FCC CFR47 PART 95 REQUIREMENT

CERTIFICATION REPORT

FOR

FRS TRANSCEIVER (BASE STATION)

MODEL: FRS 3000-PK

FCC ID: PDHFRS-3000PKB

REPORT NUMBER: 01I1085-1

ISSUE DATE: JANUARY 29, 2002

Prepared for
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Prepared by
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1. VERIFICATION OF COMPLIANCE

Inspection Institution: COMPLIANCE ENGINEERING SERVICES INC.
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Applicant: TTI TECH CO., LTD.
Manufacturer: TTI TECH CO., LTD.
Brand Name: TTI TECH CO., LTD.
Model No/Name: FRS 3000-PK Serial No: N/A

ITEM	TESTING ITEM	APPLIED SPECIFICATION	TESTING RESULTS
1	Channel Frequency	Section 95.627(a)	Complied
2	Type of Communication	Section 95.193	Complied
3	Frequency Toleration	Section 95.627(b)	Complied
4	Emission Type	Section 95.631	Complied
5	Emission Bandwidth	Section 95.633	Complied
6	Unwanted Emission	Section 95.635	Complied
7	Modulation Standards	Section 95.637	Complied
8	Maximum Transmitter Power	Section 95.639	Complied
9	Transmitter Antenna	Section 95.647	Complied
10	Power Capability	Section 95.649	Complied

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC PART 95 Subpart B FRS. The results of testing in this report apply to the product/system, which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties. **Warning** : This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification will constitute fraud and shall nullify the document.

Tested By:

THU CHAN
SENIOR EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Approved & Released For CCS By:

STEVE CHENG
ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

a). Type of EUT: FRS Transceiver
b). Trade Name: N/A
c). Model No: FRS 3000 PK
d). FCC ID: PDHFRS-3000PKB
e). Working Frequency: 14 Channels within frequency band from 462.5625 ~ 467.7125 MHz.
f). Power Supply: 12Vdc Adapter

2.2. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures documented in chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

2.3. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

2.4. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code:200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT(1300F2))

2.5. MEASURING INSTRUMENT CALIBRATION

The measuring equipment which was utilized in performing the tests documented herein has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment which is traceable to recognized national standards.

3. REQUIREMENTS OF PROVISION

3.1. GENERAL TECHNICAL REQUIMENTS

a). Section 95.193 – Communication Type shall be Voice/Tone only
b). Section 95.627(b) – Frequency Tolerance less than 0.00025%
c). Section 95.631 – Emission Type shall be F3E
d). Section 95.633 – Emission Bandwidth shall less than 12.5 KHz
e). Section 95.635 – Unwanted Radiation

According to CFR 47 section 95.635(b), the power of each unwanted emission shall be less than Transmitted Power as specified below:

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 authorized bandwidth by more than 250%.

f). Section 95.637 – Peak Frequency Deviation less than ± 2.5 KHz, and Audio Frequency Response less than 3.125 KHz
g). Section 95.639 – Maximum Transmitter Power less than 0.5W
h). Section 95.647 – Antenna shall be a dedicate type
i). Section 95.649 – Output power can't be change

3.2. 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 section 2.925 (Identification of equipment) and section 2.926 (FCC Identifier).

3.3. 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 the compliance could void the user's authority to operate the equipment.

4. OUTPUT POWER MEASUREMENT

4.1. PROVISION APPLICABLE

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

4.2. MEASUREMENT PROCEDURE

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the frequency of the transmitter.

3). The output of the test antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

4). The transmitter shall be switched on, if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.

6). The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.

8). The maximum signal level detected by the measuring receiver shall be noted.

9). The transmitter shall be replaced by a tuned dipole (substitution antenna).

10). The substitution antenna shall be oriented for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.

11). The substitution antenna shall be connected to a calibrated signal generator.

12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

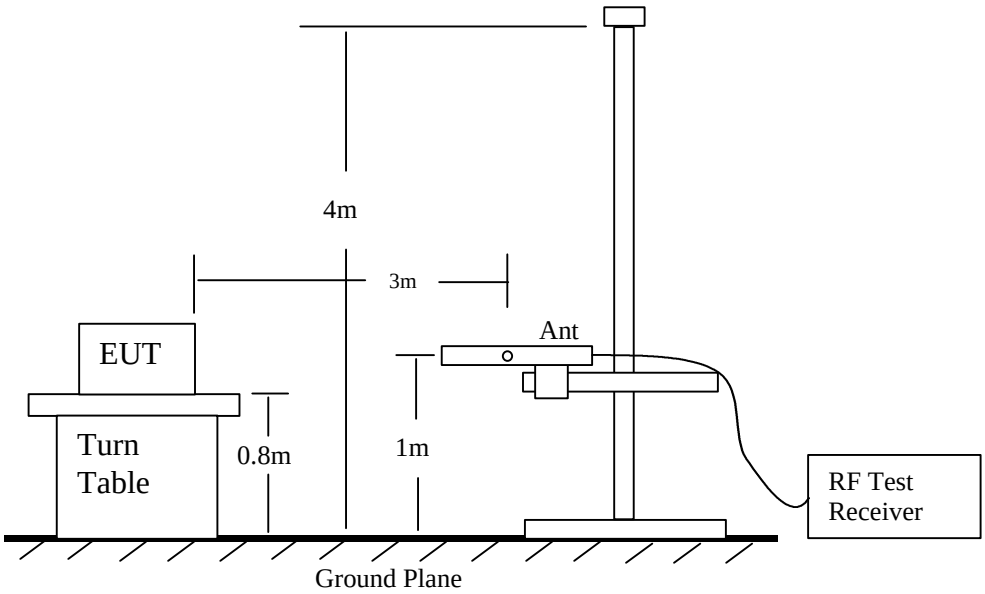


Fig 1: Radiated Emission Measurement 30 to 1000 MHz

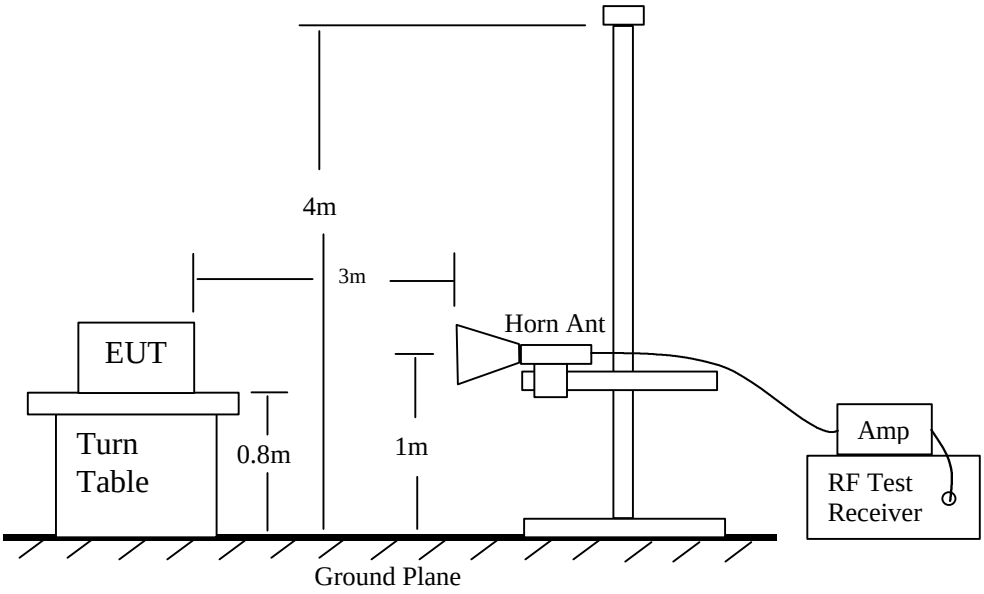


Fig 2: Radiated Emission Above 1000 MHz

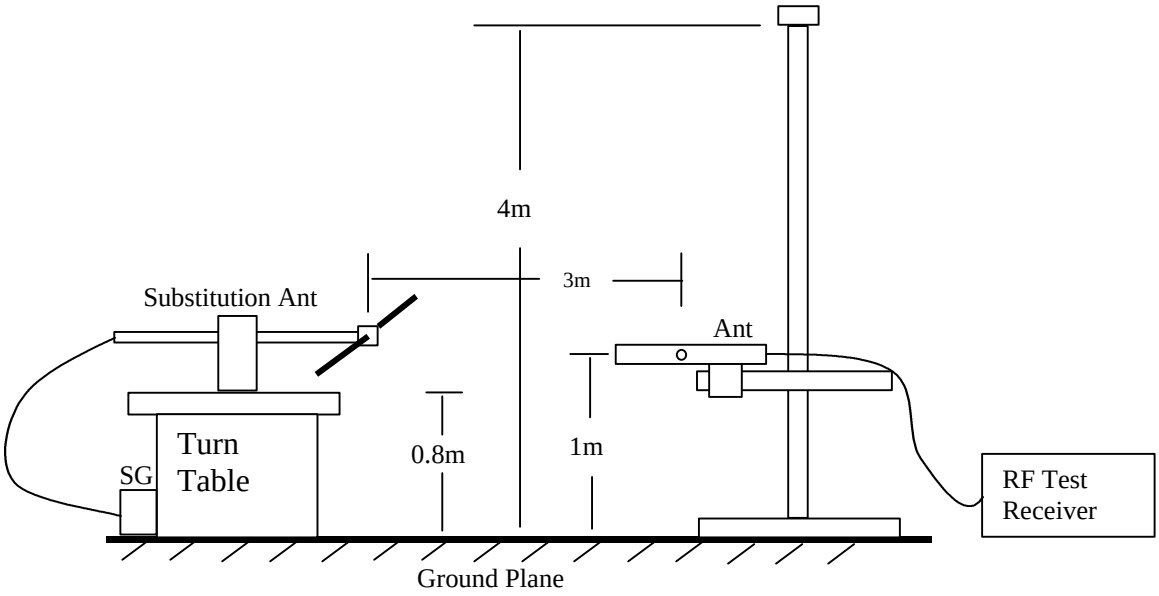


Fig 3: Radiated Emission – Substitution Method setup

4.3. OUTPUT POWER TEST EQUIPMENT

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer	HP	8593EM	6/20/02
Bilog Antenna	CHASE	CBL6112B	8/2/02
Dipole Antenna	COMPLIANCE DESIGN	ROBERTS	5/5/02
Synthesized Signal Generator	HP	83732B	3/21/02
Audio Signal Generator	HP	3325A	9/26/02
Amplifier	MINI-CIRCUITS	ZHL-42W	Cal before used
Amplifier	MITEQ	NSP2600-44	4/12/02

4.4. MEASUREMENT RESULT

Channel	Frequency (MHz)	SA Reading (dBuV)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	Result (dBm)	Limit (dBm)	Margin dB
1	462.5625	97.4	20.50	.52	0	19.98	27	-7.02
7	462.7125	97.3	20.40	.52	0	19.88	27	-7.12
14	467.7125	96.5	19.50	.52	0	18.98	27	-8.02

Maximum Output Power (ERP): 19.98dBm = 0.0995 W

5. MODULATION CHARACTERISTICS

5.1. PROVISIONS APPLICABLE

According to CFR 47 section 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000 Hz shall be measured.

