S T S LAB

FCC TEST REPORT

Report No:STS2003236W21

Issued for

Shanghai Unihertz E-Commerce Co., Ltd

Room 302, No. 5, Lane 59, Shennan Rd, Minhang district, Shanghai, China 201108

Product Name:	Smart phone
Brand Name:	Unihertz
Model Name:	Atom XL
Series Model:	N/A
FCC ID:	2AK6CATOMXL
Test Standard:	FCC Part 90 Rules

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Shenzhen STS Test Services Co., Ltd.
A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ,
Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China
TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com

TESTING CONSULTING SOLUTION CERTIFICATION APPROVAL

TEST RESULT CERTIFICATION

Applicant's Name .....: Shanghai Unihertz E-Commerce Co., Ltd

Address .....: Room 302, No. 5, Lane 59, Shennan Rd, Minhang district, Shanghai, China 201108

Manufacture's Name .....: OBLUE Communication Technology Co.,Ltd.

Address .....: 7th floor, building B, dayou industrial and trade industrial park, heping yonghe road,fuyong street,baoan district, Shenzhen, China

Product Description

Product Name .....: Smart phone

Brand Name .....: Unihertz

Model Name.....: Atom XL

Series Model .....: N/A

Test Standards .....: FCC Part 90 Rules

Test Procedure.....: C63.26-2015

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test .....:

Date of receipt of test item .....: 19 Mar. 2020

Date of performance of tests..: 19 Mar. 2020 ~ 27 May 2020

Date of Issue .....: 27 May 2020

Test Result .....: Pass

Testing Engineer : Chris chen

(Chris chen)

Technical Manager : Sean She

(Sean she)

Authorized Signatory : Vita Li

(Vita Li)

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	27 May 2020	STS2003236W21	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

Emission			
Standard	Item	Result	Remarks
FCC Part 90.205	Maximum Effective Radiated Power	PASS	
FCC Part 90.209	Occupied Bandwidth	PASS	
FCC Part 90.210	Emission Mask	PASS	
FCC Part 90.210	Transmitter Radiated Spurious Emssion	PASS	
FCC Part 90.210	Spurious Emssion on Antenna Port	PASS	
FCC Part 90.213	Frequency Stability Test	PASS	
FCC Part 90.210	Transmitter Frequency Behavior	PASS	
FCC Part 2.1047	Modulation Characteristic	PASS	

NOTE:

(1) “N/A” denotes test is not applicable in this Test Report.

1.1 TEST FACILITY

SHENZHEN STS TEST SERVICES CO., LTD
Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China
FCC test Firm Registration Number: 625569
IC test Firm Registration Number: 12108A
A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	RF output power, conducted	±0.68dB
2	Unwanted Emissions, conducted	±2.988dB
3	All emissions, radiated 30-1GHz	±6.7dB
4	All emissions, radiated 1G-6GHz	±5.5dB
5	All emissions, radiated>6G	±5.8dB
6	Conducted Emission (9KHz-150KHz)	±4.43dB
7	Conducted Emission (150KHz-30MHz)	±5dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Smart phone
Brand Name:	Unihertz
Model Name:	Atom XL
Series Model:	N/A
Model Difference description:	N/A
Operation Frequency Range	Frequency Range: 450.0125MHz ~ 469.9875MHz
Maximum Transmitter Power:	32.616dBm
Channel Separation:	12.5KHz
Modulation type:	Analogue mode: FM Digital mode: 4FSK
Adapter:	Input: 100-240V~50/60Hz 0.6A Output: 3.6-6V ⎓ 3A 6-9V ⎓ 2.0A 9-12V ⎓ 1.5A
Battery：	Rated Voltage: 3.85V Charge Limit: 4.4V Capacity: 4260mAh
Temperature Range:	-30℃-50℃
Test frequency list:	See Note 3
Software version number:	G63_V2.0
Hardware version number:	Unihertz_Atom_XL_20200312

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	Unihertz	Atom XL	External	N/A	0dBi	Antenna

The EUT antenna is External Antenna. No antenna other than that furnished by the responsible party shall be used with the device.

3. Test frequency list

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	450.0125	…	…	…	…
02	450.0250	…	…	…	…
03	450.0375	…	…	…	…
…	…	799	459.9875	…	…
…	…	800	460.0000	…	…
…	…	801	460.0125	1597	469.9625
…	…	…	…	1598	469.9750
…	…	…	…	1599	469.9875

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test,please see the above listed frequency for testing.

2.2 EUT OPERATION MODE

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

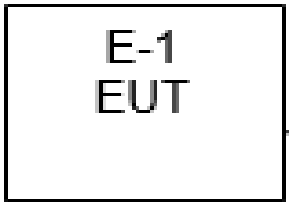
2.3 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

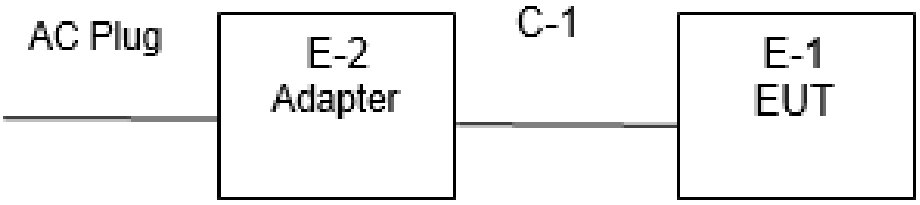
Test Mode	Power level	Modulation Type	Channel Separation	Frenquency
Mode1	Low power	FM	12.5kHz	Low channel(450.0125MHz)
				Mid channel(460.0000MHz)
				High channel(469.9875MHz)
Mode2	High power			Low channel(450.0125MHz)
				Mid channel(460.0000MHz)
				High channel(469.9875MHz)
Mode3	Low power	4FSK		Low channel(450.0125MHz)
				Mid channel(460.0000MHz)
				High channel(469.9875MHz)
Mode4	High power			Low channel(450.0125MHz)
				Mid channel(460.0000MHz)
				High channel(469.9875MHz)

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Emission Test



2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-2	Adapter	Unihertz	TPA-10120150UU	N/A	N/A
C-1	DC Cable	N/A	150cm	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

2.7 TEST EQUIPMENT

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Signal Analyzer	Agilent	N9020A	MY51110105	2020.03.05	2021.03.04
Signal Generator	Agilent	N5182A	MY46240556	2019.10.09	2020.10.08
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2020.11.01
Horn Antenna	SCHWARZBECK	BBHA 9120D(1201)	9120D-1343	2018.10.19	2021.10.18
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2019.10.09	2020.10.08
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2019.10.12	2020.10.11
Pre-Amplifier (18G-40G)	SKET	LNPA_1840-50	SK2018101801	2019.10.22	2020.10.21
Attenuator	HP	8494B	DC-18G	2020.04.30	2021.04.29
programmable power supply	Agilent	E3642A	MY40002025	2019.10.11	2020.10.10
AC Power Source	APC	KDF-11010G	F214050035	N.C.R	N.C.R
Audio analyzer	R&S	UPL	100689	2020.03.05	2021.03.04

3. MAXIMUM EFFECTIVE RADIATED POWER

3.1 LIMITS

Per FCC Part 2.1046 and Part 90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List [available in accordance with §90.203(a)(1)] for transmitters included in this list or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

3.2 TEST PROCEDURE

The procedure of conducted power is as follows:
Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted bellow:
If the power output is adjustable, measurements shall be made for the highest and lowest power levels. The EUT connect to the Spectrum Analyzer through 30 dB attenuator.

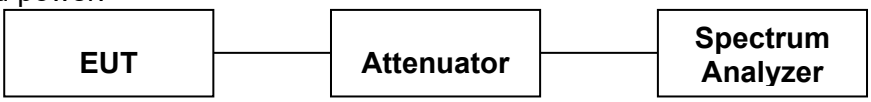
The procedure of effective radiated power is as follows:
a) Pre-calibration With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as, RSE=Rx（dBuV）+CL（dB）+SA（dB）+Gain（dBi）-107（dBuV to dBm）The SA is calibrated using following setup.
b) EUT was placed on a 1.5m non-conductive stand at a 3 m test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 m from the test item for emission measurements. The height of receiving antenna is 0.8m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the test item and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic measured with peak detector and 1MHz bandwidth.
Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of any band into any of the other blocks.
The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the ARpl is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss. The measurement results are obtained as described below: Power=PMea+ARpl

3.3 DEVIATION FROM TEST STANDARD

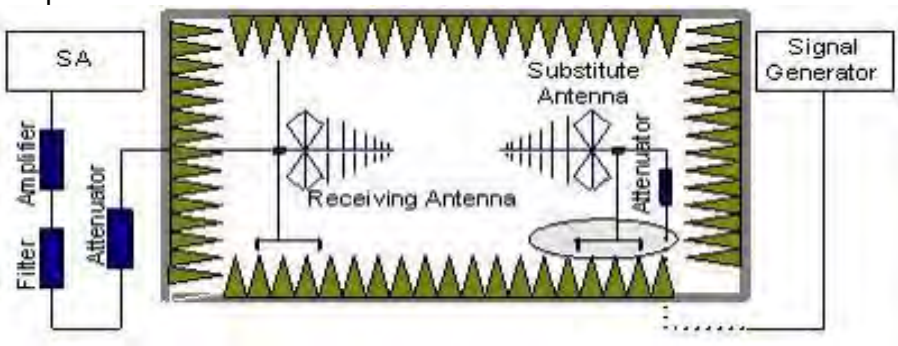
No deviation

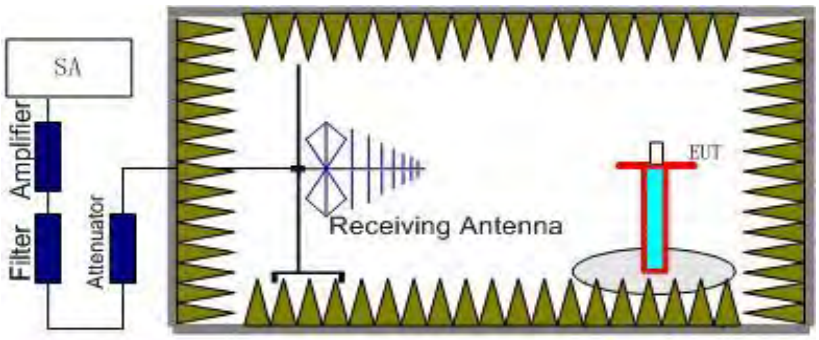
3.4 TEST SETUP BLOCK DIAGRAM

Conducted power:



Effective radiated power:





3.5 TEST RESULT

Conducted Power:

Modulation Type	Channel Sparation	Operation Mode	Test Channel	Test Frequency (MHz)	Test Results (dBm)	Test Results (W)
FM	12.5KHz	Low Power	CH1	450.0125	27.615	0.58
			CH800	460.0000	27.701	0.59
			CH1599	469.9875	27.742	0.59
		High Power	CH1	450.0125	32.162	1.65
			CH800	460.0000	32.152	1.64
			CH1599	469.9875	32.033	1.60

Modulation Type	Channel Sparation	Operation Mode	Test Channel	Test Frequency (MHz)	Test Results (dBm)	Test Results (W)
4FSK	12.5KHz	Low Power	CH1	450.0125	27.703	0.59
			CH800	460.0000	27.732	0.59
			CH1599	469.9875	27.740	0.59
		High Power	CH1	450.0125	32.616	1.83
			CH800	460.0000	32.190	1.66
			CH1599	469.9875	32.069	1.61

Effective radiated power:

Low Power

Operation Mode	Freq (MHz)	Channel	Antenna	Reading (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)
FM	450.0125	CH1	V	24.91	1.43	6.20	27.53	26.02-27.78
			H	24.93	1.43	6.20	27.55	26.02-27.78
	460.0000	CH800	V	25.00	1.49	6.00	27.36	26.02-27.78
			H	25.05	1.49	6.00	27.41	26.02-27.78
	469.9875	CH1599	V	25.17	1.51	6.00	27.51	26.02-27.78
			H	25.14	1.51	6.00	27.48	26.02-27.78
Note:ERP=Reading - Cable loss + Antenna Gain - 2.15								

High Power

Operation Mode	Freq (MHz)	Channel	Antenna	Reading (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)
FM	450.0125	CH1	V	29.50	1.43	6.20	32.12	32.04-33.8
			H	29.46	1.43	6.20	32.08	32.04-33.8
	460.0000	CH800	V	29.77	1.49	6.00	32.13	32.04-33.8
			H	29.75	1.49	6.00	32.11	32.04-33.8
	469.9875	CH1599	V	29.61	1.51	6.00	31.95	32.04-33.8
			H	29.65	1.51	6.00	31.99	32.04-33.8
Note:ERP=Reading - Cable loss + Antenna Gain - 2.15								

Low Power

Operation Mode	Freq (MHz)	Channel	Antenna	Reading (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)
4FSK	450.0125	CH1	V	24.89	1.43	6.20	27.51	26.02-27.78
			H	24.86	1.43	6.20	27.48	26.02-27.78
	460.0000	CH800	V	24.90	1.49	6.00	27.26	26.02-27.78
			H	24.95	1.49	6.00	27.31	26.02-27.78
	469.9875	CH1599	V	24.94	1.51	6.00	27.28	26.02-27.78
			H	24.98	1.51	6.00	27.32	26.02-27.78
Note:ERP=Reading - Cable loss + Antenna Gain - 2.15								

High Power

Operation Mode	Freq (MHz)	Channel	Antenna	Reading (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)
4FSK	450.0125	CH1	V	29.95	1.43	6.20	32.57	32.04-33.8
			H	29.98	1.43	6.20	32.60	32.04-33.8
	460.0000	CH800	V	29.78	1.49	6.00	32.14	32.04-33.8
			H	29.80	1.49	6.00	32.16	32.04-33.8
	469.9875	CH1599	V	29.68	1.51	6.00	32.02	32.04-33.8
			H	29.66	1.51	6.00	32.00	32.04-33.8
Note:ERP=Reading - Cable loss + Antenna Gain - 2.15								

Note: The rated low power is 0.5W, the power limits is 0.4W~0.6W.
The rated high power is 2W, the power limits is 1.6W~2.4W.

4. OCCUPIED BANDWIDTH

4.1 LIMIT

Occupied Bandwidth: The EUT was connected to the spectrum analyzer via the main RF connector, and through an appropriate attenuator. The EUT was controlled to transmit its maximum power. Then the bandwidth of 99% power can be measured by the spectrum analyzer. The maximum authorized bandwidth shall not be more than that normally authorized for digital data mode.

4.2 MEASUREMENT PROCEDURE

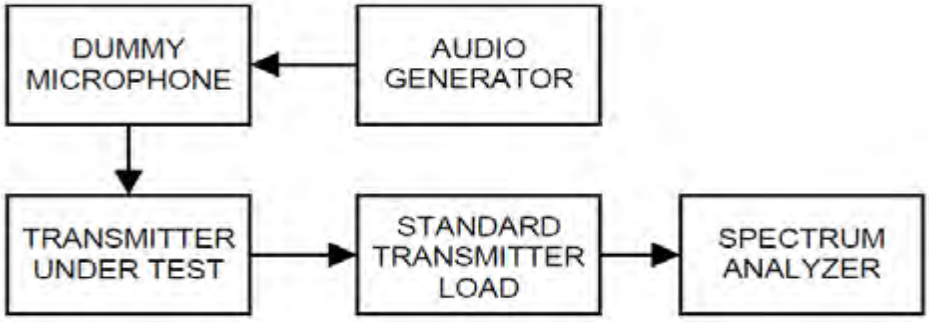
a. The EUT was connected to the spectrum analyzer through sufficent attenuation.

b. Set EUT as digital data mode.

c. Set SPA Center Frequency=fundamental frequency, RBW=300Hz, VBW=3KHz, span =15KHz or 30KHz.

e Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth.

4.3 TEST SETUP BLOCK DIAGRAM

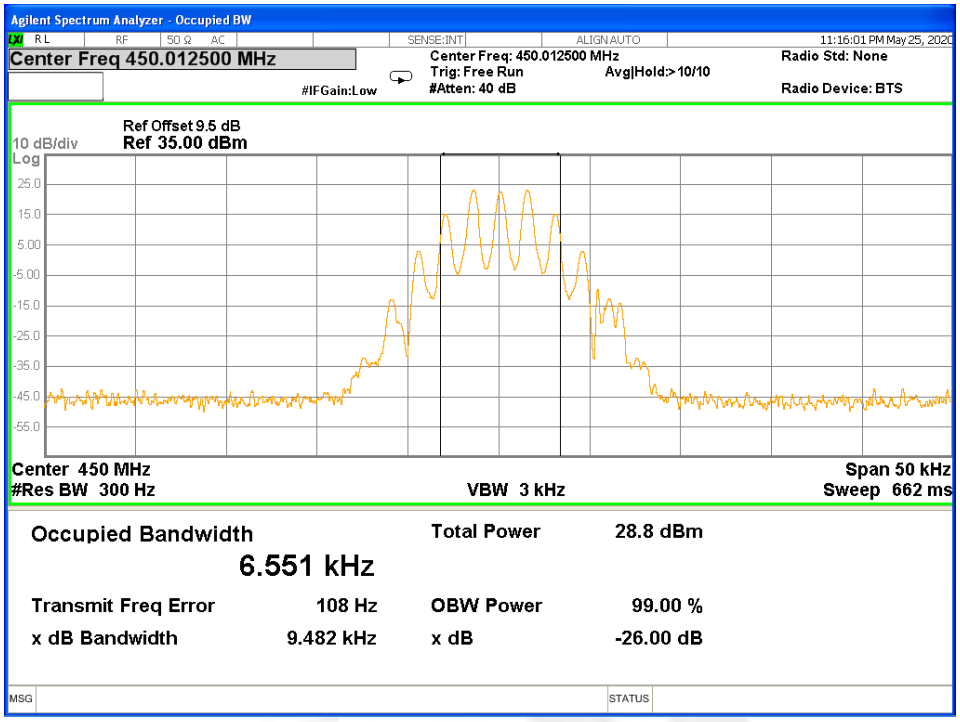


4.4 TEST RESULT

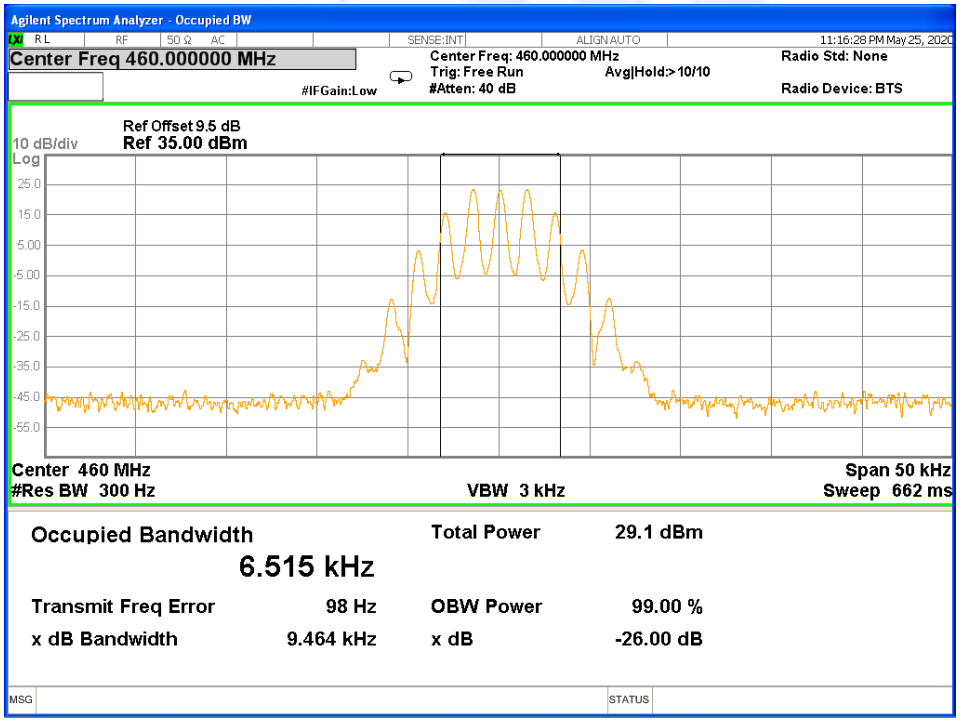
Modulation Type	Channel Sparation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)	
					99%	26dB
FM	12.5KHz	Low Power	CH1	450.0125	6.551	9.482
			CH800	460.0000	6.515	9.464
			CH1599	469.9875	6.547	9.48
		High Power	CH1	450.0125	6.545	9.494
			CH800	460.0000	6.512	9.468
			CH1599	469.9875	6.554	9.479

Modulation Type	Channel Sparation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)	
					99%	26dB
4FSK	12.5KHz	Low Power	CH1	450.0125	6.357	9.255
			CH800	460.0000	6.686	9.326
			CH1599	469.9875	6.442	8.644
		High Power	CH1	450.0125	6.492	9.209
			CH800	460.0000	6.805	9.174
			CH1599	469.9875	6.591	9.298

