EMI TEST REPORT

Test Report No. : 25BE0189-HO-1

Applicant	:	**SHARP CORPORATION**
Type of Equipment	:	**Tri-Band Mobile Cellular Phone**
Model No.	:	**Fantom**
Test standard	:	**FCC Part 24 2003**
FCC ID	:	**APYNAR0058**
Test Result	:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.

Date of test : October 14, 19, 20, 22 and 24, 2004

Tested by :

Hiroka Umeyama
EMC Service

K. Adachi

Kenichi Adachi
EMC Service

Approved by :

Hironobu Shimoji
Group Leader of EMC Service

UL Apex Co., Ltd.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
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SECTION 1: Client information

Company Name	:	SHARP Corporation
Brand Name	:	SHARP
Address	:	492 Minosho-cho Yamatokoriyama-shi Nara,639-1186,Japan
Telephone Number	:	+81-743-55-4165
Facsimile Number	:	+81-743-55-7826
Contact Person	:	Hiroyuki Uwatoko

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

SHARP CORPORATION, Model No: Fantom is the GSM/DCS/PCS Tri-Band Mobile Cellular Phone with Bluetooth. This EUT can be co-operated GSM (GPRS) and Bluetooth. Please refer to Report No. 25BE0189-HO-2 about Bluetooth mode test (FCC Part 15).

Type of Equipment	:	Tri-Band Mobile Cellular Phone
FCC ID	:	APYNAR0058
Model No.	:	Fantom
Serial No.	:	ES1-028
Rating	:	AC120V(120-140V)/0.1A/ DC 3.7V(3.3～4.2V) (DC Battery)
Country of Manufacture	:	JAPAN
Receipt Date of Sample	:	October 13, 2004
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description (GSM & GPRS)

Equipment Type	: Transceiver
Frequency of operation	: 1850.2-1909.8MHz
Clock frequency	: 13M/52M/91MHz(CPU/DSP), 26MHz(RFIC), 13MHz(Sound IC/LCDC), 5.1MHz(LCD), 32.768kHz(RTC)
Type of modulation	: GSMK
Bandwidth & channel spacing	: 60MHz & 200kHz
Channel number	: 299
Antenna Type	: Fixed Antenna
Antenna Gain	: 2 dBi
Mode of Operation	: Duplex
Intermediate frequency	: 640MHz
Other Clock Frequency	: 26MHz, 32.768kHz
Method of Frequency Generation	: Synthesizer
Power Supply	: DC2.7V – 3.0V (Inner)
Temperature of operation	: -10 deg. C. to + 55 deg. C.

2.3 Product Description (Bluetooth)

Equipment Type	: Transceiver
Frequency of Operation	: 2402MHz - 2480MHz
Bandwidth & Channel spacing	: 1MHz & 1MHz
Channel number	: 79
Type of Modulation	: FHSS/GFSK
Antenna Type	: Chip Antenna
Antenna Connector Type	: MM8430-2600RB3
Antenna Gain	: -2.1 dBi (Max)
Operating voltage (Inner)	: +3.0V
Operating temperature	: -10 to +55 deg.C.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 24 2003

Title : FCC 47CFR Part 24
Personal Communications Services

3.2 Procedures and results

Item	Test Method	FCC Regulations	Remarks	Deviation	Worst margin *0)	Results
Peak Output Power	Section 2.1046	Section 24.232(b)	Conducted/ Radiated	N/A	1.6dB 1850.16MHz Vertical (Radiated)	Complied
Emission Bandwidth, 99% Occupied Bandwidth	Section 2.1049	Section 24.238(b)	Conducted	N/A	-	Complied
Band-Edge	Section 2.1049	Section 24.238(b)	Conducted/ Radiated	N/A	8.9dB 1885.0MHz (Conducted)	Complied
Spurious Emission	Section 2.1051	Section 24.238(a)	Conducted	N/A	-	Complied
Spurious Radiation	Section 2.1053	Section 24.238(a)	Radiated	N/A	9.8dB 18502.43MHz Vertical (Radiated)	Complied
Frequency Stability (Temperature Variation)	Section 2.1055(a) (1) and (b)	Section 24.235	Conducted	N/A	-	Complied
Frequency Stability (Voltage Variation)	Section 2.1055(d)(1) and (2)	Section 24.235	Conducted	N/A	-	Complied
Note: UL Apex's EMI Work Procedures No. QPM05 *0) The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.						

*These tests were also referred to TIA-603-B " Land Mobile FM or PM Communications Equipment Measurement and Performance Standards."

3.3 Additions to standards

No addition, deviation or exclusion has been made from standards.

3.4 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 24 2003.

3.5 Uncertainty

Radiated
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ±4.5dB.
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ±5.2dB.
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ±6.6dB.
The result is within EMC Head Office lab's uncertainty

Conducted
The measurement uncertainty (with a 95% confidence level) for this test is ±3.0dB.
The data listed in this test report has enough margin.

3.6 Test Location

UL Apex Co., Ltd. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	Listed date (for NVLAP)	Registration number (for NVLAP)	IC Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	February 01, 2002	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	June 05, 2002	846015	IC4247-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 shielded room	-	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.4 shielded room	-	-	-	3.1 x 5.0 x 2.7m	N/A	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1 and No.2 semi-anechoic and No.3 measurement room.

3.7 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

4.1.1 Test mode for Radiated emission

GSM & Bluetooth mode (Radiated)

The test was made with GSM mode and Bluetooth of simultaneous mode as follows;

[GSM] *Low ch: 1850.2MHz*
Mid ch: 1880.0MHz
High ch: 1909.8MHz

[Bluetooth] *Test mode: Hopping ON*

GSM mode

The test was made with the highest channel in GSM and Bluetooth of simultaneous mode

Low Ch: 1850.2MHz

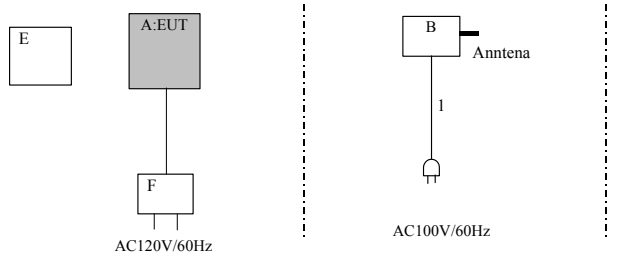
4.1.2 Test mode for Conducted tests

[GSM] *Low ch: 1850.2MHz*
Mid ch: 1880.0MHz
High ch: 1909.8MHz

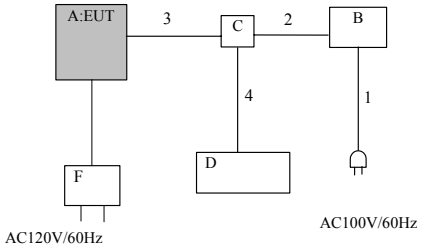
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

Radiated



Conducted



***** Cabling was taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No	Item	Model number	Serial number	Manufacturer	FCC ID	Remarks
A	Tri-Band Mobile Cellular Phone	Fantom	ES1-028	SHARP	APYNAR0058	-
B	Universal Radio Communication Tester	CMU200	130900897	ROHDE& SCHWARZ	-	-
C	Power Divider	11636A	05284	Hewlett Packard	-	-
D	Spectrum Analyzer	E4448A	MY44020357	Agilent	-	-
E	Wireless Head Set	HS801	04051-V0203.1	Motorola	-	GSM & BT mode only
F	AC Adapter	CE-EA32	-	SHARP	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	AC Power Cable	2.4	N	Polyvinyl chloride
2	Coaxial Cable	1.0	Y	Polyvinyl chloride
3	Coaxial Cable	1.5	Y	Polyvinyl chloride
4	Coaxial Cable	2.0	Y	Polyvinyl chloride

SECTION 5: Peak Output Power (Conducted/Radiated)

[Conducted]

Test Procedure
The peak output power (conducted) was measured with a power meter and an attenuator at the antenna port.

Test data : APPENDIX 3
Test result : Pass

[Radiated]

Test Procedure
1) EUT was placed on a platform of nominal size, 0.5m by 1.0m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The Radiated Electric Field Strength intensity has been measured in No.2 semi anechoic chamber with a ground plane and at a distance of 3m (for the Peak Output Power for the Radiated). The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

2) Exchanged the EUT to the Substitution Antenna, the antenna was set for the same height as EUT on the table. The frequency below 1GHz of the Substitution Antenna was used as the Half wave dipole Antenna, which is harmonized with the measured frequency in 1). The frequency above 1GHz of the Substitution Antenna was used with Horn Antenna. The Substitution Antenna was connected with the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field is equal to the measured value in 1). The measuring antenna height varied between 1 and 4m to obtain the maximum receiving level. Its Output power of Signal Generator was recorded.

3) Effective isotropic radiated power was calculated by subtracting the cable loss and the attenuator lossconnected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).

Test data : APPENDIX 3
Test result : Pass

SECTION 6: Bandwidth and Band-Edge (Conducted)

Test Procedure
The Emission Bandwidth, 99% Occupied Bandwidth and Band-Edge was measured with a spectrum analyzer and attenuator connected to the antenna port.

Test data : APPENDIX 3
Test result : Pass

SECTION 7: Spurious Emission and Band-Edge (Conducted)

Test Procedure
The Spurious Emission was measured with a spectrum analyzer and attenuator connected to the antenna port.

