30	0.055	0.052	834.00005	841.20004
100 %		-20	0.059	0.050	834.00005	841.20004
100 %		-10	0.058	0.050	834.00005	841.20004
100 %		0	-0.044	0.055	833.99996	841.20005
100 %		10	0.046	0.049	834.00004	841.20004
100 %		30	0.056	-0.050	834.00005	841.19996
100 %		40	-0.061	0.058	833.99995	841.20005
100 %		50	0.048	0.061	834.00004	841.20005
Batt. Endpoint	3.400	20	-0.047	0.052	833.99996	841.20004

▣ PCC Channel: 20476
▣ PCC Frequency: 831.6 MHz
▣ PCC BandWidth: 10 MHz
▣ SCC Channel: 20575
▣ SCC Frequency: 841.5 MHz
▣ SCC BandWidth: 10 MHz
▣ Voltage : 3.860 VDC
▣ LIMIT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	PPM		Frequency Error (MHz)	
			PCC	SCC	PCC	SCC
100 %	3.860	+20(Ref)	0.057	-0.050	831.60005	841.49996
100 %		-30	0.063	0.043	831.60005	841.50004
100 %		-20	-0.054	-0.062	831.59996	841.49995
100 %		-10	0.047	0.052	831.60004	841.50004
100 %		0	0.048	0.054	831.60004	841.50005
100 %		10	0.049	0.063	831.60004	841.50005
100 %		30	0.063	-0.060	831.60005	841.49995
100 %		40	-0.049	0.058	831.59996	841.50005
100 %		50	0.050	-0.059	831.60004	841.49995
Batt. Endpoint	3.400	20	0.043	0.046	831.60004	841.50004

8.6 Radiated Spurious Emissions

▣ PCC Channel : 20416 (825.6 MHz)

▣ PCC BW(MHz) : 3

▣ PCC RB/ RB Offset : 1/ 14

▣ SCC Channel : 20455 (829.5 MHz)

▣ SCC BW(MHz) : 5

▣ SCC RB/ RB Offset : 1/ 0

▣ DISTANCE: 3 meters

▣ LIMIT: -13.0 dBm

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)
1 651.20	-53.04	9.70	-63.36	1.99	H	-55.65
2 476.80	-26.92	10.50	-31.63	2.48	V	-23.61
3 302.40	-58.09	12.10	-59.65	2.89	V	-50.44
4 128.00	-48.23	12.54	-46.84	3.27	H	-37.57

▣ PCC Channel : 20476 (831.6 MHz)

▣ PCC BW(MHz) : 10

▣ PCC RB/ RB Offset : 1/ 49

▣ SCC Channel : 20575 (841.5 MHz)

▣ SCC BW(MHz) : 10

▣ SCC RB/ RB Offset : 1/ 0

▣ DISTANCE: 3 meters

▣ LIMIT: -13.0 dBm

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)
1 663.20	-51.59	9.76	-62.11	2.01	V	-54.36
2 494.80	-25.83	10.66	-30.52	2.49	H	-22.35
3 326.40	-57.76	12.25	-59.33	2.91	H	-49.99
4 158.00	-48.58	12.54	-47.09	3.27	H	-37.82

▣ PCC Channel : 20528 (836.8 MHz)

▣ PCC BW(MHz) : 5

▣ PCC RB/ RB Offset : 1/ 24

▣ SCC Channel : 20600 (244.0 MHz)

▣ SCC BW(MHz) : 10

▣ SCC RB/ RB Offset : 1/ 0

▣ DISTANCE: 3 meters

▣ LIMIT: -13.0 dBm

Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	Result (dBm)
1 673.60	-53.23	9.82	-63.74	2.01	V	-55.93
2 510.40	-20.95	10.70	-25.25	2.50	H	-17.05
3 347.20	-57.29	12.40	-58.98	2.92	V	-49.50
4 184.00	-43.72	12.64	-42.09	3.29	H	-32.74
5 020.80	-51.19	12.56	-45.38	3.60	H	-36.42

8.7 Occupied Bandwidth

PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	QPSK	15/ 0	5	20540	838.0	QPSK	25/ 0	7.5069
5	20510	835.0	QPSK	25/ 0	3	20549	838.9	QPSK	15/ 0	7.4923
5	20478	831.8	QPSK	25/ 0	10	20550	839.0	QPSK	50/ 0	13.868
10	20500	834.0	QPSK	50/ 0	5	20572	841.2	QPSK	25/ 0	13.898
10	20476	831.6	QPSK	50/ 0	10	20575	841.5	QPSK	50/ 0	18.869

PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	16QAM	15/ 0	5	20540	838.0	16QAM	25/ 0	7.5113
5	20510	835.0	16QAM	25/ 0	3	20549	838.9	16QAM	15/ 0	7.5397
5	20478	831.8	16QAM	25/ 0	10	20550	839.0	16QAM	50/ 0	13.904
10	20500	834.0	16QAM	50/ 0	5	20572	841.2	16QAM	25/ 0	13.918
10	20476	831.6	16QAM	50/ 0	10	20575	841.5	16QAM	50/ 0	18.793

