



JAPAN QUALITY ASSURANCE ORGANIZATION

21-25, KINUTA 1-CHOME, SETAGAYA-KU, TOKYO 157-8573 JAPAN
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JQA APPLICATION NO.: 400-90678

Issue Date : February 2, 2000

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EMI TEST REPORT

JQA APPLICATION NO. : 400-90678

Model No. : TD3531

Type of Equipment : Radio Controlled Toy

Regulations Applied : CFR 47 FCC Rules and Regulations Part 15

FCC ID : CVTTD3531

Applicant : NIKKO CO., LTD.

Address : 1-7-14, Mizumoto, Katsushika-ku,
Tokyo 125-0032, Japan

Manufacture : NIKKO TEC INTERNATIONAL LTD.

Address : Room 812, Houston Center, 63 Mody Road,
Tsimshatsui, Kowloon, Hong Kong

Final Judgment : Passed

TEST RESULTS IN THIS REPORT are obtained in use of equipment that is traceable to Electrotechnical Lab. of MITI Japan and Communications Research Lab. of MPT Japan.

The test results only respond to the tested sample. It is not allowed to copy this report even partly without the allowance of the JQA EMC Engineering Dept. Testing Div.



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1 DOCUMENTATION**1.1 TEST REGULATION**

FCC Rules and Regulations Part 15 Subpart A and C (June 23, 1989) Intentional Radiators

Test procedure :

AC power line conducted emission, radiated emission, frequency stability and occupied bandwidth tests were performed according to the procedures in ANSI C63.4-1992.

1.2 GENERAL INFORMATION**1.2.1 Test facility :**

1) Test Facility located at EMC Engineering Dept. Testing Div. : No.2 and 3 Anechoic Chambers(3 meters Site)

FCC filing No. : 31040/SIT 1300F2

2) EMC Engineering Dept. Testing Div. is recognized under the National Voluntary Laboratory accreditation Program for satisfactory compliance established in title 15, Part 285 Code of Federal Regulations.

NVLAP Lab Code : 200189-0 (Effective through : June 30, 2000)

1.2.2 Description of the Equipment Under Test (EUT) :

- | | |
|--------------------------------------|--|
| 1) Type of Equipment | : Radio Controlled Toy |
| 2) Product Type | : Pre-Production |
| 3) Category | : Low Power Communication Device Transmitter |
| 4) EUT Authorization | : Certification |
| 5) FCC ID | : CVTTD3531 |
| 6) Trade Name | : NIKKO |
| 7) Model No. | : TD3531 |
| 8) Operating Frequency Range | : 26.995 MHz - 27.255 MHz |
| 9) Highest Frequency Used in the EUT | : 27.145 MHz |
| 10) Serial No. | : None |
| 11) Date of Manufacture | : - |
| 12) Power Rating | : DC 9.0V(Battery) |
| 13) EUT Grounding | : None |

1.2.3 Definitions for symbols used in this test report :

- x - indicates that the listed condition, standard or equipment is applicable for this report.
- indicates that the listed condition, standard or equipment is not applicable for this report.

1.3 TEST CONDITION

1.3.1 The measurement of the AC Power Line Conducted Emission

☐ - was performed in the following test site.

☒ - was not applicable.

Test location :

Safety Testing Center EMC Engineering Dept. Testing Div.
21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

☐ - Shielded Enclosure

☐ - Anechoic Chamber No. 2 (portable Type)

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
☐ - Field Strength Meter	ESH-2	Rohde & Schwarz	880370/016	May 1999	1 Year
☐ - Field Strength Meter	ESH-3	Rohde & Schwarz	881460/016	May 1999	1 Year
☐ - Field Strength Meter	ESH-3	Rohde & Schwarz	881460/030	Nov 1999	1 Year
☐ - LISN	KNW-407	Kyoritsu Electrical	8-833-6	Apr. 1999	1 Year
☐ - LISN	KNW-407	Kyoritsu Electrical	8-855-2	Apr. 1999	1 Year
☐ - LISN	KNW-407	Kyoritsu Electrical	8-757-1	Apr. 1999	1 Year
☐ - RF Cable	3D-2W	Fujikura	155-21-005E0	Apr. 1999	1 Year
☐ - RF Cable	3D-2W	Fujikura	155-21-006E0	Apr. 1999	1 Year

1.3.2 The measurement of the Radiated Emission(30 MHz - 1000 MHz)

 x - was performed in the following test site.

 - was not applicable.

Test location :

Safety Testing Center EMC Engineering Dept. Testing Div.
21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

 x - Anechoic Chamber No. 2 (3 meters)

 - Anechoic Chamber No. 3 (3 meters)

Validation of Site Attenuation :

1) Last Confirmed Date :March, 1999

2) Interval :1 year

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<u> </u> - Field Strength Meter	ESV	Rohde & Schwarz	872148/039	May 1999	1 Year
<u> </u> - Field Strength Meter	ESVP	Rohde & Schwarz	879783/030	May 1999	1 Year
<u> x </u> - Field Strength Meter	ESVP	Rohde & Schwarz	881487/004	May 1999	1 Year
<u> </u> - Field Strength Meter	ESVP	Rohde & Schwarz	881487/005	May 1999	1 Year
<u> </u> - Antenna	KBA-511A	Kyoritsu Electrical	0-201-13	Nov. 1999	1 Year
<u> x </u> - Antenna	KBA-511A	Kyoritsu Electrical	0-170-1	Nov. 1999	1 Year
<u> </u> - Antenna	KBA-611	Kyoritsu Electrical	0-210-5	Nov. 1999	1 Year
<u> x </u> - Antenna	KBA-611	Kyoritsu Electrical	0-147-14	Nov. 1999	1 Year
<u> x </u> - RF Cable	5D-2W	Fujikura	155-21-001E0	Feb. 1999	1 Year
<u> </u> - RF Cable	5D-2W	Fujikura	155-21-002E0	Feb. 1999	1 Year

1.3.3 The measurement of the Radiated Emission(Above 1000 MHz)

- ☐ - was performed in the following test site.
☒ - was not applicable.

