

### 3.5. EUT's Configuration during Compliance Measurement

The following equipment was installed on FREQUENCY STABILITY Test to meet the commission requirement.

#### 3.5.1. FRS Radio Transceiver (EUT)

Model Number	:	ETALK-2000
FCC ID	:	NJQFRS-168
Manufacturer	:	Wintecronics Ltd.
Power Supply	:	6VDC Battery
AC Adapter	:	Ming Bao Electric Co., Ltd.
		M/N MW35-0600350
		I/P: 120Vac, 60Hz; O/P: 6Vdc, 350mA
		Cord: Non-Shielded, Undetachable, 1.8m

### 3.6. Test Procedure

#### 3.6.1. Temperature Variation

3.6.1.1. Setup the EUT and test equipment as shown on 3.2.1.

3.6.1.2. Set the EUT at channel 1 (462.5625MHz) or channel 8 (467.5625MHz), varied the temperature from -30°C to +50°C with 10°C increment for each step to find out the maximum frequency stability tolerance and minimum frequency tolerance.

#### 3.6.2. Primary Supply Voltage Variation

3.6.2.1. Setup the EUT and test equipment as shown on 3.2.2.

3.6.2.2. Set the EUT at channel 1 (462.5625MHz) or channel 8 (467.5625MHz), varied the primary supply voltage by a transformer from 85 % to 115 % of the nominal operation power to find out the maximum frequency stability tolerance and minimum frequency tolerance.

### 3.7. Test Results

**PASSED.** Please refer to the following pages.

### 3.8. Frequency Stability Measurement Results

Date of Test: Aug. 14, 1999

#### 3.8.1. Temperature Variation Measurement Results

Varied ambient temperature from -30° C to +50°C.

Channel No.	Frequency (MHz)	Measured Max. Freq. (MHz)	Tolerance (%)	Measured Min. Freq. (MHz)	Tolerance (%)
1	462.5625	462.5624	- 0.0000216	462.5614	- 0.000238
8	467.5625	467.5624	- 0.0000213	467.5614	- 0.000235

#### 3.8.2. Primary Supply Voltage Variation Measurement Results

3.8.2.1. For DC Battery (6VDC, 115%: 6.9VCD; 85%: 5.1VDC)

Temperature: 22

Varied primary supply voltage from 85% to 115%

Channel No.	Frequency (MHz)	Measurement Max. Freq. (MHz)	Tolerance (%)	Measurement Min. Freq. (MHz)	Tolerance (%)
1	462.5625	462.5619	- 0.000130	462.5622	- 0.0000648
8	467.5625	467.5619	- 0.000128	467.5623	- 0.0000428

3.8.2.2. For AC Adapter (120VAC, 115%: 138VAC; 85%: 102VAC)

Temperature: 22

Varied primary supply voltage from 85% to 115%

Channel No.	Frequency (MHz)	Measurement Max. Freq. (MHz)	Tolerance (%)	Measurement Min. Freq. (MHz)	Tolerance (%)
1	462.5625	462.5621	- 0.0000865	462.5623	- 0.0000432
8	467.5625	467.5620	- 0.0001069	467.5623	-0.0000428

