FCC Part 95 Subpart B
EMI TEST REPORT

of

E.U.T. : FRS Transceiver

FCC ID. : LIPTL99001

MODEL : FRS-300

Working Frequency : 462.5625, 467.5625, 467.6625 MHz

for

APPLICANT : Tron Link enterprises Co., Ltd.
ADDRESS : No. 184, Hwa Kang Street, Pa-Teh City, Taoyuan Hsien, Taiwan, R.O.C.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN
NO. 8 LANE 29, WENMIMG ROAD,
LOSHAN TSUN, KWEISHAN HSIANG,
TAOYUAN, TAIWAN, R.O.C.

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Report Number : ET88R-11-065-01

TEST REPORT CIRTIFICATION

Applicant : Tron Link enterprises Co., Ltd.
No. 184, Hwa Kang Street, Pa-Teh City, Taoyuan Hsien, Taiwan, R.O.C.

Manufacturer : Tron Link enterprises Co., Ltd.
No. 184, Hwa Kang Street, Pa-Teh City, Taoyuan Hsien, Taiwan, R.O.C.

Description of EUT :

a) Type of EUT	: FRS Transceiver
b) Trade Name	: N/A
c) Model No.	: FRS-300
d) FCC ID	: LIPTL99001
e) Working Frequency	: 462.5625, 467.5625, 467.6625 MHz
f) Power Supply	: DC 6V

Regulation Applied : FCC Rules and Regulations Part 95 Subpart B (1998)

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Issued Date : Feb. 27, 2000

Test Engineer : Tien Lu Liau
(Tien Lu Liau)

Approve & Authorized Signer : Will Yauo
Will Yauo, Supervisor
EMI Test Site of ELECTRONICS
TESTING CENTER, TAIWAN

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1. GENERAL INFORMATION

1.1 Product Description

a) Type of EUT	: FRS Transceiver
b) Trade Name	: N/A
c) Model No.	: FRS-300
d) FCC ID	: LIPTL99001
e) Working Frequency	: 462.5625 & 467.5625 & 467.6625 MHz
f) Power Supply	: DC 6V

1.2 Characteristics of Device:

The EUT is a FRS Transceiver with following features:

* three frequencies for selection (462.5625 & 467.5625 & 467.6625 MHz).
* effective distance 2 miles range, has a full 500mW output power.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4.

The FRS Transceiver under test was operated continuously in its normal operating mode for the purpose of the measurements. In order to secure the continuous operation of the device under test, rewiring in the circuit was done by the manufacturer so as to affect its intended operation.

The receiving antenna polarized horizontally was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the FRS Transceiver under test.
In order to determining the average value during one pulse train of the radiated power generated from the FRS Transceiver under test, the encoded wave form in the time domain was used.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No. 34, Lin 5, Ding Fu Tsun, Linkou Hsiang, Taipei Hsien, Taiwan, R.O.C.

This site has been fully described in a report submitted to your office, and accepted in a letter dated Feb. 10 , 2000.

2. REQUIREMENTS OF PROVISIONS

2.1 Definition

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Frequencies Available

According to sec. 95.627 of Part 95, the following frequencies are available for wireless microphone operations :

CH 01	462.5625	CH 08	467.5625
CH 02	462.5875	CH 09	467.5875
CH 03	462.6125	CH 10	467.6125
CH 04	462.6375	CH 11	467.6375
CH 05	462.6625	CH 12	467.6625
CH 06	462.6875	CH 13	467.6875
CH 07	462.7125	CH 14	467.7125

2.3 Requirements For Measurement

(1) RF Output Power
For transmitters, the power output shall be measured at the RF output terminals.

(2) Modulation Characteristics
For 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.

(3) Occupied Bandwidth
Other than signle sideband or independent sideband Transmitter when moolulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

(4) Spurious Emissions at Antenna Terminals
The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminal when properly loaded with a suitable artificial antenna.

(5) Field Strength of Spurious Emissions

Measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal condition of installation and operation.

(6) Frequencies Tolerance

a) The frequency stability shall be measured with variation of ambient temperature.

b) The frequency stability shall be measured with variation of primary supply voltage.

2.4 Labeling Requirement

Each equipment for which a type acceptance application is filed on or after May 1,1981, shall bear an identification plate or label pursuant to §2.925（Identification of equipment） and §2.926（FCC identifier）.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. OUTPUT POWER MEASUREMENT

3.1 Provision Applicable

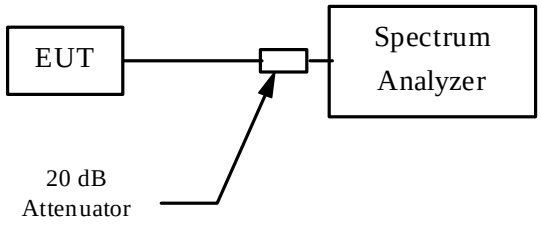
According to § 95.639 (d), the output power shall not exceed 500 milliwatts (ERP).

3.2 Measurement Procedure

A. Conducted measured

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 1 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 spectrum analyzer RBW to 10.0 kHz and VBW to 100 kHz., and adjust spectrum analyzer center frequency at the highest amplitude appearing on spectral display. Then set spectrum analyzer frequency span to convenient range including the highest signal reading..
4. Measure the highest amplitude appearing on spectral display and record the level as result data.
5. Repeat above procedures until all frequencies measured were complete.

Figure 1 : Output power measurement configuration



B. ERP

1. Setup the configuration per figure 3 and 4 for frequencies measured below and above 1 GHz respectively, adjusting the input voltage to produce the maximum power as measured in above conducted output power measurement.

2. Adjust the analyzer for each frequency measured in chapter 6 on a 1 MHz frequency span and 100 kHz resolution bandwidth for frequencies below 1 GHz and 1 MHz RBW for frequencies above 1 GHz.

3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0◦ to 360 ◦ , and record the highest value indicated on spectrum analyzer as reference value.

4. Repeat step 3 until all frequencies need to be measured were complete.

5. Repeat step 4 with search antenna in vertical polarized orientations.

6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1 GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at a appreciated output level. Rise and lower the search antenna to get the highest value on spectrum analyzer, and then hold this position. Adjust the SG output to get a value as close as that derived from step 3 on spectrum analyzer. Record this value for result calculated.

7. Repeat step 6 until all frequencies need to be measured were complete.

8. Repeat step 7 with both dipole antenna (horn antenna for above 1 GHz) and search antenna in vertical polarized orientations.

Figure 3 : Frequencies measured below 1 GHz configuration

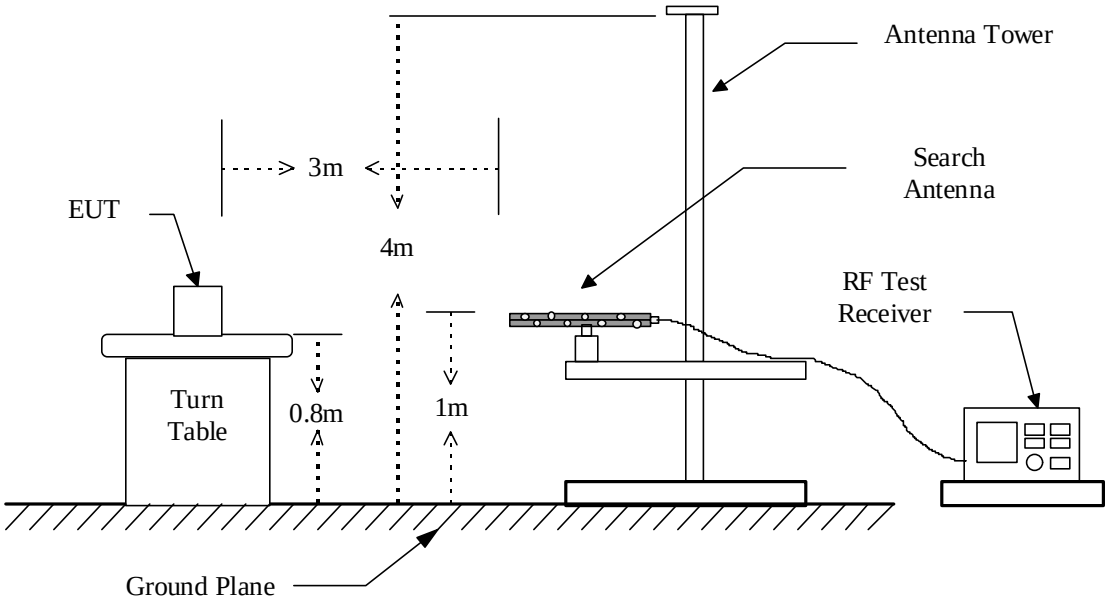
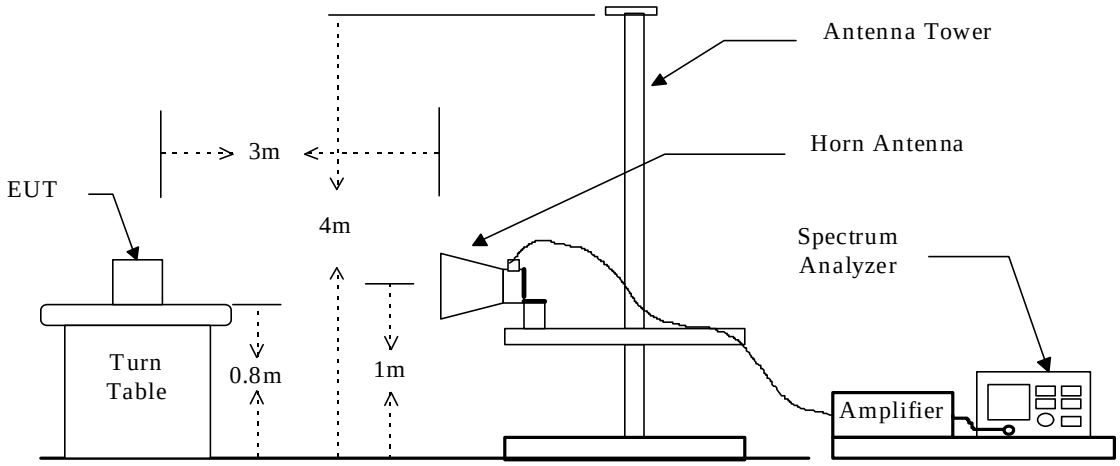


Figure 4 : Frequencies measured above 1 GHz configuration



3.3 Test Data

A. Conducted measured

Operated mode : Normal Test Date : Feb. 04, 2000
Temperature : 17 ℃ Humidity : 70 %

CH	Frequency (MHz)	SA Reading (dBm)	Cable Loss (dB)	Attenuator (dB)	Result (dBm)	Output Power (W)	Limit (W)
A	462.562	6.28	0.5	20	26.78	0.476	0.5
C	467.662	6.18	0.5	20	26.68	0.466	0.5

Note: Result = SA Reading + Cable Loss + Attenuator
Pease find Appendix 1 for plotted graphs.

