JAPAN QUALITY ASSURANCE ORGANIZATION
KITA-KANSAI TESTING CENTER
7-7, Ishimaru 1-Chome, Minoh-shi, Osaka 562-0027 Japan. Phone. +81-727-29-2243/Facsimile. +81-727-28-6848

EMC EMISSION - TEST REPORT

JQA APPLICATION No. : KL80030382S

Name of Product : PHS Cell Station

Model/Type No. : PBS-CS37

FCC ID : AEZPBS-CS37

Applicant : SANYO Electric Co., Ltd.

Address : 1-1, Sanyo-cho, Daito City, Osaka 574-8534, Japan

Manufacturer : SANYO Electric Co., Ltd.

Address : 1-1, Sanyo-cho, Daito City, Osaka 574-8534, Japan

Receive date of EUT : August 10, 2003

Final Judgement : **passed**

TEST RESULTS IN THIS REPORT are obtained in use of equipment that is traceable to National Institute of Advanced Industrial Science and Technology(AIST) under METI Japan and Communications Research Lab.(CRL) under MPHPT Japan.

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

Authorized by:

Takashi Yamanaka, Director
JQA KITA-KANSAI Testing Center

DIRECTORY

TEST REGULATION

FCC Rules and Regulations Part 24 (October 1, 2002)

1900 MHz systems
○ - Narrowband PCS
● - Broadband PCS

Test procedure:

The tests were performed according to FCC Rules and Regulations Part 2 (October 1, 2002), and ANSI C63.4 (2001).

GENERAL INFORMATION

Test facility:

1) Test Facility located at Kita-Kansai : 1st Open Site (3 m Site)
Test Facility located at Kameoka : 1st Open Site (3, 10 and 30 m, on common plane)
: 2nd Open Site (3 and 10 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.
NVLAP Lab Code: 200191-0

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.

Description of the Equipment Under Test (EUT):

1) Name : PHS Cell Station
2) Model/Type No. : PBS-CS37
3) Product Type : Mass-Production(Serial No.: UTN00001)
4) Category : Broadband PCS
5) EUT Authorization : ○ - Verification ● - Certification ○ - D.o.C.
6) Transmitting Frequency : 1880.15 MHz (206 ch) - 1909.55 MHz (49 ch)
7) Receiving Frequency : 1880.15 MHz (206 ch) - 1909.55 MHz (49 ch)
8) Emission Designations : 286KDXW
9) Maximum RF Output Power : 166.34W(EIRP)
10) Power Rating : AC120V 60Hz 1ϕ-3 pin plug
11) Channel Numbers and Frequencies for PCS 1900MHz
The carrier spacing is 300 kHz.
The carrier frequency is designated by the absolute frequency channel number(ARFCN).
The carrier frequency is expessed in the equation shown as follows:

TX frequency(in MHz) = 1880.15 + 0.3 * (n -206) where n : Channel Number($206 \leq n \leq 255$)
TX frequency(in MHz) = 1895.15 + 0.3 * (n -1) where n : Channel Number($1 \leq n \leq 49$)

RX frequency(in MHz) = 1880.15 + 0.3 * (n -206) where n : Channel Number($206 \leq n \leq 255$)
RX frequency(in MHz) = 1895.15 + 0.3 * (n -1) where n : Channel Number($1 \leq n \leq 49$)

13) Modulation Type : $\pi/4$ shift QPSK
14) Type of Communication System : TDMA-TDD

TEST CONDITIONS

Transmitter Power(TP) Measurement (§2.1046(a))

Test Procedure :

The Transmitter Power was measured with a power meter, one 30 dB attenuator and a short, low loss cable.

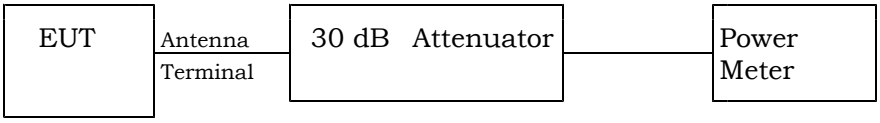


Fig.1 Trasmitter Powe Measurement

Test location :

KITA-KANSAI Testing Center
7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan
● - Shielded room
KAMEOKA EMC Branch
9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan
○ - Shielded room

Used test instruments and sites :

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - 432B/8478B	B - 24/B-43		
● - E4417A	B - 51	August, 2003	1 Year
● - E9321A	B - 52	May, 2003	1 Year
● - E9300B accessory	B - 32	June, 2003	1 Year
○ - 6-20	D - 27		
○ - 4T-10	D - 73		
○ - 4T-10	D - 73		
○ - 2-10	D - 79		
○ - 2-10	D - 80		
○ - 54-10	D - 83		
○ - 54-10	D - 84		
○ - 8566B	A - 13		
○ - 8593A	A - 15		
● - Cable	C - 40 - 9	June, 2003	1 Year

Environmental conditions :

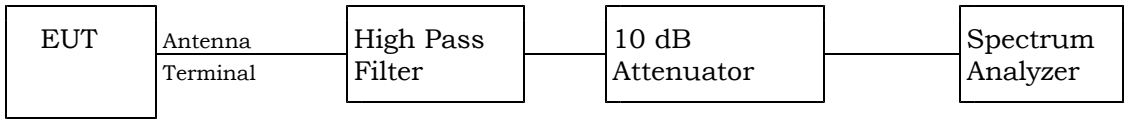
Temperature: 23 °C Humidity: 60 %

Antenna Conducted Spurious Emission Measurement (§2.1051,§24.238))

Test Procedure :

The Antenna Conducted Emission was measured with a spectrum analyzer. The test system is shown as follows:

1) Frequency Range : 2.2GHz - 5.8GHz



2) Frequency Range : 5.8GHz - 20GHz

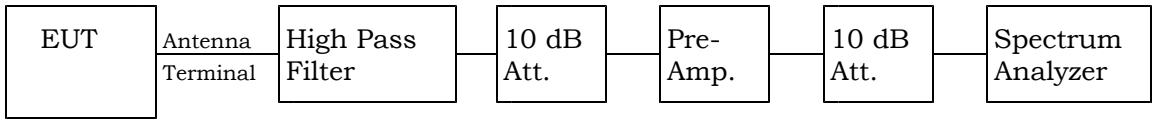


Fig.2 Antenna Conducted Spurious Emission Measurement

Test location :

KITA-KANSAI Testing Center
7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan
● - Shielded room
KAMEOKA EMC Branch
9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan
○ - Shielded room

Used test instruments:

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - MP721C	D - 66		
● - 4T-10	D - 73	May, 2003	1 Year
● - 4T-10	D - 74	May, 2003	1 Year
● - 2-10	D - 40	July, 2003	1 Year
○ - 2-10	D - 79		
○ - 2-10	D - 80		
● - UHP-127	D - 42	May, 2003	1 Year
○ - UHP-128	D - 43		
● - 8566B	A - 13	February, 2003	1 Year
○ - 8593A	A - 15		
● - DBL-0618N515	A - 33	May, 2003	1 Year
● - MZ5010C	D - 81	November, 2002	1 Year
● - 8673D	B - 2	April, 2003	1 Year
● - Cable	C - 40 - 9	June, 2003	1 Year
● - Cable	C - 40 - 11	May, 2003	1 Year
● - Cable	C - 40 - 12	May, 2003	1 Year

Environmental conditions:

Temperature: 23 °C Humidity: 60 %

Transmitter Power(EIRP) Measurement (§24.232)

The measurement were performed shown as follows.

Step 1) The test was set-up shown as Fig.3(a). In order to obtain the maximum emission, the EUT is placed at the height 1.0m on the non-conducted support and the center of the Adaptive Array Antenna is set to 2.3m at the distance 3m from the receiving antenna(Horn Antenna) and rotated around 360 degrees. The receiving antenna height was varied from 1m to 4 m . Then the meter reading of the spectrum analyzer at the maximum emission was A dB(μV).
The Details of Test-Arrangement on Radiated emission test (Drawings) is shown in page 31.

Step 2) The test was set-up shown as Fig.3(b). the center of the Adaptive Array Antenna was replaced to Horn antenna at the same polarized under the same condition as step 1. The RF power was fed to the transmitting Antenna(horn Antenna) through the RF amplifier from the signal generator. In order to obtain the maximum emission level, the height of the receiving antenna is varied from 1m to 4 m. The level of the signal generator was adjusted so that the meter reading of the spectrum analyzer at the maximum emission was A dB(μV) ,same as the recorded level in Step1. Then the RF power into the substitution horn antenna was P(dBm).

The EIRP is calculated in the following equation.

$$EIRP(dBm) = P(dBm) + Gh(dBi)$$

Where, Gh(dBi) : Gain of the substitution horn antenna

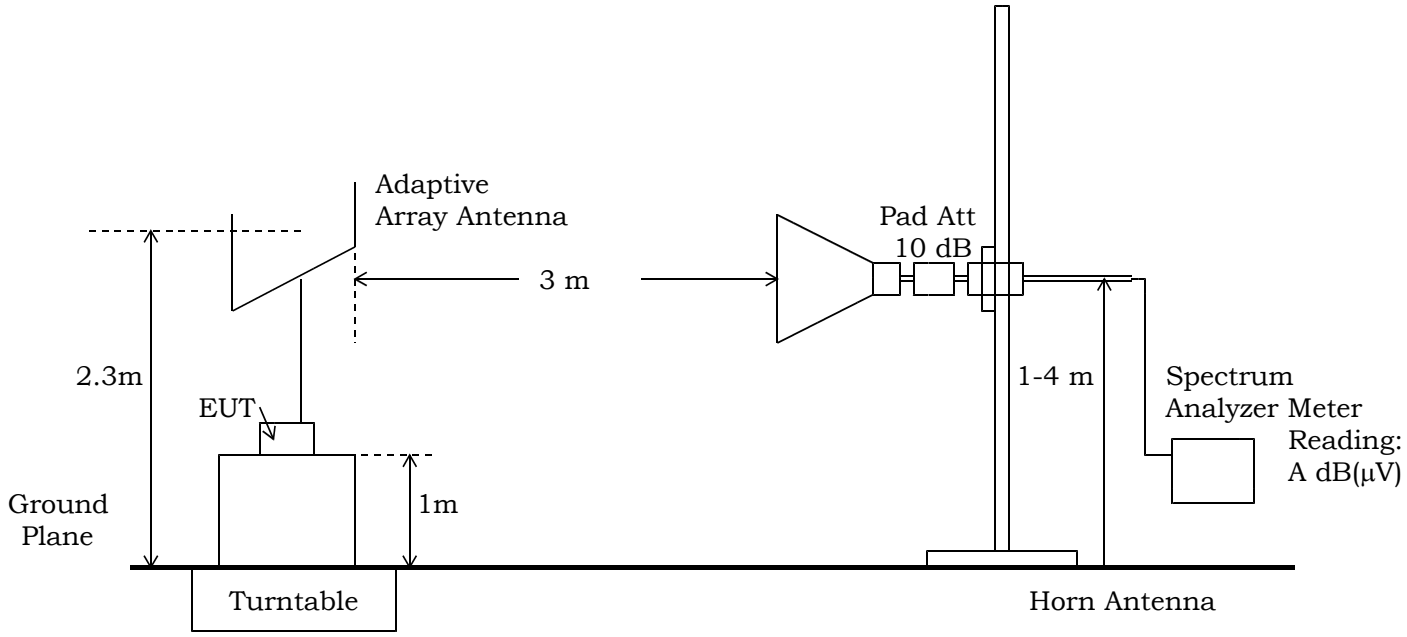
Test location:

KITA-KANSAI Testing Center
7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan
○ - 1st open test site (3 meters)
KAMEOKA EMC Branch
9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan
● - 1st open test site ● - 3 m ○ - 10 m ○ - 30 m
○ - 2nd open test site ○ - 3 m ○ - 10 m

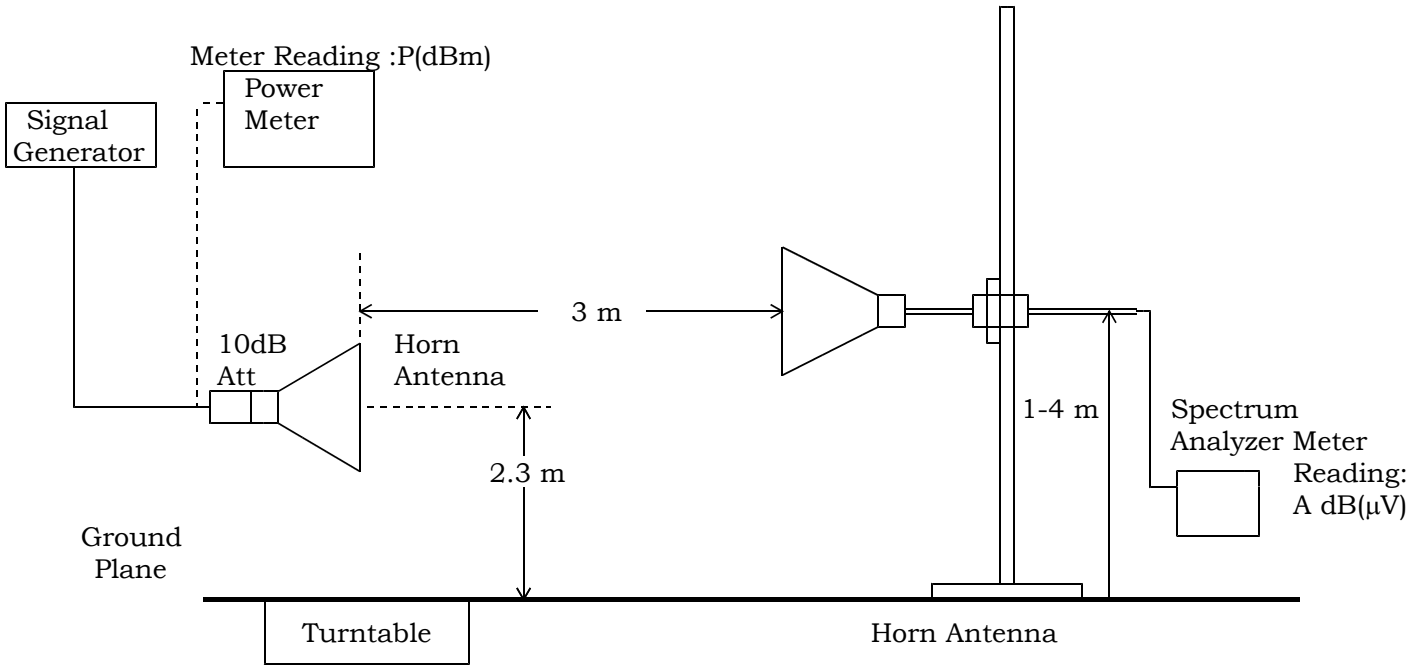
Used test instruments:

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - ESCS 30	A - 1		
○ - ESCS 30	A - 9		
● - 8566B	A - 13	February, 2003	1 Year
○ - 8593A	A - 15		
○ - ESV	A - 6		
● - 4T-10	D - 73	May, 2003	1 Year
○ - 4T-10	D - 74		
○ - 2-10	D - 79		
○ - 2-10	D - 80		
○ - WJ-6611-513	A - 23		
○ - WJ-6882-824	A - 21		
○ - DBL-0618N515	A - 33		
● - 91888-2	C - 40 - 1	May, 2003	1 Year
● - 91888-2	C - 41 - 1	May, 2003	1 Year
○ - 91889-2	C - 41 - 2		
○ - 94613-1	C - 41 - 3		
○ - 91891-2	C - 41 - 4		
○ - 94614-1	C - 41 - 5		
○ - 3160-09	C - 48		
○ - 355C	D - 22		
○ - 355D	D - 23		
○ - MZ5010C	D - 81		
● - Cable	C - 40 - 11	May, 2003	1 Year
● - Cable	C - 40 - 12	May, 2003	1 Year
○ - 432B/8478B	B - 24/B-43		
● - E4417A	B - 51	August, 2003	1 Year
● - E9321A	B - 52	May, 2003	1 Year
○ - ML2437A/ML2444A	B - 10/B-11		
○ - 8673D	B - 2		
○ - MG3681A	B - 3		
● - 6062A	B - 44	May, 2003	1 Year

Temperature: 25 °C Humidity: 58 %



(a) EUT



(b) Substitution Horn Antenna

Fig.3 Maximum Transmitter Power (EIRP) Measurement

Unwanted Radiation Measurement (§2.1053,§24.238)
- EIRP method -

Step 1) The spurious radiation for transmitter were measured at the distance 3m away from the EUT which was placed on a non-conducted support 1.0m in height and the center of the Adaptive Array Antenna was set to 2.3m. The receiving antenna was oriented for vertical polarization and varied from 1 m to 4 m until the maximum emission level was detected on the measuring instrument. The EUT was rotated 360 degrees until the maximum emission was received. The measurement was also repeated with the receiving antenna in the horizontal polarization.
The Details of Test-Arrangement on Radiated emission test (Drawings) is shown in page 31.

This test was carried out using the loop antenna for up to 30MHz, using the half-wave dipole antenna for up to 1GHz and using the horn antenna for above 1GHz.

Step 2) The EIRP measurement was carried out with according to Step 2 in page 7 . Then the RF power in the substitution antenna half-wave dipole antenna for up to 1GHz and the substitution horn antenna for above 1GHz.

The EIRP is calculated in the following equation.

A) Up to 1GHz

EIRP(dBm) = P (dBm) + Gd(dBi) - (Balun Loss of the half-wave dipole Ant. (dB)) + Cable Loss(dB)

Where, Gd(dBi) : Gain of the substitution half-dipole antenna

B) Above 1GHz

EIRP(dBm) = P (dBm) + Gh(dBi)

Where, Gh(dBi) : Gain of the substitution horn antenna

The ERP is calculated in the following equation.

ERP[dBm] = EIRP (dBm)- Gd(dBi)

The respective calculated EIRP of the spurious and harmonics were compared with the EIRP and ERP of fundamental frequency by specified attenuation limits, $43+10\log_{10}$ (TP in watt)[dB]. Where, TP = Transmitter power at the ANT OUT under test configuration as the handsfree unit used.

The tests were carried out under one test configuration as the handsfree unit used.

Test location:

KITA-KANSAI Testing Center
7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan
○ - 1st open test site (3 meters)
KAMEOKA EMC Branch
9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan
● - 1st open test site ● - 3 m ○ - 10 m ○ - 30 m
○ - 2nd open test site ○ - 3 m ○ - 10 m

Validation of Site Attenuation:

1) Last Confirmed Date : November 5, 2002
2) Interval : 1 Year

Used test instruments :

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - ESCS 30	A - 1		
○ - ESCS 30	A - 9		
○ - ESH 2	A - 2		
○ - ESH 2	A - 3		
○ - HFH2-Z2	C - 2		
● - HFH2-Z2	C - 3	July, 2003	1 Year
○ - ESV/ESV-Z3	A - 7 / A - 17		
○ - ESV/ESV-Z3	A - 6 / A - 18		
○ - ESV/ESV-Z3	A - 4 / A - 20		
● - ESV/ESV-Z3	A - 8 / A - 19	November, 2003	1 Year
○ - ESVS 10	A - 5		
○ - VHA9103/BBA9106	C - 43		
○ - UHALP9107	C - 42		
● - VHA9103/FBAB9177	C - 25	August, 2003	1 Year
● - UHALP9108-A1	C - 28	August, 2003	1 Year
● - Cable	H - 1	August, 2003	1 Year