Test data : APPENDIX 3
Test result : Pass

SECTION 8: Spurious Radiation and Band-Edge (Radiated)

Test Procedure

1) EUT was placed on a platform of nominal size, 0.5m by 1.0m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The Radiated Electric Field Strength intensity has been measured in No.2 semi anechoic chamber with a ground plane and at a distance of 3m.
The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

2) Exchanged the EUT to the Substitution Antenna, the antenna was set for the same height as EUT on the table. The frequency below 1GHz of the Substitution Antenna was used as the Half wave dipole Antenna, which is harmonized with the measured frequency in 1).
The frequency above 1GHz of the Substitution Antenna was used with Horn Antenna.
The Substitution Antenna was connected with the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field is equal to the measured value in 1).
The measuring antenna height varied between 1 and 4m to obtain the maximum receiving level.
Its Output power of Signal Generator was recorded.

3) Effective isotropic radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).

Test data : APPENDIX 3
Test result : Pass

SECTION 9: Frequency Stability

Test Procedure

The Frequency Stability was measured with a frequency counter and attenuator connected to the antenna port. The Frequency Drift was measured with the 10 deg. C. steps from –30 deg.C. to 50 deg.C., and it is presented as the ppm unit. The Frequency Drift was measured with the normal temperature(20 deg.C.) and Voltage tolerance (0 %, +15%, -15%), and it is presented as the ppm unit.

Test data : APPENDIX 3
Test result : Pass

APPENDIX 1: Photographs of test setup

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This page has been submitted for a separate exhibit.

APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MPSE-04	Power sensor	Agilent	E9327A	PO(Con.)	2004/03/11 * 12
MPM-04	Power Meter	Agilent	E4416A	PO(Con.)	2004/03/03 * 12
MAT-22	Attenuator(10dB)(above1GHz)	Orient Microwave	BX10-0476-00	PO(Con.) ,EX,FR	2004/03/30 * 12
MAT-23	Attenuator(10dB)(above1GHz)	Orient Microwave	BX10-0476-00	PO(Con.) ,EX,FR	2004/03/30 * 12
MCC-22	Microwave Cable	Storm	-	EX,FR,PO(Con.)	2004/05/01 * 12
MPD-01	PowerDivider DC to 26.5GHz	Agilent	11636B	EX,FR,PO(Con.)	2004/03/26 * 12
MCH-02	Temperature and Humidity Chamber	Tabai Espec	PL-4KP	FR	2003/11/28 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	EX,FR	2004/06/12 * 12
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2004/04/12 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	RE	2004/02/18 * 12
MCC-04	Microwave Cable	Storm	421-011	RE	2004/01/06 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2004/02/06 * 12
MAT-20	Attenuator(10dB)(above1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	RE	2004/01/28 * 12
MAT-23	Attenuator(10dB)(above1GHz)	Orient Microwave	BX10-0476-00	RE	2004/03/30 * 12
MCC-24	Microwave Cable	Storm	-	RE	2004/05/01 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2004/01/10 * 12
MAEC-01	Anechoic chamber	TDK	Semi Anechoic Chamber 10m	RE (used for confirmation)	2003/12/27 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE (used for confirmation)	2003/11/12 * 12
MCC-05	Microwave Cable	Storm	421-011	RE (used for confirmation)	2004/01/06 * 12
MPA-05	Pre Amplifier	TSJ	TSJ 1-26.5GHz PreAmp	RE (used for confirmation)	2004/06/12 * 12
MAT-20	Attenuator (10dB)(above1GHz)	HIROSE ELECTRIC CO., LTD.	AT-110	RE (used for confirmation)	2004/01/28 * 12
MAT-22	Attenuator (10dB)(above1GHz)	Orient Microwave	BX10-0476-00	RE (used for confirmation)	2004/03/30 * 12
MAT-23	Attenuator (10dB)(above1GHz)	Orient Microwave	BX10-0476-00	RE (used for confirmation)	2004/03/30 * 12
MCC-23	Microwave Cable	Storm	-	RE (used for confirmation)	2004/05/01 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	RE (used for confirmation)	2004/01/10 * 12
MSG-01	Signal Generator	Rohde & Schwarz	SMR40	RE (used for confirmation)	2003/11/26 * 12
MCC-10	Coaxial cable	Storm	90-195-394	RE (used for confirmation)	2004/03/25 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE (used for confirmation)	2004/01/10 * 12
MLA-04	Logperiodic Antenna	Rohde & Schwarz	ESLP9145	(JIG)	Pre Check
MCC-32	coaxial cable	ULApex	-	(JIG)	2004/06/12 * 12
MHF-02	High Pass Filter	Tokimec	TF323DCA	RE	2004/09/18 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MPA-06	Pre Amplifier	Hewlett Packard	8447D	RE	2004/08/29 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2004/10/14 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2004/10/14 * 12
MHA-02	Horn Antenna	EMCO	3160-09	RE	2004/01/10 * 12

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards. Test Item:
RE: Radiated emission
PO(Rad.): Power Output Power(Radiated)
BE(Rad.): Band Edge(Radiated)
PO(Con.): Power Output Power(Conducted)
FR: Frequency Stability
EX: Except for RE,PO(Rad.),PO(Con.), BE(Rad.) and FR

APPENDIX 3: Data of EMI test

Peak Output Power (Conducted)

UL Apex Co., Ltd.
Head Office EMC Lab. Semi Anechoic Chamber : No.3

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.232(b)
MODEL	Fantom	TEST METHOD	FCC Part2 Section 2.1046
S/N	ES1-028	TEST DISTANCE	-
POWER	DC3.7V(AC120V/60Hz)	DATE	October 20, 2004
MODE	Tx	TEMPERATURE	24℃
		HUMIDITY	57%
		ENGINEER	Hiroka Umeyama

Ch	Frequency [MHz]	P/M Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]	Convert [mW]
Low	1850.2	0.24	20.00	9.48	29.72	33.00	3.28	736.21
Mid	1880.0	0.26	20.00	9.48	29.74	33.00	3.26	751.62
High	1909.8	0.28	20.00	9.48	29.76	33.00	3.24	693.43

Sample Calculation : Result = Reading + Atten. + Cable Loss

Peak Output Power (Radiated)

UL Apex Co., Ltd.
Head Office EMC Lab. Semi Anechoic Chamber : No.2

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	GSM Mobile Cellular Phone	REGULATION	FCC part24 Section 24.232(b)
MODEL	Fantom	TEST DISTANCE	3m
S/N	ES1-028	DATE	10/19/2004
POWER	AC120V / 60Hz (EUT : DC 3.7V)	TEMPERATURE	24deg.C.
MODE	Tx 1850.2MHz/1880MHz/1909.8MHz	HUMIDITY	60%
	GSM + Bluetooth communication	CALIBRATION	OK
POSITION	H: Z-axis / V: Y-axis	ENGINEER	Kenichi Adachi
TX ANTENNA HIGH	0.8m		

GSM Low(1850.2MHz)

No.	FREQUENCY [MHz]	Input Power to Tx Antenna [dBm]		ANT GAIN [dBi]	RESULT (EIRP) [dBm]		LIMIT [dBm] (EIRP)	MARGIN [dB]	
		HOR	VER		HOR	VER		HOR	VER
1	1850.16	21.5	22.0	9.4	30.9	31.4	33.0	2.1	1.6

GSM Mid(1880.MHz)

No.	FREQUENCY [MHz]	Input Power to Tx Antenna [dBm]		ANT GAIN [dBi]	RESULT (EIRP) [dBm]		LIMIT [dBm] (EIRP)	MARGIN [dB]	
		HOR	VER		HOR	VER		HOR	VER
2	1880.00	20.8	20.8	9.6	30.3	30.3	33.0	2.7	2.7

GSM High(1909.8MHz)

No.	FREQUENCY [MHz]	Input Power to Tx Antenna [dBm]		ANT GAIN [dBi]	RESULT (EIRP) [dBm]		LIMIT [dBm] (EIRP)	MARGIN [dB]	
		HOR	VER		HOR	VER		HOR	VER
3	1909.87	21.6	21.1	9.7	31.3	30.8	33.0	1.7	2.2

CALCULATION:Input Power to Tx Antenna+ANT.GAIN
Rx-ANTENNA : Biconical Antena(30-300MHz), Logperriodic Antenna(300-1000MHz), Horn Antenna(1-20GHz)
Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Anrenna(1-20GHz)
All other emissions were at least 20dB below the specification limit.
The noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise.
With the result above, the effective radiated power was calculated on the basis of the reference value
- for the calibration data on the substitution measurement.
Result is calculated to two places of decimals. Therefore, there may be 0.1 difference for the result.
Detector S/A PK(RBW/VBW: 3MHz)

Emission Bandwidth and 99%Occupied Bandwidth

UL Apex Co., Ltd.
Head Office EMC Lab. Measurement Room : No.3

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.238(b)
MODEL	Fantom	TEST METHOD	FCC Part2 Section 2.1049
S/N	ES1-028	TEST DISTANCE	-
POWER	DC3.7V(AC120V/60Hz)	DATE	October 14, 2004
MODE	Tx	TEMPERATURE	28℃
		HUMIDITY	30%
		ENGINEER	Hiroka Umeyama

Emission Bandwidth

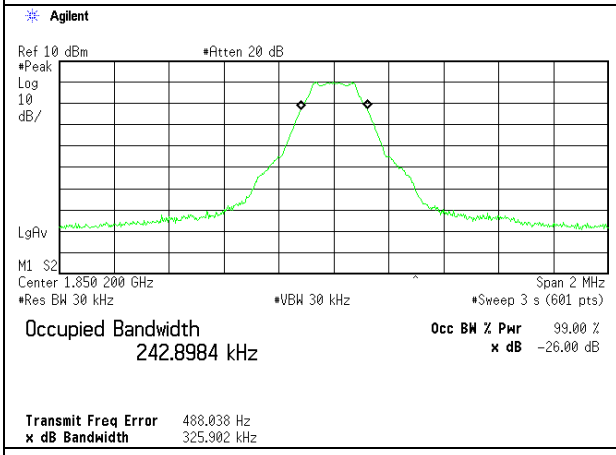
CH	FREQ [MHz]	Bandwidth [kHz]	Limit [kHz]
Low	1850.2	325.9	-
Mid	1880.0	326.8	-
High	1909.8	327.3	-

