SGS-CSTC Standards Technical Services Co., Ltd.
Guangzhou Branch

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TEST REPORT

The following sample(s) was/were submitted and identified on behalf of the client as:

Application No.:	GZEM1507003481CR
Applicant:	ENPING MISHA ELECTRONIC CO., LTD
Manufacturer:	Same as the applicant
FCC ID:	SW6TWM301
Product Description:	Wireless microphone
Model No.:	MA-XX(XX=100-3000), TWM301,MPWL 1509-BK♣
♣	Please refer to section 3 of this report for further details.
Trade Mark:	MISHA, AXESS, tyler
Standards:	47 CFR Part 74, Subpart H:2014 section 74.861
Date of Receipt:	2015-07-21
Date of Test:	2015-08-24
Date of Issue:	2015-11-06
Test Result :	**Pass***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above. Please refer to section 3 of this report for further details.

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Jerry Chan
Manager

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2015-11-06		Original Report

Authorized for issue by:				
Tested By		 **(Little Xiang) / Project Engineer**		2015-08-24 **Date**
Prepared By		 **(Little Xiang) / Project Engineer**		2015-10-19 **Date**
Checked By		 **(Jerry Chan) / Reviewer**		2015-10-19 **Date**

3 Test Summary

Test	Test Requirement	Test method	Limit/Severity	Result
RF Power Output (Conducted)	FCC Rules Part 74, Section 74.861(e)(1)	ANSI/TIA-603-D 2010 Section 2.2.1	FCC Rules Part 74, Section 74.861(e)(1)	PASS
Spurious Emissions (Radiated)	FCC Rules Part 74, Section 74.861(e)(6)(III)	ANSI/TIA-603-D 2010 Section 2.2.12	FCC Rules Part 74, Section 74.861(e)(6)(III)	PASS
Spurious Emissions (Conducted)	FCC Rules Part 74, Section 74.861(e)(6)(III)	ANSI/TIA-603-D 2010 Section 2.2.13	FCC Rules Part 74, Section 74.861(e)(6)(III)	PASS
Modulation Characteristics Measurement	FCC Part 2 Per Section 2.1047(a) and (b)	ANSI/TIA-603-D 2010 Section 2.2.6 & 2.2.3	ANSI/TIA-603-D 2010 Section 3.2.6 and 3.2.3	PASS
Occupied Bandwidth	FCC Rules Part 74, Section 74.861(e)(3), Section 74.861(e)(5), Section 74.861(e)(6)	ANSI/TIA-603-D 2010 Section 2.2.11	FCC Rules Part 74, Section 74.861(e)(3), Section 74.861(e)(5), Section 74.861(e)(6)	PASS
Frequency Tolerance	FCC Rules Part 74, Section 74.861(e)(4)	ANSI/TIA-603-D 2010 Section 2.2.2	FCC Rules Part 74, Section 74.861(e)(4)	PASS

Remark:

EUT: In this whole report EUT means Equipment Under Test.

♣ **Model No.:** MA-XX(XX=100-3000), TWM301, MPWL 1509-BK

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference being the model no. and outer decoration.

Therefore only one model **MA-317** was tested in this report.

4 Contents

5 General Information

5.1 Client Information

Applicant:	ENPING MISHA ELECTRONIC CO., LTD
Address of Applicant:	PINGSHI DEVELOPMENT AREA, ENPING CITY GUANGDONG CHINA
Manufacturer:	Same as the applicant
Address of Manufacturer:	Same as the applicant

5.2 General Description of E.U.T.

Product Description:	Wireless microphone
Model No.:	MA-317

5.3 Details of E.U.T.

Operating Frequency	199.6MHz, 207.5MHz
Type of Modulation:	FM
Number of Channels	2
Channel Separation:	7.9MHz
Antenna Type	Integral
Antenna gain:	0 dBi
Maximum Frequency Deviation:	+/- 75kHz
Frequency Response:	75Hz-12kHz
Authorized Bandwidth:	2 times Maximum Frequency Deviation plus 2 time Maximum Audio Frequency means 174KHz {2X(75+12)KHz} according to the specification of this product.
Function:	Microphone with wireless function to transmit audio signal.
Power Supply:	DC 9.0V 1Xsize “6F22” battery
Normal Test Voltage:	DC9.0V

5.4 Description of Support Units

The EUT has been tested as an independent unit.

5.5 Deviation from Standards

Biconical and log periodic antennas were used instead of dipole antennas.

5.6 Abnormalities from Standard Conditions

The EUT passed Frequency Tolerance test after modification.

5.7 Other Information Requested by the Customer

None.

5.8 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663
Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

5.9 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

  The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC (Registration No.: 282399)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **Industry Canada (Registration No.: 4620B-1)**

  The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

  The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co. Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584，G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

  SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01:2006-10 and Rules of procedure IECEE 02:2006-10, and the relevant IECEE CB-Scheme Operational documents.

6 Equipment List

No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0039	Temperature Chamber	GZ GongWen Co.Ltd.	GDJW-100	118	2015-07-18	2016-07-17
EMC2022	DC Power Supply	KIKUSUI ELECTRONICS CORP.	PAN60-20A	HH000269	2015-03-02	2016-03-01
EMC0007	DMM	Fluke	73	70671122	2015-09-15	2016-09-14
EMC0006	DMM	Fluke	73	70681569	2015-09-15	2016-09-14
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2014-12-5	2015-12-4
EMC0530	10m Semi- Anechoic Chamber	ETS	N/A	N/A	2014-05-03	2016-05-02
EMC2080	Biconical Antenna (Tx)	Rohde & Schwarz	HK116	100641	201412-04	2017-12-03
EMC2082	Log-Perd. Dipole Antenna (Rx)	Rohde & Schwarz	HL223	100624	201412-04	2017-12-03
EMC2026	Horn Antenna (Rx)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	9120D-84	2013-08-31	2016-08-30
EMC0519	Bilog Type Antenna	Schaffner Chase	CBL6143	5070	2014-05-04	2017-05-03
EMC0521	1-26.5GHz Pre Amplifier	Agilent	8449B	3008A01649	2015-03-02	2016-03-01
EMC0075	9KHz-1GHz Pre Amplifier	SONOMA INSTRUMENT Co.	310N	272683	2015-03-02	2016-03-01
EMC0507	Antenna Mask (Tx)	HD-GmbH	AS620M	620/408	N/A	N/A
EMC0508	Antenna Mask (Rx)	HD-GmbH	MA240	240/619	N/A	N/A
EMC0509	Turntable	HD-GmbH	DT430	N/A	N/A	N/A
EMC0510	Turntable & Antenna Mask Controller	HD-GmbH	HD100	N/A	N/A	N/A
EMC0512	EMI Test Software	Rohde & Schwarz	ES-K1	N/A	N/A	N/A
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2015-03-02	2016-03-01
EMC0516	Signal Generator	Rohde & Schwarz	SMR20	100416	2015-03-02	2016-03-01
EMC0032	Radio Communication Monitor	Rohde & Schwarz	CMS54	100137	2015-07-18	2016-07-17
EMC0904	Power Meter	Rohde & Schwarz	NRVS	825770/074	2015-03-02	2016-03-01
EMC0071	URV5-Z2 Insert. Unit	Rohde & Schwarz	URV5-Z2	100309	2015-03-02	2016-03-01
EMC0906	Dual Directional Coupler	Werlatone Inc.	C1795	6634	2015-07-18	2016-07-17
EMC2012	Power-Electronics Measurement System	Tektronix	TDS 744A	N/A	2015-03-02	2016-03-01
EMC0523	Active Loop Antenna	EMCO	6502	42963	2015-03-22	2016-03-21
EMC0069	Signal Analyzer (20Hz ~ 26.5Ghz	R&S	FSIQ26	100312	2015-03-02	2016-03-01
EMC2025	Trilog Broadband Antenna 30-1000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9160	9160-3372	2014-07-14	2017-07-13
EMC0078	Temperature, & Humidity	Shanghai Meteorological Instrument factory Co., Ltd.	ZJ1-2B	709131	2015-09-16	2016-09-15
EMC0068	Modulation Analyzer	HP	8901B	3438B05310	2015-04-10	2015-04-09

7 Test Results

7.1 Test conditions

7.1.1 Normal conditions

Ambient:	Temperature:	+15°C to +35°C
	Relative humidity:	20% to 75%
Power supply:	Battery:	Nominal

