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. : KL80030626

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 : December 22, 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

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 Unwanted Radiation 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.: PP2-387)
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) Power Rating : 3.9VDC
10) 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 ($512 \leq n \leq 810$)

11) Modulation Type : GMSK
12) Type of Communication System : GSM

TEST CONDITIONS

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.

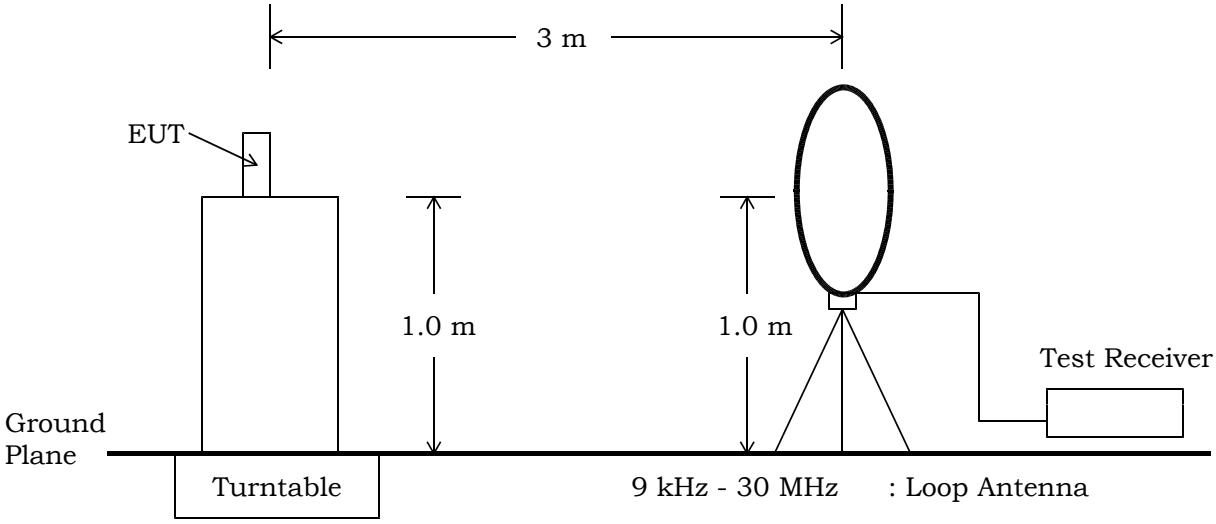
Step 2) The ERP measurement was carried out with according to Step 2 in page 9. Then the RF power in the substitution antenna half-wave dipole antenna for up to 1 GHz and the substitution horn antenna for above 1 GHz.

The EIRP is calculated in the following equation.