B. ERP

Operated mode : Normal Test Date : Feb. 04, 2000
Temperature : 17 ℃ Humidity : 70 %
SG @ 20 dBm

Frequency (MHz)	SA Reading (dBuV)	SG Reading (dBuV)	Cable Loss (dB)	Result (dBm)	ERP (W)	Limit (W)
462.5625	102.9	95.0	-1.9	26.0	0.398	0.5
467.6625	102.1	94.9	-1.9	25.3	0.339	0.5

3.3 Result Calculation

The conducted result is calculated as following equation :

a. For conducted output power measurement:
Result = Reading ＋Cable Loss ＋Attenuation of Attenuator (if any)

b. For ERP measurement:
Result = SA Reading – SG Reading + 20 ＋Cable Loss

c. $W = \log^{-1}[\frac{Result(dBm)}{10}]/1000$

3.4 Output Power Test Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Hewlett-Packard	8568B	JAN. 03, 2001
Pre-selector	Hewlett-Packard	85685A	JAN. 10, 2001
Quasi Peak Detector	Hewlett-Packard	85650A	JAN. 10, 2001
Log periodic Antenna	EMCO	3146	NOV. 03, 2000
Dipole Antenna	EMCO	3121C	SEP. 22, 2000

4. MODULATION CHARACTERISTICS

4.1 Provisions Applicable

According to §2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be measured.

According to §95.637 (a), a FRS unit that transmits emission type F3E must not exceed, a peak frequency deviation of ±2.5 KHz, and the audio frequency response must not exceed 3.125 KHz.

4.2 Measurement Method

A) Modulation Limit

1. Position the EUT as shown in figure 2, adjust the audio input frequency to 100 Hz and the input level from 0V to 5V with recording each carrier frequency deviation responding to respective input level.

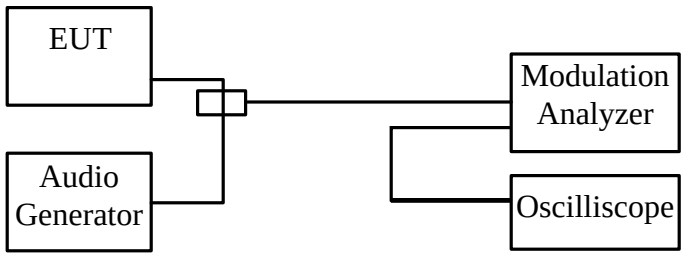
2. Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000, and 5000 Hz in sequence.

B) Audio frequency response

1. Position the EUT as shown in figure 2.

2. Vary the modulating frequency from 100 Hz to 500 Hz with varying the input voltage from 0V to 10V, and observe the change in putput.

Figure 2 : Modulation characteristic measurement configuration



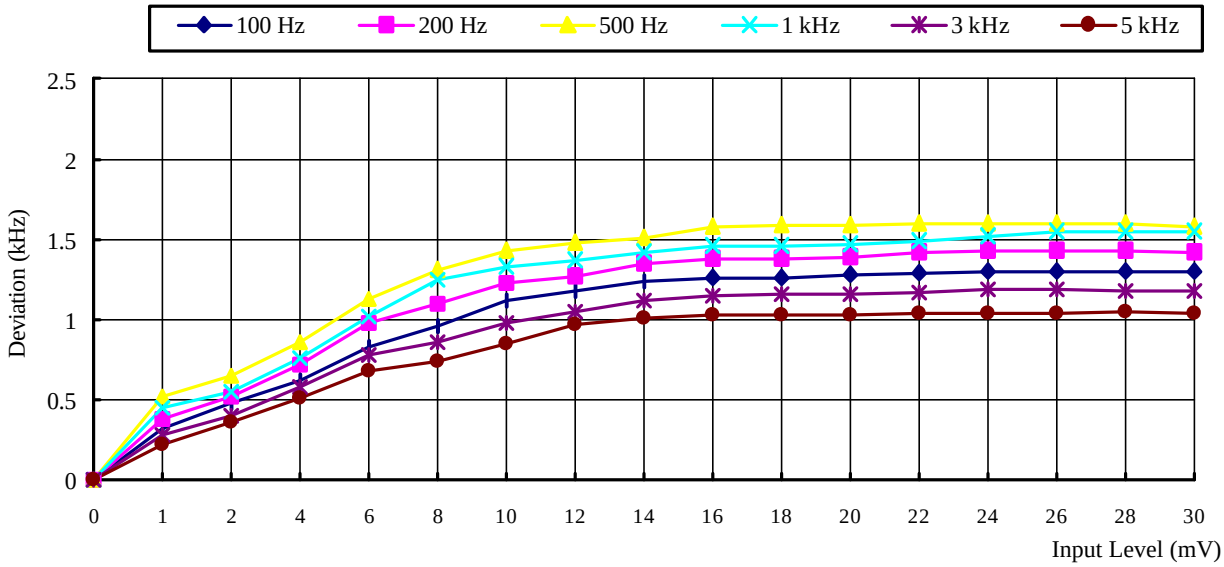
4.3 Measurement Instrument

Equipment	Manufacturer	Model No.	Next Cal. Date
Modulation Analyzer	Hewlett-Packard	8901A	Dec. 01, 2000
Multifunction Synthesizer	Hewlett-Packard	8904A	Dec. 01, 2000
Oscilloscope	LECROY	9350A	Dec. 01, 2000

