



Test Report No.: FC130523N012



TEST REPORT

Applicant	Sam Ash Music Corporation
Address	262 Duffy Avenue Hicksville, NY 11801 United States

Manufacturer or Supplier	Sam Ash Music Corporation
Address	262 Duffy Avenue Hicksville, NY 11801 United States
Product	Concert 88 Multi Channel UHF Wireless
Brand Name	SAMSON
Model	CH88
Additional Model & Model Difference	N/A
Date of tests	May 25 ~ Jun. 21, 2013

The tests have been carried out according to the requirements of the following standards:

FCC Part 74, Subpart H (Section 74.861e)

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Glyn He
Project Engineer / EMC Department

Approved by Sam Tung
Manager / EMC Department

Date: Jun. 21, 2013

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification



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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FC130523N012	Original release	Jun. 21, 2013

1. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 74, SUBPART H (SECTION 74.861e)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
§74.861(e)(1)	Power Output Measurement	PASS	Compliant
§74.861 (e)(6) (III)	Spurious Radiated Emission	PASS	Compliant
§74.861 (e)(6) (III)	Conducted Spurious Measurement	PASS	Compliant
§74.861(e)(3,5,6)	Occupied Bandwidth	PASS	Compliant
§74.861(e)(4)	Frequency Tolerance	PASS	Compliant
§2.1047(a)(b)	Modulation Characteristics Measurement	PASS	Compliant

2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44dB
Radiated emissions	30MHz ~ 200MHz	3.19dB
	200MHz ~1000MHz	3.21dB
	1GHz ~ 18GHz	2.26dB
	18GHz ~ 40GHz	1.94dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Concert 88 Multi Channel UHF Wireless
MODEL NO.	CH88
FCC ID	CCRCH88
NOMINAL VOLTAGE	3V DC (Battery)
MODULATION TYPE	FM
OPERATING FREQUENCY	542.125 ~ 565.975MHz 638.125 ~ 661.975MHz
ANTENNA TYPE	Integral Antenna
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

NOTE:

For the tests, the input gain control of EUT had been tested with highest level for each test.

3.2 DESCRIPTION OF TEST MODES

CHANNEL	FREQUENCY
Low	542.125MHz
Middle	554.000MHz
High	565.975MHz

CHANNEL	FREQUENCY
Low	638.125MHz
Middle	650.000MHz
High	661.975MHz



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3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 74, Subpart H (74.861e)

TIA-603-C-2009

All test items have been performed and recorded as per the above standards.

3.4 DESCRIPTION OF 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.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DC Power Supply	LWDQGS	PS-6403D	010970922	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	AC Cable---Unshielded----1.5M

4. TEST TYPES AND RESULTS

4.1 CONDUCTED POWER OUTPUT MEASUREMENT

4.1.1 LIMITS OF CONDUCTED POWER OUTPUT MEASUREMENT

According to FCC Part 74 Section 74.861(e) (1): The power of the measured unmodulated carrier power at the output of the transmitter power amplifier may not exceed 250mW

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Digital Multimeter FLUKE	15B	A1220010DG	Oct. 31,12	Oct. 30,13
Power Meter Anritsu	ML2495A	1139001	Nov. 04,12	Nov. 03,13

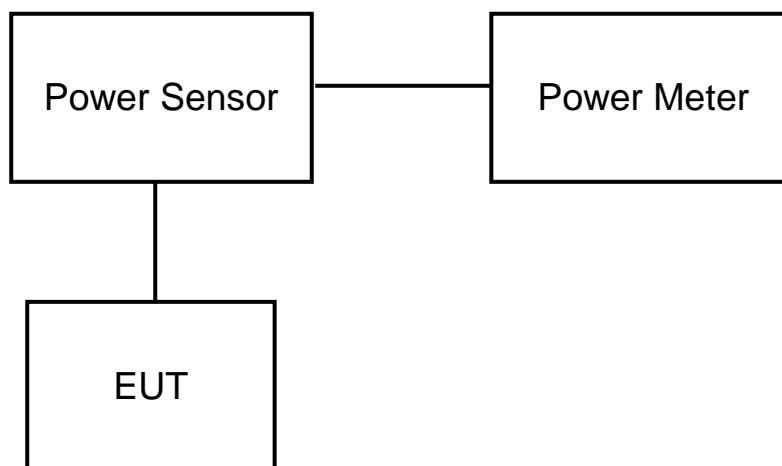
NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.
2. The test was performed in Dongguan Chamber RF.

4.1.3 TEST PROCEDURES

According to the clause 2.2.1.2 of TIA – 603 – C

- a) Connect the equipment as illustrated.
- b) Measure the transmitter output power during the defined duty cycle (see 1.3.2). Correct for all losses in the RF path (The duty cycle is 100% for this product, Correction Factor is 0).
- c) The value recorded in step b) is the conducted carrier output power rating.

4.1.4 TEST SETUP



4.1.5 EUT OPERATING CONDITIONS

- a. Placed the EUT on the testing table.
- b. Trun on the EUT power by battery,
- c. Enable EUT under transmission condition continuously at specific channel frequency.

4.1.6 TEST RESULTS

FREQUENCY (MHz)	Output Power dBm	Output Power mW	Limit mW
542.125	9.63	9.18	250
554.000	10.35	10.84	250
565.975	11.05	12.74	250
638.125	10.44	11.07	250
650.000	9.80	9.55	250
661.975	8.56	7.18	250

4.2 SPURIOUS RADIATION MEASUREMENT

4.2.1 LIMITS OF SPURIOUS RADIATION MEASUREMENT

According to FCC 74.861(e)(6)(iii), On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43+10\text{Log}_{10}$ (mean output power in watts) dB..

4.2.2 TEST INSTRUMENTS

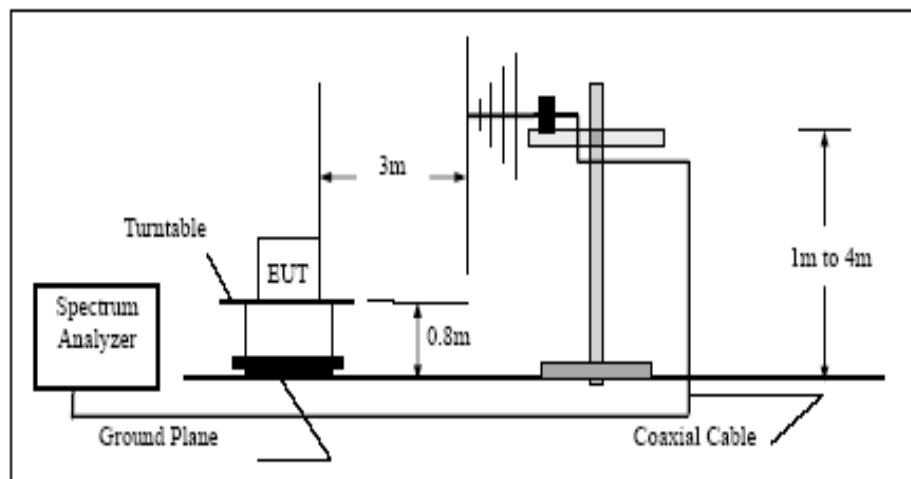
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Agilent	E4446A	MY46180622	Apr. 24,13	Apr. 23,14
EMI Test Receiver	Rohde&Schwarz	ESVD	847398/003	May 14,13	May 13,14
Bilog Antenna (25MHz-2GHz)	Teseq	CBL 6111D	27089	Jul. 16,12	Jul. 15,13
Bilog Antenna	Teseq	CBL 6111D	25757	Nov. 22,12	Nov. 21,13
Horn Antenna (1GHz -18GHz)	EMCO	3117	00062558	Oct.18,12	Oct.17,13
Pre-Amplifier (20MHz-3GHz)	EMCI	EMC 330	980095	Nov. 02,12	Nov.01,13
Pre-Amplifier (100MHz-26.5GHz)	Agilent	8449B	3008A00409	May 14,13	May 13,14
10m Semi-anechoic Chamber	CHANGLING	21.4m*12.1m*8 .8m	NSEMC006	Mar. 24,13	Mar. 23,14
Digital Multimeter	FLUKE	15B	A1220010D G	Oct. 31,12	Oct. 30,13
Test Software	ADT	ADT_Radiated _V7.6.15	N/A	N/A	N/A

- NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.
2. The test was performed in Dongguan Chamber 10m.
3. The horn antenna are used only for the measurement of emission frequency above 1GHz if tested.

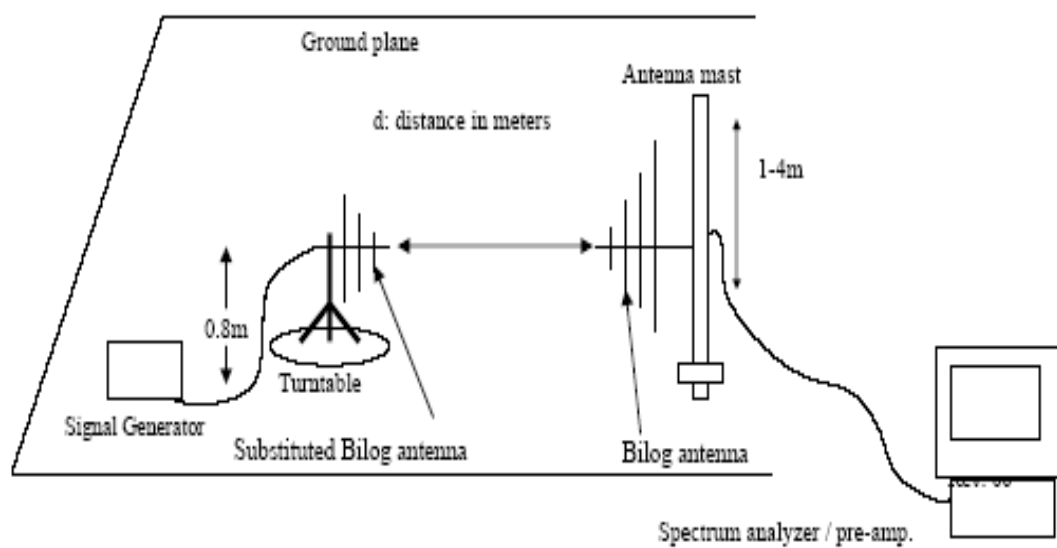
4.2.3 TEST PROCEDURE

1. On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
2. The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
3. The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
4. The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
6. The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. Replace the antenna with a proper Antenna (substitution antenna).
10. The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
11. The substitution antenna shall be connected to a calibrated signal generator.
12. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13. The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
14. The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16. The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
17. The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

4.2.4 TEST SETUP



SUBSTITUTION METHOD:



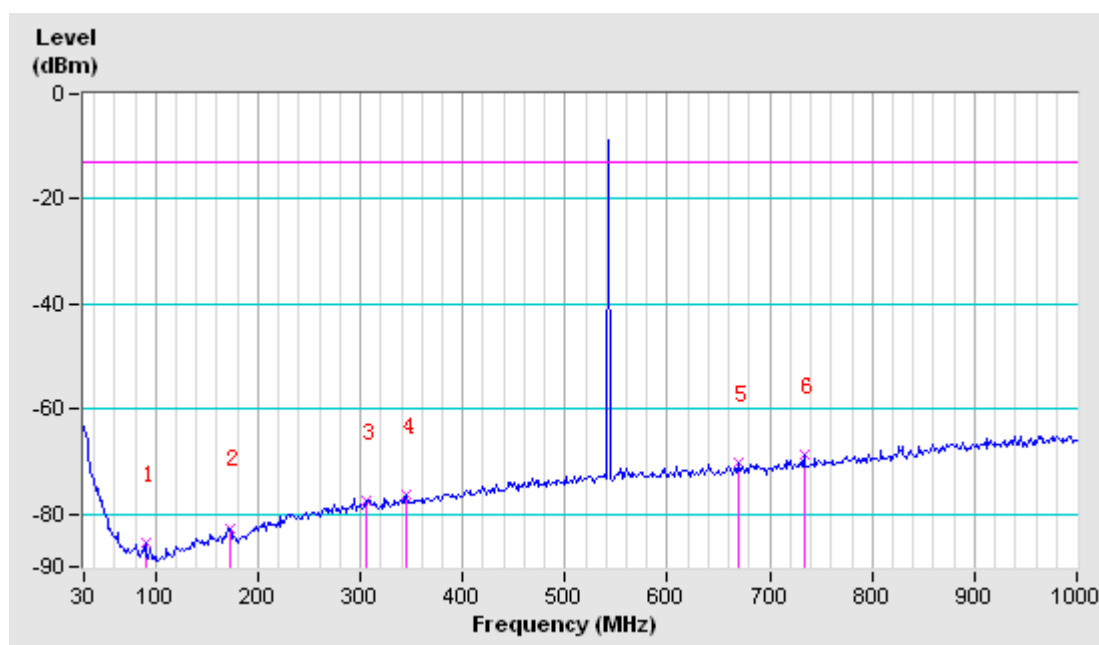
4.2.5 TEST RESULTS

BELOW 1GHz WORST-CASE DATA : 542.125MHz

SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	CH 0
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
89.82	H	-85.47	-13	-72.47
172.27	H	-82.58	-13	-69.58
304.83	H	-77.45	-13	-64.45
345.25	H	-76.45	-13	-63.45
668.58	H	-70.27	-13	-57.27
733.25	H	-68.68	-13	-55.68

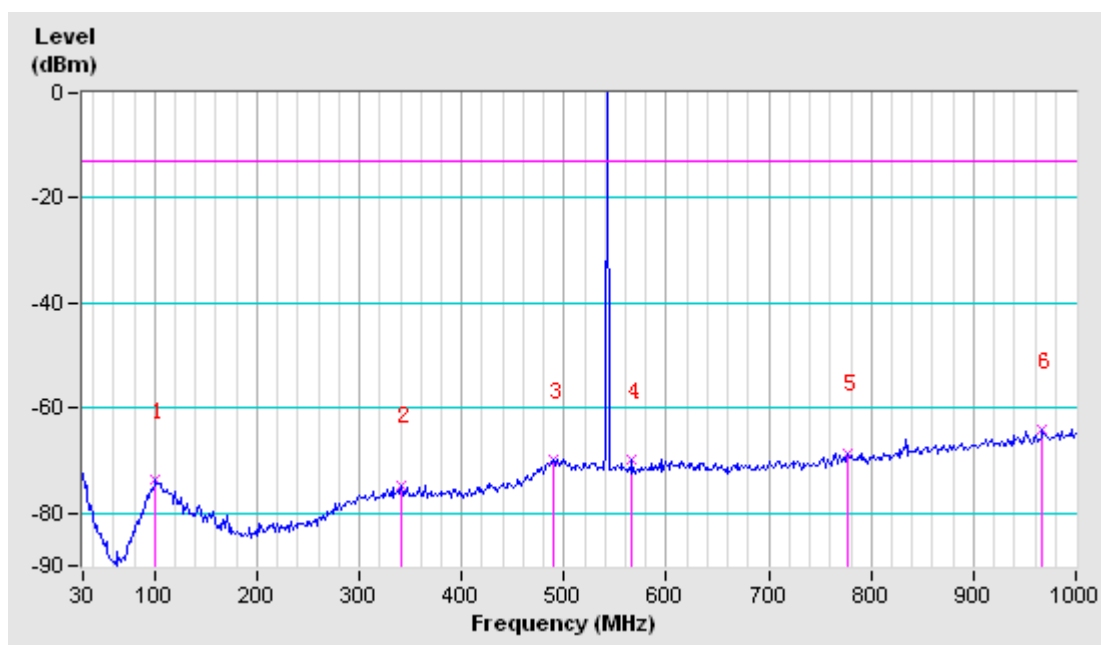
NOTE: The emission behavior belongs to narrowband spurious emission.



SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	CH 0
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
101.13	V	-73.71	-13	-60.71
340.4	V	-74.57	-13	-61.57
489.13	V	-69.89	-13	-56.89
566.73	V	-69.82	-13	-56.82
776.9	V	-68.48	-13	-55.48
967.67	V	-64.15	-13	-51.15

NOTE: The emission behavior belongs to narrowband spurious emission.

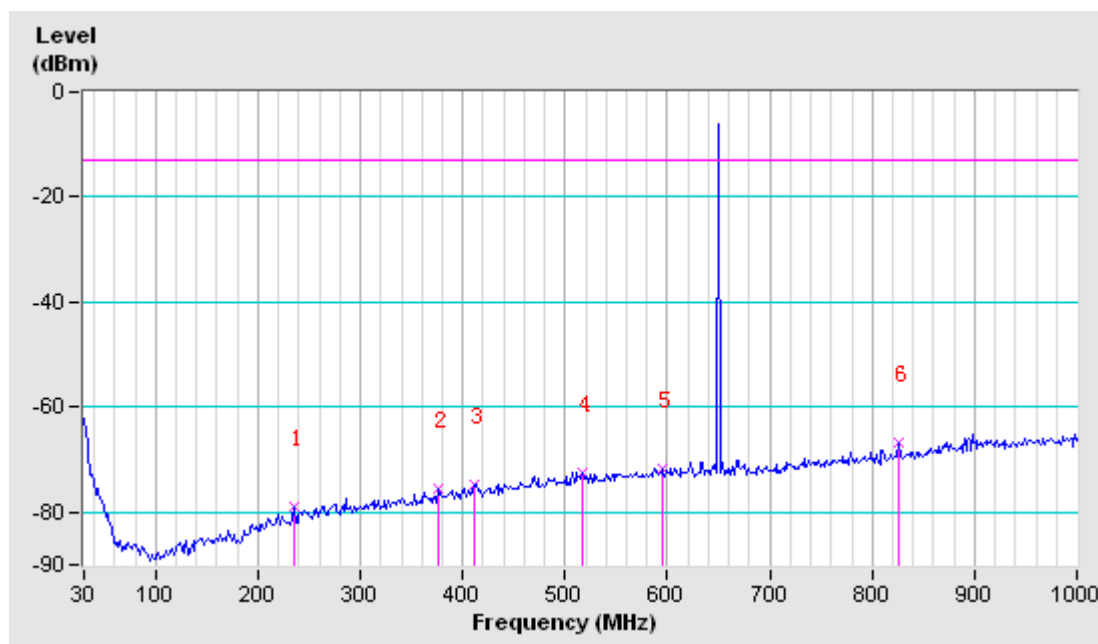


BELOW 1GHz WORST-CASE DATA : 650.000MHz

SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	CH 8
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
235.32	H	-78.86	-13	-65.86
375.97	H	-75.39	-13	-62.39
411.53	H	-74.64	-13	-61.64
516.62	H	-72.64	-13	-59.64
595.83	H	-71.58	-13	-58.58
825.4	H	-66.69	-13	-53.69

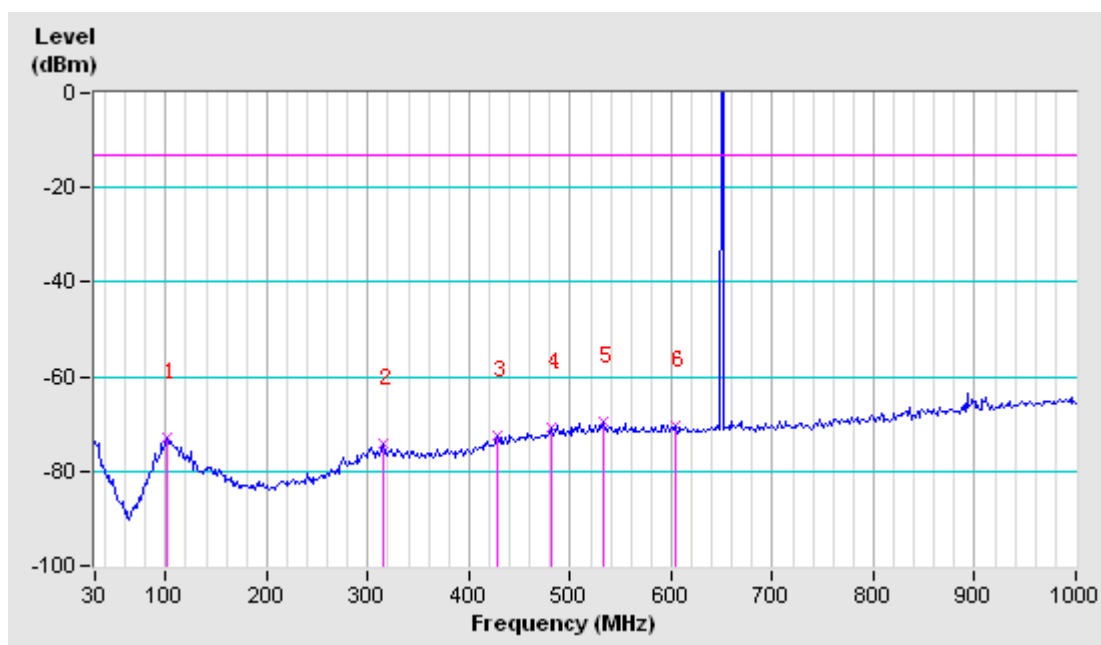
NOTE: The emission behavior belongs to narrowband spurious emission.



SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	CH 8
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SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
101.13	V	-72.94	-13	-59.94
314.53	V	-74.01	-13	-61.01
427.7	V	-72.52	-13	-59.52
481.05	V	-70.71	-13	-57.71
532.78	V	-69.48	-13	-56.48
603.92	V	-70.23	-13	-57.23

NOTE: The emission behavior belongs to narrowband spurious emission.



ABOVE 1GHz WORST-CASE DATA : 542.125MHz---565.975M

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 6GHz	OPERATING CHANNEL	0, 8, F
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SPURIOUS EMISSION LEVEL					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
0	1108.33	V	-43.14	-13.00	-30.14
	1516.67	H	-50.82	-13.00	-37.82
	1658.33	V	-47.25	-13.00	-34.25
	2058.33	H	-49.55	-13.00	-36.55
	2216.67	V	-48.94	-13.00	-35.94
	3416.67	H	-47.01	-13.00	-34.01
8	1133.33	V	-36.05	-13.00	-23.05
	1600.00	H	-51.09	-13.00	-38.09
	1700.00	V	-47.96	-13.00	-34.96
	2266.67	V	-48.72	-13.00	-35.72
	2650.00	H	-49.51	-13.00	-36.51
	3200.00	H	-47.77	-13.00	-34.77
F	1083.33	H	-51.39	-13.00	-38.39
	1083.33	V	-42.92	-13.00	-29.92
	1500.00	H	-51.78	-13.00	-38.78
	1625.00	V	-46.54	-13.00	-33.54
	2008.33	H	-48.82	-13.00	-35.82
	2166.67	V	-49.42	-13.00	-36.42

ABOVE 1GHz WORST-CASE DATA : 638.125MHz---661.975M

SPURIOUS EMISSION FREQUENCY RANGE	1GHz ~ 7GHz	OPERATING CHANNEL	0, 8, F
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SPURIOUS EMISSION LEVEL					
Channel	Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
0	1275.00	V	-36.29	-13.00	-23.29
	1283.33	H	-52.27	-13.00	-39.27
	1916.67	H	-50.88	-13.00	-37.88
	1916.67	V	-45.86	-13.00	-32.86
	2533.33	H	-49.86	-13.00	-36.86
	5108.33	V	-42.52	-13.00	-29.52
8	1141.67	H	-52.46	-13.00	-39.46
	1300.00	V	-35.21	-13.00	-22.21
	1875.00	H	-50.07	-13.00	-37.07
	1950.00	V	-46.87	-13.00	-33.87
	2425.00	H	-50.55	-13.00	-37.55
	2850.00	V	-49.49	-13.00	-36.49
F	1325.00	H	-51.36	-13.00	-38.36
	1325.00	V	-27.76	-13.00	-14.76
	1916.67	H	-50.78	-13.00	-37.78
	1983.33	V	-37.22	-13.00	-24.22
	2433.33	H	-50.42	-13.00	-37.42
	2791.67	V	-49.39	-13.00	-36.39

4.3 CONDUCTED SPURIOUS MEASUREMENT

4.3.1 LIMITS OF CONDUCTED SPURIOUS MEASUREMENT

According to FCC 74.861(e)(6)(iii), On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43+10\text{Log}_{10}$ (mean output power in watts) dB..

