



BUREAU
VERITAS

Test Report No.: FC130523N012-1

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	CB88
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.	CB88
FCC ID	CCRCB88
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

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

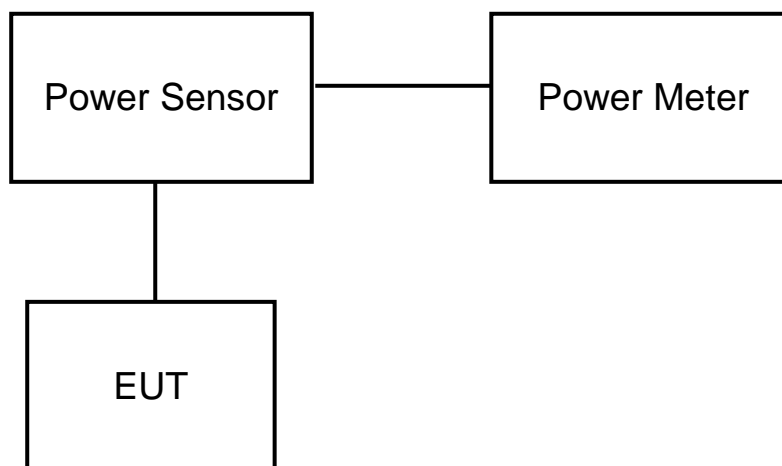
NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.
2. The test was performed in Dongguan Chamber RF.

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	10.01	10.02	250
554.000	9.19	8.30	250
565.975	7.35	5.43	250
638.125	10.35	10.84	250
650.000	9.80	9.55	250
661.975	8.63	7.29	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

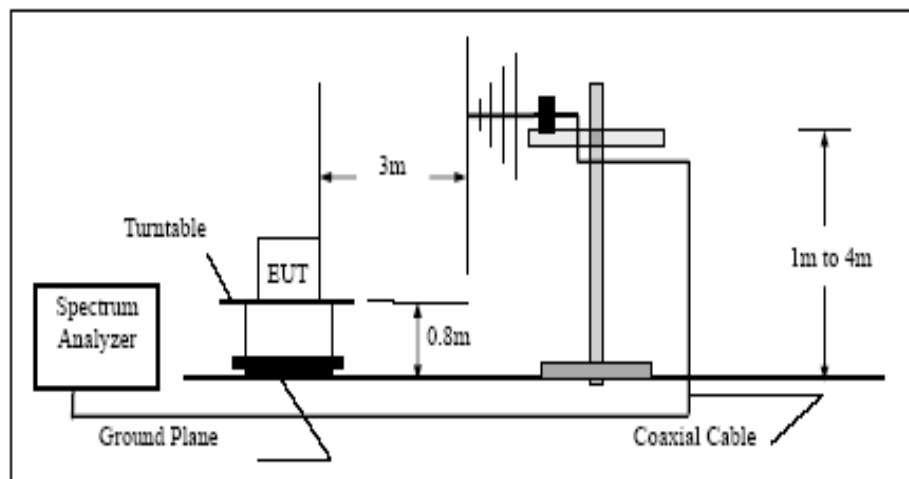
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Agilent	E4446A	MY46180622	Apr. 24,13	Apr. 23,14
EMI Test Receiver	Rohde&Schwarz	ESVD	847398/003	May 14,13	May 13,14
Bilog Antenna (25MHz-2GHz)	Teseq	CBL 6111D	27089	Jul. 16,12	Jul. 15,13
Bilog Antenna	Teseq	CBL 6111D	25757	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.

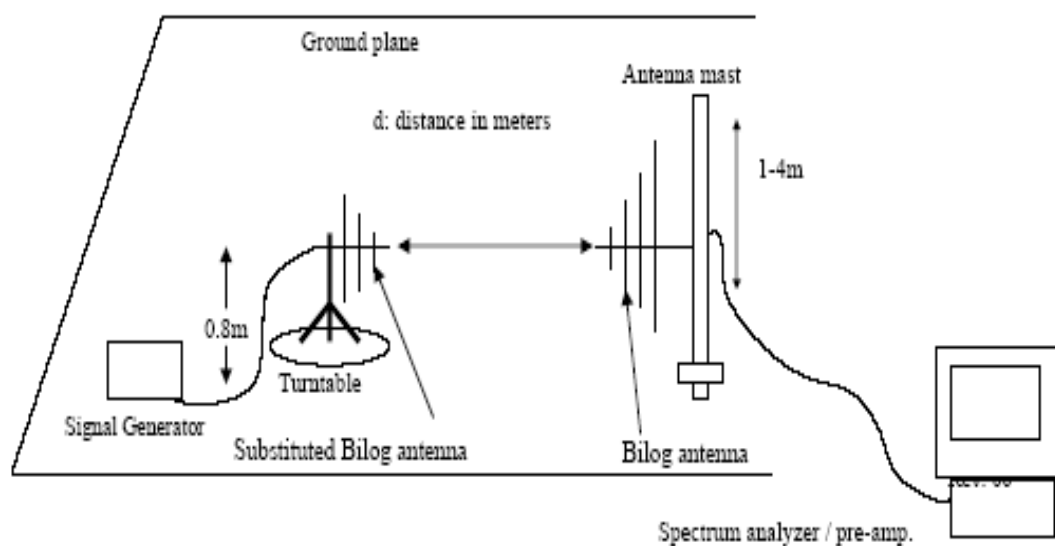
4.2.3 TEST PROCEDURE

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 then 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:



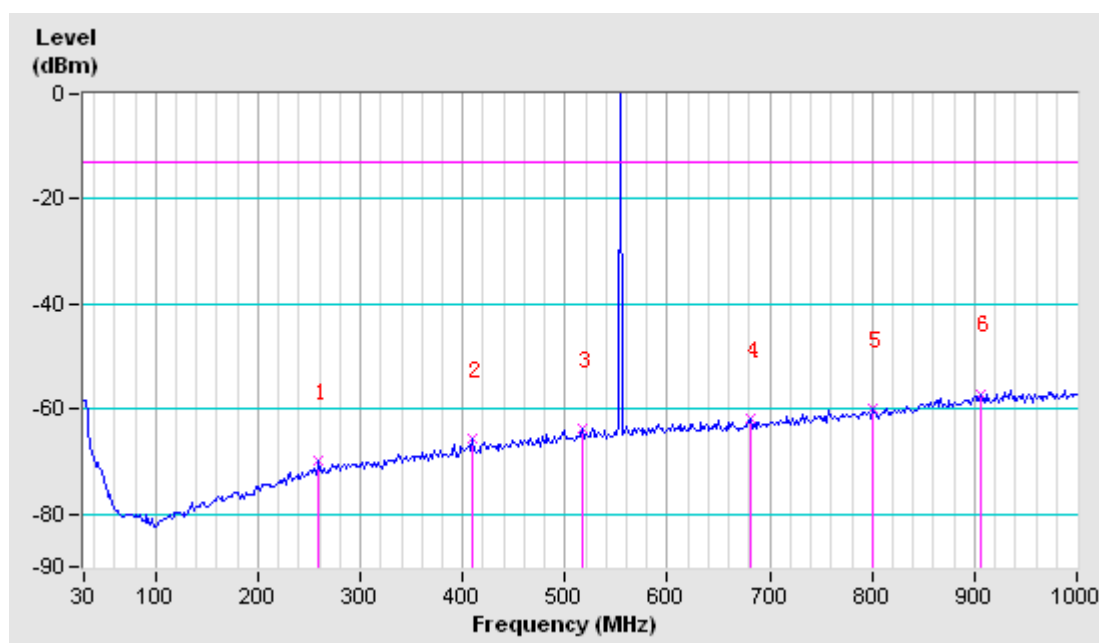
4.2.5 TEST RESULTS

BELOW 1GHz WORST-CASE DATA : 554.000MHz

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)
259.57	H	-69.94	-13	-56.94
409.92	H	-65.55	-13	-52.55
516.62	H	-63.65	-13	-50.65
681.52	H	-61.92	-13	-48.92
801.15	H	-60.05	-13	-47.05
906.23	H	-57.04	-13	-44.04

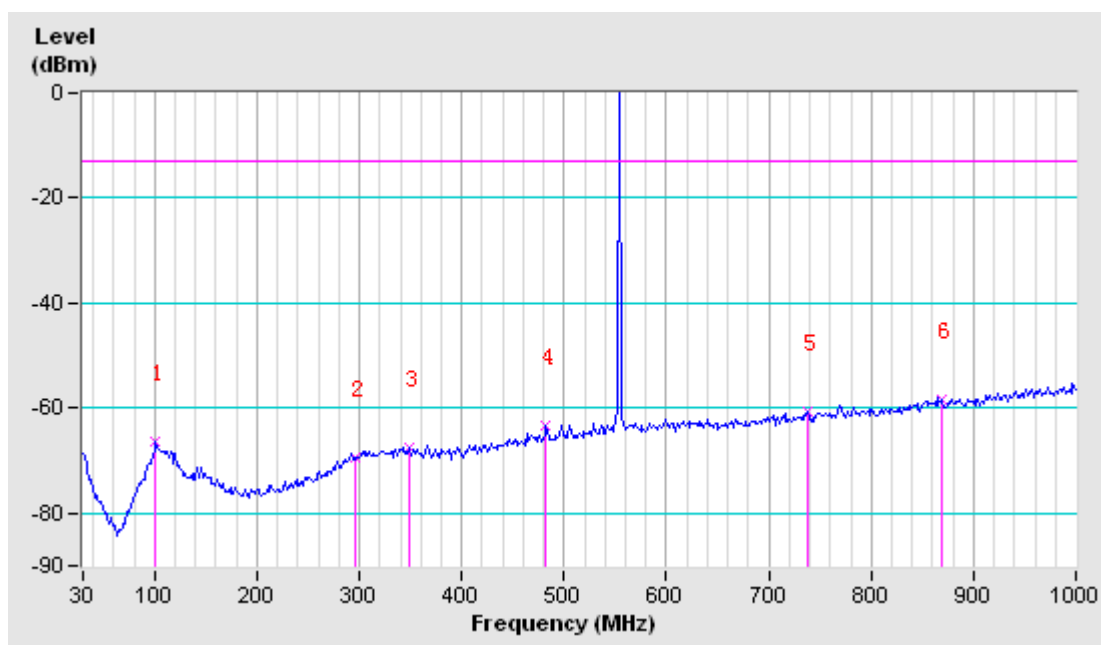
NOTE: The emission behavior belongs to narrowband spurious emission.



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	-66.54	-13	-53.54
296.75	V	-69.52	-13	-56.52
348.48	V	-67.63	-13	-54.63
482.67	V	-63.37	-13	-50.37
738.1	V	-60.79	-13	-47.79
869.05	V	-58.3	-13	-45.3

NOTE: The emission behavior belongs to narrowband spurious emission.

