



EMI TEST REPORT

Test Report No. : 24JE0153-HO-1

Applicant : SHARP CORPORATION
Type of Equipment : Tri-Band Mobile Cellular Phone
Model No. : TM150
Test standard : FCC Part 24 2003
FCC ID : APYNAR0057
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 : May 27, 29 and 31, 2004

Tested by :

Naoki Sakamoto Hiroka Umeyama
EMC Service 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

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

CONTENTS	PAGE
SECTION 1: Client information.....	3
SECTION 2: Equipment under test (E.U.T.)	3
SECTION 3: Test specification, procedures & results	4
SECTION 4: Operation of E.U.T. during testing.....	6
SECTION 5: Peak Output Power (Conducted/Radiated).....	7
SECTION 6: Bandwidth and Band-Edge (Conducted).....	8
SECTION 7: Spurious Emission (Conducted)	8
SECTION 8: Spurious Radiation and Band-Edge (Radiated).....	8
SECTION 9: Frequency Stability	9
APPENDIX 1: Photographs of test setup.....	10
Conducted Emission	10
Spurious Radiation	11
Worst Case Position (X-axis:Horizontal / Y-axis:Vertical)	12
APPENDIX 2: Test instruments	13
APPENDIX 3: Data of EMI test	14
Peak Output Power (Conducted)	14
Peak Output Power (Radiated)	15
Emission Bandwidth	16
99%Occupied Bandwidth	18
Band Edge(Conducted)	20
Band Edge (Radiated)	23
Spurious Emission (Conducted)	24
Spurious Radiation	28
Frequency Stability(Temperature/Voltage Variation).....	31

SECTION 1: Client information

Company Name : SHARP CORPORATION
Address : 2-13-1 Iida Hachihonmatsu Higashihiroshima-city Hiroshima, 739-0192
Japan
Telephone Number : +81-824-20-1863
Facsimile Number : +81-824-20-1864
Contact Person : Hiroyuki Uwatoko

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

2.1 Identification of E.U.T.

Type of Equipment : Tri-Band Mobile Cellular Phone
Model No. : TM150
Serial No. : CS-268
Rating : AC120V/60Hz (AC Charger), DC12/24V(DC Charger)
DC3.7V (DC Battery)
Country of Manufacture : JAPAN
Receipt Date of Sample : May 26, 2004
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

SHARP CORPORATION, Model No.: TM150(referred to as the EUT in this report) is the Tri-Band Mobile Cellular Phone.

Equipment Type : Transceiver
Frequency of operation : 1850.2-1909.8MHz
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.

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

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	Results
Peak Output Power	Section 2.1046	Section 24.232(b)	Conducted/ Radiated	N/A	4.24dB 1880MHz (Conducted)	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	1.0dB 1850MHz Vertical	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	13.7dB 17188.2MHz Horizontal	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

*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 $\pm 4.5\text{dB}$.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is $\pm 5.2\text{dB}$.

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is $\pm 6.6\text{dB}$.

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Conducted

The measurement uncertainty (with a 95% confidence level) for this test is $\pm 3.0\text{dB}$.

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.

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

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

4.1 Operating Modes

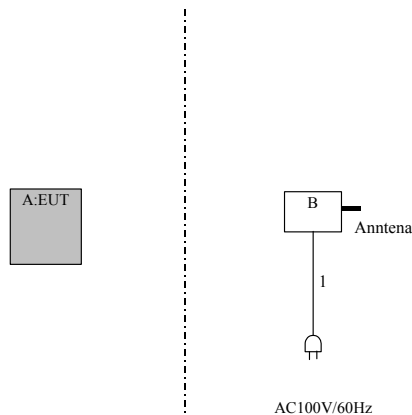
The EUT was set with the mode in a manner similar to typical use during the tests.

The sequence is used : Transmitting mode (GSM, GSMK)
Low Channel : 1850.2MHz(Ch512)
Mid Channel : 1880.0MHz(Ch661)
High channel : 1909.8MHz(Ch810)

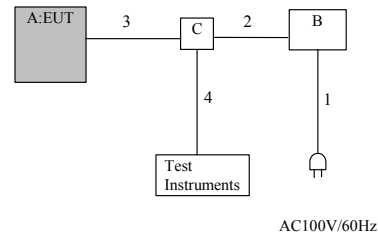
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

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
A	Tri-Band Mobile Cellular Phone	TM150	CS-268	SHARP	APYNAR0057
B	Universal Radio Communication Tester	CMU200	130900897	ROHDE& SCHWARZ	N/A
C	Power Divider	11636A	05284	Hewlett Packard	N/A

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

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

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, 1m by 1.5m, 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.1 semi anechoic chamber (19.2x11.2x7.7m) 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 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). For the usage of the Antenna (Horn Antenna) except for the Half wave dipole Antenna (2.15dBi) for the Substitution Antenna, the Effective radiated power was calculated by compensating the finite difference in the Antenna gain of the Half wave dipole Antenna, and Substitution Antenna.

Test data : **APPENDIX 3**
Test result : **Pass**

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

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 (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, 1m by 1.5m, 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.1 semi anechoic chamber (19.2x11.2x7.7m) 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 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).
For the usage of the Antenna (Horn Antenna) except for the Half wave dipole Antenna (2.15dBi) for the Substitution Antenna, the Effective radiated power was calculated by compensating the finite difference in the Antenna gain of the Half wave dipole Antenna, and Substitution Antenna.

Test data : APPENDIX 3
Test result : Pass

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

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

Conducted Emission

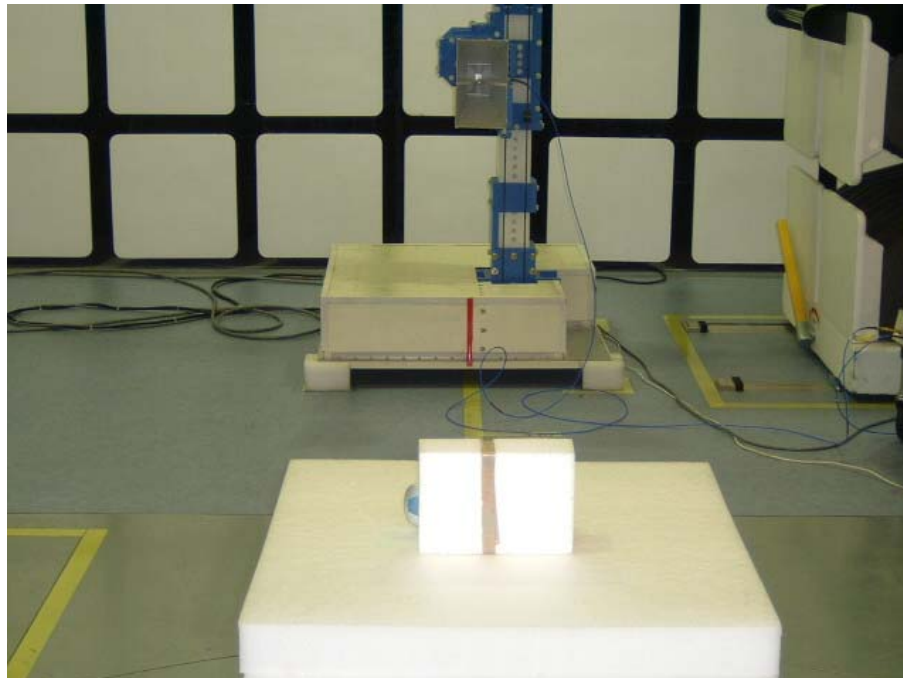


Spurious Radiation

Front



Rear



Worst Case Position (X-axis:Horizontal / Y-axis:Vertical)

