

EMI TEST REPORT

Test Report No. : 25BE0189-HO-2

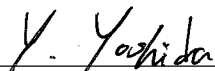
Applicant : SHARP CORPORATION
Type of Equipment : Tri-Band Mobile Cellular Phone
Model No. : Fantom
Test standard : FCC Part 15 Subpart C
Section 15.207, Section 15.247 : 2004
FCC ID : APYNAR0058
Test Result : Complied

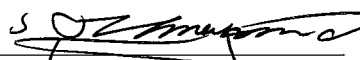
1. This test report shall not be reproduced in full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contain a true representation of the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

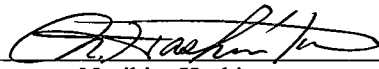
Date of test:

October 20,22,28 and29, 2004

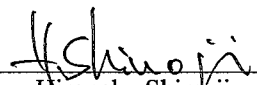
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Number of Hopping Frequency(FHSS)	23
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Maximum Peak Output Power(FHSS)	28
Radiated Spurious Emission(30-1000MHz)	30
Radiated Spurious Emission (1-25GHz) / Band Edge compliance	33
Conducted Spurious Emission (FHSS)	36
99% Occupied Bandwidth(FHSS)	40

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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-1 about GSM mode test (FCC Part 24).

Type of Equipment : Tri-Band Mobile Cellular Phone
FCC ID : APYNAR0058
Model No. : Fantom
Serial No. : ES1-239 and ES1-310 (for Radiated Emission /Bluetooth)
FCC1 (for the other tests)
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.

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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.

FCC 15.31 (e)

There is DC battery inside (DC3.7V) of this EUT and this EUT provides stable voltage (DC3.0V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C : 2004
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits : 2004
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz : 2004

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin*0)	Results
1	Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Section 15.207	-	N/A	6.1 dB 0.2111MHz L, QP	Complied
2	Carrier Frequency Separation	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(a)(1)	Conducted	N/A	*See data.	Complied
3	20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(a)(1)	Conducted	N/A		Complied
4	Number of Hopping Frequency	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(a)(1)(iii)	Conducted	N/A		Complied
5	Dwell time	ANSI C63.4:2003 13.Measurement of intentional radiators	Section15.247(a)(1)(iii)	Conducted	N/A		Complied
6	Maximum Peak Output Power	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(b)(1)	Conducted	N/A		Complied
7	Spurious Emission /Band Edge Compliance	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(c)	Conducted/ Radiated	N/A	2.8dB, 4804.0MHz VER (2402MHz) AV	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.

Uncertainty

*In case of the margin below the EMC Head Office's uncertainty.

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

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is ± 1.3 dB.

Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.5 dB(3m)/ ± 4.7 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB(3m)/ ± 3.8 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ± 6.6 dB.

Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test is ± 3.0 dB.

*These tests were also referred to FCC Public Notice DA 00-705 "Guidance on Measurement for Frequency Hopping Spread Spectrum Systems".

*These tests were performed without any deviations from test procedure except for additions or exclusions.

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3.3 Addition to standards

No addition, deviation, nor exclusion has been made from standards.

3.4 Test Location

UL Apex Co., Ltd. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
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	Listed date (for FCC)	FCC Registration Number	IC Registration 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 measurement 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 shielded room.

3.5 Test set up, Test instruments and Data of EMI

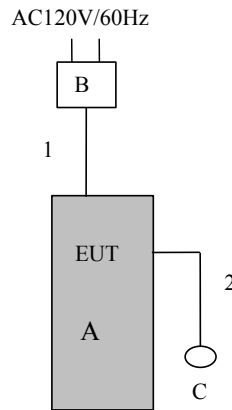
Refer to APPENDIX 1 to 3.

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

4.1 Operating Modes

The mode is used : [FHSS: Bluetooth]
<Hopping ON>
Transmitting mode(Packet size DH5)
<Hopping OFF>
Low Channel :2402MHz
Mid Channel :2441MHz
High Channel :2480MHz
Inquiry
Standby mode (for Conducted emission)

4.2 Configuration and peripherals



* 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	Fantom	ES1-239 and ES1-310 (for Radiated Emission /Bluetooth) FCC1 (for the other tests)	SHARP	APYNAR0058
B	AC Charger	CE-EA31	N/A	SHARP	N/A
C	Earphone	N/A	N/A	SHARP	N/A

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	AC Charger Cable	1.5	N	Polyvinyl chloride
2	Earphone Cable	1.2	N	Polyvinyl chloride

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SECTION 5: Conducted Emission, Section 15.207

Test Procedure and conditions

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

1) For the tests on EUT itself (as a stand alone equipment)

Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN /(AMN) to the input power source. All unused 50ohm connectors of the LISN(AMN) were resistively terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

Detector	: CISPR quasi-peak detector (IF BW 9 kHz)
Measurement range	: 0.15-30MHz
Test data	: APPENDIX 3
Test result	: Pass

SECTION 6: Carrier Frequency Separation, Section15.247(a)(1)

Test Procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Test data	: APPENDIX 3
Test result	: Pass

SECTION 7: 20 dB Bandwidth, Section 15.247(a)(1)

Test Procedure

The 20dB bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data	: APPENDIX 3
Test result	: Pass

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SECTION 8: Number of Hopping Frequency, Section 15.247(a)(1)(iii)

Test Procedure

The Number of Hopping Frequency was measured with a spectrum analyzer by sending radio signal from the antenna of EUT.

Test data	: APPENDIX 3
Test result	: Pass

SECTION 9: Dwell time, Section 15.247(a)(1)(iii)

Test Procedure

The Dwell time was measured with a spectrum analyzer connected to the antenna port.

Test data	: APPENDIX 3
Test result	: Pass

SECTION 10: Maximum Peak Output Power, Section 15.247(b)(1)

Test Procedure

The Maximum Peak Output Power was measured with a spectrum analyzer connected to the antenna port.

Test data	: APPENDIX 3
Test result	: Pass

SECTION 11: Spurious Emission / Band Edge Compliance 15.247(c)

[Conducted]

Test Procedure

The Out of Band Emission was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 3
Test result : Pass

[Radiated]

Test Procedure

EUT was placed on a platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. The Radiated Electric Field Strength intensity has been measured in a Semi Anechoic Chamber with a ground plane and at a distance of 3m(Below 10GHz) and 1m(Upper 10GHz).

The height of the measuring varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver or the Spectrum Analyzer.

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

Test data : APPENDIX 3
Test result : Pass

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver / Spectrum Analyzer	Spectrum Analyzer
Detector	QP: BW 120kHz(T/R)	PK: RBW:1MHz/VBW: 1MHz
IF Bandwidth		AV: RBW:1MHz/VBW:10Hz

- The carrier level and noise levels were measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.

With the position, the noise levels of all the frequencies was measured.