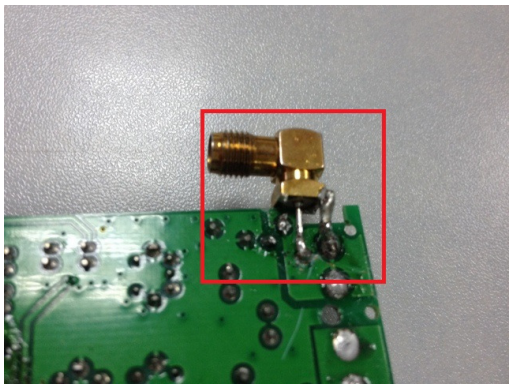
7.1.2 Extreme conditions

Ambient:	Temperature:	-30°C to +60°C
Power supply:	Battery:	Nominal -15% to Nominal

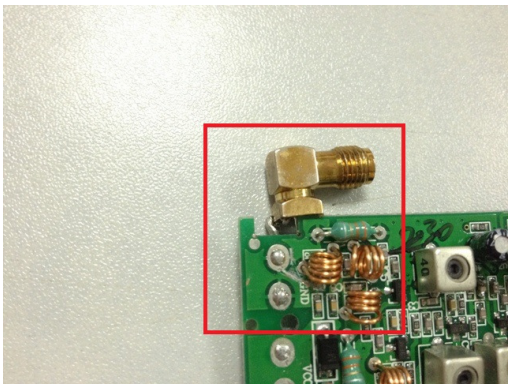
7.2 Test frequencies and antenna

Test frequencies are 199.6MHz and 207.5MHz.

This product has an integral antenna. In order to conduct the RF test the manufacturer provide one temporary SMA –Female type antenna connector which input impedance is 50ohm and connected it to the PCB with the shortest connection path to make sure the good matching between temporary antenna connector and PCB as following figure shown.



Bottom



Top

7.3 RF Power Output (Conducted)

Test Requirement: FCC Rules Part 74, Section 74.861(E)(1)

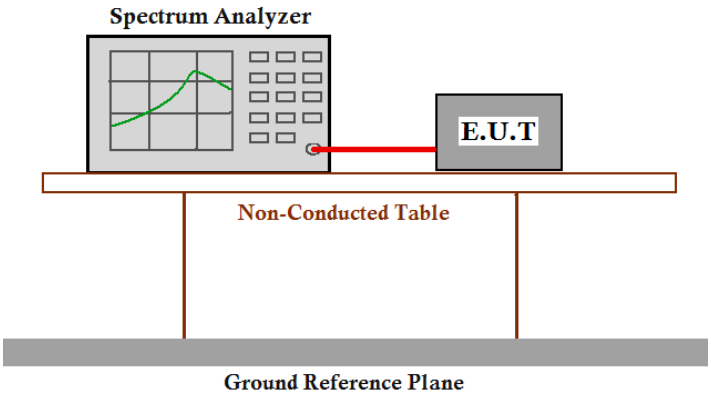
Test Method: ANSI/TIA-603-D-2010 Section 2.2.1

Test Voltage: DC 9.0V

EUT Operation:

Status: Test the EUT in transmitting without modulated mode.

Test setup:



Test procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 KHz. VBW = 300 KHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

7.3.1.1 Measurement Record

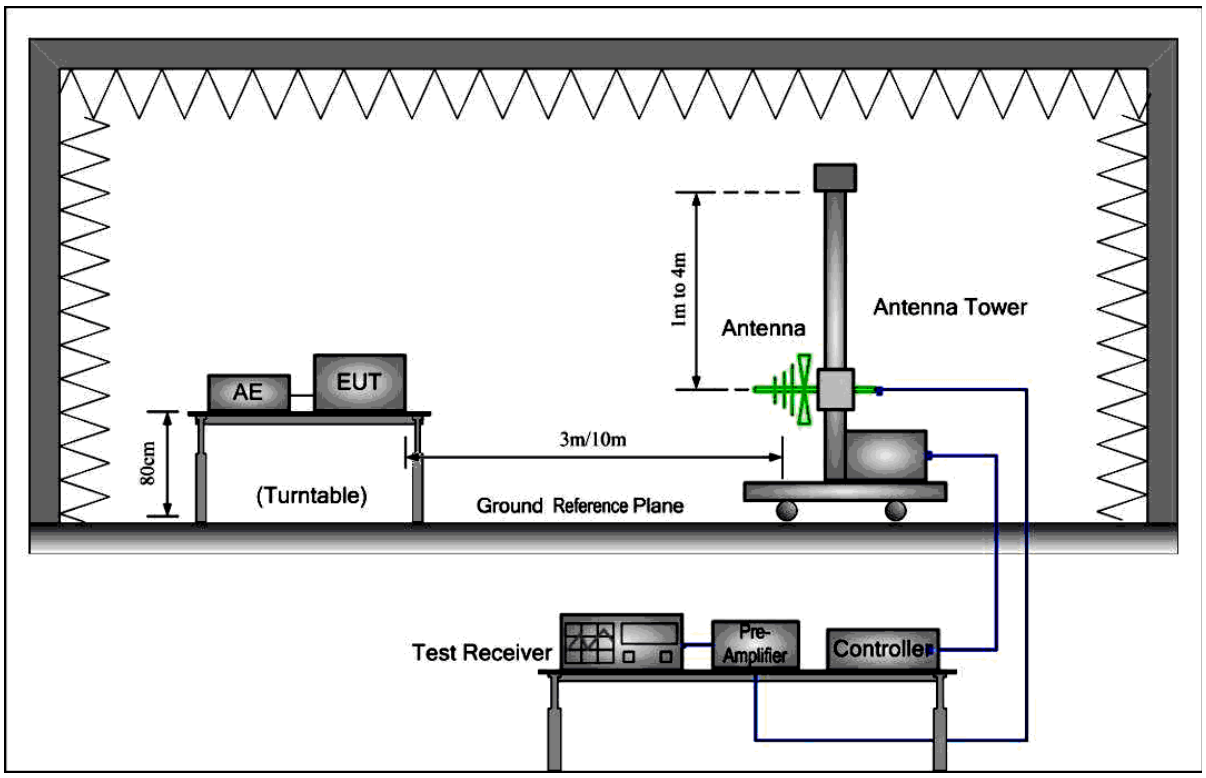
Test Result:					
DC 9.0V					
Frequency Point	**Fundamental Frequency (MHz)**	**Output Power (dBm)**	**Output Power (mW)**	**Limit (mW)**	**Result**
1	199.6	5.97	3.95	50.0	Pass
2	207.5	8.39	6.90	50.0	Pass
DC 7.65V					
1	199.6	5.23	3.33	50.0	Pass
2	207.5	8.24	6.67	50.0	Pass
Test result: The unit does meet the FCC requirements.					

