



JAPAN QUALITY ASSURANCE ORGANIZATION
2096, OHYATA, TSURU-SHI, YAMANASHI 402, JAPAN
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FCC ID:MOZRI-4ETY

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REPORT OF MEASUREMENTS

Date : February 19, 1999
Issue in : Yamanashi, Japan

JQA APPLICATION NO.: 85-80827

1. Applicant : TOKAI RIKA CO., LTD.
260, Toyota 3-chome, Oguchi-cho
Niwa-gun, Aichi-ken 480-0195 Japan
2. Manufacturer : TOKAI RIKA CO., LTD.
260, Toyota 3-chome, Oguchi-cho
Niwa-gun, Aichi-ken 480-0195 Japan
3. Description of Equipment : Car Immobilizer
 - a) FCC ID : MOZRI-4ETY
 - b) Trade Name : -
 - c) Model No. : RI-4ETY
 - d) Power Supply : 12.0 VDC
4. Applicable Rule : FCC Rules & Regulations Part 15
Subpart C (June 23, 1989)
5. Place of Measurement : JQA EMC Engineering Dept.
Tsuru Branch
6. Date of Measurement : February 15, 1999
7. Total Pages of This Report : 9 (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.


Masaaki Takahashi, Director
Tsuru Branch
JQA EMC Engineer Dept.

1. Radiated Field Strength and Harmonic Emission: [§15.209]

Measurement Method Employed: The field strength measurements of the immobilizer system fundamental and harmonics radiation were made at the distance of 30 meters away from the system under test which was placed on the wooden turntable 0.8 meter in height.

The receiving loop antenna was positioned with its plane vertical at 30 meters from the system and rotated about its vertical axis for maximum response at each azimuth about the system.

The center of loop antenna was set to 1 meter above ground. The wooden turntable was rotated through 360 degrees and the system under test was tested by positioned three orthogonal planes, to obtain the highest reading on the field strength meter.

The results were shown the maximum value.

Measurement Results:

Operating Frequency : 134.2 kHz
Distance of Measurement : 30 meters

Frequency (MHz)	Antenna Factor (dB)	Meter Reading (dB/uV)	Field Strength (dB/uV/m)
0.1342	10.7	< 20.0	< 30.7
0.2684	10.6	< 20.0	< 30.6
0.4026	10.6	< 20.0	< 30.6
0.5368	10.6	< 20.0	< 30.6
0.6710	10.6	< 20.0	< 30.6
0.8052	10.5	< 20.0	< 30.5
0.9394	10.4	< 20.0	< 30.4
1.0736	10.4	< 20.0	< 30.4
1.2078	10.5	< 20.0	< 30.5
1.3420	10.5	< 20.0	< 30.5

Since, the fundamental field strength was found undetectable weak of the field strength meter.

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The distance of measurements was reduced to 10 meters.

Operating Frequency : 134.2 kHz
Distance of Measurement : 10 meters

Frequency (MHz)	Antenna Factor (dB)	Meter Reading (dB/μV)	Field Strength (dB/μV/m)
0.1342	10.7	29.9	40.6
0.2684	10.6	< 20.0	< 30.6
0.4026	10.6	< 20.0	< 30.6
0.5368	10.6	< 20.0	< 30.6
0.6710	10.6	< 20.0	< 30.6
0.8052	10.5	< 20.0	< 30.5
0.9394	10.4	< 20.0	< 30.4
1.0736	10.4	< 20.0	< 30.4
1.2078	10.5	< 20.0	< 30.5
1.3420	10.5	< 20.0	< 30.5

For fundamental, field strength was extrapolated to distance 300 meters using the formula that field strength varies as the inverse distance square (40 dB per decade of distance).

Calculation :

$$40.6 \text{ dB/uV/m} - 20 \log_{10} \left(\left(\frac{300}{10} \right)^2 \right) =$$

$$40.6 \text{ dB/uV/m} - 59.1 \text{ dB} = -18.5 \text{ dB/uV/m at 300 meters}$$

$$\begin{aligned} \text{Limits for fundamental} &= 20\log_{10}(2400/F) \quad F = \text{Frequency in kHz} \\ &= 20\log_{10}(2400/134) = \underline{25.1 \text{ dB/uV/m}} \end{aligned}$$

Measuring Instruments Setting :

Frequency Range : 110 kHz to 490 kHz
 Detector Function : Average
 IF Bandwidth : 10 kHz

Frequency Range : 536.8 kHz to 1340 kHz
 Detector Function : CISPR QP
 IF Bandwidth : 9 kHz