X-axis



Y-axis



Z-axis



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE,PO(Rad) BE(Rad.)	2004/04/12 * 12
MRENT-06	Spectrum Analyzer	Advantest	R3273	RE,PO(Rad) BE(Rad.)	2003/10/31 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/10/15 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/10/15 * 12
MPA-02	Pre Amplifier	Agilent	87405A	RE	2004/04/16 * 12
MPSE-04	Power sensor	Agilent	E9327A	PO(Con.)	2004/03/11 * 12
MPM-04	Power Meter	Agilent	E4416A	PO(Con.)	2004/03/03 * 12
MHF-02	High Pass Filter	Tokimec	TF323DCA	RE	2003/09/19 * 12
MAT-21	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-120	PO(Con.) EX	2004/01/28 * 12
MAT-23	Attenuator	Orient Microwave	BX10-0476-00	PO(Con.) EX,RE	2004/03/30 * 12
MCC-04	Microwave Cable	Storm	421-011	RE,PO(Rad) BE(Rad.)	2004/01/06 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE,PO(Rad) BE(Rad.)	2003/01/11 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2004/02/06 * 12
MCC-24	Microwave Cable	Storm	-	RE,PO(Rad) BE(Rad.)	2004/05/01 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	EX,FR	2004/02/18 * 12
MSG-01	Signal Generator	Rohde & Schwarz	SMR40	RE,PO(Rad) BE(Rad.)	2003/11/26 * 12
MSG-02	Signal Generator	Rohde & Schwarz	SML03	RE	2003/08/26 * 12
MCC-22	Microwave Cable	Storm	-	EX,FR	2004/05/01 * 12
MCH-01	Temp.&Humid. Chamber	Tabai Spec	PL-2KP	FR	2003/08/26 * 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

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

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	24JE0153-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.232(b)
MODEL	TM150	TEST METHOD	FCC Part2 Section 2.1046
S/N	CS-268	TEST DISTANCE	-
POWER	DC3.7V(AC120V/60Hz)	DATE	May 27, 2004
MODE	Tx	TEMPERATURE	23℃
		HUMIDITY	63%
		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	-2.69	30.00	1.36	28.67	33.00	4.33	736.21
Mid	1880.0	-2.67	30.00	1.36	28.69	33.00	4.31	751.62
High	1909.8	-2.99	30.00	1.36	28.37	33.00	4.63	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	24JE0153-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.232(b)
MODEL	TM150	TEST METHOD	FCC Part2 Section 2.1046
S/N	CS-268	TEST DISTANCE	3m
POWER	DC3.7V(AC120V/60Hz)	DATE	May 29, 2004
MODE	Tx	TEMPERATURE	23°C
POSITION	H:X-axis / V:Y-axis	HUMIDITY	54%
		CALIBRATION	OK
		ENGINEER	Naoki Sakamoto

No.	FREQ [MHz]	SG READING		CABLE LOSS [dB]	ANT GAIN [dBi]	ATTEN [dB]	RESULT		LIMITS (EIRP) [dBm]	MARGIN	
		HOR	VER				HOR	VER		HOR	VER
1	1850.36	21.4	19.4	2.6	9.4	0.0	28.2	26.2	33.0	4.8	6.8
2	1880.05	19.6	18.4	2.6	9.6	0.0	26.6	25.4	33.0	6.4	7.6
3	1909.89	18.4	17.8	2.6	9.7	0.0	25.5	24.9	33.0	7.5	8.1

CALCULATION:READING(SG)-LOSS(CABLE)+ANT.GAIN-ATTEN

Rx-ANTENNA : Biconical Antena(30-300MHz), Logperriodic Antenna(300-1000MHz), Horn Antenna(1-19GHz)

Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Anrenna(1-19GHz)

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: 3MHz , VBW:3MHz)

Emission Bandwidth

UL Apex Co., Ltd.

Head Office EMC Lab. Measurement Room : No.3

COMPANY	SHARP CORPORATION	REPORT NO	24JE0153-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.238(b)
MODEL	TM150	TEST METHOD	FCC Part2 Section 2.1049
S/N	CS-268	TEST DISTANCE	-
POWER	DC3.7V (AC120V/60Hz)	DATE	May 31, 2004
MODE	Tx	TEMPERATURE	23°C
		HUMIDITY	63%
		ENGINEER	Hiroka Umeyama

CH	FREQ	Bandwidth	Limit
	[MHz]	[kHz]	[kHz]
Low	1850.2	334.0	-
Mid	1880.0	330.0	-
High	1909.8	330.0	-

UL Apex Co., Ltd.

Head Office EMC Lab.