According to CFR 47 section 95.637 (a), a FRS unit that transmits emission type F3E must not exceed a peak frequency deviation of ± 2.5KHz, and the audio frequency response shall not exceed 3.125 KHz.

According to CFR 47 section 95.637(b) _ Audio Frequency Low Pass Filter between the modulation limiter & the modulation stage of the transmitter. At any frequency (f in KHz) between 3 and 20 KHz, the filter must have an attenuation of at least 60 $\log_{10}(f/3)$ dB greater than the attenuation at 1 KHz. Above 20 KHz, it must have an attenuation of at least 50 dB greater than the attenuation at 1 KHz.

5.2. MEASUREMENT METHOD

5.2.1. Modulation Limit

1). Configure the EUT as shown in figure 4, adjust the audio input for 60% of rated system deviation at 1 KHz using this level as a reference (0 dB) and vary the input level from -20 to +20 dB. Record the frequency deviation obtained as a function of the input level.

2). Repeat step 1 with input frequency changing to 300, 1004, and 2500 Hz in sequence.

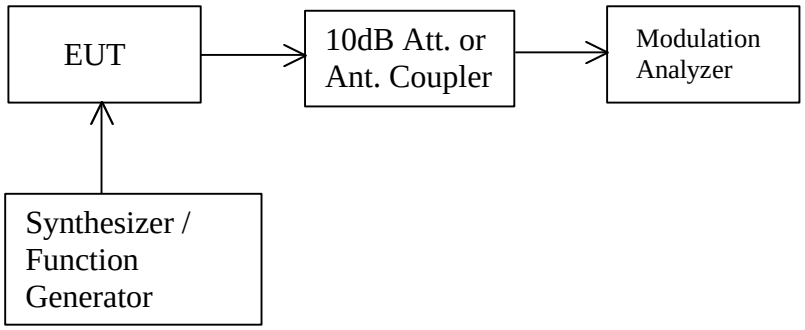
5.2.2. Audio Frequency Response

1). Configure the EUT as shown in figure 4.

2). Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0 dB).

3). Vary the Audio frequency from 100 Hz to 10 KHz and record the frequency deviation.

4). Audio Frequency Response = 20 $\log_{10}$ (Deviation of test frequency / Deviation of 1KHz reference).



Modulation characteristic measurement configuration

5.2.3. Audio Low Pass Filter Response

1). Configure the EUT as shown below.

2). Connect the audio frequency generator as close as possible the input of the post limiter low pass filter within the transmitter under test.

3). Connect the audio spectrum analyzer to the output of the post limiter low pass filter within the transmitter under test.

4). Apply 1000 Hz tone from the audio frequency generator and adjust the level per manufacturer's specifications.

5). Record the dB level of the 1000 Hz spectral line on the audio spectrum analyzer as LEV_{REF}.

6). Set the audio frequency generator to the desired test frequency between 3000 Hz and the upper low pass filter limit.

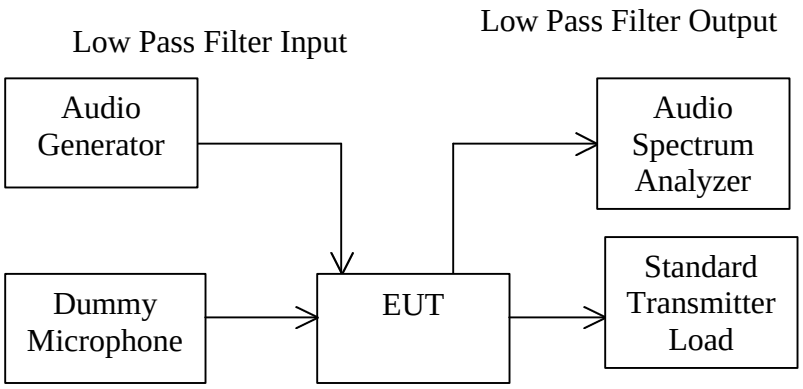
7). Record audio spectrum analyzer levels, at the frequency in step 6).

8). Record the dB level on the audio spectrum analyzer as LEV_{FREQ}.

9). Calculate the audio frequency response at the test frequency as:

low pass filter response = LEV_{FREQ} - LEV_{REF}

10). Repeat the 6) through 9) for all the desired test frequencies.



Audio low pass filter response measurement configuration

5.3. MEASUREMENT INSTRUMENT

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Modulation Analyzer	HP	8901b	5/30/02
Attenuator	MINI CIRCUITS	MCL BW-N10W5	N/A
Audio Signal Generator	HP	3325A	9/26/02

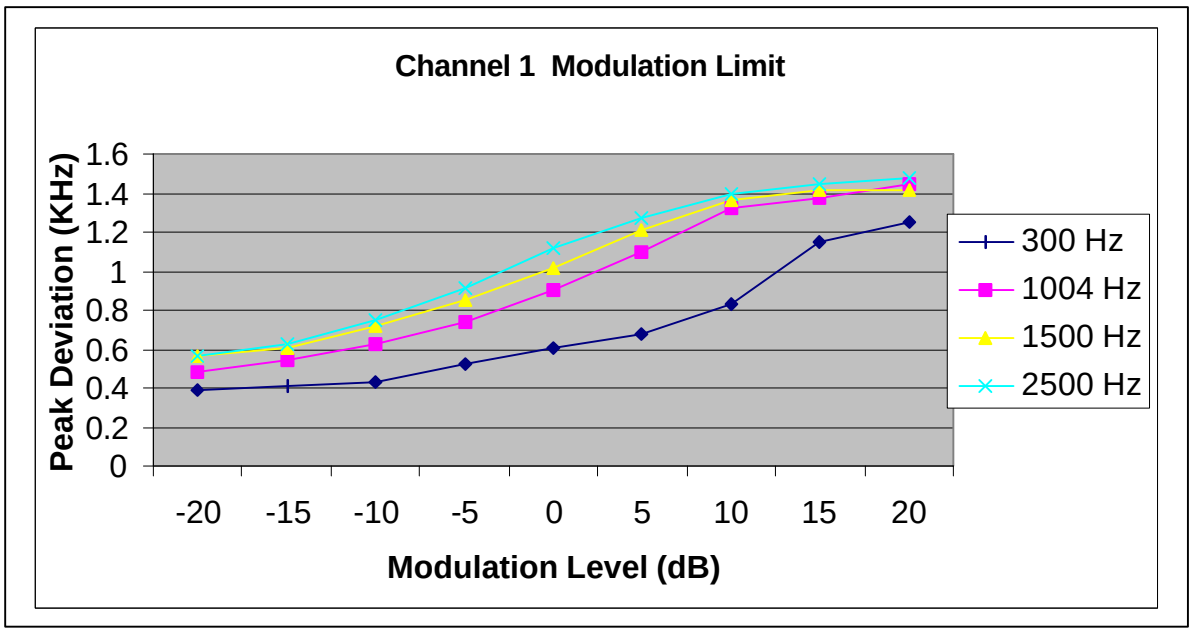
5.4. MEASUREMENT RESULT

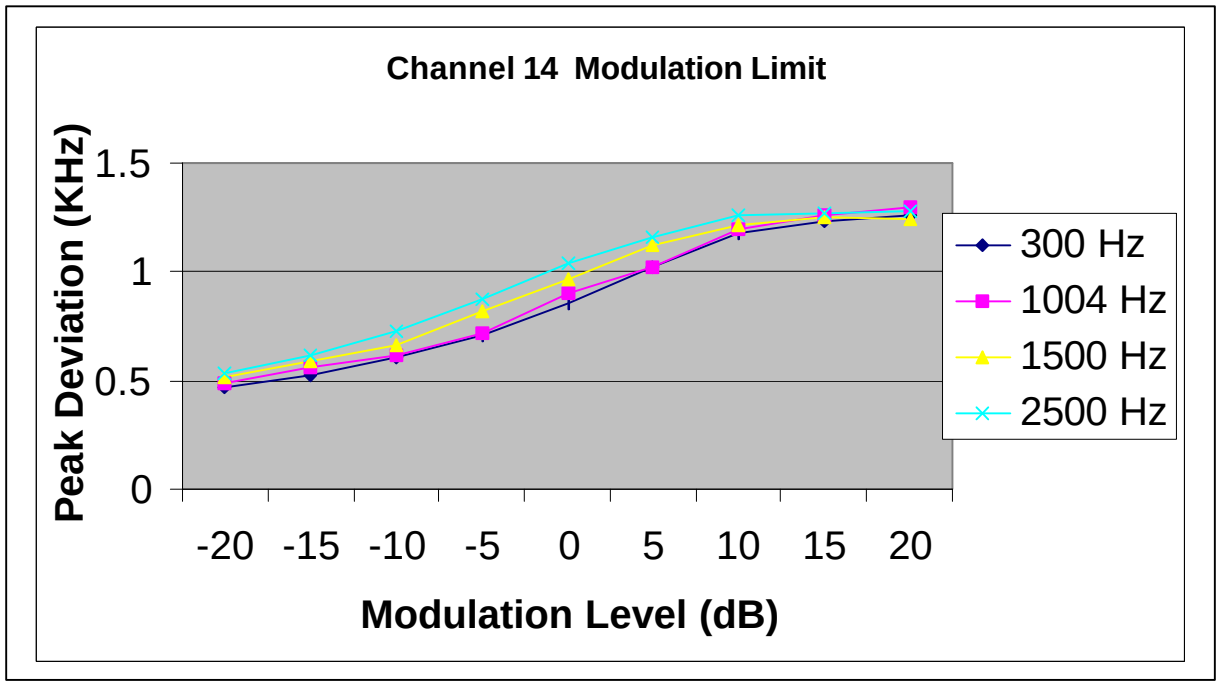
a). Modulation Limit: Channel #1 – 462.5625 MHz