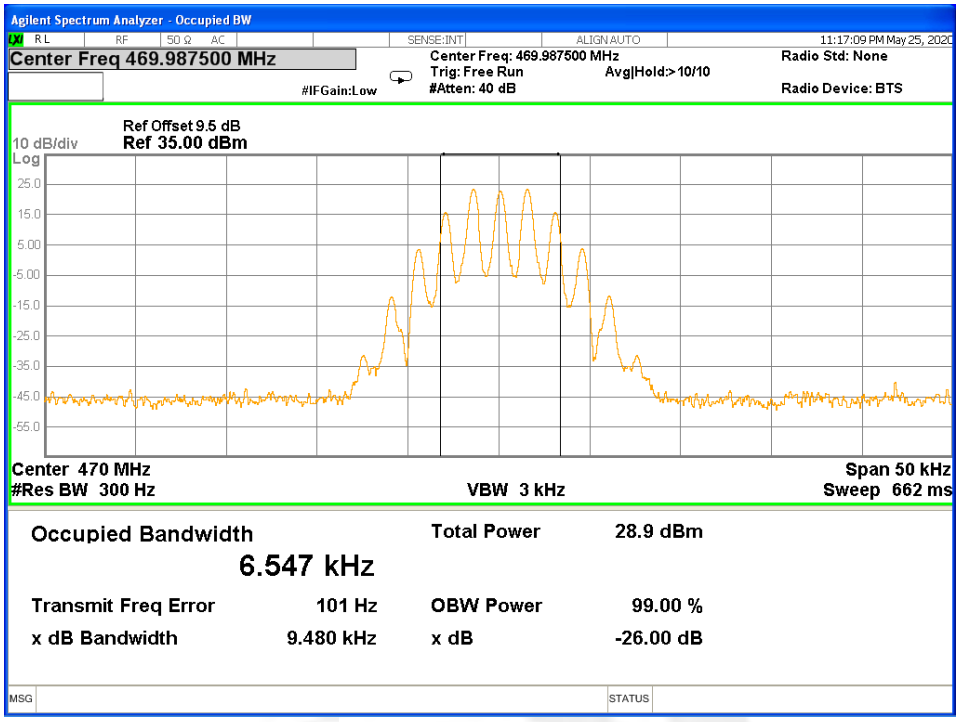
CH 1 Model 1



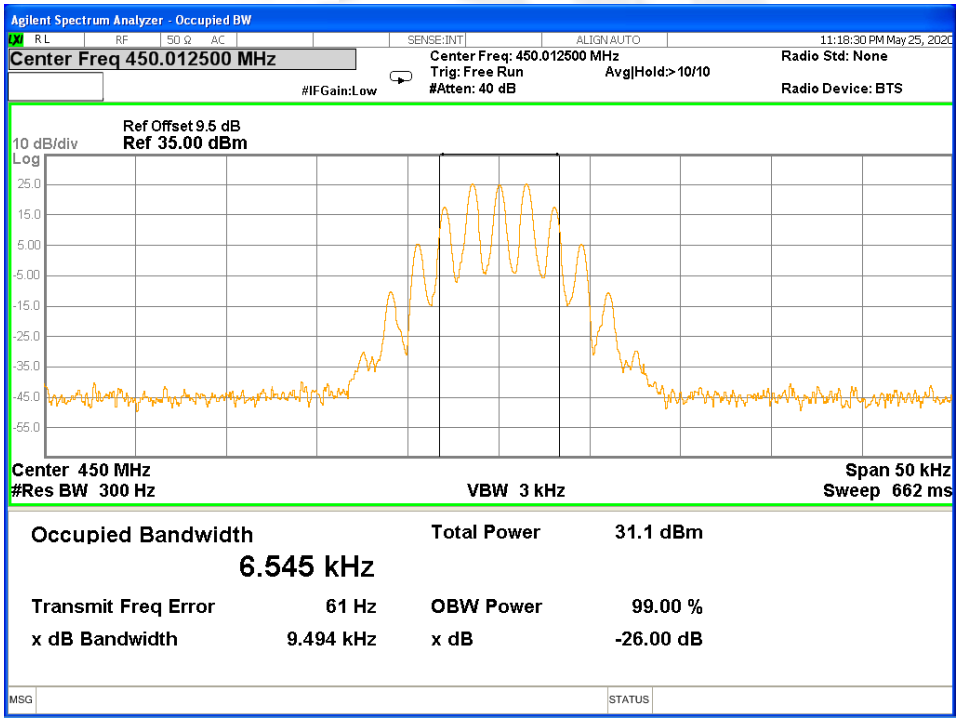
CH 800 Model 1



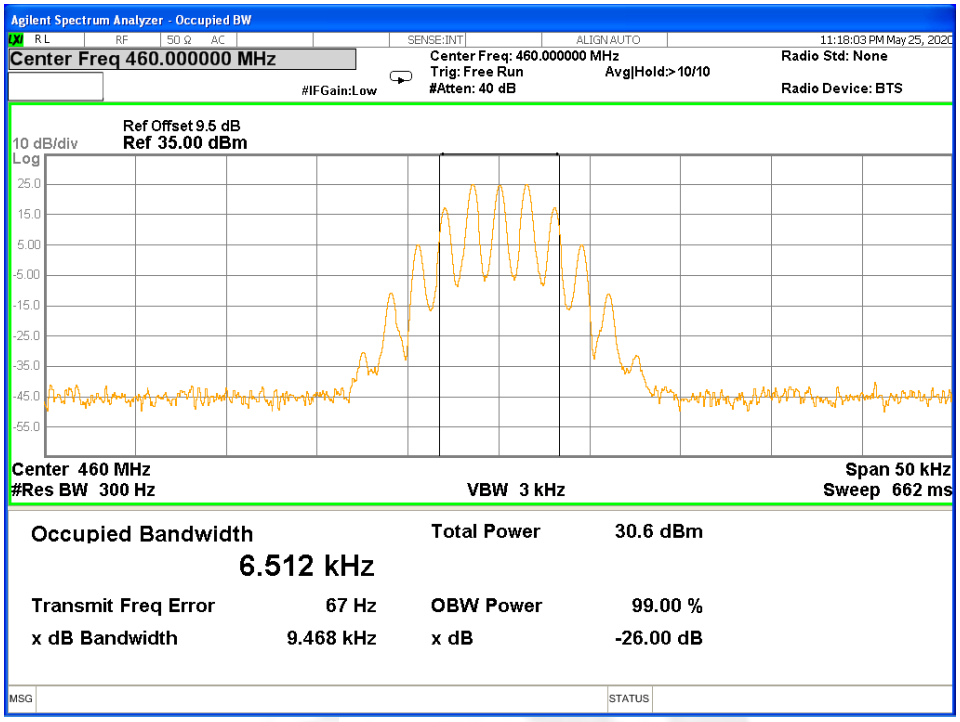
CH 1599 Model 1



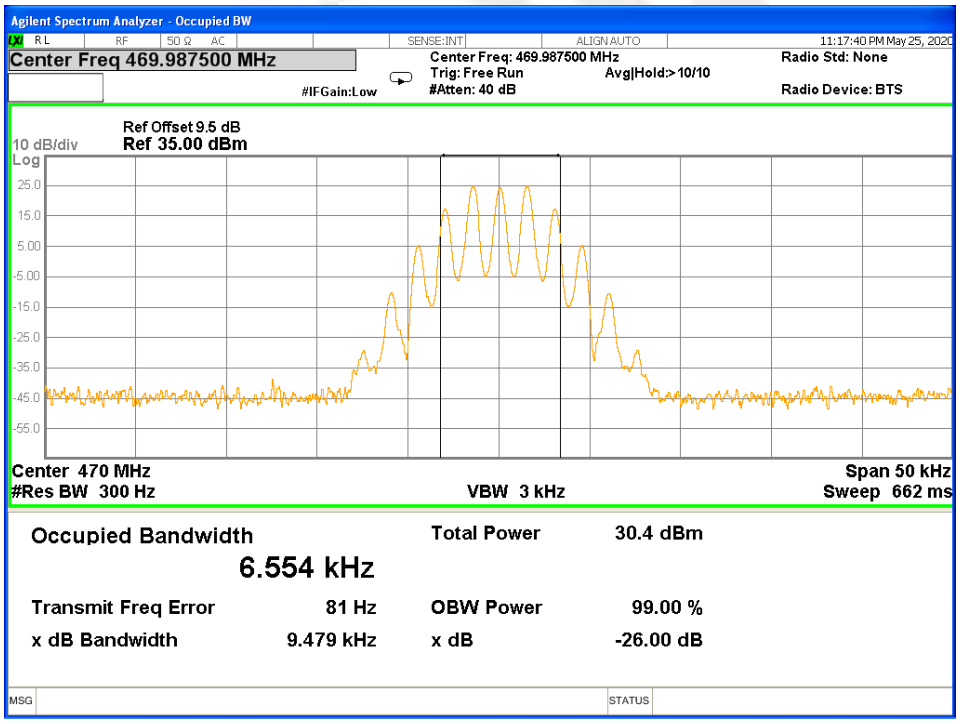
CH 1 Model 2



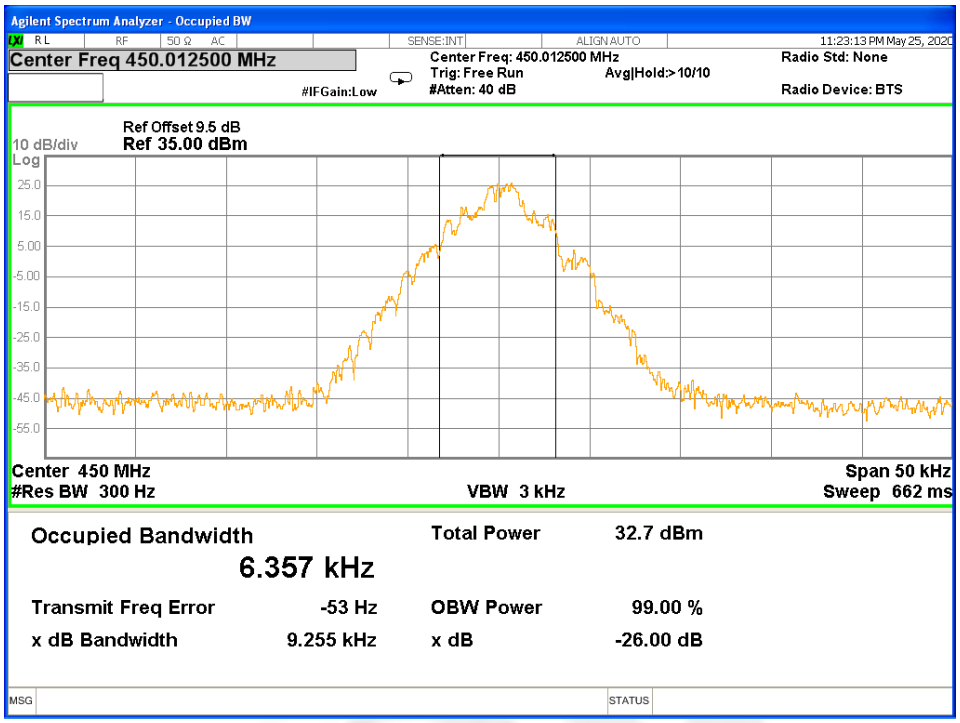
CH 800 Model 2



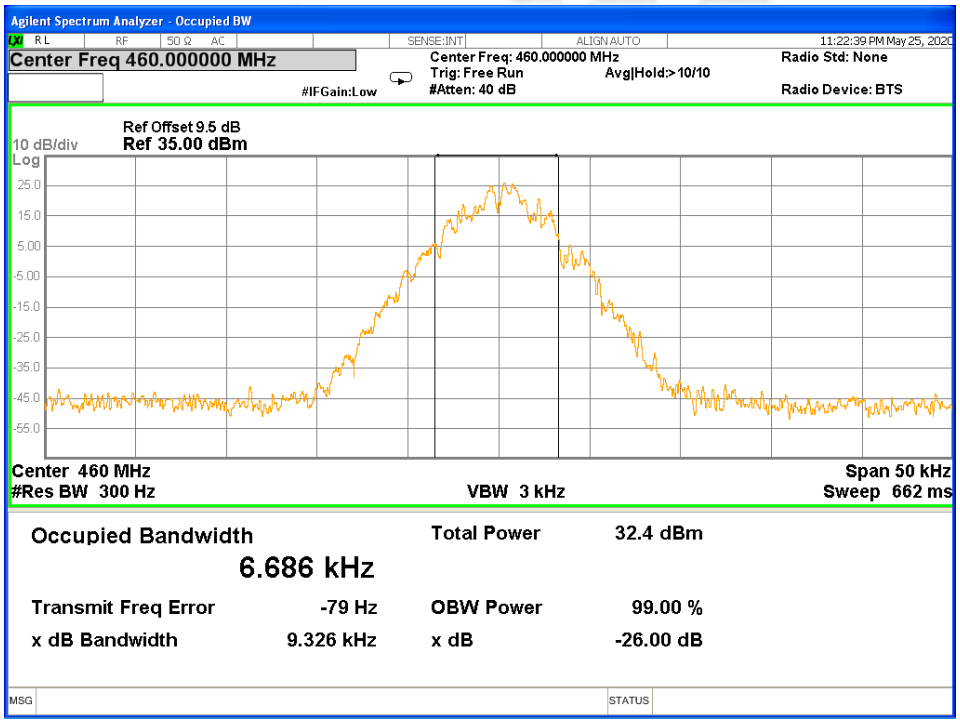
CH 1599 Model 2



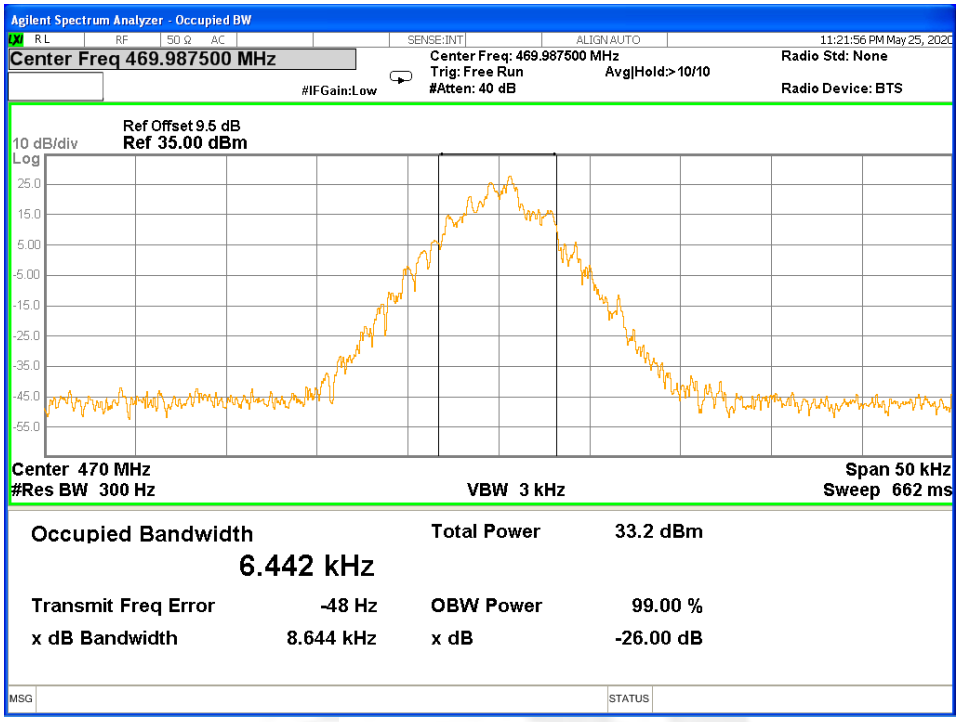
CH 1 Model 3



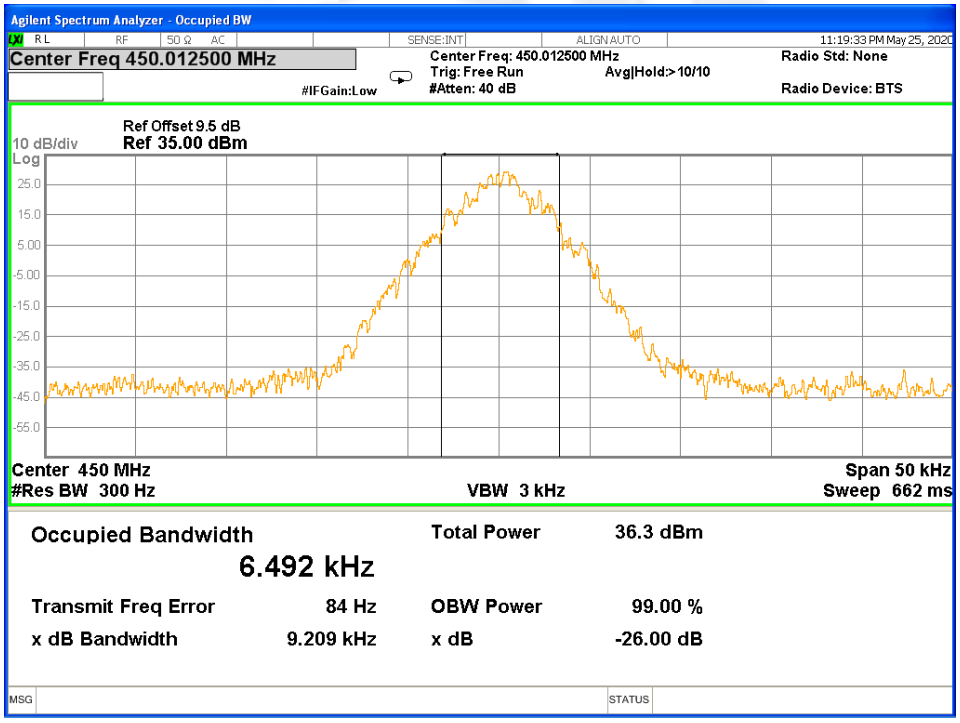
CH 800 Model 3



CH 1599 Model 3



CH 1 Model 4



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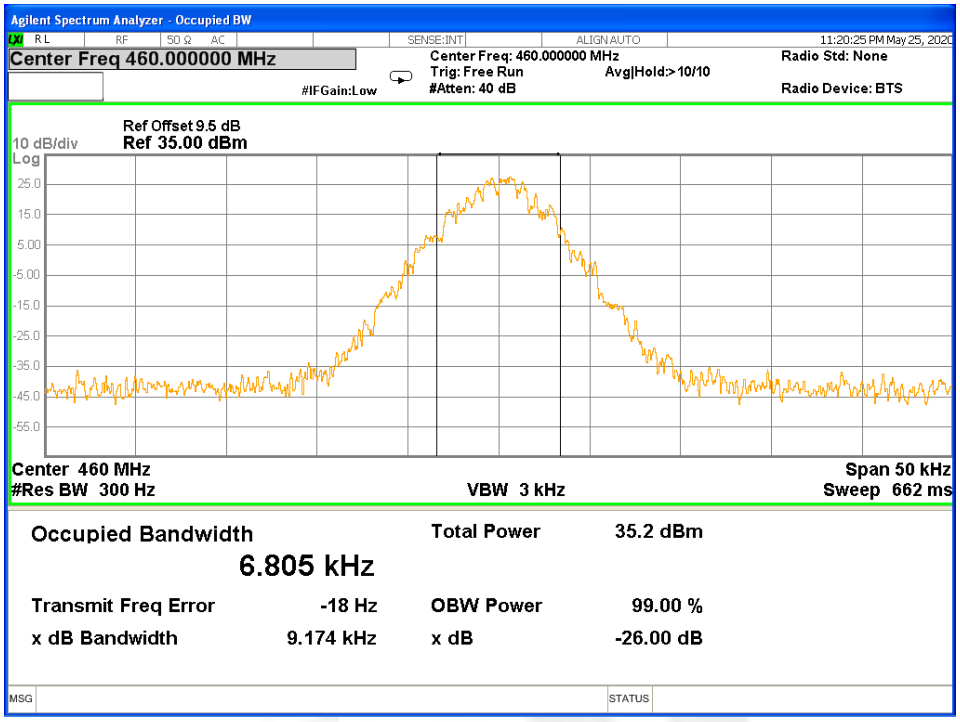
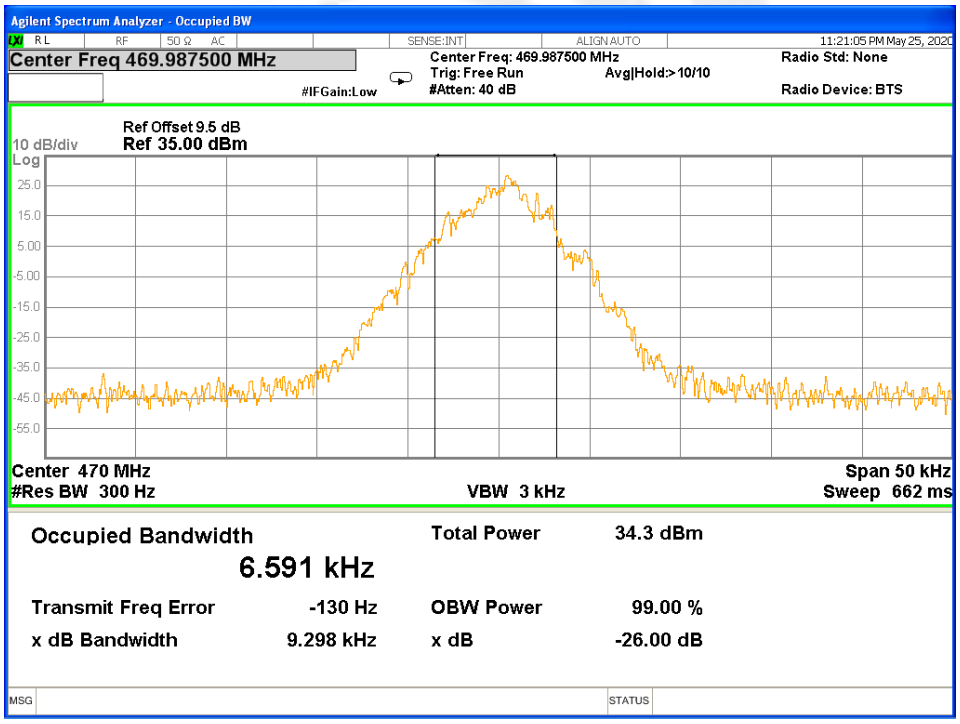


CH 1599 Model 4



5. EMISSION MASK

5.1 PROVISIONS APPLICABLE

(h) Emission Mask H. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least 107 log (f_d/4) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least 40.5 log (f_d/1.16) dB;

(4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least 116 log (f_d/6.1) dB;

(5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least 43 + 10 log (P) dB.

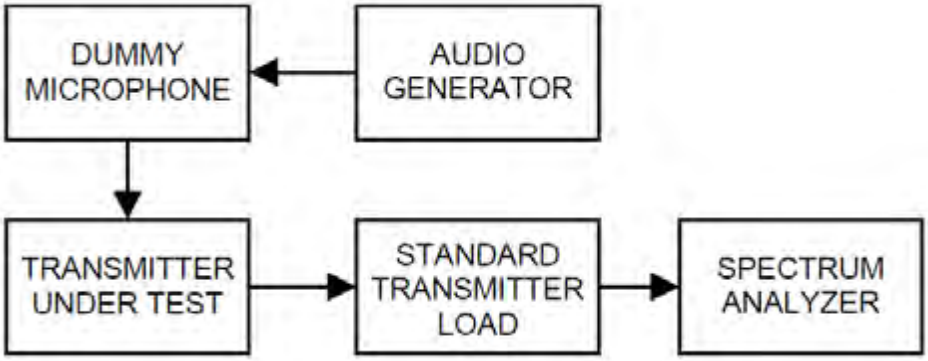
5.2 MEASUREMENT PROCEDURE

a. The EUT was connected to the spectrum analyzer through sufficent attenuation.

b. Set EUT as digital data mode.

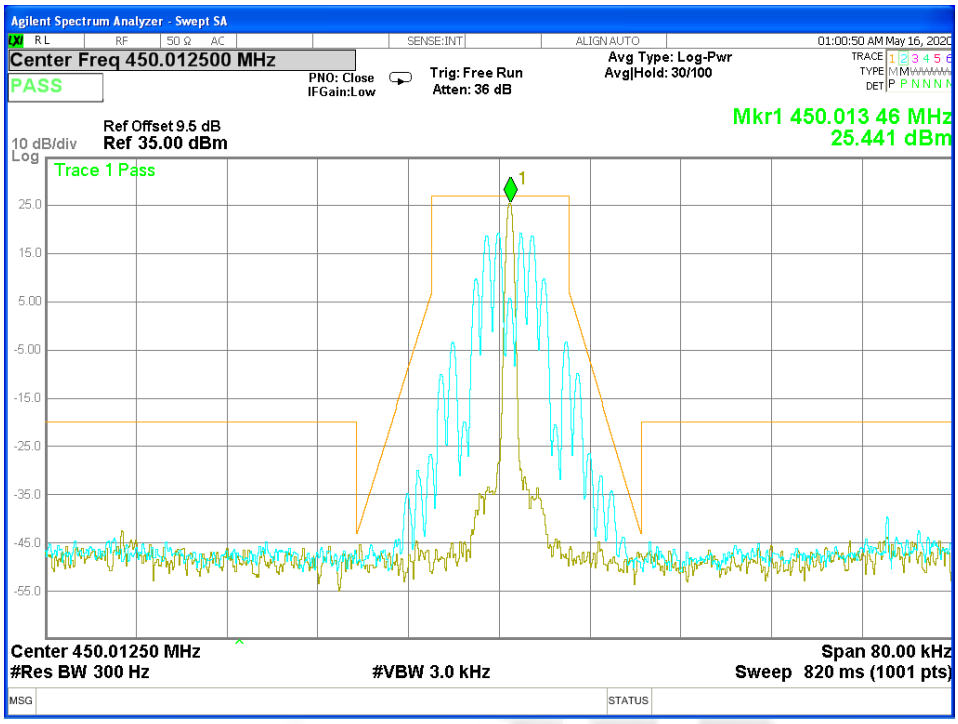
c Set SPA Center Frequency=fundamental frequency, RBW=1kHz, VBW=3KHz, span =100KHz.