7.4 Spurious Emissions (Radiated)

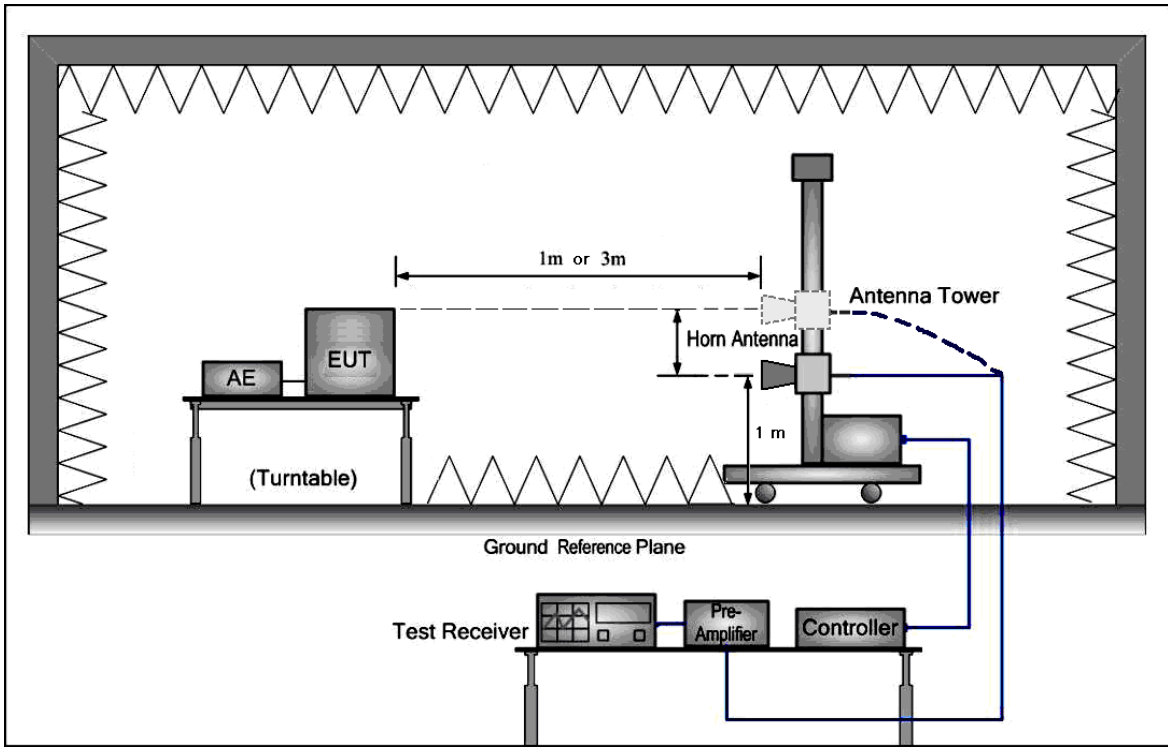
Test Requirement:	FCC Rules Part 74, Section 74.861(E)(6)(III) (i) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB; (ii) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB; (iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43+10lg(mean output power in watts)dB.
Test Method:	ANSI/TIA-603-D-2010 Section 2.2.12
Test Voltage:	DC 9.0V
EUT Operation:	
Status:	Test the EUT in transmitting mode.
Test Frequency Range:	30 MHz-3 GHz
Detector:	1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1GHz. 2) Video Bandwidth = 300 kHz for spurious emissions below 1 GHz, and 3 MHz for spurious emissions above 1 GHz. 3) Sweep Speed slow enough to maintain measurement calibration. 4) Detector Mode = Positive Peak.

Test Configuration:

30 MHz to 1 GHz emissions:



30 MHz to 1 GHz emissions:



Test procedure:

1. The procedure used was EIA/TIA 603-D: 2010. The receiver scanned from the lowest frequency generated within the EUT to 3GHz.When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage as nominal with the maximum power output.

Substitution method was performed to determine the actual spurious emission levels of the EUT.
The following test procedure as below:
1) Below 1GHz test procedure:

1. On the test site as test setup graph above, the EUT was placed at the 0.8m support on the turntable and in the position closest to normal use as declared by the provider.
2. The test antenna was oriented initially for vertical polarization and was chosen to correspond to the test frequency of the transmitter. The output of the test antenna was connected to the measuring receiver.
3. The transmitter was switched on with normal modulation and the measuring receiver was tuned to the test frequency of the transmitter under test.
4. The test antenna was raised and lowered from 1m to 4m until a maximum signal level was detected by the measuring receiver. Then the turntable was rotated through 360° in the horizontal plane, until the maximum signal level was detected by the measuring receiver.

5. Repeated step 4 for test frequency with the test antenna polarized horizontally.
6. Removed the transmitter and replace it with a substitution antenna (the antenna was half-wavelength for each frequency involved). The center of the substitution antenna was approximately at the same location as the center of the transmitter.
7. Fed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raised and lowered the test antenna to obtain a maximum reading at the spectrum analyzer. Adjusted the level of the signal generator output until the previously recorded maximum reading for this set of conditions was obtained. This was done carefully repeating the adjustment of the test antenna and generator output.
8. Repeated step 7 with both antennas horizontally polarized for each test frequency.
9. Calculated power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

$$ERP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where:

Pg is the generator output power into the substitution antenna.

2) Above 1GHz test procedure:

1. Different between above was the test site, changed from Semi- Anechoic Chamber to fully Anechoic Chamber.

7.4.1.1 Measurement Result

1. Test in 199.6 MHz

below 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit of Table 4&5	Margin
MHz	polarization	dBm	dBm	dB
61.57	Vertical	-59.43	-13.0	-46.43
399.20	V	-43.38	-13.0	-30.38
598.80	V	-61.46	-13.0	-48.46
62.54	Horizontal	-58.35	-13.0	-45.35
399.20	H	-42.10	-13.0	-29.10
598.80	H	-60.38	-13.0	-47.38
Above 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit of Table 4&5	Margin
MHz	polarization	dBm	dBm	dB
1197.60	Vertical	-60.98	-13.0	-47.98
1596.80	V	-62.03	-13.0	-49.03
1796.40	V	-64.86	-13.0	-51.86
1197.60	Horizontal	-61.39	-13.0	-48.39
1596.80	H	-63.43	-13.0	-50.43
1796.40	H	-61.04	-13.0	-48.04

2. Test in 207.5MHz

below 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit of Table 4&5	Margin
MHz	polarization	dBm	dBm	dB
71.35	Vertical	-58.67	-13.0	-45.67
415.00	V	-41.89	-13.0	-28.89
622.50	V	-59.40	-13.0	-46.40
72.54	Horizontal	-57.22	-13.0	-44.22
415.00	H	-40.76	-13.0	-27.76
830.00	H	-58.87	-13.0	-45.87
Above 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit of Table 4&5	Margin
MHz	polarization	dBm	dBm	dB
1037.50	Vertical	-61.30	-13.0	-48.30
1452.50	V	-64.97	-13.0	-51.97
1867.50	V	-66.74	-13.0	-53.74
1037.50	Horizontal	-59.22	-13.0	-46.22
1452.50	H	-60.03	-13.0	-47.03
1867.50	H	-61.99	-13.0	-48.99

Remark:

- Applicable limits:

  The Emission Limit equals:

  10Lg(*power x1000) – [43+10Lg(power)]

  =10Lg1000 – 43dB

  =–13 dBm

  power is mean output power in watts

- –100dBm was the minimum level which could be detected by measuring facility when below 1GHz, -70dBm at over 1GHz.

7.5 Spurious Emission (Conducted)

Test Requirement: FCC Rules Part 74, Section 74.861(E)(6)(III)

Test Method: ANSI/TIA-603-D 2010 Section 2.2.13

(iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43+10lg(mean output power in watts)dB.

- Applicable limits:
  The Emission Limit equals:
  10Lg(*power x1000) – [43+10Lg(power)]
  =10Lg1000 – 43dB
  =–13 dBm
  power is mean output power in watts

Test Voltage: DC 9.0V

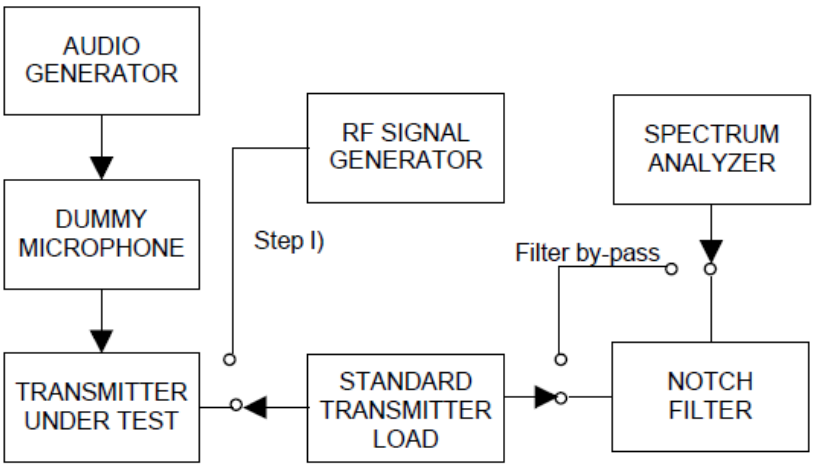
EUT Operation:

Status: Test the EUT in transmitting mode.

Test Frequency Range: 19.5 MHz-2.5GHz

Detector: 1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.
2) Video Bandwidth ≥3 times the resolution bandwidth.
3) Sweep Speed ≤2000 Hz per second.
4) Detector Mode = mean or average power.