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APPENDIX 1: Photographs of test setup

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

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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	2004/04/12 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	RE	2004/02/18 * 12
MHA-01	Horn Antenna	EMCO	3160-09	RE	2004/01/10 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2004/01/10 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2004/02/06 * 12
MCC-04	Microwave Cable	Storm	421-011	RE	2004/01/06 * 12
MCC-24	Microwave Cable	Storm	-	RE	2004/05/01 * 12
MHF-02	High Pass Filter	Tokimec	TF323DCA	RE	2004/09/18 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2004/10/14 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2004/10/14 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MPA-06	Pre Amplifier	Hewlett Packard	8447D	RE	2004/08/29 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	AT	2004/06/12 * 12
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	CE	2003/12/27 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/ Agilent/TSJ	-	CE	2003/12/24 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	CE	2003/11/12 * 12
MLS-02	LISN(AMN)	Schwarzbeck	NSLK8127	CE	2003/11/10 * 12

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item:

CE: Conducted emission

RE: Radiated emission

AT: the other tests

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APPENDIX 3: Data of EMI test

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2004/10/20 17:25:58

Applicant : SHARP CORPORATION
Kind of EUT : Tri-Band Mobile Cellular Phone
Model No. : Fantom
Serial No. : ES1-239

Report No. : 25BE0189-HO
Power : AC120V 60Hz
Temp°C/Humi% : 23deg.C / 65%
Operator : Norihisa Hashimoto

Mode / Remarks : Bluetooth Tx2402

LIMIT : FCC15C §15.207 (QP)
FCC15C §15.207 (AV)

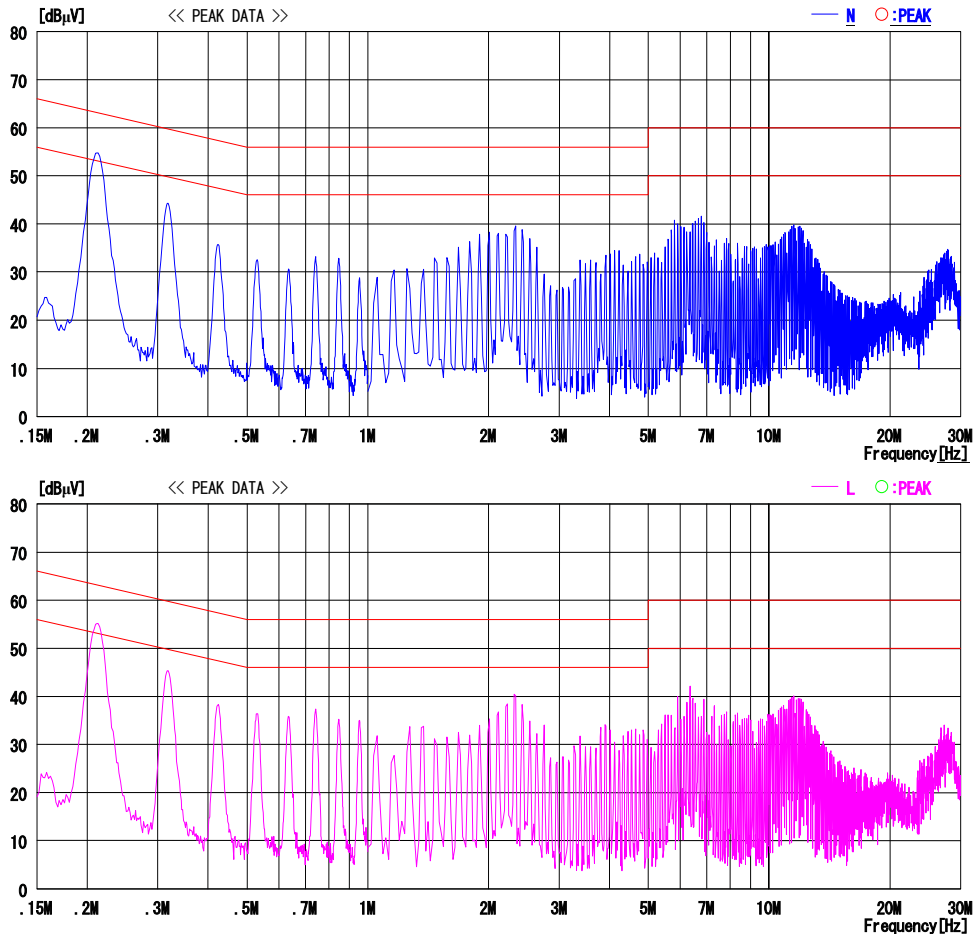


CHART:WITH FACTOR, Peak hold data, Data is uncorrected. CALCURATION: RESULT=READING+C. F (LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

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DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2004/10/20 17:19:40

Applicant : SHARP CORPORATION
Kind of EUT : Tri-Band Mobile Cellular Phone
Model No. : Fantom
Serial No. : ES1-239

Report No. : 25BE0189-HO
Power : AC120V 60Hz
Temp°C/Humi% : 23deg.C / 65%
Operator : Norihisa Hashimoto

Mode / Remarks : Bluetooth Tx2441

LIMIT : FCC15C §15.207 (QP)
FCC15C §15.207 (AV)

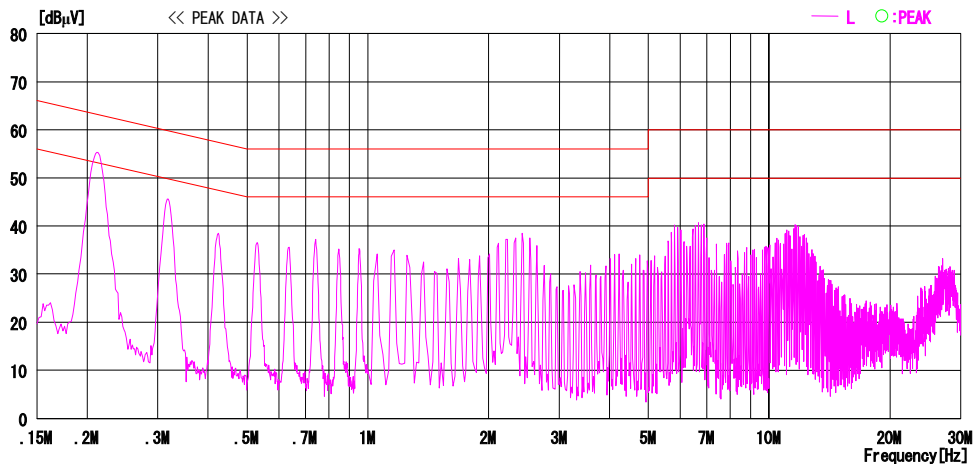
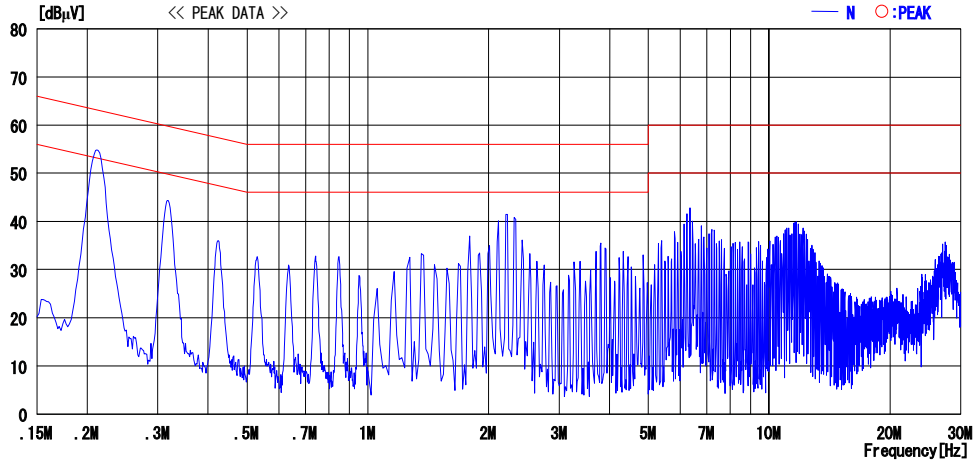


