JAPAN QUALITY ASSURANCE ORGANIZATION
21-25, KINUTA 1-CHOME, SETAGAYA-KU, TOKYO 157-8573 JAPAN
PHONE (03) 3416-0111, TELEX 242-2531 JQA J FAX (03) 3416-9691

EMI TEST REPORT

JQA APPLICATION NO.	: 400-00120
Model No.	: AAO6004257
Type of Equipment	: Radio Controlled Toy
Regulations Applied	: CFR 47 FCC Rules and Regulations Part 15
FCC ID	: AAO6004257
Applicant	: NIKKO CO., LTD.
Address	: 1-7-14, Mizumoto, Katsushika-ku, Tokyo 125-0032, Japan
Manufacture	: NIKKO ELECTRONICS BHD.
Address	: Plot 497 Prai Free Trade Zone, Prai Industrial Estate, 13600 Prai, Penang, Malaysia
Received date of EUT	: May 17, 2000
Final Judgment	**: Passed**

COPY

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.

TABLE OF CONTENTS

Page

1 Documentation

1.1 Test Regulation 3

1.2 General Information 3

1.3 Test Condition 4 – 7

1.4 EUT Modifications / Deviation from Standard 8

1.5 Test results 9

1.6 Summary 10

1.7 Test Configuration / Operation of EUT 11

1.8 Preliminary Test and Test-setup (Drawings) 12 – 16

1.9 EUT Arrangement (Photographs) 17

2 Test Data

2.1 AC Power Line Conducted Emission 0.45 MHz – 30 MHz N/A

2.2 Radiated Emission (Electric Field) 18 – 20

2.3 Frequency Stability N/A

2.4 Occupied Bandwidth 21 – 28

COPY

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).
   - Shielded Enclosure.
   Expiration date of FCC test facility filing : June 04, 2002

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)

COPY

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	: AAO6004257
6)	Trade Name	: Radio Shack
7)	Model No.	: AAO6004257
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.
_x_ - 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
___	Test Receiver	ESH-2	Rohde & Schwarz	880370/016	Sep. 1999	1 Year
___	Test Receiver	ESH-3	Rohde & Schwarz	881460/030	Jun. 1999	1 Year
___	LISN(for Peripheral)	KNW-407	Kyoritsu Electrical	8-833-6	Apr. 2000	1 Year
___	LISN(for EUT)	KNW-407	Kyoritsu Electrical	8-855-2	Apr. 2000	1 Year
___	LISN	KNW-407	Kyoritsu Electrical	8-757-1	Apr. 2000	1 Year
___	RF Cable	3D-2W	Fujikura	155-21-006E0	Apr. 2000	1 Year
___	RF Cable	3D-2W	Fujikura	155-21-007E0	Apr. 2000	1 Year
___	50ohm Termination	-	SUHNER	154-06-501E0	Jan. 2000	1 Year
___	50ohm Termination	-	SUHNER	154-06-502E0	Jan. 2000	1 Year

COPY

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, 2000
2) Interval :1 year

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___	Test Receiver	ESH-2	Rohde & Schwarz	880370/016	Sep. 1999	1 Year
___	Test Receiver	ESV	Rohde & Schwarz	872148/039	May 2000	1 Year
___	Test Receiver	ESVS10	Rohde & Schwarz	826148/002	Jun. 1999	1 Year
_x_	Test Receiver	ESVP	Rohde & Schwarz	881487/004	May 2000	1 Year
___	Test Receiver	ESVP	Rohde & Schwarz	881487/005	Dec. 1999	1 Year
_x_	Antenna	KBA-511A	Kyoritsu Electrical	0-170-1	Nov. 1999	1 Year
___	Antenna	KBA-511A	Kyoritsu Electrical	0-201-13	Nov. 1999	1 Year
_x_	Antenna	KBA-611	Kyoritsu Electrical	0-147-14	Nov. 1999	1 Year
___	Antenna	KBA-611	Kyoritsu Electrical	0-210-5	Nov. 1999	1 Year
___	Biconical Antenna	BBA9106	Schwarzbeck	VHA91031150	May 2000	1 Year
___	Biconical Antenna	BBA9106	Schwarzbeck	11905078E0	May 2000	1 Year
___	Log-Periodic Antenna	UHALP9107	Schwarzbeck	11905079E0	May 2000	1 Year
___	Log-Periodic Antenna	UHALP9107	Schwarzbeck	11905110	May 2000	1 Year
_x_	RF Cable	5D-2W	Fujikura	155-21-001E0	Feb. 2000	1 Year
___	RF Cable	5D-2W	Fujikura	155-21-002E0	Feb. 2000	1 Year

COPY

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

___ - was performed in the following test site.
_x_ - 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 : N/A
2) Interval : N/A

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___ -	Spectrum Analyzer	8563E	Hewlett Packard	3221A00201	May 2000	1 Year
___ -	Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Sep. 1999	1 Year
___ -	Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Apr. 2000	1 Year
___ -	RF Pre-selector	85685A	Hewlett Packard	2648A00522	Apr. 2000	1 Year
___ -	Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	May 2000	1 Year
___ -	RF Pre-selector	85685A	Hewlett Packard	2091A00933	May 2000	1 Year
___ -	Log-Periodic Antenna	HL 025	Rohde & Schwarz	340182/015	Nov. 1999	1 Year
___ -	RF Amplifier	DBP-0102N5334272B	DBS Microwave Inc.	012	Jun. 1999	1 Year
___ -	RF Amplifier	WJ-6882-814	Watkins-Johnson	0414	Jun. 1999	1 Year
___ -	RF Amplifier	WJ-5315-556	Watkins-Johnson	106	Jun. 1999	1 Year
___ -	RF Amplifier	WJ-5320-307	Watkins-Johnson	645	Jun. 1999	1 Year
___ -	RF Cable(10m)	S 04272B	Suhner	155-21-011E0	May 2000	1 Year
___ -	RF Cable(2m)	SUCOFLEX 104	Suhner	155-21-012E0	May 2000	1 Year
___ -	RF Cable(1m)	SUCOFLEX 104	Suhner	155-21-013E0	May 2000	1 Year

COPY

1.3.4 The measurement of the Frequency Stability

___ - was performed.
_x_ - was not applicable.

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___ -	Frequency Counter	53131A	Hewlett Packard	3546A11807	May 2000	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

_x_ - was performed.
___ - was not applicable.

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___ -	Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Sep. 1999	1 Year
___ -	Spectrum Analyzer	8563E	Hewlett Packard	3221A00201	May 2000	1 Year
_x_ -	Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Apr. 2000	1 Year
___ -	Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	May 2000	1 Year
___ -	Function Generator	3325A	Hewlett Packard	2512A21776	May 2000	1 Year
___ -	FM Linear Detector	MS61A	Anritsu Corp.	M77486	Sep. 1999	1 Year
___ -	Level Meter	ML422C	Anritsu Corp.	M87571	June 1999	1 Year

COPY

1.4 EUT MODIFICATION / Deviation from Standard

1.4.1 EUT MODIFICATION

_x_ - 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

1.4.2 Deviation from Standard:

_x_ - No deviations from the standard described in clause 1.1.
___ - The following deviations were employed from the standard described in clause 1.1:

1.5 TEST RESULTS

AC Power Line Conducted Emission ___ **- Applicable** _x_ **- NOT Applicable**

The requirements are ___ **- PASSED** ___ **- NOT PASSED**

Remarks :

Radiated Emission [§15.227] _x_ **- Applicable** ___ **- NOT Applicable**

The requirements are _x_ **- PASSED** ___ **- NOT PASSED**

Remarks:

Frequency Stability ___ **- Applicable** _x_ **- NOT Applicable**

The requirements are ___ **- PASSED** ___ **- NOT PASSED**

Remarks:

Occupied Bandwidth [§15.215(c)] _x_ **- Applicable** ___ **- NOT Applicable**

The requirements are _x_ **- PASSED** ___ **- NOT PASSED**

Remarks:

COPY

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 : May 22, 2000

End of testing : May 31, 2000

COPY

- JAPAN QUALITY ASSURANCE ORGANIZATION -

Approved by:

Masaaki Takahashi
Manager
JQA EMC Engineering Dept.