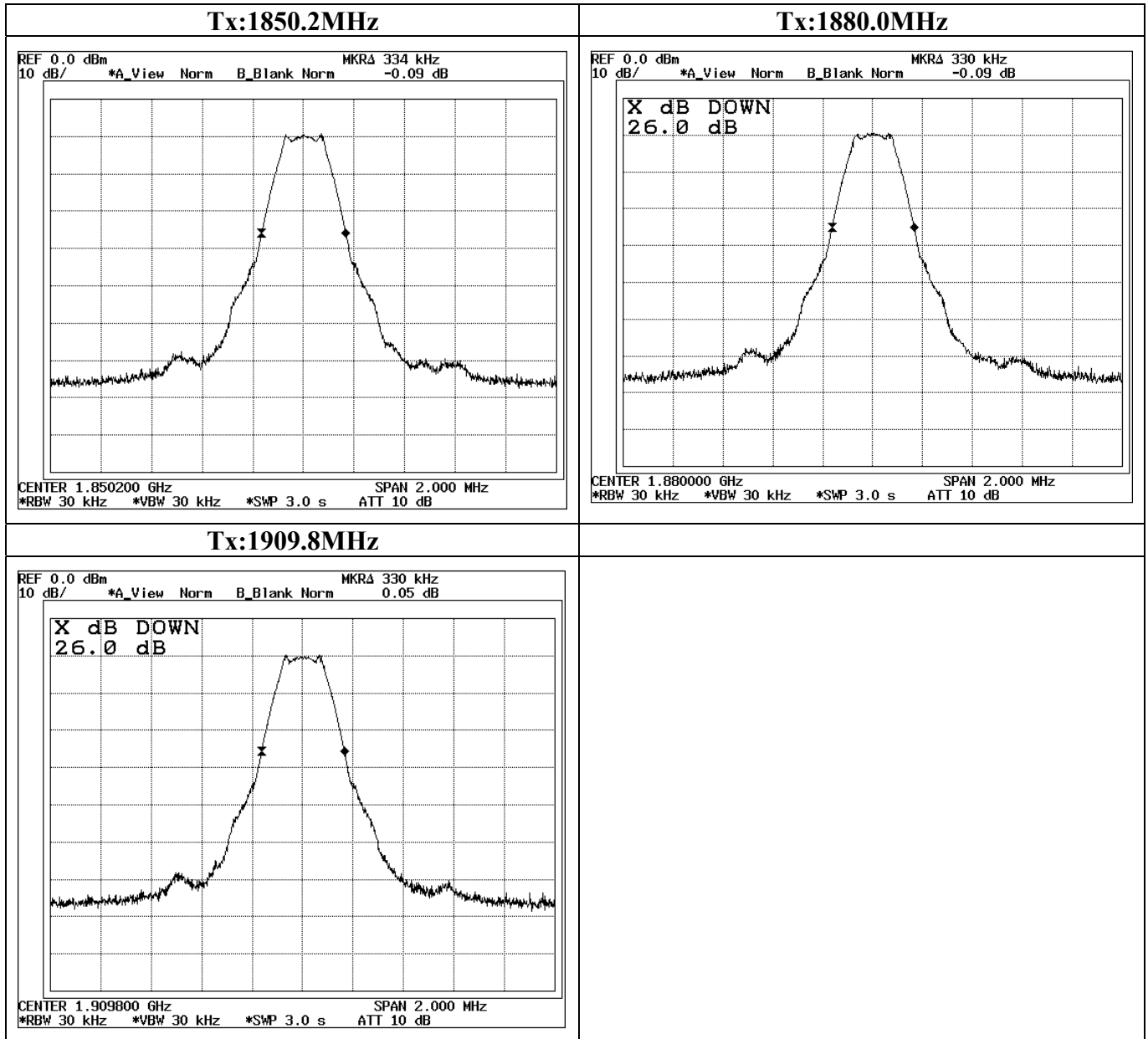
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

Emission Bandwidth



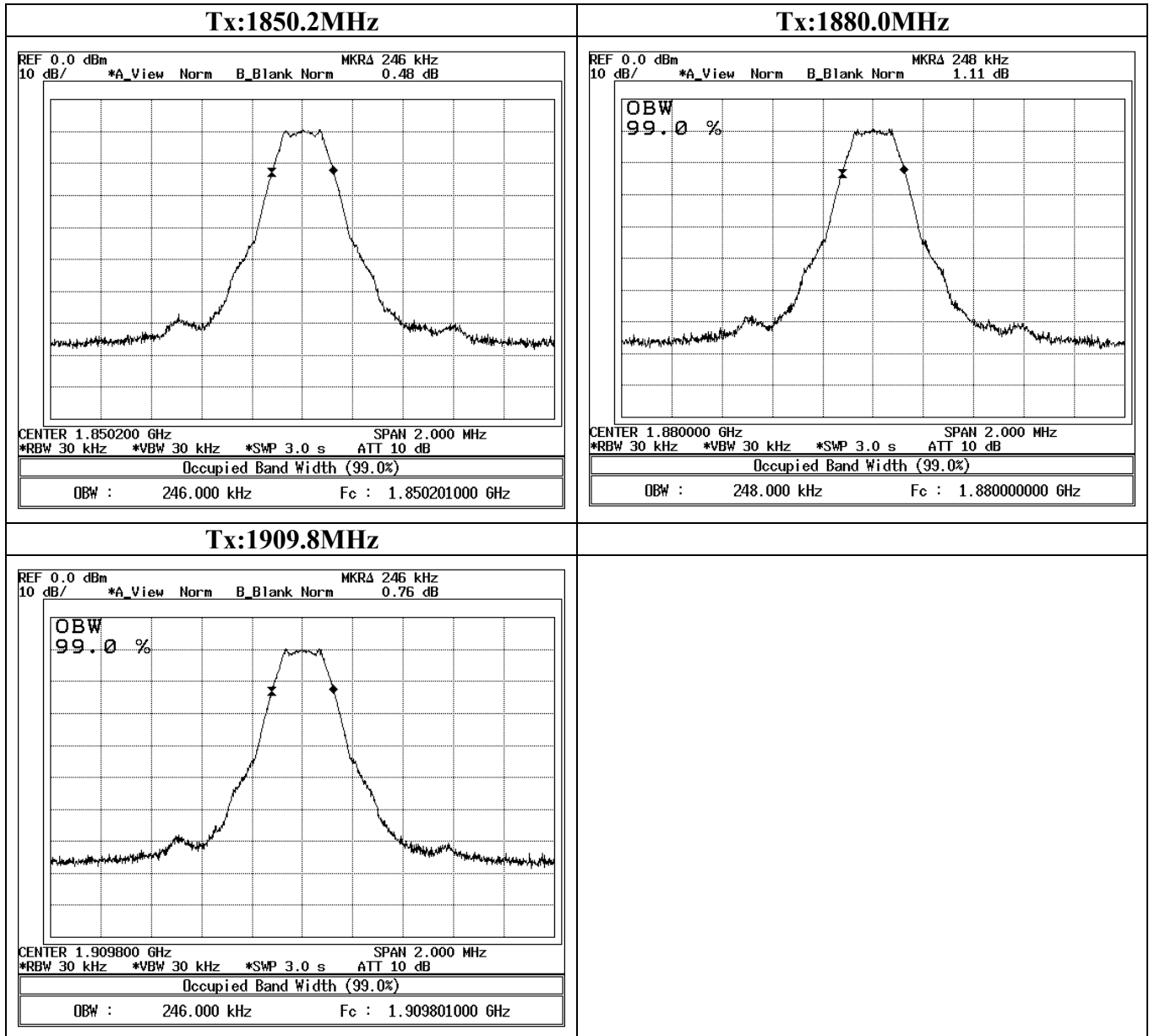
99%Occupied Bandwidth

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

COMPANY	SHARP CORPORATION	REPORT NO	24JE0153-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.238(b)
MODEL	TM150	TEST METHOD	FCC Part2 Section 2.1049
S/N	CS-268	TEST DISTANCE	-
POWER	DC3.7V (AC120V/60Hz)	DATE	May 31, 2004
MODE	Tx	TEMPERATURE	23°C
		HUMIDITY	63%
		ENGINEER	Hiroka Umeyama

CH	FREQ	Bandwidth	Limit
	[MHz]	[kHz]	[kHz]
Low	1850.2	246.0	-
Mid	1880.0	248.0	-
High	1908.8	246.0	-

99%Occupied Bandwidth



Band Edge(Conducted)

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

COMPANY SHARP CORPORATION
EQUIPMENT Tri-Band Mobile Cellular Phone
MODEL TM150
S/N CS-268
POWER DC3.7V (AC120V/60Hz)
MODE Tx

