CFR 47 Part 2 and 22 Test Report

Terminal device

FCC ID: HHV20020606
Device Name: Emergency Communication Device
Model Number: TG100

Date of Report: 8, July, 2002

Rev. 1.0

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1. GENERAL INFOMATION

1.1. List of General Information Required for Certification

1.1.1. Sub-Part 2.1033(c)(1)

Name and Address of Applicant: Matsushita Electric Works, Ltd
1048, Kadoma, Kadoma-shi, Osaka, 571-8686, Japan

Manufacturer: Matsushita Electric Works, Ltd
or
Shintom Co., Ltd.
1-19-20 Shin-Yokohama, Kohoku-Ku
Yokohama 222-0033, Japan

1.1.2. Sub-Part 2.1033(c)(2)

FCC ID: HHV20020606

1.1.3. Sub-Part 2.1033(c)(3)

Instruction Manual(s): Refer to EXHIBIT 13

1.1.4. Sub-Part 2.1033(c)(4)

Type of Emission: 40K0F8W and 40K0F1D

1.1.5. Sub-Part 2.1033(c)(5)

Frequency Range: 824.04 to 848.97 MHz

1.1.6. Sub-Part 2.1033(c)(6)

Power Rating, Watts, Rated:

Variable	
Conducted:	0.468W (26.7 dBm)
Radiated:	0.562W (27.5 dBm)

1.1.7. Sub-Part 2.1033(c)(7)

Maximum Power Rating: 0.562 Watts(ERP)

1.1.8. Sub-Part 2.1033(c)(8)

DC Voltage and Current to the Final Amplifier Module:

Supply Voltage:	6.00 V DC
Drain Voltage:	5.92 V DC
Drain Current:	0.299 to 0.053 A

1.1.9. Sub-Part 2.1033(c)(9)

Tune-Up Procedure: Refer to EXHIBIT 7

1.1.10. Sub-Part 2.1033(c)(10)

Circuit Diagrams/Circuit Description:
Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting power.
Refer to EXHIBIT 8, 9 and 10.

1.1.11. Sub-Part 2.1033(c)(11)

Equipment Identification: Refer to EXHIBIT 4

1.1.12. Sub-Part 2.1033(c)(12)

Photographs: Refer to EXHIBIT 5 and 6.

1.1.13. Sub-Part 2.1033(c)(13)

Digital Modulation Description: Not applicable

1.1.14. Sub-Part 2.1033(c)(14)

Test and Measurement Data: Refer to Section 2 onwards of this report.

1.1.15. Sub-Part 2.1091

Radiofrequency radiation exposure evaluation:
This Cellular telephone is mobile device which is used in such a way that a separation distance of at least 20 centimeters is maintained between the transmitter's radiating structure and the body of the user or nearby persons. And the Maximum ERP of this Cellular phone is less than 1.5 Watt. So, it is not subject to the environmental evaluation for RF exposure.

1.1.16. Sub-Part 22.919(a)(b)(c)

Description of Electronic Serial Number: Refer to EXHIBIT 10

1.2. Test Summary

Test Performed	Reference	Section of Report	Complies/ Does not comply
RF Power Output (Conducted)	FCC Part 2.1046 (a), (c)	4	Complies
Modulation Requirements: Transmitter Audio Frequency Response	FCC Part 2.1047(a), 22.915(d)(1)	5	Complies
Modulation Requirements: Modulation Limiting	FCC Part 2.1047(b), 22.915(b)(1), (c)	6	Complies
Occupied Bandwidth	FCC Part 2.1049(c)(1), 22.917	7	Complies
Spurious Emissions as Antenna Terminals	FCC Part 2.1051 / 22.917	8	Complies
Emissions in Receive Band	FCC Part 2.1051 / 22.917(f)	9	Complies
Frequency Stability (Temperature Variation)	FCC Part 2.1055(a)(1)	10	Complies
Frequency Stability (Voltage Variation)	FCC Part 2.1055(d)	11	Complies

The following tests was performed by KEC(Kansai Electronic Industry Development Center). Refer to attached EXHIBITS.

Test Performed	Reference	Exhibit No.	Complies/ Does not comply
RF Power Output (Radiated)	FCC Part 2.913(a)	Exhibit 12	Complies
Radiated Spurious Emissions	FCC Part 2.1053 / 22.917(e)	Exhibit 12	Complies

2. Standard Test Conditions

The following conditions and procedures were followed during testing of this transmitter:

Room temperature:	23 - 27 Degrees Celsius
Room Humidity:	30 – 50 %
Supply Voltage:	6.0 V DC

Prior to testing, the unit was tuned-up according to the manufacturer's alignment procedure. Test procedures were according to EIA specification IS19B.

3. Test Equipment List

The following equipment were used for testing.

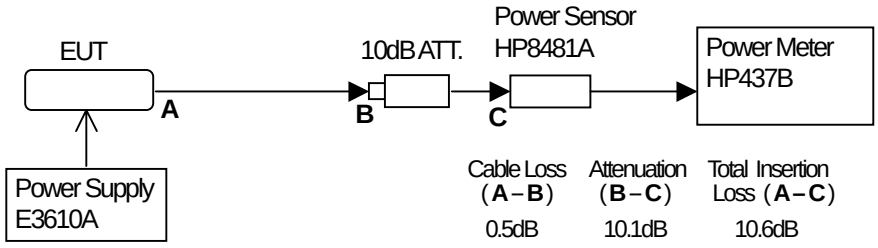
Test/Section of Report	Test Equipment	Manufacturer	Model No.
4	Power Meter	Hewlett Packard	437B
4	Power Sensor	Hewlett Packard	8481A
5, 6	Modulation Analyzer	Hewlett Packard	8901B
5, 6, 7, 8, 9	Audio Analyzer	Hewlett Packard	8903A
7, 8, 9	Spectrum Analyzer	Hewlett Packard	8566B
10,11	RF Signal Generator	Hewlett Packard	8642A
10,11	Frequency Counter	Hewlett Packard	53132A
10,11	Cellular Interface	Hewlett Packard	8958A
4, 5, 6, 7, 8, 9,10,11	Power Supply	Hewlett Packard	E3610A
11	Multi Meter	Hewlett Packard	34401A
9	Branching Filter	TDK	CF6121612D
4,	Attenuator (10dB)	Anritsu	MP721C
7, 8	Attenuator (20dB)	Anritsu	MP721D
9	Terminator	Anritsu	MP752A

4. RF POWER OUTPUT (CONDUCTED)

Specification: FCC Part 2.1046(a)(c)

4.1. Setup and Procedure

The test set-up is as per the following figure.
The EUT was connected to a coaxial attenuator having a 50ohm Impedance through a RF coaxial cable.



