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. : KL80030551

Name of Product : GSM-PCS Cellular Phone for USA and EU

Model/Type No. : GX30

FCC ID : APYHRO00033

Applicant : Sharp Corporation

Address : 2-13-1, Iida Hachihonmatsu, Higashihiroshima-city,
: Hiroshima 739-0192, JAPAN

Manufacturer : Sharp Corporation

Address : 2-13-1, Iida Hachihonmatsu, Higashihiroshima-city,
: Hiroshima 739-0192, JAPAN

Receive date of EUT : November 13, 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:

T. Yamanaka

Takashi Yamanaka, Director
JQA KITA-KANSAI Testing Center

DIRECTORY

- PCS1900 -

TEST REGULATION

FCC Rules and Regulations Parts 22 and 24 (October 1, 2002)

a) 800 MHz systems (Part 22) : Cellular Radiotelephone

b) 1900 MHz systems (Part 24)
○ - 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 : GSM-PCS Cellular Phone for USA and EU
2) Model/Type No. : GX30
3) Product Type : Prototype(Serial No.: ES2-219)
4) Category : Cellular Radiotelephone/Broadband PCS
5) EUT Authorization : ○ - Verification ● - Certification ○ - D.o.C.
6) Transmitting Frequency : 824.2 MHz (128 ch) - 848.8 MHz (251 ch)(GSM850)
: 1850.2 MHz (512 ch) - 1909.8 MHz (810 ch)(PCS1900)
7) Receiving Frequency : 869.2MHz (128 ch) - 893.8MHz (251 ch) (GSM850)
: 1930.2 MHz (512 ch) - 1989.8 MHz (810 ch) (PCS1900)
8) Integrated Antenna : Mono-pole Antenna
9) Emission Designations : 242KGXW(GSM850)
: 244KGXW(PCS1900)
10) Maximum RF Output Power : 1.620W(ERP)(GSM850)
: 1.259W(EIRP)(PCS1900)
11) Power Rating : 3.9VDC
12) Channel Numbers and Frequencies :

A) GSM850
The carrier spacing is 200 kHz.
The carrier frequency is designated by the absolute frequency channel number (ARFCN).
The carrier frequency is expressed in the equation shown as follows:

TX frequency (in MHz) = 824.2 + 0.2 × (n -128)
RX frequency (in MHz) = 869.2 + 0.2 × (n -128)
Where n : Channel Number ($128 \leq n \leq 251$)

B) PCS1900
The carrier spacing is 200 kHz.
The carrier frequency is designated by the absolute frequency channel number (ARFCN).
The carrier frequency is expressed in the equation shown as follows:

TX frequency (in MHz) = 1850.2 + 0.2 × (n -512)
RX frequency (in MHz) = 1930.2 + 0.2 × (n -512)
Where n : Channel Number ($512 \leq n \leq 810$)

13) Modulation Type : GMSK
14) Type of Communication System : GSM

TEST CONDITIONS

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

Test Procedure :

The Transmitter Power was measured with a power meter, one 10 dB attenuator and a short, low loss cable.

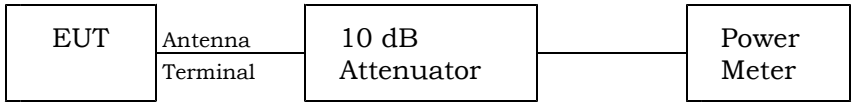


Fig.1 Transmitter Power Measurement

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
● - E4417A	B - 51	August, 2003	1 Year
● - E9321A	B - 52	May, 2003	1 Year
○ - 6-20	D - 27		
○ - 4T-10	D - 73		
○ - 4T-10	D - 74		
○ - 2-10	D - 79		
○ - 2-10	D - 80		
● - 54-10	D - 82	November, 2002	1 Year
○ - 54-10	D - 83		

Environmental conditions :

Temperature: 24 °C Humidity: 52 %

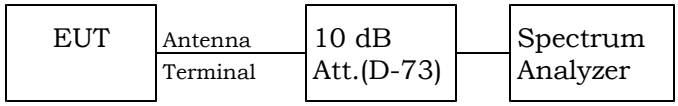
Antenna Conducted Spurious Emission Measurement (§2.1051,§22.917,§24.238)

Test Procedure :

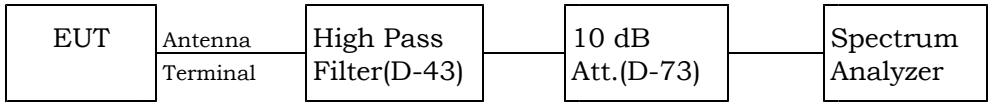
The Antenna Conducted Emission was measured with a spectrum analyzer. The test system is shown as follows:

A) GSM850

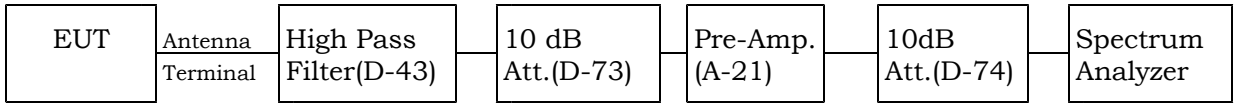
1) Frequency Range : 9kHz - 1.2GHz



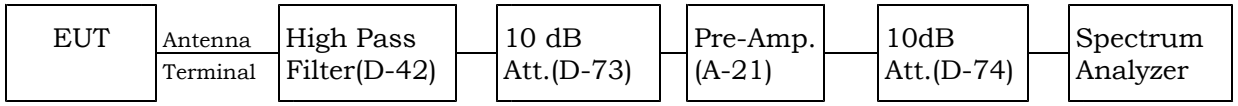
2) Frequency Range : 1.2GHz -2.2GHz



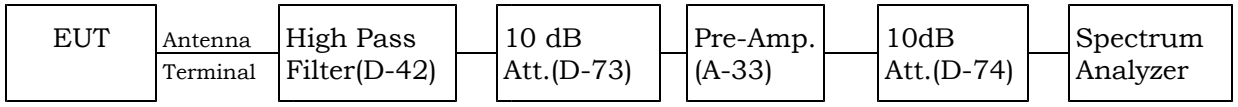
3) Frequency Range : 2.2GHz - 3.8GHz



4) Frequency Range : 3.8GHz - 5.8GHz

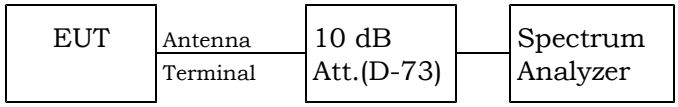


5) Frequency Range : 5.8GHz - 10GHz

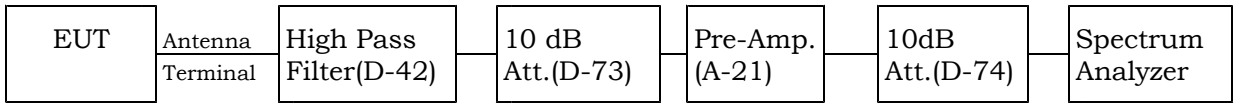


B) PCS1900

1) Frequency Range : 9kHz - 2.2GHz



2) Frequency Range : 2.2GHz -5.8GHz



3) Frequency Range : 5.8GHz - 20GHz

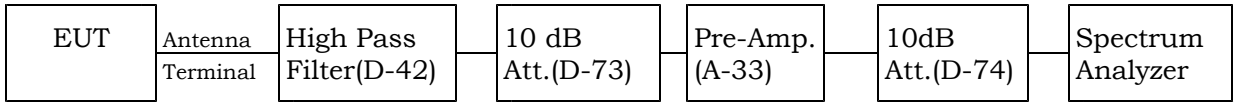


Fig.2 Antenna Conducted Spurious Emission Measurement

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	February, 2003	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		
○ - 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	May, 2003	1 Year

Environmental conditions:

Temperature: 24 °C Humidity: 55 %

Transmitter Power (ERP) Measurement (§22.913)