4.3.2 TEST INSTRUMENTS

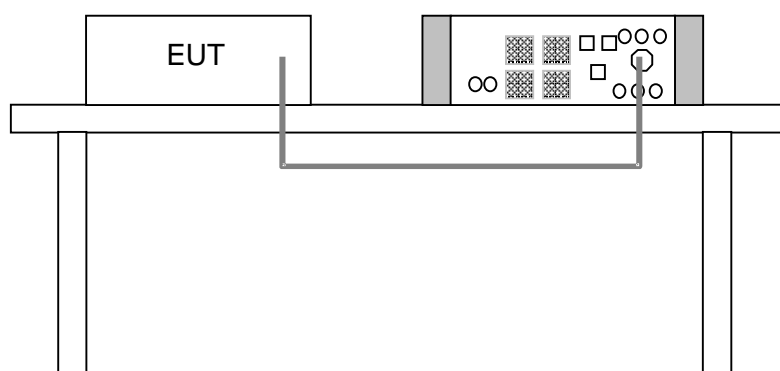
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Signal Analyzer Rohde & Schwarz	FSV7	102331	Nov. 26,12	Nov. 25,13

- NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.
2. The test was performed in Dongguan Chamber RF.

4.3.3 TEST PROCEDURE

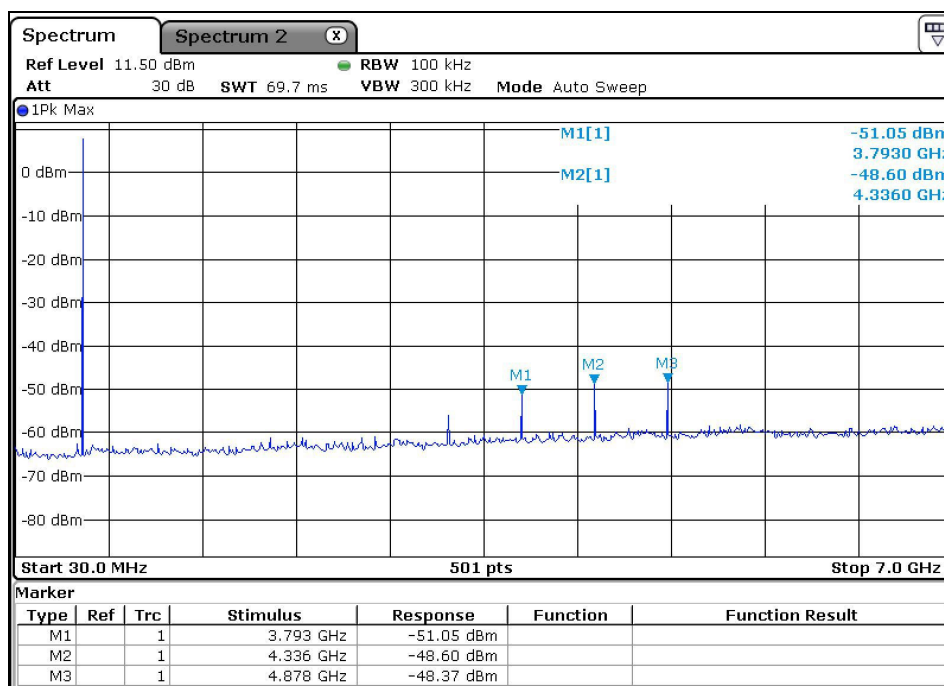
Reference to chapter FCC 2.1051.

