

# **Exhibit C**

# **Measurement Report**

**SMILE COMMUNICATION INC.**

**FCC ID.:NL9RMTX315**

**RF IR Repeater Transmitter**

***FCC Part 15 Subpart C***  
***EMI TEST REPORT***  
*of*

E.U.T. : TRANSMITTER  
(RF IR REPEATER)

FCC ID. : NL9RMTX315

MODEL : RMTX315

Working Frequency : 315 MHz

*for*

APPLICANT : SMILE COMMUNICATION INC.

ADDRESS : 6F-1, 66, NANKAN RD., SEC. 2,  
LUCHU HSIANG, TAUYUAN HSIEN,  
TAIWAN, R.O.C.

Test Performed by

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

Tel:(03)3280026-32

Fax:(03)3280034

Report Number : ET87R-02-071-01

Issued Date : APR. 21, 1998

## **Exhibit A**

## **Technical Report**

**SMILE COMMUNICATION INC.**

**FCC ID.:NL9RMTX315**

**RF IR Repeater Transmitter**

### **Applicant Name and Address**

Their full name and mailing address is given below:

**Name: SMILE COMMUNICATION INC.**

**Address :** *6F-1, 66 Nanka Rd., Sec. 2, Luchu Hsiang, Tao Yuan Hsien,  
Taiwan, R.O.C.*

**Model No.: RMTX315**

### 3. RADIATED EMISSION MEASUREMENT

#### 3.1 Description

The measuring instruments, such as test receiver and spectrum analyzer, are set to peak detector function. And the limit is employed average value, hence the peak reading can be transferred to average value by subtracting the duty factor. The furthermore explanation of field strength measured is given in paragraph 3.4.

#### 3.2 Test Data

Temperature : 19 °C  
Humidity : 70 %  
Operated mode : Tx  
Test Date : APR. 10, 1998

Frequency (MHz)	Ant Pol H/V	Reading (dBuV) Peak	Factor (dB)		Result @3m (dBuV/m)		Limit @3m (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (m)
			C	D	Peak	Ave.	Peak	Ave.			
315.000	H	84.0	-7.0	-10.7	77.0	66.3	95.6	75.6	-9.3	0	4
630.000	H	62.2	-1.8	-10.7	60.4	49.7	75.6	55.6	-5.9	0	4
945.000	V	25.2	4.8	-10.7	30.0	19.3	75.6	55.6	-36.3	0	1
1260.200	H	55.1	-10.2	-10.7	44.9	34.2	75.6	55.6	-21.4	0	1.2
*1575.100	V	48.7	-8.8	-10.7	39.9	29.2	74.0	54.0	-24.8	0	1.2
1890.100	H	51.3	-7.1	-10.7	44.2	33.5	75.6	55.6	-22.1	0	1.5
*2205.110	V	47.9	-4.4	-10.7	43.5	32.8	75.6	55.6	-22.8	0	1
2519.970	V	50.5	-2.8	-10.7	47.7	37.0	75.6	55.6	-18.6	0	1
*2834.970	V	50.9	-1.8	-10.7	49.1	38.4	74.0	54.0	-15.6	0	1
3149.970	V	44.3	-1.3	-10.7	43.0	32.3	75.6	55.6	-23.3	0	1

**Note :**

- Factor C means "corrected", and that includes antenna factor, cable loss, amplifier gain (if any). And Factor D means "Duty", that is for calculating the average value and derived from section 3.6 in this test report.

~~PK 2. Result = Reading + C. Factor~~

~~Ave. = Peak Value + D Factor~~

- Remark "\*" means that the radiated frequency falls in restricted band, and the limit employed is §15.209 general requirement.

## TEST REPORT CERTIFICATION

Applicant : SMILE COMMUNICATION INC.  
6F-1, 66, NANKAN RD., SEC. 2, LUCHU HSIANG, TAUUYUAN HSIEN,  
TAIWAN, R.O.C.