Signatories:
Issued by:

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 ELECTRONICS BHD.	AAO6004257	AAO6004257	None

1.7.2 Operating condition

Power supply Voltage : 9.0 VDC(Battery)
The tests have been carried out under the transmitting condition.

COPY

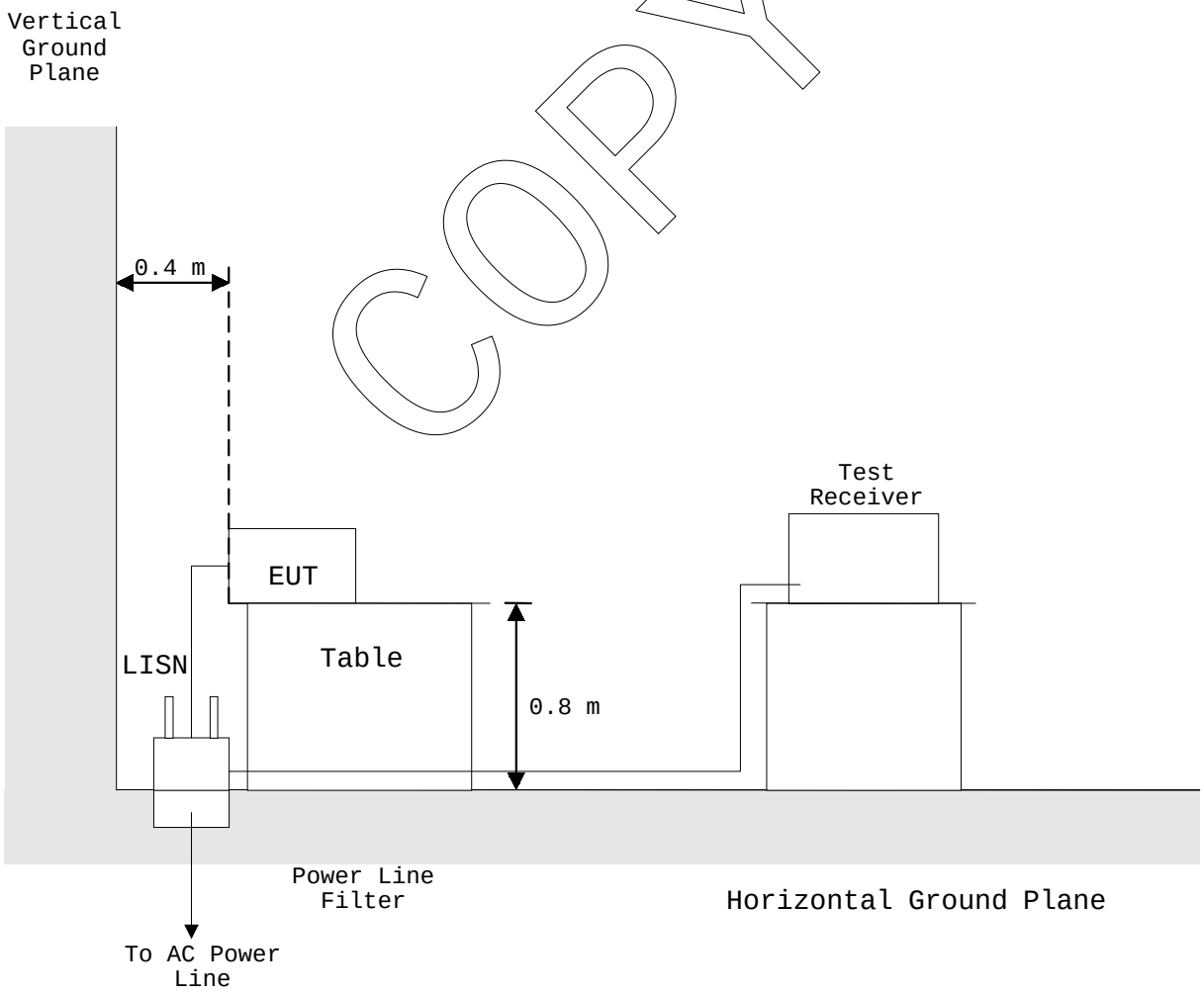
1.8 PRELIMINARY TEST AND TEST-SETUP (DRAWINGS)

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 -



COPY

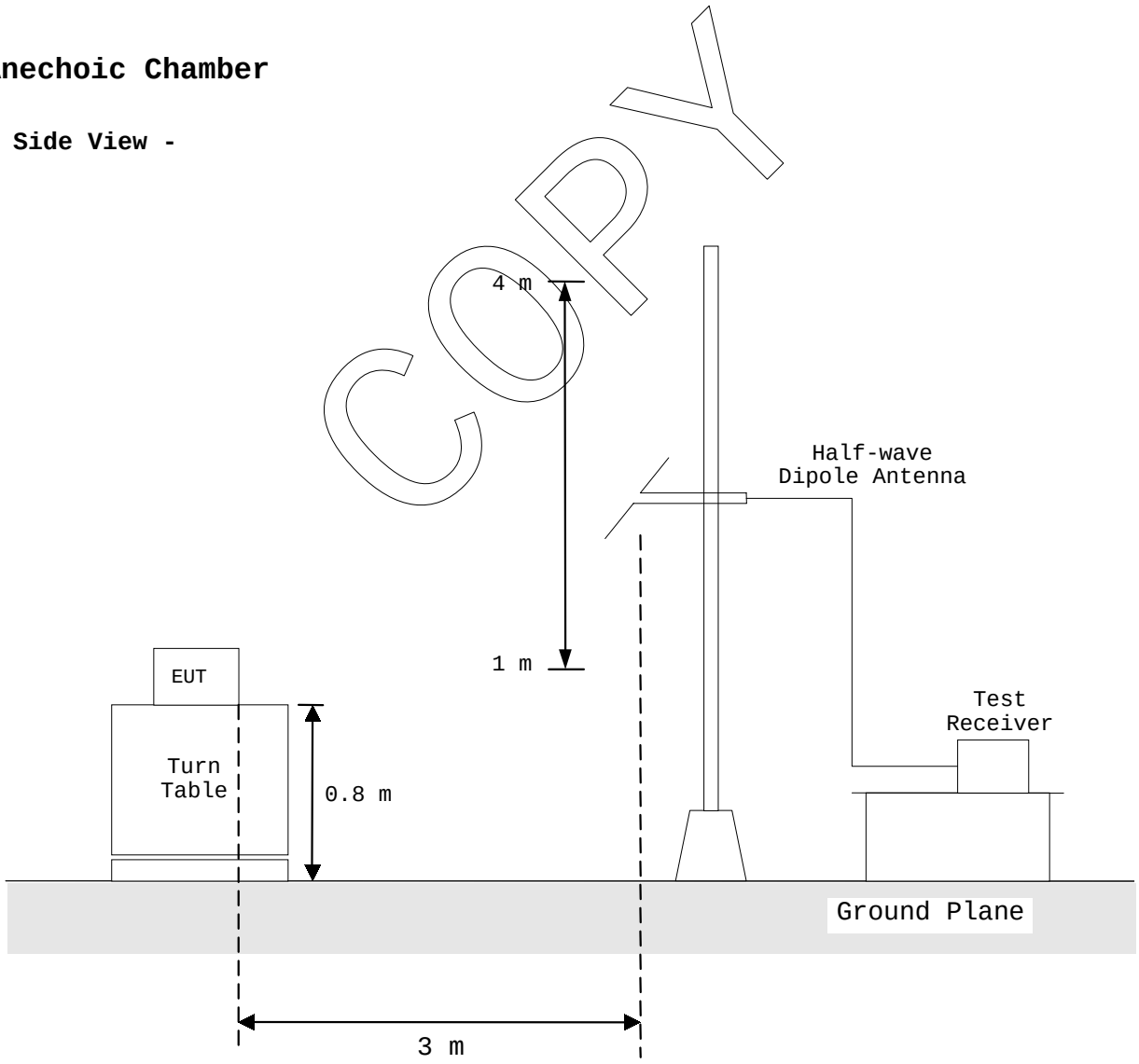
1.8.2 Radiated Emission (30 MHz – 1000 MHz) :