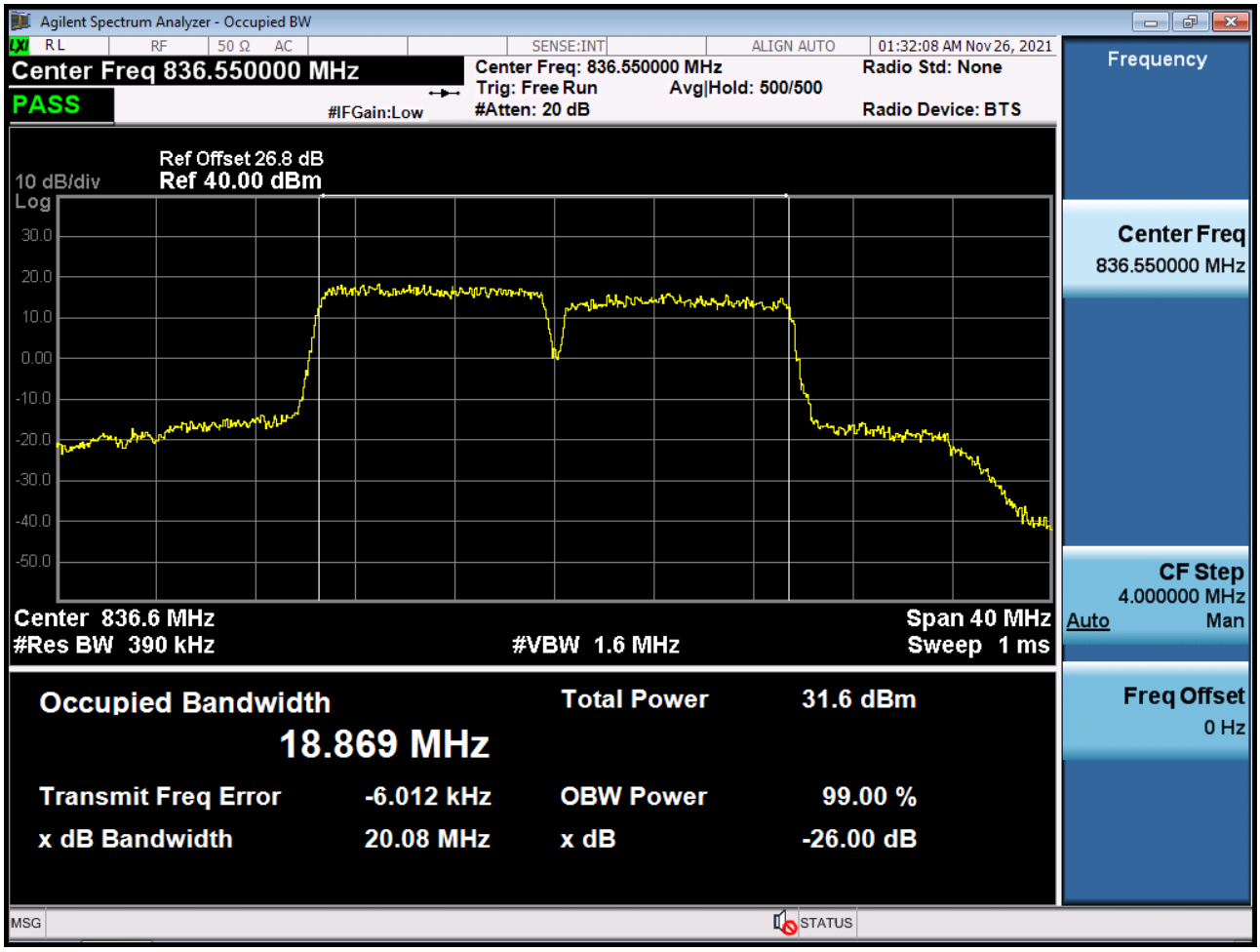
PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	64QAM	15/ 0	5	20540	838.0	64QAM	25/ 0	7.5297
5	20510	835.0	64QAM	25/ 0	3	20549	838.9	64QAM	15/ 0	7.5273
5	20478	831.8	64QAM	25/ 0	10	20550	839.0	64QAM	50/ 0	13.881
10	20500	834.0	64QAM	50/ 0	5	20572	841.2	64QAM	25/ 0	13.914
10	20476	831.6	64QAM	50/ 0	10	20575	841.5	64QAM	50/ 0	18.752

PCC					SCC					Data (MHz)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	256QAM	15/ 0	5	20540	838.0	256QAM	25/ 0	7.5173
5	20510	835.0	256QAM	25/ 0	3	20549	838.9	256QAM	15/ 0	7.5146
5	20478	831.8	256QAM	25/ 0	10	20550	839.0	256QAM	50/ 0	13.892
10	20500	834.0	256QAM	50/ 0	5	20572	841.2	256QAM	25/ 0	13.908
10	20476	831.6	256QAM	50/ 0	10	20575	841.5	256QAM	50/ 0	18.732