2. Radiated Spurious Emissions [§15.209]

Frequency (MHz)	Antenna Factor (dB)	MeterReading		Limits (dB/uV/m)	Field strength at 3 m	
		Horiz. (dB/uV)	Vert. (dB/uV)		Horiz. (dB/uV/m)	Vert. (dB/uV/m)
30.000	18.7	< -2.0	1.7	40.0	<16.7	20.4
40.400	14.7	-1.5	7.2	40.0	13.2	21.9
47.700	12.4	1.7	18.8	40.0	14.1	31.2
51.400	11.2	11.7	24.8	40.0	22.9	36.0
52.500	10.9	2.6	20.9	40.0	13.5	31.8
57.100	9.5	3.0	17.0	40.0	12.5	26.5
68.400	6.7	1.3	12.8	40.0	8.0	19.5
80.000	7.1	< -2.0	9.8	40.0	< 5.1	16.9
96.000	9.9	< -2.0	5.7	43.5	< 7.9	15.6
110.100	11.9	< -2.0	2.8	43.5	< 9.9	14.7
137.200	14.9	7.1	10.7	43.5	22.0	25.6
155.400	16.5	7.4	6.3	43.5	23.9	22.8
176.100	17.8	0.2	-0.2	43.5	18.0	17.6
200.000	19.1	< -2.0	< -2.0	43.5	<17.1	<17.1
230.000	20.0	< -2.0	< -2.0	46.0	<18.0	<18.0
270.000	20.2	< -2.0	< -2.0	46.0	<18.2	<18.2
309.000	17.7	8.0	1.6	46.0	25.7	19.3
377.700	19.4	11.2	4.8	46.0	30.6	24.2
412.000	20.0	13.4	6.3	46.0	33.4	26.3
446.300	20.5	8.7	6.9	46.0	29.2	27.4
500.000	21.3	< -2.0	< -2.0	46.0	<19.3	<19.3
700.000	24.4	< -2.0	< -2.0	46.0	<22.4	<22.4
1000.000	28.9	< -2.0	< -2.0	54.0	<26.9	<26.9

- Note: 1. The spectrum was checked from 30 MHz to 1000 MHz.
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.
average limits.
4. Sample calculation :

at 51.4 MHz

$$AF + Mr = 11.2 + 24.8 = 36.0 \text{ dB/uV/m}$$

Where,

AF = Antenna Factor including the cable loss.