Test Configuration:



Test Procedure:

1. Connect the equipment as illustrated, with the notch filter by-passed.
2. Set the centre frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.
3. Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than the necessary to produce 50% of rated system deviation which is 32.5 kHz. (the full rated system deviation of this product is 75kHz according to the specification supplied by the manufacturer)The input level shall be established at the frequency of maximum response of the audio modulating circuit.
4. Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from:
   1) The lowest radio frequency generated in the equipment to the carrier frequency minus the test bandwidth.
   2) The carrier frequency plus the test bandwidth to a frequency less than 2 times the carrier frequency.
5. Record the frequencies and levels of spurious emissions from step 4.
6. Unkey the transmitter. Replace the transmitter under test with the signal generator and adjust the signal level to reproduce the frequencies and levels of every spurious emission recorded in step 5. Record the signal generator levels in dBm.
7. Insert the notch filter.
8. Key the transmitter. Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from a frequency equal to 2 times the carrier frequency and to the tenth harmonic of the carrier frequency.
9. Record the frequencies and levels of spurious emissions from step 8.
10. Unkey the transmitter. Replace the transmitter under test with the signal generator and adjust the signal level to reproduce the frequencies and levels of every spurious emission recorded in step 9. Record the signal generator levels in dBm.

7.5.1.1 Test Result

199.6MHz:

Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)
19.53	-70.29	-13dBm	-57.29
36.30	-67.30		-54.3
399.20	-41.93		-28.93
1197.60	-60.56		-47.56
1596.80	-63.87		-50.87
1796.40	-60.74		-47.74

207.5MHz:

Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)
19.53	-68.32	-13dBm	-55.32
415.00	-39.48		-26.48
830.00	-56.96		-43.96
1037.50	-57.43		-44.43
1452.50	-58.92		-45.92
1867.50	-59.81		-46.81

7.6 Modulation Characteristics Measurement

Test Requirement: FCC Rules Part 2, Section 1047(a) and (b)

ANSI/TIA-603-D 2010 Section 3.2.6 and 3.2.3

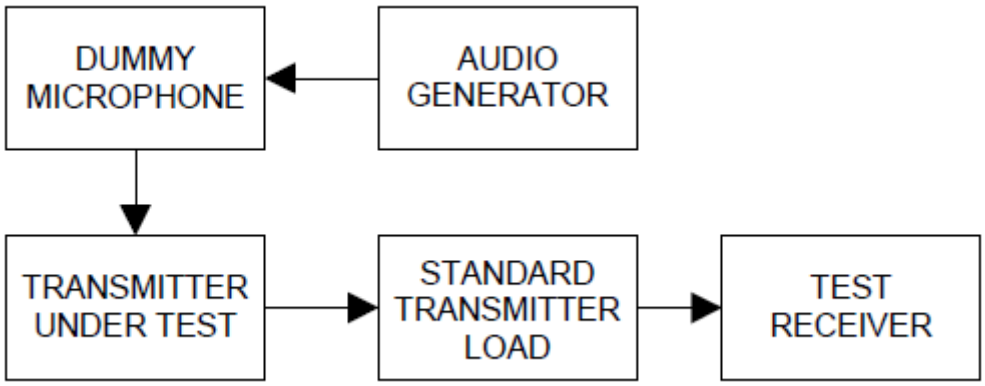
Test Method: ANSI/TIA-603-D 2010 Section 2.2.6 and 2.2.3

7.6.1 Audio Frequency Response

EUT Operation:

Status: Test the EUT in transmitting mode.

Test setup:



Test procedure:

1. Connect the equipment as illustrated.
2. Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤50 Hz to ≥15,000 Hz. Turn the de-emphasis function off.
3. Set the DMM to measure rms voltage.
4. Adjust the transmitter per the manufacturer's procedure for full rated system deviation. According to the specification of this product the full rated system deviation is 75 KHz.
5. Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation which is 15 KHz.
6. Set the test receiver to measure rms deviation and record the deviation reading.
7. Record the DMM reading as V_{REF}.
8. Set the audio frequency generator to the desired test frequency between 75 Hz and 12 KHz.

9. Vary the audio frequency generator output level until the deviation reading that was recorded in step 6) is obtained.
10. Record the DMM reading as V_{FREQ}.
11. Calculate the audio frequency response at the present frequency as:

$$audio\ frequency\ response = 20\ \log_{10}\left(\frac{V_{FREQ}}{V_{REF}}\right)$$

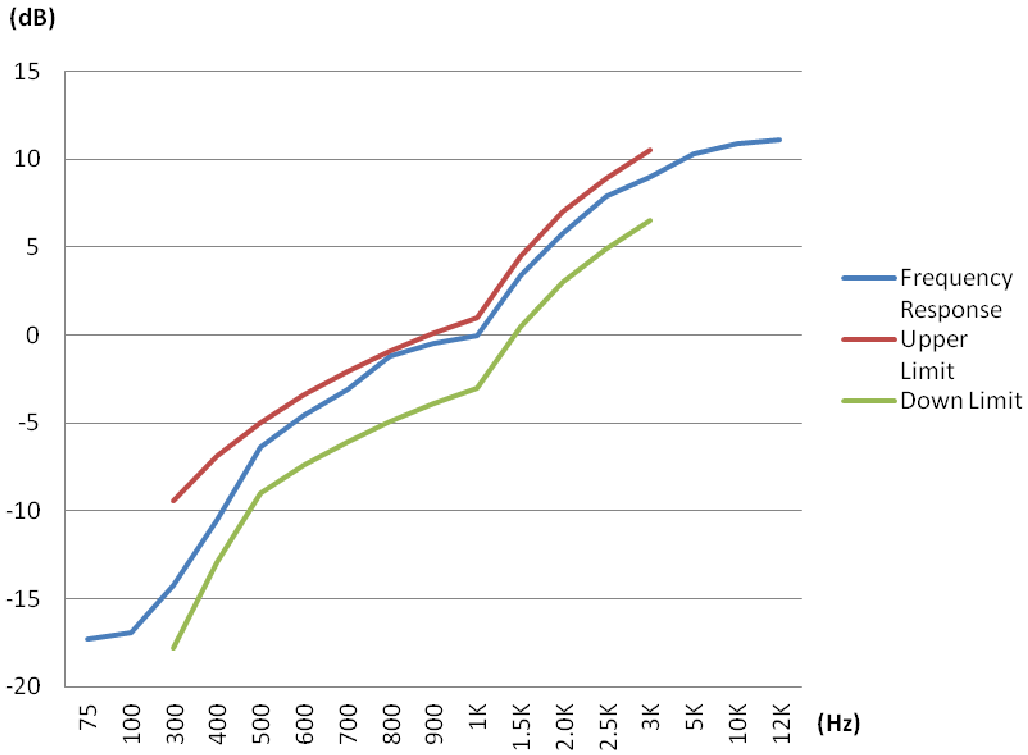
12. Repeat steps 8) through 11) for all the desired test frequencies.

7.6.1.1 Measurement Record

The test result of Audio Frequency Response is presented hereinafter as reference.

Audio Frequency (Hz)	DMM Read Level (mV)	Audio Frequency Response (dB)	Limit
75	10.9	-17.3	No limit
100	11.4	-16.9	No limit
300	15.5	-14.2	>-17.8 and <-9.4
400	23.8	-10.5	>-12.9 and <-6.9
500	38.2	-6.39	>-9.0 and <-5.0
600	47.4	-4.53	>-7.4 and <-3.4
700	55.9	-3.08	>-6.1 and <-2.1
800	69.7	-1.17	>-4.9 and <-0.9
900	75.8	-0.433	>-3.9 and <0.1
1K	79.7	0.000	V_{REF}
1.5K	117.7	3.39	>0.5 and <4.5
2.0K	154.7	5.76	>3.0 and <7.0
2.5K	198.8	7.94	>4.9 and <8.9
3K	224.9	9.01	>6.5 and <10.5
5K	260.9	10.3	No limit
10K	279.5	10.9	No limit
12K	286.1	11.1	No limit

The plot(s) of Audio Frequency Response is presented hereinafter as reference.



According to the FCC Part 2 section 1047(a), Voice modulated communication equipment. A curve or equivalent data showing 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, above is showing the frequency response of the range 100 to 5000Hz.

Also above is showing the audio frequency response is satisfied the limit in ANSI/TIA-603-D 2010 Section 3.2.6.

