

RF Test Report

Applicant : unitech electronics co., ltd.
Product Type : Rugged Handheld Computer
Trade Name : unitech
Model Number : EA630
Applicable Standard : FCC 47 CFR PART 22H
FCC 47 CFR PART 24E
ANSI C63.26 2015
Received Date : May 11, 2020
Test Period : May 18 ~ May 27, 2020
Issued Date : Ju1. 01, 2020

Issued by

A Test Lab Techno Corp.
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Taiwan Accreditation Eoundation accreditation number: 1330
Test Firm MRA designation number: TW0010

Note:

- 1.The test results are valid only for samples provided by customers and under the test conditions described in this report.
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- 3.The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.



Revision History

Rev.	Issued Date	Revisions	Revised By
00	Jun. 16, 2020	Initial Issue	Nina Lin
01	Ju1. 01, 2020	Update Test Results (P.5/P.27)	Snow Wang



Verification of Compliance

Issued Date: Ju1. 01, 2020

Applicant : unitech electronics co., ltd.
Product Type : Rugged Handheld Computer
Trade Name : unitech
Model Number : EA630
FCC ID : HLEEA630BTNFL
EUT Rated Voltage : DC 5 V, 2.5 A / DC 9 V, 2 A
Test Voltage : DC 3.6 V / DC 3.8 V / DC 4.35 V
Applicable Standard : FCC 47 CFR PART 22H
FCC 47 CFR PART 24E
ANSI C63.26 2015
Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.
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Tel : +886-3-2710188 / Fax : +886-3-2710190



Taiwan Accreditation Foundation accreditation number: 1330
<http://www.atl-lab.com.tw/e-index.htm>

A Test Lab Techno Corp. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by A Test Lab Techno Corp. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Approved By : Fly Lu
(Manager) (Fly Lu)

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1 General Information

1.1. EUT Description

Applicant	unitech electronics co., ltd. 5F., No.136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist, New Taipei City, Taiwan			
Manufacturer	unitech electronics co., ltd. 5F., No.136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist, New Taipei City, Taiwan			
Product	Rugged Handheld Computer			
Trade Name	unitech			
Model Number	EA630			
IMEI No.	IMEI1: 355239110051120, IMEI2: 355239115204005			
FCC ID	HLEEA630BTNFL			
Mode	Band	UL Frequency (MHz)	DL Frequency (MHz)	Modulation
WCDMA(RMC12.2K)/ HSDPA/ HSUPA	II	1852.4 ~ 1907.6	1932.4 ~ 1987.6	QPSK
	V	826.4 ~ 846.6	871.4 ~ 891.6	QPSK
Antenna information	Type		Max. Gain (dBi)	
	PIFA Antenan		WCDMA/ HSDPA/ HSUPA Band II	0.4
			WCDMA/ HSDPA/ HSUPA Band V	-2.6
Operate Temp. Range	-10 ~ +50 °C			

Frequency Band	Max. RF Output Power (W)	E.R.P. /E.I.R.P. (W)	
WCDMA/ HSDPA/ HSUPA Band II	0.299	0.33	(E.I.R.P.)
WCDMA/ HSDPA/ HSUPA Band V	0.252	0.08	(E.R.P.)

Frequency Band	Occupied Bandwidth (MHz)	Emission Designator
WCDMA/ HSDPA/ HSUPA Band II	4.1484	4M15F9W
WCDMA/ HSDPA/ HSUPA Band V	4.1468	4M15F9W

1.2. Mode of Operation

ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: WCDMA Band II Link Mode
Mode 2: WCDMA Band V Link Mode

Note: Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

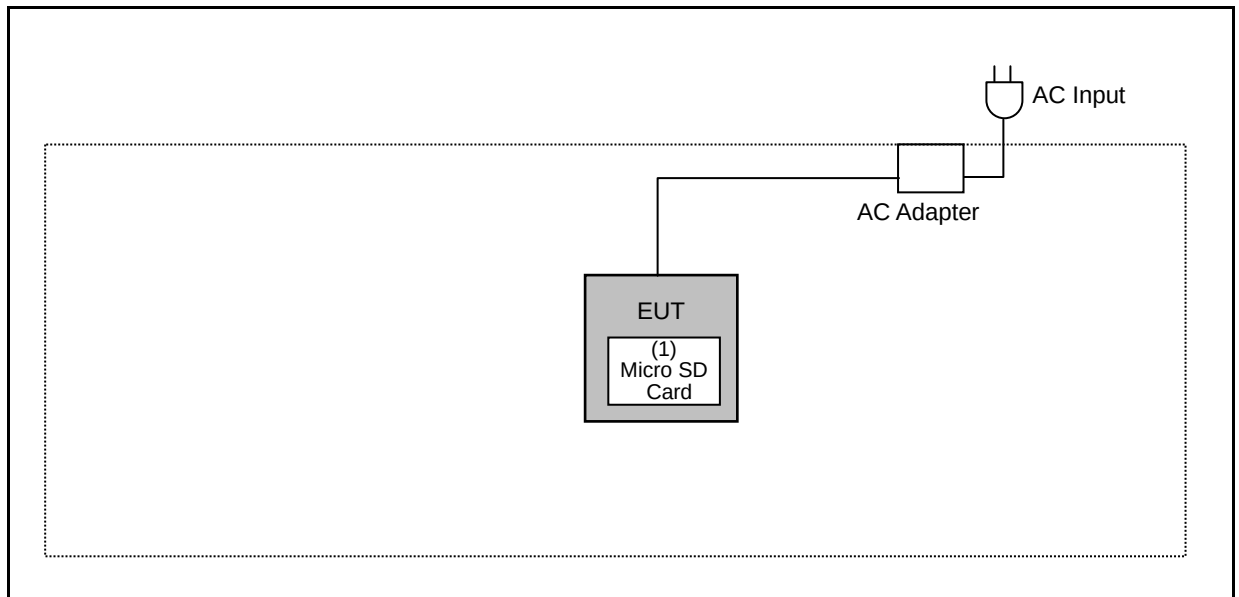
By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "X axis" position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

1.3. EUT Test Step

1	Setup the EUT shown on "Configuration of Test System Details".
2	Turn on the power of all equipment.

Measurement Software			
No.	Description	Software	Version
1	Radiated Emission	EZ EMC	1.1.4.4

1.4. Configuration of Test System Details



Devices Description					
Product		Manufacturer	Model Number	Serial Number	Power Cord
(1)	Micro SD Card	Transcend	9153BA 8G 07DS1	---	---



1.5. Test Instruments

For Conducted

Test Period: May 18 ~ May 27, 2020

Testing Engineer: Eric Ouyang

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Temperature & Humidity Chamber	TAICHY	MHU-225LA	980729	03/31/2020	1 year
Power Supply	KEITHLEY	2303	4045290	02/11/2020	1 year
Divider	Warison	WDIV-2I0.5-26.5S20	WR222AM2B2	11/08/2019	1 year
Spectrum Analyzer	Agilent	N9030A	MY53120541	01/06/2020	1 year
Universal Radio Communication Tester	Agilent	E5515C	MY47511156	09/09/2019	1 year

For Radiated Emissions

Test Period: May 22 ~ May 23, 2020

Testing Engineer: Bradley Liao

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Wireless Communications	Agilent	E5515C	MY47511156	09/09/2019	1 year
Spectrum Analyzer (10 Hz~44 GHz)	Keysight	N9010A	MY52221312	01/13/2020	1 year
Pre Amplifier (1~26.5 GHz)	Agilent	8449B	3008A02237	10/18/2019	1 year
Pre Amplifier (100 kHz~1.3 GHz)	Agilent	8447D	2944A11119	01/15/2020	1 year
Broadband Antenna	Schwarzbeck	VULB9168	416	10/23/2019	1 year
Horn Antenna (1~18 GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	08/22/2019	1 year
Loop Antenna	COM-POWER CORPORATION	AL-130	121014	03/27/2020	1 year
RF Cable	EMCI	EMC104-N-N-6000	TE01-1	02/20/2020	1 year
Microwave Cable	EMCI	EMC104-SM-SM-1 3000	170814	10/29/2019	1 year
Microwave Cable	EMCI	EMC102-KM-KM-1 4000	151001	02/20/2020	1 year

Note: N.C.R. = No Calibration Request.

1.6. Test Site Environment

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	20-30
Humidity (%RH)	25-75	45-75
Barometric pressure (mbar)	860-1060	990-1005

Test Setting Condition		
L.V.	Low Voltage	DC 3.6 V
N.V.	Normal Voltage	DC 3.8 V
H.V.	High Voltage	DC 4.35 V
L.T.	Low Temperature	-10 °C
N.T.	Normal Temperature	+25 °C
H.T.	High Temperature	+50 °C

1.7. Summary of Test Result

FCC Rule	Description	Result
§2.1046	Conducted Output Power	Pass
§22.913(a)(5)	Effective Radiated Power	Pass
§24.232(c)	Equivalent Isotropic Radiated Power	Pass
§24.232(d) §27.50 KDB 971168 D01 (5.7.1)	Peak to average ratio	Pass
§2.1049 §22.917(a) §24.238(a)	Emission Bandwidth & Occupied Bandwidth	Pass
§2.1051 §22.917(a) §24.238(a)	Band Edge Measurement	Pass
§2.1051 §22.917(a) §24.238(a)	Conducted Spurious Emission	Pass
§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	Pass
§2.1055 §22.355 §24.235	Frequency Stability for Temperature & Voltage	Pass

1.8. Measurement Uncertainty

Parameter	Uncertainty
RF Output Power	0.69 dB
Effective Radiated Power / Equivalent Isotropic Radiated Power	5.7 dB
Peak to Average Ratio	0.69 dB
Emission Bandwidth & Occupied Bandwidth	4.96 %
Band Edge	0.69 dB
Conducted Spurious Emission	0.69 dB
Field Strength of Spurious Radiation	5.7 dB
Frequency Stability (Temperature & Voltage Variation)	$-1.56 \times 10^{-7} \times f_c / +1.72 \times 10^{-7} \times f_c$ Hz

Decision Rule

- ☒ Uncertainty is not included.
- ☐ Uncertainty is included.

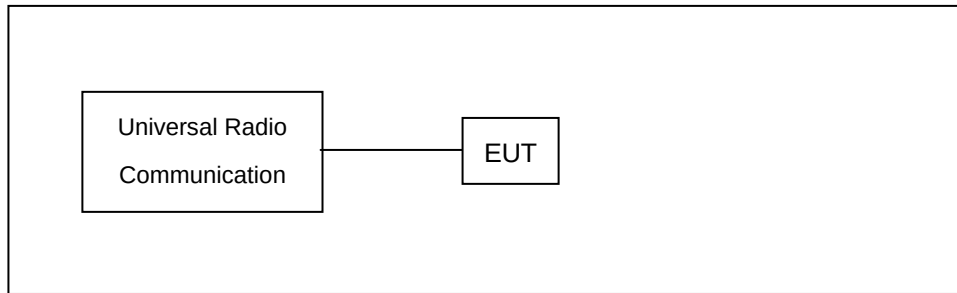
2 Measurement Procedure

2.1. RF Output Power Test

■ Limit

N/A

■ Test Setup



■ Test Procedure

- a. The EUT was set up for the maximum power with with simulator.
- b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

2.2. Effective Radiated Power / Equivalent Isotropic Radiated Power Test

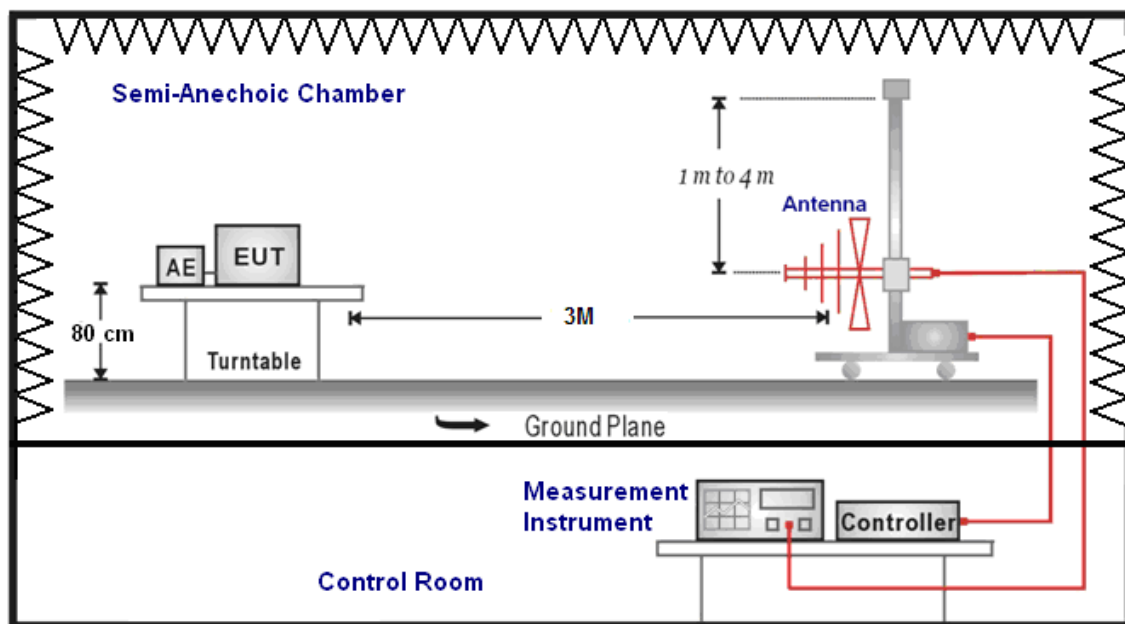
■ Limit

For FCC Part 22.913(a)(5): The E.R.P. of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

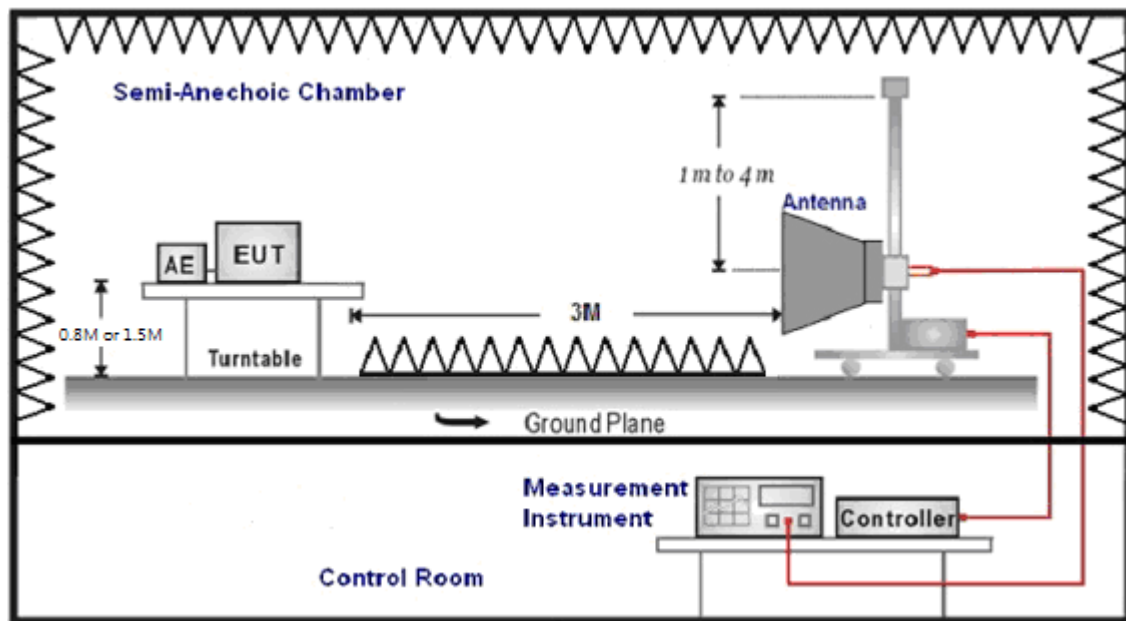
For FCC Part 24.232(c): The E.I.R.P. of Mobile and portable stations test transmitters must not exceed 2 Watts.

■ Setup

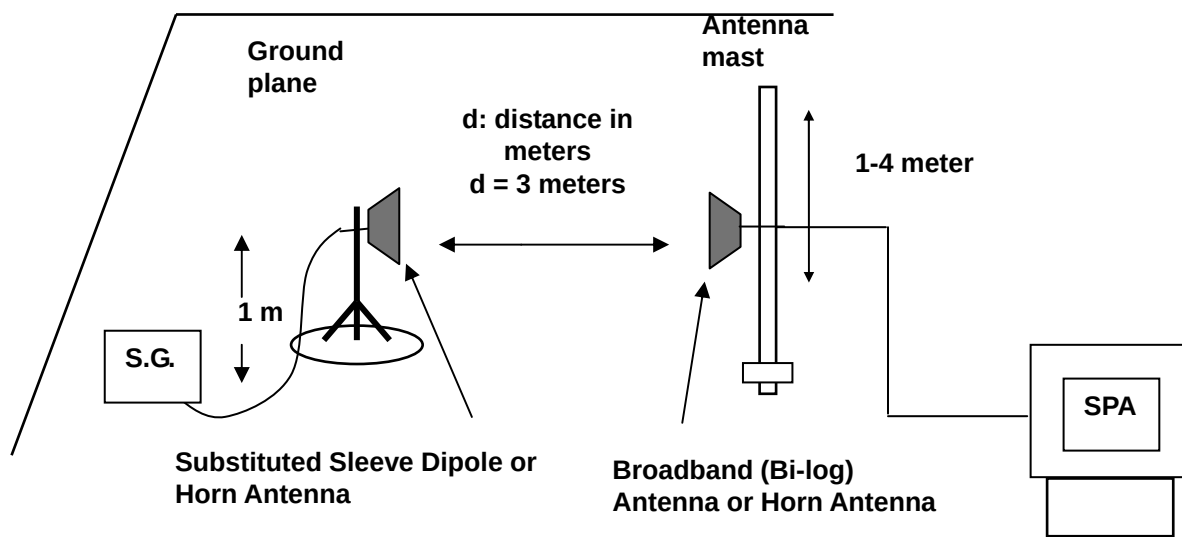
Below 1 GHz



Above 1 GHz



For Substituted Method Test Set-UP



■ Test Procedure

For FCC

- a. The EUT was set up for the maximum power with wwan link data modulation. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational frequency range).
- b. E.I.R.P power measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (1.5 m for above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution antenna (Note:1 & 2) is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G.
- d. $E.I.R.P. = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$
- e. $E.R.P. = E.I.R.P. - 2.15 \text{ dB}$

Note: 1. Below 1 GHz Substituted Method Test : Sleeve dipole antenna to Bi-Log Antenna

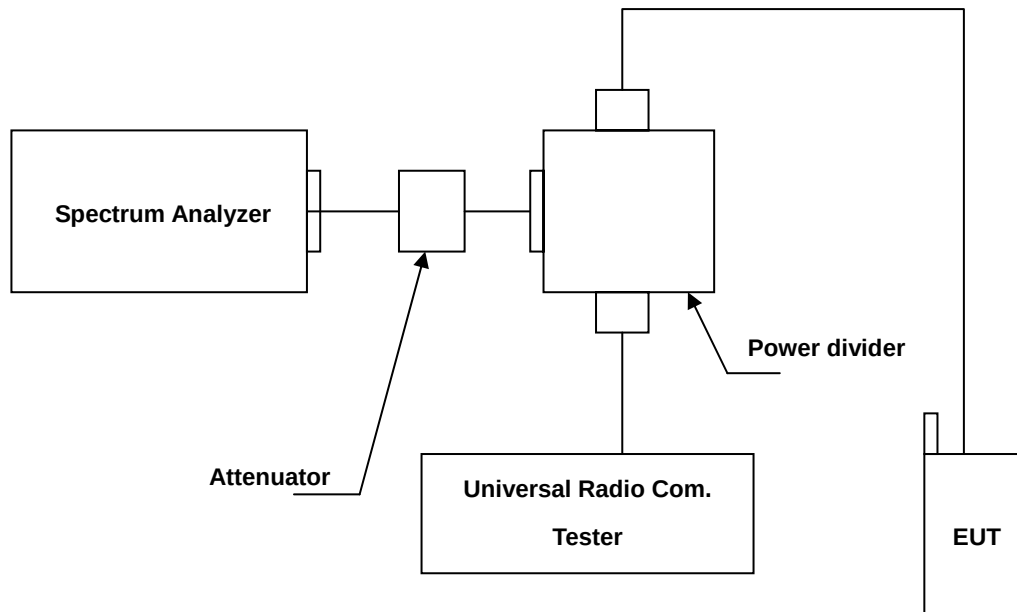
2. Above 1 GHz Substituted Method Test : Horn antenna to Horn Antenna

2.3. Peak to Average Ratio Test

■ Limit

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

■ Setup



■ Test Procedure

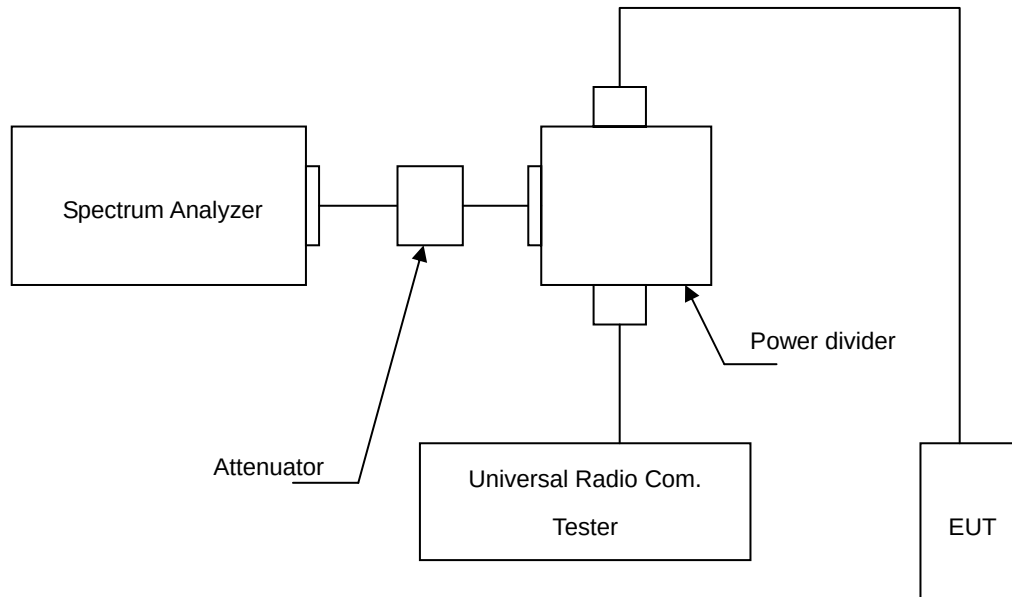
- Set resolution/measurement bandwidth signal's occupied bandwidth;
- Set the number of counts to a value that stabilizes the measured CCDF curve;
- Record the maximum PAPR level associated with a probability of 0.1 %.

2.4. Emission Bandwidth & Occupied Bandwidth Test

■ Limit

The Occupied Bandwidth Limit:
N/A.

■ Setup



■ Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station via Power Divider.
2. The occupied bandwidth of middle channel for the highest and lowest RF powers was measured.

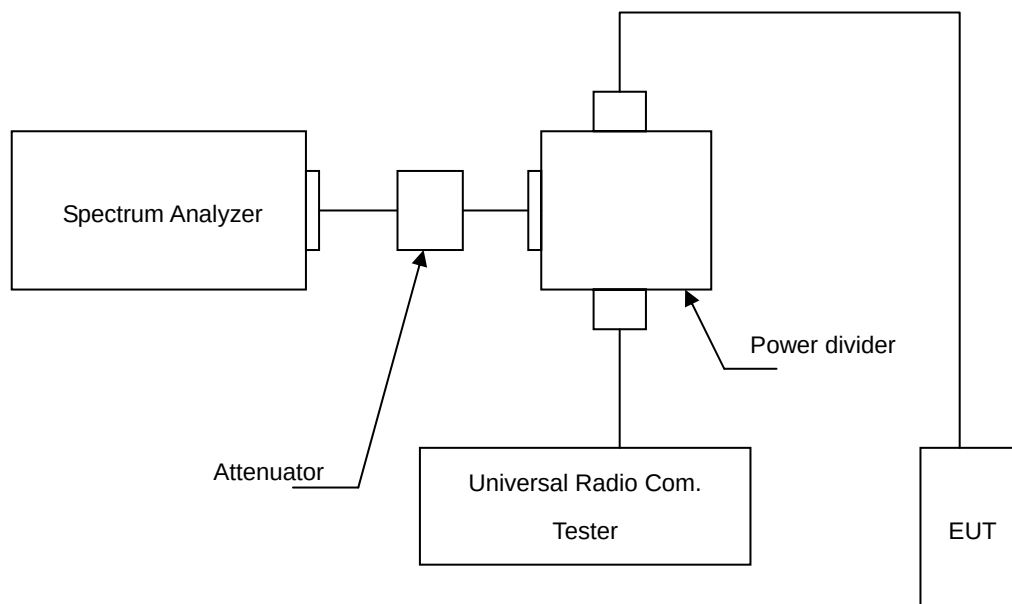
2.5. Band Edge Test

■ Limit

The Band Edge Limit:

The 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.

■ Setup



■ Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station via Power Divider.
2. The band edge of low and high channels for the highest RF powers within the transmitting frequency band were measured.

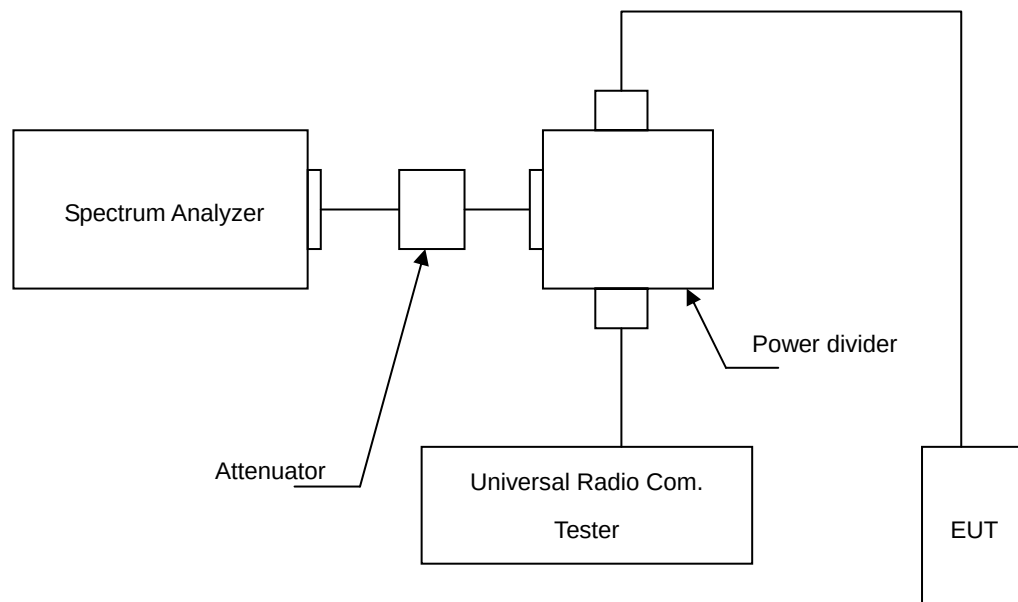
2.6. Conducted Spurious Emission Test

■ Limit

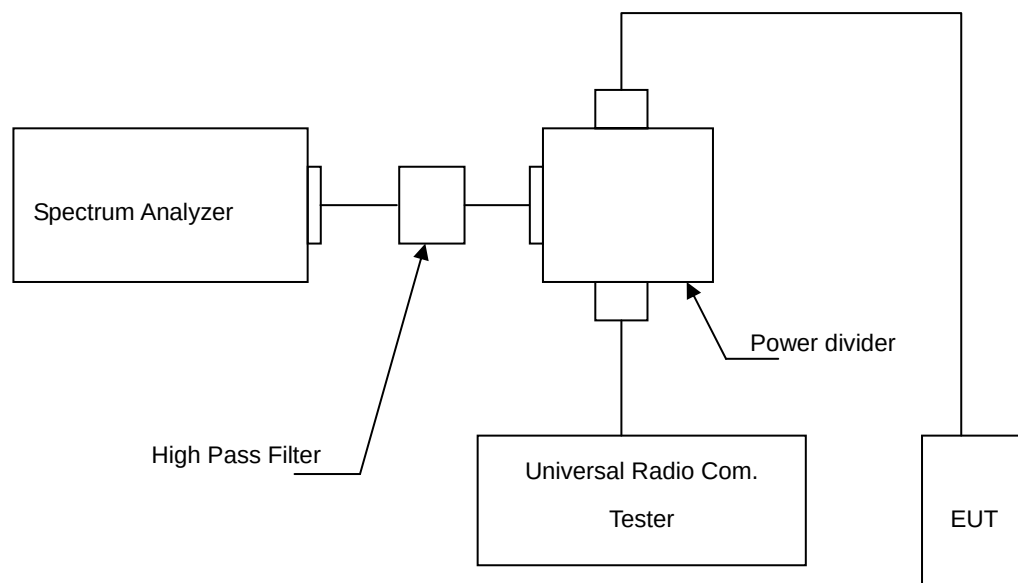
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

■ Setup

Below 2.8 GHz



Above 2.8 GHz





■ **Test Procedure**

1. The EUT was connected to Spectrum Analyzer and Base Station via Power Divider.
2. The middle channel for the highest RF power within the transmitting frequency was measured.
3. The conducted spurious emission for the whole frequency range was taken.
4. Test setting at WCDMA Band IV RB=1 MHz, VB=1 MHz.