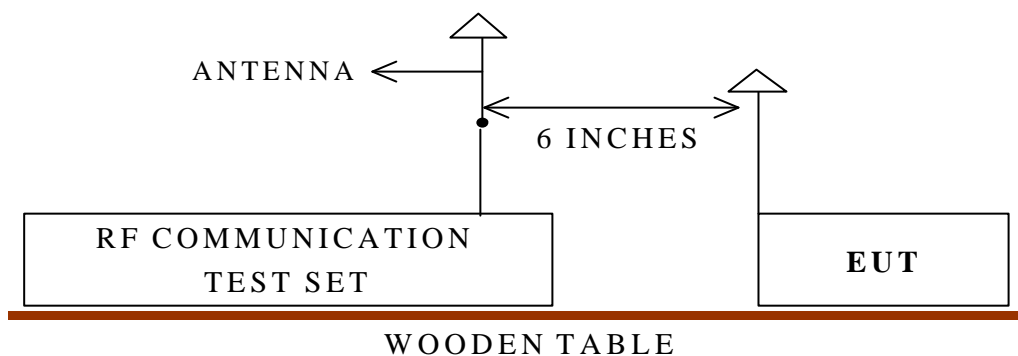
## 4. FREQUENCIES AND CHANNELS TEST

### 4.1. Test Equipment

The following test equipment were used during the Frequencies and Channels Test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Communication Test Set	HP	8920A	3524A07043	Dec. 05, 98'	1 Year
2.	Antenna	EMCO	4610	9410-1274	Dec. 28, 98'	1 Year

### 4.2. Block Diagram of Test Setup



### 4.3. Test Rules

CRF 47 Part 95 § 95.627

### 4.4. Specification Limits

Each FRS unit must be maintained within a frequency tolerance of 0.00025% .

### 4.5. EUT's Configuration during Compliance Measurement

The following equipment was installed on FREQUENCYS AND CHANNELS Test to meet the commission requirement.

#### 4.5.1. FRS Radio Transceiver (EUT)

Model Number	:	ETALK-2000
FCC ID	:	NJQFRS-168
Manufacturer	:	Wintecronics Ltd.
Power Supply	:	6VDC Battery

#### 4.6. Test Procedure

4.6.1. Setup the EUT and test equipment as shown on 4.2.

4.6.2. The EUT was placed on a wooden table and through RF Communication Test Set to check the channels frequencies' tolerance.

#### 4.7. Test Results

**PASSED.**

#### 4.8. Frequencies and Channels Measurement Results

Date of Test: Aug. 14, 1999

<b>CH. No.</b>	<b>Frequency (MHz)</b>	<b>Measured Freq. (MHz)</b>	<b>Tolerance (%)</b>	<b>CH. No.</b>	<b>Frequency (MHz)</b>	<b>Measured Freq. (MHz)</b>	<b>Tolerance (%)</b>
<b>1</b>	462.5625	462.5622	<b>-0.00006486</b>	<b>8</b>	467.5625	467.5622	<b>-0.00006416</b>
<b>2</b>	462.5875	462.5872	<b>-0.00006485</b>	<b>9</b>	467.5875	467.5872	<b>-0.00006416</b>
<b>3</b>	462.6125	462.6123	<b>-0.00004323</b>	<b>10</b>	467.6125	467.6121	<b>-0.00008554</b>
<b>4</b>	462.6375	462.6373	<b>-0.00004323</b>	<b>11</b>	467.6375	467.6373	<b>-0.00004277</b>
<b>5</b>	462.6625	462.6621	<b>-0.00008646</b>	<b>12</b>	467.6625	467.6622	<b>-0.00006415</b>
<b>6</b>	462.6875	462.6872	<b>-0.00006484</b>	<b>13</b>	467.6875	467.6872	<b>-0.00006415</b>
<b>7</b>	462.7125	462.7122	<b>-0.00006484</b>	<b>14</b>	467.7125	467.7122	<b>-0.00006414</b>