Modulation Level (dB)	Peak Freq. Deviation At 300 Hz (KHz)	Peak Freq. Deviation At 1004 Hz (KHz)	Peak Freq. Deviation At 1500 Hz (KHz)	Peak Freq. Deviation At 2500 Hz (KHz)
-20	0.388	0.482	0.565	0.563
-15	0.407	0.542	0.608	0.624
-10	0.43	0.625	0.719	0.752
-5	0.525	0.743	0.856	0.908
0	0.604	0.9	1.017	1.121
+5	0.679	1.093	1.214	1.268
+10	0.832	1.319	1.365	1.39
+15	1.153	1.375	1.416	1.45
+20	1.256	1.446	1.419	1.479

b). Modulation Limit: Channel #14 – 467.7125 MHz

Modulation Level (dB)	Peak Freq. Deviation At 300 Hz (KHz)	Peak Freq. Deviation At 1004 Hz (KHz)	Peak Freq. Deviation At 1500 Hz (KHz)	Peak Freq. Deviation At 2500 Hz (KHz)
-20	0.473	0.485	0.515	0.538
-15	0.522	0.563	0.587	0.612
-10	0.603	0.614	0.664	0.731
-5	0.713	0.722	0.819	0.871
0	0.855	0.9	0.962	1.044
+5	1.022	1.026	1.124	1.156
+10	1.18	1.196	1.214	1.261
+15	1.232	1.262	1.247	1.271
+20	1.265	1.293	1.24	1.282



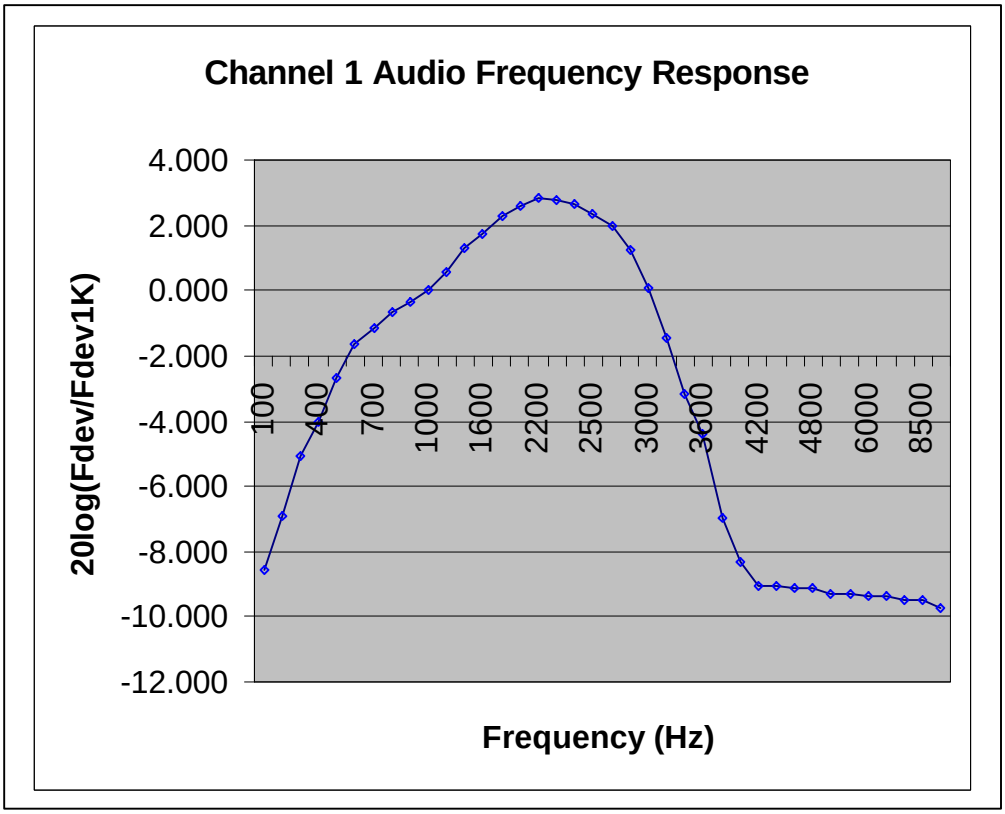


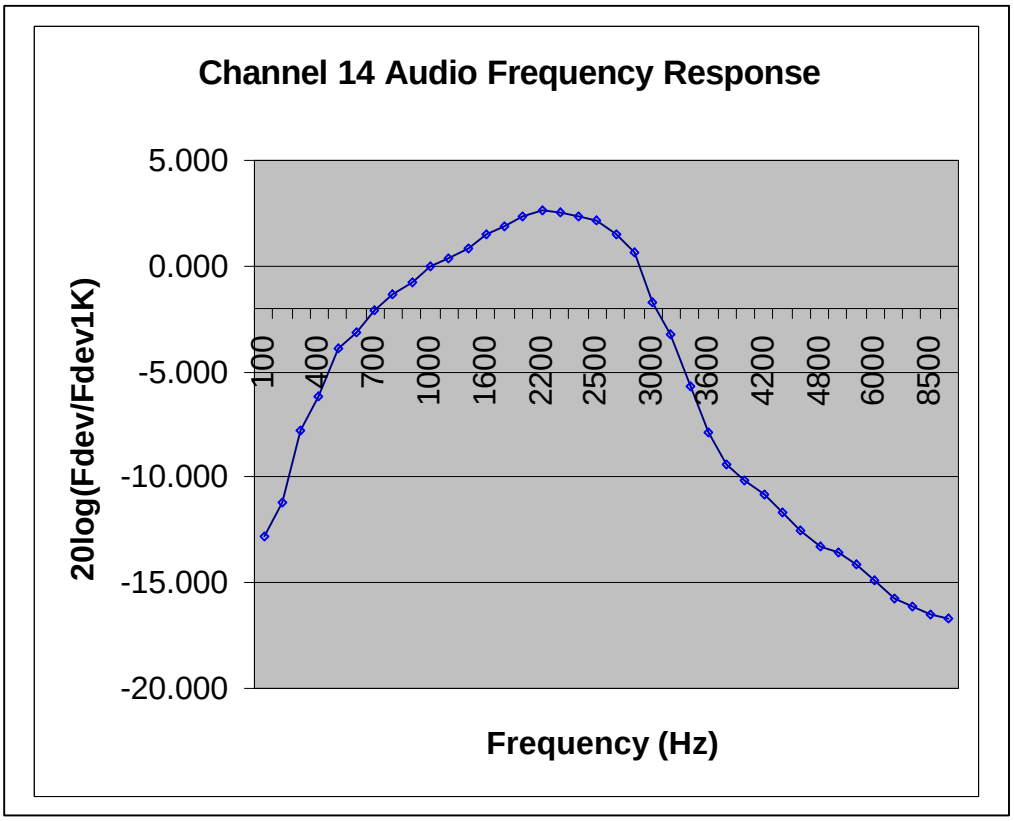
c). Audio Frequency Response: Channel #1 – 462.5625 MHz

Frequency (Hz)	Deviation (KHz)
100	0.112
200	0.135
300	0.167
400	0.189
500	0.221
600	0.248
700	0.262
800	0.279
900	0.289
1000	0.3
1200	0.32
1400	0.348
1600	0.367
1800	0.389
2000	0.405
2200	0.415
2400	0.412
2450	0.407
2500	0.393
2600	0.378
2800	0.346
3000	0.302
3200	0.254
3400	0.208
3600	0.181
3800	0.134
4000	0.115
4200	0.106
4400	0.106
4600	0.105
4800	0.105
5000	0.103
5500	0.103
6000	0.102
6500	0.102
7000	0.101
8500	0.101
10000	0.098