5.3 TEST SETUP BLOCK DIAGRAM

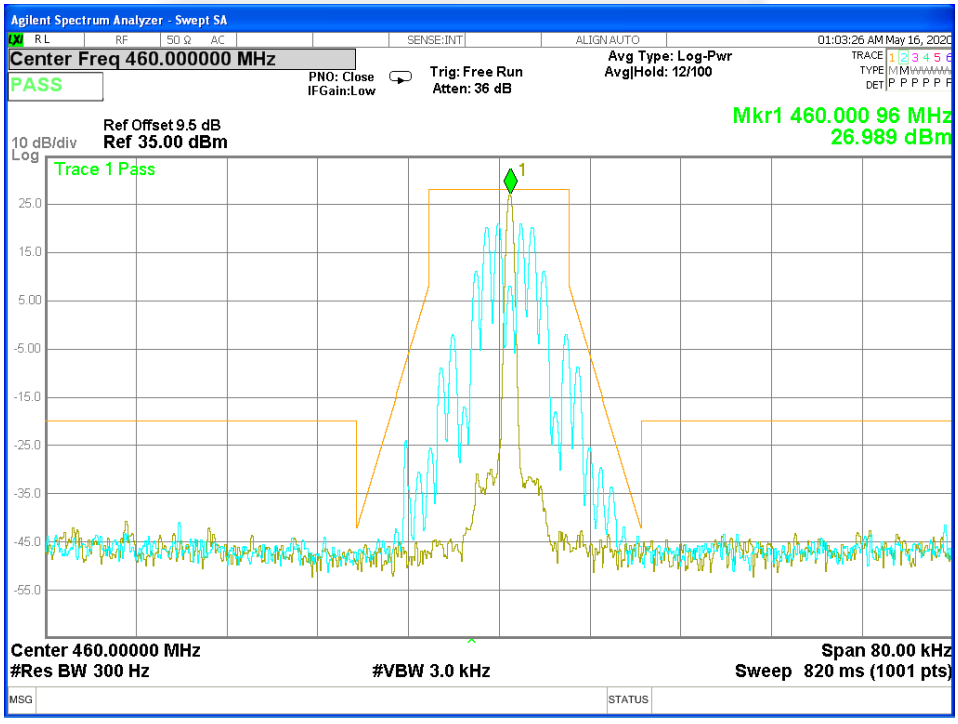


5.4 MEASUREMENT RESULT

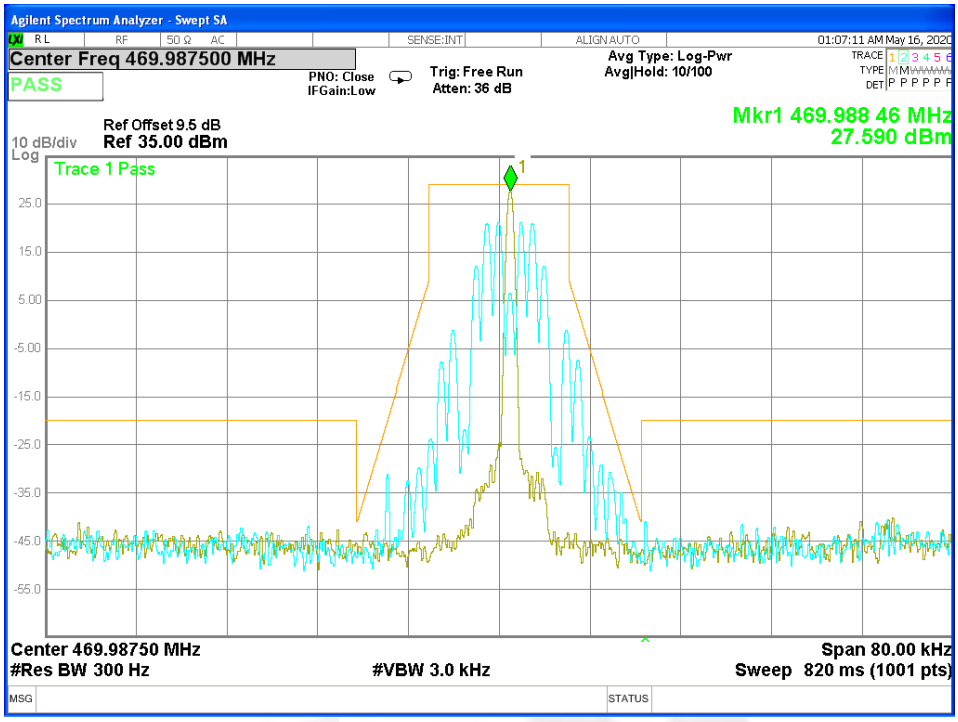
CH 1 Model 1



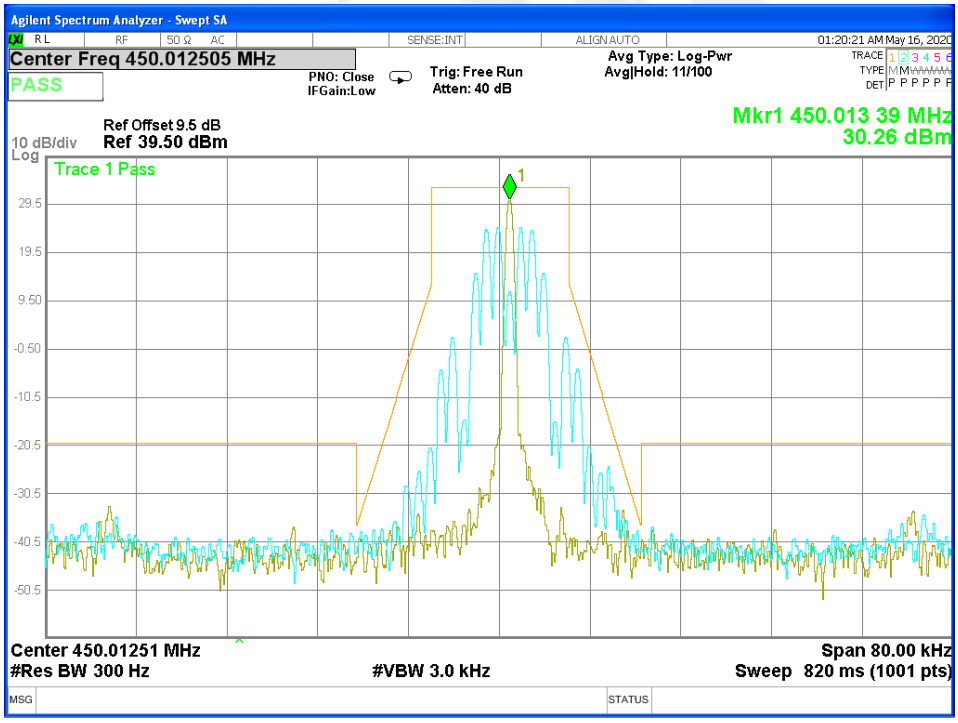
CH 800 Model 1



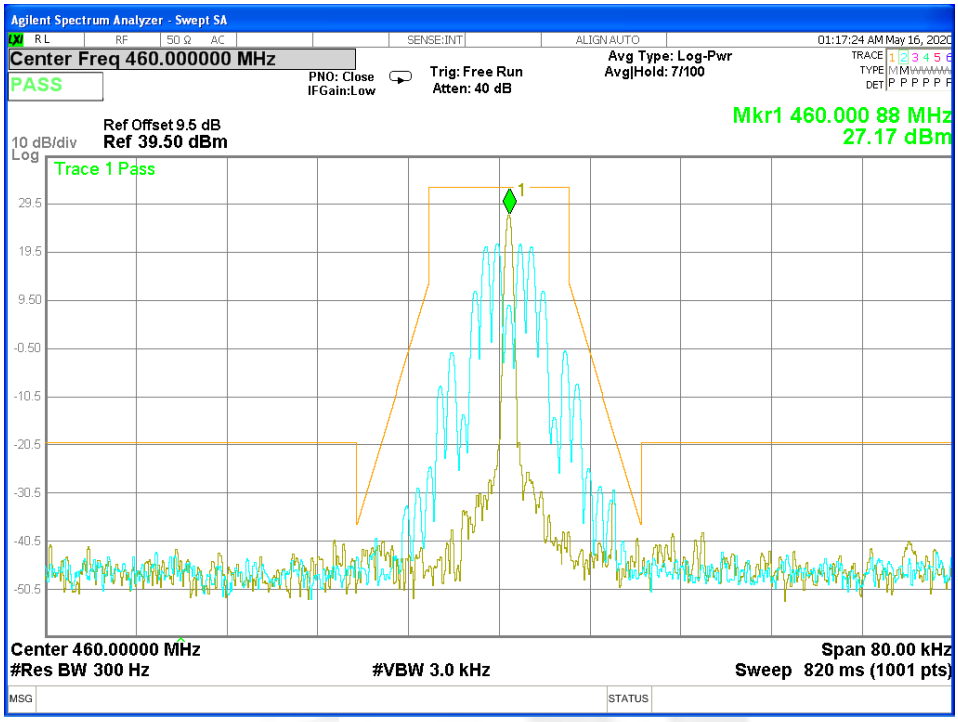
CH 1599 Model 1



CH 1 Model 2



CH 800 Model 2



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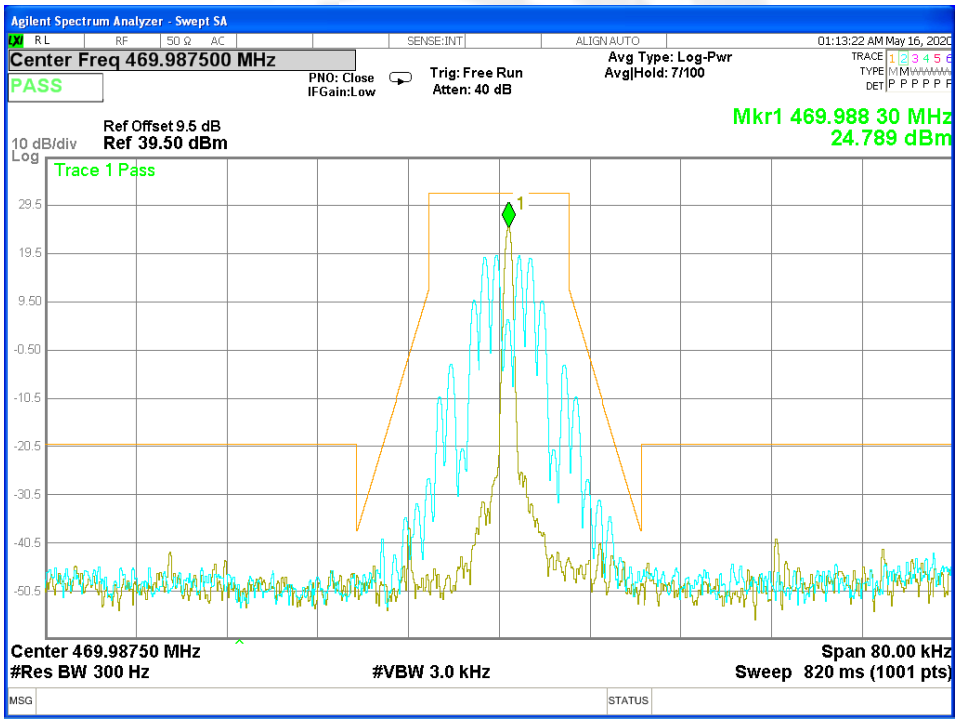
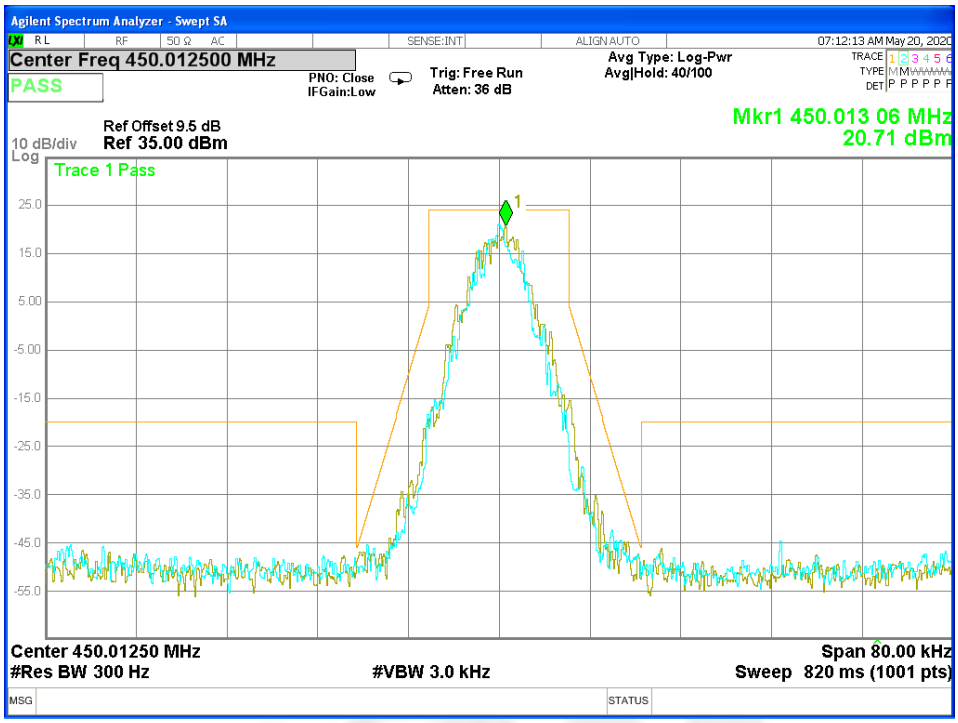
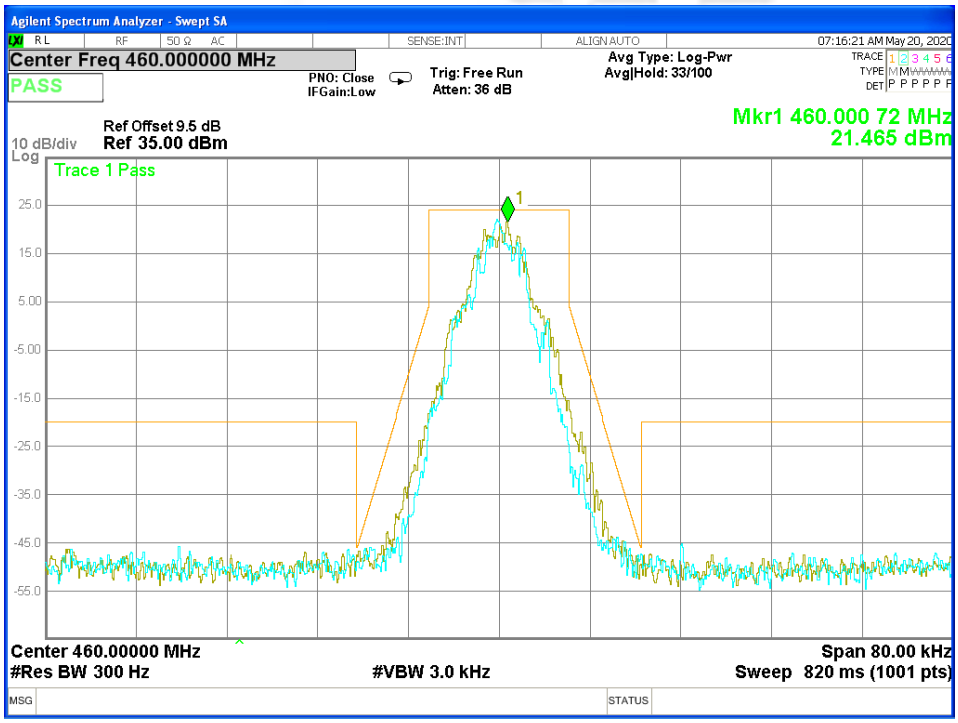


CH 1 Model 3



CH 800 Model 3



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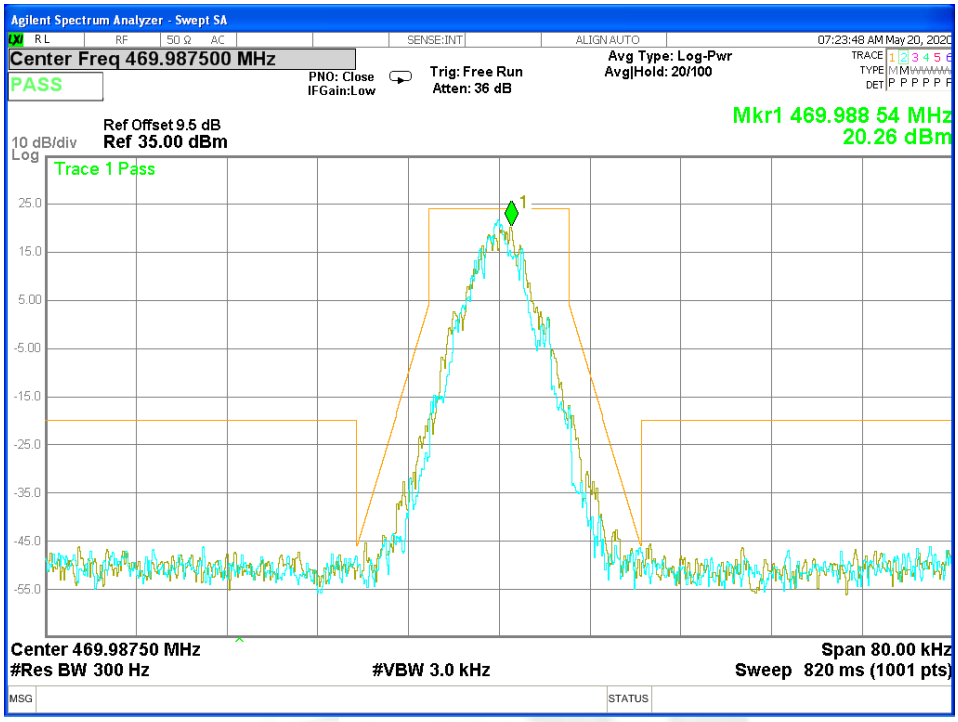
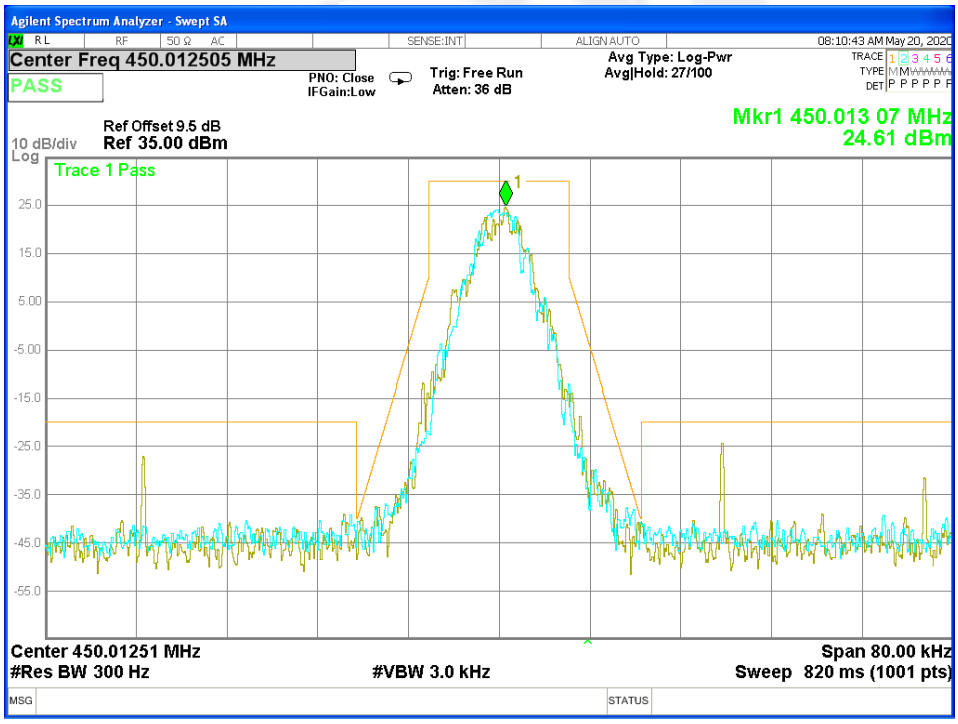
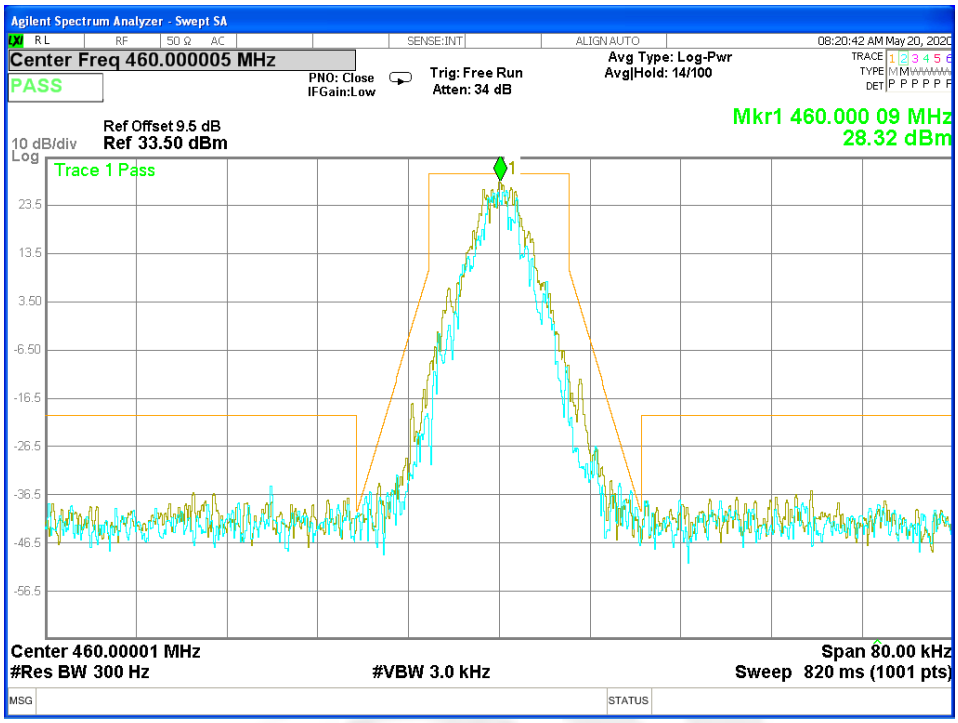


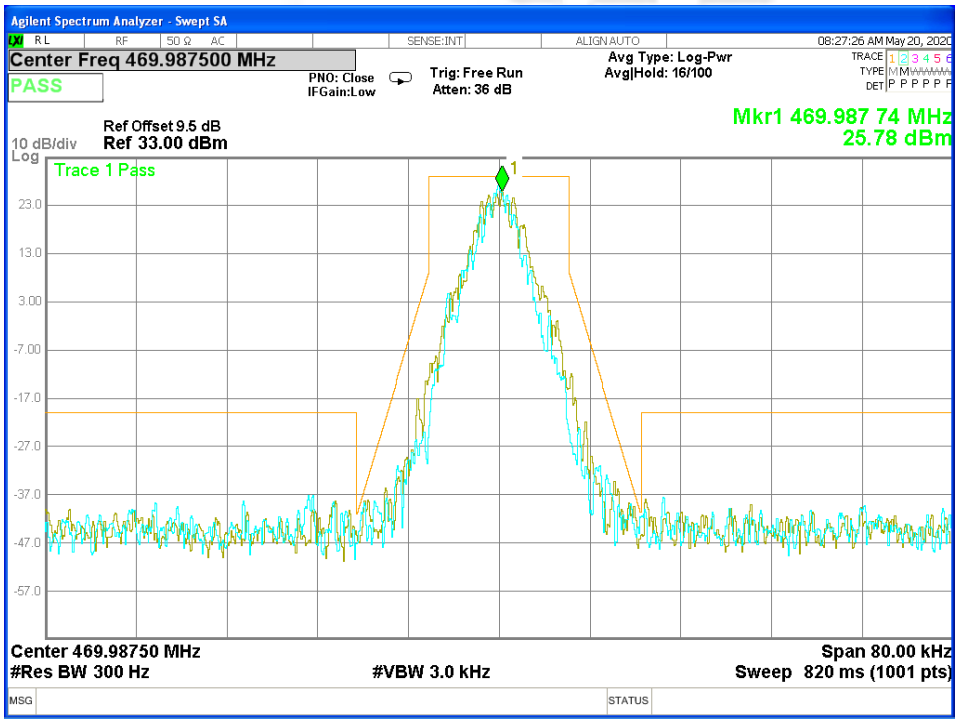
CH 1 Model 4



CH 800 Model 4



CH 1599 Model 4



6. TRANSMITTER RADIATED SPURIOUS EMSSION

6.1 PROVISIONS APPLICABLE

According to the TIA/EIA 603 test method, and according to Section 90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least 107 log (f_d/4) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least 40.5 log (f_d/1.16) dB;

(4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least 116 log (f_d/6.1) dB;

(5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least 43 + 10 log (P) dB.

For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

(1) On any frequency removed from the assigned frequency by more than 75 kHz, the attenuation of any emission must be at least 43 + 10 log (P_{watts}) dB.

6.2TEST PROCEDURE

a. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. for emission measurements. The height of receiving antenna is 1.50 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in six channels were measured with peak detector.

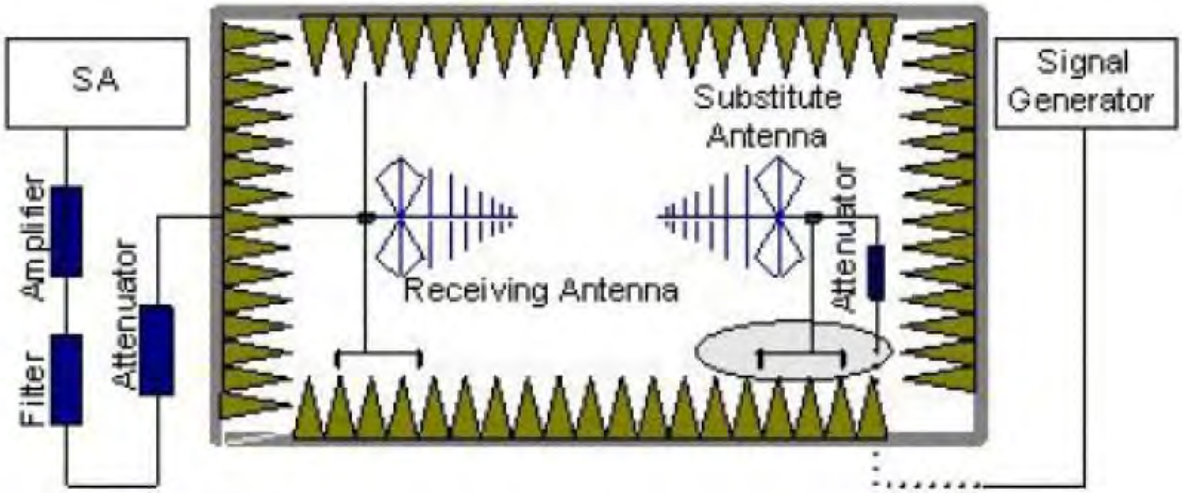
b. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions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

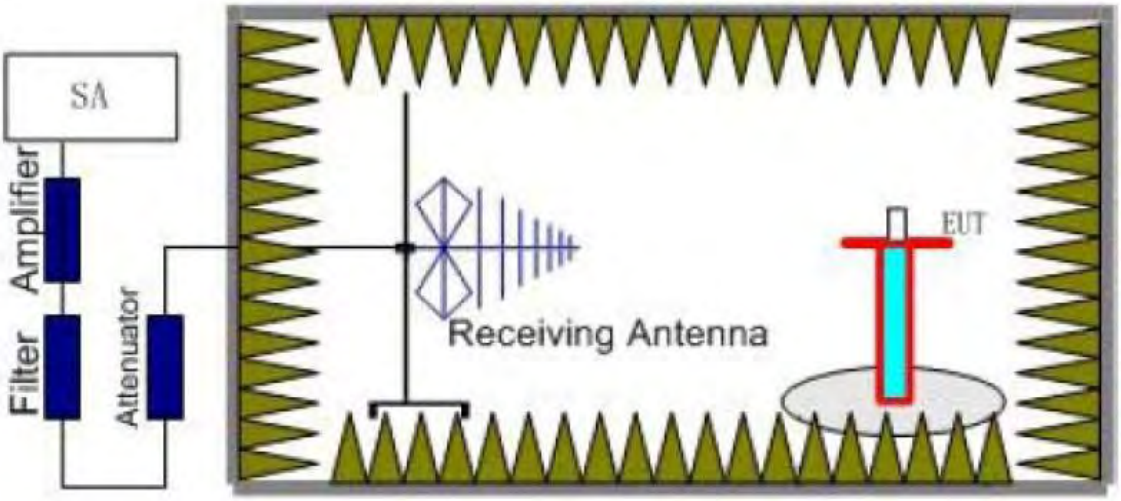
c. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and RBW=100KHz,VBW=300KHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (P_r).

d. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

e. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test. The measurement results are obtained as described below:
Amplifier for substituation test; The measurement results are amend as described below:
Power(EIRP)=P_{Mea}- P_{cl}+ G_a

6.3 TEST CONFIGURATION





6.4 TEST RESULT

CH 1					Model 1		
Frequency	Result					Limit (dBm)	Conclusion
	P_{meas} (dBm)	Cable loss	Antenna Gain(dBi)	P_{Meas} E.I.R.P(dBm)	Polarization Of Max. EIRP		
900.03	-32.76	0.44	6.4	-28.95	Horizontal	-20	Pass
1350.04	-35.7	1.02	8.63	-30.24	Horizontal	-20	Pass
1800.05	-32.38	1.52	10.2	-25.85	Horizontal	-20	Pass
900.03	-35.42	0.44	6.4	-31.61	Vertical	-20	Pass
1350.04	-32.11	1.02	8.63	-26.65	Vertical	-20	Pass
1800.05	-35.64	1.52	10.2	-29.11	Vertical	-20	Pass

CH 800					Model 1		
Frequency	Result					Limit (dBm)	Conclusion
	P_{meas} (dBm)	Cable loss	Antenna Gain(dBi)	P_{Meas} E.I.R.P(dBm)	Polarization Of Max. EIRP		
979.80	-34.73	0.44	6.4	-30.92	Horizontal	-20	Pass
1467.40	-37.9	1.13	8.63	-32.55	Horizontal	-20	Pass
1959.60	-33.92	1.57	10.2	-27.44	Horizontal	-20	Pass
979.80	-37.59	0.44	6.4	-33.78	Vertical	-20	Pass
1467.40	-34.11	1.13	8.63	-28.76	Vertical	-20	Pass
1959.60	-37.26	1.57	10.2	-30.78	Vertical	-20	Pass

CH 1599					Model 1		
Frequency	Result					Limit (dBm)	Conclusion
	P_{meas} (dBm)	Cable loss	Antenna Gain(dBi)	P_{Meas} E.I.R.P(dBm)	Polarization Of Max. EIRP		
941.24	-33.64	0.46	6.4	-29.85	Horizontal	-20	Pass
1411.48	-36.8	1.17	8.63	-31.49	Horizontal	-20	Pass
1882.13	-32.62	1.63	10.2	-26.2	Horizontal	-20	Pass
941.28	-36.67	0.46	6.4	-32.88	Vertical	-20	Pass
1411.50	-33.26	1.17	8.63	-27.95	Vertical	-20	Pass
1882.33	-36.11	1.63	10.2	-29.69	Vertical	-20	Pass

CH 1					Model 2		
Frequency	Result					Limit (dBm)	Conclusion
	P_{meas} (dBm)	Cable loss	Antenna Gain(dBi)	P_{Meas} E.I.R.P(dBm)	Polarization Of Max. EIRP		
899.22	-32.99	0.44	6.4	-29.18	Horizontal	-20	Pass
1348.91	-35.87	1.02	8.63	-30.41	Horizontal	-20	Pass
1798.29	-32.41	1.52	10.2	-25.88	Horizontal	-20	Pass
899.37	-35.62	0.44	6.4	-31.81	Vertical	-20	Pass
1348.75	-32.21	1.02	8.63	-26.75	Vertical	-20	Pass
1798.79	-35.54	1.52	10.2	-29.01	Vertical	-20	Pass

CH 800					Model 2		
Frequency	Result					Limit (dBm)	Conclusion
	Pmeas (dBm)	Cable loss	Antenna Gain(dBi)	PMeas E.I.R.P(dBm)	Polarization Of Max. EIRP		
979.80	-34.84	0.44	6.4	-31.03	Horizontal	-20	Pass
1467.40	-37.89	1.13	8.63	-32.54	Horizontal	-20	Pass
1959.60	-33.98	1.57	10.2	-27.5	Horizontal	-20	Pass
979.80	-37.35	0.44	6.4	-33.54	Vertical	-20	Pass
1467.40	-34.26	1.13	8.63	-28.91	Vertical	-20	Pass
1959.60	-37.46	1.57	10.2	-30.98	Vertical	-20	Pass