4.3.4 TEST SETUP

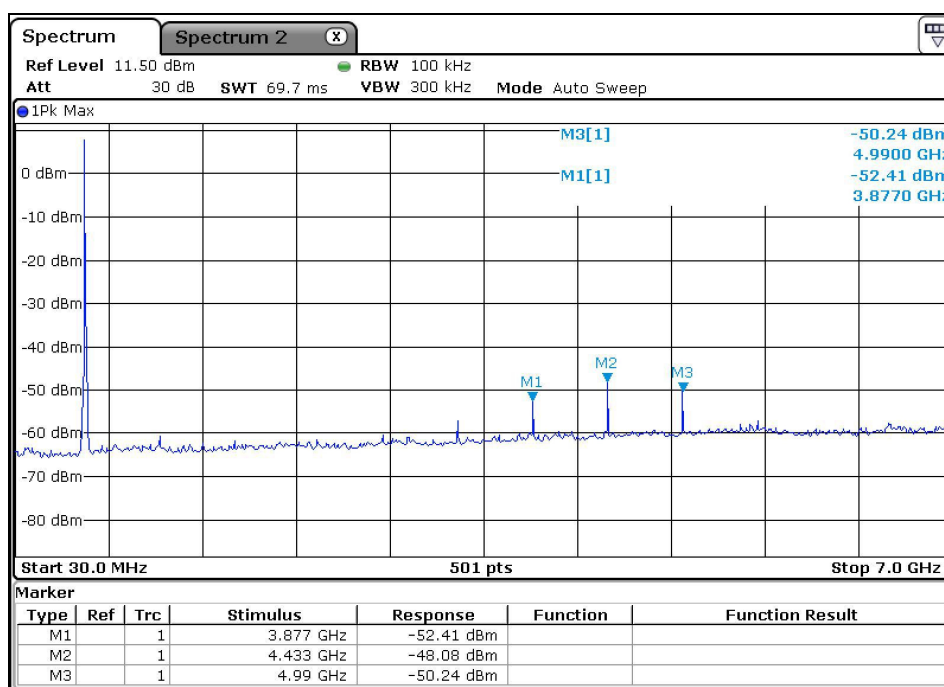


4.3.5 TEST RESULTS

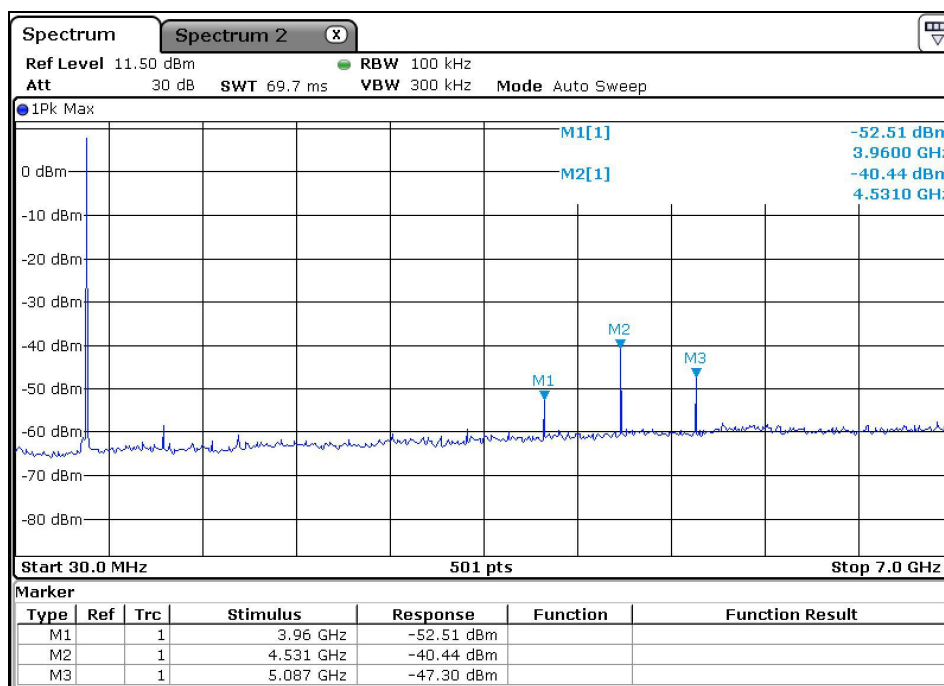
CH 0-542.125MHz



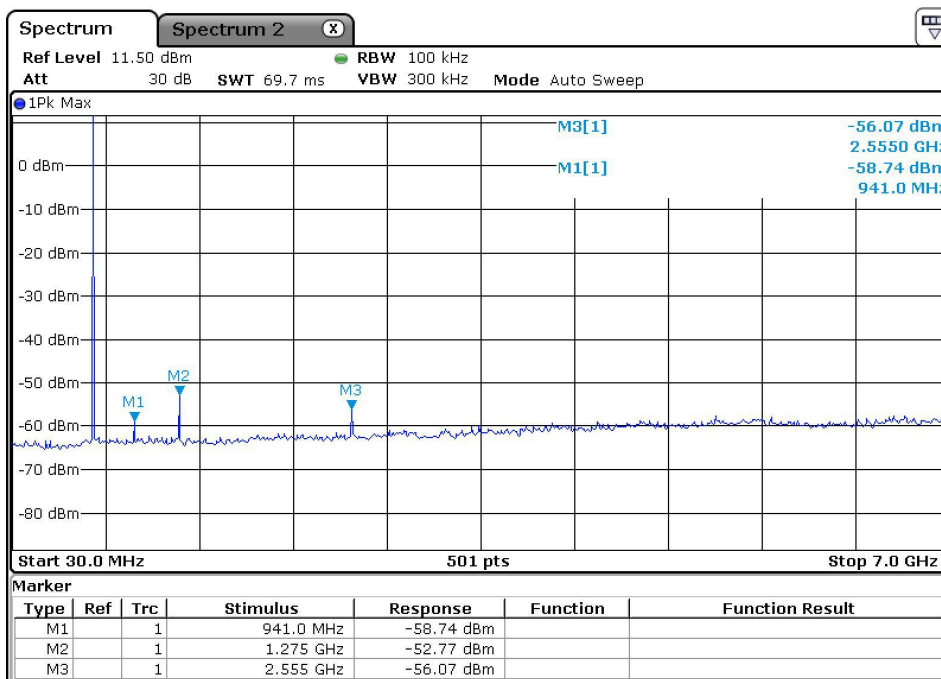
CH 8-554.000MHz



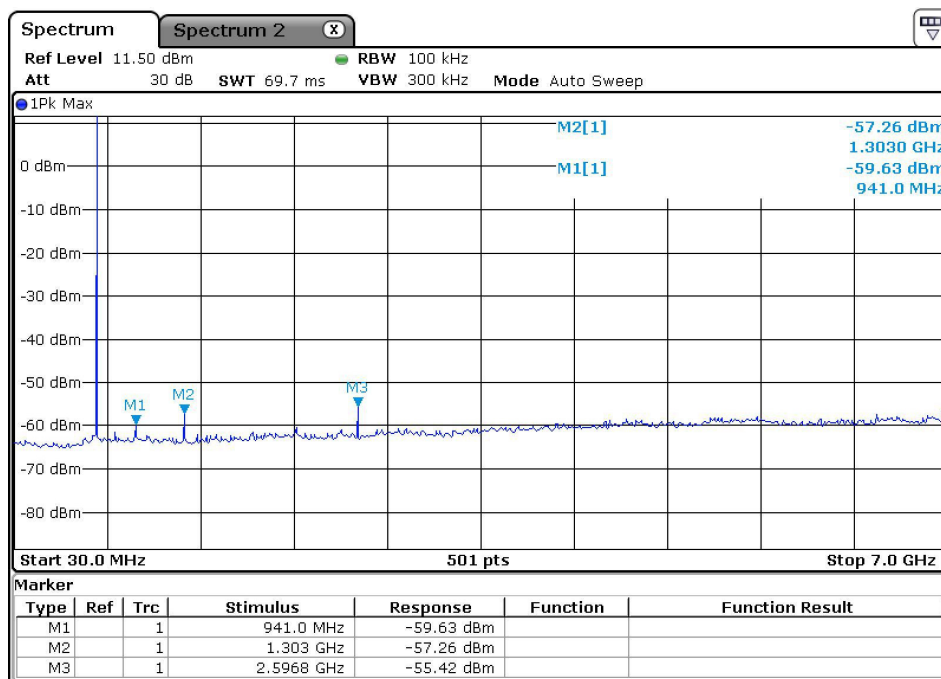
CH F-565.975MHz



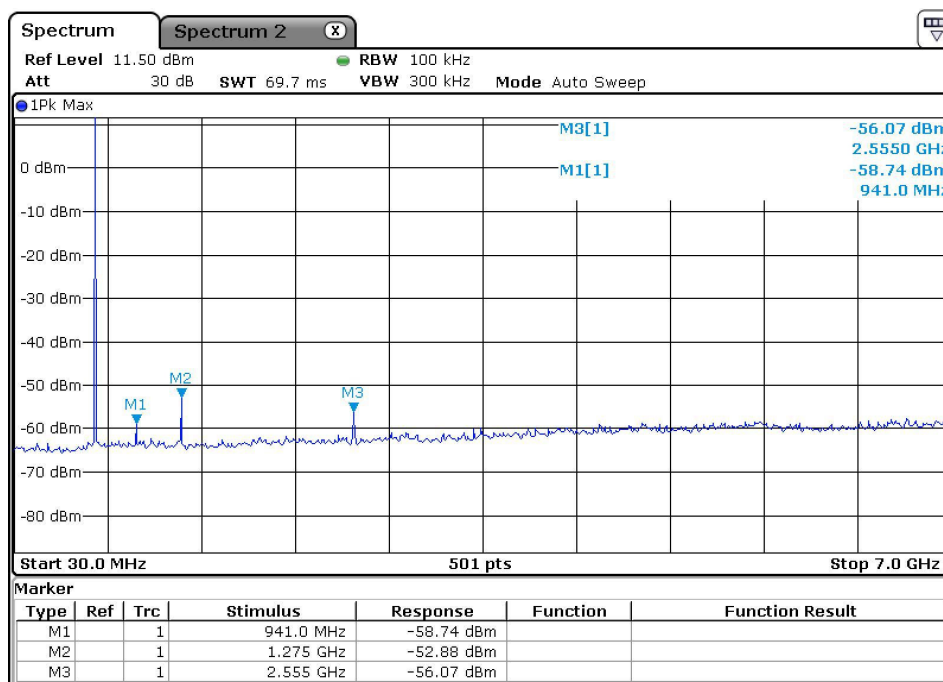
CH 0-638.125MHz



CH 8-650.000MHz



CH F-661.975MHz





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4.4 OCCUPIED BANDWIDTH

4.4.1 STANDARD APPLICABLE

According to FCC 74.861(e)(3) Any form of modulation may be used. A maximum deviation of ± 75 kHz is permitted when frequency modulation is employed.

(5) The operating bandwidth shall not exceed 200 kHz.

(6) The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(i) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB;

(ii) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB;

4.4.2 TEST EQUIPMENT LIST AND DETAILS

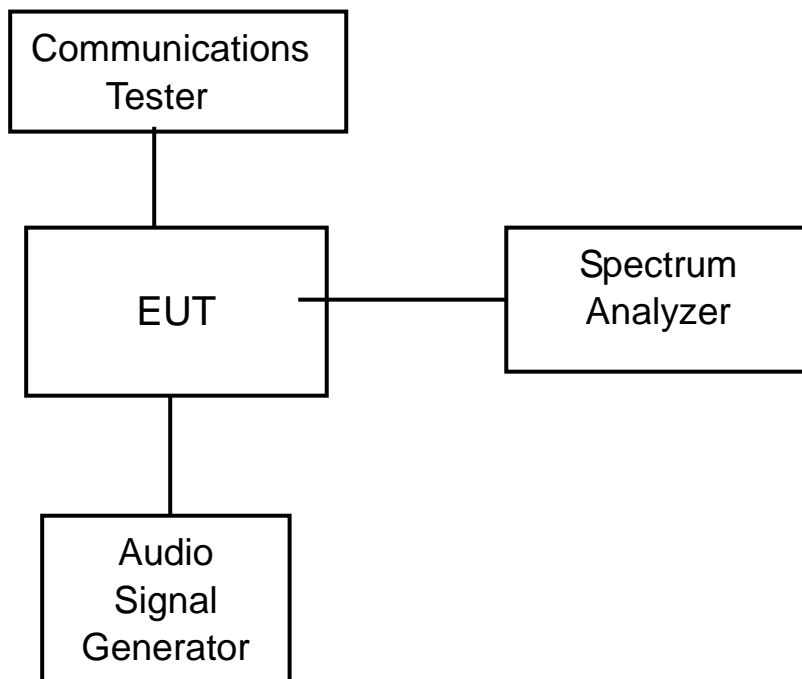
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Signal Analyzer Rohde & Schwarz	FSV7	102331	Nov. 26, 12	Nov. 25, 13
Audio Test System BOSCH	ATS-1	0000300054270000	Nov. 01, 12	Oct. 30, 13
Communications Tester JUNG JIN	MM-2500	N/A	Nov. 01, 12	Oct. 30, 13

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.4.3 TEST PROCEDURE

According to FCC 2.1049(c)(1) Other than single sideband or independent sideband transmitters—when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

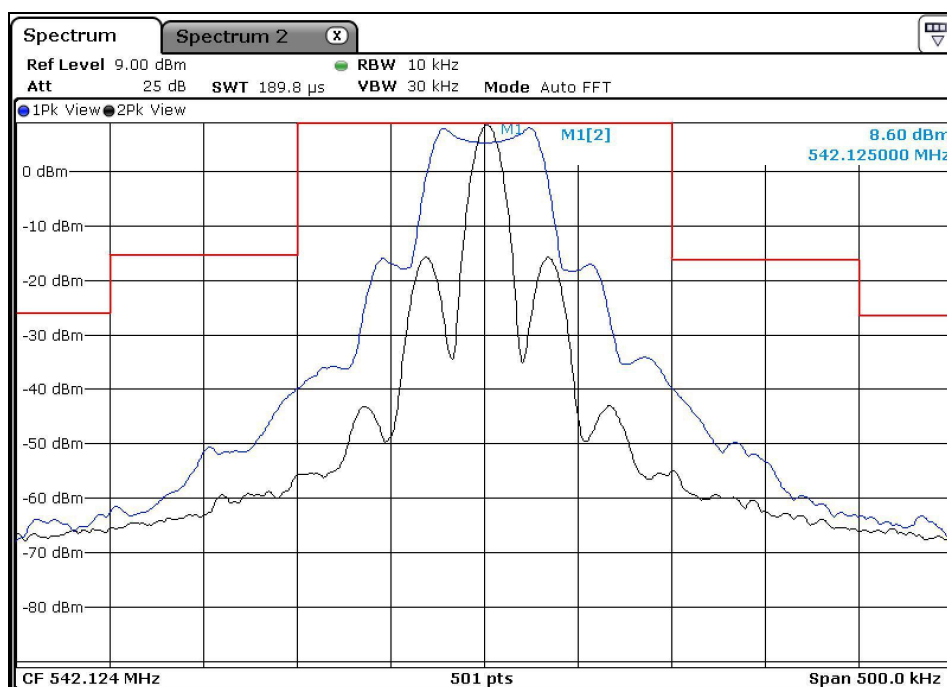
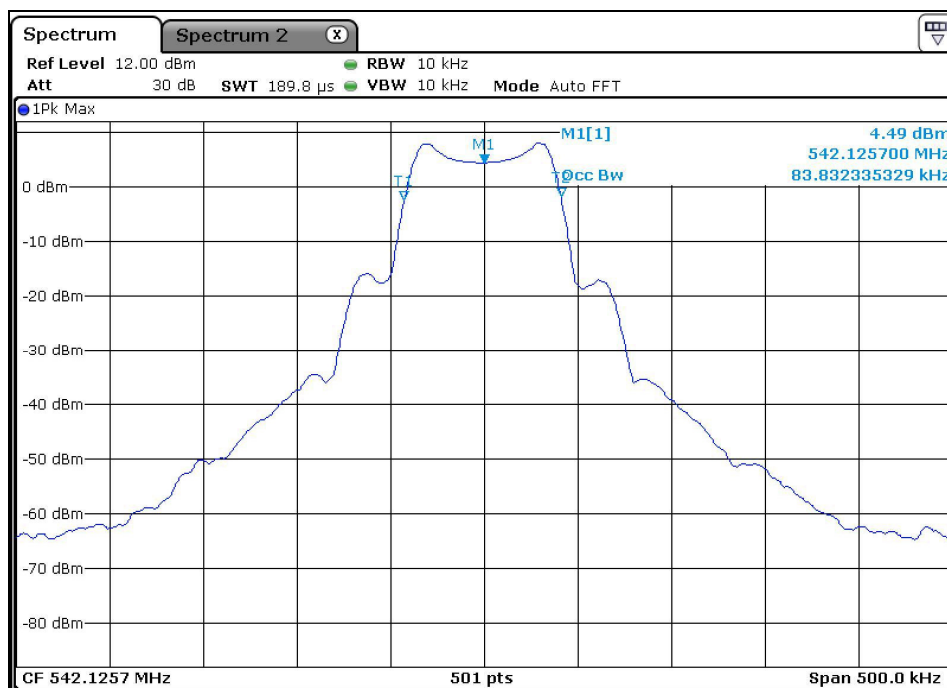
4.4.4 TEST SETUP



4.4.5 TEST RESULTS

The 100% deviation is 60 KHz; 50% deviation is 30KHz

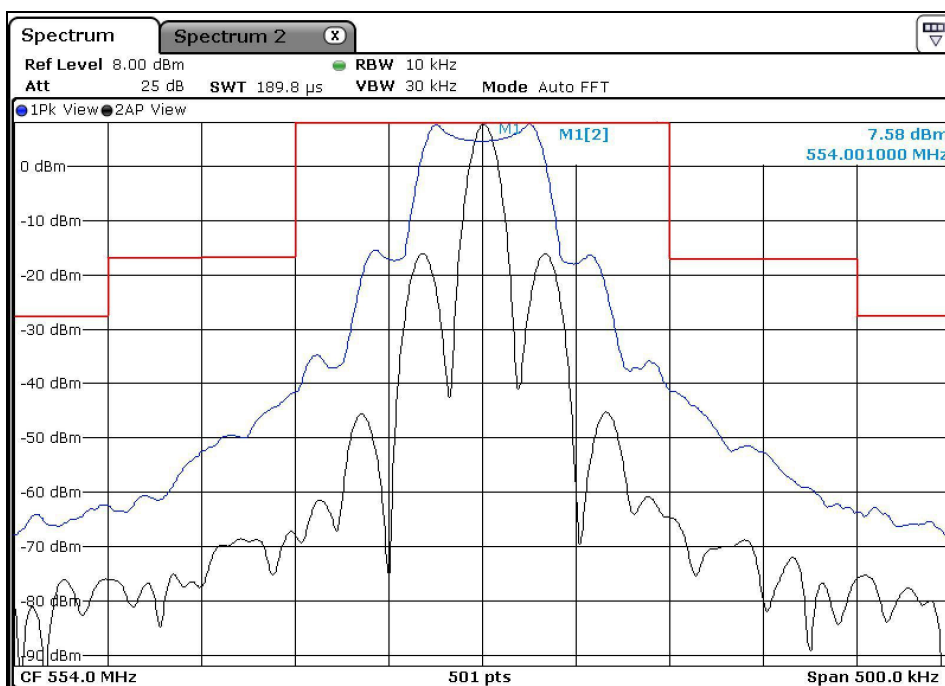
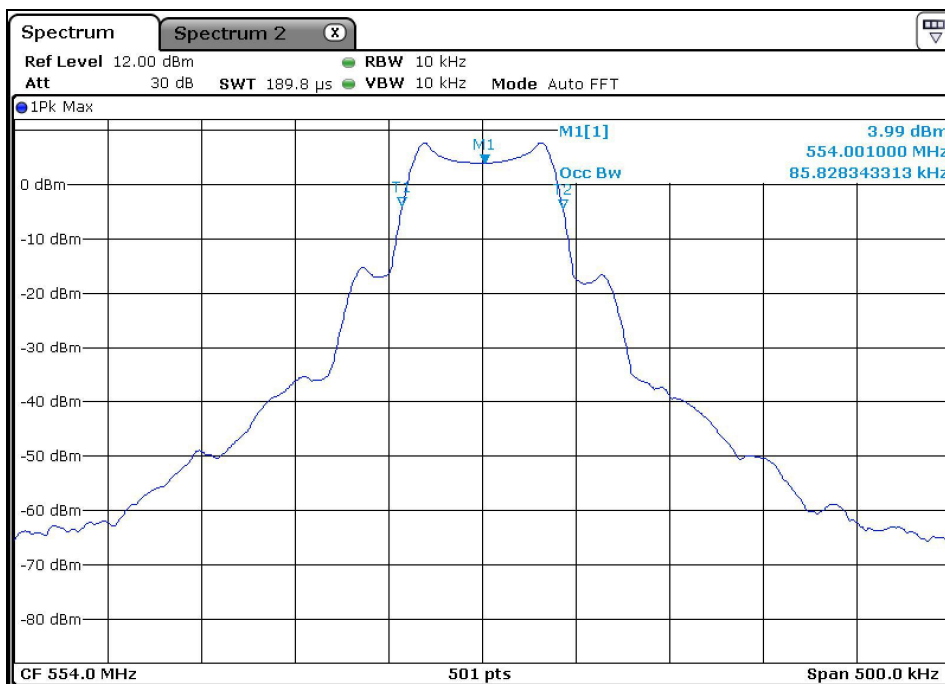
CH 0: 542.125 MHz