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 -

COPY

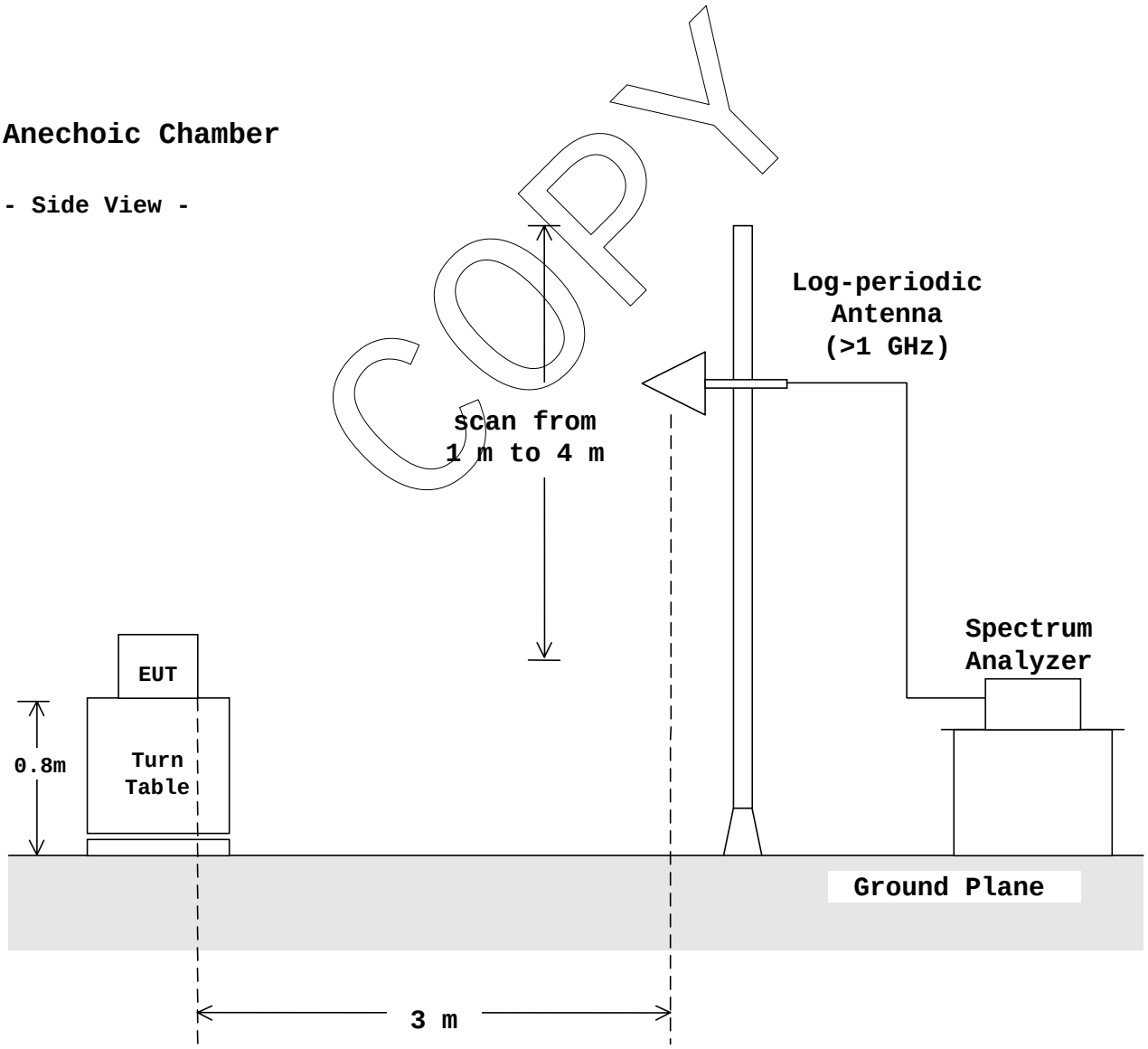


1.8.3 Radiated Emission (Above 1 GHz) :

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

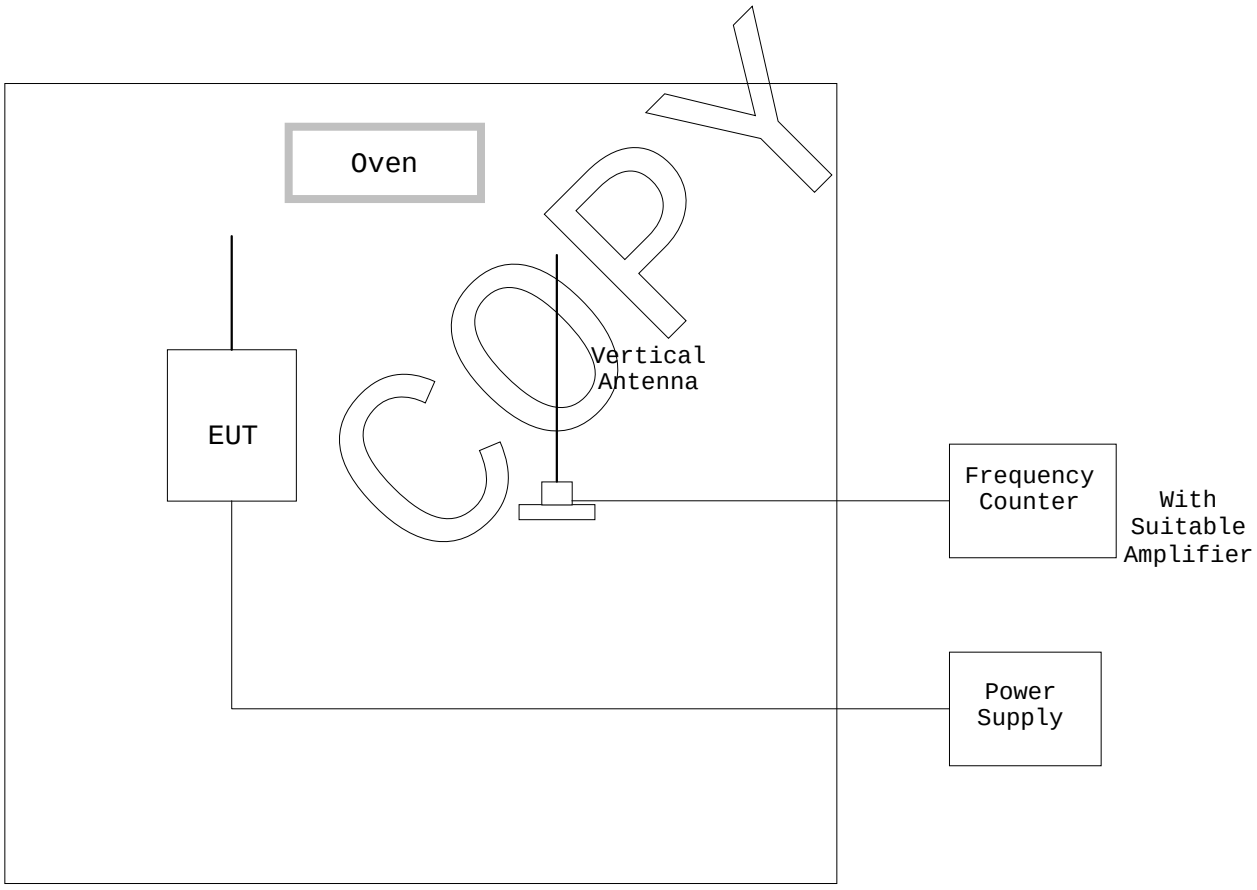
- Side View -



COPY

1.8.4 Frequency Stability :

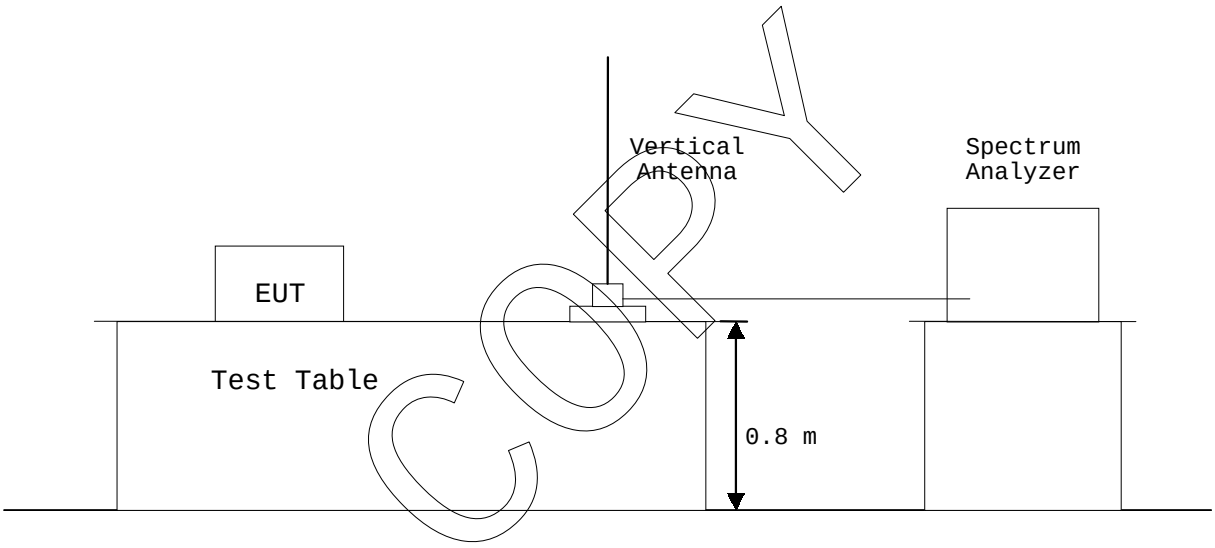
According to description of ANSI C63.4-1992 sec.13.1.5 and sec.13.1.6, the frequency stability measurements were carried out. By using frequency counter with suitable RF amplifier, the carrier frequency of the transmitter under test was measured with a temperature variation of –20°C to +50°C at the normal 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°C.
These measurements were carried out after allow sufficient time (approximately 1 hour) for the temperature of the chamber to stabilize.



COPY

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.