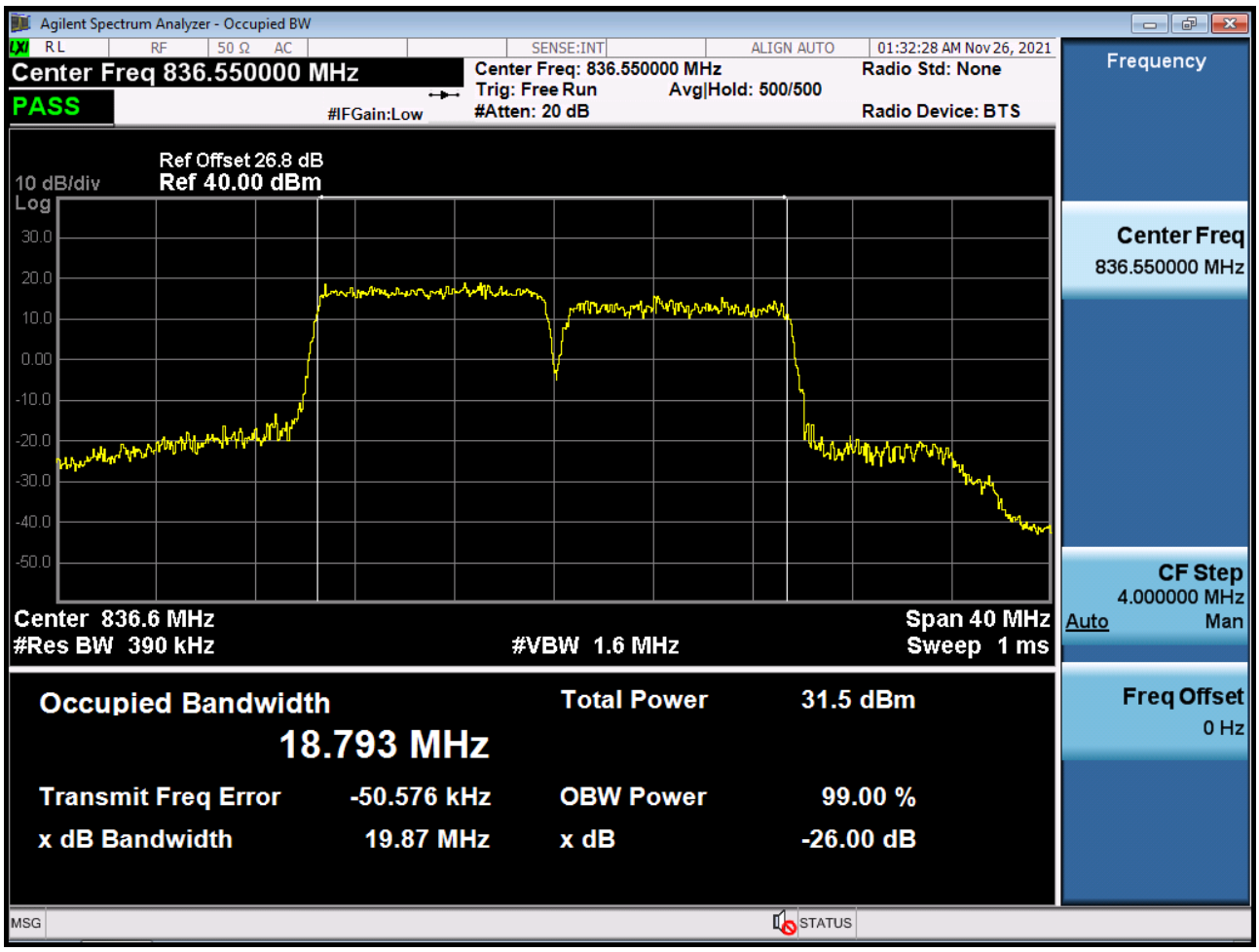
Note:

In order to simplify the report, attached plots were only Max.Bandwidth(10+10)