Test location :

Safety Testing Center EMC Engineering Dept. Testing Div.
 21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

- ☐ - No. 2 site (3 meters)
☐ - No. 3 site (3 meters)

Validation of Site Attenuation :

- 1) Last Confirmed Date :March, 1999
 2) Interval :1 year

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
☐ - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Apr. 1999	1 Year
☐ - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	May 1999	1 Year
☐ - Log-Periodic Antenna	HL 025	Rohde & Schwarz	340182/015	Nov. 1999	1 Year
☐ - RF Cable	S-04272B	Suhner	155-21-011E0	May 1999	1 Year

1.3.4 The measurement of the Frequency Stability☐ - was performed.☒ - was not applicable.**Used test instruments :**

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
☐ - Frequency Counter	53131A	Hewlett Packard	3546A11807	June 1999	1 Year
☐ - Oven	-	Ohnishi Co. Ltd.	-	Aug. 1999	1 Year
☐ - DC Power Supply	6628A	Hewlett Packard	3224A00284	July 1999	1 Year

1.3.5 The measurement of the Occupied Bandwidth☒ - was performed.☐ - was not applicable.**Used test instruments :**

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
☒ - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Apr. 1999	1 Year
☐ - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	May 1999	1 Year
☐ - Function Generator	3325A	Hewlett Packard	2512A21776	June 1999	1 Year
☐ - FM Linear Detector	MS61A	Anritsu Corp.	M77486	Sep. 1999	1 Year
☐ - Level Meter	ML422C	Anritsu Corp.	M87571	June 1999	1 Year



1.4 EUT MODIFICATION

- ☒ -No modifications were conducted by JQA to achieve compliance to Class B levels.
☐ -To achieve compliance to Class B levels, the following changes were made by JQA during the compliance test.

The modifications will be implemented in all production models of this equipment.

Applicant :

Date :

Typed Name :

Position :

COPY



1.5 TEST RESULTS

AC Power Line Conducted Emission

☐ - Applicable ☒ - NOT Applicable

The requirements are

☐ - PASSED ☐ - NOT PASSED

Remarks :

Radiated Emission [§15.227]

☒ - Applicable ☐ - NOT Applicable

The requirements are

☒ - PASSED ☐ - NOT PASSED

Remarks:

Frequency Stability

☐ - Applicable ☒ - NOT Applicable

The requirements are

☐ - PASSED ☐ - NOT PASSED

Remarks:

Occupied Bandwidth [§15.215(c)]

☒ - Applicable ☐ - NOT Applicable

The requirements are

☒ - PASSED ☐ - NOT PASSED

Remarks:

1.6 SUMMARY

General Remarks :

The EUT was tested according to the requirements of FCC Rules and Regulations Part 15 Subpart A and C (June 23, 1989) under the test configuration, as shown in clause 1.7 to 1.9.

The conclusion for the test items of which are required by the applied regulation is indicated under the final judgment.

Final Judgment :

The "as received" sample;

- x - fulfill the test requirements of the regulation mentioned on clause 1.1.
- fulfill the test requirements of the regulation mentioned on clause 1.1, but with certain qualifications.
- doesn't fulfill the test regulation mentioned on clause 1.1.

Begin of testing : January 20, 2000

End of testing : January 24, 2000

- JAPAN QUALITY ASSURANCE ORGANIZATION -

Signatories:



Masaaki Takahashi
Manager
JQA EMC Engineering Dept.



Shigeru Osawa
Assistant Manager
JQA EMC Engineering Dept.

1.7 TEST CONFIGURATION / OPERATION OF EUT

1.7.1 Test Configuration

The equipment under test (EUT) consists of :

Item	Manufacturer	Model No.	FCC ID	Serial No.
Radio Controlled Toy	NIKKO TEC INTERNATIONAL LTD.	TD3531	CVTTD3531	None

1.7.2 Operating condition

Power supply Voltage : 9.0 VDC(Battery)

The tests have been carried out under the transmitting condition.

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1.8 PRELIMINARY TEST AND TEST-SETUP (DRAWINGS)

1.8.1 AC Power Line Conducted Emission (450 kHz - 30 MHz) :

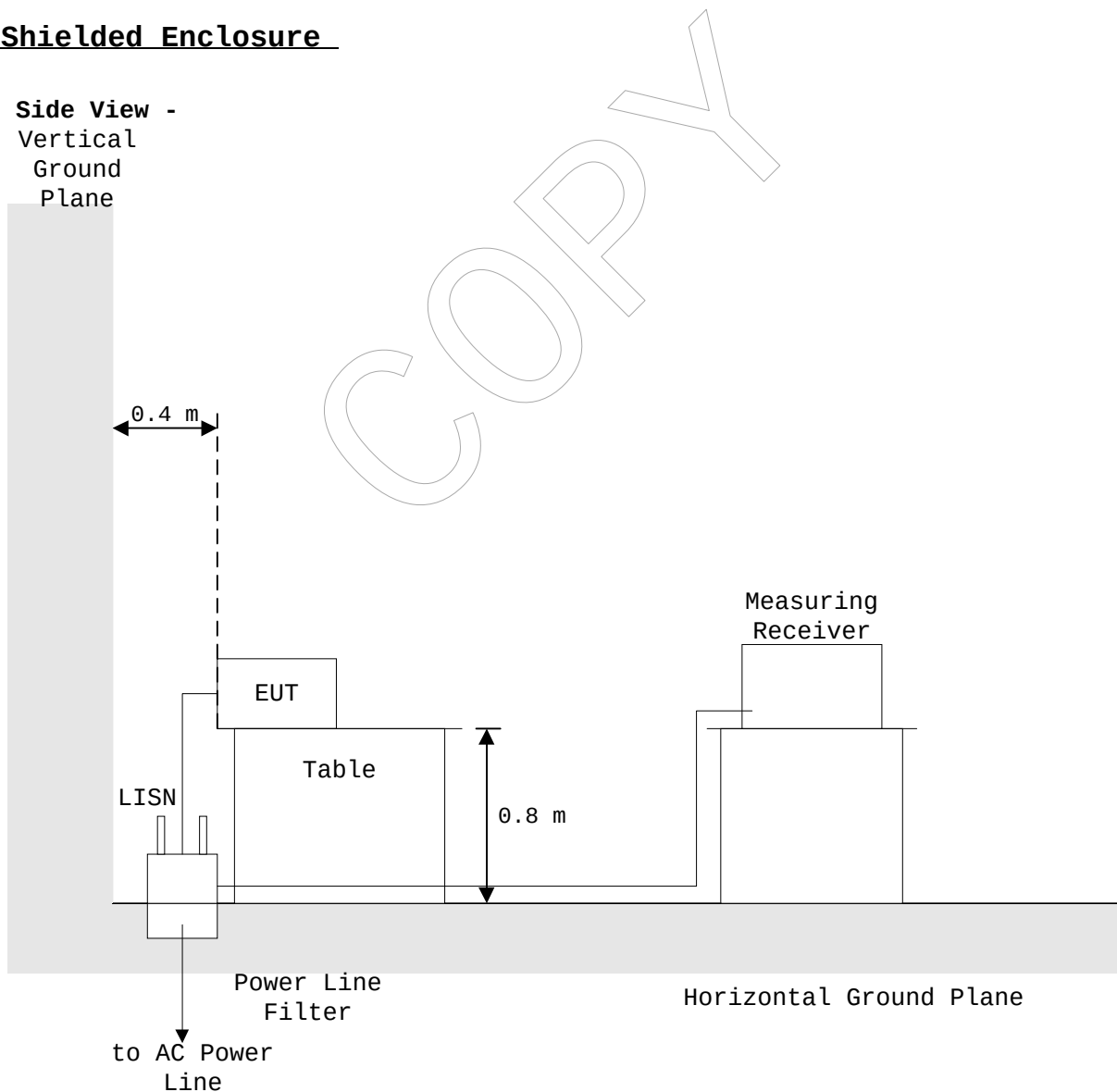
According to description of ANSI C63.4-1992 sec.13.1.3.1, the AC power line preliminary conducted emissions measurements were carried out.