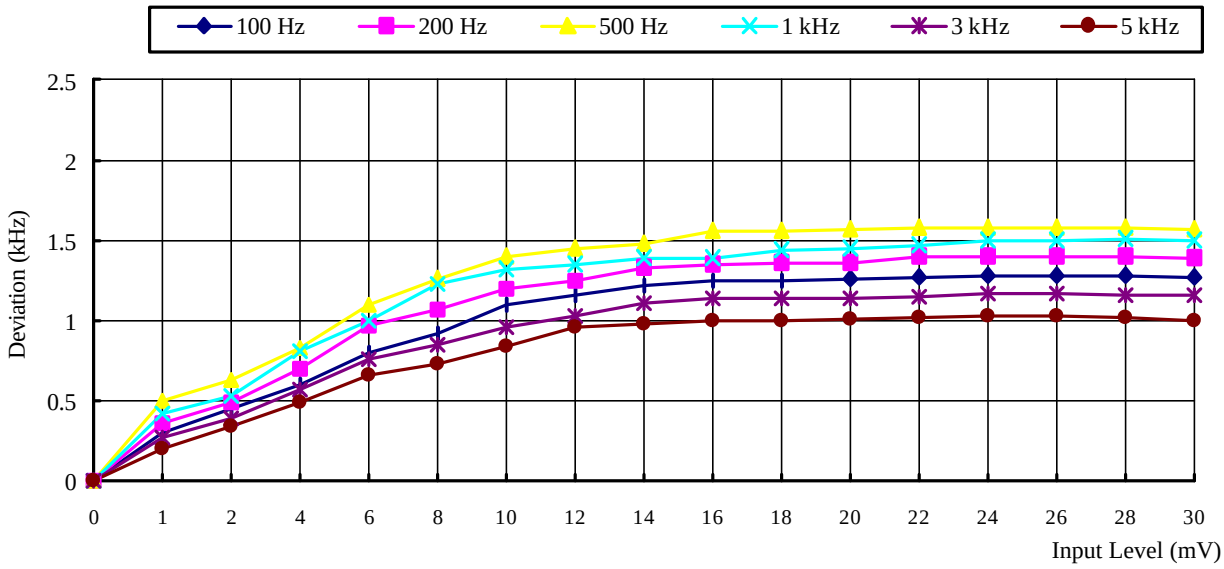
4.4 Measurement Result

A). Modulation Limit

Channel 1 : 462.5625 MHz

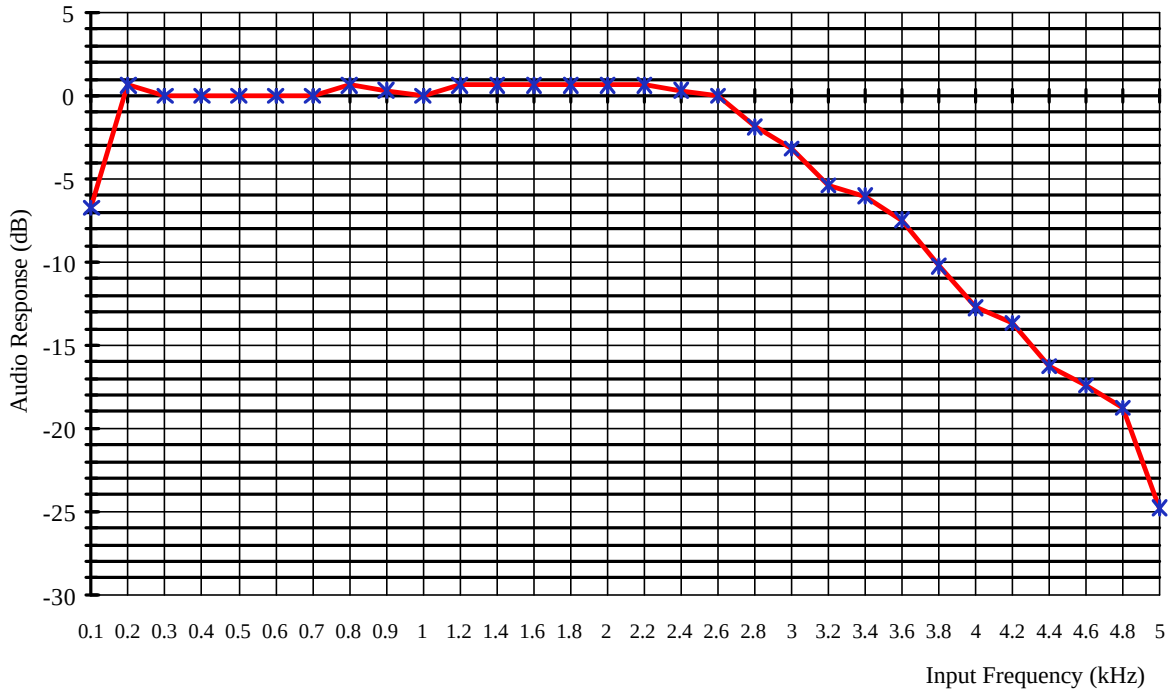


Channel 2 : 467.6625 MHz

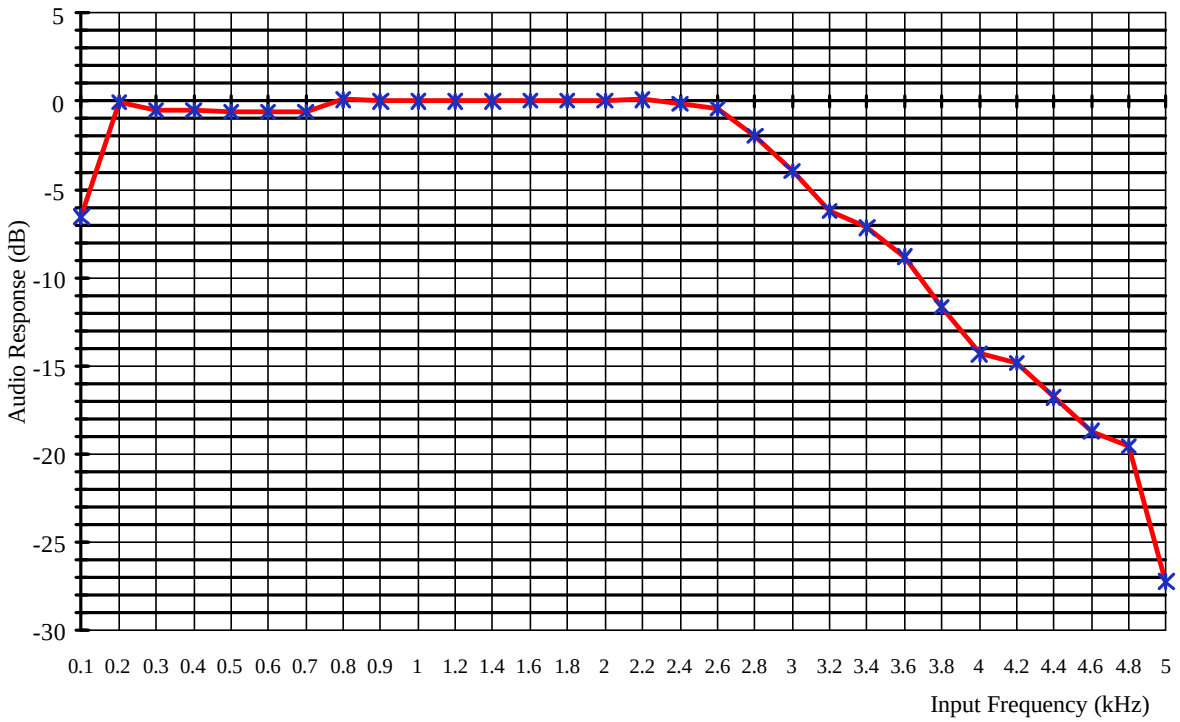


B). Frequency response of all circuits

CH A: 462.5625 MHz



CH C: 467.6625 MHz


5
0
-5
-10
-15
-20
-25
-30
Audio Response (dB)
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.2 1.4 1.6 1.8 2 2.2 2.4 2.6 2.8 3 3.2 3.4 3.6 3.8 4 4.2 4.4 4.6 4.8 5
Input Frequency (kHz)

5. EMISSION BANDWIDTH

5.1 Provisions Applicable

According to §95.633 (3), the authorized andwidth for emission type F3E transmitted by a FRS unit is 12.5 KHz.

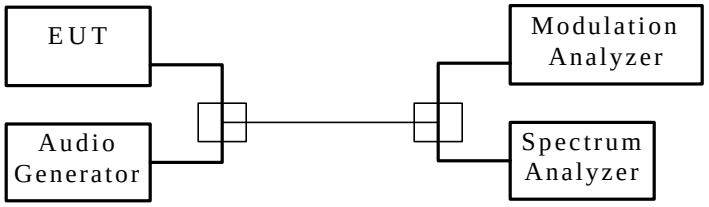
5.2 Measurement Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

2. Position the EUT as shown in figure 3, and Install new batteries in the EUT. Turn on the EUT ant set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

3. Apply a 2.5 kHz modulation signal to EUT and measure the frequencies of the modulated signal from the EUT where it is the specified number of dB below the reference level set in step 2. This is the occupied bandwidth specified.

Figure 3 : Occupied bandwidth measurement configuration



5.3 Occupied Bandwidth Test Equipment

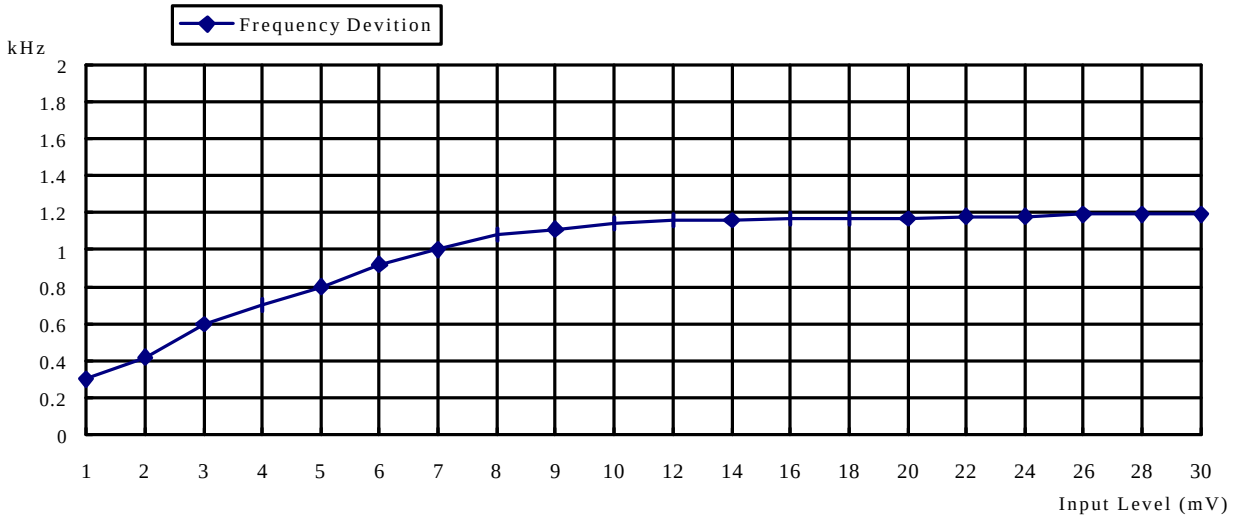
Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Adventest	R3361A	Mar. 22, 2001
Modulation Analyzer	Hewlett-Packard	8901A	Dec. 01, 2000
Multifunction Synthesizer	Hewlett-Packard	8904A	Dec. 01, 2000
Plotter	Hewlett-Packard	7440A	N/A

5.4 Bandwidth Measured

a.) Input Level Derived

1) Channel A : 462.5625 MHz

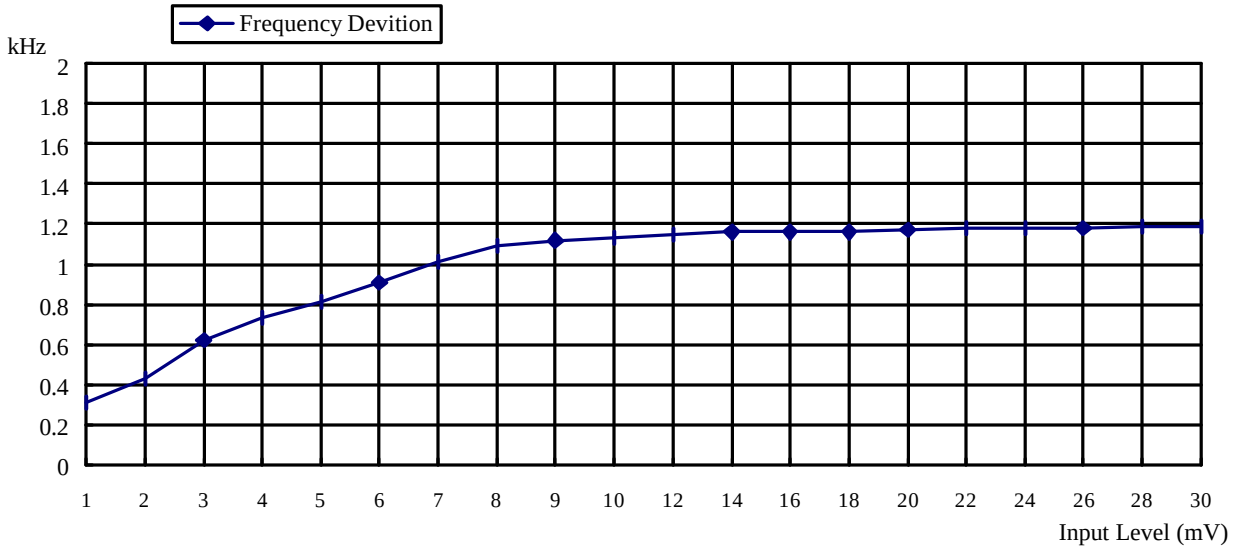
Input Audio Frequency : 2.5 kHz, Sine Wave



The Level input to produce 85% modulation is 8 mV.