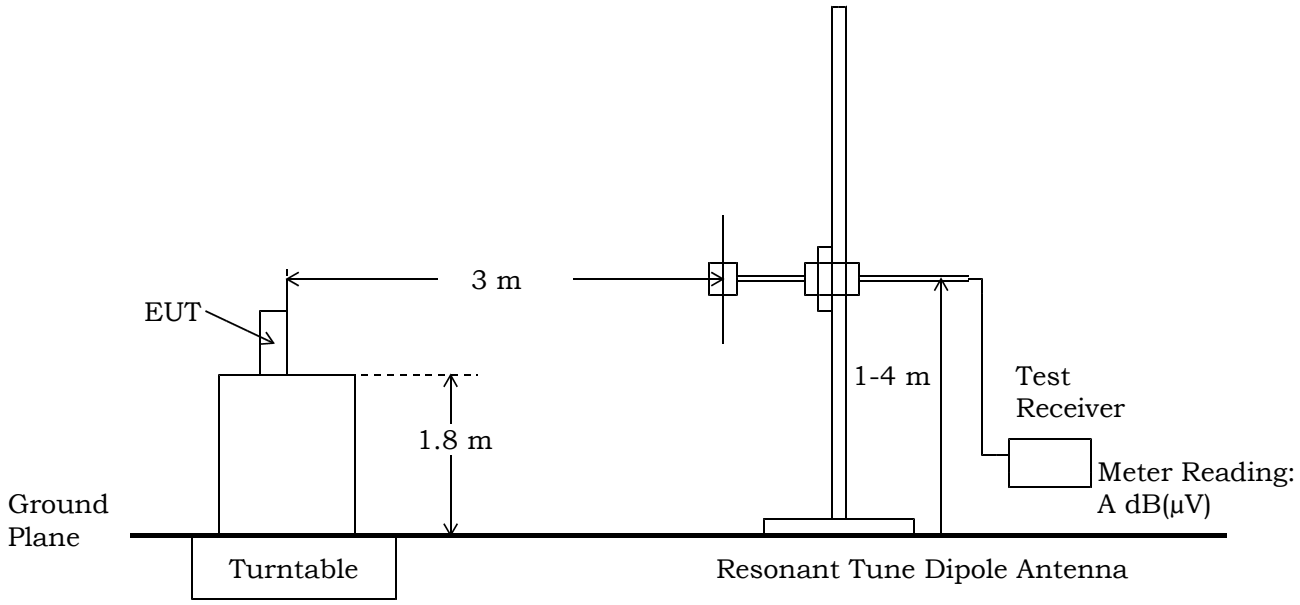
Test Procedure :

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 1.8m on the non-conducted support, at the distance 3m from the receiving antenna (Resonant Tuned Antenna) and rotated around 360 degrees. The receiving antenna height was varied from 1m to 4 m. The EUT on the table was placed to be maximum emission against the receiving antenna polarized (Vertical and Horizontal). Then the meter reading of the test receiver at the maximum emission was A dB(μV).

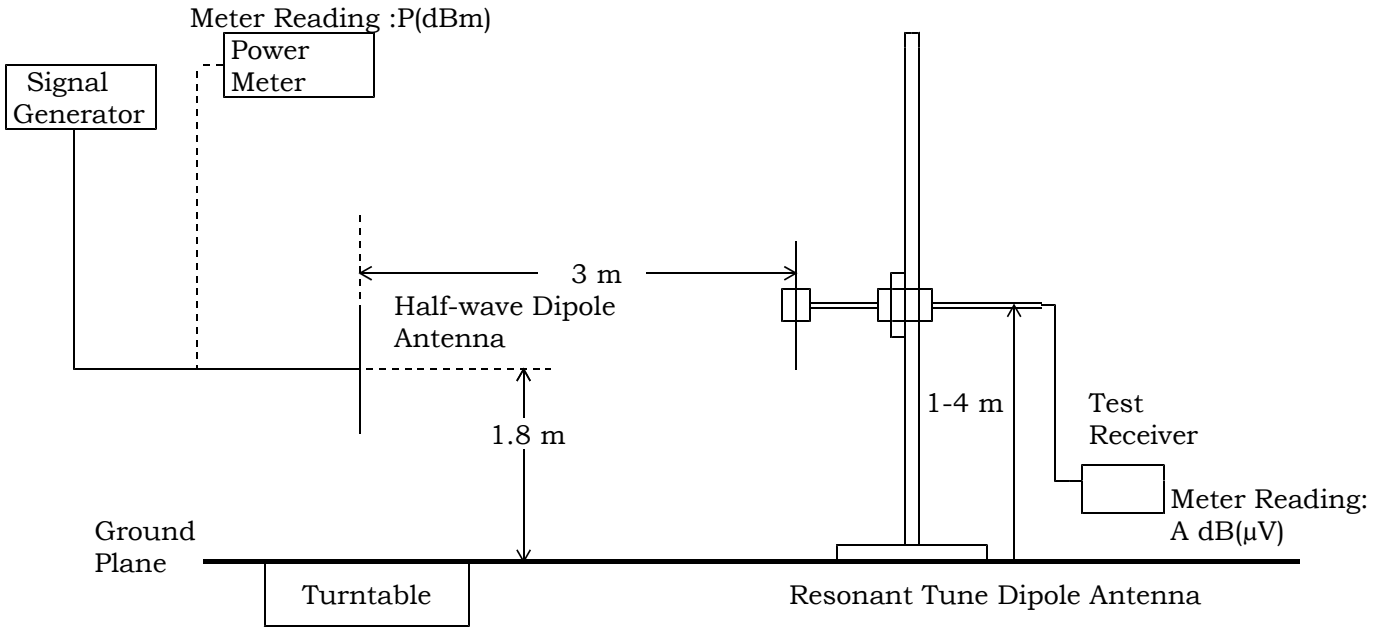
Step 2) The test was set-up shown as Fig.3 (b). The EUT was replaced to half-wave dipole antenna at the same polarization under the same condition as step 1. The RF power was fed to the transmitting Antenna (Half-wave Dipole Antenna) from the signal generator. In order to obtain the maximum emission 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 test receiver at the maximum emission was A dB(μV), same as the recorded level in step 1. Then the RF power into the substitution half-wave dipole antenna was P(dBm).

The ERP is calculated in the following equation.

ERP[dBm] = P (dBm)- (Balun Loss of the half-wave Dipole Ant. (dB)) + Cable Loss(dB)



(a) EUT



(b) Half-wave Dipole Antenna

Fig.3 Maximum Transmitter Power (ERP) Measurement

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		
● - ESV/ESV-Z3	A - 7 / A - 17	November, 2002	1 Year
○ - ESV/ESV-Z3	A - 6 / A - 18		
○ - ESV/ESV-Z3	A - 4 / A - 20		
○ - ESV/ESV-Z3	A - 8 / A - 19		
○ - ESVS 10	A - 5		
○ - KBA-511A	C - 13		
● - KBA-611	C - 19	August, 2003	1 Year
● - KBA-611	C - 22	August, 2003	1 Year
○ - VHA9103/BBA9106	C - 43		
○ - UHALP9107	C - 42		
○ - VHA9103/FBAB9177	C - 25		
○ - UHALP9108-A1	C - 28		
● - Cable	H - 6	August, 2003	1 Year
● - E4417A	B - 51	August, 2003	1 Year
● - E9321A	B - 52	May, 2003	1 Year
○ - 8673D	B - 2		
○ - MG3681A	B - 3		
● - 6062A	B - 44	May, 2003	1 Year

Temperature: 23 °C Humidity: 60 %

Transmitter Power (EIRP) Measurement (§24.232)

Test Procedure :

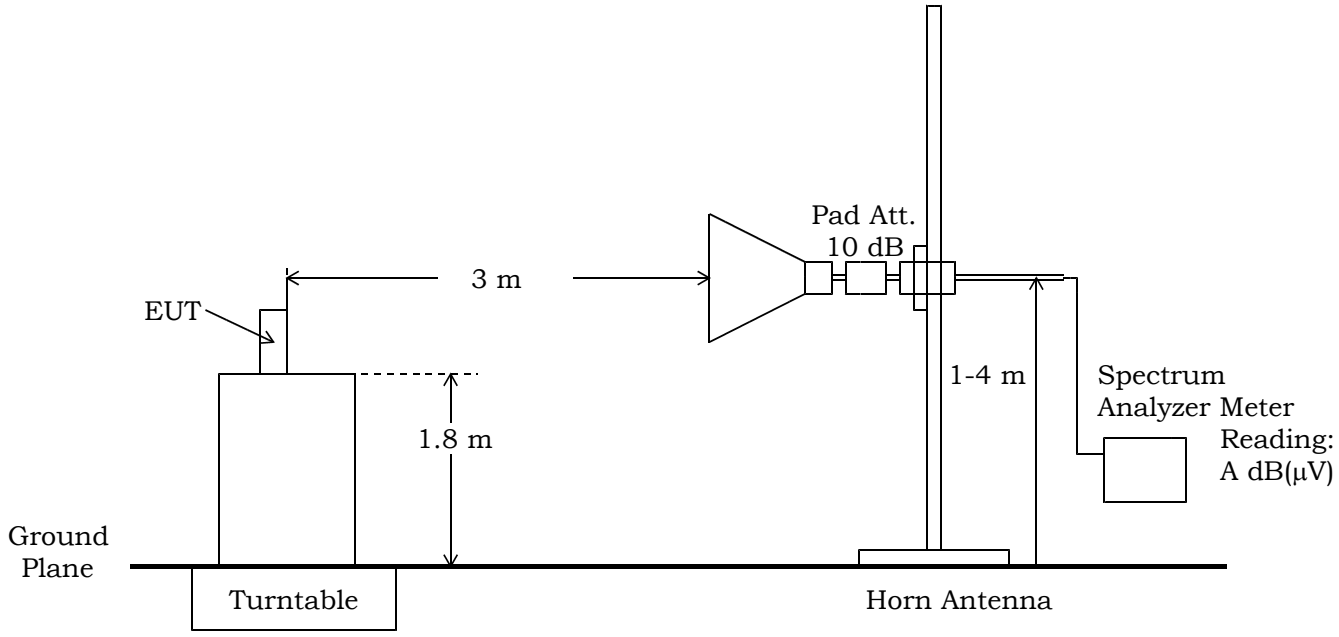
Step 1) The test was set-up shown as Fig.4 (a). In order to obtain the maximum emission, the EUT is placed at the height 1.8m on the non-conducted support, at the distance 3m from the receiving antenna (Horn Antenna) and rotated around 360 degrees. The receiving antenna height was varied from 1 m to 4 m. The EUT on the table was placed to be maximum emission against the receiving antenna polarized (Vertical and Horizontal). Then the meter reading of the spectrum analyzer at the maximum emission was A dB(μV).