The preliminary conducted measurements were performed using the spectrum analyzer to observe the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for final AC power line conducted emissions measurements.

Shielded Enclosure

- Side View -
Vertical
Ground
Plane



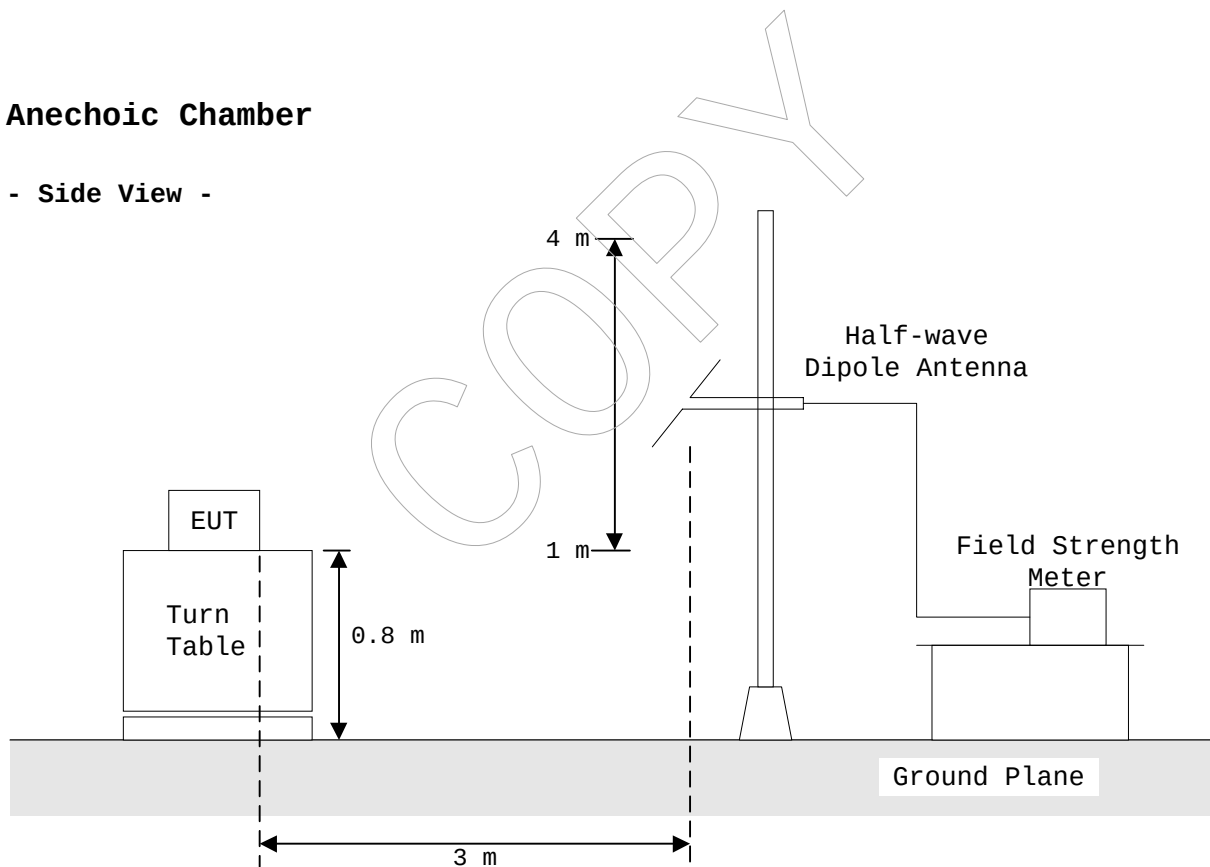
1.8.2 Radiated Emission (30 MHz - 1000 MHz) :

According to description of ANSI C63.4-1992 sec.13.1.4.1, the preliminary radiated emissions measurement were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements.