Manufacturer : SMILE COMMUNICATION INC.  
6F-1, 66, NANKAN RD., SEC. 2, LUCHU HSIANG, TAUUYUAN HSIEN,  
TAIWAN, R.O.C.

Description of EUT :

a) Type of EUT : TRANSMITTER (RF IR REPEATER)  
b) Trade Name : SMILE  
c) Model No. : RMTX315  
d) FCC ID : NL9RMTX315  
e) Working Frequency : 315 MHz  
f) Power Supply : DC 12V Battery

Regulation Applied : FCC Rules and Regulations Part 15 Subpart C (1993)

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.

Note : 1. The results of the testing report relate only to the items tested.  
2. The testing report shall not be reproduced except in full, without the written approval of ETC.

Test Date : APR. 10, 1998

Test Engineer : Chin Cheng Yeh  
( Chin Cheng Yeh )

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

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## 1. GENERAL INFORMATION

### 1.1 Product Description

a) Type of EUT	: TRANSMITTER (RF IR REPEATER)
b) Trade Name	: SMILE
c) Model No.	: RMTX315
d) FCC ID	: NL9RMTX315
e) Working Frequency	: 315 MHz
f) Power Supply	: DC 12V Battery

### 1.2 Characteristics of Device:

1. The access code can be changed by setting the dip switch.
2. A DC 12V size 23A battery is required for the transmitter.

### 1.3 Test Methodology

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

The transmitter 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 transmitter under test.

In order to determining the average value during one pulse train of the radiated power generated from the transmitter 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, 5 Lirn, Din Fu Tsun, Lin Kou, Taipei, 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, 1997.

## 2. DEFINITION AND LIMITS

### 2.1 Definition

Intentional radiator:

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

### 2.2 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3360-4400	Above 38.6
13.36-13.41			

Remark "\*\*\*" : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

### 2.3 Limitation

#### (1) Conducted Emission Limits :

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the conducted limit is the following:

Frequency ( MHz )	Emission ( $\mu$ V )	Emission ( dB $\mu$ V )
0.45 - 30.0	250	48.0



**(2) Radiated Emission Limits :**

According to 15.231 ,Periodic operation in the band 40.66-40.70 MHz and above 70 MHz, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Frequency Band (MHz)	Field strength of Fundamental (uV/m)	Field strength of Spurious (uV/m)
40.66-40.70	2250	225
70-130	1250	125
130-174	*1,250 to 3,750	*125 to 375
174-260	3750	375
260-470	*3,750 to 12,500	*375 to 1250
Above 470	12500	1250

\* Linear interpolations.

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209,as following table:

Other Frequencies (MHz)	Field Strength of Fundamental	
	$\mu\text{V}/\text{meter}$	$\text{dB}\mu\text{V}/\text{meter}$
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

**(3) Limit of transmission time**

- A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- A transmitter activated automatically shall cease transmission within 5 seconds after activation.

## **2.4 Labeling Requirement**

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## **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. RADIATED EMISSION MEASUREMENT

#### 3.1 Description

The measuring instruments, such as test receiver and spectrum analyzer, are set to peak detector function. And the limit is employed average value, hence the peak reading can be transferred to average value by subtracting the duty factor. The furthermore explanation of field strength measured is given in paragraph 3.4.

#### 3.2 Test Data

Temperature : 19 °C  
Humidity : 70 %  
Operated mode : Tx  
Test Date : APR. 10, 1998

Frequency (MHz)	Ant Pol H/V	Reading (dBuV) Peak	Factor (dB)		Result @3m (dBuV/m)		Limit @3m (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (m)
			C	D	Peak	Ave.	Peak	Ave.			
315.000	H	84.0	7.0	-10.7	78.8	68.1	95.6	75.6	-7.5	0	4
630.000	H	62.2	-1.8	-10.7	47.1	36.4	75.6	55.6	-19.2	0	4
945.000	V	25.2	4.8	-10.7	41.9	31.2	75.6	55.6	-24.4	0	1
1260.200	H	55.1	-10.2	-10.7	44.9	34.2	75.6	55.6	-21.4	0	1.2
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*2834.970	V	50.9	-1.8	-10.7	49.1	38.4	74.0	54.0	-15.6	0	1
3149.970	V	44.3	-1.3	-10.7	43.0	32.3	75.6	55.6	-23.3	0	1