2.7. Field Strength of Spurious Radiation Test

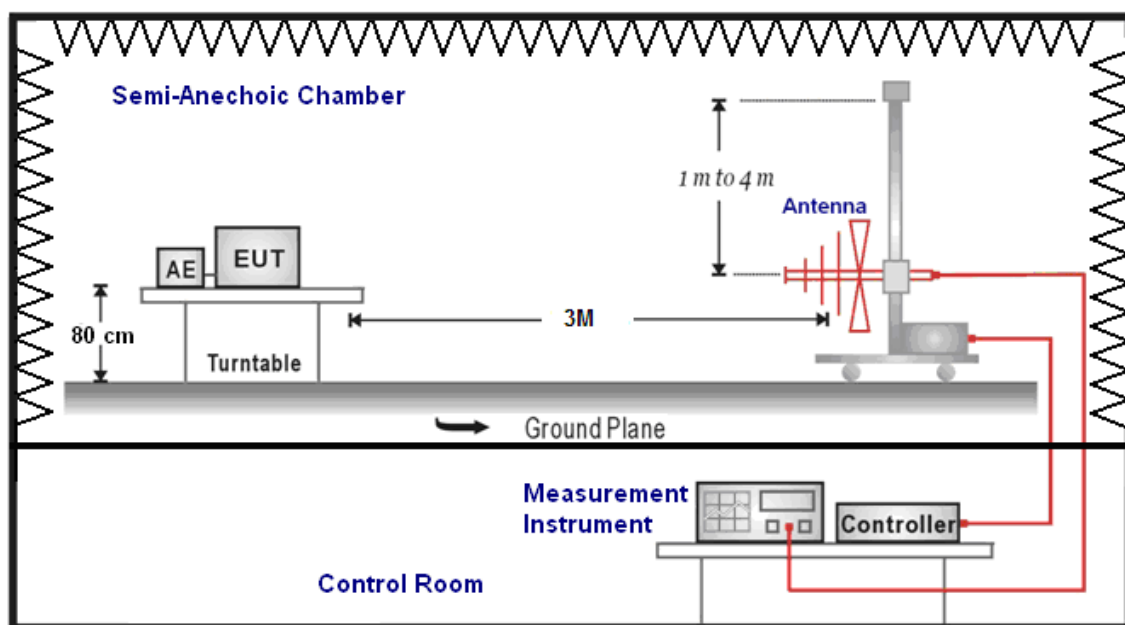
■ Limit

The 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.

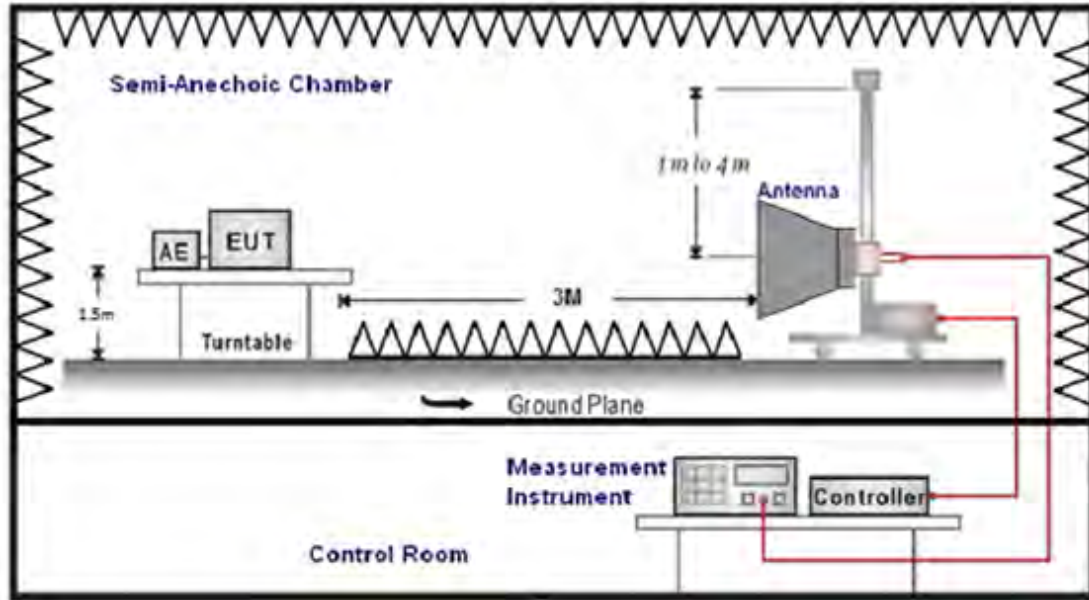
It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

■ Setup

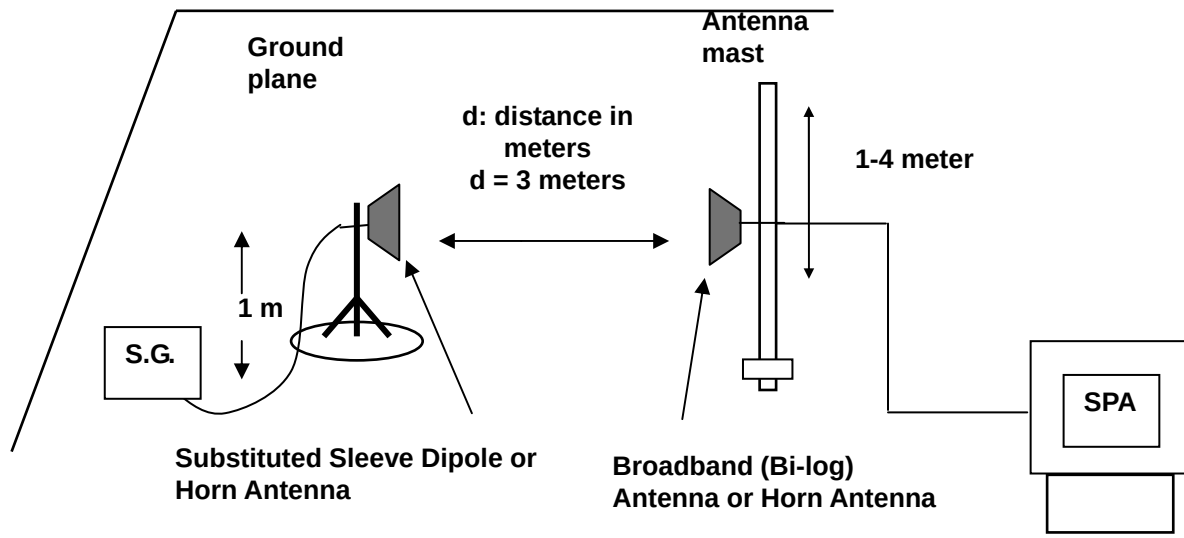
Below 1 GHz



Above 1 GHz



For Substituted Method Test Set-UP



■ Test Procedure

For FCC

- a. The EUT was set up for the maximum power with wwan link data modulation. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational frequency range).
- b. E.I.R.P power measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (1.5 m for above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution antenna (Note:1 & 2) is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G.
- d. E.I.R.P. = Output power level of S.G - TX cable loss + Antenna gain of substitution horn
- e. E.R.P. = E.I.R.P.- 2.15 dB
- f. Measurement range 9 kHz - 10 th Harmonic

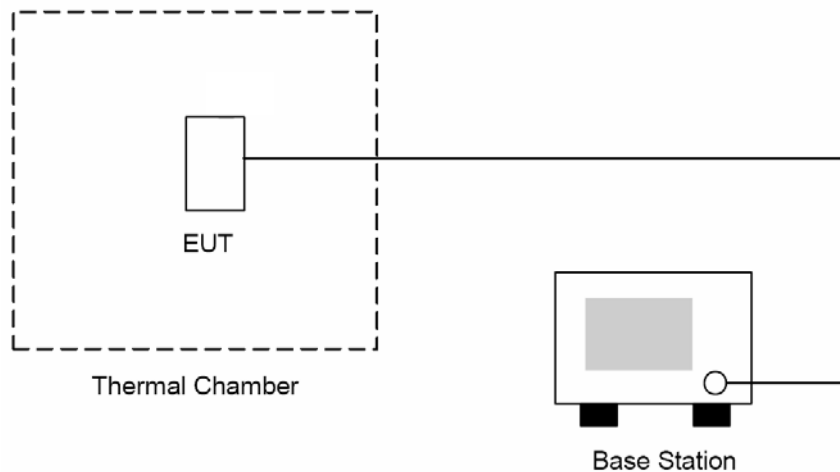
Note: 1. Below 1 GHz Substituted Method Test : Sleeve dipole antenna to Bi-Log Antenna
2. Above 1 GHz Substituted Method Test : Horn antenna to Horn Antenna

2.8. Frequency Stability (Temperature & Voltage Variation) Test

■ Limit

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

■ Setup



■ Test Procedure

1. The EUT and test equipment were set up as shown on the following section.
2. With all power removed, the temperature was decreased to $-30\text{ }^{\circ}\text{C}$ and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
3. With power OFF, the temperature was raised in $10\text{ }^{\circ}\text{C}$ steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
4. The EUT was placed in a temperature chamber at $25 \pm 5\text{ }^{\circ}\text{C}$ and connected as the following section.
5. The power supply voltage to the EUT was varied from BEP to 115 % of the nominal value measured at the input to the EUT.
6. The temperature tests were performed for the worst case.
7. Test data was recorded.

3 Test Results

Test Mode	Test Modes description
UMTS/TM1	WCDMA system,QPSK modulation
UMTS/TM2	HSDPA system,QPSK modulation
UMTS/TM3	HSUPA system,QPSK modulation

Appendix A: Conducted Output Power

Test Band	Test Mode	Test Channel	Average Measured (dbm)	Peak Measured (dbm)	Verdict
WCDMA850	UMTS/TM1	LCH	24.65	27.98	PASS
		MCH	24.68	27.94	PASS
		HCH	24.75	28.20	PASS
Test Band	Test Mode	Test Channel	Average Measured (dbm)	Peak Measured (dbm)	Verdict
WCDMA850	UMTS/TM2	LCH_SubTest-1	23.79	27.28	PASS
		LCH_SubTest-2	23.22	26.66	PASS
		LCH_SubTest-3	23.16	26.29	PASS
		LCH_SubTest-4	23.61	26.77	PASS
		MCH_SubTest-1	23.85	26.96	PASS
		MCH_SubTest-2	23.27	26.38	PASS
		MCH_SubTest-3	23.21	26.37	PASS
		MCH_SubTest-4	23.68	27.08	PASS
		HCH_SubTest-1	23.9	27.18	PASS
		HCH_SubTest-2	23.31	26.55	PASS
		HCH_SubTest-3	23.24	26.57	PASS
		HCH_SubTest-4	23.71	26.83	PASS
Test Band	Test Mode	Test Channel	Average Measured (dbm)	Peak Measured (dbm)	Verdict
WCDMA850	UMTS/TM3	LCH_SubTest-1	23.16	26.47	PASS
		LCH_SubTest-2	21.16	24.4	PASS
		LCH_SubTest-3	22.11	25.18	PASS
		LCH_SubTest-4	21.13	24.42	PASS
		LCH_SubTest-5	22.96	26.33	PASS
		MCH_SubTest-1	23.25	26.37	PASS
		MCH_SubTest-2	21.24	24.65	PASS
		MCH_SubTest-3	22.22	25.45	PASS
		MCH_SubTest-4	21.24	24.44	PASS
		MCH_SubTest-5	23.04	26.13	PASS
		HCH_SubTest-1	23.27	26.43	PASS
		HCH_SubTest-2	21.26	24.51	PASS
		HCH_SubTest-3	22.21	25.47	PASS
		HCH_SubTest-4	21.25	24.51	PASS
		HCH_SubTest-5	23.08	26.11	PASS

Note: The peak power testing result was used peak detector.

Test Band	Test Mode	Test Channel	Average Measured (dbm)	Peak Measured (dbm)	Verdict
WCDMA1900	UMTS/TM1	LCH	23.82	27.13	PASS
		MCH	24.02	27.32	PASS
		HCH	23.76	27.02	PASS
Test Band	Test Mode	Test Channel	Average Measured (dbm)	Peak Measured (dbm)	Verdict
WCDMA1900	UMTS/TM2	LCH_SubTest-1	22.94	26.16	PASS
		LCH_SubTest-2	22.34	25.61	PASS
		LCH_SubTest-3	22.32	25.66	PASS
		LCH_SubTest-4	22.74	25.88	PASS
		MCH_SubTest-1	23.17	26.38	PASS
		MCH_SubTest-2	22.55	25.58	PASS
		MCH_SubTest-3	22.51	25.79	PASS
		MCH_SubTest-4	22.99	26.24	PASS
		HCH_SubTest-1	22.89	26.15	PASS
		HCH_SubTest-2	22.29	25.59	PASS
		HCH_SubTest-3	22.24	25.51	PASS
		HCH_SubTest-4	22.68	26.09	PASS
Test Band	Test Mode	Test Channel	Average Measured (dbm)	Peak Measured (dbm)	Verdict
WCDMA1900	UMTS/TM3	LCH_SubTest-1	22.34	25.6	PASS
		LCH_SubTest-2	20.31	23.49	PASS
		LCH_SubTest-3	21.27	24.43	PASS
		LCH_SubTest-4	20.28	23.53	PASS
		LCH_SubTest-5	22.14	25.31	PASS
		MCH_SubTest-1	22.58	25.77	PASS
		MCH_SubTest-2	20.54	23.92	PASS
		MCH_SubTest-3	21.55	25	PASS
		MCH_SubTest-4	20.54	23.69	PASS
		MCH_SubTest-5	22.37	25.61	PASS
		HCH_SubTest-1	22.28	25.38	PASS
		HCH_SubTest-2	20.25	23.57	PASS
		HCH_SubTest-3	21.24	24.7	PASS
		HCH_SubTest-4	20.26	23.38	PASS
		HCH_SubTest-5	22.01	25.23	PASS

Note: The peak power testing result was used peak detector.

Appendix B: Effective Radiated Power / Equivalent Isotropic Radiated Power Test

Test Item	E.R.P / E.I.R.P.						
Bands	Modulation Type	Frequency (MHz)	Avg Conducted power (dBm)	Antenna Gain (dBi)	E.I.R.P		Limit
					(dBm)	(W)	
WCDMA Band 2	QPSK	1852.4	24.65	0.40	25.05	0.32	< 7W
		1880.0	24.68	0.40	25.08	0.32	< 7W
		1907.6	24.75	0.40	25.15	0.33	< 7W

Test Item	E.R.P / E.I.R.P.						
Bands	Modulation Type	Frequency (MHz)	Avg Conducted power (dBm)	Antenna Gain (dBi)	E.R.P		Limit
					(dBm)	(W)	
WCDMA Band 5	QPSK	826.4	23.82	-2.60	19.07	0.08	< 2W
		836.6	24.02	-2.60	19.27	0.08	< 2W
		846.6	23.76	-2.60	19.01	0.08	< 2W

Note: ERP = Avg Conducted power + Antenna Gain - 2.15, EIRP = Avg Conducted power + Antenna Gain



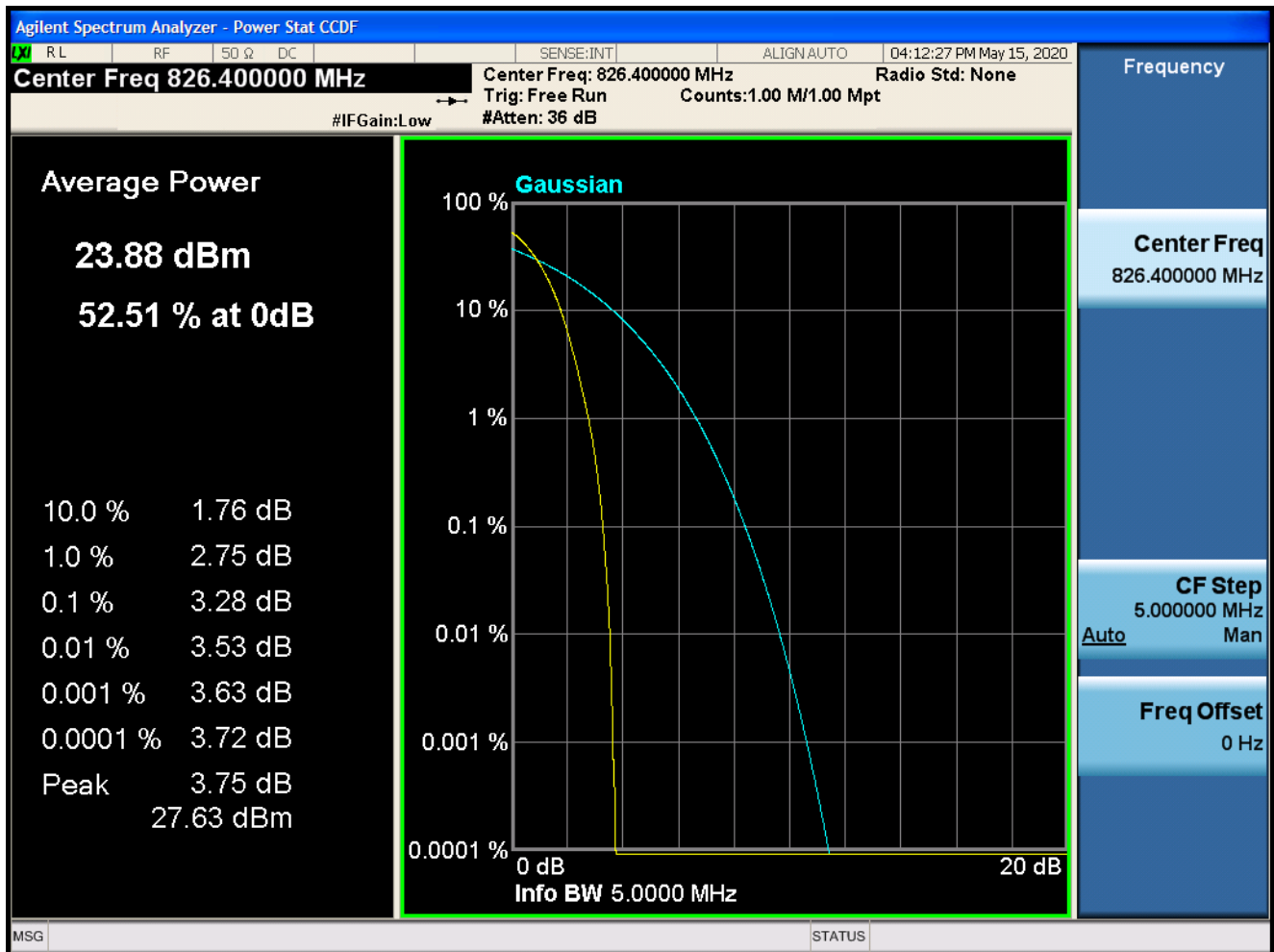
Appendix C: Peak to Average Ratio

Test Band	Test Mode	Test Channel	Measured (db)	Limit (db)	Verdict
WCDMA850	UMTS/TM1	LCH	3.28	13	PASS
		MCH	3.04	13	PASS
		HCH	3.27	13	PASS

Test Band	Test Mode	Test Channel	Measured (db)	Limit (db)	Verdict
WCDMA1900	UMTS/TM1	LCH	2.85	13	PASS
		MCH	2.79	13	PASS
		HCH	2.47	13	PASS

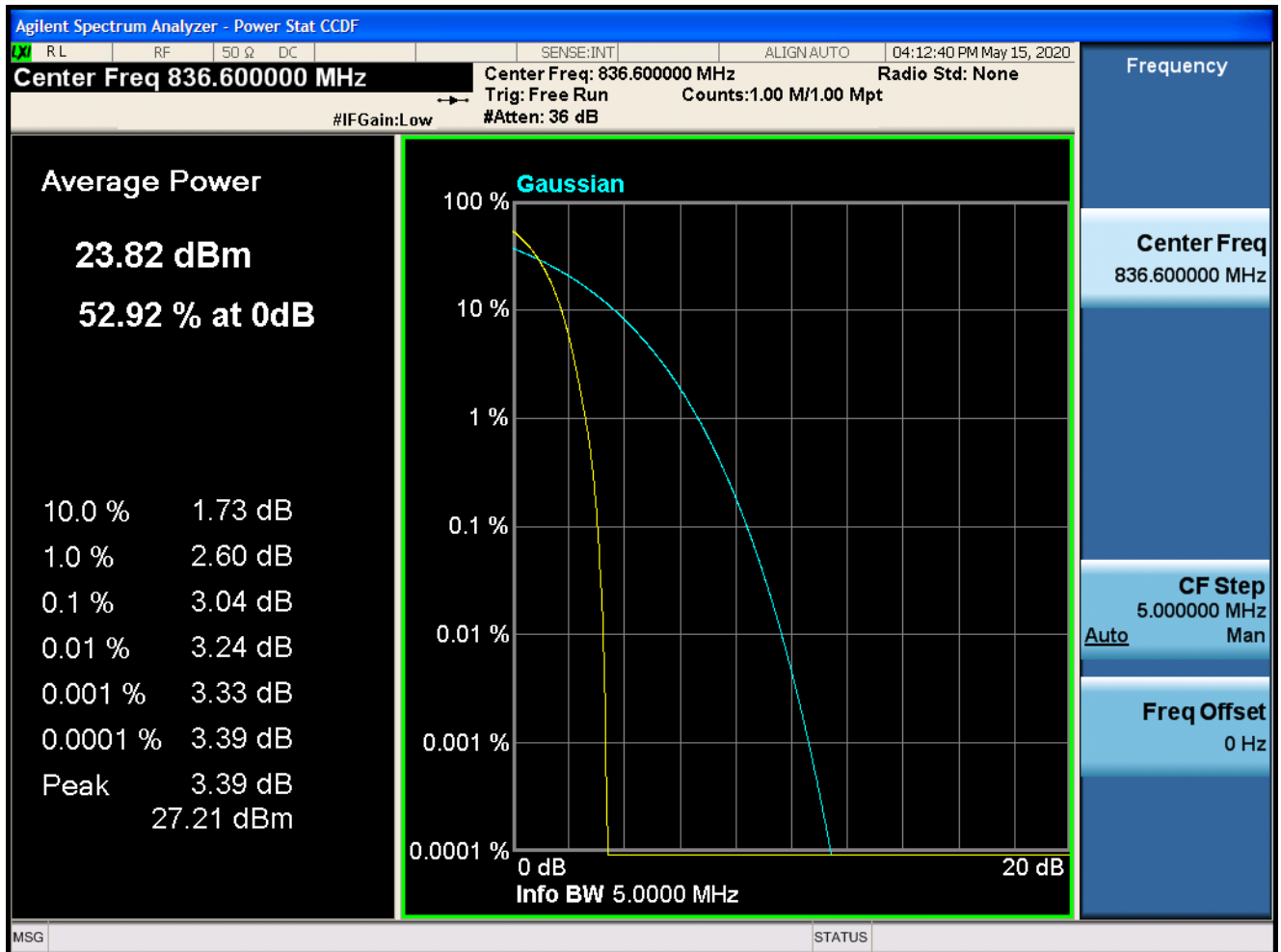


- 1 For WCDMA
- 1.1 Test Band=WCDMA850
- 1.1.1 Test Mode=UMTS/TM1
- 1.1.1.1 Test Channel=LCH



