



Issue Date : April 1, 2004  
Page 1 of 70

## *EMC* EMISSION - TEST REPORT

JQA APPLICATION No. : KL80030738

Name of Product : PHS Cell Station

Model/Type No. : PBS-CS82

FCC ID : AEZPBS-CS82

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 : March 2, 2004

**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 National Institute of Information and Communications Technology(NICT) 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

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## **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-CS82
- 3) Product Type : Mass-Production(Serial No.: UTP00001)
- 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 : 246KDXW
- 9) Maximum RF Output Power : 154.88W(EIRP)
- 10) Power Rating : AC120V 60Hz 1 $\phi$ -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 expressed in the equation shown as follows:

$$\text{TX frequency(in MHz)} = 1880.15 + 0.3 * (n - 206) \quad \text{where } n : \text{Channel Number}( 206 \leq n \leq 255)$$

$$\text{TX frequency(in MHz)} = 1895.15 + 0.3 * (n - 1) \quad \text{where } n : \text{Channel Number}( 1 \leq n \leq 49)$$

$$\text{RX frequency(in MHz)} = 1880.15 + 0.3 * (n - 206) \quad \text{where } n : \text{Channel Number}( 206 \leq n \leq 255)$$

$$\text{RX frequency(in MHz)} = 1895.15 + 0.3 * (n - 1) \quad \text{where } n : \text{Channel Number}( 1 \leq n \leq 49)$$

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

## TEST CONDITIONS

### Transmitter Power(TP) Measurement (§2.1046(a),§24.232(a))

#### Test Procedure :

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

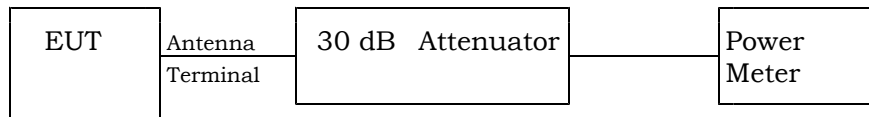


Fig.1 Trasmmitter Powe Measurement

#### 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 :

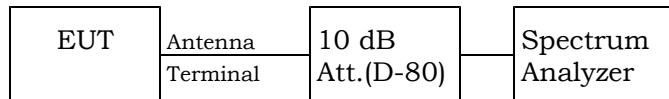
Temperature: 21 °C Humidity: 46 %

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

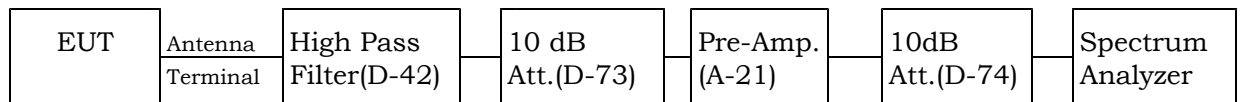
### Test Procedure :

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

- 1) Frequency Range : 9kHz - 2.2GHz



- 2) Frequency Range : 2.2GHz -5.8GHz



- 3) Frequency Range : 5.8GHz - 20GHz

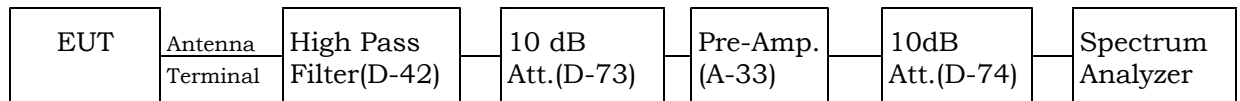


Fig.2 Antenna Conducted Spurious Emission Measurement

**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
● - 8566B	A - 13	March, 2004	1 Year
○ - 8593A	A - 15		
○ - MP721C	D - 65		
● - 4T-10	D - 73	May, 2003	1 Year
● - 4T-10	D - 74	May, 2003	1 Year
○ - 2-10	D - 79		
● - 2-10	D - 80	September, 2003	1 Year
○ - WJ-6611-513	A - 23		
● - WJ-6882-824	A - 21	May, 2003	1 Year
● - DBL-0618N515	A - 33	May, 2003	1 Year
● - UHP-127	D - 42	May, 2003	1 Year
○ - UHP-128	D - 43		

**Environmental conditions:**

Temperature: 22 °C      Humidity: 48 %

### **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( $\mu$ V).

The Details of Test-Arrangement on Radiated emission test (Drawings) is shown in page 34.

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( $\mu$ V) ,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.

$$\text{EIRP(dBm)} = P \text{ (dBm)} + G_h(\text{dBi})$$

Where,  $G_h(\text{dBi})$  : 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

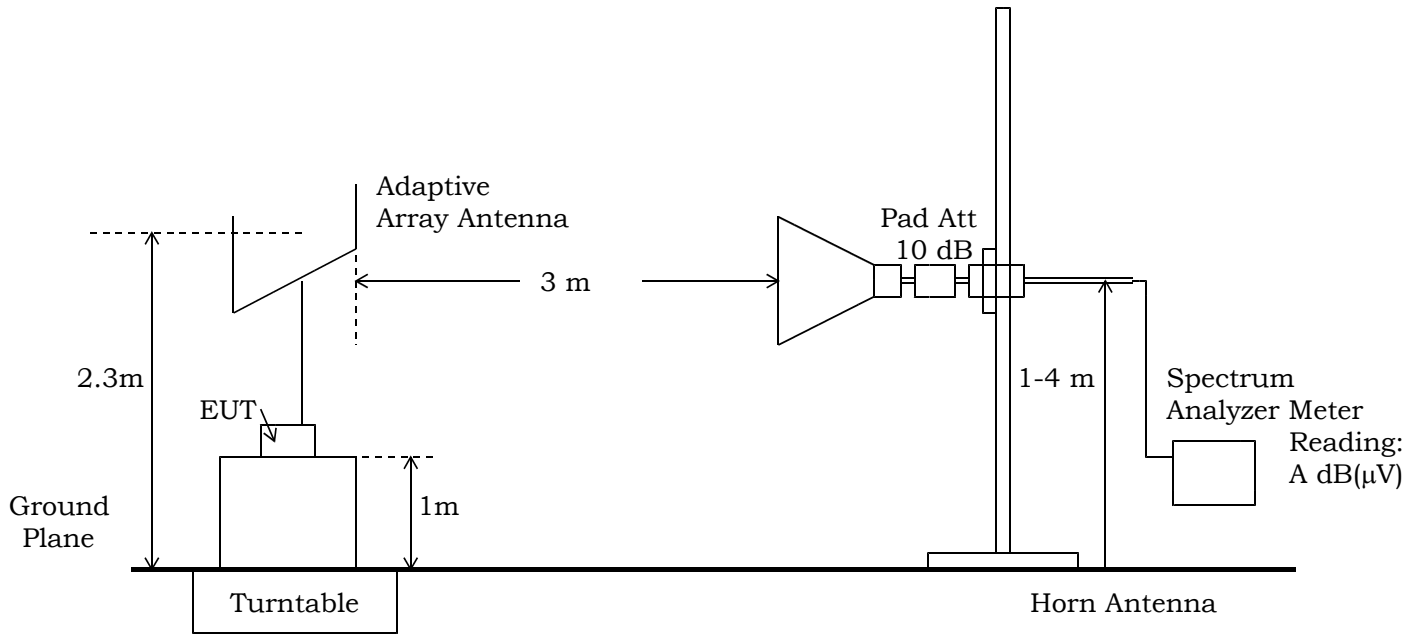
○ - 1st open test site                      ○ - 3 m            ○ - 10 m            ○ - 30 m

○ - 2nd open test site                      ○ - 3 m            ○ - 10 m

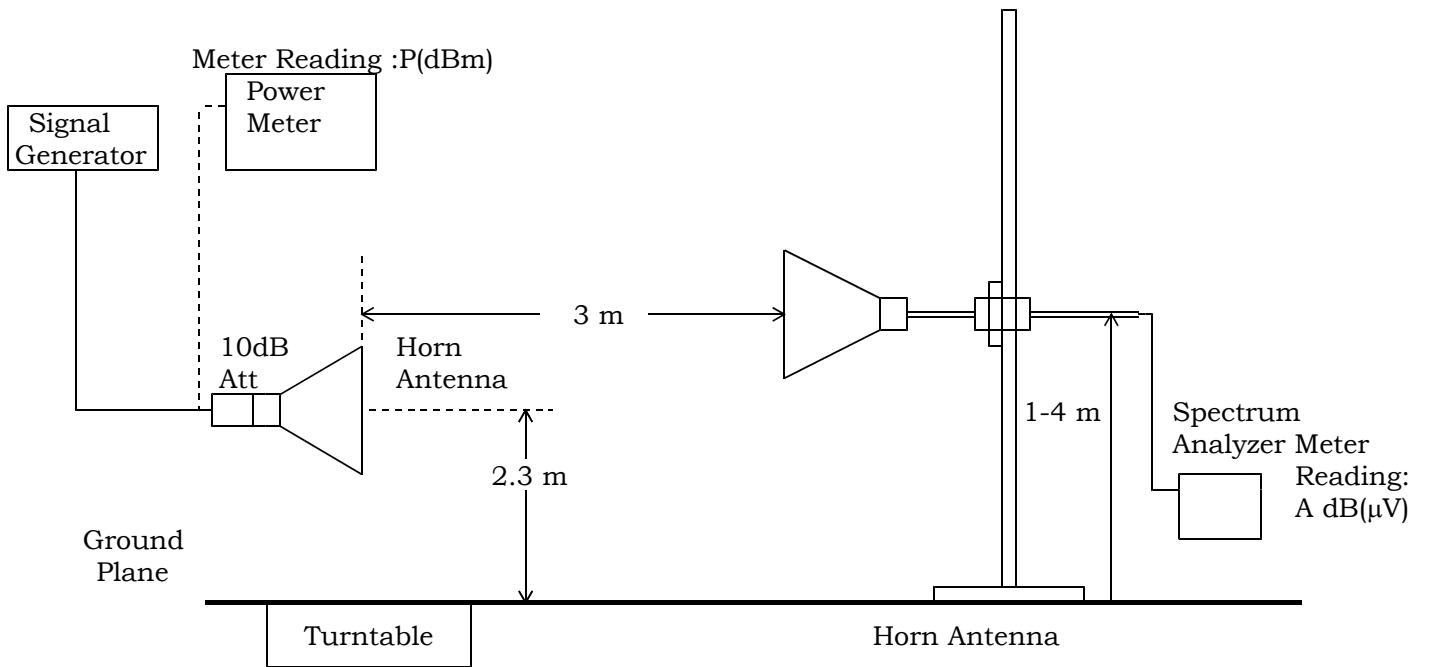
**Used test instruments:**

Model No.	Device ID	Last Cal. Date	Cal. Interval
○ - ESCS 30	A - 1		
○ - ESCS 30	A - 9		
● - 8566B	A - 13	March, 2004	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
● - E4417A	B - 51	August, 2003	1 Year
● - E9321A	B - 52	May, 2003	1 Year
○ - MG3681A	B - 3		
● - 6062A	B - 44	May, 2003	1 Year

Temperature: 24 °C    Humidity: 40 %



(a) EUT



(b) Substitution Horn Antenna

Fig.3 Maximum Transmitter Power (EIRP) Measurement

## Unwanted Radiation Measurement (§2.1053,§24.238)

### - ERP 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 34.

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

$$\text{EIRP(dBm)} = P \text{ (dBm)} + G_d(\text{dBi}) - (\text{Balun Loss of the half-wave dipole Ant. (dB)}) + \text{Cable Loss(dB)}$$

Where,  $G_d(\text{dBi})$  : Gain of the substitution half-dipole antenna

B) Above 1GHz

$$\text{EIRP(dBm)} = P \text{ (dBm)} + G_h(\text{dBi})$$

Where,  $G_h(\text{dBi})$  : Gain of the substitution horn antenna

The ERP is calculated in the following equation.

$$\text{ERP[dBm]} = \text{EIRP (dBm)} - G_d(\text{dBi})$$

The respective calculated EIRP of the spurious and harmonics were compared with the EIRP and ERP of fundamental frequency by specified attenuation limits,  $43 + 10 \log_{10}(\text{TP in watt})[\text{dB}]$ . 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 18, 2003