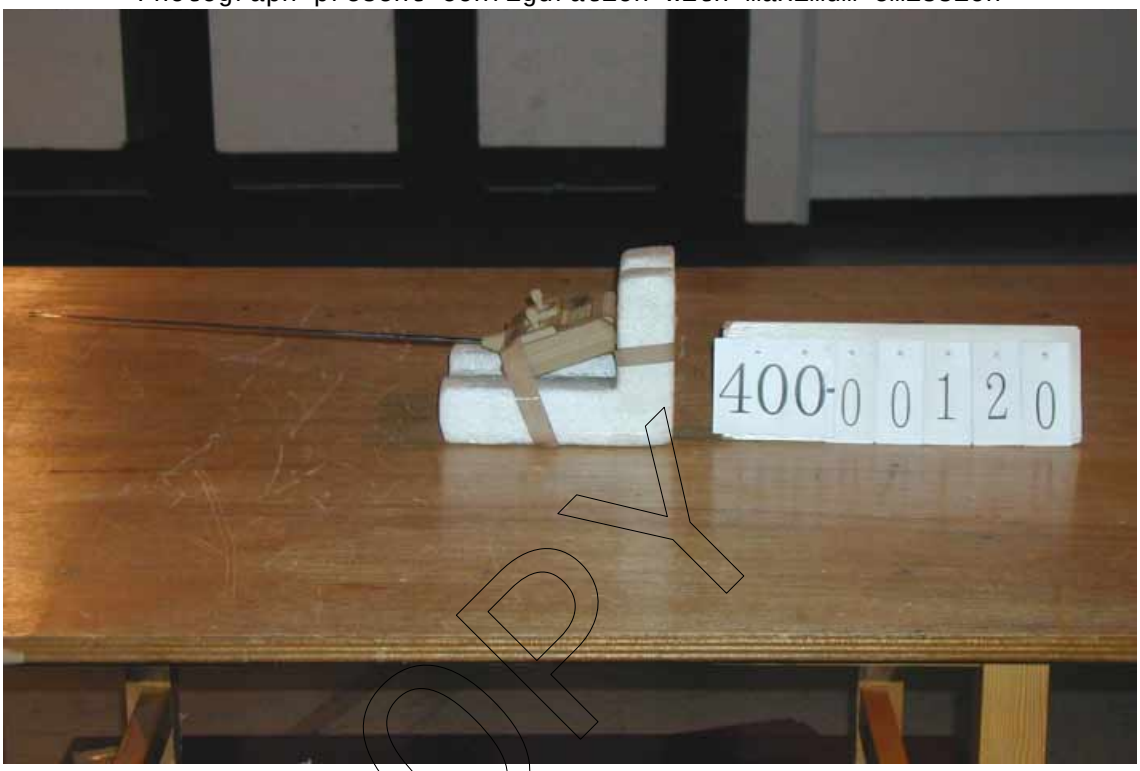


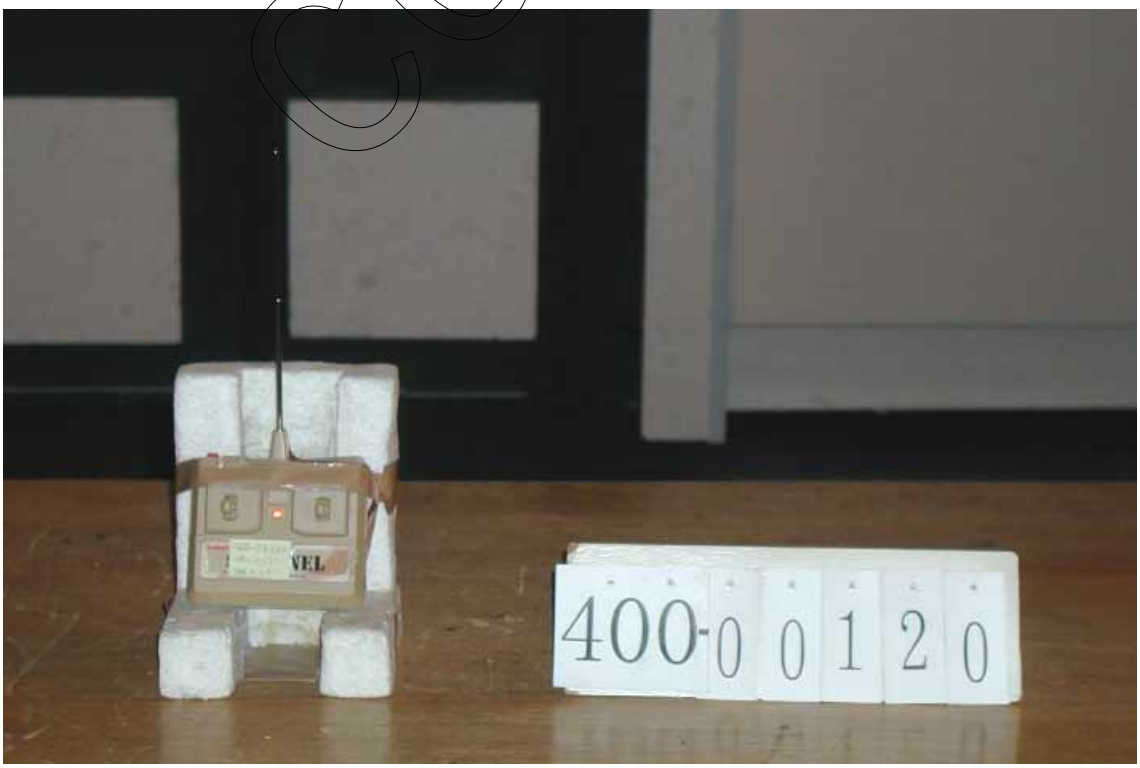
COPY

1.9 TEST ARRANGEMENT (PHOTOGRAPHS)

PHOTOGRAPHS OF EUT CONFIGURATION FOR RADIATED EMISSIONS MEASUREMENT

Photograph present configuration with maximum emission





COPY

TEST DATA

2.2 Radiated Emissions Measurement

Date : May 22, 2000
Temp.: 26 °C Humi.: 61 %

Operating Frequency : 27.145 MHz
Distance of Measurement : 3.0 meters

Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading Horiz. (dBμV)	Meter Reading Vert. (dBμV)	Limits (dBμV/m)	Field Strength at 3 m Horiz. (dBμV/m)	Field Strength at 3 m Vert. (dBμV/m)	
Fundamental							
27.145	-2.0	53.1	64.9	80.0	51.1	62.9	(Average)
27.145	-2.0	59.6	71.9	100.0	57.6	69.9	(Peak)
Harmonics & other Frequency components							
54.290	4.3	16.5	15.1	40.0	20.8	19.4	
81.435	8.1	< 0.0	< 0.0	40.0	< 8.1	< 8.1	
108.580	10.7	< 0.0	< 0.0	43.5	< 10.7	< 10.7	
135.725	12.8	< 0.0	< 0.0	43.5	< 12.8	< 12.8	
162.870	14.5	< 0.0	< 0.0	43.5	< 14.5	< 14.5	
190.015	15.9	< 0.0	< 0.0	43.5	< 15.9	< 15.9	