**Note :**

1. Factor C means "corrected", and that includes antenna factor, cable loss, amplifier gain (if any). And Factor D means "Duty", that is for calculating the average value and derived from section 3.6 in this test report.
2. Result = Reading + C. Factor  
Ave. = Peak Value + D Factor
3. Remark "\*" means that the radiated frequency falls in restricted band, and the limit employed is §15.209 general requirement.

### 3.3 Measuring Instrument Setup

Explanation of measuring instrument setup in frequency band measured is as following :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz

### 3.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corr. Factor}$$

where

$$\text{Corr. Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain (if any)}$$

And the average value is

$$\text{Average} = \text{Peak Value} + \text{Duty Factor}$$

*Note : If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function.*

### 3.5 Activate Time

This transmitter is operated by Manual, and Activate Time is less than 1 second after being released.

### 3.6 Calculation of Duty Factor

The transmitter code switches were set to obtain the maximum duty cycle. The encoded waveform is the time domain

The period of the one pulse train observed above is 60msec. In order to obtain the peak to average factor, calculation of the period of total on time was computed by personal computer. Results was obtained by following.

$$\text{Duty} = (\text{Total on time} / \text{one pulse train}) \times 100\% = (17.486 \text{ msec.} / 60 \text{ msec.}) \times 100\% = 29.1\%$$

Therefore

$$\text{factor is } 20 \log (29.1 / 60) = -10.7 \text{ dB}$$

The duty factor is -10.7dB details see following pages.

