FCC PART 95
EMI MEASUREMENT AND TEST REPORT

For

Midland Radio Corporation

1120 Clay Street
North Kansas City, MO 64116

FCC ID: MMA4001

2003-05-02

This Report Concerns:	Equipment Type:
☒ Original Report	MOBILE CB RADIO

Test Engineer:	Ling Zhang /
Report Number:	R0304037
Test Date:	2003-04-17
Reviewed By:	Hans Mellberg /
Prepared By:	Bay Area Compliance Laboratory Corporation 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

Note: This test report is specially limited to the above client company and product model. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

TABLE OF CONTENTS

1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Midland Radio Corporation's* Model: *4001* or the "EUT" as referred to in this report is mobile CB radio which measured approximately 6.5"L x 8.25"W x 2.3"H.

** The test data was only good for test sample. There may have deviation for other product samples.*

1.2 Objective

This report is prepared on behalf of *Midland Radio Corporation* in accordance with Part 95 Subpart A, Subpart B and Subpart E of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules for effective radiated power, modulation characteristics, occupied bandwidth, radiated spurious emissions, AC line conducted emissions and frequency stability.

1.3 Related Grant/Submission

No Related Submittals.

1.4 Test Methodology

Measurements contained in this report were also conducted with TIA/EIA Standard 603, Telecommunications Industry Association Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2517A01610	2003-10-30
HP	Spectrum Analyzer	8593A	29190A00242	2003-05-01
HP	Amplifier	8447E	1937A01054	2003-05-01
HP	Quasi-Peak Adapter	85650A	2521A00718	2003-05-01
Com-Power	Biconical Antenna	AB-100	14012	2003-05-01
Com-Power	LISN	LI-200	12005	2004-03-28
Com-Power	LISN	LI-200	12008	2004-03-28
Com-Power	Log Periodic Antenna	AL-100	16091	2003-05-01
Com-Power	Log Periodic Antenna	AB-900	15049	2003-05-01
Rohde & Schwarz	EMI Test Receiver	ESPI	1147 8007 07	2003-12-03
Agilent	Spectrum Analyzer (9KHz – 40GHz)	8564E	08303	2003-08-01
Agilent	Spectrum Analyzer (9KHz – 50GHz)	8565EC	06042	2003-05-03
HP	Amplifier (1-26.5GHz)	8449B	3147A00400	2004-03-14
Nan Yan	Audio Generator	NY2201	000420	Not Required
A.H.System	Horn Antenna (700MHz-18GHz)	SAS-200/571	261	2003-05-31

*** Statement of Traceability:** Bay Area Compliance Laboratory Corp. certifies that all calibration has been performed using suitable standards traceable to NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY. (NIST)

1.7 Local Support Equipment

Manufacturer	Description	Model	Serial Number	FCC ID
Narda	Attenuator	768-20	203596	None

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was tested under typical operating modes to represent the worst-case results during the final qualification test.

2.2 EUT Test Configuration

The EUT was powered and fully operated by pushing PTT (Push To Talk) button and then change the channel to Low, Middle, and High by using up and down buttons.

2.3 Special Accessories

As shown in section 2.7, interface cable used for compliance testing is shielded as normally supplied by customer and its respective support equipment manufacturers.

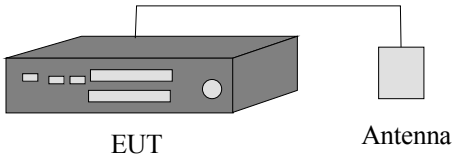
2.4 Schematics / Block Diagram

Please refer to Appendix D.

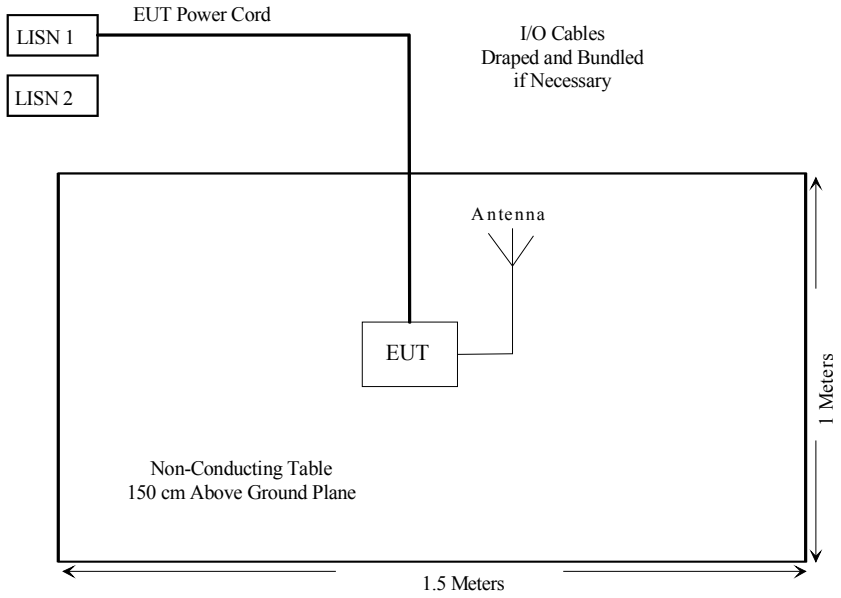
2.5 Equipment Modifications

No modification was made by BACL Corp. to make sure the EUT to comply with the applicable limits.

2.6 Configuration of Test System



2.7 Test Setup Block Diagram



3 - REQUIREMENTS OF PROVISIONS

3.1 Requirements and Test Summary

FCC Rules	Rules Description	Requirement	Result
2.1046 95.639 (c) (1)	Conducted Output Power	4W	Complied
2.1047 95.637 (d) 95.637 (c)	Modulation Characteristics A3E analog device Audio Frequency Response Modulation Limiting Over Modulation Transient Response	85% < Amplitude Modulation < 100%	Complied
2.1049 95.633 (a)	Occupied Bandwidth	8KHz	Complied
2.1053 15.109 (a)	Field Strength of Spurious Radiation	Worst Case < 48dB	Complied
95.635(a) 2.1053 (a)	Spurious Emission	Complied	Complied
2.1055 95.625 (b)	Frequency Stability Vs. Temperature Vs. Voltage	< 0.005%	Complied

3.2 Labeling Requirement

Each equipment for which a type acceptance applications is filed on or after May 1, 1981, shall bear an identification plate or label pursuant to §2.295 (Identification of Equipment) and §2.926 (FCC identifier)

In August 1996 the Federal Communications Commissions (FCC) adopted RF exposure guidelines with safety levels for hand-held wireless devices.

Generally users manual contains a RF exposure statement to indicate compliance with FCC requirements.

The users manual should also contain required information and instruction pursuant to 95.653.

4 – CONDUCTED OUTPUT POWER

4.1 Provision Applicable

Per FCC §2.1046 and FCC § 95.639 (c)(1), no CB transmitter, under any condition of modulation, shall exceed 4W Carrier power when transmitting emission type A3E or A1D.

4.2 Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.