99%Occupied Bandwidth

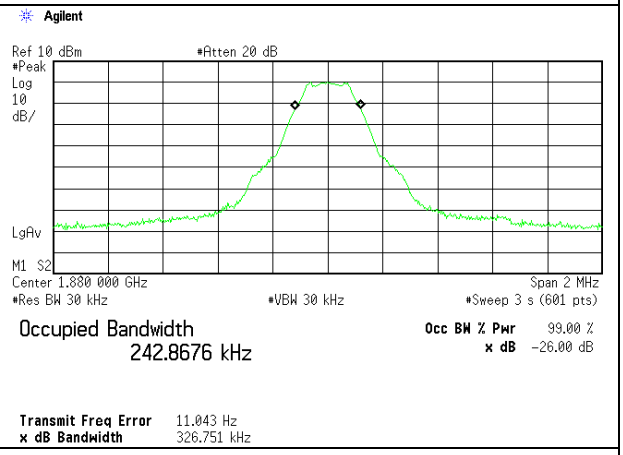
CH	FREQ [MHz]	Bandwidth [kHz]	Limit [kHz]
Low	1850.2	242.9	-
Mid	1880.0	242.9	-
High	1908.8	243.7	-

Emission Bandwidth and 99%Occupied Bandwidth

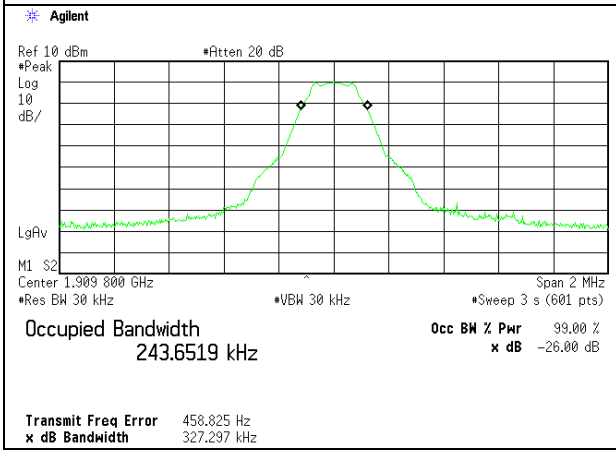
Tx:1850.2MHz



Tx:1880.0MHz



Tx:1909.8MHz



Band Edge(Conducted)

UL Apex Co., Ltd.
Head Office EMC Lab. Measurement Room : No.3

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.238(b)
MODEL	Fantom	TEST METHOD	FCC Part2 Section 2.1049
S/N	ES1-028	TEST DISTANCE	-
POWER	DC3.7V(AC120V/60Hz)	DATE	October 14, 2004
MODE	Tx	TEMPERATURE	28℃
		HUMIDITY	30%
		ENGINEER	Hiroka Umeyama

VIDEO AV 30 times

Block A

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]
1850.0	-51.5	20.0	9.1	-22.4	-13.0
1865.0	-53.5	20.0	9.1	-24.4	-13.0

Block D

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]
1865.0	-51.7	20.0	9.1	-22.6	-13.0
1870.0	-53.4	20.0	9.1	-24.3	-13.0

Block B

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]
1870.0	-51.7	20.0	9.1	-22.6	-13.0
1885.0	-51.7	20.0	9.1	-22.6	-13.0

Block E

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]
1885.0	-51.0	20.0	9.1	-21.9	-13.0
1890.0	-51.6	20.0	9.1	-22.5	-13.0

Block F

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable [dB]	Result [dBm]	Limit [dBm]
1890.0	-52.1	20.0	9.1	-23.0	-13.0
1895.0	-51.1	20.0	9.1	-22.0	-13.0

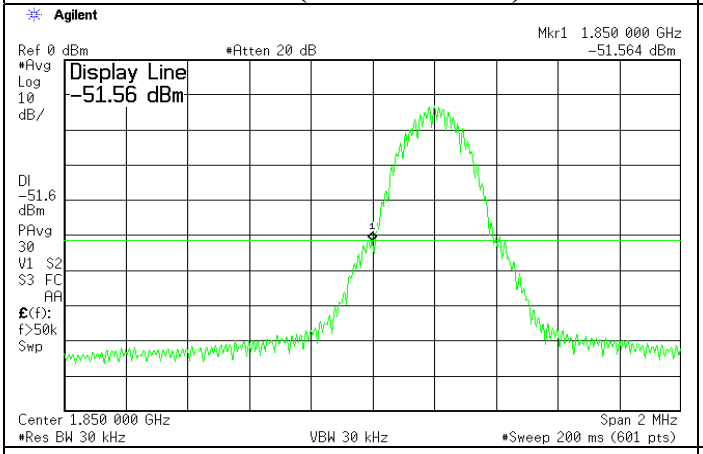
Block C

Frequency [MHz]	Reading [dBm]	Atten. [dB]	Cable Loss [dB]	Result [dBm]	Limit [dBm]
1895.0	-52.5	20.0	9.1	-23.4	-13.0
1910.0	-51.9	20.0	9.1	-22.8	-13.0

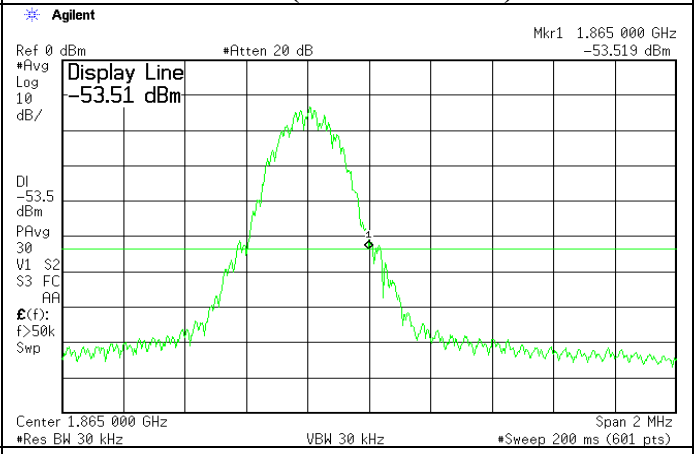
Sample Calculation : Result = Reading + Atten. + Cable Loss

Band Edge(Conducted)

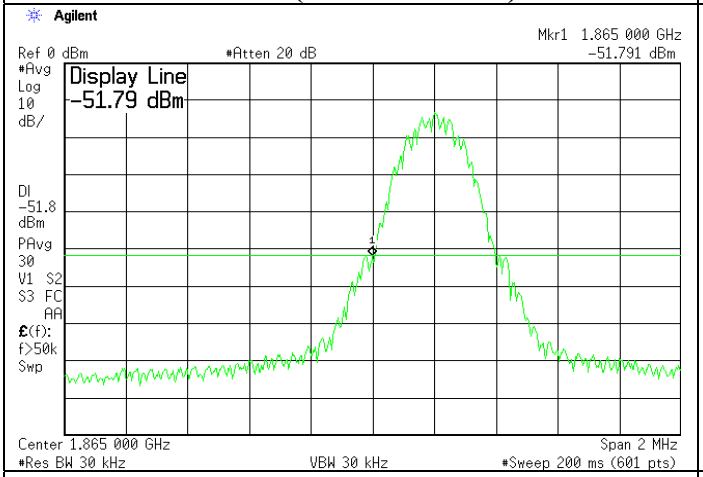
Block A (Tx:1850.2MHz)



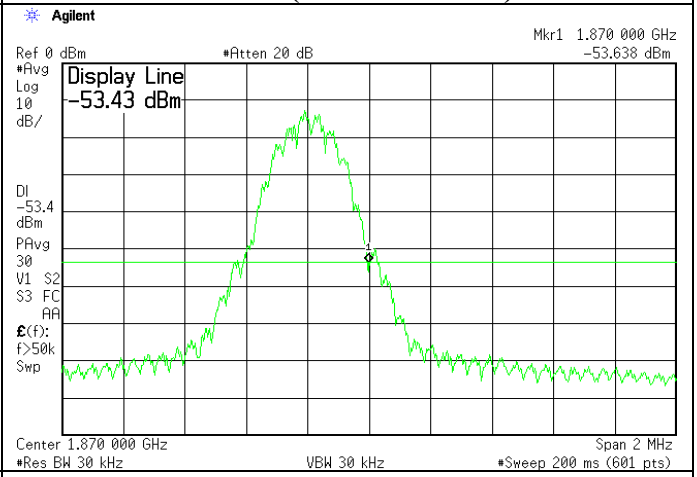
Block A(Tx:1864.8MHz)