CHART:WITH FACTOR,Peak hold data.Data is uncorrected. CALCURATION:RESULT=READING+C.F(LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2004/10/20 16:57:10

Applicant : SHARP CORPORATION
Kind of EUT : Tri-Band Mobile Cellular Phone
Model No. : Fantom
Serial No. : ES1-239

Report No. : 25BE0189-HO
Power : AC120V 60Hz
Temp°C/Humi% : 23deg.C / 65%
Operator : Norihisa Hashimoto

Mode / Remarks : Bluetooth Tx2480

LIMIT : FCC15C §15.207 (QP)
FCC15C §15.207 (AV)

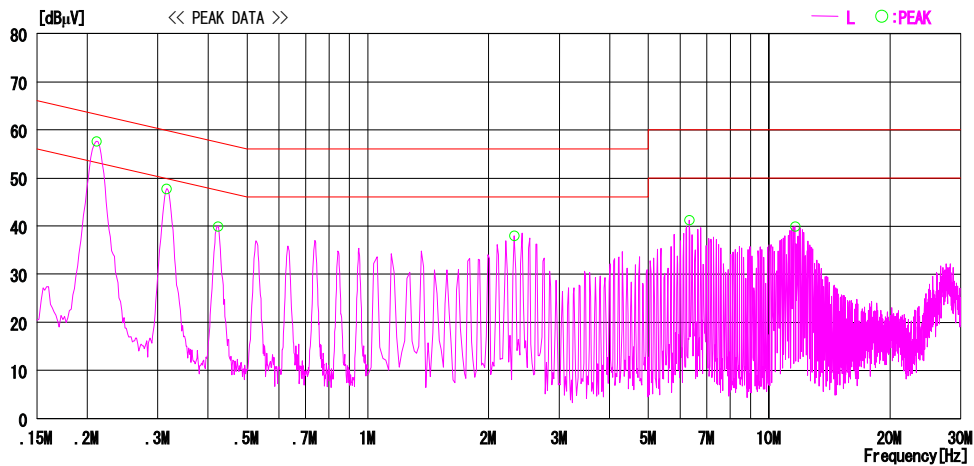
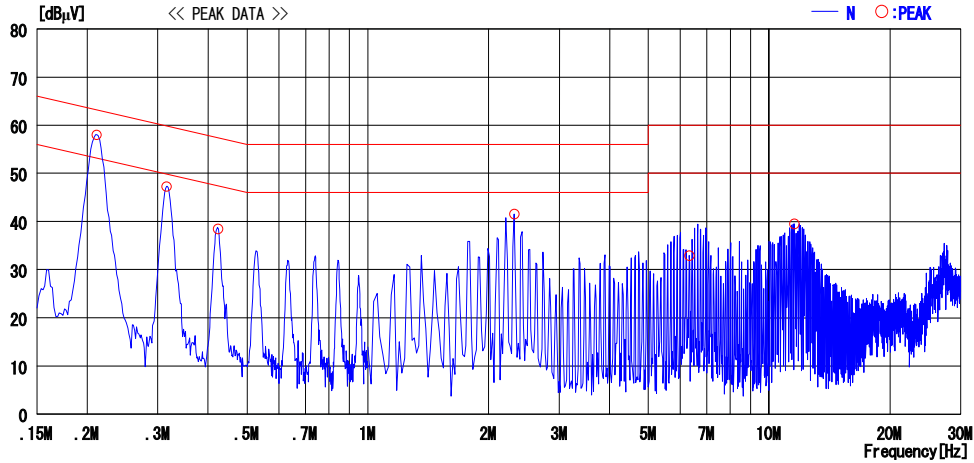


CHART:WITH FACTOR,Peak hold data.Data is uncorrected. CALCURATION:RESULT=READING+C.F(L1SN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

DATA OF CONDUCTED EMISSION TEST

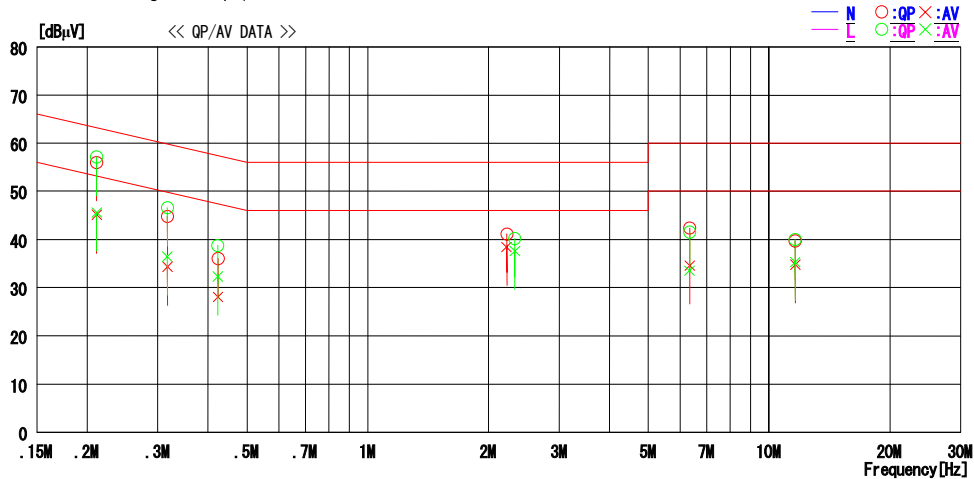
UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2004/10/20 16:57:10

Applicant : SHARP CORPORATION
Kind of EUT : Tri-Band Mobile Cellular Phone
Model No. : Fantom
Serial No. : ES1-239

Report No. : 25BE0189-HO
Power : AC120V 60Hz
Temp°C/Humi% : 23deg.C / 65%
Operator : Norihisa Hashimoto

Mode / Remarks : Bluetooth Tx2480

LIMIT : FCC15C §15.207 (QP)
FCC15C §15.207 (AV)



NO	FREQ [MHz]	READING		C.F	RESULT		LIMIT		MARGIN		PHASE
		QP [dBμV]	AV [dBμV]		QP [dBμV]	AV [dBμV]	QP [dBμV]	AV [dBμV]	QP [dB]	AV [dB]	
1	0.2111	55.8	44.9	0.2	56.0	45.1	63.2	53.2	7.2	8.1	N
2	0.3171	44.6	34.1	0.2	44.8	34.3	59.8	49.8	15.0	15.5	N
3	0.4236	35.7	27.7	0.4	36.1	28.1	57.4	47.4	21.3	19.3	N
4	2.2206	40.9	38.1	0.3	41.2	38.4	56.0	46.0	14.8	7.6	N
5	6.3430	41.6	33.8	0.8	42.4	34.6	60.0	50.0	17.6	15.4	N
6	11.6294	38.7	33.8	1.0	39.7	34.8	60.0	50.0	20.3	15.2	N
7	0.2111	56.9	45.4	0.2	57.1	45.6	63.2	53.2	6.1	7.6	L
8	0.3167	46.4	36.2	0.2	46.6	36.4	59.8	49.8	13.2	13.4	L
9	0.4226	38.4	31.9	0.4	38.8	32.3	57.4	47.4	18.6	15.1	L
10	2.3240	39.8	37.2	0.4	40.2	37.6	56.0	46.0	15.8	8.4	L
11	6.3400	40.7	32.7	0.8	41.5	33.5	60.0	50.0	18.5	16.5	L
12	11.6220	39.0	34.3	1.0	40.0	35.3	60.0	50.0	20.0	14.7	L