217.160	17.2	< 0.0	< 0.0	46.0	< 17.2	< 17.2	
244.305	18.3	< 0.0	< 0.0	46.0	< 18.3	< 18.3	
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	

COPY

Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading Horiz. (dBμV)	Meter Reading Vert. (dBμV)	Limits (dBμV/m)	Field Strength at 3 m Horiz. (dBμV/m)	Field Strength at 3 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 + 64.9 = 62.9 dBμV/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

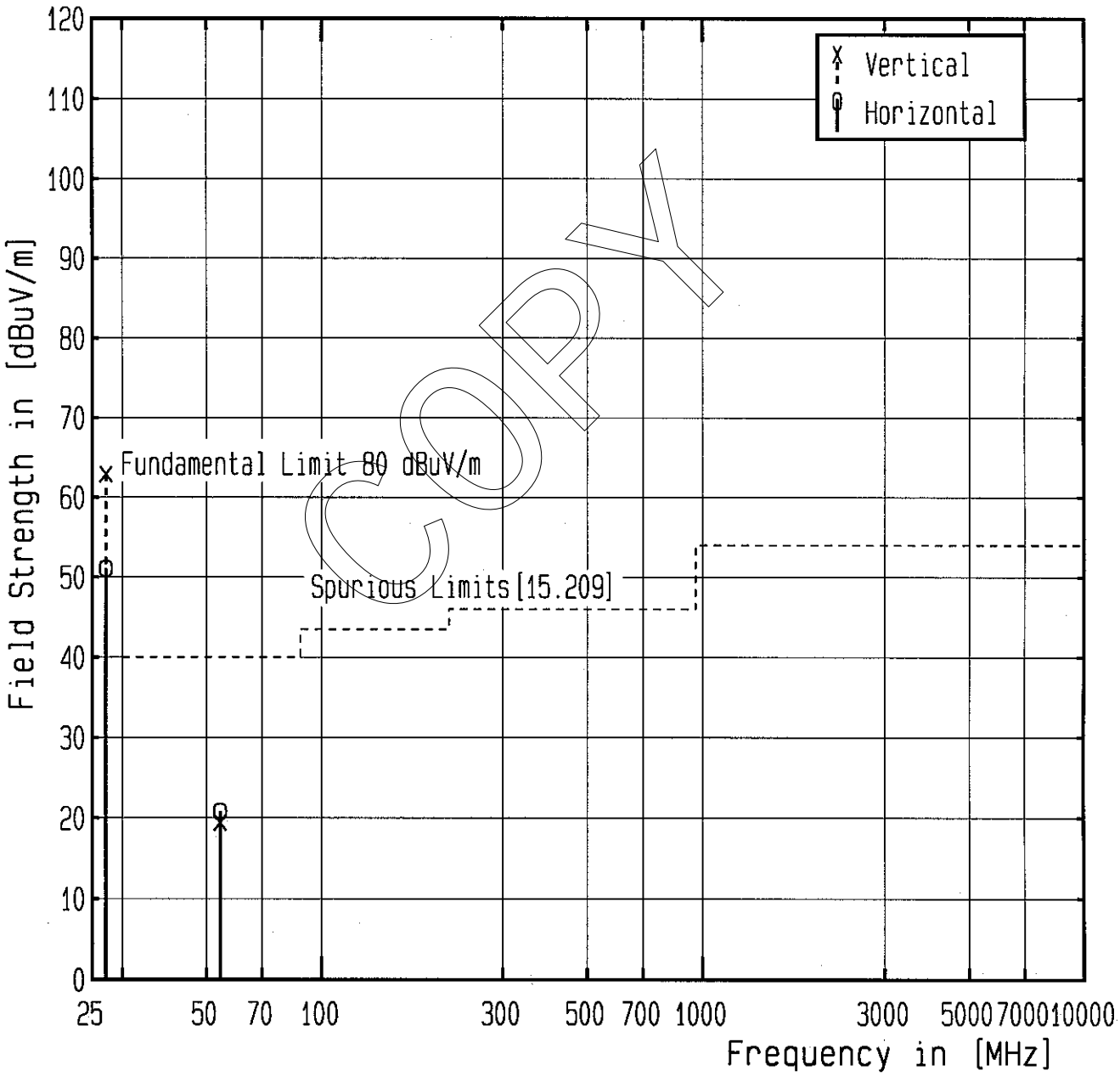
Harmonics & other Frequency components
Detector function : CISPR quasi-peak
IF Bandwidth : 120 kHz

COPY

Tested by : Shigeru Osawa
Shigeru Osawa
Testing Engineer

Transmitter Fundamental and Spurious Emissions

Model No. : AAO6004257
Operating Frequency : 27.145 MHz
Test Condition :



COPY

2.4 Occupied Bandwidth Measurement

Date : May 31, 2000
Temp.: 25 °C Humi.: 63 %

Measurements Results : Refer to the attached graphs.

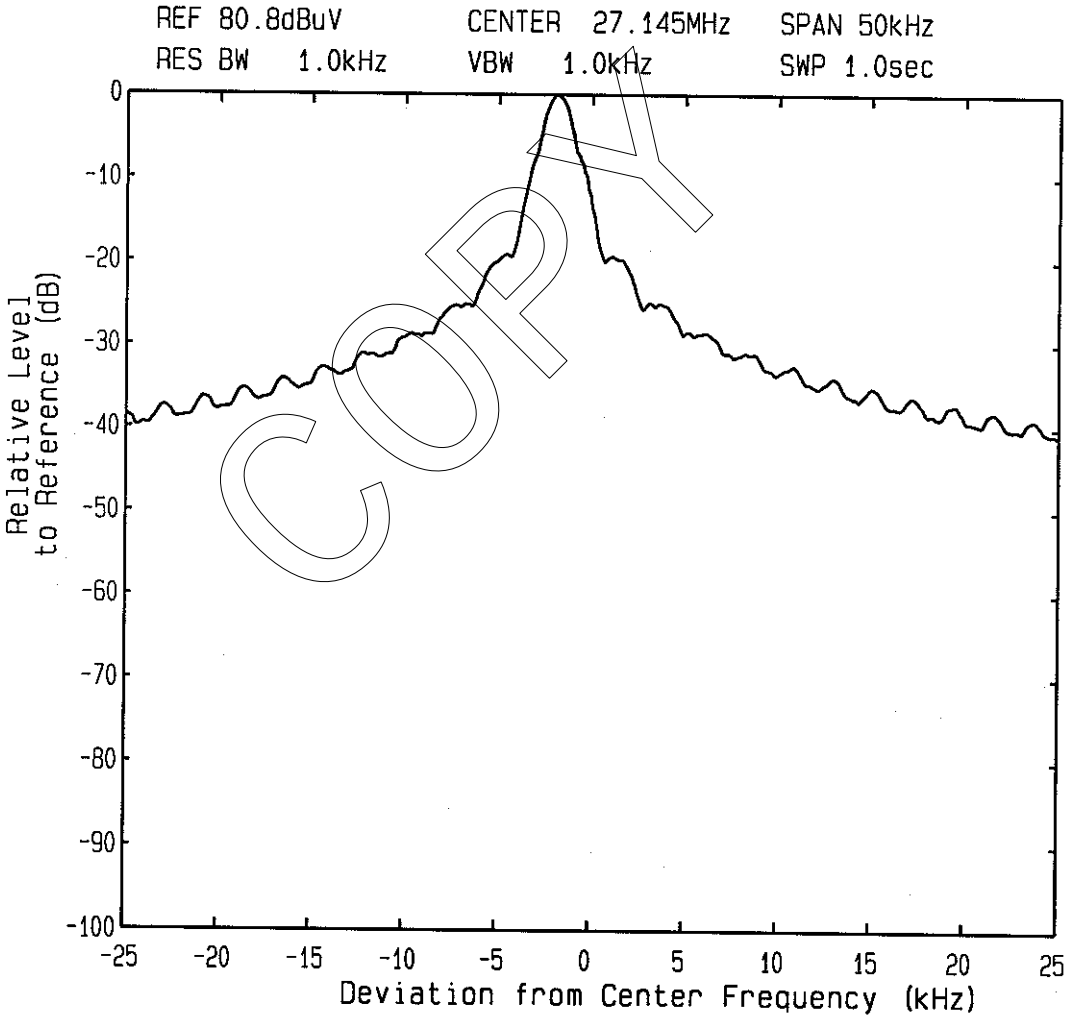
Tested by : Shigeru Osawa
Shigeru Osawa
Testing Engineer