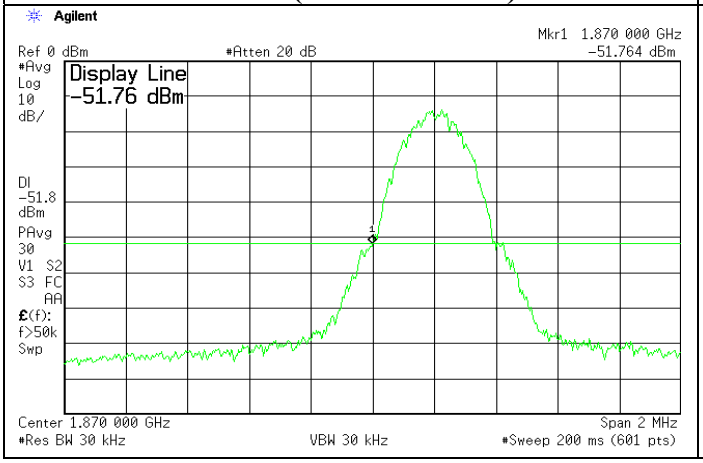
Block D(Tx:1865.2MHz)



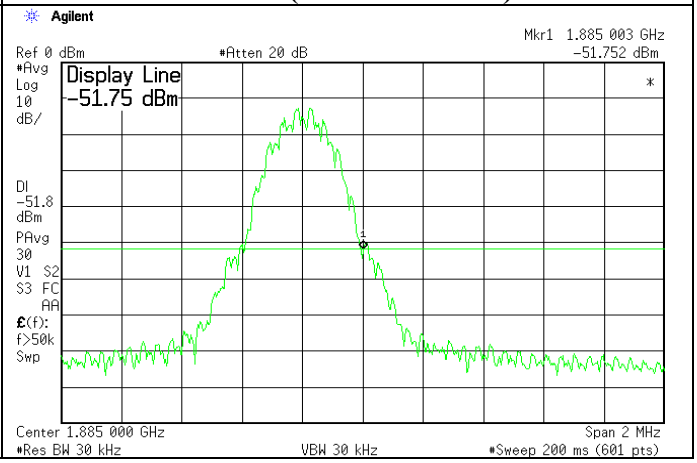
Block D(Tx:1869.8MHz)



Block B(Tx:1870.2MHz)

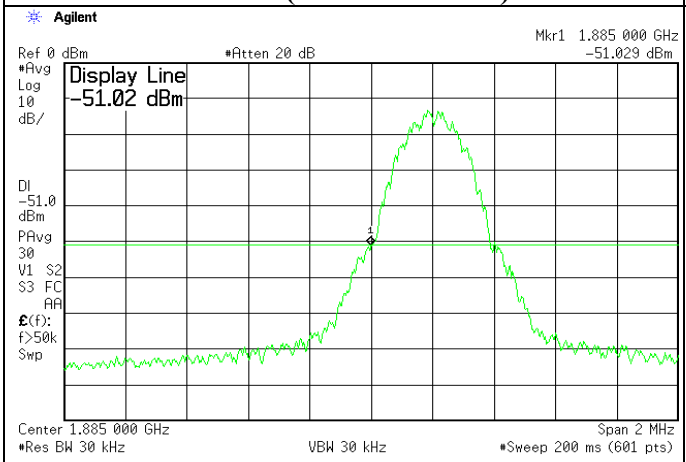


Block B(Tx:1884.8MHz)

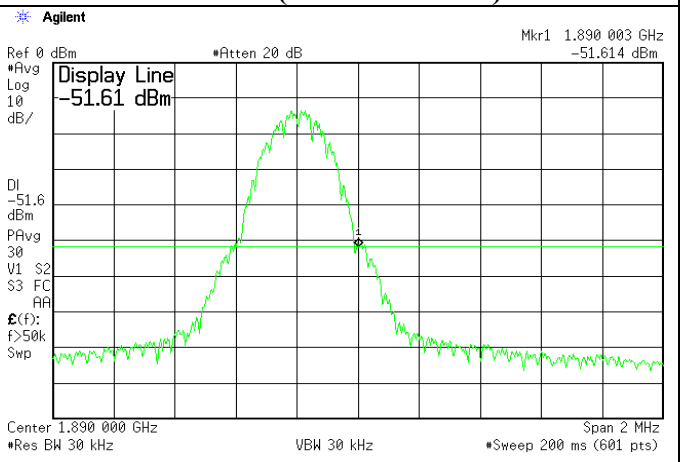


Band Edge(Conducted)

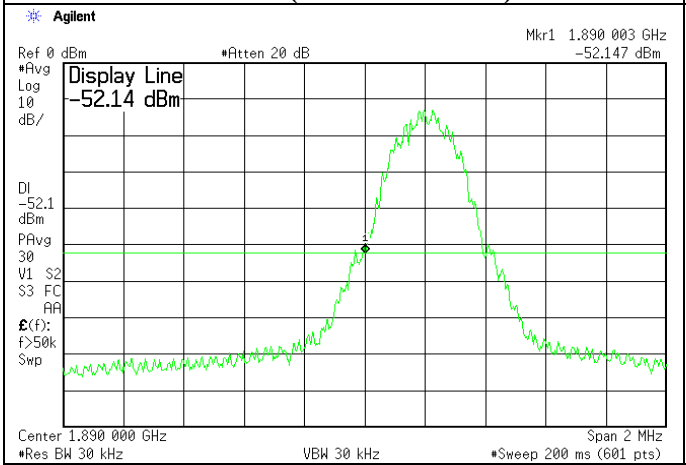
Block E(Tx:1885.2MHz)



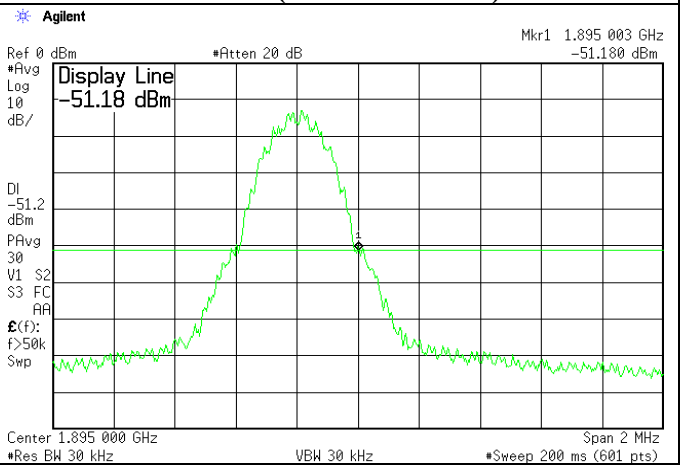
Block E(Tx:1889.8MHz)



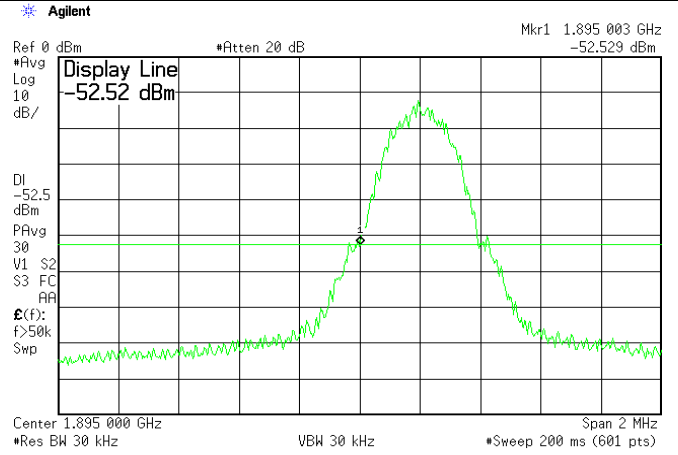
Block F (Tx:1890.2MHz)



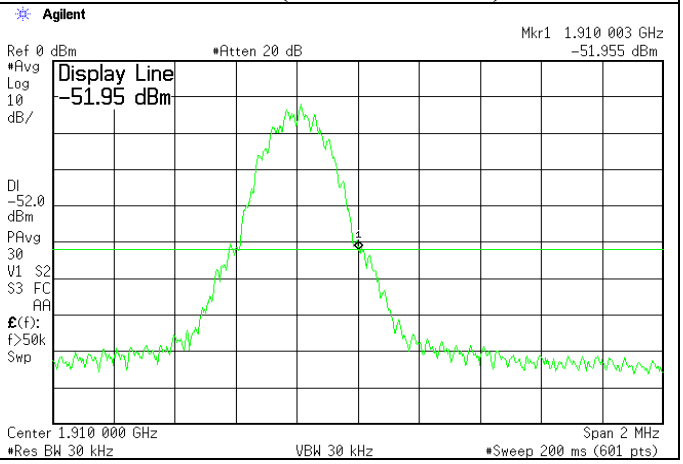
Block F(Tx:1894.8MHz)



Block C(Tx:1895.2MHz)



Block C(Tx:1909.8MHz)



Band Edge (Radiated)

UL Apex Co., Ltd.
Head Office EMC Lab. Semi Anechoic Chamber : No2

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	GSM Mobile Cellular Phone	REGULATION	FCC part24 Section 24.238(b)
MODEL	Fantom	TEST DISTANCE	3m
S/N	ES1-028	DATE	10/19/2004
POWER	AC120V / 60Hz (EUT : DC 3.7V)	TEMPERATURE	24deg.C.
MODE	Tx 1850.2 / 1909.8MHz	HUMIDITY	60%
	GSM + Bluetooth communication	CALIBRATION	OK
POSITION	H: Z-axis / V: Y-axis	ENGINEER	Kenichi Adachi
TX ANTENNA HIGH	0.8m		

GSM Low(1850.2MHz) and Bluetooth communication

No.	FREQUENCY [MHz]	Input Power to Tx Antenna [dBm]		ANT GAIN [dBi]	RESULT (EIRP) [dBm]		LIMIT [dBm] (EIRP)	MARGIN [dB]	
		HOR	VER		HOR	VER		HOR	VER
1	1850.00	-40.8	-40.6	9.4	-31.4	-31.2	-13.0	18.4	18.2