2) Interval : 1 Year

**Used test instruments :**

Model No.	Device ID	Last Cal. Date	Cal. Interval
● - ESCS 30	A - 1	August, 2003	1 Year
○ - ESCS 30	A - 9		
○ - ESH 2	A - 2		
○ - ESH 2	A - 3		
● - HFH2-Z2	C - 2	July, 2003	1 Year
○ - HFH2-Z2	C - 3		
● - Cable	H - 28	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	May, 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
○ - KBA-511	C - 12		
○ - KBA-611	C - 22		
● - Cable	H - 1	August, 2003	1 Year

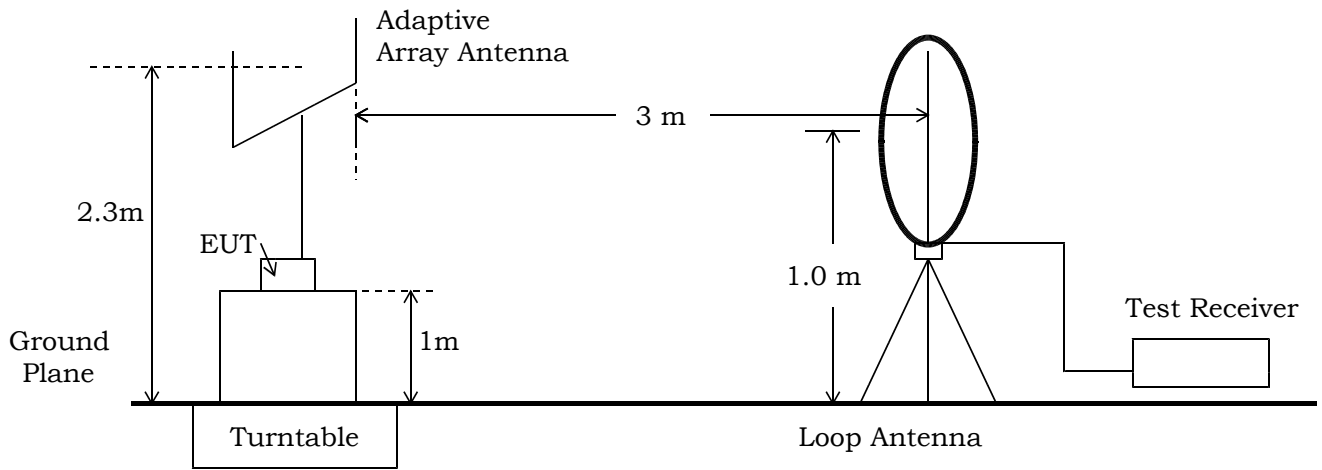
- continue -

**Used test instruments :**

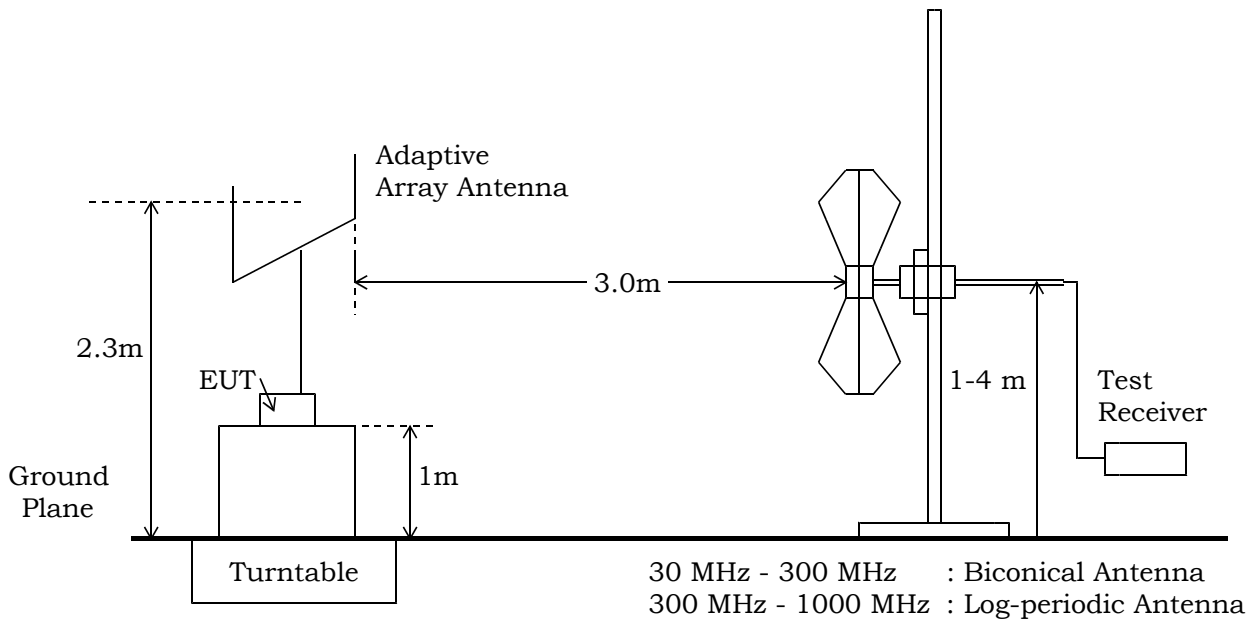
Model No.	Device ID	Last Cal. Date	Cal. Interval
● - 8566B	A - 13	March, 2004	1 Year
○ - 8593A	A - 15		
● - 4T-10	D - 73	May, 2003	1 Year
○ - 4T-10	D - 74		
● - WJ-6611-513	A - 23	May, 2003	1 Year
● - WJ-6882-824	A - 21	May, 2003	1 Year
● - DBL-0618N515	A - 33	May, 2003	1 Year
● - 91888-2	C - 40 - 1	May, 2003	1 Year
● - 91889-2	C - 40 - 2	May, 2003	1 Year
● - 94613-1	C - 40 - 3	May, 2003	1 Year
● - 91891-2	C - 40 - 4	May, 2003	1 Year
● - 94614-1	C - 40 - 5	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
● - 3160-09	C - 48	December, 2003	1 Year
○ - 355C	D - 22		
○ - 355D	D - 23		
● - MZ5010C	D - 81	December, 2003	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	May, 2003	1 Year
○ - UHP-128	D - 43		

**Environmental conditions :**

Temperature: 23 °C      Humidity: 40 %

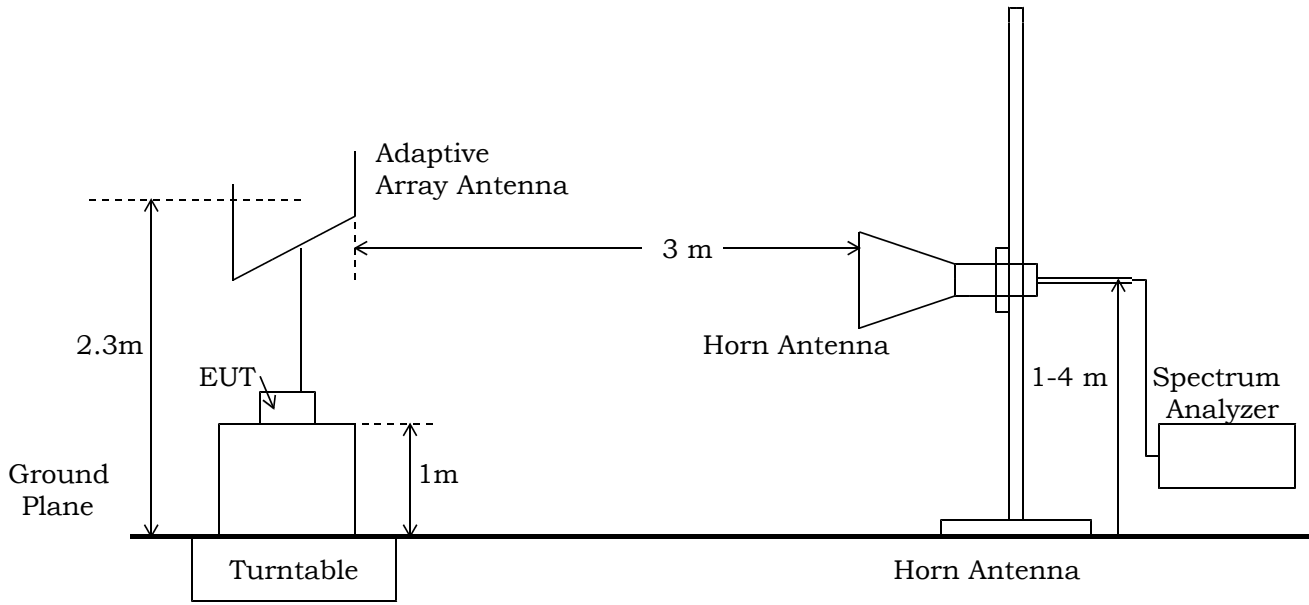


(a) Measurement set up for up to 30 MHz



(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.

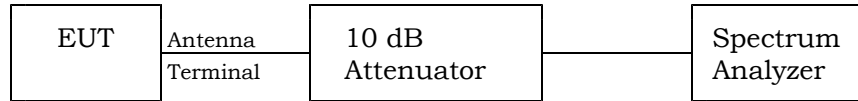


Fig.5 Occupied Bandwidth Measurement

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	September, 2003	1 Year
○ - 2-10	D - 79		
○ - 2-10	D - 80		
● - 8566B	A - 13	March, 2004	1 Year
○ - 8593A	A - 15		

### Environmental conditions:

Temperature: 22 °C Humidity: 48 %



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

**Test Procedure :**

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

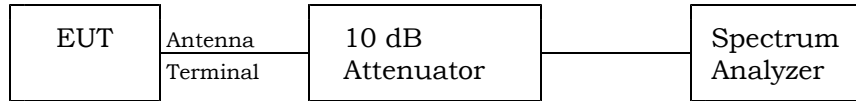


Fig.6 Band-Edge Emission Measurement

The setting of the spectrum analyzer are shown as follows :

TX Frequency	1880.15 MHz	1909.55 MHz
Band-edge Frequency	1870.00 MHz	1910.00 MHz
Res. Bandwidth	3 kHz	3 kHz
Video Bandwidth	10 kHz	10 kHz
Span	30 MHz	2 MHz
Sweep Time	AUTO	AUTO
Trace	Maxhold	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	September, 2003	1 Year
○ - 2-10	D - 79		
○ - 2-10	D - 80		
● - 8566B	A - 13	March, 2004	1 Year
○ - 8593A	A - 15		

**Environmental conditions:**

Temperature: 22 °C      Humidity: 48 %

### 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.

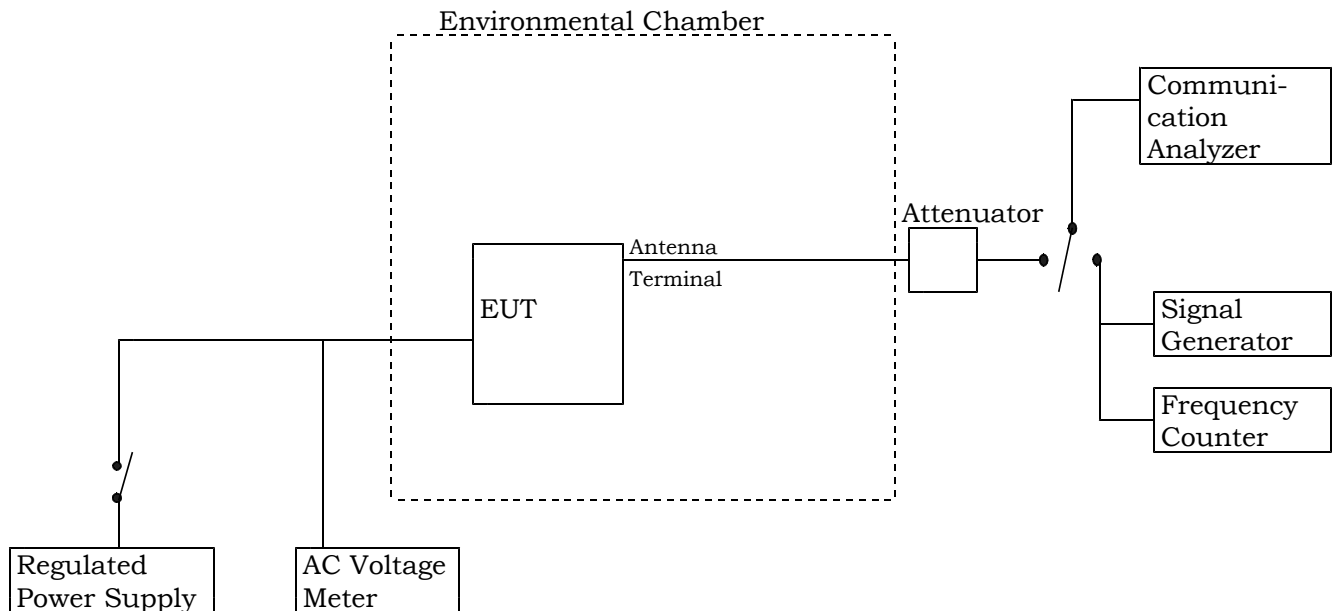


Fig.7 Frequency Stability Measurement

**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, 2004	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	May, 2003	1 Year
○ - ESH 2	A - 3		
● - KNW-407	D - 6	October, 2003	1 Year
○ - KNW-408	D - 11		
○ - KNW-242	D - 7		
○ - ESH3-Z5	D - 12		
○ - KNW-341C	D - 13		
○ - 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		
● - Cable	H - 8	October, 2003	1 Year

### Environmental conditions:

Temperature: 23 °C Humidity: 32 %

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.