Step 2) The test was set-up shown as Fig.4 (b). The EUT 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 1 m 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 step 1. Then the RF power into the substitution horn antenna was P(dBm).

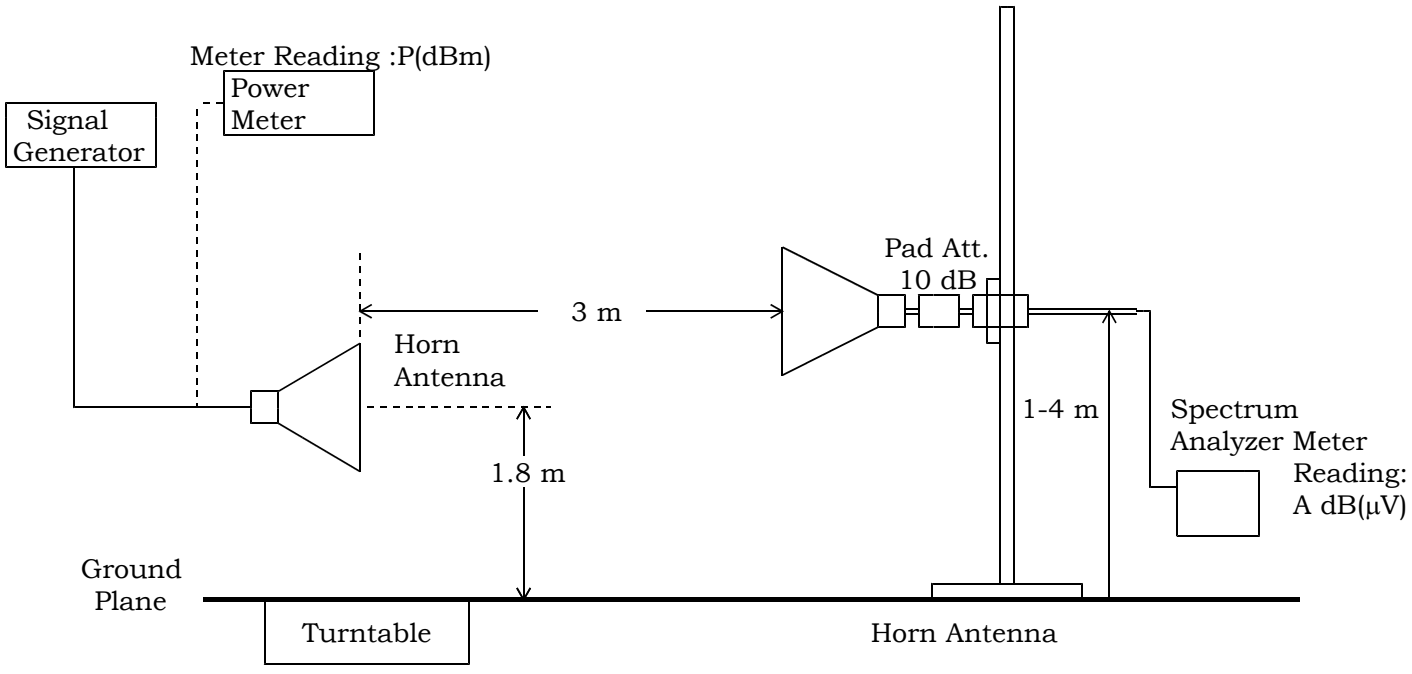
The EIRP is calculated in the following equation.

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

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



(a) EUT



(b) Substitution Horn Antenna

Fig.4 Maximum Transmitter Power (EIRP) Measurement

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
● - 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: 25 °C Humidity: 58 %

Unwanted Radiation Measurement (§2.1053,§22.917,§24.238) - ERP method -

Test Procedure :

Step 1) The spurious radiation for transmitter were measured at the distance 3 m away from the EUT which was placed on a non-conducted support 1.0 m in height and was varying at three orthogonal axes. 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.
This test was carried out using the loop antenna for up to 30 MHz, using the half-wave dipole antenna for up to 1GHz and using the horn antenna for above 1 GHz.

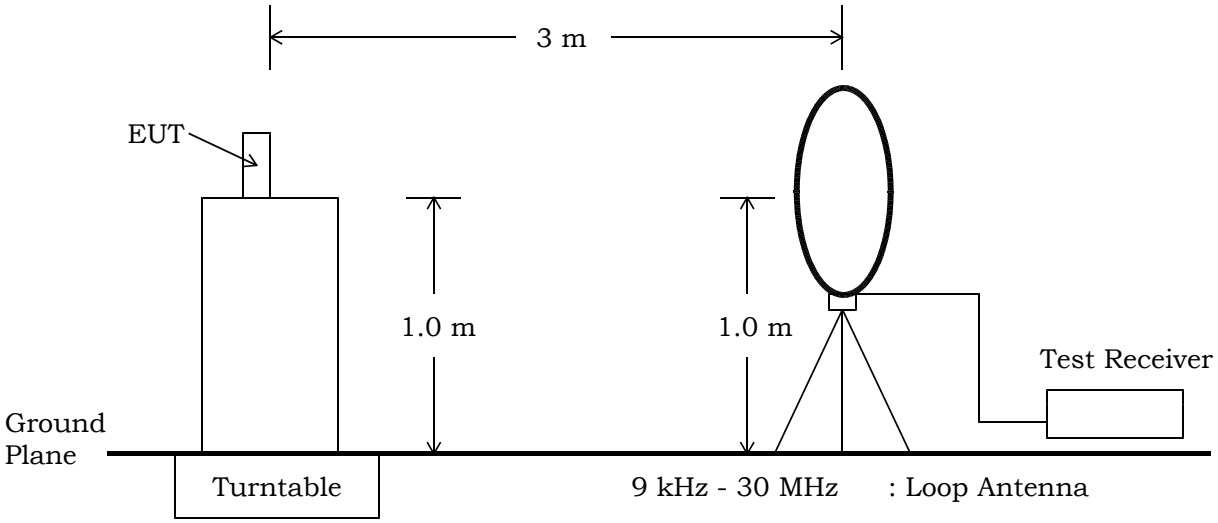
Step 2) The ERP measurement was carried out with according to Step 2 in page 9. Then the RF power in the substitution antenna half-wave dipole antenna for up to 1 GHz and the substitution horn antenna for above 1 GHz.

The EIRP is calculated in the following equation.