GSM High(1909.8MHz) and Bluetooth communication

No.	FREQUENCY [MHz]	Input Power to Tx Antenna [dBm]		ANT GAIN [dBi]	RESULT (EIRP) [dBm]		LIMIT [dBm] (EIRP)	MARGIN [dB]	
		HOR	VER		HOR	VER		HOR	VER
2	1910.00	-37.7	-41.0	9.7	-28.0	-31.3	-13.0	15.0	18.3

CALCULATION:Input Power to Tx Antenna+ANT.GAIN
Rx-ANTENNA : Biconical Antena(30-300MHz), Logperriodic Antenna(300-1000MHz), Horn Antenna(1-20GHz)
Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Anrenna(1-20GHz)
All other emissions were at least 20dB below the specification limit.
The noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise.
With the result above, the effective radiated power was calculated on the basis of the reference value
- for the calibration data on the substitution measurement.
Result is calculated to two places of decimals. Therefore, there may be 0.1 difference for the result.
Detector S/A PK(RBW/VBW: 30kHz)

Spurious Emission (Conducted)

UL Apex Co., Ltd.
Head Office EMC Lab. Measurement Room : No.3

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	Fcc Part 24 Section 24.238(a)
MODEL	Fantom	TEST METHOD	Fcc Part 2 Section 2.1051
S/N	ES1-028	TEST DISTANCE	-
POWER	DC3.7V(AC120V/60Hz)	DATE	October 14, 2004
MODE	Tx	TEMPERATURE	28℃
		HUMIDITY	30%
		ENGINEER	Hiroka Umeyama

Limit Line

Limit [dBm]	Atten. [dB]	Cable Loss [dB]	Limit Line [dBm]
-13.0	20.0	9.1	-42.1

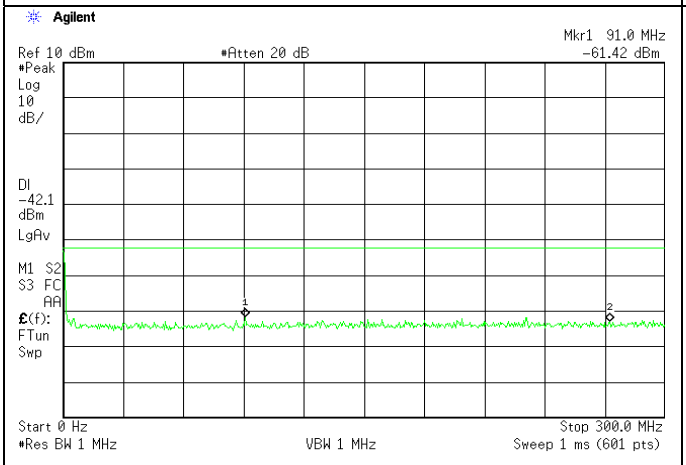
Sample Calculation : Limit Line = Limit - Atten. - Cable Loss

Result OK

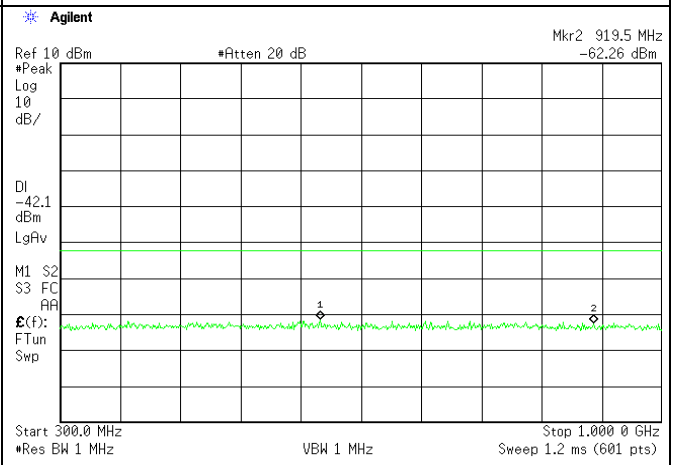
Spurious Emission (Conducted)

Tx:1850.2MHz

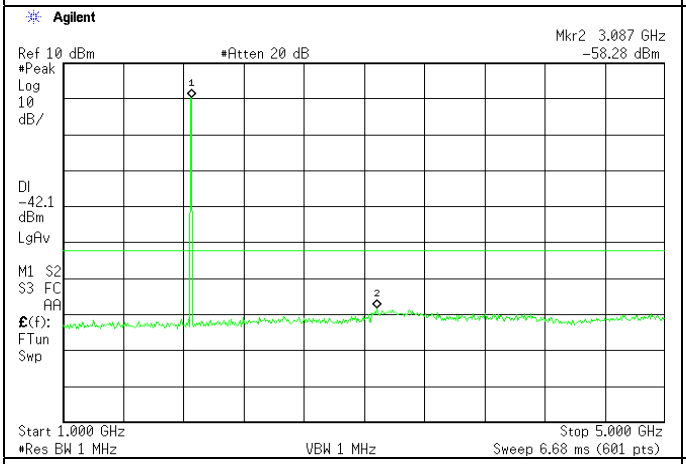
0Hz-300MHz



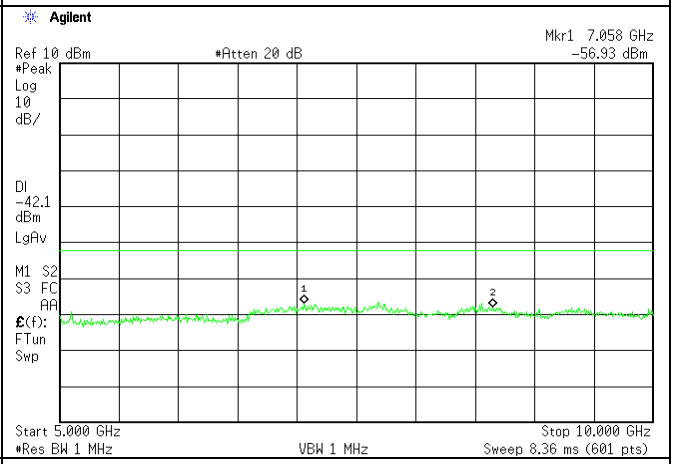
300MHz-1GHz



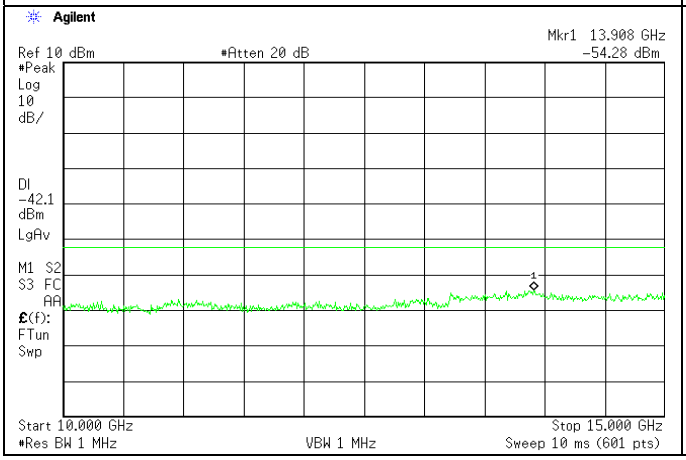
1GHz-5GHz



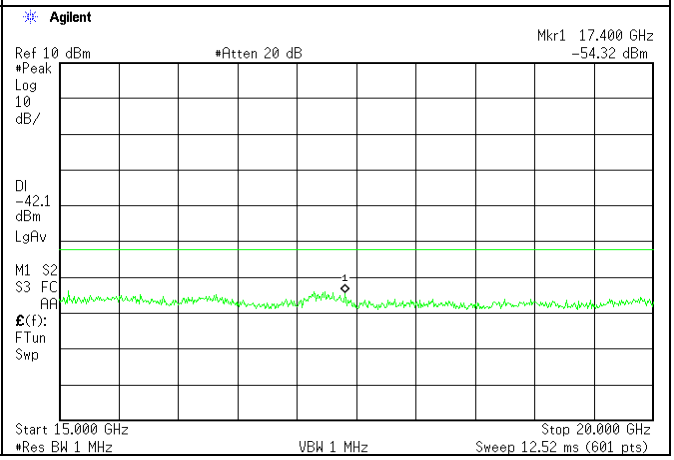
5GHz-10GHz



10GHz-15GHz



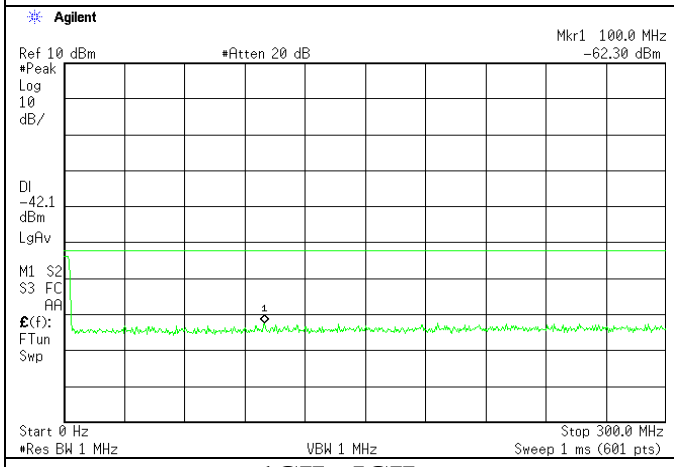
15GHz-20GHz



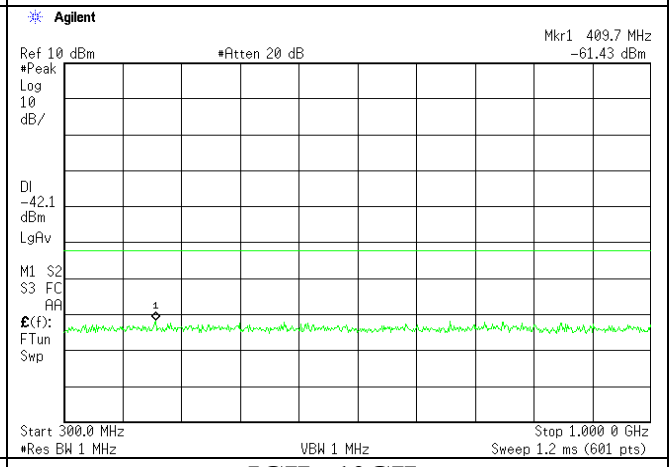
Spurious Emission (Conducted)