CH 1599					Model 2		
Frequency	Result					Limit (dBm)	Conclusion
	Pmeas (dBm)	Cable loss	Antenna Gain(dBi)	PMeas E.I.R.P(dBm)	Polarization Of Max. EIRP		
941.37	-33.86	0.46	6.4	-30.07	Horizontal	-20	Pass
1411.69	-36.96	1.17	8.63	-31.65	Horizontal	-20	Pass
1882.16	-32.59	1.63	10.2	-26.17	Horizontal	-20	Pass
941.16	-36.52	0.46	6.4	-32.73	Vertical	-20	Pass
1411.53	-33.11	1.17	8.63	-27.8	Vertical	-20	Pass
1882.12	-36.31	1.63	10.2	-29.89	Vertical	-20	Pass

CH 1					Model 3		
Frequency	Result					Limit (dBm)	Conclusion
	P_{meas} (dBm)	Cable loss	Antenna Gain(dBi)	P_{Meas} E.I.R.P(dBm)	Polarization Of Max. EIRP		
899.13	-32.22	0.44	6.4	-28.41	Horizontal	-20	Pass
1348.70	-35.31	1.02	8.63	-29.85	Horizontal	-20	Pass
1798.26	-31.89	1.52	10.2	-25.36	Horizontal	-20	Pass
899.13	-35.27	0.44	6.4	-31.46	Vertical	-20	Pass
1348.70	-31.73	1.02	8.63	-26.27	Vertical	-20	Pass
1798.26	-35.15	1.52	10.2	-28.62	Vertical	-20	Pass

CH 800					Model 3		
Frequency	Result					Limit (dBm)	Conclusion
	Pmeas (dBm)	Cable loss	Antenna Gain(dBi)	PMeas E.I.R.P(dBm)	Polarization Of Max. EIRP		
979.13	-34.28	0.44	6.4	-30.47	Horizontal	-20	Pass
1468.35	-37.15	1.13	8.63	-31.8	Horizontal	-20	Pass
1957.51	-33.55	1.57	10.2	-27.07	Horizontal	-20	Pass
979.05	-37.04	0.44	6.4	-33.23	Vertical	-20	Pass
1468.55	-33.46	1.13	8.63	-28.11	Vertical	-20	Pass
1957.70	-36.73	1.57	10.2	-30.25	Vertical	-20	Pass

CH 1599					Model 3		
Frequency	Result					Limit (dBm)	Conclusion
	Pmeas (dBm)	Cable loss	Antenna Gain(dBi)	PMeas E.I.R.P(dBm)	Polarization Of Max. EIRP		
941.45	-33.28	0.46	6.4	-29.49	Horizontal	-20	Pass
1411.79	-36.22	1.17	8.63	-30.91	Horizontal	-20	Pass
1882.78	-32.15	1.63	10.2	-25.73	Horizontal	-20	Pass
941.53	-35.9	0.46	6.4	-32.11	Vertical	-20	Pass
1411.78	-32.51	1.17	8.63	-27.2	Vertical	-20	Pass
1882.38	-35.72	1.63	10.2	-29.3	Vertical	-20	Pass

CH 1					Model 4		
Frequency	Result					Limit (dBm)	Conclusion
	P_{meas} (dBm)	Cable loss	Antenna Gain(dBi)	P_{Meas} E.I.R.P(dBm)	Polarization Of Max. EIRP		
899.52	-32.49	0.44	6.4	-28.68	Horizontal	-20	Pass
1348.76	-35.34	1.02	8.63	-29.88	Horizontal	-20	Pass
1798.54	-31.94	1.52	10.2	-25.41	Horizontal	-20	Pass
899.45	-35.15	0.44	6.4	-31.34	Vertical	-20	Pass
1349.09	-31.8	1.02	8.63	-26.34	Vertical	-20	Pass
1798.67	-35.36	1.52	10.2	-28.83	Vertical	-20	Pass

CH 800					Model 4		
Frequency	Result					Limit (dBm)	Conclusion
	Pmeas (dBm)	Cable loss	Antenna Gain(dBi)	PMeas E.I.R.P(dBm)	Polarization Of Max. EIRP		
978.87	-34.14	0.44	6.4	-30.33	Horizontal	-20	Pass
1468.24	-37.05	1.13	8.63	-31.7	Horizontal	-20	Pass
1957.55	-33.63	1.57	10.2	-27.15	Horizontal	-20	Pass
978.73	-37.18	0.44	6.4	-33.37	Vertical	-20	Pass
1468.33	-33.56	1.13	8.63	-28.21	Vertical	-20	Pass
1957.58	-36.85	1.57	10.2	-30.37	Vertical	-20	Pass

CH 1599					Model 4		
Frequency	Result					Limit (dBm)	Conclusion
	Pmeas (dBm)	Cable loss	Antenna Gain(dBi)	PMeas E.I.R.P(dBm)	Polarization Of Max. EIRP		
941.82	-33.29	0.46	6.4	-29.5	Horizontal	-20	Pass
1411.91	-36.09	1.17	8.63	-30.78	Horizontal	-20	Pass
1882.63	-32.14	1.63	10.2	-25.72	Horizontal	-20	Pass
941.60	-35.88	0.46	6.4	-32.09	Vertical	-20	Pass
1412.16	-32.73	1.17	8.63	-27.42	Vertical	-20	Pass
1882.54	-35.59	1.63	10.2	-29.17	Vertical	-20	Pass

Note: $EIRP=P_{Mea}(dBm)-P_{cl}(dB)+G_a(dBi)$

We were not recorded other points as values lower than limits

7. SPURIOUS EMSSION ON ANTENNA PORT

7.1 PROVISIONS APPLICABLE

According to the TIA/EIA 603 test method, and according to Section 90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least 107 log (f_d/4) dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least 40.5 log (f_d/1.16) dB;

(4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least 116 log (f_d/6.1) dB;

(5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least 43 + 10 log (P) dB.

For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

(1) On any frequency removed from the assigned frequency by more than 75 kHz, the attenuation of any emission must be at least 43 + 10 log (P_{watts}) dB.

7.2 MEASUREMENT PROCEDURE

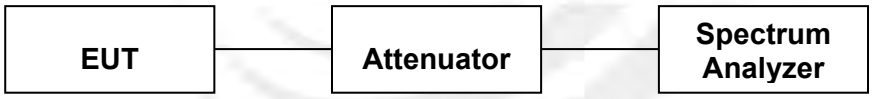
a. The EUT was connected to the spectrum analyzer through sufficent attenuation.

b. Sufficient scans were taken to show any out of band emission up to 10th. Harmonic for the lower and the highest frequency range.

c. Set EUT as digital data mode.

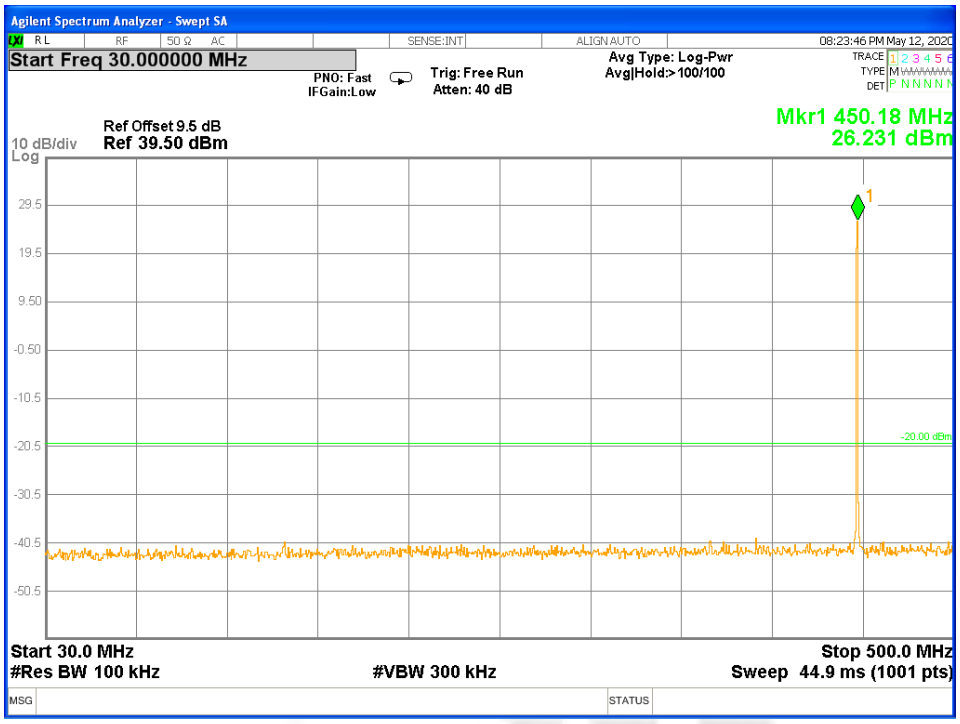
d Set RBW 100kHz, VBW 300 kHz in the frequency band 30MHz to 1GHz,while set RBW=1MHz. VBW=3MHz from the 1GHz to 10th Harmonic.

7.3 TEST SETUP BLOCK DIAGRAM

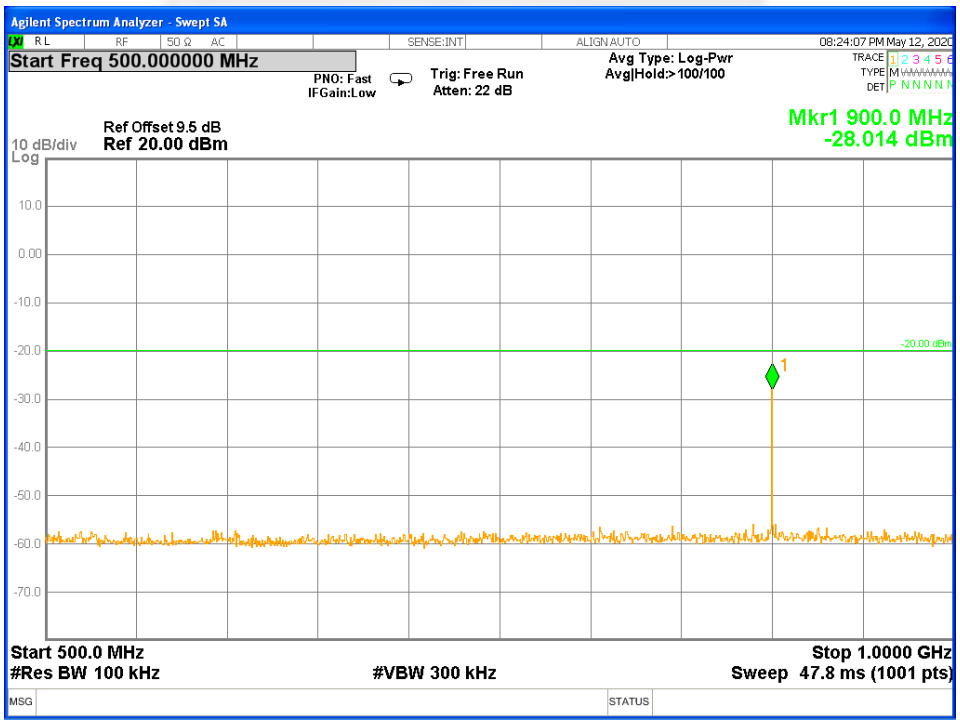


7.4 TEST RESULT

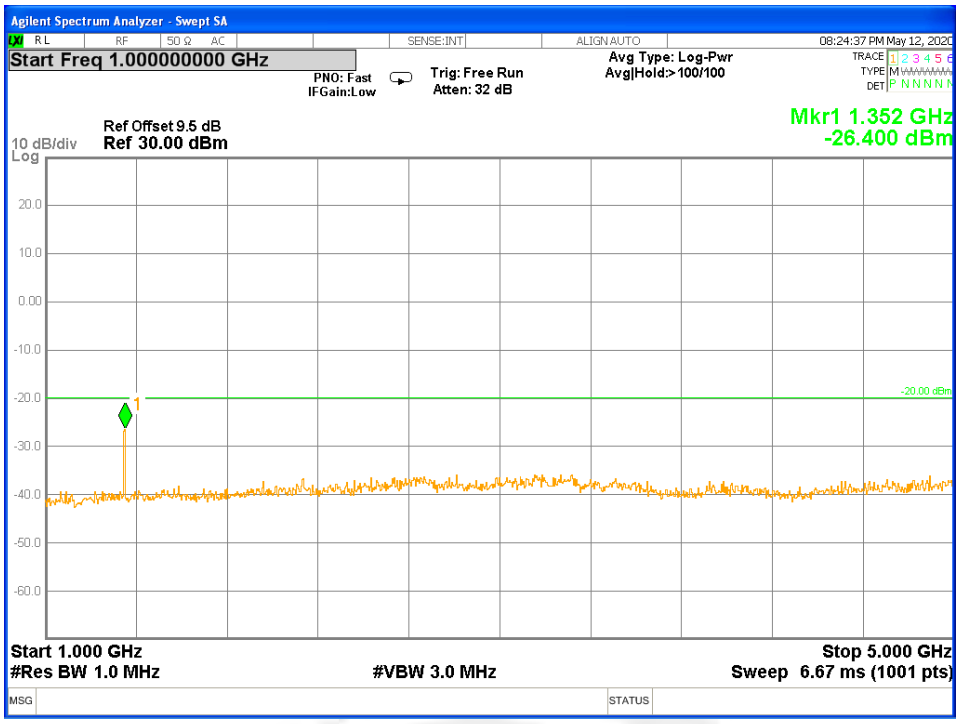
CH 1 Model 1



30M-500M

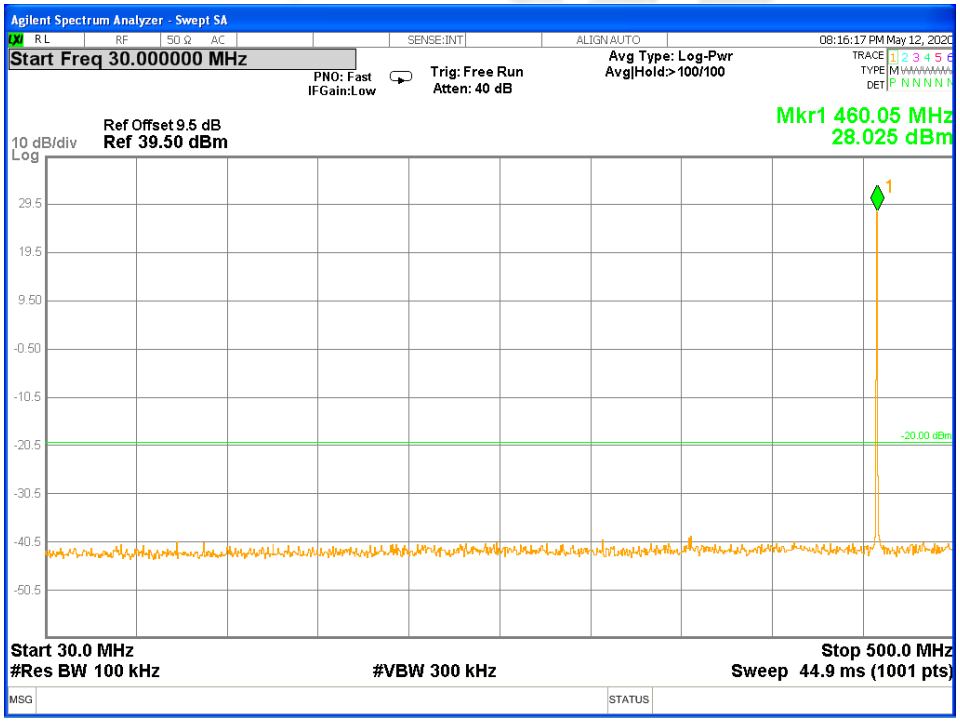


500M-1G

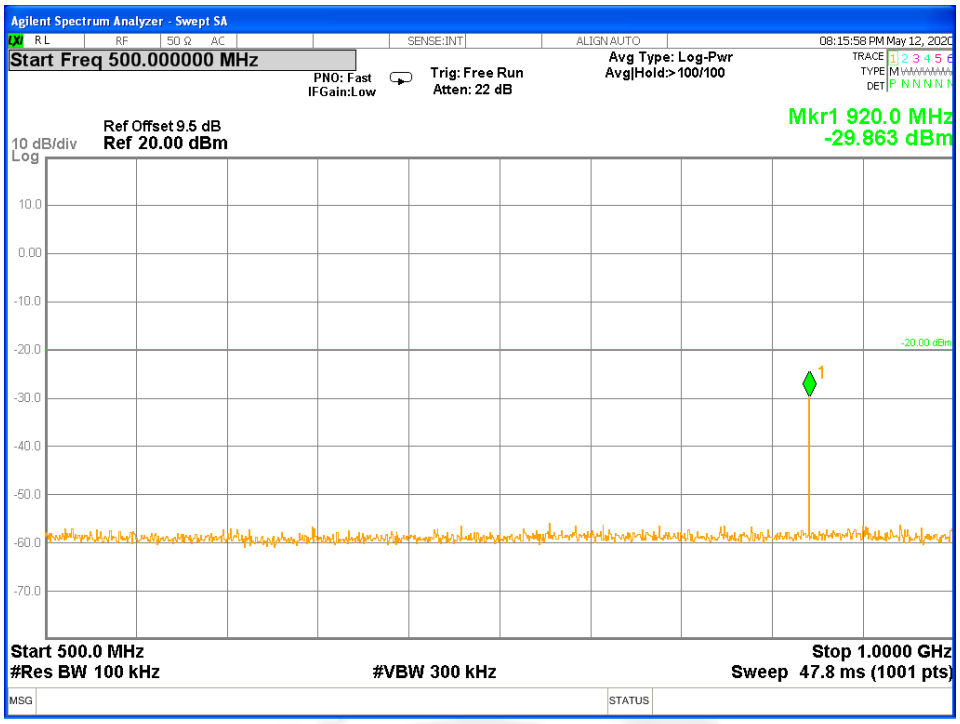


1G-5G

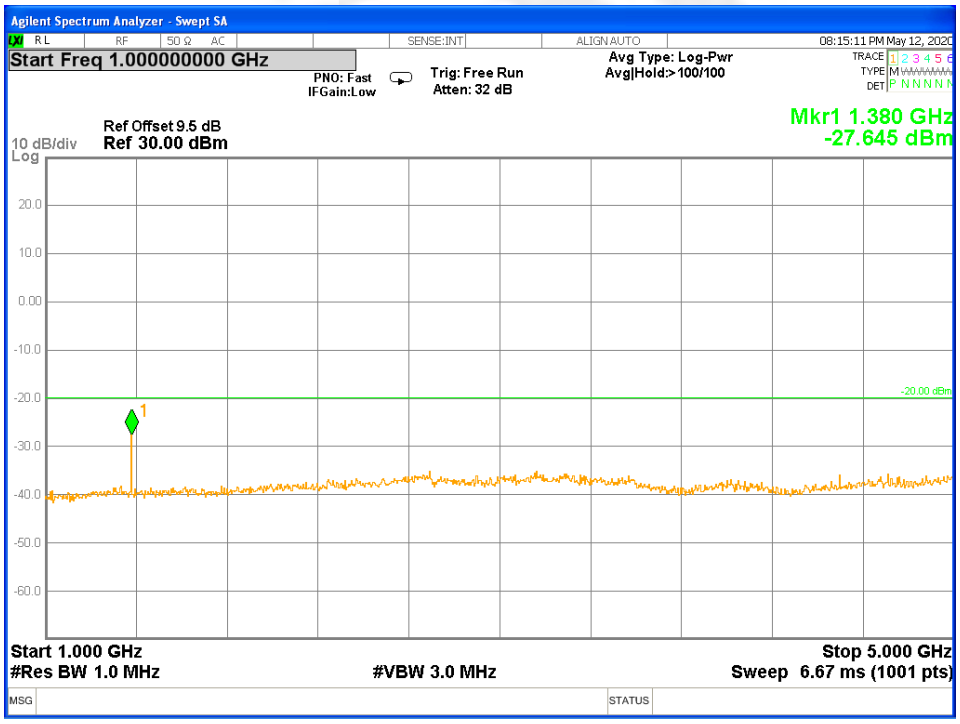
CH 800 Model 1



30M-500M

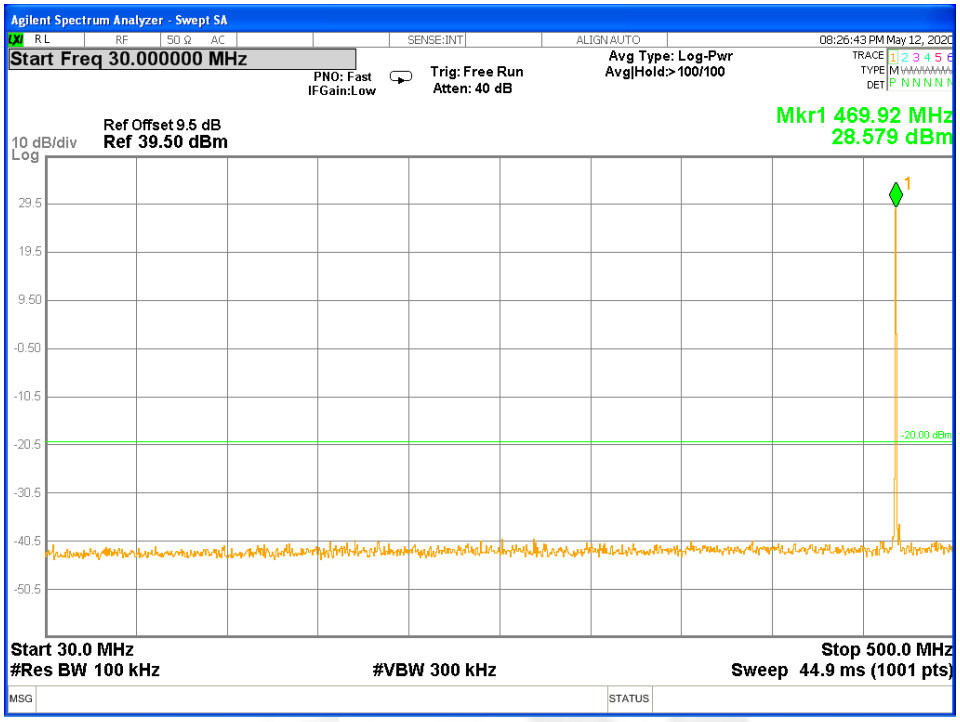

Agilent Spectrum Analyzer - Swept SA
Start Freq 500.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 22 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:15:58 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 20.00 dBm
Mkr1 920.0 MHz
-29.863 dBm
-20.00 dBm
Start 500.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 47.8 ms (1001 pts)

500M-1G

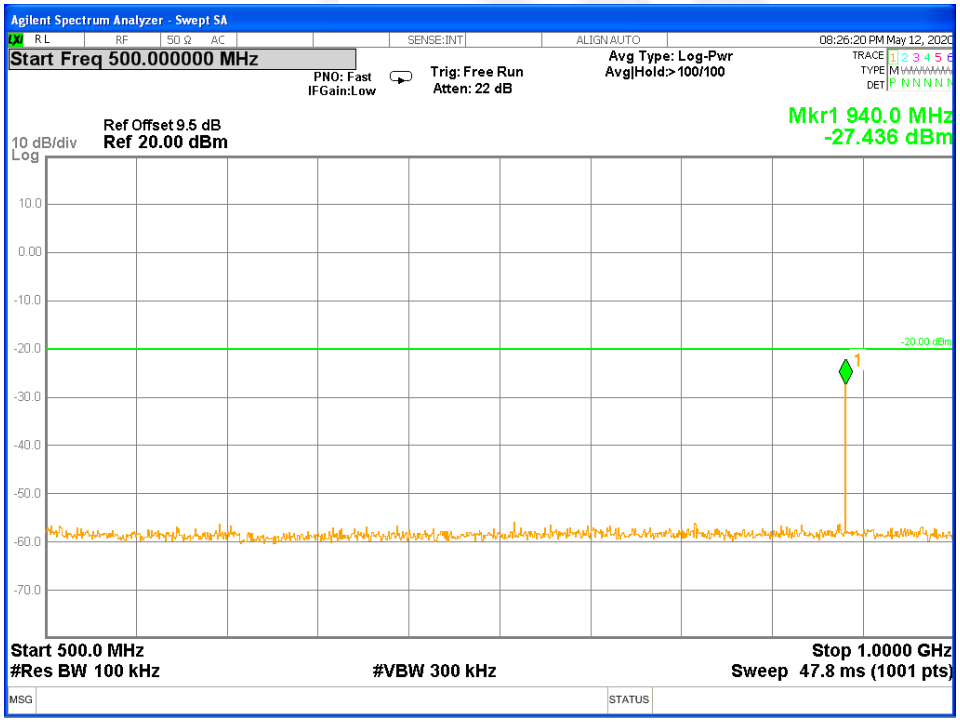

Agilent Spectrum Analyzer - Swept SA
Start Freq 1.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 32 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:15:11 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 30.00 dBm
Mkr1 1.380 GHz
-27.645 dBm
-20.00 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 5.000 GHz
Sweep 6.67 ms (1001 pts)