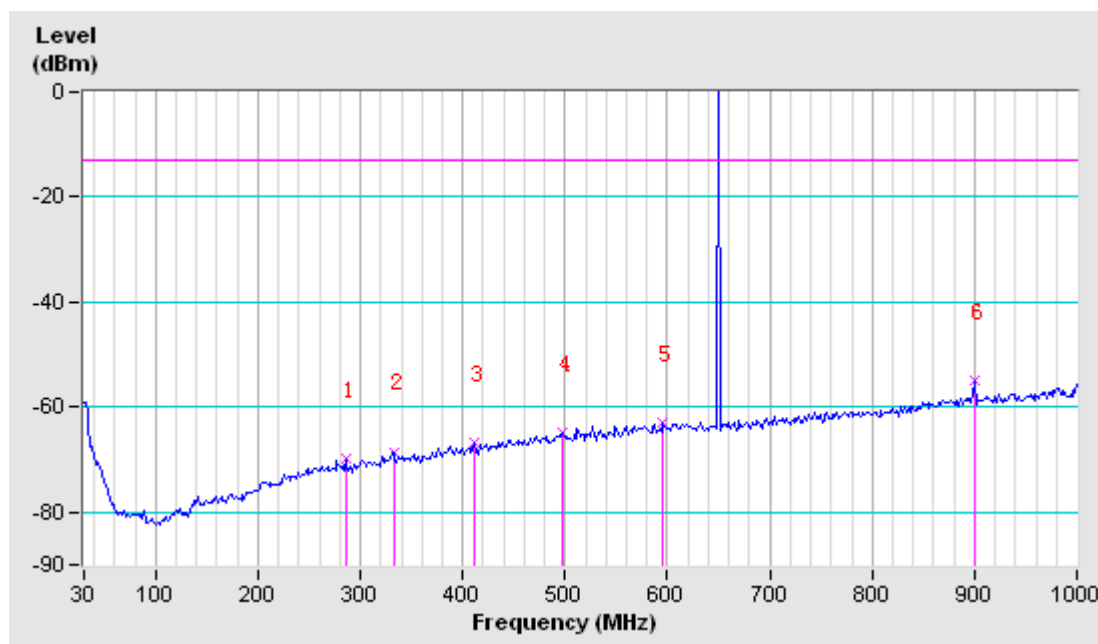


BELOW 1GHz WORST-CASE DATA : 650.000MHz

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)
285.43	H	-69.76	-13	-56.76
332.32	H	-68.48	-13	-55.48
411.53	H	-66.87	-13	-53.87
497.22	H	-64.8	-13	-51.8
595.83	H	-63.03	-13	-50.03
899.77	H	-54.81	-13	-41.81

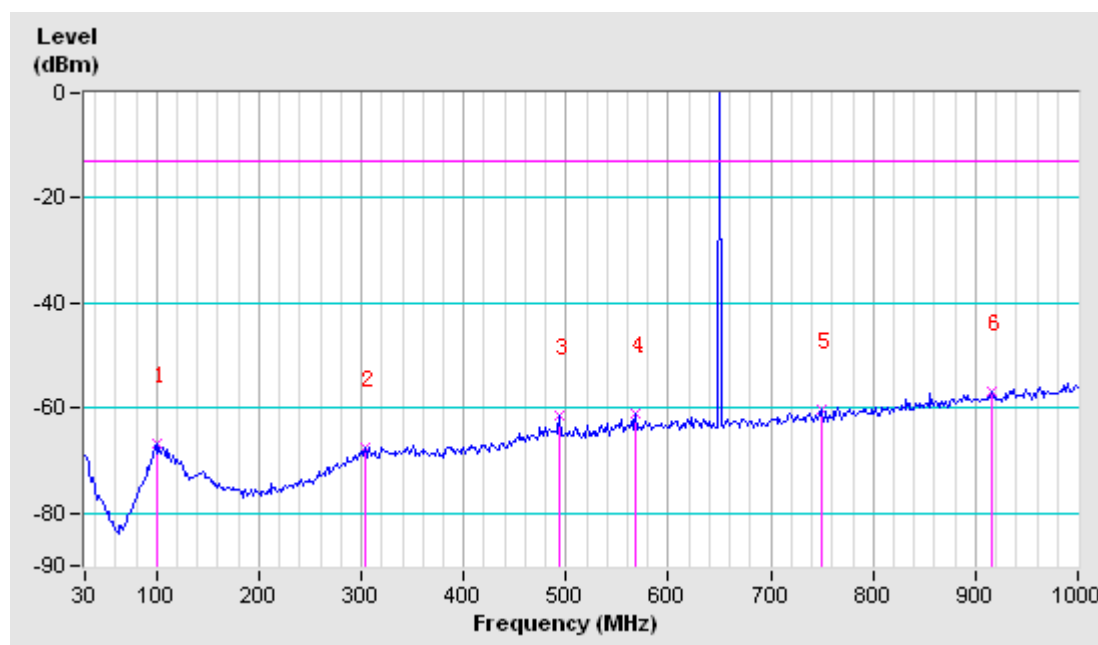
NOTE: The emission behavior belongs to narrowband spurious emission.



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	-66.82	-13	-53.82
303.22	V	-67.53	-13	-54.53
493.98	V	-61.57	-13	-48.57
568.35	V	-61.17	-13	-48.17
749.42	V	-60.34	-13	-47.34
915.93	V	-56.88	-13	-43.88

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	1300.00	H	-38.27	-13.00	-25.27
	1300.00	V	-33.27	-13.00	-20.27
	1950.00	H	-46.00	-13.00	-33.00
	1950.00	V	-42.83	-13.00	-29.83
	3250.00	H	-40.16	-13.00	-27.16
	3250.00	V	-42.78	-13.00	-29.78
	5850.00	H	-39.47	-13.00	-26.47
8	1325.00	H	-36.47	-13.00	-23.47
	1325.00	V	-31.43	-13.00	-18.43
	1983.33	H	-42.53	-13.00	-29.53
	1983.33	V	-41.67	-13.00	-28.67
	3308.33	H	-42.55	-13.00	-29.55
	3308.33	V	-45.91	-13.00	-32.91
	5958.33	H	-41.02	-13.00	-28.02
F	1275.00	H	-30.22	-13.00	-17.22
	1275.00	V	-36.35	-13.00	-23.35
	1916.67	H	-37.18	-13.00	-24.18
	1916.67	V	-46.15	-13.00	-33.15
	3191.67	H	-40.66	-13.00	-27.66
	3191.67	V	-43.32	-13.00	-30.32
	5741.67	H	-38.95	-13.00	-25.95

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	1083.33	H	-44.27	-13.00	-31.27
	1083.33	V	-47.28	-13.00	-34.28
	1625.00	H	-41.47	-13.00	-28.47
	1625.00	V	-41.25	-13.00	-28.25
	3250.00	H	-46.28	-13.00	-33.28
	3250.00	V	-45.22	-13.00	-32.22
8	1108.33	H	-47.77	-13.00	-34.77
	1658.33	H	-40.85	-13.00	-27.85
	1658.33	V	-42.58	-13.00	-29.58
	2816.67	V	-48.82	-13.00	-35.82
	3325.00	H	-45.57	-13.00	-32.57
	3458.33	V	-45.71	-13.00	-32.71
F	1133.33	H	-47.65	-13.00	-34.65
	1133.33	V	-45.84	-13.00	-32.84
	1700.00	H	-40.01	-13.00	-27.01
	1700.00	V	-43.47	-13.00	-30.47
	3391.67	H	-44.99	-13.00	-31.99
	3400.00	V	-46.47	-13.00	-33.47
	5658.33	H	-40.82	-13.00	-27.82

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

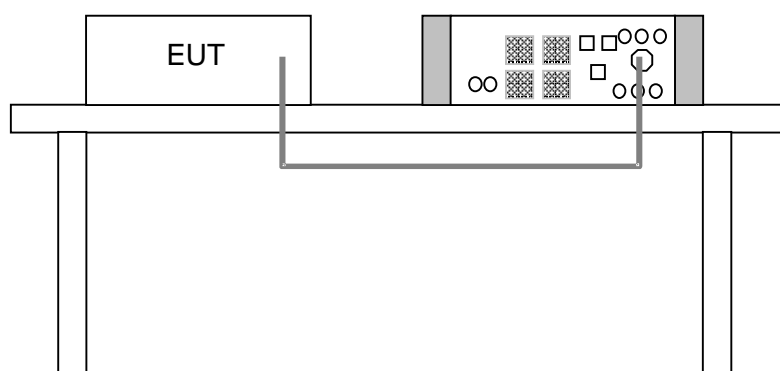
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Signal Analyzer Rohde & Schwarz	FSV7	102331	Nov. 26,12	Nov. 25,13

- 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

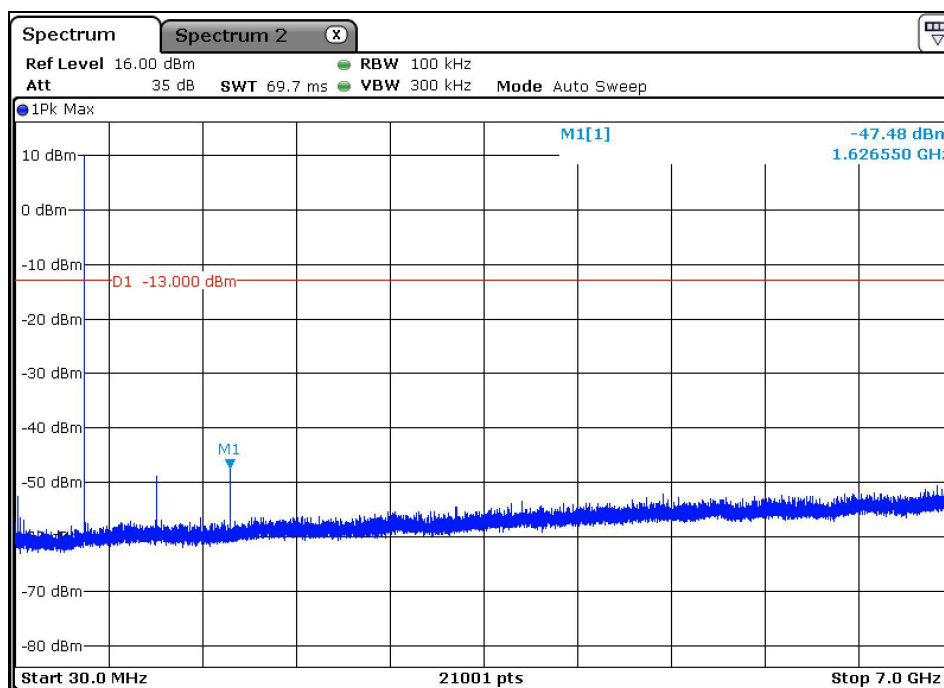
Reference to chapter FCC 2.1051.