2. Connect a low loss RF cable from the antenna port to a spectrum analyzer.

4.3 Test equipment

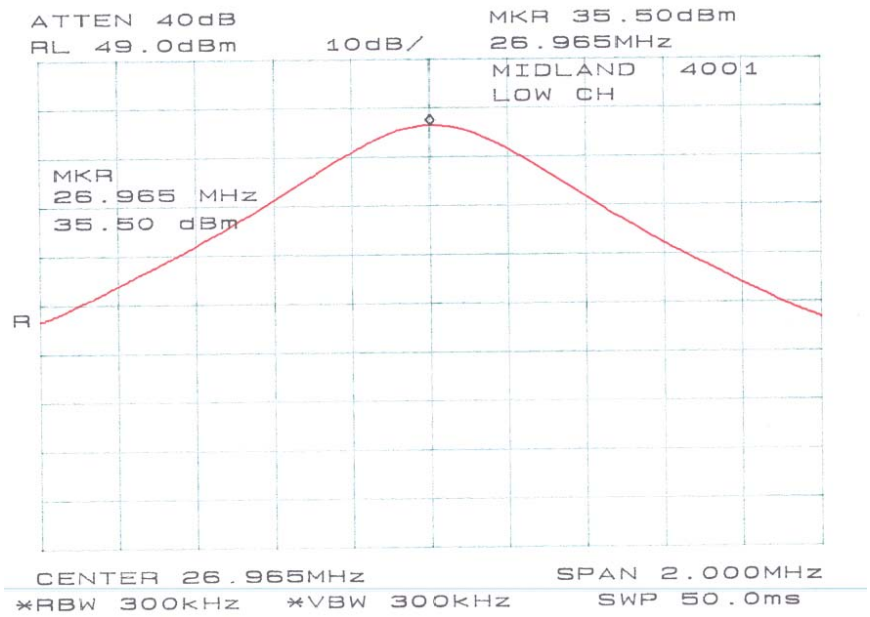
- Spectrum Analyzer
  Manufacturer: Hewlett Packard
  Model: 8568B
  S/N: 2517A01610
  Calibration Due Date: 2003-10-30

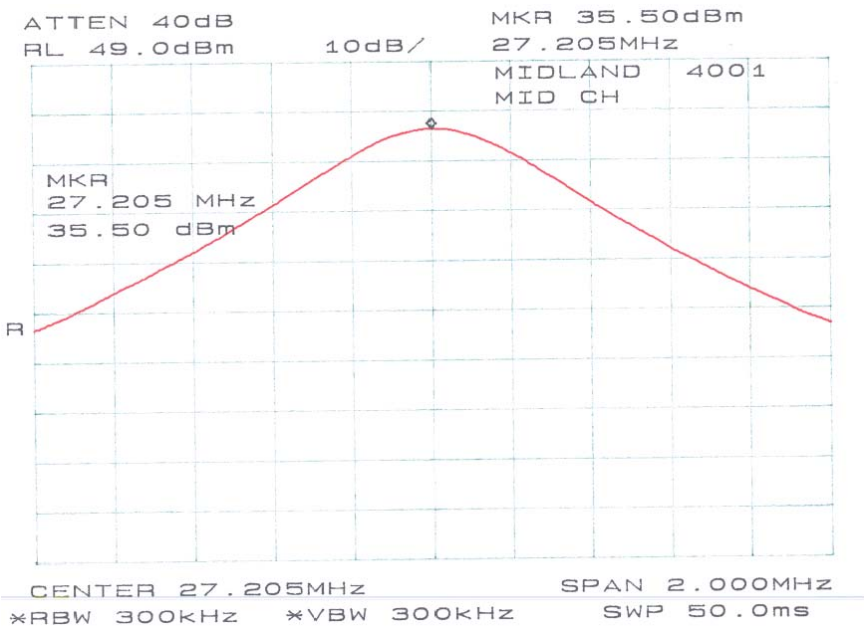
- Attenuator
  Manufacturer: Narda
  Model: 768-20
  S/N: 203596

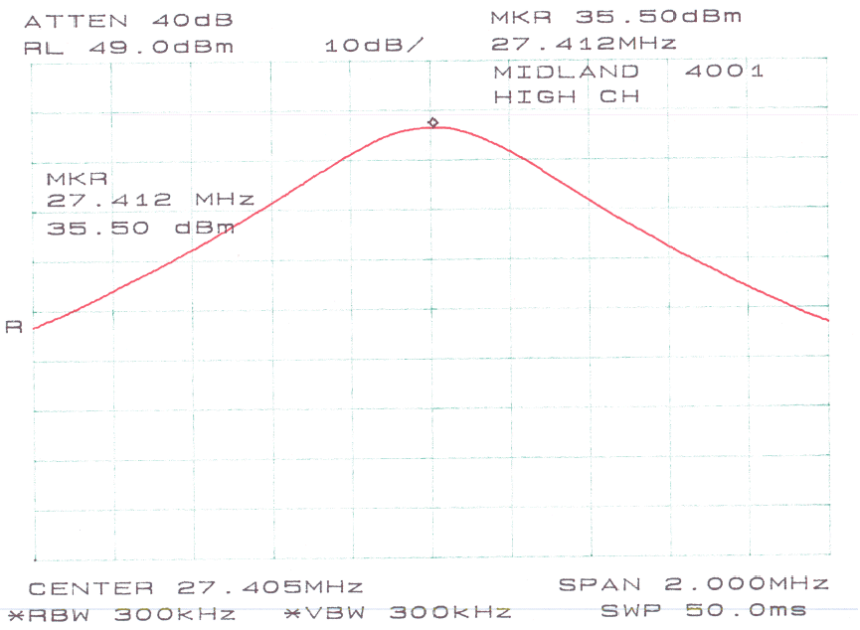
4.4 Test Results

Channel	Output Power in dBm	Output Power in W	Limit in W
Low	35.50	3.55	4
Middle	35.50	3.55	4
High	35.50	3.55	4

Please refer to the following plots.


ATTEN 40dB
RL 49.0dBm
10dB/
MKR 35.50dBm
26.965MHz
MIDLAND 4001
LOW CH
MKR
26.965 MHz
35.50 dBm
R
CENTER 26.965MHz
SPAN 2.000MHz
*RBW 300kHz
*VBW 300kHz
SWP 50.0ms


ATTEN 40dB
RL 49.0dBm
10dB/
MKR 35.50dBm
27.205MHz
MIDLAND 4001
MID CH
MKR
27.205 MHz
35.50 dBm
R
CENTER 27.205MHz
SPAN 2.000MHz
*RBW 300kHz
*VBW 300kHz
SWP 50.0ms


ATTEN 40dB
RL 49.0dBm
10dB/
MKR 35.50dBm
27.412MHz
MIDLAND 4001
HIGH CH
MKR
27.412 MHz
35.50 dBm
R
CENTER 27.405MHz
SPAN 2.000MHz
*RBW 300kHz
*VBW 300kHz
SWP 50.0ms

5 - MODULATION CHARACTERISTICS

5.1 Provision Applicable

Per FCC § 2.1047 and FCC §95.637 (c), when emission type A3E is transmitted, the modulation must be greater than 85% but most not exceed 100%. Simultaneous amplitude modulation and frequency or phase modulation of a transmitter are not permitted. The transients must have a duration of less than 100 milliseconds & be attenuated by at least 26dB.

5.2 Test Procedure

5.2.1 Audio Frequency Response

The RF output of the transceiver was connected to the input of a FM deviation meter through sufficient attenuation so as not to overload the meter or distort the reading. An audio signal generator was coupled into the external microphone jack of the transceiver, or alternatively, the microphone element was removed the generator output was connected to the microphone connectors.

The audio signal input level was adjusted to obtain 20% of the maximum rated system deviation at 1 kHz, and recorded as DEVREF. With the audio signal generator level unchanged, set the generator frequency between 100 Hz to 5000 Hz. The transmitter deviations (DEVFREQ) were measured and the audio frequency response was calculated as

$$20\log_{10}[DEV_{FREQ} / DEV_{REF}]$$

5.2.2 Audio Low-Pass Filter Response

An audio signal generator and an audio spectrum analyzer were connected to the input and output of the post limiter low pass filter respectively. The audio signal generator frequency was set between 1000 Hz and the upper low pass filter limit. The audio frequency response at test frequency was calculated as

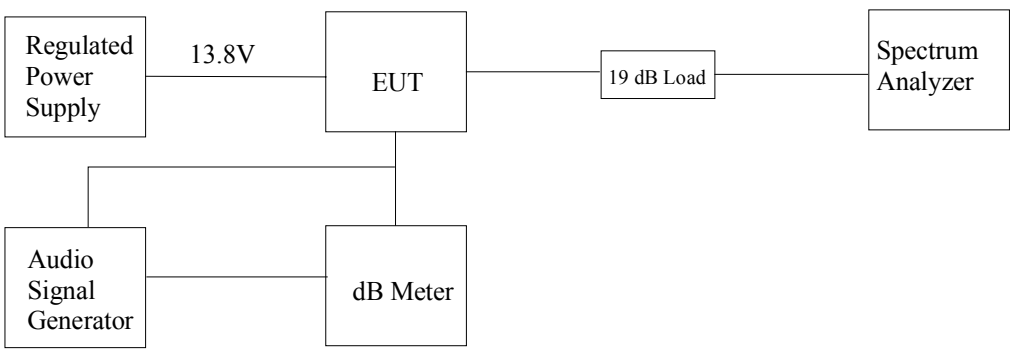
$$LEV_{FREQ} - LEV_{REF}$$

5.2.3 Modulation Limiting

With the same setup as section 5.2.1 above, at three different modulating frequencies, the output level of the audio generator was varied and the FM deviation level was recorded.