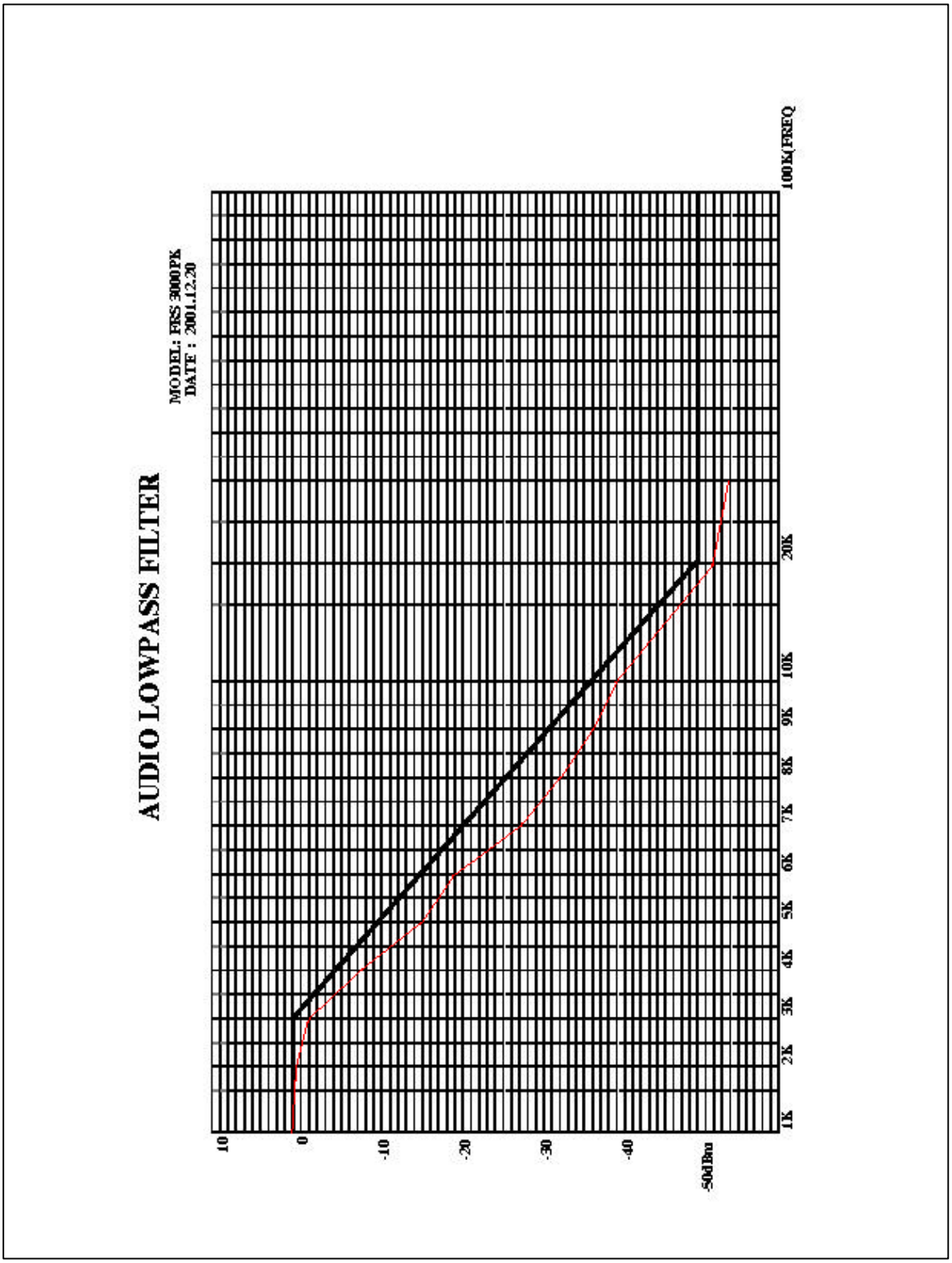
d). Audio Frequency Response: Channel #14 – 467.7125 MHz

Frequency (Hz)	Deviation (KHz)
100	0.069
200	0.083
300	0.123
400	0.148
500	0.192
600	0.21
700	0.236
800	0.258
900	0.275
1000	0.3
1200	0.313
1400	0.331
1600	0.356
1800	0.373
2000	0.394
2200	0.405
2300	0.403
2400	0.395
2500	0.385
2600	0.356
2800	0.323
3000	0.245
3200	0.206
3400	0.156
3600	0.121
3800	0.102
4000	0.093
4200	0.086
4400	0.078
4600	0.071
4800	0.065
5000	0.063
5500	0.059
6000	0.054
6500	0.049
7000	0.047
8500	0.045
10000	0.044





c). Audio low pass filter response:



6. EMISSION BANDWIDTH

6.1. PROVISIONS APPLICABLE

According to CFR 47 section 95.633(3), the authorized bandwidth for emission type FRS unit is 12.5 KHz.

6.2. MEASUREMENT METHOD

a). Check the calibration of the measurement instrument using either an internal calibrator or a known signal from an external generator.
b). Set-up the test equipments as shown in the following Figure (5).

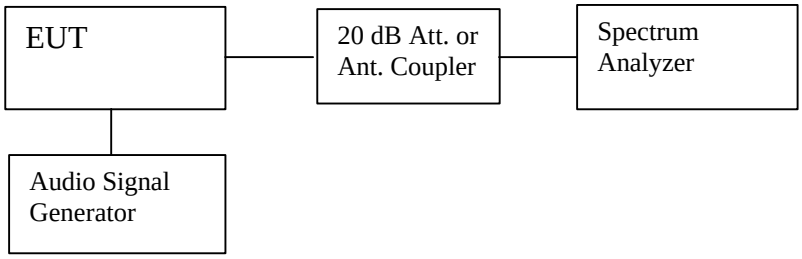


Figure 5: Emission Bandwidth measurement configuration

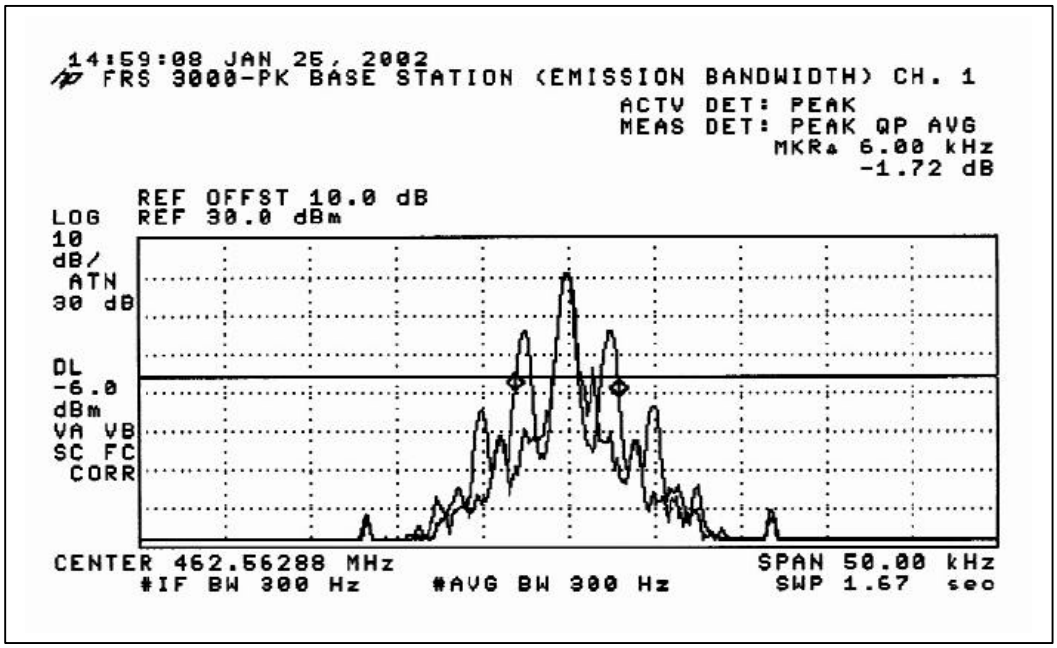
c). Set the level of audio signal generator to obtain 16 dB greater than required for the rated 50% modulation.
d). The occupied bandwidth is measured with the spectrum analyzer set at 5 KHz/div scan and 10 dB/div.