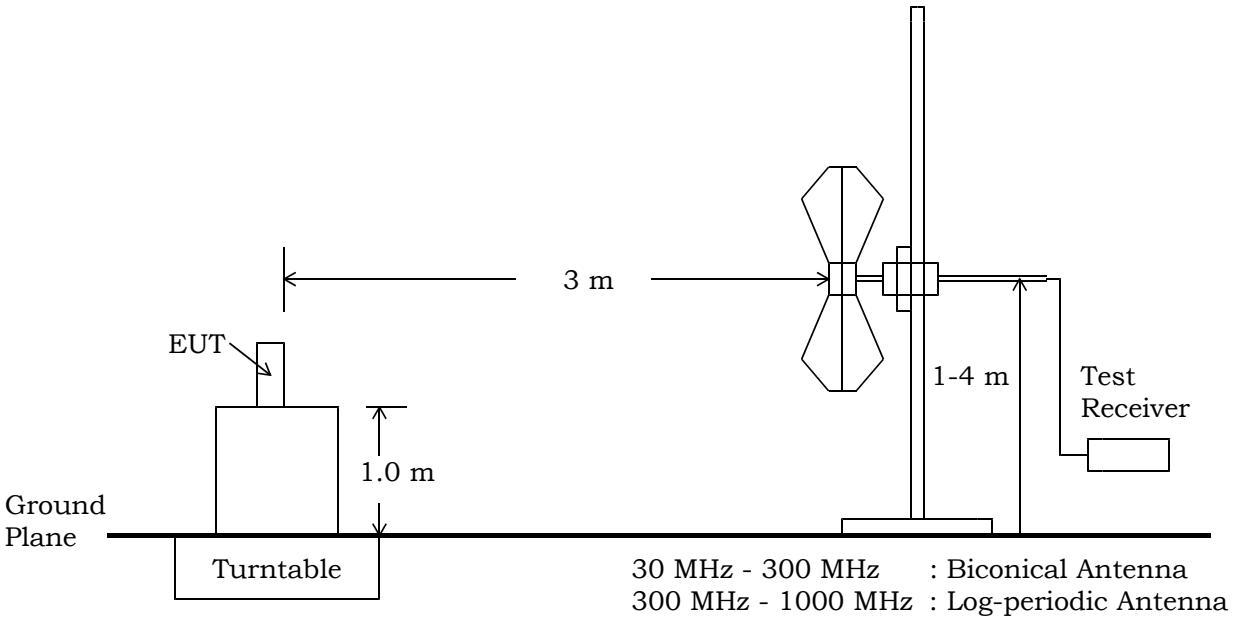
A) Up to 1 GHz
ERP(dBm) = P (dBm) - (Balun Loss of the half-wave dipole Ant. (dB)) + Cable Loss(dB)

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

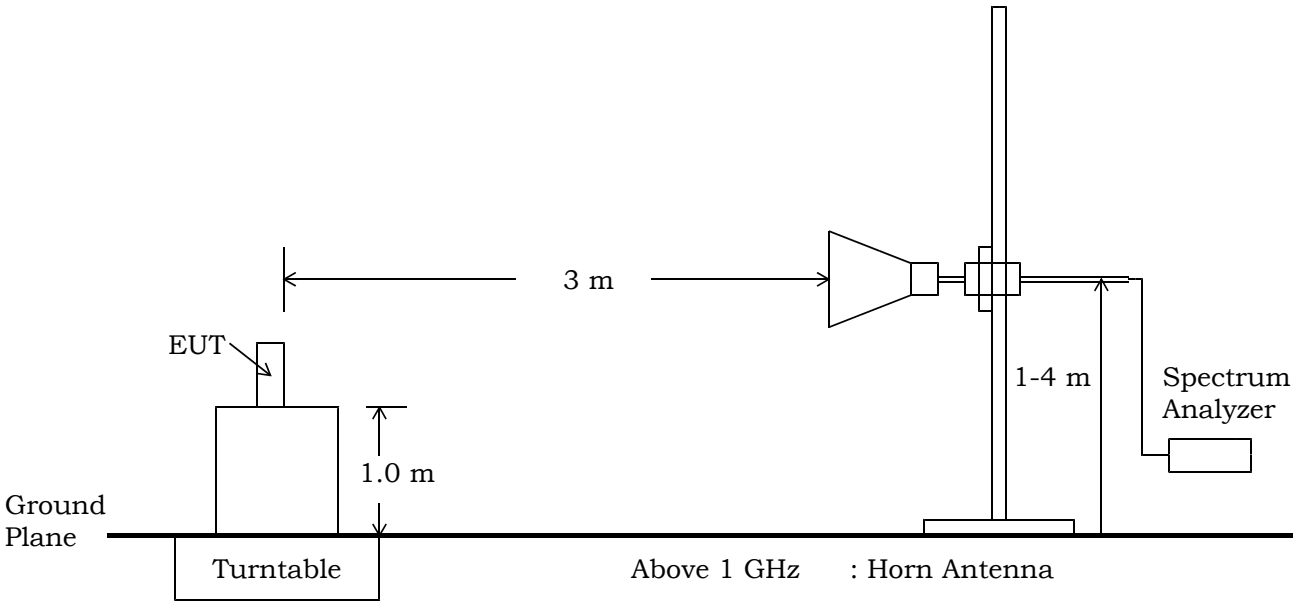
The respective calculated ERP of the spurious and harmonics were compared with the EIRP and ERP of fundamental frequency by specified attenuation limits, $43+10\log_{10}$ (TP in watt)[dB]. Where, TP = Transmitter power at the ANT OUT under test configuration as the hands free unit used.