5.2.4 Over Modulation Transient Response

1. Set up the test equipment in the following configuration:



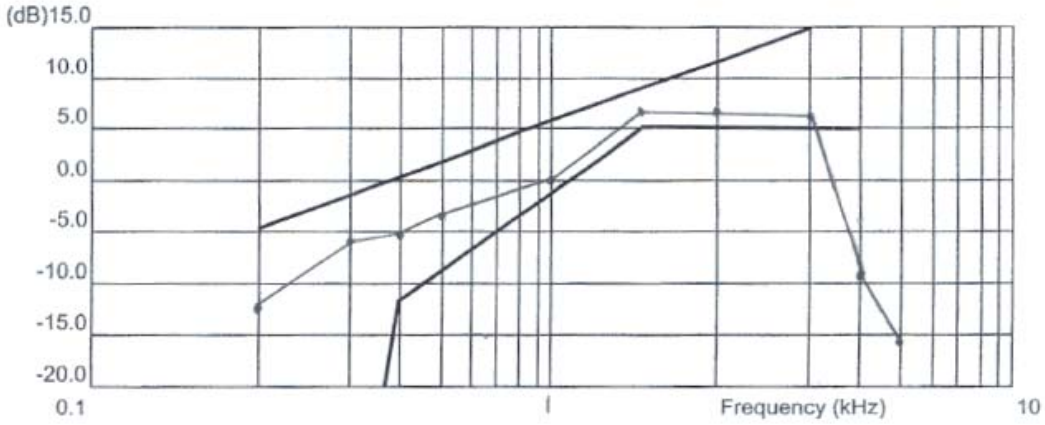
2. Set the frequency of the audio signal generator to 2.5kHz at level 16dB greater than required for 50% modulation.
3. Use the other audio signal generator pulse the previous signal at on P.P.S. with pulse width of 0.5 second.
4. Tune the spectrum analyzer to the channel on which the transmitter is set and adjust the setting as for the measurement of occupied bandwidth.
5. And then tune the spectrum analyzer to adjacent channel (+/-10kHz) and use "Zero-scan" to observe the transients caused by the pulsed modulation.

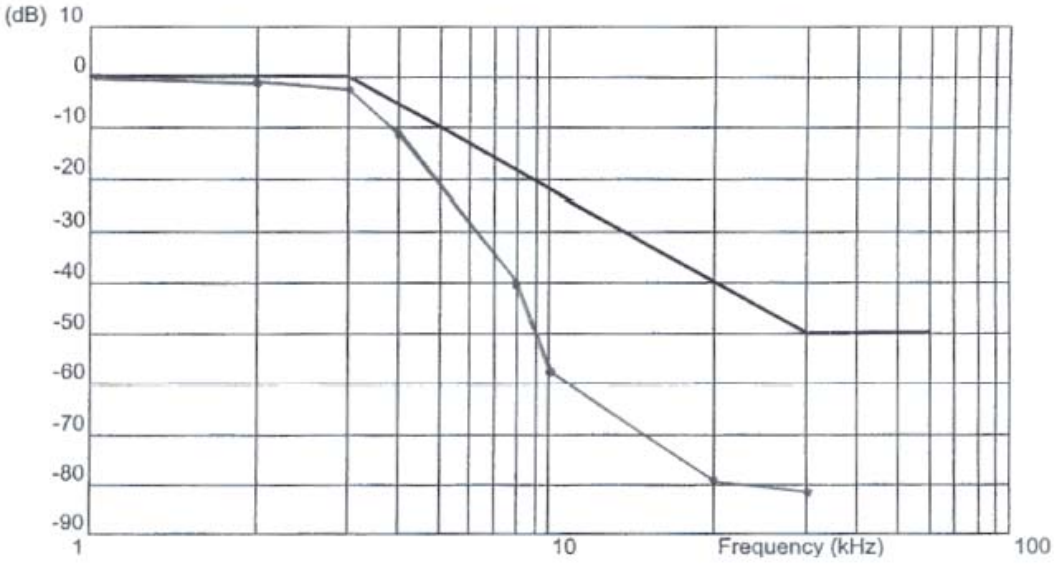
5.3 Test Equipment

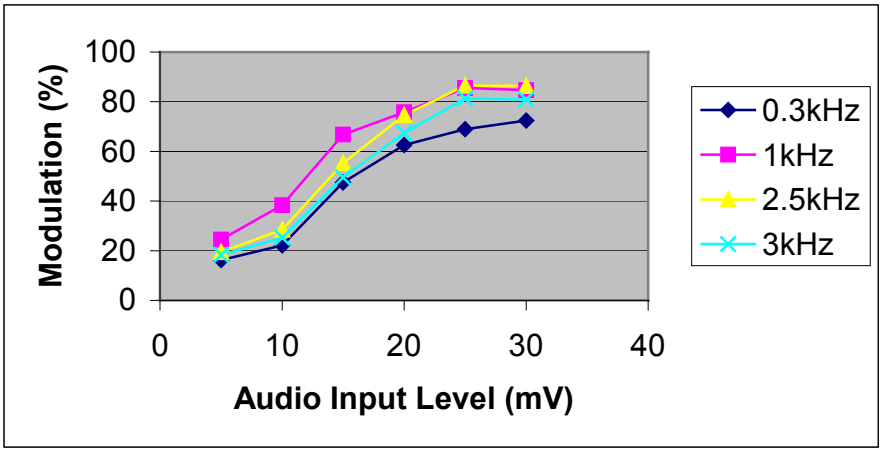
Hewlett Packard HP8568B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Hewlett Packard HP8901A Modulation Analyzer
Lecroy 9350A Oscillscope
Nan Yan, Audio Signal Generator, Model No. NY2201, S/N:000420