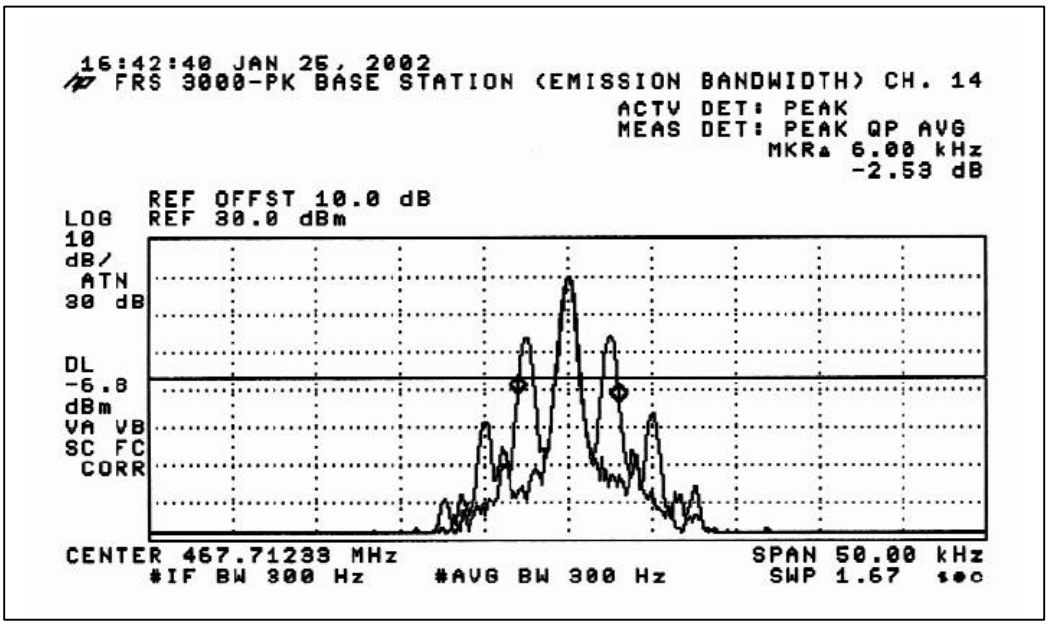
6.3. MEASUREMENT INSTRUMENT

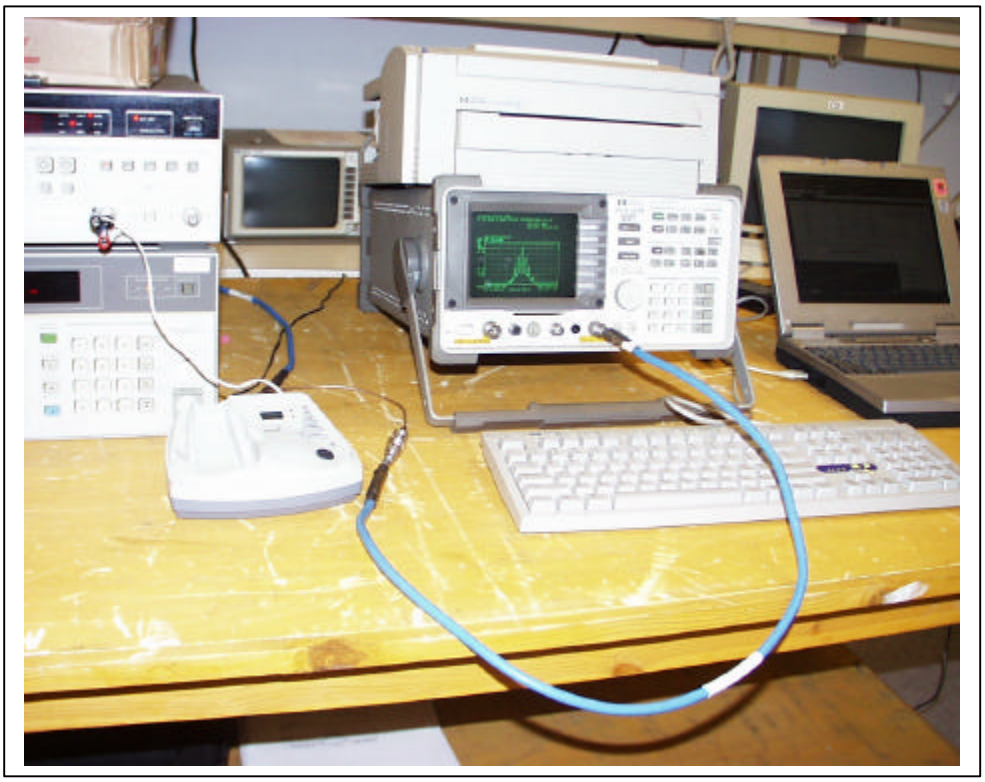
EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer	HP	8593EM	6/20/02
Attenuator	MINI CIRCUITS	MCL BW-N10W5	N/A
Modulation Analyzer	HP	8901b	5/30/02
Audio Signal Generator	HP	3325A	9/26/02

6.4. MEASUREMENT RESULT

The Occupied Bandwidth is measured to be 6.0 KHz.







7. UNWANTED EMISSION

7.1. PROVISIONS APPLICABLE

According to CFR47 section 2.1053(a), Measurement shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads or intermediate circuit element 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,

According to CFR 47 section 95.635(b), the power of each unwanted emission shall be less than Transmitted Power as specified below:
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 authorized bandwidth by more than 250%.

7.2. MEASUREMENT PROCEDURE

--- For Frequency Range From 30 to 1000 MHz ---

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the frequency of the transmitter.

3). The output of the test antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

4). The transmitter shall be switched on, if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.

6). The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.

8). The maximum signal level detected by the measuring receiver shall be noted.

9). The measurement shall be repeated with the test antenna set to horizontal polarization.

--- For Frequency Above 1000 MHz ---

10). Repeat procedures 1 to 9 with a proper Antenna (i.e. Horn antenna for 1 to 26 GHz)

11). After down with step 10. Replace the transmitter with a proper Antenna (substitution antenna).

12). The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.

13). The substitution antenna shall be connected to a calibrated signal generator.

14). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

15). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

16). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured in step 10, corrected for the change of input attenuation setting of the measuring receiver.

17). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

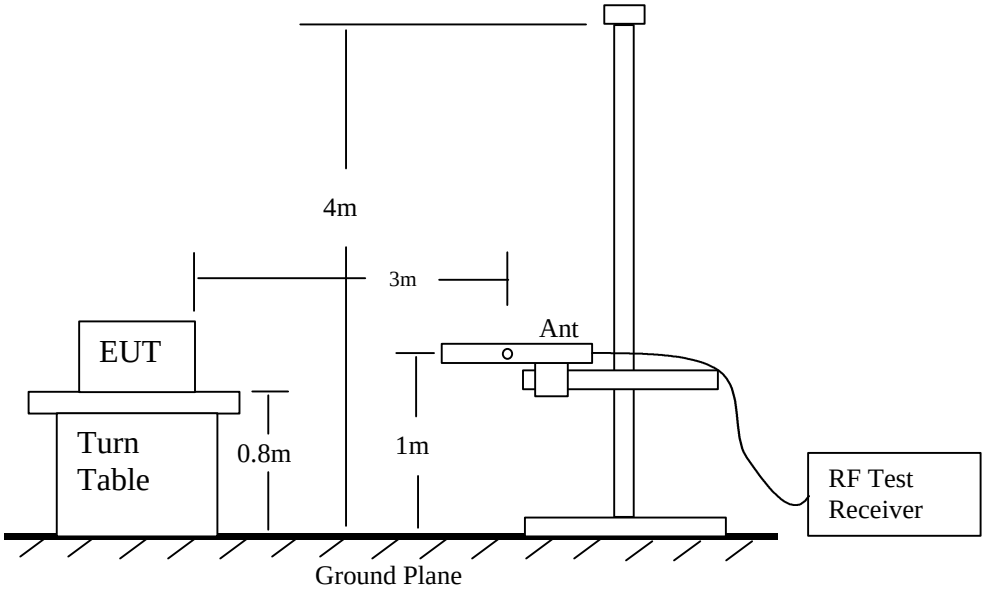
18). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

7.3. MEASUREMENT INSTRUMENT

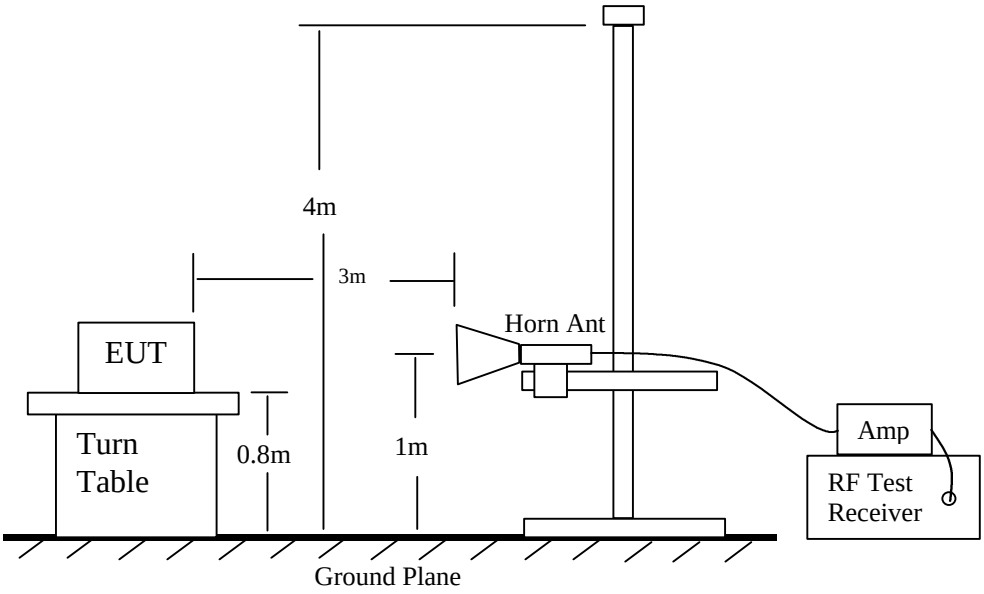
EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer	HP	8593EM	6/20/02
Synthesizer Signal Generator	HP	83732B	3/21/02
Amplifier	MITEQ	NSP2600-44	4/12/02
Bilog Antenna	CHASE	CBL6112B	8/2/02
Horn Antenna	EMCO	3115 SN: 2238	6/20/02
Horn Antenna	EMCO	3115 SN: 3245	6/20/02
Dipole Antenna	COMPLIANCE DESIGN	ROBERTS	5/5/02

Detector Function Setting of Test Receiver

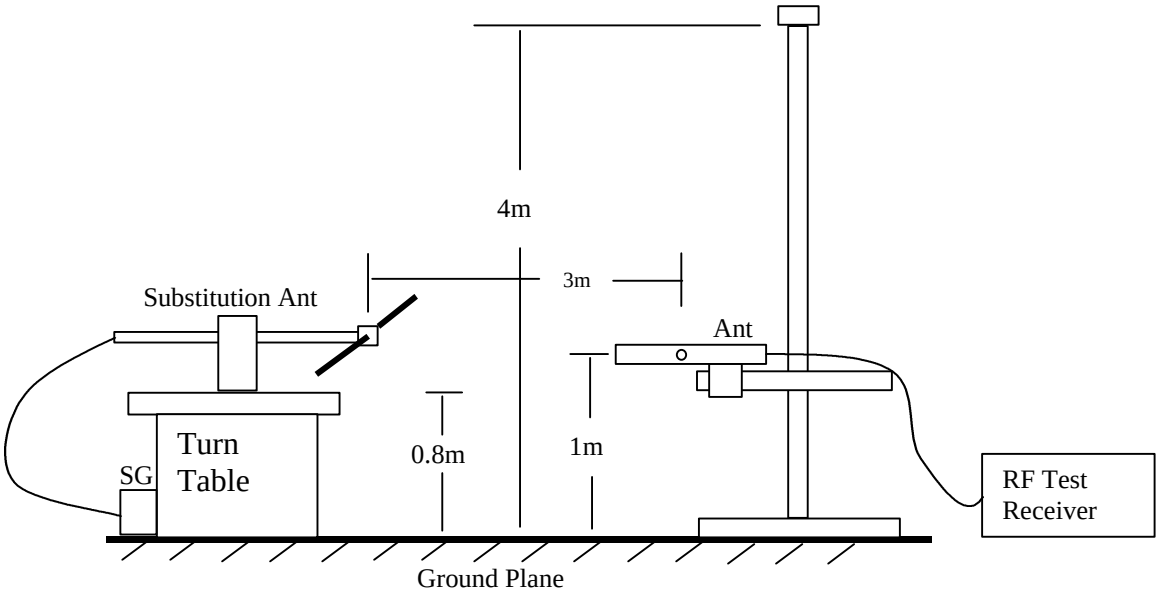
Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	Quasi Peak/Peak	120 KHz/100 KHz	120 KHz/100 KHz
Above 1000	Average/ Peak	1 MHz	1 MHz