4.3.4 TEST SETUP

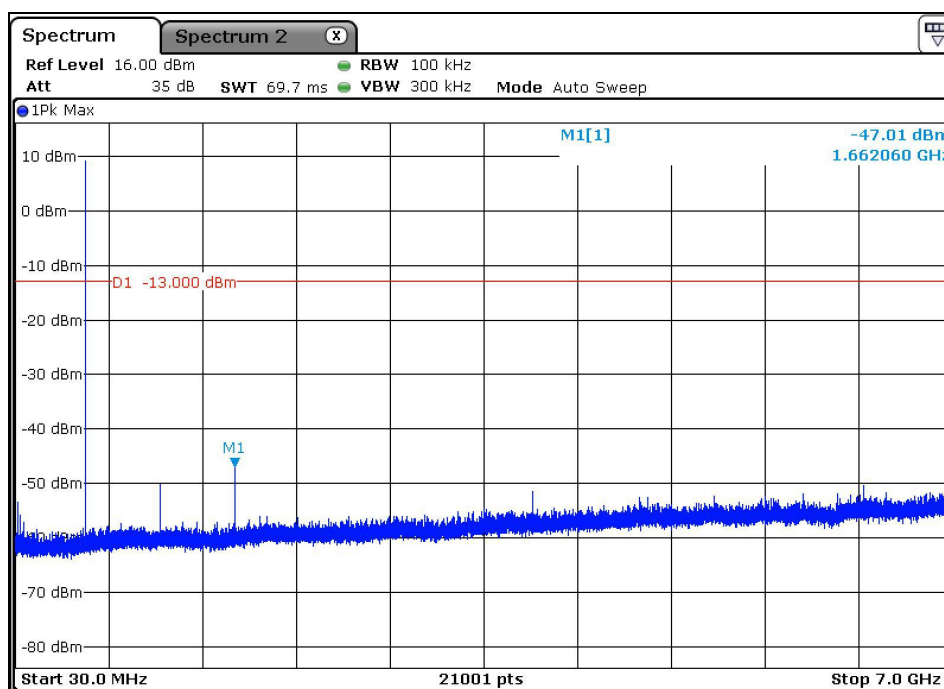


4.3.5 TEST RESULTS

CH 0-542.125MHz



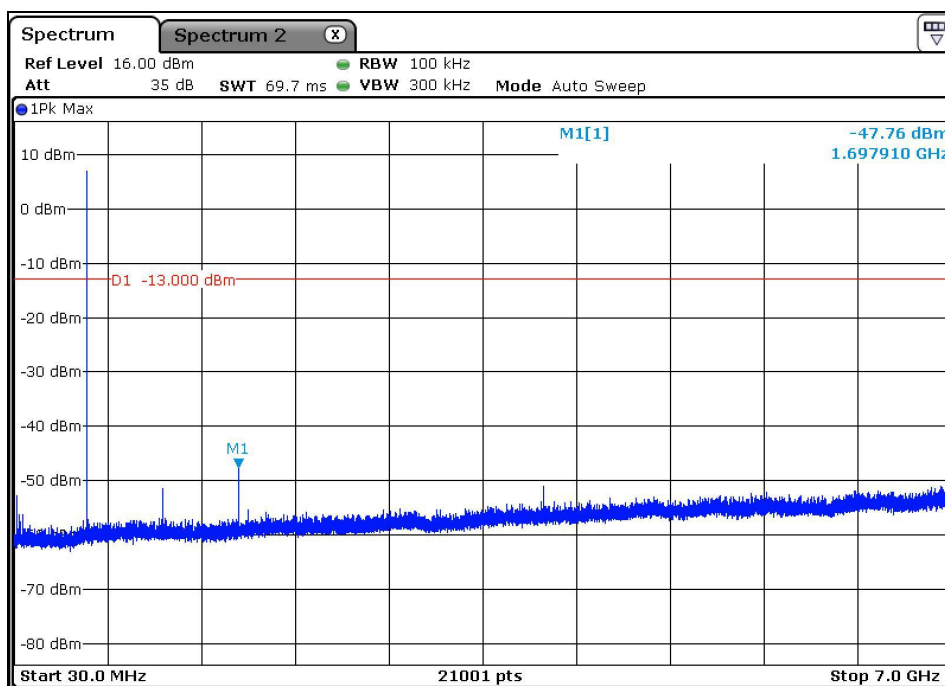
CH 8-554.000MHz



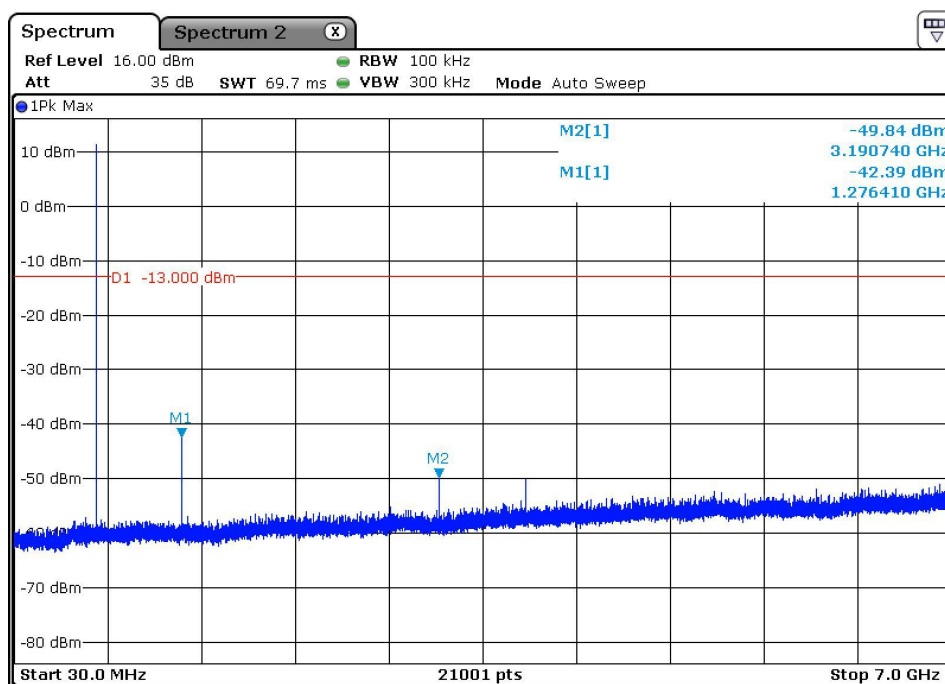


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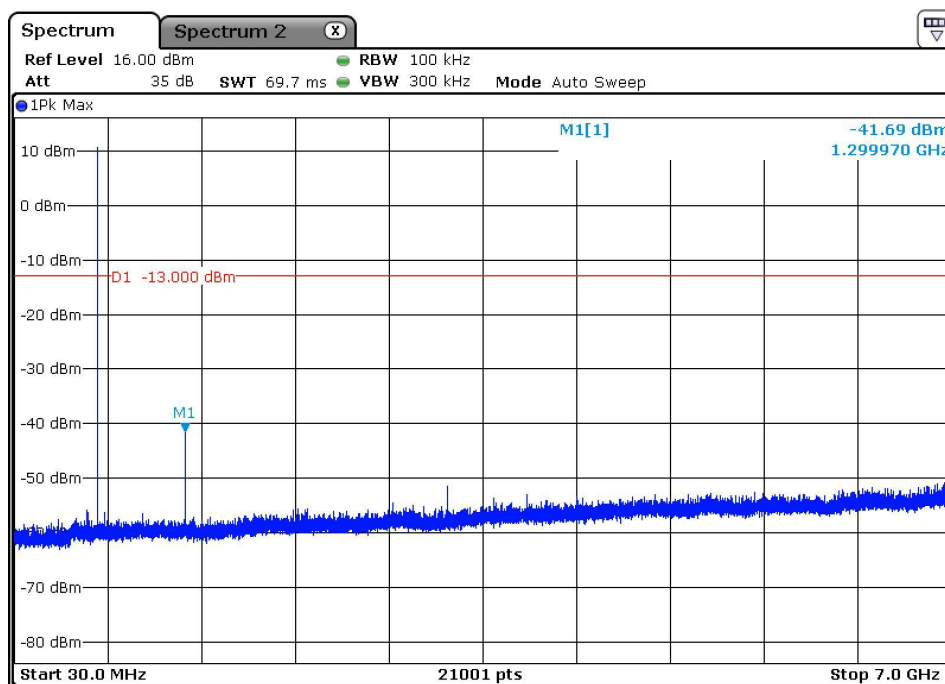
CH F-565.975MHz