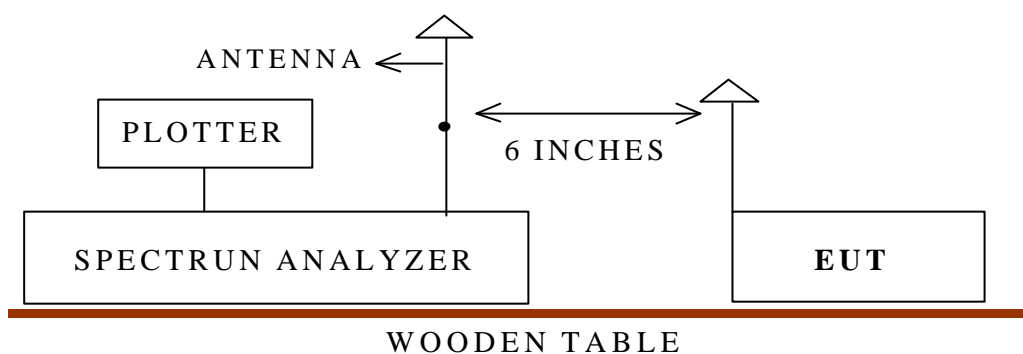
## 5. TRANSMITTER EMISSION TYPE TEST

### 5.1. Test Equipment

The following test equipment were used during the Transmitter Emission Type Test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	HP	8593A	3212A01727	Jul. 29, 99'	1 Year
2.	Antenna	EMCO	4610	9410-1274	Dec. 28, 98'	1 Year

### 5.2. Block Diagram of Test Setup



### 5.3. Test Rules

CRF 47 Part 95 § 95.631 (d)

### 5.4. Specification Limits

An FRS unit may transmit only emission type F3E.

### 5.5. EUT's Configuration during Compliance Measurement

The configuration of EUT were same as section 4.5.

### 5.6. Test Procedure

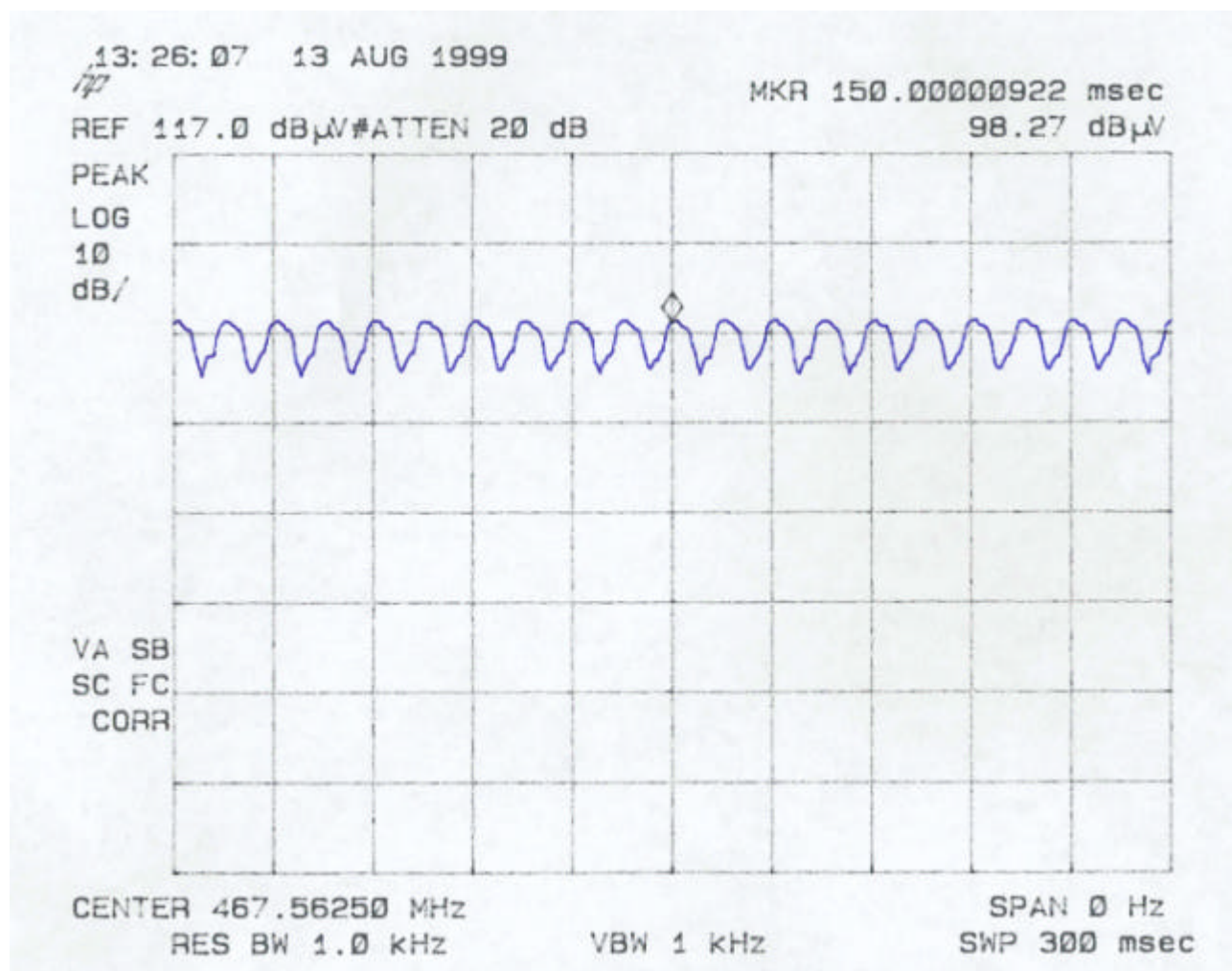
5.6.1. Setup the EUT and simulator as shown on 5.2.