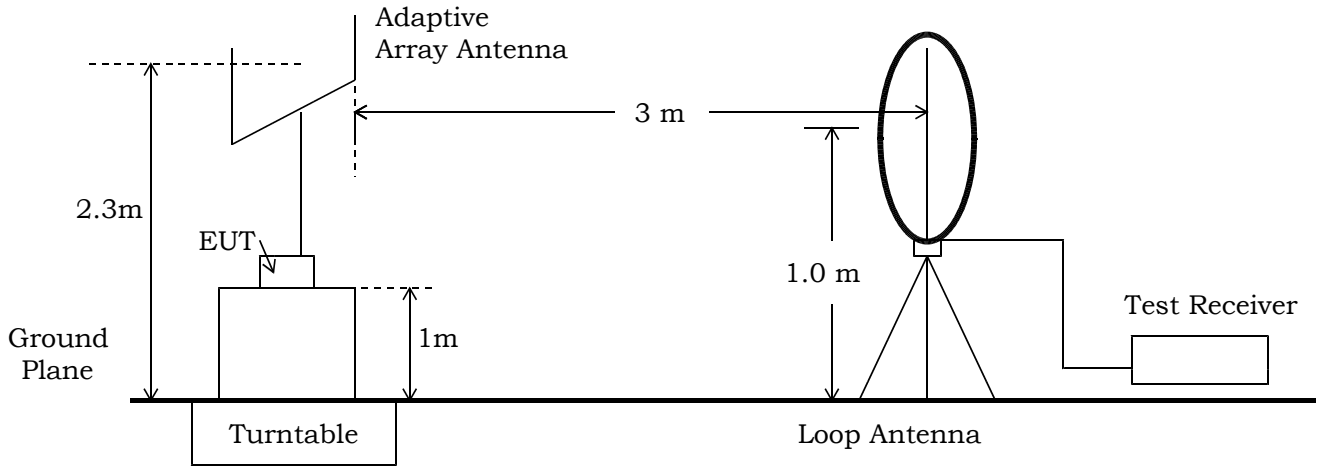
- continue -

Used test instruments :

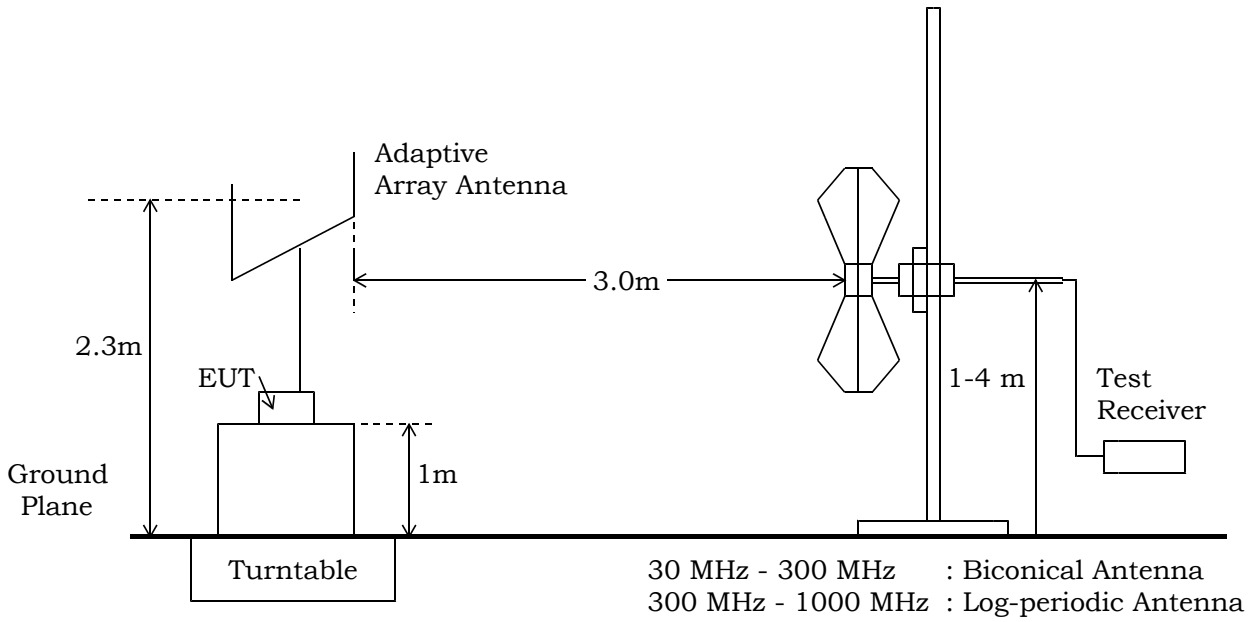
Model No.	Device ID	Last Cal. Date	Cal. Interval
● - 8566B	A - 13	February, 2003	1 Year
○ - 8593A	A - 15		
● - 4T-10	D - 73	May, 2003	1 Year
● - 4T-10	D - 74	May, 2003	1 Year
● - WJ-6611-513	A - 23	May, 2003	1 Year
● - WJ-6882-824	A - 21	May, 2003	1 Year
● - DBL-0618N515	A - 33	May, 2003	1 Year
● - 91888-2	C - 41 - 1	May, 2003	1 Year
● - 91889-2	C - 41 - 2	May, 2003	1 Year
● - 94613-1	C - 41 - 3	May, 2003	1 Year
● - 91891-2	C - 41 - 4	May, 2003	1 Year
● - 94614-1	C - 41 - 5	May, 2003	1 Year
○ - 3160-04	C - 55		
○ - 3160-05	C - 56		
○ - 3160-06	C - 57		
○ - 3160-07	C - 58		
○ - 3160-08	C - 59		
● - 3160-09	C - 48	November, 2002	1 Year
○ - 355C	D - 22		
○ - 355D	D - 23		
● - MZ5010C	D - 81	November, 2002	1 Year
● - 8673D	B - 2	April, 2003	1 Year
● - Cable	C - 40 - 11	May, 2003	1 Year
● - Cable	C - 40 - 12	May, 2003	1 Year
○ - UHP-127	D - 42		
● - UHP-128	D - 43	May, 2003	1 Year

Environmental conditions :

Temperature: 21 °C Humidity: 73 %

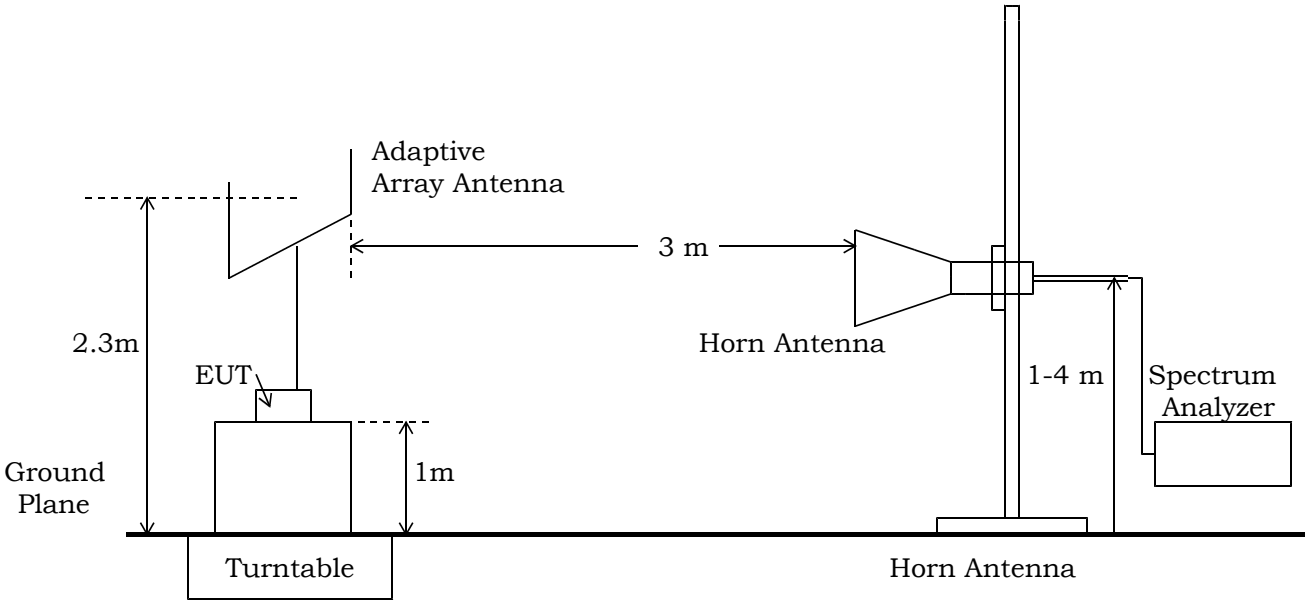


(a) Measurement set up for up to 30 MHz



(b) Measurement set up for up to 1 GHz

Fig.4 Unwanted Radiation Measurement



(c) Measurement set up for above 1GHz

Fig.4 Unwanted Radiation Measurement

Occupied Bandwidth Measurement (§2.1049, §24.238)

Test Procedure :

The measurement test-setup is shown in Fig.5.

The setting of the spectrum analyzer are shown as follows :

Res. Bandwidth	:	10 kHz
Video Bandwidth	:	30 kHz
Span	:	1 MHz
Sweep Time	:	AUTO
Trace	:	Maxhold

Test location :

KITA-KANSAI Testing Center
7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan
● - Shielded room
KAMEOKA EMC Branch
9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan
○ - Shielded room

Used test instruments:

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - 4T-10	D - 73		
○ - 4T-10	D - 74		
● - 2-10	D - 40	June, 2003	1 Year
○ - 2-10	D - 79		
○ - 2-10	D - 80		
● - 8566B	A - 13	February, 2003	1 Year
○ - 8593A	A - 15		

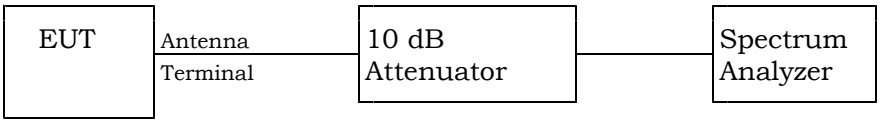


Fig.5 Occupied Bandwidth Measurement

Environmental conditions:

Temperature: 23 °C Humidity: 60 %

Band-Edge Emission Measurement(§22.917,§24.238)

Test Procedure :

The measurement test-setup is shown in Fig.6.