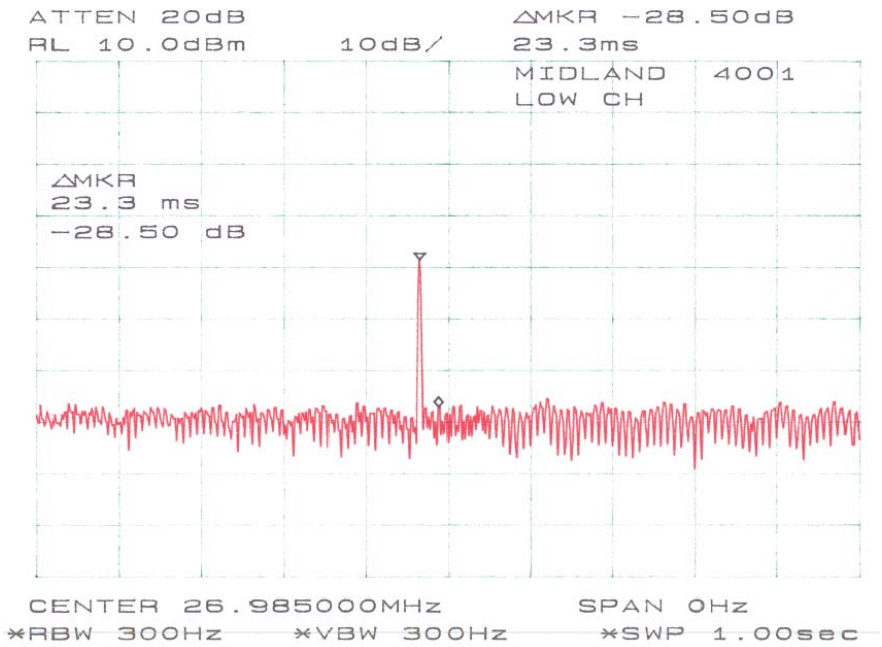
5.4 Test Results

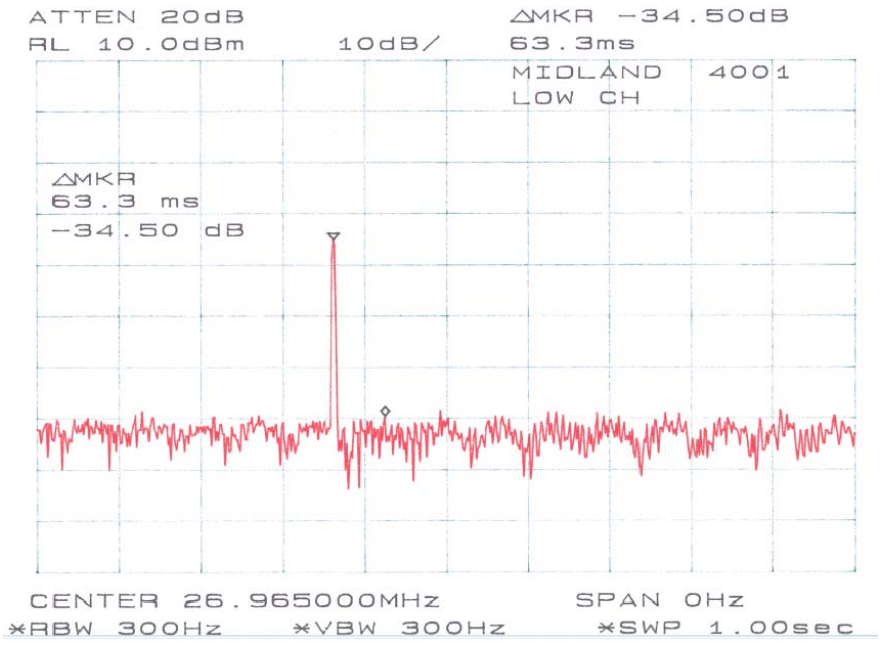
The plots of modulation characteristic and over modulation limit are presented hereinafter as reference.

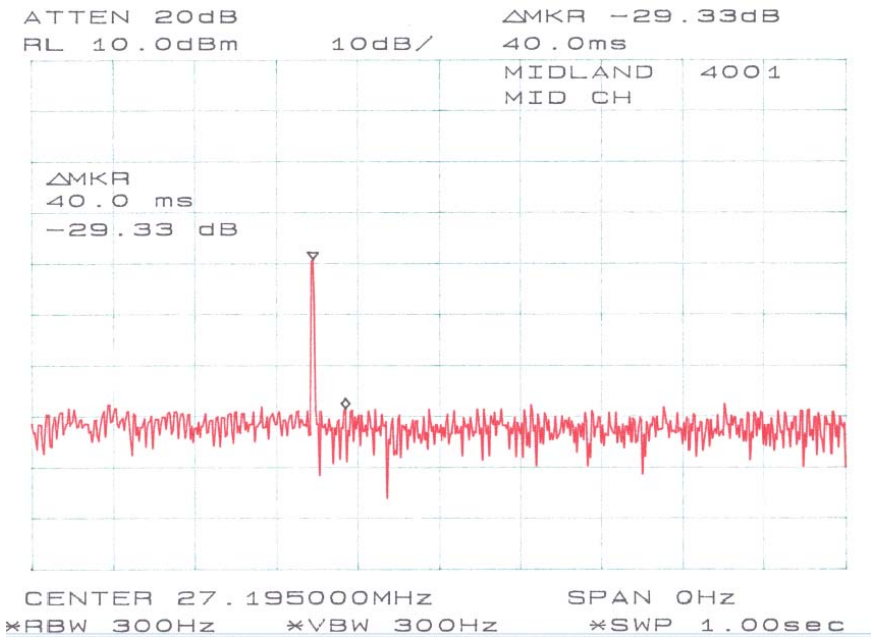

(dB)15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
0.1
1
Frequency (kHz)
10

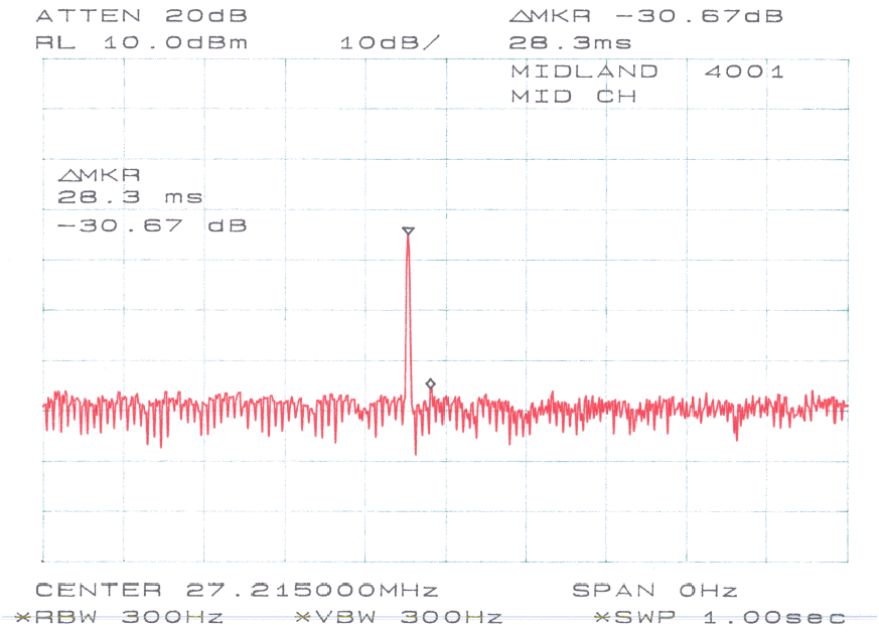

(dB) 10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1
10
Frequency (kHz)
100

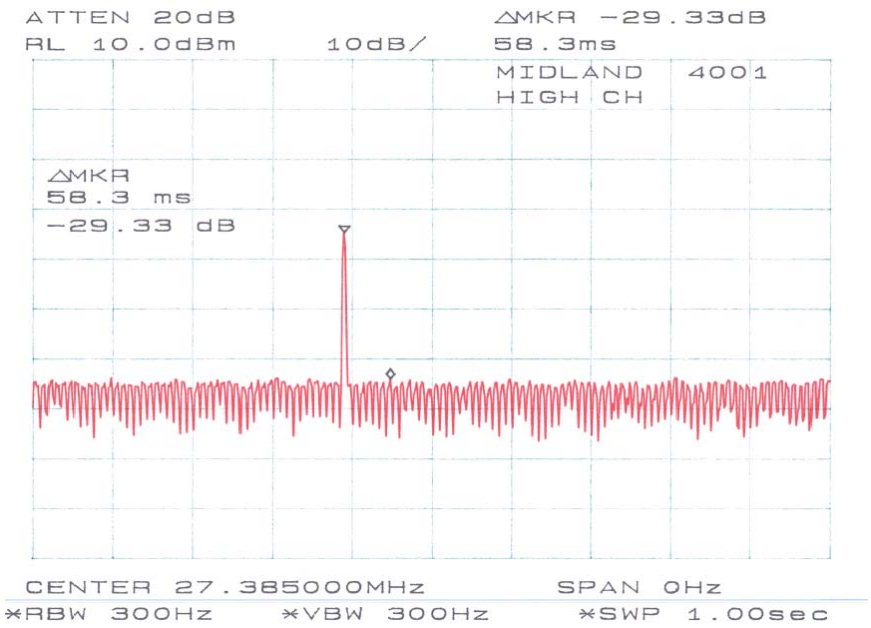

Modulation (%)
100
80
60
40
20
0
0
10
20
30
40
Audio Input Level (mV)
0.3kHz
1kHz
2.5kHz
3kHz