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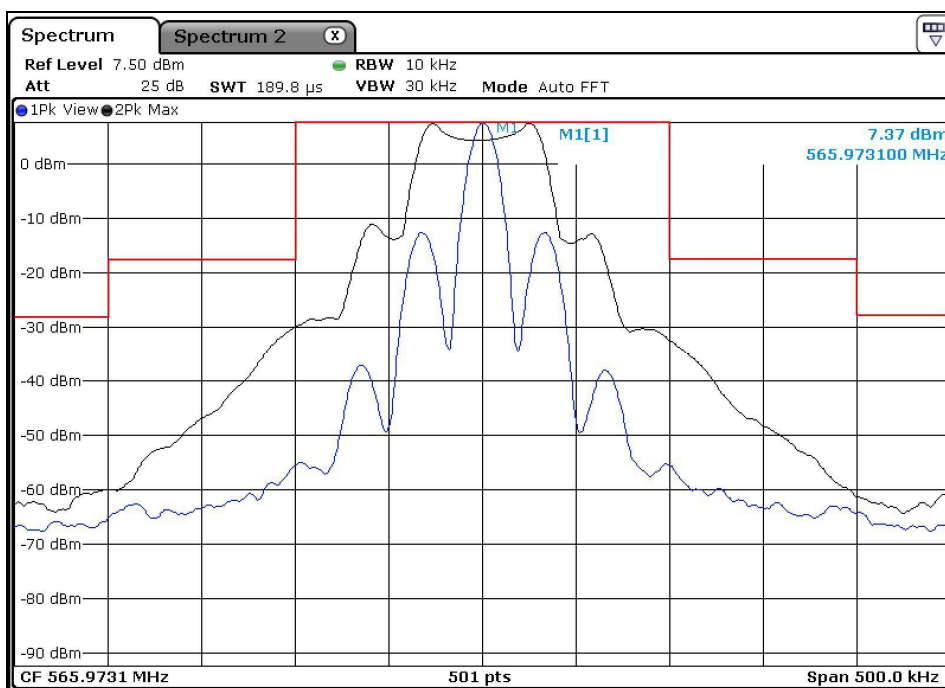
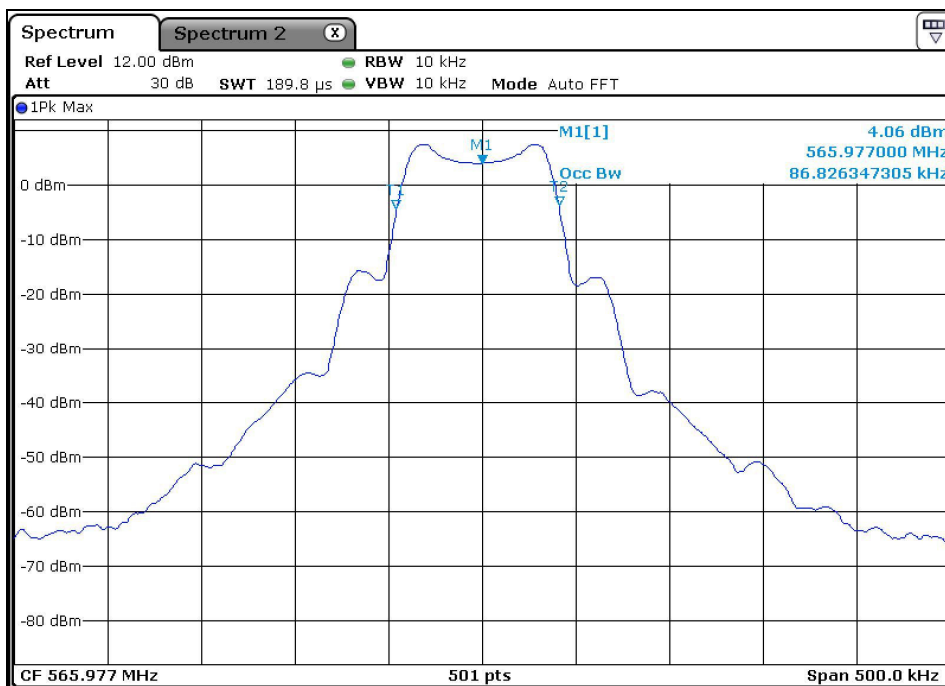
CH 8: 554.000 MHz

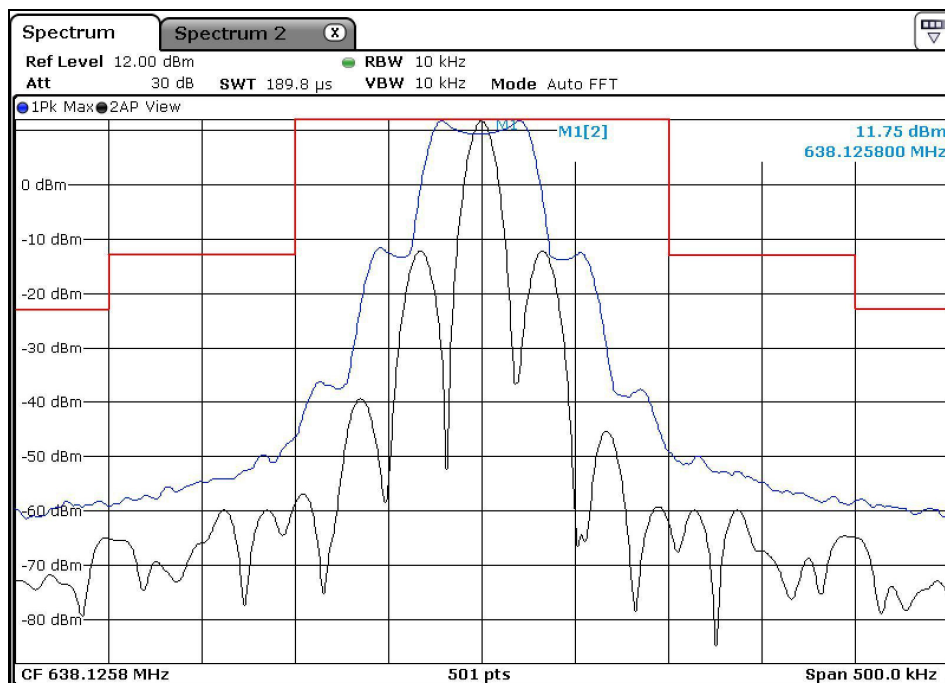
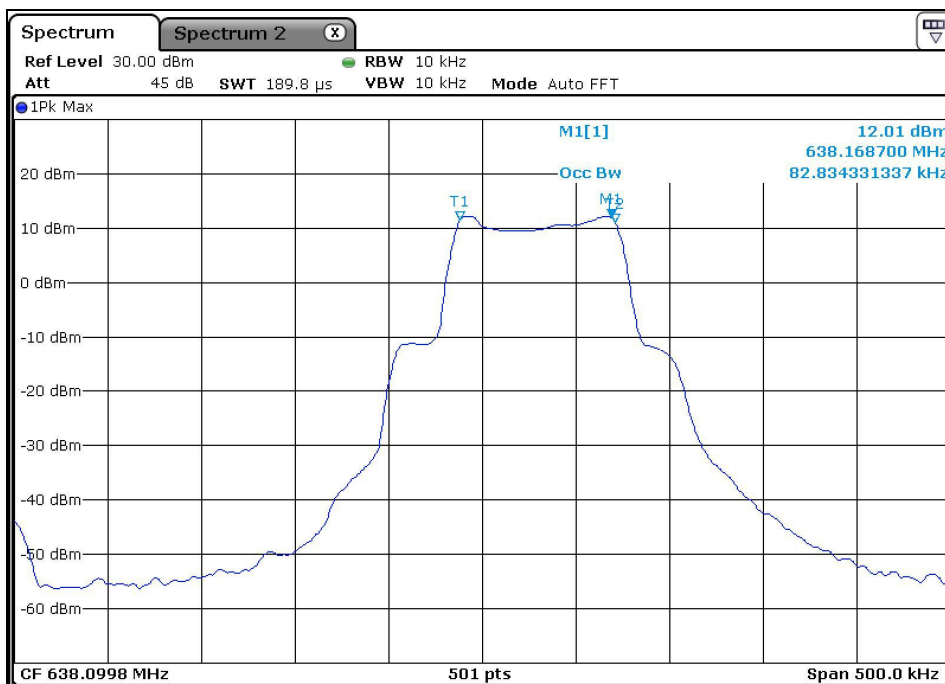