The setting of the spectrum analyzer are shown as follows :

TX Frequency	:	1880.15MHz/1909.55 MHz
Band-edge Frequency	:	1870.0MHz/1910.0 MHz
Res. Bandwidth	:	3 kHz
Video Bandwidth	:	10 kHz
Span	:	30 MHz/2 MHz
Sweep Time	:	AUTO
Trace	:	Maxhold

Test location :

KITA-KANSAI Testing Center
7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan
● - Shielded room
KAMEOKA EMC Branch
9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan
○ - Shielded room

Used test instruments:

○ - 4T-10	D - 73		
○ - 4T-10	D - 74		
● - 2-10	D - 40	June, 2003	1 Year
○ - 2-10	D - 79		
○ - 2-10	D - 80		
● - 8566B	A - 13	February, 2003	1 Year
○ - 8593A	A - 15		

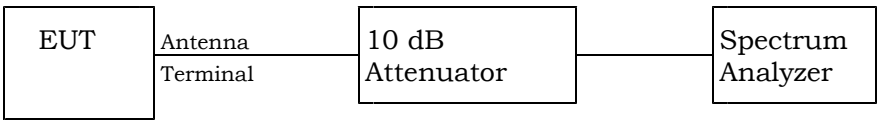


Fig.6 Band-Edge Emission Measurement

Environmental conditions:

Temperature: 23 °C Humidity: 60 %

Frequency Stability Measurement(§2.1055, §24.235)

a) Frequency Stability Measurement versus Temperature

The EUT was placed in an environmental chamber and was tested in the range from -30 to +50 degrees Celsius. The EUT was stabilized at each temperature. The power(120VAC) supplied was applied to the transmitter and allowed to stabilize for 10 minutes. The transmitting frequency was measured at startup and 2 minutes, 5 minutes and 10 minutes after startup. This procedure was repeated from -30 to +50 degrees Celsius at the interval of 10 degrees.

b) Frequency Stability Measurement versus Power Supply Voltage

The EUT was placed in an environmental chamber and was tested at the temperature of +20 degrees Celsius. The EUT was stabilized at the temperature. The power(120VAC),the power(102VAC, 85%) and the power(138VAC, 115%) was applied to the EUT allowed to stabilize for 10 minutes. The transmitting frequency was measured at startup and 2 minutes, 5 minutes and 10 minutes after startup.

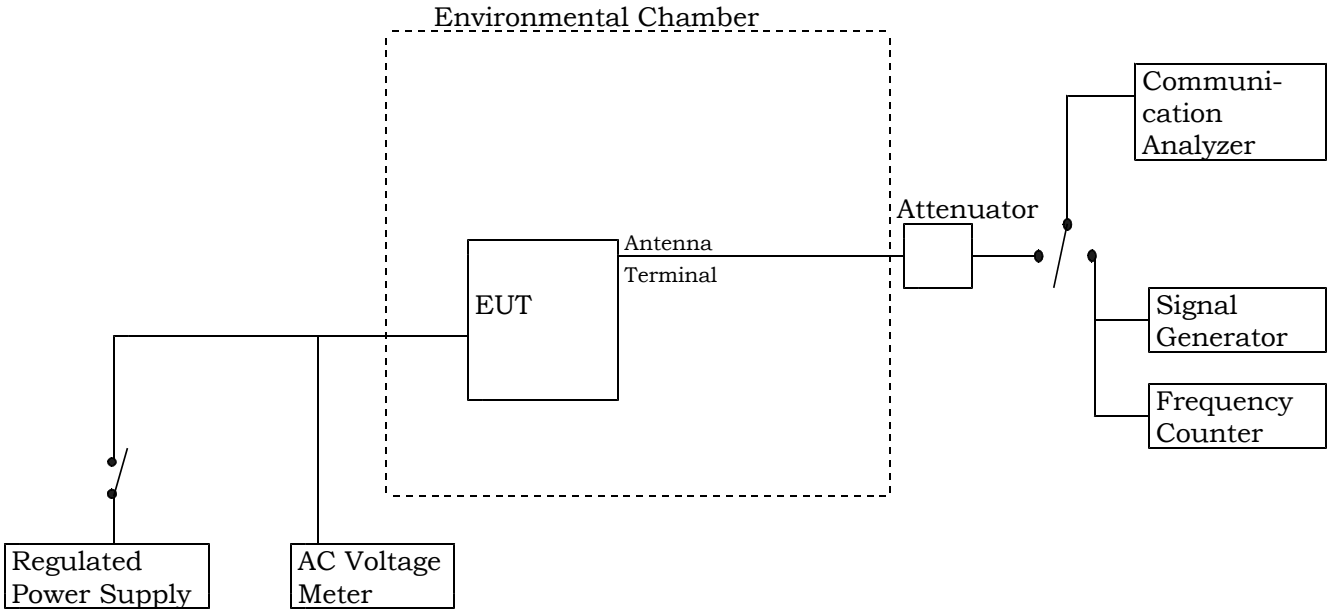


Fig.7 Frequency Stability Measurement

Test location:

KITA-KANSAI Testing Center
7-7, Ishimaru, 1-Chome, Mino-Shi, Osaka, 562-0027, Japan
○ - Shielded room
● - Environment Testing Room
KAMEOKA EMC Branch
9-1, Ozaki, Inukanno, Nishibetsuin-Cho, Kameoka-Shi, Kyoto, 621-0126, Japan
○ - Shielded room

Used test instruments and sites :

Model No.	Device ID	Last Cal. Date	Cal. Interval
● - PL-3G	02304009	July, 2003	1 Year
● - EL100-06T4	14201089	July, 2003	1 Year
○ - 2011-39	B - 33		
● - 2013-18	B - 34	April, 2003	1 Year
○ - 6032A	F - 5		
● - TR5212	B - 30	March, 2003	1 Year
● - CMU200	103210	April, 2003	1 Year
● - MG3681A	B - 3	January, 2003	1 Year

AC Powerline Conducted Emission Measurement
was performed in the following test site.

Test location:

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

Used test instruments and sites:

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - ESCS 30	A - 1		
○ - ESH 2	A - 2		
● - ESH 2	A - 3	November, 2002	1 Year
○ - KNW-407	D - 6		
○ - KNW-408	D - 11		
○ - KNW-242	D - 7		
○ - ESH3-Z5	D - 12		
● - KNW-341C	D - 13	October, 2002	1 Year
○ - KNW-408	D - 14		
○ - KNW-244C	D - 77		
○ - KNW-408	D - 78		
○ - ESH2-Z5	D - 10		
○ - ESH2-Z3	D - 17		
○ - 65 BNC-50-0-1	H - 26		
○ - 65 BNC-50-0-1	H - 27		
● - Cable	H - 7	October, 2002	1 Year
○ - Cable	H - 8		

Environmental conditions:

Temperature: 25 °C Humidity: 60 %

AC Powerline Conducted Emission 150 kHz - 30 MHz:

The preliminary test was performed according to the description of ANSI C63.4-2001 Sec.7.2.3 (Exploratory AC Powerline Conducted Emission Measurements) and Sec.6.2.1 (Tabletop Equipment Tests).
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 (150 kHz - 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 reconfirmed.
The photographs of the test system setup on the worst point were taken and recorded.

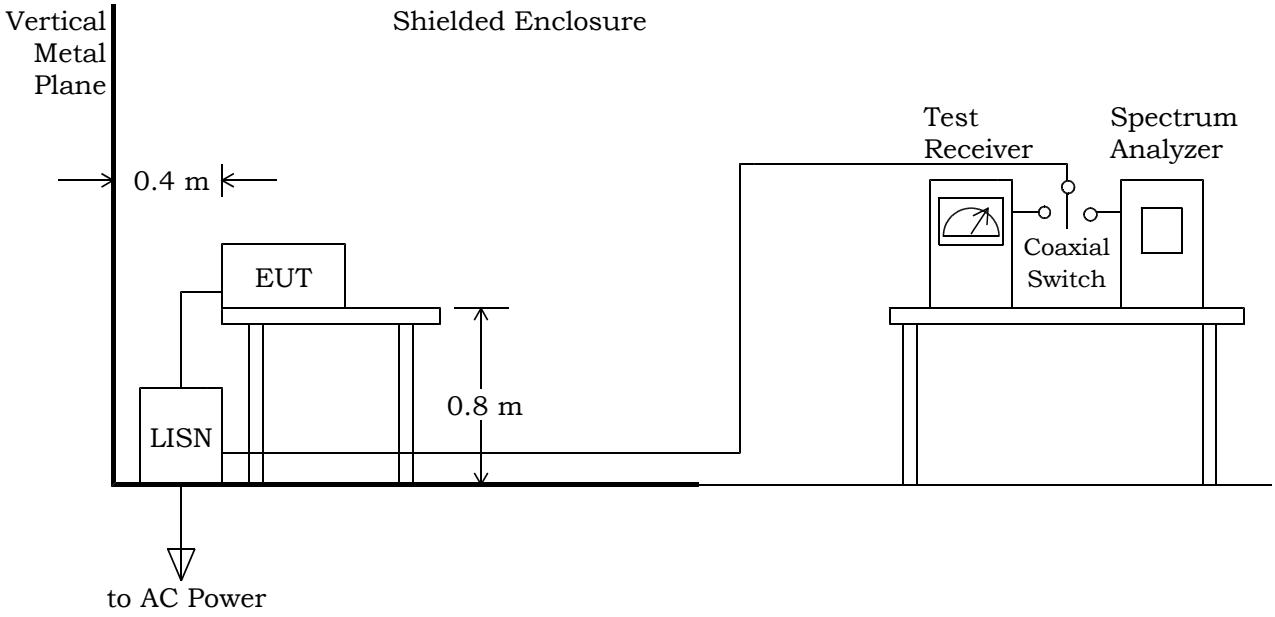


Fig.8 AC Powerline Conducted Emission Measurement

CONFIGURATION OF EUT

The Equipment Under Test (EUT) consists of :

Description	Applicant (Manufacturer)	Model No. (Serial No.)	FCC ID
PHS Cell Station	SANYO Electric Co., Ltd. (SANYO Electric Co., Ltd.)	PBS-CS37 (UTN00001)	AEZPBS-CS37

The measurement was carried out with the following equipment connected :

Description	Grantee/Distributor	Model No. (Serial No.)	FCC ID
Antenna 1	MASPRO DENKOH CORPORATION	AMSP0011 (1027990)	N/A
Antenna 2	MASPRO DENKOH CORPORATION	AMSP0011 (1027992)	N/A
Antenna 3	MASPRO DENKOH CORPORATION	AMSP0011 (1027989)	N/A
Antenna 4	MASPRO DENKOH CORPORATION	AMSP0011 (1027991)	N/A
GPS Antenna	Trimble Navigation Limited	Acutime2000 (12253054)	N/A(DoC)