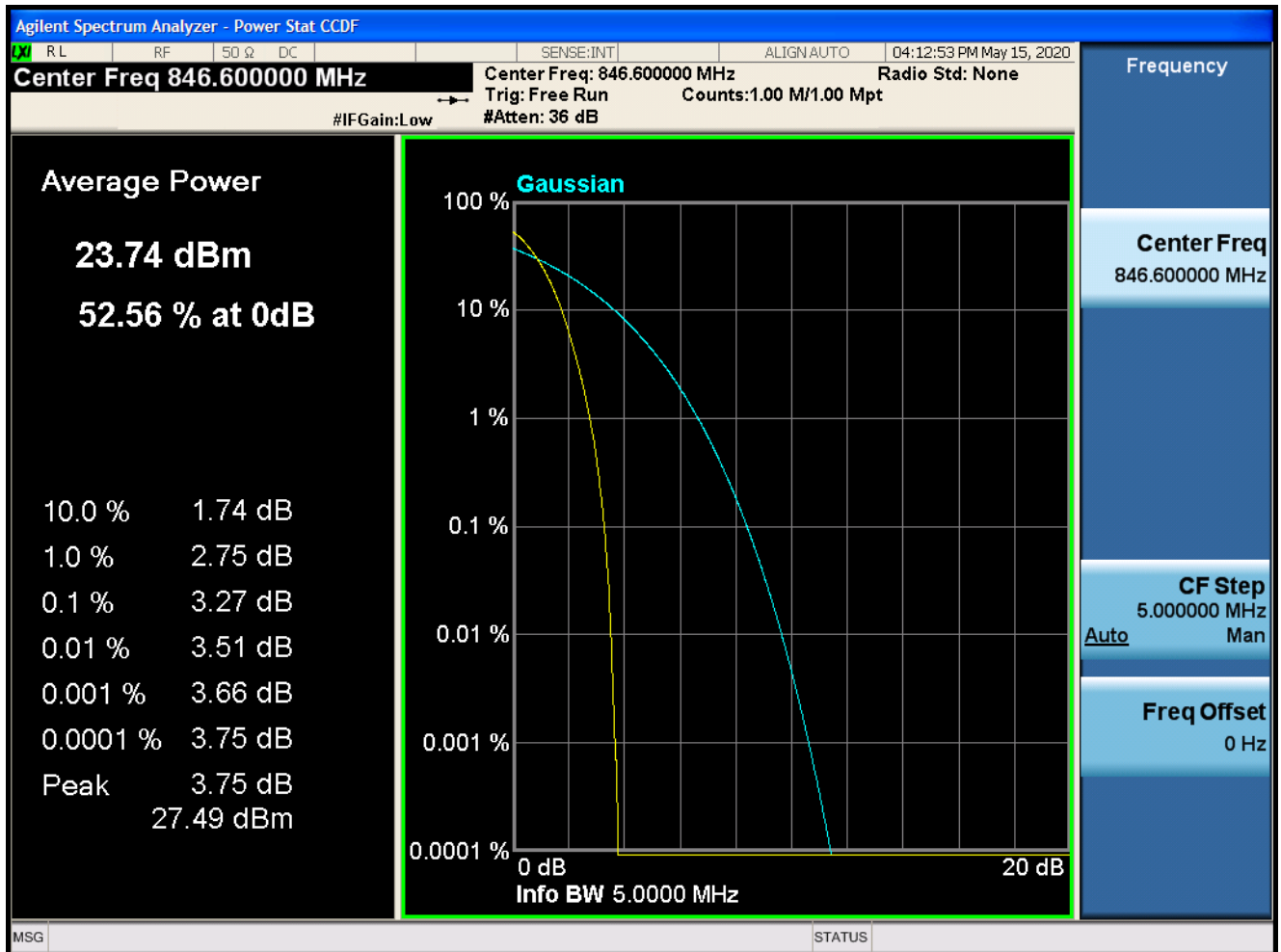


1.1.1.2 Test Channel=MCH





1.1.1.3 Test Channel=HCH

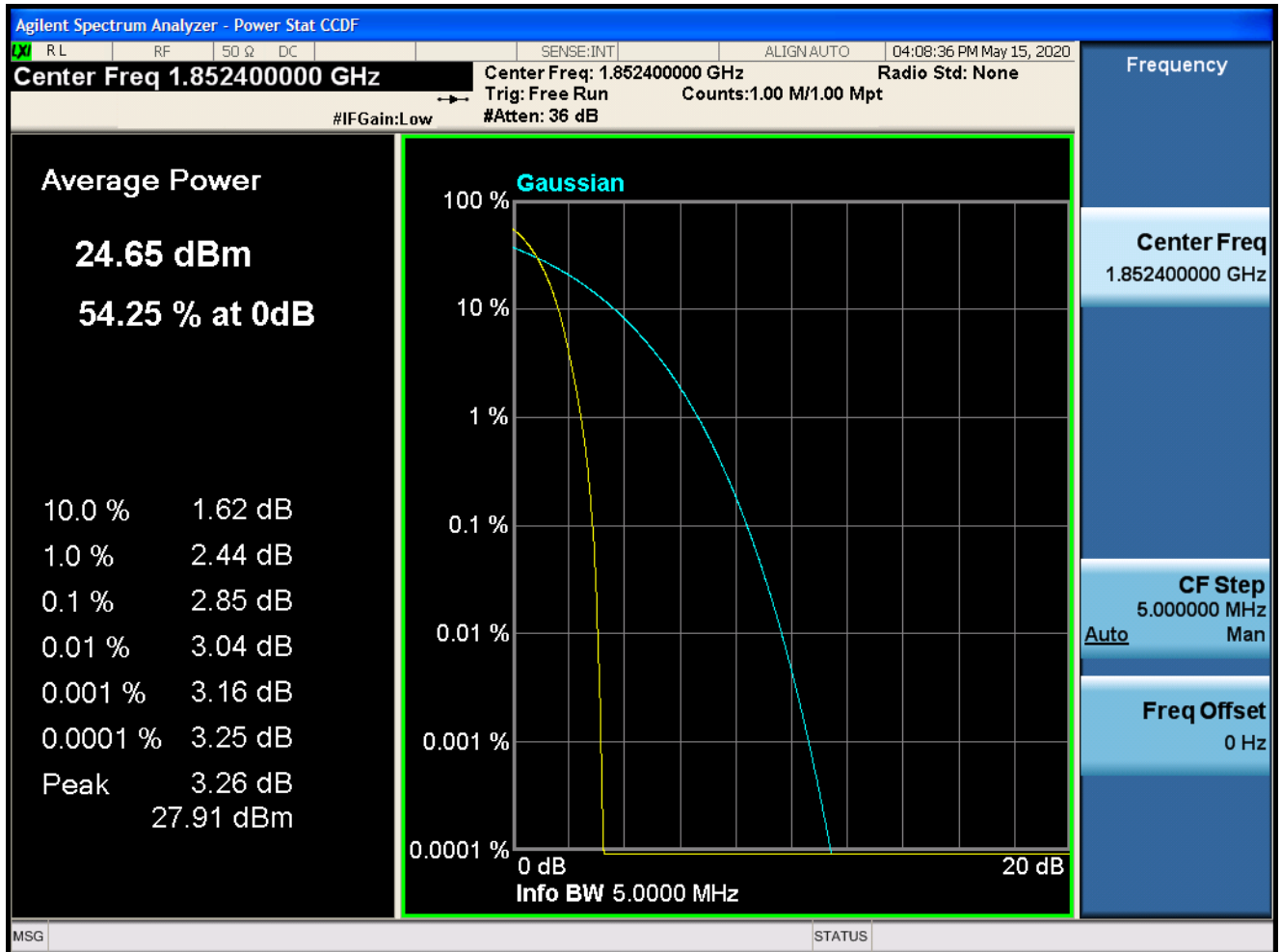




1.2 Test Band=WCDMA1900

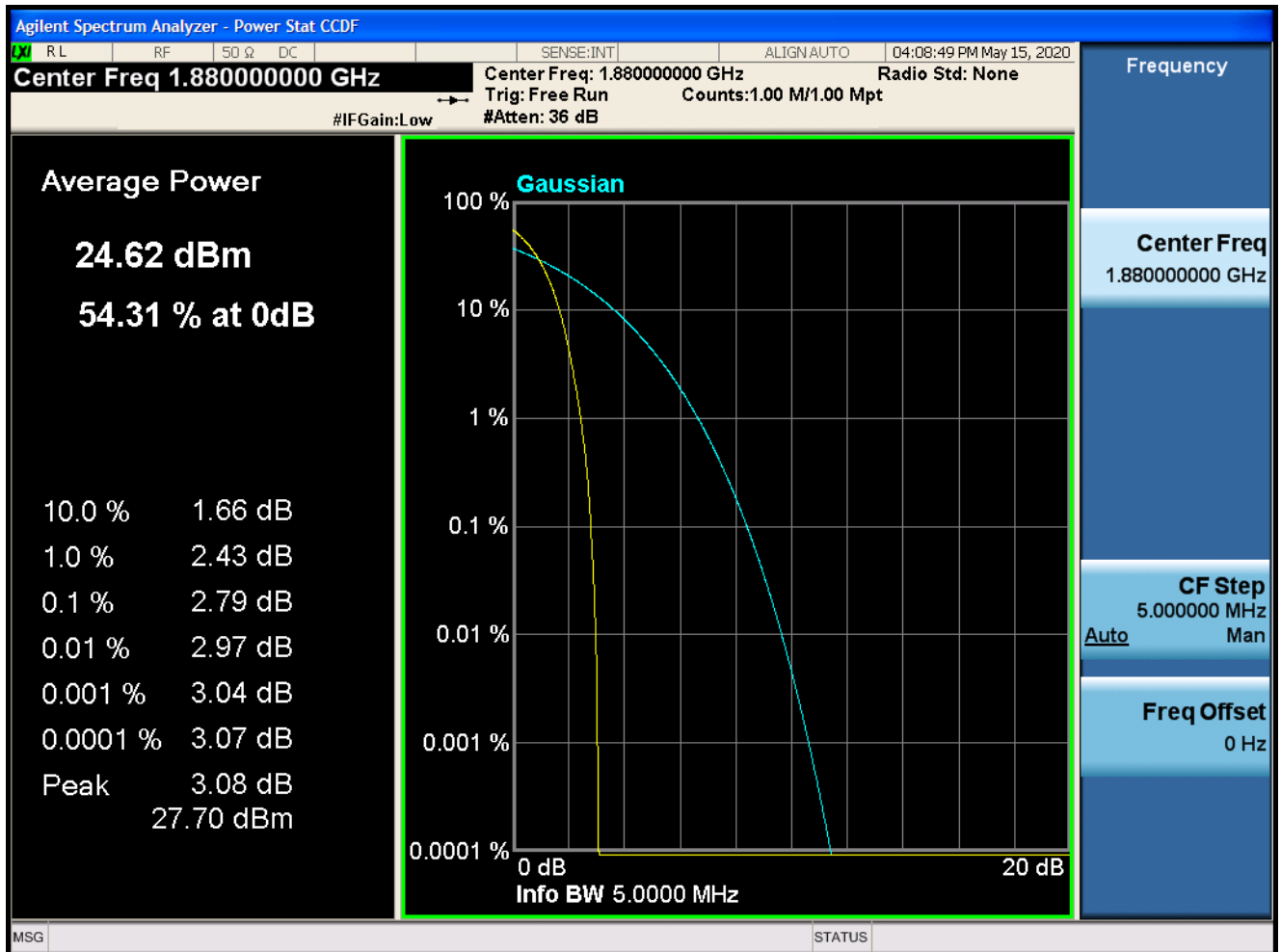
1.2.1 Test Mode=UMTS/TM1

1.2.1.1 Test Channel=LCH



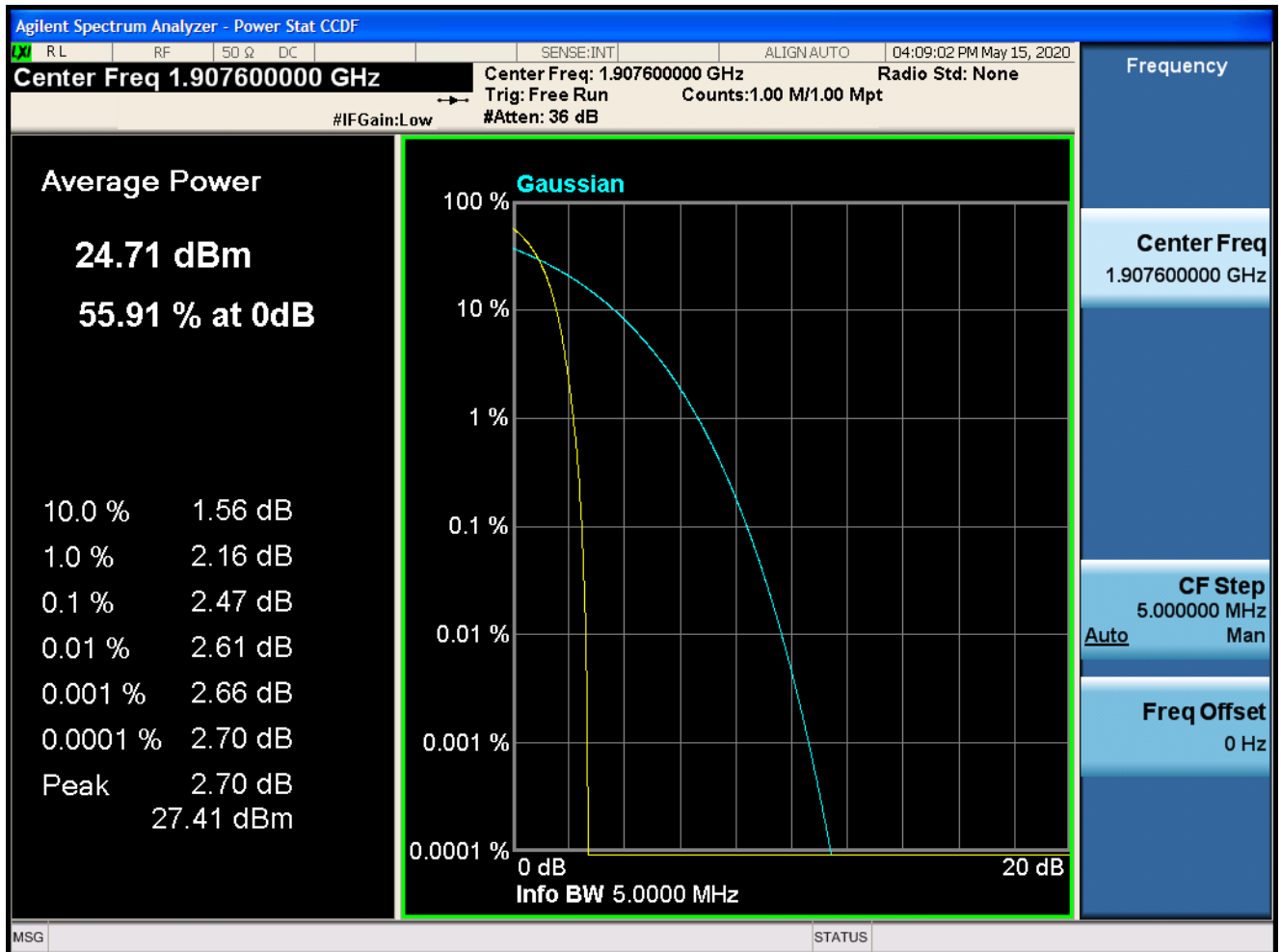


1.2.1.2 Test Channel=MCH





1.2.1.3 Test Channel=HCH



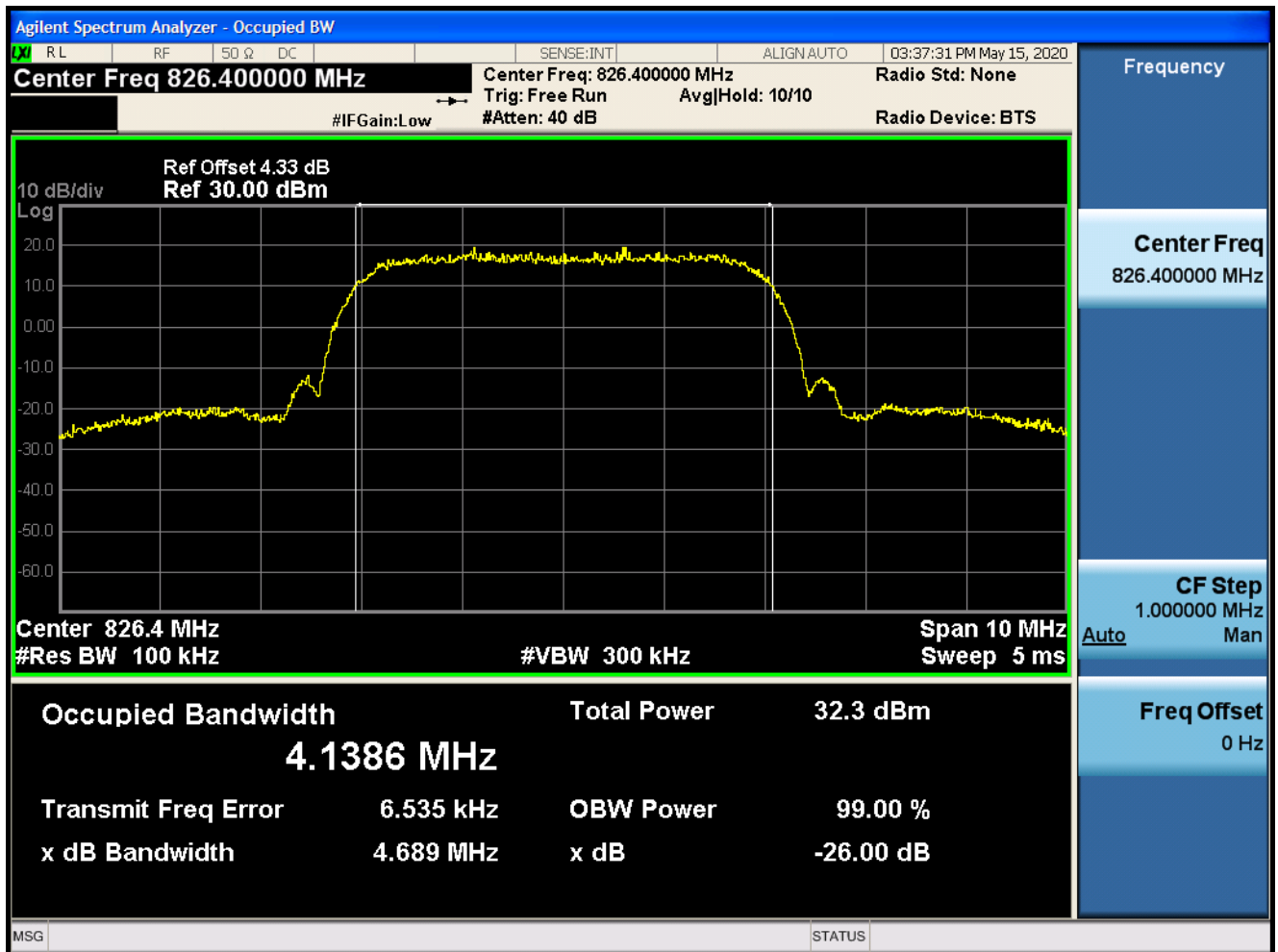
Appendix D: Emission Bandwidth & Occupied Bandwidth

Test Band	Test Mode	Test Channel	Occupied Bandwidth (kHz)	Emission Bandwidth (kHz)	Verdict
WCDMA850	UMTS/TM1	LCH	4138.6	4689	PASS
		MCH	4148.4	4686	PASS
		HCH	4129.5	4675	PASS

Test Band	Test Mode	Test Channel	Occupied Bandwidth (kHz)	Emission Bandwidth (kHz)	Verdict
WCDMA1900	UMTS/TM1	LCH	4128.2	4713	PASS
		MCH	4137.6	4701	PASS
		HCH	4146.8	4758	PASS

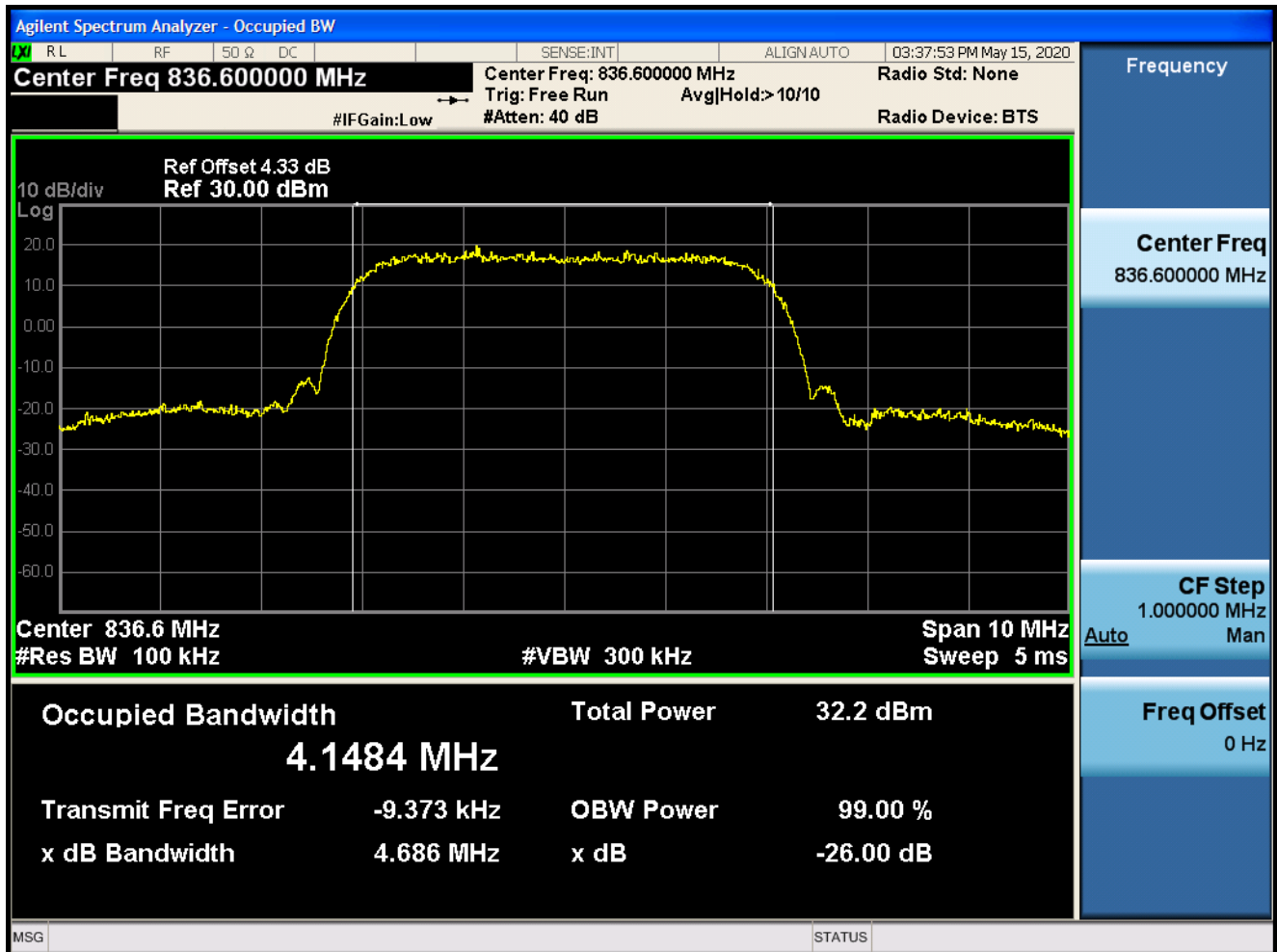


- 2 For WCDMA
- 2.1 Test Band=WCDMA850
- 2.1.1 Test Mode=UMTS/TM1
- 2.1.1.1 Test Channel=LCH



