


REPORT OF MEASUREMENTS

Date : January 28, 1999
Issue in : Tokyo, Japan

JQA APPLICATION NO.: 80-80627

- | | |
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| 1. Applicant | : U-shin Ltd.
5217, Nakaze, Hamakita-shi,
Shizuoka 434-0012, Japan |
| 2. Manufacturer | : U-shin Ltd.
5217, Nakaze, Hamakita-shi,
Shizuoka 434-0012, Japan |
| 3. Description of Equipment | : Keyless Entry System
(Transmitter) |
| a) FCC ID | : OBIC9483TX |
| b) Trade Name | : U-shin |
| c) Model No. | : C9483 |
| d) Operating Frequency | : 315 MHz |
| e) Power Supply | : 3 VDC |
| 4. Applicable Rule | : FCC Rules & Regulations Part 15
Subpart C (June 23, 1989) |
| 5. Place of Measurement | : JQA EMC Engineering Dept. |
| 6. Date of Measurement | : December 22, 1998 |
| 7. Total Pages of This Report | : 12 (including this page) |
| 8. I certify that I am authorized to sign for the report and that all the statement in this report and in the exhibits hereto are true and correct to the best my knowledge and belief. | |



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Testing Div.
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1. Transmitter Fundamental and Spurious Emission: [§15.231(b)]

Measurement Method Employed:

Measurements were made under the conditions specified 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 down 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 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. The device was tested three orthogonal planes. These measurements were repeated with the receiving antenna polarized vertically.

In this measurements, in order to determining the average value during a 100 ms interval of the maximum radiated power generated from the transmitter under test, the encoded waveform in the time domain was used, details of which was illustrated in the attached sheet.

Measurement Results:

Operating Frequency : 315 MHz
Distance of Measurement : 3.0 meters

	Antenna	Amp.	Meter Reading		Factor*	Field Strength	
Frequency	Factor	Gain	Horiz.	Vert.		Horiz.	Vert.
(MHz)	(dB)	(dB)	(dB/uV)	(dB/uV)	(dB)	(uV/m)	(uV/m)
Fundamental							
315	23.0	-	46.7	44.5	-4.9	1737.8	1349.0
Harmonic Frequency							
630	31.2	-	17.2	15.2	-4.9	149.6	118.9
945	36.6	-	17.1	16.0	-4.9	275.4	242.7
1260	26.7	-	24.5	22.9	-4.9	206.8	172.0
1575	29.5	-	19.9	20.6	-4.9	167.8	181.9
1890	31.1	-	19.2	17.5	-4.9	187.2	153.9
2205	33.0	46.8	50.6	49.0	-4.9	39.2	32.6
2520	33.8	46.8	60.0	60.3	-4.9	127.5	132.0
2835	35.2	46.8	50.5	52.1	-4.9	50.2	60.3
3150	36.4	46.7	49.9	49.0	-4.9	54.3	48.9

Note: 1. The spectrum was checked from 30 MHz to tenth harmonics.
All emissions not listed were found to be more than 20 dB below the limits.

2. The symbol of "<" means "or less".

3. The cable loss was included in the antenna factor.

4. Sample calculation :

at 315 MHz

$$10(Af+Mr+F)/20 = 10(23.0+46.7-4.9)/20 = 1737.8 \text{ uV/m}$$

Where,

Af = Antenna Factor including the cable loss.

Mr = Meter Reading

F = Peak to Average factor

5. "": The factor due to the pulsed waveform as shown in the attached sheets.