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

	Description	Port	Shielded Cable	Shell Material	Ferrite Core	Cable Length
1	EUT Antenna	ANT 1 ---	YES	Metal Metal	NO	1.2 m
2	EUT Antenna	ANT 2 ---	YES	Metal Metal	NO	1.2 m
3	EUT Antenna	ANT 3 ---	YES	Metal Metal	NO	1.2 m
4	EUT Antenna	ANT 4 ---	YES	Metal Metal	NO	1.2 m
5	EUT GPS Antenna	GPS ---	YES	Metal Metal	NO	15.0 m
6	EUT No termination	NT1 ---	YES	Metal Metal	NO	20.0 m
7	EUT No termination	COMM ---	YES	Metal Metal	NO	12.0 m
8	AC Power Cord (EUT) 1ϕ 3-pin plug	--	YES	--	NO	1.4 m

Test Configuration:

Operation - mode of the EUT:

The tests were carried out under one modulation type shown as follows :
Modulation type : π/4 shift QPSK

Test system:

The EUT is 1900MHz PHS Cell Station.
The adaptive array antenna technology is apllied to the PHS system , in order to effective use of available frequency, improves capacity of subscribers, and improves the transmission quality of the system.
The EUT has 7 ports shown as follows :

1) 4 ANT Set ports : Each of them is connected to the Antenna.
2) GPS port : is connected to the GPS Antenna.
3) NT1 port : is connected to No terminated cable.
4) COMM port : is connected to No terminated cable.

The specification of the antenna is shown as follows:

1) Type : Co-Linear antnna(Omni-direction)
2) Gain : 10dBi
3) Impedance : 50Ω
4) VSWR : Less than 1.5
5) Cable : Length 1.2m , Attenuation 0.5dB/m

The specification of the adaptive array antenna systems is shown as follows:

1) Number of elements: 4
2) Array Gain : 6dB

The adaptive array antenna controls antenna pattern for desired user, by controlling the phase and amplitude of signals.
Maximizing signal from desire user : beam steerimg
Suppressing signals from undesired users : null steering

Special accessories:

None

Detailed Transmitter portion:

Transmitting frequency : 1880.15 MHz(206ch) - 1909.55 MHz(49ch)
Local frequency : 1636.20 MHz(206ch) - 1665.60 MHz(49ch), 9.6 MHz, 233.15 MHz

Detailed Receiver portion:

Receiving frequency : 1880.15 MHz(206ch) - 1909.55 MHz(49ch)
Local frequency : 1636.20 MHz(206ch) - 1665.60 MHz(49ch), 9.6 MHz, 233.15 MHz

Other Clock Frequency:

TCXO : 19.2 MHz

EUT Modification

● - No modifications were conducted by JQA to achieve compliance to applied levels.

○ - To achieve compliance to applied 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 : N/A Date : N/A

Typed Name : N/A Position : N/A

Responsible Party

Responsible Party of Test Item(Product)

Responsible party :

Contact Person :

Signatory

Deviation from Standard

● - No deviations from the standard described in page 3.

○ - The following deviations were employed from the standard described in page 3.

TEST RESULTS

Transmitter Power(TP)

The requirements are ● - Passed ○ - Not Passed

The transmitter power is	1.29	W	at	1894.850	MHz
Min. limit margin	18.9	dB	at	1894.850	MHz
Max. limit exceeding		dB	at		MHz
Uncertainty of measurement results	+0.6	dB(2σ)		-0.6	dB(2σ)

Remarks:

Antenna Conducted Spurious Emission

The requirements are ● - Passed ○ - Not Passed

Min. limit margin	More than	20.6	dB	at	18801.500	MHz
Max. limit exceeding			dB	at		MHz
Uncertainty of measurement results		+2.4	dB(2σ)		-2.4	dB(2σ)

Remarks:

Transmitter Power(EIRP)

The requirements are ● - Passed ○ - Not Passed

The Maximum EIRP is	166.34	W	at	1894.85	MHz
Min. limit margin	9.9	dB	at	1894.85	MHz
Max. limit exceeding		dB	at		MHz
Uncertainty of measurement results	+1.3	dB(2σ)		-1.3	dB(2σ)

Remarks:

Unwanted Radiation (9 kHz - 20 GHz)

The requirements are ● - Passed ○ - Not Passed

Min. limit margin 14.6 dB at 3760.300 MHz

Max. limit exceeding _____ dB at _____ MHz

Uncertainty of measurement results				
9 kHz - 30 MHz	+2.5 dB(2σ)	-2.5 dB(2σ)
30 MHz - 1 GHz	+3.6 dB(2σ)	-3.7 dB(2σ)
1 GHz - 20 GHz	+3.1 dB(2σ)	-3.2 dB(2σ)

Remarks:

Occupied Bandwidth

The requirements are ● - Passed ○ - Not Passed

The 26dB Bandwdth is 286 kHz at 1894.85 MHz

The results(Occupied Bandwidth) Refer to pages* 2 - 13

Uncertainty of measurement results at Frequency ±0.05 ppm(2σ)
Uncertainty of measurement results at Amplitude ±0.6 dB(2σ)

Remarks: *: The Page is one in the Attachment A.

Band-Edge Emission

The requirements are ● - Passed ○ - Not Passed

The Band-Edge level is -67.5 dBc at 1910.00 MHz

The results(Band-edge Emission) Refer to pages* 15- 22

Uncertainty of measurement results at Frequency ±0.05 ppm(2σ)
Uncertainty of measurement results at Amplitude ±0.6 dB(2σ)

Remarks: *: The Page is one in the Attachment A.

Minimum Save-distance

Minimum Save-distance : 1.15 m

Remarks:

Frequency Stability

Max. Frequency Deviation : +1950.7 Hz at 1880.150 MHz

Uncertainty of measurement results ±0.05 ppm

Remarks:

TEST RESULTS
Digital Device Class B, Part15

AC Powerline Conducted Emission 150 kHz - 30 MHz

The requirements are	● - Passed		○ - Not Passed		
Min. limit margin	23.7	dB	at	0.25	MHz
Max. limit exceeding		dB	at		MHz
Uncertainty of measurement results	+ 2.1	dB(2σ)		- 2.1	dB(2σ)

Remarks:

Electromagnetic Field Radiated Emission 30 MHz - 1000 MHz

The requirements are	● - Passed		○ - Not Passed		
Min. limit margin	17.7	dB	at	607.2	MHz
Max. limit exceeding		dB	at		MHz
Uncertainty of measurement results	+3.6	dB(2σ)		-3.7	dB(2σ)

Remarks:

SUMMARY

GENERAL REMARKS :

The EUT was tested according to the requirements of FCC Rules and Regulations Part 24 (October 1, 2002) under the test configuration, as shown in page 30.

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 : August 25, 2003

End of testing : October 5, 2003

- JAPAN QUALITY ASSURANCE ORGANIZATION -

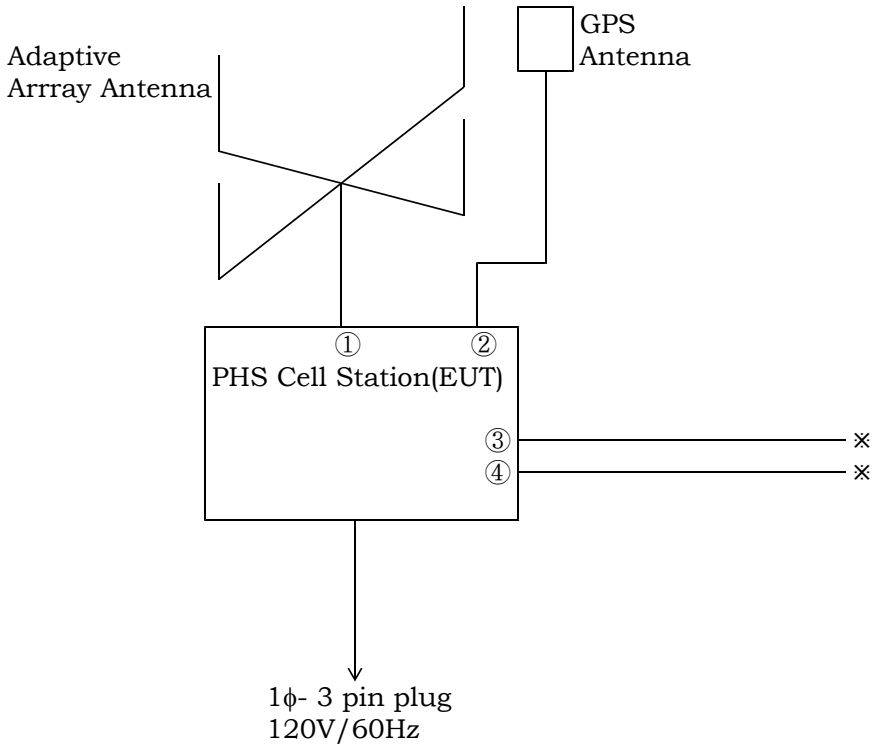
Approved by :

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

Issued by :