2) Channel C : 467.6625 MHz

Input Audio Frequency : 2.5 kHz, Sine Wave



The Level input to produce 85% modulation is 8 mV

b) Occupied Bandwidth Plotted

Please find Appendix 2 for plotted data.

6. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

6.1 Provisions Applicable

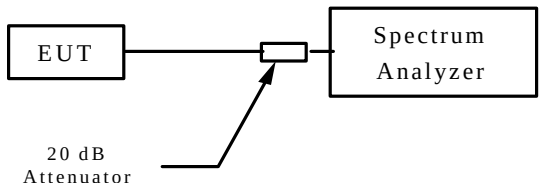
According to § 2.1051, the radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminal when properly loaded with a suitable artificial antenna.

According to § 95.635 (b), the power of each unwanted emission shall be less than TP as specified as follows:
(1) At least 25 dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth
(2) 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.
(3) At least 43 + 10 $\log_{10}$(TP) dB on any frequency removed from the center of the anuthorized bandwidth by more than 250%.

6.2 Measurement Procedure

1. Setup the configure per figure 4, adjusting the input voltage to produce the maximum power as measured in chapter 3.
2. Adjust the analyzer frequency span from 30 MHz to 1 GHz, record any frequency attenuated less than 20 dB relative to the permitted emission and then adjust the analyzer frequency span from 1 GHz to 2 GHz and record emissions frequency should be measured.
3. Adjust the analyzer for each frequency measured above on a 2 MHz frequency span and 1MHz resolution bandwidth. Record the highest value on spectrum analyzer.

Figure 4 : Conducted spurious emission measurement configuration



6.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Hewlett-Packard	8568B	Jan. 03, 2001
Pre-selector	Hewlett-Packard	85685A	Jan. 10, 2001
Quasi Peak Detector	Hewlett-Packard	85650A	Jan. 10, 2001

6.3 Measurement Data

a) Channel A

Operated mode : Rx Mode Test Date : FEB. 04, 2000
Temperature : 17 ℃ Humidity : 70 %

Unmodulated carrier power is 26.8 dBm , or 0.479 W (Conducted).

The limit of spurious or harmonics is 26.8-[43+10log(output power in W)], or -13dBm

Frequency (MHz)	SA Reading (dBm)	Cable Loss (dB)	Attenuator (dB)	Result	Limit (dBm)	Margin (dB)
925.104	-39.5	0.3	20	-19.2	-13.0	-6.2
1387.656	-38.1	0.4	20	-17.7	-13.0	-4.7
1850.208	-43.3	0.8	20	-22.5	-13.0	-9.5
2312.760	-40.3	1.0	20	-19.3	-13.0	-6.3
2775.312	-46.5	1.2	20	-25.3	-13.0	-12.3
3237.864	-41.3	1.4	20	-19.9	-13.0	-6.9
3700.416	-39.8	1.6	20	-18.2	-13.0	-5.2
4162.968	-37.0	1.9	20	-15.1	-13.0	-2.1
4625.520	-42.7	2.2	20	-20.5	-13.0	-7.5

b) Channel C: 467.6625 MHz

Operated mode	: Normal	Test Date	:FEB. 04, 2000
Temperature	: 23 ℃	Humidity	: 65 %

Unmodulated carrier power is 26.7 dBm , or 0.466 W (Conducted).

The limit of spurious or harmonics is 26.7-[43+10log(output power in W)], or -13dBm

Frequency (MHz)	SA Reading (dBm)	Cable Loss (dB)	Attenuator (dB)	Result	Limit (dBm)	Margin (dB)
935.325	-44.9	0.3	20	-24.6	-13.0	-11.6
1402.988	-39.6	0.4	20	-19.2	-13.0	-6.2
1870.650	-44.2	0.8	20	-23.4	-13.0	-10.4
2338.313	-40.5	1.0	20	-19.5	-13.0	-6.5
2805.975	46.6	1.2	20	-25.4	-13.0	-12.4
3273.638	-41.0	1.4	20	-19.6	-13.0	-6.6
3741.300	-38.3	1.6	20	-16.7	-13.0	-3.7
4208.963	-38.6	1.9	20	-16.7	-13.0	-3.7
4676.625	-41.5	2.2	20	-19.3	-13.0	-6.3

7. FIELD STRENGTH OF EMISSION

7.1 Provisions Applicable

According to § 2.1053 (a), Measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediate 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.

According to § 95.635 (b), the power of each unwanted emission shall be less than TP as specified as follows:
(1) At least 25 dB on any frequency removed from the center of the authorized bandwidth by mure than 50% up to and including 100% of the authorized bandwidth
(2) At least 35 dB on any frequency removed from the center of the authorized bandwidth by mure than 100% up to and including 250% of the authorized bandwidth.
(3) At least $43 + 10 \log_{10}(TP)$ dB on any frequency removed from the center of the anuthorized bandwidth by more than 250%.

7.2 Measurement Procedure

1. Setup the configuration per figure 5 and 6 for frequencies measured below and above 1 GHz respectively, adjusting the input voltage to produce the maximum power as measured in chapter 3.

2. Adjust the analyzer for each frequency measured in chapter 6 on a 1 MHz frequency span and 100 kHz resolution bandwidth.

3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0◦ to 360 ◦ , and record the highest value indicated on spectrum analyzer as reference value.

4. Repeat step 3 until all frequencies need to be measured were complete.

5. Repeat step 4 with search antenna in vertical polarized orientations.

6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1 GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at a appreciated output level. Rise and lower the search antenna to get the highest value on spectrum analyzer, and then hold this position. Adjust the SG output to get a identical value derived from step 3 on spectrum analyzer. Record this value for result calculated.

7. Repeat step 6 until all frequencies need to be measured were complete.

8. Repeat step 7 with both dipole antenna (horn antenna for above 1 GHz) and search antenna in vertical polarized orientations.

Figure 5 : Frequencies measured below 1 GHz configuration

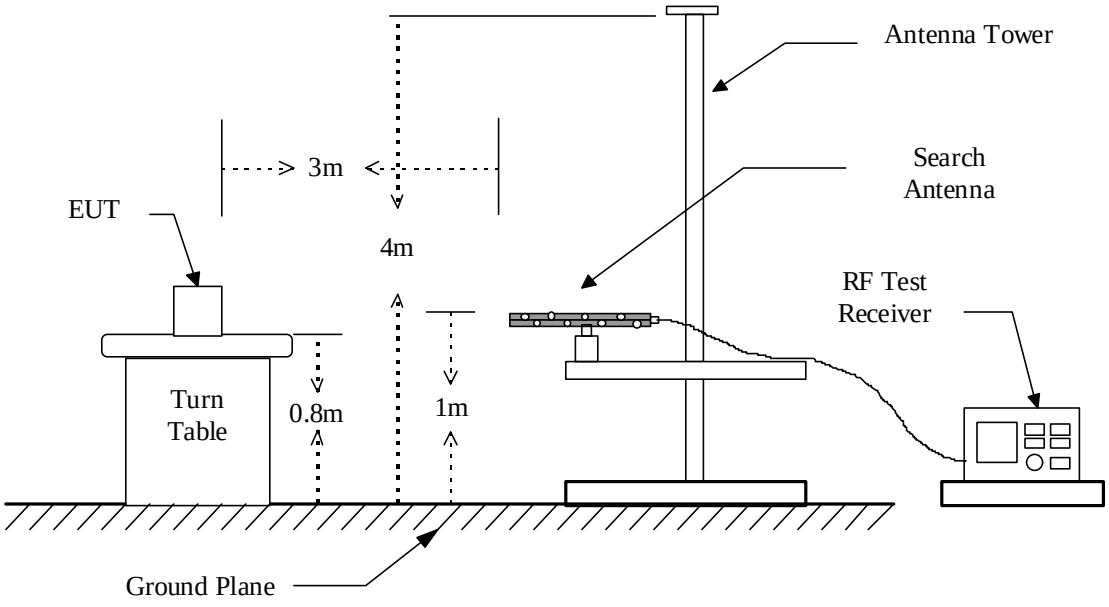
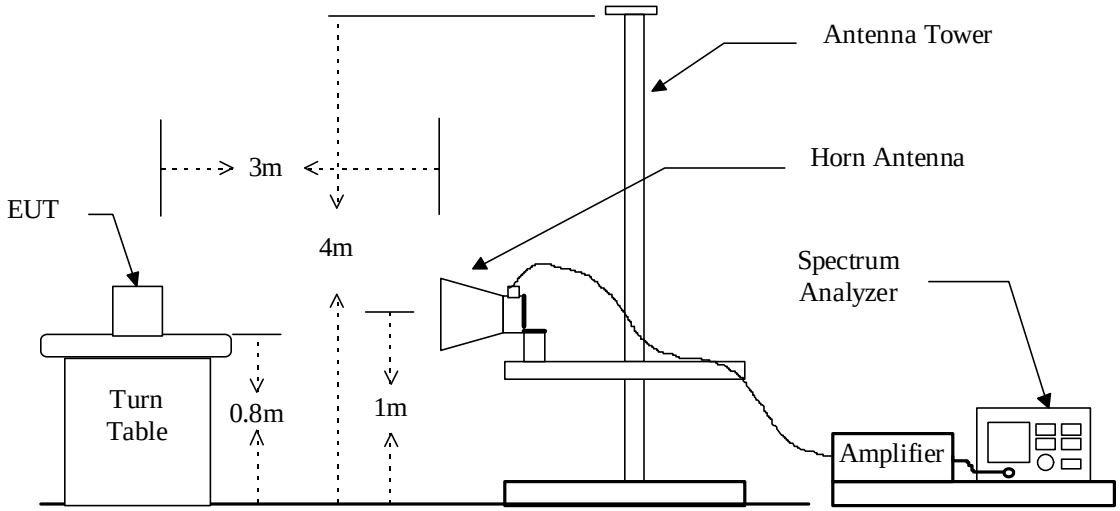