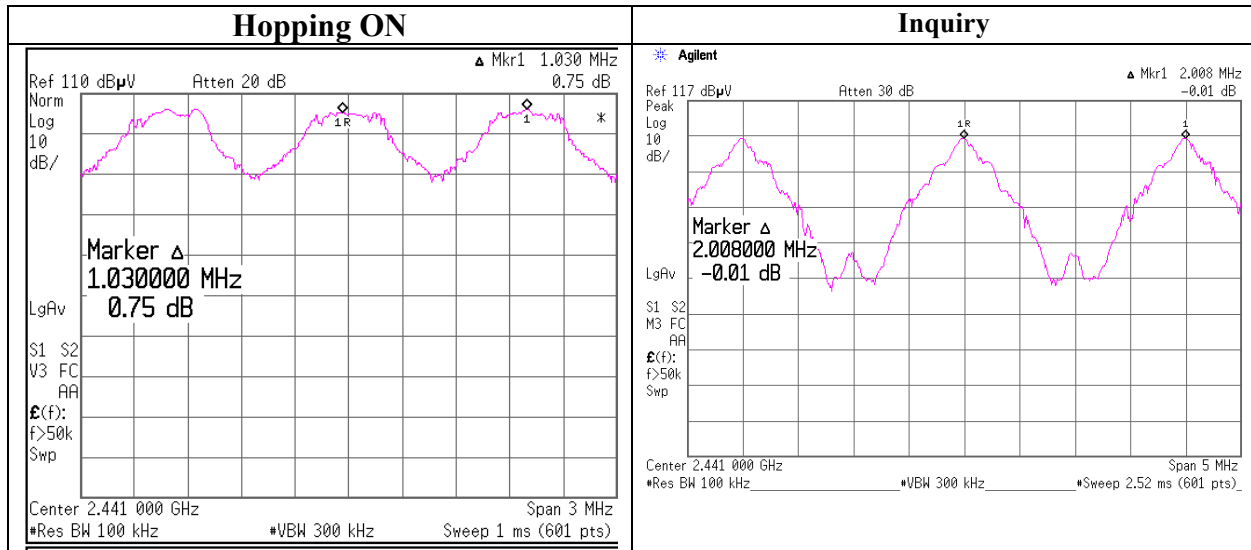
CHART:WITH FACTOR, Peak hold data. Data is uncorrected. CALCULATION: RESULT=READING+C.F (L ISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Carrier Frequency Separation(FHSS)

COMPANY	: Sharp Corporation	REGULATION	: Fcc Part15 Subpart C 15.247(a)(1)
EQUIPMENT	: Tri-Band Mobile Cellular Phone	TEST DISTANCE	: -
MODEL	: Fantom	DATE	: 10/22/2004
S/ N	: FCC1	TEMPERATURE	: 25deg.C
POWER	: DC3.7V	HUMIDITY	: 39%
MODE	: Tx(Hopping on)/Inquiry	ENGINEER	: Hiroka Umeyama

Ch	Freq. [MHz]	Channel separation [MHz]	Limit
Hopping ON	2441.0	1.030	>20dB Bandwidth and 25[kHz]
Inquiry	2441.0	2.008	>20dB Bandwidth and 25[kHz]

Carrier Frequency Separation(FHSS)



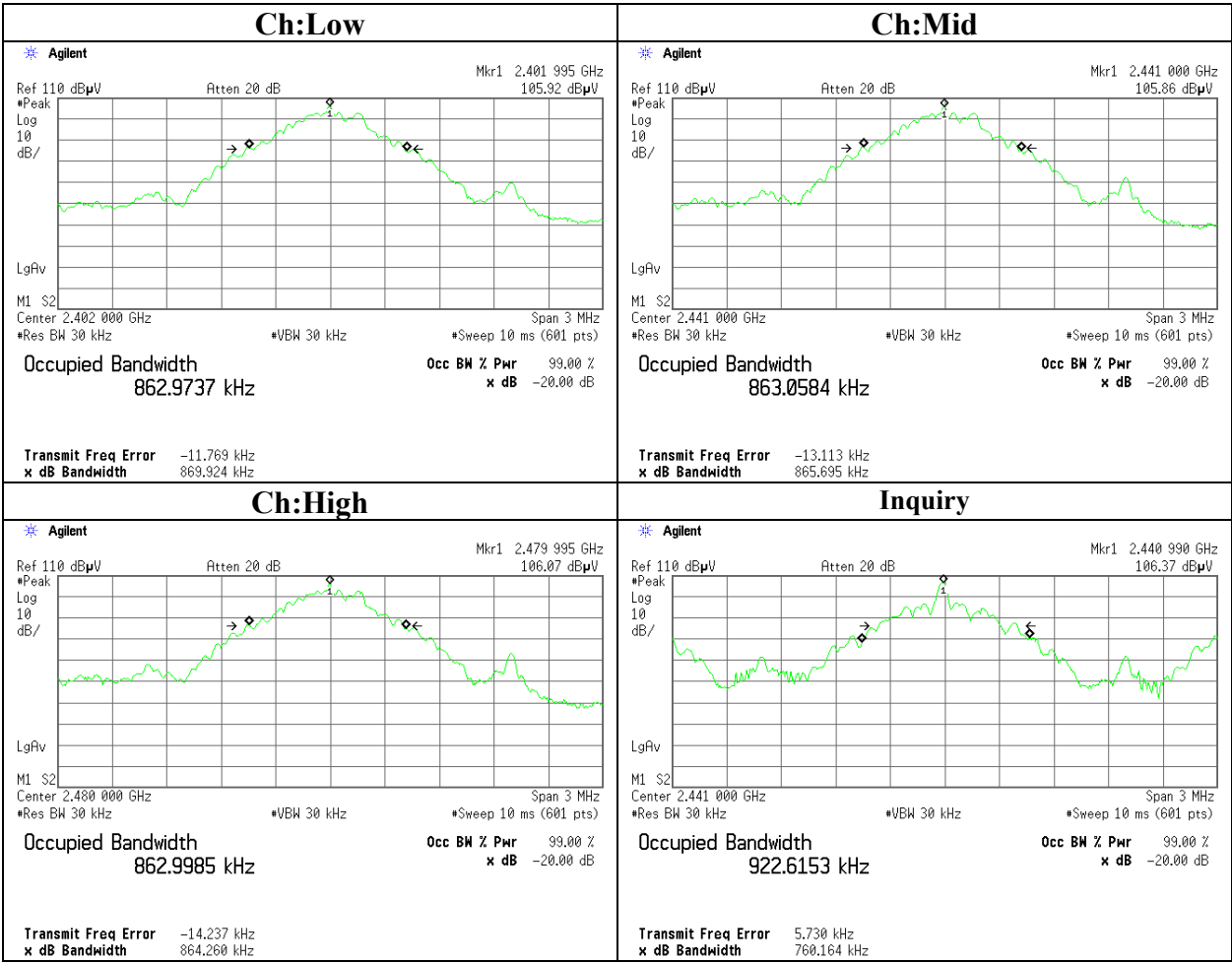
20dB Bandwidth(FHSS)