REPORT NO 24JE0153-HO
REGULATION FCC Part24 Section 24.238(b)
TEST METHOD FCC Part2 Section 2.1049
TEST DISTANCE -
DATE May 31, 2004
TEMPERATURE 23℃
HUMIDITY 63%
ENGINEER Hiroka Umeyama

VIDEO AV 30 times

Block A

Frequency	Reading	Atten.	Cable Loss	Result	Limit
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]
1850.0	-61.8	30.0	8.0	-23.8	-13.0
1865.0	-63.2	30.0	8.0	-25.2	-13.0

Block D

Frequency	Reading	Atten.	Cable Loss	Result	Limit
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]
1865.0	-59.7	30.0	8.0	-21.7	-13.0
1870.0	-59.6	30.0	8.0	-21.6	-13.0

Block B

Frequency	Reading	Atten.	Cable Loss	Result	Limit
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]
1870.0	-60.3	30.0	8.0	-22.3	-13.0
1885.0	-61.3	30.0	8.0	-23.3	-13.0

Block E

Frequency	Reading	Atten.	Cable Loss	Result	Limit
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]
1885.0	-62.5	30.0	8.0	-24.5	-13.0
1890.0	-61.4	30.0	8.0	-23.4	-13.0

Block F

Frequency	Reading	Atten.	Cable Loss	Result	Limit
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]
1890.0	-60.2	30.0	8.0	-22.2	-13.0
1895.0	-61.9	30.0	8.0	-23.9	-13.0

Block C

Frequency	Reading	Atten.	Cable Loss	Result	Limit
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]
1895.0	-60.0	30.0	8.0	-22.0	-13.0
1910.0	-61.1	30.0	8.0	-23.1	-13.0

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

UL Apex Co., Ltd.

Head Office EMC Lab.

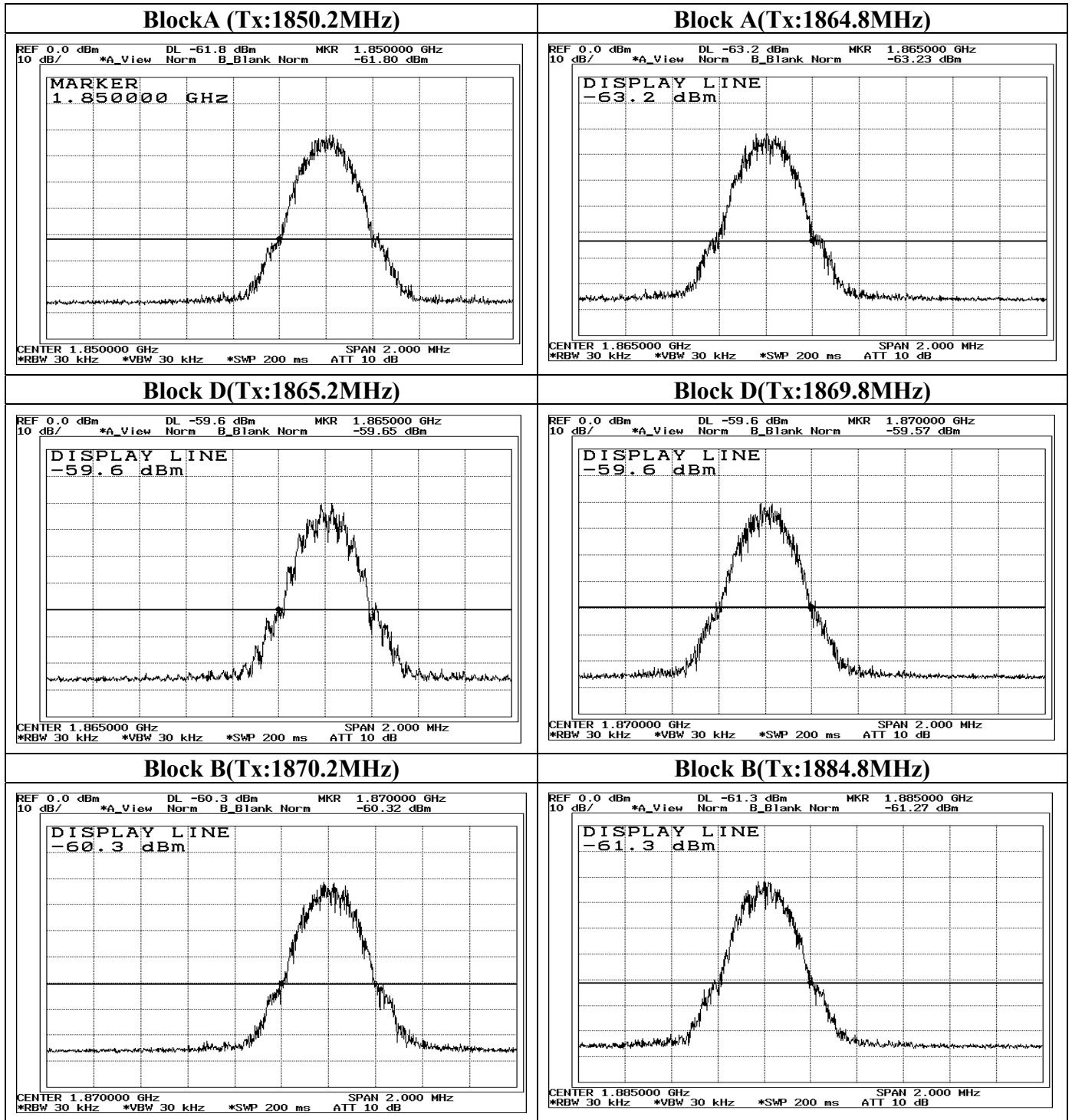
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