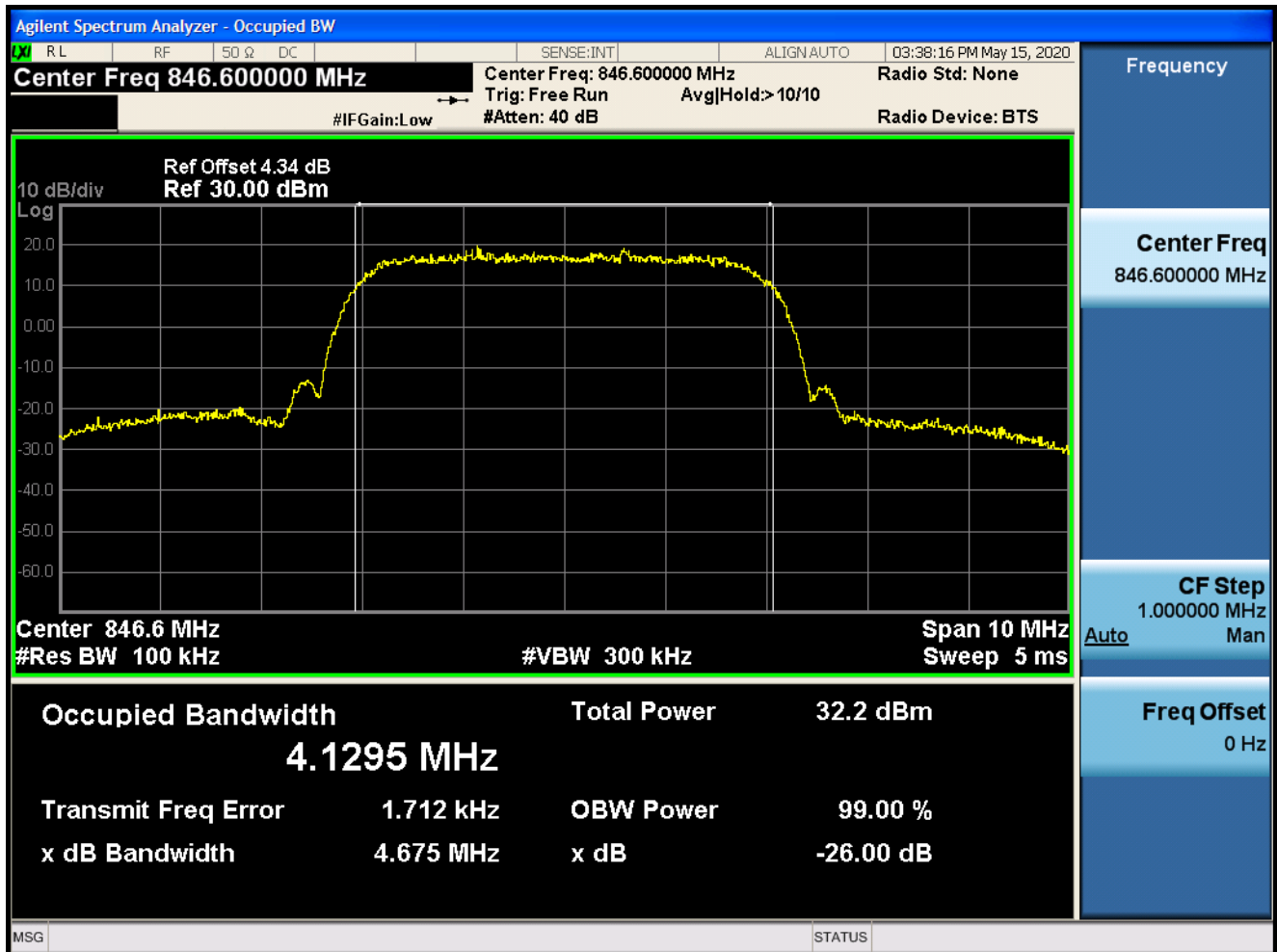


2.1.1.2 Test Channel=MCH





2.1.1.3 Test Channel=HCH

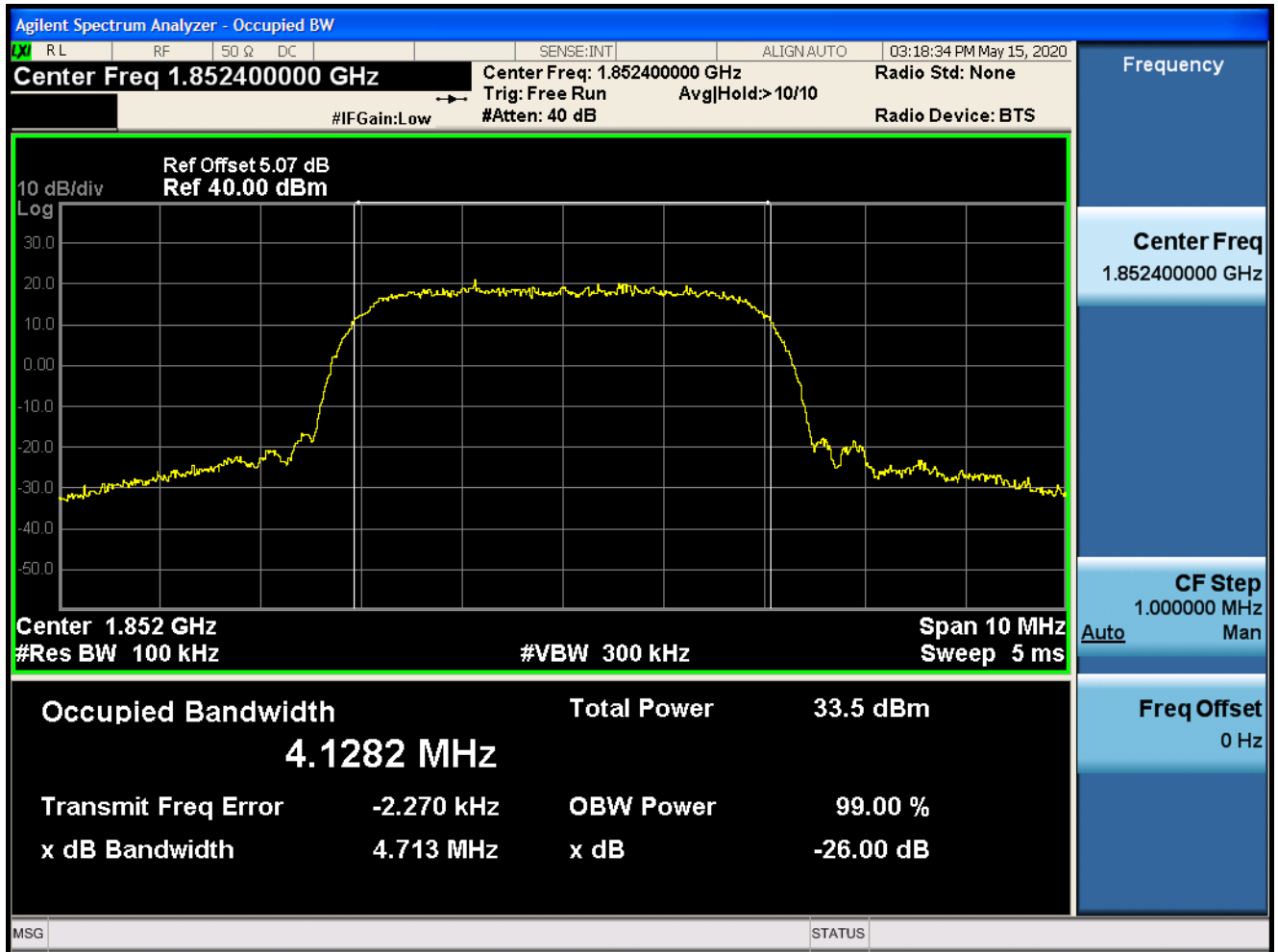




2.2 Test Band=WCDMA1900

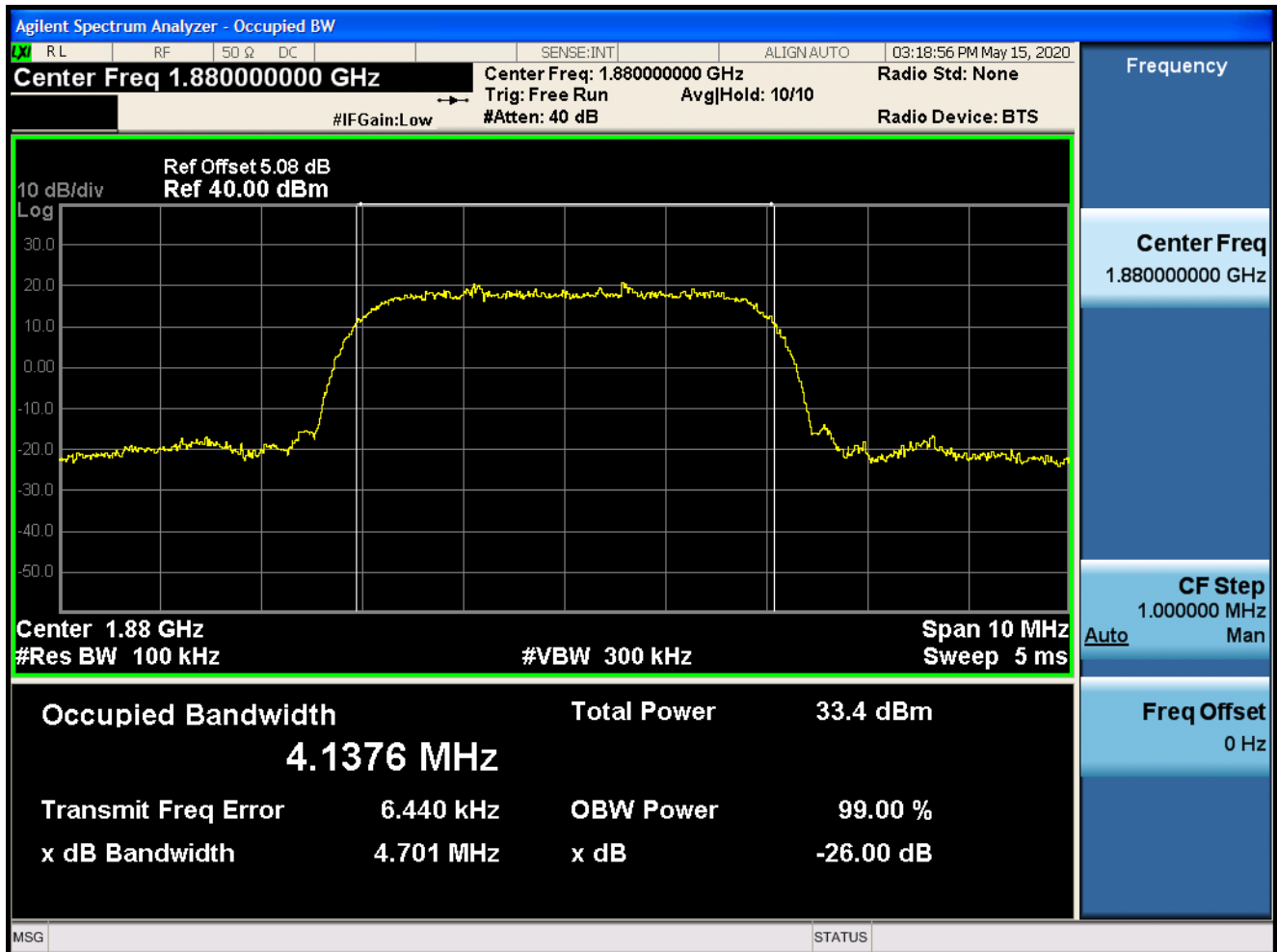
2.2.1 Test Mode=UMTS/TM1

2.2.1.1 Test Channel=LCH



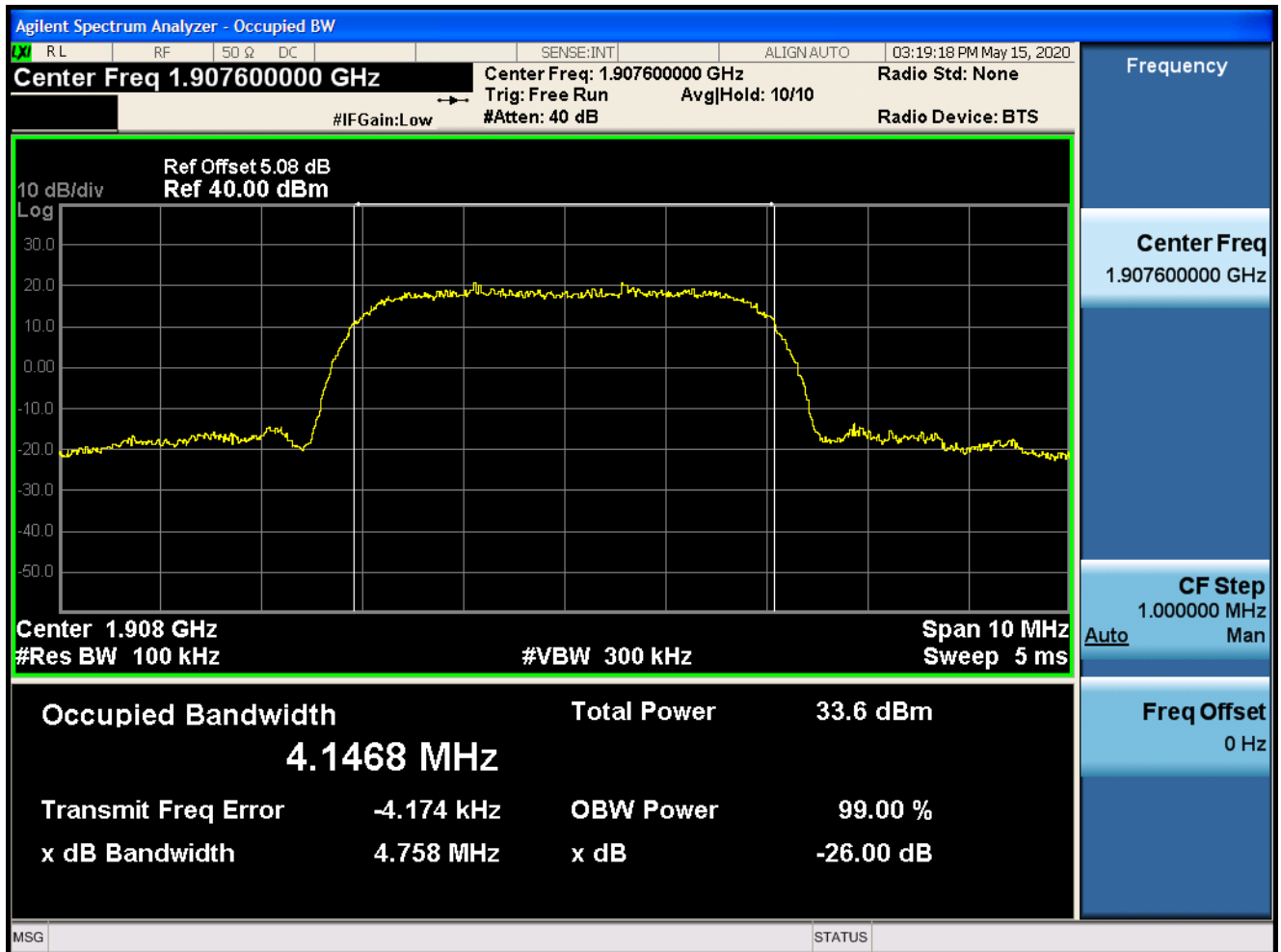


2.2.1.2 Test Channel=MCH





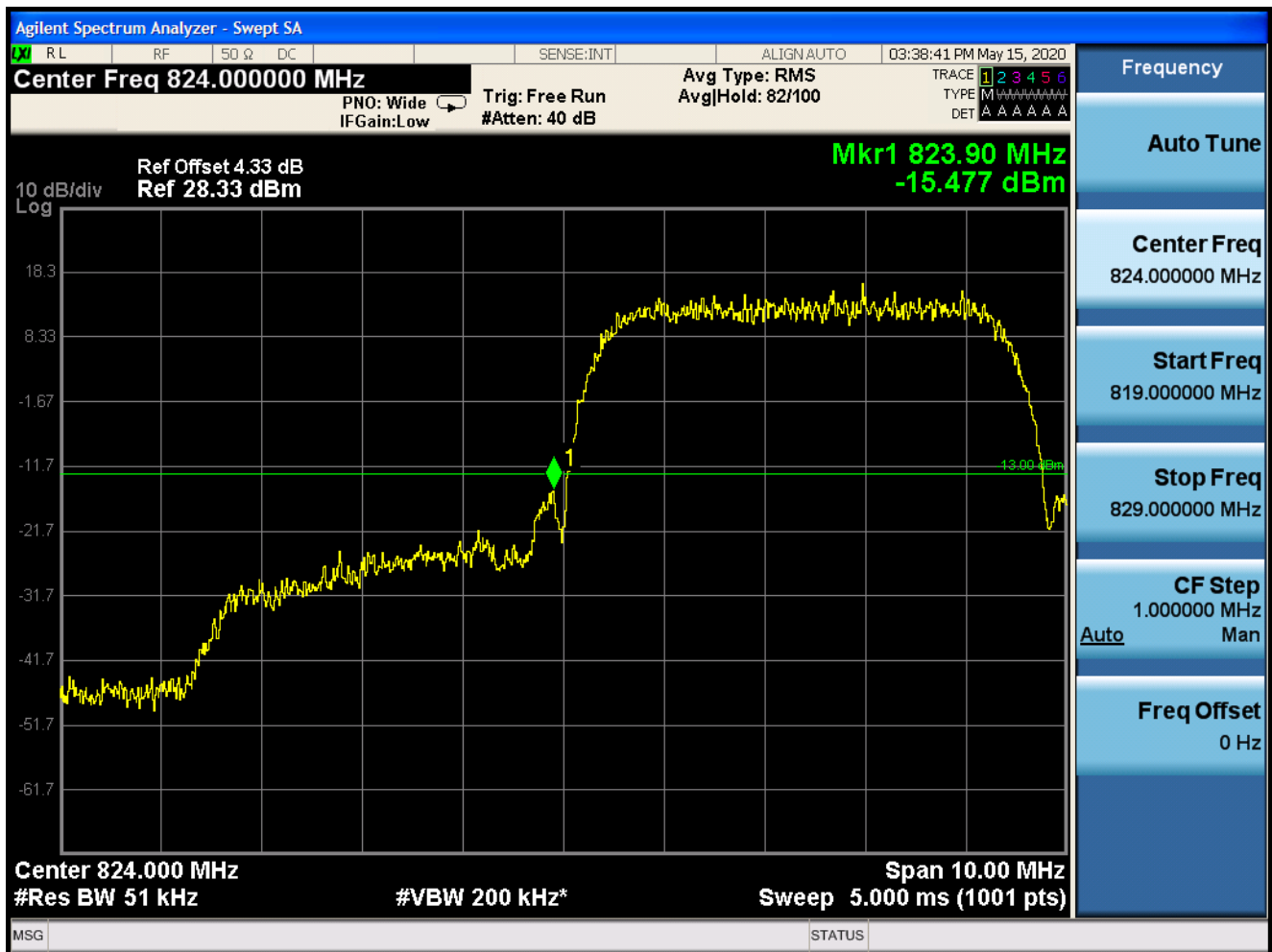
2.2.1.3 Test Channel=HCH





Appendix E: Band Edge Measurement

- 1 For WCDMA
- 1.1 Test Band=WCDMA850
- 1.1.1 Test Mode=UMTS/TM1
- 1.1.1.1 Test Channel=LCH





1.1.1.2 Test Channel=HCH

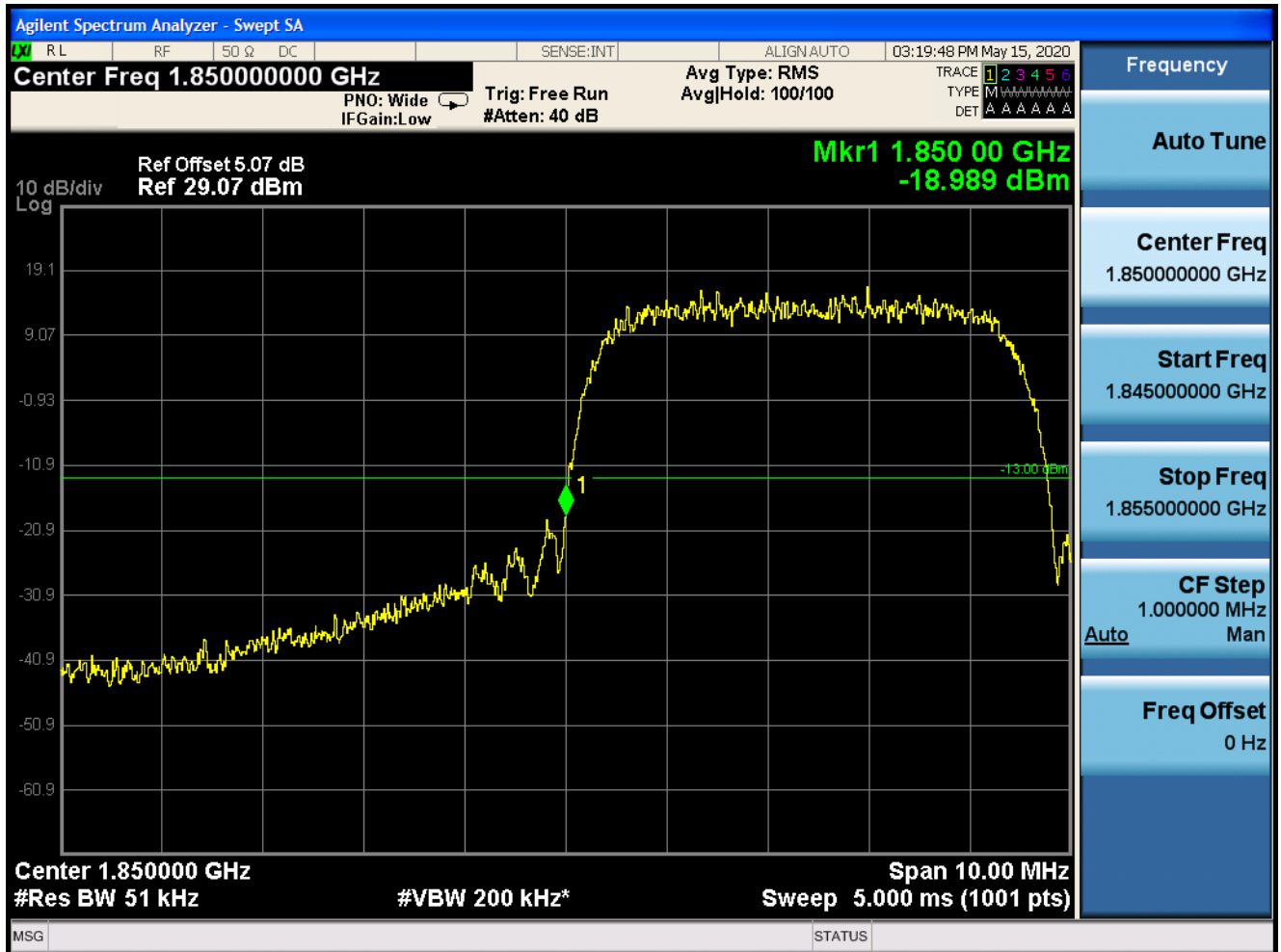




1.2 Test Band=WCDMA1900

1.2.1 Test Mode=UMTSTM1

1.2.1.1 Test Channel=LCH





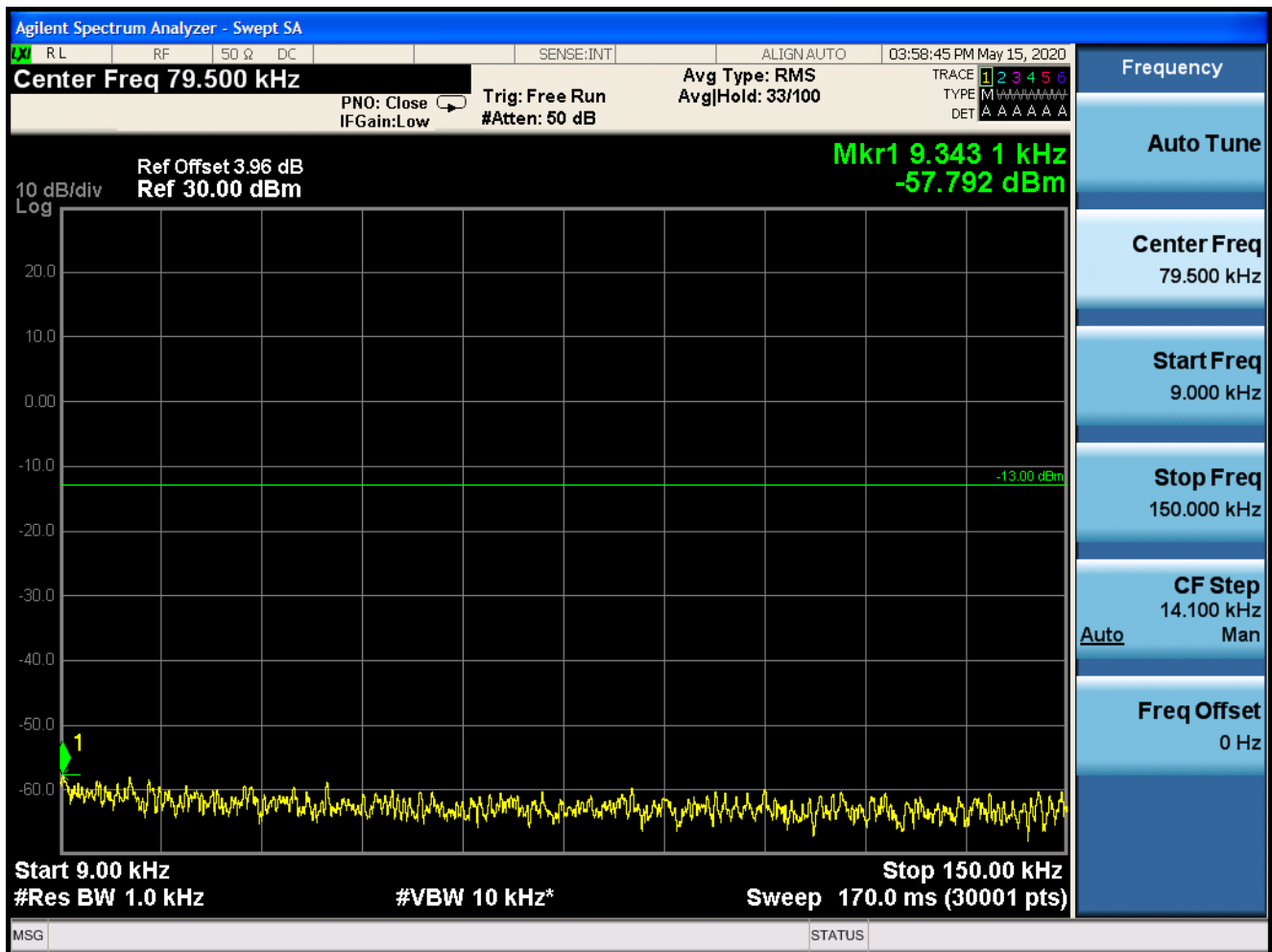
1.2.1.2 Test Channel=HCH

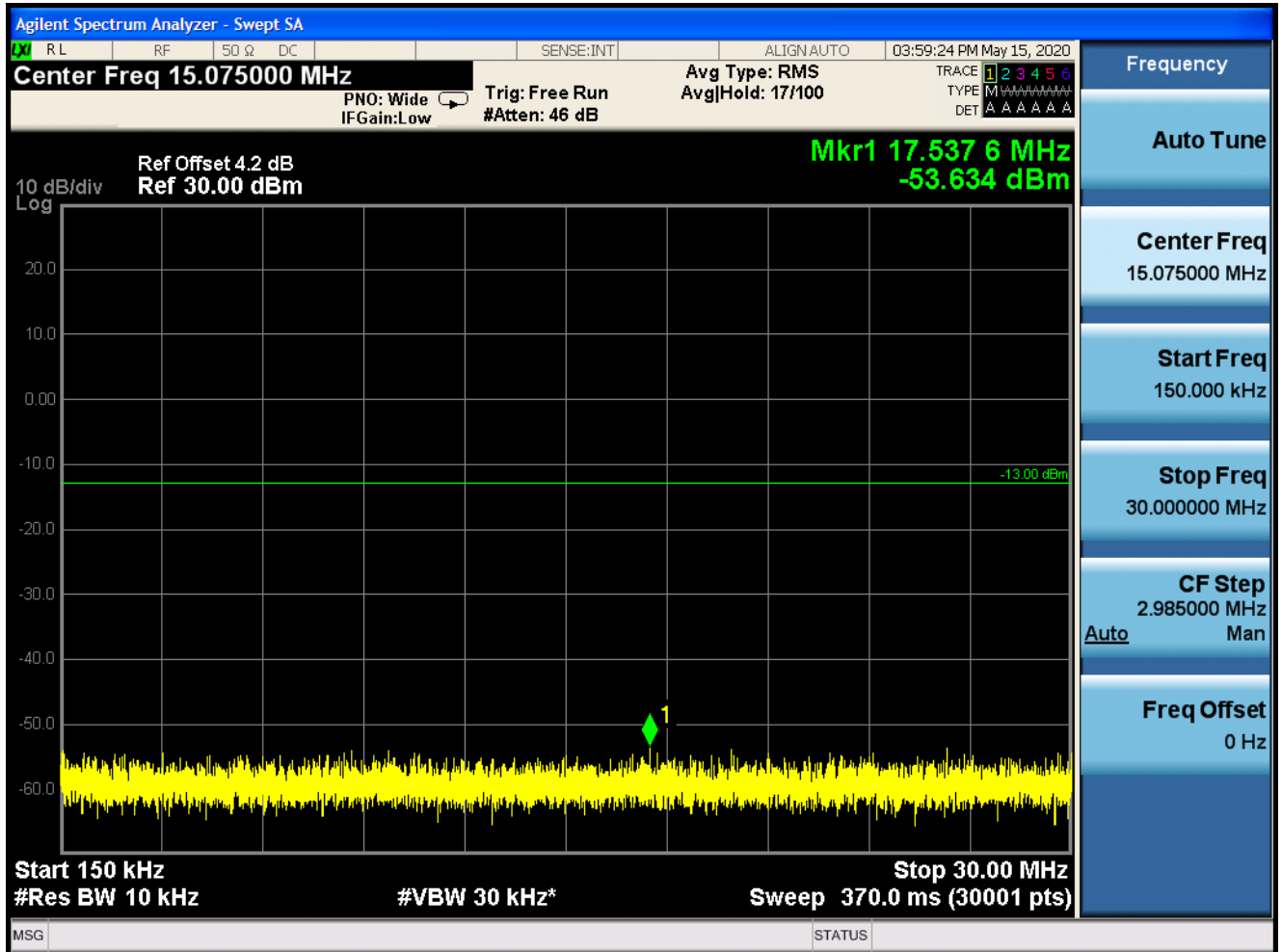


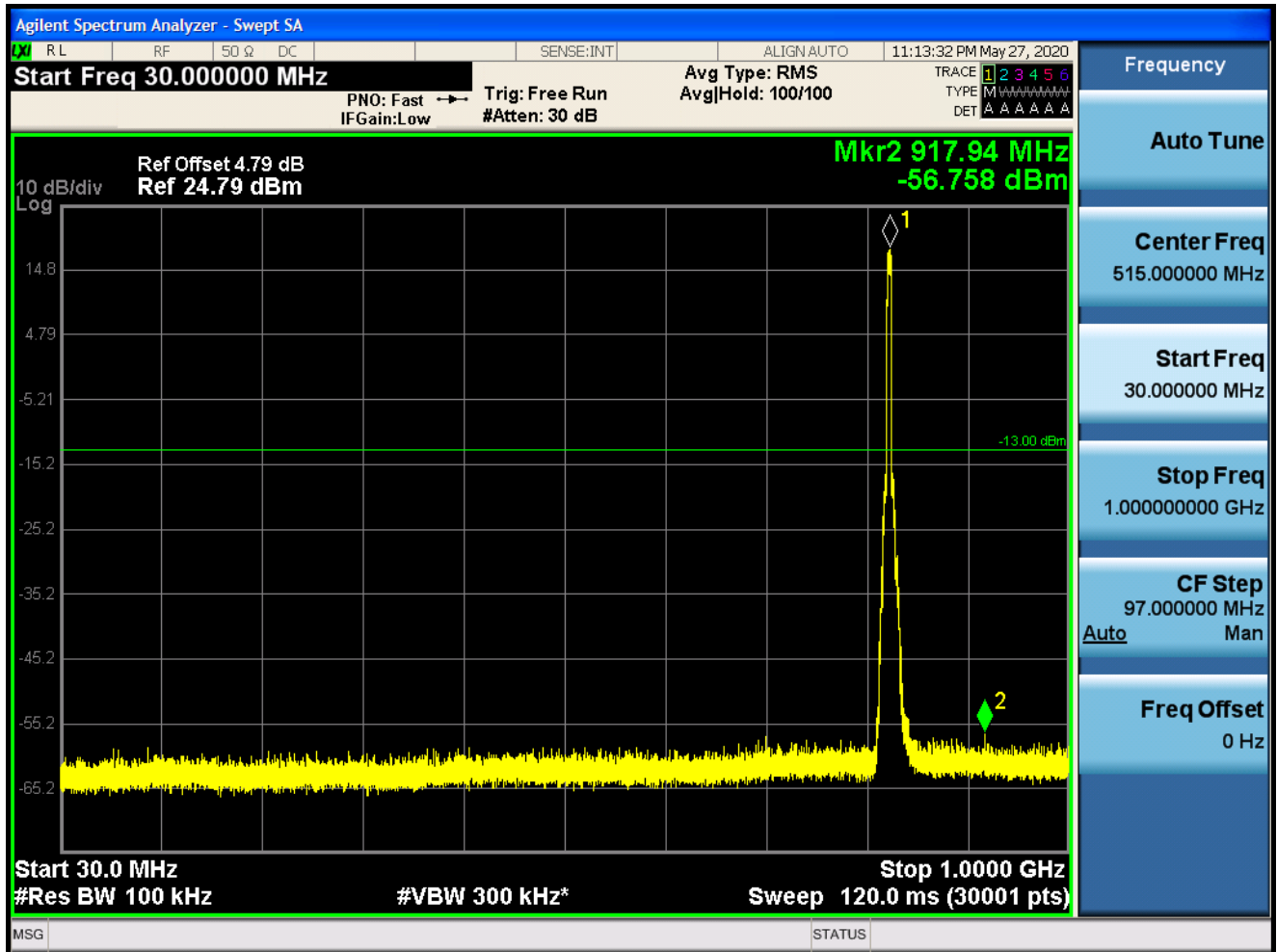


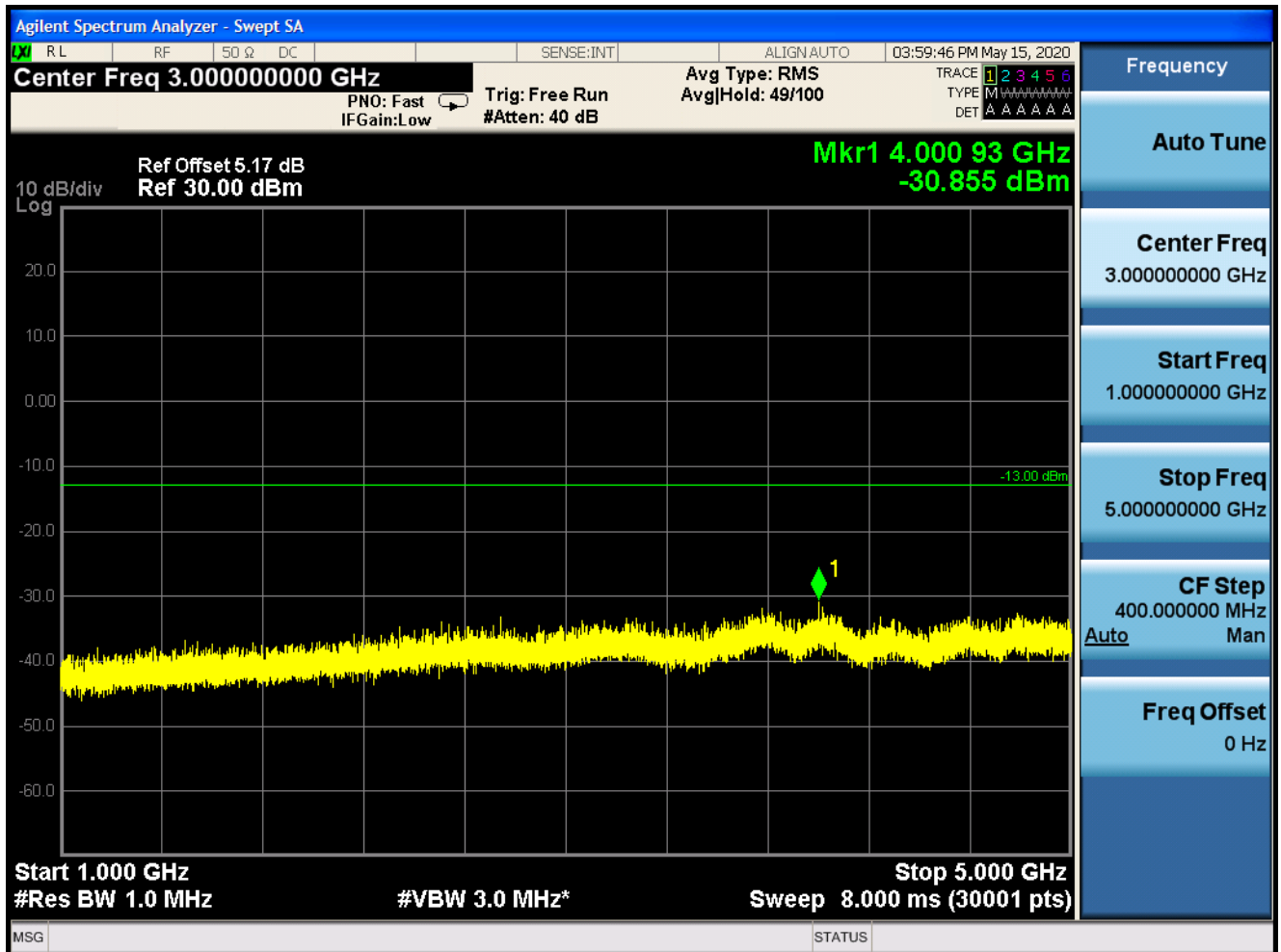
Appendix F: Spurious Emission at Antenna Terminal

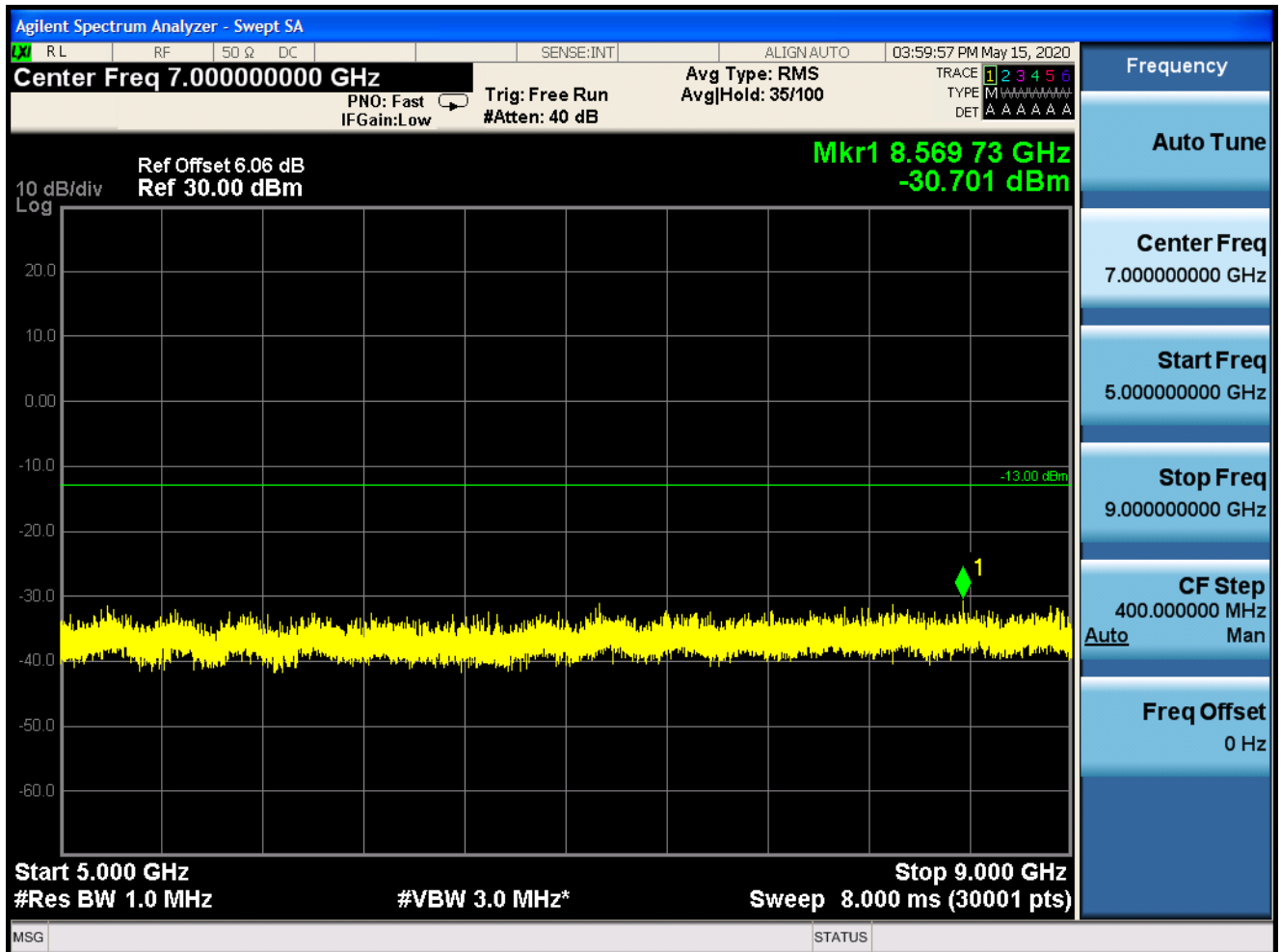
- 1 For WCDMA
- 1.1 Test Band=WCDMA850
- 1.1.1 Test Mode=UMTS/TM1
- 1.1.1.1 Test Channel=LCH