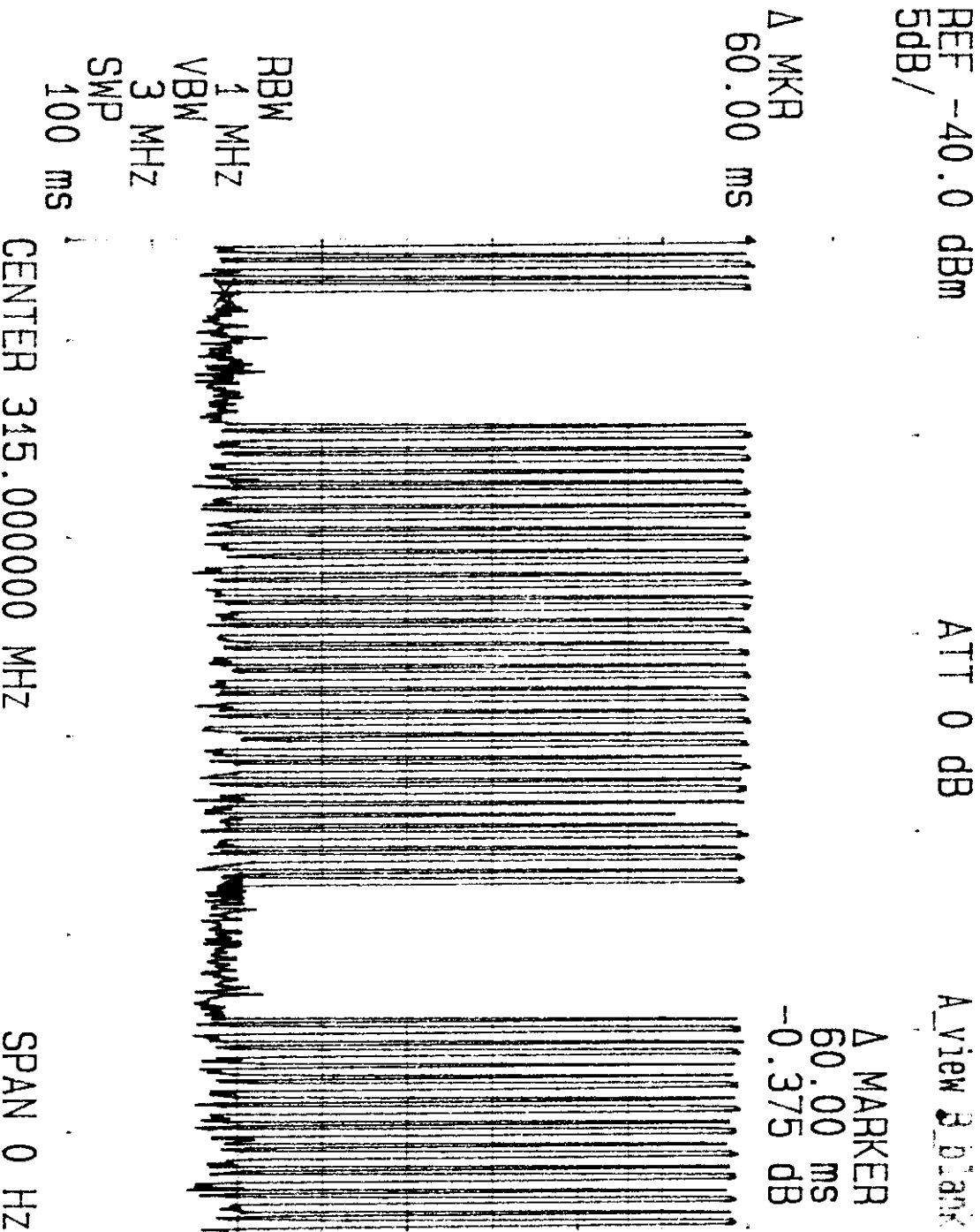
3.6.1 Full Cycle of The Pulse Train

$$L = .6 \times 10$$