Figure 6 : Frequencies measured above 1 GHz configuration



7.3 Measuring Instrument

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Hewlett-Packard	8568B	Jan. 03, 2001
Pre-selector	Hewlett-Packard	85685A	Jan. 10, 2001
Quasi Peak Detector	Hewlett-Packard	85650A	Jan. 10, 2001
Spectrum Analyzer	Hewlett-Packard	8563A	Oct. 16, 2000
Horn Antenna	EMCO	3115	May 11, 2000
Log periodic Antenna	EMCO	3146	Nov. 03, 2000
Biconical Antenna	EMCO	3110	Nov. 03, 2000
Preamplifier	Hewlett-Packard	8449B	Jun. 29, 2000
Preamplifier	Hewlett-Packard	8447D	Sep. 19, 2000

Measuring instrument setup in frequency band measured is as following :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz

7.4 Measurement Data

a) Channel A

Operated mode : Tx Test Date : Feb. 04, 2000
Temperature : 17 ℃ Humidity : 70 %
Fundamental Frequency: 462.5625 MHz

Unmodulated carrier output power is 26.0 dBm , or 0.398 W (ERP).
The limit of spurious or harmonics is calculated as following :
26-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBuV)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain Corrected	Result (dBm)	Limit (dBm)	Margin (dB)
935.114	45.6	-21.0	-2.8	0	-23.8	-13	-10.8
1402.671	82.0	-22.7	-1.3	6.2	-17.8	-13	-4.8
1870.228	65.2	-36.6	-1.7	7.4	-30.9	-13	-17.9
2337.785	72.3	-30.6	-1.7	7.3	-25.0	-13	-12.0
2805.342	74.5	-26.1	-1.7	7.5	-20.3	-13	-7.3
3272.899	69.5	-27.8	-1.7	7.7	-21.8	-13	-8.8
3740.456	74.5	-22.9	-2.1	7.6	-17.4	-13	-4.4
4208.013	67.5	-28.9	-2.1	8.1	-22.9	-13	-9.9
4675.567	66.3	-29.2	-2.1	8.9	-22.4	-13	-9.4

Note :
1. Result calculation is as following :
Result ＝ SG Reading ＋Cable Loss ＋Antenna Gain Corrected
Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

Operation Mode : Rx
Fundamental Frequency : 483.970 MHz (Rx)
Test Date : Feb. 04, 2000 Temperature : 17 °C Humidity : 70%

Frequency (MHz)	Reading (dBuV) @3m H Peak	H Ave	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak	Result @3m (dBuV/m) Ave	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Ave./OP	Margin (dB)	Table Deg. (Deg.)	Ant. High (m)
483.971	---	---	42.5	---		-4.5	38.0	---	N/A	46.0	-8.0	32	1.60
967.942	---	---	40.4	---		3.3	43.7	---	74.0	54.0	-10.3	110	1.40
1451.913	45.8	---	---	---		-7.7	38.1	---	74.0	54.0	-15.9	0	1.20
1935.884	---	---	---	---		-5.0	---	---	74.0	54.0	---	---	---
2419.855	---	---	---	---		-3.0	---	---	74.0	54.0	---	---	---
2903.826	---	---	---	---		-1.5	---	---	74.0	54.0	---	---	---
3387.797	---	---	43.6	---		-0.3	43.3	---	74.0	54.0	-10.7	32	1.60
3871.768	---	---	41.6	---		1.5	43.1	---	74.0	54.0	-10.9	110	1.40
4355.739	---	---	---	---		2.0	---	---	74.0	54.0	---	---	---
4839.710	---	---	---	---		2.6	---	---	74.0	54.0	---	---	---

Note :

1. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
2. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

b) Channel C

Operated mode : Tx
Test Date : Feb. 04, 2000
Temperature : 17 ℃
Humidity : 70 %
Fundamental Frequency: 467.6625 MHz

Unmodulated carrier output power is 25.3 dBm , or 0.339W (ERP).
The limit of spurious or harmonics is calculated as following :
25.3-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBuV)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain Corrected	Result (dBm)	Limit (dBm)	Margin (dB)
935.114	45.3	-20.0	-2.9	0	-22.9	-13	-9.9
1402.671	83.5	-21.2	-1.3	7.2	-15.3	-13	-2.3
1870.228	71.5	-30.3	-1.7	7.4	-24.6	-13	-11.6
2337.785	78.3	-24.6	-1.7	7.3	-19.0	-13	-6.0
2805.342	77.8	-22.8	-1.7	7.5	-17.0	-13	-4.0
3272.899	73.5	-23.8	-1.7	7.7	-17.8	-13	-4.8
3740.456	78.3	-21.1	-2.1	7.6	-15.6	-13	-2.6
4208.013	74.5	-21.9	-2.1	8.1	-15.9	-13	-2.9
4675.567	68.2	-27.3	-2.1	8.9	-20.5	-13	-7.5

Note :
1. Result calculation is as following :
Result = SG Reading + Cable Loss + Antenna Gain Corrected
Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

Operation Mode : Rx
Fundamental Frequency : 489.060 MHz (Rx)
Test Date : Feb. 04, 2000 Temperature : 17 °C Humidity : 70%

Frequency (MHz)	Reading (dBuV) @3m H Peak	H Ave	V Peak	V Ave	Factor (dB) Corr.	Result @3m (dBuV/m) Peak	Result @3m (dBuV/m) Ave	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Ave./QP	Margin (dB)	Table Deg. (Deg.)	Ant. High (m)
488.963	---	---	43.6	---	-4.4	39.2	---	N/A	46.0	-6.8	32	1.60
977.926	---	---	41.2	---	3.4	44.6	---	74.0	54.0	-9.4	110	1.40
1466.889	46.0	---	---	---	-7.6	38.4	---	74.0	54.0	-15.6	0	1.20
1955.852	---	---	---	---	-4.9	---	---	74.0	54.0	---	---	---
2444.815	---	---	---	---	-2.9	---	---	74.0	54.0	---	---	---
2933.778	---	---	---	---	-1.4	---	---	74.0	54.0	---	---	---
3422.741	---	---	---	---	-0.2	---	---	74.0	54.0	---	---	---
3911.704	---	---	---	---	1.6	---	---	74.0	54.0	---	---	---
4400.667	---	---	---	---	2.0	---	---	74.0	54.0	---	---	---
4889.630	---	---	---	---	2.7	---	---	74.0	54.0	---	---	---

Note :

1. Remark "---" means that the emission level is too low to be measured (a pre-amplifier of about 35 dB is used).
2. Margins are derived from Peak or Average whichever is lower. If there is only peak value in Result field, the Margin is also referred to average limits.

7.5 Radiated Measurement Photos

Please see setup photos in Exhibit F.

8. FREQUENCY STABILITY MEASUREMENT

8.1 Provisions Applicable

According to §2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C centigrade.
According to §2.1055 (d)(2), for hand carried, battery powered equipment, 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 §95.627 (b), the FRS unit must be maintained within a frequency tolerance of 0.00025%.

8.2 Measurement Procedure

A) Frequency stability versus environmental temperature

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is within 15°C to 25°C. Otherwise, an environmental chamber set for a temperature of 20°C shall be used. Install new batteries in the EUT.

2. Turn on EUT and set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.

3. 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.

4. Repeat step 2 with a 10°C decreased per stage until the lowest temperature -30°C is measured, record all measurement frequencies.

