

Issue Date : November 4, 1998
Page 1 of 37JQA Application No. : K18080495
Model No. : LQ300
FCC ID : M8D62378Y06Regulation : CFR 47 FCC Rules Part 15
Issue Date : November 4, 1998

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EMC EMISSION - TEST REPORT

JQA APPLICATION No. : K18080495

Model/Type No. : LQ300

Name of Product : DENSITY METER

FCC ID : M8D62378Y06

Applicant : TOSHIBA CORPORATION CONTROL & INSTRUMENTATION DIVISION

Address : 1-1, SHIBAURA 1-chome, Minato-ku, Tokyo, Japan

Manufacturer : TOSHIBA CORPORATION CONTROL & INSTRUMENTATION DIVISION

Address : 1-1, SHIBAURA 1-chome, Minato-ku, Tokyo, Japan

Final Judgement : 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 PTT Japan.

THE TEST RESULTS only responds to the test sample. This test report shall not be reproduced except in full.

JAPAN QUALITY ASSURANCE ORGANIZATION (JQA)
KITA-KANSAI TESTING CENTER
EMC DIVISION

NVLAQ®

LAB CODE: 200191-0

JAPAN QUALITY ASSURANCE ORGANIZATION

K700H

DIRECTORY

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TEST REGULATION

FCC Rules and Regulations Part 15 Subpart A and C (April 1st, 1997)

- - Intentional Radiator

Test procedure:

Conducted and radiated emission test were performed according to the procedures in ANSI C63.4-1992.

GENERAL INFORMATION

Test facility:

- 1) Test Facility located at Kita-Karsai : 1st and 2nd Open Sites (3 m Site)
Test Facility located at Kameoka Open Site (3, 10 and 30 m, on common plane))
FCC filing No. : 31040/SIT 1300F2
- 2) KITA-KANSAI TESTING CENTER is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance established in Title 15, Part 285 Code of Federal Regulations.
NAVLAP Lab Code: 200191-0

Description of the Equipment Under Test (EUT):

- 1) Name : DENSITY METER
- 2) Model/Type No. : LQ300
- 3) Product Type : Pre-Production(S/N ---)
- 4) Category : Intentional Radiator
- 5) EUT Authorization : ☐ - Verification ☒ - Certification ☐ - D.O.C
- 6) Operating Frequency Range : 1825 MHz - 1975 MHz
- 6) Highest frequency use/generated : 1975 MHz
- 7) Power Rating : 120 V / 60 Hz

Definitions for symbols used in this test report:

- - Black box indicates that the listed condition, standard or equipment is applicable for this Report.
- - Blank box indicates that the listed condition, standard or equipment is not applicable for this Report.

TEST CONDITIONS

The measurement of the Conducted Emission (Disturbance Voltage) was performed in the following test site.

Test location:

KITA-KANSAI Testing Center
7-7, Ishimaru 1-Chome, Minoh-Shi, Osaka 562-0027 Japan
☐ - Shielded room
KAMEOKA EMC Branch
9-1, Ozaki, Inukamo, Nishibetsuin-Cho, Kameoka-Shi, Kyoto 621-0126 Japan
☒ - Shielded room
☐ - On metal plane of open site

Used test instruments and sites:

Model No.	Device I.D No.	Last Cal. Date	Cal. Interval
☐ - ESH 3	A - 1		
☒ - ESH 2	A - 2	December, 1997	1 Year
☐ - ESH 2	A - 3		
☐ - KMW-407	D - 6		
☐ - KMW-242	D - 7		
☐ - KMW-408	D - 14		
☒ - KMW-341C	D - 13	February, 1997	1 Year
☐ - ESH2-75	D - 10		
☐ - ESH3-75	D - 12		
☐ - ESH2-73	D - 17		
☐ - 8568B	A - 10		
☐ - 8568B	A - 13		
☐ - 8593A	A - 15		
☐ - Cable	H - 5		
☒ - Cable	H - 8	February, 1997	1 Year

Environmental conditions:

Temperature: 18 °C Humidity: 62 %

The measurement of the Radiated Emission (9 kHz - 30 MHz)

was performed in the frequency range of 9 kHz - 30 MHz, in the following test site.

Test location:

KITA-KANSAI Testing Center
7-7, Ishimaru, 1-Chome, Minoh-Shi, Osaka, 562-0027, Japan

- - 1st site (3 meters)
- - 2nd site (3 meters)

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

- - 3 meters
- - 10 meters
- - 30 meters

Validation of Site Attenuation:

- 1) Last Confirmed Date: November 27, 1997
- 2) Interval : 1 Year

Used test instruments:

Model No.	Device I.D No.	Last Cal. Date	Cal. Interval
○ - ESH 3	A - 1		
○ - ESH 2	A - 2		
● - ESH 2	A - 3	December, 1997	1 Year
○ - HFH2-72	C - 2		
● - HFH2-72	C - 3	September, 1998	1 Year

Environmental conditions:

Temperature: 18 °C Humidity: 65 %

The measurement of the Radiated Emission (Electric Field)

was performed in horizontal and vertical polarization, in the frequency range of 30 MHz - 1000 MHz, in the following test site.

Test location:

KITA-KANSAI Testing Center

7-7, Ishimaru, 1-Chome, Minoh-Shi, Osaka, 562-0027, Japan

- - 1st site (3 meters)
- - 2nd site (3 meters)

KAMEOKA EMC Branch

9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan

- - 3 meters
- - 10 meters

Validation of Site Attenuation:

- 1) Last Confirmed Date: November 27, 1997
- 2) Interval : 1 Year

Used test instruments:

Model No.	Device I.D No.	Last Cal. Date	Cal. Interval
○ - ESV/ISV-Z3	A - 7 / A - 17		
○ - ESV/ISV-Z3	A - 6 / A - 18		
○ - ESV/ISV-Z3	A - 5 / A - 16		
● - ESV/ISV-Z3	A - 4 / A - 20	December, 1997	1 Year
○ - ESV/ISV-Z3	A - 8 / A - 19		
○ - KBA-511A	C - 12		
○ - KBA-611	C - 22		
○ - KBA-511A	C - 13		
○ - KBA-611	C - 19		
● - KBA-511A	C - 11	December, 1997	1 Year
● - KBA-611	C - 21	December, 1997	1 Year
● - Cable	H - 1	November, 1997	1 Year

Environmental conditions:

Temperature: 18 °C Humidity: 65 %

The measurement of the Radiated Emission (Electric Field)

was performed in horizontal and vertical polarization, in the frequency range of 1 GHz - 20 GHz, in the following test site.

Test location:

KITA-KANSAI Testing Center
7-7, Ishimaru 1-Chome, Minoh-Shi, Osaka 562-0027 Japan

- - 1st site (3 meters)
- - 2nd site (3 meters)

KAMEOKA EMC Branch

9-1, Ozaki, Imukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto 621-0126 Japan

- - 3 meters
- - 10 meters

Used test instruments:

Model No.	Device I.D No.	Last Cal. Date	Cal. Interval
● - 8566B	A - 13	October, 1998	1 Year
○ - 8593A	A - 15		
○ - 4T-10	D - 73		
○ - 4T-10	D - 74		
○ - MZ5010C	D - 31	October, 1998	1 Year
● - 8673D	B - 2	April, 1998	1 Year
● - WJ-6611-513	A - 23	May, 1998	1 Year
● - WJ-6882-824	A - 21	May, 1998	1 Year
● - DBL-0618N515	A - 33	October, 1998	1 Year
● - 91888-2	C - 41-1	May, 1998	1 Year
● - 91889-2	C - 41-2	May, 1998	1 Year
● - 94613-1	C - 41-3	May, 1998	1 Year
● - 91891-2	C - 41-4	May, 1998	1 Year
● - 94614-1	C - 41-5	May, 1998	1 Year
● - 3160-09	C - 48	October, 1998	1 Year
● - Cable	H - 3	May, 1998	1 Year
○ - Cable	H - 10	May, 1998	1 Year

Setting of the spectrum analyzer:

RES 3.W : 1 MHz Video B.W : 1 MHz
SCALE : LIN Sweep Time: 20 msec.

Environmental conditions:

Temperature: 18 °C Humidity: 65 %

The measurement of the Spectrum of the Fundamental Emission

was performed in the following test site.