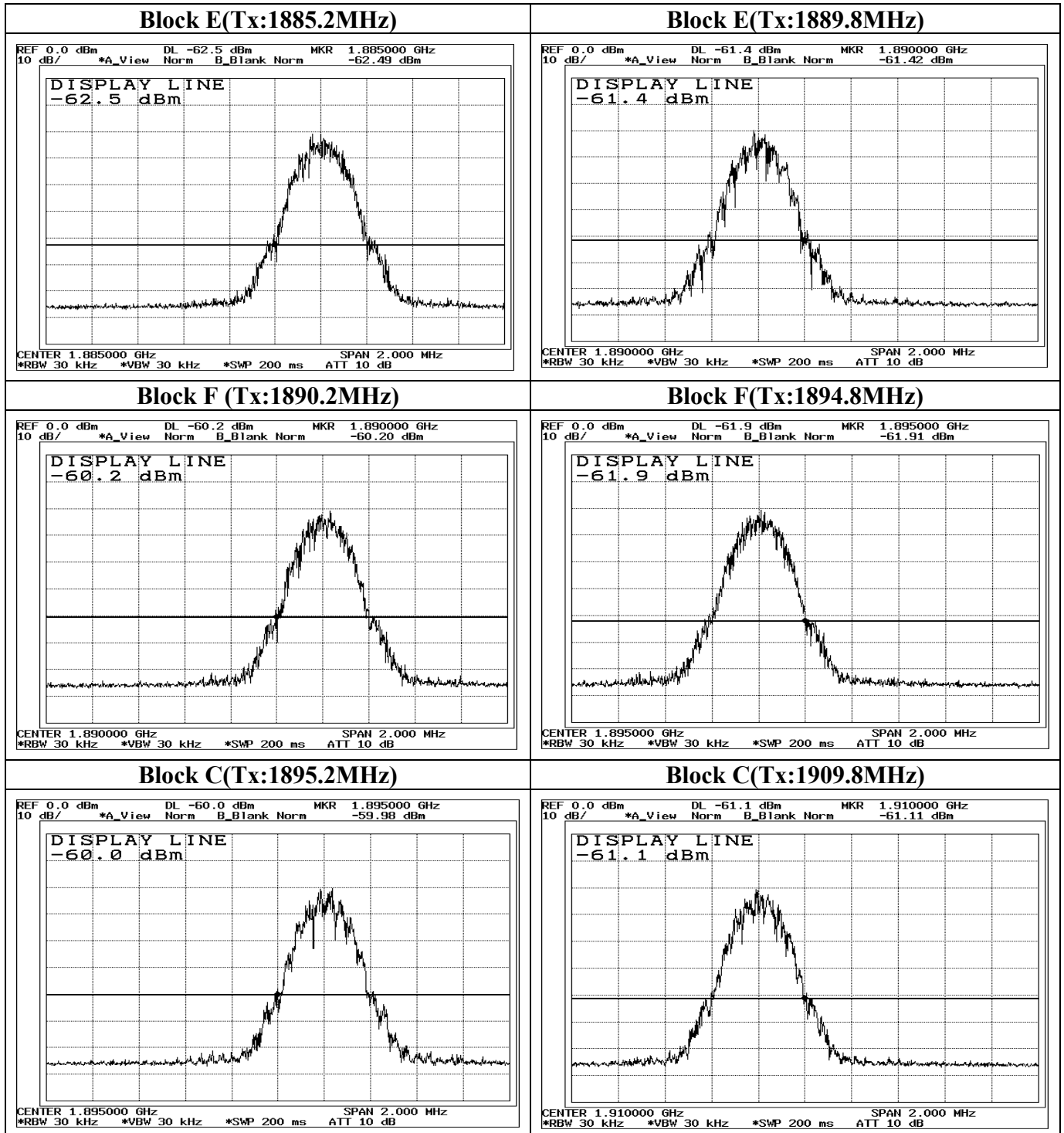
Facsimile : +81 596 24 8124

MF060b(10.04.03)

Band Edge(Conducted)



Band Edge(Conducted)



Band Edge (Radiated)

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

COMPANY	SHARP CORPORATION	REPORT NO	24JE0153-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.238(b)
MODEL	TM150	TEST METHOD	FCC Part2 Section 2.1049
S/N	CS-268	TEST DISTANCE	3m
POWER	DC3.7V(AC120V/60Hz)	DATE	May 29, 2004
MODE	Tx	TEMPERATURE	23℃
POSITION	H:X-axis / V:Y-axis	HUMIDITY	54%
		CALIBRATION	OK
		ENGINEER	Naoki Sakamoto

No.	FREQ	SG READING		CABLE LOSS [dB]	ANT GAIN [dBi]	ATTEN [dB]	RESULT		LIMITS (EIRP) [dBm]	MARGIN	
		HOR	VER				HOR	VER		HOR	VER
		[dBm]					[dBm]			[dB]	
1	1850.00	-18.5	-16.5	2.6	9.4	0.0	-14.9	-14.0	-13.0	1.9	1.0
2	1910.00	-17.2	-19.2	2.6	9.7	0.0	-14.3	-16.3	-13.0	1.3	3.3

Rx-ANTENNA : Biconical Antena(30-300MHz), Logperriodic Antenna(300-1000MHz), Horn Antenna(1-19GHz)

Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Anrenna(1-19GHz)

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: 30kHz, VBW:30kHz)

Spurious Emission (Conducted)

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

COMPANY SHARP CORPORATION
EQUIPMENT Tri-Band Mobile Cellular Phone
MODEL TM150
S/N CS-268
POWER DC3.7V (AC120V/60Hz)
MODE Tx

REPORT NO 24JE0153-HO
REGULATION Fcc Part 24 Section 24.238(a)
TEST METHOD Fcc Part 2 Section 2.1051
TEST DISTANCE -
DATE May 31, 2004
TEMPERATURE 23°C
HUMIDITY 63%
ENGINEER Hiroka Umeyama