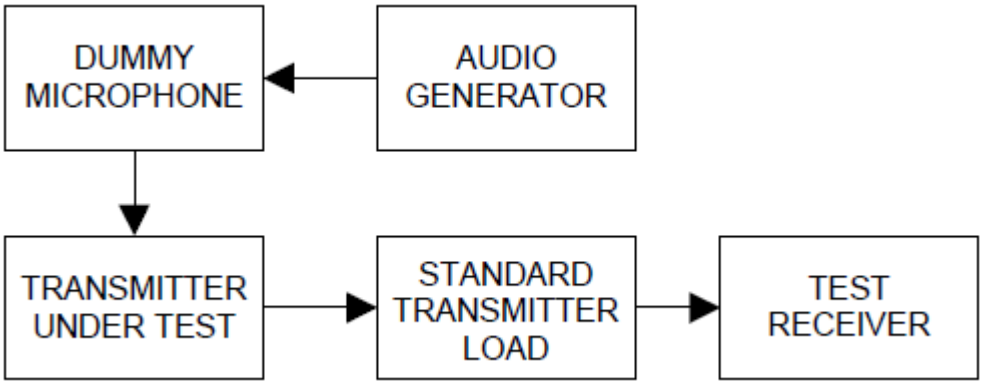
Conclusion: This product meets the requirement of Frequency Response.

7.6.2 Modulation Limiting

EUT Operation:

Status: Test the EUT in transmitting mode.

Test setup:



Test procedure:

1. Connect the equipment as illustrated.
2. Adjust the transmitter per the manufacturer's procedure for full rated system deviation. According to the specification of this product the full rated system deviation is 75 KHz.
3. Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤0.25 Hz to ≥15,000 Hz. Turn the de-emphasis function off.
4. 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 which is 45 KHz..
5. Increase the level from the audio frequency generator by 20 dB in one step (rise time between the 10% and 90% points shall be 0.1 second maximum).
6. Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level.
7. With the level from the audio frequency generator held constant at the level obtained in step 5, slowly vary the audio frequency from 300 Hz to 3000 Hz and observe the steady-state deviation. Record the maximum deviation.
8. Set the test receiver to measure peak negative deviation and repeat steps 4 through 7.
9. The values recorded in steps 7 and 8 are the modulation limiting.

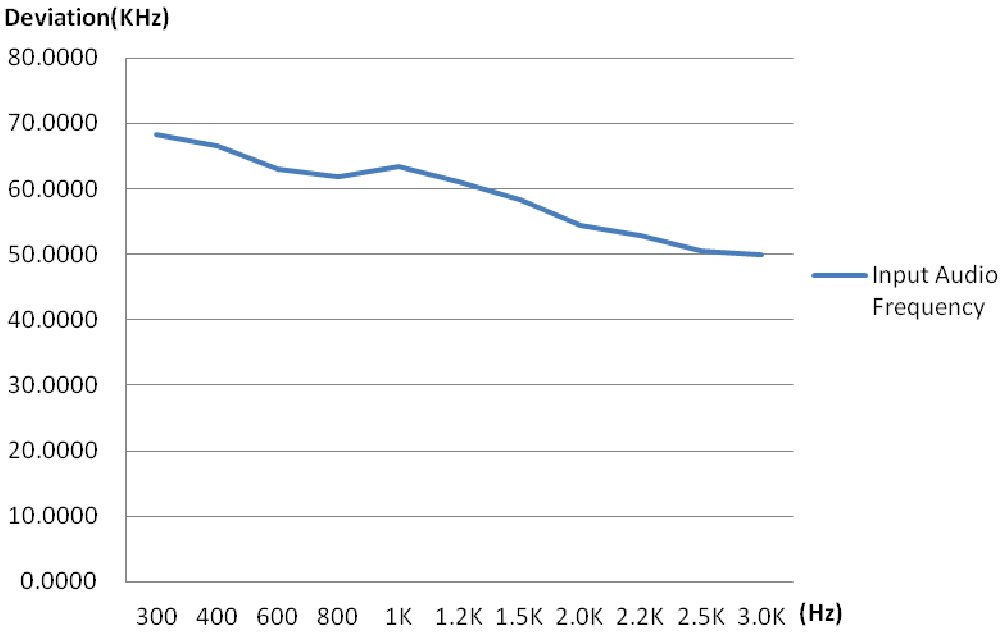
7.6.2.1 Measurement Record

1. Input 1 kHz audio frequency for positive peak deviation

Audio Level(dB)	Deviation (kHz)
0 (110 mV)	45.0000
Increase 20 (instantaneous)	70.8372
Increase 20 (steady-state)	63.4585

2. Positive peak deviation

Input Audio Frequency (Hz)	Deviation (kHz)	Percentage of full rated system deviation (%)	Limit
300	68.3922	91.2	>=60% and <=100%
400	66.5038	88.7	
600	62.9937	84.0	
800	61.8432	82.5	
1K	63.4585	84.7	
1.2K	61.0382	81.3	
1.5K	58.3201	77.8	
2.0K	54.3820	72.5	
2.2K	52.7980	70.4	
2.5K	50.4899	67.3	
3.0K	49.8369	66.4	

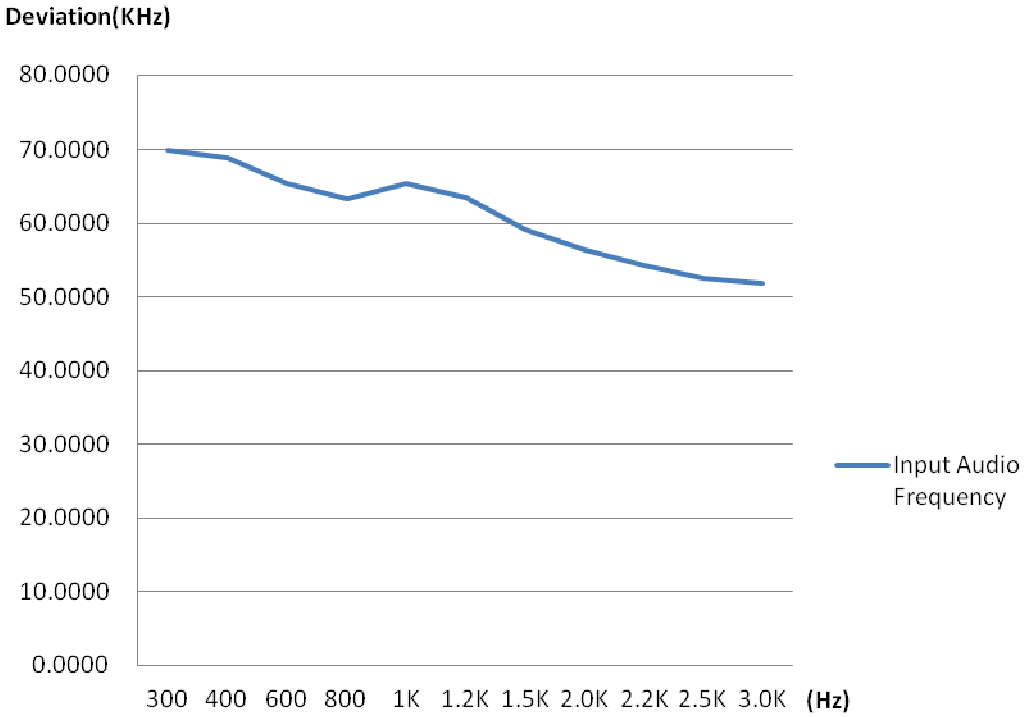


3. Input 1 kHz audio frequency for negative peak deviation

Audio Level(dB)	Deviation (kHz)
0 (112 mV)	45.0000
20 (instantaneous)	72.3289
20 (steady-state)	65.4840

4. Negative peak deviation

Input Audio Frequency (Hz)	Deviation (KHz)	Percentage of full rated system deviation (%)	Limit
300	70.0038	93.3	>=60% and <=100%
400	68.9546	91.9	
600	65.3938	87.2	
800	63.3003	84.4	
1K	65.4840	87.3	
1.2K	63.4943	84.7	
1.5K	59.1908	78.9	
2.0K	56.3101	75.1	
2.2K	54.3292	72.4	
2.5K	52.4922	70.0	
3.0K	51.8920	69.2	



According to the FCC Part 2 section 1047(b), Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed, above is shown the percentage of modulation versus the modulation input voltage.

Also above is showing the audio frequency response is satisfied the limit in ANSI/TIA-603-D 2010 Section 3.2.3.