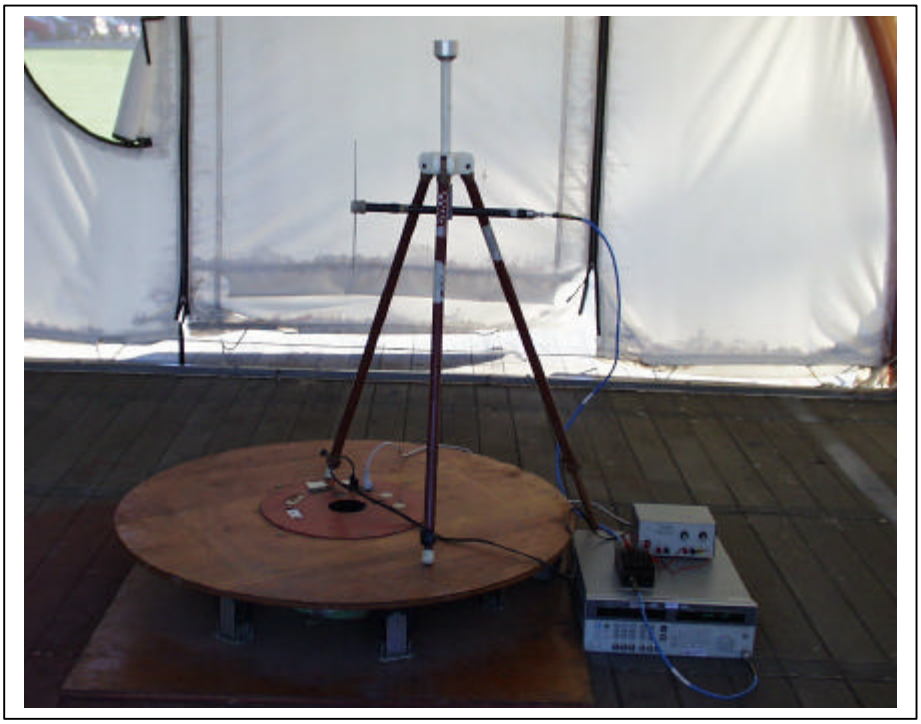
Radiated Emission Measurement 30 to 1000 MHz



Radiated Emission Above 1000 MHz



Radiated Emission – Substitution Method setup



Radiated Emissions & Substitution Method Below 1GHz

Radiated Emissions & Substitution Method Above 1GHz

7.4. MEASUREMENT RESULT

a). Channel-1: 462.5625 MHz

COMPLIANCE Certification Services

FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #: 01I1085-1
Report #: 020107Chm
Date& Time: 01/07/02 9:33 AM
Test Engr: Thu Chan

Company: Hyundai C-Tech
EUT Description: Walkie Talkie (FRS 3000 PK Base Station)
Test Configuration : EUT only
Type of Test: FCC 95
Mode of Operation: Channel 1

(•) A-Site ( ) B-Site ( ) C-Site ( ) F-Site 6 Worst Data Descending

Freq. (MHz)	SA Reading (dBuV)	SG Setting (dBm)	Ant Gain (dBi)	Dipole Gain (dBd)	Cable Loss (dB)	Other (dB)	Result (dBm)	Limit (dBm)	Margin (dBm)	Pol (H/V)
925.13	52.60	-21.00	0.00	0.00	1.60	0.00	-22.60	-13.00	-9.60	V
925.13	48.00	-25.50	0.00	0.00	1.60	0.00	-27.10	-13.00	-14.10	H
1387.69	53.00	-29.00	9.00	2.15	1.80	0.00	-23.95	-13.00	-10.95	V
1387.69	49.50	-32.50	9.00	2.15	1.80	0.00	-27.45	-13.00	-14.45	H
1850.25	82.50	-33.00	9.10	2.15	2.00	0.00	-28.05	-13.00	-15.05	V
1850.25	80.00	-35.00	9.10	2.15	2.00	0.00	-30.05	-13.00	-17.05	H
2312.81	82.00	-37.00	9.70	2.15	2.20	0.00	-31.65	-13.00	-18.65	V
2312.81	81.00	-39.00	9.70	2.15	2.20	0.00	-33.65	-13.00	-20.65	H
2775.38	90.00	-24.00	9.90	2.15	2.40	0.00	-18.65	-13.00	-5.65	V
2775.38	91.50	-27.00	9.90	2.15	2.40	0.00	-21.65	-13.00	-8.65	H
3237.94	84.50	-25.00	9.60	2.15	2.60	0.00	-20.15	-13.00	-7.15	V
3237.94	81.50	-30.50	9.60	2.15	2.60	0.00	-25.65	-13.00	-12.65	H
3700.50	90.00	-20.00	9.60	2.15	2.60	0.00	-15.15	-13.00	-2.15	V
3700.50	90.00	-21.00	9.60	2.15	2.60	0.00	-16.15	-13.00	-3.15	H
4163.06	84.50	-23.00	9.80	2.15	2.60	0.00	-17.95	-13.00	-4.95	V
4163.06	84.00	-25.00	9.80	2.15	2.60	0.00	-19.95	-13.00	-6.95	H
4625.63	82.00	-25.00	11.20	2.15	2.60	0.00	-18.55	-13.00	-5.55	V
4625.63	84.00	-24.00	11.20	2.15	2.60	0.00	-17.55	-13.00	-4.55	H

Total data #: 18
V.2c

b). Channel-14: 467.7125 MHz

COMPLIANCE Certification Services

FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

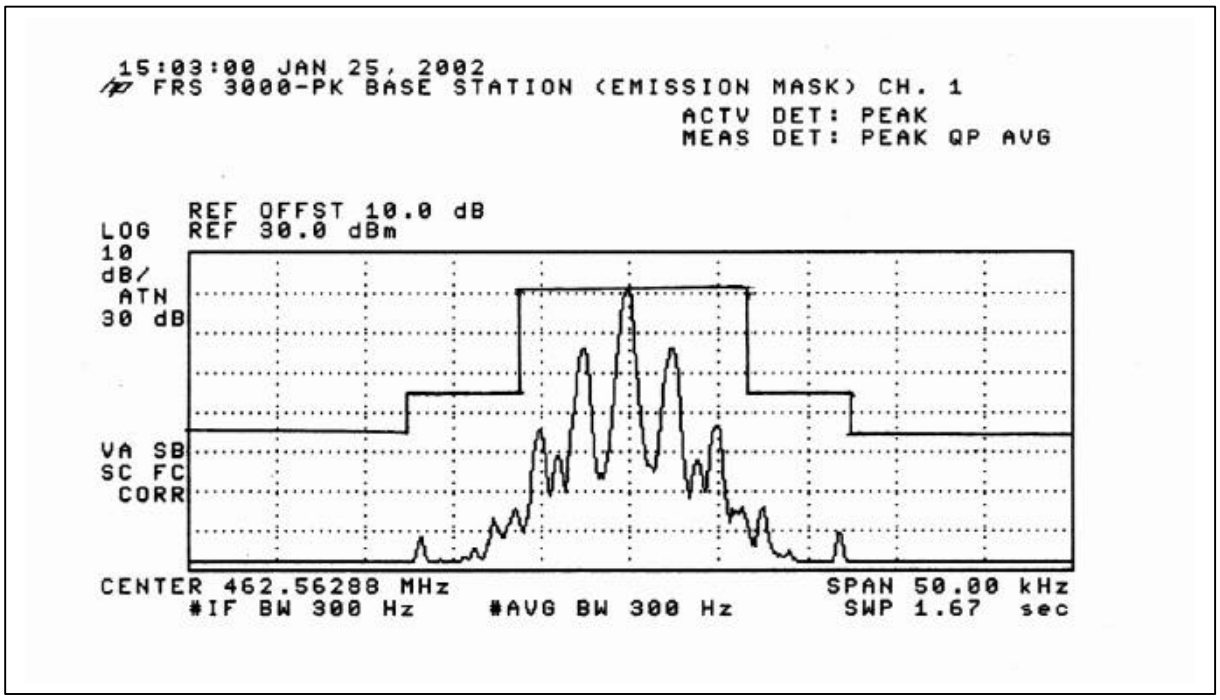
Project #: 01I1085-1
Report #: 020107Chm
Date& Time: 01/07/02 9:33 AM
Test Engr: Thu Chan