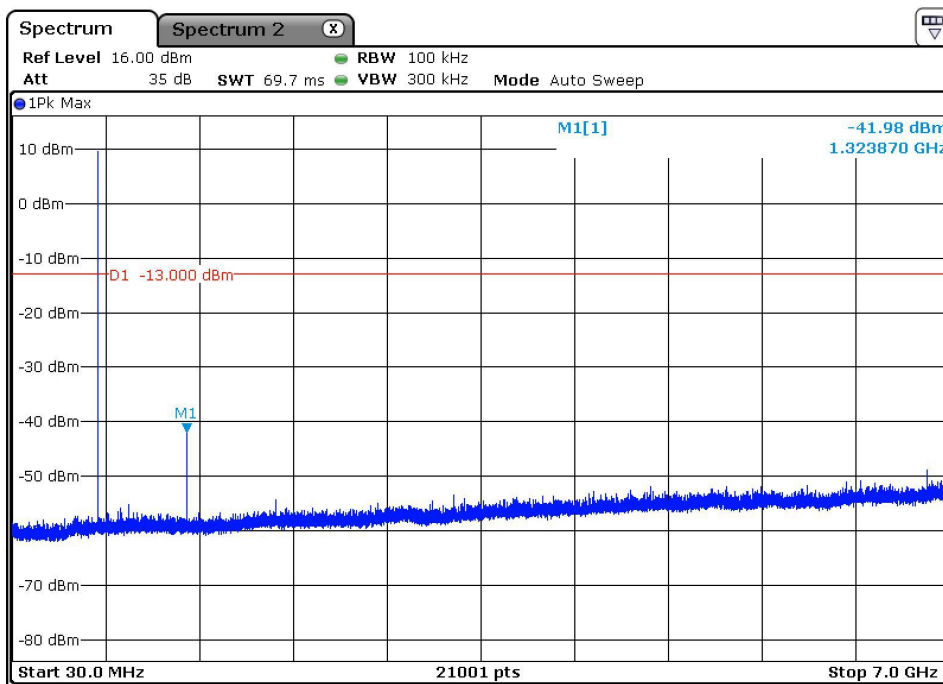
CH 0-638.125MHz



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

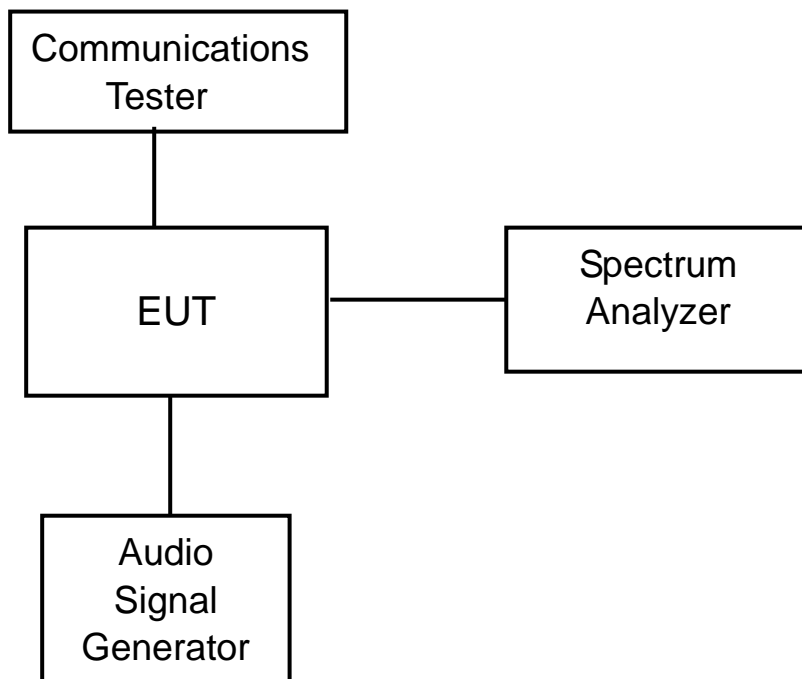
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Signal Analyzer Rohde & Schwarz	FSV7	102331	Nov. 26, 12	Nov. 25, 13
Audio Test System BOSCH	ATS-1	0000300054270000	Nov. 01, 12	Oct. 30, 13
Communications Tester JUNG JIN	MM-2500	N/A	Nov. 01, 12	Oct. 30, 13

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.

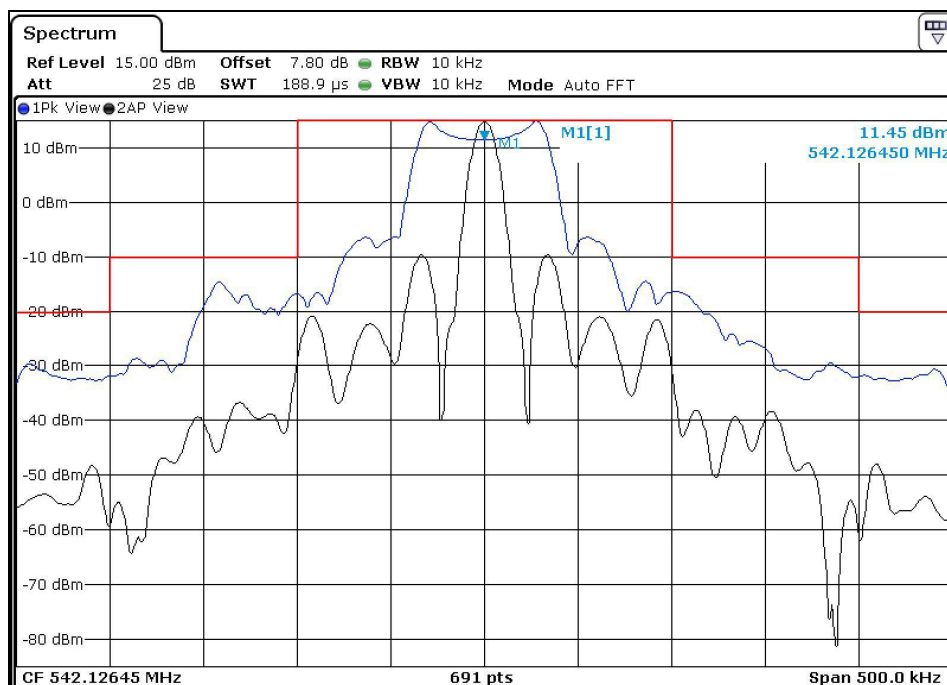
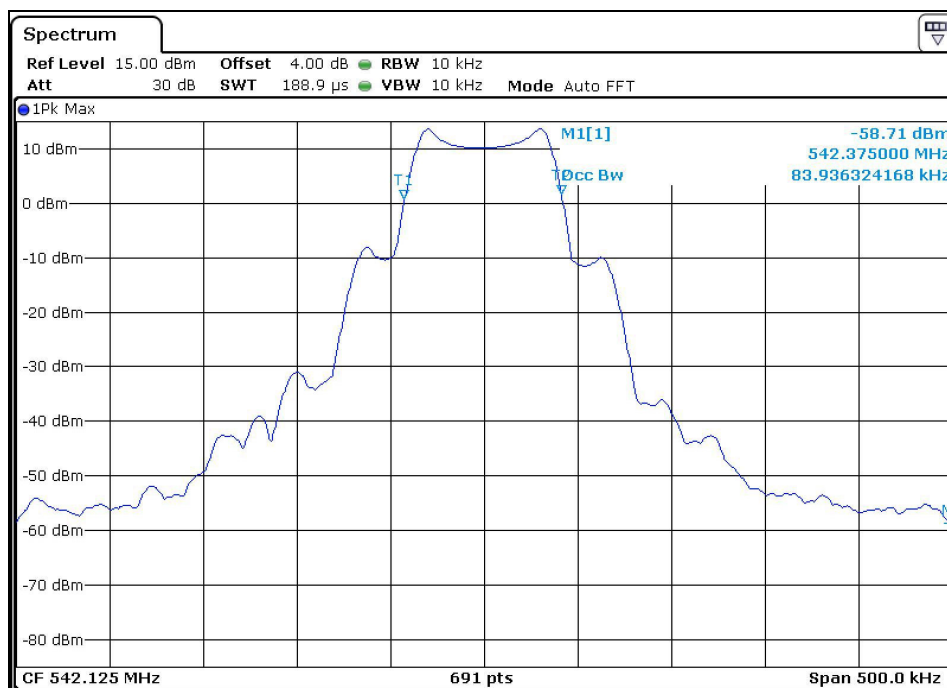
4.4.4 TEST SETUP



4.4.5 TEST RESULTS

The 100% deviation is 70 KHz; 50% deviation is 35KHz

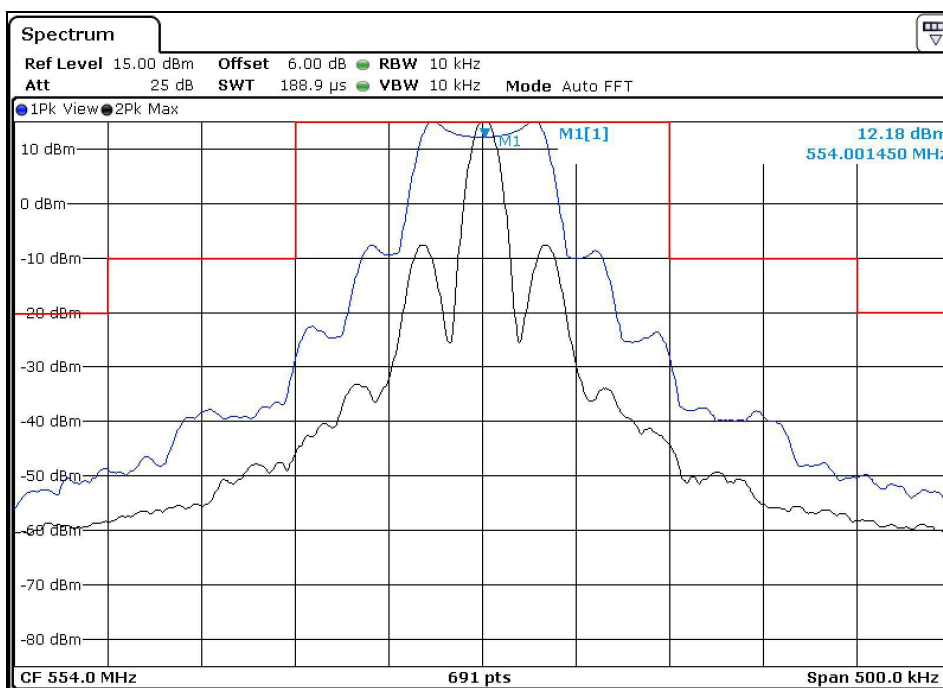
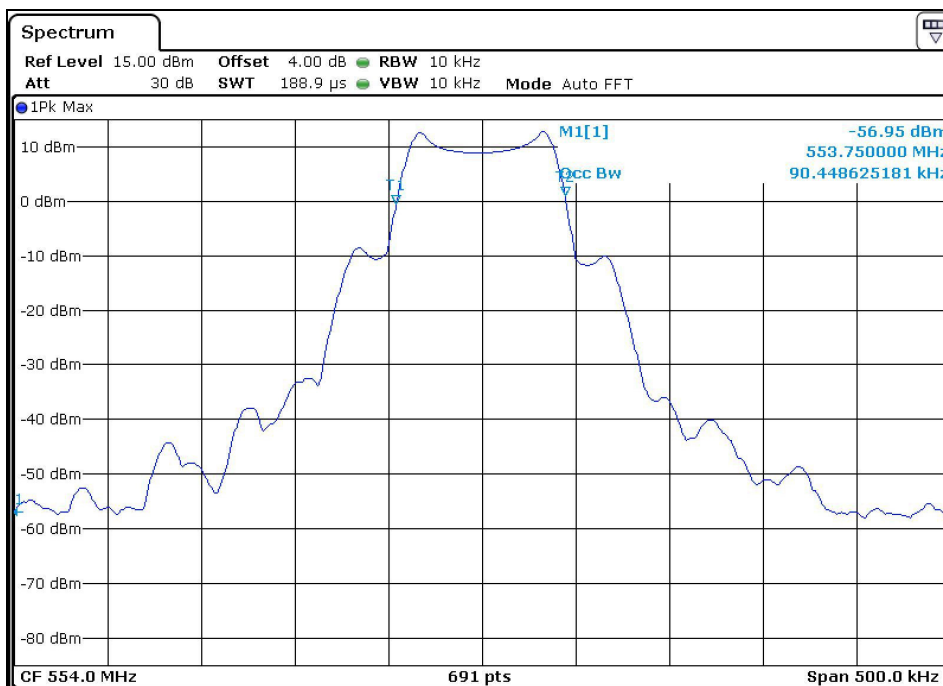
CH 0: 542.125 MHz