1G-5G

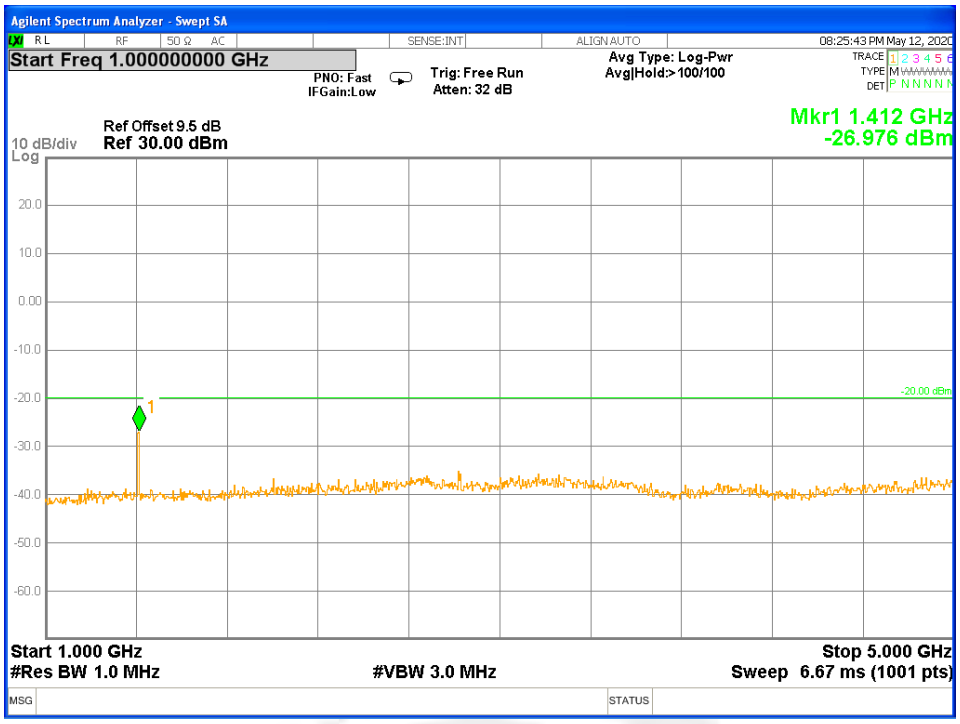
CH 1599 Model 1



30M-500M

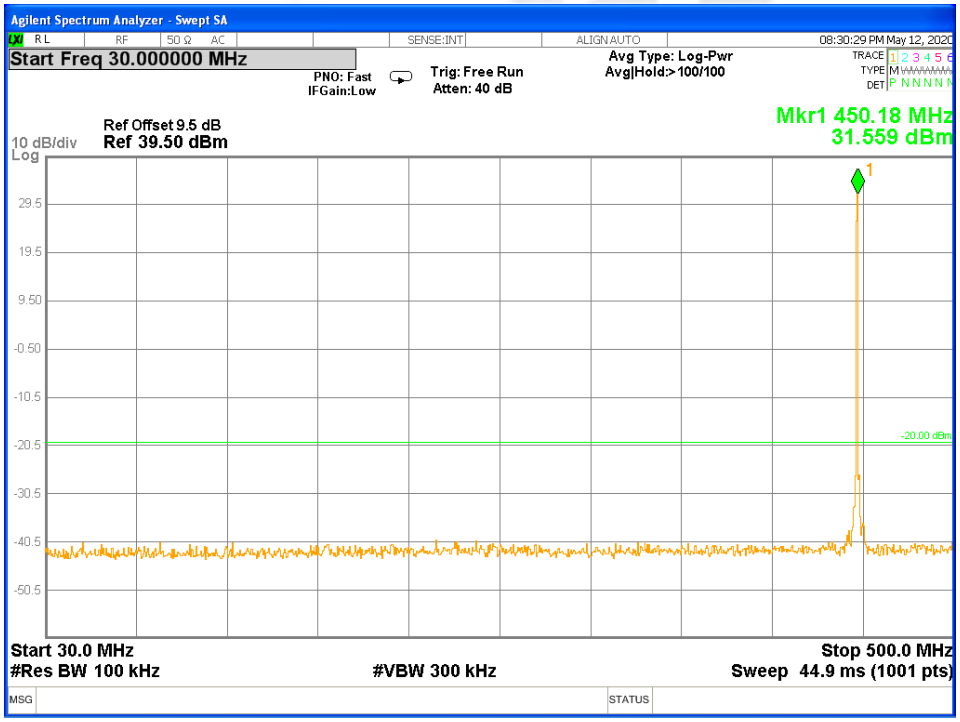


500M-1G

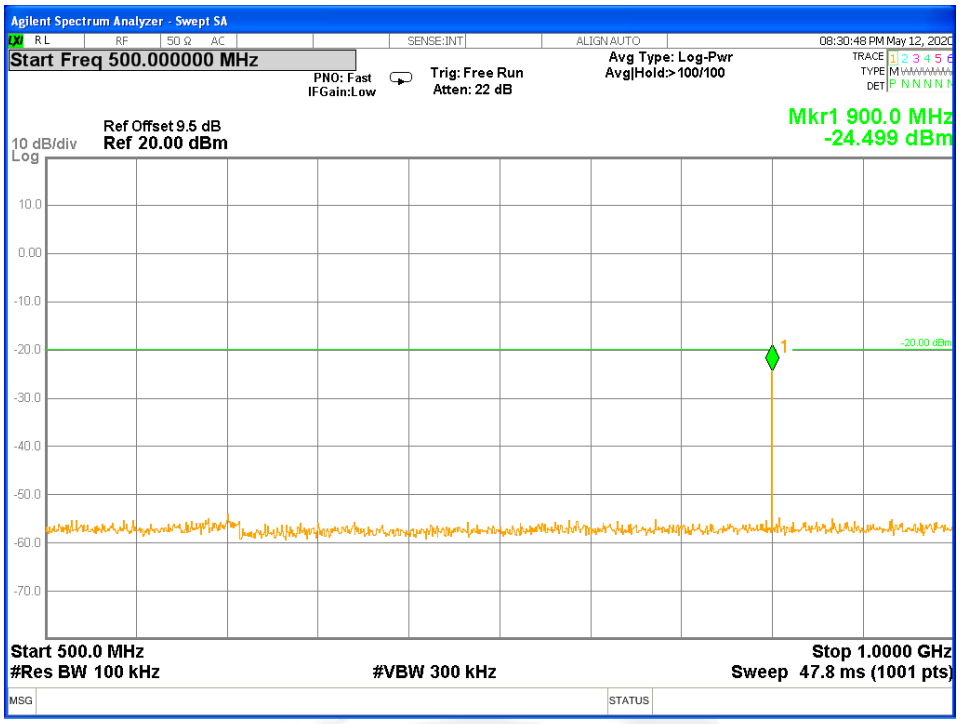


1G-5G

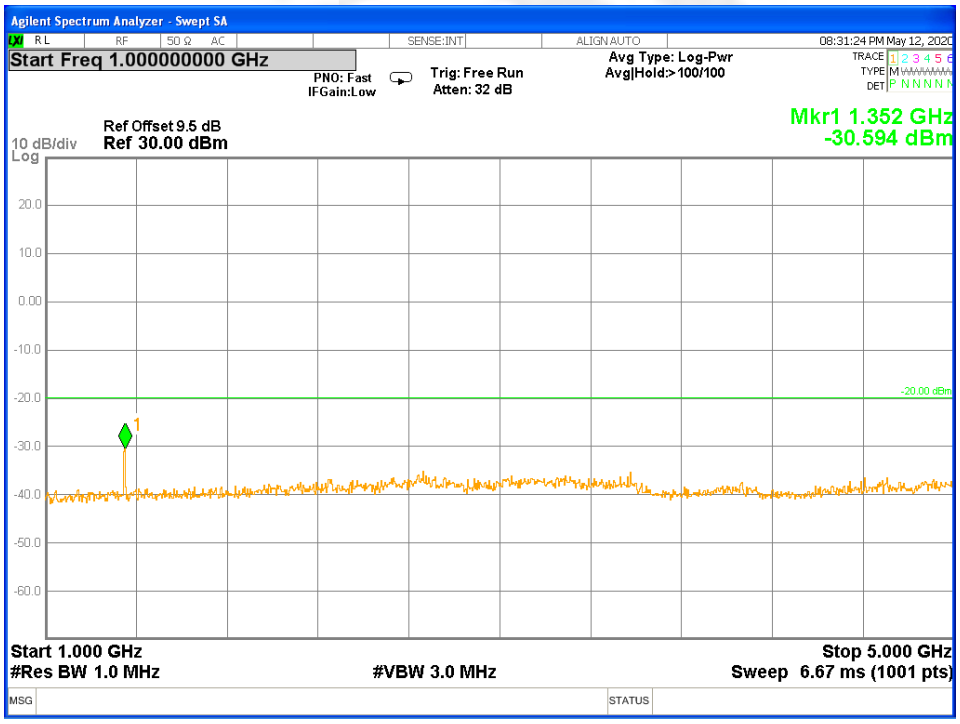
CH 1 Model 2



30M-500M

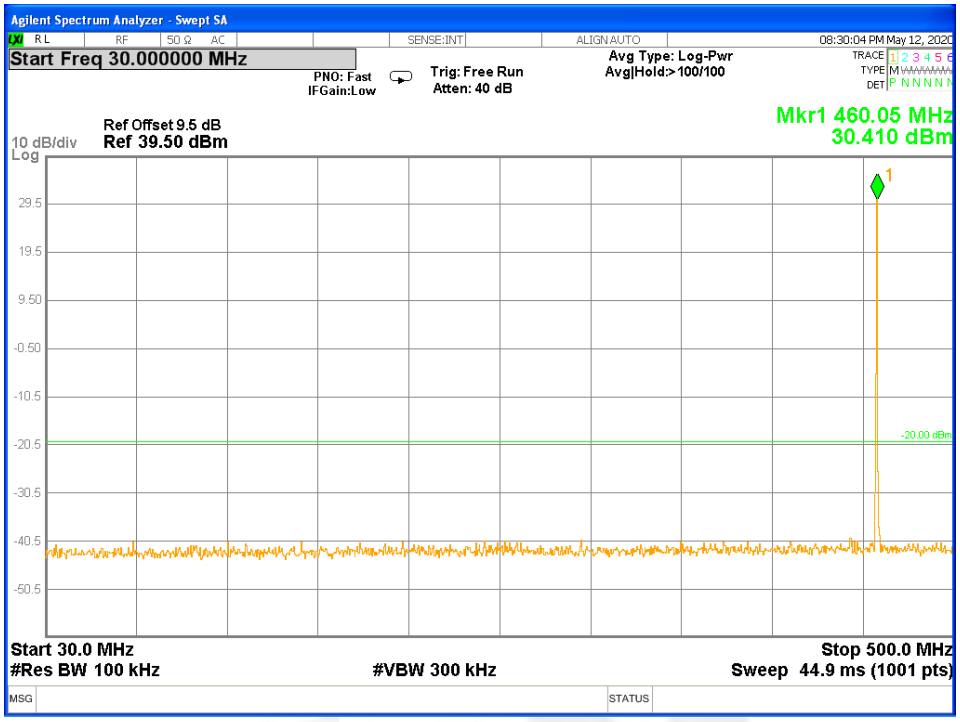

Agilent Spectrum Analyzer - Swept SA
Start Freq 500.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 22 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:30:48 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 20.00 dBm
Mkr1 900.0 MHz
-24.499 dBm
-20.00 dBm
Start 500.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 47.8 ms (1001 pts)

500M-1G

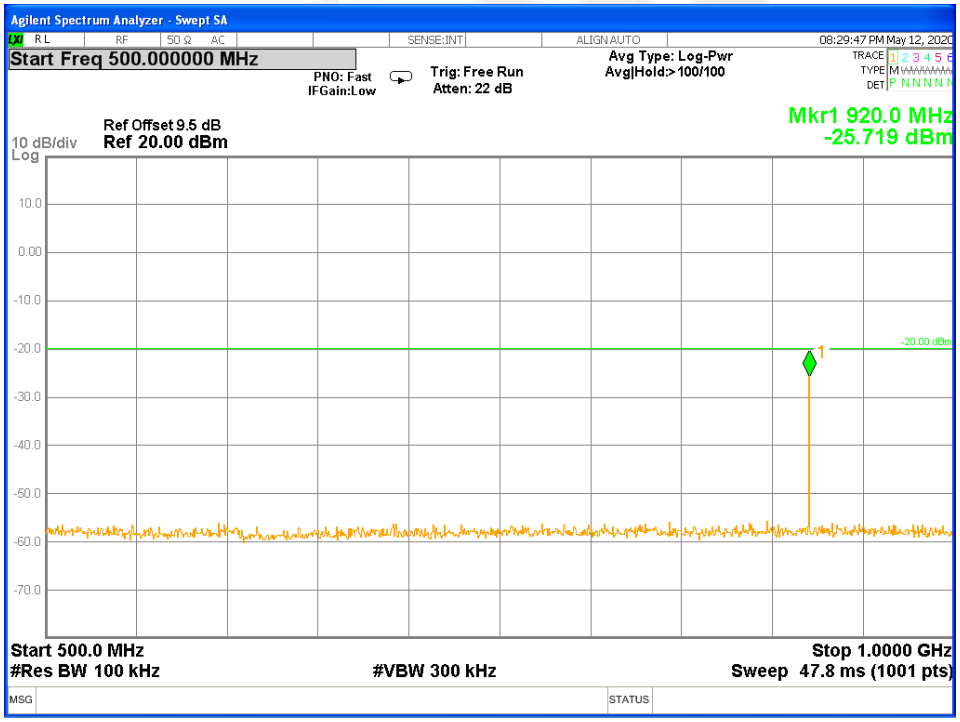

Agilent Spectrum Analyzer - Swept SA
Start Freq 1.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 32 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:31:24 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 30.00 dBm
Mkr1 1.352 GHz
-30.594 dBm
-20.00 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 5.000 GHz
Sweep 6.67 ms (1001 pts)

1G-5G

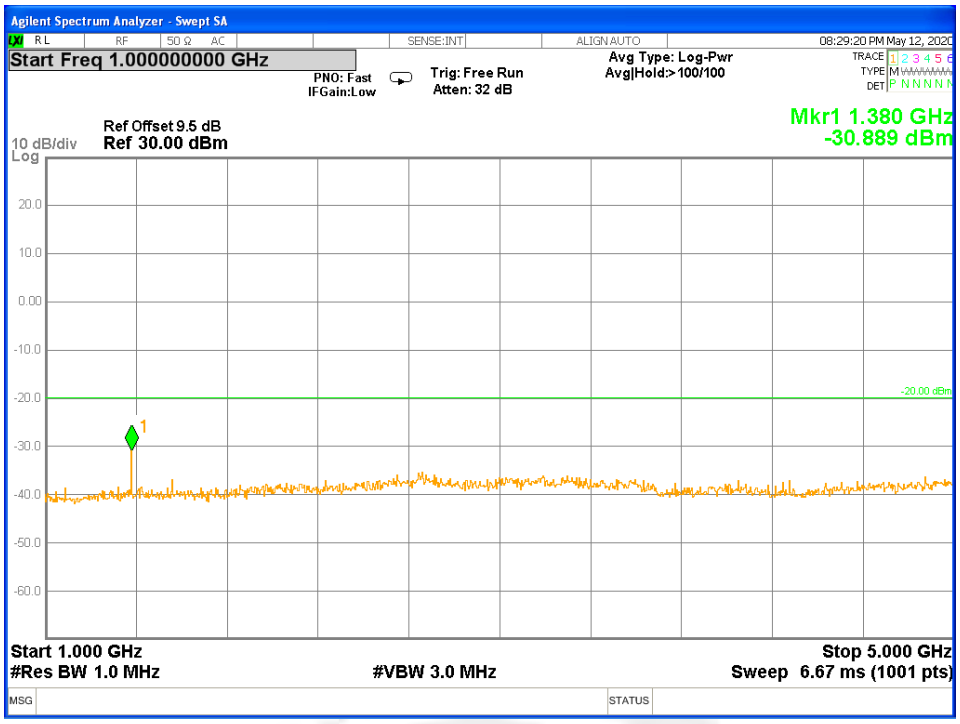
CH 800 Model 2



30M-500M

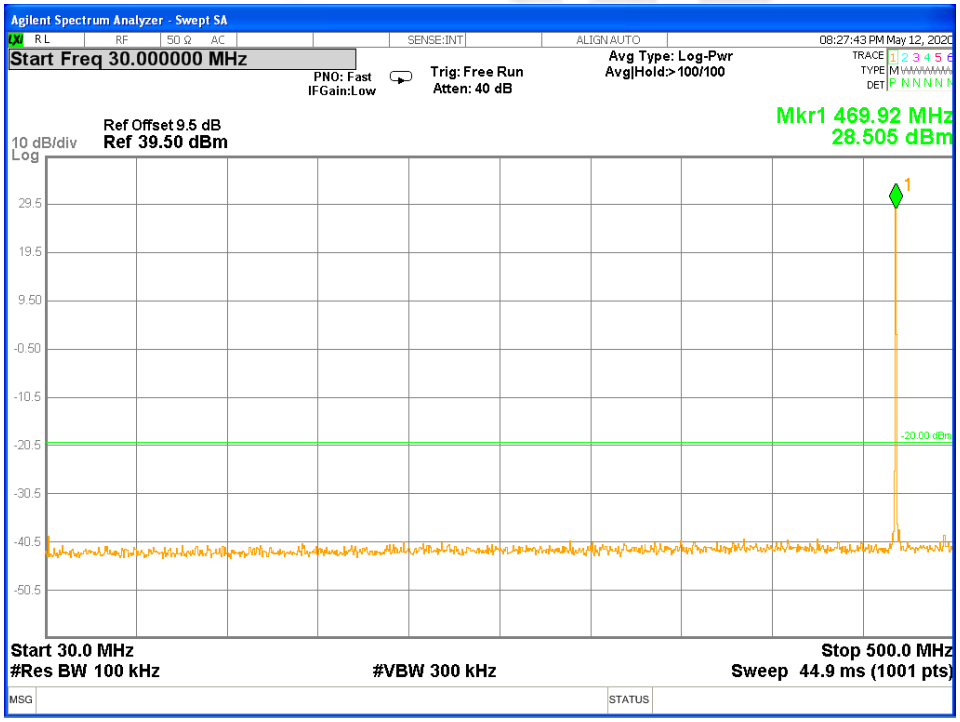


500M-1G

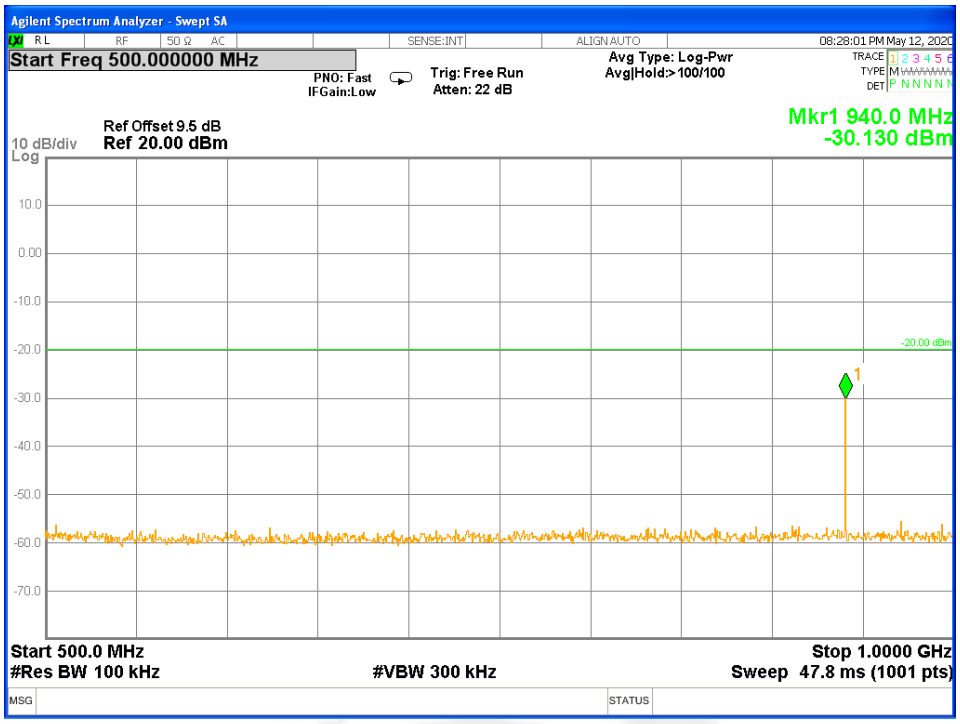


1G-5G

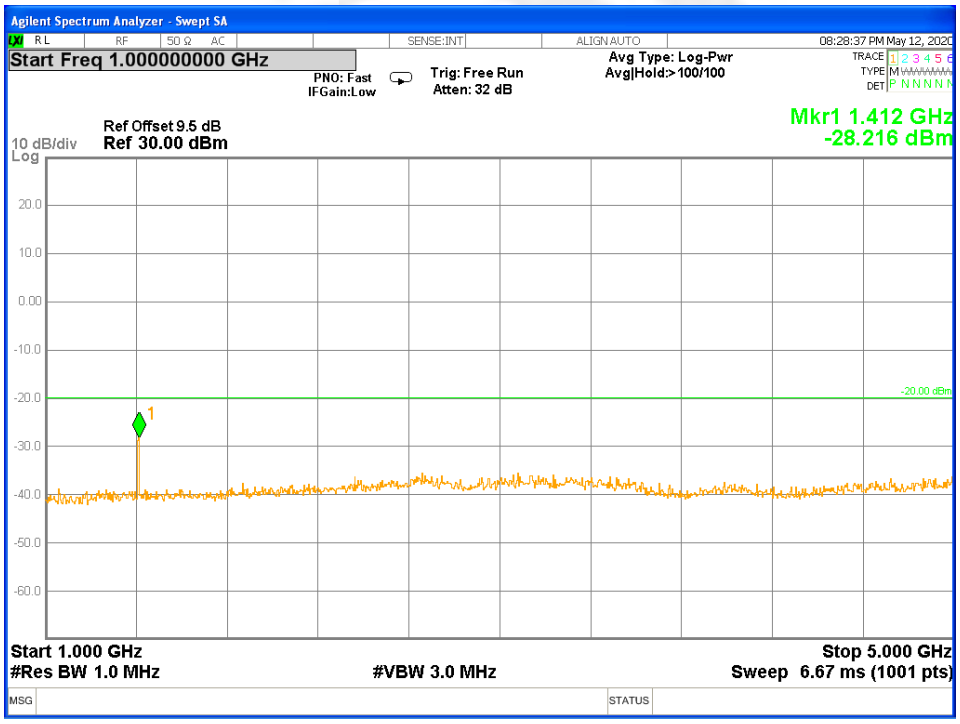
CH 1599 Model 2



30M-500M

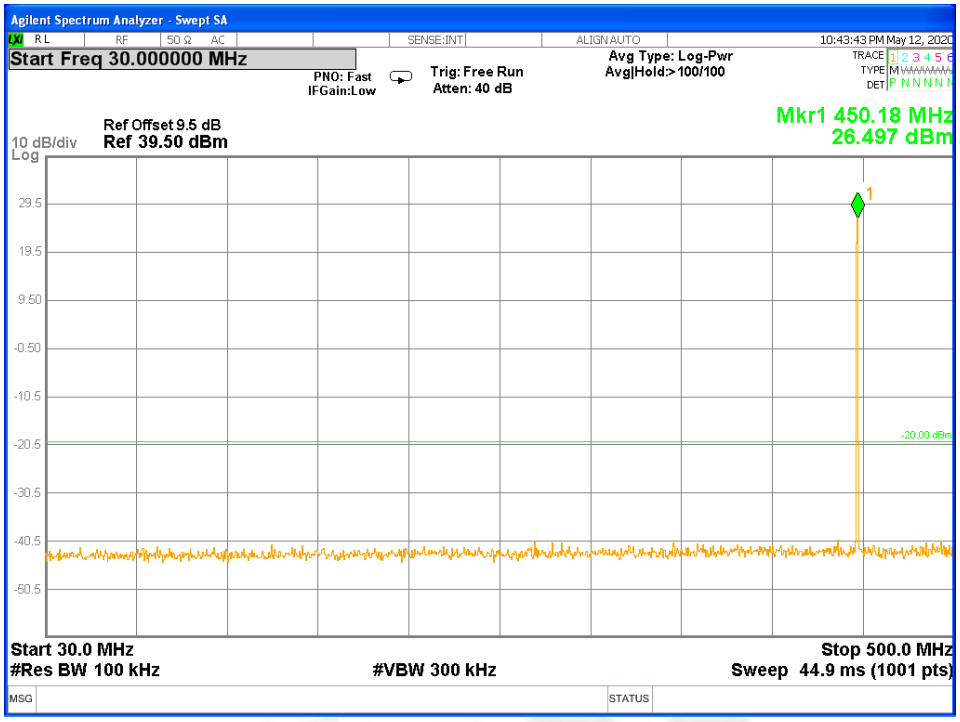

Agilent Spectrum Analyzer - Swept SA
Start Freq 500.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 22 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:28:01 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 20.00 dBm
Mkr1 940.0 MHz
-30.130 dBm
-20.00 dBm
Start 500.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 47.8 ms (1001 pts)

500M-1G

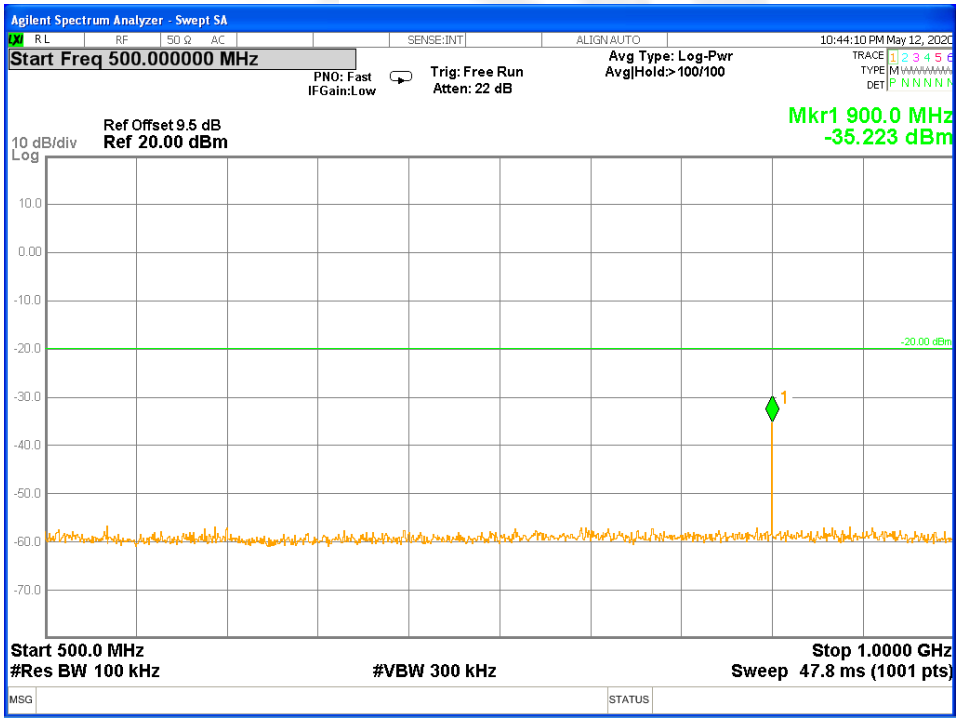

Agilent Spectrum Analyzer - Swept SA
Start Freq 1.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 32 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:28:37 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 30.00 dBm
Mkr1 1.412 GHz
-28.216 dBm
-20.00 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 5.000 GHz
Sweep 6.67 ms (1001 pts)