Mr = Meter Reading

5. Measuring Instrument Setting:

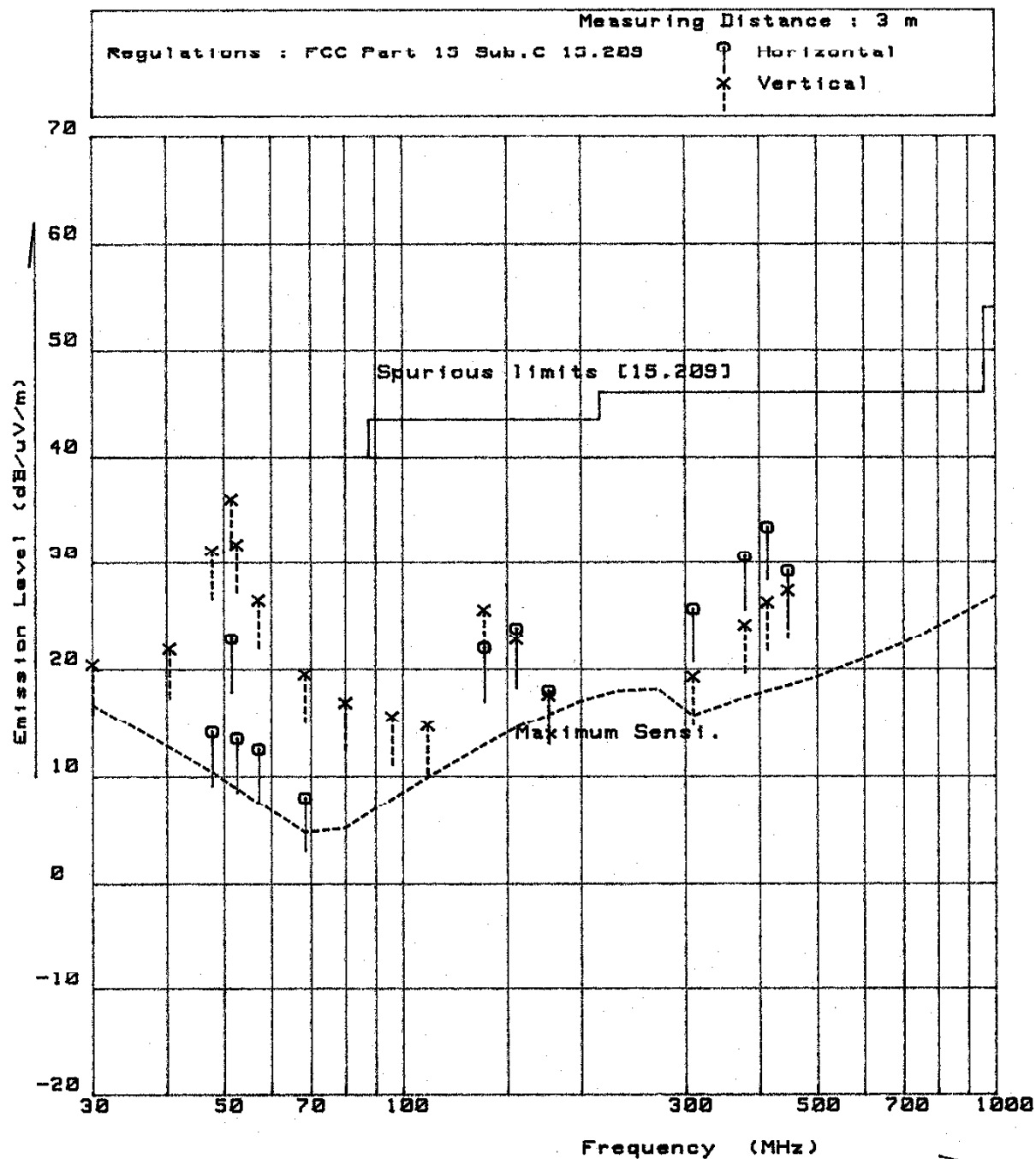
(1) Below 1000 MHz

Detector function : CISPR quasi-peak

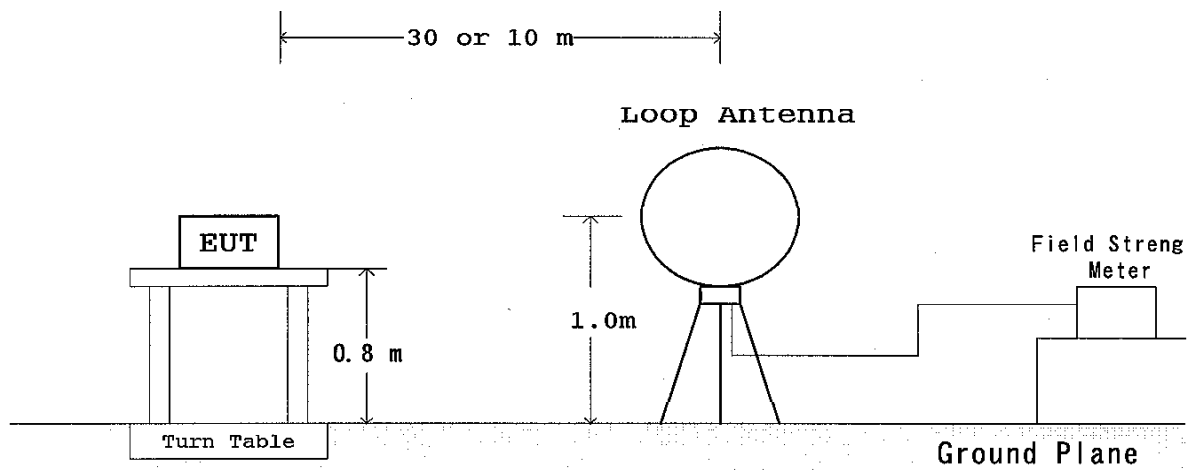
IF Bandwidth : 120 kHz

RADIATED SPURIOUS EMISSION MEASUREMENTS

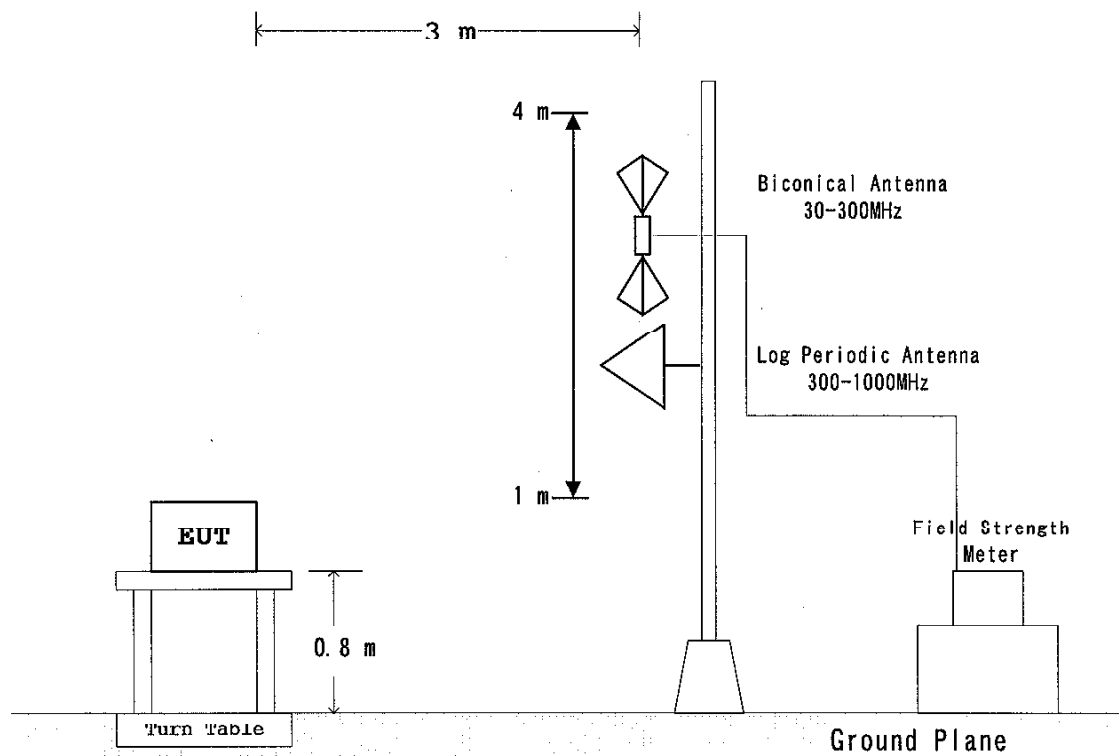
Model No.: RI-4ETY



Measuement Set Up for up to 30 MHz



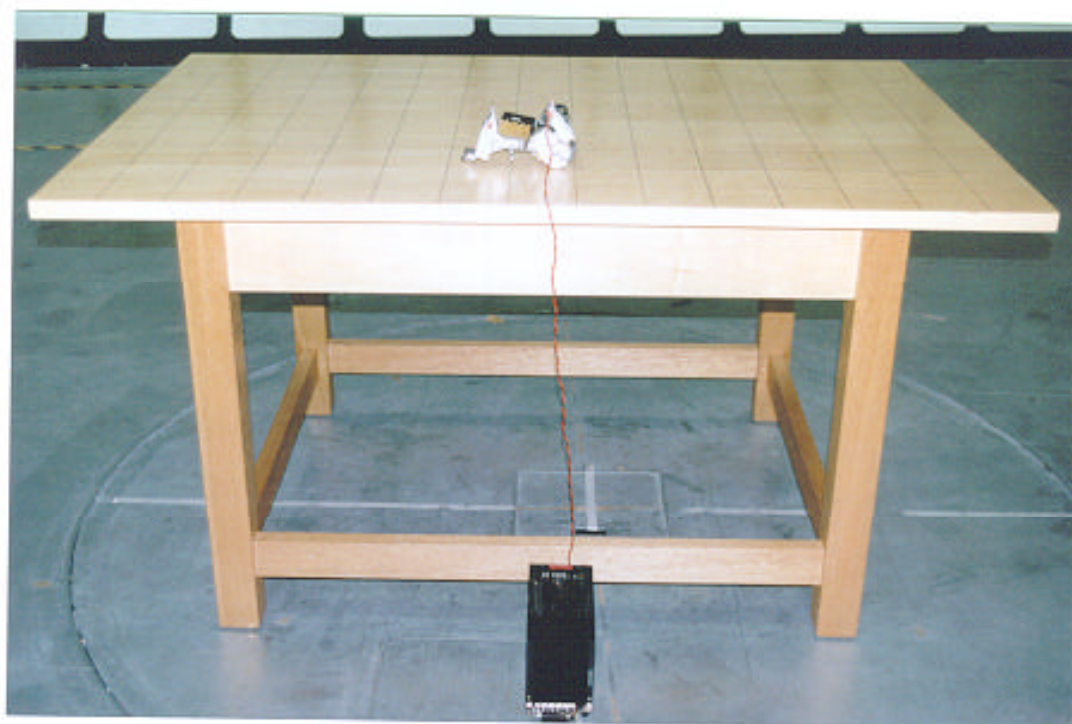
MEASUREMENT SET-UP FOR RADIATED EMISSIONS



- Front View -



- Rear View -



LIST OF MEASUREMENT EQUIPMENT

<u>Equipment (Model No.)</u>	<u>Manufacturer</u>	<u>Date of Cal.</u>
1. Field Strength Meter		
ESH3	Rohde & Schwarz	May 1998
2. Field Strength Meter		
ESV	Rohde & Schwarz	May 1998
3. DC Power Supply		
PAB 18-2.5DU	KIKUSUI ELECTRONICS CORP	--
4. Loop Antenna		
6502	Electro-Mechanics	Sep. 1998
5. Biconical Antenna		
BBA9106	Schwarzbeck	May 1998
6. Log-periodic Antenna		
UHALP9107	Schwarzbeck	May 1998