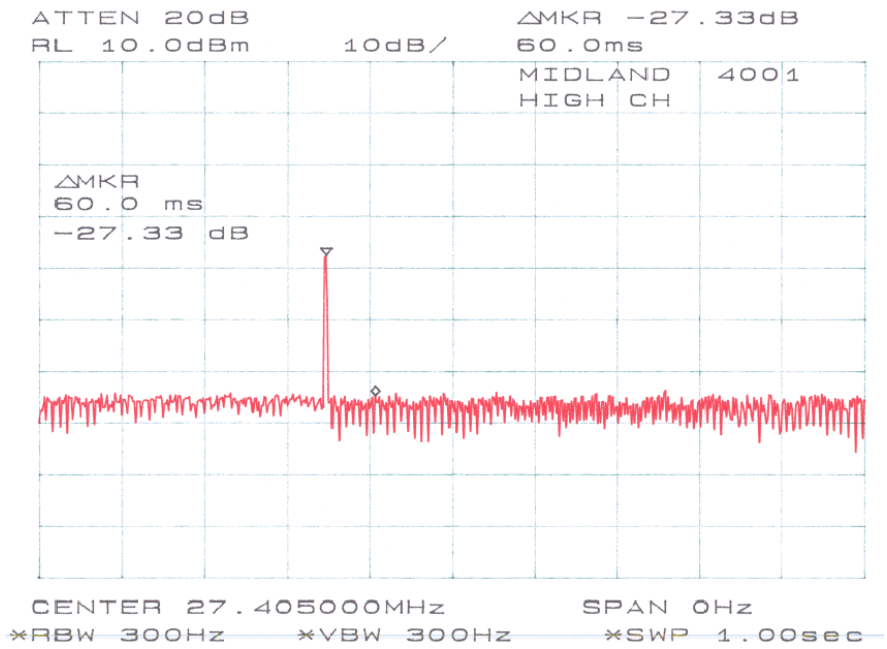

ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -28.50dB
23.3ms
MIDLAND 4001
LOW CH
ΔMKR
23.3 ms
-28.50 dB
CENTER 26.985000MHz
SPAN 0Hz
*RBW 300Hz
*VBW 300Hz
*SWP 1.00sec


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -34.50dB
63.3ms
MIDLAND 4001
LOW CH
ΔMKR
63.3 ms
-34.50 dB
CENTER 26.965000MHz
SPAN 0Hz
*RBW 300Hz
*VBW 300Hz
*SWP 1.00sec


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -29.33dB
40.0ms
MIDLAND 4001
MID CH
ΔMKR
40.0 ms
-29.33 dB
CENTER 27.195000MHz
SPAN 0Hz
*RBW 300Hz
*VBW 300Hz
*SWP 1.00sec


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -30.67dB
28.3ms
MIDLAND 4001
MID CH
ΔMKR
28.3 ms
-30.67 dB
CENTER 27.215000MHz
SPAN 0Hz
*RBW 300Hz
*VBW 300Hz
*SWP 1.00sec


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -29.33dB
58.3ms
MIDLAND 4001
HIGH CH
ΔMKR
58.3 ms
-29.33 dB
CENTER 27.385000MHz
SPAN 0Hz
*RBW 300Hz
*VBW 300Hz
*SWP 1.00sec


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -27.33dB
60.0ms
MIDLAND 4001
HIGH CH
ΔMKR
60.0 ms
-27.33 dB
CENTER 27.405000MHz
SPAN 0Hz
*RBW 300Hz
*VBW 300Hz
*SWP 1.00sec

6 - OCCUPIED BANDWIDTH OF EMISSION

6.1 Provision Applicable

Per FCC §2.1049 and FCC §95.633 (a), the authorized bandwidth for emission type A3E transmitted is 8 kHz.

6.2 Test Procedure

The antenna was disconnected from the transmitter and the short cable was connected to the transmitter RF output.

The RF output was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set up at least 10 times higher than the authorized bandwidth of the transmitter. With the transmitter keyed, the level of the unmodulated carrier was set to the full scale reference line of the spectrum analyzer. This is used as a 0dB reference for emission mask measurements.

The transmitter was then modulated with a 2500 Hz tone at an input level 20 dB greater than the necessary to produce 50% of rated system deviation. The resolution bandwidth of the spectrum analyzer was set up to 300 Hz and the spectrum of the transmitting signal was recorded. This spectrum was compared to the required emission mask.

6.3 Test Equipment

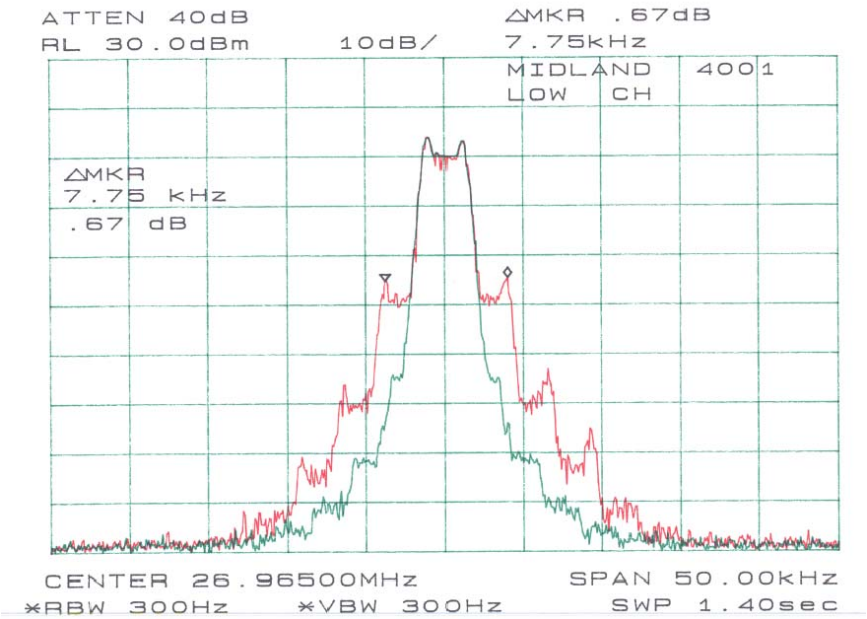
Leader LFG-1300S Function Generator
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