6. Measuring Instrument Setting:

Field Strength Meter:(<1000 MHz)

Detector function : Peak

IF Bandwidth : 120 kHz

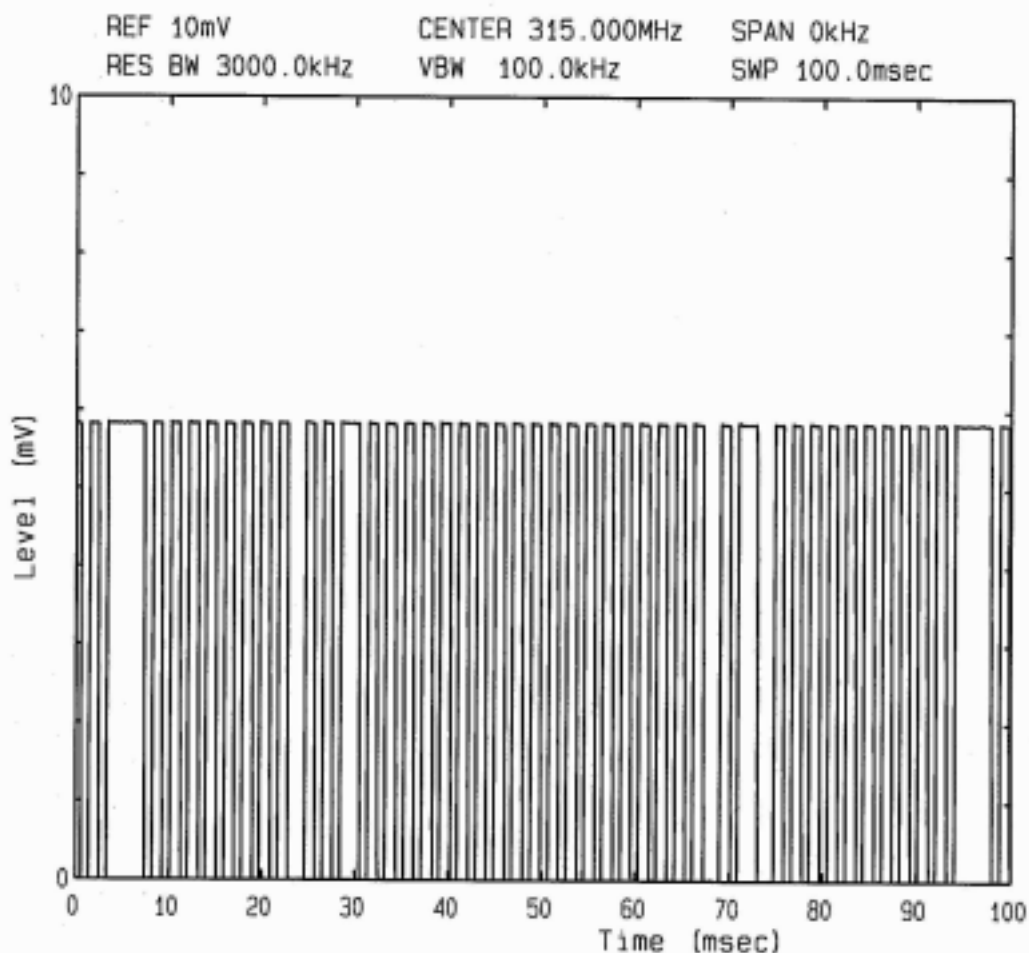
Spectrum Analyzer:(>1000 MHz)

Resolution Bandwidth : 1 MHz

The encoded waveform in the time domain

FCC ID : OBIC9483TX
Model : C9483

Mode of EUT : Transmit



The above waveform indicates the case when field strength averaged over 100 milliseconds was maximum value. 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.

$$\begin{aligned}\text{Duty cycle} &= (\text{Maximum total on-time} / 100 \text{ msec}) \times 100 \\ &= (56.6 \text{ msec} / 100 \text{ msec}) \times 100 = 56.6 \%\end{aligned}$$