Conclusion: This product meets the requirement of Modulation Limit

7.7 Occupied Bandwidth

Test Requirement: FCC Rules Part 74, Section 74.861(e)(3), Section 74.861(e)(5), Section 74.861(e)(6)

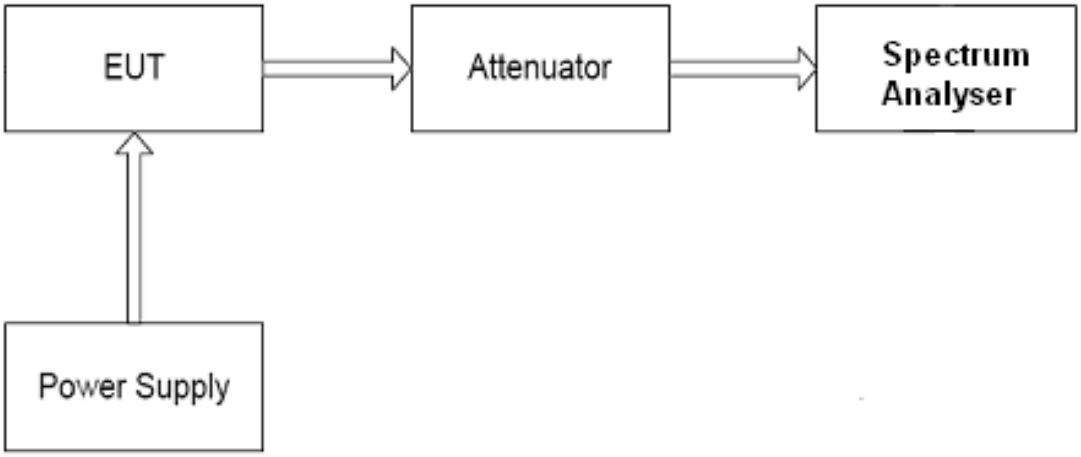
Test Method: ANSI/TIA-603-D-2010 Section 2.2.11

EUT Operation:

Status: Test EUT in operating mode with modulation.

Equipment Used: Refer to section 6 for details.

Test Setup:



Test Procedure:

1. Connect the equipment as illustrated.
2. Plot the unmodulated chart shows on spectrum.
3. Adjust the transmitter per the manufacturer's procedure for full rated system deviation. According to the specification of this product the full rated system deviation is 75 kHz.
4. Set to 2500 Hz tone at an input level to produce the 50 percent modulation which is 32.5 kHz.
5. Set 5 kHz, 10 kHz and 12 kHz to the input level 16 dB greater than that necessary to produce 50 percent modulation, until maximum modulation is shown on the spectrum analyzer.
6. Set the spectrum analyzer: RBW = 1 kHz, VBW = 3 kHz Sweep = auto; Detector Function = Peak. Trace = Max Hold Mark the peak frequency.
7. Measure the 99% bandwidth and record this value.

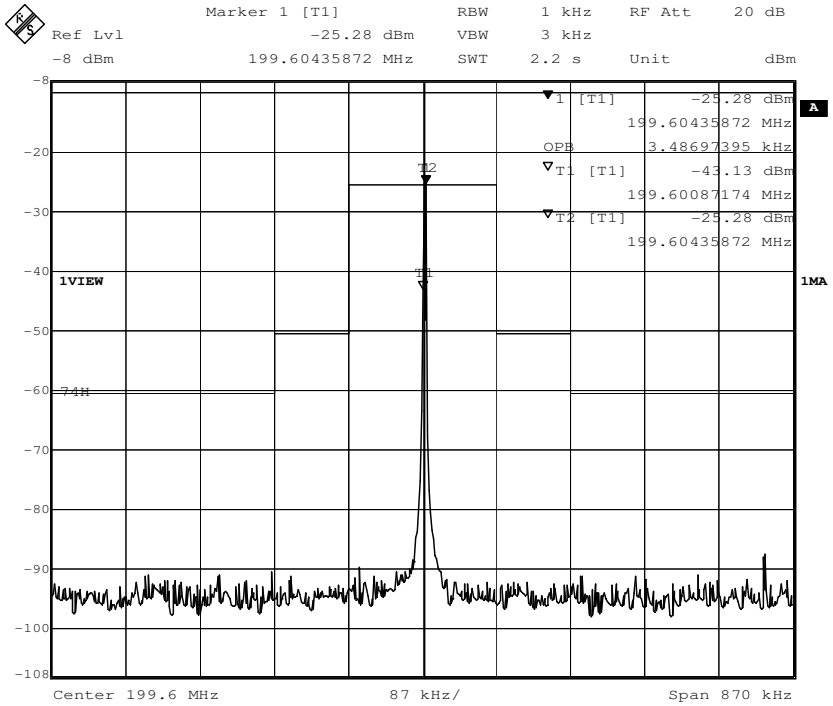
7.7.1 Measurement Record

1. 199.6 MHz:

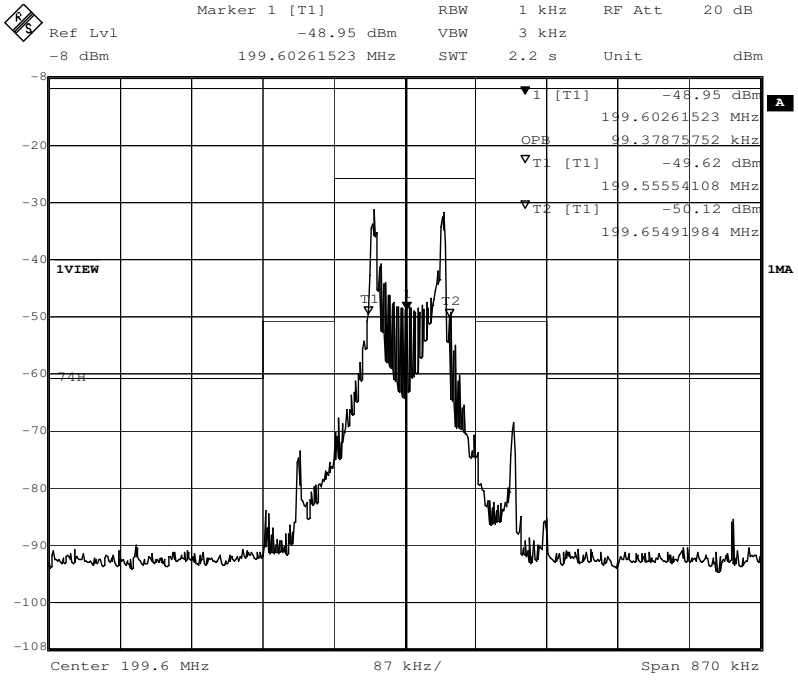
Test Result:

Input Audio Frequency (Hz)	Measured Occupied bandwidth (kHz)	Occupied Bandwidth Limit (kHz)	Mask Emission Limit
2500	99.38	<=200	FCC Rules Part 74, Section 74.861(e)(6)(i)&(ii) See below Figures.
5000	130.76		
10000	134.25		
12000	144.71		