Test location:

KITA-KANSAI Testing Center

7-7, Ishimaru 1-Chome, Minoh-Shi, Osaka 562-0027 Japan

- - Shielded room

KAMEOKA EMC Branch

9-1, Ozaki, Imukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto 621-0126 Japan

- - Shielded room

Used test instruments and sites:

Model No.	Device I.D No.	Last Cal. Date	Cal. Interval
● - 8566E	A - 13	October, 1998	1 Year
○ - 8566E	A - 13		
○ - 8593A	A - 15		
○ - 4T-1C	D - 73		
○ - 4T-1C	D - 74		
● - WJ-6611-513	A - 23	May, 1998	1 Year
○ - WJ-6882-824	A - 21		
○ - DBL-6618N515	A - 33	May, 1998	1 Year
● - 91888-2	C - 41-1		
○ - 91889-2	C - 41-2		
○ - 94613-1	C - 41-3		
○ - 91891-2	C - 41-4		
○ - 94614-1	C - 41-5		
○ - 3160-09	C - 48		

Setting of the spectrum analyzer:

1)RES B.W : 100 kHz Video B.W : 100 kHz
SCALE : LOG Sweep Time: 20 msec.

2)RES B.W : 1 MHz Video B.W : 1 MHz
SCALE : LOG Sweep Time: 20 msec.

Environmental conditions:

Temperature: 24 °C Humidity: 52 %

CONFIGURATION OF EUT

The Equipment Under Test (EUT) consists of:

Description	Applicant (Manufacturer)	Model No. (Serial No.)	FCC ID
INTENSITY METER	TOSHIBA CORPORATION (TOSHIBA CORPORATION)	LQ300 (---)	M8D62378Y06

The measurement was carried out with the following equipment connected:

None

Type of Interference Cable(s) and the AC Power Cord used with the EUT:

No.	Cable	Shielded	Ferrite Core	Length
①	AC Power Cord(EUT) with 3-pin plug	NO	NO	1.2m
②-1	EUT"Density Output" / 250 Ω Resistance	YES	NO	1.0m
②-2	EUT"Error In-maintenance Contact Signal Output" / Short Circuit	YES	NO	1.0m
③	EUT"Digital Input" / Short Circuit	YES	NO	1.0m
④-1	EUT"Externak Synchronized Input" / Short Circuit	YES	NO	1.0m
④-2	EUT"Conductivity Meter Input" / No termination	YES	NO	1.0m

Operation - mode of the EUT:

The equipment under test was operated during the measurement under the following specification:

Measuring (Transmitting Microwave)

Detailed EUT:

The EUT measures the density of a substance that flows through a pipe by method of a phase difference using microwaves.

Special accessories:

None

The used (generated) frequencies in the EUT:

Transmitter : F1=1825 MHz - 1975 MHz[Note 1]
RF Unit : F2=1824.85 MHz - 1974.85 MHz[Note 2], 30MHz
Main Board : 460.8 kHz, 3.6864 MHz, 29.4912 MHz
Display Board : 220 kHz
Power Supply : 140 kHz, 165 kHz

Note 1 : F1 is any of adjusted frequency between 1825 MHz to 1975 MHz.
Note 2 : F2 is any of adjusted frequency between 1824.85 MHz to 1974.85 MHz.
The following relational expression consists in F1 and F2.
F2-F1= 0.150 MHz

EUT Modification

- - No modifications were conducted by JQA to achieve compliance to Intentional Radiator levels.
- - To achieve compliance to Intentional Radiator levels, the following change(s) were made by JQA during the compliance test.

—The modification(s) will be implemented in all production models of this equipment.

Applicant : _____ Date : _____
Typed Name : _____ Position : _____

Responsible Party

—Responsible Party of Test Item(Product) _____
Responsible party : _____
Contact Person : _____
Signature _____

TEST RESULTS

Conducted Emission 450 kHz - 30 MHz

The requirements are ● - KEPT ○ - NOT KEPT
Min. limit margin 11.1 dB at 25.80 MHz
Max. limit exceeding _____ dB at _____ MHz
Uncertainty of measurement results +2.1 dB(2σ) -2.1 dB(2σ)
Remarks: _____

Radiated Emission (Electric Field) 9 kHz - 30 MHz

The requirements are ● - KEPT ○ - NOT KEPT
Min. limit margin 40.4 dB at 1.29 MHz
Max. limit exceeding _____ dB at _____ MHz
Uncertainty of measurement results + 2.5 dB(2σ) - 2.5 dB(2σ)
Remarks: _____

Radiated Emission (Electric Field) 30 MHz - 1000 MHz

The requirements are ● - KEPT ○ - NOT KEPT
Min. limit margin 5.3 dB at 302.3 MHz
Max. limit exceeding _____ dB at _____ MHz
Uncertainty of measurement results +3.6 dB(2σ) -3.7 dB(2σ)
Remarks: _____

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Radiated Emission (Electric Field) 1 GHz - 20 GHz

The requirements are ● - KEPT ○ - NOT KEPT
Min. limit margin More than 6.0 dB at 13000.0 MHz and 19750.0 MHz
Max. limit exceeding _____ dB at _____ MHz
Uncertainty of measurement results +3.1 dB(2σ) -3.2 dB(2σ)

Remarks: _____

Spectrum of Fundamental Emission

Result

Refer to pages 28 - 33.

Remarks: _____

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SUMMARY

GENERAL REMARKS :

The EUT was tested according to the requirements of FCC Rules and Regulations Part 15 Subpart A and C (April 17, 1997) under the test configuration, as shown in page 15.
The conclusion for the test items of which are required by the applied regulation is indicated under the final judgement.

FINAL JUDGEMENT :

The "as received" sample;

- - fulfill the test requirements of the regulation mentioned on page 3.
- - fulfill the test requirements of the regulation mentioned on page 3, but with certain qualifications.
- - doesn't fulfill the test regulation mentioned on page 3.

Begin of testing : October 26, 1998

End of testing : October 29, 1998

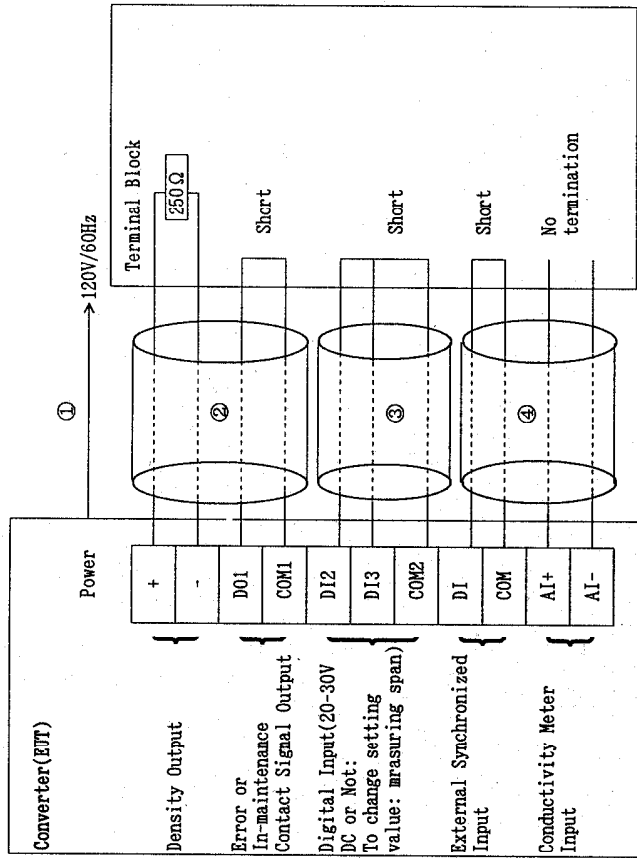
- JAPAN QUALITY ASSURANCE ORGANIZATION -

Approved Signatory :

T. Yamana
Takashi Yamana
Manager
EMC Div.
JQA KITA-KANSAI Testing Center

A. Hosoda
Akio Hosoda
Project Manager
EMC Div.
JQA KITA-KANSAI Testing Center

Test System-Arrangement (Drawings)



Nota) ①-④: Refer to page 9.

Preliminary Test and Test-setup(Drawings)

Conducted Emission 0.45 MHz - 30 MHz:

The preliminary test was performed according to the description of ANSI C63.4-1992 Sec.13.1.3.1 (Preliminary A Powerline Emissions Tests) and Sec.13.1.2(Equipment Configurations), the preliminary test was carried out to investigate the frequency of the emission that has the highest amplitude relative to the limits within normal operating modes, cable positions, and a typical system configuration. In order to find out to the maximum emission, the preliminary test and a final test were performed in accordance with the following steps.

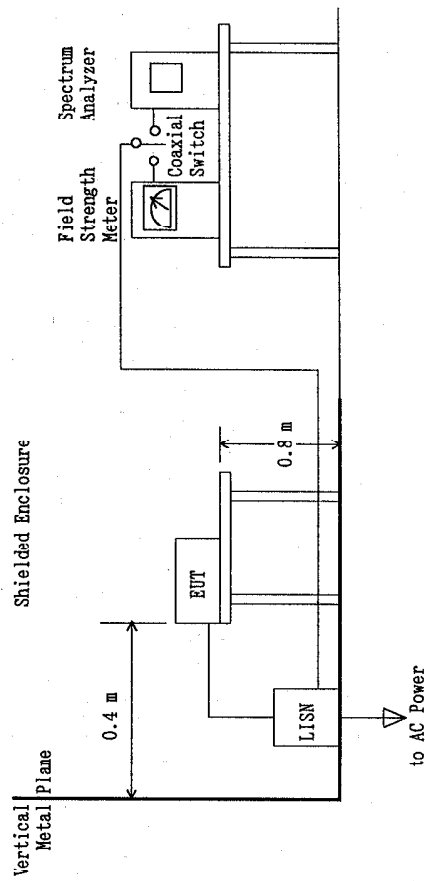
Step 1: One operation mode of the test system was setting.