Tx:1880.0MHz

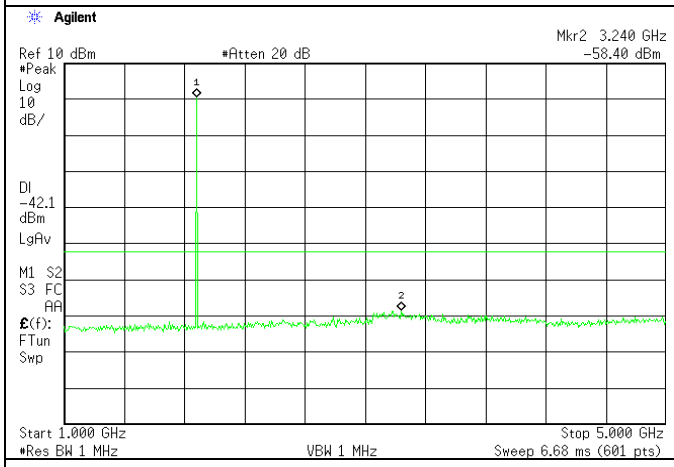
0Hz-300MHz



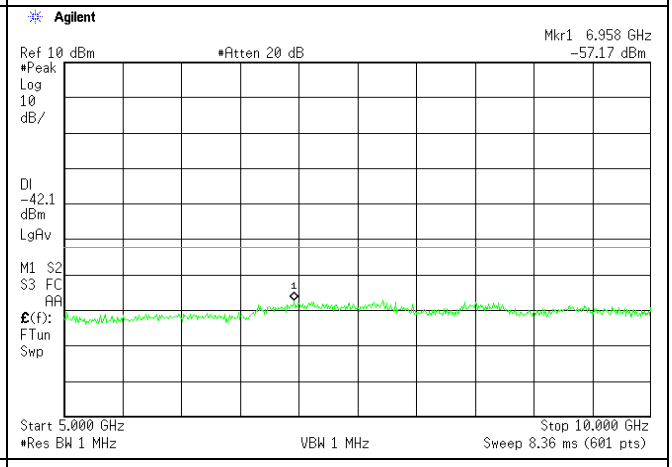
300MHz-1GHz



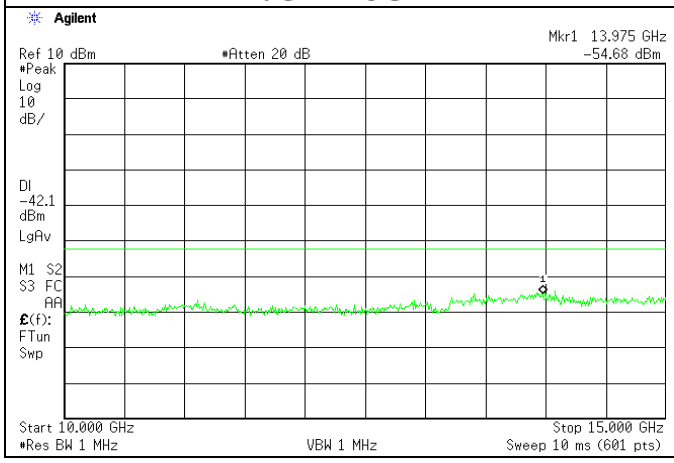
1GHz-5GHz



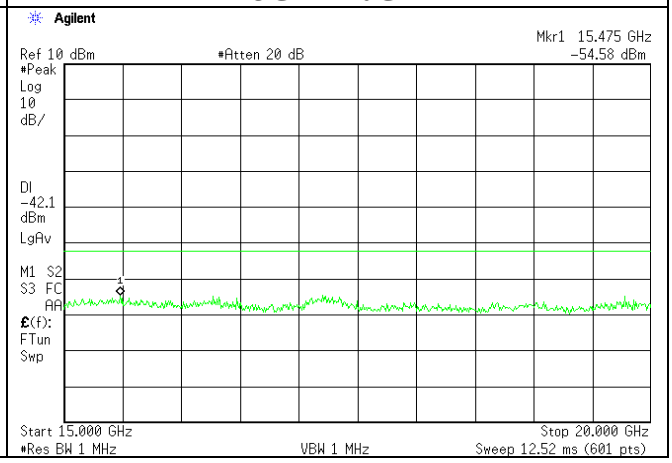
5GHz-10GHz



10GHz-15GHz

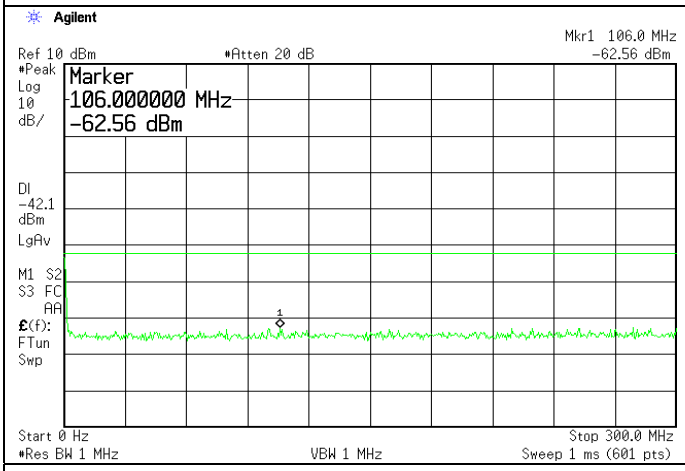


15GHz-20GHz

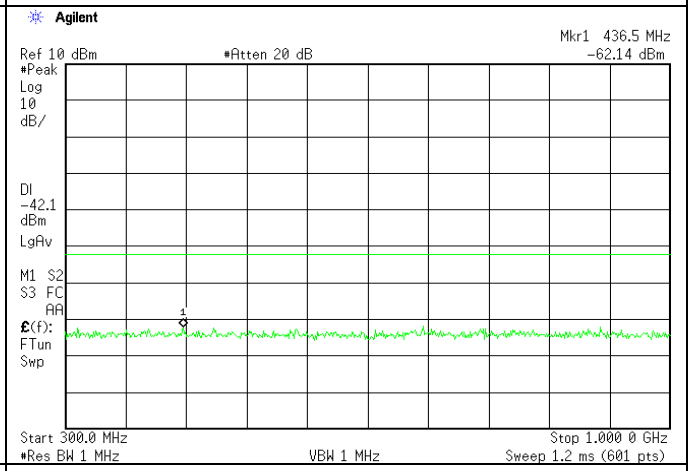


Spurious Emission (Conducted)
Tx:1909.8MHz

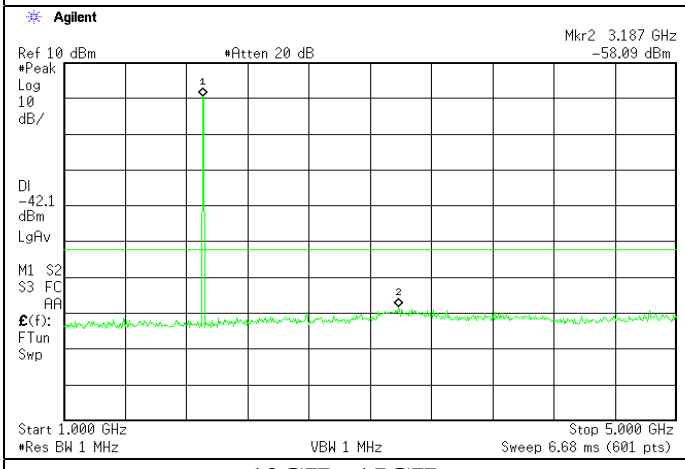
0Hz-300MHz



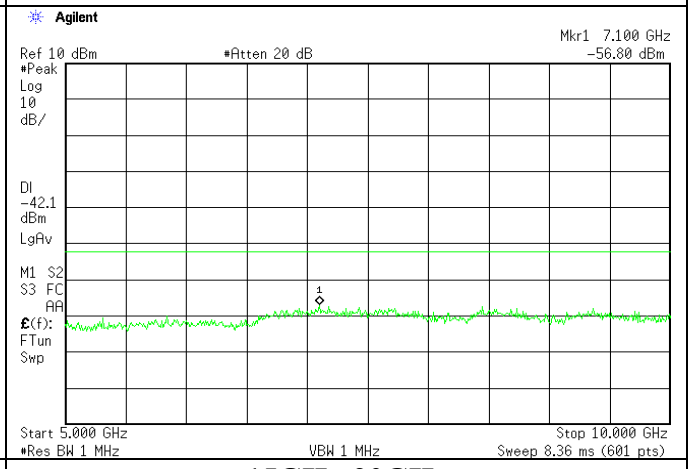
300MHz-1GHz



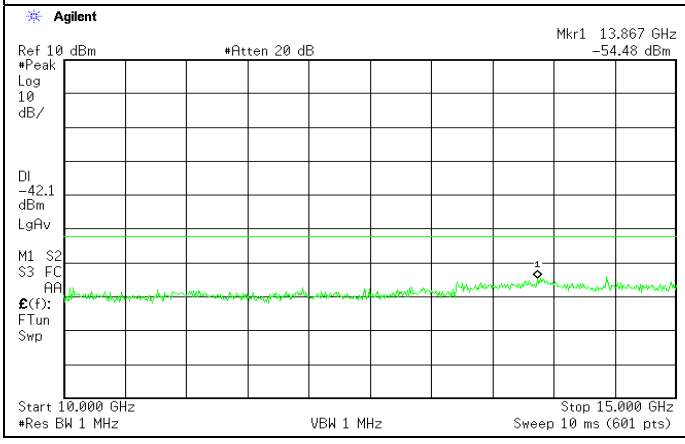
1GHz-5GHz



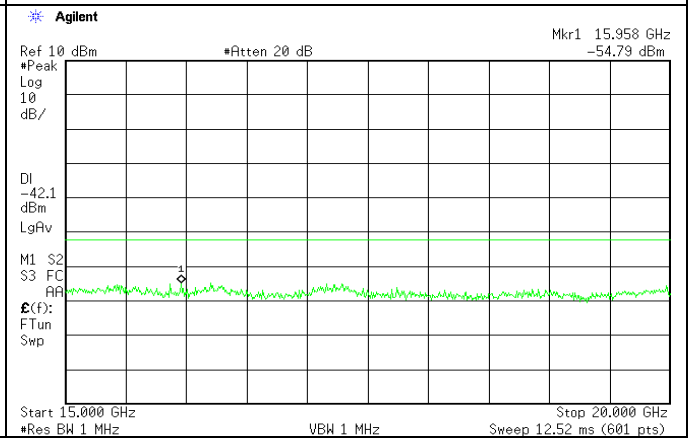
5GHz-10GHz



10GHz-15GHz



15GHz-20GHz



Spurious Radiation (Radiated)(GSM & BT mode)
(GSM Low ch(512ch) and Bluetooth communication)

UL Apex Co., Ltd.
Head Office EMC Lab. Semi Anechoic Chamber : No.2

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	GSM Mobile Cellular Phone	REGULATION	FCC part24 Section 24.238(b)
MODEL	Fantom	TEST DISTANCE	3m
S/N	ES1-028	DATE	10/19/2004 10/22/2004
POWER	AC120V / 60Hz (EUT : DC 3.7V)	TEMPERATURE	24deg.C. 25deg.C.
MODE	Tx 1850.2 MHz	HUMIDITY	60% 48%
	GSM Low(1850.2MHz) and Bluetooth communication	CALIBRATION	OK
POSITION	H: Z-axis / V: Y-axis	ENGINEER	Kenichi Adachi
TX ANTENNA HIGH	0.8m		

No.	FREQUENCY [MHz]	Input Power to Tx Antenna [dBm]		ANT GAIN [dBi]	RESULT (EIRP) [dBm]		LIMIT [dBm] (EIRP)	MARGIN [dB]		Mode
		HOR	VER		HOR	VER		HOR	VER	
1	49.42	-46.7	-29.4	-20.81	-67.5	-50.2	-13.0	54.5	37.2	Operating
2	78.28	-54.5	-38.0	-7.78	-62.3	-45.8	-13.0	49.3	32.8	Operating
3	95.34	-61.6	-50.2	-2.15	-63.7	-52.3	-13.0	50.7	39.3	Operating
4	104.00	-65.3	-61.7	-0.11	-65.4	-61.8	-13.0	52.4	48.8	Operating
5	597.21	-47.2	-59.2	2.15	-45.0	-57.0	-13.0	32.0	44.0	Operating
6	1690.20	-45.9	-46.8	8.60	-37.3	-38.2	-13.0	24.3	25.2	Operating
7	1930.15	-48.6	-41.8	9.80	-38.8	-32.0	-13.0	25.8	19.0	Operating
8	1959.72	-51.9	-45.3	9.90	-42.0	-35.4	-13.0	29.0	22.4	Operating
9	2374.14	-53.9	-53.0	10.80	-43.1	-42.2	-13.0	30.1	29.2	Operating
10	2483.65	-50.1	-49.6	11.00	-39.1	-38.6	-13.0	26.1	25.6	Operating
11	3700.32	-50.8	-59.1	12.40	-38.4	-46.7	-13.0	25.4	33.7	Operating
12	5550.61	-53.8	-54.0	13.10	-40.7	-40.9	-13.0	27.7	27.9	Operating
13	7400.88	-44.6	-45.1	12.10	-32.5	-33.0	-13.0	19.5	20.0	Operating
14	9250.98	-39.7	-41.6	11.40	-28.3	-30.2	-13.0	15.3	17.2	Operating
15	11101.21	-49.4	-49.5	11.00	-38.4	-38.5	-13.0	25.4	25.5	Operating
16	12951.21	-44.1	-45.0	14.20	-29.9	-30.8	-13.0	16.9	17.8	Operating
17	14801.78	-45.7	-44.1	12.30	-33.4	-31.8	-13.0	20.4	18.8	Operating
18	16651.52	-44.4	-43.6	15.10	-29.3	-28.5	-13.0	16.3	15.5	Operating
19	18502.43	-43.9	-37.1	14.30	-29.6	-22.8	-13.0	16.6	9.8	Operating

CALCULATION:Input Power to Tx Antenna+ANT.GAIN
Rx-ANTENNA : Biconical Antena(30-300MHz), Logperriodic Antenna(300-1000MHz), Horn Antenna(1-20GHz)
Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Anrenna(1-20GHz)