$$S = .3 \times 22$$

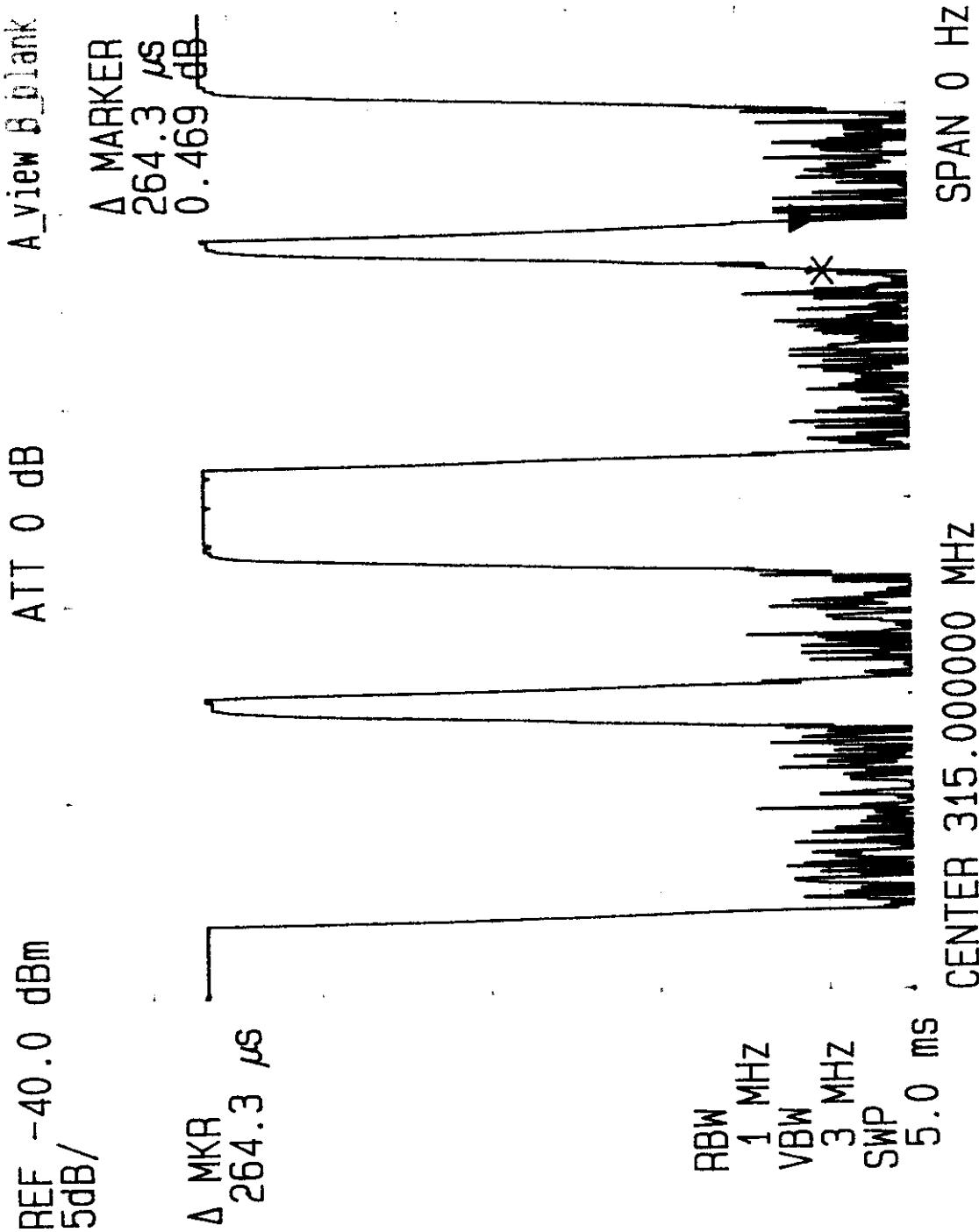
$$\frac{20}{66}$$

$$10 \text{ udd} .3 \rightarrow -10.5 \text{ dB}$$

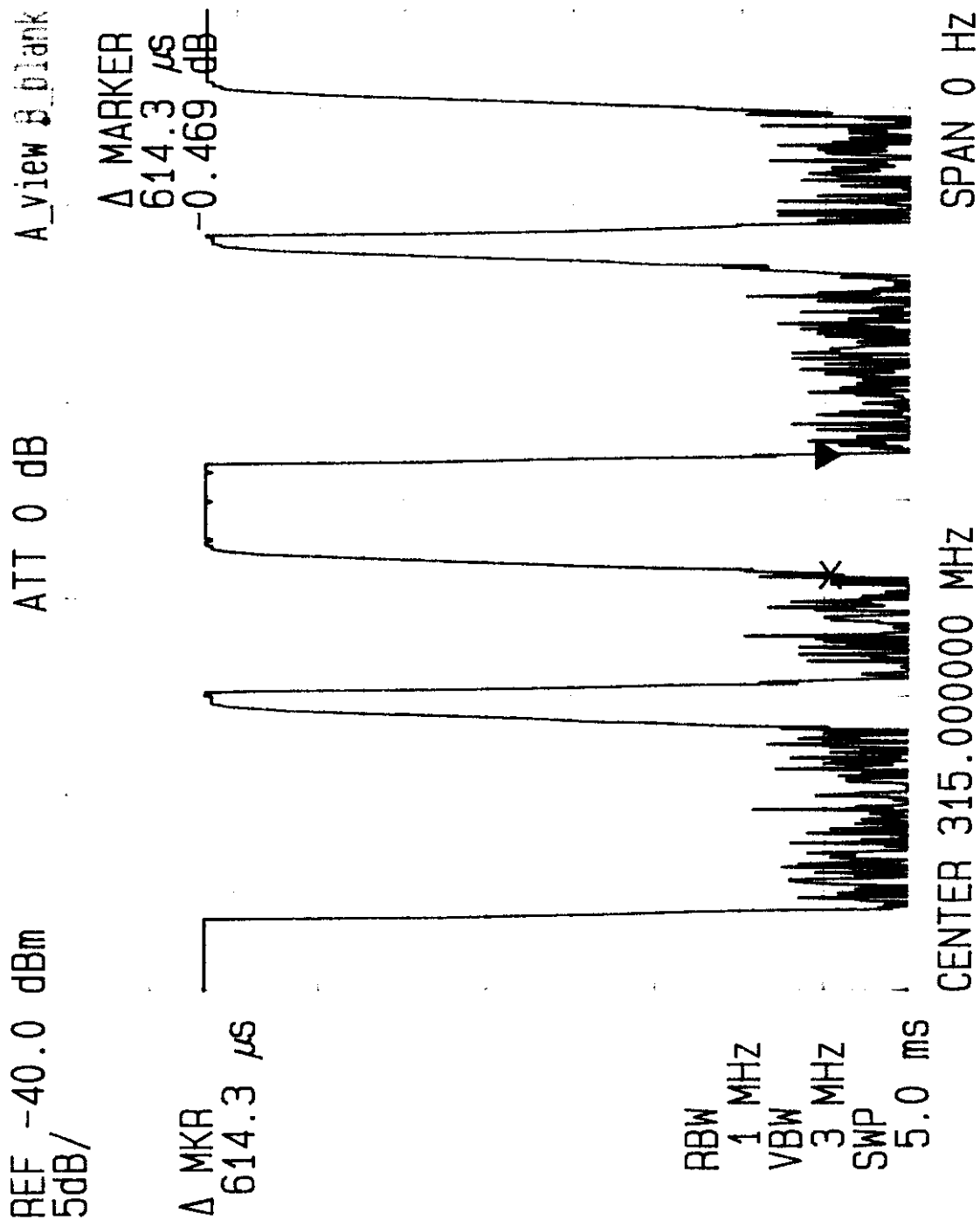


3.6.2 Detail of The Pulse Train

a.



b.