4.2. Pass/Fail Criteria

Not Applicable

4.3. Test Results

RF Power					
Channel	Nominal Frequency (MHz)	Max (mW)	Max (dBm)	Min (mW)	Min (dBm)
991	824.04	417	26.2	6.14	7.88
383	836.49	468	26.7	5.94	7.74
799	848.97	427	26.3	5.47	7.38

Note: Channel capacity = 832

5. TRANSMITTER AUDIO FREQUENCY RESPONSE

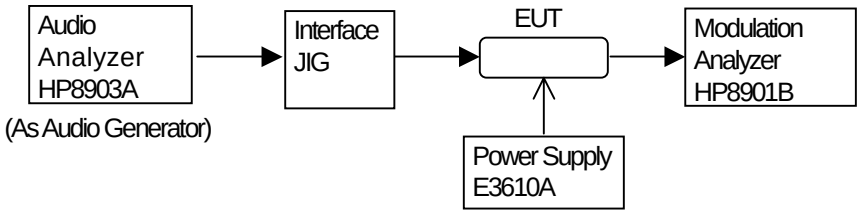
Specification: FCC Part 2.1047(a), 22.915(d)(1)

5.1. Setup and Procedure

The test set-up is as per the following figure.
The audio signal generator was connected to the audio input circuit of the EUT through the Interface JIG.

Operate the EUT with the compressor disabled, and monitor the output using the HP8901B modulation analyzer without standard 750-microsecondde-emphasis, with expandor disabled. Apply the sine wave audio signal to the audio input of the EUT, vary the modulating frequency from 300 to 3000 Hz, and observe the input levels necessary to maintain a constant ±2.9KHzsystem deviation.

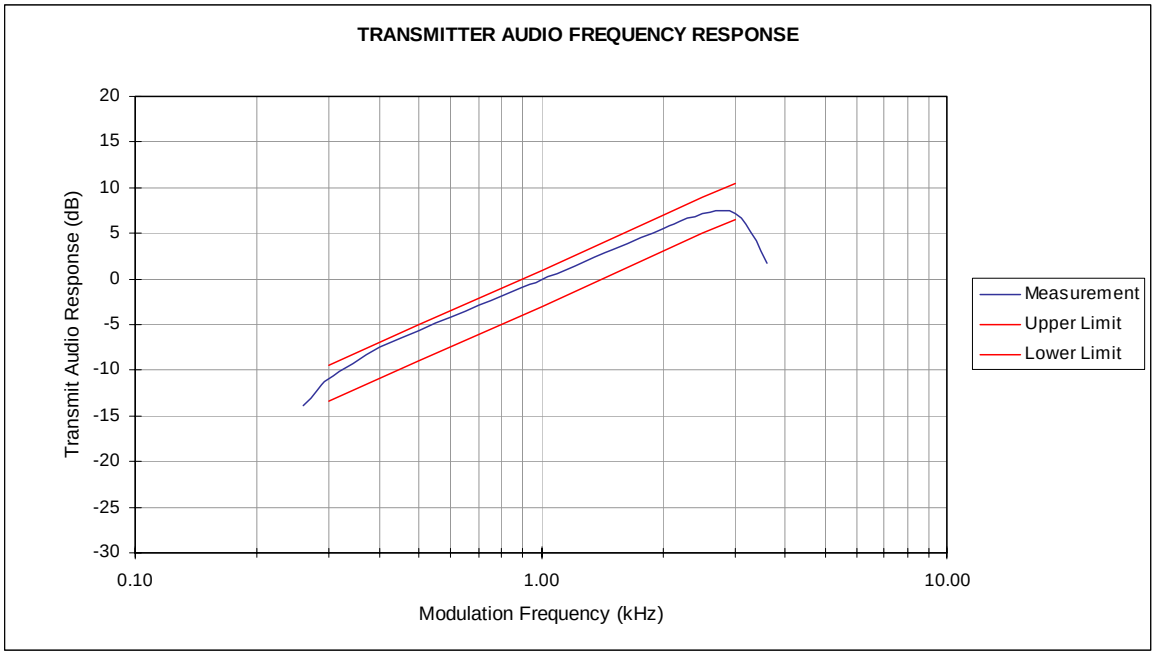
Adjust the audio input frequency to 1000 Hz, and adjust the input level to 20 dB greater than that required to produce ±8KHz deviation. Note the output level on the frequency deviation meter or standard test receiver. Using this output level as reference (0dB), Vary the modulating frequency from 3000 Hz to 30,000 Hz, and observe the change in output while maintaining a constant audio input level.

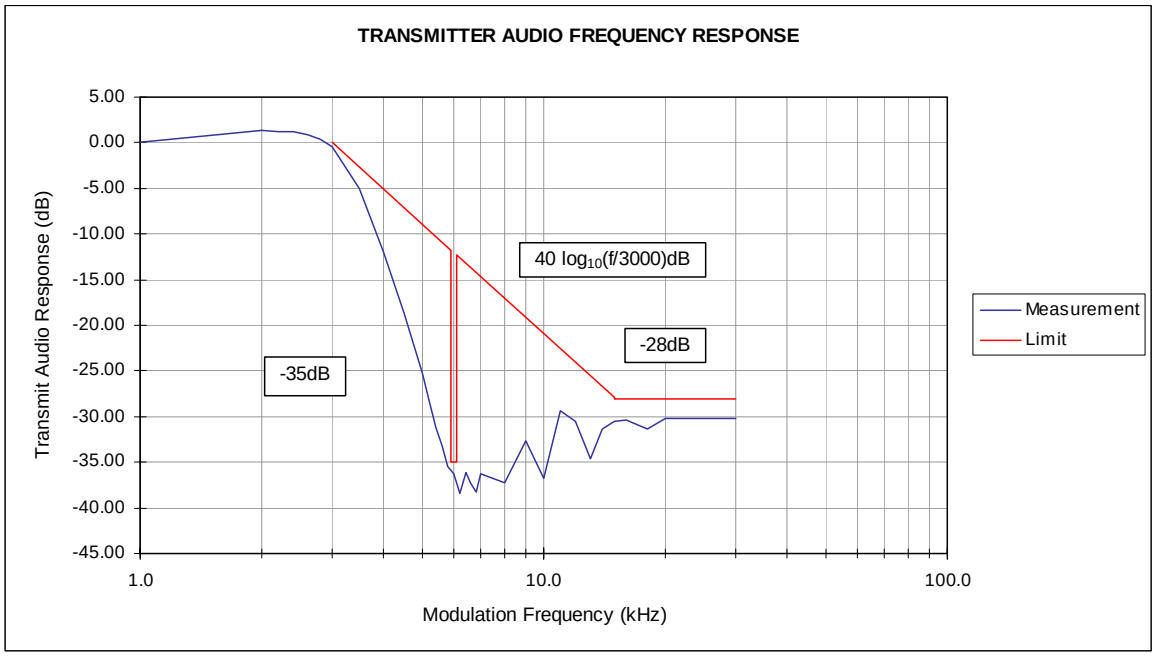


5.2. Pass/Fail Criteria

Emissions mask.