1G-5G

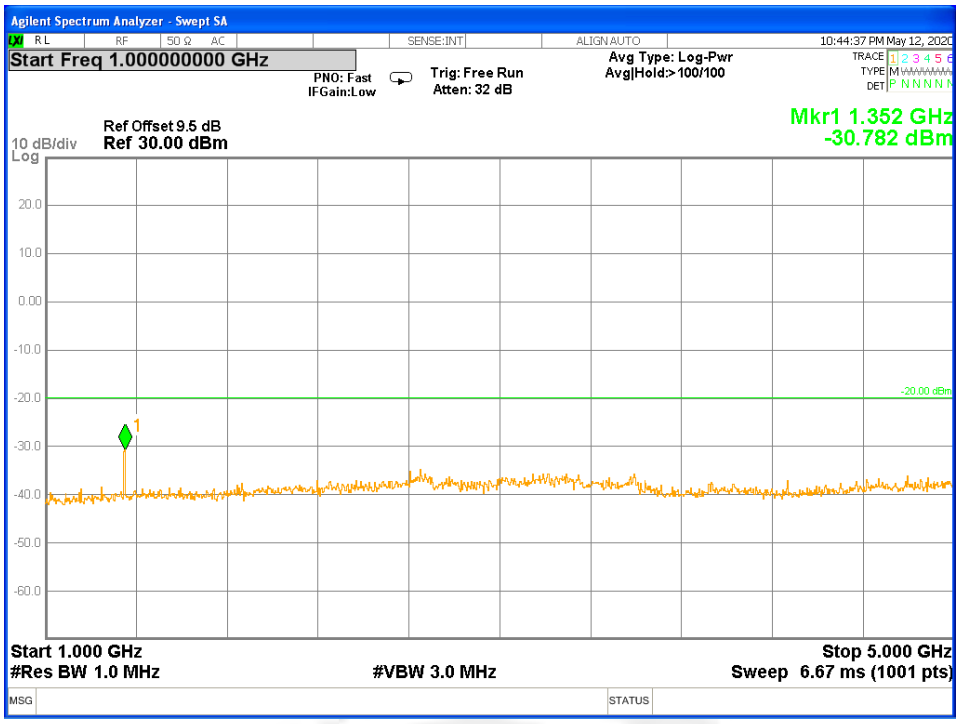
CH 1 Model 3



30M-500M

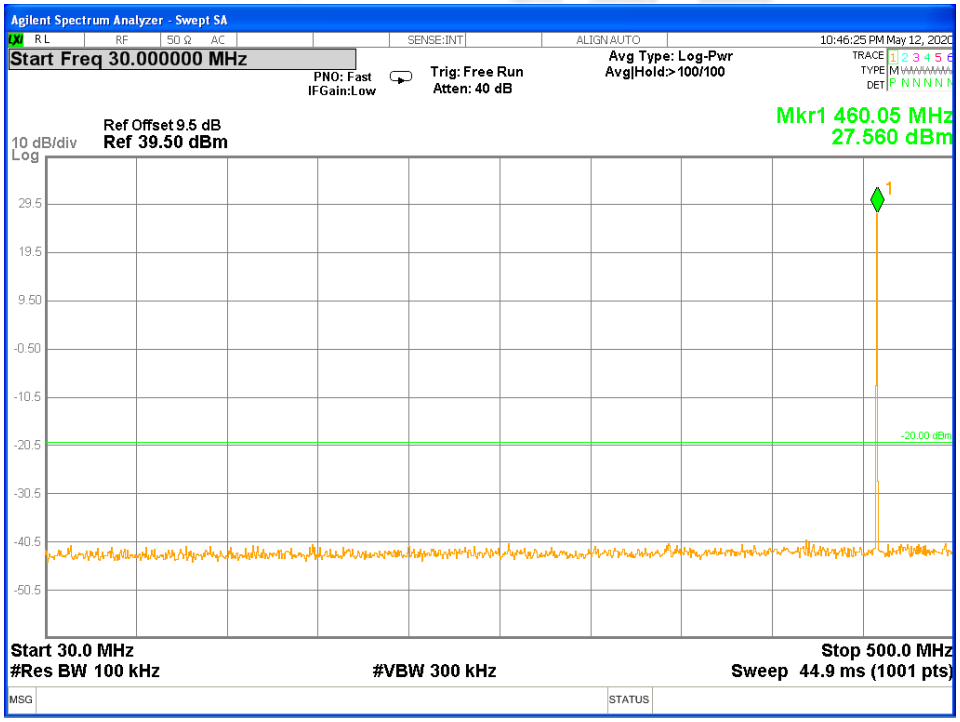


500M-1G

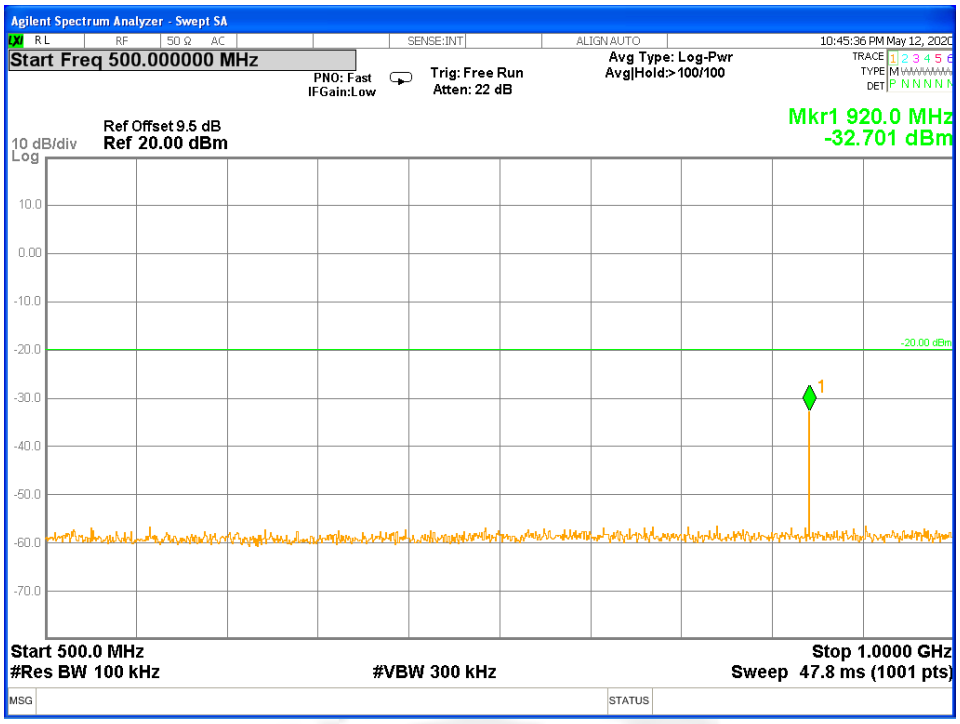


1G-5G

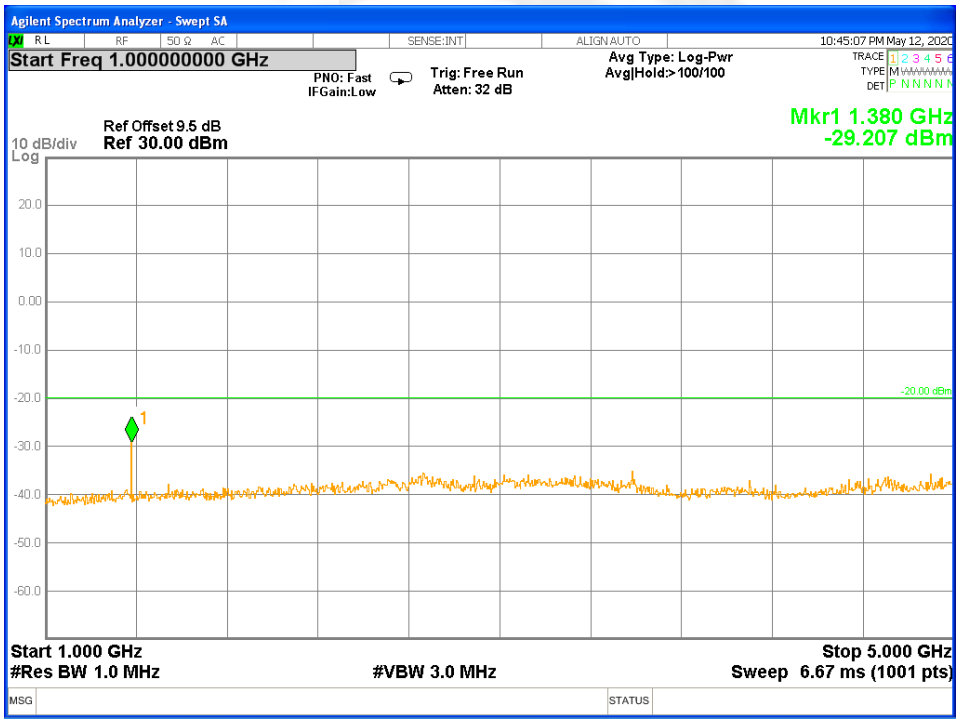
CH 800 Model 3



30M-500M

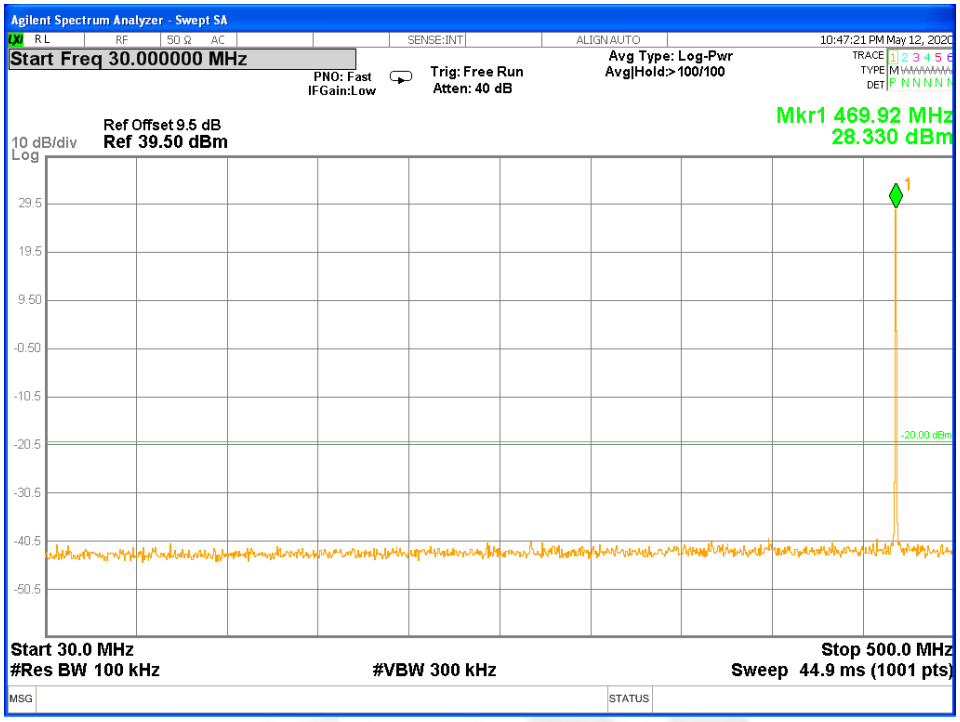

Agilent Spectrum Analyzer - Swept SA
Start Freq 500.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 22 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:45:36 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 20.00 dBm
Mkr1 920.0 MHz
-32.701 dBm
-20.00 dBm
Start 500.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 47.8 ms (1001 pts)

500M-1G

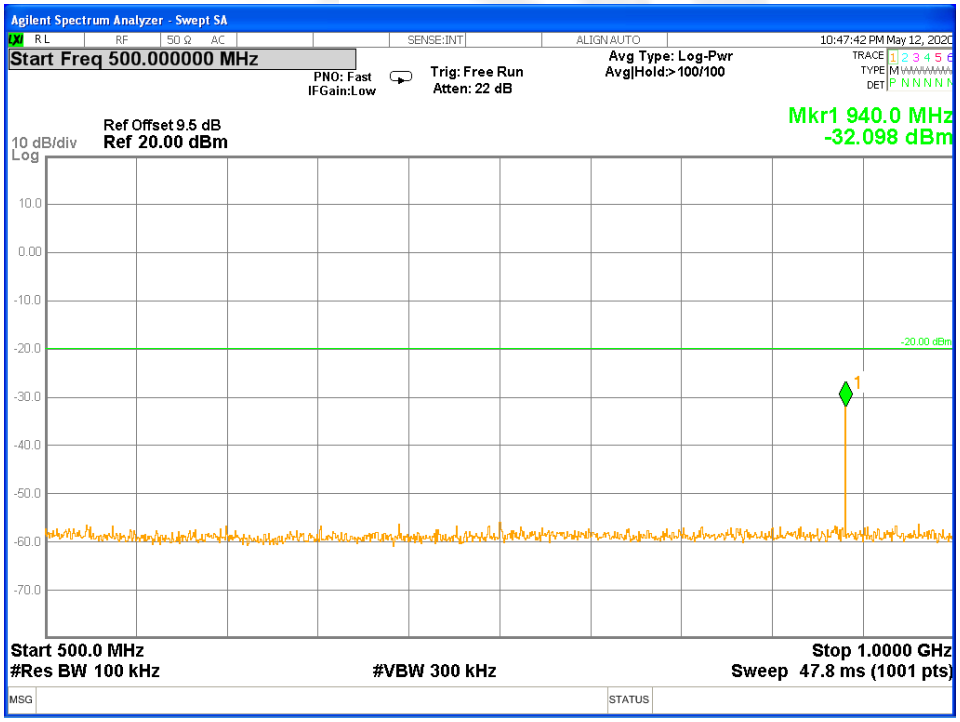

Agilent Spectrum Analyzer - Swept SA
Start Freq 1.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 32 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:45:07 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 30.00 dBm
Mkr1 1.380 GHz
-29.207 dBm
-20.00 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 5.000 GHz
Sweep 6.67 ms (1001 pts)

1G-5G

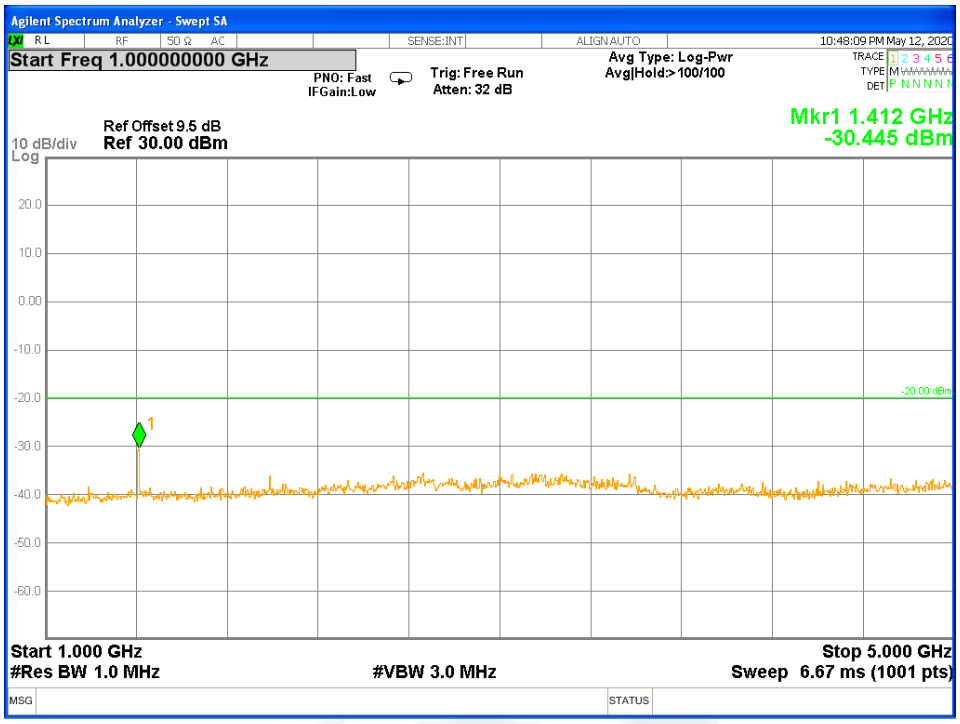
CH 1599 Model 3



30M-500M

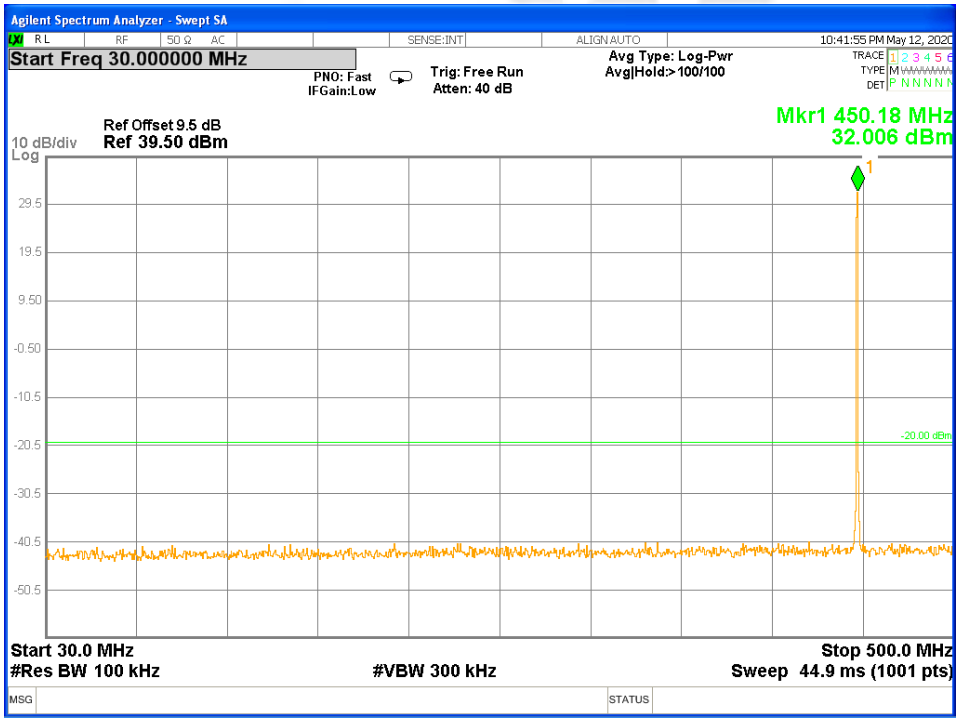


500M-1G

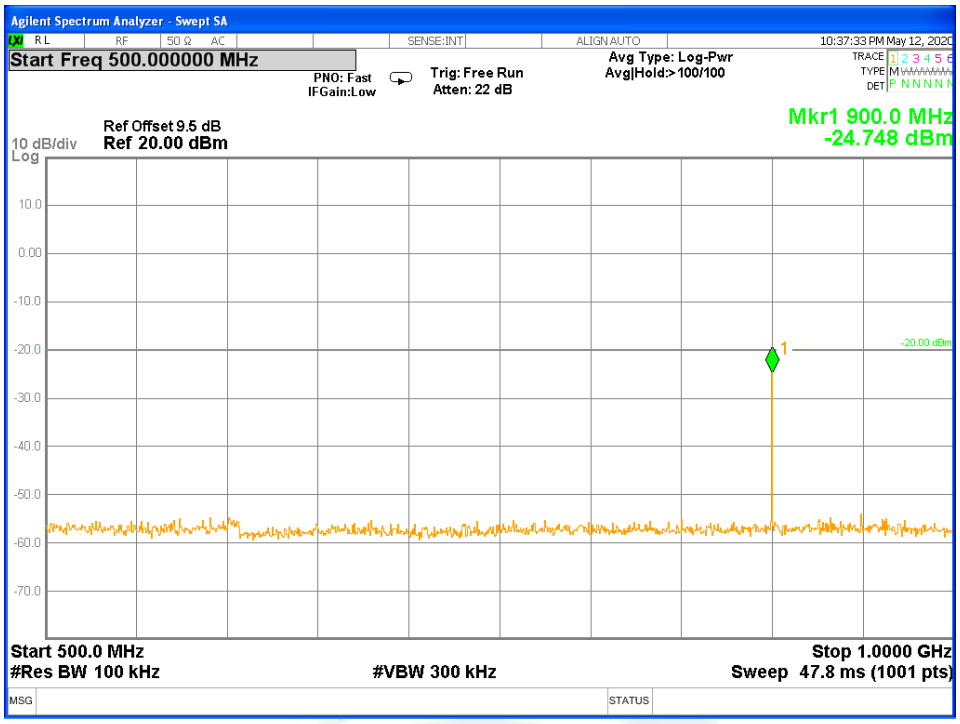


1G-5G

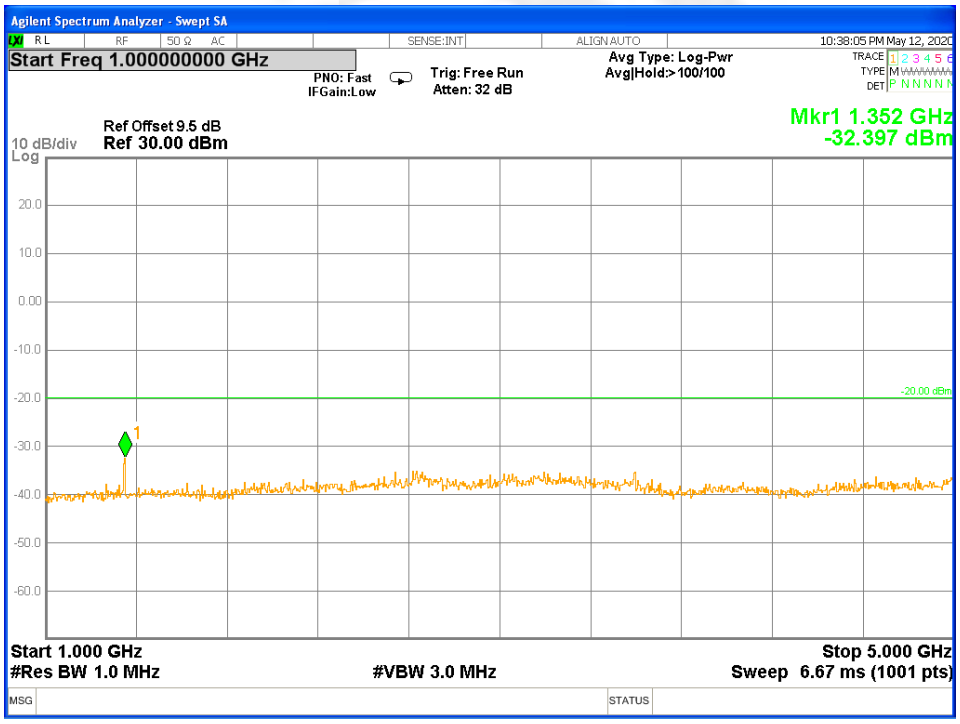
CH 1 Model 4



30M-500M

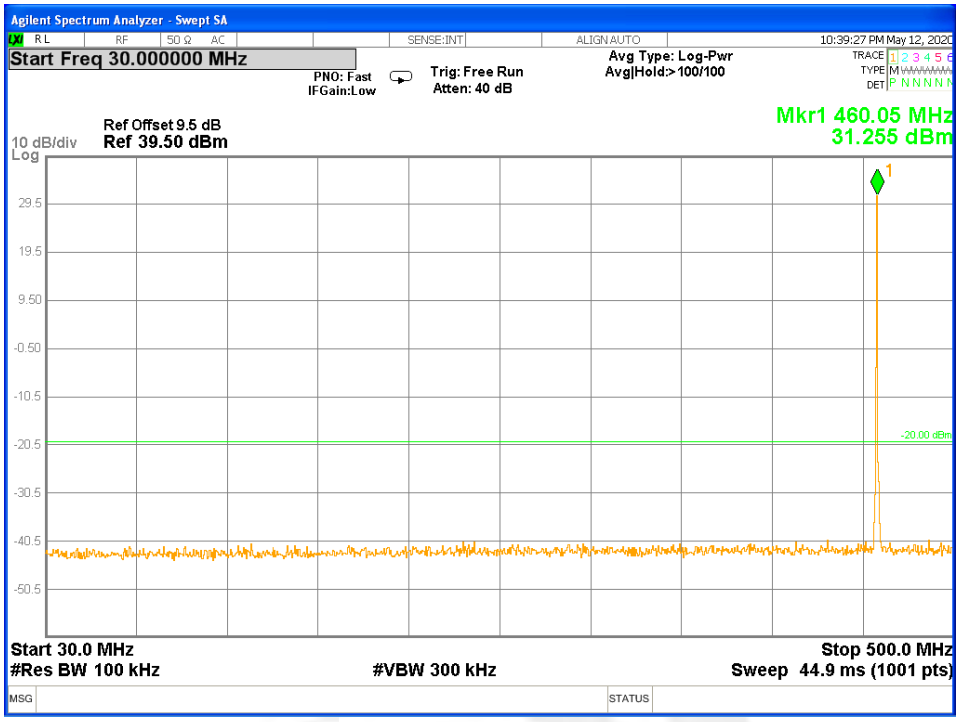

Agilent Spectrum Analyzer - Swept SA
Start Freq 500.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 22 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:37:33 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 20.00 dBm
Mkr1 900.0 MHz
-24.748 dBm
-20.00 dBm
Start 500.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 47.8 ms (1001 pts)

500M-1G

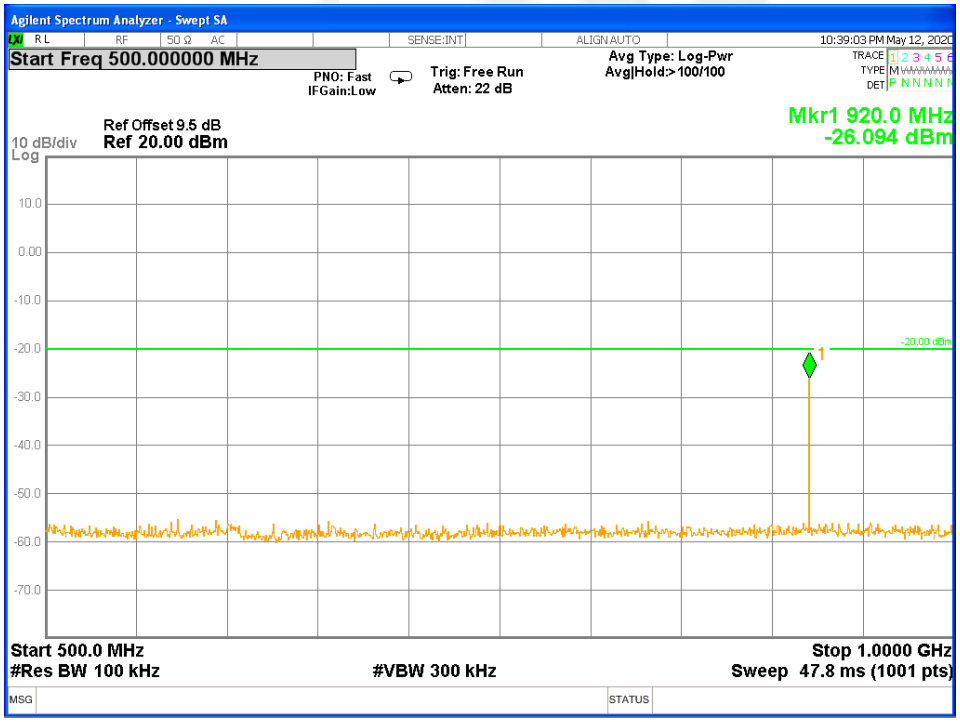

Agilent Spectrum Analyzer - Swept SA
Start Freq 1.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 32 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:38:05 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 30.00 dBm
Mkr1 1.352 GHz
-32.397 dBm
-20.00 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 5.000 GHz
Sweep 6.67 ms (1001 pts)