COPY

Emission Limitation

FCC ID : AAO6004257
Model : AAO6004257

Mode of EUT : Forward (Left Switch)

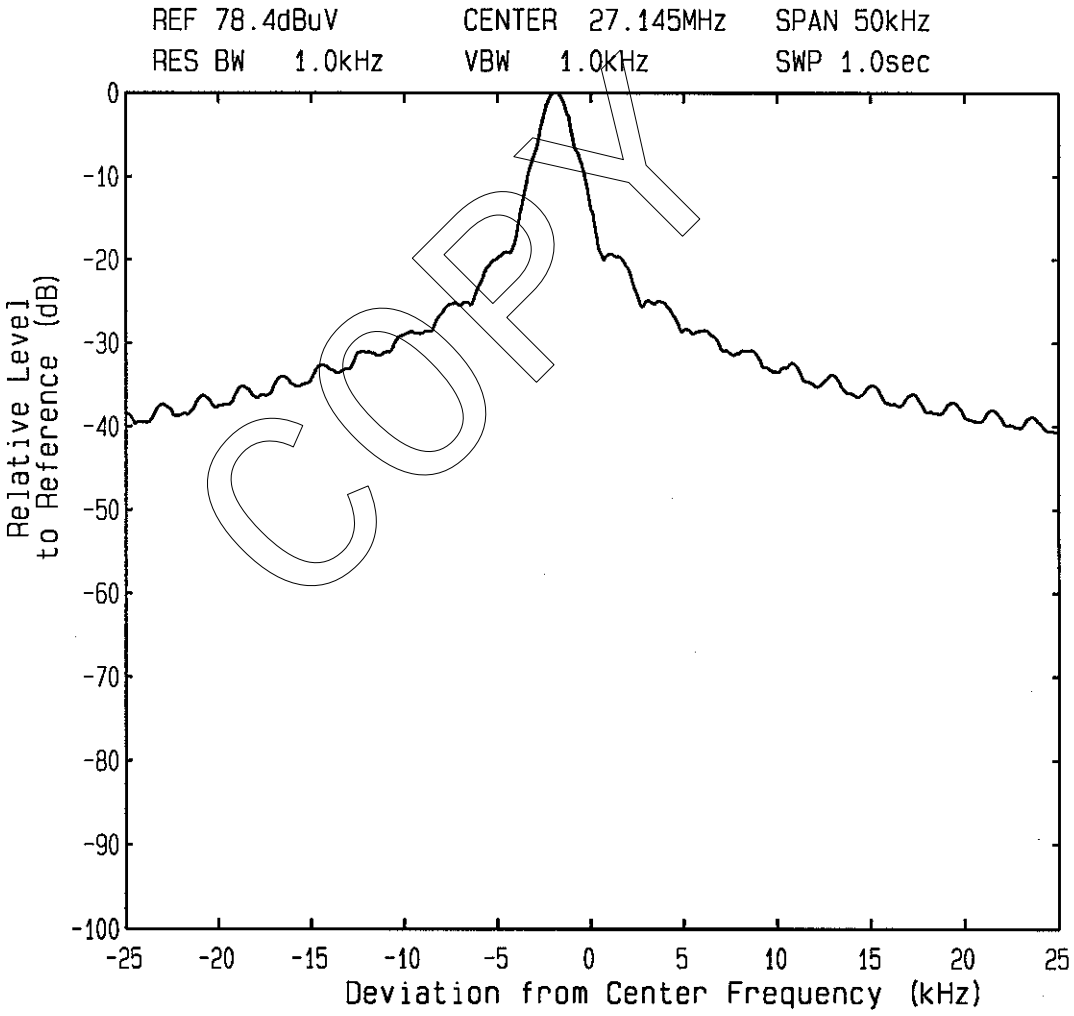


COPY

Emission Limitation

FCC ID : AAO6004257
Model : AAO6004257

Mode of EUT : Reverse (Left Switch)