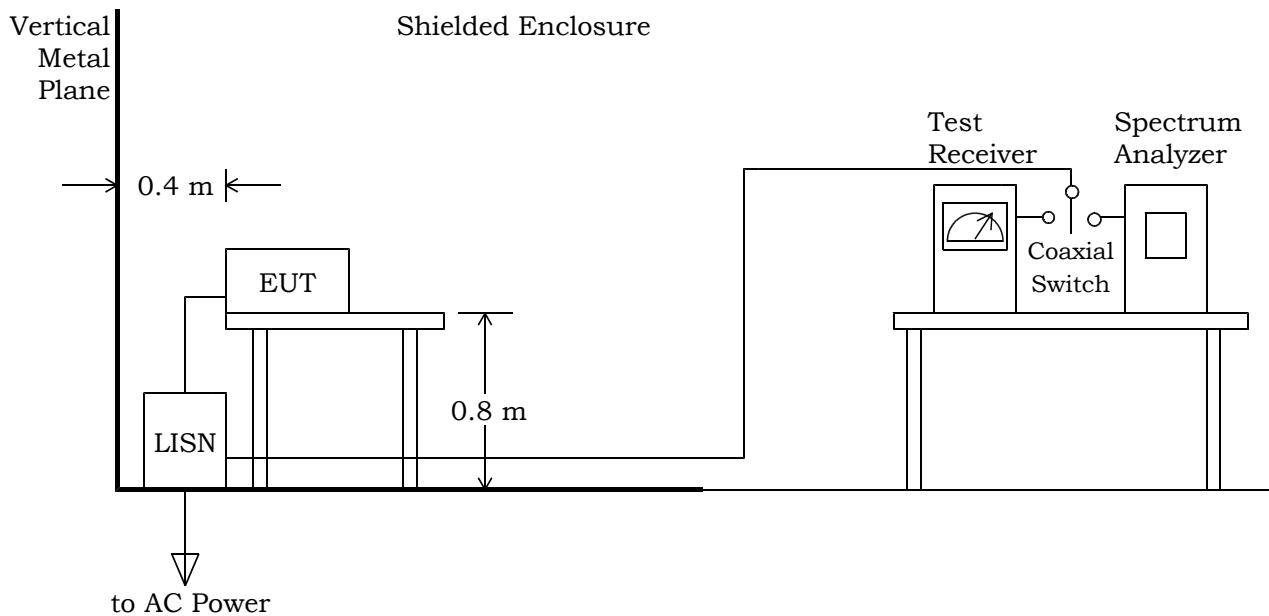


Fig.8 AC Powerline Conducted Emission Measurement

### 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-CS82 (UTP00001)	AEZPBS-CS82

**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 (1027989)	N/A
Antenna 2	MASPRO DENKOH CORPORATION	AMSP0011 (1027992)	N/A
Antenna 3	MASPRO DENKOH CORPORATION	AMSP0011 (1027991)	N/A
Antenna 4	MASPRO DENKOH CORPORATION	AMSP0011 (1027990)	N/A
Antenna 5	MASPRO DENKOH CORPORATION	AMSP0011 (1027996)	N/A
Antenna 6	MASPRO DENKOH CORPORATION	AMSP0011 (1027995)	N/A
Antenna 7	MASPRO DENKOH CORPORATION	AMSP0011 (1027994)	N/A
Antenna 8	MASPRO DENKOH CORPORATION	AMSP0011 (1027993)	N/A
GPS Antenna	Trimble Navigation Limited	Acutime2000 (12253054)	N/A

**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	ANT 1	YES	Metal	NO	1.2 m
	----- Antenna 1	---		Metal		
2	EUT	ANT 2	YES	Metal	NO	1.2 m
	----- Antenna 2	---		Metal		
3	EUT	ANT 3	YES	Metal	NO	1.2 m
	----- Antenna 3	---		Metal		
4	EUT	ANT 4	YES	Metal	NO	1.2 m
	----- Antenna 4	---		Metal		
5	EUT	ANT 5	YES	Metal	NO	1.2 m
	----- Antenna 5	---		Metal		
6	EUT	ANT 6	YES	Metal	NO	1.2 m
	----- Antenna 6	---		Metal		
7	EUT	ANT 7	YES	Metal	NO	1.2 m
	----- Antenna 7	---		Metal		
8	EUT	ANT 8	YES	Metal	NO	1.2 m
	----- Antenna 8	---		Metal		
9	EUT	GPS	YES	Metal	NO	15.0 m
	----- GPS Antenna	---		Metal		
10	EUT	NT1	YES	Metal	NO	20.0 m
	----- No termination	---		Metal		
11	EUT	COMM	YES	Metal	NO	12.0 m
	----- No termination	---		Metal		
12	AC Power Cord (EUT) 1 $\phi$ 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 :  $\pi/4$  shift QPSK

The test configuration were shown as follows:

1) Maximum Transmitter Power(EIRP) and Unwanted Radiation

A) Antenna Arrangement A

The test configuration (Transmission Antenna System: ANT1-ANT4) is refer to page 32.

The test configuration (Transmission Antenna System: ANT5-ANT8) is refer to page 33.

B) Antenna Arrangement B

This setup is the condition that a secondary adaptive array is introduced to the near field of the original antenna.

The test configuration is refer to pages 34-35.

2) Digital Device Class B, FCC Part 15

The test configuration is refer to page 36.

### Test system:

The EUT is 1900MHz PHS Cell Station.

The adaptive array antenna technology is applied 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 11 ports shown as follows :

- 1) 4 ANT Set ports : Each of them is connected to the Antenna.(ANT1-ANT4)
- 2) 4 ANT Set ports : Each of them is connected to the Antenna.(ANT5-ANT8)
- 3) GPS port : is connected to the GPS Antenna.
- 4) NT1 port : is connected to No terminated cable.
- 5) COMM port : is connected to No terminated cable.

The specification of the antenna is shown as follows:

- 1) Type : Co-Linear antenna(Omni-direction)
- 2) Gain : 10dBi
- 3) Impedance :  $50\Omega$
- 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 steering

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 transmitter power is 1.75 W at 1909.550 MHz  
Min. limit margin 17.6 dB at 1909.550 MHz  
Max. limit exceeding \_\_\_\_\_ dB at \_\_\_\_\_ MHz  
Uncertainty of measurement results +0.6 dB(2 $\sigma$ ) -0.6 dB(2 $\sigma$ )

**Remarks:** \_\_\_\_\_  
\_\_\_\_\_

### Antenna Conducted Spurious Emission

The requirements are **● - Passed** **○ - Not Passed**  
Min. limit margin 12.7 dB at 3819.100 MHz  
Max. limit exceeding \_\_\_\_\_ dB at \_\_\_\_\_ MHz  
Uncertainty of measurement results +2.4 dB(2 $\sigma$ ) -2.4 dB(2 $\sigma$ )

**Remarks:** \_\_\_\_\_  
\_\_\_\_\_

### Transmitter Power(EIRP)

The requirements are **○ - Passed** **○ - Not Passed**  
The Maximum EIRP is 154.88 W at 1894.85 MHz  
Min. limit margin 10.2 dB at 1894.85 MHz  
Max. limit exceeding \_\_\_\_\_ dB at \_\_\_\_\_ MHz  
Uncertainty of measurement results +1.3 dB(2 $\sigma$ ) -1.3 dB(2 $\sigma$ )

**Remarks:** \_\_\_\_\_  
\_\_\_\_\_

**Unwanted Radiation (9 kHz - 20 GHz)**

The requirements are		<b>● - Passed</b>		<b>○ - Not Passed</b>
Min. limit margin	More than	<u>17.6</u>	dB at	<u>18948.50</u> MHz
Max. limit exceeding		_____	dB at	_____ MHz
Uncertainty of measurement results	9 kHz - 30 MHz	<u>+2.5</u>	dB(2σ)	<u>-2.5</u> dB(2σ)
	30 MHz - 1 GHz	<u>+3.6</u>	dB(2σ)	<u>-3.7</u> dB(2σ)
	1 GHz - 20 GHz	<u>+3.1</u>	dB(2σ)	<u>-3.2</u> dB(2σ)

**Remarks:** \_\_\_\_\_  
\_\_\_\_\_

**Occupied Bandwidth**

The requirements are		<b>● - Passed</b>		<b>○ - Not Passed</b>
The 26dB Bandwidth is		<u>284</u>	kHz at	<u>1909.55</u> MHz
The 99% Bandwidth is		<u>246</u>	kHz at	<u>1909.55</u> MHz
The results(Occupied Bandwidth)		Refer to pages* 1 - 26		
Uncertainty of measurement results	at Frequency	<u>±0.05</u>	ppm(2σ)	
Uncertainty of measurement results	at Amplitude	<u>±0.6</u>	dB(2σ)	

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

**Band-Edge Emission**

The requirements are		<b>● - Passed</b>		<b>○ - Not Passed</b>
The Band-Edge level is		<u>-67.9</u>	dBc at	<u>1910.00</u> MHz
The results(Band-edge Emission)		Refer to pages* 27 - 35		
Uncertainty of measurement results	at Frequency	<u>±0.05</u>	ppm(2σ)	
Uncertainty of measurement results	at Amplitude	<u>±0.6</u>	dB(2σ)	

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

**Frequency Stability**

Max. Frequency Deviation : +0.49 ppm at 1880.150 MHz

Uncertainty of measurement results ±0.05 ppm

**Remarks:**

---

---

**Minimum Save-distance**

Minimum Save-distance : 1.23 m

**Remarks:**

---

---

**TEST RESULTS**  
**Digital Device Class B, Part15**

**AC Powerline Conducted Emission 150 kHz - 30 MHz**

The requirements are	<b>● - Passed</b>	<b>○ - Not Passed</b>
Min. limit margin	<u>22.8</u> dB	at <u>2.44</u> MHz
Max. limit exceeding	_____ dB	at _____ MHz
Uncertainty of measurement results	<u>+ 2.1</u> dB(2 $\sigma$ )	<u>- 2.1</u> dB(2 $\sigma$ )

**Remarks:** \_\_\_\_\_  
\_\_\_\_\_

**Electromagnetic Field Radiated Emission 30 MHz - 1000 MHz**

The requirements are	<b>● - Passed</b>	<b>○ - Not Passed</b>
Min. limit margin	<u>18.7</u> dB	at <u>364.8</u> MHz
Max. limit exceeding	_____ dB	at _____ MHz
Uncertainty of measurement results	<u>+3.6</u> dB(2 $\sigma$ )	<u>-3.7</u> dB(2 $\sigma$ )

**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 pages 32 - 37.

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 : March 7, 2004

End of testing : March 28, 2004

- JAPAN QUALITY ASSURANCE ORGANIZATION -

Approved by :



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

Issued by :