1G-5G

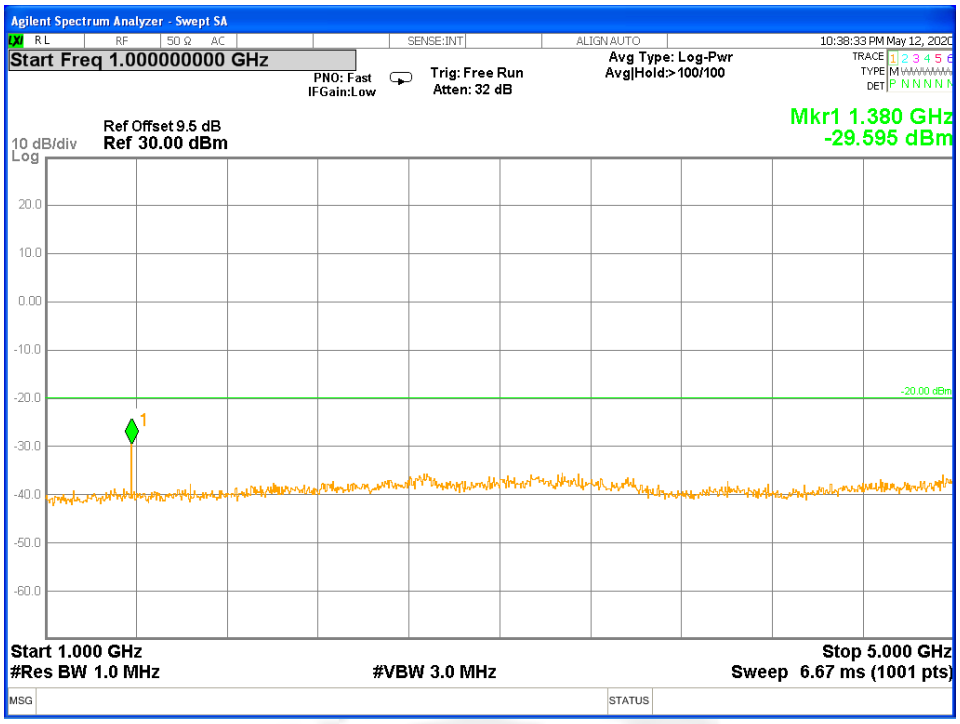
CH 800 Model 4



30M-500M

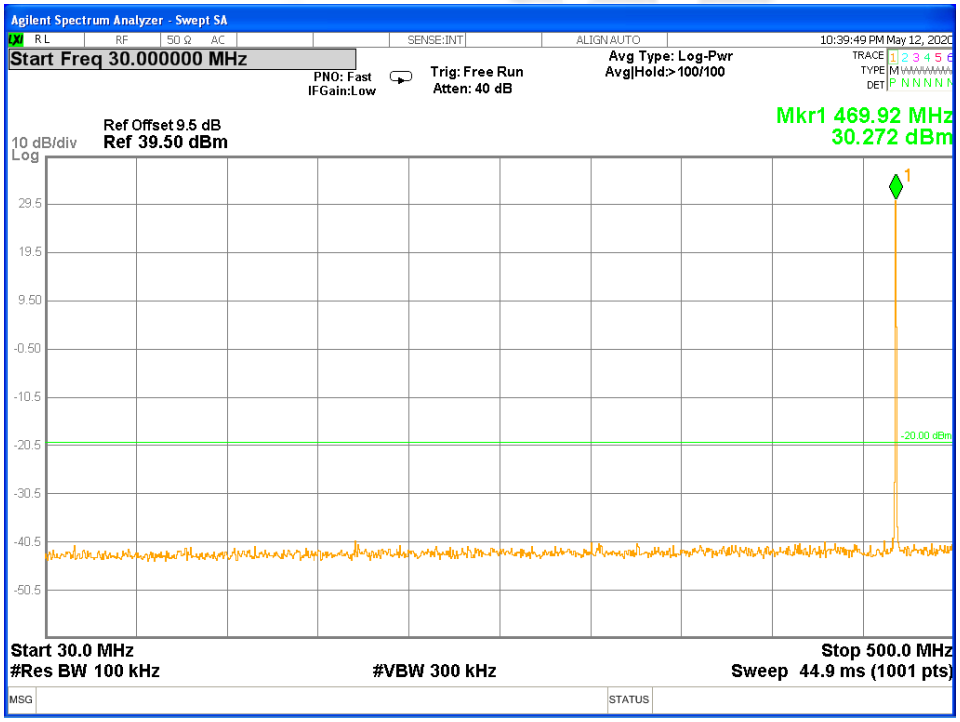


500M-1G

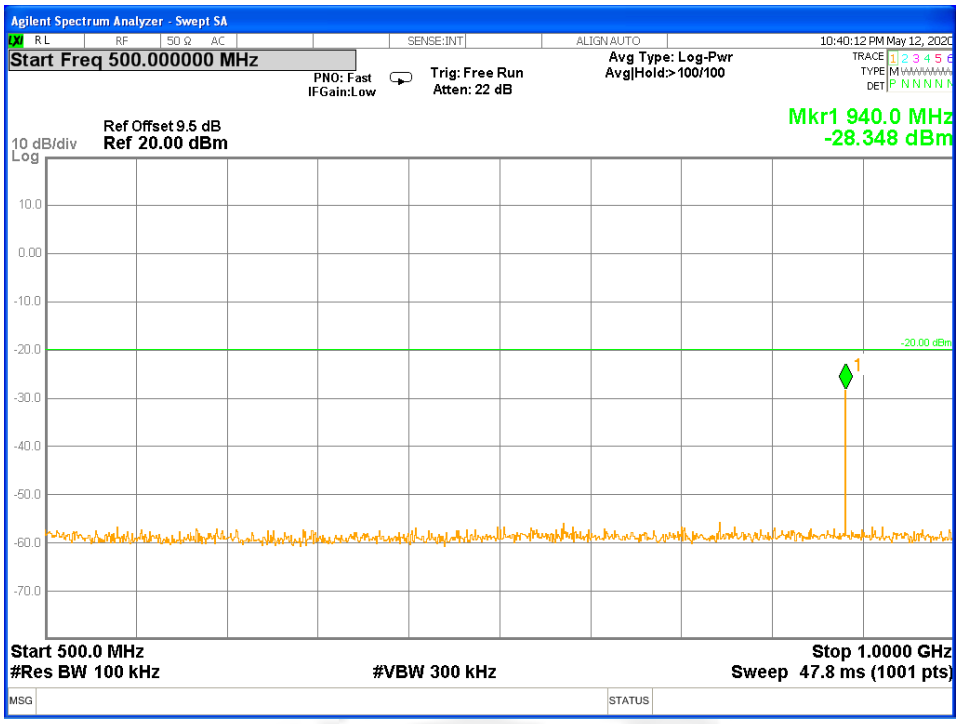


1G-5G

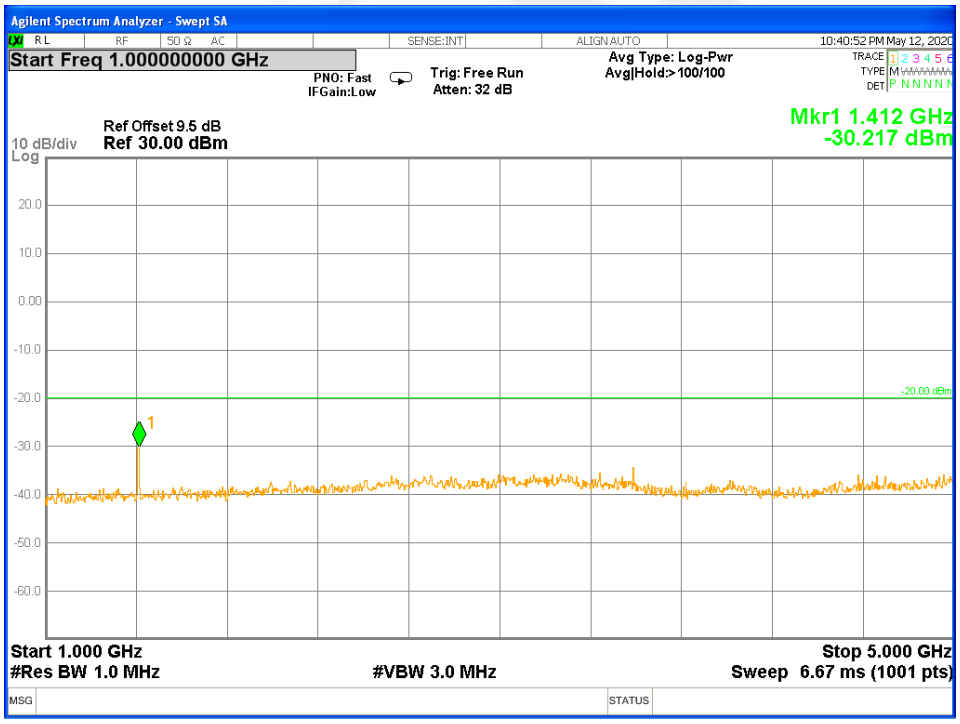
CH 1599 Model 4



30M-500M


Agilent Spectrum Analyzer - Swept SA
Start Freq 500.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 22 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:40:12 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 20.00 dBm
Mkr1 940.0 MHz
-28.348 dBm
-20.00 dBm
Start 500.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 47.8 ms (1001 pts)

500M-1G


Agilent Spectrum Analyzer - Swept SA
Start Freq 1.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 32 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
10:40:52 PM May 12, 2020
Ref Offset 9.5 dB
10 dB/div
Ref 30.00 dBm
Mkr1 1.412 GHz
-30.217 dBm
-20.00 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 5.000 GHz
Sweep 6.67 ms (1001 pts)

1G-5G

8. FREQUENCY STABILITY

8.1 PROVISIONS APPLICABLE

1) According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30℃ to +50℃ centigrade.

2) According to FCC Part 2 Section 2.1055 (a) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.

3) Vary primary supply voltage from 85 to 115 percent of the nominal value.

4)

		Mobile stations	
Frequency range (MHz)	**Fixed and base stations**	**Over 2 watts output power**	**2 watts or less output power**
Below 25	[1 2 3]100	100	200
25-50	20	20	50
72-76	5		50
150-174	[5 11]5	[6]5	[4 6]50
216-220	1.0		1.0
220-222[12]	0.1	1.5	1.5
421-512	[7 11 14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928[13]	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	[9]300	300	300
Above 2450[10]			

8.2 MEASUREMENT PROCEDURE

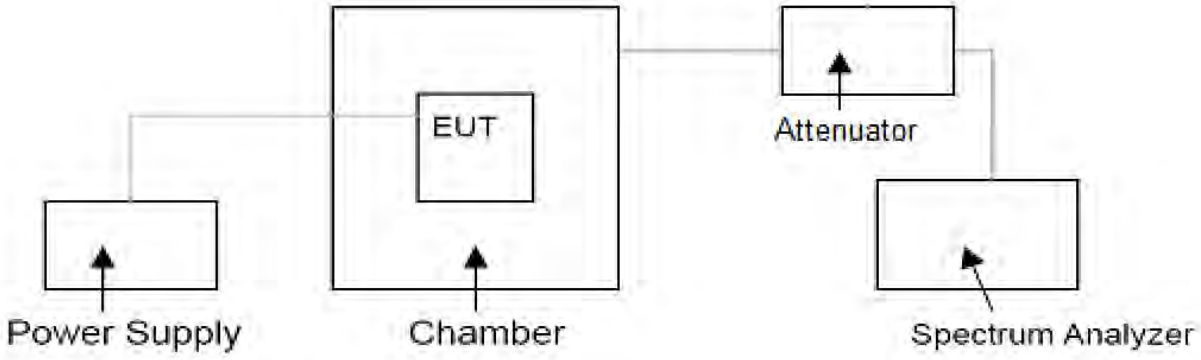
a. The EUT was connected to the spectrum analyzer through sufficent attenuation.

b. The EUT was set in the climate chamber and connected to an external DC power supply

c. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded.

d For Frequency stability Vs. Voltage the EUT was connected to a DC power supply and the voltage was adjusted in the required ranges. The result was recorded.

8.3 TEST SETUP BLOCK DIAGRAM



8.4 TEST RESULT

CH 1 Mode 1

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	450.0125	450.0125	0.089	2.5ppm	PASS
-20	450.0125	450.0126	0.133		
-10	450.0125	450.0126	0.222		
0	450.0125	450.0126	0.178		
10	450.0125	450.0126	0.267		
20	450.0125	450.0127	0.444		
30	450.0125	450.0126	0.289		
40	450.0125	450.0127	0.422		
50	450.0125	450.0126	0.222		

CH 800 Mode 1

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	460.0000	460.0001	0.174	2.5ppm	PASS
-20	460.0000	460.0001	0.109		
-10	460.0000	460.0000	0.065		
0	460.0000	460.0001	0.196		
10	460.0000	460.0001	0.217		
20	460.0000	460.0000	0.026		
30	460.0000	460.0002	0.326		
40	460.0000	460.0002	0.391		
50	460.0000	460.0002	0.457		

CH 1599 Mode 1

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	469.9875	469.9876	0.234	2.5ppm	PASS
-20	469.9875	469.9876	0.277		
-10	469.9875	469.9877	0.383		
0	469.9875	469.9877	0.319		
10	469.9875	469.9877	0.426		
20	469.9875	469.9876	0.170		
30	469.9875	469.9876	0.191		
40	469.9875	469.9876	0.213		
50	469.9875	469.9877	0.404		

CH 1 Mode 2

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	450.0125	450.0126	0.200	2.5ppm	PASS
-20	450.0125	450.0126	0.222		
-10	450.0125	450.0126	0.111		
0	450.0125	450.0125	0.067		
10	450.0125	450.0126	0.156		
20	450.0125	450.0125	0.000		
30	450.0125	450.0126	0.289		
40	450.0125	450.0127	0.378		
50	450.0125	450.0127	0.356		

CH 800 Mode 2

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	460.0000	460.0001	0.217	2.5ppm	PASS
-20	460.0000	460.0003	0.652		
-10	460.0000	460.0001	0.217		
0	460.0000	460.0001	0.174		
10	460.0000	460.0001	0.152		
20	460.0000	460.0002	0.435		
30	460.0000	460.0001	0.130		
40	460.0000	460.0003	0.652		
50	460.0000	460.0002	0.435		

CH 1599 Mode 2

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	469.9875	469.9876	0.234	2.5ppm	PASS
-20	469.9875	469.9877	0.404		
-10	469.9875	469.9876	0.277		
0	469.9875	469.9877	0.340		
10	469.9875	469.9877	0.319		
20	469.9875	469.9876	0.213		
30	469.9875	469.9876	0.213		
40	469.9875	469.9877	0.426		
50	469.9875	469.9877	0.404		

CH 1 Mode 3

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	450.0125	450.0135	2.222	2.5ppm	PASS
-20	450.0125	450.0133	1.778		
-10	450.0125	450.0132	1.556		
0	450.0125	450.0133	1.778		
10	450.0125	450.0133	1.778		
20	450.0125	450.0132	1.556		
30	450.0125	450.0136	2.444		
40	450.0125	450.0133	1.778		
50	450.0125	450.0136	2.444		

CH 800 Mode 3

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	460.0000	460.0008	1.739	2.5ppm	PASS
-20	460.0000	460.0007	1.522		
-10	460.0000	460.0006	1.304		
0	460.0000	460.0005	1.087		
10	460.0000	460.0007	1.522		
20	460.0000	460.0008	1.739		
30	460.0000	460.0008	1.739		
40	460.0000	460.0009	1.957		
50	460.0000	460.0010	2.174		

CH 1599 Mode 3

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	469.9875	469.9886	2.340	2.5ppm	PASS
-20	469.9875	469.9885	2.128		
-10	469.9875	469.9884	1.915		
0	469.9875	469.9885	2.128		
10	469.9875	469.9883	1.702		
20	469.9875	469.9884	1.915		
30	469.9875	469.9881	1.277		
40	469.9875	469.9886	2.340		
50	469.9875	469.9886	2.340		

CH 1 Mode 4

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	450.0125	450.0133	1.778	2.5ppm	PASS
-20	450.0125	450.0133	1.778		
-10	450.0125	450.0132	1.556		
0	450.0125	450.0132	1.556		
10	450.0125	450.0131	1.333		
20	450.0125	450.0132	1.556		
30	450.0125	450.0134	2.000		
40	450.0125	450.0135	2.222		
50	450.0125	450.0135	2.222		

CH 800 Mode 4

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	460.0000	460.0009	1.957	2.5ppm	PASS
-20	460.0000	460.0008	1.739		
-10	460.0000	460.0008	1.739		
0	460.0000	460.0009	1.957		
10	460.0000	460.0008	1.739		
20	460.0000	460.0007	1.522		
30	460.0000	460.0010	2.174		
40	460.0000	460.0010	2.174		
50	460.0000	460.0010	2.174		

CH 1599 Mode 4

Condition (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	469.9875	469.9886	2.340	2.5ppm	PASS
-20	469.9875	469.9884	1.915		
-10	469.9875	469.9885	2.128		
0	469.9875	469.9883	1.702		
10	469.9875	469.9886	2.340		
20	469.9875	469.9884	1.915		
30	469.9875	469.9883	1.702		
40	469.9875	469.9881	1.277		
50	469.9875	469.9880	1.064		

9. TRANSMITTER FREQUENCY BEHAVIOR

9.1 PROVISIONS APPLICABLE

Section 90.214

Transient frequencies must be within the maximum frequency difference limits during the time intervals indicated:

Time intervals [1, 2]	Maximum frequency difference [3]	All equipment	
		150 to 174 MHz	421 to 512MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 KHz Channels			
t_1 [4]	± 25.0 KHz	5.0 ms	10.0 ms
t_2	± 12.5 KHz	20.0 ms	25.0 ms
t_3 [4]	± 25.0 KHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 KHz Channels			
t_1 [4]	± 12.5 KHz	5.0 ms	10.0 ms
t_2	± 6.25 KHz	20.0 ms	25.0 ms
t_3 [4]	± 12.5 KHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 KHz Channels			
t_1 [4]	±6.25 KHz	5.0 ms	10.0 ms
t_2	±3.125 KHz	20.0 ms	25.0 ms
t_3 [4]	±6.25 KHz	5.0 ms	10.0 ms

1. t_{on} is the instant when a 1 KHz test signal is completely suppressed, including any capture time due to phasing.
   t_1 is the time period immediately following t_{on}.
   t_2 is the time period immediately following t_1.
   t_3 is the time period from the instant when the transmitter is turned off until t_{off}.
   t_{off} is the instant when the 1 KHz test signal starts to rise.
2. During the time from the end of t_2 to the beginning of t_3, the frequency difference must not exceed the limits specified in § 90.213.
3. Difference between the actual transmitter frequency and the assigned transmitter frequency.
4. If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

9.2 MEASUREMENT PROCEDURE

Use Digital portable radio which manufactured by VictelGlobal Communications Corporation

a. Limited which uses same protocol as the DUT connect to RX antenna by 20Att in order to avoid damaging DUT;

b. Connect DUT into Test discriminator and Storage Oscilloscope and keep DUT stats ON;

c. Inut 1KHz signal into digital portable radio;

d Set the modulation domain analyzer to trigger on the rising edge of the waveform in order to capture a single-shot turn-on of the transmitter signals;

e Keep the digital protable radio in OFF state and Key the PTT of digital portable radio;

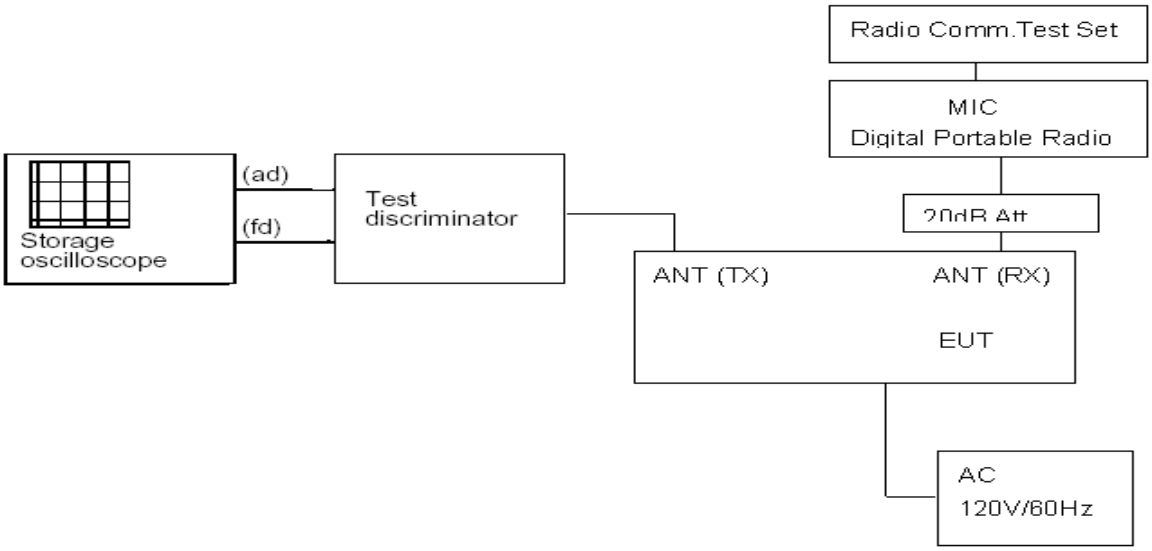
f Observe the stored oscilloscope of modulation domain analyzer.The signal trace shall be maintained within the allowable limits during the periods t_1 and t_2,and shall also remain within limits following t_2;

g Adjust the modulation domain anzlyzer to trigger on the falling edge of the transmitter waveform in order to capture a single-shot turn-off transmitter of the transmitter signal.

h Keep the digital portable radio in ON state and Unkey the PTT of digital portable radio;

f Observe the stored oscilloscope of modulation domain analyzer.The signal trace shall be maintained within the allowable limits during the period t_3