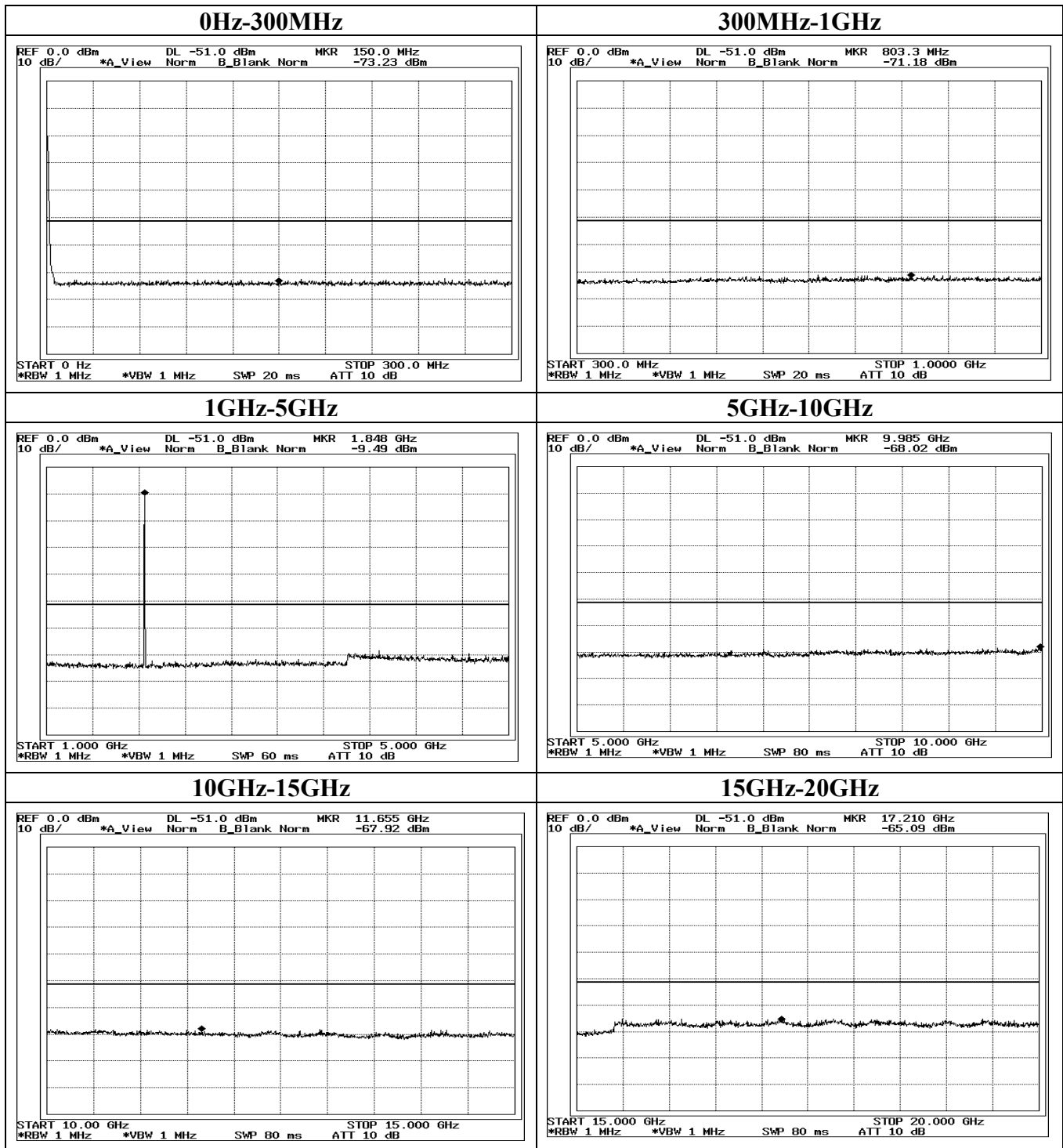
Limit Line

Limit	Atten.	Cable Loss	Limit Line
[dBm]	[dB]	[dB]	[dBm]
-13.0	30.0	8.0	-51.0

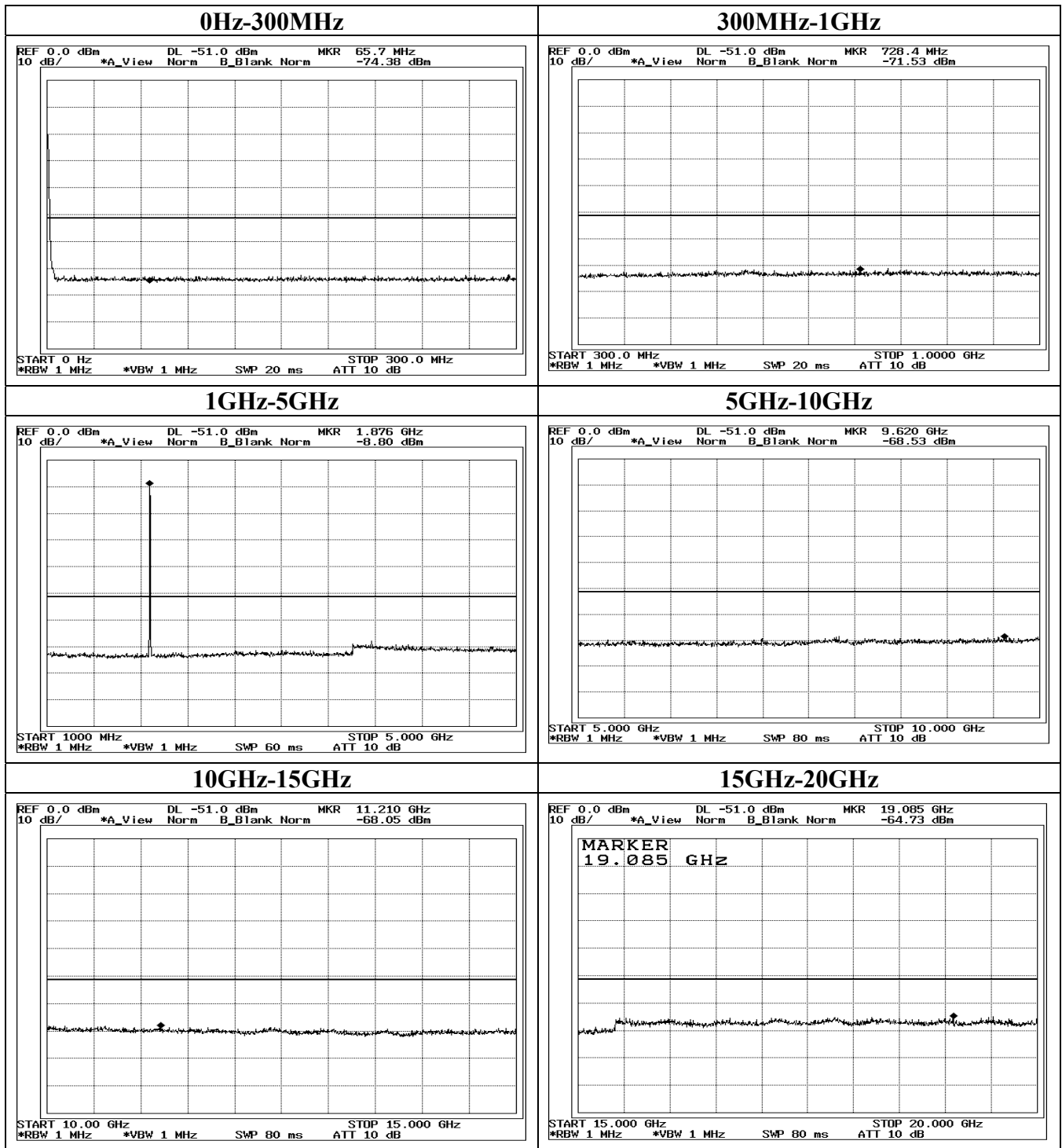
Sample Calculation : Limit Line = Limit - Atten. - Cable Loss