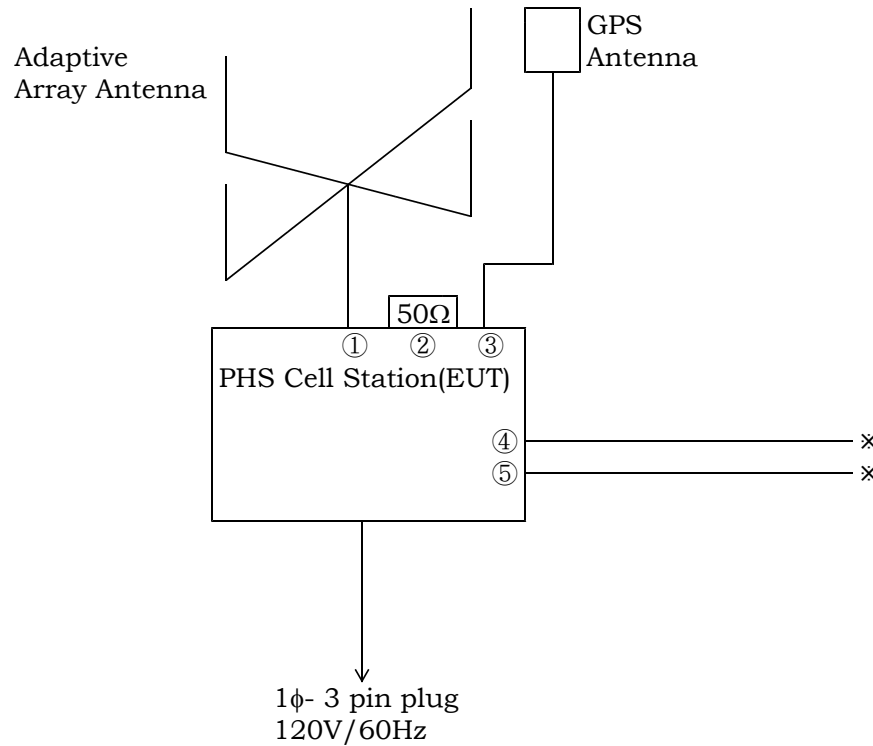


\_\_\_\_\_  
Shigeru Kinoshita  
Deputy Manager  
EMC Div.  
JQA KITA-KANSAI Testing Center

**Test System-Arrangement (Drawings)**

**1) FCC Part 24**

- A) Antenna Arrangement: A  
Transmission Antenna System: ANT1-ANT4

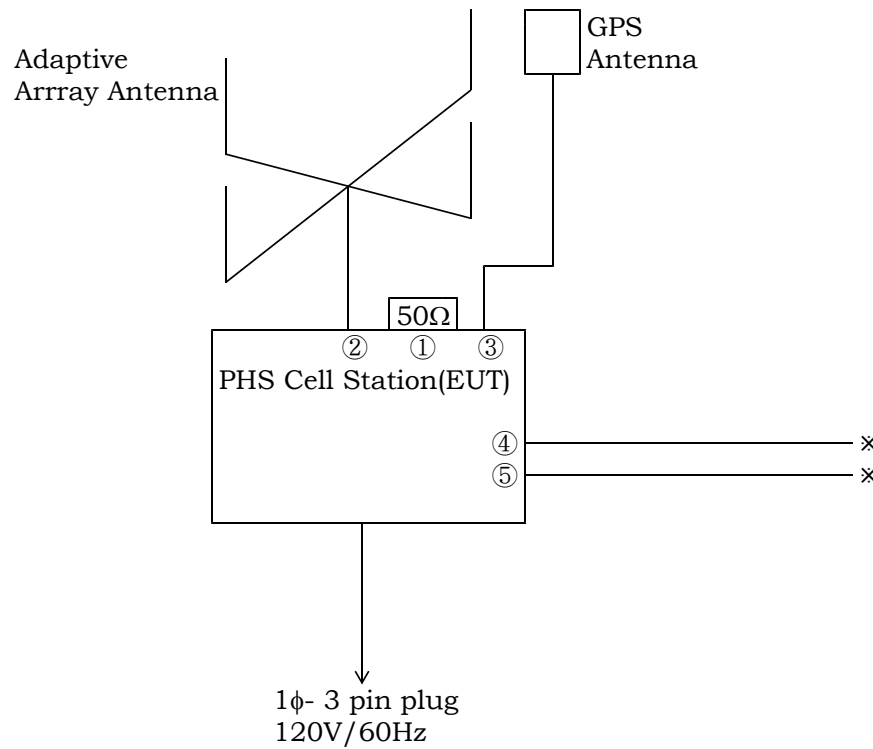


Note:

- ※ : No termination
- ① : ANT1/ANT2/ANT3/ANT4
- ② : ANT5/ANT6/ANT7/ANT8
- ③ : GPS
- ④ : NT1
- ⑤ : COMM



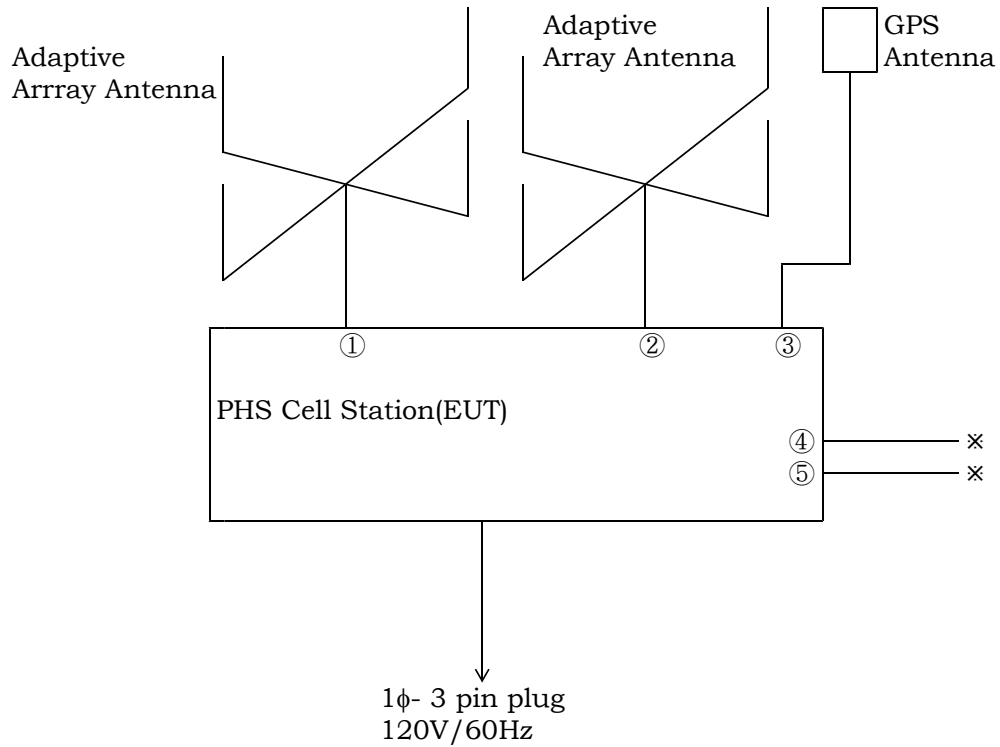
B) Antenna Arrangement: B  
Transmission Antenna System: ANT5-ANT8



Note:

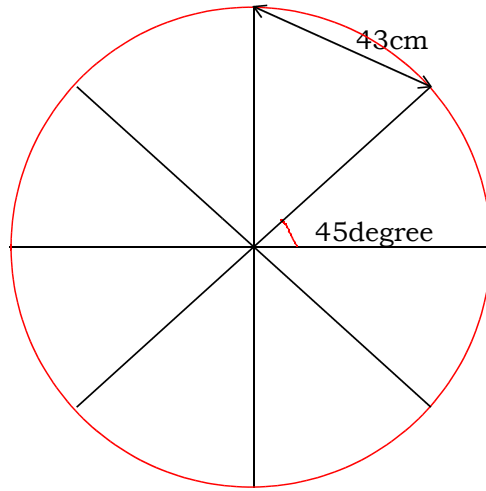
- ※ : No termination
- ① : ANT1/ANT2/ANT3/ANT4
- ② : ANT5/ANT6/ANT7/ANT8
- ③ : GPS
- ④ : NT1
- ⑤ : COMM

- C) Antenna Arrangement: B  
Transmission Antenna System: ANT1-ANT4  
Transmission Antenna System: ANT5-ANT8



Note:

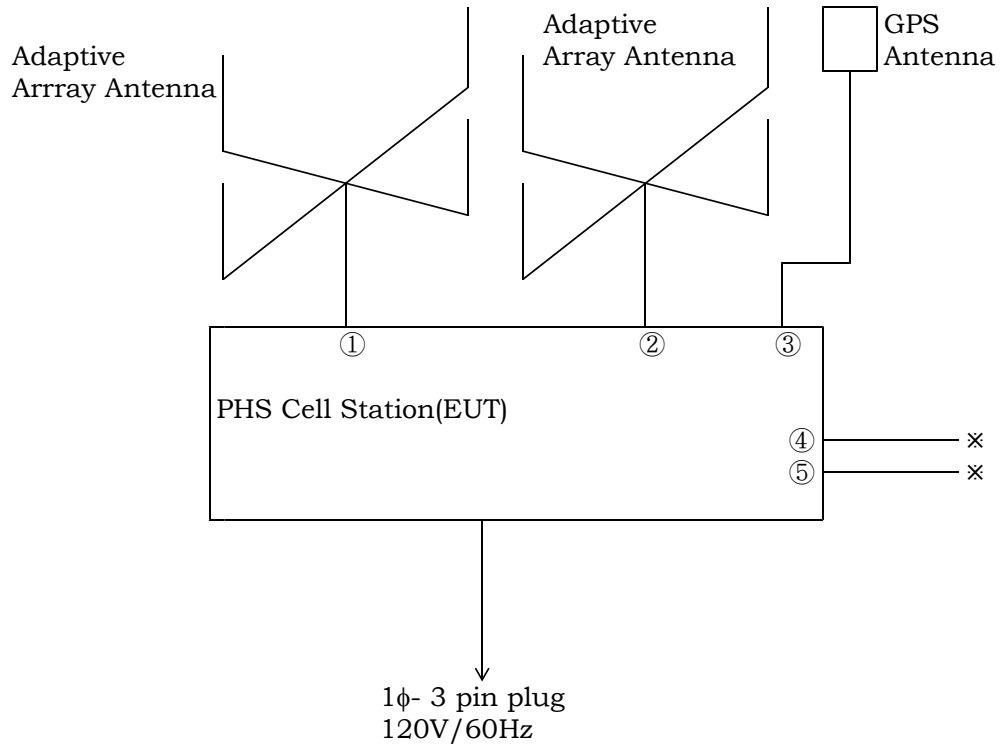
- ※ : No termination
- ① : ANT1/ANT2/ANT3/ANT4
- ② : ANT5/ANT6/ANT7/ANT8
- ③ : GPS
- ④ : NT1
- ⑤ : COMM



Top View of Antenna Configuration of Antenna Arrangement C

**Test System-Arrangement (Drawings)**

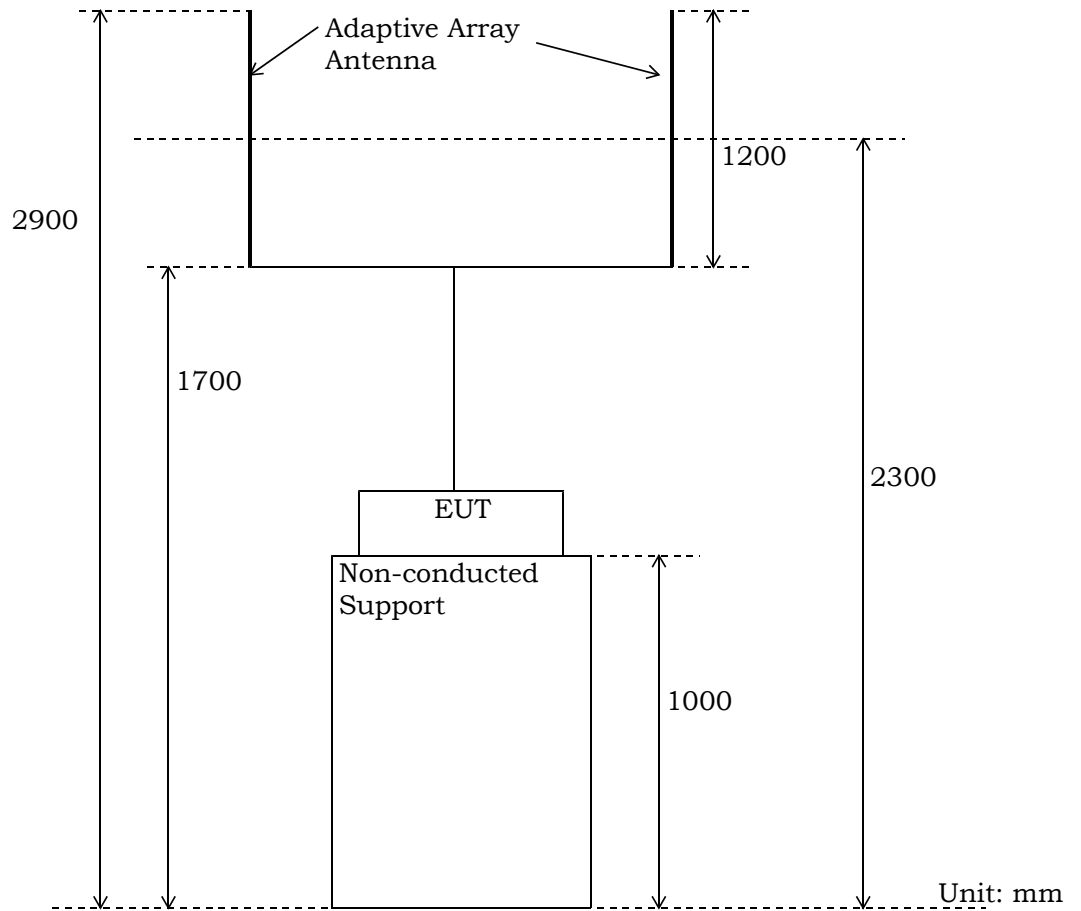
**2) Digital Device Class B,FCC Part 15**