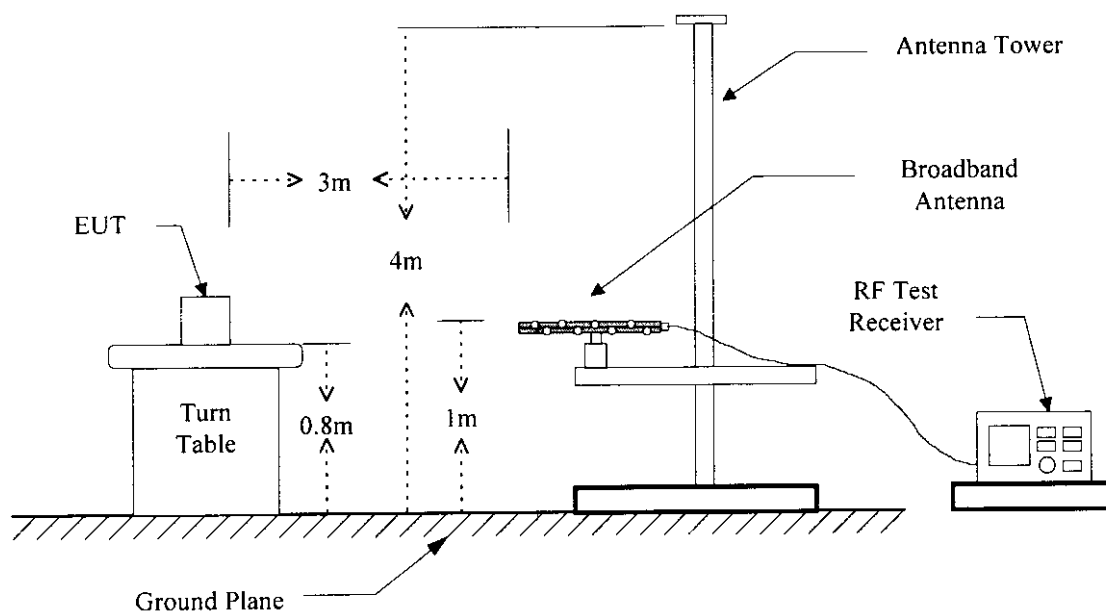


### 3.7 Radiated Test Equipment

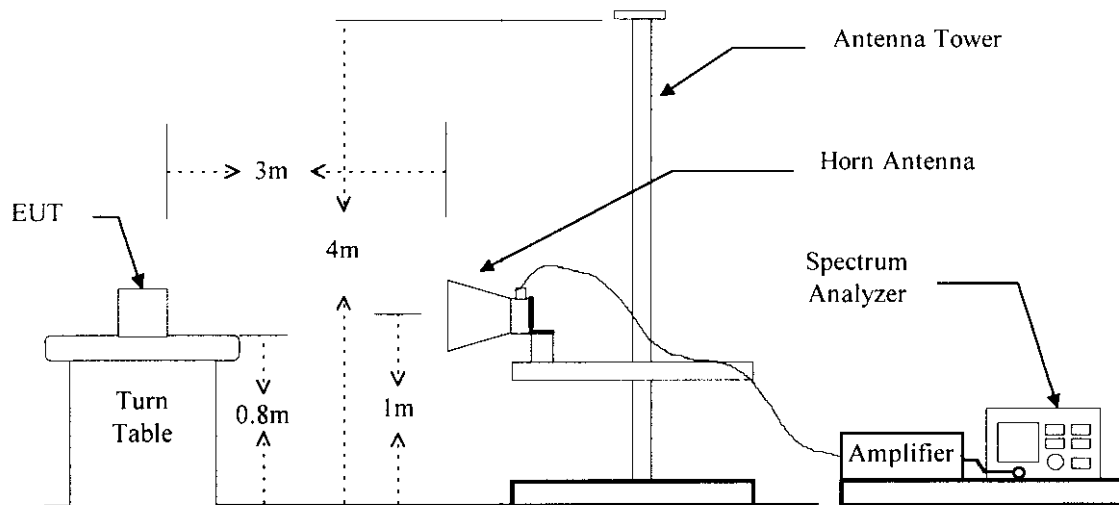
Equipment	Manufacturer	Model No.	Next Cal. Date
RF Test Receiver	Rohde and Schwarz	ESVS 30	DEC. 19, 1998
Spectrum Analyzer	Hewlett-Packard	8568B	OCT. 16, 1998
Pre-selector	Hewlett-Packard	85685A	OCT. 16, 1998
Quasi Peak Detector	Hewlett-Packard	85650A	OCT. 07, 1998
Horn Antenna	EMCO	3115	AUG. 05, 1998
Log periodic Antenna	EMCO	3146	DEC. 10, 1999
Spectrum Analyzer	Hewlett-Packard	8546A	FEB. 11, 1999
Spectrum Analyzer	Advantest	R3271	SEP. 02, 1998
Amplifier	Hewlett-Packard	8449B	MAY 08, 1998

### 3.8 Open Field Test Site Setup Diagram

#### 3.8.1 Radiated Emission's Frequency Below 1 GHz





**3.8.2 Radiated Emission's Frequency Above 1 GHz**

#### 4. BANDWIDTH OF EMISSION

##### 4.1 Bandwidth Test Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Advantest	R3271	09/02/1998
Plotter	Hewlett-Packard	7440A	N/A