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

COMPANY	: Sharp Corporation	REGULATION	: Fcc Part15 Subpart C 15.247(a)(1)
EQUIPMENT	: Tri-Band Mobile Cellular Phone	TEST DISTANCE	: -
MODEL	: Fantom	DATE	: 10/22/2004
S/ N	: FCC1	TEMPERATURE	: 25deg.C
POWER	: DC3.7V	HUMIDITY	: 39%
MODE	: Tx(Hopping off)/Inquiry	ENGINEER	: Hiroka Umeyama

Ch	Freq.	20dB Bandwidth	Limit
	[MHz]	[MHz]	[MHz]
Low	2402.0	0.870	-
Mid	2441.0	0.866	-
High	2480.0	0.864	-
Inquiry	2441.0	0.760	-

20dB Bandwidth(FHSS)



Number of Hopping Frequency(FHSS)

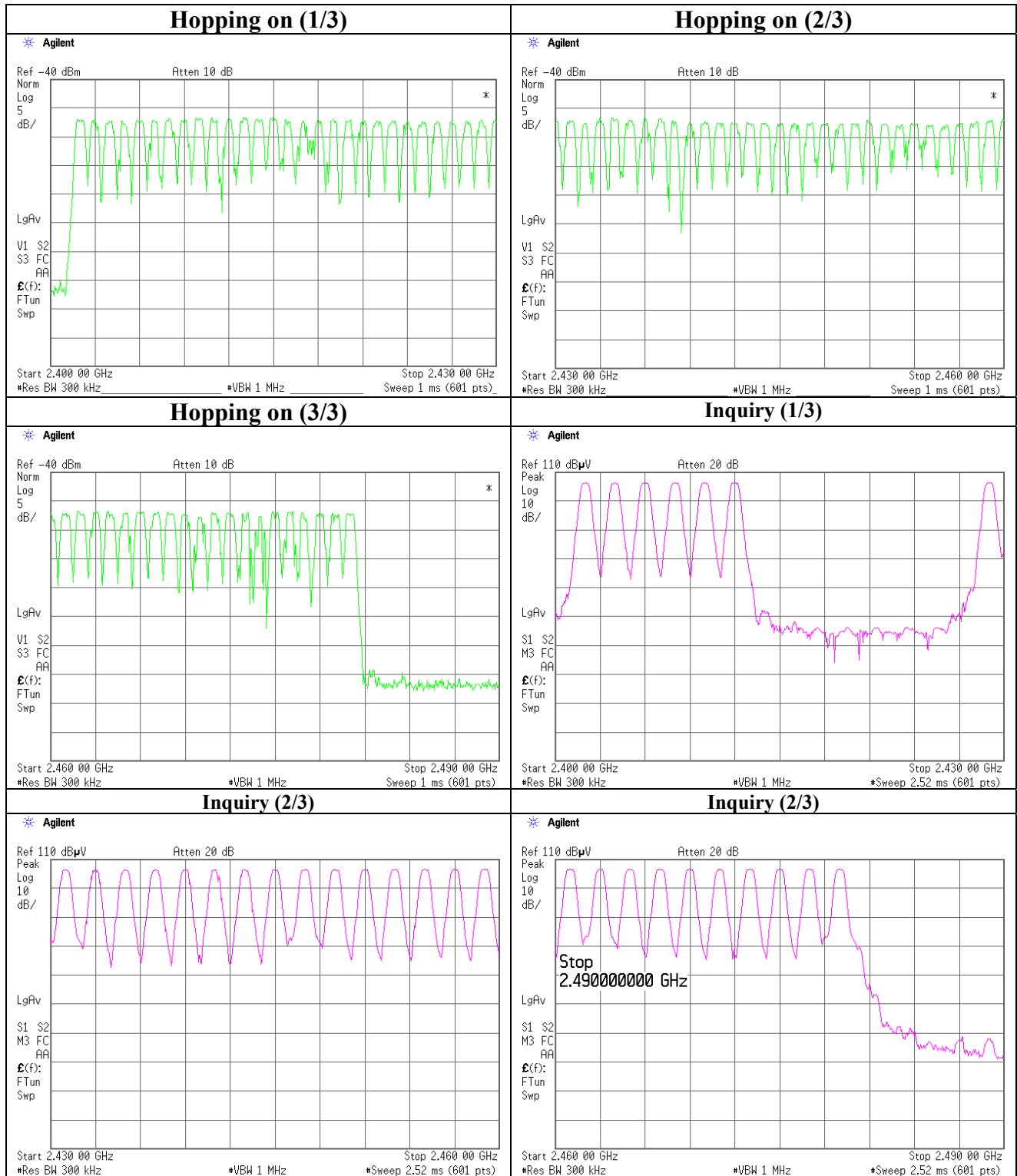
UL Apex Co., Ltd.
Head Office EMC Lab. No.3 Measurement Room

COMPANY	: Sharp Corporation	REGULATION	: Fcc Part15 Subpart C 15.247(a)(1)(iii)
EQUIPMENT	: Tri-Band Mobile Cellular Phone	TEST DISTANCE	: -
MODEL	: Fantom	DATE	: 10/22/2004
S/N	: FCC1	TEMPERATURE	: 25deg.C
POWER	: DC3.7V	HUMIDITY	: 39%
MODE	: Tx(Hopping on)/Inquiry	ENGINEER	: Hiroka Umeyama

Mode	Number of channel	Limit
	[time]	[time]
Tx(Hoppng on)	79	≥ 15

Mode	Number of channel	Limit
	[time]	[time]
Inquiry	32	≥ 15

Number of Hopping Frequency(FHSS)