Result OK

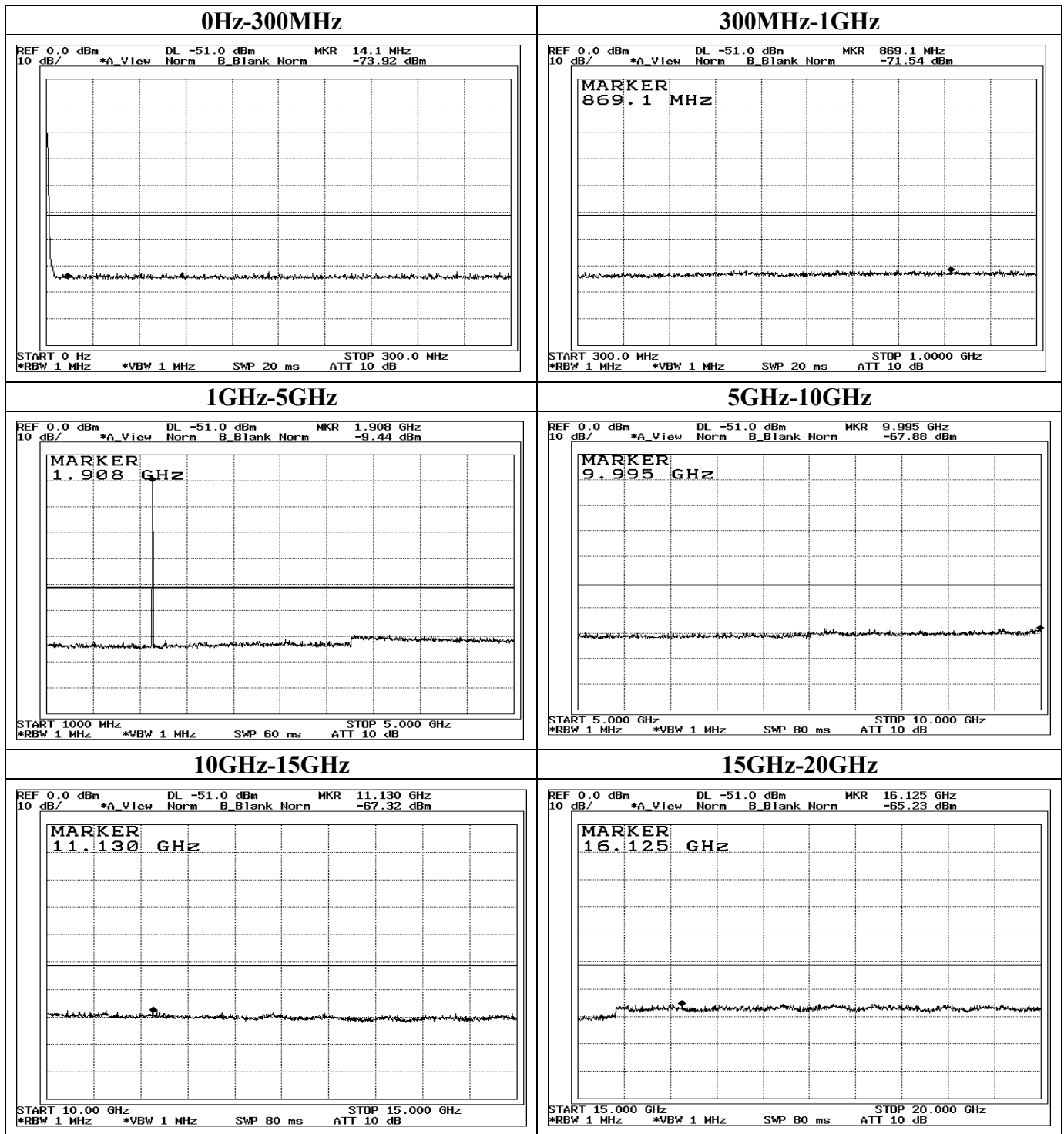
Spurious Emission (Conducted)
Tx:1850.2MHz



Spurious Emission (Conducted)
Tx:1880.0MHz



Spurious Emission (Conducted)
Tx:1909.8MHz



Spurious Radiation

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

COMPANY	SHARP CORPORATION	REPORT NO	24JE0153-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.238(a)
MODEL	TM150	TEST METHOD	FCC Part2 Section 2.1053
S/N	CS-268	TEST DISTANCE	3m
POWER	DC3.7V(AC120V/60Hz)	DATE	May 29, 2004
MODE	Tx 1850.2 MHz	TEMPERATURE	23℃
POSITION	H:X-axis / V:X-axis (Below 1GHz)	HUMIDITY	54%
	H:Z-axis / V:Y-axis (above 1GHz)	CALIBRATION	OK
		ENGINEER	Naoki Sakamoto

No.	FREQ [MHz]	SG READING		CABLE LOSS [dB]	ANT GAIN [dBi]	ATTEN [dB]	RESULT		LIMITS (EIRP) [dBm]	MARGIN	
		HOR	VER				HOR	VER		HOR	VER
		[dBm]	[dBm]				[dBm]	[dBm]		[dB]	[dB]
1	35.24	-17.3	-27.6	0.3	-26.6	9.9	-54.1	-64.4	-13.0	41.1	51.4
2	60.01	-54.5	-52.9	0.4	-14.6	9.9	-79.4	-77.8	-13.0	66.4	64.8
3	79.93	-53.2	-48.1	0.5	-7.9	9.9	-71.5	-66.4	-13.0	58.5	53.4
4	97.49	-58.8	-55.9	0.6	-3.0	9.9	-72.2	-69.4	-13.0	59.2	56.4
5	131.33	-53.8	-45.4	0.7	2.2	9.9	-62.2	-53.9	-13.0	49.2	40.9
6	659.60	-28.7	-43.5	1.8	2.2	10.0	-38.3	-53.1	-13.0	25.3	40.1
7	832.02	-48.4	-47.6	1.9	2.2	10.0	-58.2	-57.3	-13.0	45.2	44.3
8	3700.40	-52.4	-50.9	3.8	12.5	0.0	-43.7	-42.2	-13.0	30.7	29.2
9	5550.60	-53.0	-58.1	4.3	13.3	0.0	-44.0	-49.1	-13.0	31.0	36.1
10	7400.80	-45.9	-44.9	5.7	11.7	0.0	-39.9	-38.9	-13.0	26.9	25.9
11	9251.00	-45.1	-47.1	6.1	11.0	0.0	-40.2	-42.2	-13.0	27.2	29.2
12	11101.20	-39.1	-38.4	7.8	9.8	0.0	-37.1	-36.4	-13.0	24.1	23.4
13	12951.40	-41.4	-44.1	8.5	15.1	0.0	-34.8	-37.5	-13.0	21.8	24.5
14	14801.60	-37.9	-38.0	9.3	11.7	0.0	-35.5	-35.6	-13.0	22.5	22.6
15	16651.80	-32.0	-32.8	9.3	13.6	0.0	-27.7	-28.5	-13.0	14.7	15.5
16	18502.00	-37.7	-38.8	9.6	15.4	0.0	-31.9	-33.0	-13.0	18.9	20.0

CALCULATION:READING(SG)-LOSS(CABLE)+ANT.GAIN-ATTEN

Rx-ANTENNA : Biconical Antenna(30-300MHz), Logperriodic Antenna(300-1000MHz), Horn Antenna(1-19GHz)

Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Antenna(1-19GHz)

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

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

COMPANY	SHARP CORPORATION	REPORT NO	24JE0153-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.238(a)
MODEL	TM150	TEST METHOD	FCC Part2 Section 2.1053
S/N	CS-268	TEST DISTANCE	3m
POWER	DC3.7V(AC120V/60Hz)	DATE	May 29, 2004
MODE	Tx 1880.0 MHz	TEMPERATURE	23°C
POSITION	H:X-axis / V:X-axis (below 1GHz)	HUMIDITY	54%
	H:Z-axis / V:Y-axis (above 1GHz)	CALIBRATION	OK
		ENGINEER	Naoki Sakamoto