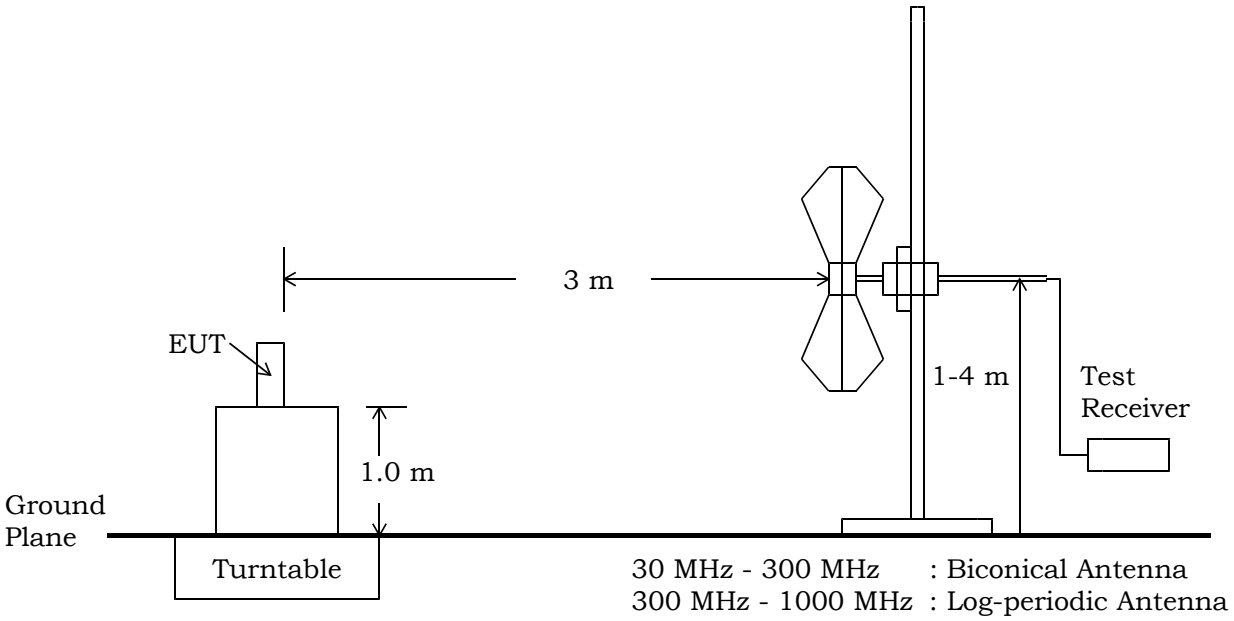
A) Up to 1 GHz
ERP(dBm) = P (dBm) - (Balun Loss of the half-wave dipole Ant. (dB)) + Cable Loss(dB)

B) Above 1 GHz
ERP(dBm) = P (dBm) + Gh(dBi)- Gd(dBi)
Where, Gh(dBi) : Gain of the substitution horn antenna
Gd(dBi) : Gain of the substitution half-wave dipole antenna

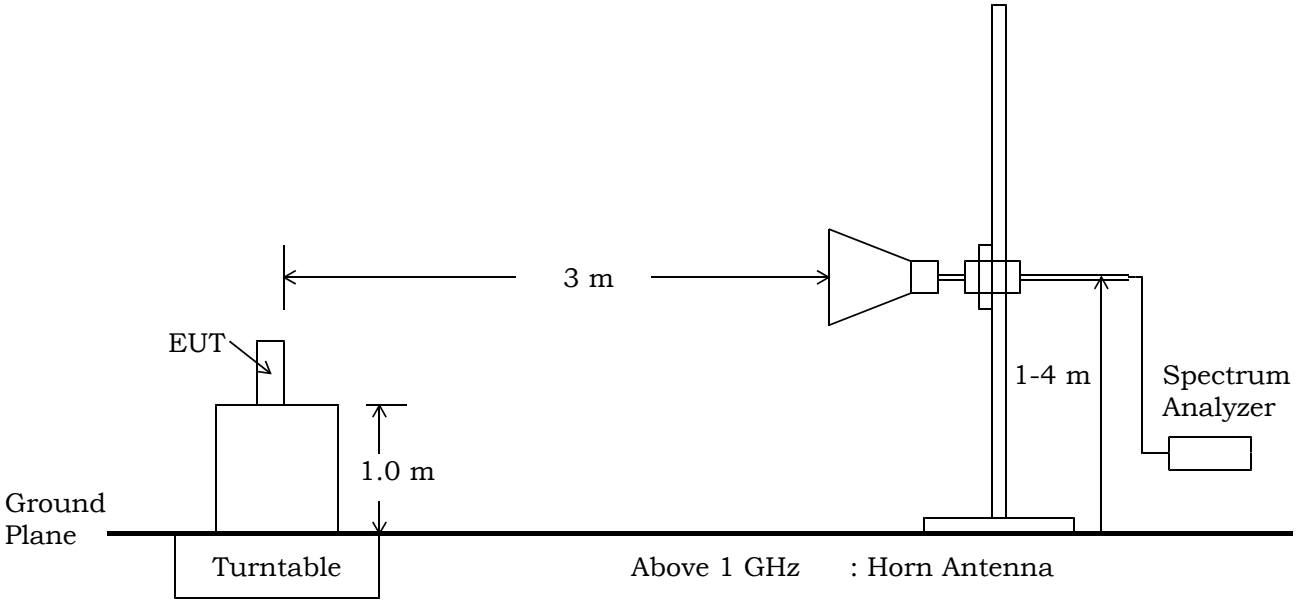
The respective calculated ERP of the spurious and harmonics were compared with the EIRP and ERP of fundamental frequency by specified attenuation limits, $43+10\log_{10}$ (TP in watt)[dB]. Where, TP = Transmitter power at the ANT OUT under test configuration as the hands free unit used.



(a) Measurement set up for up to 30 MHz



(b) Measurement set up for up to 1 GHz



(c) Measurement set up for above 1GHz

Fig.5 Unwanted Radiation Measurement

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 : October 9, 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		
○ - ESVS 10	A - 5		
● - VHA9103/BBA9106	C - 43	August, 2003	1 Year
● - UHALP9107	C - 42	August, 2003	1 Year
○ - VHA9103/FBAB9177	C - 27		
○ - UHALP9108-A1	C - 26		
● - KBA-511	C - 12	August, 2003	1 Year
● - KBA-611	C - 22	August, 2003	1 Year
● - Cable	H - 5	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		
● - 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, 2002	1 Year
○ - 355C	D - 22		
○ - 355D	D - 23		
● - MZ5010C	D - 81	December, 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	May, 2003	1 Year
● - UHP-128	D - 43	May, 2003	1 Year

Environmental conditions :

Temperature: 23 °C Humidity: 60 %

Occupied Bandwidth Measurement (§2.1049, §22.917, §24.238)

Test Procedure :

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

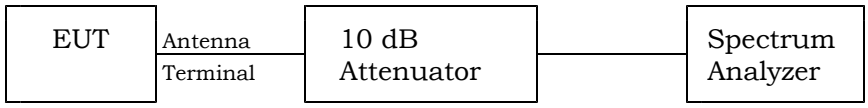


Fig.6 Occupied Bandwidth Measurement

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

Environmental conditions:

Temperature: 24 °C Humidity: 55 %

Band-Edge Emission Measurement (§2.1049, §22.917, §24.238)

Test Procedure :

The measurement test-setup is shown in Fig.7.

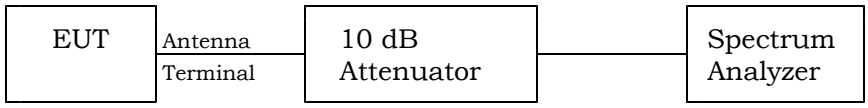


Fig.7 Band-Edge Emission Measurement

The setting of the spectrum analyzer are shown as follows :

	GSM 850	PCS 1900
TX Frequency	824.20 MHz / 848.80 MHz	1850.20 MHz / 1909.8 MHz
Band-edge Frequency	824.00 MHz / 849.00 MHz	1850.00 MHz / 1910.0 MHz
Res. Bandwidth	3 kHz	
Video Bandwidth	10 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:

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

Environmental conditions:

Temperature: 24 °C Humidity: 55 %

Frequency Stability Measurement(§2.1055, §22.917, §24.235)

Test Procedure :

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 (3.9VDC) 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 (3.9VDC) and the power (3.7VDC, the Ending Voltage) 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.