5.3. Test Results



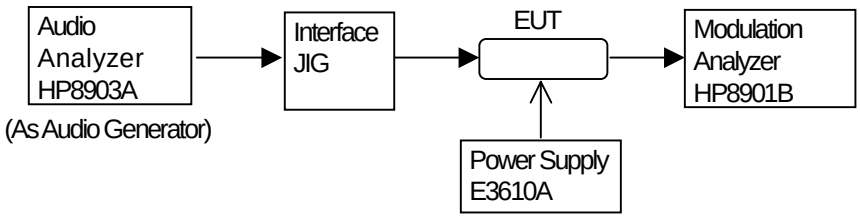

TRANSMITTER AUDIO FREQUENCY RESPONSE
Transmit Audio Response (dB)
5.00
0.00
-5.00
-10.00
-15.00
-20.00
-25.00
-30.00
-35.00
-40.00
-45.00
1.0
10.0
100.0
Modulation Frequency (kHz)
40 log10(f/3000)dB
-28dB
-35dB
Measurement
Limit

6. MODULATION LIMITING

Specification: FCC Part 2.1047(b), 22.915(b)(1),(c)

6.1. Setup and Procedure

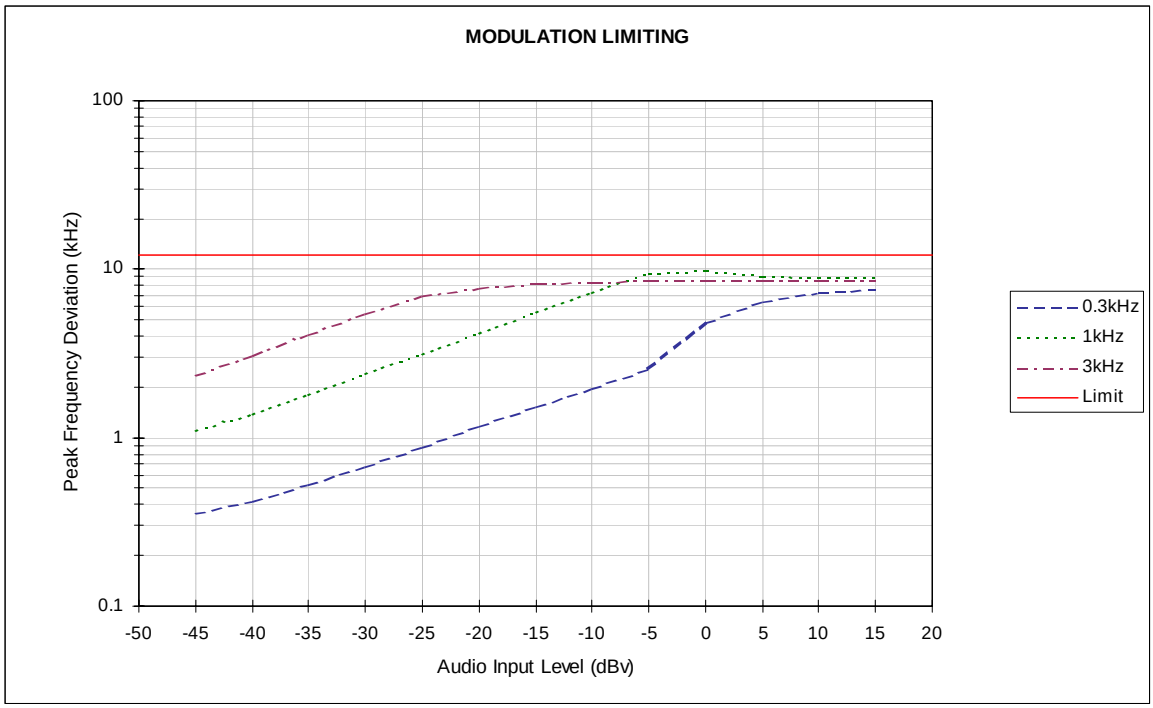
The test set-up is as per the following figure.
The deviation is to be observed by varying the audio input voltage.
Test has been performed for three different modulation frequencies.



6.2. Pass/Fail Criteria

Less than +/-12kHz deviation.

6.3. Test Results



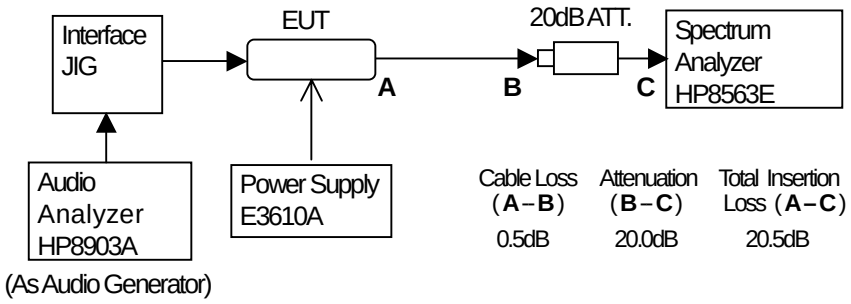
7. OCCUPIED BANDWITH

Specification: FCC Part 2.1049(c)(1), 22.917

7.1. Setup and Procedure

The test set-up is as per the following figure.
The Audio Signal Generator was adjusted to the frequency of 1 KHz. The output level was set to ±6 KHz deviation. With level constant, the frequency was set to 2,500 Hz. Then the audio signal level was increased by 16 dB.

In addition, occupied bandwidth data was obtained for the SAT (Supervisory Audio Tone), ST (Signaling Tone), WBD (Wideband Data), and DTMF (Dual Tone Multi Frequencies).