Anechoic Chamber

- Side View -



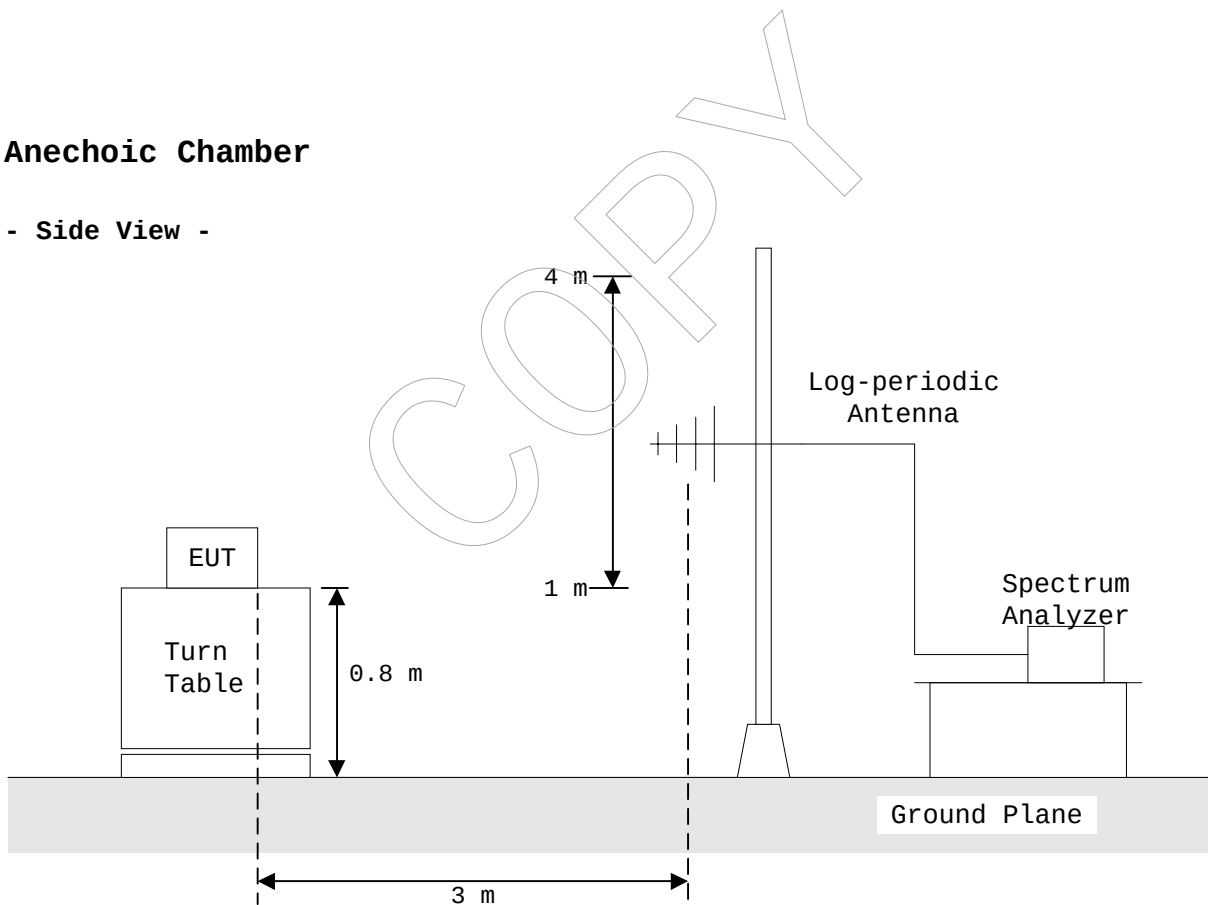
1.8.3 Radiated Emission (Above 1 GHz) :

According to description of ANSI C63.4-1992 sec.13.1.4.1, the preliminary radiated emissions measurements were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements.