Step 2: Using both of a spectrum analyzer and a test receiver, the emission's circumstance from the system was monitored in one of ten divided frequency bands of the specified frequency range(0.45 MHz - 30 MHz). The maximum emission in the band was found by changing the typical cable positions or cable manipulation under a typical system configuration and by selecting of current-carrying conductor. The level and the frequency at the one point which are regarded as relative high emission in the band was measured and recorded. This step was repeated until the ending frequency band.

Step 3: Return to step 1, if the other operation mode was possible to be setting.

Step 4: Based on the collected results, the operation mode produced the maximum emission was selected. The final test on the selected operation mode was performed. But if it was difficult to select the operation mode, the final tests on all operation modes were performed.

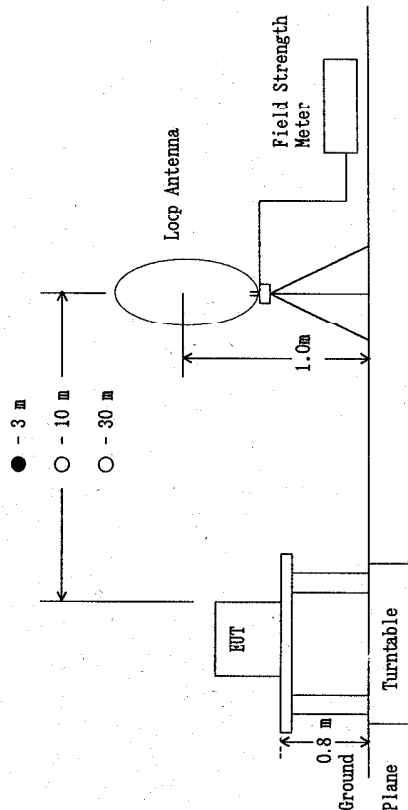
Step 5: Based on the same data, as result if the final measurement, at the worst point that has the highest amplitude relative to the limit the repeatability of the worst was confirmed. The photographs of the test system setup on the worst point were taken and recorded.



Radiated Emission (Electric Field) 9 kHz - 30 MHz:

The preliminary test was performed according to the description of ANSI C63.4-1992 Sec.13.1.4.1 (Preliminary Radiated Emissions Tests) and Sec.13.1.2(Equipment Configurations), the preliminary test was carried out to investigate the frequency of the emission that has the highest amplitude relative to the limits within normal operating modes, cable positions and a typical system configuration. In order to find out to the maximum emission, the preliminary test and a final test were performed in accordance with the following steps.

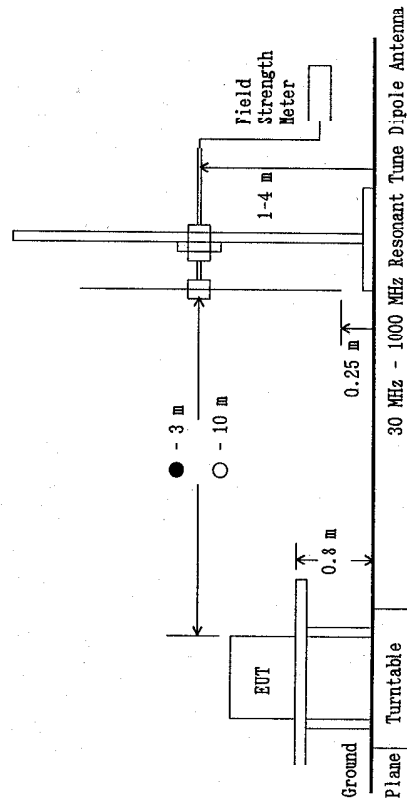
- Step 1: One operation mode of the test system was setting.
 Step 2: Using a test receiver and a test antenna probe, the significant frequency of the emission's circumstance from the test system were investigated.
 Step 3: Using a test receiver and a resonant tuned dipole antenna, the emission's circumstance from the test system was measured in accordance with ANSI C63.4-1992 Sec.13.1.4(Final Radiated Emissions Tests) at each frequency which was found the higher emission referred to level vs. frequency on the list and which was measured by the resonant tuned dipole antenna. The maximum emission was found by changing the cable positions or cable manipulation under a typical system configuration.
 Step 4: Return to step 1, if the other operation mode was possible to be setting.
 Step 5: The worst result was reported arranging data of which was obtained and performed by one or plural operation modes as the final test.
 At the worst point that has the highest amplitude relative to the limit the repeatability of the level was reconfirmed. The photographs of the tests system setup on the worst point were taken and recorded.



Radiated Emission (Electric Field) 30 MHz - 1000 MHz:

The preliminary test was performed according to the description of ANSI C63.4-1992 Sec.13.1.4.1 (Preliminary Radiated Emissions Tests) and Sec.13.1.2(Equipment Configurations), the preliminary test was carried out to investigate the frequency of the emission that has the highest amplitude relative to the limits within normal operating modes, cable positions and a typical system configuration. In order to find out to the maximum emission, the preliminary test and a final test were performed in accordance with the following steps.

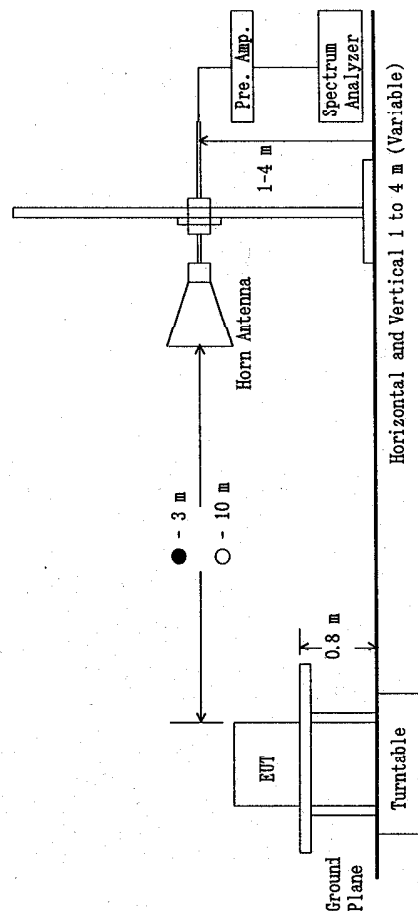
- Step 1: One operation mode of the test system was setting.
 Step 2: Using a test receiver and a test antenna probe, the significant frequency of the emission's circumstance from the test system were investigated. These data were recorded every one of 22 divided bands in the specified frequency band(30 MHz - 1000 MHz).
 Step 3: Using a test receiver and a resonant tuned dipole antenna, the emission's circumstance from the test system was measured in accordance with ANSI C63.4-1992 Sec.13.1.4(Final Radiated Emissions Tests) at each frequency which was found the higher emission referred to level vs. frequency on the list and which was measured by the resonant tuned dipole antenna. The maximum emission was found by changing the cable positions or cable manipulation under a typical system configuration.
 Step 4: Return to step 1, if the other operation mode was possible to be setting.
 Step 5: The worst result was reported arranging data of which was obtained and performed by one or plural operation modes as the final test.
 At the worst point that has the highest amplitude relative to the limit the repeatability of the level was reconfirmed. The photographs of the tests system setup on the worst point were taken and recorded.



Radiated Emission (Electric Field) 1 GHz - 20 GHz:

The preliminary test was performed according to the description of ANSI C63.4-1992 Sec.13.1.4.1 (Preliminary Radiated Emissions Tests) and Sec.13.1.2(Equipment Configurations), the preliminary test was carried out to investigate the frequency of the emission that has the highest amplitude relative to the limits within normal operating modes, cable positions and a typical system configuration. In order to find out the maximum emission, the preliminary test and a final test were performed in accordance with the following steps.

- Step 1: One operation mode of the test system was setting.
 - Step 2: In order to investigate the frequencies of maximum emissions, the horn antenna position was approached to the EUT and the significant frequency of the emission's circumference from the test system were investigated. These data were recorded in the specified frequency band(1 GHz - 4 GHz).
 - Step 3: The emission's circumference from the test system was measured in accordance with ANSI C63.4-1992, Sec.13.1.4(Final Radiated Emissions Tests) at each frequency which was found higher emission referred to level vs. frequency on the list and which was measured in the specified distance using the horn antenna.
 - Step 4: Return to step 1, if the other operation mode was possible to be setting.
 - Step 5: The worst result was reported arranging data of which was obtained and performed by one or plural operation modes as the final test.
- At the worst point that has the highest amplitude relative to the limit the repeatability of the level was reconfirmed. The photographs of the tests system setup on the worst point were taken and recorded.