Therefore

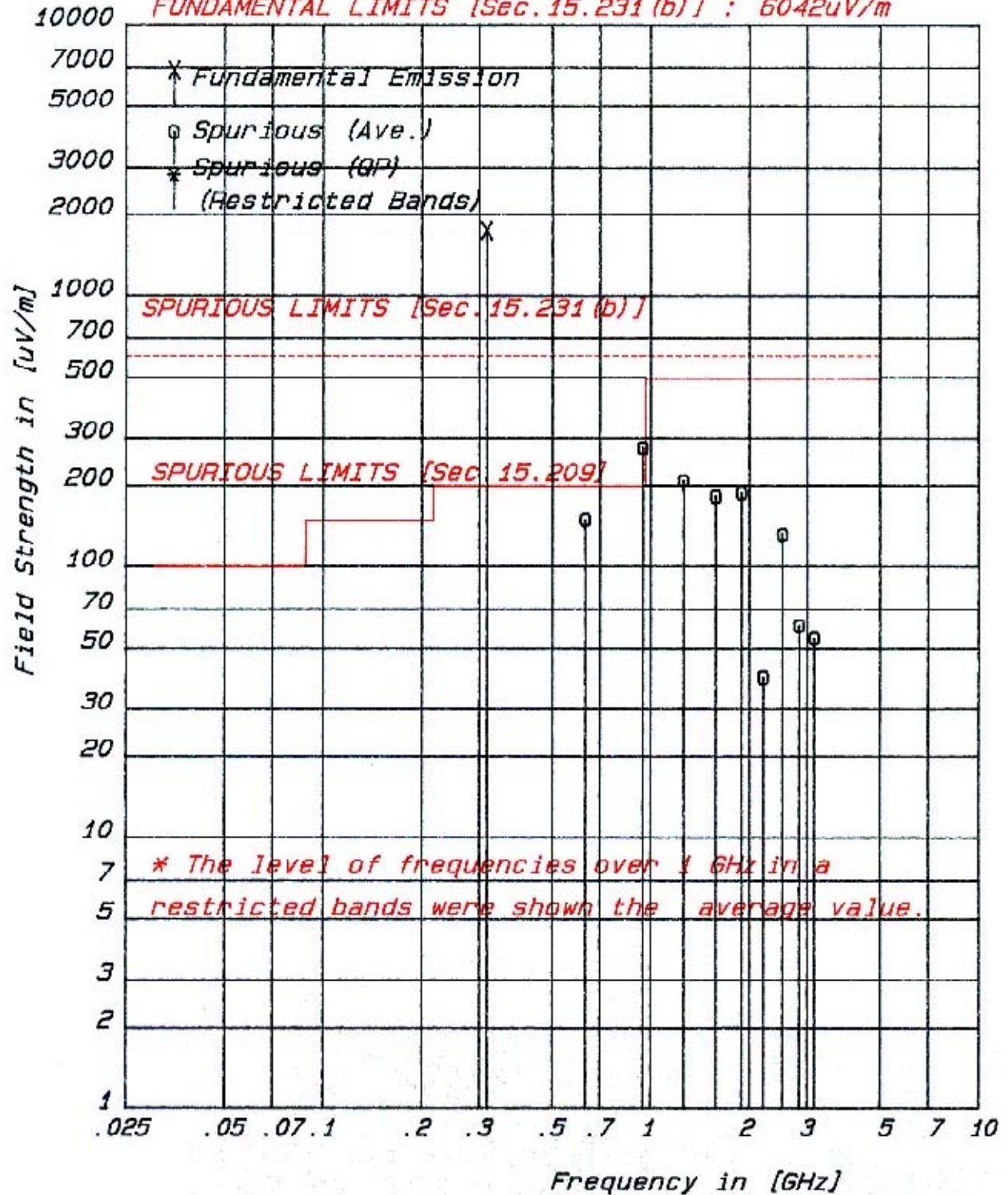
$$\text{Factor is } 20\log(0.5660) = -4.9 \text{ dB}$$