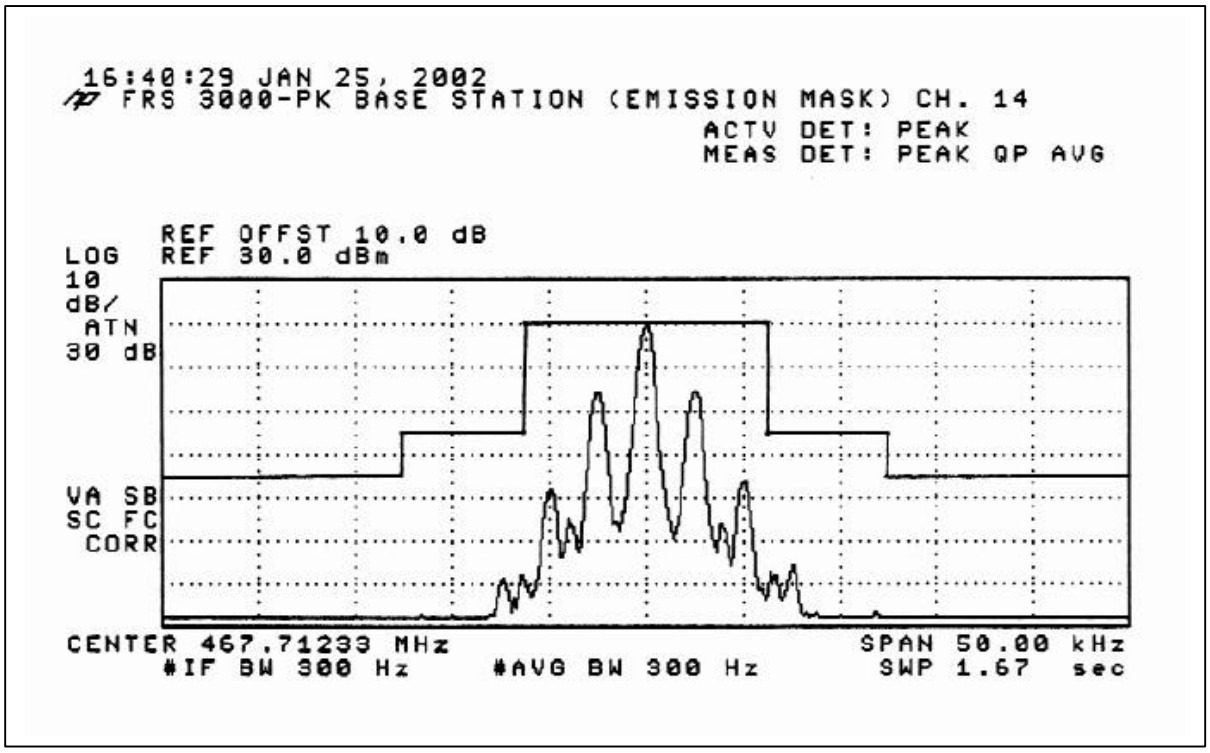
Company: Hyundai C-Tech
EUT Description: Walkie Talkie (FRS 3000 PK Base Station)
Test Configuration : EUT only
Type of Test: FCC 95
Mode of Operation: Channel 14

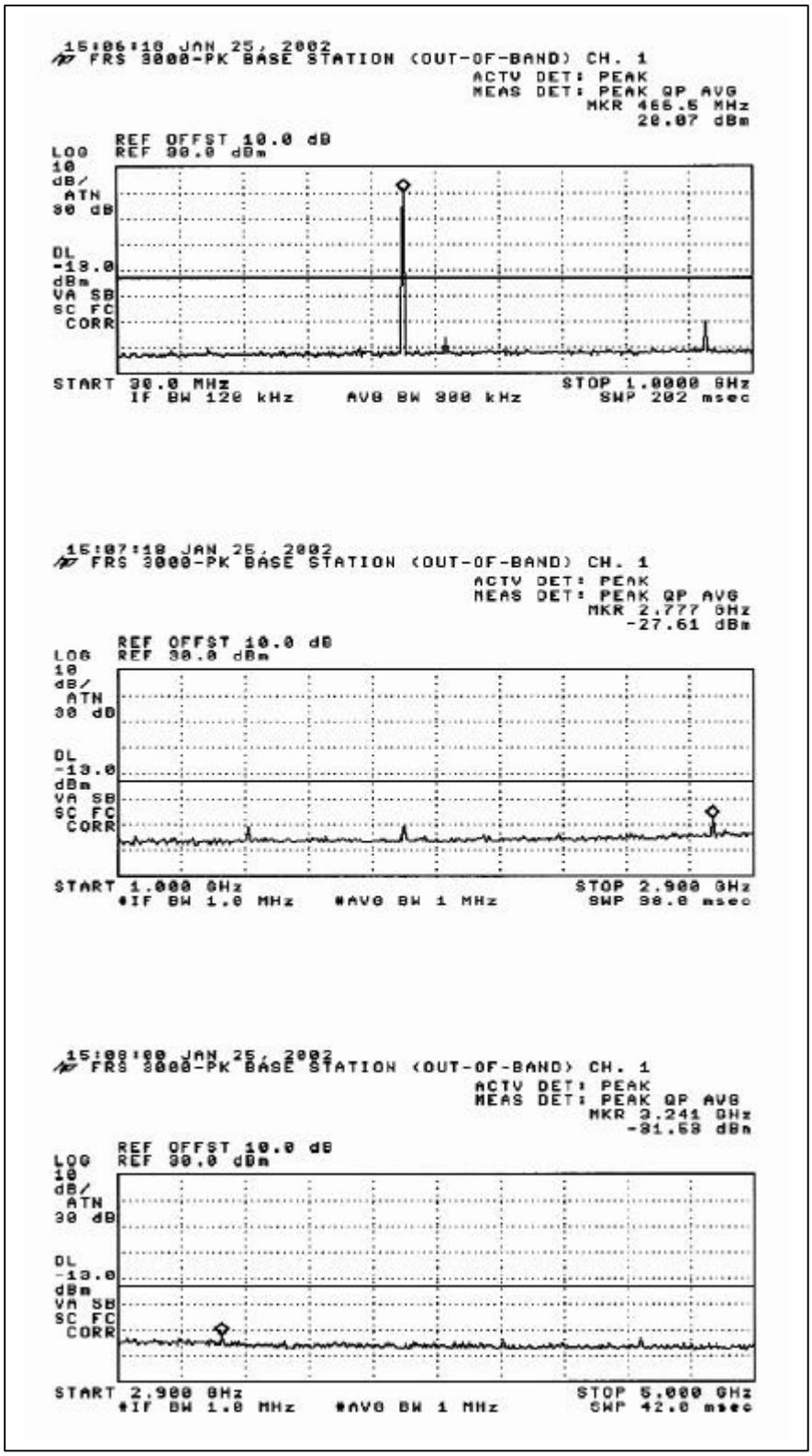
(•) A-Site ( ) B-Site ( ) C-Site ( ) F-Site [6 Worst Data] [Descending]

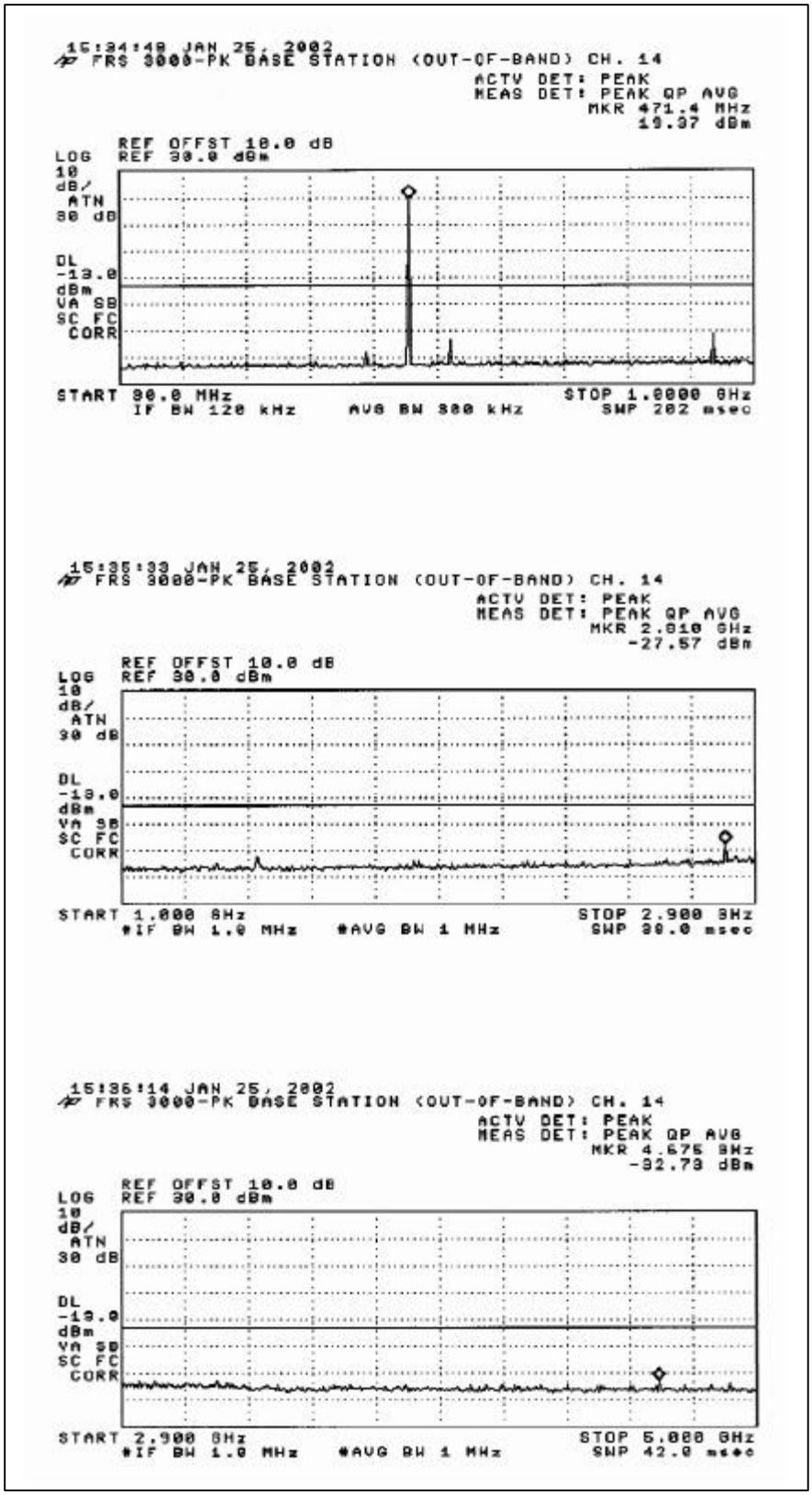
Freq. (MHz)	SA Reading (dBuV)	SG Setting (dBm)	Ant Gain (dBi)	Dipole Gain (dBd)	Cable Loss (dB)	Other (dB)	Result (dBm)	Limit (dBm)	Margin (dBm)	Pol (H/V)
935.43	49.70	-25.00	0.00	0.00	1.60	0.00	-26.60	-13.00	-13.60	V
935.43	45.50	-28.00	0.00	0.00	1.60	0.00	-29.60	-13.00	-16.60	H
1403.14	53.65	-28.00	9.00	2.15	1.80	0.00	-22.95	-13.00	-9.95	V
1403.14	50.00	-32.00	9.00	2.15	1.80	0.00	-26.95	-13.00	-13.95	H
1870.85	83.00	-33.00	9.10	2.15	2.00	0.00	-28.05	-13.00	-15.05	V
1870.85	80.00	-40.00	9.10	2.15	2.00	0.00	-35.05	-13.00	-22.05	H
2338.56	83.00	-34.00	9.70	2.15	2.20	0.00	-28.65	-13.00	-15.65	V
2338.56	82.00	-40.00	9.70	2.15	2.20	0.00	-34.65	-13.00	-21.65	H
2806.28	92.00	-22.00	9.90	2.15	2.40	0.00	-16.65	-13.00	-3.65	V
2806.28	93.60	-22.50	9.90	2.15	2.40	0.00	-17.15	-13.00	-4.15	H
3273.99	83.33	-26.00	9.60	2.15	2.60	0.00	-21.15	-13.00	-8.15	V
3273.99	80.00	-32.00	9.60	2.15	2.60	0.00	-27.15	-13.00	-14.15	H
3741.70	90.00	-20.00	9.60	2.15	2.60	0.00	-15.15	-13.00	-2.15	V
3741.70	90.00	-20.50	9.60	2.15	2.60	0.00	-15.65	-13.00	-2.65	H
4209.41	84.00	-24.50	9.80	2.15	2.60	0.00	-19.45	-13.00	-6.45	V
4209.41	84.00	-24.50	9.80	2.15	2.60	0.00	-19.45	-13.00	-6.45	H
4677.13	80.00	-26.00	11.20	2.15	2.60	0.00	-19.55	-13.00	-6.55	V
4677.13	84.00	-23.50	11.20	2.15	2.60	0.00	-17.05	-13.00	-4.05	H