Anechoic Chamber

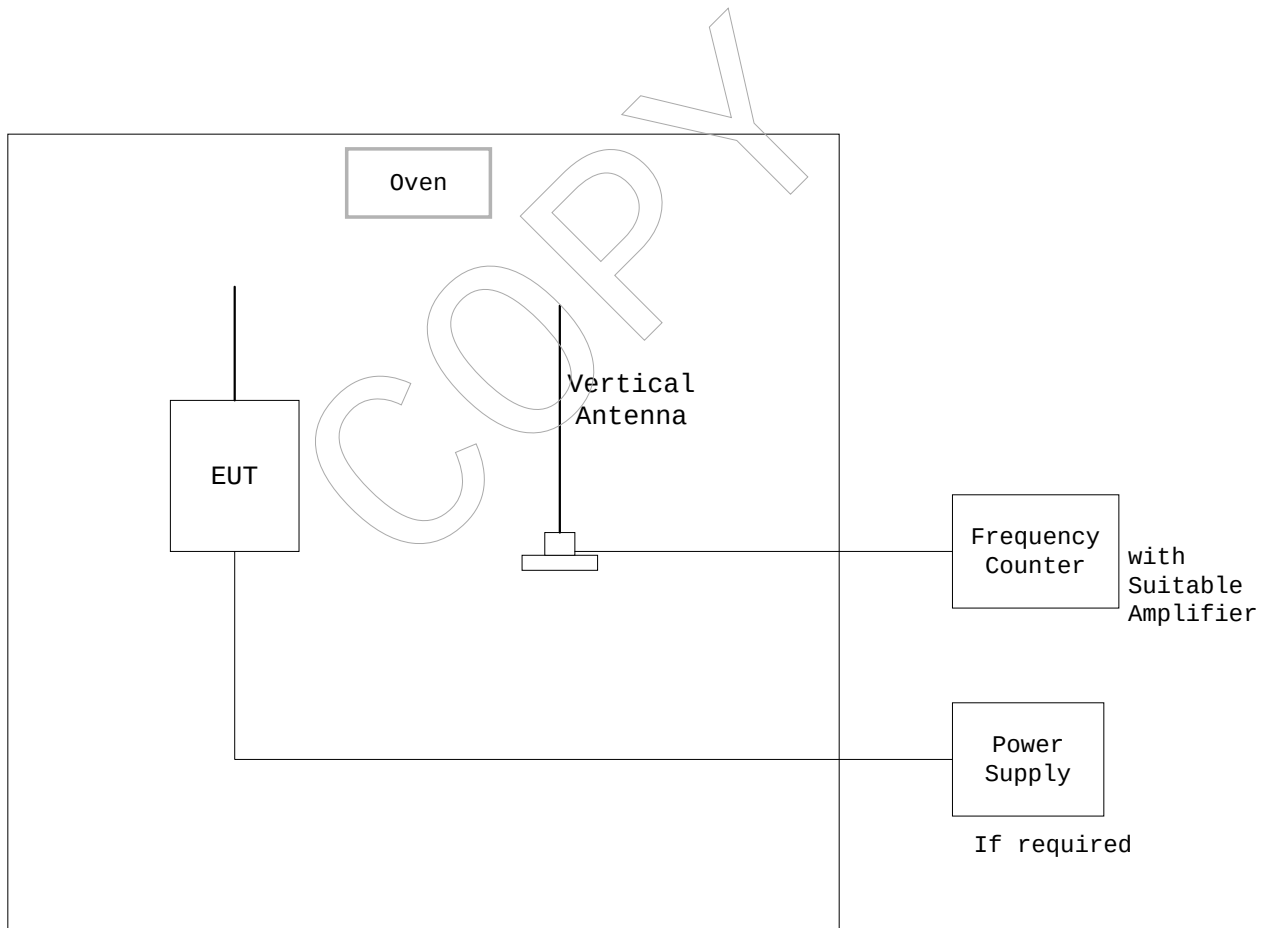
- Side View -



1.8.4 Frequency Stability :

According to description of ANSI C63.4-1992 sec.13.1.5 and sec.13.1.6, the frequency stability measurements were carried out. By using frequency counter with suitable RF amplifier, the carrier frequency of the transmitter under test was measured with a temperature variation of -20°C to $+50^{\circ}\text{C}$ at the normal supply voltage, and if required, with a variation in the primary voltage from 85 % to 115 % the rated supply voltage at the temperature of $+20^{\circ}\text{C}$.

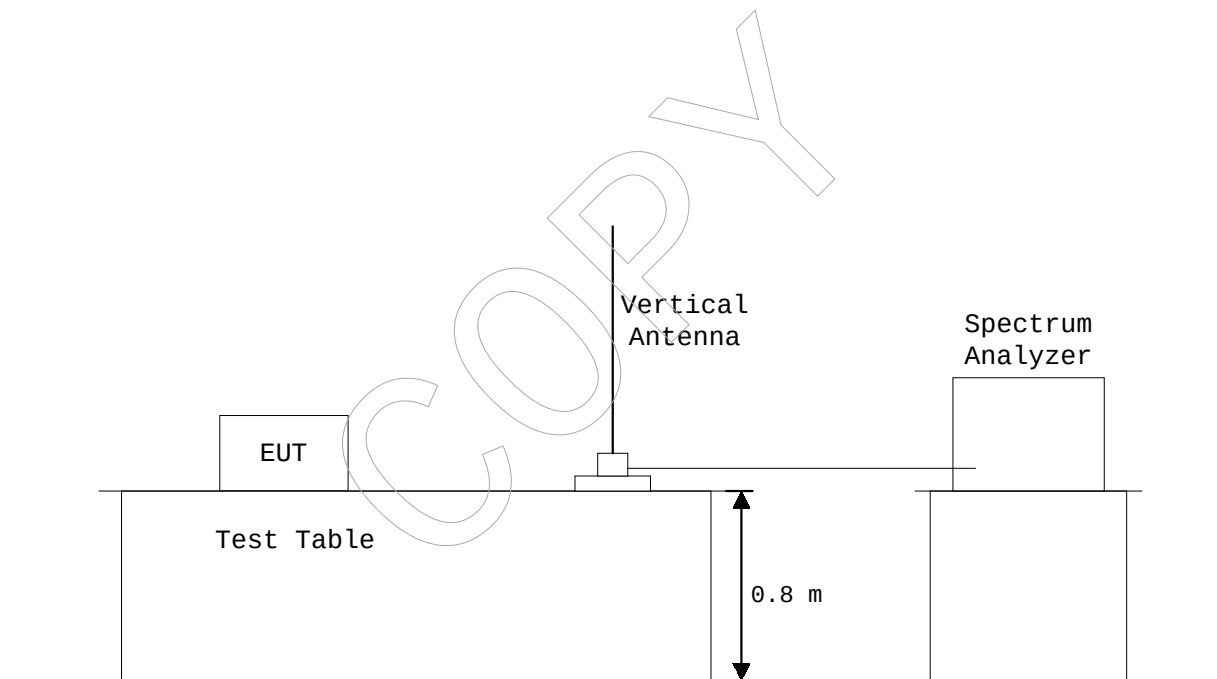
These measurements were carried out after allow sufficient time (approximately 1 hour) for the temperature of the chamber to stabilize.



1.8.5 Occupied Bandwidth :

According to description of ANSI C63.4-1992 sec.13.1.7, the occupied bandwidth measurements were carried out. By using a spectrum analyzer with a vertical antenna for picking up the signal, the measurements of the emission were made under the transmitting modes of the EUT.