5.6.2. The EUT was placed on a wooden table to check the transmitter emission type by using spectrum analyzer.

## 5.7. Transmitter Emission Type Measurement Results

Date of Test: Aug. 13, 1999

This FRS unit its emission type is F3E. The test data is attached in next figure.



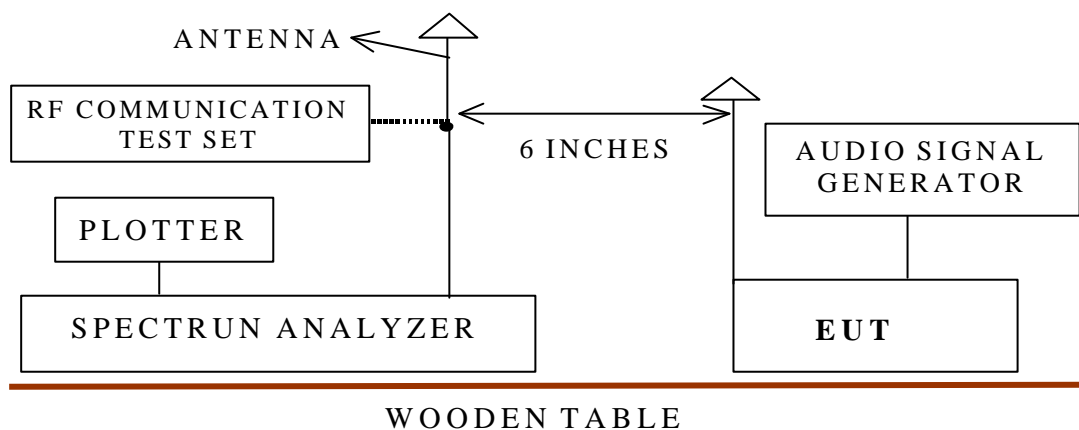
## 6. EMISSION BANDWIDTH TEST

### 6.1. Test Equipment

The following test equipment were used during the Emission Bandwidth Test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Communication Test Set	HP	8920A	3524A07043	Dec. 05, 98'	1 Year
2.	Spectrum Analyzer	HP	8593A	3212A01727	Jul. 29, 99'	1 Year
3.	Audio Signal Generator	HP	8904A	3633A08312	Oct. 08, 99'	1 Year
4.	Antenna	EMCO	4610	9410-1274	Dec. 28, 98'	1 Year

### 6.2. Block Diagram of Test Setup



### 6.3. Test Rules

CRF 47 Part 95 § 95.633 (c)

### 6.4. Specification Limits

The authorized bandwidth for emission type F3E transmitted by a FRS unit is 12.5KHz.