Shigeru Kinoshita
Deputy Manager
EMC Div.
JQA KITA-KANSAI Testing Center

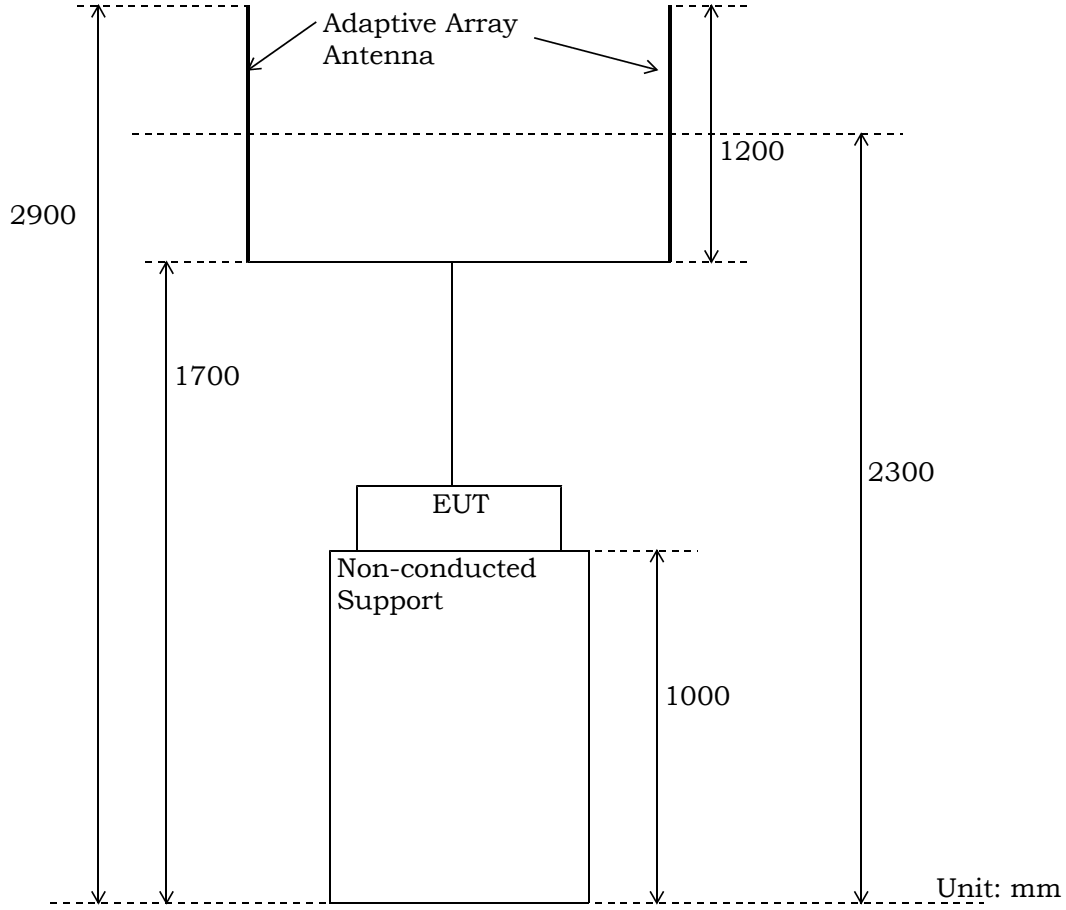
Test System-Arrangement (Drawings)



Note:

※ : No temination
① : ANT1/ANT2/ANT3/ANT4
② : GPS
③ : NT1
④ : COMM

Details of Test-Arrangement on Radiated emission test (Drawings)



Test-Setup (Photographs) at worst case

Conducted Emission 150kHz - 30MHz:

Front View

Side View

Radiated Emission 9kHz - 20GHz:

Front View

Rear View

Transmitter Power(TP) Measurement

Test Date: September 16, 2003
Temp.: 23 °C ; Humi.: 60 %

1)Antenna Terminal : ANT1

CH	Frequency	Correction Factor	Meter Reading Peak	Results Peak		Limits	Margin
	[MHz]	[dB]	[dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	0.80	30.92	1.24	100.0	+19.1
255	1894.850	30.14	0.86	31.00	1.26	100.0	+19.0
49	1909.550	30.16	0.66	30.82	1.21	100.0	+19.2

2)Antenna Terminal : ANT2

CH	Frequency	Correction Factor	Meter Reading Peak	Results Peak		Limits	Margin
	[MHz]	[dB]	[dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	0.72	30.84	1.21	100.0	+19.2
255	1894.850	30.14	0.89	31.03	1.27	100.0	+19.0
49	1909.550	30.16	0.66	30.82	1.21	100.0	+19.2

3)Antenna Terminal : ANT3

CH	Frequency	Correction Factor	Meter Reading Peak	Results Peak		Limits	Margin
	[MHz]	[dB]	[dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	0.87	30.99	1.26	100.0	+19.0
255	1894.850	30.14	0.95	31.09	1.29	100.0	+18.9
49	1909.550	30.16	0.66	30.82	1.21	100.0	+19.2

4)Antenna Terminal : ANT4

CH	Frequency	Correction Factor	Meter Reading Peak	Results Peak		Limits	Margin
	[MHz]	[dB]	[dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	0.88	31.00	1.26	100.0	+19.0
255	1894.850	30.14	0.82	30.96	1.25	100.0	+19.0
49	1909.550	30.16	0.66	30.82	1.21	100.0	+19.2

Sample of calculated result at 1894.850 MHz, as he Maximum Level Point:

	Correction Factor	=	30.14 dB
+)	Meter Reading	=	0.95 dBm
	Result	=	31.09 dBm

: $10^{(31.09/10)}$ = 1290 (mW) = 1.29(W)

Minimum Margin : 10Log(100/1.29) = +18.9(dB)

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

Note : 1. The correction factor includes the attenuator loss and the cable loss.

Tester : Shigeru Kinoshita

Antenna Conducted Spurious Emission Measurement

Test Date: September 16, 2003
Temp.: 23 °C ; Humi.: 60 %

Measurement Results:

1) Antenna Terminal : ANT1

Transmitting Frequency :1880.150 MHz (206ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3760.300	11.7	-53.4	-13.0	-41.7	+28.7	A
5640.450	11.7	-62.3	-13.0	-50.6	+37.6	A
7520.600	-16.8	-49.4	-13.0	-66.2	+53.2	B
9400.750	-16.7	-47.2	-13.0	-63.9	+50.9	B
11280.900	-14.7	< -50.0	-13.0	< -64.7 >	+51.7	B
13161.050	-15.6	< -50.0	-13.0	< -65.6 >	+52.6	B
15041.200	-16.1	< -50.0	-13.0	< -66.1 >	+53.1	B
16921.350	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
18801.500	16.4	< -50.0	-13.0	< -33.6 >	+20.6	C

Transmitting Frequency :1894.850 MHz (255ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3789.700	11.8	-52.2	-13.0	-40.4	+27.4	A
5684.550	11.6	-60.7	-13.0	-49.1	+36.1	A
7579.400	-16.8	-48.9	-13.0	-65.7	+52.7	B
9474.250	-16.7	-47.9	-13.0	-64.6	+51.6	B
11369.100	-15.4	< -50.0	-13.0	< -65.4 >	+52.4	B
13263.950	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
15158.800	-16.1	< -50.0	-13.0	< -66.1 >	+53.1	B
17053.650	-14.2	< -50.0	-13.0	< -64.2 >	+51.2	B
18948.500	16.3	< -50.0	-13.0	< -33.7 >	+20.7	C

Transmitting Frequency :1909.550 MHz (49ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3819.100	11.8	-55.1	-13.0	-43.3	+30.3	A
5728.650	11.9	-60.1	-13.0	-48.2	+35.2	A
7638.200	-16.8	-50.3	-13.0	-67.1	+54.1	B
9547.750	-16.4	-51.3	-13.0	-67.7	+54.7	B
11457.300	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
13366.850	-15.4	< -50.0	-13.0	< -65.4 >	+52.4	B
15276.400	-15.8	< -50.0	-13.0	< -65.8 >	+52.8	B
17185.950	-14.7	< -50.0	-13.0	< -64.7 >	+51.7	B
19095.500	15.9	< -50.0	-13.0	< -34.1 >	+21.1	C

2) Antenna Terminal : ANT2

Transmitting Frequency :1880.150 MHz (206ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3760.300	11.7	-57.8	-13.0	-46.1	+33.1	A
5640.450	11.7	-61.9	-13.0	-50.2	+37.2	A
7520.600	-16.8	-46.4	-13.0	-63.2	+50.2	B
9400.750	-16.7	-47.6	-13.0	-64.3	+51.3	B
11280.900	-14.7	< -50.0	-13.0	< -64.7 >	+51.7	B
13161.050	-15.6	< -50.0	-13.0	< -65.6 >	+52.6	B
15041.200	-16.1	< -50.0	-13.0	< -66.1 >	+53.1	B
16921.350	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
18801.500	16.4	< -50.0	-13.0	< -33.6 >	+20.6	C

Transmitting Frequency :1894.850 MHz (255ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3789.700	11.8	-58.2	-13.0	-46.4	+33.4	A
5684.550	11.6	-60.2	-13.0	-48.6	+35.6	A
7579.400	-16.8	-46.2	-13.0	-63.0	+50.0	B
9474.250	-16.7	-48.1	-13.0	-64.8	+51.8	B
11369.100	-15.4	< -50.0	-13.0	< -65.4 >	+52.4	B
13263.950	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
15158.800	-16.1	< -50.0	-13.0	< -66.1 >	+53.1	B
17053.650	-14.2	< -50.0	-13.0	< -64.2 >	+51.2	B
18948.500	16.3	< -50.0	-13.0	< -33.7 >	+20.7	C

Transmitting Frequency :1909.550 MHz (49ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3819.100	11.8	-63.2	-13.0	-51.4	+38.4	A
5728.650	11.9	-60.0	-13.0	-48.1	+35.1	A
7638.200	-16.8	-48.9	-13.0	-65.7	+52.7	B
9547.750	-16.4	-49.0	-13.0	-65.4	+52.4	B
11457.300	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
13366.850	-15.4	< -50.0	-13.0	< -65.4 >	+52.4	B
15276.400	-15.8	< -50.0	-13.0	< -65.8 >	+52.8	B
17185.950	-14.7	< -50.0	-13.0	< -64.7 >	+51.7	B
19095.500	15.9	< -50.0	-13.0	< -34.1 >	+21.1	C

3) Antenna Terminal : ANT3

Transmitting Frequency :1880.150 MHz (206ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3760.300	11.7	-52.6	-13.0	-40.9	+27.9	A
5640.450	11.7	-60.9	-13.0	-49.2	+36.2	A
7520.600	-16.8	-49.0	-13.0	-65.8	+52.8	B
9400.750	-16.7	-48.3	-13.0	-65.0	+52.0	B
11280.900	-14.7	< -50.0	-13.0	< -64.7 >	+51.7	B
13161.050	-15.6	< -50.0	-13.0	< -65.6 >	+52.6	B
15041.200	-16.1	< -50.0	-13.0	< -66.1 >	+53.1	B
16921.350	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
18801.500	16.4	< -50.0	-13.0	< -33.6 >	+20.6	C