Radiated Fundamental & Spurious Emissions

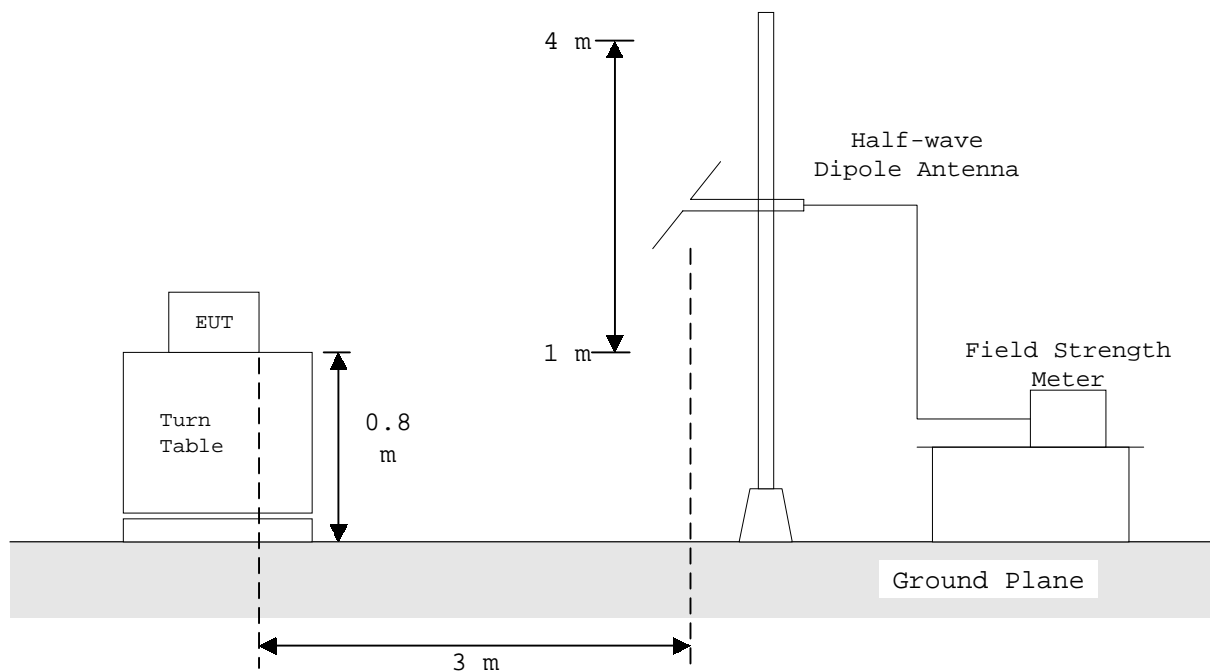
FCC ID : OBIC9483TX

Operating Frequency : 315 MHz

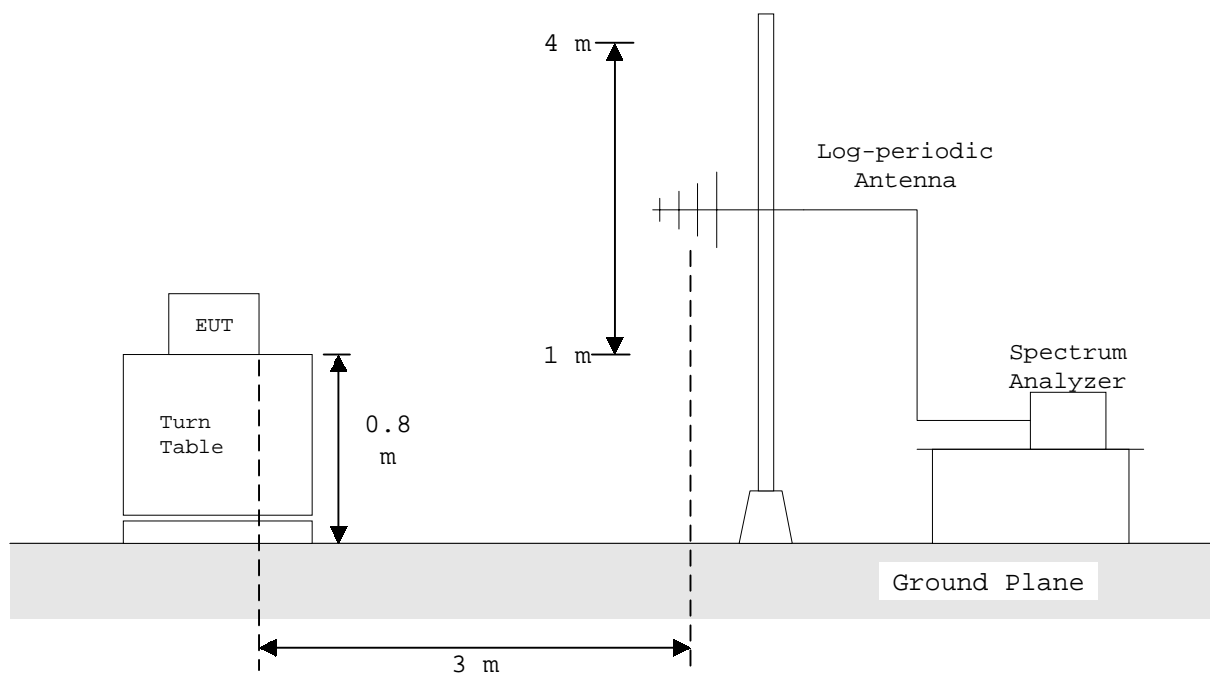
FUNDAMENTAL LIMITS [Sec.15.231(b)] : 6042uV/m