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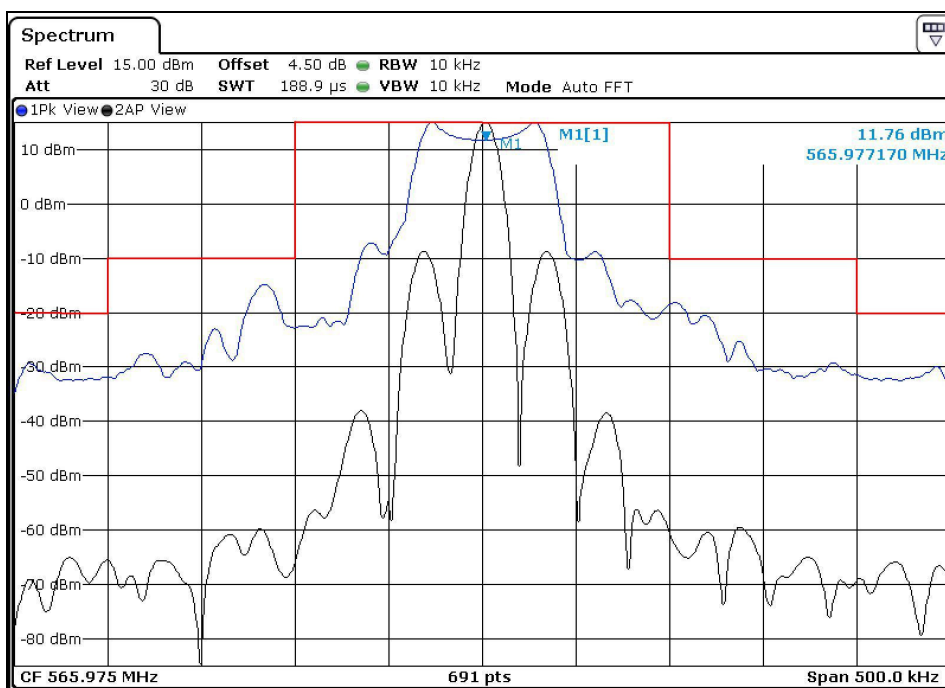
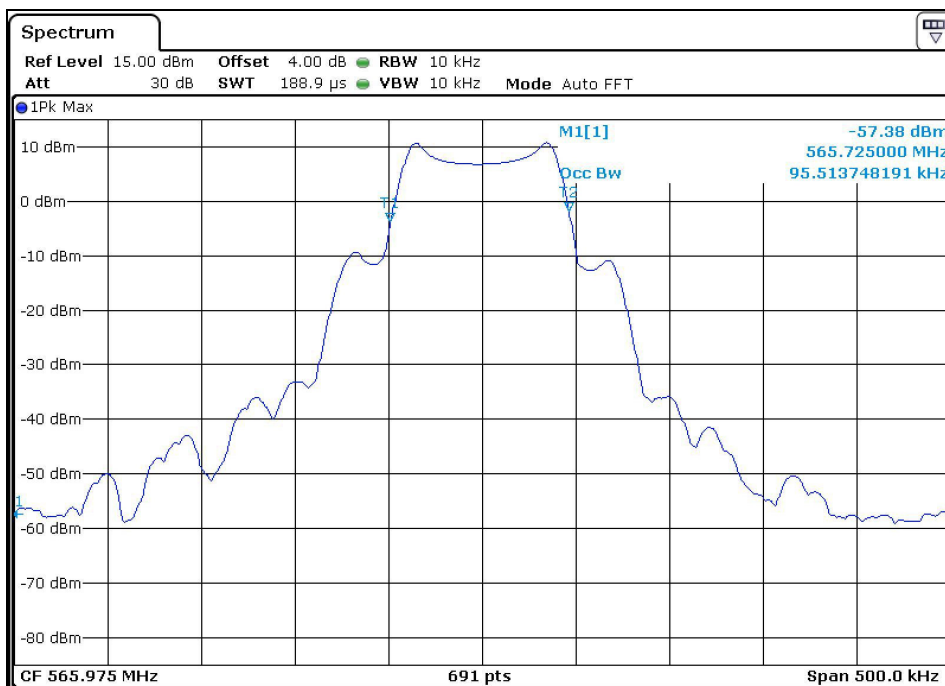
CH 8: 554.000 MHz





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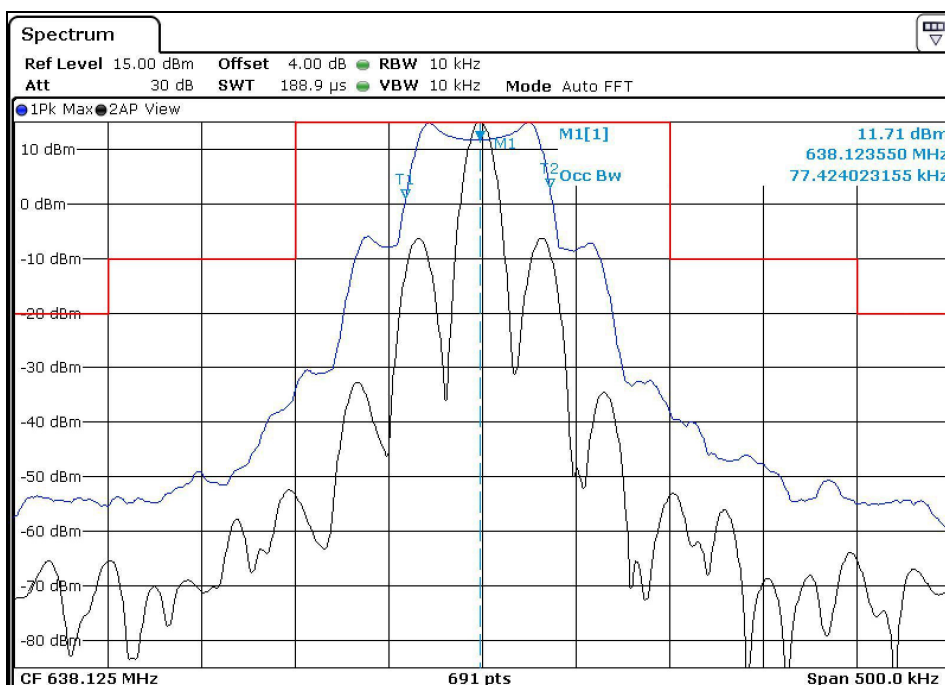
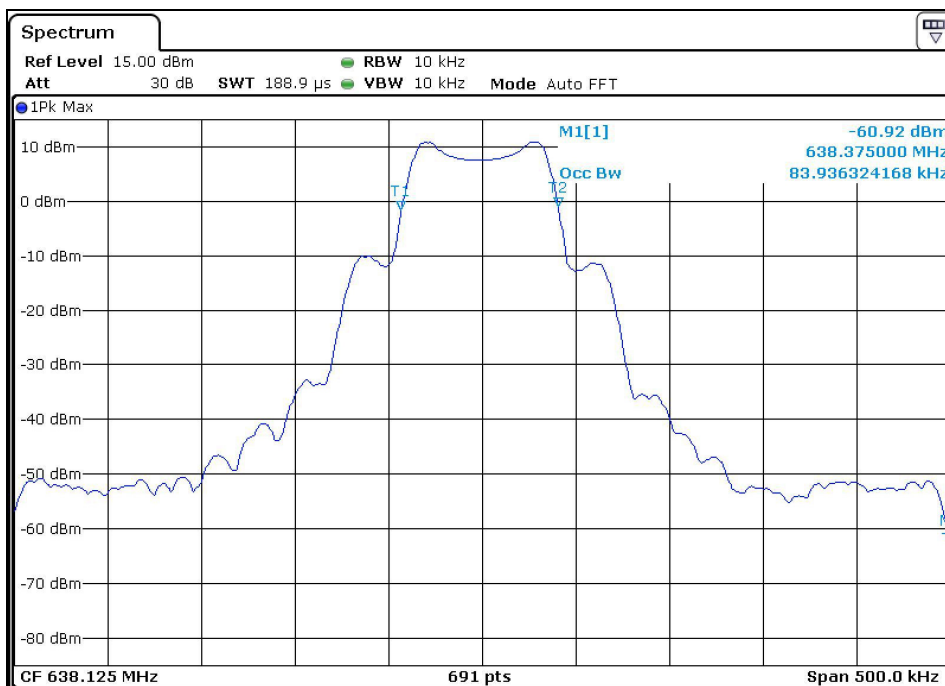
CH F: 565.975 MHz



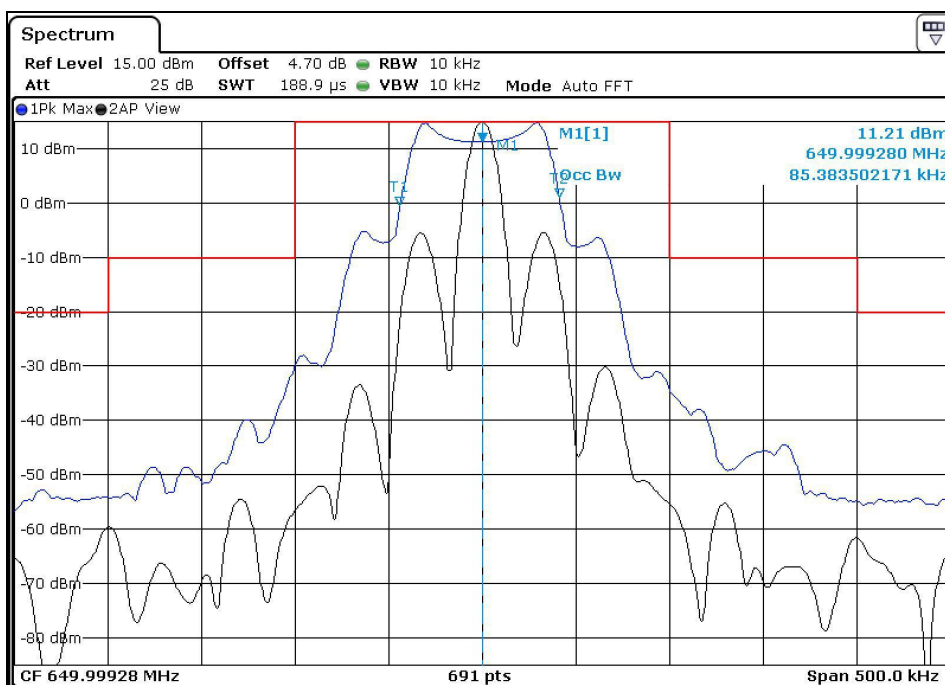
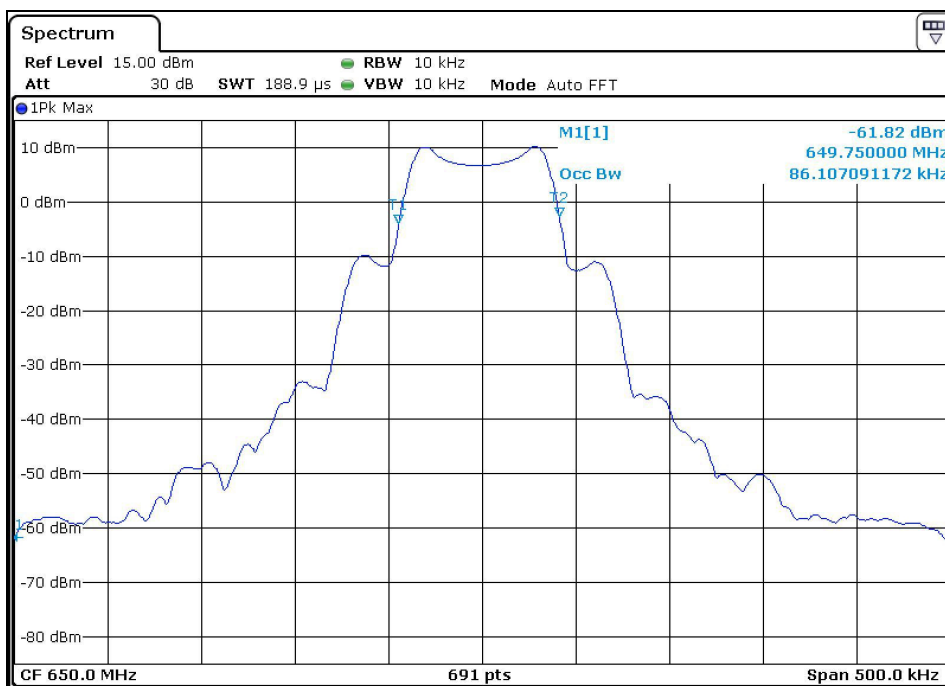