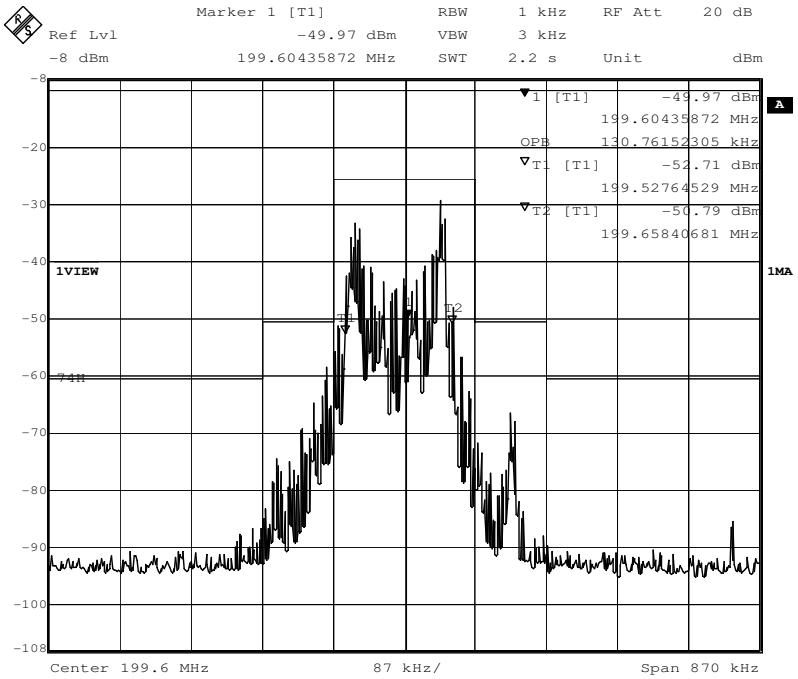
Unmodulated RF carrier



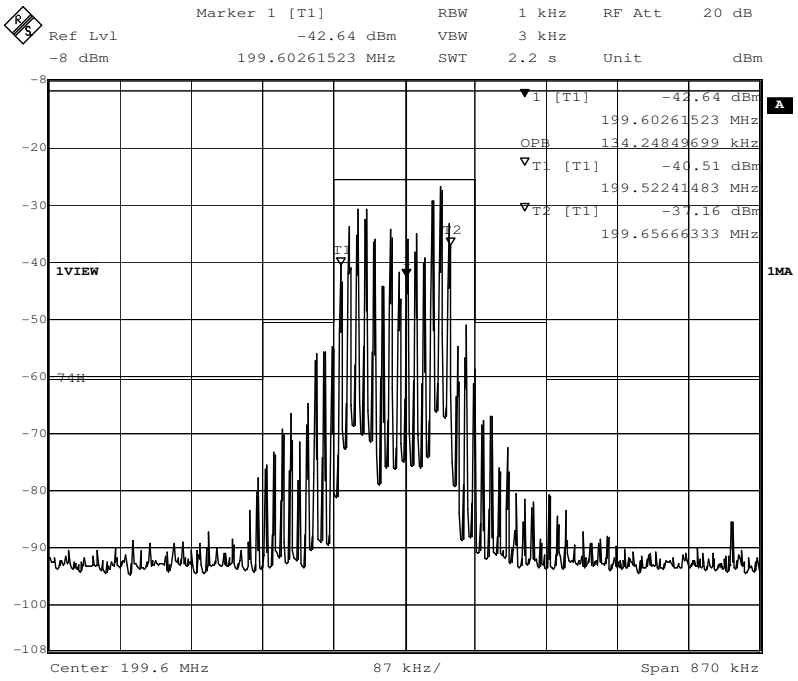
Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.



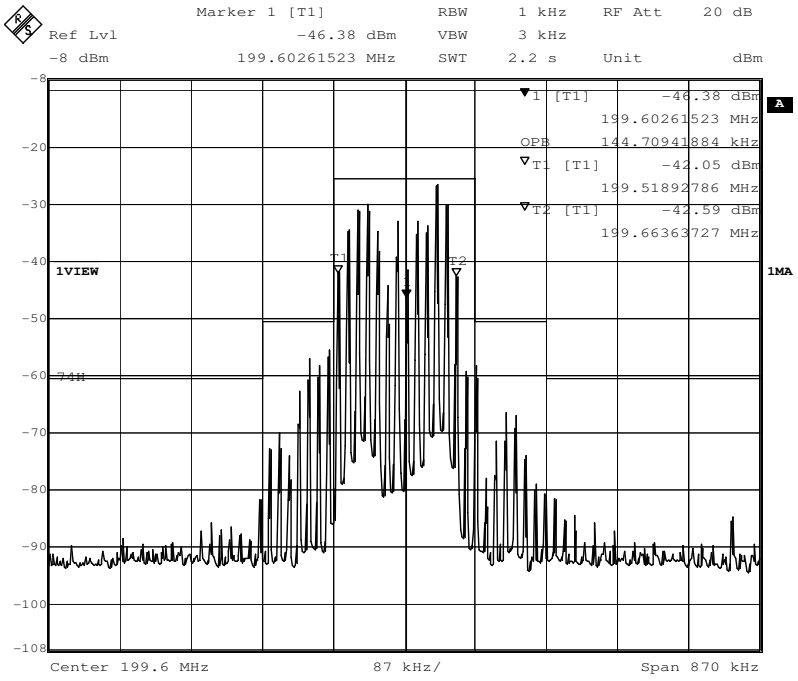
Modulate the transmitter with a 5 kHz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.



Modulate the transmitter with a 10 kHz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.



Modulate the transmitter with a 12 kHz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.

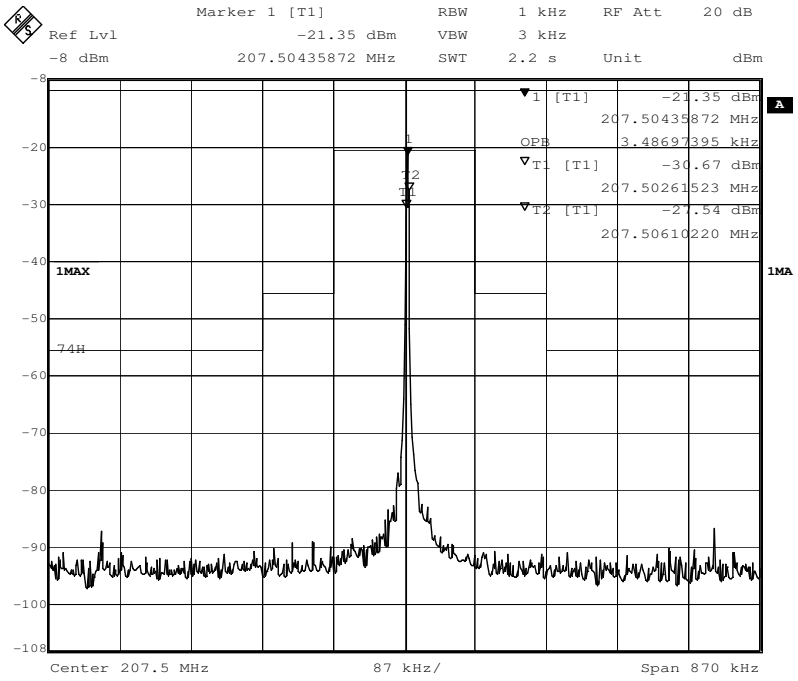


2. 207.5MHz

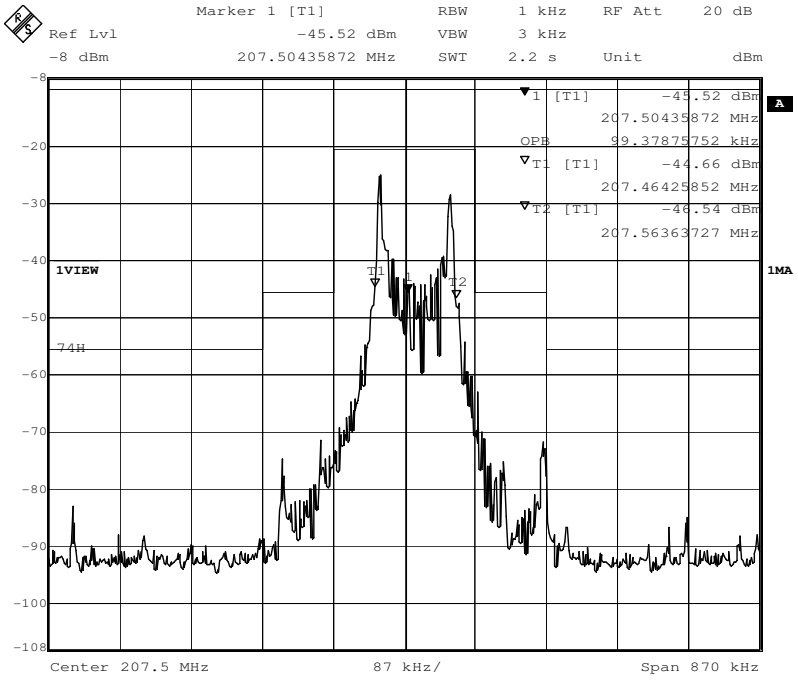
Test Result:

Input Audio Frequency (Hz)	Measured Occupied bandwidth (kHz)	Occupied Bandwidth Limit (kHz)	Mask Emission Limit
2500	99.38	<=200	FCC Rules Part 74, Section 74.861(e)(6)(i)&(ii) See below Figures.
5000	130.76		
10000	134.25		
12000	146.45		