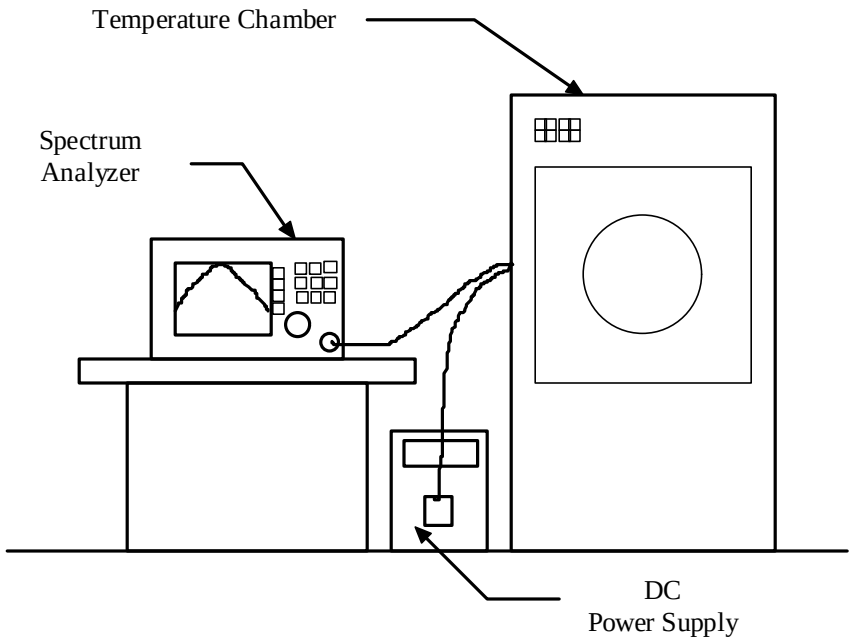
B) Frequency stability versus input voltage

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is within 15°C to 25°C. Otherwise, an environmental chamber set for a temperature of 20°C shall be used. Install new batteries in the EUT.

2. Set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.

3. For battery operated only device, supply the EUT primary voltage at the battery operating end point which is specified by the manufacturer and record the frequency.

Figure 7 : Frequency stability measurement configuration



8.3 Measurement Instrument

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Adventest	R3361A	Mar. 22, 2001
Temperature Chamber	ACS	EOS 200T	Jan. 10, 2001
Modulation Analyzer	Hewlett-Packard	8901A	Dec. 01, 2000
Multifunction Synthesizer	Hewlett-Packard	8904A	Dec. 01, 2000

8.4 Measurement Data

A) Frequency stability versus environmental temperature

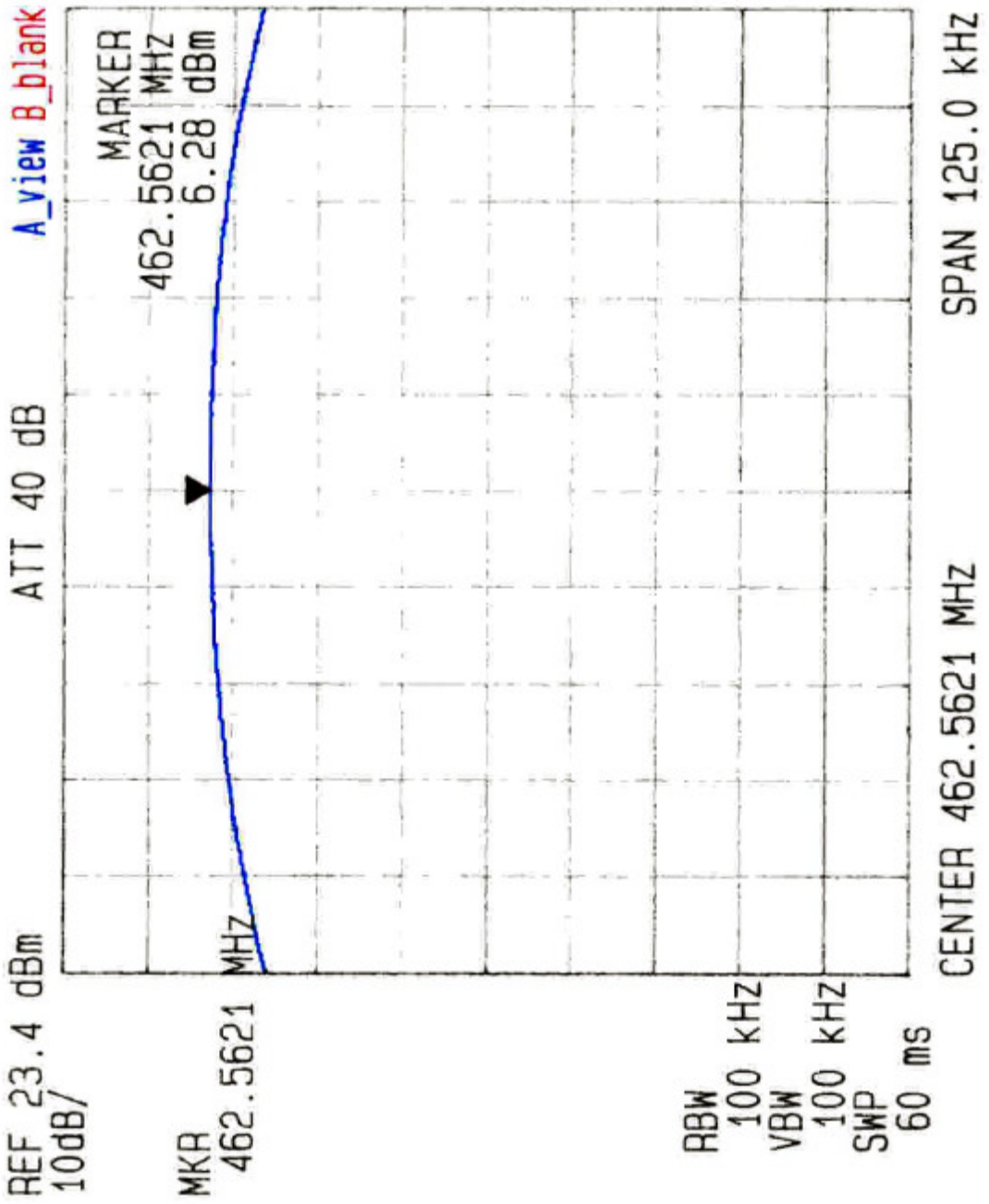
Reference Frequency: 462.5624 (MHz)					Limit: 0.00025 (%)		
Environment	Power	Frequency deviation measured with time elapse					
Tempture	Supplied	2 minute		5 minute		10 minute	
(°C)	(Vdc)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	New Batt	462.5622	-0.00004	462.5632	0.00017	462.5619	-0.00011
40	New Batt	462.5620	-0.00009	462.5629	0.00011	462.5624	0.00000
30	New Batt	462.5630	0.00013	462.5624	0.00000	462.5615	-0.00019
20	New Batt	462.5618	-0.00013	462.5626	0.00004	462.5622	-0.00004
10	New Batt	462.5624	0.00000	462.5622	-0.00004	462.5623	-0.00002
0	New Batt	462.5624	0.00000	462.5618	-0.00013	462.5623	-0.00002
-10	New Batt	462.5630	0.00013	462.5624	0.00000	462.5625	0.00002
-20	New Batt	462.5630	0.00013	462.5627	0.00006	462.5632	0.00017
-30	New Batt	462.5628	0.00009	462.5626	0.00004	462.5632	0.00017

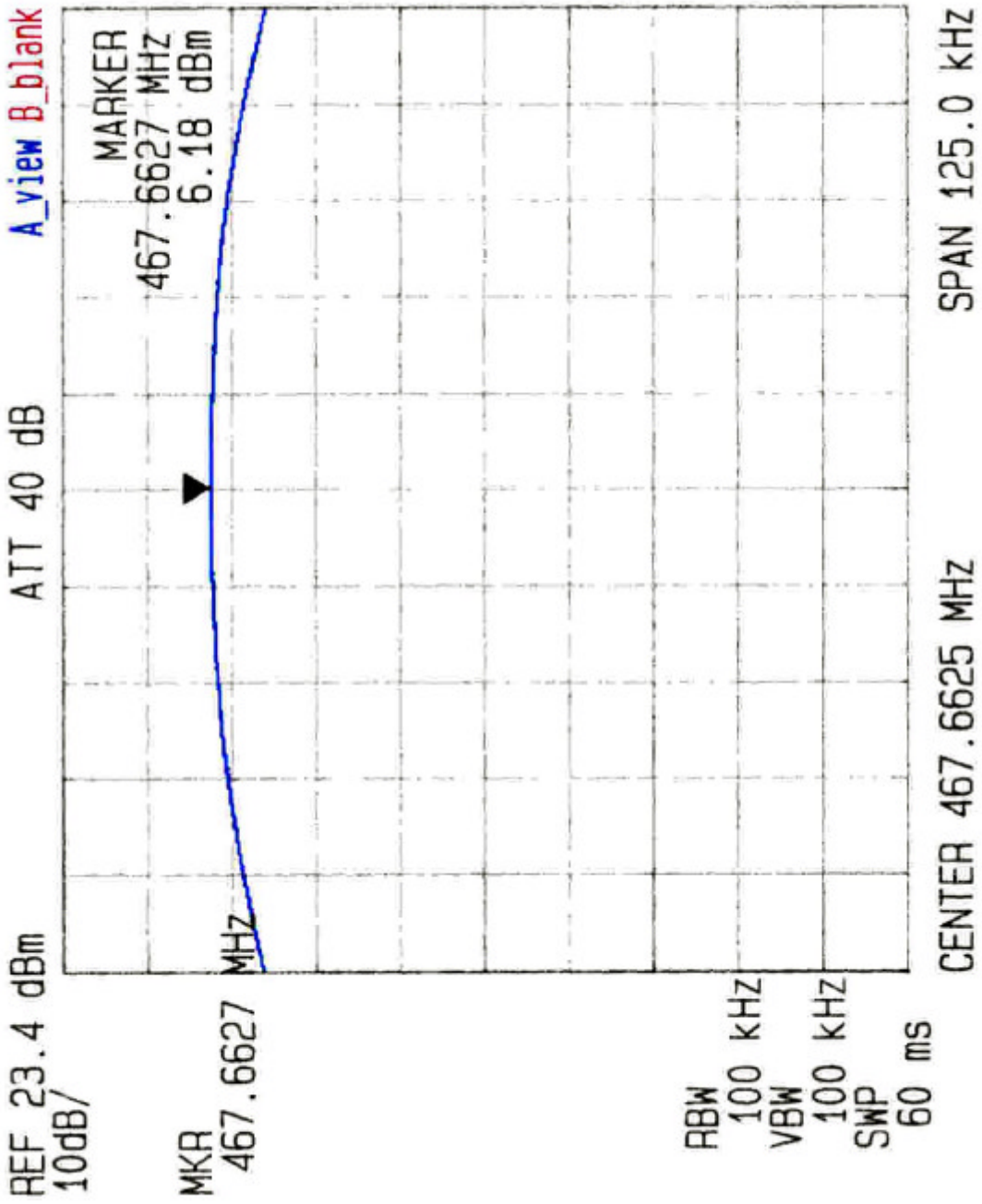
Reference Frequency: 467.6623 (MHz)					Limit: 0.00025 (%)		
Environment	Power	Frequency deviation measured with time elapse					
Tempture	Supplied	2 minute		5 minute		10 minute	
(°C)	(Vdc)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	New Batt	467.6628	0.00011	467.6616	-0.00015	467.6615	-0.00017
40	New Batt	467.6618	-0.00011	467.6627	0.00009	467.6620	-0.00006
30	New Batt	467.6614	-0.00019	467.6619	-0.00009	467.6632	0.00019
20	New Batt	467.6622	-0.00002	467.6615	-0.00017	467.6616	-0.00015
10	New Batt	467.6631	0.00017	467.6618	-0.00011	467.6630	0.00015
0	New Batt	467.6629	0.00013	467.6620	-0.00006	467.6628	0.00011
-10	New Batt	467.6622	-0.00002	467.6620	-0.00006	467.6628	0.00011
-20	New Batt	467.6622	-0.00002	467.6625	0.00004	467.6622	-0.00002
-30	New Batt	467.6629	0.00013	467.6625	0.00004	467.6625	0.00004