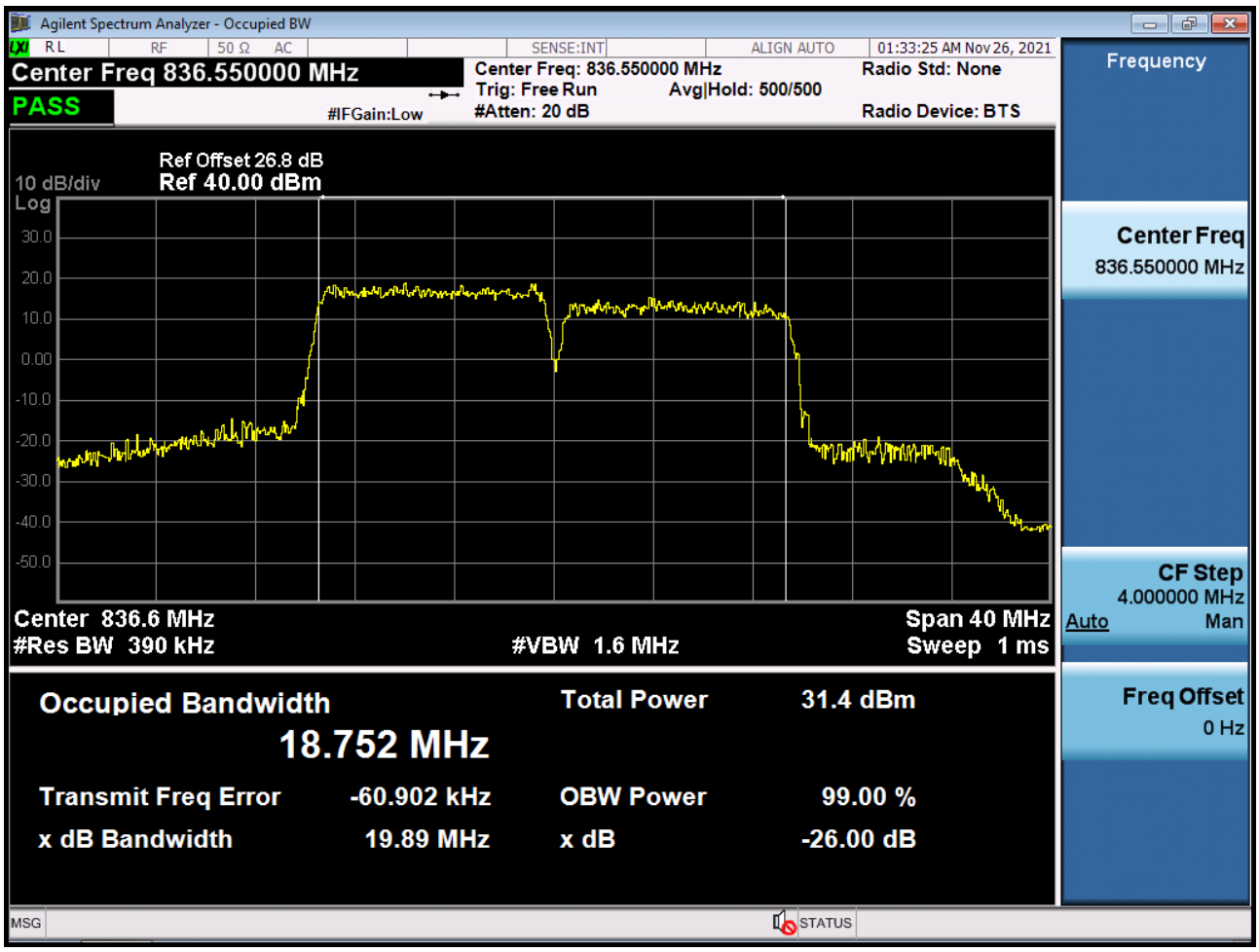
PCC 10 MHz Ch20476 RB50 Offset0, SCC 10 MHz Ch20575 RB50 Offset0_(QPSK)



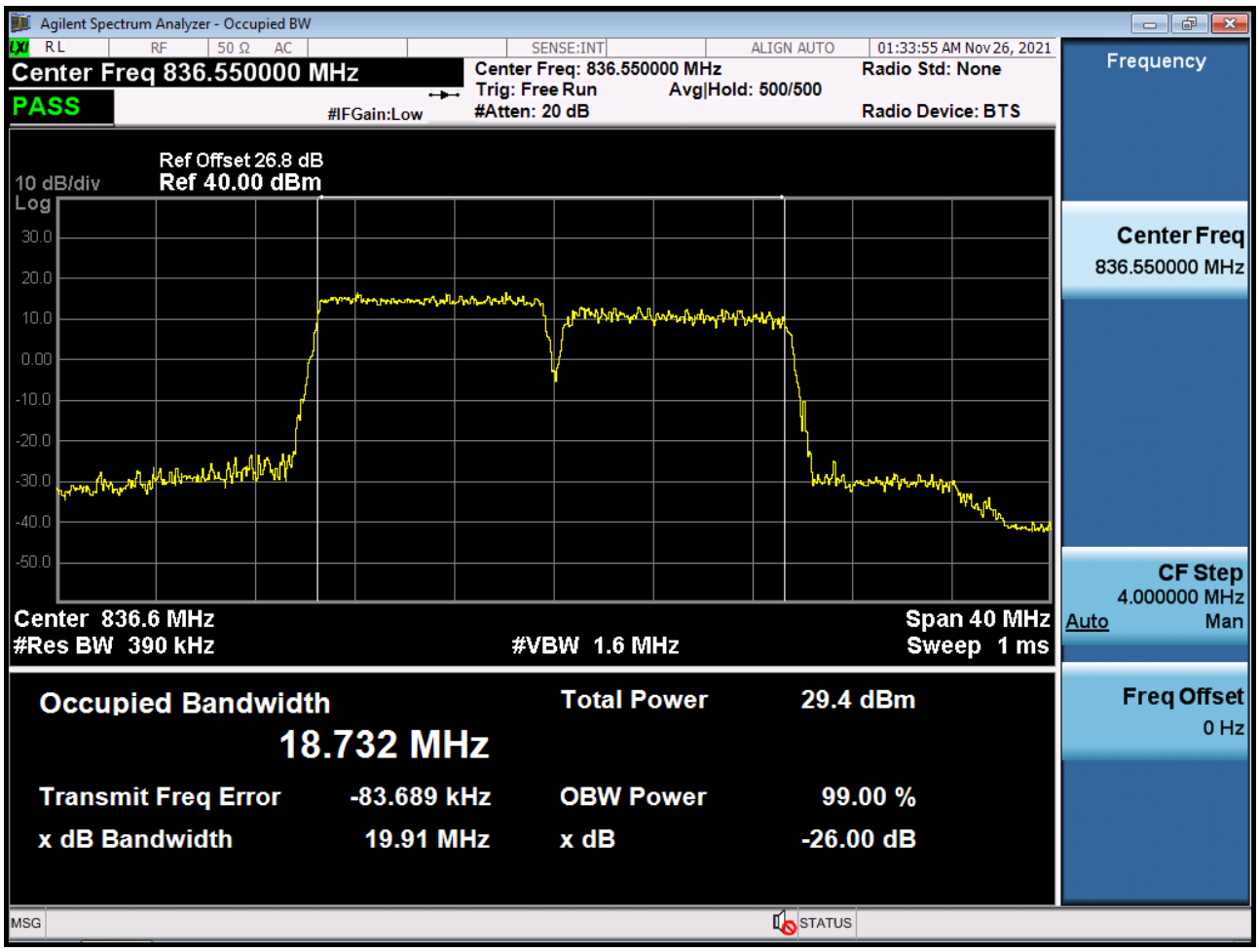
PCC 10 MHz Ch20476 RB50 Offset0, SCC 10 MHz Ch20575 RB50 Offset0_(16QAM)