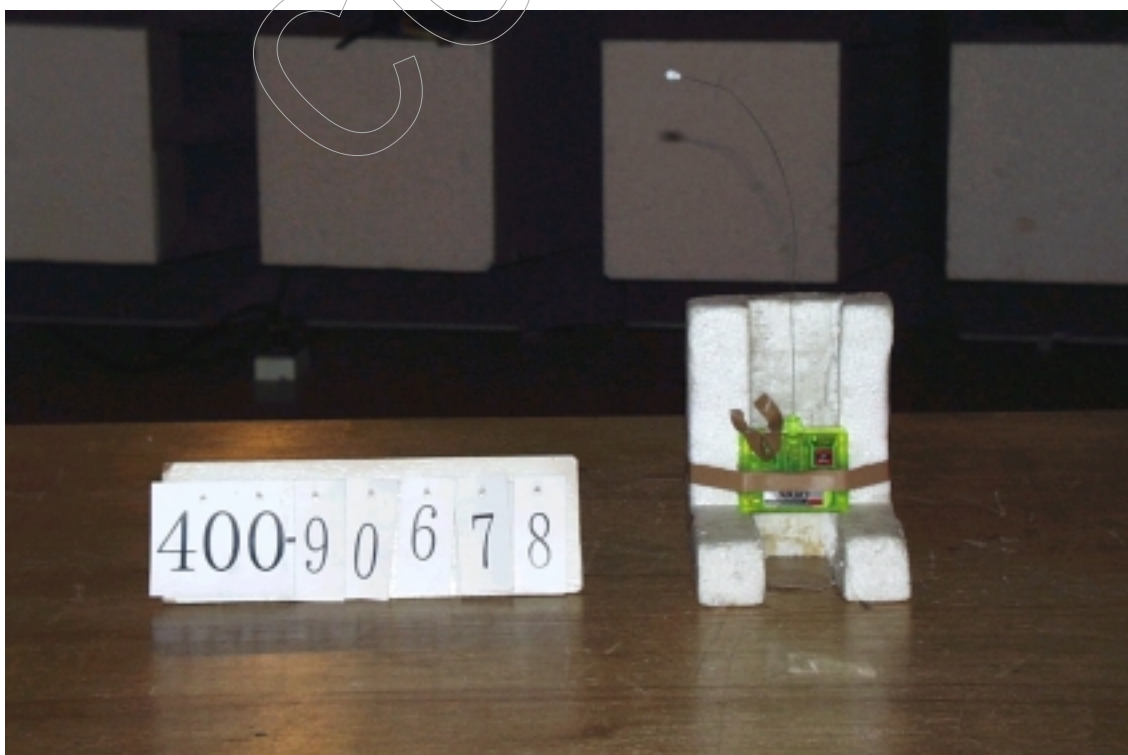
The resolution bandwidth of spectrum analyzer was set to the value specified in sec.13.1.7.



1.9 TEST ARRANGEMENT (PHOTOGRAPHS)

PHOTOGRAPHS OF EUT CONFIGURATION FOR RADIATED EMISSIONS MEASUREMENT

Photograph present configuration with maximum emission





TEST DATA

2.2 Radiated Emissions Measurement

Date : January 20, 2000Temp.: 20 °C Humi.: 47 %

Operating Frequency : 27.145 MHz

Distance of Measurement : 3.0 meters

Antenna		Meter Reading		Field Strength at 3 m			
Frequency	Factor	Horiz.	Vert.	Limits	Horiz.	Vert.	
(MHz)	(dB/m)	(dBμV)	(dBμV)	(dBμV/m)	(dBμV/m)	(dBμV/m)	
Fundamental							
27.145	-2.0	49.4	60.2	80.0	47.4	58.2	(Average)
27.145	-2.0	54.6	65.1	100.0	52.6	63.1	(Peak)
Harmonics & other Frequency components							
54.290	4.3	15.4	13.5	40.0	19.7	17.8	
81.435	8.1	8.3	11.1	40.0	16.4	19.2	
108.580	10.7	3.9	2.0	43.5	14.6	12.7	
135.725	12.8	0.1	< 0.0	43.5	12.9	< 12.8	
162.870	14.5	1.0	< 0.0	43.5	15.5	< 14.5	
190.015	15.9	2.0	< 0.0	43.5	17.9	< 15.9	
217.160	17.2	6.8	2.9	46.0	24.0	20.1	
244.305	18.3	3.8	2.3	46.0	22.1	20.6	
271.450	19.4	< 0.0	< 0.0	46.0	< 19.4	< 19.4	
298.595	20.3	< 0.0	< 0.0	46.0	< 20.3	< 20.3	
325.740	21.1	< 0.0	< 0.0	46.0	< 21.1	< 21.1	
352.885	21.9	< 0.0	< 0.0	46.0	< 21.9	< 21.9	
380.030	22.6	< 0.0	< 0.0	46.0	< 22.6	< 22.6	
407.175	23.3	< 0.0	< 0.0	46.0	< 23.3	< 23.3	
434.320	24.0	< 0.0	< 0.0	46.0	< 24.0	< 24.0	
461.465	24.6	< 0.0	< 0.0	46.0	< 24.6	< 24.6	
488.610	25.1	< 0.0	< 0.0	46.0	< 25.1	< 25.1	
515.755	25.7	< 0.0	< 0.0	46.0	< 25.7	< 25.7	
542.900	26.2	< 0.0	< 0.0	46.0	< 26.2	< 26.2	
570.045	26.7	< 0.0	< 0.0	46.0	< 26.7	< 26.7	
597.190	27.2	< 0.0	< 0.0	46.0	< 27.2	< 27.2	
624.335	27.7	< 0.0	< 0.0	46.0	< 27.7	< 27.7	
651.480	28.2	< 0.0	< 0.0	46.0	< 28.2	< 28.2	
678.625	28.6	< 0.0	< 0.0	46.0	< 28.6	< 28.6	
705.770	29.1	< 0.0	< 0.0	46.0	< 29.1	< 29.1	

Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading		Limits (dBμV/m)	Field Strength at 3 m	
		Horiz. (dBμV)	Vert. (dBμV)		Horiz. (dBμV/m)	Vert. (dBμV/m)
732.915	29.6	< 0.0	< 0.0	46.0	< 29.6	< 29.6
760.060	30.0	< 0.0	< 0.0	46.0	< 30.0	< 30.0
787.205	30.4	< 0.0	< 0.0	46.0	< 30.4	< 30.4
814.350	30.9	< 0.0	< 0.0	46.0	< 30.9	< 30.9
841.495	31.3	< 0.0	< 0.0	46.0	< 31.3	< 31.3
868.640	31.7	< 0.0	< 0.0	46.0	< 31.7	< 31.7
895.785	32.1	< 0.0	< 0.0	46.0	< 32.1	< 32.1
922.930	32.5	< 0.0	< 0.0	46.0	< 32.5	< 32.5
950.075	32.9	< 0.0	< 0.0	46.0	< 32.9	< 32.9
977.220	33.3	< 0.0	< 0.0	54.0	< 33.3	< 33.3

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.

4. Sample calculation :

at 27.145 MHz

$$Af + Mr = -2.0 + 60.2 = 58.2 \text{ dB}\mu\text{V/m}$$

Where,

Af = Antenna Factor including the cable loss.