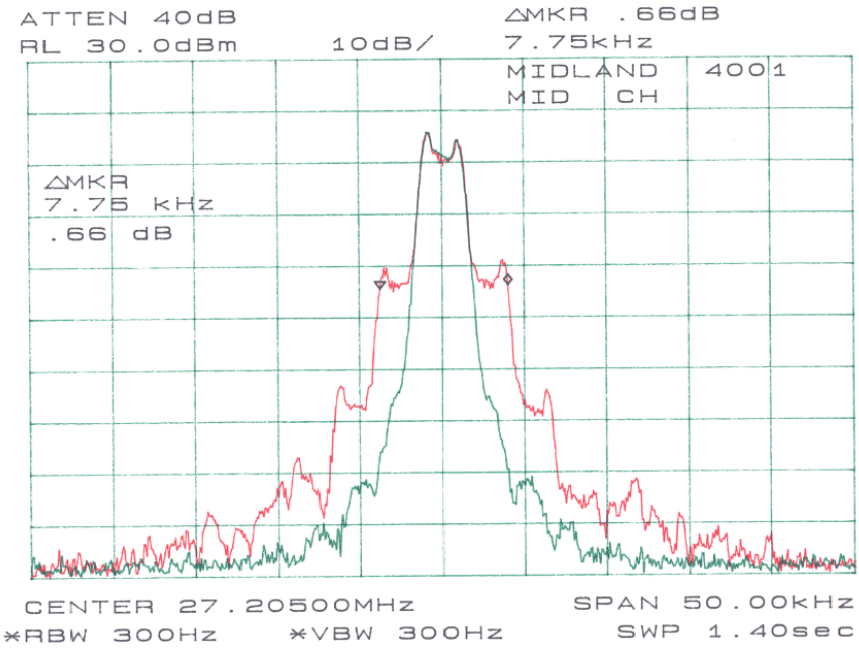
6.4 Test Results

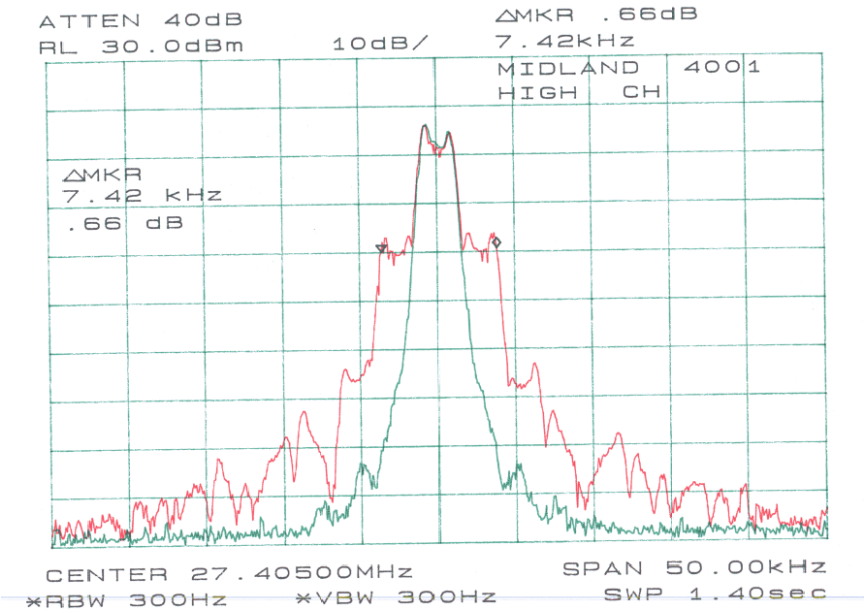
Test Result: Pass
Please refer the following curve and plots.

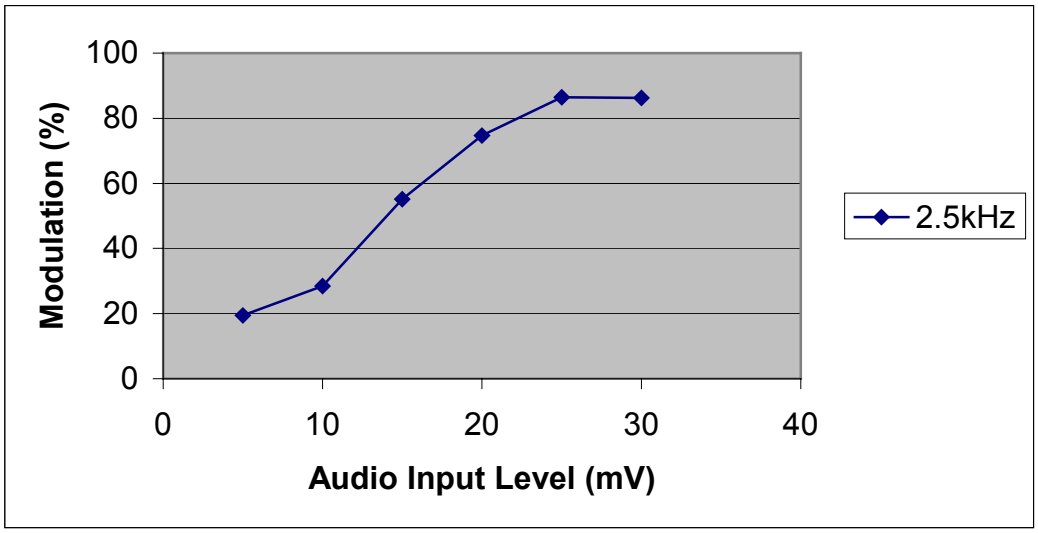
6.5 Emission Designator

According to plots on page19 & 20, the emission designator is 7K75A3E.


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR .67dB
7.75kHz
MIDLAND 4001
LOW CH
ΔMKR
7.75 kHz
.67 dB
CENTER 26.96500MHz
SPAN 50.00kHz
*RBW 300Hz
*VBW 300Hz
SWP 1.40sec


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR .66dB
7.75kHz
MIDLAND 4001
MID CH
ΔMKR
7.75 kHz
.66 dB
CENTER 27.20500MHz
SPAN 50.00kHz
*RBW 300Hz
*VBW 300Hz
SWP 1.40sec


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR .66dB
7.42kHz
MIDLAND 4001
HIGH CH
ΔMKR
7.42 kHz
.66 dB
CENTER 27.40500MHz
SPAN 50.00kHz
*RBW 300Hz
*VBW 300Hz
SWP 1.40sec


Modulation (%)
100
80
60
40
20
0
0
10
20
30
40
Audio Input Level (mV)
2.5kHz

7 - RADIATED SPURIOUS EMISSION

7.1 Provision Applicable

According to FCC §2.1053, measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediated circuit elements under normal condition of installation and operation. Information submitted shall include the relative radiated power of spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from a halfwave dipole antenna.

7.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 53 + 10 Log_{10} (power out in Watts)

7.3 Test Equipment

CDI B100/200/300 Biconical Antennas
EMCO Bi-logcon Antenna
HP 8566B Spectrum Analyzer
HP8640 Generator
Narda, Non-radiating Load, Model No.:768-20, S/N:203596

7.4 Test Result

Low Frequency: -25.9 dB at 53.93 MHz
Middle Frequency: -23.9 dB at 54.41 MHz
High Frequency: -24.6 dB at 54.81 MHz

EUT				Generator							Standard	
Indicated		Test Antenna		Substitution		Substitution Antenna		Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wave cm	Polar H/V	Gain Corrected	Loss dB	Level dBm	Limit dBm	Margin DB
Low Channel												
26.965	104.5	1.5	V	26.965	25.4	5550	V	2.1	-0.5	27.0		
26.965	97.17	1.8	H	26.965	19.8	5550	H	2.1	-0.5	21.4		
53.93	37.5	1.5	V	53.93	-40.5	2780	V	2.1	-0.5	-38.9	-13	-25.9
53.93	36.5	1.8	H	53.93	-41.2	2780	H	2.1	-0.5	-39.6	-13	-26.6
80.895	42.67	1.5	V	80.895	-43.0	1850	V	2.1	-0.7	-41.6	-13	-28.6
80.895	41.17	1.5	H	80.895	-43.7	1850	H	2.1	-0.7	-42.3	-13	-29.3
107.86	34.67	1.8	H	107.86	-44.8	1390	H	2.1	-0.7	-43.4	-13	-30.4
107.86	35.17	1.8	V	107.86	-45.7	1390	V	2.1	-0.7	-44.3	-13	-31.3
Middle Channel												
27.205	103.67	1.5	V	27.205	24.5	5550	V	2.1	-0.5	26.1		
27.205	98.83	1.6	H	27.205	20.0	5550	H	2.1	-0.5	21.6		
54.41	38.5	1.8	V	54.41	-38.5	2780	V	2.1	-0.5	-36.9	-13	-23.9
54.41	39.67	1.5	H	54.41	-39.2	2780	H	2.1	-0.5	-37.6	-13	-24.6
81.615	41.67	1.6	V	81.615	-43.5	1850	V	2.1	-0.7	-42.1	-13	-29.1
81.615	42.83	1.5	H	81.615	-44.0	1850	H	2.1	-0.7	-42.6	-13	-29.6
108.82	35.33	1.5	V	108.82	-44.8	1390	V	2.1	-0.7	-43.4	-13	-30.4
108.82	35.5	1.5	H	108.82	-45.2	1390	H	2.1	-0.7	-43.8	-13	-30.8
		High Channel										
27.405	106.5	1.8	V	27.405	25.8	5550	V	2.1	-0.5	27.4		
27.405	100.2	1.6	H	27.405	21.4	5550	H	2.1	-0.5	23.0		
54.81	38.33	1.6	V	54.81	-39.2	2780	V	2.1	-0.5	-37.6	-13	-24.6
54.81	39.5	1.8	H	54.81	-40.5	2780	H	2.1	-0.5	-38.9	-13	-25.9
109.62	36	1.6	H	109.62	-44.0	1390	H	2.1	-0.7	-42.6	-13	-29.6
109.62	36.67	1.8	V	109.62	-44.5	1390	V	2.1	-0.7	-43.1	-13	-30.1
82.215	43.5	1.5	V	82.215	-44.9	1850	V	2.1	-0.7	-43.5	-13	-30.5
82.215	44.17	1.5	H	82.215	-45.2	1850	H	2.1	-0.7	-43.8	-13	-30.8

Compliance Statement:

According to FCC Part 95, at 3-meter distance the emission from an intentional radiator shall not exceed the field strength level –13dBm on any frequency removed from center of the authorized bandwidth by more than 250%.