PCC 10 MHz Ch20476 RB50 Offset0, SCC 10 MHz Ch20575 RB50 Offset0_(64QAM)



PCC 10 MHz Ch20476 RB50 Offset0, SCC 10 MHz Ch20575 RB50 Offset0_(256QAM)



8.8 Peak- to- Average Ratio

PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	QPSK	15/ 0	5	20540	838.0	QPSK	25/ 0	5.52
5	20510	835.0	QPSK	25/ 0	3	20549	838.9	QPSK	15/ 0	5.65
5	20478	831.8	QPSK	25/ 0	10	20550	839.0	QPSK	50/ 0	5.91
10	20500	834.0	QPSK	50/ 0	5	20572	841.2	QPSK	25/ 0	6.11
10	20476	831.6	QPSK	50/ 0	10	20575	841.5	QPSK	50/ 0	6.33

PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	16QAM	15/ 0	5	20540	838.0	16QAM	25/ 0	5.79
5	20510	835.0	16QAM	25/ 0	3	20549	838.9	16QAM	15/ 0	5.91
5	20478	831.8	16QAM	25/ 0	10	20550	839.0	16QAM	50/ 0	6.32
10	20500	834.0	16QAM	50/ 0	5	20572	841.2	16QAM	25/ 0	6.48
10	20476	831.6	16QAM	50/ 0	10	20575	841.5	16QAM	50/ 0	6.55