Mr = Meter Reading

5. Measuring Instrument Setting:

Fundamental

Detector function : Average/Peak

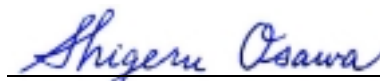
IF Bandwidth : 120 kHz

Harmonics & other Frequency components

Detector function : CISPR quasi-peak

IF Bandwidth : 120 kHz

Tested by :



Shigeru Osawa

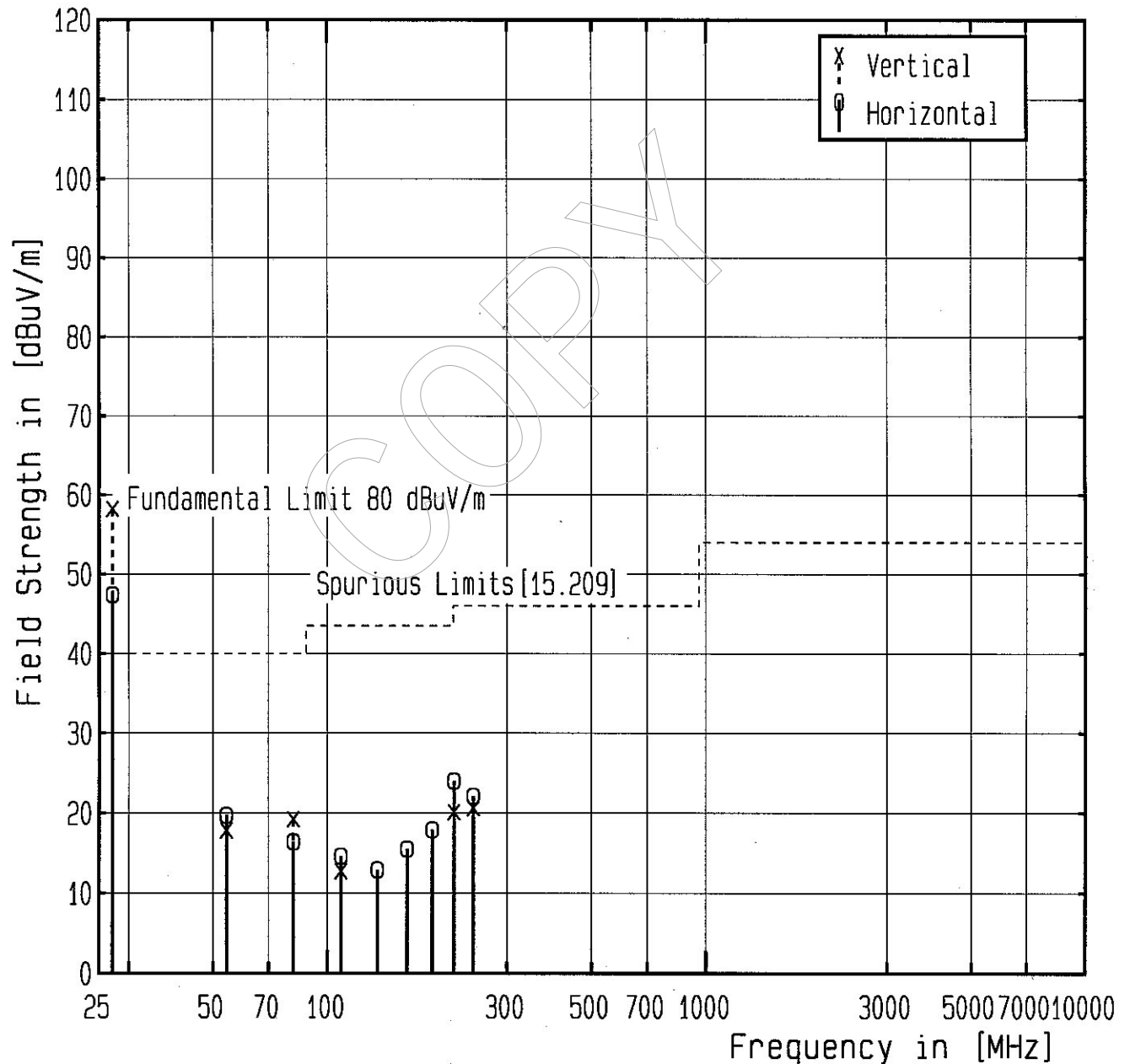
Testing Engineer

Transmitter Fundamental and Spurious Emissions

Model No. : TD3531

Operating Frequency : 27.145 MHz

Test Condition :





JQA Application No. :400-90678

Model No. :TD3531

Standard :CFR 47 FCC Rules Part 15

FCC ID :CVTTD3531

Issue Date :February 2, 2000

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2.4 Occupied Bandwidth Measurement

Date : January 24, 2000

Temp.: 23 °C Humi.: 31 %

Measurements Results : Refer to the attached graphs.

Tested by :