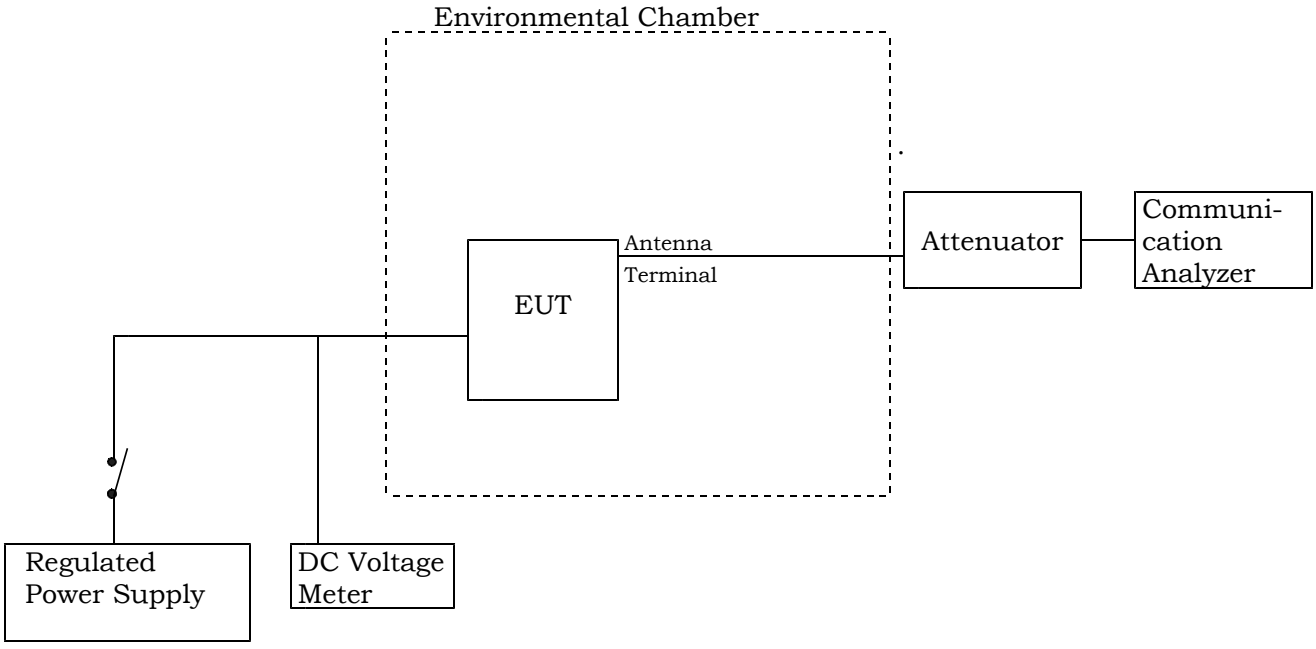


Fig.8 Frequency Stability Measurement

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	April, 2003	1 Year
● - 6032A	F - 5	April, 2003	1 Year
○ - TR5212	B - 30		
● - CMU200	B - 21	April, 2003	1 Year

CONFIGURATION OF EUT

The Equipment Under Test (EUT) consists of :

Description	Applicant (Manufacturer)	Model No. (Serial No.)	FCC ID
GSM-PCS Cellular Phone for USA and EU	Sharp Corporation (Sharp Corporation)	GX30 (ES2-219)	APYHRO00033
Lithium-ION Battery	Sharp Corporation (Sharp Corporation)	XN-1BT30 (---)	N/A
AC Charger	Sharp Corporation (Sharp Corporation)	NX-1QC34 (---)	N/A
Head Set	Sharp Corporation (Sharp Corporation)	--- (---)	N/A

The measurement was carried out with the following equipment connected :

Description	Grantee/Distributor	Model No. (Serial No.)	FCC ID
None			

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

	Description	Port	Shielded Cable	Shell Material	Ferrite Core	Cable Length
1	EUT	USB	NO	Nonmetal	NO	1.5 m
	AC Charger	---		Nonmetal		
2	EUT	Head Set	NO	Nonmetal	NO	1.2 m
	Head Set	---		Nonmetal		

Test Configuration:

Operation - mode of the EUT:

The tests were carried out under one modulation type shown as follows :
Modulation Burst Signal : DATA TSC 5 in accordance with GSM 05.02.

The Radiated Emission tests were carried under 3 test configurations in page 33 shown as follows:

	Test Configuration	The condition of the transmitting antenna
1	Single Unit	Integrated antenna
2	AC Charger used	Integrated antenna
3	Head Set used	Integrated antenna

The test configuration on the worst data at the unwanted radiation measurement is Single Unit.

Test system:

The EUT has 2 ports shown as follows :
1) Head Set port : is connected to the Head Set.
2) USB port : is connected to the AC Charger or the personal computer.

Special accessories:

None

Detailed Transmitter portion:

A)GSM850
Transmitting frequency : 824.2 MHz(128ch) - 848.8 MHz(251ch)
Local frequency : 3616.8 MHz(128ch) - 3715.2 MHz(251ch)
B)PCS1900
Transmitting frequency : 1850.2 MHz(512ch) - 1909.8 MHz(810ch)
Local frequency : 3860.4 MHz(512ch) - 3979.6 MHz(810ch)

Detailed Receiver portion:

A)GSM850
Receiving frequency : 869.2 MHz(128ch) - 893.8 MHz(251ch)
Local frequency : 3476.8 MHz(128ch) - 3575.2 MHz(251ch)
B)PCS1900
Receiving frequency : 1930.2 MHz(512ch) - 1989.8 MHz(810ch)
Local frequency : 3860.4 MHz(512ch) - 3979.6 MHz(810ch)

Other Clock Frequency:

Clock Display : 32.768 kHz
Reference frequency : 26.0 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
GSM850

Transmitter Power(TP)

The transmitter power is 997.7 mW at 824.00 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 12.4 dB at 1646.116 MHz

Max. limit exceeding _____ dB at _____ MHz

Uncertainty of measurement results +2.4 dB(2σ) -2.4 dB(2σ)

Remarks:

Transmitter Power(ERP)

The requirements are ● **- Passed** ○ **- Not Passed**

The Maximum ERP is 1.62 W at 824.20 MHz

Min. limit margin 6.35 dB at 824.20 MHz

Max. limit exceeding _____ dB at _____ MHz

Uncertainty of measurement results +1.4 dB(2σ) -1.3 dB(2σ)

Remarks:

Unwanted Radiation (9 kHz - 10 GHz)

The requirements are ● - Passed ○ - Not Passed

Min. limit margin 5.3 dB at 7417.800 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	+4.1 dB(2σ)	-4.2 dB(2σ)
1 GHz - 10 GHz	+3.1 dB(2σ)	-3.2 dB(2σ)

Remarks:

Occupied Bandwidth

The requirements are ● - Passed ○ - Not Passed

The 26dB Bandwidth is 309 kHz at 836.40 MHz
The 99% Bandwidth is 242 kHz at 824.20 MHz

The results(Occupied Bandwidth) Refer to pages* 2 - 4

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 -41.5 dBc at 824.00 MHz

The results(Band-edge Emission) Refer to pages* 6 - 7

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.

Frequency Stability

The requirements are ● - Passed ○ - Not Passed

Frequency Stability :	+0.10	ppm	at	836.400	MHz
Min. limit margin	2.40	ppm	at	836.400	MHz
Max. limit exceeding		ppm	at		MHz
Uncertainty of measurement results	±0.05	ppm			

Remarks:

TEST RESULTS
PCS1900

Transmitter Power(TP)

The transmitter power is 849.2 mW at 1850.20 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 28.0 dB at 3696.430 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 1.259 W at 1850.20 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 8.2 dB at 7639.2 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	+4.1 dB(2σ)	-4.2 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 Bandwidth is 310 kHz at 1850.20 MHz
The 99% Bandwidth is 244 kHz at 1880.00 MHz
The results(Occupied Bandwidth) Refer to pages* 9 - 11

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 -42.5 dBc at 1850.00 MHz

The results(Band-edge Emission) Refer to pages* 13 - 14

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.

Frequency Stability

Frequency Stability : +0.33 ppm at 1880.000 MHz

Uncertainty of measurement results ±0.05 ppm

Remarks:

SUMMARY

GENERAL REMARKS :

The EUT was tested according to the requirements of FCC Rules and Regulations Parts 22&24 (October 1, 2002) under the test configuration, as shown in page 25.

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 : November 15, 2003

End of testing : November 20, 2003

- JAPAN QUALITY ASSURANCE ORGANIZATION -

Approved by :

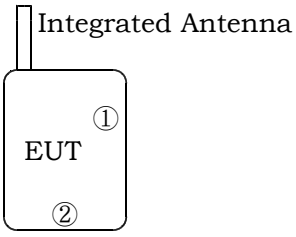
Akio Hosoda
Manager
EMC Div.
JQA KITA-KANSAI Testing Center

Issued by :

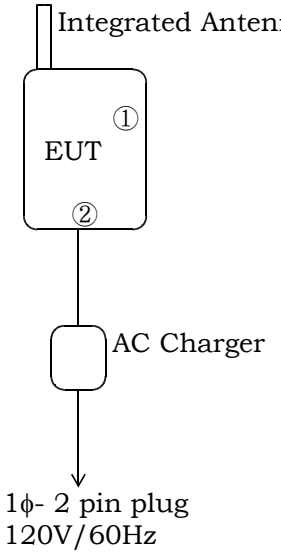
Shigeru Kinoshita
Deputy Manager
EMC Div.
JQA KITA-KANSAI Testing Center

Test System-Arrangement (Drawings)