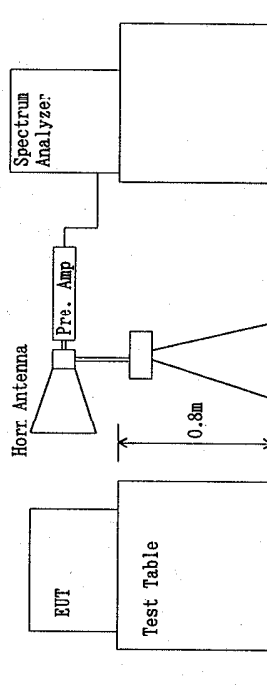


SCALE	LIN
RBW	1 MHz
VBW	1 MHz
SPAN	0 MHz

Spectrum of the fundamental Emission Measurement :

The measurement of the fundamental emission were made by using a spectrum analyzer with Horn antenna.

Measurement Results: Refer to pages 28 - 33.



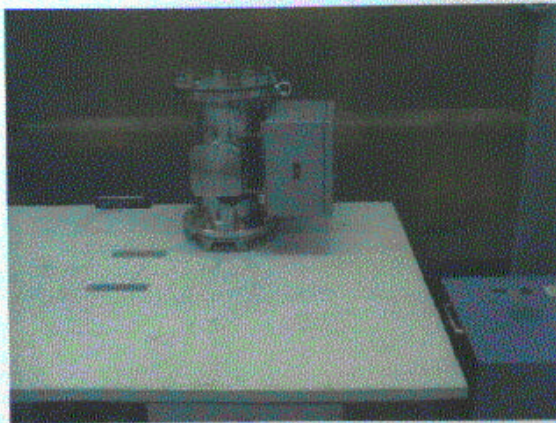
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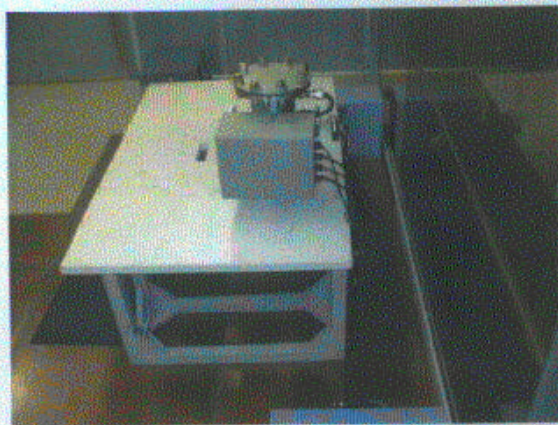
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Test-Setup (Photographs) at worst case

Conducted Emission 450kHz - 30MHz:

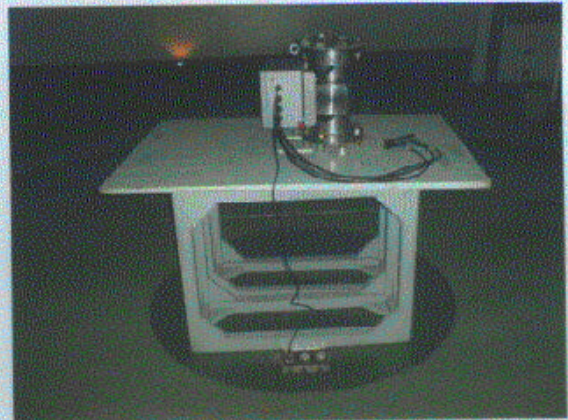


Front View



Side View

Radiated Emission 9kHz - 18GHz:



Front View



Close-up

Mains terminal Disturbance Measurement

Intentional Radiator

Based on the test result of every test mode, the mode of operation that produce the conducted emission that has the highest amplitude is shown as follows:

Operating Frequency : 1900 MHz

Test Date: October 26, 1998

Temp.: 18°C Hum.: 62%

Frequency [MHz]	Correction Factor [dB]	Meter Readings		Limits dB(μV)	Results dB(μV) QP	Margin [dB]	Remarks (Note 2)
		VA-QP	VB-QP				
0.45	0.1	29.5	29.0	48.0	29.6	+18.4	A
4.40	0.3	29.0	29.0	48.0	29.3	+18.7	A
4.95	0.4	31.0	25.0	48.0	31.4	+16.6	A
9.04	0.5	30.0	30.0	48.0	30.5	+17.5	A
9.90	0.5	32.0	32.0	48.0	32.5	+15.5	A
11.62	0.6	36.0	36.0	48.0	36.6	+11.4	A
15.92	0.7	35.0	35.0	48.0	35.7	+12.3	A
23.50	0.8	28.0	30.0	48.0	30.8	+17.2	A
25.80	0.9	35.0	36.0	48.0	36.9	+11.1	A
30.00	0.9	33.0	32.0	48.0	33.9	+14.1	A

Sample of calculated result at 25.80 MHz, as the Minimum Margin point:

Cable Loss = 0.9 dB

+ Meter Reading = 36.0 dB(μV)

Result = 36.9 dB(μV)

Minimum Margin : 48.0 - 36.9 = 11.1(dB)

The point shown on " " is the Minimum Margin Point.

Note 1:

1. The correction factors includes the LISN insertion loss and the cable loss.

Remarks:

Note 2	Detector Function	IF Bandwidth
A	CISPR QP	9kHz
B	Average	10kHz

Tester Signature : A. Hosoda

Type Name : Akio Hosoda

Electromagnetic Radiation Disturbance Measurement

Intentional Radiator

Operating Frequency : 1825 MHz

Test Date: October 28, 1998

Temp.: 23 °C Hum.: 58 %

Frequency [MHz]	Correction Factor [dB]	Meter Readings at 3m dB(μV)	Conversion Factor [dB]	Limits dB(μV/m) at 300m	Field Strength dB(μV/m) at 300m	Margin [dB]	Remarks (Note 2)
0.009	0.0	<32.0	-80.0	48.5	<48.0	+96.5	A
0.090	0.0	22.0	-80.0	28.5	-58.0	+86.5	A
0.115	0.0	20.0	-80.0	26.4	-60.0	+86.4	A
0.136	0.0	28.0	-80.0	24.9	-52.0	+76.9	A
0.18	0.0	<31.0	-80.0	22.6	<49.0	+71.6	B
0.27	0.0	<29.0	-80.0	19.0	<51.0	+70.0	B
0.36	0.0	<27.0	-80.0	16.5	<53.0	+69.5	B
0.43	0.0	37.0	-80.0	15.0	-43.0	+58.0	B
Frequency [MHz]	Correction Factor [dB]	Meter Readings at 3m dB(μV)	Conversion Factor [dB]	Limits dB(μV/m) at 300m	Field Strength dB(μV/m) at 300m	Margin [dB]	Remarks (Note 2)
0.86	0.0	<25.0	-40.0	28.9	<15.0	+43.9	B
1.29	0.0	<24.0	-40.0	25.4	<16.0	+41.4	B
2.14	0.0	<24.0	-40.0	29.5	<16.0	+45.5	B
3.01	0.0	<24.0	-40.0	29.5	<16.0	+45.5	B
5.00	0.0	<24.0	-40.0	29.5	<16.0	+45.5	B
10.00	0.0	<24.0	-40.0	29.5	<16.0	+45.5	B
14.00	0.0	<24.0	-40.0	29.5	<16.0	+45.5	B
22.00	0.0	<24.0	-40.0	29.5	<16.0	+45.5	B
30.00	0.0	<24.0	-40.0	29.5	<16.0	+45.5	B

Sample of calculated result at 1.29 MHz, as the Minimum Margin point:

Correction Factor = 0.0 dB

Conversion Factor = -40.0 dB (-40dB/decade)

+ Meter Reading = 25.0 dB(μV)

Result = -15.0 dB(μV/m) at 30 m

Minimum Margin : 25.4 - (-15.0) = 40.4(dB)

The point shown on " " is the Minimum Margin Point.

Note 1:

1) Conversion Factor(3m→300m -80dB(-40dB/decade))

2) Conversion Factor(3m→30m -40dB(-40dB/decade))

Remarks:

Note 2	Detector Function	IF Bandwidth
A	CISPR QP	500 Hz
B	CISPR QP	9 kHz

Tester Signature : A. Hosoda

Type Name : Akio Hosoda

Electromagnetic Radiation Disturbance Measurement

Intentional Radiator

Operating Frequency : 1900 MHz

Test Date: October 28, 1998 Temp.: 23 °C ; Humi.: 58 %									
Field Strength									
dB(μV/m)									
at 300m									
Frequency	Correction Factor	Meter Readings at 3m	Conversion Factor	Limits at 300m	Field Strength	Margin	Remarks		
[MHz]	[dB]	dB(μV)	[dB]	dB(μV/m)	at 300m	[dB]	(Note 2)		
0.009	0.0	<32.0	-80.0	48.5	<48.0	>+96.5	A		
0.090	0.0	24.0	-80.0	28.5	-56.0	+84.5	A		
0.115	0.0	20.0	-80.0	26.4	-60.0	+86.4	A		
0.133	0.0	27.0	-80.0	24.9	-53.0	+77.9	A		
0.18	0.0	<31.0	-80.0	22.6	<49.0	>+71.6	B		
0.27	0.0	<28.0	-80.0	19.0	<52.0	>+71.0	B		
0.36	0.0	<27.0	-80.0	16.5	<53.0	>+69.5	B		
0.43	0.0	36.0	-80.0	15.0	-44.0	+59.0	B		
Field Strength									
dB(μV/m)									
at 300m									
Frequency	Correction Factor	Meter Readings at 3m	Conversion Factor	Limits at 300m	Field Strength	Margin	Remarks		
[MHz]	[dB]	dB(μV)	[dB]	dB(μV/m)	at 300m	[dB]	(Note 2)		
0.86	0.0	<24.0	-40.0	28.9	<16.0	>+44.9	B		
1.29	0.0	25.0	-40.0	25.4	-15.0	-40.4	B		
2.14	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
3.01	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
5.00	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
10.00	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
14.00	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
22.00	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
30.00	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		

Sample of calculated result at 1.29 MHz, as the Minimum Margin point:

Correction Factor = 0.0 dB
Conversion Factor = -40.0 dB (-40dB/decade)
+ Meter Reading = 25.0 dB(μV)
Result = -15.0 dB(μV/m) at 30 m
Minimum Margin : 25.4 - (-15.0) = 40.4(dB)
The point shown on " " is the Minimum Margin Point.

Note 1:

1) Conversion Factor(3m→300m -80dB(-40dB/decade))
2) Conversion Factor(3m→30m -40dB(-40dB/decade))

Remarks:

Note 2	Detector Function	IF Bandwidth
A	CISPR QP	200 Hz
B	CISPR QP	9 kHz

Tester Signature : A. Hosoda
Type Name : Akio Hosoda

Electromagnetic Radiation Disturbance Measurement

Intentional Radiator

Operating Frequency : 1975 MHz

Test Date: October 28, 1998 Temp.: 23 °C ; Humi.: 58 %									
Field Strength									
dB(μV/m)									
at 300m									
Frequency	Correction Factor	Meter Readings at 3m	Conversion Factor	Limits at 300m	Field Strength	Margin	Remarks		
[MHz]	[dB]	dB(μV)	[dB]	dB(μV/m)	at 300m	[dB]	(Note 2)		
0.009	0.0	<32.0	-80.0	48.5	<48.0	>+96.5	A		
0.090	0.0	22.0	-80.0	28.5	-58.0	+86.5	A		
0.115	0.0	20.0	-80.0	26.4	-60.0	+86.4	A		
0.164	0.0	34.0	-80.0	23.3	-46.0	+69.3	B		
0.27	0.0	<29.0	-80.0	19.0	<51.0	>+70.0	B		
0.46	0.0	<27.0	-80.0	16.5	<53.0	>+69.5	B		
0.43	0.0	37.0	-80.0	15.0	-43.0	+59.0	B		
Field Strength									
dB(μV/m)									
at 300m									
Frequency	Correction Factor	Meter Readings at 3m	Conversion Factor	Limits at 300m	Field Strength	Margin	Remarks		
[MHz]	[dB]	dB(μV)	[dB]	dB(μV/m)	at 300m	[dB]	(Note 2)		
0.86	0.0	<25.0	-40.0	28.9	<15.0	>+43.9	B		
1.29	0.0	<24.0	-40.0	25.4	<16.0	>+41.4	B		
2.14	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
3.01	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
5.00	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
10.00	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
14.00	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
22.00	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		
30.00	0.0	<24.0	-40.0	29.5	<16.0	>+45.5	B		

Sample of calculated result at 1.29 MHz, as the Minimum Margin point:

Correction Factor = 0.0 dB
Conversion Factor = -40.0 dB (-40dB/decade)
+ Meter Reading = 25.0 dB(μV)
Result = -15.0 dB(μV/m) at 30 m
Minimum Margin : 25.4 - (-15.0) = 40.4(dB)
The point shown on " " is the Minimum Margin Point.

Note 1:

1) Conversion Factor(3m→300m -80dB(-40dB/decade))
2) Conversion Factor(3m→30m -40dB(-40dB/decade))

Remarks:

Note 2	Detector Function	IF Bandwidth
A	CISPR QP	200 Hz
B	CISPR QP	9 kHz

Tester Signature : A. Hosoda
Type Name : Akio Hosoda

Electromagnetic Radiation Disturbance Measurement

Intentional Radiator

Operating Frequency : 1825 MHz

Test Date: October 26, 1998
Temp.: 18°C ; Hum.: 65%

Frequency [MHz]	Antenna Factor dB(1/m)	Cable Loss [dB]	Meter Readings dB(uV) at 3m Vert.	Limits dB(uV/m) at 3m	Results dB(uV/m) at 3m Hori. Vert.	Margin [dB]	Remarks (Note 2)
36.9	0.4	0.7	< 4.0	40.0	< 5.1	26.1	+13.9 A
47.0	2.4	0.7	23.0	40.0	23.1	26.1	+13.9 A
68.3	5.6	0.9	23.0	40.0	23.5	21.5	+10.5 A
118.0	10.3	1.3	12.0	43.5	23.6	30.6	+12.9 A
132.7	11.4	1.4	17.0	43.5	29.8	21.8	+13.7 A
265.4	17.4	2.0	14.0	46.0	33.4	32.4	+12.6 A
294.9	18.3	2.1	15.0	46.0	35.4	30.4	+10.6 A
302.3	18.5	2.2	20.0	46.0	40.7	32.7	+ 5.3 A
339.1	19.3	2.3	15.0	46.0	36.9	<20.9	+ 9.1 A

Sample of calculated result at 302.3 MHz, as the Minimum Margin point:

Antenna Factor = 18.5 dB(1/m)
Cable Loss = 2.2 dB
+) Meter Reading = 20.0 dB(uV)
Result = 40.7 dB(uV/m)
Minimum Margin : 46.0 - 40.7 = 5.3 (dB)
The point shown on " " is the Minimum Margin Point.

Note 1:

- 1)The highest frequency generated or used in the EUT: 1975 MHz
- 2)The upper frequency of measurement range: 19.75 GHz

Remarks:

Note 2	Detector Function	IF Bandwidth
A	CISPR QP	120 kHz
B	Average	120 kHz
C	Average	12 kHz
D	Average	7.5 kHz

Tester Signature : A. Hosoda

Type Name : Akio Hosoda

Electromagnetic Radiation Disturbance Measurement

Intentional Radiator

Operating Frequency : 1900 MHz

Test Date: October 26, 1998
Temp.: 18°C ; Hum.: 65%

Frequency [MHz]	Antenna Factor dB(1/m)	Cable Loss [dB]	Meter Readings dB(uV) at 3m Hori. Vert.	Limits dB(uV/m) at 3m	Results dB(uV/m) at 3m Hori. Vert.	Margin [dB]	Remarks (Note 2)
36.9	0.4	0.7	< 4.0	40.0	< 5.1	26.1	+13.9 A
47.0	2.4	0.7	20.0	40.0	23.1	26.1	+13.9 A
68.3	5.6	0.9	23.0	40.0	23.5	21.5	+10.5 A
118.0	10.3	1.3	14.0	43.5	25.6	29.6	+13.9 A
132.7	11.4	1.4	17.0	43.5	29.8	27.8	+13.7 A
265.4	17.4	2.0	14.0	46.0	33.4	31.4	+12.6 A
294.9	18.3	2.1	16.0	46.0	36.4	30.4	+ 9.6 A
302.3	18.5	2.2	20.0	46.0	40.7	32.7	+ 5.3 A
339.1	19.6	2.3	14.0	46.0	35.9	<20.9	+10.1 A

Sample of calculated result at 302.3 MHz, as the Minimum Margin point:

Antenna Factor = 18.5 dB(1/m)
Cable Loss = 2.2 dB
+) Meter Reading = 20.0 dB(uV)
Result = 40.7 dB(uV/m)
Minimum Margin : 46.0 - 40.7 = 5.3 (dB)
The point shown on " " is the Minimum Margin Point.

Note 1:

- 1)The highest frequency generated or used in the EUT: 1975 MHz
- 2)The upper frequency of measurement range: 19.75 GHz

Remarks:

Note 2	Detector Function	IF Bandwidth
A	CISPR QP	120 kHz
B	Average	120 kHz
C	Average	12 kHz
D	Average	7.5 kHz

Tester Signature : A. Hosoda

Type Name : Akio Hosoda

Electromagnetic Radiation Disturbance Measurement

Intentional Radiator

Operating Frequency : 1975 MHz

Test Date: October 26, 1998
Temp.: 18°C ; Hum.: 65%

Frequency [MHz]	Antenna Factor dB(1/m)	Cable Loss [dB]	Meter Readings dB(uV) at 3m Hori. Vert.	Limits dB(uV/m) at 3m	Results dB(uV/m) at 3m Hori. Vert.	Margin [dB]	Remarks (Note 2)
38.9	0.4	0.7	< 4.0	25.0	< 5.1	+13.9	A
47.0	2.4	0.7	20.0	23.0	23.1	+13.9	A
68.3	5.6	0.9	23.0	21.0	29.5	+10.5	A
118.0	10.3	1.3	14.0	17.0	23.6	+14.9	A
132.7	11.4	1.4	17.0	15.0	29.8	+13.7	A
265.4	17.4	2.0	13.0	13.0	32.4	+13.6	A
294.9	18.3	2.1	15.0	11.0	35.4	+10.6	A
302.3	18.5	2.2	20.0	13.0	40.7	+5.3	A
333.1	19.6	2.3	14.0	< -1.0	46.0	+20.9	+10.1 A

Sample of calculated result at 302.3 MHz, as the Minimum Margin point:

Antenna Factor = 18.5 dB(1/m)
Cable Loss = 2.2 dB
+ Meter Reading = 20.0 dB(uV)
Result = 40.7 dB(uV/m)
Minimum Margin : 46.0 - 40.7 = 5.3 (dB)
The point shown on " " is the Minimum Margin Point.

Note 1:

- 1)The highest frequency generated or used in the EUT: 1975 MHz
- 2)The upper frequency of measurement range : 19.75 GHz

Remarks:

Note 2	Detector Function	IF Bandwidth
A	CISPR QP	120 kHz
B	Average	120 kHz
C	Average	12 kHz
D	Average	7.5 kHz

Tester Signature : A. Hosoda

Type Name : Akio Hosoda

Electromagnetic Radiation Disturbance Measurement

Intentional Radiator

Operating Frequency : 1825 MHz

Test Date: October 26, 1998
Temp.: 18°C ; Hum.: 65%

Frequency [MHz]	Antenna Factor dB(1/m)	Corr. Loss [dB]	Meter Readings dB(uV) at 3m Hori. Vert.	Limits dB(uV/m) at 3m	Results dB(uV/m) at 3m Hori. Vert.	Margin [dB]	Remarks (Note 2)
1825.0	22.2	-47.3	65.0	60.0	54.0	34.9	+14.1 A
3650.0	35.3	-42.5	< 37.0	< 37.0	54.0	< 29.8	>+24.2 A
5475.0	38.6	-43.0	< 37.0	< 37.0	54.0	< 32.6	>+21.4 A
7300.0	38.6	-39.0	< 37.0	< 37.0	54.0	< 36.6	>+17.4 A
9125.0	42.3	-37.9	< 34.0	< 34.0	54.0	< 38.4	>+15.6 A
10950.0	41.8	-37.0	< 33.0	< 33.0	54.0	< 37.8	>+16.2 A
12775.0	47.0	-36.6	< 33.0	< 33.0	54.0	< 43.4	>+10.6 A
14600.0	48.4	-36.7	< 34.0	< 34.0	54.0	< 45.7	>+8.3 A
16425.0	47.6	-37.0	< 35.0	< 35.0	54.0	< 45.6	>+8.4 A
18250.0	40.2	-27.3	< 33.0	< 33.0	54.0	< 45.9	>+8.1 A

Corr. Factor(dB)=Cable Loss - Amp. Gain(1 GHz - 18 GHz)

Corr. Factor(dB)=Cable Loss - Amp. Gain + Mixer Conversion Loss(18 GHz - 26 GHz)

Sample of calculated result at 18250.0 MHz, as the Minimum Margin point:

Antenna Factor = 40.2 dB(1/m)
Corr. Factor = -27.3 dB
+ Meter Reading = < 33.0 dB(uV)
Result = 45.9 dB(uV/m)
Minimum Margin : 54.0 - 45.9 = > 8.1(dB)
The point shown on " " is the Minimum Margin Point.

Note 1:

- 1)The highest frequency generated or used in the EUT: 1975 MHz
- 2)The upper frequency of measurement range : 19.75 GHz

Remarks:

Note 2	Detector Function	RES. B.W	V.B.W	Sweep T	Span
A	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz
B	Peak (SP)	100kHz	100kHz	20 msec	0 Hz
* C	Average (ESV)	1 MHz (3 MHz)	3 MHz	20 msec	0 Hz

() : Setting of spectrum analyzer

*)For the average measurement method, it is made measurement using a test receiver, a step attenuator, and a spectrum analyzer(950523A)

Tester Signature : A. Hosoda

Type Name : Akio Hosoda

Electromagnetic Radiation Disturbance Measurement

Intentional Radiator

Operating Frequency : 1900 MHz

Test Date: October 26, 1998
Temp.: 18°C ; Hum.: 65%

Frequency [MHz]	Antenna Factor dB(1/m)	Corr. Loss [dB]	Meter Readings dB(μV) at 3m Hori. Vert.	Limits dB(μV/m) at 3m	Results dB(μV/m) at 3m Hori. Vert.	Margin [dB]	Remarks (Note 2)
1900.0	22.4	-47.6	60.0	54.0	34.8	+19.2	A
3800.0	35.9	-42.3	< 37.0	54.0	< 30.6	> 23.4	A
5700.0	38.8	-42.6	< 37.0	54.0	< 33.2	> 20.8	A
7600.0	38.6	-38.0	< 35.0	54.0	< 35.6	> 18.4	A
9500.0	41.8	-37.5	< 35.0	54.0	< 39.3	> 14.7	A
11400.0	42.1	-37.0	< 35.0	54.0	< 40.1	> 13.9	A
13300.0	47.7	-36.6	< 35.0	54.0	< 46.1	> 7.9	A
15200.0	48.0	-37.0	< 35.0	54.0	< 46.0	> 8.0	A
17100.0	47.7	-37.2	< 35.0	54.0	< 45.5	> 8.5	A
19000.0	40.2	-27.2	< 35.0	54.0	< 48.0	> 6.0	A

Corr. Factor(dB)-Cable Loss - Amp. Gain(1 GHz - 18 GHz)

Corr. Factor(dB)-Cable Loss - Amp. Gain + Mixer Conversion Loss(18 GHz - 26 GHz)

Sample of calculated result at 19000.0 MHz, as the Minimum Margin point:

Antenna Factor = 40.2 dB(1/m)

Corr. Factor = -27.2 dB

+) Meter Reading = 35.0 dB(μV)

Result = 48.0 dB(μV/m)

Minimum Margin : 54.0 - 48.0 = > 6.0(dB)

The point shown on " " is the Minimum Margin Point.

Note 1:

1) The highest frequency generated or used in the EUT: 1975 MHz

2) The upper frequency of measurement range : 19.75 GHz

Remarks:

Note 2	Detector Function	RFS. B.W	V.B.W	Sweep T	Span
A	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz
B	Peak (SP)	100KHz	100KHz	20 msec	0 Hz
* C	Average (ESV)	1 MHz (3 MHz)	3 MHz	20 msec	0 Hz

() : Setting of spectrum analyzer

*) For the average measurement method, it is made measurement using a test receiver, a step attenuator and a spectrum analyzer(950523A)

Tester Signature : A. Hosoda

Type Name

: Akio Hosoda

Electromagnetic Radiation Disturbance Measurement

Intentional Radiator

Operating Frequency : 1975 MHz

Test Date: October 26, 1998
Temp.: 19°C ; Hum.: 65%

Frequency [MHz]	Antenna Factor dB(1/m)	Corr. Loss [dB]	Meter Readings dB(μV) at 3m Hori. Vert.	Limits dB(μV/m) at 3m	Results dB(μV/m) at 3m Hori. Vert.	Margin [dB]	Remarks (Note 2)
1975.0	22.5	-47.5	65.0	54.0	40.0	+12.0	A
3950.0	36.1	-42.3	< 37.0	54.0	< 30.8	> 23.2	A
5925.0	38.9	-42.2	< 37.0	54.0	< 31.7	> 22.3	A
7900.0	42.2	-37.7	< 35.0	54.0	< 39.5	> 24.5	A
9875.0	41.4	-37.5	< 35.0	54.0	< 38.9	> 15.1	A
11850.0	42.4	-37.0	< 35.0	54.0	< 40.4	> 13.6	A
13825.0	49.3	-36.6	< 35.0	54.0	< 47.7	> 6.3	A
15800.0	47.8	-37.0	< 35.0	54.0	< 45.8	> 8.2	A
17775.0	48.0	-37.0	< 35.0	54.0	< 46.0	> 8.0	A
19750.0	40.2	-27.2	< 35.0	54.0	< 48.0	> 6.0	A

Corr. Factor(dB)-Cable Loss - Amp. Gain(1 GHz - 18 GHz)

Corr. Factor(dB)-Cable Loss - Amp. Gain + Mixer Conversion Loss(18 GHz - 26 GHz)

Sample of calculated result at 19750.0 MHz, as the Minimum Margin point:

Antenna Factor = 40.2 dB(1/m)

Corr. Factor = -27.2 dB

+) Meter Reading = 35.0 dB(μV)

Result = 48.0 dB(μV/m)

Minimum Margin : 54.0 - 48.0 = > 6.0(dB)

The point shown on " " is the Minimum Margin Point.

Note 1:

1) The highest frequency generated or used in the EUT: 1975 MHz

2) The upper frequency of measurement range : 19.75 GHz

Remarks:

Note 2	Detector Function	RFS. B.W	V.B.W	Sweep T	Span
A	Peak (SP)	1 MHz	1 MHz	20 msec	0 Hz
B	Peak (SP)	100KHz	100KHz	20 msec	0 Hz
* C	Average (ESV)	1 MHz (3 MHz)	3 MHz	20 msec	0 Hz

() : Setting of spectrum analyzer

*) For the average measurement method, it is made measurement using a test receiver, a step attenuator and a spectrum analyzer(950523A)

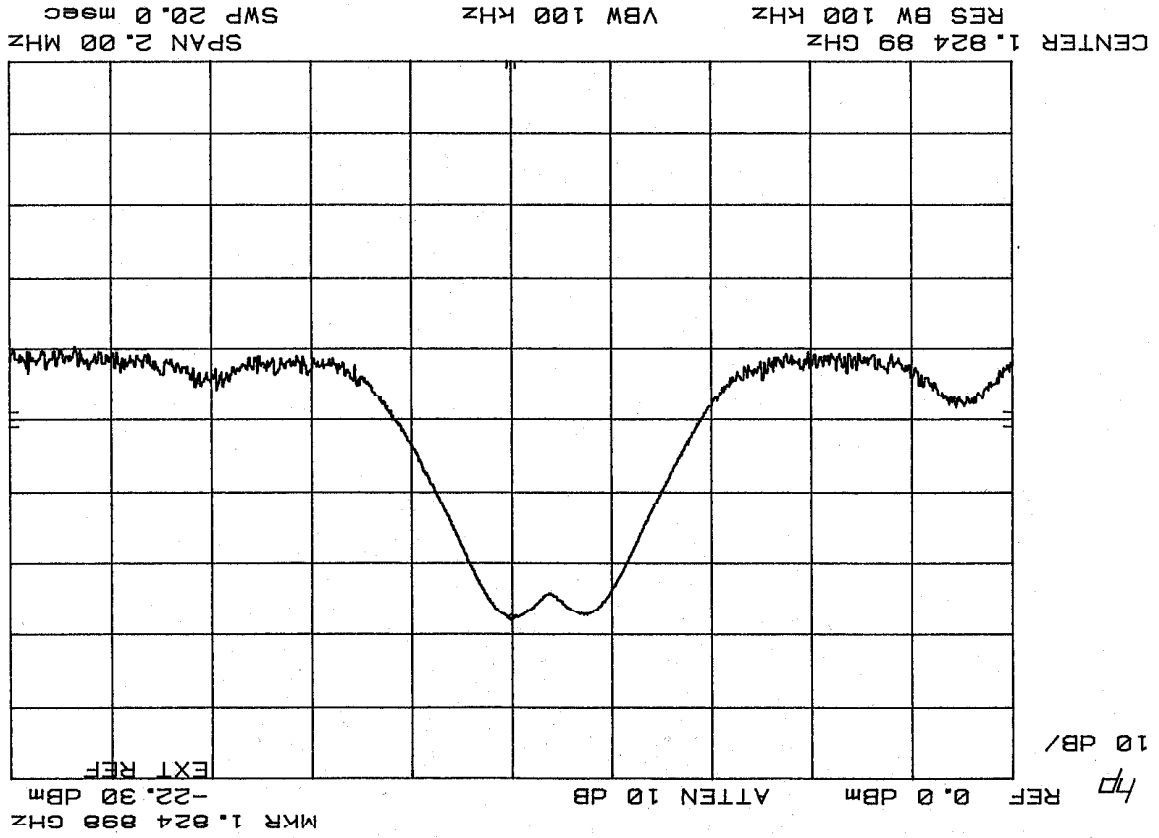
Tester Signature : A. Hosoda

Type Name

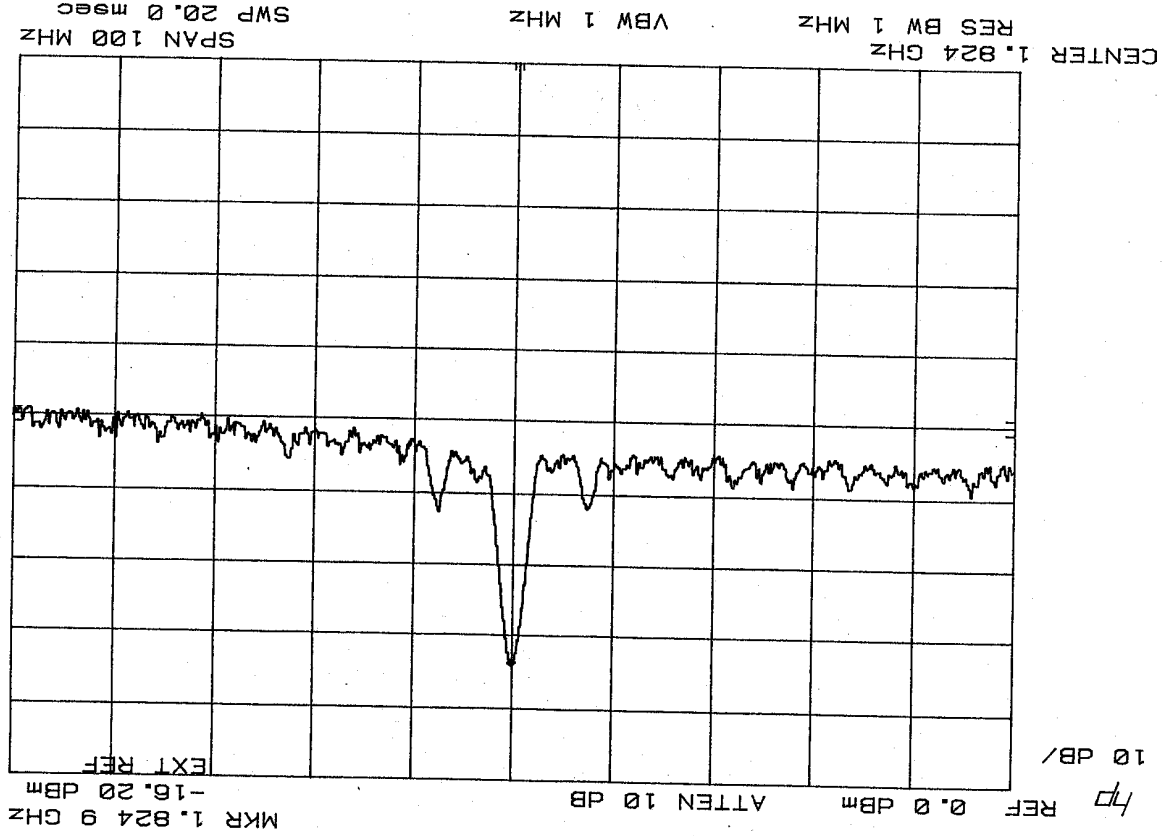
: Akio Hosoda

Spectrum of the Fundamental Emission:

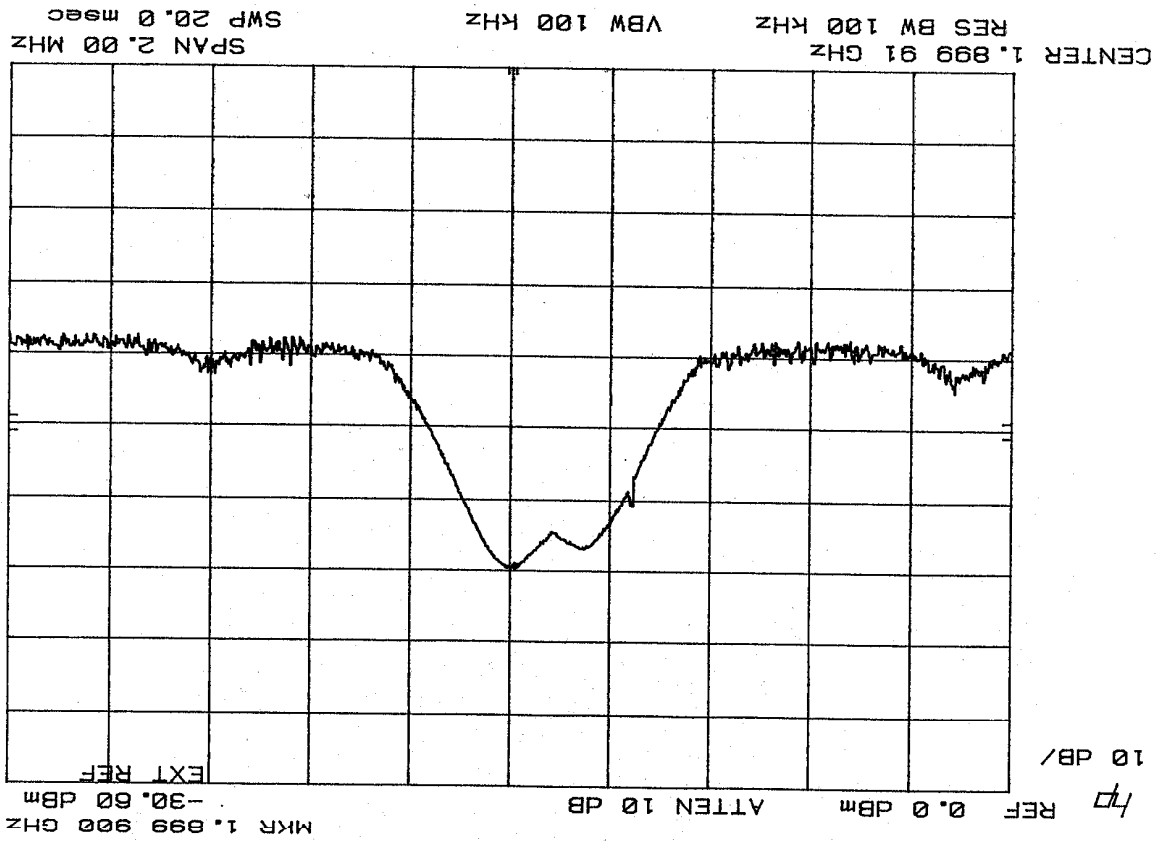
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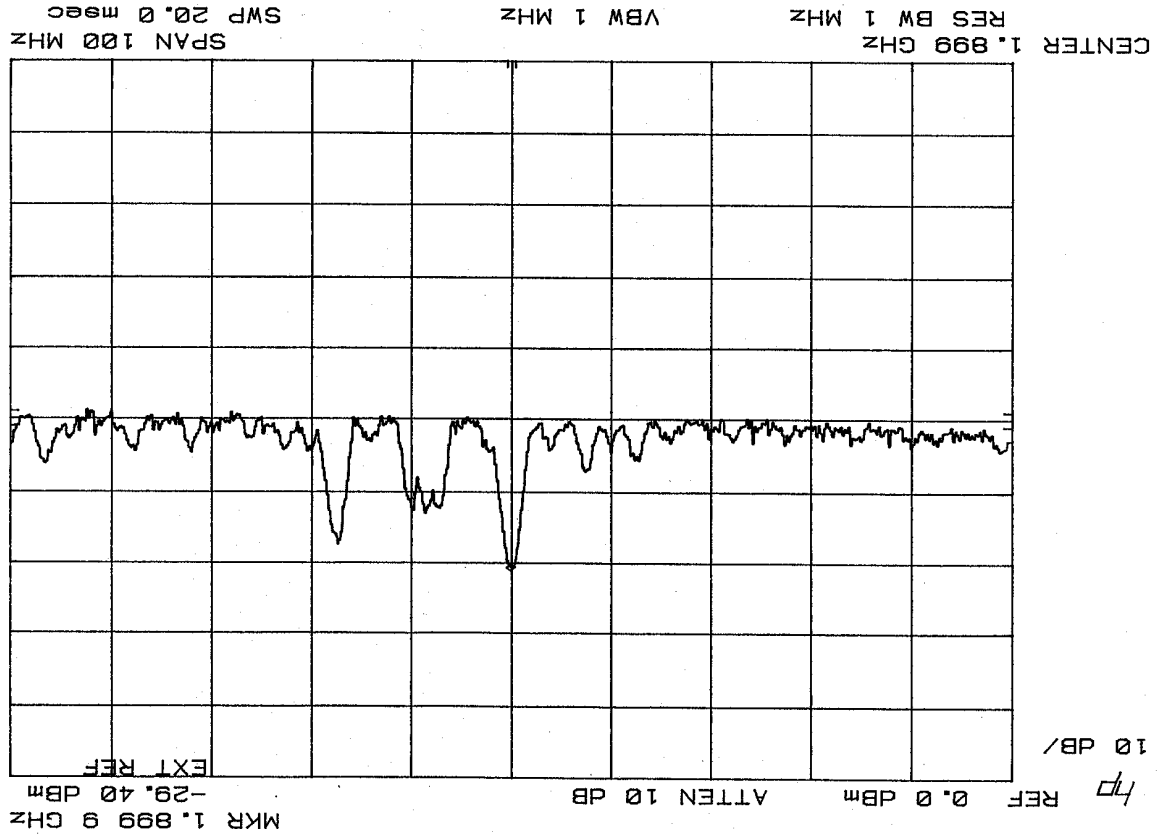
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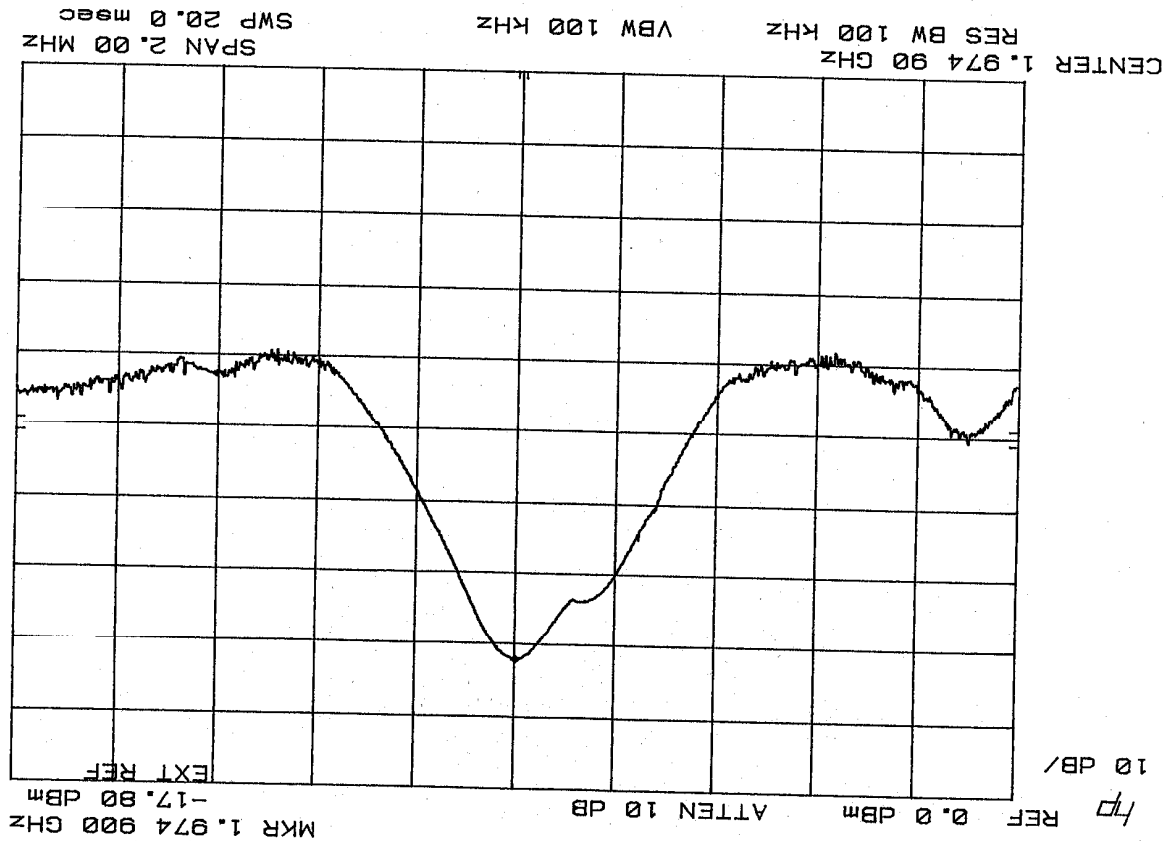
Operating Frequency : 1900 MHz



Operating Frequency : 1900 MHz



Operating Frequency : 1975 MHz



Operating Frequency : 1975 MHz