Shigeru Osawa

Shigeru Osawa

Testing Engineer

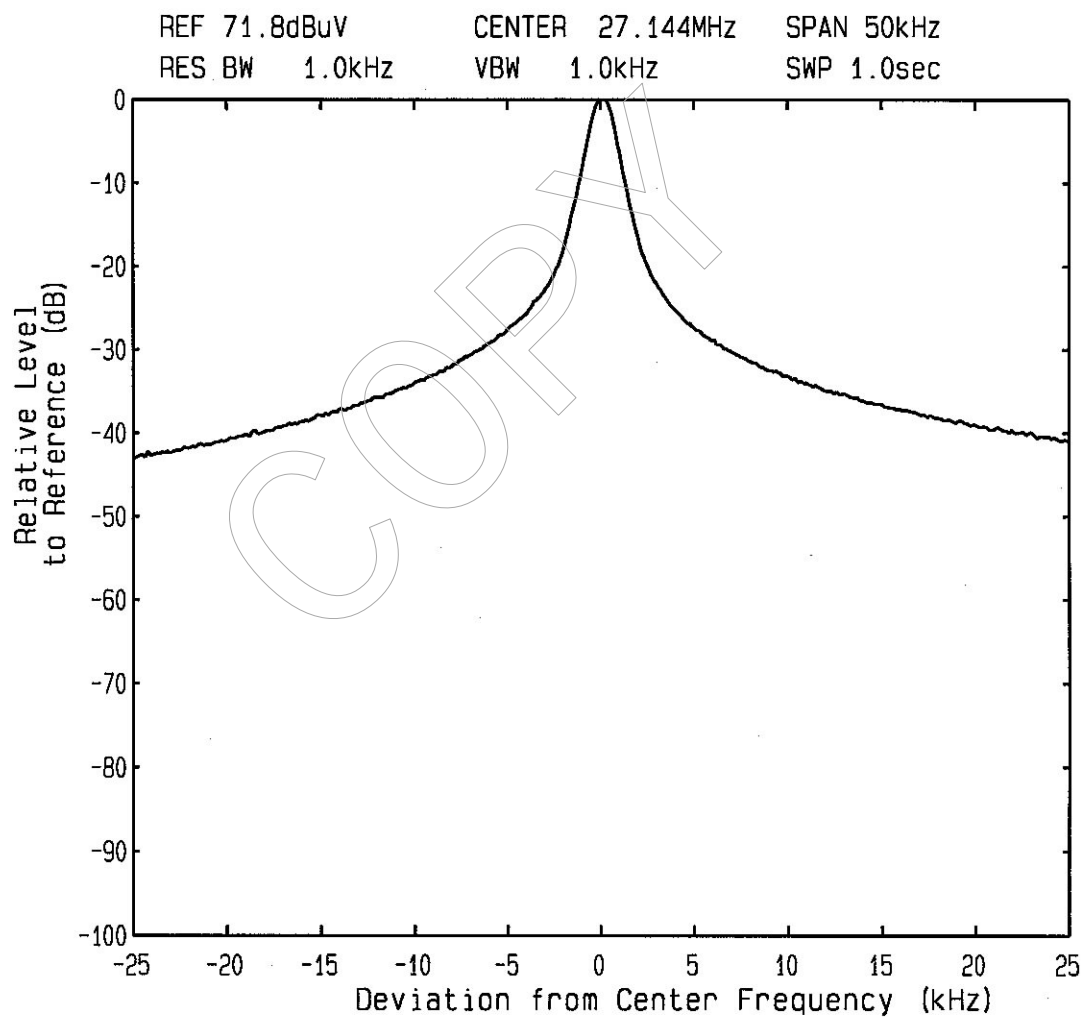
COPY

Emission Limitation

FCC ID : CVTTD3531

Model : TD3531

Mode of EUT : Forward



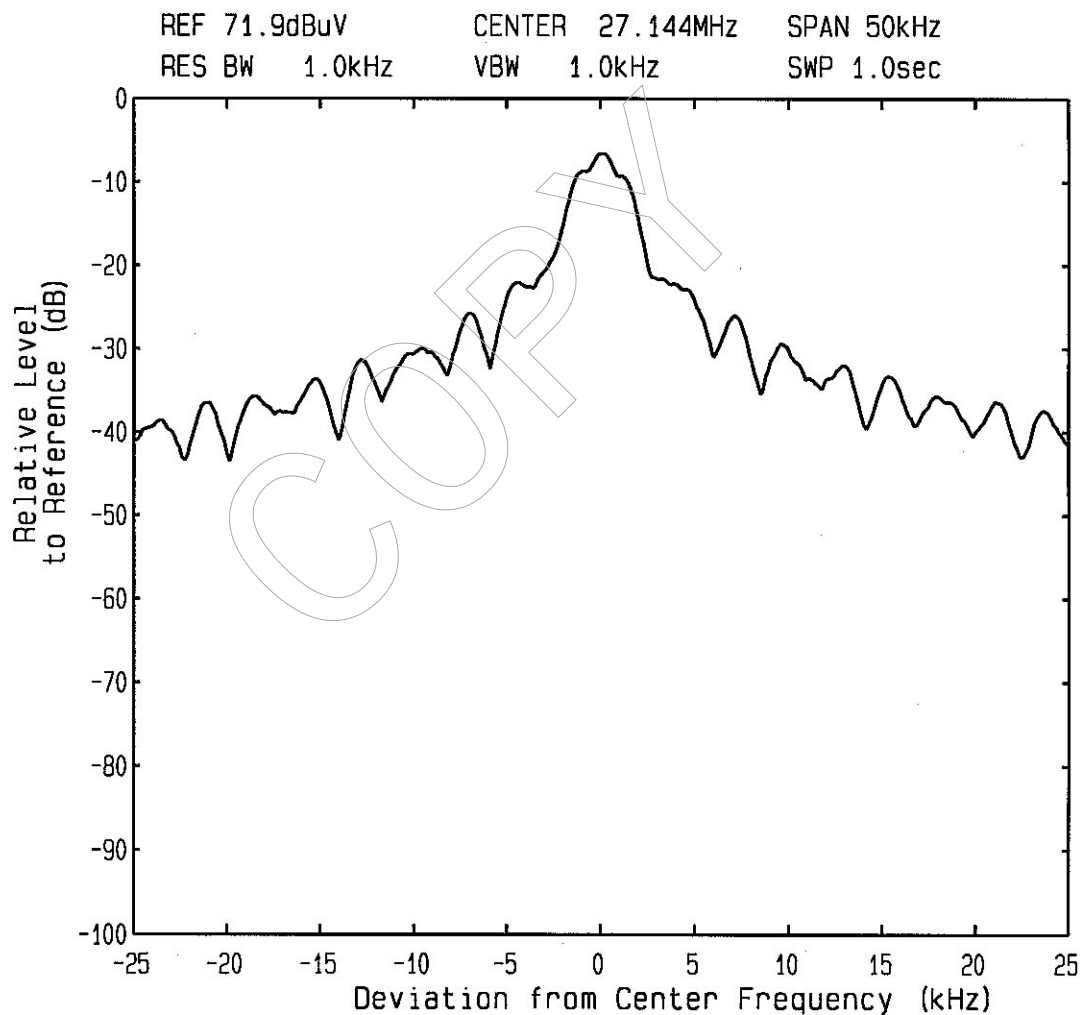


Emission Limitation

FCC ID : CVTTD3531

Model : TD3531

Mode of EUT : Reverse



Emission Limitation

FCC ID : CVTTD3531

Model : TD3531

Mode of EUT : Reverse