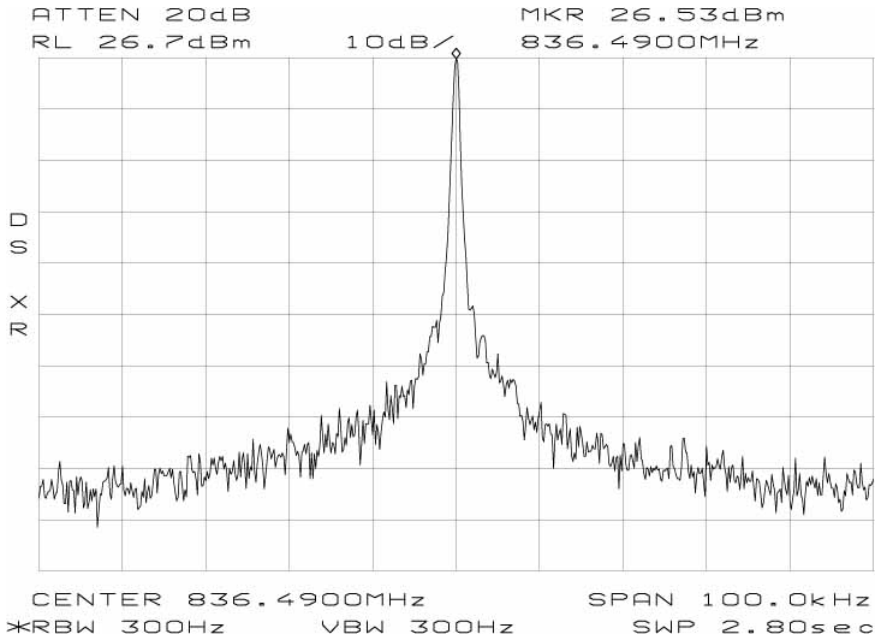


7.2. Pass/Fail Criteria

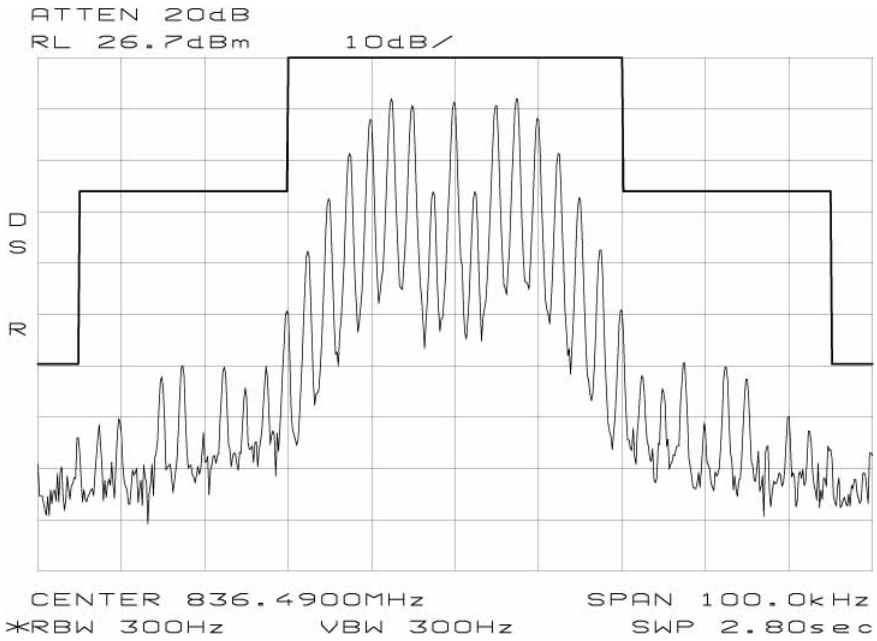
Emissions mask.

7.3. Test Results

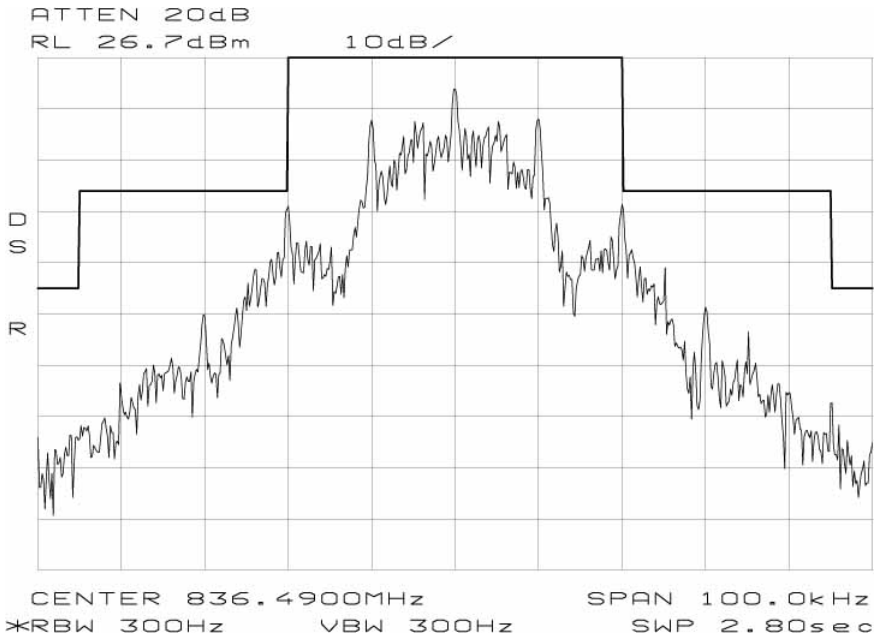
No Modulation; 836.49 MHz



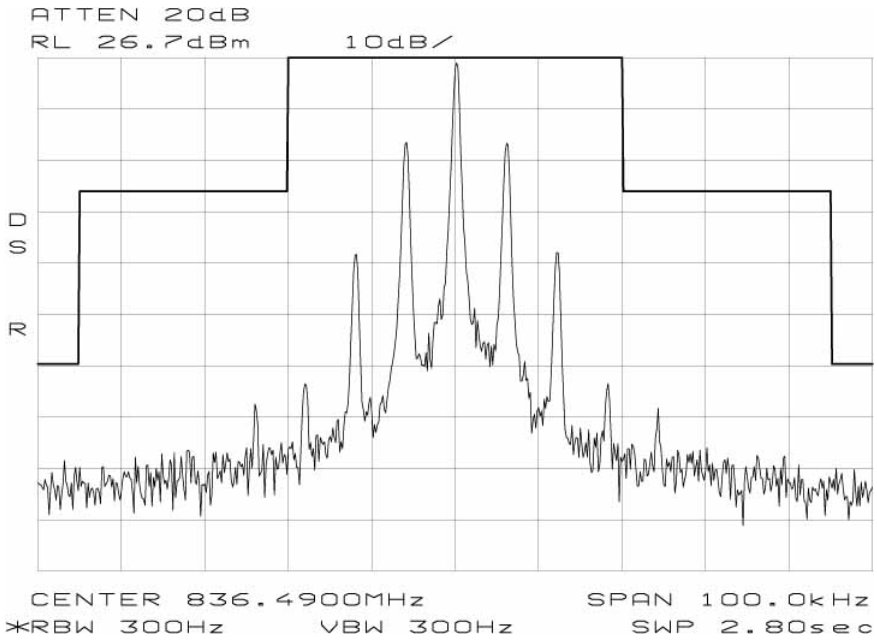
Voice; 836.49 MHz
100kHz Span, 300Hz RBW/VBW, Ref to power level