**Note:**

- ※ : No temination
- ① : ANT1/ANT2/ANT3/ANT4
- ② : ANT5/ANT6/ANT7/ANT8
- ③ : GPS
- ④ : NT1
- ⑤ : COMM

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



**Test-Setup (Photographs) at worst case**

**1) Part 24**

**Antenna Arrangement : A**

Radiated Emission 1GHz - 20GHz:



Side View



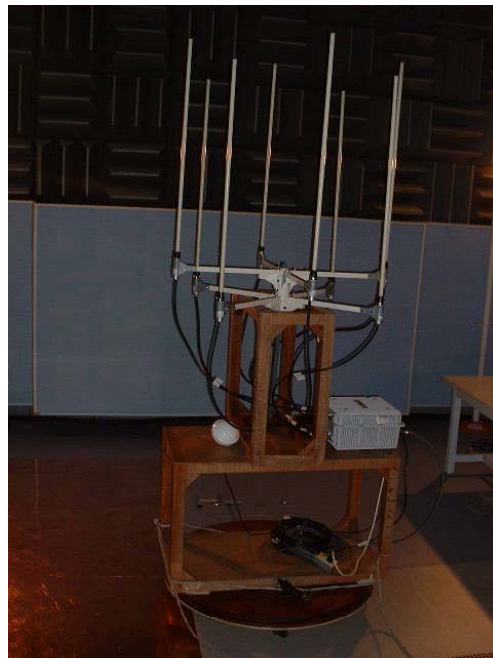
Side View

**1) Part 24**  
**Antenna Arrangement : B**

Radiated Emission 1GHz - 20GHz:



Side View



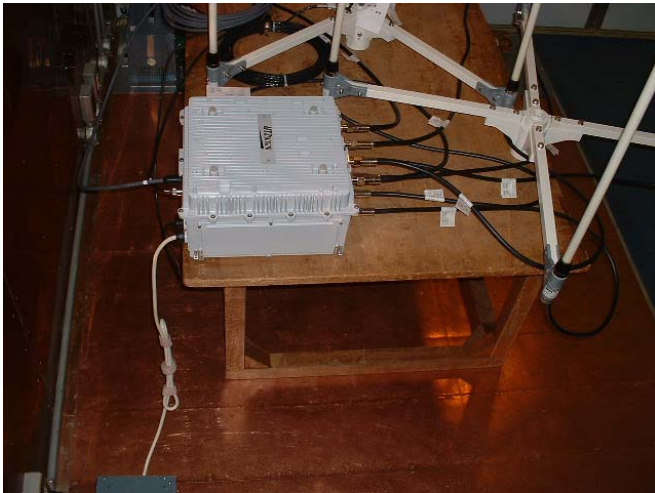
Side View

**2) Digital Device Class B,FCC Part 15  
Antenna Arrangement : C**

Conducted Emission 150kHz - 30MHz:



Front View



Side View

Radiated Emission 1GHz - 20GHz:



Front View



Rear View



### Transmitter Power(TP) Measurement

Test Date: March 22, 2004  
 Temp.: 21 °C, Humi: 46 %

Antenna Terminal : ANT1

Transmitting Frequency		Correction	Meter	Results(Peak)		Limits	Margin
CH	[MHz]	Factor [dB]	Reading(Peak) [dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	2.05	32.17	1.65	100.0	+17.8
255	1894.850	30.12	2.11	32.23	1.67	100.0	+17.8
49	1909.550	30.12	2.19	32.31	1.70	100.0	+17.7

Sample of calculated result at 1909.550 MHz, as the Maximum Level point:

Correction Factor	=	30.12 dBm
+ ) Meter Reading	=	2.19 dB
Result	=	32.31 dBm = 1.70 W

Minimum Margin:  $10\log(1.70/100)=17.7$  dB

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

Note: The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Tester: \_\_\_\_\_ Shigeru Kinoshita

### Transmitter Power (TP) Measurement

Test Date: March 22, 2004  
 Temp.: 21 °C, Humi: 46 %

Antenna Terminal : ANT2

Transmitting Frequency		Correction	Meter	Results(Peak)		Limits	Margin
CH	[MHz]	Factor [dB]	Reading(Peak) [dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	1.96	32.08	1.61	100.0	+17.9
255	1894.850	30.12	2.00	32.12	1.63	100.0	+17.9
49	1909.550	30.12	2.09	32.21	1.66	100.0	+17.8

Sample of calculated result at 1909.550 MHz, as the Maximum Level point:

Correction Factor	=	30.12 dBm
+ ) Meter Reading	=	2.09 dB
Result	=	32.21 dBm = 1.66 W

Minimum Margin:  $10\log(1.66/100)=17.8$  dB

The point shown on “ \_\_\_\_ ” is the Minimum Margin Point.

Note: The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Tester: \_\_\_\_\_ Shigeru Kinoshita

### Transmitter Power (TP) Measurement

Test Date: March 22, 2004  
 Temp.: 21 °C, Humi: 46 %

Antenna Terminal : ANT3

Transmitting Frequency		Correction	Meter	Results(Peak)		Limits	Margin
CH	[MHz]	Factor [dB]	Reading(Peak) [dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	2.22	32.34	1.71	100.0	+17.7
255	1894.850	30.12	2.20	32.32	1.71	100.0	+17.7
49	1909.550	30.12	2.18	32.30	1.70	100.0	+17.7

Sample of calculated result at 1880.150 MHz, as the Maximum Level point:

Correction Factor	=	30.12 dBm
+ ) Meter Reading	=	2.22 dB
Result	=	32.34 dBm = 1.71 W

Minimum Margin:  $10\log(1.71/100)=17.7$  dB

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

Note: The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Tester: \_\_\_\_\_ Shigeru Kinoshita

### Transmitter Power (TP) Measurement

Test Date: March 22, 2004  
 Temp.: 21 °C, Humi: 46 %

Antenna Terminal : ANT4

Transmitting Frequency		Correction	Meter	Results(Peak)		Limits	Margin
CH	[MHz]	Factor [dB]	Reading(Peak) [dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	2.09	32.21	1.66	100.0	+17.8
255	1894.850	30.12	2.11	32.23	1.67	100.0	+17.8
49	1909.550	30.12	2.16	32.28	1.69	100.0	+17.7

Sample of calculated result at 1909.550 MHz, as the Maximum Level point:

Correction Factor	=	30.12 dBm
+ ) Meter Reading	=	2.16 dB
Result	=	32.28 dBm = 1.69 W

Minimum Margin:  $10\log(1.69/100)=17.7$  dB

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

Note: The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Tester: \_\_\_\_\_ Shigeru Kinoshita

## Transmitter Power (TP) Measurement

Test Date: March 22, 2004  
 Temp.: 21 °C, Humi: 46 %

Antenna Terminal : ANT5

Transmitting Frequency		Correction	Meter	Results(Peak)		Limits	Margin
CH	[MHz]	Factor [dB]	Reading(Peak) [dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	2.03	32.15	1.64	100.0	+17.9
255	1894.850	30.12	2.03	32.15	1.64	100.0	+17.9
49	1909.550	30.12	2.01	32.13	1.63	100.0	+17.9

Sample of calculated result at 1880.150 MHz, as the Maximum Level point:

Correction Factor	=	30.12 dBm
+ ) Meter Reading	=	2.03 dB
Result	=	32.15 dBm = 1.64 W

Minimum Margin:  $10\log(1.64/100)=17.9$  dB

The point shown on “ \_\_\_\_ ” is the Minimum Margin Point.

Note: The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Tester: \_\_\_\_\_ Shigeru Kinoshita

### Transmitter Power(TP) Measurement

Test Date: March 22, 2004  
 Temp.: 21 °C, Humi: 46 %

Antenna Terminal : ANT6

Transmitting Frequency		Correction	Meter	Results(Peak)		Limits	Margin
CH	[MHz]	Factor [dB]	Reading(Peak) [dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	2.00	32.12	1.63	100.0	+17.9
255	1894.850	30.12	2.11	32.23	1.67	100.0	+17.8
49	1909.550	30.12	2.21	32.33	1.71	100.0	+17.7

Sample of calculated result at 1909.550 MHz, as the Maximum Level point:

Correction Factor	=	30.12 dBm
+ ) Meter Reading	=	2.21 dB
Result	=	32.33 dBm = 1.71 W

Minimum Margin:  $10\log(1.71/100)=17.7$  dB

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

Note: The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Tester: \_\_\_\_\_ Shigeru Kinoshita

### Transmitter Power(TP) Measurement

Test Date: March 22, 2004  
 Temp.: 21 °C, Humi: 46 %

Antenna Terminal : ANT7

Transmitting Frequency		Correction	Meter	Results(Peak)		Limits	Margin
CH	[MHz]	Factor [dB]	Reading(Peak) [dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	2.10	32.22	1.67	100.0	+17.8
255	1894.850	30.12	2.20	32.32	1.71	100.0	+17.7
49	1909.550	30.12	2.31	32.43	1.75	100.0	+17.6

Sample of calculated result at 1909.550 MHz, as the Maximum Level point:

Correction Factor	=	30.12 dBm
+ ) Meter Reading	=	2.31 dB
Result	=	32.43 dBm = 1.75 W

Minimum Margin:  $10\log(1.75/100)=17.6$  dB

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

Note: The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Tester: \_\_\_\_\_ Shigeru Kinoshita

### Transmitter Power(TP) Measurement

Test Date: March 22, 2004  
 Temp.: 21 °C, Humi: 46 %

Antenna Terminal : ANT8

Transmitting Frequency		Correction	Meter	Results(Peak)		Limits	Margin
CH	[MHz]	Factor [dB]	Reading(Peak) [dBm]	[dBm]	[W]	[W]	[dB]
206	1880.150	30.12	2.26	32.38	1.73	100.0	+17.6
255	1894.850	30.12	2.27	32.39	1.73	100.0	+17.6
49	1909.550	30.12	2.31	32.43	1.75	100.0	+17.6

Sample of calculated result at 1909.550 MHz, as the Maximum Level point:

Correction Factor	=	30.12 dBm
+ ) Meter Reading	=	2.31 dB
Result	=	32.43 dBm = 1.75 W

Minimum Margin:  $10\log(1.75/100)=17.6$  dB

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

Note: The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.