Transmitting Frequency :1894.850 MHz (255ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3789.700	11.8	-52.3	-13.0	-40.5	+27.5	A
5684.550	11.6	-59.5	-13.0	-47.9	+34.9	A
7579.400	-16.8	-48.1	-13.0	-64.9	+51.9	B
9474.250	-16.7	-50.1	-13.0	-66.8	+53.8	B
11369.100	-15.4	< -50.0	-13.0	< -65.4 >	+52.4	B
13263.950	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
15158.800	-16.1	< -50.0	-13.0	< -66.1 >	+53.1	B
17053.650	-14.2	< -50.0	-13.0	< -64.2 >	+51.2	B
18948.500	16.3	< -50.0	-13.0	< -33.7 >	+20.7	C

Transmitting Frequency :1909.550 MHz (49ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3819.100	11.8	-57.8	-13.0	-46.0	+33.0	A
5728.650	11.9	-59.8	-13.0	-47.9	+34.9	A
7638.200	-16.8	-49.3	-13.0	-66.1	+53.1	B
9547.750	-16.4	-54.3	-13.0	-70.7	+57.7	B
11457.300	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
13366.850	-15.4	< -50.0	-13.0	< -65.4 >	+52.4	B
15276.400	-15.8	< -50.0	-13.0	< -65.8 >	+52.8	B
17185.950	-14.7	< -50.0	-13.0	< -64.7 >	+51.7	B
19095.500	15.9	< -50.0	-13.0	< -34.1 >	+21.1	C

4) Antenna Terminal : ANT4

Transmitting Frequency :1880.150 MHz (206ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3760.300	11.7	-55.2	-13.0	-43.5	+30.5	A
5640.450	11.7	-60.1	-13.0	-48.4	+35.4	A
7520.600	-16.8	-46.7	-13.0	-63.5	+50.5	B
9400.750	-16.7	-47.3	-13.0	-64.0	+51.0	B
11280.900	-14.7	< -50.0	-13.0	< -64.7 >	+51.7	B
13161.050	-15.6	< -50.0	-13.0	< -65.6 >	+52.6	B
15041.200	-16.1	< -50.0	-13.0	< -66.1 >	+53.1	B
16921.350	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
18801.500	16.4	< -50.0	-13.0	< -33.6 >	+20.6	C

Transmitting Frequency :1894.850 MHz (255ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3789.700	11.8	-56.7	-13.0	-44.9	+31.9	A
5684.550	11.6	-58.8	-13.0	-47.2	+34.2	A
7579.400	-16.8	-47.6	-13.0	-64.4	+51.4	B
9474.250	-16.7	-47.5	-13.0	-64.2	+51.2	B
11369.100	-15.4	< -50.0	-13.0	< -65.4 >	+52.4	B
13263.950	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
15158.800	-16.1	< -50.0	-13.0	< -66.1 >	+53.1	B
17053.650	-14.2	< -50.0	-13.0	< -64.2 >	+51.2	B
18948.500	16.3	< -50.0	-13.0	< -33.7 >	+20.7	C

Transmitting Frequency :1909.550 MHz (49ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 2)
3819.100	11.8	-59.2	-13.0	-47.4	+34.4	A
5728.650	11.9	-59.8	-13.0	-47.9	+34.9	A
7638.200	-16.8	-48.9	-13.0	-65.7	+52.7	B
9547.750	-16.4	-51.0	-13.0	-67.4	+54.4	B
11457.300	-15.7	< -50.0	-13.0	< -65.7 >	+52.7	B
13366.850	-15.4	< -50.0	-13.0	< -65.4 >	+52.4	B
15276.400	-15.8	< -50.0	-13.0	< -65.8 >	+52.8	B
17185.950	-14.7	< -50.0	-13.0	< -64.7 >	+51.7	B
19095.500	15.9	< -50.0	-13.0	< -34.1 >	+21.1	C

Sample of calculated result at 18801.500 MHz, as the Minimum Margin point:

	Correction Factor	= 16.4 dB
+)	Meter Reading	= <-50.0 dBm
	Result	= <-33.6 dBm

Minimum Margin : -13.0 - (<-33.6) = >20.6(dB)
The point shown on "___ " is the Minimum Margin Point.

Applied limits :
Applied limits = 10log[TP(mW)] - [43 + 10log[tp(W)]] = 10log[TP(mW)] - [43 + (10log[TP(mW)] - 30)]
= -13 [dBm]
Where tp(W) = TP(mW) / 1000 : Transmitter Power at antenna terminal
10log[tp(W)] = 10log[TP(mW)] - 30

Note : 1. The spectrum was checked from 9 kHz up to 20 GHz.
2. All emissions not listed were found to be more than 20dB below the limit.

Remarks:

Note 3	Detector Function	RES. B.W	V.B.W	Sweep T	Span	Corr. Factor *
A	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P10(D-40) +HPF(D-42)
B	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P10(D-73)-Amp.(A-33)+P10(D-74) +HPF(D-42)
C	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P10(D-73)-Amp.(A-33)+Mix.

*)CL: Cable Loss / P10: 10dB Att. / HPF: High Pass Filter Loss/ Amp.: Amplifier Gain/ Mix.: Mixer Conversion Loss

Tester : Shigeru Kinoshita

Transmitter Power(EIRP) Measurement

Test Date: September 6, 2003
Temp.: 25 °C ; Humi.: 58 %

Measurement Results:

1)Emission Measurement in Fig.3(a)

CH	Frequency [MHz]	Meter Reading [dBuV] Horizontal Mh	Vertical Mv
206	1880.150	98.68	124.70
255	1894.850	99.30	125.40
49	1909.550	95.42	124.60

2)Substitution Measurement in Fig.3(b)

CH	Frequency [MHz]	Meter Reading [dBuV] Horizontal Msh	Vertical Msv	Supplied Power to Substitution Antenna [dBm] Ps	Gain of Substitution Antenna [dBi] Gs
206	1880.150	85.40	85.45	-2.08	14.22
255	1894.850	85.55	85.45	-2.02	14.28
49	1909.550	85.85	85.95	-1.95	14.36

3)Calculated Result

CH	Frequency [MHz]	Peak EIRP [dBm] Horizontal EIRPh	Vertical EIRPv	Maximum Peak EIRP [W]	Limits [W]	Margin [dB]
512	1880.150	25.42	51.39	137.72	1640.0	+10.8
661	1894.850	26.01	52.21	166.34	1640.0	+ 9.9
49	1909.550	21.98	51.06	127.64	1640.0	+11.1

Sample of calculated result at 1894.850 MHz, as the Minimum Margin point:

	Meter Reading Mh in Fig.3(a)	=	125.40 dB(μV)
	Meter Reading -Msh in Fig.3(b)	=	-85.45 dB(μV)
	Supplied Power to Sub. Ant.	=	-2.02 dB
+)	Gain of Sub. Ant.	=	14.28 dB
	Result	=	52.21 dBm

Peak EIRP = 52.21 dBm : $10^{((52.21-30)/10)}$ = 166.34 (W)

EIRPh = Mh - Msh + Ps + Gs

EIRPv = Mv - Msv + Ps + Gs

Minimum Margin : 10log(1640/166.34) = 9.9(dB)

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

Remarks:

Note 3	Detector Function	RES. B.W	V.B.W	Sweep T	Span
A	Peak (SP)	1 MHz	3MHz	20 msec	0 Hz

Tester : Akio Hosoda

Unwanted Radiation Measurement

Test Date: September 6, 2003
Temp.: 25 °C ; Humi.: 58 %

Measurement Results:

Transmitting Frequency : 1880.150 MHz (206ch)

Frequency [MHz]	EIRP [dBm] Hori.	EIRP [dBm] Vert.	Limits [dBm]	Margin [dB]	Remarks (Note 3)
3760.300	-33.6	-27.6	-13.0	+14.6	E
5640.450	-38.6	-38.6	-13.0	+25.6	B
7520.600	-37.3	-37.3	-13.0	+24.3	B
9400.750	< -52.6	< -52.6	-13.0	> +39.6	C
11280.900	< -52.1	< -52.1	-13.0	> +39.1	C
13161.050	< -46.2	< -46.2	-13.0	> +33.2	C
15041.200	< -46.2	< -46.2	-13.0	> +33.2	C
16921.350	< -48.2	< -48.2	-13.0	> +35.2	C
18801.500	< -43.6	< -43.6	-13.0	> +30.6	D

Transmitting Frequency : 1894.850 MHz (255ch)

Frequency [MHz]	EIRP [dBm] Hori.	EIRP [dBm] Vert.	Limits [dBm]	Margin [dB]	Remarks (Note 3)
3789.700	-35.7	-27.7	-13.0	+14.7	E
5684.550	-38.6	-38.6	-13.0	+25.6	B
7579.400	-37.8	-37.8	-13.0	+24.8	B
9474.250	< -52.5	< -52.5	-13.0	> +39.5	C
11369.100	< -52.1	< -52.1	-13.0	> +39.1	C
13263.950	< -46.0	< -46.0	-13.0	> +33.0	C
15158.800	< -46.7	< -46.7	-13.0	> +33.7	C
17053.650	< -47.9	< -47.9	-13.0	> +34.9	C
18948.500	< -43.6	< -43.6	-13.0	> +30.6	D

Transmitting Frequency : 1909.55 MHz (49ch)

Frequency [MHz]	EIRP [dBm] Hori.	EIRP [dBm] Vert.	Limits [dBm]	Margin [dB]	Remarks (Note 3)
3819.100	-35.7	-30.7	-13.0	+17.7	E
5728.650	-38.7	-38.7	-13.0	+25.7	B
7638.200	-42.6	-42.6	-13.0	+29.6	B
9547.750	< -52.5	< -52.5	-13.0	> +39.5	C
11457.300	< -52.0	< -52.0	-13.0	> +39.0	C
13366.850	< -45.8	< -45.8	-13.0	> +32.8	C
15276.400	< -47.1	< -47.1	-13.0	> +34.1	C
17185.950	< -48.0	< -48.0	-13.0	> +35.0	C
19095.500	< -43.4	< -43.4	-13.0	> +30.4	D

Sample of calculated result at 3760.300 MHz, as the Minimum Margin point:
Minimum Margin : -13.0 -(-27.6) = 14.6(dB)
The point shown on "___ " is the Minimum Margin Point.