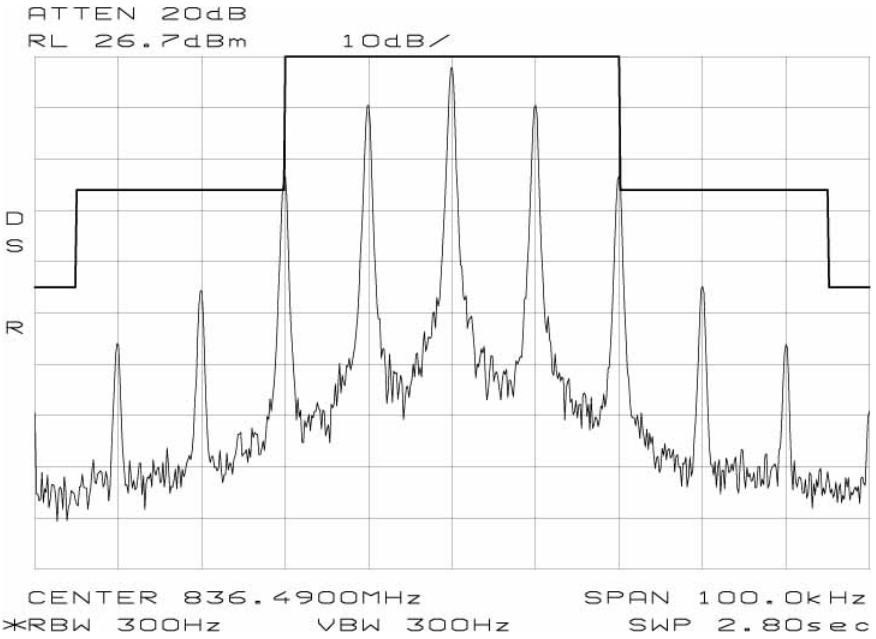
Wideband Data; 836.49 MHz
100kHz Span, 300Hz RBW/VBW, Ref to power level



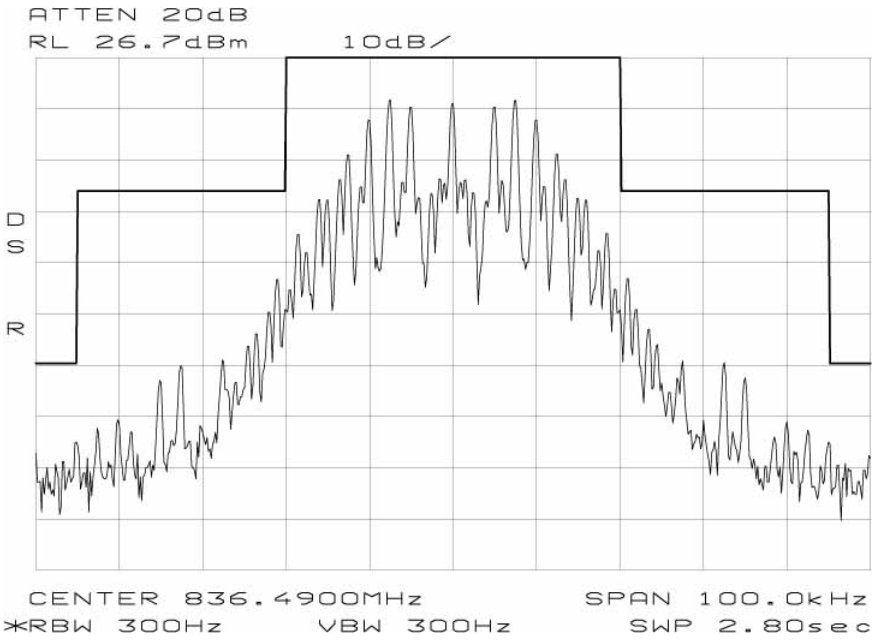
SAT; 836.49 MHz
100kHz Span, 300Hz RBW/VBW, Ref to power level



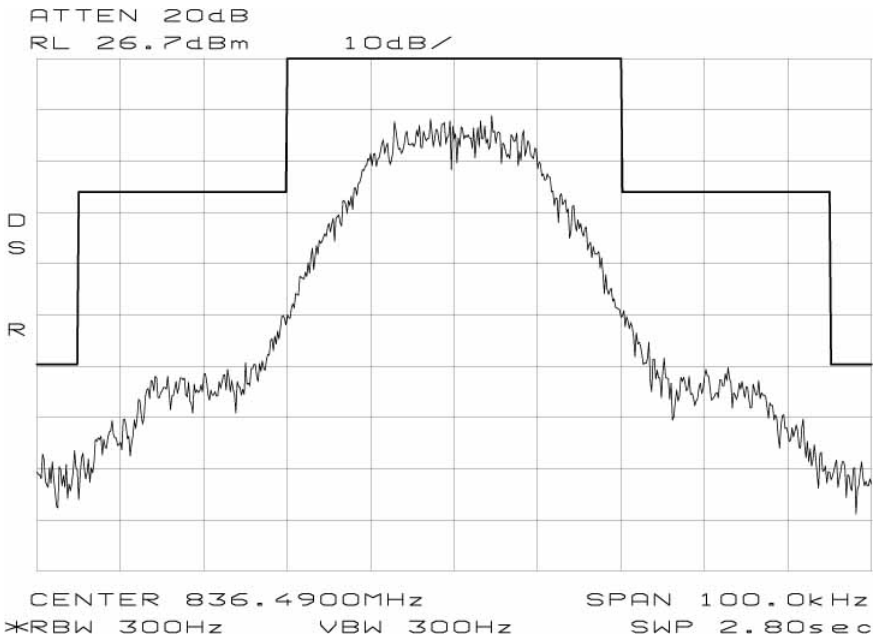
ST; 836.49 MHz
100kHz Span, 300Hz RBW/VBW, Ref to power level



SAT + Voice; 836.49 MHz
100kHz Span, 300Hz RBW/VBW, Ref to power level



SAT + DTMF; 836.49 MHz
100kHz Span, 300Hz RBW/VBW, Ref to power level

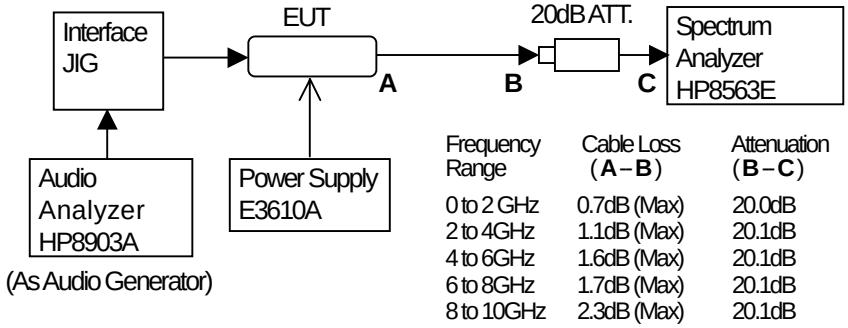


8. SPURIOUS EMISSIONS AT ANTENNA TERMINAL

Specification: FCC Part 2.1051, 22.917

8.1. Setup and Procedure

The test set-up is as per the following figure.
The level of the carrier and the various conducted spurious and harmonic frequencies were measured by means of a calibrated Spectrum Analyzer.
The spectrum was scanned from the lowest frequency generated in the equipment to 10 GHz.