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CH 0: 638.125 MHz



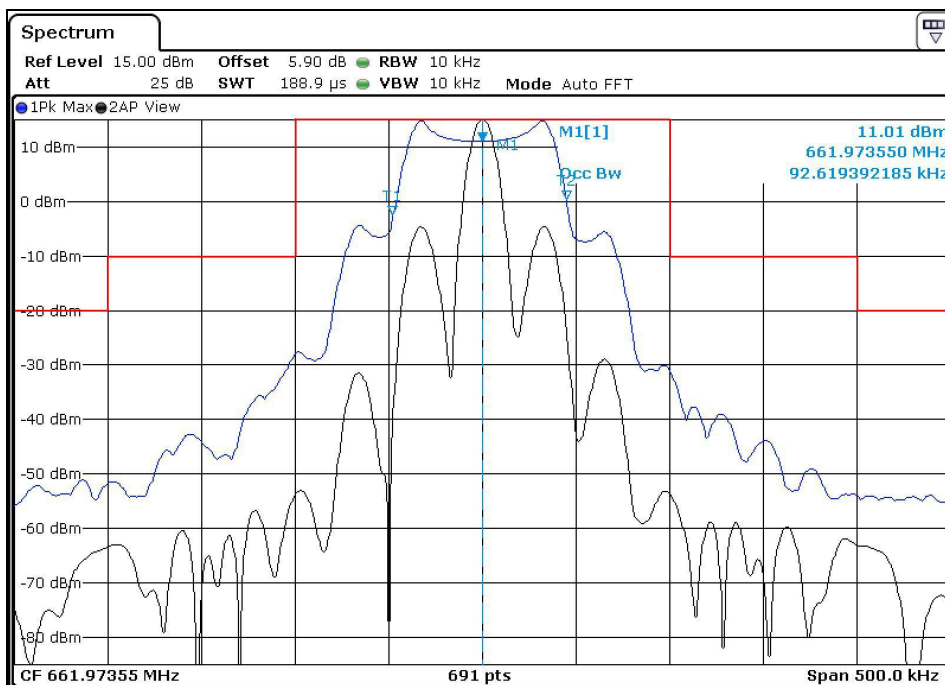
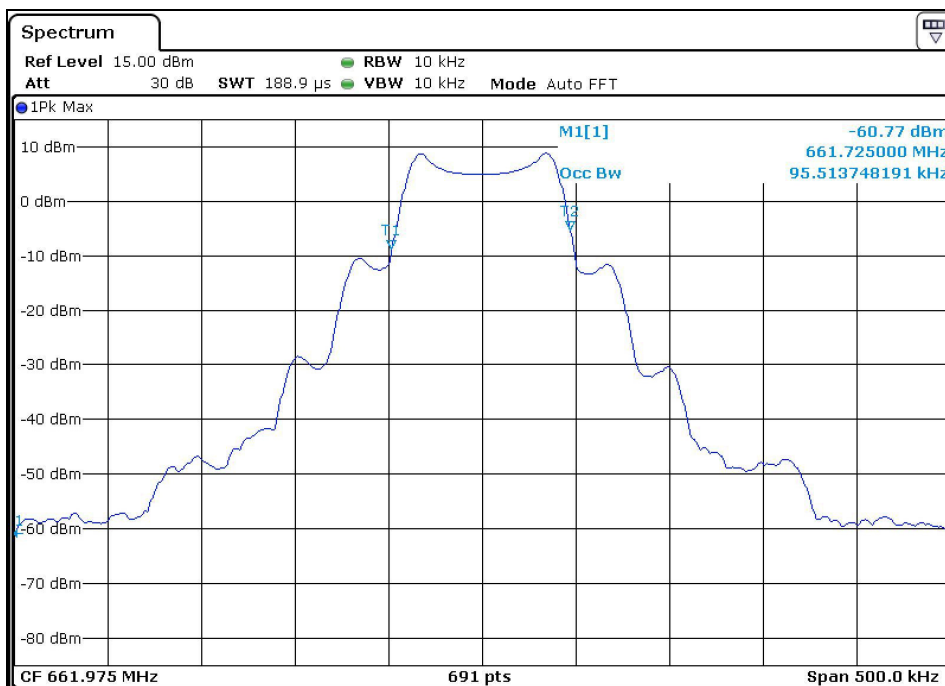
CH 8: 650.000 MHz





Test Report No.: FC130523N012-1

CH F: 661.975 MHz





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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

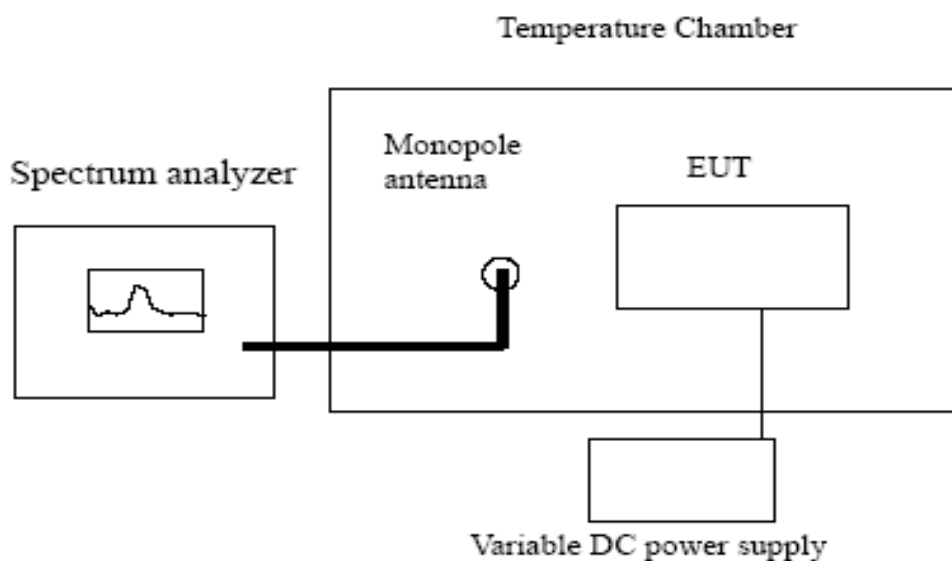
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Signal Analyzer Rohde & Schwarz	FSV7	102331	Nov. 26,12	Nov. 25,13

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	542.1237	553.9985	565.9742
-20	3V	542.1247	553.9990	565.9749
-10	3V	542.1258	553.9990	565.9750
0	3V	542.1250	554.000	565.975
10	3V	542.1253	554.0004	565.9752
20	3V	542.1259	554.0009	565.9755
30	3V	542.1259	554.0010	565.9759
40	3V	542.1263	554.0010	565.9770
50	3V	542.1268	554.0016	565.9773
Frequency Error		+1.8 KHz	+1.6 KHz	+2.3 KHz
Frequency tolerance		0.00033%	0.00029%	0.00041%
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	542.1250	554.0001	565.9753
20	3.45V	542.1252	554.0004	565.9754
Frequency Error		+0.2 KHz	+0.4 KHz	+0.4 KHz
Frequency tolerance		0.000037%	0.000072%	0.000071%
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	638.1240	650.0003	661.9738
-20	3V	638.1241	650.0001	661.9741
-10	3V	638.1248	650.0001	661.9745
0	3V	638.1250	650.0000	661.9750
10	3V	638.1255	650.0000	661.9752
20	3V	638.1255	650.0008	661.9755
30	3V	638.1258	650.0010	661.9759
40	3V	638.1259	650.0015	661.9762
50	3V	638.1263	650.0020	661.9771
Frequency Error		+1.3 KHz	+2.0 KHz	+2.1 KHz
Frequency tolerance		0.0002%	0.00031%	0.00032%
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	638.1250	650.000	661.9751
20	3.45V	638.1252	650.0002	661.9755
Frequency Error		+0.2 KHz	+0.2 KHz	+0.5 KHz
Frequency tolerance		0.000031%	0.000031%	0.000076%
Frequency Tolerance Limit		0.005%		