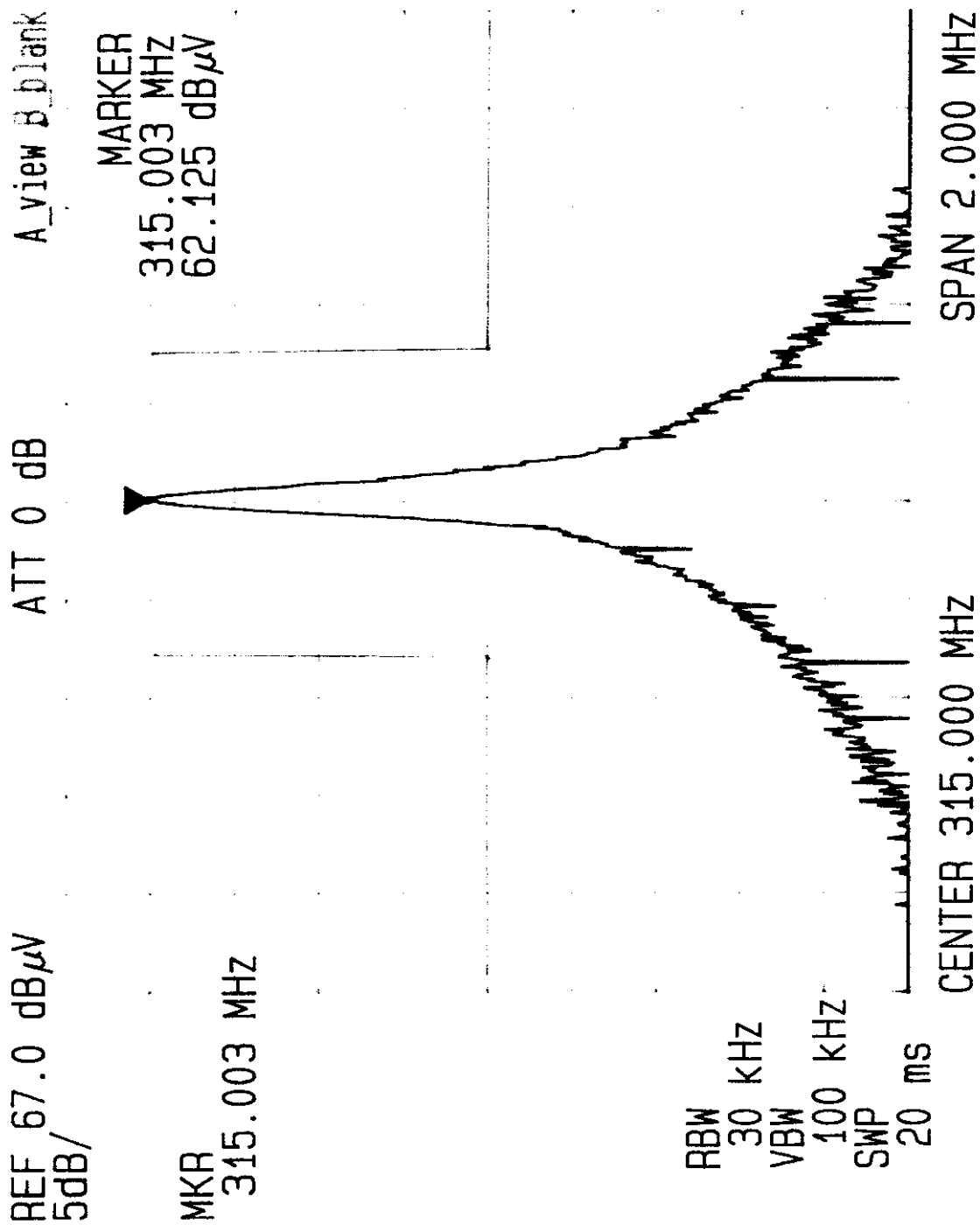
##### 4.2 Plot Graphic of Bandwidth

Specified Limits: 0.25% of the Fundamental Frequency

$$315.0 \text{ MHz} \times 0.0025 = 787.5 \text{ KHz}$$

The measurement of emission were made by using a spectrum analyzer with a vertical antenna and carried out its maximum hold mode.

Plotted graphics please see following page.



## **5. CONDUCTED EMISSION MEASUREMENT**

### **5.1 Description**

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to § 15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.