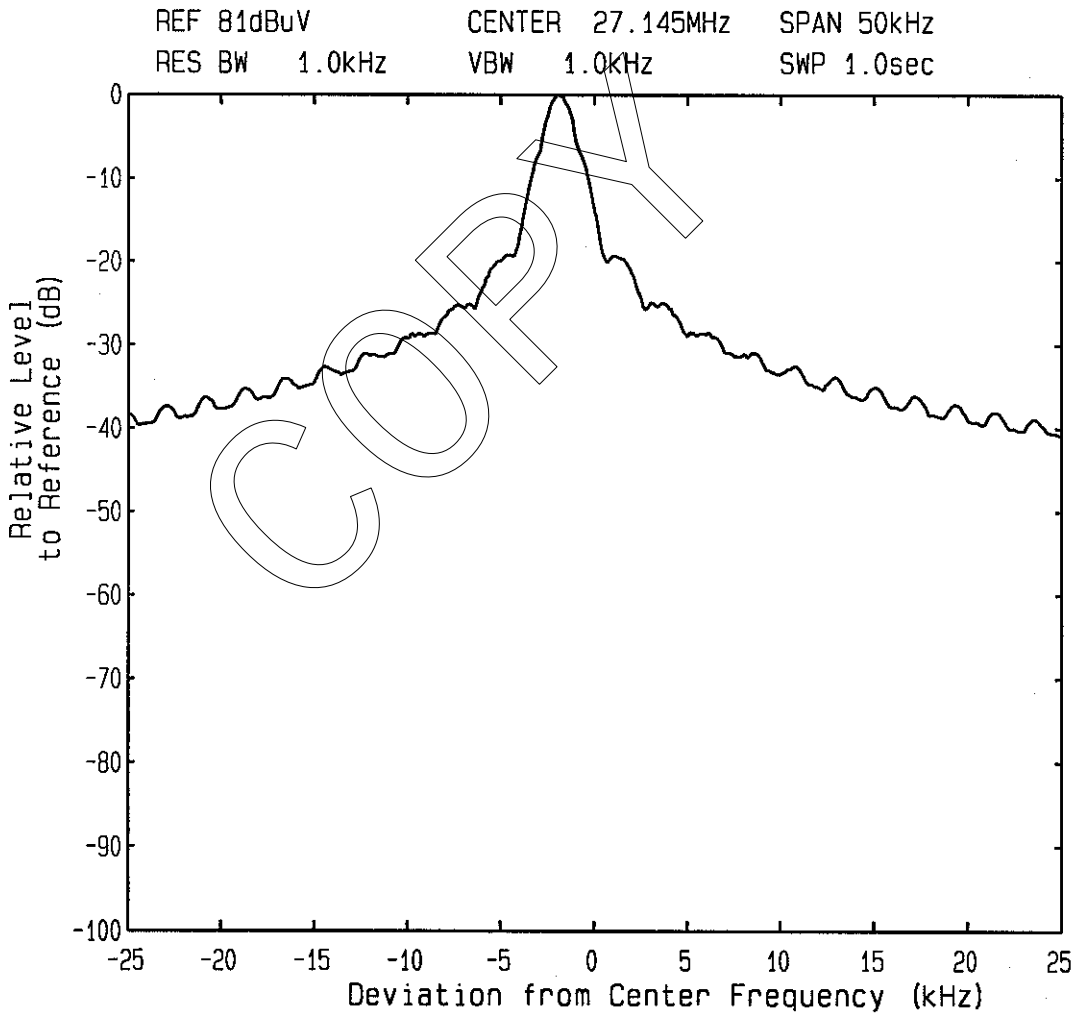


COPY

Emission Limitation

FCC ID : AAO6004257
Model : AAO6004257

Mode of EUT : Forward (Right Switch)

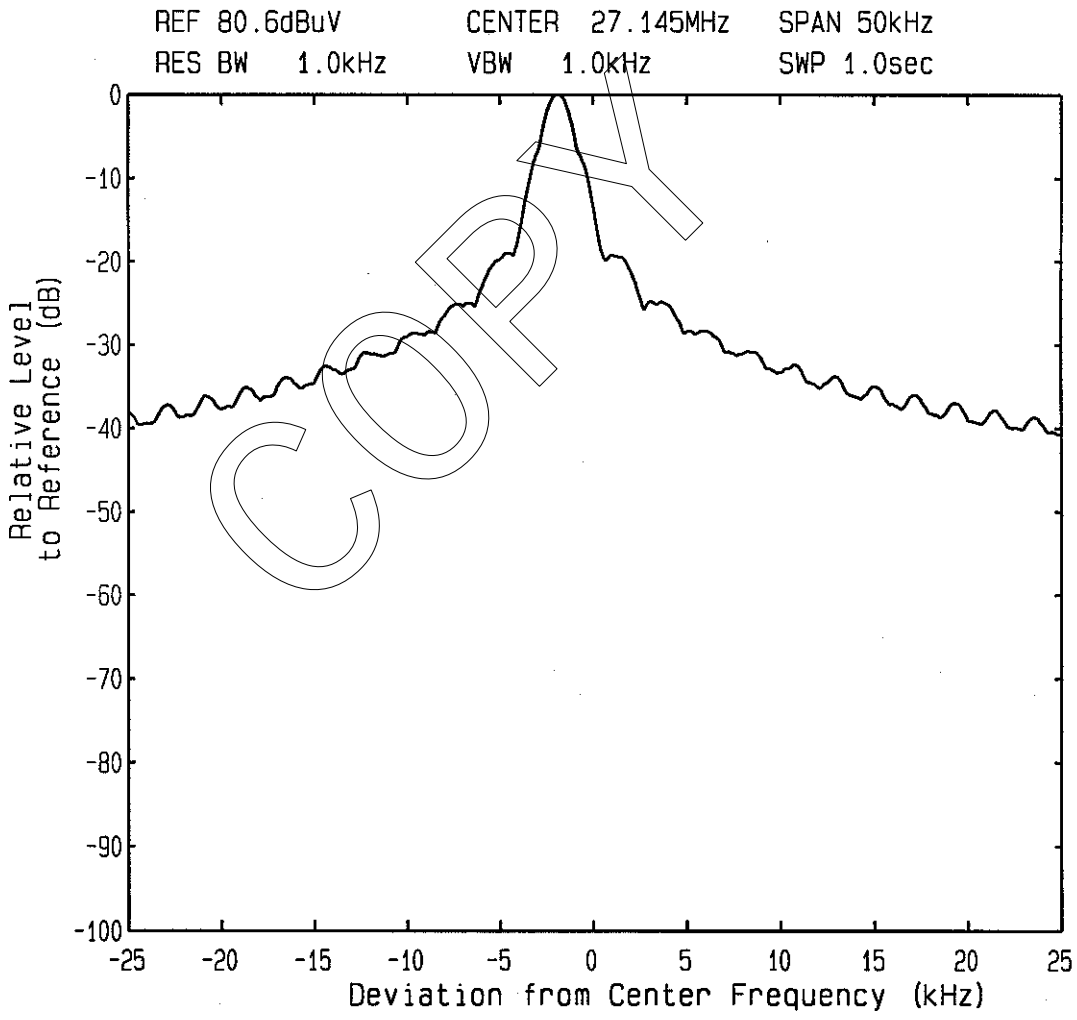


COPY

Emission Limitation

FCC ID : AAO6004257
Model : AAO6004257

Mode of EUT : Reverse (Right Switch)