Tester: \_\_\_\_\_ Shigeru Kinoshita



## Antenna-Conducted Spurious Emission Measurement

Antenna Terminal : ANT1

Test Date: March 18, 2004  
Temp.: 22 °C, Humi: 48 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
206	1880.150	3760.300	-19.4	-7.1	-13.0	-26.5	+13.5	C
		5640.450	-20.7	-24.2	-13.0	-44.9	+31.9	C
		7520.600	-9.7	-54.8	-13.0	-64.5	+51.5	C
		9400.750	-10.0	-28.1	-13.0	-38.1	+25.1	C
		11280.900	-10.5	-53.0	-13.0	-63.5	+50.5	C
		13161.050	-10.3	-61.3	-13.0	-71.6	+58.6	C
		15041.200	-10.7	-54.9	-13.0	-65.6	+52.6	C
255	1894.850	3789.700	-19.9	-7.7	-13.0	-27.6	+14.6	C
		5684.550	-20.2	-28.3	-13.0	-48.5	+35.5	C
		7579.400	-9.7	-51.3	-13.0	-61.0	+48.0	C
		9474.250	-10.1	-27.4	-13.0	-37.5	+24.5	C
		11369.100	-10.0	-51.0	-13.0	-61.0	+48.0	C
		13263.950	-10.6	-61.9	-13.0	-72.5	+59.5	C
		15158.800	-10.6	-57.9	-13.0	-68.5	+55.5	C
49	1909.550	3819.100	-19.4	-9.1	-13.0	-28.5	+15.5	C
		5728.650	-19.7	-31.2	-13.0	-50.9	+37.9	C
		7638.200	-10.2	-49.2	-13.0	-59.4	+46.4	C
		9547.750	-10.3	-26.7	-13.0	-37.0	+24.0	C
		11457.300	-10.5	-48.2	-13.0	-58.7	+45.7	C
		15276.400	-10.5	-60.6	-13.0	-71.1	+58.1	C
		17185.950	-10.5	-59.2	-13.0	-69.7	+56.7	C

## Antenna-Conducted Spurious Emission Measurement

Antenna Terminal : ANT2

Test Date: March 18, 2004  
Temp.: 22 °C, Humi: 48 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
206	1880.150	3760.300	-19.4	-8.0	-13.0	-27.4	+14.4	C
		5640.450	-20.7	-27.4	-13.0	-48.1	+35.1	C
		7520.600	-9.7	-52.4	-13.0	-62.1	+49.1	C
		9400.750	-10.0	-32.2	-13.0	-42.2	+29.2	C
		11280.900	-10.5	-57.0	-13.0	-67.5	+54.5	C
		13161.050	-10.3	-59.5	-13.0	-69.8	+56.8	C
		15041.200	-10.7	-56.0	-13.0	-66.7	+53.7	C
255	1894.850	3789.700	-19.9	-7.5	-13.0	-27.4	+14.4	C
		5684.550	-20.2	-25.4	-13.0	-45.6	+32.6	C
		7579.400	-9.7	-50.6	-13.0	-60.3	+47.3	C
		9474.250	-10.1	-28.9	-13.0	-39.0	+26.0	C
		11369.100	-10.0	-55.6	-13.0	-65.6	+52.6	C
		15158.800	-10.6	-57.4	-13.0	-68.0	+55.0	C
49	1909.550	3819.100	-19.4	-7.4	-13.0	-26.8	+13.8	C
		5728.650	-19.7	-25.6	-13.0	-45.3	+32.3	C
		7638.200	-10.2	-48.2	-13.0	-58.4	+45.4	C
		9547.750	-10.3	-32.2	-13.0	-42.5	+29.5	C
		11457.300	-10.5	-46.0	-13.0	-56.5	+43.5	C
		15276.400	-10.5	-60.6	-13.0	-71.1	+58.1	C
		17185.950	-10.5	-59.2	-13.0	-69.7	+56.7	C

## Antenna-Conducted Spurious Emission Measurement

Antenna Terminal : ANT3

Test Date: March 18, 2004  
Temp.: 22 °C, Humi: 48 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
206	1880.150	3760.300	-19.4	-6.4	-13.0	-25.8	+12.8	C
		5640.450	-20.7	-28.4	-13.0	-49.1	+36.1	C
		7520.600	-9.7	-52.2	-13.0	-61.9	+48.9	C
		9400.750	-10.0	-33.0	-13.0	-43.0	+30.0	C
		11280.900	-10.5	-52.5	-13.0	-63.0	+50.0	C
		13161.050	-10.3	-60.0	-13.0	-70.3	+57.3	C
		15041.200	-10.7	-55.4	-13.0	-66.1	+53.1	C
255	1894.850	3789.700	-19.9	-6.1	-13.0	-26.0	+13.0	C
		5684.550	-20.2	-27.2	-13.0	-47.4	+34.4	C
		7579.400	-9.7	-51.3	-13.0	-61.0	+48.0	C
		9474.250	-10.1	-28.6	-13.0	-38.7	+25.7	C
		11369.100	-10.0	-46.9	-13.0	-56.9	+43.9	C
		13263.950	-10.6	-60.1	-13.0	-70.7	+57.7	C
		15158.800	-10.6	-54.2	-13.0	-64.8	+51.8	C
49	1909.550	3819.100	-19.4	-7.8	-13.0	-27.2	+14.2	C
		5728.650	-19.7	-26.4	-13.0	-46.1	+33.1	C
		7638.200	-10.2	-48.4	-13.0	-58.6	+45.6	C
		9547.750	-10.3	-28.8	-13.0	-39.1	+26.1	C
		11457.300	-10.5	-43.1	-13.0	-53.6	+40.6	C
		15276.400	-10.5	-59.4	-13.0	-69.9	+56.9	C
		17185.950	-10.5	-58.9	-13.0	-69.4	+56.4	C

## Antenna-Conducted Spurious Emission Measurement

Antenna Terminal : ANT4

Test Date: March 18, 2004  
Temp.: 22 °C, Humi: 48 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
206	1880.150	3760.300	-19.4	-12.5	-13.0	-31.9	+18.9	C
		5640.450	-20.7	-33.5	-13.0	-54.2	+41.2	C
		7520.600	-9.7	-54.3	-13.0	-64.0	+51.0	C
		9400.750	-10.0	-34.6	-13.0	-44.6	+31.6	C
		11280.900	-10.5	-52.1	-13.0	-62.6	+49.6	C
		13161.050	-10.3	-58.1	-13.0	-68.4	+55.4	C
		15041.200	-10.7	-52.5	-13.0	-63.2	+50.2	C
255	1894.850	3789.700	-19.9	-10.2	-13.0	-30.1	+17.1	C
		5684.550	-20.2	-29.9	-13.0	-50.1	+37.1	C
		7579.400	-9.7	-52.4	-13.0	-62.1	+49.1	C
		9474.250	-10.1	-31.8	-13.0	-41.9	+28.9	C
		11369.100	-10.0	-45.1	-13.0	-55.1	+42.1	C
		13263.950	-10.6	-58.7	-13.0	-69.3	+56.3	C
		15158.800	-10.6	-55.1	-13.0	-65.7	+52.7	C
49	1909.550	3819.100	-19.4	-9.2	-13.0	-28.6	+15.6	C
		5728.650	-19.7	-28.8	-13.0	-48.5	+35.5	C
		7638.200	-10.2	-49.4	-13.0	-59.6	+46.6	C
		9547.750	-10.3	-31.3	-13.0	-41.6	+28.6	C
		11457.300	-10.5	-47.0	-13.0	-57.5	+44.5	C
		13366.850	-10.6	-59.8	-13.0	-70.4	+57.4	C
		15276.400	-10.5	-57.5	-13.0	-68.0	+55.0	C
		17185.950	-10.5	-58.1	-13.0	-68.6	+55.6	C

## Antenna-Conducted Spurious Emission Measurement

Antenna Terminal : ANT5

Test Date: March 18, 2004  
Temp.: 22 °C, Humi: 48 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
206	1880.150	3760.300	-19.4	-13.0	-13.0	-32.4	+19.4	C
		5640.450	-20.7	-27.0	-13.0	-47.7	+34.7	C
		7520.600	-9.7	-52.9	-13.0	-62.6	+49.6	C
		9400.750	-10.0	-33.8	-13.0	-43.8	+30.8	C
		11280.900	-10.5	-43.5	-13.0	-54.0	+41.0	C
		13161.050	-10.3	-57.5	-13.0	-67.8	+54.8	C
		15041.200	-10.7	-51.2	-13.0	-61.9	+48.9	C
255	1894.850	3789.700	-19.9	-10.9	-13.0	-30.8	+17.8	C
		5684.550	-20.2	-25.8	-13.0	-46.0	+33.0	C
		7579.400	-9.7	-52.8	-13.0	-62.5	+49.5	C
		9474.250	-10.1	-33.7	-13.0	-43.8	+30.8	C
		11369.100	-10.0	-43.3	-13.0	-53.3	+40.3	C
		13263.950	-10.6	-60.0	-13.0	-70.6	+57.6	C
		15158.800	-10.6	-57.4	-13.0	-68.0	+55.0	C
49	1909.550	3819.100	-19.4	-9.3	-13.0	-28.7	+15.7	C
		5728.650	-19.7	-25.7	-13.0	-45.4	+32.4	C
		7638.200	-10.2	-47.1	-13.0	-57.3	+44.3	C
		9547.750	-10.3	-32.8	-13.0	-43.1	+30.1	C
		11457.300	-10.5	-39.3	-13.0	-49.8	+36.8	C
		13366.850	-10.6	-60.5	-13.0	-71.1	+58.1	C
		15276.400	-10.5	-59.2	-13.0	-69.7	+56.7	C
		17185.950	-10.5	-59.0	-13.0	-69.5	+56.5	C

## Antenna-Conducted Spurious Emission Measurement

Antenna Terminal : ANT6

Test Date: March 18, 2004  
Temp.: 22 °C, Humi: 48 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
206	1880.150	3760.300	-19.4	-10.3	-13.0	-29.7	+16.7	C
		5640.450	-20.7	-26.6	-13.0	-47.3	+34.3	C
		7520.600	-9.7	-55.2	-13.0	-64.9	+51.9	C
		9400.750	-10.0	-29.9	-13.0	-39.9	+26.9	C
		11280.900	-10.5	-44.0	-13.0	-54.5	+41.5	C
		13161.050	-10.3	-53.3	-13.0	-63.6	+50.6	C
		15041.200	-10.7	-60.5	-13.0	-71.2	+58.2	C
255	1894.850	3789.700	-19.9	-8.5	-13.0	-28.4	+15.4	C
		5684.550	-20.2	-24.4	-13.0	-44.6	+31.6	C
		7579.400	-9.7	-49.1	-13.0	-58.8	+45.8	C
		9474.250	-10.1	-28.6	-13.0	-38.7	+25.7	C
		11369.100	-10.0	-42.3	-13.0	-52.3	+39.3	C
		13263.950	-10.6	< -60.0	-13.0	< -70.6	> +57.6	C
		15158.800	-10.6	-59.2	-13.0	-69.8	+56.8	C
49	1909.550	3819.100	-19.4	-6.3	-13.0	-25.7	+12.7	C
		5728.650	-19.7	-23.6	-13.0	-43.3	+30.3	C
		7638.200	-10.2	-44.4	-13.0	-54.6	+41.6	C
		9547.750	-10.3	-28.3	-13.0	-38.6	+25.6	C
		11457.300	-10.5	-39.4	-13.0	-49.9	+36.9	C
		13366.850	-10.6	-61.5	-13.0	-72.1	+59.1	C
		15276.400	-10.5	-57.0	-13.0	-67.5	+54.5	C
		17185.950	-10.5	-58.5	-13.0	-69.0	+56.0	C

## Antenna-Conducted Spurious Emission Measurement

Antenna Terminal : ANT7

Test Date: March 18, 2004  
Temp.: 22 °C, Humi: 48 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
206	1880.150	3760.300	-19.4	-12.9	-13.0	-32.3	+19.3	C
		5640.450	-20.7	-26.6	-13.0	-47.3	+34.3	C
		7520.600	-9.7	-52.5	-13.0	-62.2	+49.2	C
		9400.750	-10.0	-34.5	-13.0	-44.5	+31.5	C
		11280.900	-10.5	-45.8	-13.0	-56.3	+43.3	C
		13161.050	-10.3	-58.0	-13.0	-68.3	+55.3	C
		15041.200	-10.7	-54.4	-13.0	-65.1	+52.1	C
255	1894.850	3789.700	-19.9	-10.9	-13.0	-30.8	+17.8	C
		5684.550	-20.2	-25.2	-13.0	-45.4	+32.4	C
		7579.400	-9.7	-46.2	-13.0	-55.9	+42.9	C
		9474.250	-10.1	-28.7	-13.0	-38.8	+25.8	C
		11369.100	-10.0	-37.7	-13.0	-47.7	+34.7	C
		13263.950	-10.6	-57.5	-13.0	-68.1	+55.1	C
		15158.800	-10.6	-54.9	-13.0	-65.5	+52.5	C
49	1909.550	3819.100	-19.4	-15.3	-13.0	-34.7	+21.7	C
		5728.650	-19.7	-34.9	-13.0	-54.6	+41.6	C
		7638.200	-10.2	-43.1	-13.0	-53.3	+40.3	C
		9547.750	-10.3	-24.9	-13.0	-35.2	+22.2	C
		11457.300	-10.5	-37.8	-13.0	-48.3	+35.3	C
		13366.850	-10.6	-60.1	-13.0	-70.7	+57.7	C
		15276.400	-10.5	-56.8	-13.0	-67.3	+54.3	C
17185.950	-10.5	-53.8	-13.0	-64.3	+51.3	C		