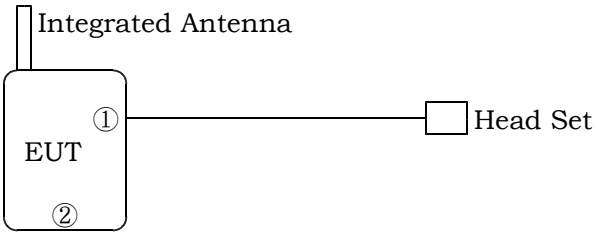
1) Single Unit



2) AC Charger used



3) Head Set used



Note:

① : Head Set
② : USB

Test-Setup (Photographs) at worst case

Radiated Emission

Horizontal Polarization

Vertical Polarization

Transmitter Power(TP) Measurement
GSM850

Test Date: November 20, 2003
Temp.: 24 °C ; Humi.: 52 %

GSM850

CH	Frequency	Correction Factor	Meter Reading Peak	Results Peak	
	[MHz]	[dB]	[dBm]	[dBm]	[mW]
128	824.200	10.00	19.96	29.96	990.8
189	836.400	10.00	19.99	29.99	997.7
251	848.800	10.00	19.92	29.92	981.7

Sample of calculated result at 836.400 MHz, as he Maximum Level Point:

	Correction Factor	=	10.00 dB	
+)	Meter Reading	=	19.99 dBm	
	Result	=	29.99 dBm	: $10^{(29.99/10)}$ = 997.7 (mW)

The point shown on "___ " is the Maximum Level Point.

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

Tester : Hiroshi Fujimoto

Antenna Conducted Spurious Emission Measurement
GSM850

Test Date: November 18, 2003
Temp.: 24 °C ; Humi.: 55 %

Measurement Results:

GSM850
Transmitting Frequency :824.200 MHz (128ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 3)
1646.116	10.4	-35.8	-13.0	-25.4	+12.4	C
2470.399	-21.8	-23.7	-13.0	-45.5	+32.5	D
3295.031	-20.8	-24.6	-13.0	-45.4	+32.4	D
3619.174	-20.4	-39.6	-13.0	-60.0	+47.0	D
4173.688	-19.0	-19.7	-13.0	-38.7	+25.7	E
5007.138	-20.1	-31.8	-13.0	-51.9	+38.9	E
6589.153	-16.1	-32.3	-13.0	-48.4	+35.4	F
7409.167	-15.9	-36.0	-13.0	-51.9	+38.9	F
8233.590	-11.1	-44.0	-13.0	-55.1	+42.1	F
9058.013	-15.2	-32.4	-13.0	-47.6	+34.6	F

GSM850
Transmitting Frequency :836.400 MHz (189ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 3)
1672.358	10.3	-37.9	-13.0	-27.6	+14.6	C
2507.348	-21.8	-25.4	-13.0	-47.2	+34.2	D
3343.737	-20.6	-27.1	-13.0	-47.7	+34.7	D
3662.841	-20.0	-37.9	-13.0	-57.9	+44.9	D
4179.986	-19.1	-22.7	-13.0	-41.8	+28.8	E
5017.635	-20.3	-29.8	-13.0	-50.1	+37.1	E
5848.496	-15.7	-36.3	-13.0	-52.0	+39.0	F
6686.144	-15.9	-32.3	-13.0	-48.2	+35.2	F
7519.384	-15.7	-37.3	-13.0	-53.0	+40.0	F
8357.033	-14.9	-41.8	-13.0	-56.7	+43.7	F
9190.273	-14.6	-36.8	-13.0	-51.4	+38.4	F

GSM850
Transmitting Frequency :848.800 MHz (251ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 3)
1695.451	10.2	-39.8	-13.0	-29.6	+16.6	C
2544.297	-21.3	-25.2	-13.0	-46.5	+33.5	D
3392.442	-20.5	-27.5	-13.0	-48.0	+35.0	D
3713.226	-20.1	-35.8	-13.0	-55.9	+42.9	D
4245.066	-19.1	-21.4	-13.0	-40.5	+27.5	E
5089.013	-20.3	-31.0	-13.0	-51.3	+38.3	E
5932.260	-15.8	-41.4	-13.0	-57.2	+44.2	F
6783.135	-16.0	-36.0	-13.0	-52.0	+39.0	F
7629.601	-15.8	-45.2	-13.0	-61.0	+48.0	F
8473.067	-15.1	-42.0	-13.0	-57.1	+44.1	F
9326.941	-14.9	-43.3	-13.0	-58.2	+45.2	F

Sample of calculated result at 1646.116 MHz, as the Minimum Margin point:

	Correction Factor	= 10.4 dB
+)	Meter Reading	= -35.8 dBm
	Result	= -25.4 dBm

Minimum Margin : -13.0 - (-25.4) = 12.4(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 10 GHz.
2. The Spectrum analyzer displays were printed out in Attachment B.
3. 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.	Correction Factor *
A	Peak (SP)	10 kHz	30 kHz	CL+P10(D-73)
B	Peak (SP)	1 MHz	3 MHz	CL+P10(D-73)
C	Peak (SP)	1 MHz	3 MHz	CL+HPF(D-43)+P10(D-73)
D	Peak (SP)	1 MHz	3 MHz	CL+HPF(D-43)+P10(D-73)+PA(A-21)+P10(D-74)
E	Peak (SP)	1 MHz	3 MHz	CL+HPF(D-42)+P10(D-73)+PA(A-21)+P10(D-74)
F	Peak (SP)	1 MHz	3 MHz	CL+HPF(D-42)+P10(D-73)+PA(A-33)+P10(D-74)

*)CL: Cable Loss / P10: 10dB Att. / HPF: High Pass Filter Loss / PA : Pre-Amp.

Tester : Shigeru Kinoshita

Transmitter Power(ERP) Measurement
GSM850

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

Measurement Results:

1)Emission Measurement in Fig.2(a)

CH	Frequency	Meter Reading [dBuV]		Remarks (Note 1)
	[MHz]	Horizontal Mh	Vertical Mv	
128	824.200	103.0	102.0	A
189	836.400	103.0	102.0	A
251	848.800	102.5	102.0	A

2)Substitution Measurement in Fig.2(b)

CH	Frequency	Meter Reading [dBuV]		Supplied Power to Substitution Antenna [dBm]	Balun Loss [dB]
	[MHz]	Horizontal Msh	Vertical Msv	Ps	Bl
128	824.200	65.0	63.0	-5.5	1.4
189	836.400	65.8	63.0	-5.6	1.4
251	848.800	65.6	63.5	-5.7	1.4

3)Calculated Result

CH	Frequency	Peak ERP [dBm]		Maximum Peak ERP [W]	Limits [dBm]	Margin [dB]
	[MHz]	Horizontal ERPh	Vertical ERPv			
128	824.200	31.10	32.10	1.62	38.45	+ 6.35
189	836.400	30.20	32.00	1.58	38.45	+ 6.45
251	848.800	29.80	31.40	1.38	38.45	+ 7.05

Sample of calculated result at 824.200 MHz, as the Minimum Margin point:

	Meter Reading Mv in Fig.2(a)	=	102.0 dB(μV)
	Meter Reading -Msv in Fig.2(b)	=	-63.0 dB(μV)
	Supplied Power to Sub. Ant.	=	-5.5 dB
+)	Balun Loss	=	-1.4 dB
	Result	=	32.1 dBm

Peak ERP = 32.1 dBm : $10^{(32.1/10)}$ = 1.62 (W)

ERPh = Mh - Msh + Ps + Gs

ERPv = Mv - Msv + Ps + Gs

Minimum Margin : 38.45 - 32.10 = 6.35(dB)

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

Remarks:

Note 1	Detector Function	IF Bandwidth
A	Peak	1 MHz

Tester : Akio Hosoda

Unwanted Radiation Measurement
GSM850

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

Measurement Results:

GSM850
Test Configuration : Single Unit
Transmitting Frequency : 824.200 MHz (128ch)

Frequency [MHz]	ERP [dBm] Hori.	ERP [dBm] Vert.	Limits [dBm]	Margin [dB]	Remarks (Note 3)
1648.400	-28.2	-27.2	-13.0	+14.2	A
2472.600	-32.0	-34.5	-13.0	+19.0	A
3296.800	-44.3	-43.8	-13.0	+30.8	A
4121.000	-33.7	-34.4	-13.0	+20.7	B
4945.200	-38.8	-38.8	-13.0	+25.8	B
5769.400	< -40.8	< -40.8	-13.0	> +27.8	B
6593.600	-35.4	-34.4	-13.0	+21.4	B
7417.800	-18.3	-20.6	-13.0	+ 5.3	B
8242.000	-24.2	-24.7	-13.0	+11.2	C

GSM850
Test Configuration : Single Unit
Transmitting Frequency : 836.400 MHz (189ch)