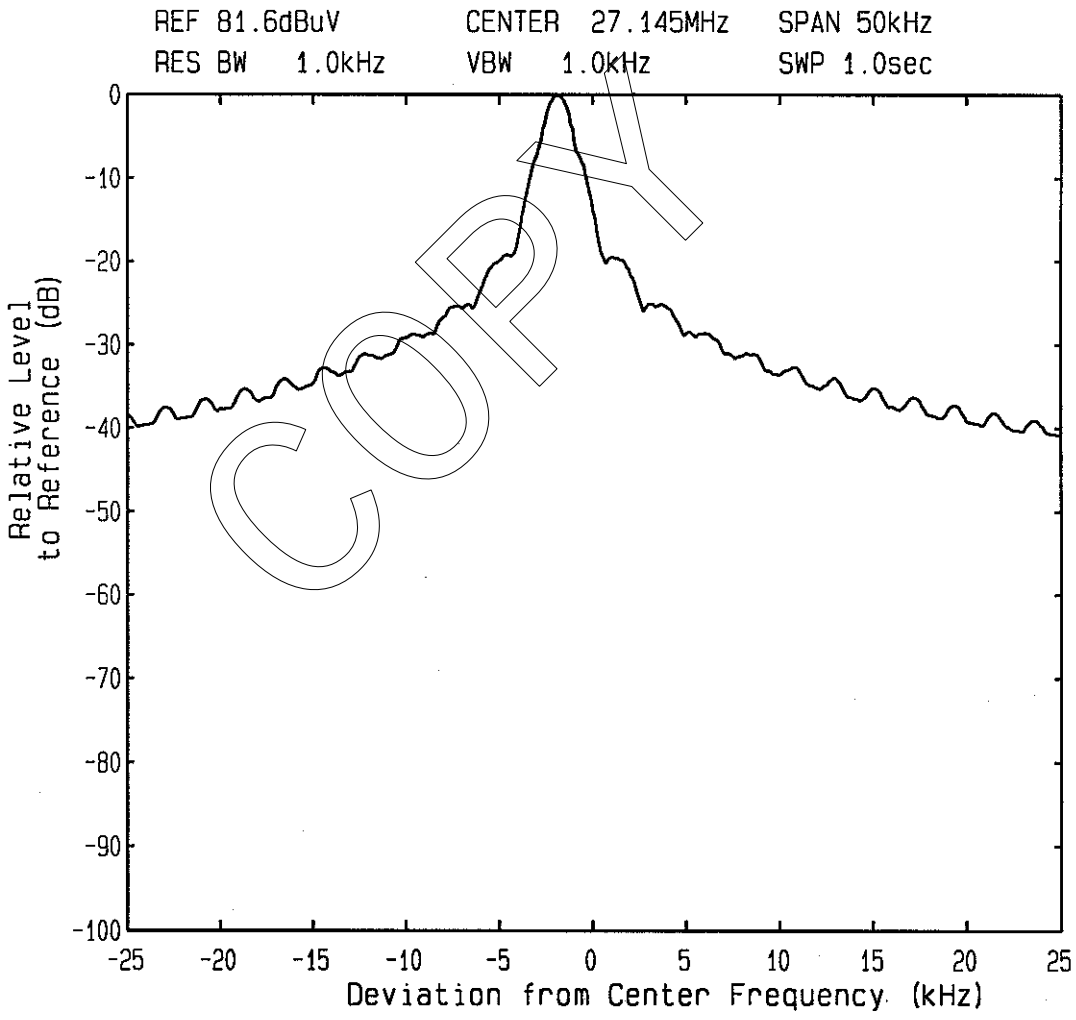


COPY

Emission Limitation

FCC ID : AAO6004257
Model : AAO6004257

Mode of EUT : Turn Button

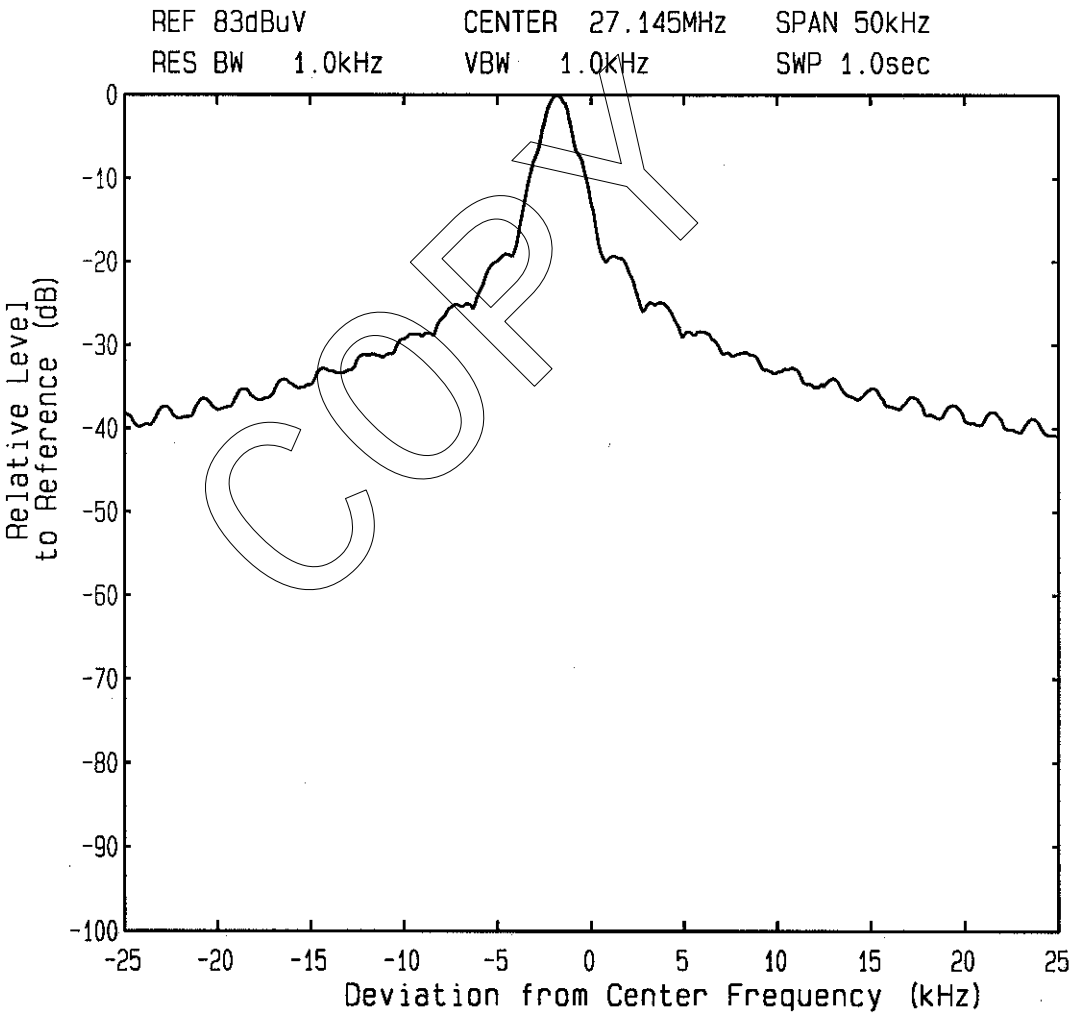


COPY

Emission Limitation

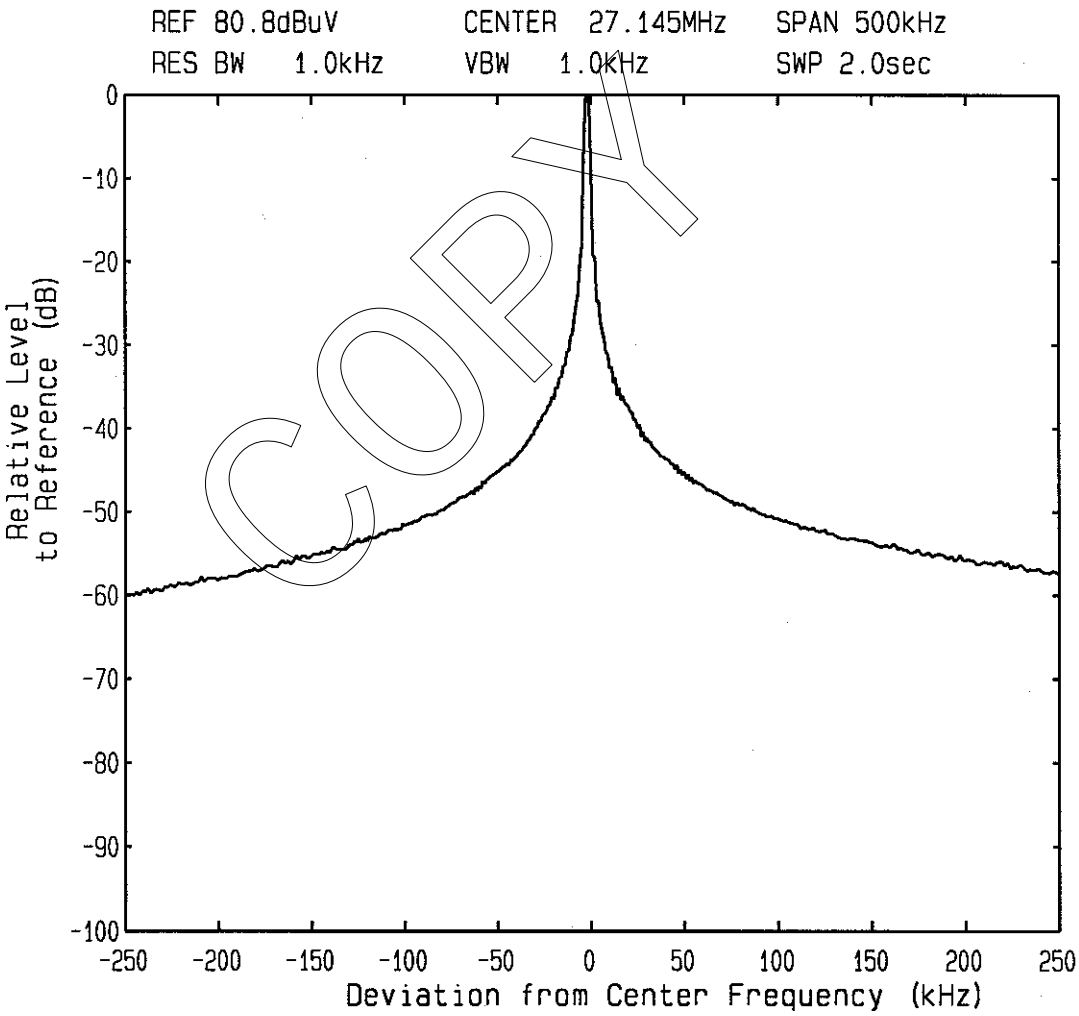
FCC ID : AAO6004257
Model : AAO6004257

Mode of EUT : Fire Button



COPY

Emission Limitation

FCC ID : AAO6004257
Model : AAO6004257

Mode of EUT : Reverse(Right Switch)