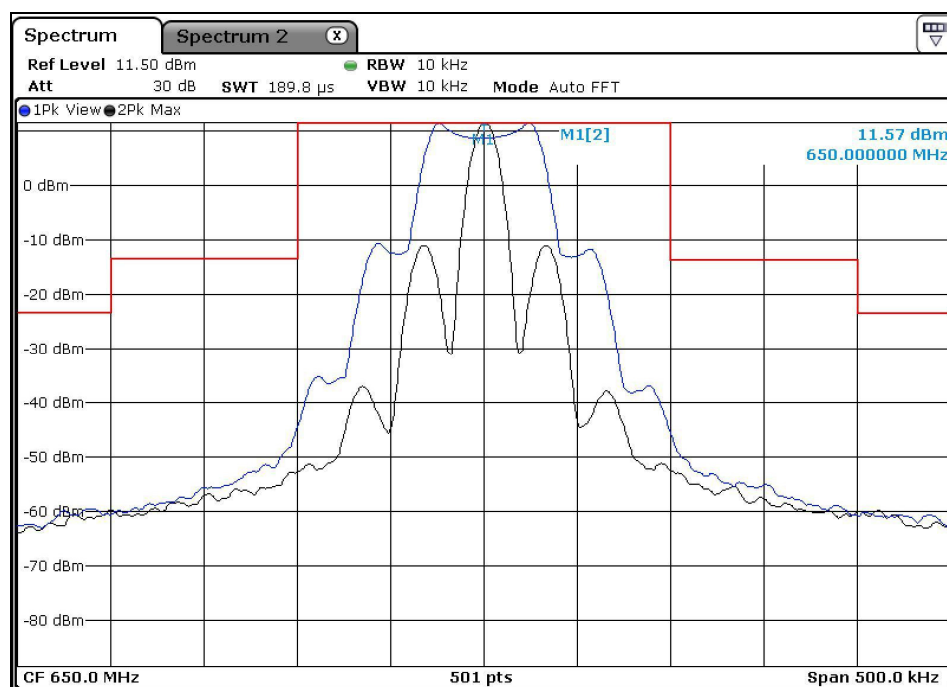
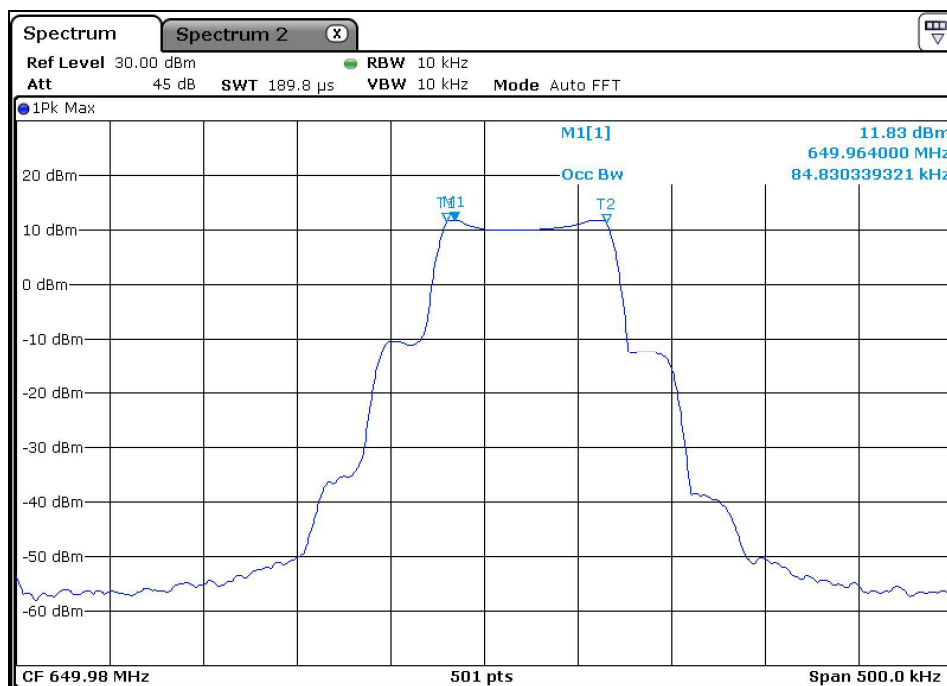
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CH F: 565.975 MHz





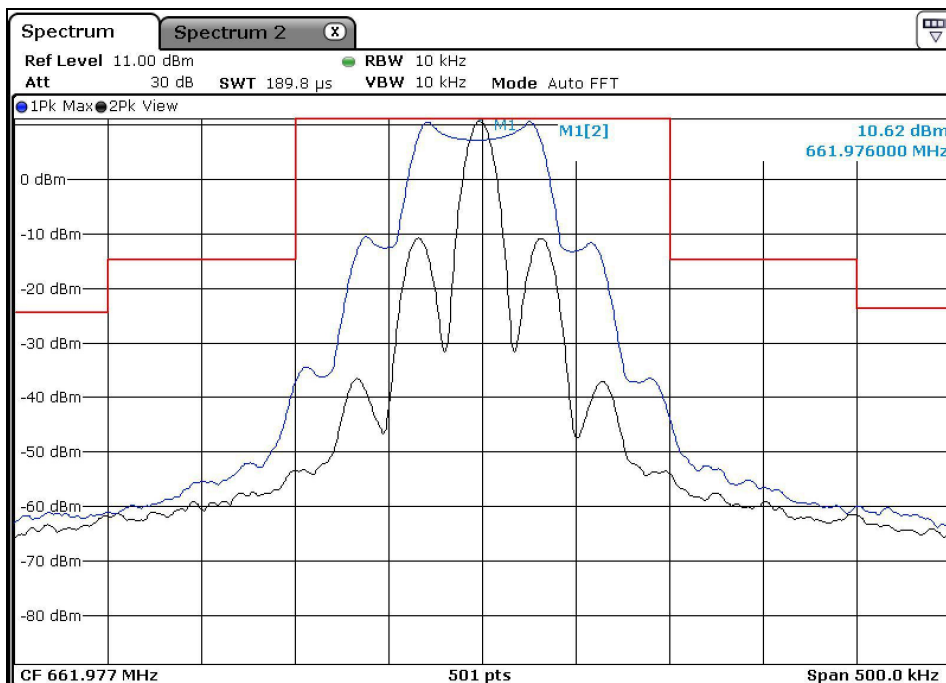
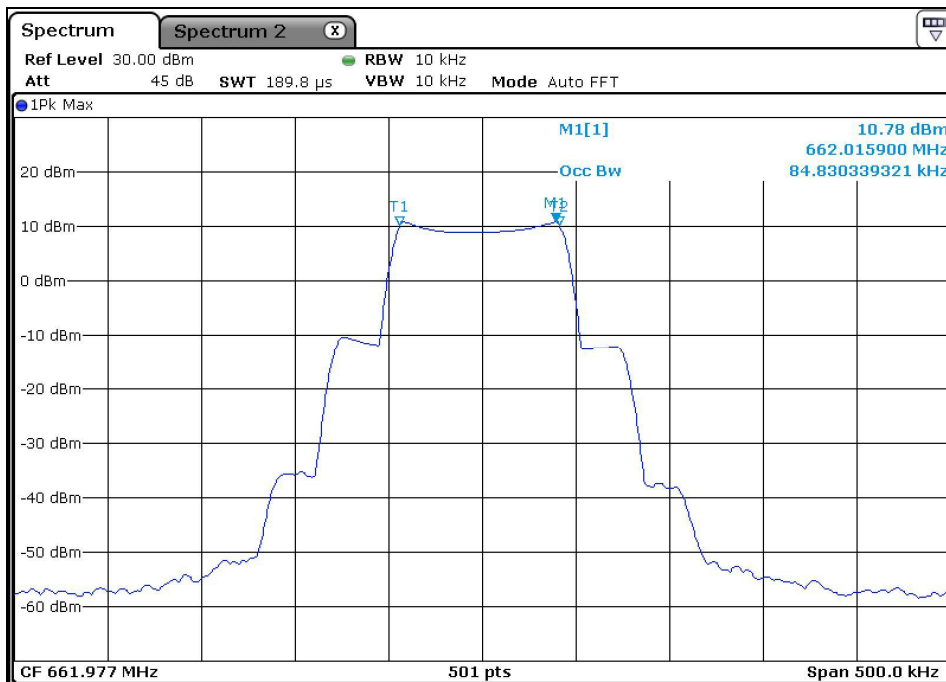
CH 8: 650.000 MHz





Test Report No.: FC130523N012

CH F: 661.975 MHz





Test Report No.: FC130523N012

4.5 FREQUENCY TOLERANCE MEASUREMENT

4.5.1 STANDARD APPLICABLE

According to FCC Part 74 Section 74.861(e)(4), the frequency tolerance must be maintained within 0.005%.

4.5.2 TEST EQUIPMENT LIST AND DETAILS

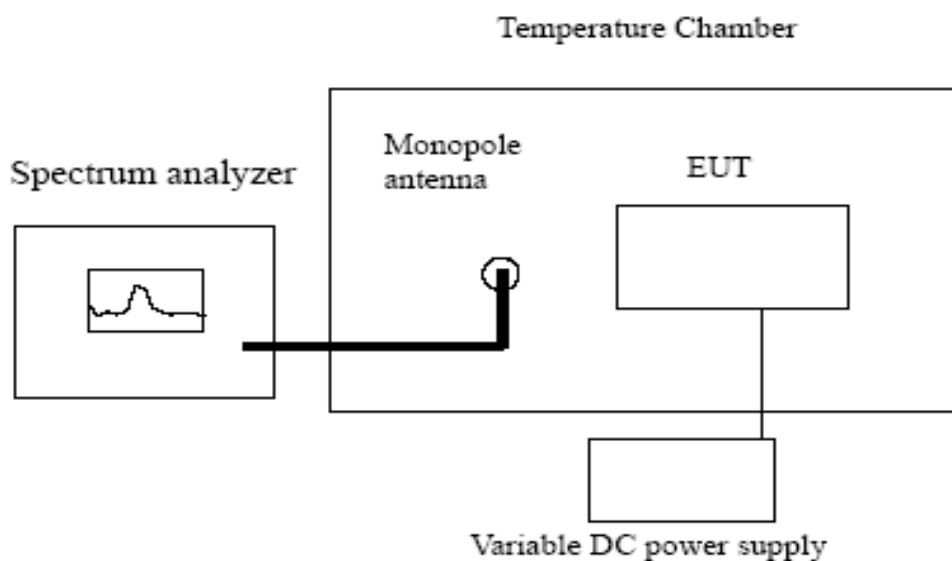
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Signal Analyzer Rohde & Schwarz	FSV7	102331	Nov. 26,12	Nov. 25,13

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.5.3 TEST PROCEDURE

1. Turn on EUT and set spectrum analyzer center frequency to the EUT operating frequency. Set spectrum analyzer Resolution Bandwidth to 1 kHz and Video Resolution Bandwidth to 1 kHz and Frequency Span to 50kHz. Record this frequency as reference frequency.
2. Set the temperature of chamber to 50 °C. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
3. Repeat step 2 with a 10°C decreased per stage until the lowest temperature -30°C is measured, record all measured frequencies on each temperature step.
4. Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

4.5.4 TEST SETUP



4.5.5 TEST RESULTS

Test Data: 542.125MHz-565.975MHz

A, measurement of Frequency Tolerance (temperature)

Test condition	Power supply	Low Frequency (542.125 MHz)	Middle Frequency (554.000 MHz)	High Frequency (565.975MHz)
-30	3V	542.1271	554.0017	565.9772
-20	3V	542.1260	554.0017	565.9769
-10	3V	542.1250	554.0010	565.9755
0	3V	542.1250	554.000	565.975
10	3V	542.1252	554.0008	565.9753
20	3V	542.1252	554.0011	565.9760
30	3V	542.1255	554.0012	565.9765
40	3V	542.1266	554.0013	565.9771
50	3V	542.1266	554.0014	565.9771
Frequency Error		+2.1 KHz	+1.7 KHz	-2.2 KHz
Frequency tolerance		0.00039%	0.00031%	0.00039%
Frequency Tolerance Limit		0.005%		

B, The measurement of Frequency Tolerance (supply voltage)

Test condition	Power supply	Low Frequency (542.125 MHz)	Middle Frequency (554.000 MHz)	High Frequency (565.975MHz)
20	2.55V	542.1252	554.0004	565.9759
20	3.45V	542.1255	554.0007	565.9761
Frequency Error		+0.5 KHz	+0.7 KHz	+1.1 KHz
Frequency tolerance		0.000092%	0.00013%	0.00019%
Frequency Tolerance Limit		0.005%		

Test Data: 638.125MHz-661.975MHz

A, measurement of Frequency Tolerance (temperature)

Test condition	Power supply	Low Frequency (638.125 MHz)	Middle Frequency (650.000 MHz)	High Frequency (661.975MHz)
-30	3V	638.1258	650.0018	661.9766
-20	3V	638.1253	650.0012	661.9755
-10	3V	638.1253	650.0008	661.9753
0	3V	638.1250	650.0000	661.9750
10	3V	638.1252	650.0000	661.9755
20	3V	638.1252	650.0005	661.9755
30	3V	638.1255	650.0008	661.9756
40	3V	638.1259	650.0012	661.9765
50	3V	638.1262	650.0015	661.9770
Frequency Error		+1.2 KHz	+1.8 KHz	+2.0 KHz
Frequency tolerance		0.00019%	0.00028%	0.0003%
Frequency Tolerance Limit		0.005%		

B, The measurement of Frequency Tolerance (supply voltage)

Test condition	Power supply	Low Frequency (638.125 MHz)	Middle Frequency (650.000 MHz)	High Frequency (661.975MHz)
20	2.55V	638.1257	650.0008	661.9760
20	3.45V	638.1262	650.0010	661.9765
Frequency Error		+1.2 KHz	+1.0 KHz	+1.5 KHz
Frequency tolerance		0.00019%	0.00015%	0.00023%
Frequency Tolerance Limit		0.005%		