Frequency Range	Cable Loss (A – B)	Attenuation (B – C)	Total Insertion Loss (A – C)
0 to 2 GHz	0.7dB (Max)	20.0dB	20.7dB(Max)
2 to 4GHz	1.1dB (Max)	20.1dB	21.2dB(Max)
4 to 6GHz	1.6dB (Max)	20.1dB	21.7dB(Max)
6 to 8GHz	1.7dB (Max)	20.1dB	21.8dB(Max)
8 to 10GHz	2.3dB (Max)	20.1dB	22.4dB(Max)

Note:

Modulation Condition: Audio Plus SAT

Audio:

Frequency: 2,500 Hz
Input Level: 16 dB greater than the level to Produce <6KHz deviation.

SAT:

Frequency: 6,000 Hz
Deviation: ±2KHz

8.2. Pass/Fail Criteria

Below -13dBm.

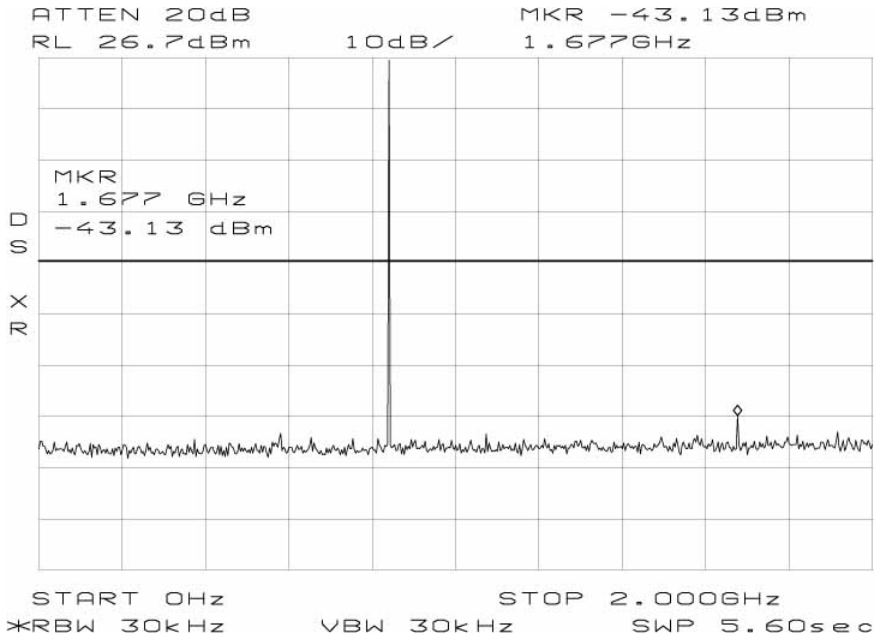
8.3. Test Results

The level of emissions were below -40 dBm.

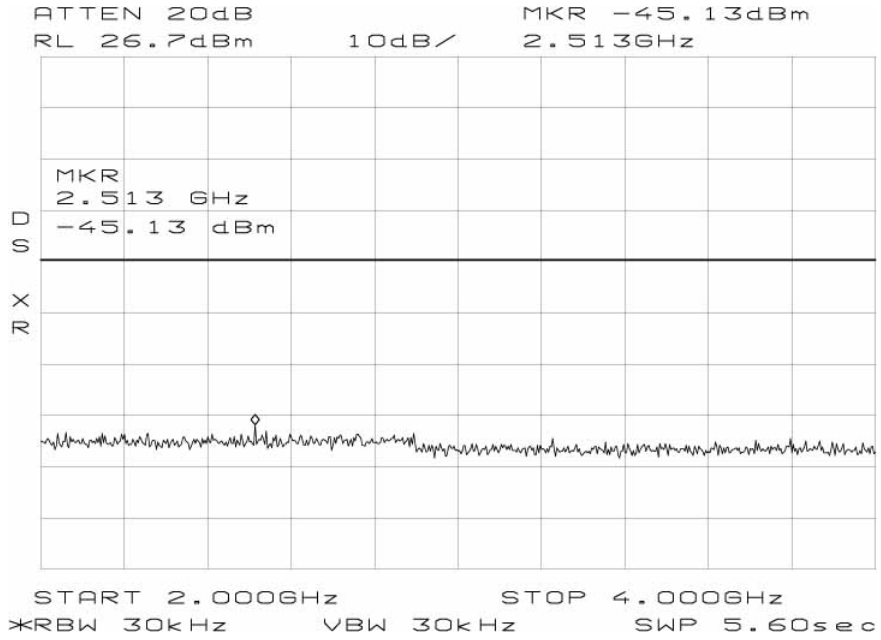
Spurious Level				
Harmonics	Frequency Range	Carrier frequency		
		824.04 MHz	836.49 MHz	848.97 MHz
2nd	0 to 2 GHz	< -40 dBm	< -40 dBm	< -40 dBm
3rd, 4th	2 to 4 GHz	< -45 dBm	< -45 dBm	< -45 dBm
5th to 7th	4 to 6 GHz	< -45 dBm	< -45 dBm	< -45 dBm
8th, 9th	6 to 8 GHz	< -45 dBm	< -45 dBm	< -45 dBm
10th, 11th	8 to 10 GHz	< -40 dBm	< -40 dBm	< -40 dBm

All other Spurious were the same as those shown previously.
The graphs measured by the spectrum analyzer is follows.

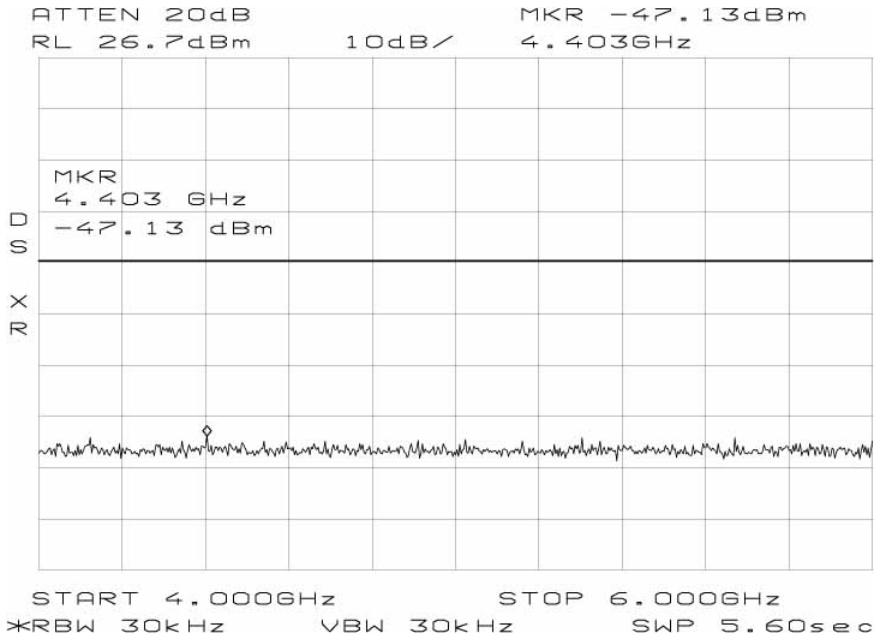
Carrier frequency: 836.49 MHz, Max Power Level
Frequency Range: 0Hz to 2GHz, 300Hz RBW/VBW, Ref to power level