MESUREMENT SET-UP FOR UP TO 1 GHz



MESUREMENT SET-UP FOR ABOVE 1 GHz





Horizontal Plane



Vertical Plane

2. Emission Limitation: [§15.231(c)]

Measurement Method Employed: By using a spectrum analyzer with a vertical antenna for picking up the signal, the measurements of the fundamental frequency were made under the following transmitting modes of the EUT.

Measurements Results :

Specified Limits: 0.25 % of the Fundamental Frequency
 $315 \text{ MHz} \times 0.0025 = 787.5 \text{ kHz}$

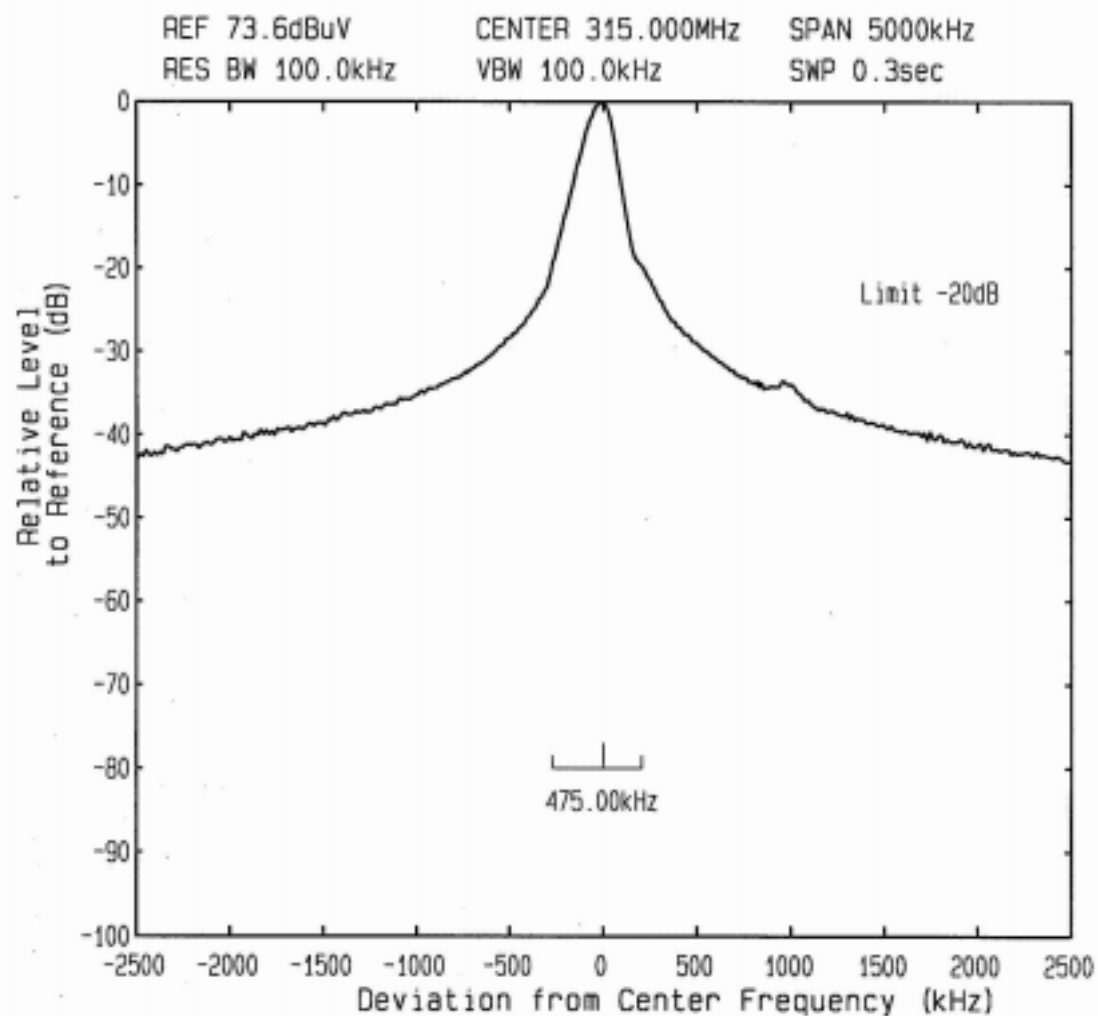
Refer to the attached graphs.