(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, 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	May, 2003	1 Year

Environmental conditions :

Temperature: 22 °C Humidity: 40 % (December 28, 2003)
Temperature: 20 °C Humidity: 45 % (December 29, 2003)

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 (PP2-387)	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

Unwanted Radiation (9 kHz - 10 GHz)

The requirements are ● - Passed ○ - Not Passed

Min. limit margin 1.1 dB at 1697.600 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: The measured result is below the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance is more probable than non-compliance with the specification limit.

PCS1900

Unwanted Radiation (9 kHz - 20 GHz)

The requirements are ● - Passed ○ - Not Passed

Min. limit margin More than 15.3 dB at 13160.000 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:

SUMMARY

GENERAL REMARKS :

The EUT was tested according to the requirements(Unwanted Radiation) of FCC Rules and Regulations Parts 22&24 (October 1, 2002) under the test configuration, as shown in page 15.

The conclusion for the test items of which are required by the applied regulation is indicated under the final judgement.

FINAL JUDGEMENT :

The "as received" sample;

● - fulfill the test requirements of the regulation mentioned on page 3.

○ - fulfill the test requirements of the regulation mentioned on page 3, but with certain qualifications.

○ - doesn't fulfill the test regulation mentioned on page 3.

Begin of testing : December 28, 2003

End of testing : December 29, 2003

- JAPAN QUALITY ASSURANCE ORGANIZATION -

Approved by :

A. Hosoda

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

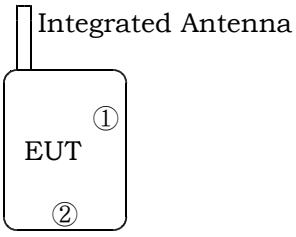
Issued by :

S. Kino

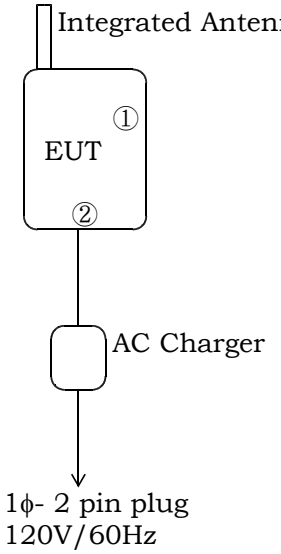
Shigeru Kinoshita
Deputy Manager
EMC Div.
JQA KITA-KANSAI Testing Center

Test System-Arrangement (Drawings)