### 6.5. EUT's Configuration during Compliance Measurement

The configuration of EUT were same as section 4.5.

## 6.6. Test Procedure

- 6.6.1. Setup the EUT and test equipment as shown on 6.2.
- 6.6.2. Supply the EUT with nominal operating voltage and set at Channel 1 or Channel 8.
- 6.6.3. Set a reference level on the measuring instrument at any location that will allow measuring the specified bandwidth.
- 6.6.4. Supply the EUT with modulation to observe and record with plotted graphs the worst –case occupied bandwidth by these different modulation sources.

## 6.7. Emission Bandwidth Measurement Results

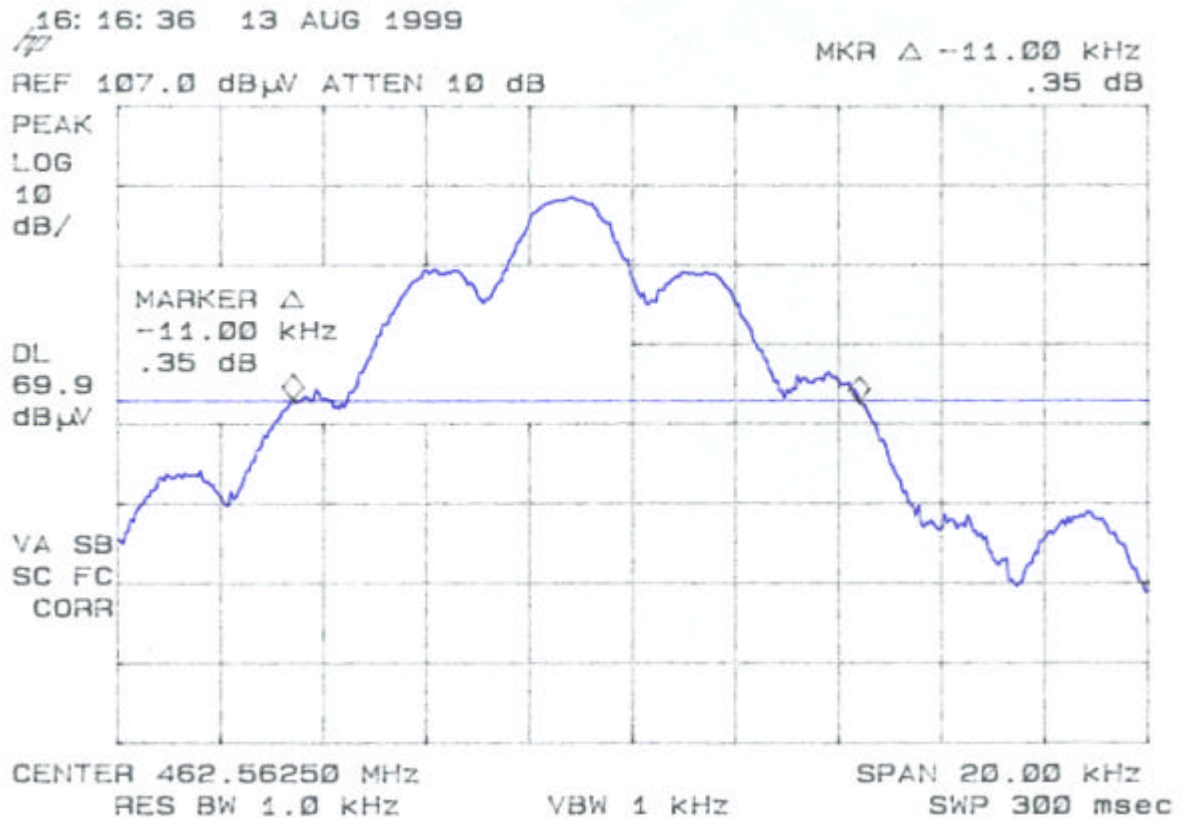
Date of Test: Aug. 13, 1999

Channel No.	Frequency (MHz)	Bandwidth (KHz)
1	462.5625	<b>11.0</b>
8	467.5625	<b>10.9</b>