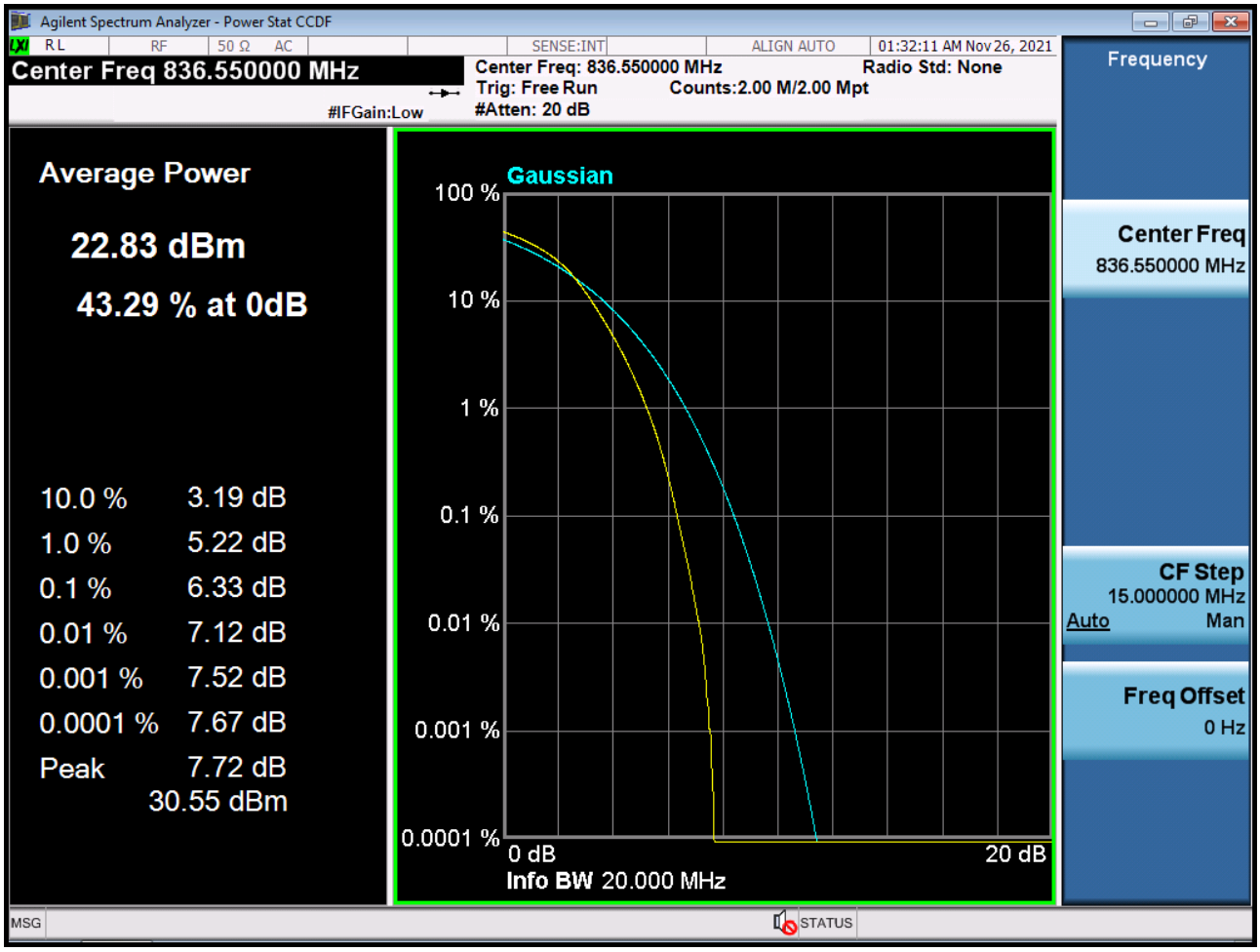
PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	64QAM	15/ 0	5	20540	838.0	64QAM	25/ 0	5.83
5	20510	835.0	64QAM	25/ 0	3	20549	838.9	64QAM	15/ 0	5.92
5	20478	831.8	64QAM	25/ 0	10	20550	839.0	64QAM	50/ 0	6.37
10	20500	834.0	64QAM	50/ 0	5	20572	841.2	64QAM	25/ 0	6.49
10	20476	831.6	64QAM	50/ 0	10	20575	841.5	64QAM	50/ 0	6.65

PCC					SCC					Data (dBm)
BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	BW [MHz]	Ch	Freq [MHz]	Mod	RB/ Offset	
3	20501	834.1	256QAM	15/ 0	5	20540	838.0	256QAM	25/ 0	5.92
5	20510	835.0	256QAM	25/ 0	3	20549	838.9	256QAM	15/ 0	5.98
5	20478	831.8	256QAM	25/ 0	10	20550	839.0	256QAM	50/ 0	6.72
10	20500	834.0	256QAM	50/ 0	5	20572	841.2	256QAM	25/ 0	6.93
10	20476	831.6	256QAM	50/ 0	10	20575	841.5	256QAM	50/ 0	7.01

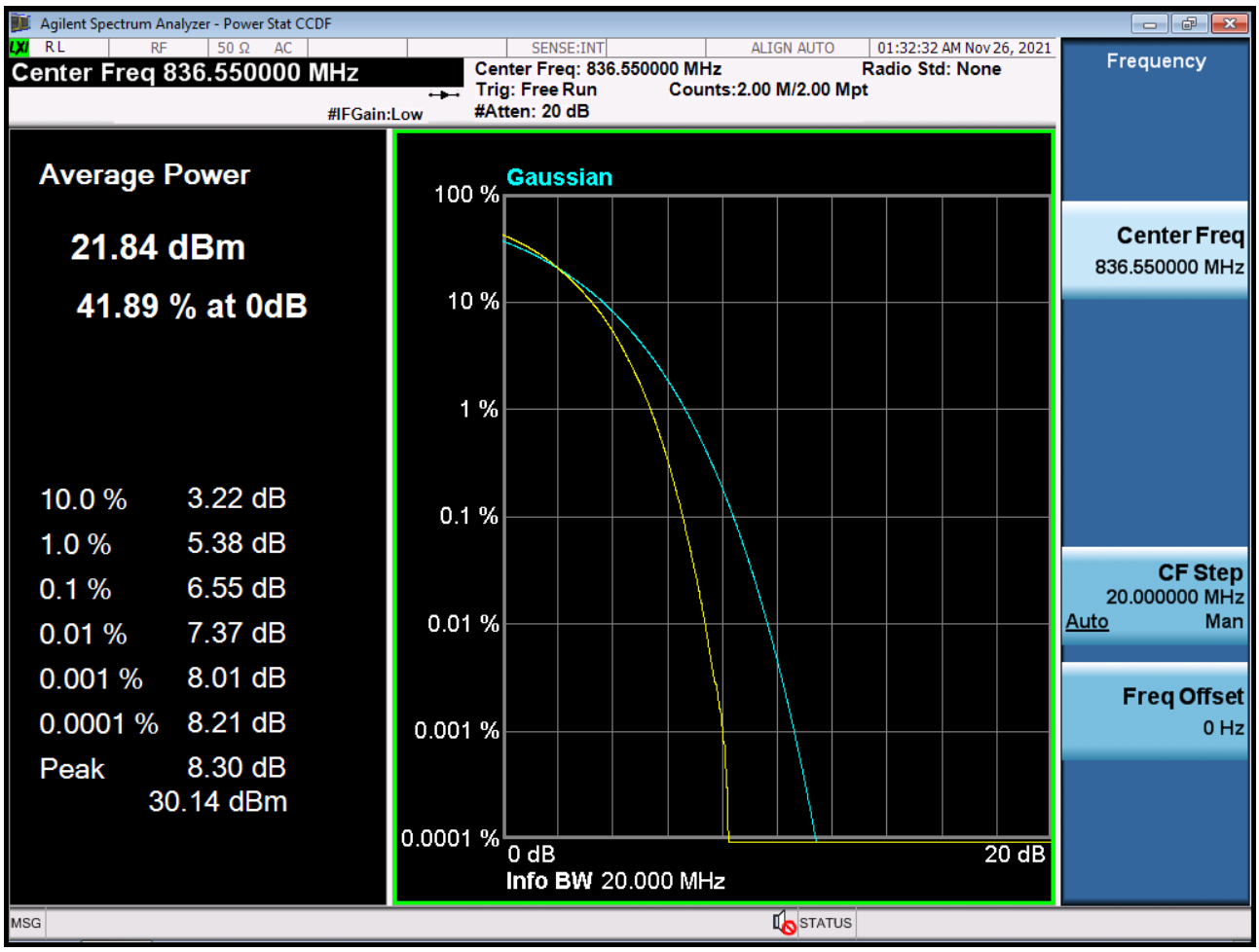
Note:

In order to simplify the report, attached plots were only Max.Bandwidth(10+10)

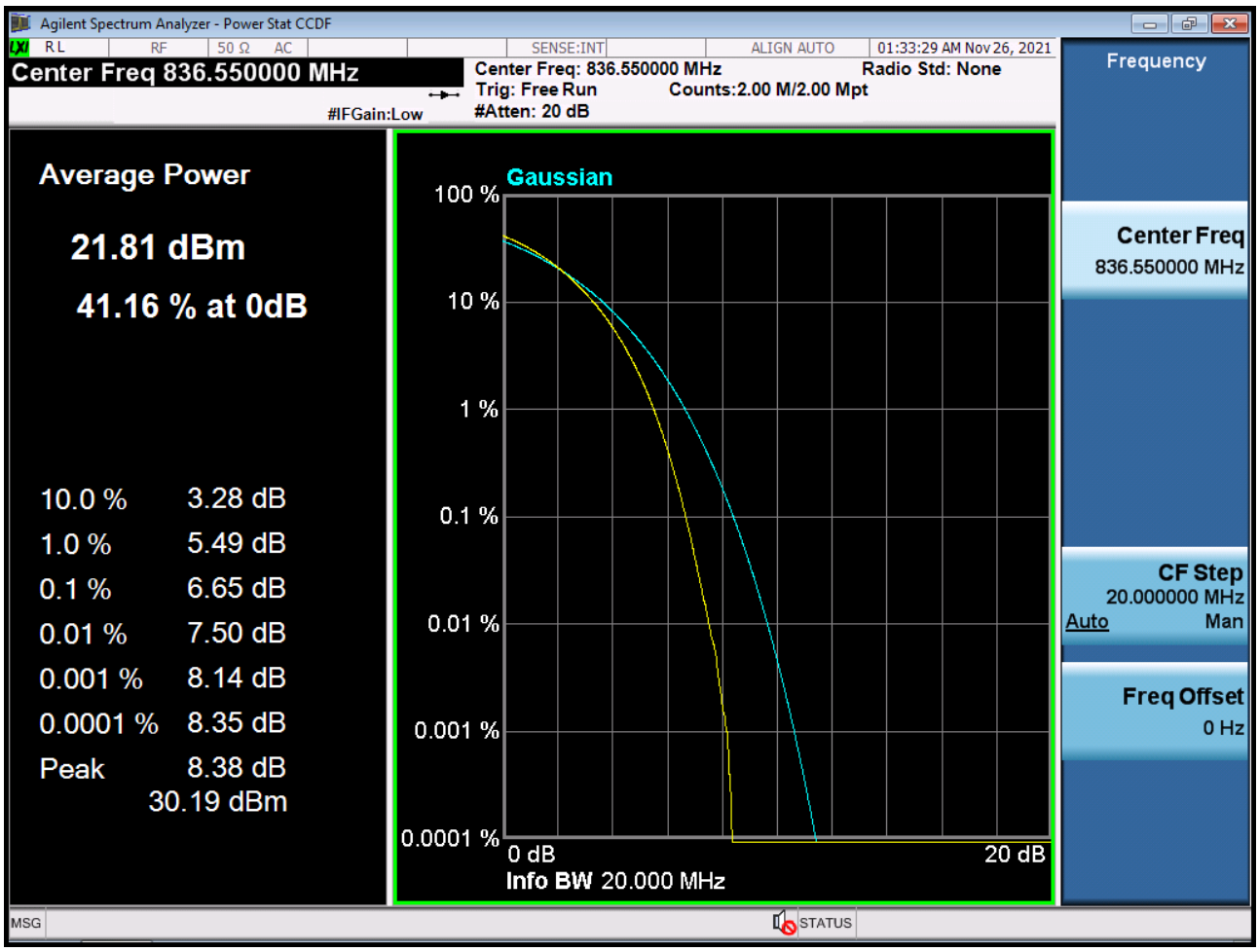
PCC 10 MHz 20476 RB50 Offset0, SCC 10 MHz Ch20575 RB50 Offset0 (QPSK)