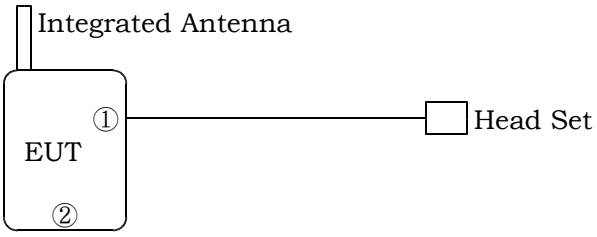
1) Single Unit



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

Unwanted Radiation Measurement
GSM850

Test Date: December 28, 2003
Temp.: 22 °C ; Humi.: 40 %

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	-16.9	-18.3	-13.0	+ 3.9	A
2472.600	-41.7	-41.7	-13.0	+28.7	A
3296.800	-47.8	-48.0	-13.0	+34.8	A
4121.000	< -52.9	-49.9	-13.0	+36.9	B
4945.200	-46.1	-45.9	-13.0	+32.9	B
5769.400	-47.3	< -47.8	-13.0	+34.3	B
6593.600	-42.8	-44.2	-13.0	+29.8	B
7417.800	-37.4	-38.3	-13.0	+24.4	B
8242.000	< -43.7	< -43.7	-13.0	> +30.7	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	-15.6	-15.6	-13.0	+ 2.6	A
2509.200	-42.4	-42.6	-13.0	+29.4	A
3345.600	-50.8	-50.5	-13.0	+37.5	A
4182.000	-47.5	-47.8	-13.0	+34.5	B
5018.400	-46.9	-47.2	-13.0	+33.9	B
5854.800	-46.5	-47.1	-13.0	+33.5	B
6691.200	-43.1	-44.4	-13.0	+30.1	B
7527.600	-39.5	-39.8	-13.0	+26.5	B
8364.000	< -43.5	< -43.5	-13.0	> +30.5	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	-14.1	-14.1	-13.0	+ 1.1	A
2546.400	-42.5	-41.9	-13.0	+28.9	A
3395.200	-51.9	-51.8	-13.0	+38.8	A
4244.000	-46.1	-46.1	-13.0	+33.1	B
5092.800	-47.9	-47.8	-13.0	+34.8	B
5941.600	-46.0	< -50.6	-13.0	+33.0	B
6790.400	-43.8	-45.5	-13.0	+30.8	B
7639.200	-34.1	-34.3	-13.0	+21.1	B
8488.000	< -43.4	< -43.4	-13.0	> +30.4	C

Sample of calculated result at 1697.600 MHz, as the Minimum Margin point:
Minimum Margin : -13.0 -(-14.1) = 1.1(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

Unwanted Radiation Measurement
PCS1900

Test Date: December 29, 2003
Temp.: 22 °C ; Humi.: 45 %

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	-36.7	-37.5	-13.0	+23.7	A
5550.600	-34.8	-35.5	-13.0	+21.8	A
7400.800	-32.7	-32.4	-13.0	+19.4	A
9251.000	-32.9	-32.8	-13.0	+19.8	B
11101.200	-35.0	-35.0	-13.0	+22.0	B
12951.400	< -38.6	< -38.6	-13.0	> +25.6	B
14801.600	< -38.2	< -38.2	-13.0	> +25.2	B
16651.800	< -40.1	< -40.1	-13.0	> +27.1	B
18502.000	< -36.1	< -36.1	-13.0	> +23.1	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	-37.9	-38.0	-13.0	+24.9	A
5640.000	-33.3	-34.6	-13.0	+20.3	A
7520.000	-33.3	-33.2	-13.0	+20.2	A
9400.000	-34.9	-35.0	-13.0	+21.9	B
11280.000	-34.6	-35.6	-13.0	+21.6	B
13160.000	< -28.3	< -28.3	-13.0	> +15.3	B
15040.000	< -38.3	< -38.3	-13.0	> +25.3	B
16920.000	< -40.3	< -40.3	-13.0	> +27.3	B
18800.000	< -35.5	< -35.5	-13.0	> +22.5	C

PCS1900
Test Configuration : Single Unit
Transmitting Frequency : 1909.800 MHz (810ch)

Frequency [MHz]	ERP [dBm] Hori.	ERP [dBm] Vert.	Limits [dBm]	Margin [dB]	Remarks (Note 3)
3819.600	-37.5	-38.3	-13.0	+24.5	A
5729.400	-36.1	-36.0	-13.0	+23.0	A
7639.200	-31.1	-32.3	-13.0	+18.1	B
9549.000	-33.9	-34.9	-13.0	+20.9	B
11458.800	-35.7	< -44.1	-13.0	+22.7	B
13368.600	< -37.9	< -37.9	-13.0	> +24.9	B
15278.400	< -39.2	< -39.2	-13.0	> +26.2	B
17188.200	< -40.1	< -40.1	-13.0	> +27.1	B
19098.000	< -36.2	< -36.2	-13.0	> +23.2	C

Sample of calculated result at 13160.000 MHz, as the Minimum Margin point:
Minimum Margin : -13.0 -(<-28.3) = >15.3(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 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