Test Report No.: FC130523N012-1

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

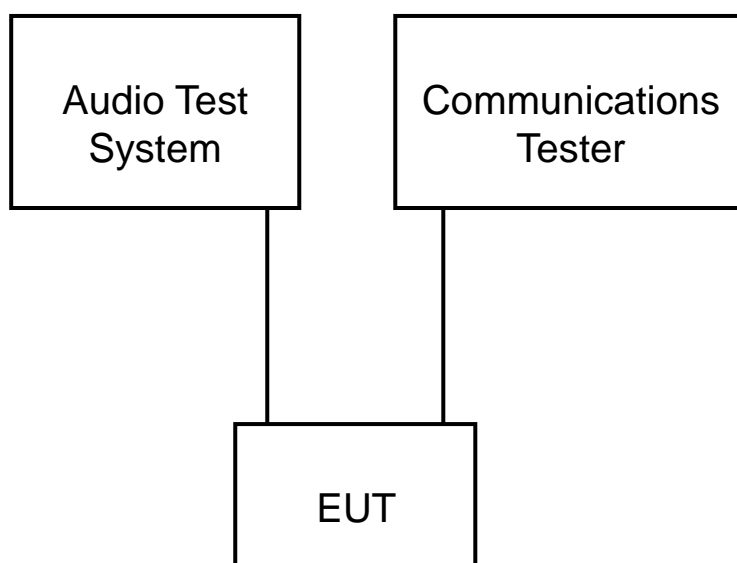
Audio Frequency Response:

- 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	39.60	1.38
300	39.85	1.44
500	38.04	1.03
700	35.89	0.53
1000	33.77	0
1500	29.10	-1.29
2000	25.36	-2.49
2500	21.93	-3.75
3500	17.49	-5.71
5000	13.58	-7.91

554.000 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	30.60	0.79
300	32.79	1.39
500	31.89	1.15
700	30.23	0.68
1000	27.94	0
1500	23.66	-1.44
2000	20.46	-2.71
2500	17.65	-3.99
3500	13.97	-6.02
5000	10.79	-8.26

565.975 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	23.53	1.10
300	25.07	1.65
500	24.05	1.29
700	22.88	0.86
1000	20.73	0
1500	17.36	-1.54
2000	15.10	-2.75
2500	13.12	-3.97
3500	10.57	-5.85
5000	8.17	-8.09

638.125 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	40.58	1.84
300	39.30	1.56
500	38.21	1.31
700	35.48	0.67
1000	32.85	0
1500	28.73	-1.16
2000	25.16	-2.32
2500	22.33	-3.35
3500	17.72	-5.36
5000	13.79	-7.54

650.000 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	30.35	1.45
300	31.49	1.77
500	29.83	1.30
700	28.64	0.94
1000	25.69	0
1500	22.38	-1.20
2000	19.12	-2.57
2500	16.86	-3.66
3500	13.66	-5.49
5000	10.53	-7.75

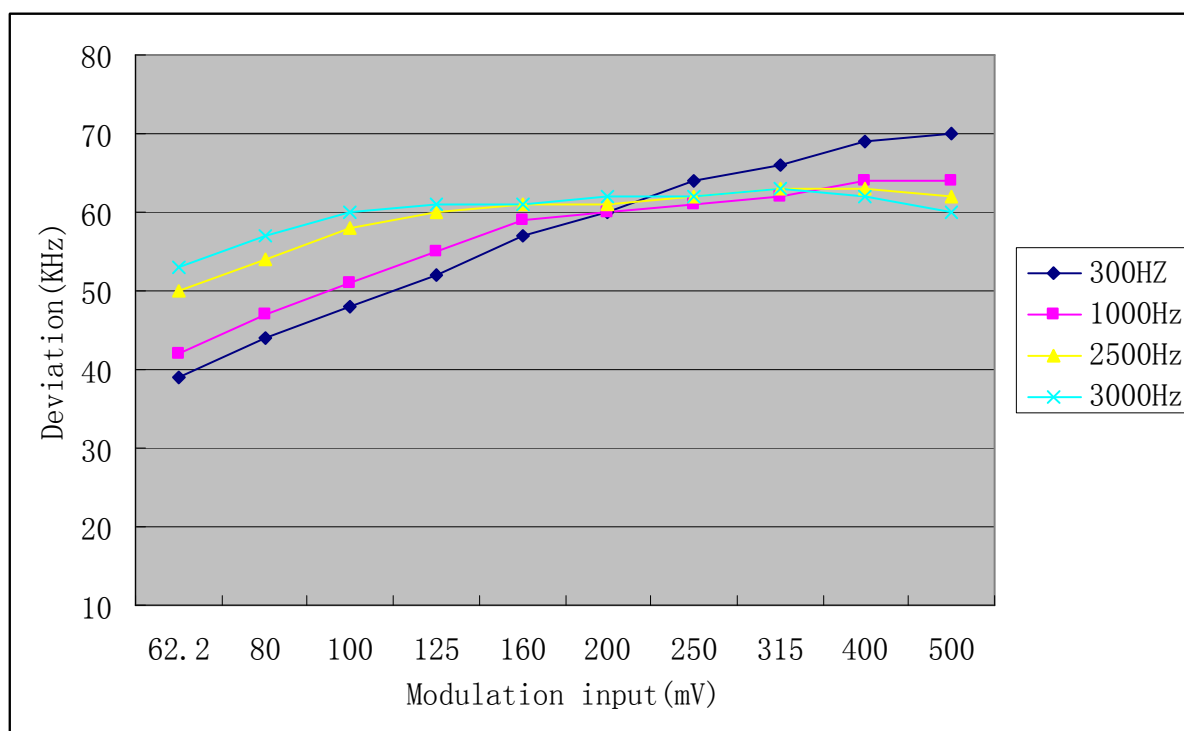
661.975 MHz

Modulation Frequency(Hz)	Input Level(mV)	Audio Frequency Response(dB)
100	24.81	1.42
300	25.57	1.68
500	24.20	1.20
700	22.83	0.69
1000	21.08	0
1500	17.87	-1.43
2000	15.66	-2.58
2500	13.61	-3.80
3500	10.93	-5.71
5000	8.47	-7.92

Modulation Limiting

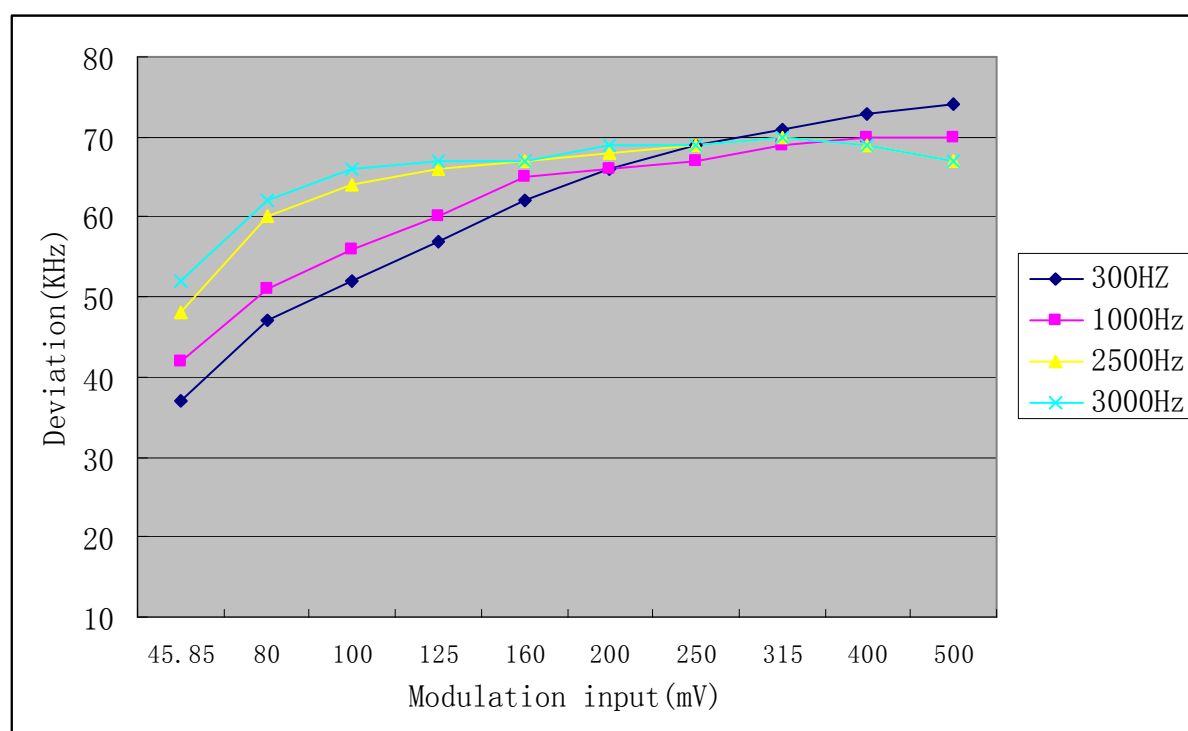
542.125 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
62.2	39	42	50	53
80	44	47	54	57
100	48	51	58	60
125	52	55	60	61
160	57	59	61	61
200	60	60	61	62
250	64	61	62	62
315	66	62	63	63
400	69	64	63	62
500	70	64	62	60



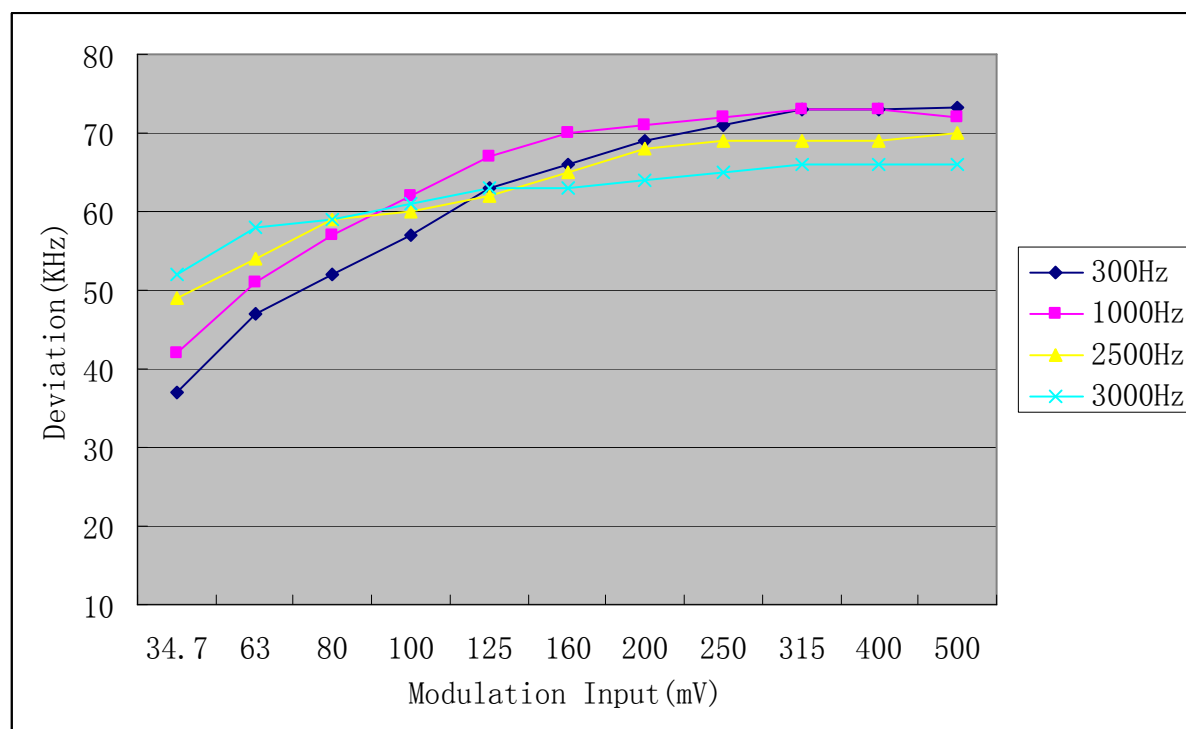
554.000 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
45.85	37	42	48	52
80	47	51	60	62
100	52	56	64	66
125	57	60	66	67
160	62	65	67	67
200	66	66	68	69
250	69	67	69	69
315	71	69	70	70
400	73	70	69	69
500	73	70	67	67