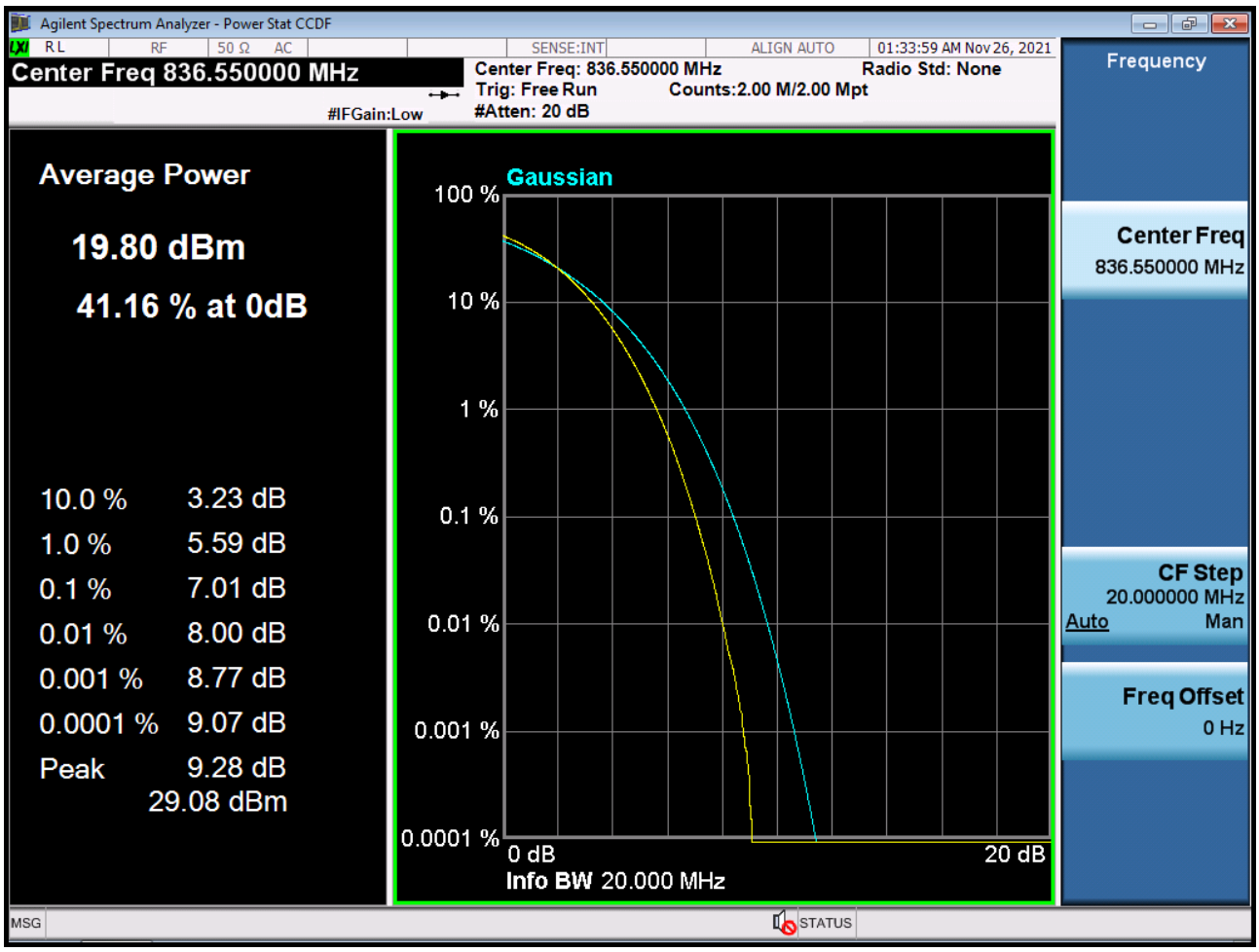
PCC 10 MHz 20476 RB50 Offset0, SCC 10 MHz Ch20575 RB50 Offset0 (16QAM)



PCC 10 MHz 20476 RB50 Offset0, SCC 10 MHz Ch20575 RB50 Offset0 (64QAM)



PCC 10 MHz 20476 RB50 Offset0, SCC 10 MHz Ch20575 RB50 Offset0 (256QAM)



9. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2111-FC088-P