All other emissions were at least 20dB below the specification limit.
*The noise level was too low to detect.
The noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise.
With the result above, the effective radiated power was calculated on the basis of the reference value
- for the calibration data on the substitution measurement.

S/A PK (RBW: 1MHz , VBW:1MHz)

Spurious Radiation(Radiated)(GSM & BT mode)
(GSM Mid ch(661ch) and Bluetooth communication)

UL Apex Co., Ltd.
Head Office EMC Lab. Semi Anechoic Chamber : No.2

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	GSM Mobile Cellular Phone	REGULATION	FCC part24 Section 24.238(b)
MODEL	Fantom	TEST DISTANCE	3m
S/N	ES1-028	DATE	10/19/2004 10/22/2004
POWER	AC120V / 60Hz (EUT : DC 3.7V)	TEMPERATURE	24deg.C. 25deg.C.
MODE	Tx 1880 MHz	HUMIDITY	60% 48%
	GSM Mid(1880MHz) and Bluetooth communication	CALIBRATION	OK
POSITION	H: Z-axis / V: Y-axis	ENGINEER	Kenichi Adachi
TX ANTENNA HIGH	0.8m		

No.	FREQUENCY [MHz]	Input Power to Tx Antenna [dBm]		ANT GAIN [dBi]	RESULT (EIRP) [dBm]		LIMIT [dBm] (EIRP)	MARGIN [dB]		Mode
		HOR	VER		HOR	VER		HOR	VER	
1	48.76	-46.0	-30.3	-21.15	-67.1	-51.4	-13.0	54.1	38.4	Operating
2	78.08	-56.3	-37.7	-7.87	-64.2	-45.6	-13.0	51.2	32.6	Operating
3	95.34	-61.9	-50.3	-2.15	-64.0	-52.4	-13.0	51.0	39.4	Operating
4	104.09	-63.4	-59.4	-0.09	-63.5	-59.5	-13.0	50.5	46.5	Operating
5	558.31	-51.5	-59.2	2.15	-49.3	-57.0	-13.0	36.3	44.0	Operating
6	1720.07	-47.7	-47.0	8.80	-38.9	-38.2	-13.0	25.9	25.2	Operating
7	1960.97	-48.0	-43.6	9.90	-38.1	-33.7	-13.0	25.1	20.7	Operating
8	2374.12	-52.0	-53.3	10.80	-41.2	-42.5	-13.0	28.2	29.5	Operating
9	2483.66	-40.1	-49.7	11.00	-29.1	-38.7	-13.0	16.1	25.7	Operating
10	3760.03	-50.1	-58.1	12.30	-37.8	-45.8	-13.0	24.8	32.8	Operating
11	5639.72	-53.6	-54.0	13.10	-40.5	-40.9	-13.0	27.5	27.9	Operating
12	7520.67	-46.5	-45.1	12.20	-34.3	-32.9	-13.0	21.3	19.9	Operating
13	9400.54	-38.8	-40.4	11.10	-27.7	-29.3	-13.0	14.7	16.3	Operating
14	11280.30	-48.3	-48.6	11.60	-36.7	-37.0	-13.0	23.7	24.0	Operating
15	13159.93	-44.0	-44.2	13.70	-30.3	-30.5	-13.0	17.3	17.5	Operating
16	15040.35	-47.1	-44.7	13.30	-33.8	-31.4	-13.0	20.8	18.4	Operating
17	16919.67	-43.7	-42.7	14.30	-29.4	-28.4	-13.0	16.4	15.4	Operating
18	18800.31	-44.4	-37.8	13.76	-30.6	-24.0	-13.0	17.6	11.0	Operating

CALCULATION:Input Power to Tx Antenna+ANT.GAIN
Rx-ANTENNA : Biconical Antena(30-300MHz), Logperriodic Antenna(300-1000MHz), Horn Antenna(1-20GHz)
Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Anrenna(1-20GHz)
All other emissions were at least 20dB below the specification limit.
*The noise level was too low to detect.
The noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise.
With the result above, the effective radiated power was calculated on the basis of the reference value
- for the calibration data on the substitution measurement.