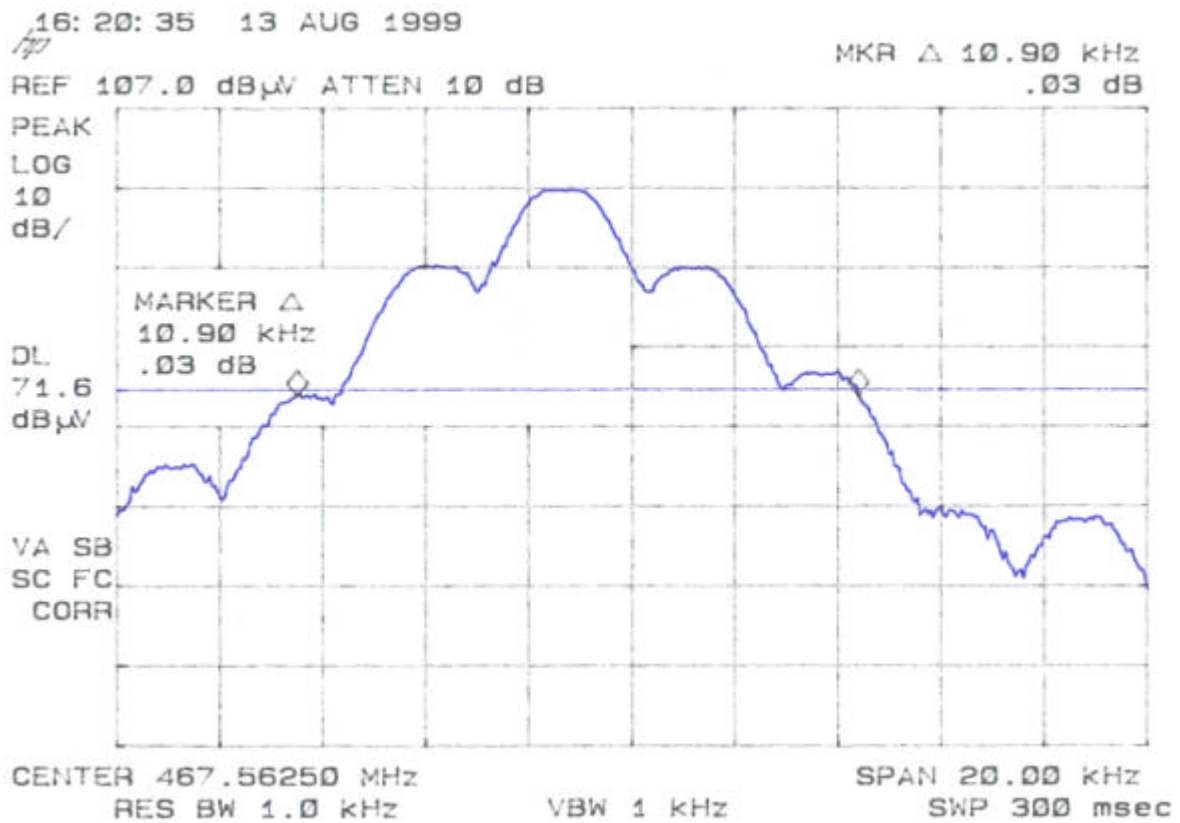
The bandwidth test data are attached in next page.