Test Report No.: FC130523N012

4.6 MODULATION CHARACTERISTICS MEASUREMENT

4.6.1 STANDARD APPLICABLE

According to FCC Part 2.1047(a) (b)

4.6.2 TEST EQUIPMENT LIST AND DETAILS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Audio Test System BOSCH	ATS-1	0000300054270000	Nov. 01, 12	Oct. 30, 13
Communications Tester JUNG JIN	MM-2500	N/A	Nov. 01, 12	Oct. 30, 13

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.6.3 TEST PROCEDURE

Audio Frequency Response:

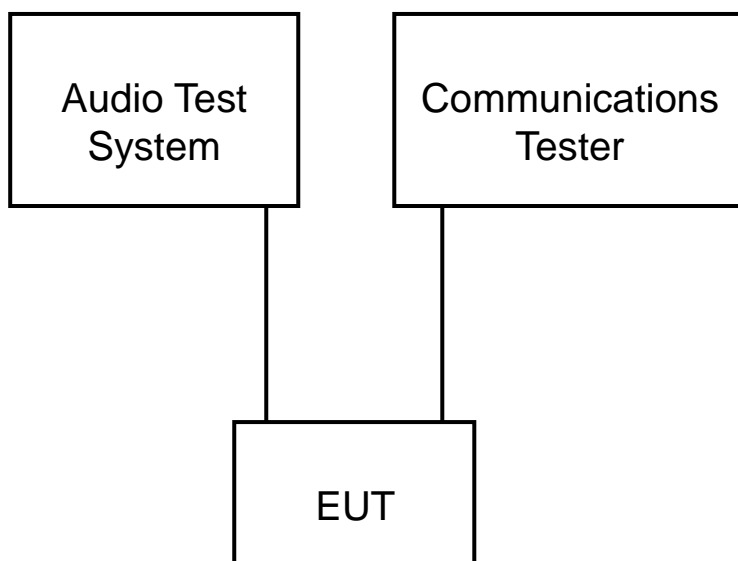
- 1) Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation.
- 2) Set the test receiver to measure rms deviation and record the deviation reading.
- 3) Record the DMM reading as V_{REF} .
- 4) Set the audio frequency generator to the desired test frequency between 100Hz and 5000Hz.
- 5) Vary the audio frequency generator output level until the deviation reading that was recorded in step f) is obtained.
- 6) Record the DMM reading as V_{FREQ} .
- 7) Calculate the audio frequency response at the present frequency as:

$$\text{audio frequency response} = 20 \log (V_{FREQ} / V_{REF})$$
- 8) Repeat steps 4) through 7) for all the desired test frequencies.

Modulation Limiting:

- 1) Apply a 1000 Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain 60% of full rated system deviation.
- 2) Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level.
- 3) With the level from the audio frequency generator held constant at the level obtained in step e), slowly vary the audio frequency from 300 Hz to 3000 Hz and observe the steady-state deviation. Record the maximum deviation.
- 4) Set the test receiver to measure peak negative deviation and repeat steps 1) through 3).
- 5) The values recorded in steps 3) and 4) are the modulation limiting.

4.6.4 TEST SETUP



4.6.5 TEST RESULTS

Audio Frequency Response

542.125 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	22.75	1.08
300	21.91	0.75
500	21.51	0.59
700	21.10	0.43
1000	20.09	0
1500	17.90	-1.0
2000	15.92	-2.02
2500	13.58	-3.40
3500	11.37	-4.94
5000	8.72	-7.25

554.000 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	19.12	1.59
300	18.58	1.34
500	18.02	1.07
700	17.61	0.87
1000	15.93	0
1500	13.80	-1.25
2000	12.08	-2.40
2500	10.59	-3.55
3500	8.55	-5.40
5000	6.81	-7.38

565.975 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	20.12	1.69
300	19.49	1.41
500	18.72	1.06
700	18.26	0.84
1000	16.57	0
1500	14.60	-1.10
2000	13.85	-1.56
2500	11.22	-3.39
3500	9.36	-4.96
5000	7.42	-6.98

638.125 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	22.34	1.38
300	21.77	1.16
500	21.15	0.91
700	20.36	0.58
1000	19.05	0
1500	18.41	-0.30
2000	16.54	-1.23
2500	14.19	-2.56
3500	12.89	-3.39
5000	9.52	-6.03

650.000 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	20.32	1.91
300	19.40	1.51
500	18.56	1.12
700	17.29	0.51
1000	16.31	0
1500	14.19	-1.21
2000	12.34	-2.42
2500	10.15	-4.12
3500	9.28	-4.90
5000	7.92	-6.27

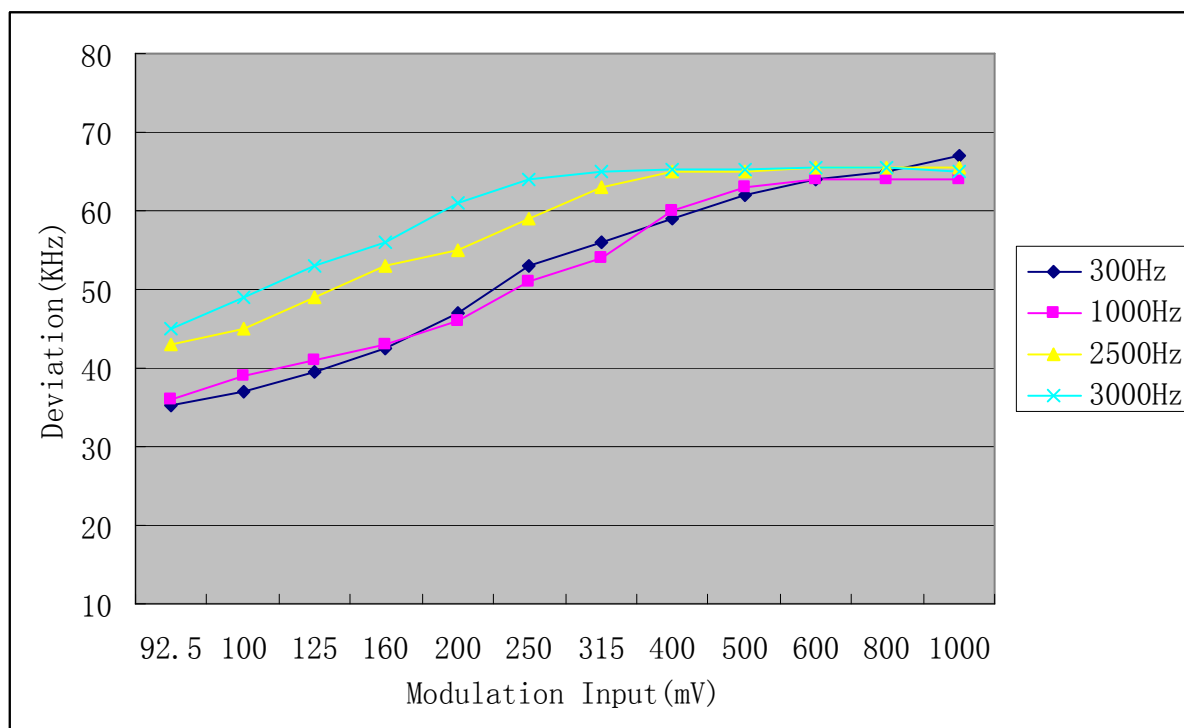
661.975 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	19.43	2.10
300	19.03	1.92
500	18.68	1.76
700	17.49	1.19
1000	15.25	0
1500	13.78	-0.88
2000	12.56	-1.69
2500	10.72	-3.06
3500	8.55	-5.03
5000	6.98	-6.79

Modulation Limiting

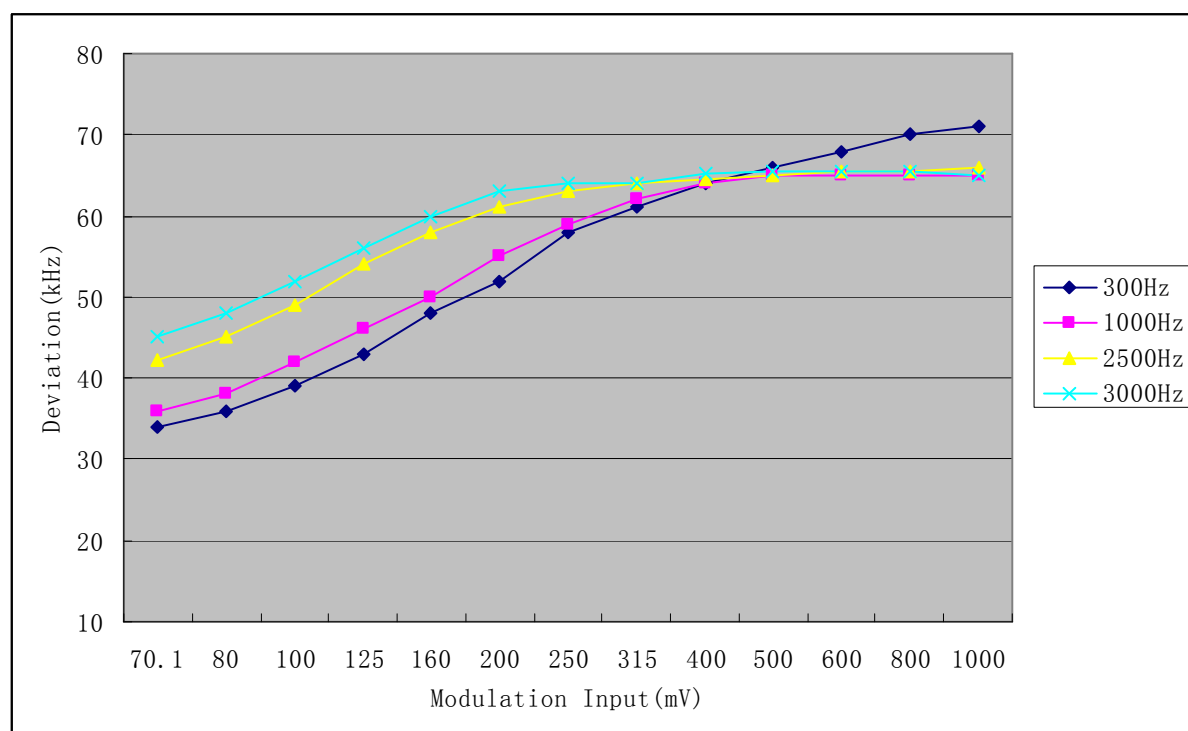
542.125 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
92.52	35.2	36	43	45
100	37	39	45	49
125	39.5	41	49	53
160	42.5	43	53	56
200	47	46	55	61
250	53	51	59	64
315	56	54	63	65
400	59	60	65	65.2
500	62	63	65	65.2
600	64	64	65.5	65.5
800	65	64	65.5	65.5
1000	67	64	65.5	65