Total data #: 18
V.2c









8. FREQUENCY STABILITY MEASUREMENT

8.1. PROVISIONS APPLICABLE

a). According to CFR 47 section 1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from –30°C to +50°C centigrade.
b). According to CFR 47 section 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 manufacture.
c). According to CFR 47 section 95.267(b), the FRS unit must be maintained within a frequency tolerance of 0.00025%.

8.2. MEASUREMENT METHOD

8.2.1. Frequency stability versus environmental temperature

1). Setup the configuration per figure 6 for frequencies measurement inside an environmental chamber. Install new battery in the EUT.

2). Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 10 KHz and Video Resolution Bandwidth to 100 KHz and Frequency Span to 100 KHz. Record this frequency as reference frequency.

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 measured frequencies on each temperature step.

8.2.2. Frequency stability versus input voltage

1). Setup the configuration per figure 6 for frequencies measured at 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 battery in the EUT.

2). Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 10 KHz and Video Resolution Bandwidth to 100 KHz and Frequency Span to 100 KHz. Record this frequency as reference frequency.

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

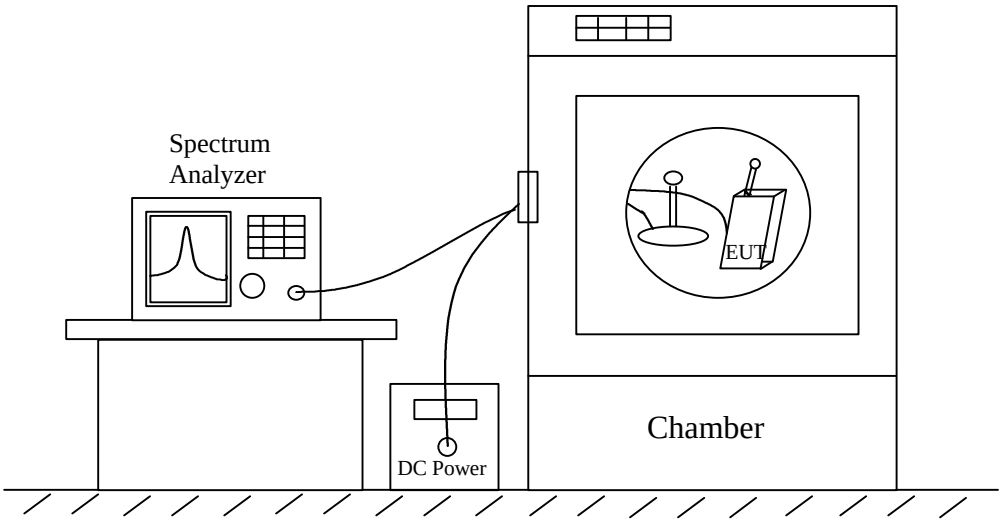


Figure 6: Frequency stability measurement configuration

8.3. MEASUREMENT INSTRUMENT

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer	HP	8593EM	6/20/02
Attenuator	MINI CIRCUITS	MCL BW-N10W5	NA
Environmental Chamber	TENNY	TEN	Internal cal before use

8.4. MEASUREMENT RESULT

Frequency Tolerance: 0.00021% (limit < 0.00025%)

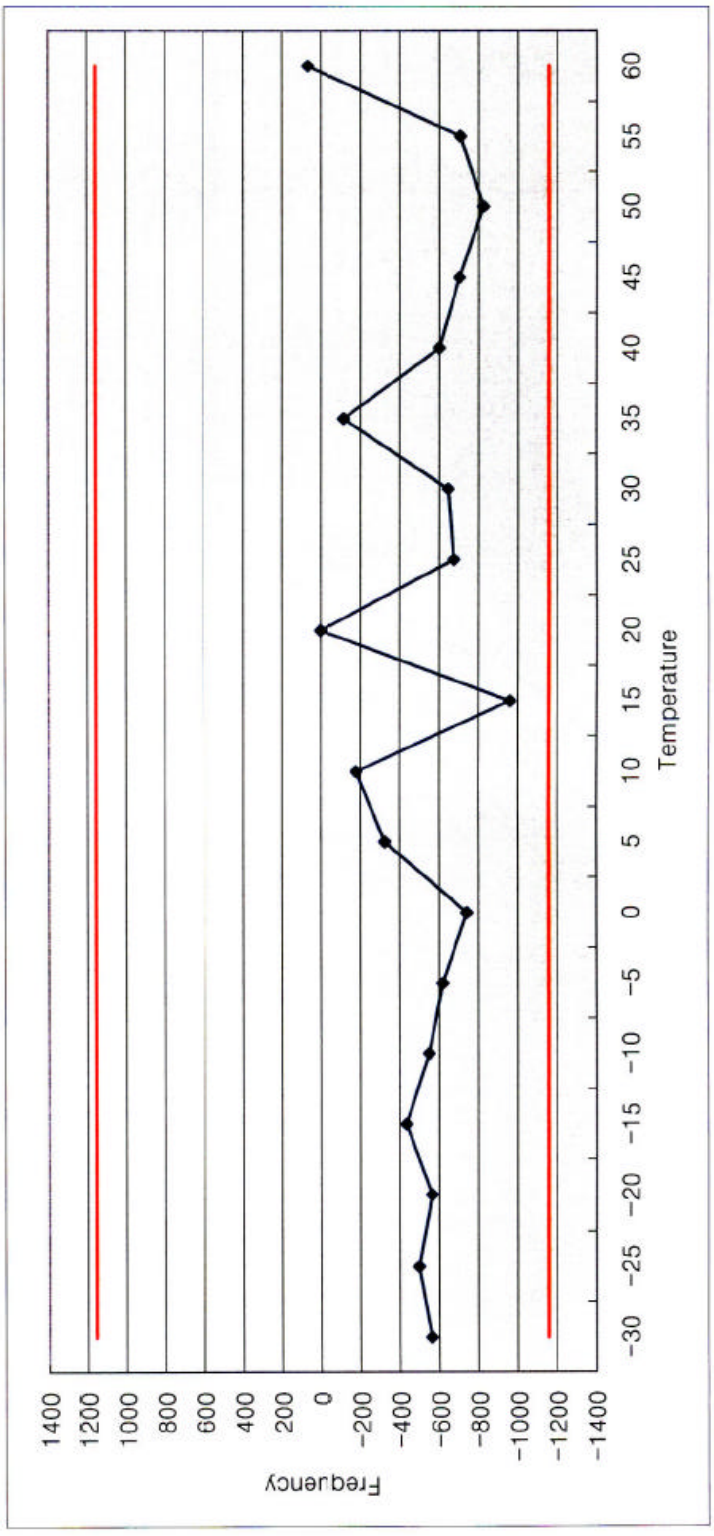
TX Frequency over Temperature

Model : FRS 3000 PK (BASE)

Date : 2001. 11 . 14

Test Frequency : 462.7125MHz (7 channel) ±1.156KHz

Frequency	-564	-500	-565	-435	-550	-620	-740	-325	-180	-960	0	-675	-645	-115	-600	-702	-825	-708	65
Temperature(℃)	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55	60
Upper Limit	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156
Lower Limit	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156	-1156



b). Frequency stability versus input voltage ±15% of 115Vac.

Frequency Tolerance: No shifted at all, 0% (limit < 0.00025%)