No.	FREQ [MHz]	SG READING		CABLE LOSS [dB]	ANT GAIN [dBi]	ATTEN [dB]	RESULT		LIMITS (EIRP) [dBm]	MARGIN	
		HOR	VER				HOR	VER		HOR	VER
		[dBm]					[dBm]			[dB]	
1	35.24	-14.2	-27.5	0.3	-26.6	9.9	-51.0	-64.3	-13.0	38.0	51.3
2	60.01	-47.6	-47.1	0.4	-14.6	9.9	-72.5	-72.0	-13.0	59.5	59.0
3	79.93	-55.4	-46.8	0.5	-7.9	9.9	-73.7	-65.1	-13.0	60.7	52.1
4	97.49	-58.7	-51.4	0.6	-3.0	9.9	-72.1	-64.9	-13.0	59.1	51.9
5	131.33	-51.5	-44.6	0.7	2.2	9.9	-59.9	-53.1	-13.0	46.9	40.1
6	659.60	-31.4	-44.9	1.8	2.2	10.0	-41.0	-54.5	-13.0	28.0	41.5
7	832.02	-45.7	-44.6	1.9	2.2	10.0	-55.5	-54.3	-13.0	42.5	41.3
8	3760.00	-42.2	-42.5	3.8	12.5	0.0	-33.5	-33.8	-13.0	20.5	20.8
9	5640.00	-59.1	-59.7	4.4	13.4	0.0	-50.1	-50.7	-13.0	37.1	37.7
10	7520.00	-43.9	-40.7	5.7	11.7	0.0	-37.9	-34.7	-13.0	24.9	21.7
11	9400.00	-42.5	-45.3	6.2	10.8	0.0	-37.9	-40.7	-13.0	24.9	27.7
12	11280.00	-39.0	-40.1	7.9	10.3	0.0	-36.6	-37.7	-13.0	23.6	24.7
13	13160.00	-42.4	-43.9	8.5	14.4	0.0	-36.5	-38.0	-13.0	23.5	25.0
14	15040.00	-37.2	-37.8	9.4	12.8	0.0	-33.8	-34.4	-13.0	20.8	21.4
15	16920.00	-31.8	-32.4	9.1	13.5	0.0	-27.4	-28.0	-13.0	14.4	15.0
16	18800.00	-37.2	-38.6	9.6	15.5	0.0	-31.3	-32.7	-13.0	18.3	19.7

CALCULATION: READING(SG)-LOSS(CABLE)+ANT.GAIN-ATTEN
Rx-ANTENNA : Biconical Antenna(30-300MHz), Logperiodic Antenna(300-1000MHz), Horn Antenna(1-19GHz)
Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Antenna(1-19GHz)
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

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

COMPANY	SHARP CORPORATION	REPORT NO	24JE0153-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.238(a)
MODEL	TM150	TEST METHOD	FCC Part2 Section 2.1053
S/N	CS-268	TEST DISTANCE	3m
POWER	DC3.7V(AC120V/60Hz)	DATE	May 29, 2004
MODE	Tx 1909.8 MHz	TEMPERATURE	23°C
POSITION	H:X-axis / V:X-axis (below 1GHz)	HUMIDITY	54%
	H:Z-axis / V:Y-axis (above 1GHz)	CALIBRATION	OK
		ENGINEER	Naoki Sakamoto

No.	FREQ [MHz]	SG READING		CABLE LOSS [dB]	ANT GAIN [dBi]	ATTEN [dB]	RESULT		LIMITS (EIRP) [dBm]	MARGIN	
		HOR [dBm]	VER [dBm]				HOR [dBm]	VER [dBm]		HOR [dB]	VER [dB]
1	35.24	-22.3	-28.2	0.3	-26.6	9.9	-59.1	-65.0	-13.0	46.1	52.0
2	60.01	-44.2	-44.4	0.4	-14.6	9.9	-69.1	-69.3	-13.0	56.1	56.3
3	79.93	-55.2	-47.1	0.5	-7.9	9.9	-73.5	-65.4	-13.0	60.5	52.4
4	97.49	-57.3	-52.7	0.6	-3.0	9.9	-70.7	-66.2	-13.0	57.7	53.2
5	131.33	-50.0	-44.1	0.7	2.2	9.9	-58.4	-52.6	-13.0	45.4	39.6
6	659.60	-32.6	-44.7	1.8	2.2	10.0	-42.2	-54.3	-13.0	29.2	41.3
7	832.02	-46.2	-44.6	1.9	2.2	10.0	-56.0	-54.3	-13.0	43.0	41.3
8	3819.60	-44.5	-45.9	3.8	12.5	0.0	-35.8	-37.2	-13.0	22.8	24.2
9	5729.40	-59.4	-59.7	4.4	13.4	0.0	-50.4	-50.7	-13.0	37.4	37.7
10	7639.20	-46.5	-45.8	5.8	11.7	0.0	-40.6	-39.9	-13.0	27.6	26.9
11	9549.00	-41.7	-43.6	6.3	10.5	0.0	-37.5	-39.4	-13.0	24.5	26.4
12	11458.80	-40.9	-40.3	8.0	10.9	0.0	-38.0	-37.4	-13.0	25.0	24.4
13	13368.60	-40.5	-39.1	8.6	13.3	0.0	-35.8	-34.4	-13.0	22.8	21.4
14	15278.40	-37.9	-38.5	9.5	13.9	0.0	-33.5	-34.1	-13.0	20.5	21.1
15	17188.20	-30.8	-31.6	9.1	13.2	0.0	-26.7	-27.5	-13.0	13.7	14.5
16	19098.00	-36.6	-36.9	9.6	15.2	0.0	-31.0	-31.3	-13.0	18.0	18.3

CALCULATION: READING(SG)-LOSS(CABLE)+ANT.GAIN-ATTEN

Rx-ANTENNA : Biconical Antenna(30-300MHz), Logperriodic Antenna(300-1000MHz), Horn Antenna(1-19GHz)

Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Antenna(1-19GHz)

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)

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

Frequency Stability(Temperature/Voltage Variation)

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

COMPANY	SHARP CORPORATION	REPORT NO	24JE0153-HO
EQUIPMENT	Tri-Band Mobile Cellular Phone	REGULATION	FCC Part24 Section 24.235
MODEL	TM150	TEST METHOD	FCC Part2 Section 2.1055(a)(1) and(b)
S/N	CS-268		FCC Part2 Section 2.1055(d)(1) and(2)
POWER	DC3.7V (AC120V/60Hz)	TEST DISTANCE	-
MODE	Tx 1880.0 MHz	DATE	May 31, 2004
		TEMPERATURE	23°C
		HUMIDITY	63%
		ENGINEER	Hiroka Umeyama

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
-30.0	0.0	1880.796103	6071.0	3.2	-
-20.0	0.0	1880.793155	9019.0	4.8	-
-10.0	0.0	1880.800522	1652.0	0.9	-
0.0	0.0	1880.791895	10279.0	5.5	-
10.0	0.0	1880.797982	4192.0	2.2	-
20.0	0.0	1880.802174	0.0	0.0	-
30.0	0.0	1880.807877	5703.0	3.0	-
40.0	0.0	1880.805540	3366.0	1.8	-
50.0	0.0	1880.811731	9557.0	5.1	-

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [Hz]	Frequency Error [ppm]	Limit [ppm]
20.0	3.145	1880.940507	149020.0	79.2	-
20.0	3.700	1880.791487	0.0	0.0	-
20.0	4.255	1880.808149	16662.0	8.9	-