Emission Limitation

FCC ID : OBIC9483TX

Model : C9483

Mode of EUT : Transmit

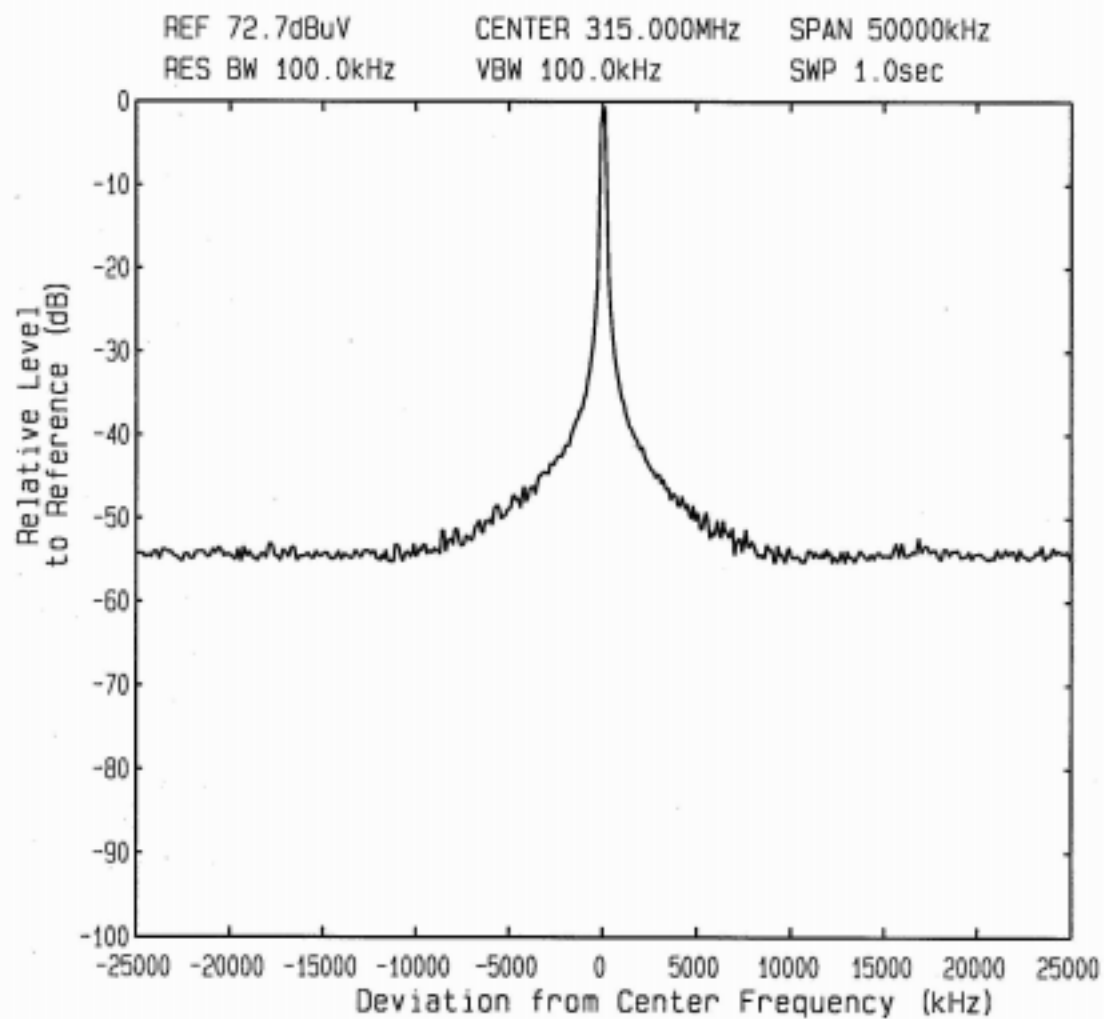


Emission Limitation

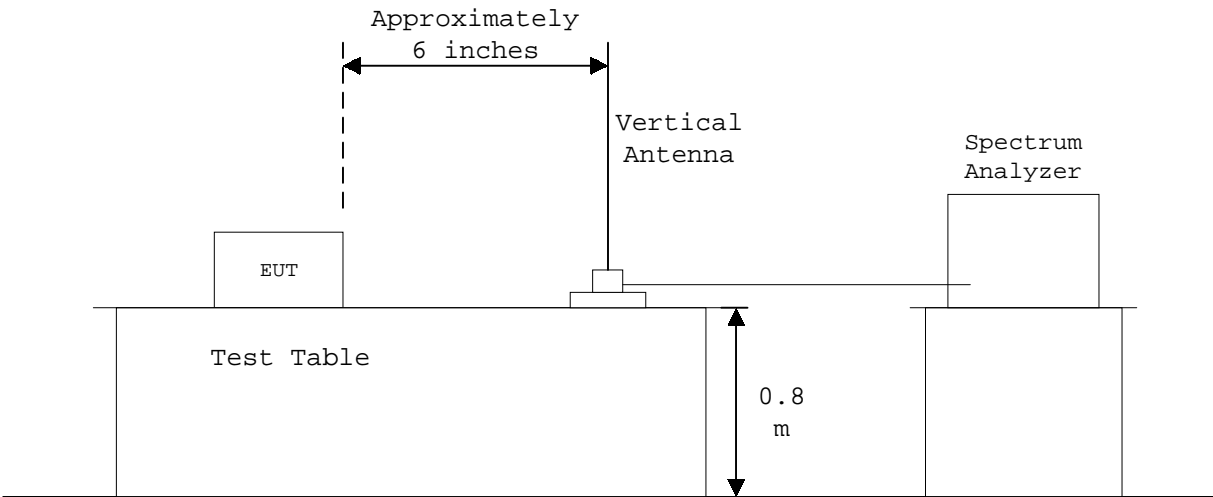
FCC ID : OBIC9483TX

Model : C9483

Mode of EUT : Transmit



MESUREMENT SET-UP FOR BAND WIDTH



LIST OF MEASUREMENT EQUIPMENT

<u>Equipment (Model No.)</u>	<u>Manufacturer</u>	<u>Date of Cal.</u>
1. Field Strength Meter		
ESVP	Rohde & Schwarz	May 1998
2. Spectrum Analyzer		
8566B	Hewlett Packard Inc.	April 1998
3. Tuned Dipole Antenna		
KBA-511	Kyoritsu Electrical Works	November 1998
KBA-611	Kyoritsu Electrical Works	November 1998
4. Vertical Antenna		
91972-2	Stoddard Aircraft Radio Co., Ltd.	-
5. Log-periodic Antenna		
HL 025	Rohde & Schwarz	November 1998