## Antenna-Conducted Spurious Emission Measurement

Antenna Terminal : ANT8

Test Date: March 18, 2004  
Temp.: 22 °C, Humi: 48 %

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dBm]	Limits [dBm]	Results [dBm]	Margin [dB]	Remarks
206	1880.150	3760.300	-19.4	-12.8	-13.0	-32.2	+19.2	C
		5640.450	-20.7	-26.1	-13.0	-46.8	+33.8	C
		7520.600	-9.7	-55.2	-13.0	-64.9	+51.9	C
		9400.750	-10.0	-37.0	-13.0	-47.0	+34.0	C
		11280.900	-10.5	-48.1	-13.0	-58.6	+45.6	C
		13161.050	-10.3	-62.1	-13.0	-72.4	+59.4	C
		15041.200	-10.7	-50.6	-13.0	-61.3	+48.3	C
	16921.350	-10.4	-60.8	-13.0	-71.2	+58.2	C	
255	1894.850	3789.700	-19.9	-10.6	-13.0	-30.5	+17.5	C
		5684.550	-20.2	-23.4	-13.0	-43.6	+30.6	C
		7579.400	-9.7	-51.3	-13.0	-61.0	+48.0	C
		9474.250	-10.1	-31.2	-13.0	-41.3	+28.3	C
		11369.100	-10.0	-39.8	-13.0	-49.8	+36.8	C
		13263.950	-10.6	-60.3	-13.0	-70.9	+57.9	C
		15158.800	-10.6	-56.1	-13.0	-66.7	+53.7	C
	17053.650	-10.1	-60.8	-13.0	-70.9	+57.9	C	
49	1909.550	3819.100	-19.4	-10.6	-13.0	-30.0	+17.0	C
		5728.650	-19.7	-23.1	-13.0	-42.8	+29.8	C
		7638.200	-10.2	-45.5	-13.0	-55.7	+42.7	C
		9547.750	-10.3	-24.8	-13.0	-35.1	+22.1	C
		11457.300	-10.5	-37.0	-13.0	-47.5	+34.5	C
		13366.850	-10.6	< -60.0	-13.0	< -70.6	> +57.6	C
		15276.400	-10.5	-59.5	-13.0	-70.0	+57.0	C



Sample of calculated result at 3819.1 MHz, as the Minimum Margin point:

Corr. Factor = -19.4 dB  
 + ) Meter Reading = -6.3 dB( $\mu$ V)  
 Result = -25.7 dB( $\mu$ V)

Minimum Margin: -13.0 - (-25.7) = 12.7 (dB)

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

Applied Limits:

-13.0 [dBm] =  $10\log(TP[mW]) - (43 + 10\log(tp[W])) = 10\log(TP[mW]) - (43 + (10 \log(TP[mW]) - 30))$

where  $tp[W] = TP[mW] / 1000$  : Transmitter power at antenna terminal

$10\log(tp[W]) = 10\log(TP[mW]) - 30$

Correction factor details:

Cable Loss + 10dB Pad Att. [dB] (9 kHz - 2.2 GHz)

Cable Loss + 20dB Pad Att. + High Pass Filter Loss (D-42) - Pre-Amp. Gain [dB] (over 5.8 GHz)

- Note: 1) The spectrum was scanned 9 kHz to 20 GHz and all emissions not reported were more than 20 dB below the applied limits.  
 2) The spectrum analyzer displays were printed out in Attachment B.

**Remarks:**

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	10 kHz	30 kHz	20 msec.
B	Peak	100 kHz	300 kHz	20 msec.
C	Peak	1 MHz	3 MHz	20 msec.

Tester : Shigeru Kinoshita

## Transmitter Power (EIRP) Measurement

Antenna Arrangement : A  
 Transmission Antenna System : ANTI-ANT4  
 1. Measurement Results

Test Date: March 28, 2004  
 Temp.: 24 °C, Humi: 40 %

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(μV)]		Substitution Measurement [dB(μV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dB]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
206	1880.150	83.6	115.5	76.0	76.2	- 2.1	14.2
255	1894.850	83.7	115.7	76.1	76.2	- 2.1	14.3
49	1909.550	83.1	115.5	76.2	76.2	- 2.1	14.3

2. Calculation Results

CH	Transmitting Frequency [MHz]	Peak EIRP [dBm]		Maximum Peak EIRP [W]	Limits [W]	Margin [dB]
		(EIRPh)	Vert. (EIRPv)			
206	1880.150	19.7	51.4	138.04	1640.0	+10.7
255	1894.850	19.8	51.7	147.91	1640.0	+10.4
49	1909.550	19.1	51.5	141.25	1640.0	+10.6

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

Emission Measurement Mv	=	115.7 dB(μV)
Substitution Measurement Msv	=	-76.2 dB(μV)
Supplied Power to Substitution Antenna	=	-2.1 dBm
+ ) Gain of Substitution Antenna	=	14.3 dB
<u>Result</u>	=	<u>51.7 dBm = 147.91 W</u>

EIRPh = Mh - Msh + Ps + Gs

EIRPv = Mv - Msv + Ps + Gs

Minimum Margin: 10Log(1640/147.91)=10.4 dB

The point shown on “ \_\_\_\_\_ ” is the Minimum Margin Point.

Remarks:

Detector Function	Resolution B.W.	V.B.W.	Sweep Time
Peak	1 MHz	1 MHz	20 msec.

Tester: \_\_\_\_\_ Akio Hosoda

## Transmitter Power (EIRP) Measurement

Antenna Arrangement : A

Transmission Antenna System : ANT5 - ANT8

Test Date: March 28, 2004

Temp.: 24 °C, Humi: 40 %

### 1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(μV)]		Substitution Measurement [dB(μV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dB]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
206	1880.150	84.9	115.5	76.0	76.2	- 2.1	14.2
255	1894.850	83.7	115.9	76.1	76.2	- 2.1	14.3
49	1909.550	85.1	115.8	76.2	76.2	- 2.1	14.3

### 2. Calculation Results

CH	Transmitting Frequency [MHz]	Peak EIRP [dBm]		Maximum Peak EIRP [W]	Limits [W]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
206	1880.150	21.0	51.4	138.04	1640.0	+10.7
255	1894.850	19.8	51.9	154.88	1640.0	+10.2
49	1909.550	21.1	51.8	151.36	1640.0	+10.3

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

Emission Measurement Mv	=	115.9 dB(μV)
Substitution Measurement Msv	=	-76.2 dB(μV)
Supplied Power to Substitution Antenna	=	-2.1 dBm
+ ) Gain of Substitution Antenna	=	14.3 dB
<u>Result</u>	=	51.9 dBm = 154.88 W

EIRPh = Mh - Msh + Ps + Gs

EIRPv = Mv - Msv + Ps + Gs

Minimum Margin: 10Log(1640/154.88)=10.2 dB

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

### Remarks:

Detector Function	Resolution B.W.	V.B.W.	Sweep Time
Peak	1 MHz	1 MHz	20 msec.

Tester: Akio Hosoda

## Transmitter Power (EIRP) Measurement

Antenna Arrangement : B

Transmission Antenna System : ANT1-ANT4

Test Date: March 28, 2004

Temp.: 24 °C, Humi: 40 %

### 1. Measurement Results

CH	Transmitting Frequency [MHz]	Emission Measurement [dB(μV)]		Substitution Measurement [dB(μV)]		Supplied Power to Substitution Antenna [dBm]	Gain of Substitution Antenna [dB]
		Hori. (Mh)	Vert. (Mv)	Hori. (Msh)	Vert. (Msv)		
206	1880.150	83.9	115.0	76.0	76.2	- 2.1	14.2
255	1894.850	84.4	115.5	76.1	76.2	- 2.1	14.3
49	1909.550	85.1	115.5	76.2	76.2	- 2.1	14.3

### 2. Calculation Results

CH	Transmitting Frequency [MHz]	Peak EIRP [dBm]		Maximum Peak EIRP [W]	Limits [W]	Margin [dB]
		Hori. (EIRPh)	Vert. (EIRPv)			
206	1880.150	20.0	50.9	123.03	1640.0	+11.2
255	1894.850	20.5	51.5	141.25	1640.0	+10.6
49	1909.550	21.1	51.5	141.25	1640.0	+10.6

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

Emission Measurement Mv	=	115.5 dB(μV)
Substitution Measurement Msv	=	-76.2 dB(μV)
Supplied Power to Substitution Antenna	=	-2.1 dBm
+ ) Gain of Substitution Antenna	=	14.3 dB
Result	=	51.5 dBm = 141.25 W

EIRPh = Mh - Msh + Ps + Gs

EIRPv = Mv - Msv + Ps + Gs

Minimum Margin: 10Log(1640/141.25)=10.6 dB

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

### Remarks:

Detector Function	Resolution B.W.	V.B.W.	Sweep Time
Peak	1 MHz	1 MHz	20 msec.

Tester: \_\_\_\_\_ Akio Hosoda

## Unwanted Radiation Measurement

Test Date: March 22, 2004  
 Temp.: 23 °C, Humi: 40 %

Antenna Arrangeent : A

Transmission Antenna System : ANT1-ANT4

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	ERP [dBm]		Limits [dBm]	Margin [dB]	Remarks
			Hori.	Vert.			
206	1880.150	3760.300	-34.7	-33.2	-13.0	+20.2	C
		5640.450	< -40.7	< -40.7	-13.0	> +27.7	C
		7520.600	< -39.4	< -39.4	-13.0	> +26.4	C
		9400.750	< -40.7	< -40.7	-13.0	> +27.7	C
		11280.900	< -40.2	< -40.2	-13.0	> +27.2	C
		13161.050	< -33.3	< -33.3	-13.0	> +20.3	C
		15041.200	< -33.3	< -33.3	-13.0	> +20.3	C
		16921.350	< -35.0	< -35.0	-13.0	> +22.0	C
		18801.500	< -30.8	< -30.8	-13.0	> +17.8	C
255	1894.850	3789.700	-35.6	-34.1	-13.0	+21.1	C
		5684.550	< -40.8	< -40.8	-13.0	> +27.8	C
		7579.400	< -39.9	< -39.9	-13.0	> +26.9	C
		9474.250	< -40.7	-35.5	-13.0	+22.5	C
		11369.100	< -40.2	< -40.2	-13.0	> +27.2	C
		13263.950	< -33.1	< -33.1	-13.0	> +20.1	C
		15158.800	< -33.8	< -33.8	-13.0	> +20.8	C
		17053.650	< -35.0	< -35.0	-13.0	> +22.0	C
		18948.500	< -30.6	< -30.6	-13.0	> +17.6	C
49	1909.550	3819.100	-34.4	-32.2	-13.0	+19.2	C
		5728.650	-97.3	-97.3	-13.0	+84.3	C
		7638.200	-34.4	-32.2	-13.0	+19.2	C
		9547.750	< -40.8	-36.4	-13.0	+23.4	C
		11457.300	< -44.7	< -44.7	-13.0	> +31.7	C
		13366.850	< -40.6	-35.1	-13.0	+22.1	C
		15276.400	< -40.1	< -40.1	-13.0	> +27.1	C
		17185.950	< -32.9	< -32.9	-13.0	> +19.9	C
		19095.500	< -34.2	< -34.2	-13.0	> +21.2	C