The levels of unwanted emission of this device were below the above limits. This device was compliant with the FCC Part 95.

Result: Pass

8 - SPURIOUS EMISSION

8.1 Standard Applicable

Per FCC §95.635 (a)(1), at least 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.

Per FCC §95.635 (a)(3), at least 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.

Per FCC §95.635 (a)(8), at least $53 + 10 \log_{10}$ (T) dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

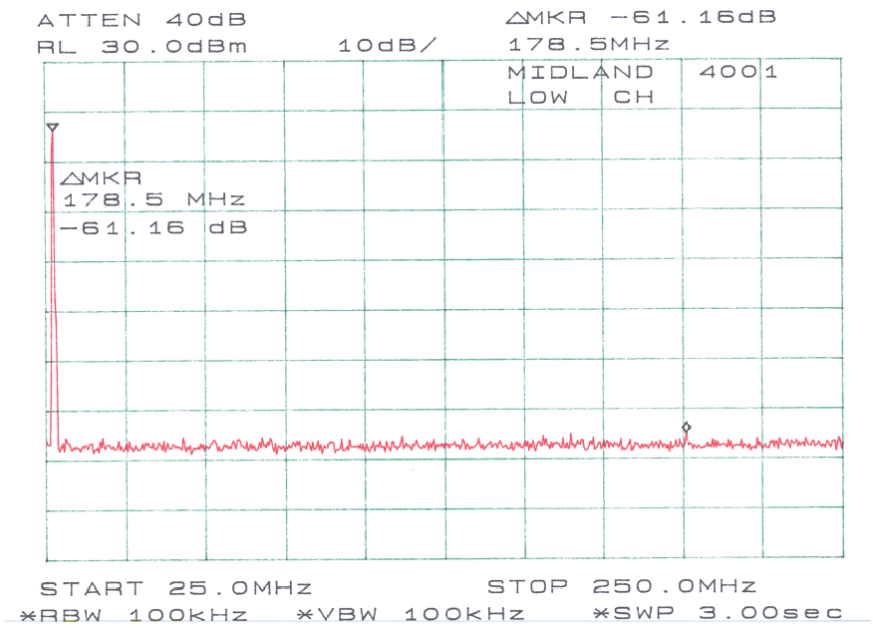
Per FCC §95.635 (a)(9), at least 60dB on any frequency twice or greater than twice the fundamental frequency.

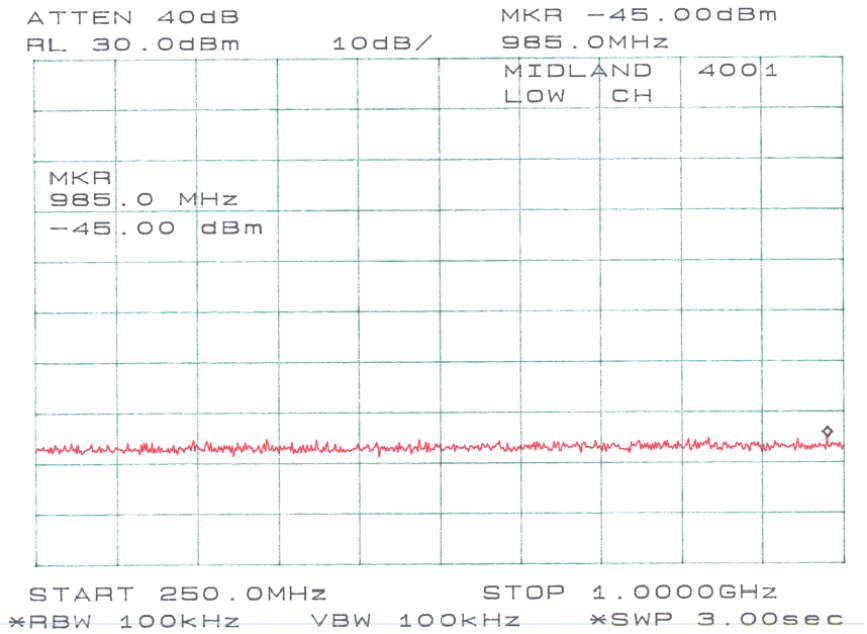
8.2 Measurement Procedure

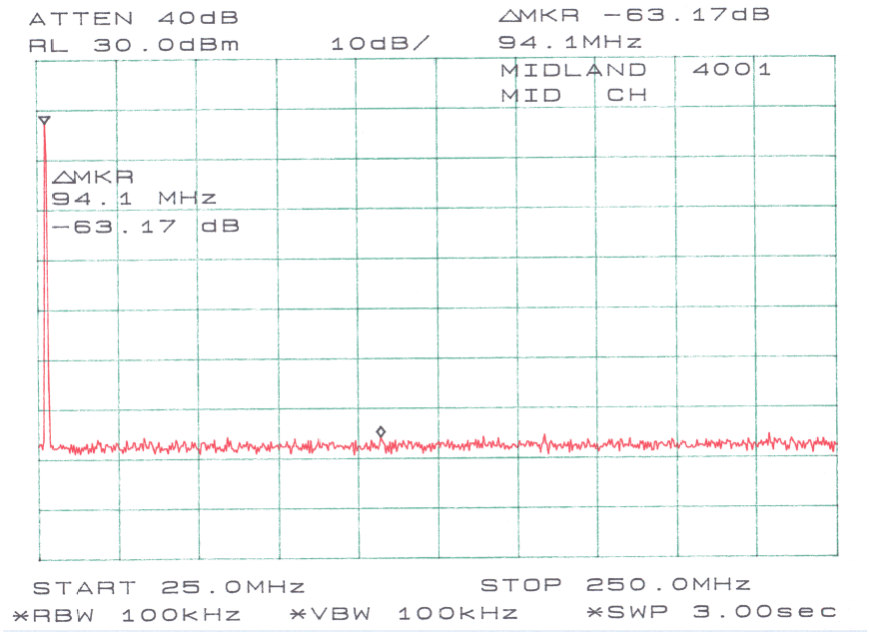
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.
6. Spurious attenuation limits in dB = $43 + 10\text{Log}_{10}$(power out in Watts)