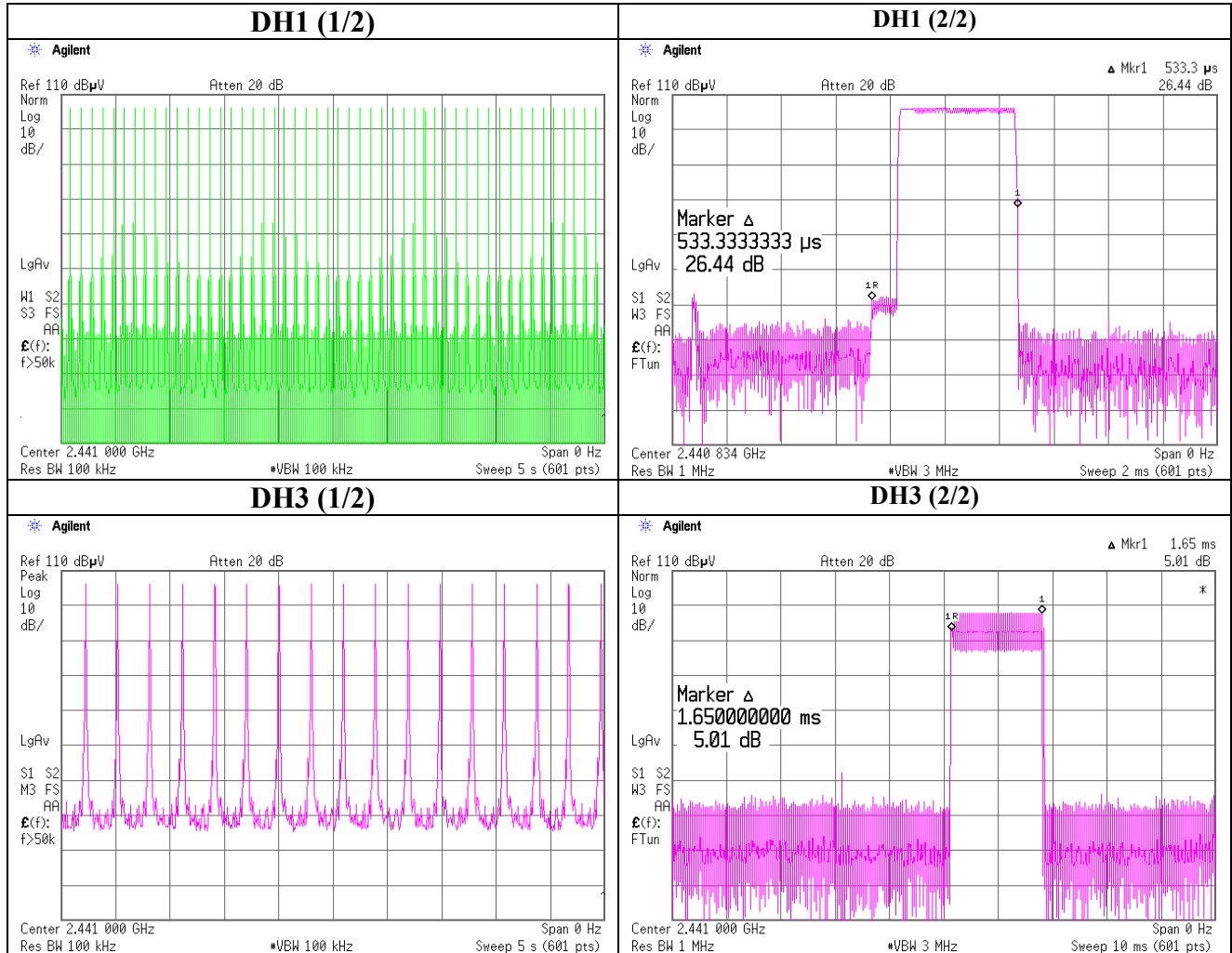
Dwell time(FHSS)

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

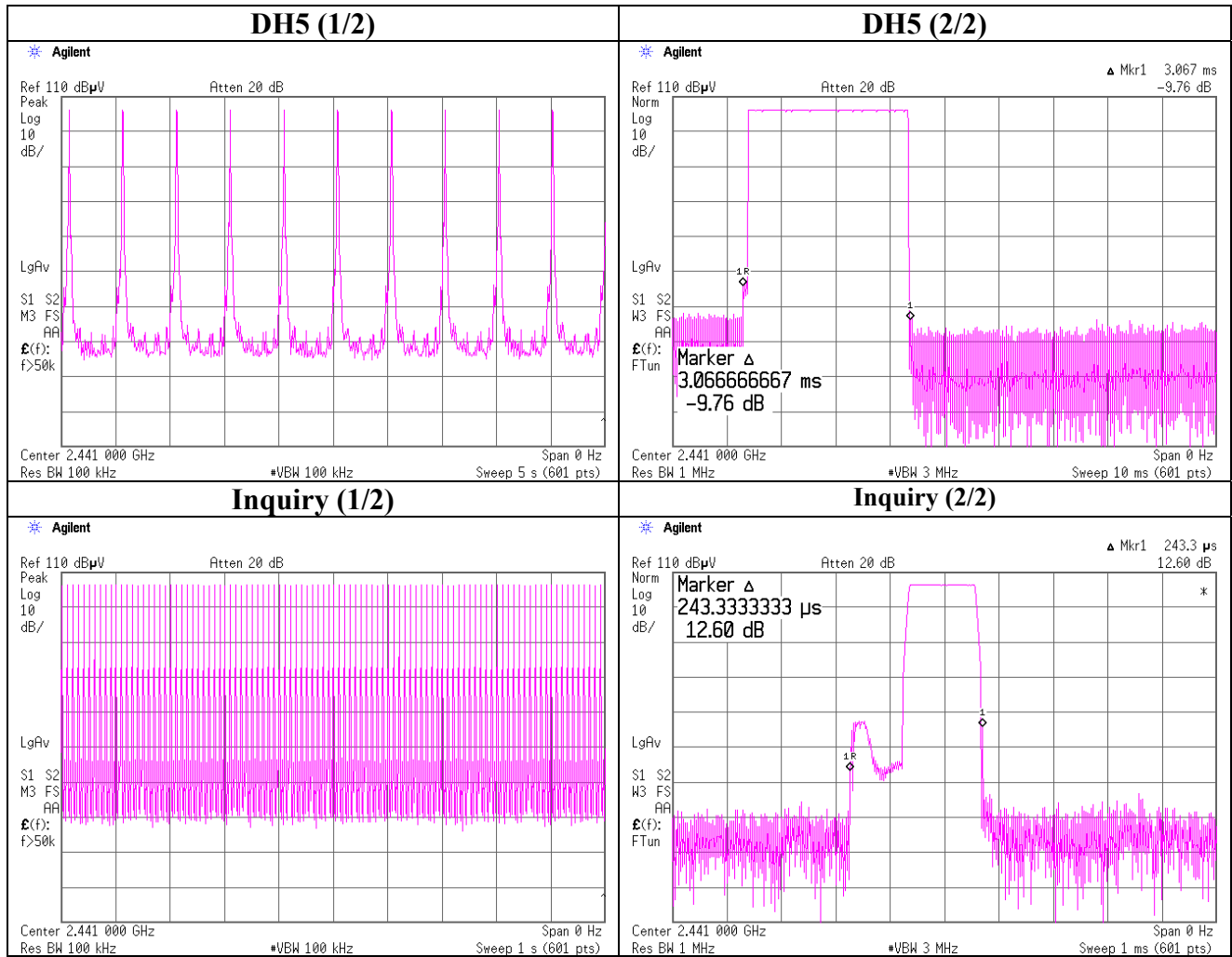
COMPANY	: Sharp Corporation	REGULATION	: Fcc Part15 Subpart C 15.247(a)(1)(iii)
EQUIPMENT	: Tri-Band Mobile Cellular Phone	TEST DISTANCE	: -
MODEL	: Fantom	DATE	: 10/22/2004
S/ N	: FCC1	TEMPERATURE	: 25deg.C
POWER	: DC3.7V	HUMIDITY	: 39%
MODE	: Tx(Hopping on)/Inquiry	ENGINEER	: Hiroka Umeyama