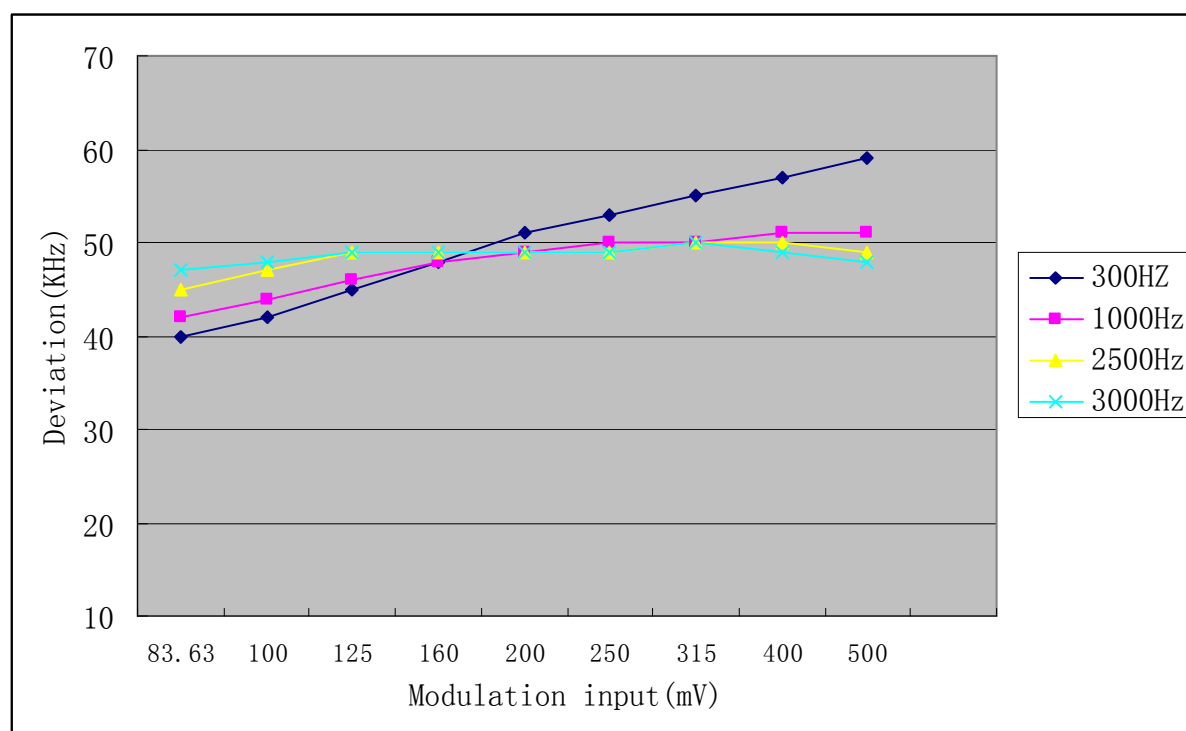
565.975 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
34.66	37	42	49	52
63	47	51	54	58
80	52	57	59	59
100	57	62	60	61
125	63	67	62	63
160	66	70	65	63
200	69	71	68	64
250	71	72	69	65
315	73	73	69	66
400	73	73	69	66
500	73.2	72	70	66



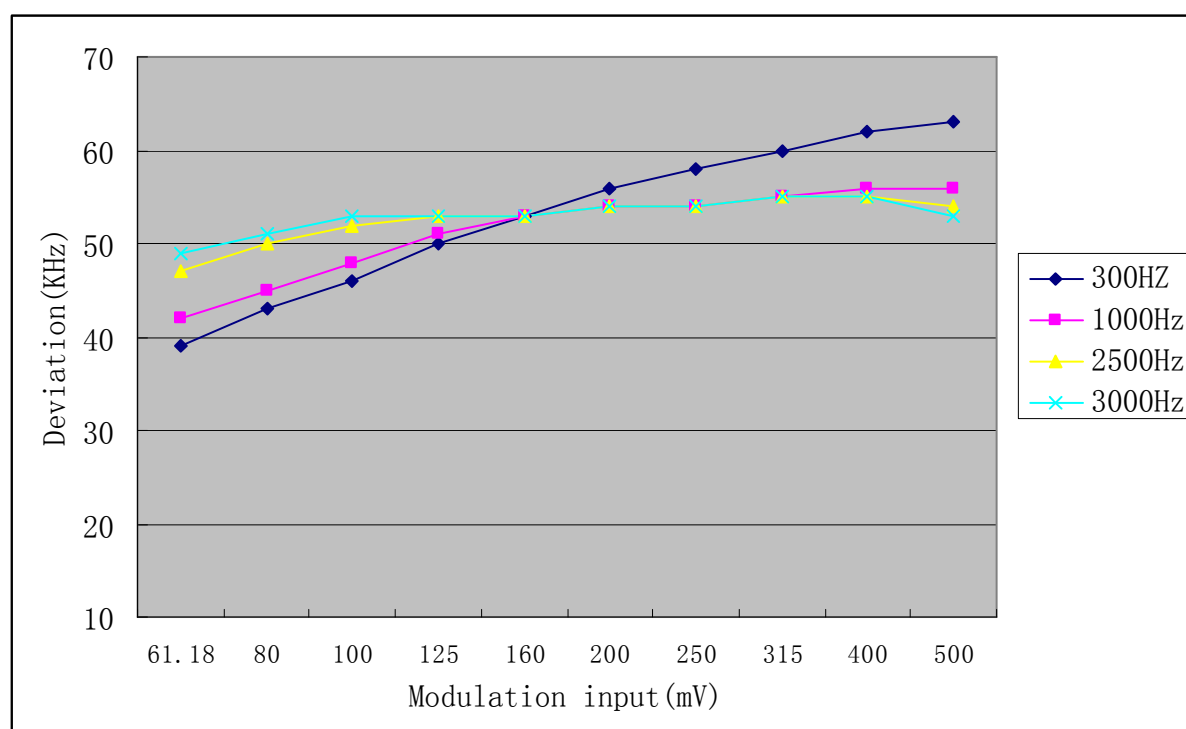
638.125 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
83.63	40	42	45	47
100	42	44	47	48
125	45	46	49	49
160	48	48	49	49
200	51	49	49	49
250	53	50	49	49
315	55	50	50	50
400	57	51	50	49
500	59	51	49	48



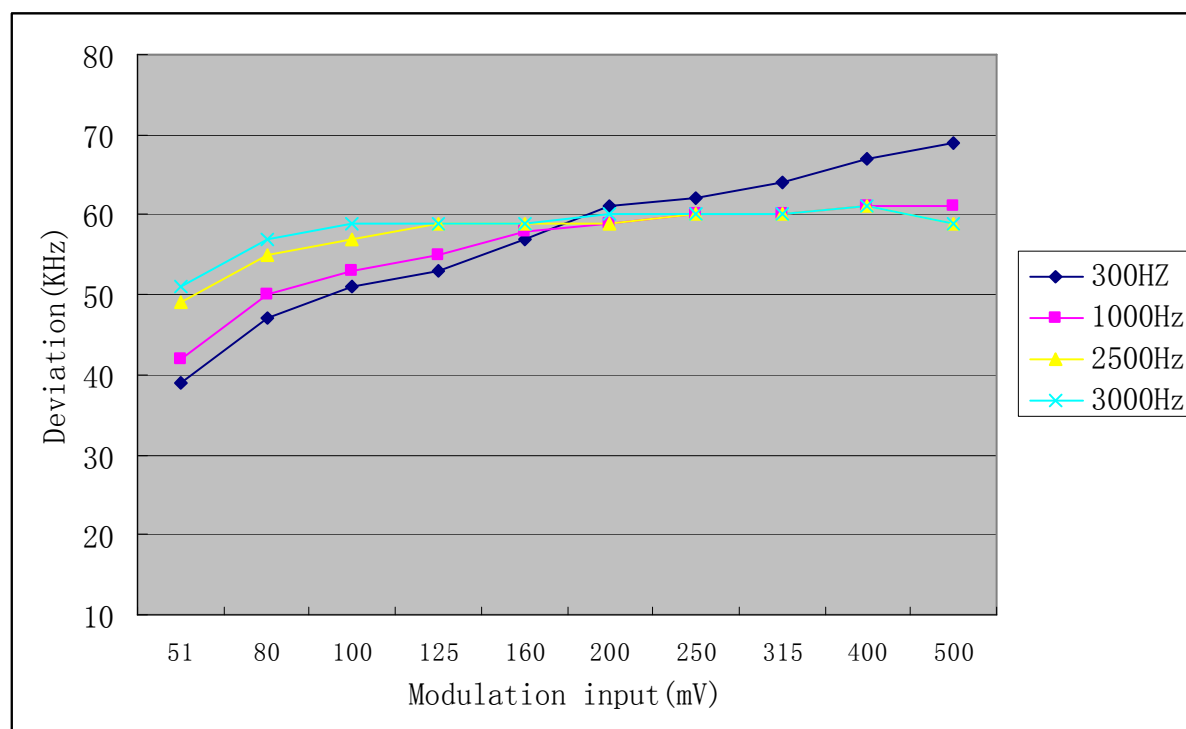
650.000 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
61.18	39	42	47	49
80	43	45	50	51
100	46	48	52	53
125	50	51	53	53
160	53	53	53	53
200	56	54	54	54
250	58	54	54	54
315	60	55	55	55
400	62	56	55	55
500	63	56	54	53



661.975 MHz

Modulation Input(mV)	Peak Frequency Deviation(KHz)			
	300Hz	1000Hz	2500Hz	3000Hz
51	39	42	49	51
80	47	50	55	57
100	51	53	57	59
125	53	55	59	59
160	57	58	59	59
200	61	59	59	60
250	62	60	60	60
315	64	60	60	60
400	67	61	61	61
500	69	61	59	59





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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---