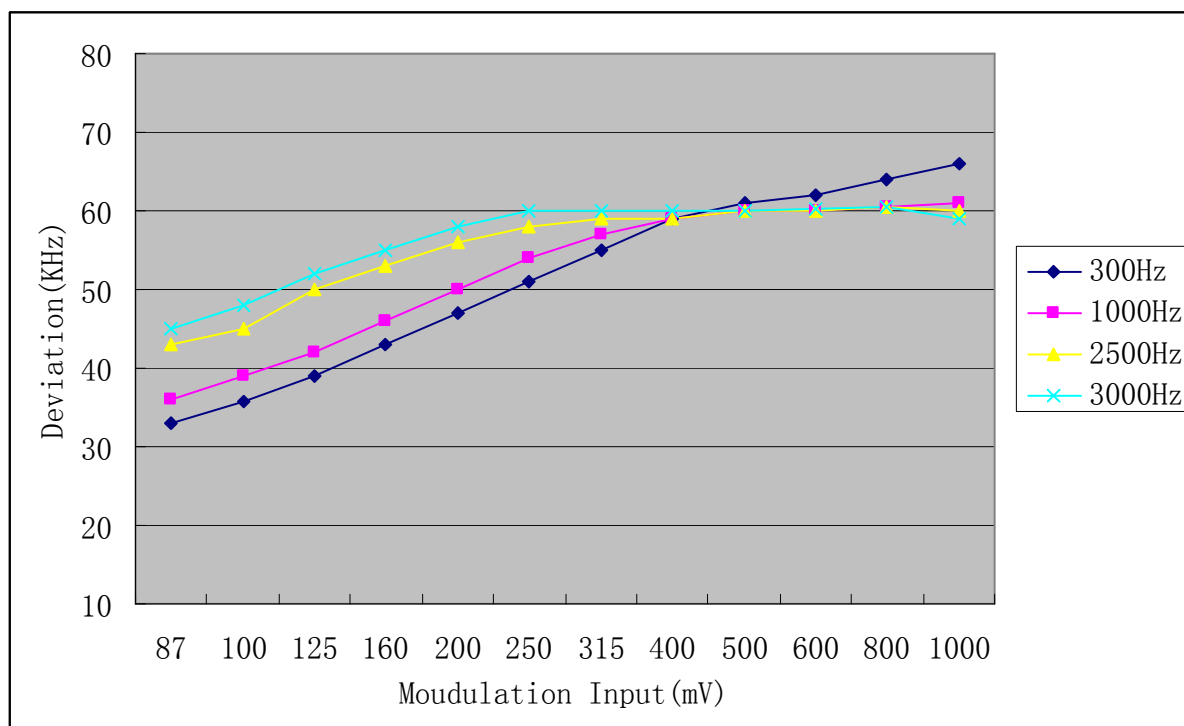
554.000 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
70.14	34	36	42.2	45
80	36	38	45	48
100	39	42	49	52
125	43	46	54	56
160	48	50	58	60
200	52	55	61	63
250	58	59	63	64
315	61	62	64	64
400	64	64	64.5	65.2
500	66	65	65	65.5
600	68	65	65.5	65.5
800	70	65	65.5	65.5
1000	71	65	66	65



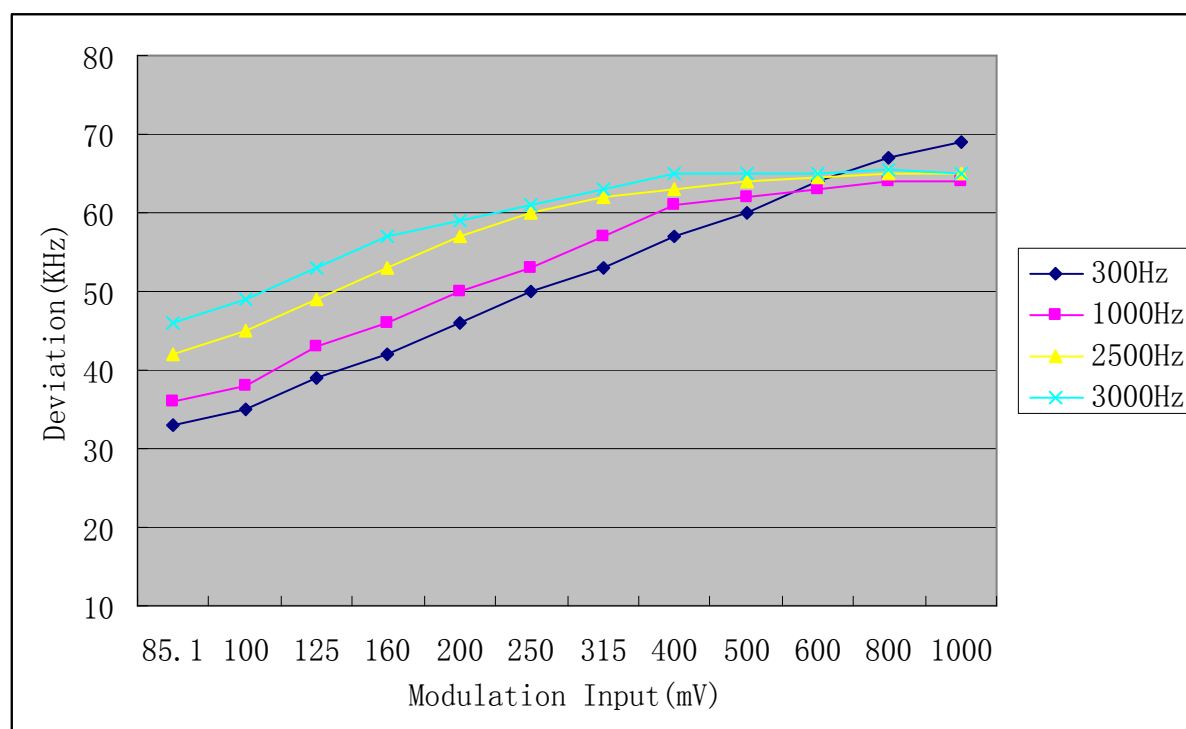
565.975 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
86.98	33	36	43	45
100	35.7	39	45	48
125	39	42	50	52
160	43	46	53	55
200	47	50	56	58
250	51	54	58	60
315	55	57	59	60
400	59	59	59	60
500	61	60	60	60
600	62	60	60	60.2
800	64	60.5	60.5	60.5
1000	66	61	60	59



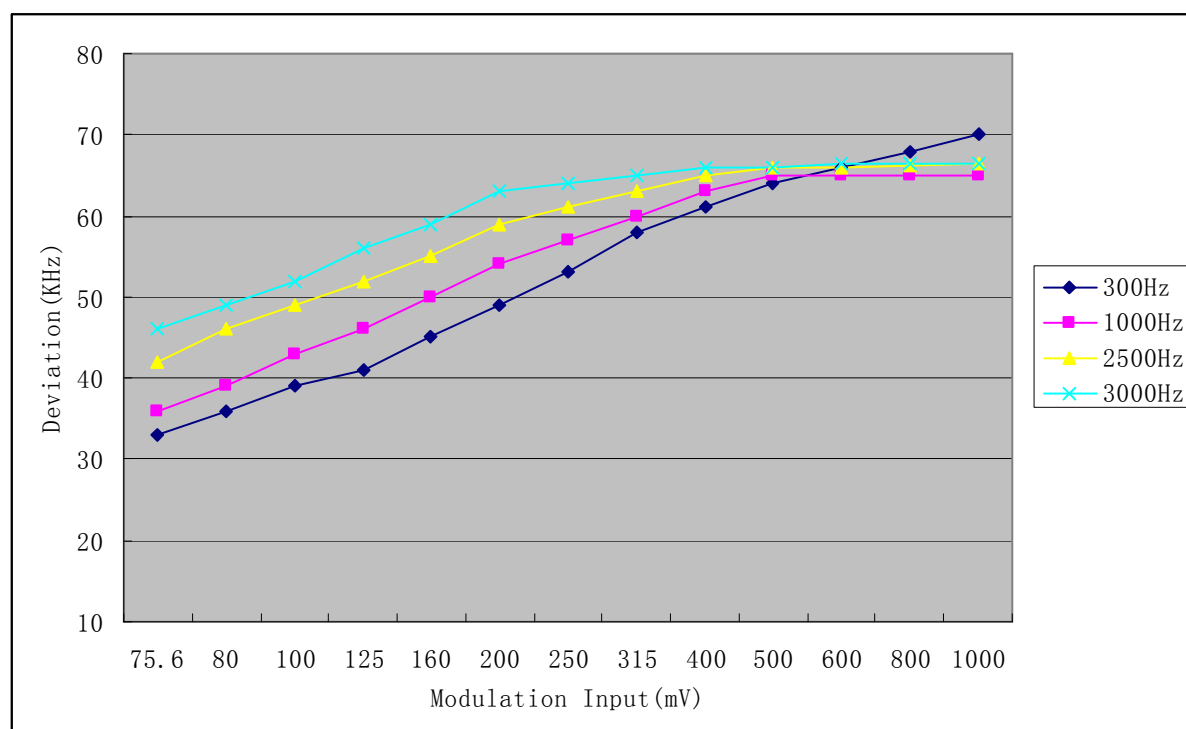
638.125 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
85.11	33	36	42	46
100	35	38	45	49
125	39	43	49	53
160	42	46	53	57
200	46	50	57	59
250	50	53	60	61
315	53	56	62	63
400	57	59	63	65
500	60	62	64	65
600	64	62	64.5	65
800	67	62.5	65	65.5
1000	69	62.5	65	65



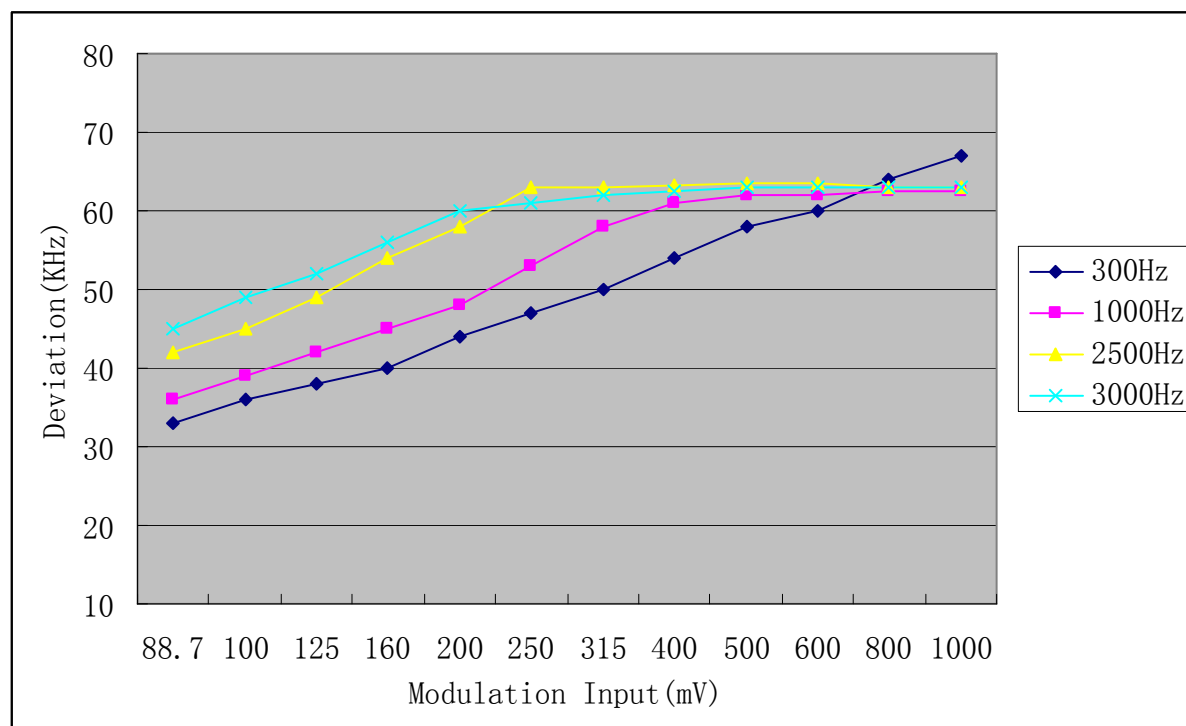
650.000 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
75.64	33	36	42	46
80	36	39	46	49
100	39	43	49	52
125	41	46	52	56
160	45	50	55	59
200	49	54	59	63
250	53	57	61	64
315	58	60	63	65
400	61	63	65	66
500	64	65	66	66
600	66	65	66	66.5
800	68	65	66.2	66.5
1000	70	65	66.5	66.5



661.975 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
88.72	33	36	42	45
100	36	39	45	49
125	38	42	49	52
160	40	45	54	56
200	44	48	58	60
250	47	53	63	61
315	50	58	63	62
400	54	61	63.2	62.5
500	58	62	63.5	63
600	60	62	63.5	63
800	64	62.5	63	63
1000	67	62.5	63	63





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5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---