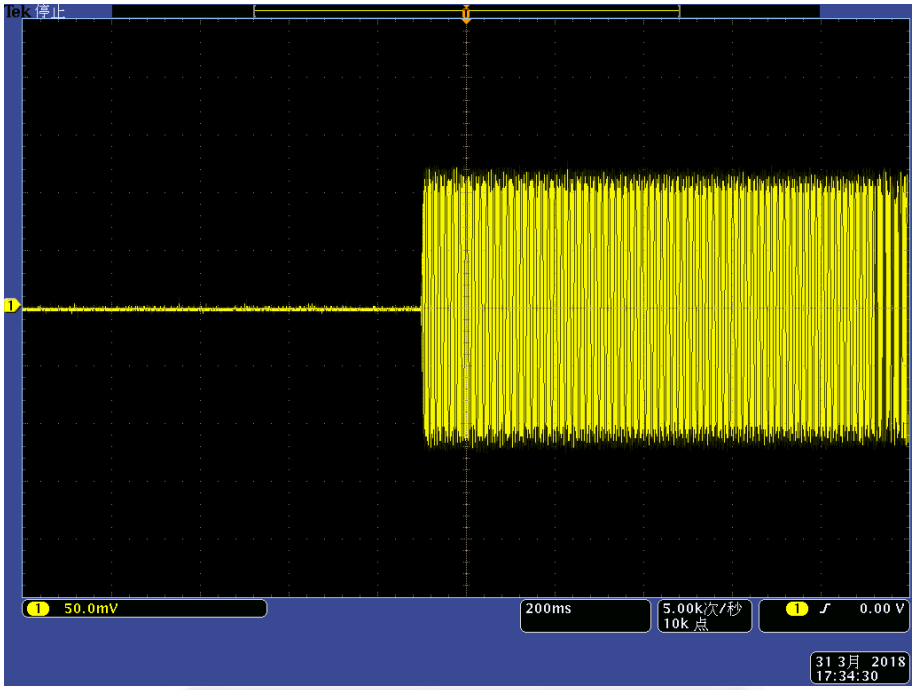
9.3 TEST SETUP BLOCK DIAGRAM



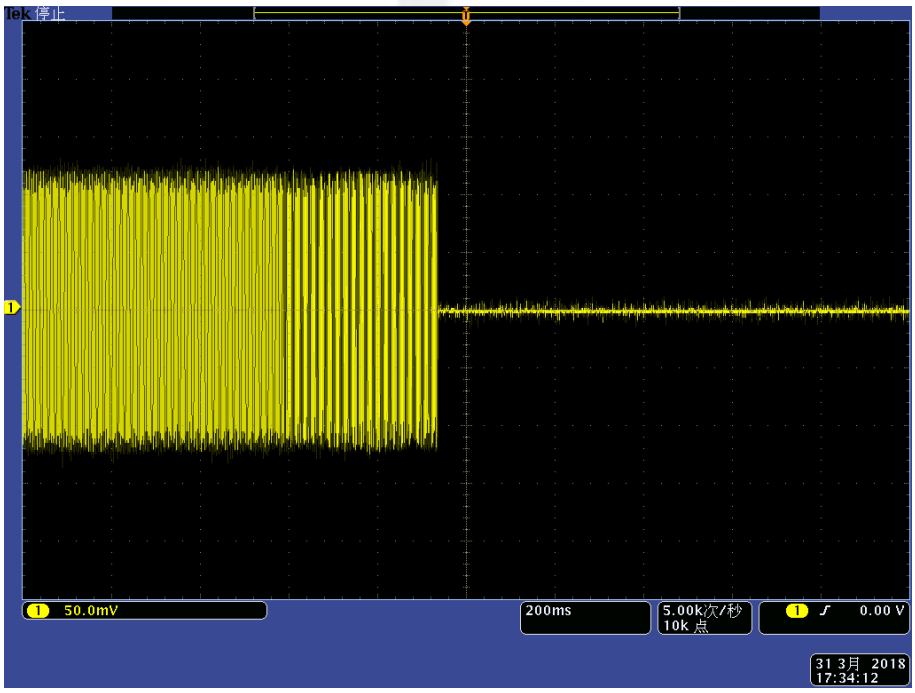
9.4 TEST RESULT

Mode 1

Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------Off – On

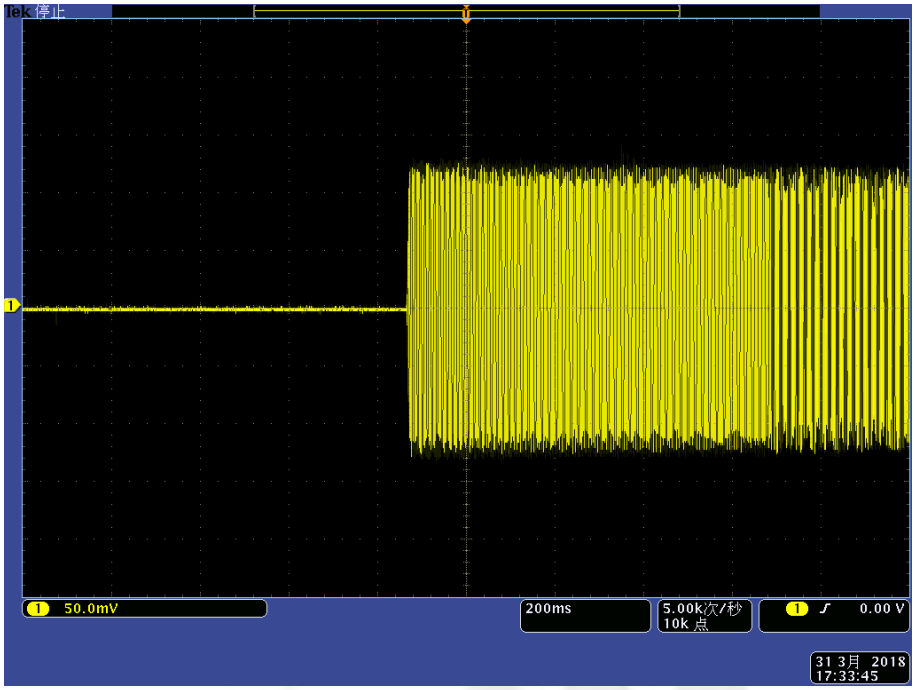


Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------On – Off

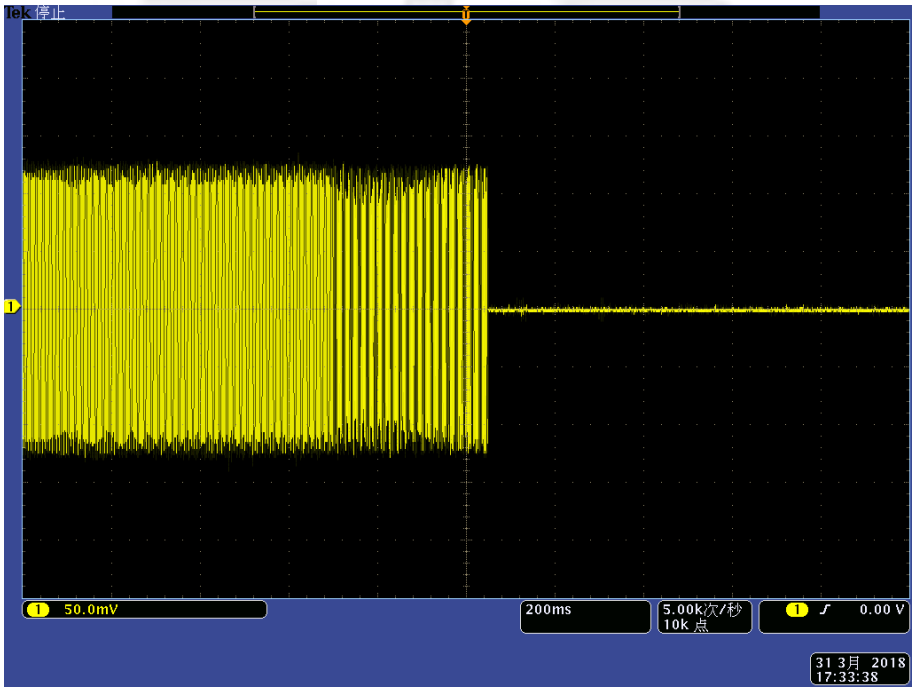


Mode 2

Transmitter Frequency Behaviour @ 25.0 KHz Channel Separation------Off – On

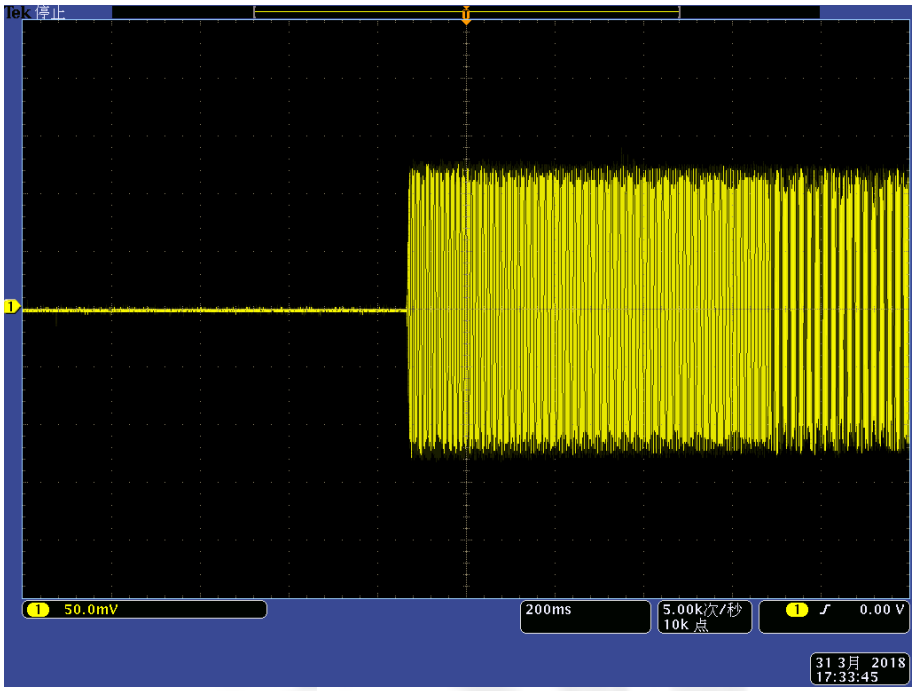


Transmitter Frequency Behaviour @ 25.0 KHz Channel Separation------On – Off

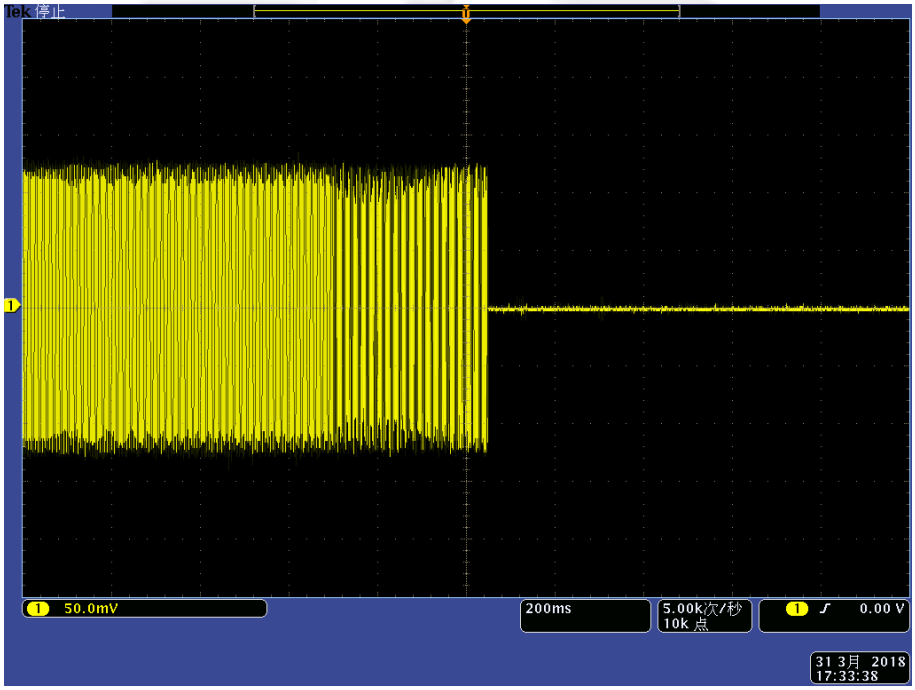


Mode 3

Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------Off – On

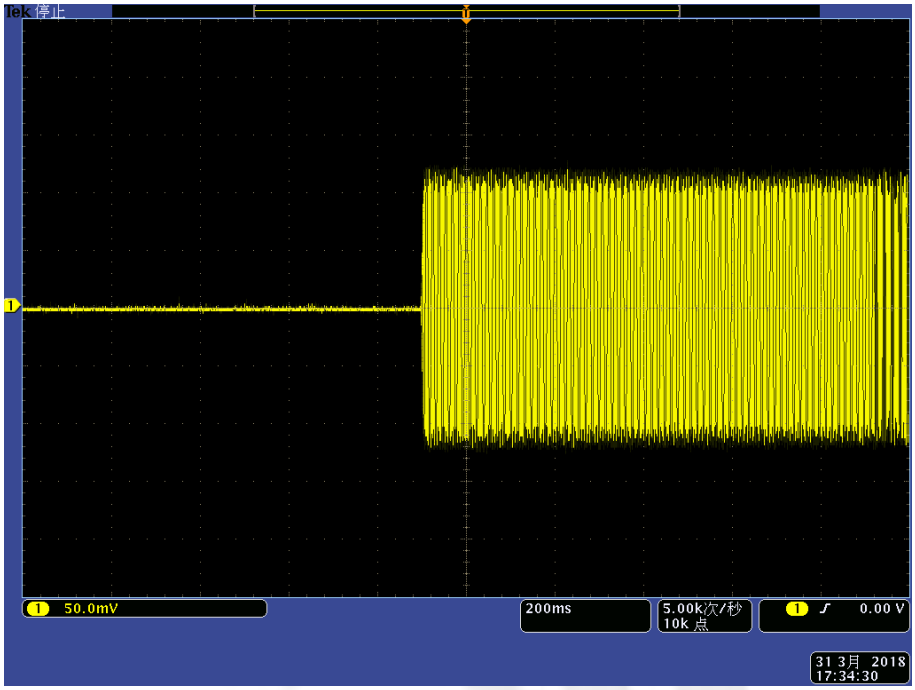


Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------On – Off

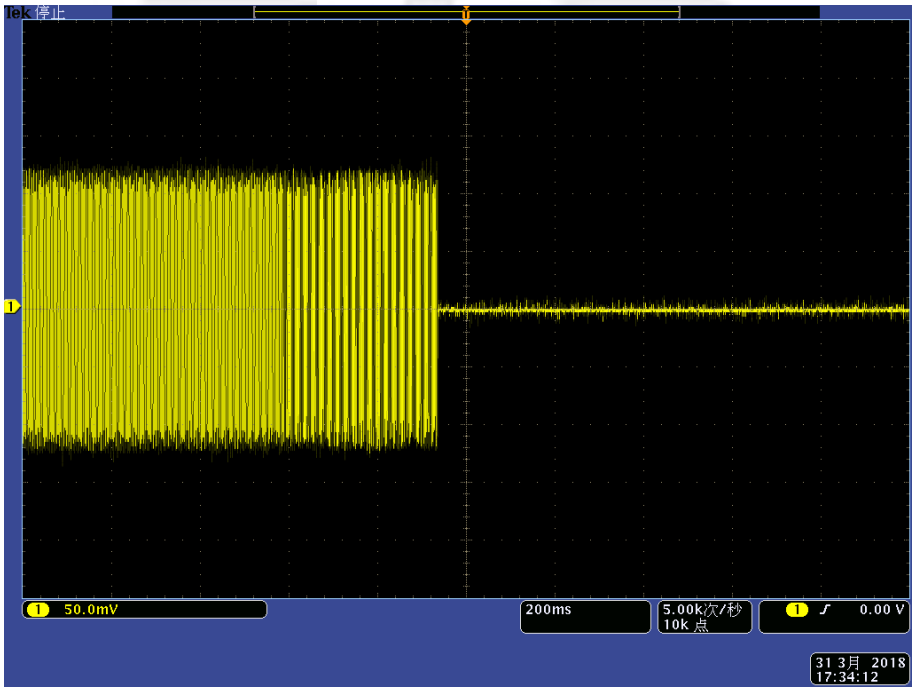


Mode 4

Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------Off – On



Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------On – Off



10. MODULATION CHARACTERISTIC

10.1 LIMIT

FCC Part 2.1047

(a) Equipment which utilizes voice modulated communication show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

(b) Equipment which employs modulation limiting,a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

10.2 TEST PROCEDURE

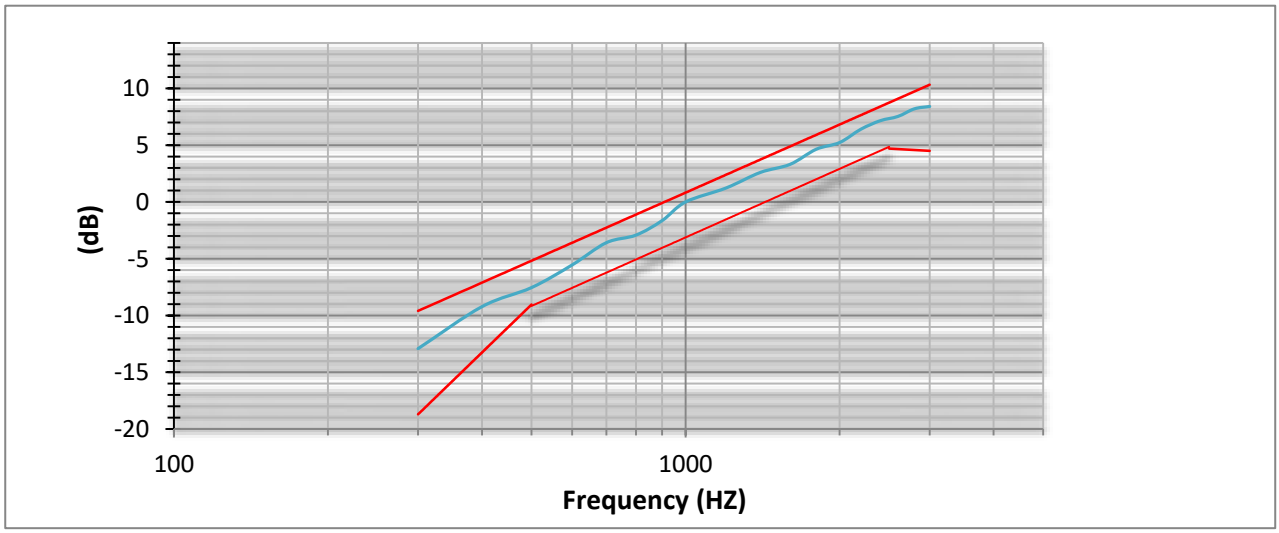
The test procedure please reference ANSI C63.26-2015.

10.3 TEST RESULT

10.3.1 Audio Frequency Response

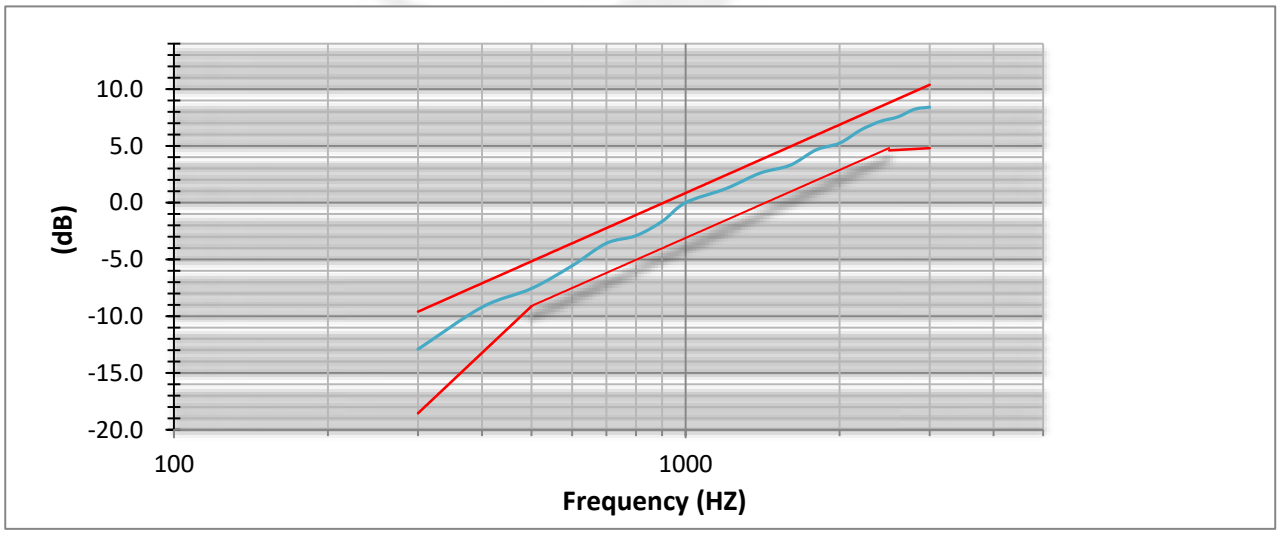
(Modulation Type:FM,Channel Separetion:12.5kHz)

Audio Frequency	Audio Frequency Response	Result
(Hz)	(dB)	PASS
300	-12.92	
400	-9.22	
500	-7.54	
600	-5.55	
700	-3.59	
800	-2.92	
900	-1.64	
1000	0.00	
1200	1.23	
1400	2.60	
1600	3.31	
1800	4.64	
2000	5.23	
2200	6.4	
2400	7.15	
2600	7.53	
2800	8.2	
3000	8.41	



(Modulation Type:4FSK,Channel Separetion:12.5kHz)

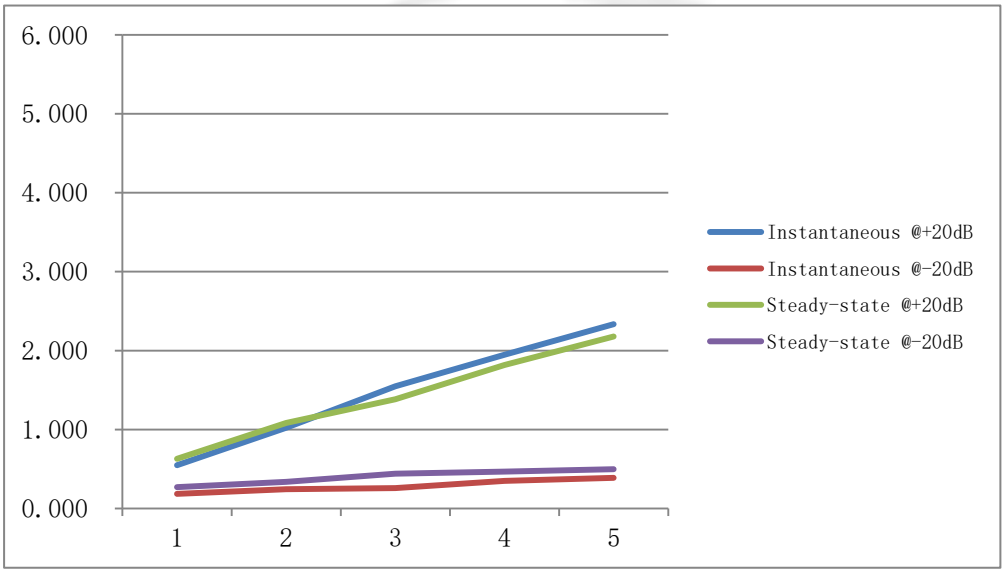
Audio Frequency	Audio Frequency Response	Result
(Hz)	(dB)	PASS
300	-12.91	
400	-9.21	
500	-7.56	
600	-5.56	
700	-3.58	
800	-2.91	
900	-1.65	
1000	0.00	
1200	1.24	
1400	2.61	
1600	3.29	
1800	4.65	
2000	5.24	
2200	6.4	
2400	7.15	
2600	7.55	
2800	8.22	
3000	8.41	



10.3.2 Modulation Limiting

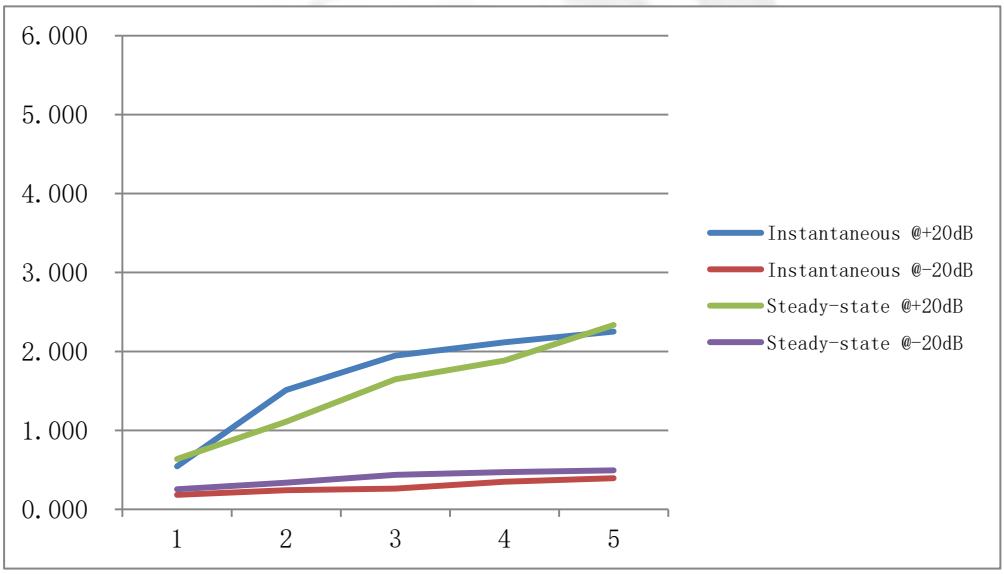
(Modulation Type:FM,Channel Separetion:12.5kHz)

Audio Frequency	Instantaneous		Steady-state		Limit (kHz)	Result
(Hz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)		
300	0.548	0.185	0.629	0.271	±2.5	Pass
1000	1.022	0.243	1.084	0.338		
1500	1.547	0.258	1.384	0.441		
2500	1.948	0.349	1.817	0.466		
3000	2.334	0.388	2.178	0.497		



(Modulation Type:4FSK,Channel Separetion:12.5kHz)

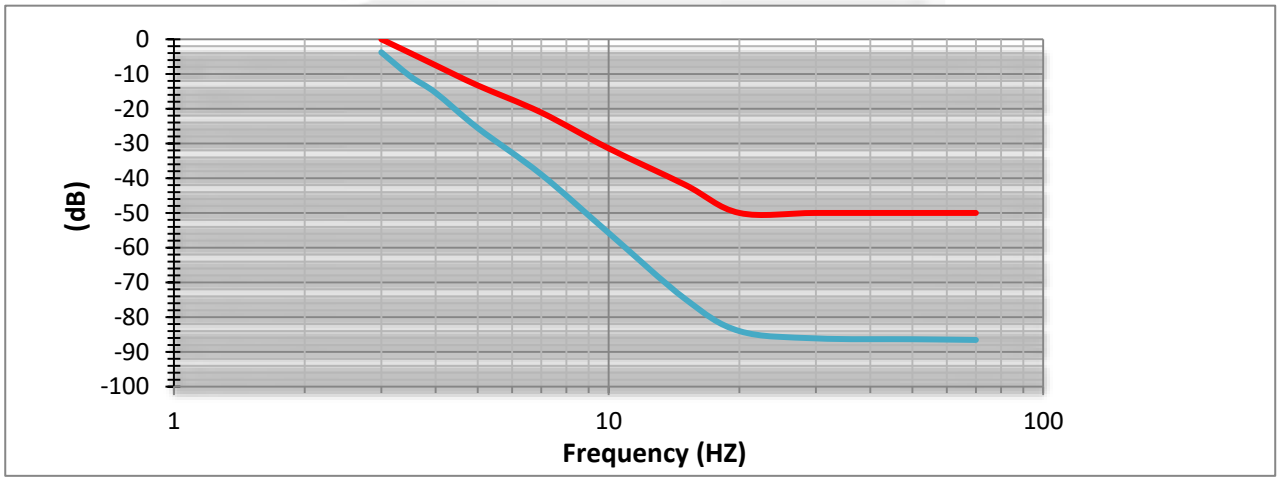
Audio Frequency	Instantaneous		Steady-state		Limit (kHz)	Result
(Hz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)		
300	0.543	0.183	0.637	0.255	±2.5	Pass
1000	1.512	0.241	1.109	0.337		
1500	1.948	0.262	1.648	0.436		
2500	2.116	0.349	1.884	0.471		
3000	2.251	0.393	2.334	0.494		



10.3.3 Audio Low Pass Filter Response

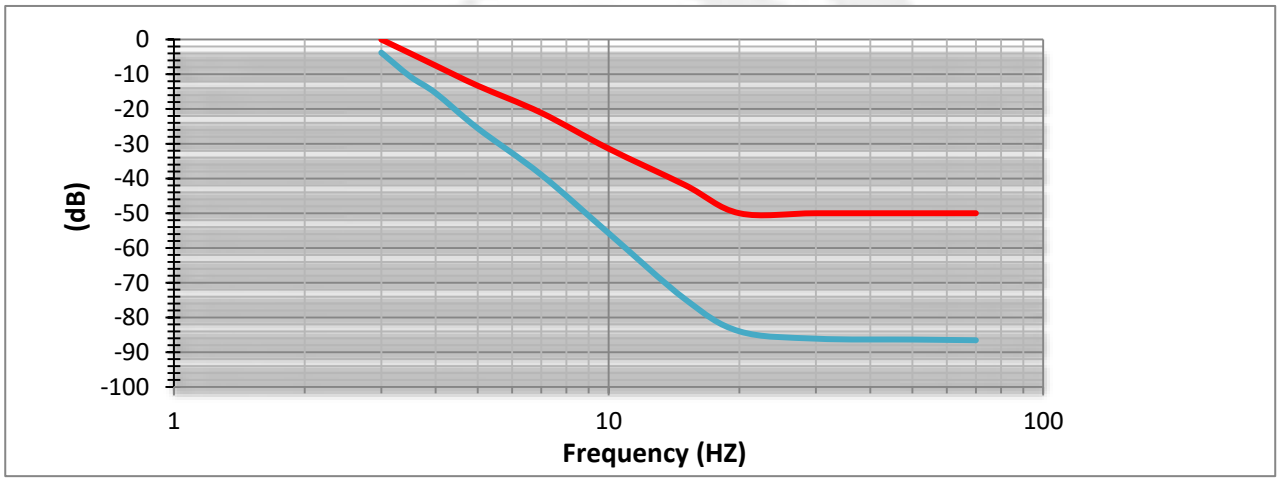
(Modulation Type:FM,Channel Separetion:12.5kHz)

Audio Frequency (KHz)	Response Attenuation (dB)	Limit	Result
3	-3.77	0	Pass
3.5	-10.69	-4	
4	-15.41	-7.5	
5	-25.56	-13.3	
7	-38.93	-21.1	
10	-55.74	-31.4	
15	-74.74	-41.9	
20	-84.00	-50	
30	-86.11	-50	
50	-86.35	-50	
70	-86.56	-50	



(Modulation Type:4FSK,Channel Separetion:12.5kHz)

Audio Frequency (KHz)	Response Attenuation (dB)	Limit	Result
3	-3.78	0	Pass
3.5	-10.69	-4	
4	-15.41	-7.5	
5	-25.56	-13.3	
7	-38.93	-21.1	
10	-55.73	-31.4	
15	-74.74	-41.9	
20	-83.99	-50	
30	-86.10	-50	
50	-86.36	-50	
70	-86.56	-50	



12. PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※※END OF THE REPORT※※※※※