Frequency [MHz]	ERP [dBm] Hori.	ERP [dBm] Vert.	Limits [dBm]	Margin [dB]	Remarks (Note 3)
1672.800	-26.6	-27.1	-13.0	+13.6	A
2509.200	-41.3	-41.7	-13.0	+28.3	A
3345.600	-44.2	-44.2	-13.0	+31.2	A
4182.000	-34.4	-33.9	-13.0	+20.9	B
5018.400	-37.7	-38.7	-13.0	+24.7	B
5854.800	< -40.6	< -40.6	-13.0	> +27.6	B
6691.200	-32.9	-33.4	-13.0	+19.9	B
7527.600	-20.3	-21.7	-13.0	+ 7.3	B
8364.000	-24.5	-23.5	-13.0	+10.5	C

GSM850
Test Configuration : Single Unit
Transmitting Frequency : 848.800 MHz (251ch)

Frequency [MHz]	ERP [dBm] Hori.	ERP [dBm] Vert.	Limits [dBm]	Margin [dB]	Remarks (Note 3)
1697.600	-28.1	-28.6	-13.0	+15.1	A
2546.400	-40.3	-42.5	-13.0	+27.3	A
3395.200	-43.1	-45.6	-13.0	+30.1	A
4244.000	-36.7	-37.2	-13.0	+23.7	B
5092.800	< -41.7	< -41.7	-13.0	> +28.7	B
5941.600	< -40.6	< -40.6	-13.0	> +27.6	B
6790.400	-32.9	-33.9	-13.0	+19.9	B
7639.200	-22.7	-23.7	-13.0	+ 9.7	B
8488.000	-24.1	-23.9	-13.0	+10.9	C

Sample of calculated result at 7417.800 MHz, as the Minimum Margin point:
Minimum Margin : -13.0 -(-18.3) = 5.3(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 10 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+P20+HPF(D-43)-Amp.
B	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P20+HPF(D-42)-Amp.
C	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P10+HPF(D-42)-Amp.
D	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	P10+HPF(D-42)-Amp. +Mix.

*)CL: Cable Loss/ P20: 20dB Att.(D-73+D-74) / P10: 10dB Att.(D-73) / Amp.: Amplifier Gain/
Mix.: Mixer Conversion Loss/ HPF : High Pass Filter loss

Tester : Akio Hosoda

Occupied Bandwidth Measurement
GSM850

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

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	99% Bandwidth	Data Page*
128	824.200	308 kHz	242 kHz	Page 2
189	836.400	309 kHz	241 kHz	Page 3
251	848.800	308 kHz	242 kHz	Page 4

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
GSM850

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

1) Low Band-Edge Measurement

CH	Transmitting Frequency(MHz)	Band-Edge Frequency(MHz)	Band-Edge Level[dBc]	Data Page*
128	824.200	824.000	-41.5	Page 6

2) High Band-Edge Measurement

CH	Transmitting Frequency(MHz)	Band-Edge Frequency(MHz)	Band-Edge Level[dBc]	Data Page*
251	848.800	849.000	-44.3	Page 7

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

Tester : Shigeru Kinoshita

Frequency Stability Measurement
GSM850

Measurement Results:

Test Date: November 19-20, 2003

GSM850

Frequency Stability Measurement versus Temperature

Reference Frequency: 836.400 MHz (189ch)

DC Supply Voltage : 3.9VDC

Ambient Temperature (°C)	Deviation(ppm) Startup	2 minutes	5 minutites	10 minutites	Limits (ppm)	Margin (ppm)
-30	- 0.02	+ 0.03	+ 0.05	+ 0.03	2.50	+ 2.45
-20	+ 0.08	+ 0.06	+ 0.05	+ 0.04	2.50	+ 2.42
-10	+ 0.09	+ 0.04	+ 0.04	+ 0.06	2.50	+ 2.41
0	+ 0.09	+ 0.06	+ 0.06	+ 0.06	2.50	+ 2.41
10	+ 0.10	+ 0.07	+ 0.06	- 0.02	2.50	+ 2.40
20	+ 0.07	+ 0.04	+ 0.02	+ 0.03	2.50	+ 2.43
30	+ 0.03	- 0.02	+ 0.03	+ 0.05	2.50	+ 2.45
40	- 0.05	- 0.03	+ 0.03	+ 0.03	2.50	+ 2.45
50	- 0.08	- 0.06	+ 0.05	+ 0.04	2.50	+ 2.42

Frequency Stability Measurement versus Power Supply Voltage

Reference Frequency: 836.400 MHz (189ch)

Ambient Temperature : 20 °C

DC Supply Voltage (VDC)	Deviation(Hz) Startup	2 minutes	5 minutites	10 minutites	Limits (ppm)	Margin (ppm)
3.9	+ 0.07	+ 0.04	+ 0.02	+ 0.03	2.50	+ 2.43
3.7(Ending)	+ 0.07	+ 0.04	+ 0.02	+ 0.03	2.50	+ 2.43

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

Sample Calculation at 836.4000 MHz ,+10°C Startup 3.9VDC) , as the Minimum Margin point: :
Minimum Margin : 2.50 - 0.10 = 2.40(ppm)
The point shown on "___ " is the Minimum Margin Point.

Tester : Akio Hosoda

Transmitter Power(TP) Measurement
PCS1900

Test Date: November 20, 2003
Temp.: 24 °C ; Humi.: 52 %

PCS1900

CH	Frequency [MHz]	Correction Factor [dB]	Meter Reading Peak [dBm]	Results Peak [dBm]	Results Peak [mW]
512	1850.200	10.00	19.29	29.29	849.2
661	1880.000	10.00	19.23	29.23	837.5
810	1909.800	10.00	19.15	29.15	822.2

Sample of calculated result at 1850.200 MHz, as he Maximum Level Point:

	Correction Factor	=	10.00 dB
+)	Meter Reading	=	19.29 dBm
	Result	=	29.29 dBm : $10^{(29.29/10)}$ = 849.2 (mW)

The point shown on "___ " is the Maximum Level Point.

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

Tester : Hiroshi Fujimoto

Antenna Conducted Spurious Emission Measurement
PCS1900

Test Date: November 18, 2003
Temp.: 24 °C ; Humi.: 55 %

Measurement Results:

PCS1900
Transmitting Frequency :1850.200 MHz (512ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 3)
3696.430	-19.4	-21.6	-13.0	-41.0	+28.0	C
3855.144	-19.1	-33.3	-13.0	-52.4	+39.4	C
5544.297	-20.2	-34.3	-13.0	-54.5	+41.5	C
6834.465	-16.0	-36.1	-13.0	-52.1	+39.1	D
8534.955	-15.2	-51.6	-13.0	-66.8	+53.8	D
11950.105	-13.7	-50.1	-13.0	-63.8	+50.8	D

PCS1900
Transmitting Frequency :1880.000 MHz (661ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 3)
3756.893	-19.9	-22.7	-13.0	-42.6	+29.6	C
3915.605	-19.1	-32.6	-13.0	-51.7	+38.7	C
5638.769	-20.2	-22.2	-13.0	-42.4	+29.4	C
6947.831	-16.1	-25.3	-13.0	-41.4	+28.4	D
8683.748	-15.2	-42.1	-13.0	-57.3	+44.3	D
10426.750	-14.6	-56.1	-13.0	-70.7	+57.7	D
12169.752	-13.1	-43.8	-13.0	-56.9	+43.9	D

PCS1900
Transmitting Frequency :1909.800 MHz (810ch)

Frequency [MHz]	Correction Factor [dB]	Meter Readings (dBm)	Limits (dBm)	Results (dBm)	Margin [dB]	Remarks (Note 3)
3817.355	-19.4	-30.7	-13.0	-50.1	+37.1	C
3976.067	-19.1	-31.1	-13.0	-50.2	+37.2	C
5725.683	-19.7	-25.8	-13.0	-45.5	+32.5	C
7068.282	-17.5	-25.5	-13.0	-43.0	+30.0	D
8832.540	-16.6	-45.8	-13.0	-62.4	+49.4	D
12368.143	-15.7	-48.5	-13.0	-64.2	+51.2	D

Sample of calculated result at 3696.430 MHz, as the Minimum Margin point:

	Correction Factor	=	-19.4 dB
+)	Meter Reading	=	-21.6 dBm
	Result	=	-41.0 dBm

Minimum Margin : -13.0 - (-41.0) = 28.0(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. The Spectrum analyzer displays were printed out in Attachment B.
3. 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.	Correction Factor *
A	Peak (SP)	10 kHz	30 kHz	CL+P10(D-73)
B	Peak (SP)	1 MHz	3 MHz	CL+P10(D-73)
C	Peak (SP)	1 MHz	3 MHz	CL+HPF(D-42)+P10(D-73)+PA(A-21)+P10(D-74)
D	Peak (SP)	1 MHz	3 MHz	CL+HPF(D-42)+P10(D-73)+PA(A-33)+P10(D-74)

*)CL: Cable Loss / P10: 10dB Att. / HPF: High Pass Filter Loss / PA : Pre-Amp.