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period	Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50 times /5sec. x 31.6 = 316times	0.533	169	400
DH3	17 times / 5sec. x 31.6 = 108 times	1.650	179	400
DH5	10 times / 5 sec. x 31.6 = 64 times	3.067	197	400
Inquiry	100 times / 1sec. x 12.8 = 1280 times	0.243	312	400

Dwell time(FHSS)



Dwell time(FHSS)



Maximum Peak Output Power(FHSS)

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

COMPANY	: Sharp Corporation	REGULATION	: Fcc Part15 Subpart C 15.247(b)(1)
EQUIPMENT	: Tri-Band Mobile Cellular Phone	TEST DISTANCE	: -
MODEL	: Fantom	DATE	: 10/22/2004
S/ N	: FCC1	TEMPERATURE	: 25deg.C
POWER	: DC3.7V	HUMIDITY	: 39%
MODE	: Tx(Hopping off)/Inquiry	ENGINEER	: Hiroka Umeyama

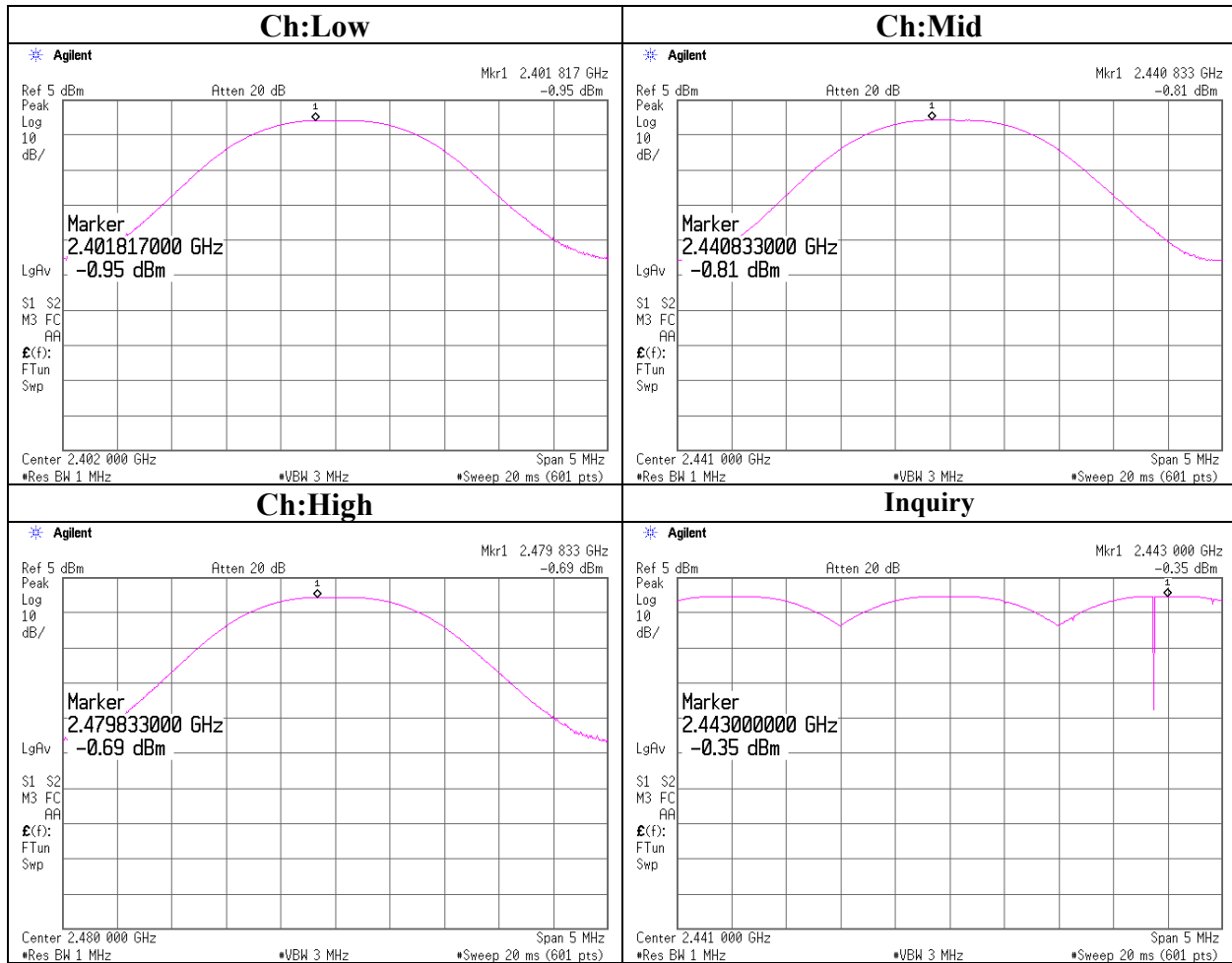
Ch	Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit (1W) [dBm]	Margin [dB]
Low	2402.0	-0.95	0.80	0.00	-0.15	30.00	30.15
Mid	2441.0	-0.81	0.68	0.00	-0.13	30.00	30.13
High	2480.0	-0.69	0.68	0.00	-0.01	30.00	30.01
Inquiry	2441.0	-0.35	0.68	0.00	0.33	30.00	29.67

Sample Calculation:

Result = Reading + Cable Loss (supplied by customer)+ Attenuator

* In the above table, factor 0.0dB represents no use of Atten. and/or Filter.

Maximum Peak Output Power(FHSS)



Radiated Spurious Emission(30-1000MHz)

DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/10/29 01:17:37

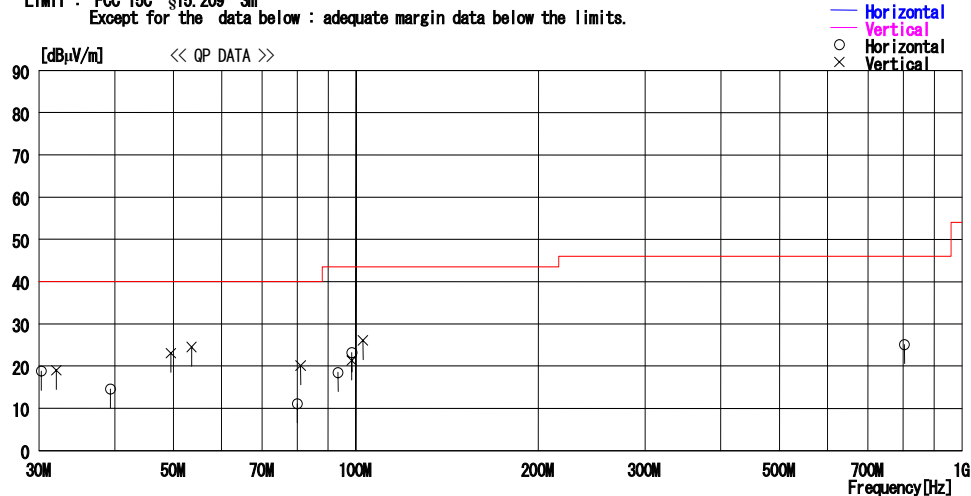
Applicant : SHARP CORPORATION
Kind of EUT : Tri-Band Mobile Cellular Phone
Model No. : Fantom
Serial No. : ES1-310