Applied limits :

Applied limits = 10log[TP(mW)] - [43 + 10log[tp(W)]] = 10log[TP(mW)] - [43 + (10log[TP(mW)] - 30)]
= -13 [dBm]

Where tp(W) = TP(mW) / 1000 : Transmitter Power at antenna terminal
10log[tp(W)] = 10log[TP(mW)] - 30

Note : 1. The spectrum was checked from 9 kHz up to 20 GHz.
2. All emissions not listed were found to be more than 20dB below the limit.

Remarks:

Note 3	Detector Function	RES. B.W	V.B.W	Sweep T	Span	Corr. Factor *
A	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P10
B	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P20-Amp.
C	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P10-Amp.
D	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	P10-Amp.+Mix.
E	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+HPF+P20-Amp.
F	Peak (ESV)	120 kHz	--	--	--	CL

*)CL: Cable Loss/ P20: 20dB Att. / P10: 10dB Att. / Amp.: Amplifier Gain/ Mix.: Mixer Conversion Loss/
HPF : High Pass Filter loss

Tester : Akio Hosoda

Occupied Bandwidth Measurement

Test Date: September 14, 2003
Temp.: 23 °C ; Humi.: 60 %

1)Ant teminal : ANT1

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	Data Page*
206	1880.150	283 kHz	Page 2
255	1894.850	282 kHz	Page 3
49	1909.550	283 kHz	Page 4

2)Ant teminal : ANT2

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	Data Page*
206	1880.150	283 kHz	Page 5
255	1894.850	284 kHz	Page 6
49	1909.550	283 kHz	Page 7

3)Ant teminal : ANT3

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	Data Page*
206	1880.150	283 kHz	Page 8
255	1894.850	284 kHz	Page 9
49	1909.550	282 kHz	Page 10

4)Ant teminal : ANT4

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	Data Page*
206	1880.150	285 kHz	Page 11
255	1894.850	286 kHz	Page 12
49	1909.550	284 kHz	Page 13

Note) 1. *: The Data Page is one in Attachment A.
2. The point shown on "_____" is the Maximum Margin Point.

Tester : Shigeru Kinoshita

Band-Edge Emission Measurement

Test Date: September 14, 2003
Temp.: 23 °C ; Humi.: 60 %

1) Low Band-Edge Measurement

Ant terinal	Transmitting Frequency(MHz)	Band-Edge Frequency(MHz)	Band-Edge Level[dBc]	Data Page*
ANT 1	1880.150	1870.000	-84.7	Page 15
ANT 2	1880.150	1870.000	-80.4	Page 16
ANT 3	1880.150	1870.000	-82.7	Page 17
ANT 4	1880.150	1870.000	-82.5	Page 18

2) High Band-Edge Measurement

Ant terinal	Transmitting Frequency(MHz)	Band-Edge Frequency(MHz)	Band-Edge Level[dBc]	Data Page*
ANT 1	1909.550	1910.000	-70.5	Page 19
ANT 2	1909.550	1910.000	-67.5	Page 20
ANT 3	1909.550	1910.000	-67.5	Page 21
ANT 4	1909.550	1910.000	-71.0	Page 22

Note) 1. *: The Data Page is one in Attachment A.
2. The point shown on "_____" is the Maximum Margin Point.

Tester : Shigeru Kinoshita

Frequency Stability Measurement

Measurement Results:

Test Date: September 25-28, 2003

Frequency Stability Measurement versus Temperature

Reference Frequency: 1880.150 MHz (206ch)

AC Supply Voltage : 120VAC

Ambient Temperature (°C)	Deviation(Hz) Startup	2 minutes	5 minutites	10 minutites
-30	-759.4	-1366.1	-1017.6	-649.5
-20	-71.0	-706.4	-436.5	-430.5
-10	+306.6	-172.3	+23.8	+82.3
0	+241.6	-380.1	-387.4	-56.8
10	+368.0	+480.6	+939.0	+816.4
20	+726.4	+783.6	+866.3	+1317.7
30	+523.3	+609.0	+464.1	+1160.5
40	+871.6	+552.7	+1102.3	+421.0
50	+659.4	+502.3	+946.1	+1639.0

Frequency Stability Measurement versus Temperature

Reference Frequency: 1880.150 MHz (206ch)

Ambient Temperature : 20 °C

AC Supply Voltage (VAC)	Deviation(Hz) Startup	2 minutes	5 minutites	10 minutites
102	+498.7	+1331.8	+1326.2	+1233.0
120	+726.4	+783.6	+866.3	+1317.7
138	+361.4	+1950.7	+592.5	+1129.1

Note : The measurement were made after all of components of the oscillator sufficiently stabilized at each temperature.

Sample Caluculation at 1880.150 MHz ,+20°C 2minutes 138VAC) :
((1880.1519507 - 1880.1500000)x10^6 = +1950.7 (Hz)
The point shown on "___ " is the Maximum Frequency Deviation.

Tester : Akio Hosoda

Maximum Permissible Exposure(MPE) :

The limit for Maximum Permissible Exposure(MPE) at frequency of 1894.85 MHz is 1.00 mW/cm^2. (1.00 mW/cm^2 for General Population/Uncotrolled enviroment in §1.1310.)

The conversion from power to power density uses the following equation :

$PD = (TPG)/4\pi r^2 = EIRP/4\pi r^2$

$r = SQRT(EIRP/4\pi PD)$

Where : PD : Power Density at the Minimum Save-distance(W/m^2)
TP : Transmitte Power (W)
G : Numeric gain of the antenna
EIRP: Equivalent Isotropically Radiated Power
r : Minimum Save-distance(in m)

The conversion from mW/cm^2 to W/m^2 is:$1mW/cm^2 = 10W/m^2$
Maximum EIRP*[1] : 166.34W

Note) *[1] : Meaured Value

Minimum Save-distance for MPE calculation

Items	Value
EIRP (W)	166.34
PD (mW/cm^2)	1.00
PD (W/m^2)	10.00
r (m)	1.15

MPE evaluation :
Minimum Save-distance : 1.15m

AC Powerline Conducted Emission Measurement

Class B Digital Device

Test Date: September 10, 2003
Temp.: 25 °C ; Humi.: 60 %

Frequency [MHz]	Correction Factor [dB]	Meter Readings [dB(μV)] VA QP	VA AV	VB QP	VB AV	Limits [dB(μV)] QP	Limits [dB(μV)] AV	Results [dB(μV)] QP	Results [dB(μV)] AV	Margin [dB]	Remarks (Note 2)
0.15	0.2	14.0	-	15.0	-	66.0	56.0	15.2	-	+50.8	A
0.20	0.2	38.0	-	38.0	-	63.6	53.6	38.2	-	+25.4	A
0.25	0.1	38.0	-	38.0	-	61.8	51.8	38.1	-	+23.7	A
0.30	0.1	13.0	-	10.0	-	60.2	50.2	13.1	-	+47.1	A
0.50	0.1	<10.0	-	<10.0	-	56.0	46.0	<10.1	-	>+45.9	A
1.00	0.1	<10.0	-	<10.0	-	56.0	46.0	<10.1	-	>+45.9	A
3.00	0.3	<10.0	-	<10.0	-	56.0	46.0	<10.3	-	>+45.7	A
5.00	0.4	<10.0	-	<10.0	-	56.0	46.0	<10.4	-	>+45.6	A
10.00	0.5	<10.0	-	<10.0	-	60.0	50.0	<10.5	-	>+49.5	A
30.00	0.9	<10.0	-	<10.0	-	60.0	50.0	<10.9	-	>+49.1	A

Sample of calculated result at 0.25 MHz, as the Minimum Margin point:

	Correction Factor	=	0.1 dB
+)	Meter Reading	=	38.0 dB(μV)
	Result	=	38.1 dB(μV)

Minimum Margin : 61.8 - 38.1 = 23.7(dB)
The point shown on "____" is the Minimum Margin Point.

Note 1:
1)The correction factor includes the LISN insertion loss and the cable loss.

Remarks:

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

Tester : Akio Hosoda

Electromagnetic Field Radiated Emission Measurement

Class B Digital Device

Test Date: September 10, 2003
Temp.: 21 °C ; Humi.: 73 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Cable Loss [dB]	Meter Readings [dB(μV)] Hori.	Meter Readings [dB(μV)] Vert.	Limits [dB(μV/m)]	Results [dB(μV/m)] Hori.	Results [dB(μV/m)] Vert.	Margin [dB]	Remarks (Note 1)
125.0	13.2	2.1	0.0	1.0	43.5	15.3	16.3	+27.2	A
192.0	16.5	2.6	< 0.0	< 0.0	43.5	<19.1	<19.1	>+24.4	A
250.0	17.4	3.0	< 0.0	< 0.0	46.0	<20.4	<20.4	>+25.6	A
268.9	17.7	3.1	0.0	< 0.0	46.0	20.8	<20.8	+25.2	A
383.9	16.0	3.8	< 0.0	2.0	46.0	<19.8	21.8	+24.2	A
500.0	17.8	4.5	<-4.0	<-4.0	46.0	<18.3	<18.3	>+27.7	A
607.2	19.3	5.0	4.0	1.0	46.0	28.3	25.3	+17.7	A
625.0	19.6	5.1	<-4.0	<-4.0	46.0	<20.7	<20.7	>+25.3	A
672.0	20.4	5.3	-2.0	-2.0	46.0	23.7	23.7	+22.3	A
750.0	21.0	5.7	<-4.0	<-4.0	46.0	<22.7	<22.7	>+23.3	A

Sample of calculated result at 607.2 MHz, as the Minimum Margin point:

	Antenna Factor	=	19.3 dB(1/m)
	Cable Loss	=	5.0 dB
+)	Meter Reading	=	4.0 dB(μV)
	Result	=	28.3 dB(μV/m)

Minimum Margin : 46.0 - 28.3 = 17.7(dB)
The point shown on "____" is the Minimum Margin Point.

Remarks:

Note 1	Detector Function	IF Bandwidth
A	CISPR QP	120 kHz
B	Average	120 kHz
C	Average	12 kHz
D	Average	7.5 kHz

Tester : Akio Hosoda