Channel 1: 462.5625MHz



Channel 8 : 467.5625MHz



## 7. RADIATED EMISSION TEST

### 7.1. Test Equipment

The following test equipment were used during the Radiated Emission Test :

#### 7.1.1. Radiation Measurement (for 30MHz~6GHz, at Open Field Test Site)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESVP	893202/001	May 13, 99'	1 Year
2.	Broadband Antenna	Schwarzbeck	BBA9106	A1L	Feb. 02, 99'	1 Year
3.	Broadband Antenna	Chase	UPA6109	1039	Feb. 02, 99'	1 Year
4.	Pre-Amplifier (1GHz~6GHz)	HP	8449B	3008A00529	Jan.27, 99'	1 Year
5.	Spectrum Analyzer (1GHz~6GHz)	HP	8593A	3212A01727	Jul. 25, 98'	1 Year
6.	Double Ridge Horn. Antenna	EMCO	3115	9112-3775	Apr.03, 99'	1 Year

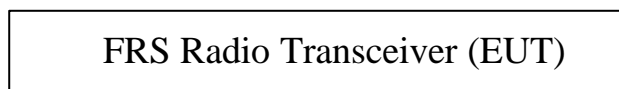
#### 7.1.2. Radiation Measurement (for Channel Center Attenuation)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	HP	8593A	3212A01727	Jul. 29, 99'	1 Year
2.	Antenna	EMCO	7405-902	N/A	Dec. 28, 98'	1 Year

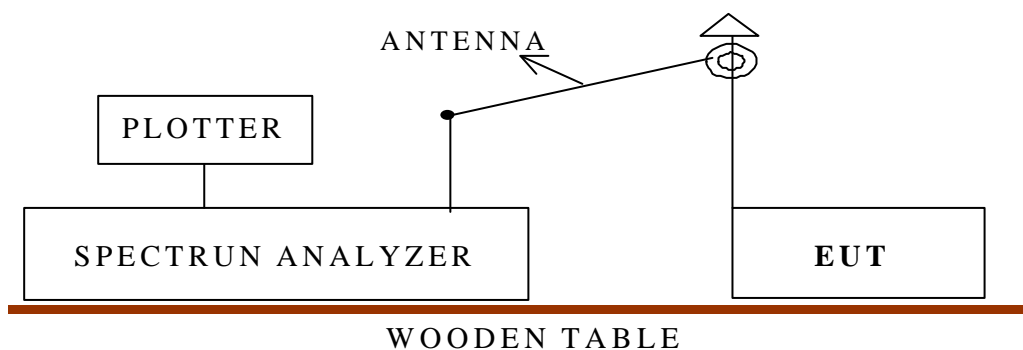
### 7.2. Block Diagram of Test Setup

#### 7.2.1. Block Diagram of connection between EUT and simulators

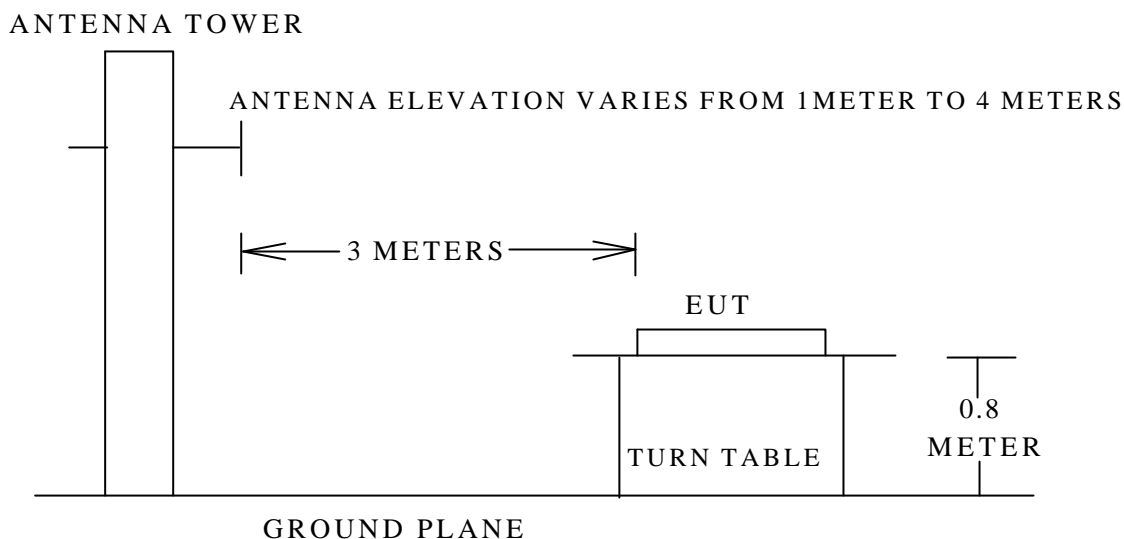
##### 7.2.1.1. Radiation Measurement at Open Field Test Site