B) Frequency stability versus input voltage (battery operating end point voltage is 4.5V dc)

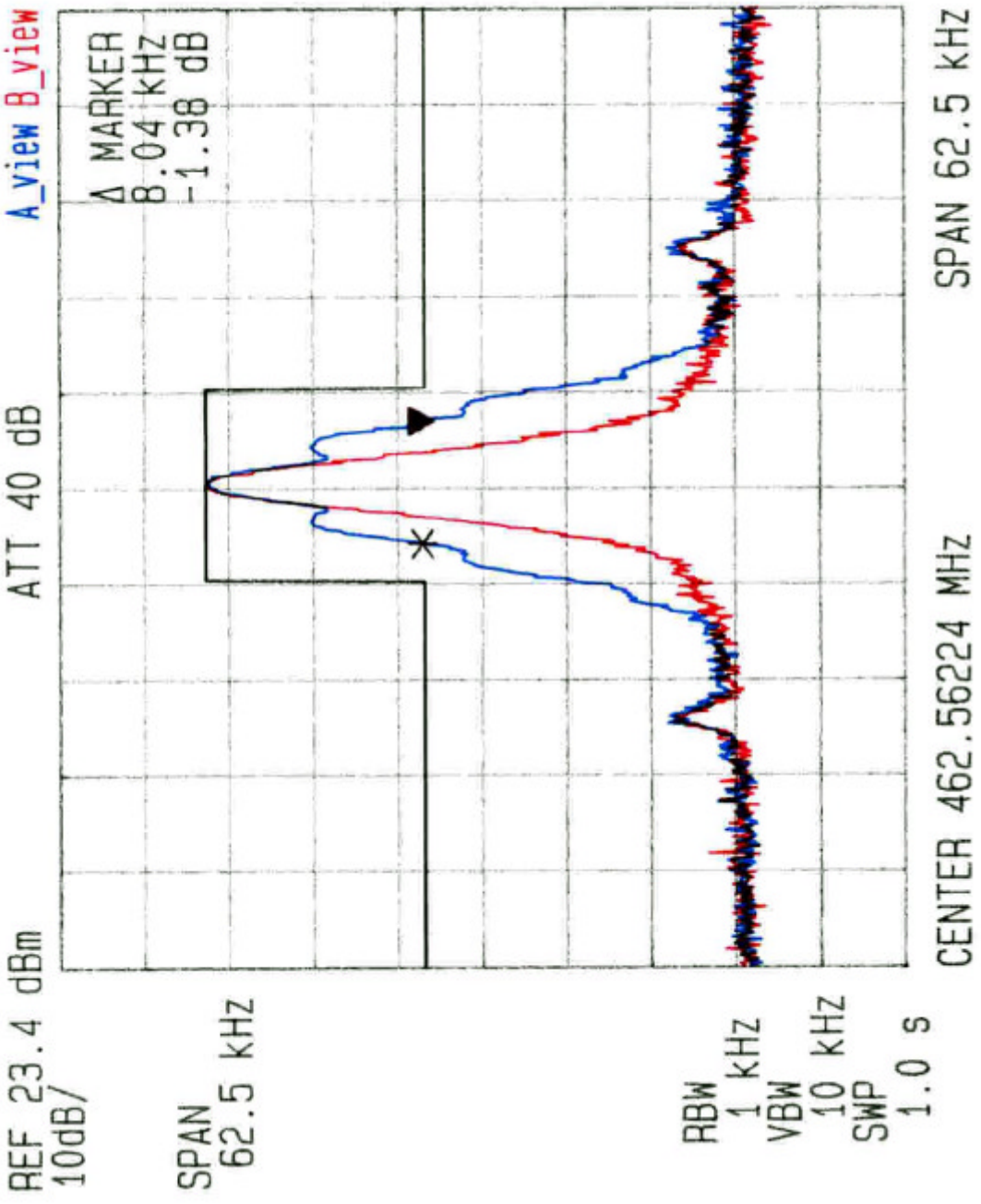
Channel	Reference Frequency (MHz)	Frequency measured at end point supply voltage (MHz)	Frequency Deviation (%)	Limit (%)
A	462.5624	462.5618	-0.00013	0.00025
C	467.6623	467.6616	-0.00015	0.00025

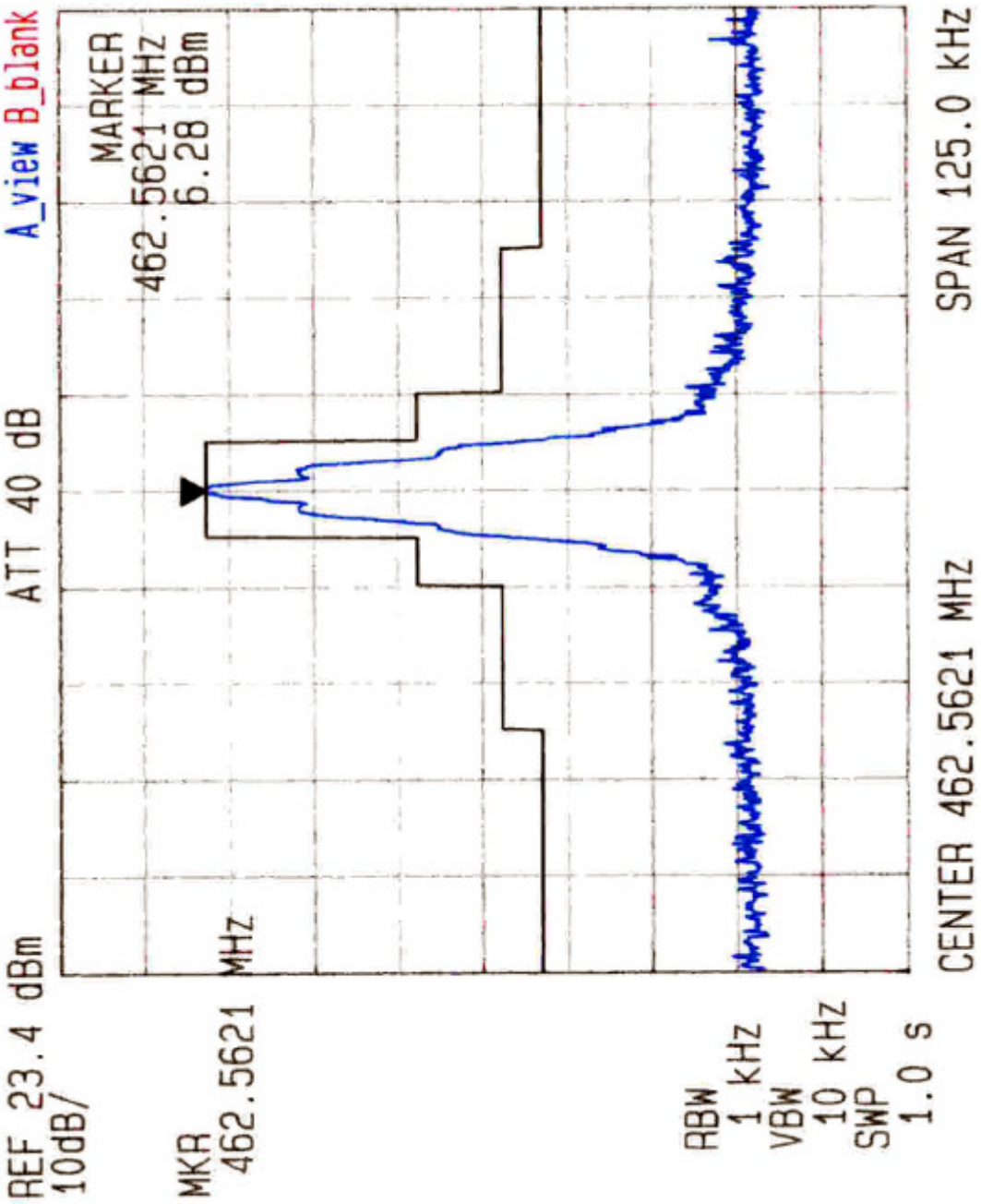
Appendix 1 : Plotted Data for Output Poewr Emission