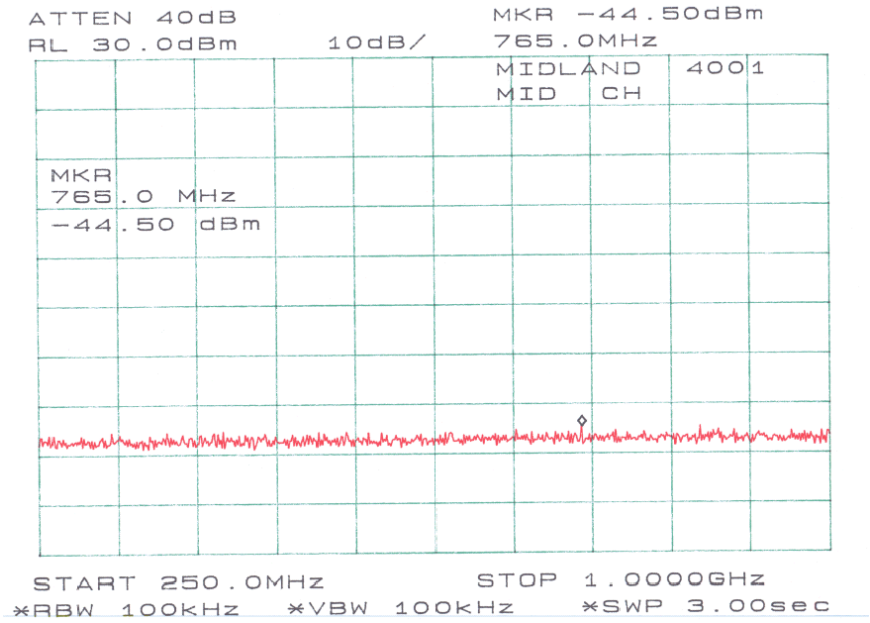
8.3 Test Result

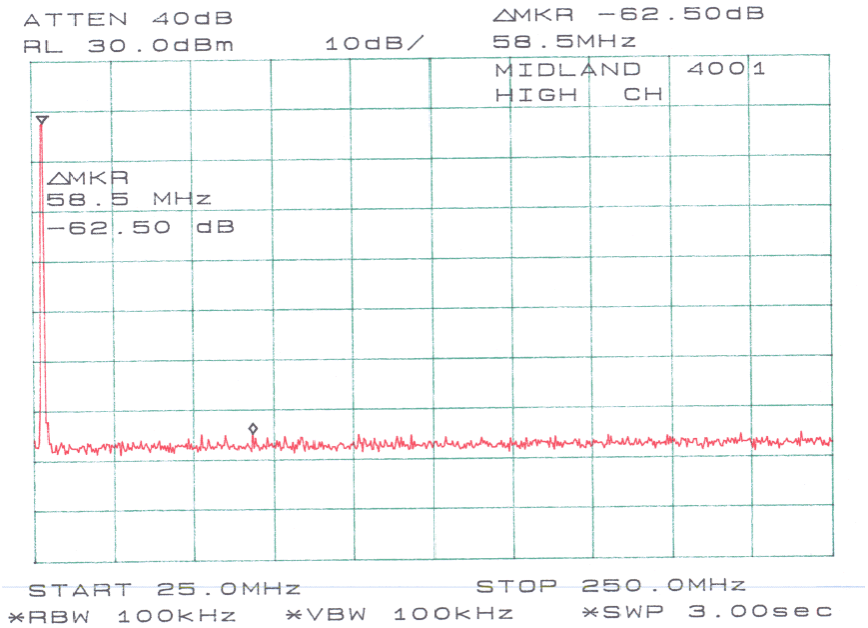
Please refer to following plots.

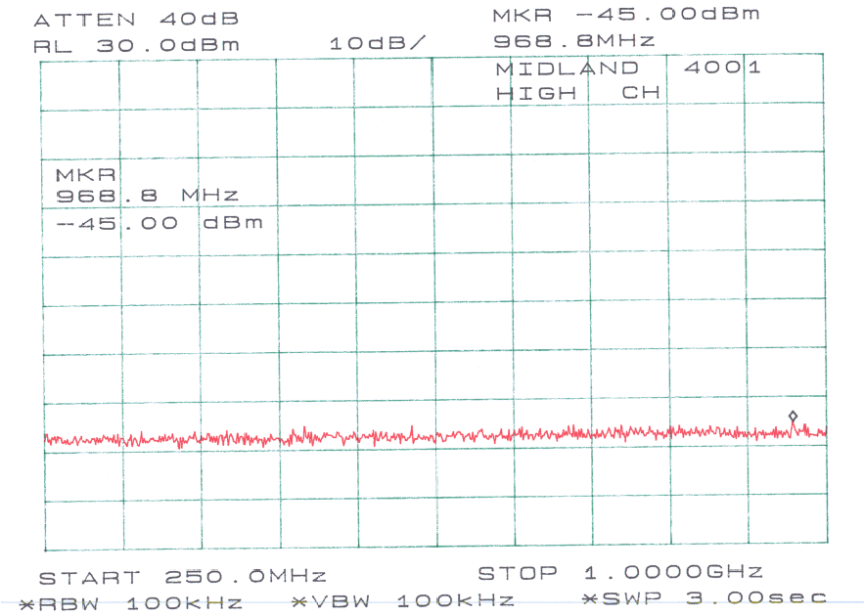

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -61.16dB
178.5MHz
MIDLAND
LOW CH
4001
ΔMKR
178.5 MHz
-61.16 dB
START 25.0MHz
STOP 250.0MHz
*RBW 100kHz
*VBW 100kHz
*SWP 3.00sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -45.00dBm
985.0MHz
MIDLAND
LOW CH
4001
MKR
985.0 MHz
-45.00 dBm
START 250.0MHz
STOP 1.0000GHz
*RBW 100kHz
VBW 100kHz
*SWP 3.00sec


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -63.17dB
94.1MHz
MIDLAND 4001
MID CH
ΔMKR
94.1 MHz
-63.17 dB
START 25.0MHz
STOP 250.0MHz
*RBW 100kHz
*VBW 100kHz
*SWP 3.00sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -44.50dBm
765.0MHz
MIDLAND 4001
MID CH
MKR
765.0 MHz
-44.50 dBm
START 250.0MHz
STOP 1.0000GHz
*RBW 100kHz
*VBW 100kHz
*SWP 3.00sec


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -62.50dB
58.5MHz
MIDLAND 4001
HIGH CH
ΔMKR
58.5 MHz
-62.50 dB
START 25.0MHz
STOP 250.0MHz
*RBW 100kHz
*VBW 100kHz
*SWP 3.00sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -45.00dBm
968.8MHz
MIDLAND 4001
HIGH CH
MKR
968.8 MHz
-45.00 dBm
START 250.0MHz
STOP 1.0000GHz
*RBW 100kHz
*VBW 100kHz
*SWP 3.00sec

9 - AC LINE CONDUCTED EMISSIONS

9.1 Applicable Requirements

According to ANSI C63.4 and FCC §15.107, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is connected back onto the AC power line on any frequency or frequencies within the band 450 kHz to 30 MHz shall not exceed 250 microvolts. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

9.2 Test Procedure

The EUT shall be connected to the DC power supply which shall be connected to the AC line through the first LISN. Both hot and neutral leads shall be tested.

9.3 Test Equipment

HP 8566B Spectrum Analyzer
LISN

9.4 Test Results

Not applicable because of battery operation.

10 - FREQUENCY STABILITY MEASUREMENT

10.1 Provision Applicable

According to FCC §2.1055(a)(1), the frequency stability shall be measure with variation of ambient temperature from –30ºC to +50ºC, and according to FCC 2.1055(d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC §95.625 (b), each CB transmitter must be maintained within a frequency tolerance of 0.005%.

10.2 Test Procedure

10.2.1 Frequency stability versus environmental temperature

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feedthrough attenuators. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.

10.2.2 Frequency Stability versus Input Voltage

At room temperature (25±5°C), an external variable DC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.

10.3 Test Equipment

Temperature Chamber, -50°C to +100°C
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Hewlett Packard HP 5383A Frequency Counter
Goldstar DC Power Supply, GR303

10.4 Test Results

Reference Frequency: 27.205 MHz, Limit: 0.005%			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		MCF (MHz)	% Error
50	13.8	27.2058	0.0029
40	13.8	27.2058	0.0029
30	13.8	27.2055	0.0018
20	13.8	27.2050	0.0000
10	13.8	27.2051	0.00037
0	13.8	27.2048	-0.00074
-10	13.8	27.2045	-0.0018
-20	13.8	27.2044	-0.0022
-30	13.8	27.2044	-0.0022

Frequency Stability Versus Input Voltage

Reference Frequency: 27.205 MHz, Limit: 5ppm under 25ºC						
Power Supplied (Vdc)	Frequency Measure with Time Elapsed					
	2 Minutes		5 Minutes		10 Minutes	
	MHz	ppm	MHz	ppm	MHz	ppm
13.8	27.205	0.46	27.2051	0.36	27.2051	0.36
11.7	27.2053	0.7	27.2052	0.74	27.2048	-0.74
15.8	27.2049	-0.4	27.2048	-0.74	27.2048	-0.74