##### 7.2.1.2. Radiation Measurement for Channel Center Attenuation



### 7.2.2. Open Field Test Site Setup Diagram ( 30MHz~6GHz, 3m)



## 7.3. Test Rules

CRF 47 Part 95 § 95.635, FRS Transmitter, Emission Type F3E.

CRF 47 Part 15 Subpart B & C, § 15.209

## 7.4. Specification Limits

### 7.4.1. Transmitter, Channel Center Attenuation (Part 95 Subpart E, § 95.635)

- (i) Emissions 12.5KHz to 22.5KHz away from the channel center frequency: at least 30 dB; and
- (ii) Emissions more than 22.5KHz away from the channel center frequency: at least  $43 + 10\log$  (carrier power in watts) dB.

### 7.4.2. Transmitter, Radiation Limit (Part 95 Subpart E, § 95.635)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS dB $\mu$ V/m
Fundamental Freq.	3	No limits
Harmonic Emission	3	85.6

- Remark :
- (1) Channel center frequency: at least  $43 + 10\log$  (carrier power in watts) dB.
  - (2) Distance refers to the distance in meters between the measuring antenna and the closed point of any part of the device or system.
  - (3) Harmonic emission limits = Fundamental Freq. max. emission level -  $43 + 10\log$  (carrier power in watts) dB.

#### 7.4.3. Receiver, Radiation Limit (Part 15 Subpart B & C, § 15.209)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		$\mu$ V/M	dB $\mu$ V/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

Remark : (1) Emission level (dB  $\mu$  V/m) = 20 log Emission level ( $\mu$  V/m)

(2) The tighter limit applies at the edge between two frequency bands.

(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

#### 7.5. EUT's Configuration during Compliance Measurement

The configuration of EUT were same as section 3.5.

#### 7.6. Operating Condition of EUT

7.6.1. Setup the EUT and simulator as shown on 7.2.

7.6.2. Turned on the power of all equipment.

7.6.3. Operated the FRS Radio Transceiver (EUT) on transmitting status during the testing.

7.6.4. Operated the FRS Radio Transceiver (EUT) on receiving status during the testing.

#### 7.7. Test Procedure

##### 7.7.1. Radiation measurement for Channel Center Attenuation

7.7.1.1. Setup the EUT and test equipment as shown on 7.2.1.2.

7.7.1.2. Setup the EUT at channel 1 (462,5625MHz).

7.7.1.3. Setup the spectrum analyzer's RES BW at 1KHz, VBW at 1KHz, SPAN 50KHz and center frequency at 462.5625MHz.

7.7.1.4. Check the emissions 12.5KHz to 22.5KHz away from the channel center frequency from spectrum analyzer to see at least 30dB below the peak or not.

7.7.1.5. Setup the spectrum analyzer's RES BW at 300KHz, VBW at 100KHz, SPAN 50KHz and center frequency at 462.5625MHz.

7.7.1.6. Check the emissions more than 22.5KHz away from the channel center frequency to see at least  $43 + 10\log$  (carrier power in watts) dB below the peak or not.