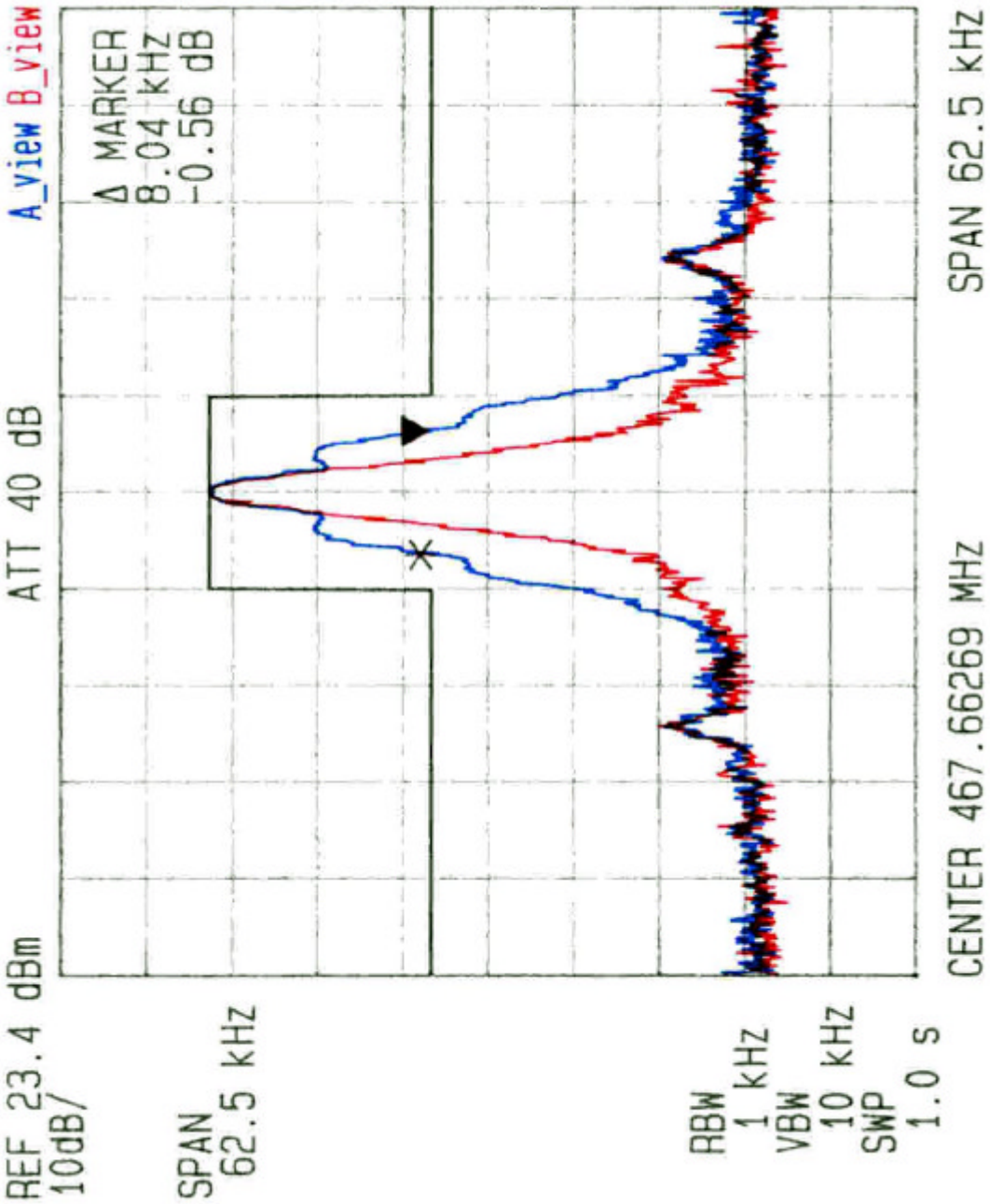

A_view B_blank
MARKER
462.5621 MHz
6.28 dBm
REF 23.4 dBm
10dB/
ATT 40 dB
MKR
462.5621 MHz
RBW
100 kHz
VBW
100 kHz
SWP
60 ms
CENTER 462.5621 MHz
SPAN 125.0 kHz

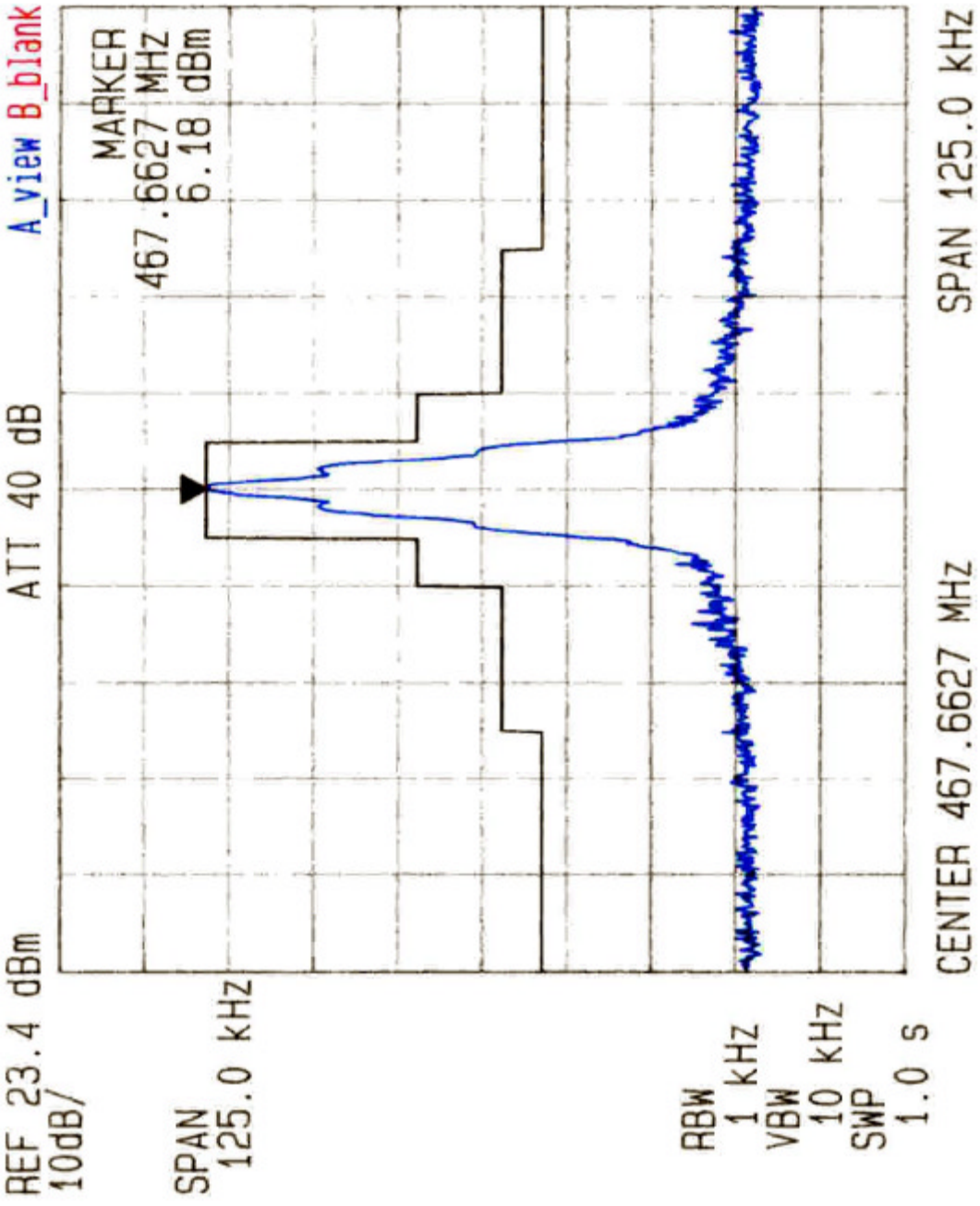

A_view B_blank
MARKER
467.6627 MHz
6.18 dBm
REF 23.4 dBm
10dB/
ATT 40 dB
MKR
467.6627 MHz
RBW
100 kHz
VBW
100 kHz
SWP
60 ms
CENTER 467.6625 MHz
SPAN 125.0 kHz

Appendix 2 : Plotted Data for Bandwidth Emission


REF 23.4 dBm
10dB/
ATT 40 dB
A_view B_view
Δ MARKER
8.04 kHz
-1.38 dB
SPAN
62.5 kHz
RBW
1 kHz
VBW
10 kHz
SWP
1.0 s
CENTER 462.56224 MHz
SPAN 62.5 kHz


A_view B_blank
MARKER
462.5621 MHz
6.28 dBm
REF 23.4 dBm
10dB/
ATT 40 dB
MKR
462.5621 MHz
RBW
1 kHz
VBW
10 kHz
SWP
1.0 s
CENTER 462.5621 MHz
SPAN 125.0 kHz


A_view B_view
Δ MARKER
8.04 kHz
-0.56 dB
REF 23.4 dBm
10dB/
ATT 40 dB
SPAN
62.5 kHz
RBW
1 kHz
VBW
10 kHz
SWP
1.0 s
CENTER 467.66269 MHz
SPAN 62.5 kHz


A_view B_blank
MARKER
467.6627 MHz
6.18 dBm
REF 23.4 dBm
10dB/
ATT 40 dB
SPAN
125.0 kHz
RBW
1 kHz
VBW
10 kHz
SWP
1.0 s
CENTER 467.6627 MHz
SPAN 125.0 kHz