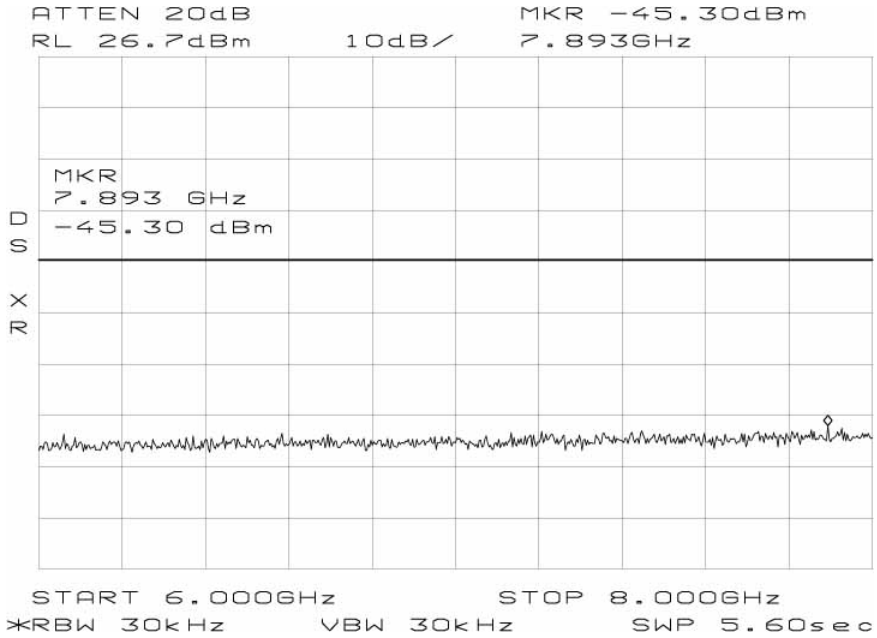
Carrier frequency: 836.49 MHz, Max Power Level
Frequency Range: 2GHz to 4GHz, 300Hz RBW/VBW, Ref to power level



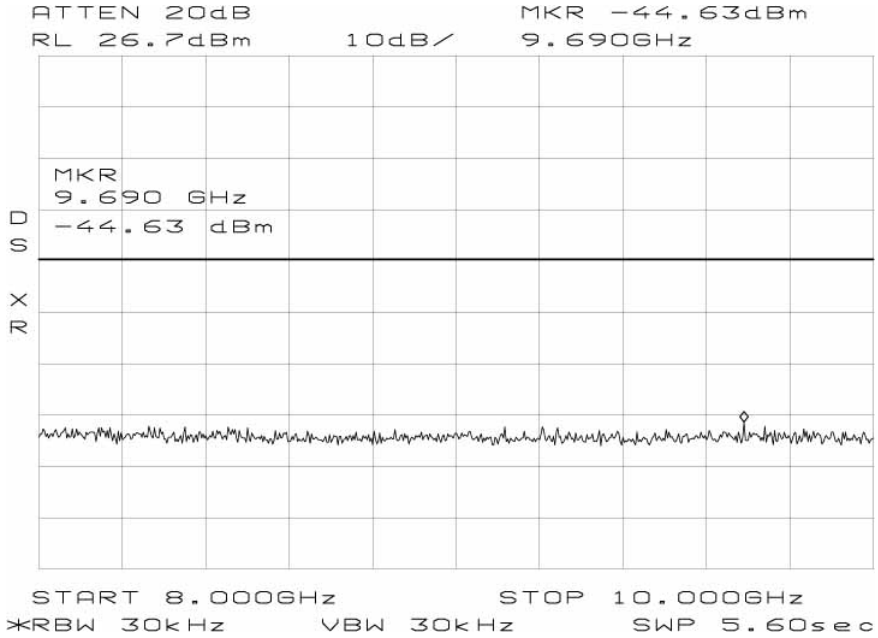
Carrier frequency: 836.49 MHz, Max Power Level
Frequency Range: 4GHz to 6GHz, 300Hz RBW/VBW, Ref to power level



Carrier frequency: 836.49 MHz, Max Power Level
Frequency Range: 6GHz to 8GHz, 300Hz RBW/VBW, Ref to power level



Carrier frequency: 836.49 MHz, Max Power Level
Frequency Range: 8GHz to 10GHz, 300Hz RBW/VBW, Ref to power level

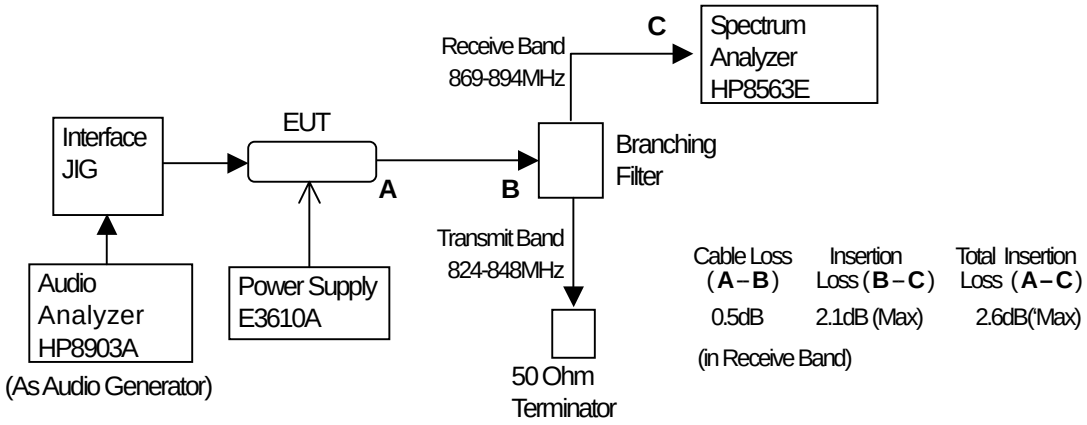


9. EMISSIONS IN RECEIVE BAND

Specification: FCC Part 2.1051, 22.917(f)

9.1. Setup and Procedure

The test set-up is as per the following figure.
The mean power of any emissions appearing in the base station frequency range (869 - 894 MHz) from the EUT were measured by means of a calibrated spectrum analyzer.