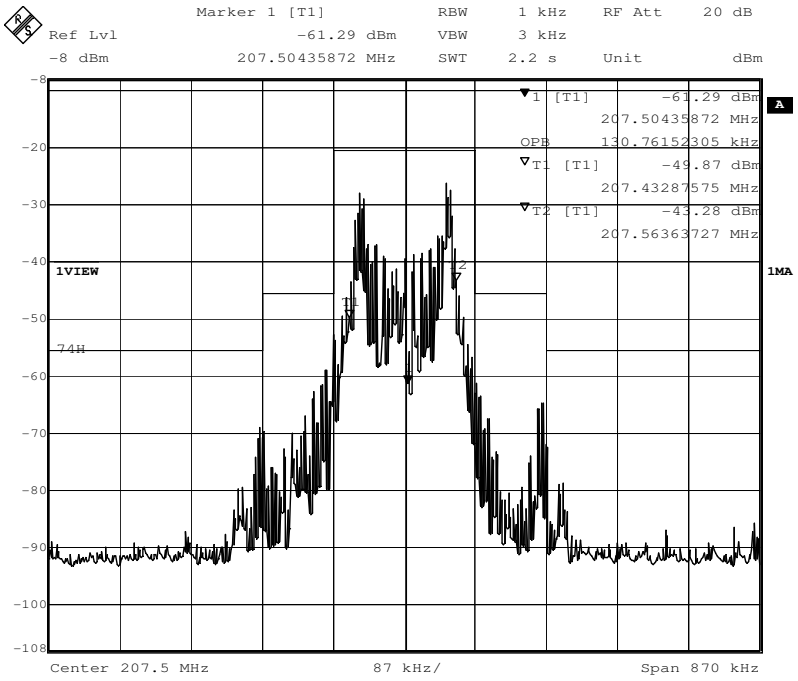
Unmodulated RF carrier



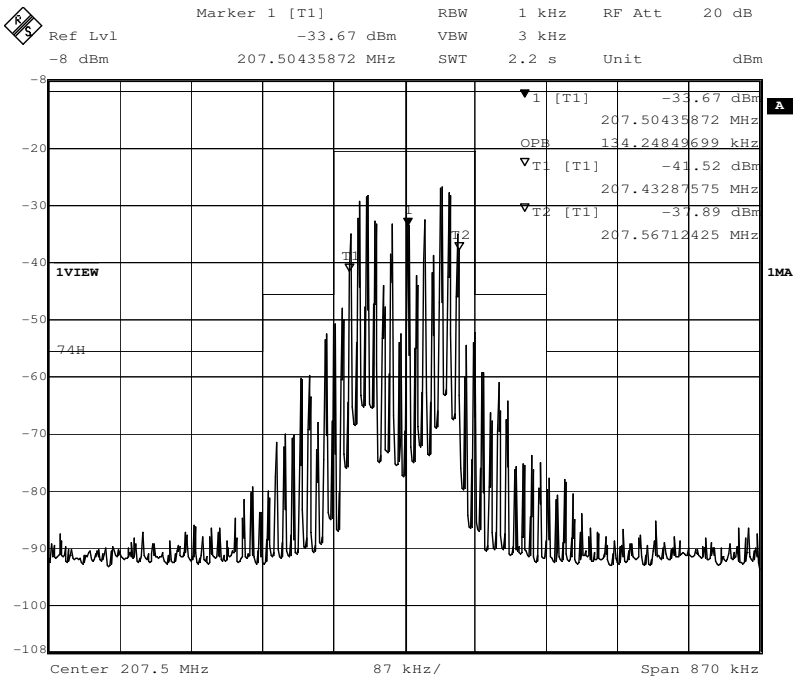
Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.



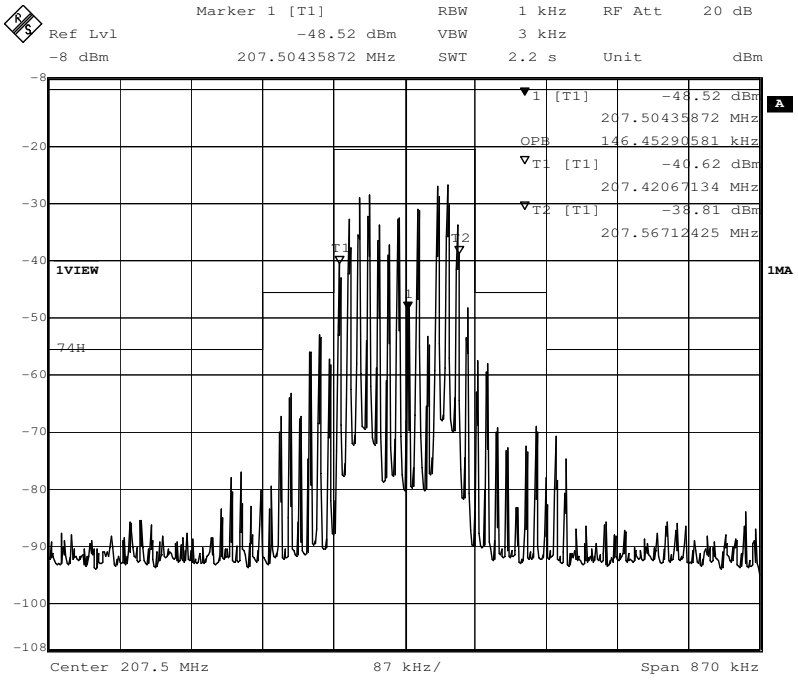
Modulate the transmitter with a 5 kHz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.



Modulate the transmitter with a 10 kHz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.



Modulate the transmitter with a 12 kHz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.



Conclusion: This product meets the requirement of Occupied Bandwidth Limit

7.8 Frequency Tolerance

Test Requirement: FCC Rules Part 74, Section 74.861(E)(4)

Test Method: ANSI/TIA-603-C-2004 Section 2.2.2

EUT Operation:

Status: Test EUT in operating mode without modulation.

Equipment Used: Refer to section 6 for details.

Temperature: -30°C to +60°C

Test Procedure:

A. Frequency stability versus environmental temperature

1. Setup the configuration as diagram 4 in section 4.5 for frequency measured inside an environment chamber and install new battery in the EUT.
2. 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 3 kHz and Frequency Span to 50kHz.Record this frequency as reference frequency.
3. Set the temperature of chamber to 50℃. 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.
4. Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

B. Frequency stability versus input voltage

1. Setup the configuration as diagram 4 for frequencies measurement at temperature range from 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used.
2. Set spectrum analyzer center frequency to the EUT operating frequency. Set spectrum analyzer Resolution Bandwidth to 1 kHz and Video Resolution Bandwidth to 3 kHz. Record this frequency as reference frequency.
3. Set the supply voltage to the nominal voltage of the EUT.
4. Turn the EUT on and measure the EUT operating frequency.
5. Repeat step 4 with decreased supply voltage, record all measured frequencies on each voltage step.
6. Stop the test until the lowest voltage specified by the manufacturer is reached or the EUT case to emission radio signal.

7.8.1 Measurement Record

The measurement of Frequency tolerance (temperature)

Test condition	Power supply (V DC)	Frequency 199.6 MHz	Frequency 207.5MHz
-30℃	9.0	199.60776553	207.50741483
-20℃	9.0	199.60598746	207.50638409
0℃	9.0	199.60449462	207.50508482
10℃	9.0	199.60392876	207.50458474
20℃	9.0	199.60275551	207.50255511
30℃	9.0	199.60003983	207.50094838
40℃	9.0	199.59984027	207.49839373
50℃	9.0	199.59947483	207.49797462
60℃	9.0	199.59939879	207.49504008
Maximum Frequency Error:		0.00389	0.00357
Frequency Tolerance Limit:		**0.005%**	

The measurement of Frequency tolerance (voltage)

Test condition	Power supply (V DC)	Frequency 199.6 MHz	Frequency 207.5MHz
25℃	9.0	199.60198734	207.50187353
25℃	8.5	174.10011	194.60022
25℃	7.65	199.60165531	207.50130461
25℃	7.2	199.60123938	207.50119474
25℃	7.0	No signal	No signal
Maximum Frequency Error:		0.0001	0.0001
Frequency Tolerance Limit:		**0.005%**	

Remark:

The equipment remains on channel when the power source was reduced below the lower extreme test voltage limit until DC 7.0V. The EUT ceases to function at voltage DC7.2V.

-End of Report-