S/A PK (RBW: 1MHz , VBW:1MHz)

Spurious Radiation(Radiated)(GSM & BT mode)
(GSM High ch(810ch) and Bluetooth communication)

UL Apex Co., Ltd.
Head Office EMC Lab. Semi Anechoic Chamber : No.2

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	GSM Mobile Cellular Phone	REGULATION	FCC part24 Section 24.238(b)
MODEL	Fantom	TEST DISTANCE	3m
S/N	ES1-028	DATE	10/19/2004 10/22/2004
POWER	AC120V / 60Hz (EUT : DC 3.7V)	TEMPERATURE	24deg.C. 25deg.C.
MODE	Tx 1909.8 MHz	HUMIDITY	60% 48%
	GSM High(1909.8MHz) and Bluetooth communication	CALIBRATION	OK
POSITION	H: Z-axis / V: Y-axis	ENGINEER	Kenichi Adachi
TX ANTENNA HIGH	0.8m		

No.	FREQUENCY [MHz]	Input Power to Tx Antenna [dBm]		ANT GAIN [dBm]	RESULT (EIRP) [dBm]		LIMIT [dBm]	MARGIN [dB]		Mode
		HOR	VER		HOR	VER	(EIRP)	HOR	VER	
1	48.35	-46.0	-29.6	-21.36	-67.4	-51.0	-13.0	54.4	38.0	Operating
2	79.34	-56.8	-43.0	-7.30	-64.1	-50.3	-13.0	51.1	37.3	Operating
3	98.46	-63.5	-50.7	-1.16	-64.7	-51.9	-13.0	51.7	38.9	Operating
4	104.02	-63.3	-57.6	-0.10	-63.4	-57.7	-13.0	50.4	44.7	Operating
5	535.49	-48.3	-60.9	2.15	-46.1	-58.7	-13.0	33.1	45.7	Operating
6	1749.76	-47.8	-47.1	8.90	-38.9	-38.2	-13.0	25.9	25.2	Operating
7	1959.86	-50.0	-45.2	9.90	-40.1	-35.3	-13.0	27.1	22.3	Operating
8	1989.91	-50.0	-44.5	10.10	-39.9	-34.4	-13.0	26.9	21.4	Operating
9	2343.36	-53.9	-54.1	10.70	-43.2	-43.4	-13.0	30.2	30.4	Operating
10	2483.63	-40.9	-49.5	11.00	-29.9	-38.5	-13.0	16.9	25.5	Operating
11	3819.71	-51.3	-57.8	12.30	-39.0	-45.5	-13.0	26.0	32.5	Operating
12	5729.52	-53.0	-53.5	13.20	-39.8	-40.3	-13.0	26.8	27.3	Operating
13	7639.49	-46.8	-43.8	11.90	-34.9	-31.9	-13.0	21.9	18.9	Operating
14	9549.22	-39.4	-41.9	10.90	-28.5	-31.0	-13.0	15.5	18.0	Operating
15	11458.56	-49.3	-48.6	12.30	-37.0	-36.3	-13.0	24.0	23.3	Operating
16	13368.35	-42.8	-43.1	13.00	-29.8	-30.1	-13.0	16.8	17.1	Operating
17	15278.23	-48.5	-46.8	14.50	-34.0	-32.3	-13.0	21.0	19.3	Operating
18	17187.85	-42.5	-40.2	14.40	-28.1	-25.8	-13.0	15.1	12.8	Operating
19	19098.46	-43.4	-36.8	13.69	-29.7	-23.1	-13.0	16.7	10.1	Operating

CALCULATION:Input Power to Tx Antenna+ANT.GAIN-ATTEN
Rx-ANTENNA : Biconical Antena(30-300MHz), Logperriodic Antenna(300-1000MHz), Horn Antenna(1-20GHz)
Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Anrenna(1-20GHz)
All other emissions were at least 20dB below the specification limit.
*The noise level was too low to detect.
The noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise.
With the result above, the effective radiated power was calculated on the basis of the reference value
- for the calibration data on the substitution measurement.

S/A PK (RBW: 1MHz , VBW:1MHz)

Spurious Radiation (Radiated)(GSM mode)
(GSM Low ch(512ch) (The highest channel in GSM & BT mode))

UL Apex Co., Ltd.
Head Office EMC Lab. Semi Anechoic Chamber : No2

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	GSM Mobile Cellular Phone	REGULATION	FCC part24 Section 24.238(b)
MODEL	Fantom	TEST DISTANCE	3m
S/N	ES1-028	DATE	10/24/2004
POWER	AC120V / 60Hz (EUT : DC 3.7V)	TEMPERATURE	24deg.C.
MODE	Tx 1909.8 MHz	HUMIDITY	43%
	GSM Low(1850.2MHz)	CALIBRATION	OK
POSITION	H: Z-axis / V: Y-axis	ENGINEER	Kenichi Adachi
TX ANTENNA HIGH	0.8m		

No.	FREQUENCY [MHz]	Input Power to Tx Antenna [dBm]		ANT GAIN [dBi]	RESULT (EIRP) [dBm]		LIMIT [dBm] (EIRP)	MARGIN [dB]		Mode
		HOR	VER		HOR	VER		HOR	VER	
1	49.35	-49.7	-53.7	-20.84	-70.5	-74.5	-13.0	57.5	61.5	Operating
2	65.54	-61.5	-54.5	-13.38	-74.9	-67.9	-13.0	61.9	54.9	Operating
3	75.32	-66.3	-52.5	-9.11	-75.4	-61.6	-13.0	62.4	48.6	Operating
4	164.21	-70.6	-66.9	2.15	-68.4	-64.7	-13.0	55.4	51.7	Operating
5	686.34	-62.9	-60.2	2.15	-60.7	-58.0	-13.0	47.7	45.0	Operating
6	873.50	-62.7	-59.5	2.15	-60.5	-57.3	-13.0	47.5	44.3	Operating
7	1690.11	-49.2	-51.6	8.60	-40.6	-43.0	-13.0	27.6	30.0	Operating
8	1930.21	-36.9	-66.4	9.80	-27.1	-56.6	-13.0	14.1	43.6	Operating
9	1959.75	-39.5	-65.9	9.90	-29.6	-56.0	-13.0	16.6	43.0	Operating
10	3700.45	-61.4	-61.3	12.40	-49.0	-48.9	-13.0	36.0	35.9	Operating
11	5550.59	-51.3	-55.1	13.10	-38.2	-42.0	-13.0	25.2	29.0	Operating
12	7400.88	-46.9	-46.3	12.10	-34.8	-34.2	-13.0	21.8	21.2	Operating
13	9250.99	-41.1	-43.3	11.40	-29.7	-31.9	-13.0	16.7	18.9	Operating
14	11100.13	-49.4	-51.7	11.00	-38.4	-40.7	-13.0	25.4	27.7	Operating
15	12951.21	-45.7	-48.0	14.20	-31.5	-33.8	-13.0	18.5	20.8	Operating
16	14802.62	-46.8	-45.8	12.30	-34.5	-33.5	-13.0	21.5	20.5	Operating
17	16651.52	-43.8	-45.4	15.10	-28.7	-30.3	-13.0	15.7	17.3	Operating
18	18495.00	-47.6	-42.0	14.29	-33.3	-27.7	-13.0	20.3	14.7	Operating

CALCULATION:Input Power to Tx Antenna+ANT.GAIN-ATTEN
Rx-ANTENNA : Biconical Antena(30-300MHz), Logperriodic Antenna(300-1000MHz), Horn Antenna(1-20GHz)
Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Anrenna(1-20GHz)
All other emissions were at least 20dB below the specification limit.
*The noise level was too low to detect.
The noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise.
With the result above, the effective radiated power was calculated on the basis of the reference value
- for the calibration data on the substitution measurement.

S/A PK (RBW: 1MHz , VBW:1MHz)

Frequency Stability(Temperature/Voltage Variation)

UL Apex Co., Ltd.
Head Office EMC Lab. Measurement Room : No.3

COMPANY	SHARP CORPORATION	REPORT NO	25BE0189-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.235
MODEL	Fantom	TEST METHOD	FCC Part2 Section 2.1055(a)(1) and(b)
S/N	ES1-028		FCC Part2 Section 2.1055(d)(1) and(2)
POWER	DC3.7V(AC120V/60Hz)	TEST DISTANCE	-
MODE	Tx 1880.0MHz	DATE	October 14, 2004
		TEMPERATURE	28℃
		HUMIDITY	30%
		ENGINEER	Hiroka Umeyama

Temp. [deg.C]	Volt. [DC V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
-30.0	3.70	1879.973290	18428.0	9.8	-
-20.0	3.70	1879.970451	21267.0	11.3	-
-10.0	3.70	1879.992130	412.0	0.2	-
0.0	3.70	1879.993678	1960.0	1.0	-
10.0	3.70	1879.994154	2436.0	1.3	-
20.0	3.70	1879.991718	0.0	0.0	-
30.0	3.70	1879.978484	13234.0	7.0	-
40.0	3.70	1879.979710	12008.0	6.4	-
50.0	3.70	1879.979500	12218.0	6.5	-

Temp. [deg.C]	Volt. [DC V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
20.0	3.15	1879.978543	13175.0	7.0	-
20.0	3.70	1879.991718	0.0	0.0	-
20.0	4.26	1879.979605	12113.0	6.4	-