9.2. Pass/Fail Criteria

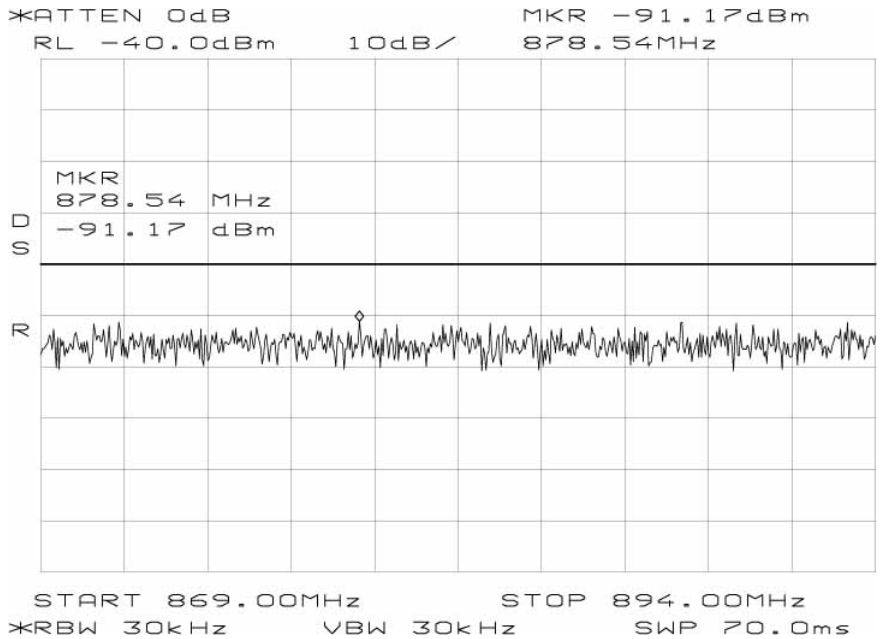
Below -80 dBm.

9.3. Test Results

The level of emissions were below -90 dBm.

Carrier frequency of 824.04, 836.49, 848.97 MHz and Max, Min Power Level were measured, and the results were the same as those shown previously. The graphs measured by the spectrum analyzer is follows.

Carrier frequency; 836.49 MHz
Max Power Level



10. FREQUENCY STABILITY (TEMPRATURE VARIATION)

Specification: FCC Part 2.1055(a)(1)

10.1. Setup and Procedure

The EUT was placed in a temperature chamber, decreased to -30℃, and permitted to stabilize for one hour. Power was applied and maximum frequency change within one minute was measured.

With the power OFF, temperature was raised in 10℃(or 15℃) steps. The next step was permitted to stabilize for one half hour. Power was applied and frequency was measured.

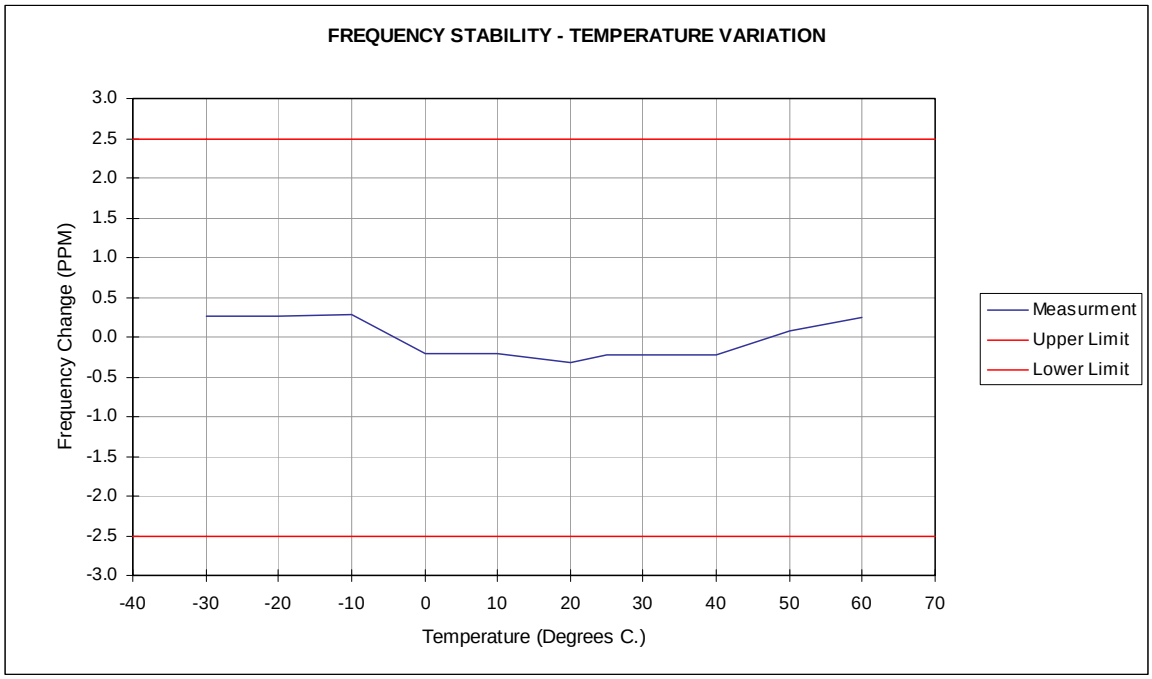
10.2. Pass/Fail Criteria

Less than ±2.5ppm (= ±2091 Hz).

10.3. Test Results

Carrier frequency: 836.49 MHz

Temp.(deg. C)	Frequency (MHz)	Change (Hz)	Chang (ppm)
-30	836.490225	225	0.269
-20	836.490215	215	0.257
-10	836.490230	230	0.275
0	836.489832	-168	-0.201
10	836.489833	-167	-0.200
20	836.489728	-272	-0.325
25	836.489815	-186	-0.222
30	836.489809	-191	-0.228
40	836.489816	-184	-0.220
50	836.490069	68	0.082
60	836.490209	208	0.249



11. FREQUENCY STABILITY (VOLTAGE VARIATION)

Specification: FCC Part 2.1055(d)

11.1. Setup and Procedure

With power OFF, the sample was permitted to stabilize at +25±2℃. Power was then applied at 85, 90, 95, 100, 105, 110 and 115% of the standard test voltage (STV). The frequency change within one minute was recorded.

Note: Standard Test Voltage = 6.0V

11.2. Pass/Fail Criteria

Less than ±2.5ppm (= ±2091 Hz).

11.3. Test Results

Carrier Frequency: 836.49 MHz

% of STV	Voltage (V)	Frequency (MHz)	Change (Hz)	Chang (ppm)
85	5.1	836.489760	-240	-0.287
90	5.4	836.489755	-245	-0.293
95	5.7	836.489804	-196	-0.234
100	6	836.489815	-185	-0.221
105	6.3	836.489753	-248	-0.296
110	6.6	836.489771	-229	-0.274
115	6.9	836.489642	-358	-0.428