## Unwanted Radiation Measurement

Test Date: March 22, 2004  
 Temp.: 23 °C, Humi: 40 %

Antenna Arrangeent : A

Transmission Antenna System : ANT5 - ANT8

CH	Transmitting Frequency [MHz]	Measured Frequency [MHz]	ERP [dBm]		Limits [dBm]	Margin [dB]	Remarks
			Hori.	Vert.			
206	1880.150	3760.300	-36.9	-35.3	-13.0	+22.3	C
		5640.450	< -40.7	-37.9	-13.0	+24.9	C
		7520.600	< -39.4	< -39.4	-13.0	> +26.4	C
		9400.750	< -40.7	< -40.7	-13.0	> +27.7	C
		11280.900	< -40.2	< -40.2	-13.0	> +27.2	C
		13161.050	< -33.3	< -33.3	-13.0	> +20.3	C
		15041.200	< -33.3	< -33.3	-13.0	> +20.3	C
		16921.350	< -35.0	< -35.0	-13.0	> +22.0	C
		18801.500	< -30.8	< -30.8	-13.0	> +17.8	C
255	1894.850	3789.700	-35.1	-32.3	-13.0	+19.3	C
		5684.550	< -40.8	< -40.8	-13.0	> +27.8	C
		7579.400	< -39.9	-36.7	-13.0	+23.7	C
		9474.250	< -40.7	< -40.7	-13.0	> +27.7	C
		11369.100	< -40.2	< -40.2	-13.0	> +27.2	C
		13263.950	< -33.1	< -33.1	-13.0	> +20.1	C
		15158.800	< -33.8	< -33.8	-13.0	> +20.8	C
		17053.650	< -35.0	< -35.0	-13.0	> +22.0	C
		18948.500	< -30.6	< -30.6	-13.0	> +17.6	C
49	1909.550	3819.100	-34.8	-33.1	-13.0	+20.1	C
		5728.650	-97.3	-97.3	-13.0	+84.3	C
		7638.200	-34.8	-33.1	-13.0	+20.1	C
		9547.750	< -40.8	-36.4	-13.0	+23.4	C
		11457.300	< -44.7	< -44.7	-13.0	> +31.7	C
		13366.850	< -40.6	< -40.6	-13.0	> +27.6	C
		15276.400	< -40.1	< -40.1	-13.0	> +27.1	C
		17185.950	< -32.9	< -32.9	-13.0	> +19.9	C
		19095.500	< -34.2	< -34.2	-13.0	> +21.2	C

Sample of calculated result at 18948.5 MHz, as the Minimum Margin point:  
Minimum Margin:  $-13.0 - (-30.6) = >17.6$  (dB)  
The point shown on “ \_\_\_\_ ” is the Minimum Margin Point.

**Applied Limits:**

$-13.0$  [dBm] =  $10\log(\text{TP}[\text{mW}]) - (43 + 10\log(\text{tp}[\text{W}])) = 10\log(\text{TP}[\text{mW}]) - (43 + (10 \log(\text{TP}[\text{mW}]) - 30))$   
where  $\text{tp}[\text{W}] = \text{TP}[\text{mW}] / 1000$  : Transmitter power at antenna terminal  
 $10\log(\text{tp}[\text{W}]) = 10\log(\text{TP}[\text{mW}]) - 30$

**Test system connection setup:**

Cable (9 kHz - 1 GHz)  
Cable + 20dB Pad Att. + High Pass Filter (D-43) - Pre-Amplifier (1.0 GHz - 3.6 GHz)  
Cable + 20dB Pad Att. + High Pass Filter (D-42) - Pre-Amplifier (3.6 GHz - 7.6 GHz)  
Cable + 10dB Pad Att. + High Pass Filter (D-42) - Pre-Amplifier (7.6 GHz - 18 GHz)  
Cable + 10dB Pad Att. + High Pass Filter (D-42) - Pre-Amplifier + Frequency Mixer (over 18 GHz)

Note: The spectrum was scanned 9 kHz to 20 GHz and all emissions not reported were more than 20 dB below the applied limits.

**Remarks:**

	Detector Function	RES B.W.	V.B.W.	Sweep Time
A	Peak	10 kHz	30 kHz	20 msec.
B	Peak	100 kHz	300 kHz	20 msec.
C	Peak	1 MHz	3 MHz	20 msec.

Tester: \_\_\_\_\_ Akio Hosoda

### Occupied Bandwidth Measurement

Test Date: March 18, 2004  
Temp.: 22 °C ; Humi.: 48 %

1)Ant teminal : ANT1

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	99% Bandwidth	Data Page*
206	1880.150	283 kHz	244 kHz	Page 3
255	1894.850	283 kHz	242 kHz	Page 4
40	1909.550	281 kHz	243 kHz	Page 5

2)Ant teminal : ANT2

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	99% Bandwidth	Data Page*
206	1880.150	282 kHz	244 kHz	Page 6
255	1894.850	280 kHz	245 kHz	Page 7
40	1909.550	284 kHz	244 kHz	Page 8

3)Ant teminal : ANT3

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	99% Bandwidth	Data Page*
206	1880.150	280 kHz	243 kHz	Page 9
255	1894.850	281 kHz	243 kHz	Page 10
40	1909.550	282 kHz	244 kHz	Page 11

4)Ant teminal : ANT4

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	99% Bandwidth	Data Page*
206	1880.150	281 kHz	244 kHz	Page 12
255	1894.850	282 kHz	242 kHz	Page 13
40	1909.550	282 kHz	242 kHz	Page 14



5)Ant terminal : ANT5

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	99% Bandwidth	Data Page*
206	1880.150	282 kHz	245 kHz	Page 15
255	1894.850	280 kHz	243 kHz	Page 16
40	1909.550	284 kHz	243 kHz	Page 17

6)Ant terminal : ANT6

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	99% Bandwidth	Data Page*
206	1880.150	281 kHz	244 kHz	Page 18
255	1894.850	280 kHz	243 kHz	Page 19
40	1909.550	281 kHz	246 kHz	Page 20

7)Ant terminal : ANT7

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	99% Bandwidth	Data Page*
206	1880.150	280 kHz	246 kHz	Page 21
255	1894.850	281 kHz	245 kHz	Page 22
40	1909.550	282 kHz	246 kHz	Page 23

8)Ant terminal : ANT8

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	99% Bandwidth	Data Page*
206	1880.150	282 kHz	246 kHz	Page 24
255	1894.850	282 kHz	245 kHz	Page 25
40	1909.550	282 kHz	244 kHz	Page 26

- Note) 1. The Data Page is one in Attachment A.  
2. The point shown on " \_\_\_\_\_ " is the Maximum Point.

Tester : Shigeru Kinoshita

### Band-Edge Emission Measurement

Test Date: March 18, 2004  
Temp.: 22 °C ; Humi.: 48 %

#### 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	-79.6	Page 28
ANT 2	1880.150	1870.000	-82.8	Page 29
ANT 3	1880.150	1870.000	-81.0	Page 30
ANT 4	1880.150	1870.000	-81.8	Page 31
ANT 5	1880.150	1870.000	-81.7	Page 32
ANT 6	1880.150	1870.000	-82.0	Page 33
ANT 7	1880.150	1870.000	-82.5	Page 34
ANT 8	1880.150	1870.000	-80.1	Page 35

#### 2)High Band-Edge Measurement

Ant terinal	Transmitting Frequency(MHz)	Band-Edge Frequency(MHz)	Band-Edge Level[dBc]	Data Page*
ANT 1	1909.850	1910.000	-67.9	Page 36
ANT 2	1909.850	1910.000	-71.9	Page 37
ANT 3	1909.850	1910.000	-72.2	Page 38
ANT 4	1909.850	1910.000	-69.3	Page 39
ANT 5	1909.850	1910.000	-75.2	Page 40
ANT 6	1909.850	1910.000	-68.3	Page 41
ANT 7	1909.850	1910.000	-68.4	Page 42
ANT 8	1909.850	1910.000	-71.4	Page 43

- Note) 1. The Data Page is one in Attachment A.  
2. The point shown on " \_\_\_\_\_ " is the Minimum Point.

Tester : Shigeru Kinoshita

## Frequency Stability Measurement

Test Date: March 12, 2004

### 1. Frequency Stability Measurement versus Temperature

Transmitting Frequency : 1894.850 MHz (255 ch)  
 AC Supply Voltage : 120.0 VAC

Ambient Temperature [°C]	Startup	Deviation [ppm]			Limits [ppm]	Margin [ppm]
		2 minutes	5 minutes	10 minutes		
-30	+ 0.12	+ 0.13	+ 0.18	+ 0.21	N/A	N/A
-20	+ 0.24	+ 0.25	+ 0.25	+ 0.25	N/A	N/A
-10	+ 0.44	+ 0.45	+ 0.45	+ 0.45	N/A	N/A
0	<b>+ 0.49</b>	<b>+ 0.49</b>	<b>+ 0.49</b>	+ 0.45	N/A	N/A
10	+ 0.41	+ 0.36	+ 0.31	+ 0.24	N/A	N/A
20	+ 0.13	+ 0.11	+ 0.08	+ 0.03	N/A	N/A
30	- 0.10	- 0.10	- 0.11	- 0.11	N/A	N/A
40	- 0.10	- 0.10	- 0.11	- 0.11	N/A	N/A
50	- 0.26	- 0.26	- 0.27	- 0.26	N/A	N/A

### 2. Frequency Stability Measurement versus Power Supply Voltage

Transmitting Frequency : 1894.850 MHz (255 ch)  
 Ambient Temperature : 20 °C

AC Supply Voltage [V]	Startup	Deviation [ppm]			Limits [ppm]	Margin [ppm]
		2 minutes	5 minutes	10 minutes		
102.0	+ 0.08	+ 0.06	+ 0.05	+ 0.00	N/A	N/A
120.0	+ 0.13	+ 0.11	+ 0.08	+ 0.03	N/A	N/A
138.0	+ 0.15	+ 0.16	+ 0.14	+ 0.12	N/A	N/A

Test condition example as the Maximum Deviation point:

Ambient Temperature : 0 °C / Startup

AC Supply Voltage : 120 VAC

The Maximum Deviation Point is shown on a red print.

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

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<sup>2</sup>. (1.00 mW/cm<sup>2</sup> for General Population/Uncotrolled enviroment in §1.1310.)

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

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

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

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

The conversion from mW/cm<sup>2</sup> to W/m<sup>2</sup> is: 1mW/cm<sup>2</sup> = 10W/m<sup>2</sup>  
 Maximum EIRP\*<sup>1</sup> : 154.88W

Note) \*<sup>1</sup> : Measured Value

**Minimum Save-distance for MPE calculation**

Items	Value
EIRP (W)	154.88
PD (mW/cm <sup>2</sup> )	1.00
PD (W/m <sup>2</sup> )	10.00
r (m)	1.23

MPE evaluation :  
 Minimum Save-distance : 1.23m



## Electromagnetic Field Radiated Emission Measurement

Test Date: March 16, 2004  
Temp.: 20 °C, Humi: 30 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Cable Loss [dB]	Meter Readings [dB(μV)]		Limits [dB(μV/m)]	Results [dB(μV/m)]		Margin [dB]	Remarks
			Hori.	Vert.		Hori.	Vert.		
162.0	15.4	2.4	< 0.0	< 0.0	43.5	< 17.8	< 17.8	> +25.7	A
198.0	16.7	2.6	< 0.0	< 0.0	43.5	< 19.3	< 19.3	> +24.2	A
250.0	17.4	3.0	< 0.0	< 0.0	46.0	< 20.4	< 20.4	> +25.6	A
288.0	17.9	3.3	< 0.0	< 0.0	46.0	< 21.2	< 21.2	> +24.8	A
364.8	15.6	3.7	7.0	8.0	46.0	26.3	27.3	+18.7	A
375.0	15.8	3.8	0.0	0.0	46.0	19.6	19.6	+26.4	A
625.0	19.6	5.1	< -5.0	< -5.0	46.0	< 19.7	< 19.7	> +26.3	A
687.5	20.6	5.4	< -5.0	< -5.0	46.0	< 21.0	< 21.0	> +25.0	A
750.0	21.0	5.7	< -5.0	< -5.0	46.0	< 21.7	< 21.7	> +24.3	A
875.0	21.9	6.2	< -5.0	< -5.0	46.0	< 23.1	< 23.1	> +22.9	A

Sample of calculated result at 364.8 MHz, as the Minimum Margin point:

Antenna Factor	=	15.6 dB(1/m)
Cable Loss	=	3.7 dB
+ ) Meter Reading	=	8.0 dB(μV)
Result	=	27.3 dB(μV/m)

Minimum Margin: 46.0 - 27.3 = 18.7 (dB)

The point shown on “ \_\_\_\_\_ ” is the Minimum Margin Point.

**Remarks:**

	Detector Function	IF Bandwidth	Antenna
A	CISPR QP	120 kHz	Broadband
B	Average	120 kHz	
C	Average	12 kHz	
D	Average	7.5 kHz	
E	CISPR QP	120 kHz	Tuned Dipole

Tester : \_\_\_\_\_ Akio Hosoda