Tester : Shigeru Kinoshita

Transmitter Power(EIRP) Measurement
PCS1900

Test Date: November 15, 2003
Temp.: 25 °C ; Humi.: 58 %

Measurement Results:

1)Emission Measurement in Fig.3(a)

CH	Frequency [MHz]	Meter Reading [dBuV] Horizontal Mh	Meter Reading [dBuV] Vertical Mv	Remarks (Note 1)
512	1850.200	93.8	91.4	A
661	1880.000	92.7	90.1	A
810	1909.800	91.6	89.5	A

2)Substitution Measurement in Fig.3(b)

CH	Frequency [MHz]	Meter Reading [dBuV] Horizontal Msh	Meter Reading [dBuV] Vertical Msv	Supplied Power to Substitution Antenna [dBm] Ps	Gain of Substitution Antenna [dBi] Gs
512	1850.200	76.1	76.1	-0.8	14.1
661	1880.000	76.1	76.2	-0.9	14.2
810	1909.800	75.9	75.8	-0.7	14.4

3)Calculated Result

CH	Frequency [MHz]	Peak EIRP [dBm] Horizontal EIRPh	Peak EIRP [dBm] Vertical EIRPv	Maximum Peak EIRP [W]	Limits [dBm]	Margin [dB]
512	1850.200	31.0	28.6	1.259	33.0	+ 2.0
661	1880.000	29.9	27.2	0.977	33.0	+ 3.1
810	1909.800	29.4	27.4	0.871	33.0	+ 3.6

Sample of calculated result at 1880.000 MHz, as the Minimum Margin point:

	Meter Reading Mh in Fig.3(a)	=	93.8 dB(μV)
	Meter Reading -Msh in Fig.3(b)	=	-76.1 dB(μV)
	Supplied Power to Sub. Ant.	=	-0.8 dB
+)	Gain of Sub. Ant.	=	14.1 dB
	Result	=	31.0 dBm

Peak EIRP = 31.0 dBm : $10^{(31.0/10)}$ = 1259 (mW)

EIRPh = Mh - Msh + Ps + Gs

EIRPv = Mv - Msv + Ps + Gs

Minimum Margin : 33.0 - 31.0 = 2.0(dB)

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

Remarks:

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

Tester : Akio Hosoda

Unwanted Radiation Measurement
PCS1900

Test Date: November 15, 2003
Temp.: 25 °C ; Humi.: 58 %

Measurement Results:

PCS1900
Test Configuration : Single Unit
Transmitting Frequency : 1850.200 MHz (512ch)

Frequency [MHz]	ERP [dBm] Hori.	ERP [dBm] Vert.	Limits [dBm]	Margin [dB]	Remarks (Note 3)
3700.400	-30.8	-32.8	-13.0	+17.8	A
5550.600	-36.3	-33.8	-13.0	+20.8	A
7400.800	-22.5	-22.7	-13.0	+ 9.5	A
9251.000	-37.3	-37.3	-13.0	+24.3	B
11101.200	< -37.7	< -37.7	-13.0	> +24.7	B
12951.400	< -31.6	< -31.6	-13.0	> +18.6	B
14801.600	< -30.2	< -30.2	-13.0	> +17.2	B
16651.800	< -32.1	< -32.1	-13.0	> +19.1	B
18502.000	< -28.1	< -28.1	-13.0	> +15.1	C

PCS1900
Test Configuration : Single Unit
Transmitting Frequency : 1880.000 MHz (661ch)

Frequency [MHz]	ERP [dBm] Hori.	ERP [dBm] Vert.	Limits [dBm]	Margin [dB]	Remarks (Note 3)
3760.000	-34.7	-34.7	-13.0	+21.7	A
5640.000	-35.2	-35.2	-13.0	+22.2	A
7520.000	-25.8	-26.8	-13.0	+12.8	A
9400.000	-36.2	-36.2	-13.0	+23.2	B
11280.000	< -37.4	< -37.4	-13.0	> +24.4	B
13160.000	< -21.3	< -21.3	-13.0	> + 8.3	B
15040.000	< -30.3	< -30.3	-13.0	> +17.3	B
16920.000	< -32.3	< -32.3	-13.0	> +19.3	B
18800.000	< -27.5	< -27.5	-13.0	> +14.5	C

PCS1900
Test Configuration : Single Unit
Transmitting Frequency : 1880.000 MHz (661ch)

Frequency [MHz]	ERP [dBm] Hori.	ERP [dBm] Vert.	Limits [dBm]	Margin [dB]	Remarks (Note 3)
3760.000	-34.7	-34.7	-13.0	+21.7	A
5640.000	-35.2	-35.2	-13.0	+22.2	A
7520.000	-25.8	-26.8	-13.0	+12.8	A
9400.000	-36.2	-36.2	-13.0	+23.2	B
11280.000	< -37.4	< -37.4	-13.0	> +24.4	B
13160.000	< -21.3	< -21.3	-13.0	> + 8.3	B
15040.000	< -30.3	< -30.3	-13.0	> +17.3	B
16920.000	< -32.3	< -32.3	-13.0	> +19.3	B
18800.000	< -27.5	< -27.5	-13.0	> +14.5	C

Sample of calculated result at 7639.200 MHz, as the Minimum Margin point:
Minimum Margin : -13.0 -(-21.2) = 8.2(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+P20+HPF(D-42)-Amp.
B	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	CL+P10+HPF(D-42)-Amp.
C	Peak (SP)	1 MHz	3 MHz	20 msec	0 Hz	P10+HPF(D-42)-Amp. +Mix.

*)CL: Cable Loss/ P20: 20dB Att.(D-73+D-74) / P10: 10dB Att.(D-73) / Amp.: Amplifier Gain/
Mix.: Mixer Conversion Loss/ HPF : High Pass Filter loss

Tester : Akio Hosoda

Occupied Bandwidth Measurement
PCS1900

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

CH No.	Transmitting Frequency(MHz)	26dB Bandwidth	99% Bandwidth	Data Page*
512	1850.200	310 kHz	242 kHz	Page 9
661	1880.000	308 kHz	244 kHz	Page 10
810	1909.800	309 kHz	242 kHz	Page 11

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
PCS1900

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

1) Low Band-Edge Measurement

CH	Transmitting Frequency(MHz)	Band-Edge Frequency(MHz)	Band-Edge Level[dBc]	Data Page*
512	1850.200	1850.000	-42.5	Page 13

2) High Band-Edge Measurement

CH	Transmitting Frequency(MHz)	Band-Edge Frequency(MHz)	Band-Edge Level[dBc]	Data Page*
810	1909.800	1910.000	-47.0	Page 14

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

Tester : Shigeru Kinoshita

Frequency Stability Measurement
PCS1900

Measurement Results:

Test Date: November 19-20, 2003

PCS1900

Frequency Stability Measurement versus Temperature

Reference Frequency: 1880.000 MHz (661ch)

DC Supply Voltage : 3.9VDC

Ambient Temperature (°C)	Deviation(ppm) Startup	2 minutes	5 minutites	10 minutites
-30	+ 0.05	+ 0.07	+ 0.05	+ 0.04
-20	+ 0.07	+ 0.05	+ 0.03	+ 0.04
-10	+ 0.07	+ 0.07	+ 0.05	+ 0.04
0	+ 0.08	+ 0.04	+ 0.06	+ 0.05
10	+ 0.10	+ 0.05	+ 0.05	+ 0.04
20	+ 0.08	+ 0.05	+ 0.01	+ 0.02
30	- 0.01	+ 0.02	+ 0.04	+ 0.05
40	+ 0.04	+ 0.02	+ 0.01	+ 0.02
50	- 0.05	+ 0.03	+ 0.05	+ 0.06

Frequency Stability Measurement versus Power Supply Voltage

Reference Frequency: 1880.000 MHz (661ch)

Ambient Temperature : 20 °C

DC Supply Voltage (VDC)	Deviation(Hz) Startup	2 minutes	5 minutites	10 minutites
3.9	+ 0.08	+ 0.05	+ 0.01	+ 0.02
3.7(Ending)	+ 0.08	+ 0.05	+ 0.01	+ 0.02

Note :1.The measurement were made after all of components of the oscillator sufficiently stabilized at each temperature.
2. The point shown on " [ ] " is the Maximum Deviation Point.

Tester : Akio Hosoda