Report No. : 25BE0189-HO
Power : AC120V 60Hz
Temp°C/Humi% : 22 / 44
Operator : Yutaka Yoshida

Mode / Remarks : Bluetooth (Tx2402MHz) MAX-Axis(H:Y/V:X)

LIMIT : FCC 15C §15.209 3m

Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
Horizontal										
1	30.266	21.2	19.1	6.4	27.9	18.8	40.0	21.2	197	0
2	39.326	21.6	14.2	6.6	27.8	14.6	40.0	25.4	100	360
3	80.002	24.9	6.7	7.1	27.6	11.1	40.0	28.9	209	82
4	93.441	29.7	9.2	7.2	27.6	18.5	43.5	25.0	352	272
5	98.450	33.5	10.1	7.2	27.6	23.2	43.5	20.3	289	268
6	803.330	20.5	22.0	10.5	27.9	25.1	46.0	20.9	100	0
Vertical										
7	32.030	22.4	18.1	6.4	27.9	19.0	40.0	21.0	100	360
8	49.530	33.8	10.3	6.7	27.7	23.1	40.0	16.9	100	0
9	53.549	36.0	9.4	6.8	27.7	24.5	40.0	15.5	100	360
10	81.070	33.7	6.9	7.1	27.6	20.1	40.0	19.9	100	-1
11	98.359	31.6	10.1	7.2	27.6	21.3	43.5	22.2	100	360
12	102.755	35.7	10.8	7.2	27.6	26.1	43.5	17.4	100	-1

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN Page:

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Facsimile : +81 596 24 8124

MF060b(10.04.03)

DATA OF RADIATED EMISSION TEST

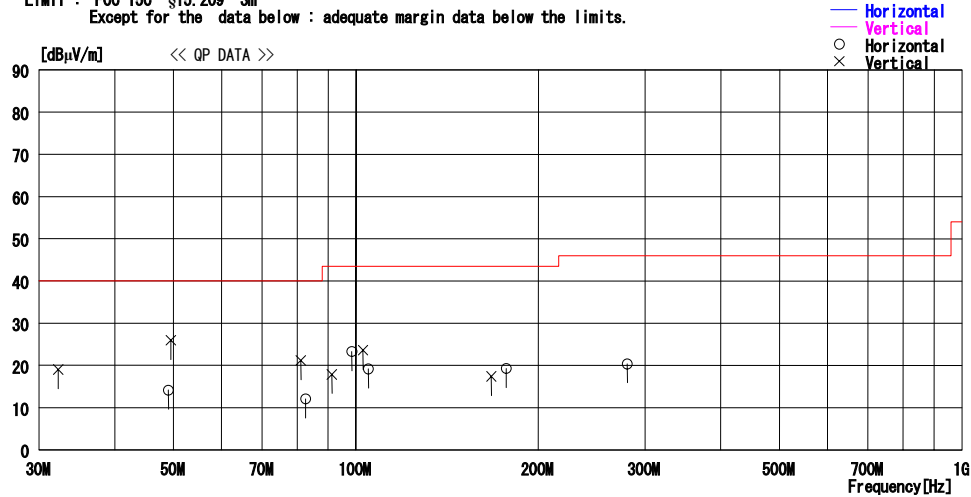
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/10/29 02:38:06

Applicant : SHARP CORPORATION
Kind of EUT : Tri-Band Mobile Cellular Phone
Model No. : Fantom
Serial No. : ES1-310

Report No. : 25BE0189-HO
Power : AC120V 60Hz
Temp°C/Humi% : 22 / 44
Operator : Yutaka Yoshida

Mode / Remarks : Bluetooth (Tx2441MHz) MAX-Axis(H:Y/V:X)

LIMIT : FCC 15C §15.209 3m
Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING QP [dB μ V]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dB μ V/m]	LIMIT [dB μ V/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
Horizontal										
1	49.039	24.8	10.4	6.7	27.7	14.2	40.0	25.8	378	276
2	82.584	25.7	7.1	7.0	27.7	12.1	40.0	27.9	242	118
3	98.452	33.6	10.1	7.2	27.6	23.3	43.5	20.2	342	116
4	104.848	28.5	11.1	7.2	27.6	19.2	43.5	24.3	250	95
5	176.949	22.0	16.8	7.7	27.2	19.3	43.5	24.2	103	7
6	280.436	19.8	19.1	8.3	26.8	20.4	46.0	25.6	167	206
Vertical										
7	32.262	22.7	17.9	6.4	27.9	19.1	40.0	21.0	162	79
8	49.530	36.6	10.3	6.7	27.7	25.9	40.0	14.1	126	342
9	81.111	34.8	6.9	7.1	27.6	21.2	40.0	18.8	142	170
10	91.315	29.5	8.8	7.2	27.6	17.9	43.5	25.6	192	212
11	102.792	33.2	10.8	7.2	27.6	23.6	43.5	19.9	107	146
12	167.293	20.3	16.8	7.6	27.3	17.4	43.5	26.1	393	198

CHART:WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

UL Apex Co., Ltd.

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MF060b(10.04.03)

DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/10/29 00:36:12

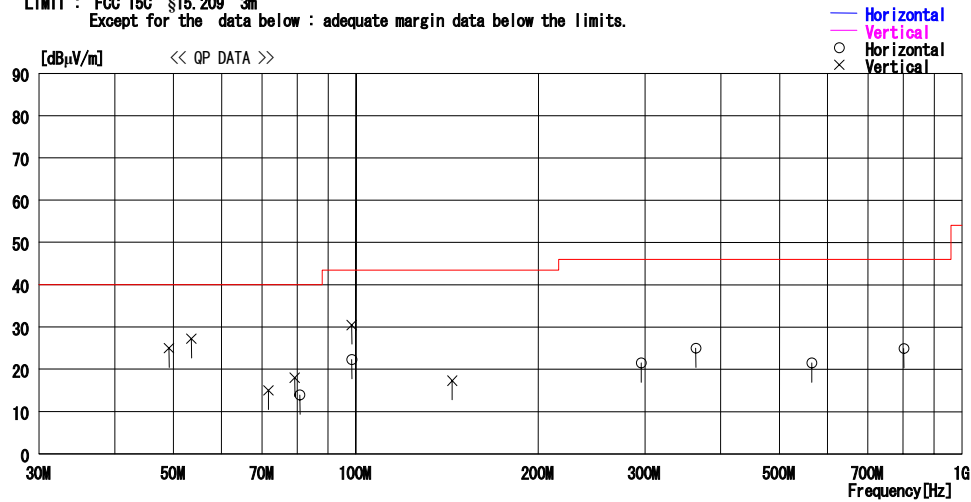
Applicant : SHARP CORPORATION
Kind of EUT : Tri-Band Mobile Cellular Phone
Model No. : Fantom
Serial No. : ES1-310

Report No. : 25BE0189-HO
Power : AC120V 60Hz
Temp°C/Humi% : 22 / 44
Operator : Yutaka Yoshida

Mode / Remarks : Bluetooth (Tx2480MHz) MAX-Axis(H:Y/V:X)

LIMIT : FCC 15C §15.209 3m

Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE