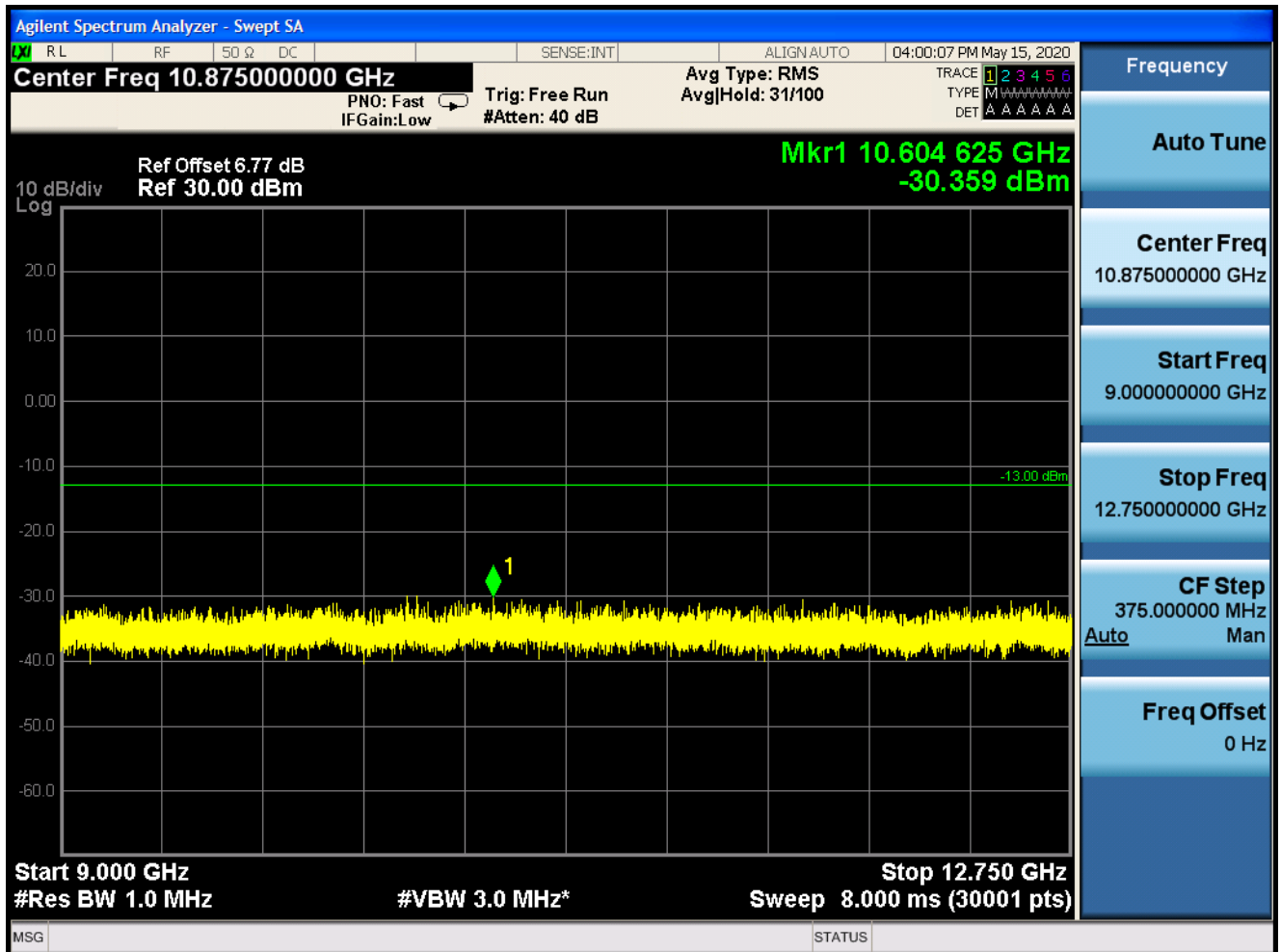






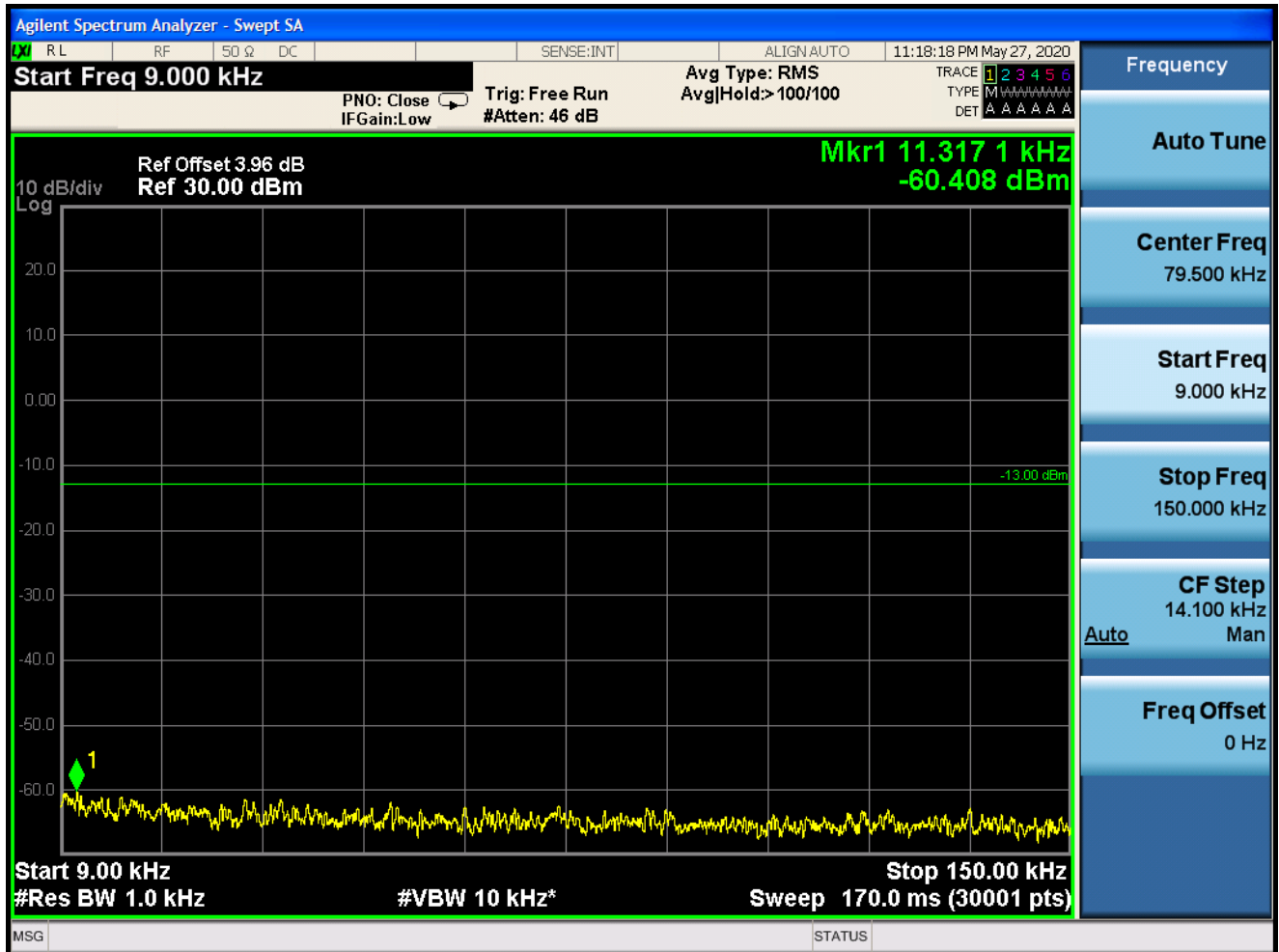


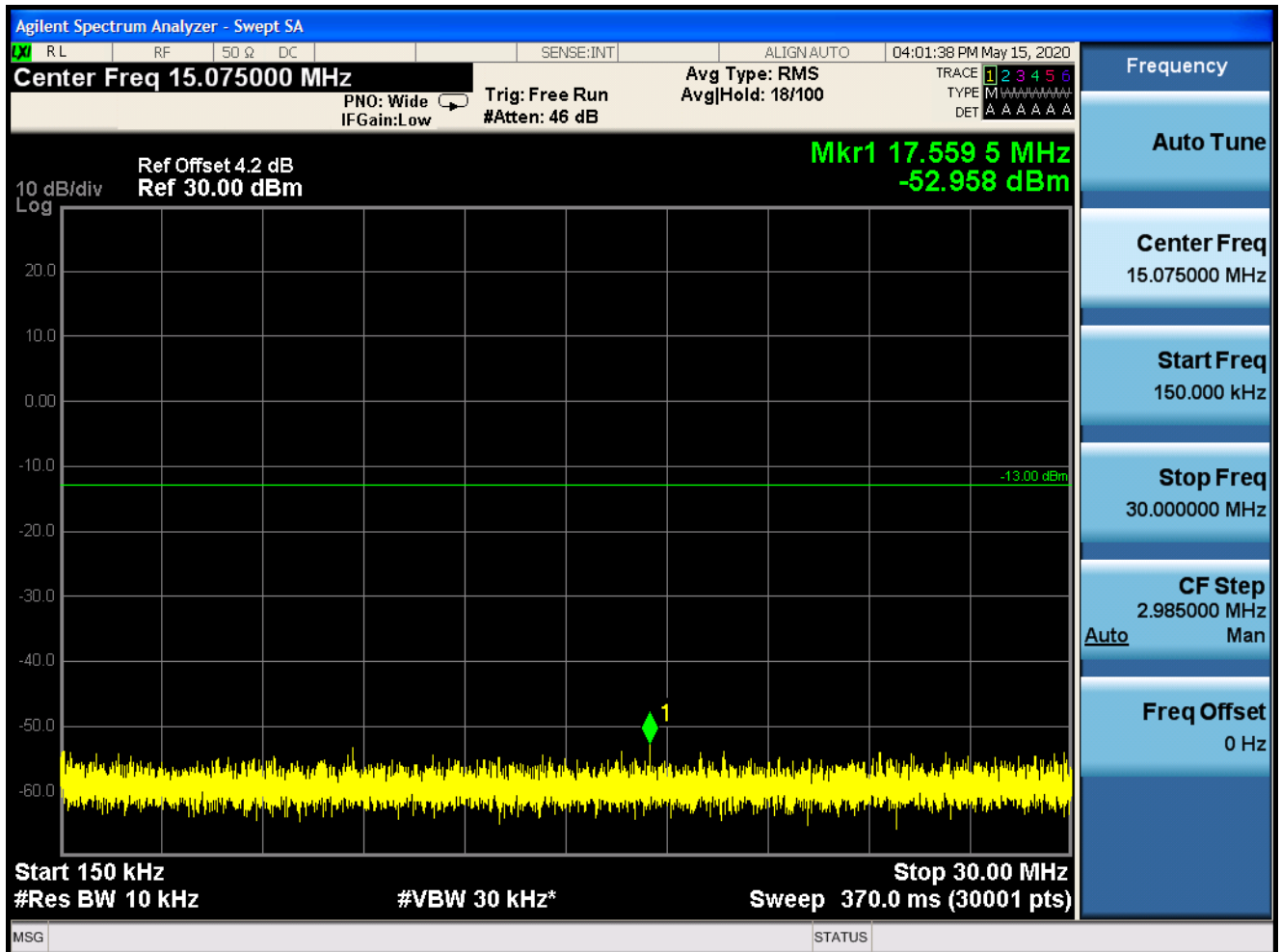


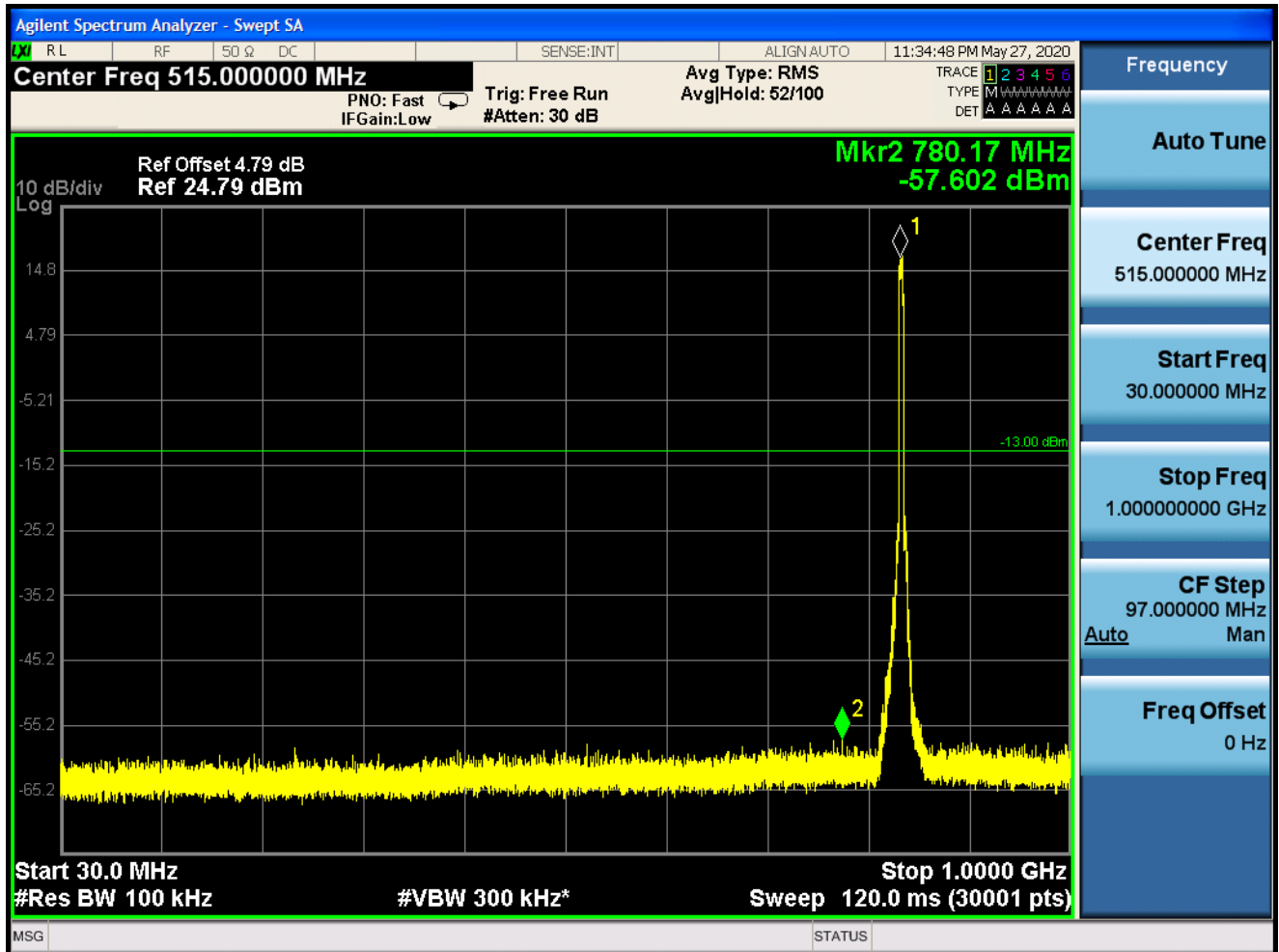


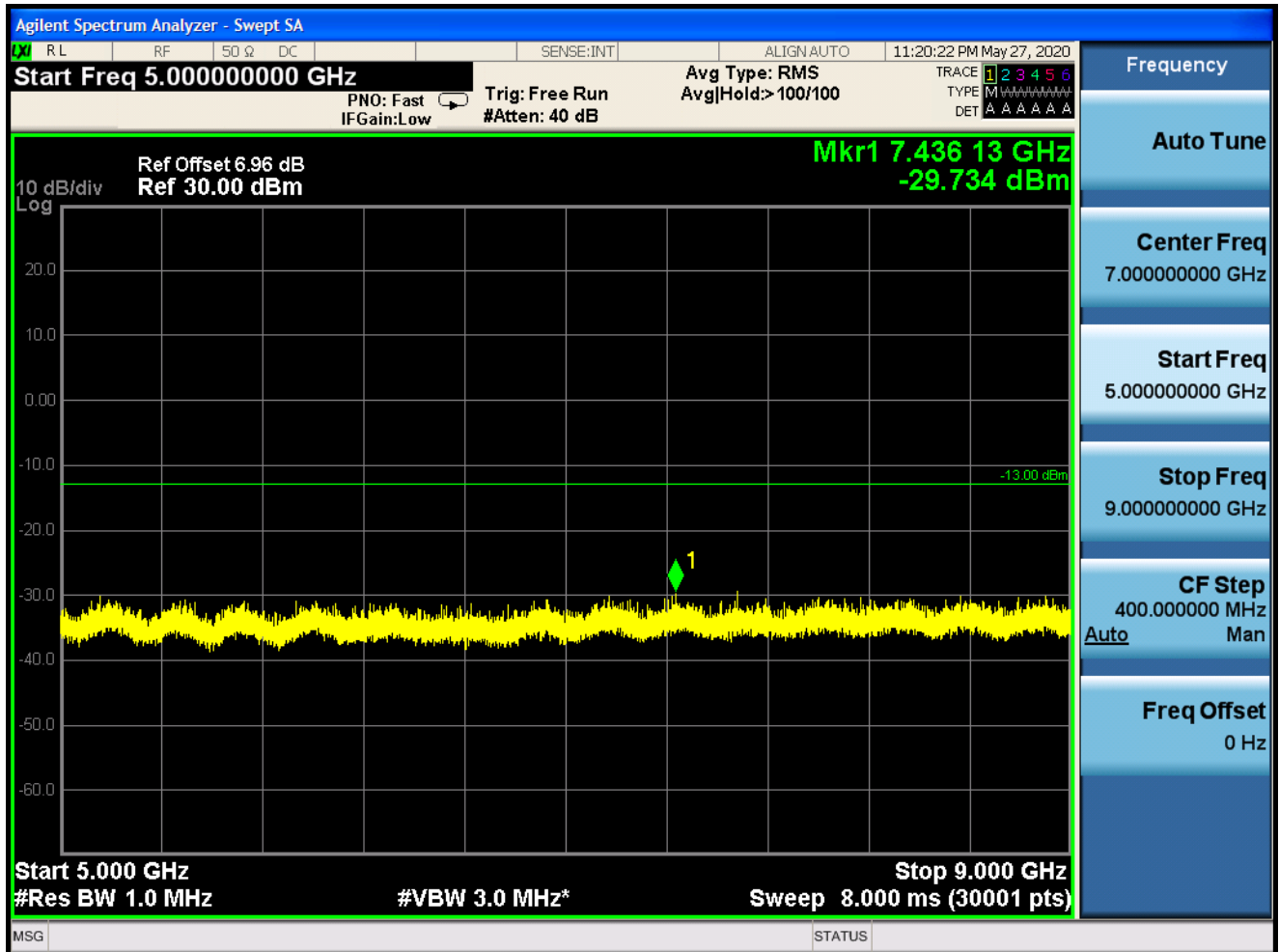


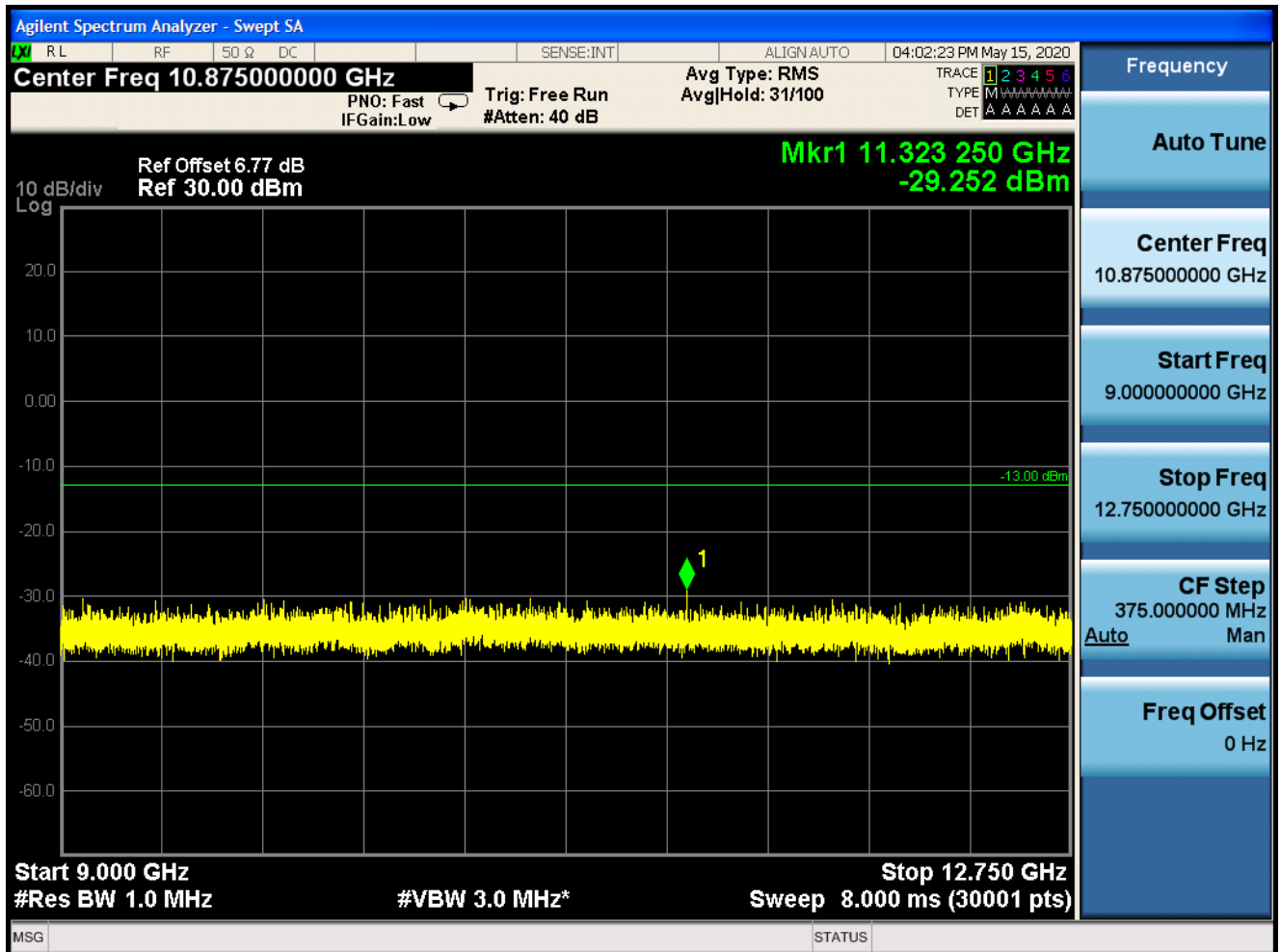
1.1.1.2 Test Channel=MCH





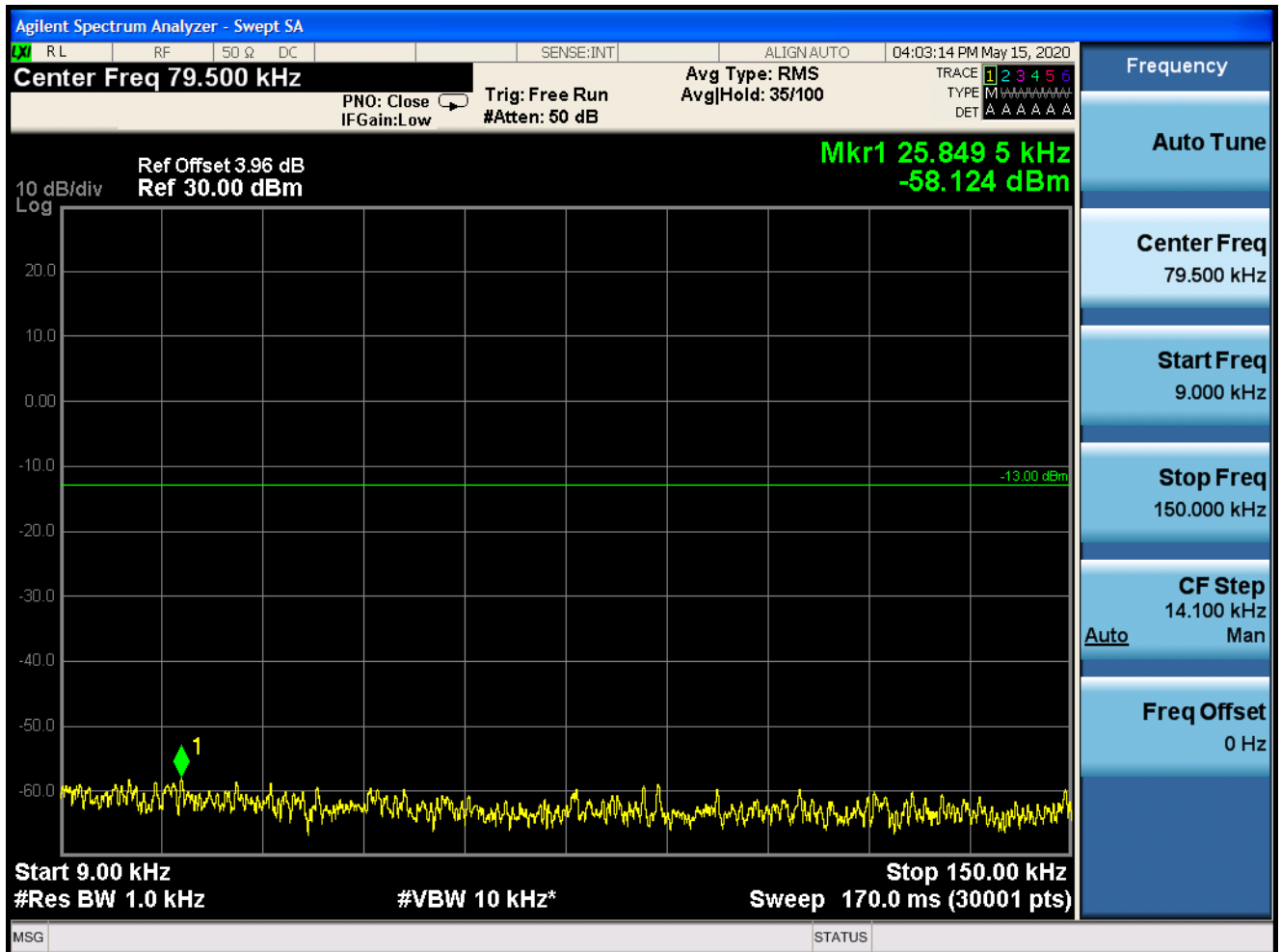


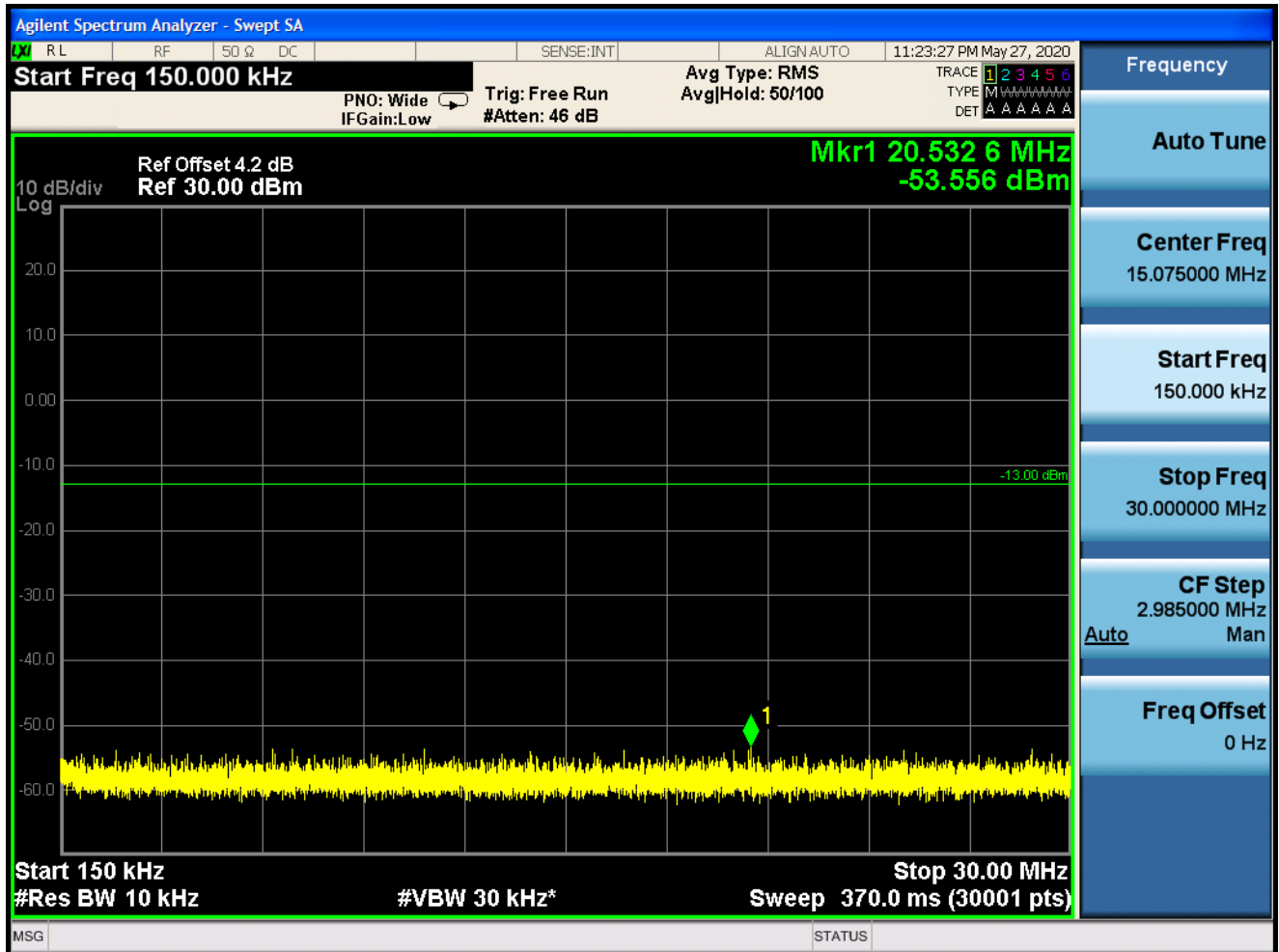


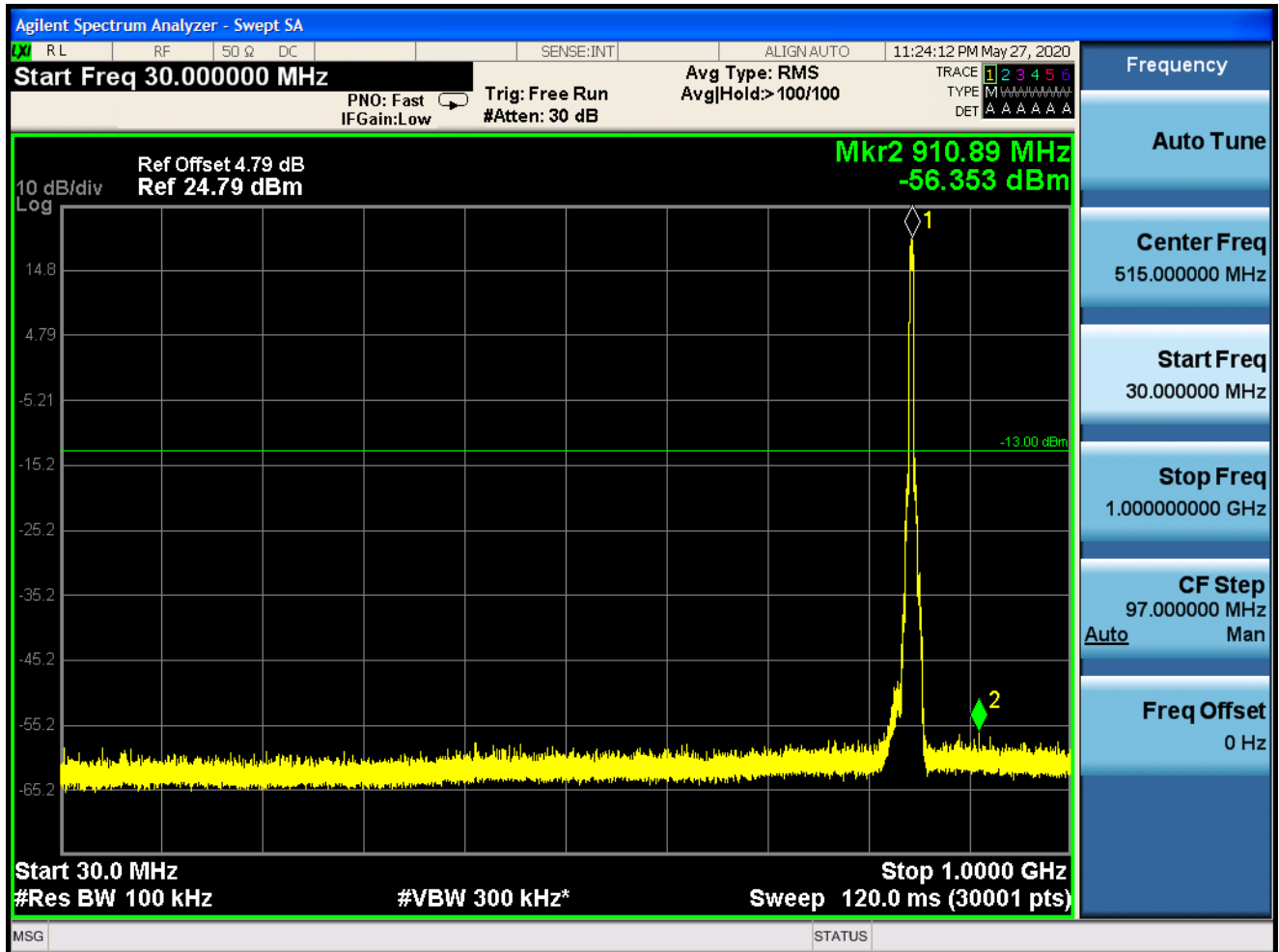


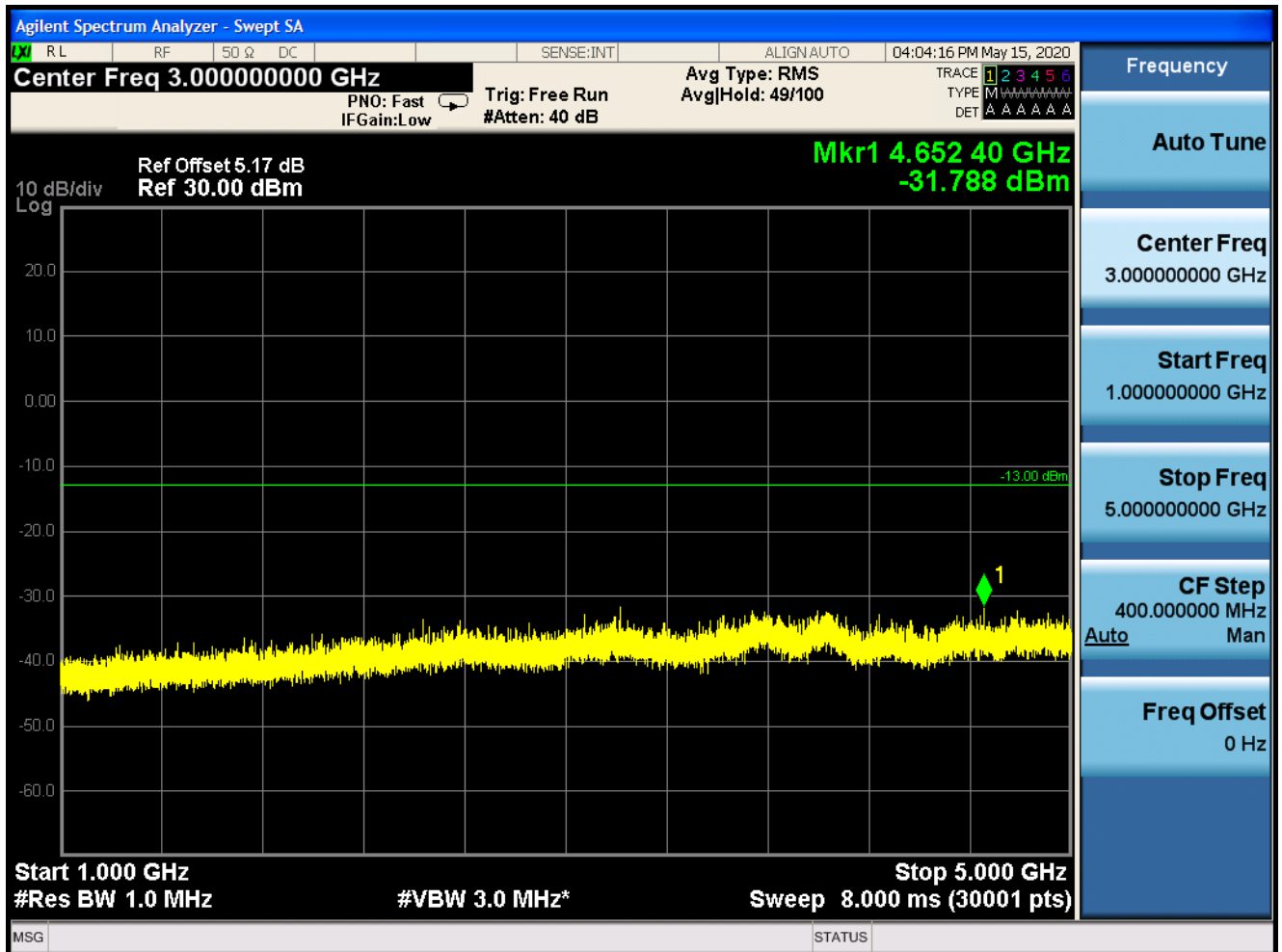


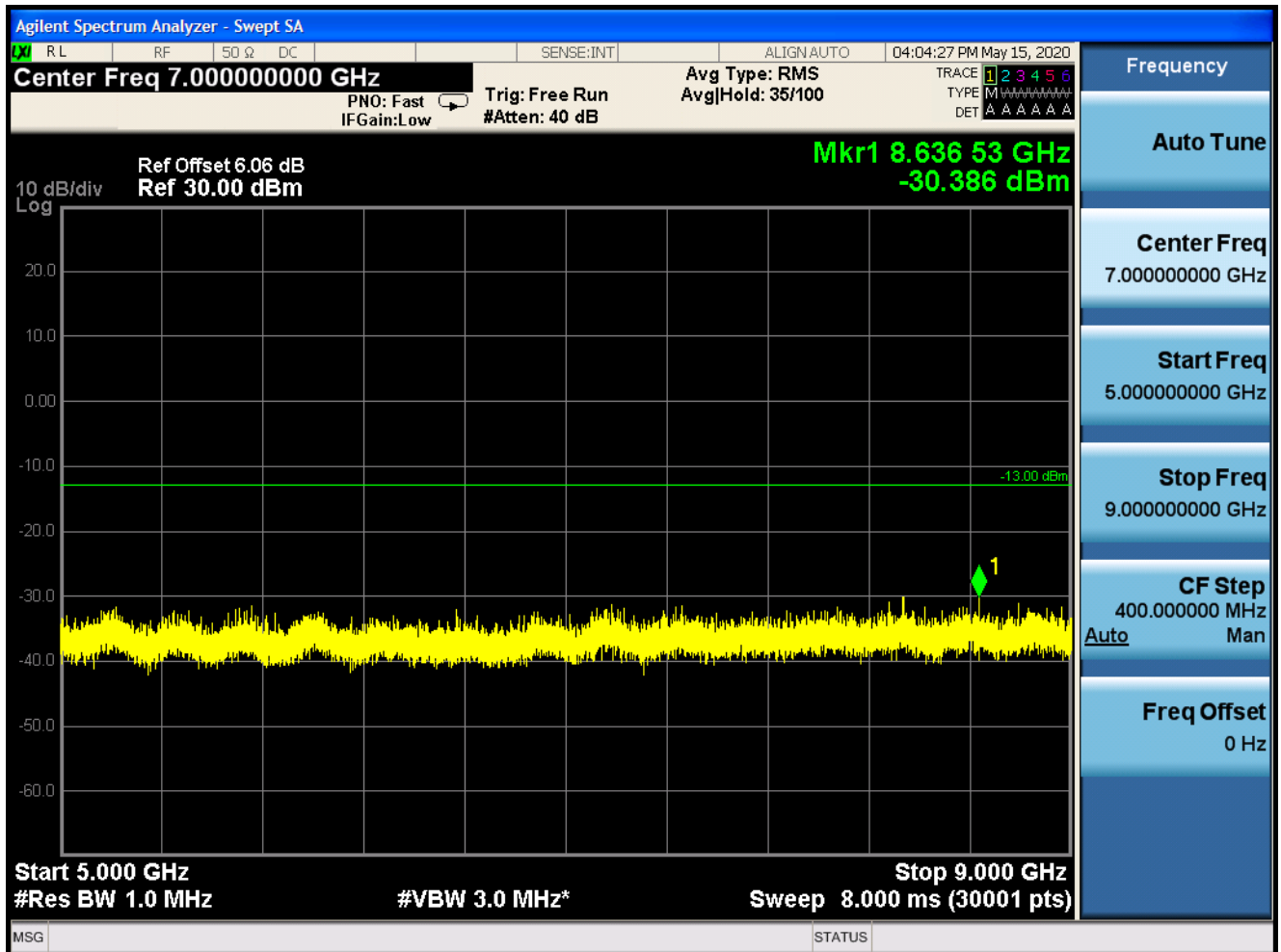
1.1.1.3 Test Channel=HCH

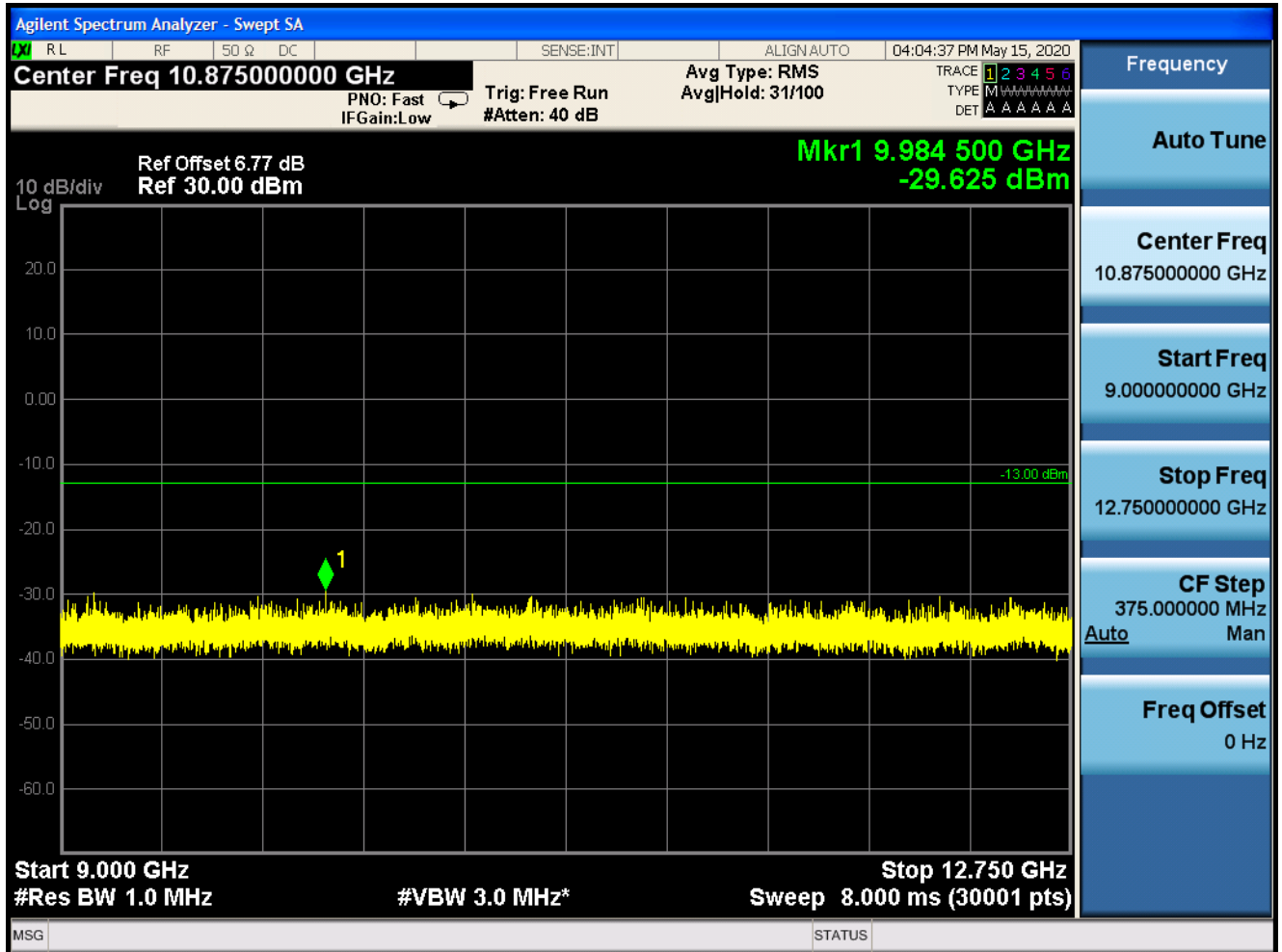










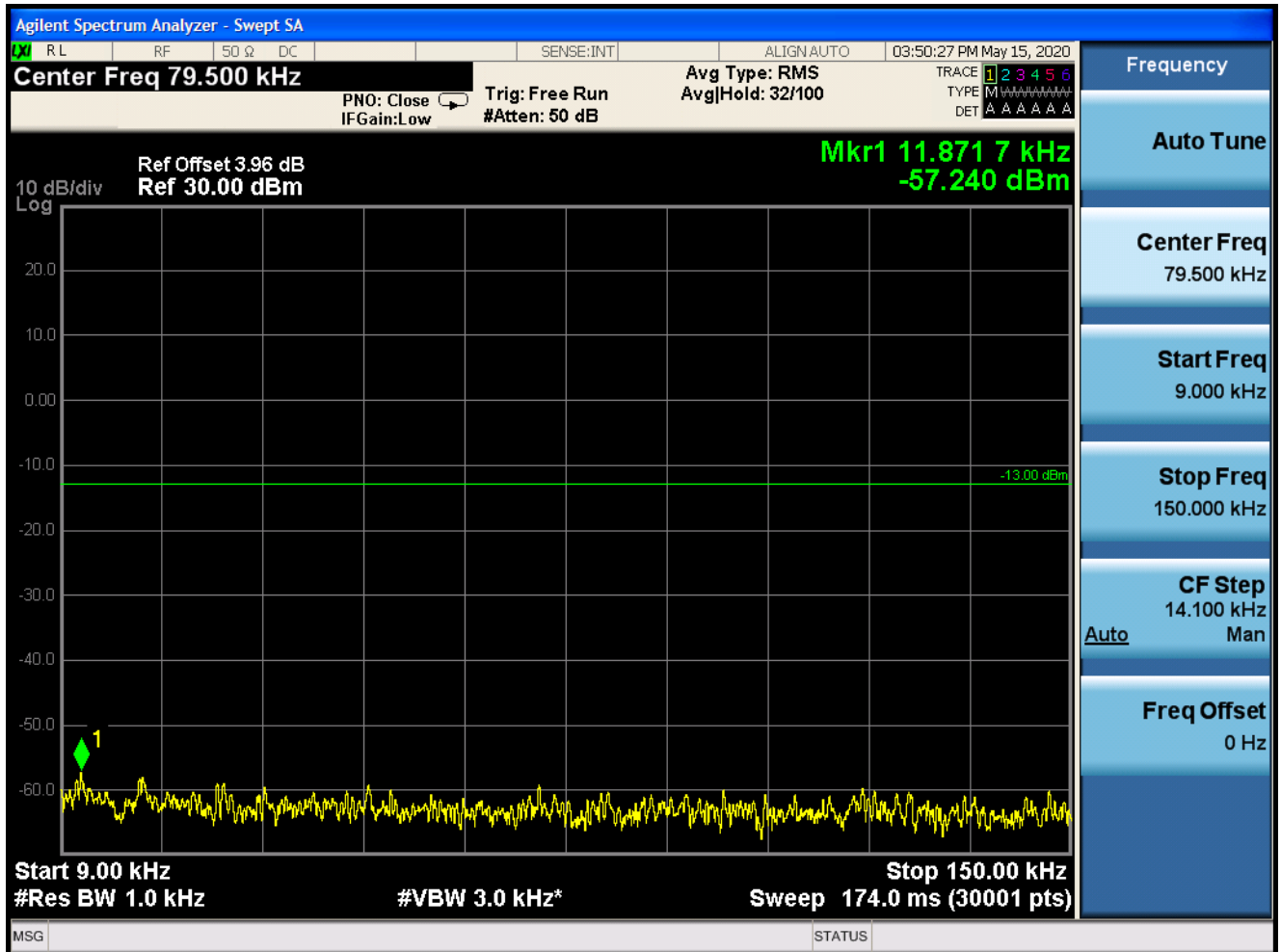


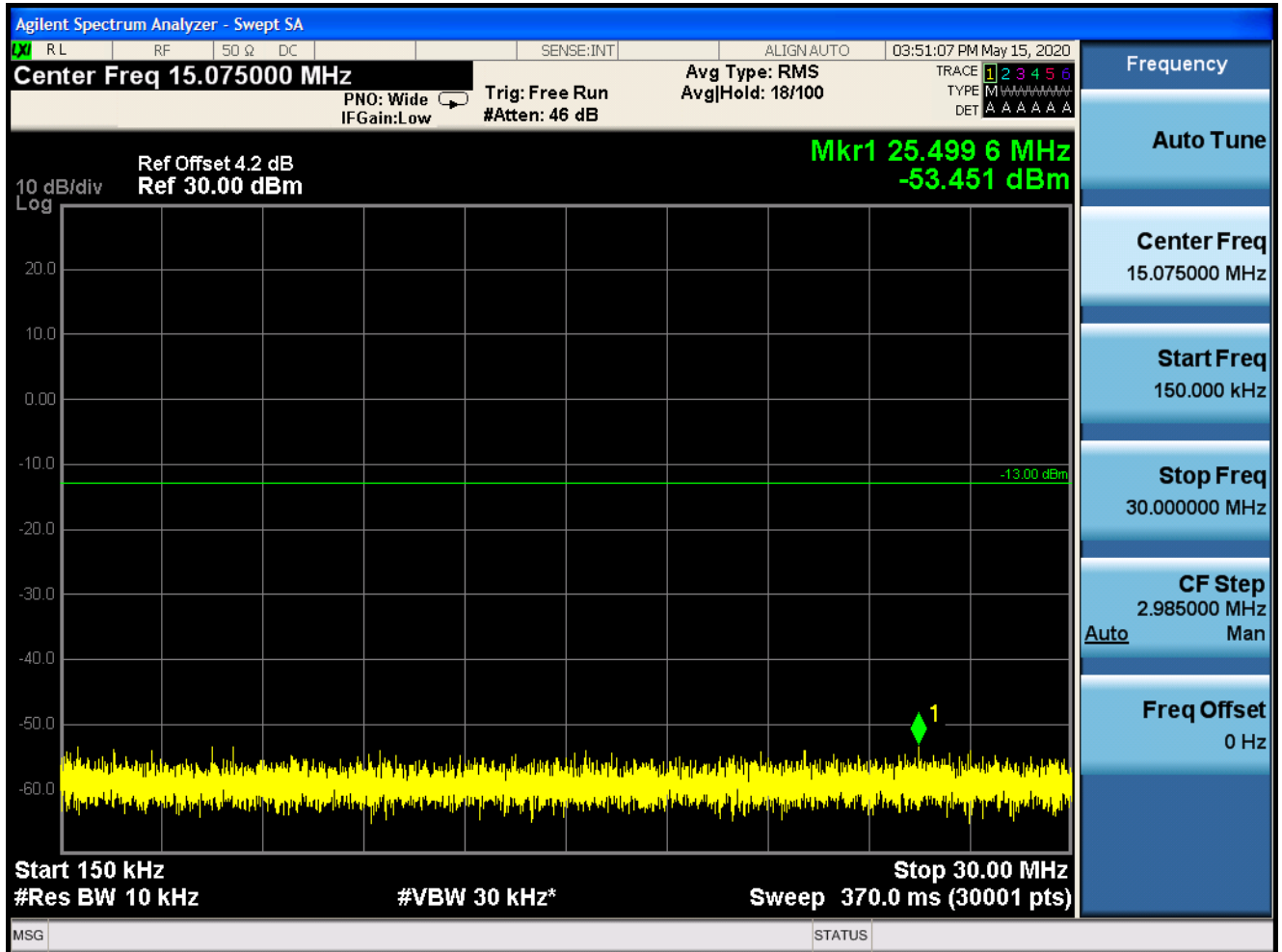


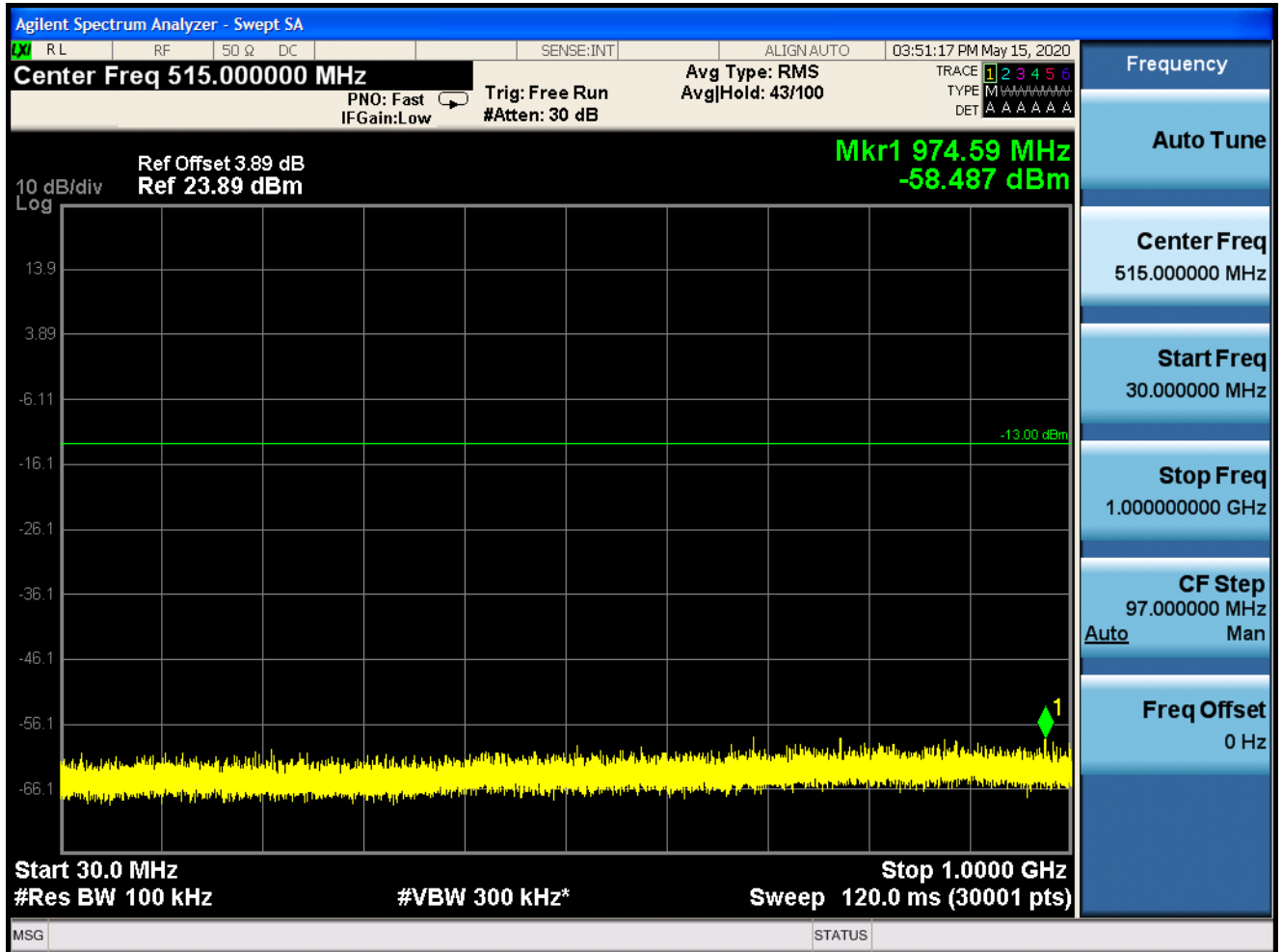
1.2 Test Band=WCDMA1900

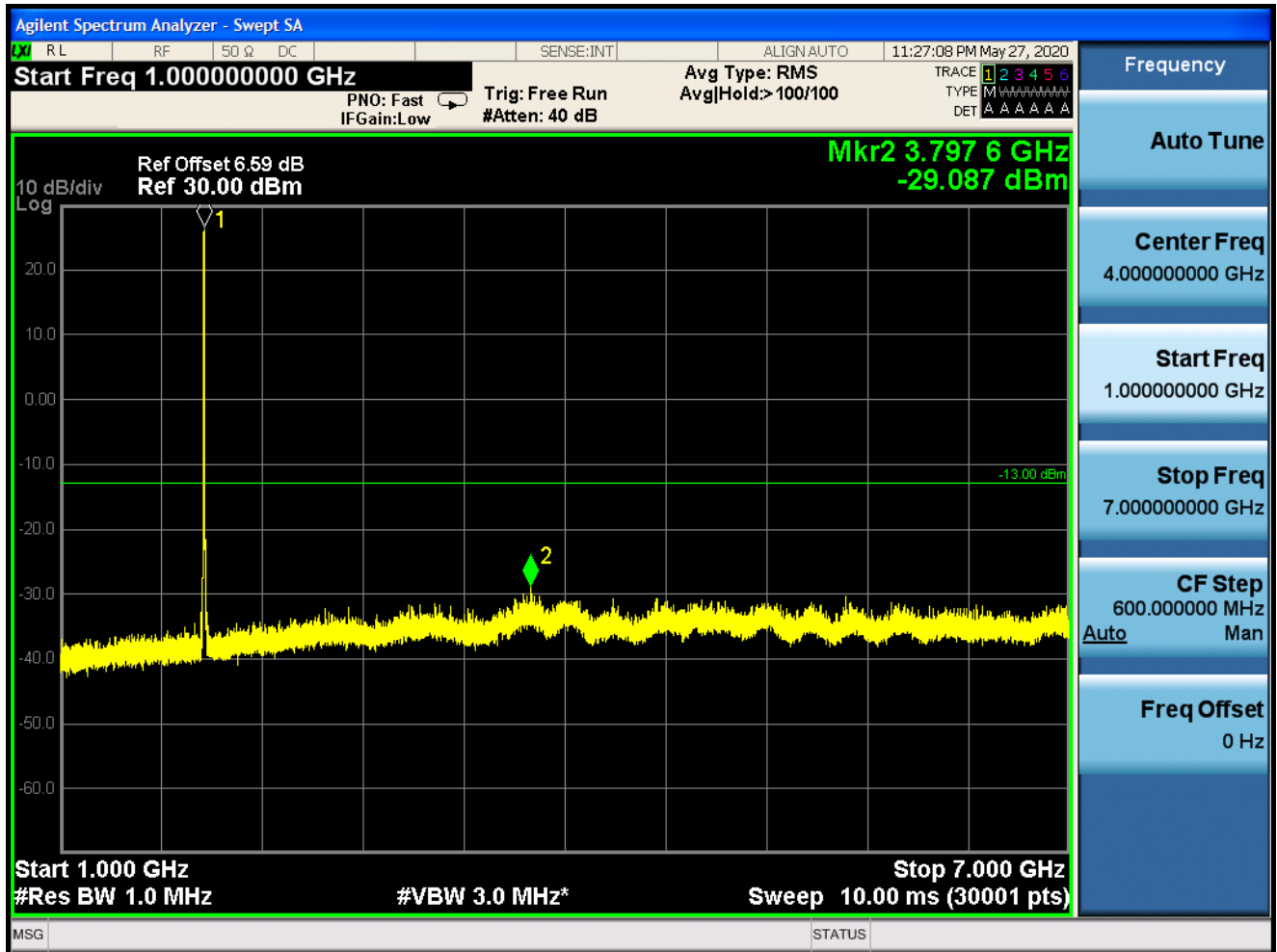
1.2.1 Test Mode=UMTS/TM1

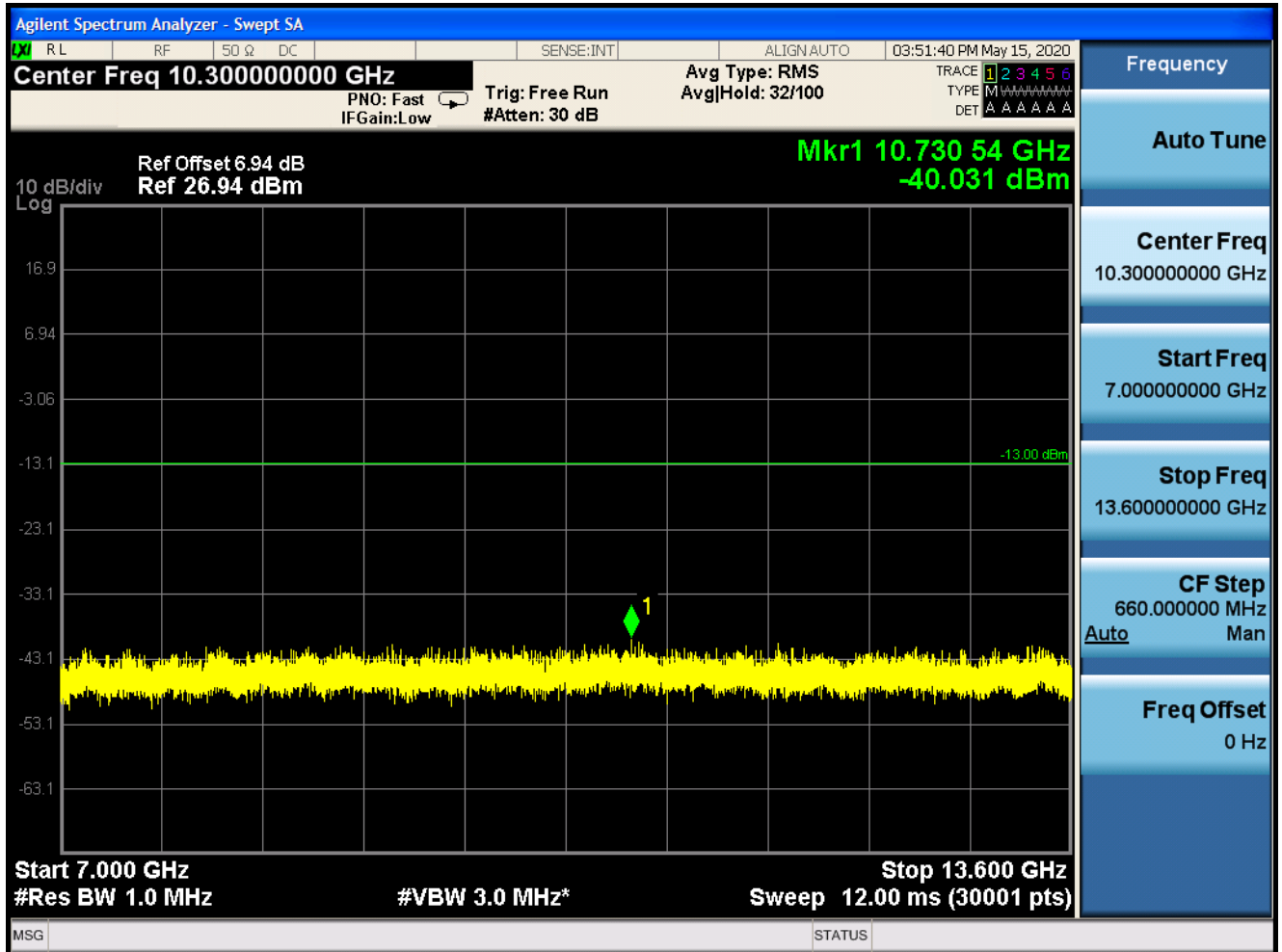
1.2.1.1 Test Channel=LCH

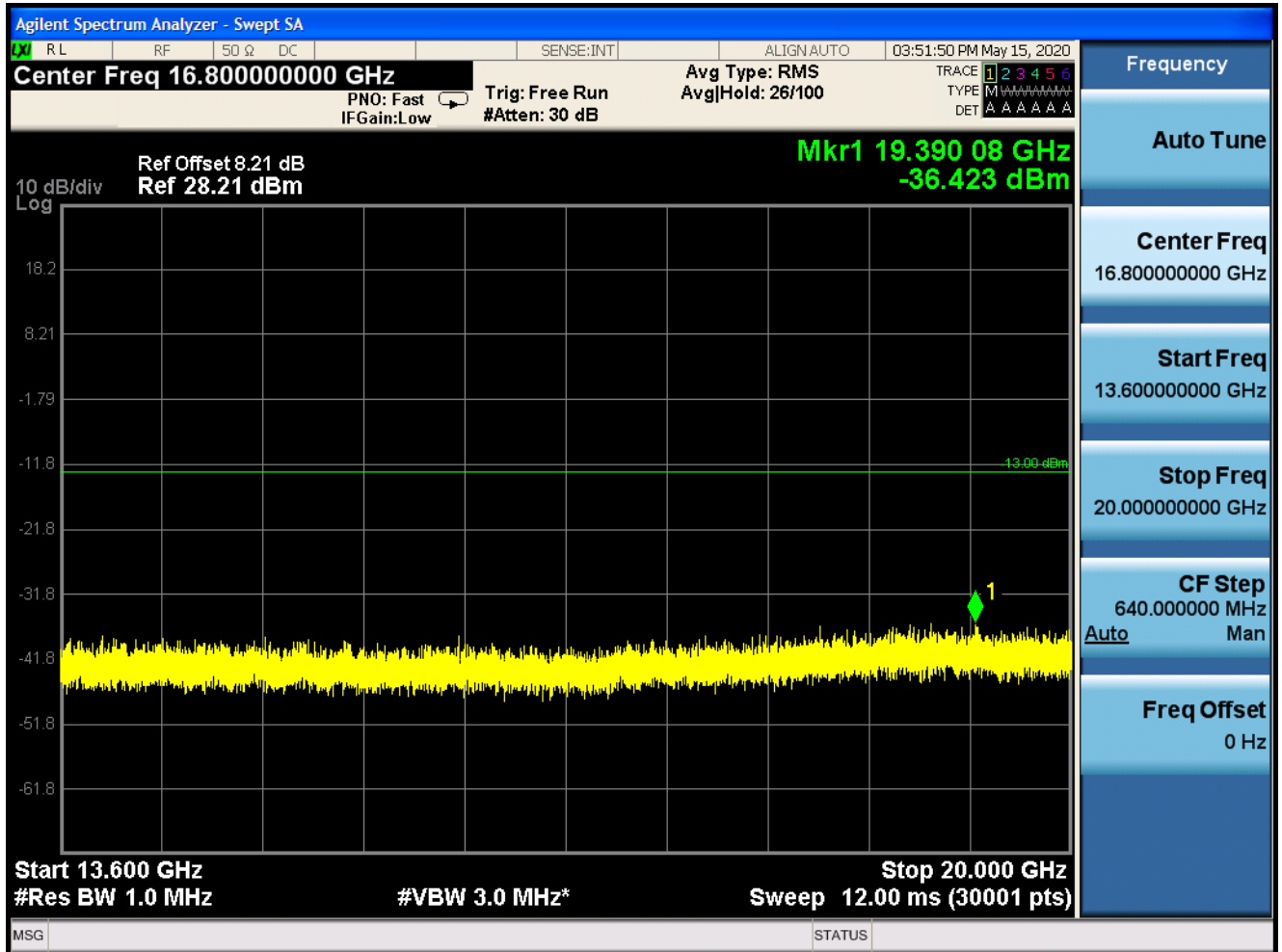






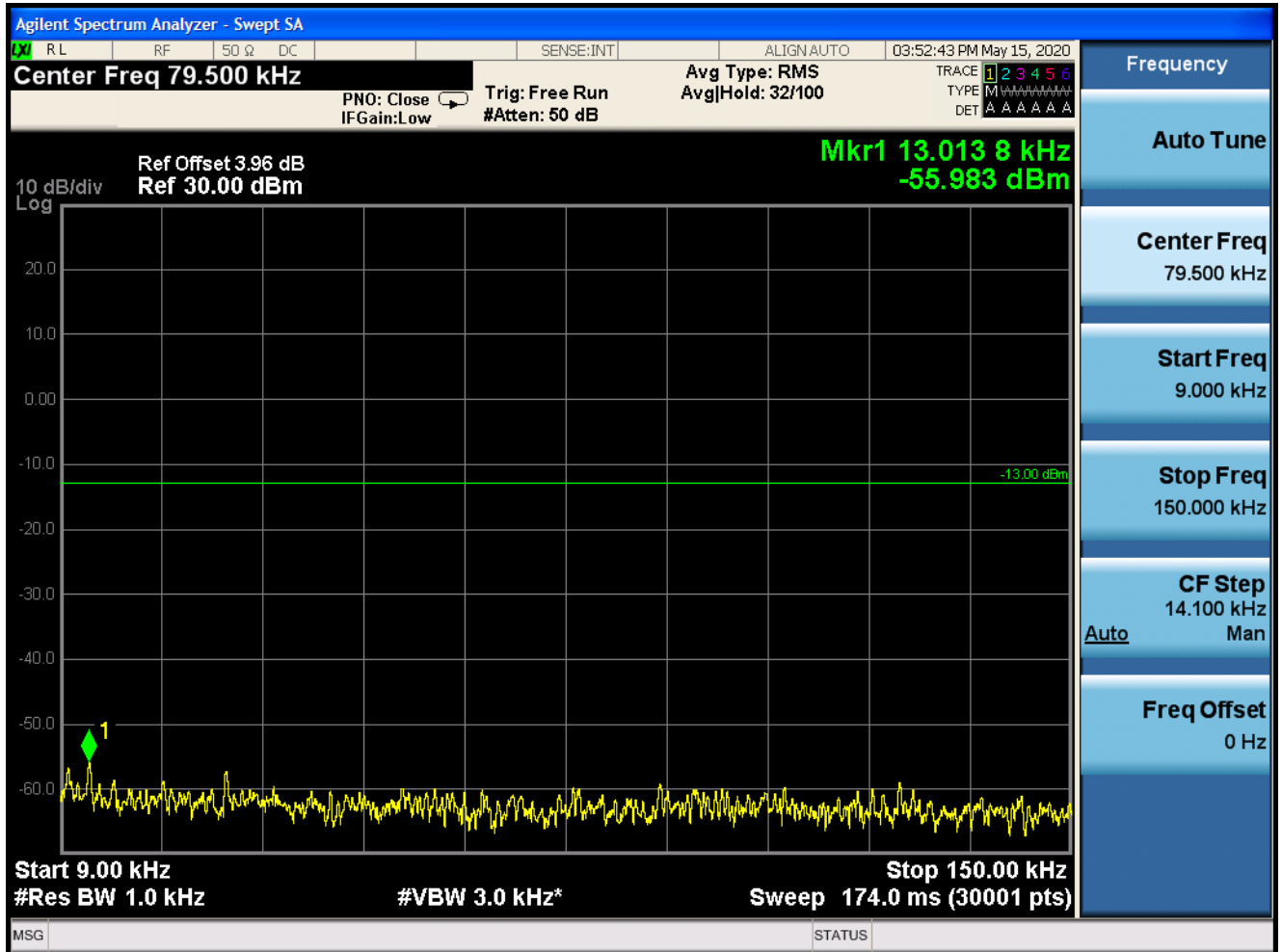


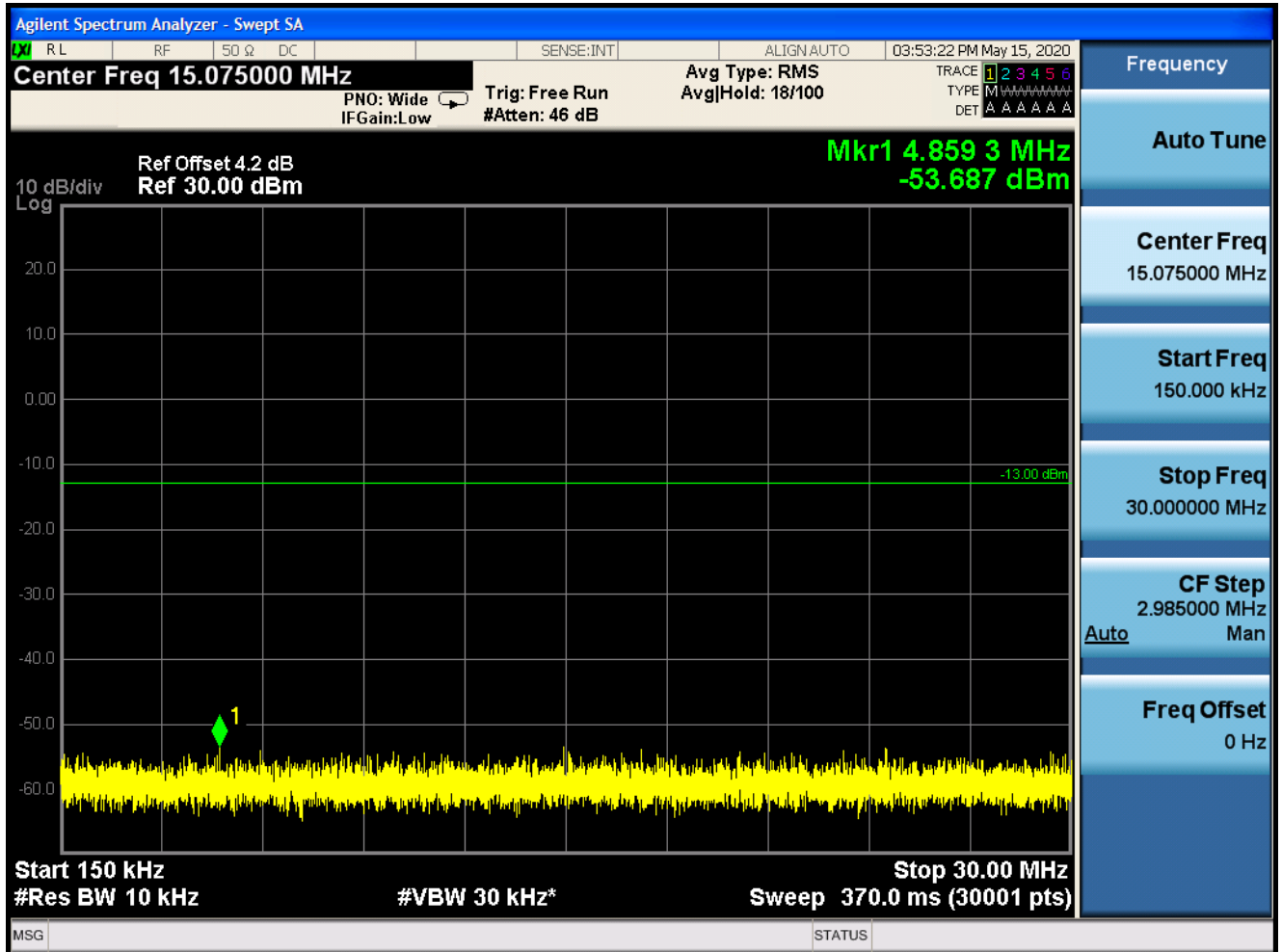


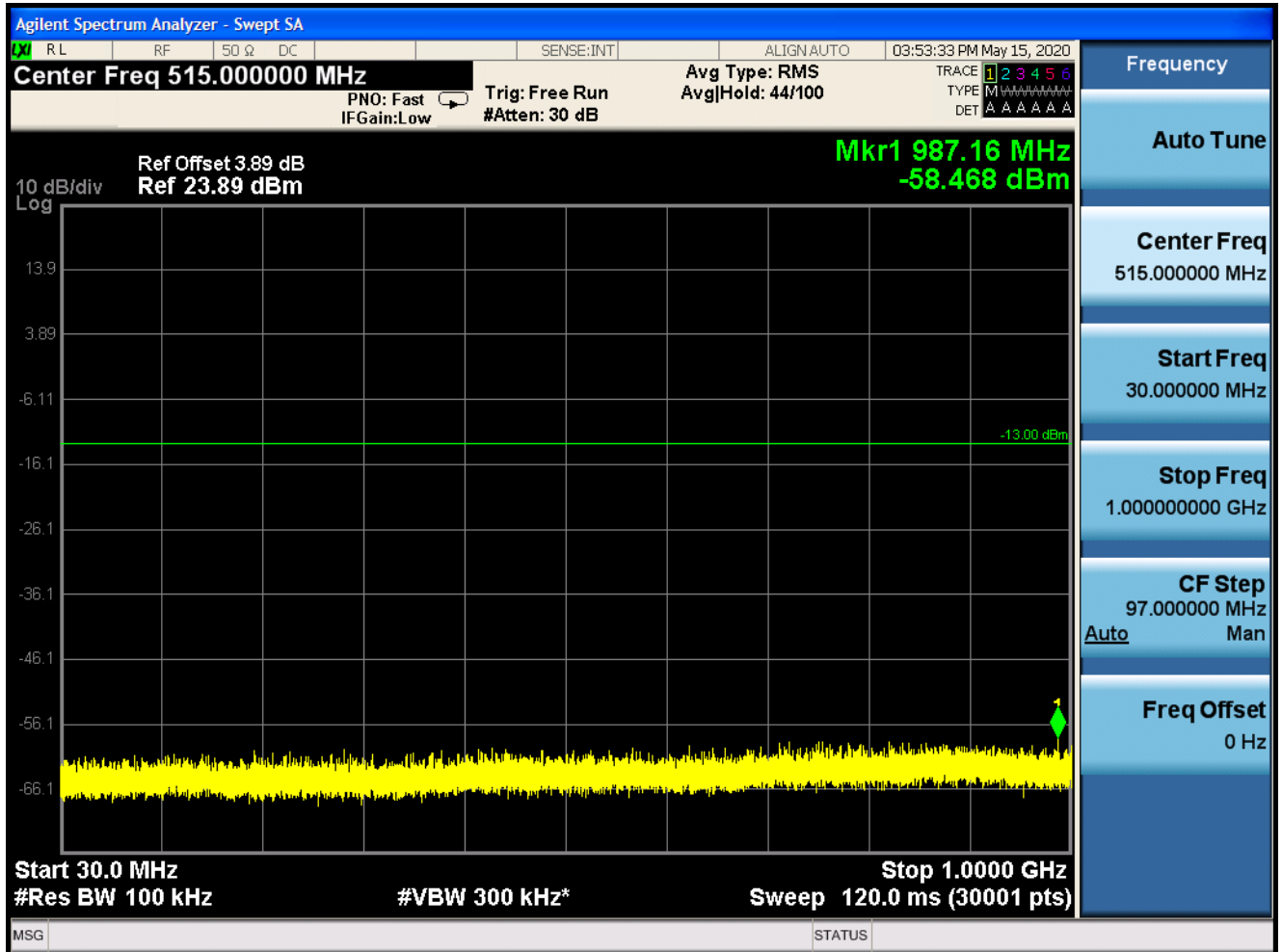


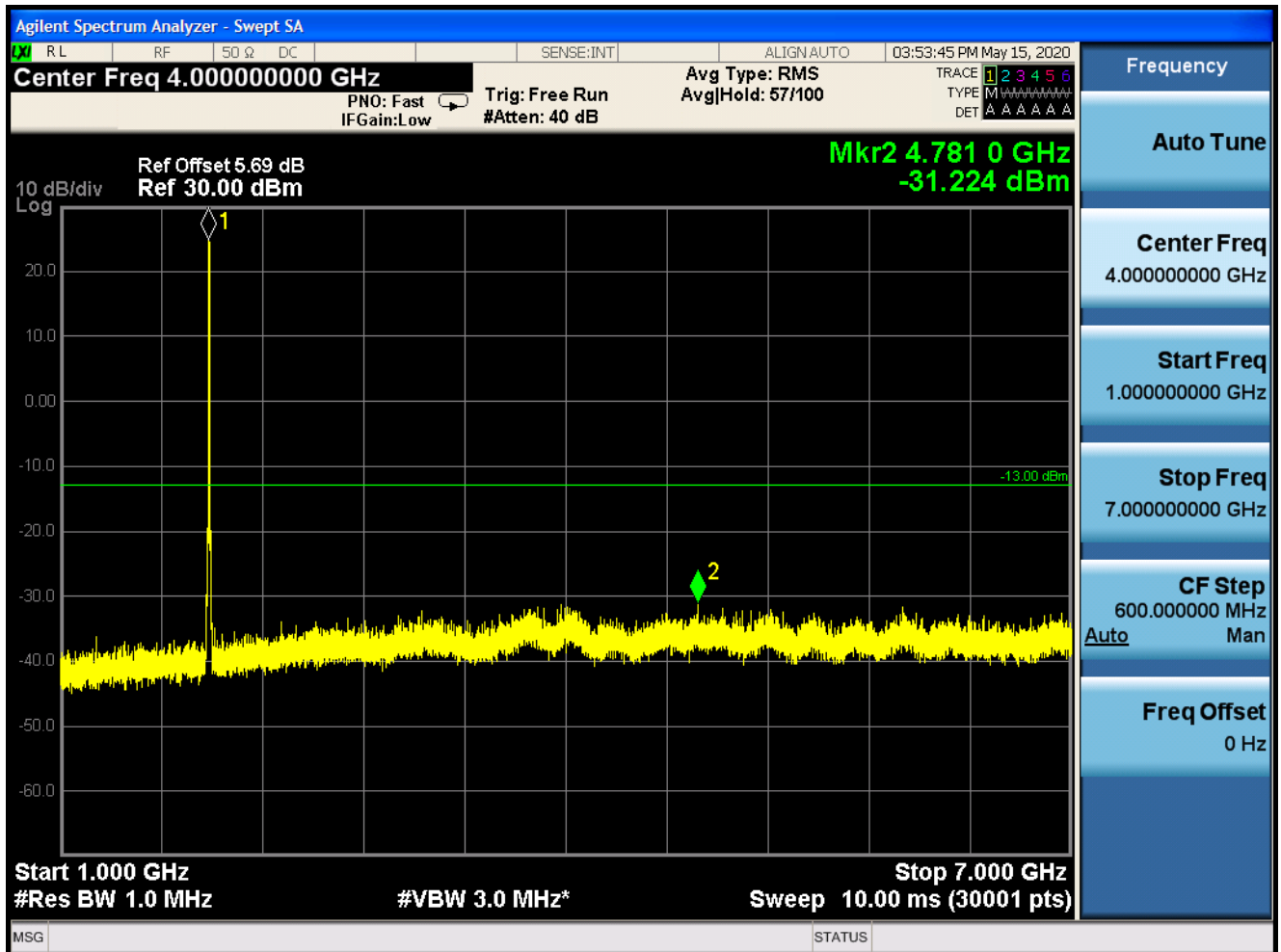


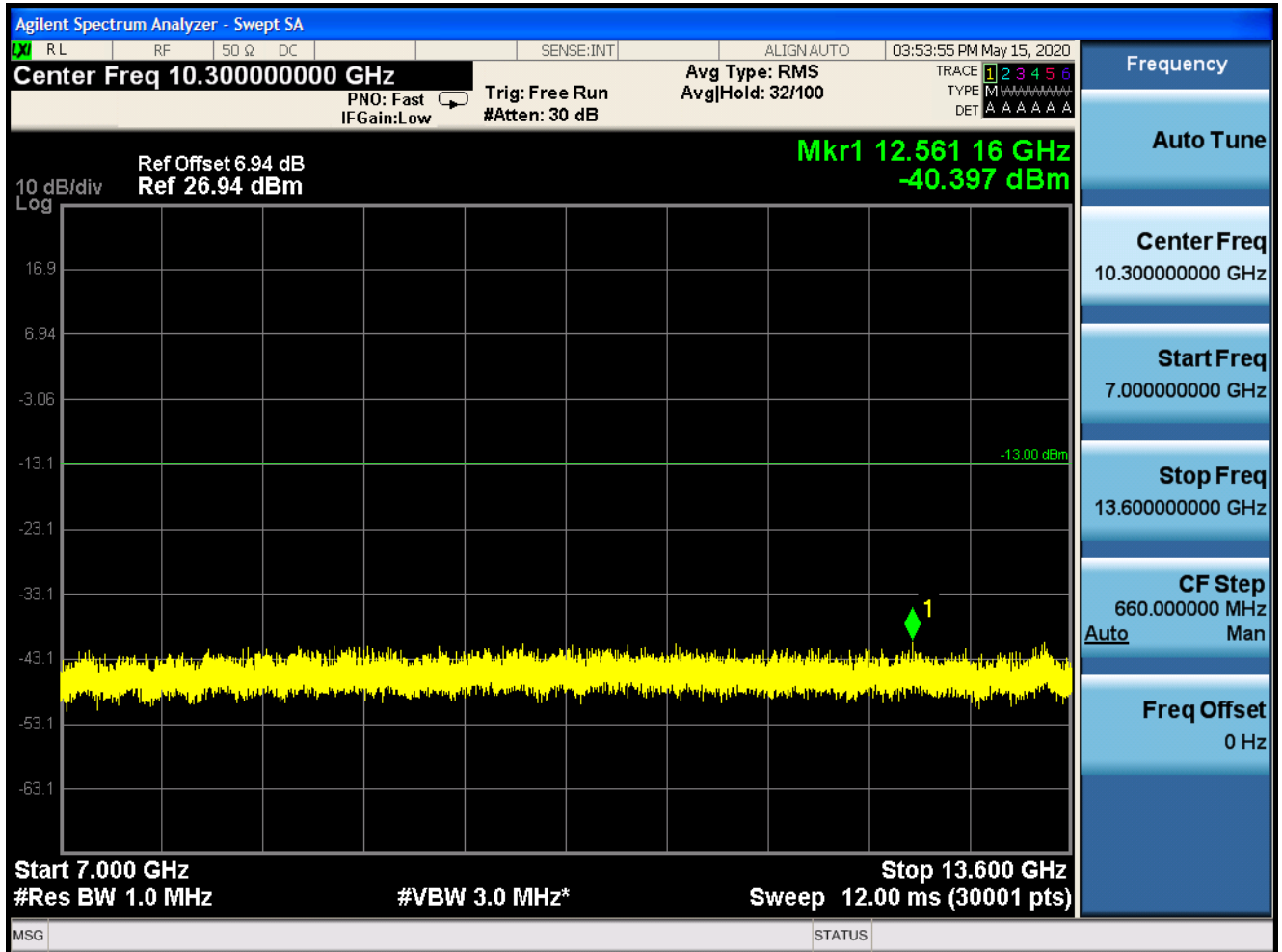
1.2.1.2 Test Channel=MCH

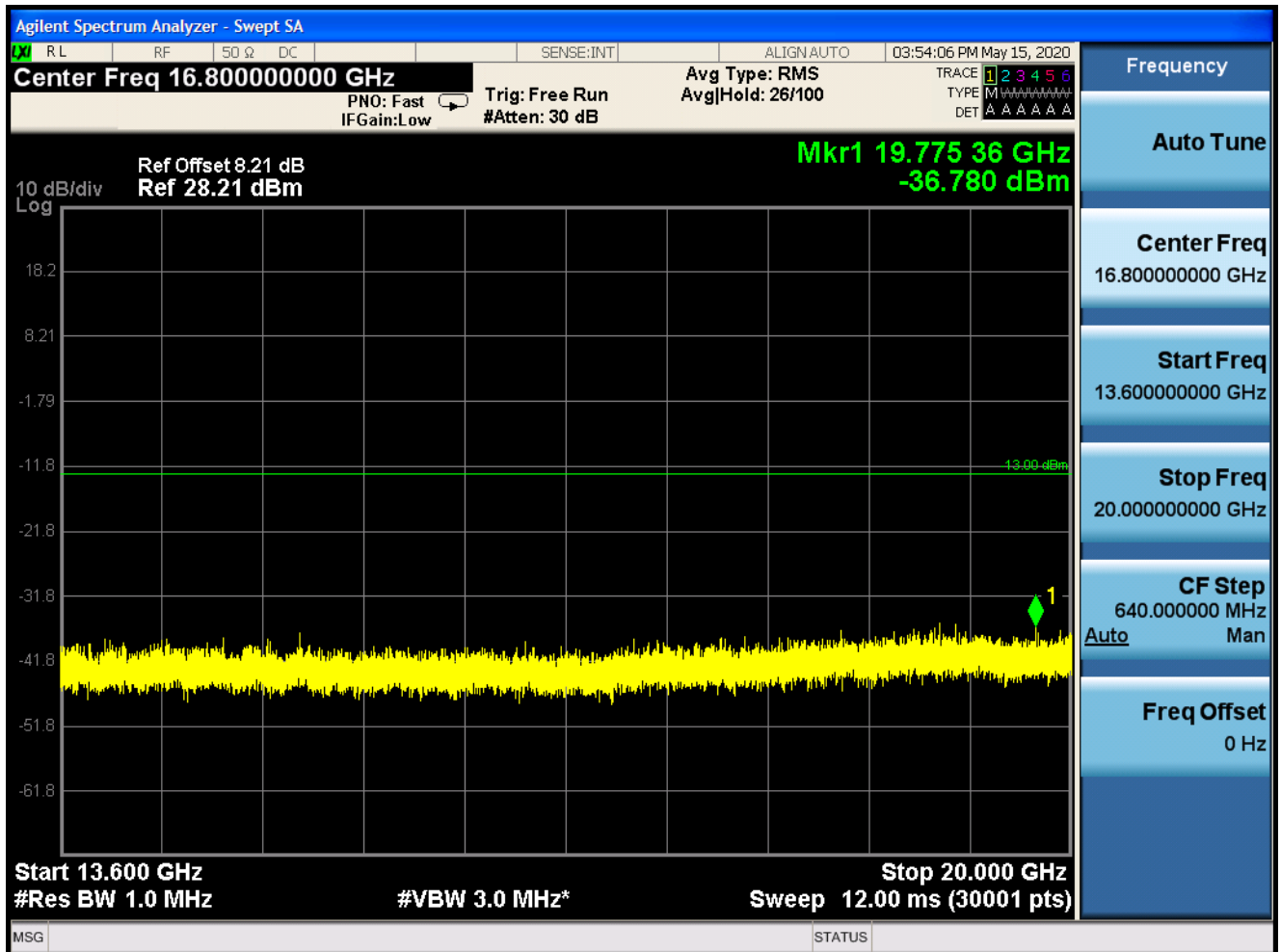






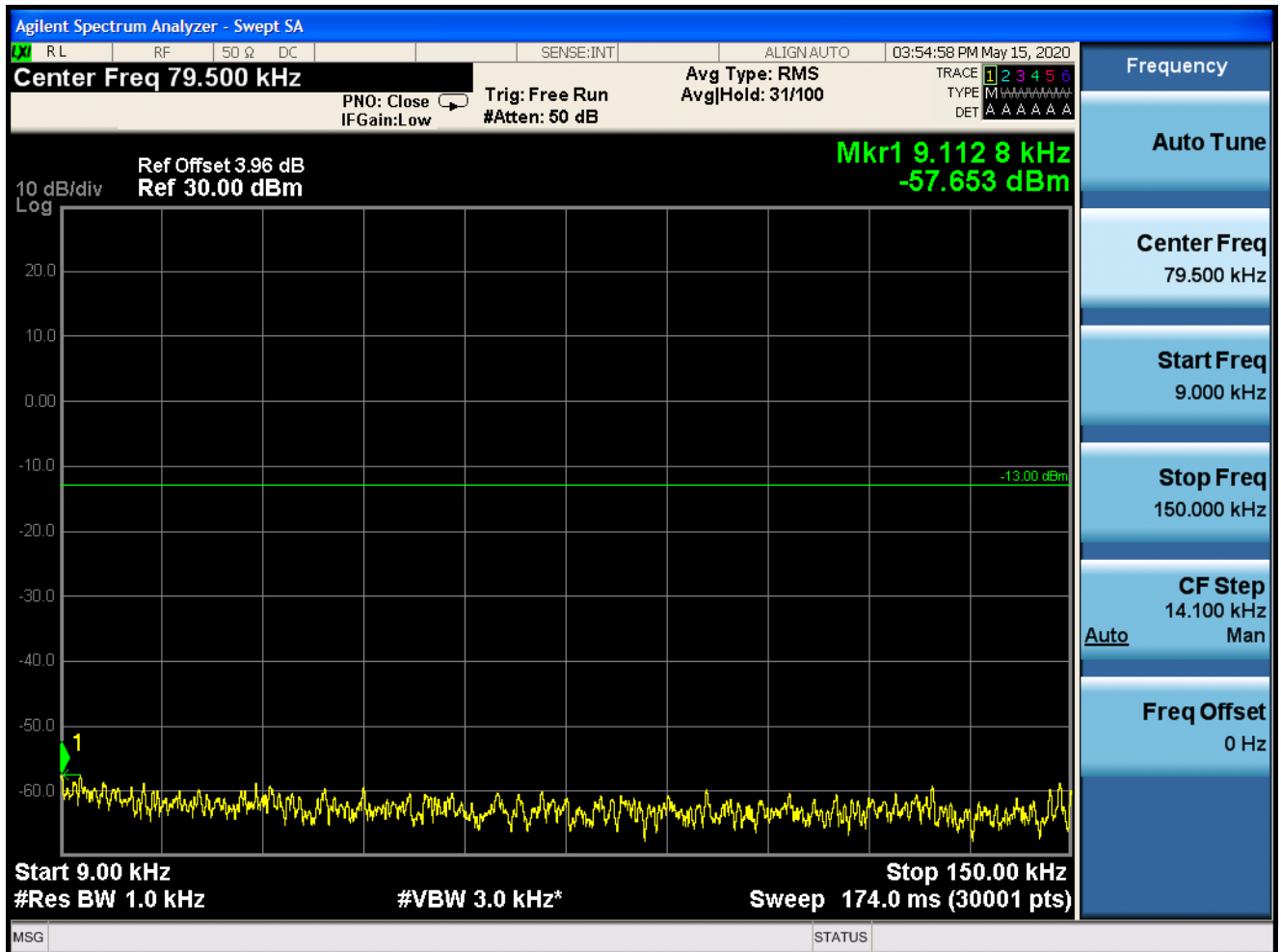


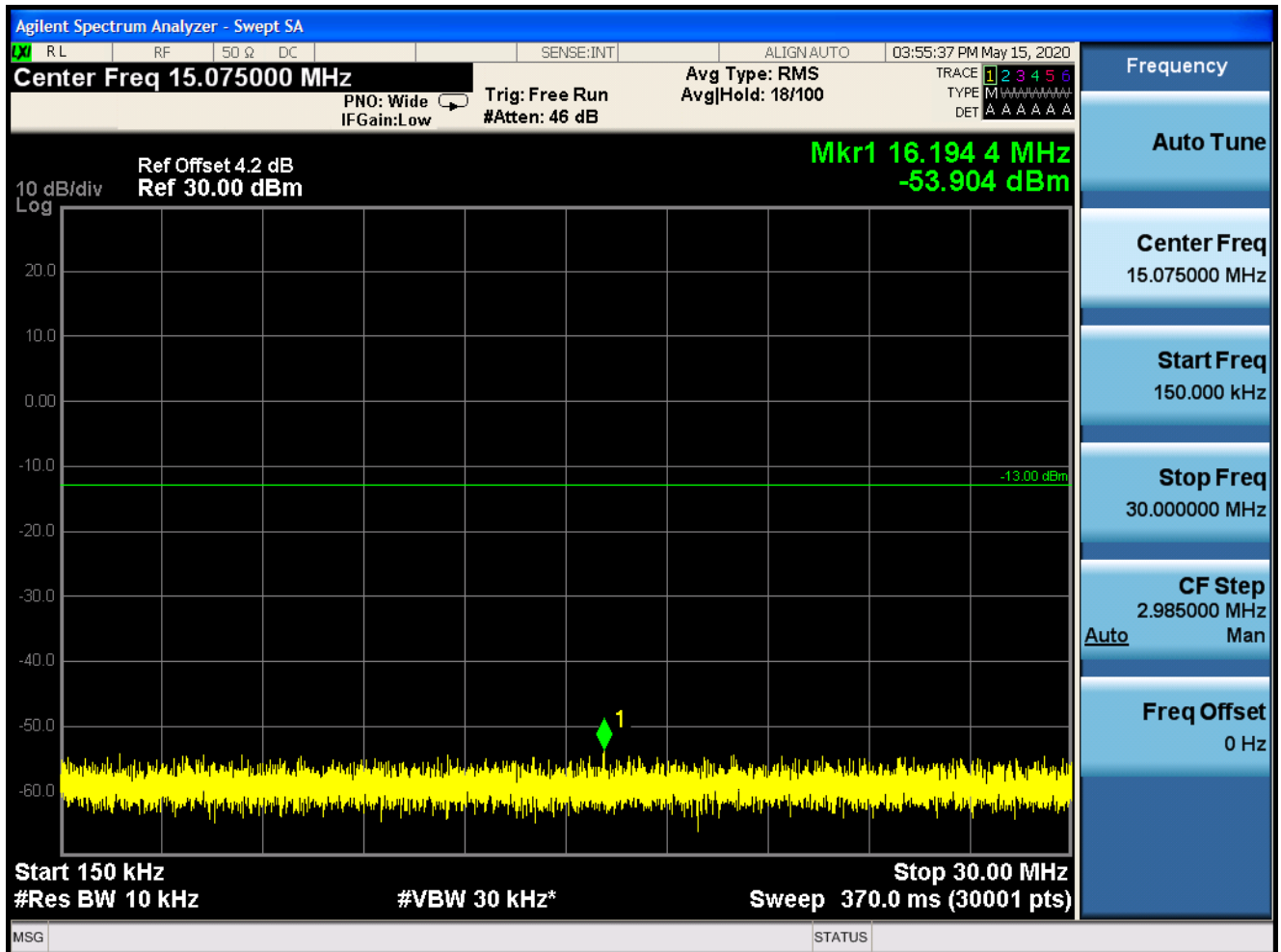


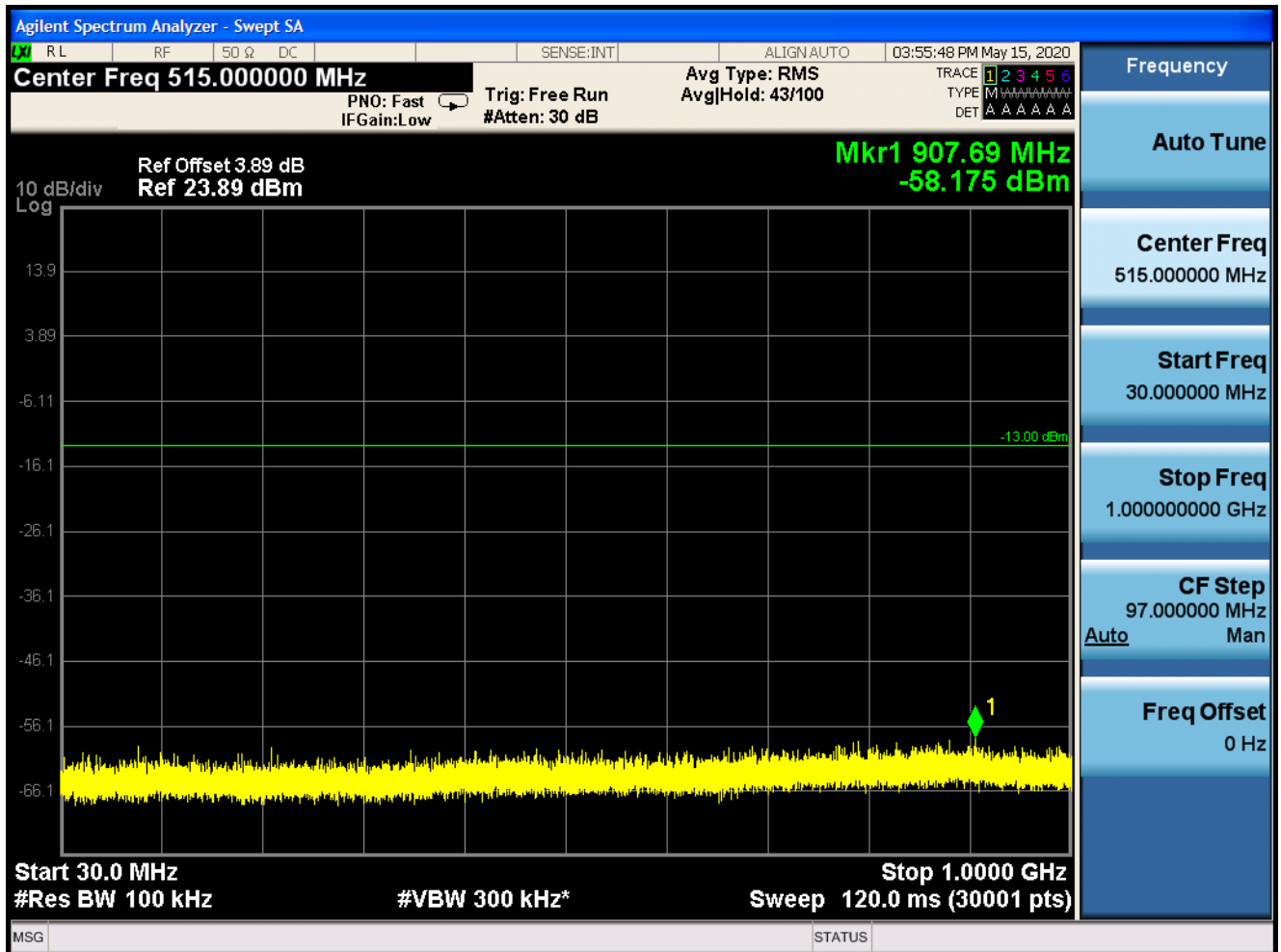


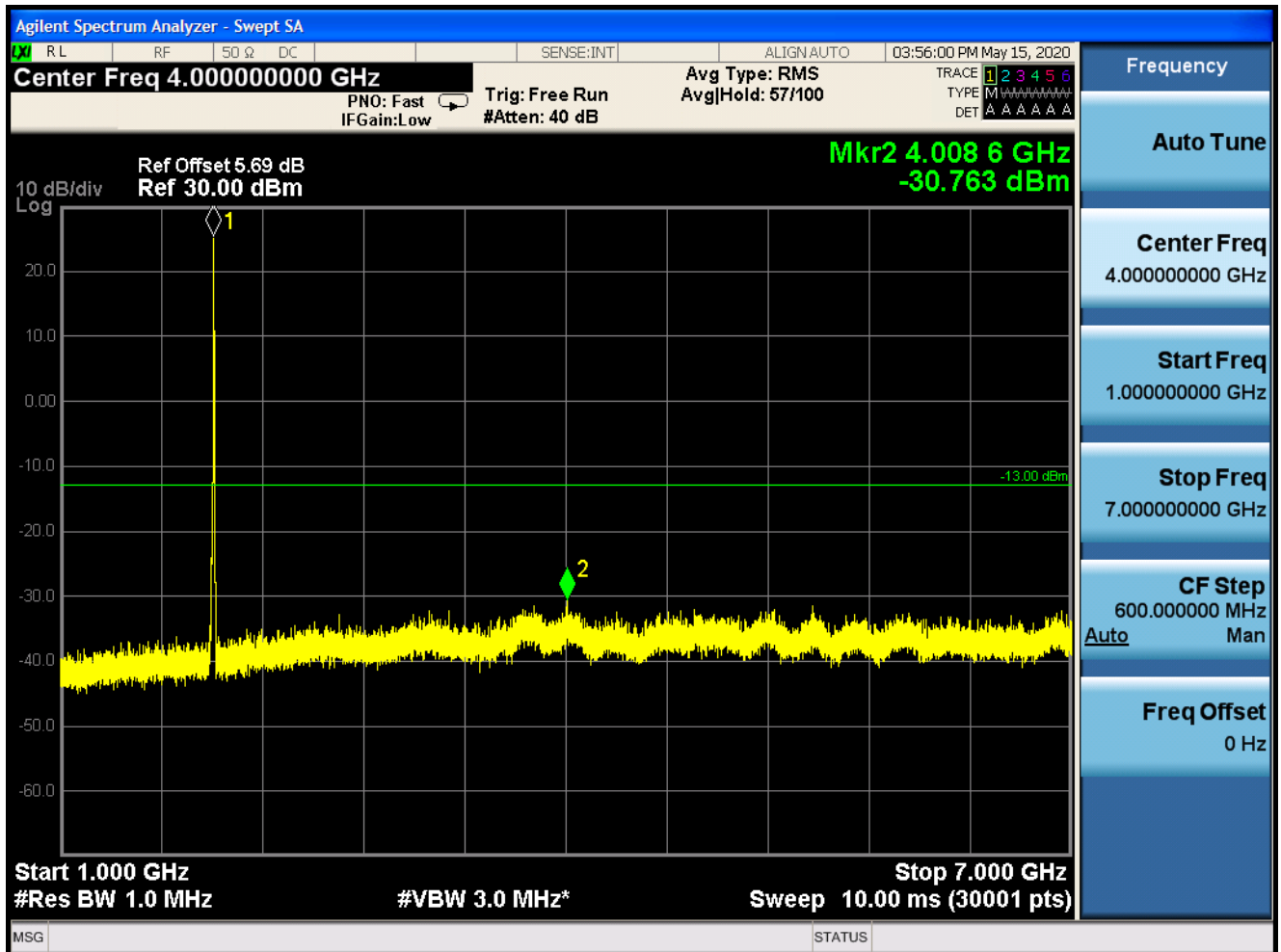


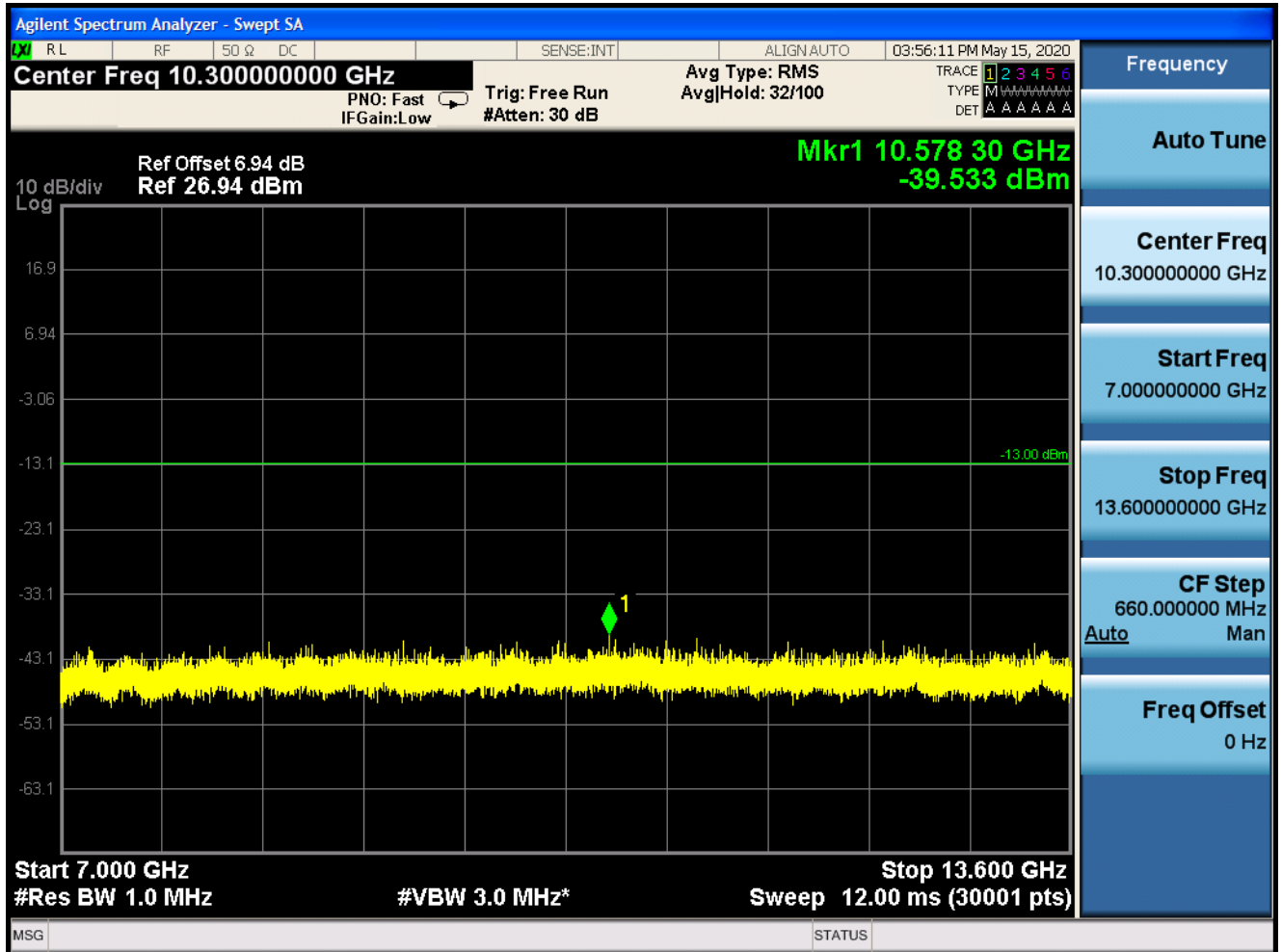
1.2.1.3 Test Channel=HCH

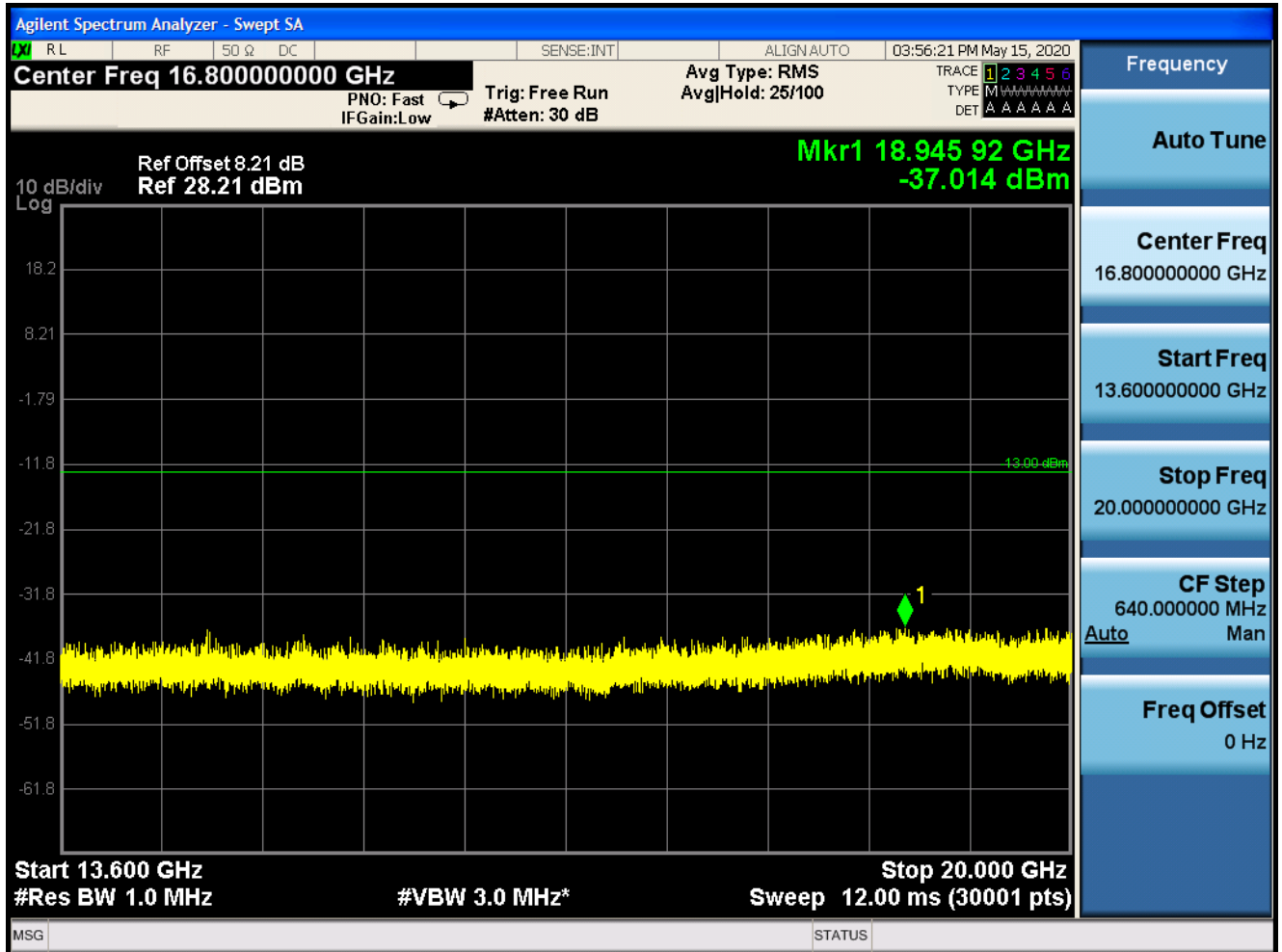












Appendix G: Field Strength of Spurious Radiation

Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	1852.4 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 2_CH9262		
Ant.Polar.:	Horizontal		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3704.800	-60.55	14.77	-45.78	-13.00	-32.78	peak
2	5557.200	-73.35	19.81	-53.54	-13.00	-40.54	peak

Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	1852.4 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 2_CH9262		
Ant.Polar.:	Vertical		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3704.800	-62.71	14.77	-47.94	-13.00	-34.94	peak
2	5557.200	-73.57	19.81	-53.76	-13.00	-40.76	peak



Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	1880 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 2_CH9400		
Ant.Polar.:	Horizontal		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3760.000	-63.03	14.96	-48.07	-13.00	-35.07	peak
2	5640.000	-73.58	19.98	-53.60	-13.00	-40.60	peak

Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	1880 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 2_CH9400		
Ant.Polar.:	Vertical		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3760.000	-64.89	14.96	-49.93	-13.00	-36.93	peak
2	5640.000	-73.30	19.98	-53.32	-13.00	-40.32	peak



Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	1907.6 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 2_CH9538		
Ant.Polar.:	Horizontal		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3815.200	-63.76	15.15	-48.61	-13.00	-35.61	peak
2	5722.800	-72.34	20.16	-52.18	-13.00	-39.18	peak

Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	1907.6 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 2_CH9538		
Ant.Polar.:	Vertical		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	3815.200	-65.51	15.15	-50.36	-13.00	-37.36	peak
2	5722.800	-72.71	20.16	-52.55	-13.00	-39.55	peak



Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	826.4 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 5_CH4132		
Ant.Polar.:	Horizontal		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1652.800	-56.22	7.70	-48.52	-13.00	-35.52	peak
2	2479.200	-68.98	11.38	-57.60	-13.00	-44.60	peak

Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	826.4 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 5_CH4132		
Ant.Polar.:	Vertical		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1652.800	-62.15	7.70	-54.45	-13.00	-41.45	peak
2	2479.200	-69.02	11.38	-57.64	-13.00	-44.64	peak



Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	836.6 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 5_CH4183		
Ant.Polar.:	Horizontal		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1673.200	-50.46	7.78	-42.68	-13.00	-29.68	peak
2	2509.800	-69.44	11.51	-57.93	-13.00	-44.93	peak

Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	836.6 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 5_CH4183		
Ant.Polar.:	Vertical		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1673.200	-59.09	7.78	-51.31	-13.00	-38.31	peak
2	2509.800	-63.14	11.51	-51.63	-13.00	-38.63	peak



Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	846.6 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 5_CH4233		
Ant.Polar.:	Horizontal		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1693.200	-54.02	7.85	-46.17	-13.00	-33.17	peak
2	2539.800	-70.12	11.61	-58.51	-13.00	-45.51	peak

Standard:	FCC Part 22H / 24E	Test Distance:	3 m
Test item:	Harmonic	Power:	AC 120 V/60 Hz
Frequency:	846.6 MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Mode:	3 G_BAND 5_CH4233		
Ant.Polar.:	Vertical		

No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1693.200	-58.59	7.85	-50.74	-13.00	-37.74	peak
2	2539.800	-68.31	11.61	-56.70	-13.00	-43.70	peak

Appendix H: Frequency Stability for Temperature & Voltage

Frequency Error vs. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
WCDMA850	TM1	LCH	TN	VL	3.30	0.00	±2.5	PASS
			TN	VN	0.08	0.00	±2.5	PASS
			TN	VH	2.61	0.00	±2.5	PASS
		MCH	TN	VL	-0.31	0.00	±2.5	PASS
			TN	VN	0.08	0.01	±2.5	PASS
			TN	VH	0.31	0.00	±2.5	PASS
		HCH	TN	VL	-2.18	0.00	±2.5	PASS
			TN	VN	0.08	0.00	±2.5	PASS
			TN	VH	-0.87	0.00	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
WCDMA850	TM1	LCH	TN	VL	10.35	0.01	±2.5	PASS
			TN	VN	8.39	0.00	±2.5	PASS
			TN	VH	14.88	0.01	±2.5	PASS
		MCH	TN	VL	10.59	0.01	±2.5	PASS
			TN	VN	8.39	0.01	±2.5	PASS
			TN	VH	8.26	0.00	±2.5	PASS
		HCH	TN	VL	7.97	0.00	±2.5	PASS
			TN	VN	8.39	0.00	±2.5	PASS
			TN	VH	5.00	0.00	±2.5	PASS

Frequency Error vs. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
WCDMA850	TM1	LCH	VN	-30	2.73	0.00	±2.5	PASS
			VN	-20	2.01	0.00	±2.5	PASS
			VN	-10	2.56	0.00	±2.5	PASS
			VN	0	2.24	0.00	±2.5	PASS
			VN	10	2.94	0.00	±2.5	PASS
			VN	20	2.96	0.00	±2.5	PASS
			VN	30	2.88	0.00	±2.5	PASS
			VN	40	3.14	0.00	±2.5	PASS
			VN	50	0.56	0.00	±2.5	PASS
WCDMA850	TM1	MCH	VN	-30	-1.21	0.00	±2.5	PASS
			VN	-20	-1.83	0.00	±2.5	PASS
			VN	-10	-2.73	0.00	±2.5	PASS
			VN	0	-0.18	0.00	±2.5	PASS
			VN	10	-1.08	0.00	±2.5	PASS
			VN	20	-0.47	0.00	±2.5	PASS
			VN	30	-0.34	0.00	±2.5	PASS
			VN	40	-1.79	0.00	±2.5	PASS
			VN	50	1.08	0.00	±2.5	PASS
WCDMA850	TM1	HCH	VN	-30	-2.99	0.00	±2.5	PASS
			VN	-20	-1.92	0.00	±2.5	PASS
			VN	-10	-1.83	0.00	±2.5	PASS
			VN	0	-1.65	0.00	±2.5	PASS
			VN	10	-4.07	0.00	±2.5	PASS
			VN	20	-1.46	0.00	±2.5	PASS
			VN	30	-4.53	-0.01	±2.5	PASS
			VN	40	-0.31	0.00	±2.5	PASS
			VN	50	1.88	0.00	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
WCDMA1900	TM1	LCH	VN	-30	12.45	0.01	±2.5	PASS
			VN	-20	10.71	0.01	±2.5	PASS
			VN	-10	11.18	0.01	±2.5	PASS
			VN	0	10.44	0.01	±2.5	PASS
			VN	10	6.20	0.00	±2.5	PASS
			VN	20	9.64	0.01	±2.5	PASS
			VN	30	11.76	0.01	±2.5	PASS
			VN	40	9.90	0.01	±2.5	PASS
			VN	50	5.91	0.00	±2.5	PASS
WCDMA1900	TM1	MCH	VN	-30	9.02	0.00	±2.5	PASS
			VN	-20	7.26	0.00	±2.5	PASS
			VN	-10	10.15	0.01	±2.5	PASS
			VN	0	9.25	0.00	±2.5	PASS
			VN	10	6.77	0.00	±2.5	PASS
			VN	20	10.62	0.01	±2.5	PASS
			VN	30	10.21	0.01	±2.5	PASS
			VN	40	11.02	0.01	±2.5	PASS
			VN	50	6.77	0.00	±2.5	PASS
WCDMA1900	TM1	HCH	VN	-30	6.23	0.00	±2.5	PASS
			VN	-20	9.40	0.00	±2.5	PASS
			VN	-10	4.73	0.00	±2.5	PASS
			VN	0	8.01	0.00	±2.5	PASS
			VN	10	4.76	0.00	±2.5	PASS
			VN	20	8.80	0.00	±2.5	PASS
			VN	30	8.93	0.00	±2.5	PASS
			VN	40	6.87	0.00	±2.5	PASS
			VN	50	7.06	0.00	±2.5	PASS

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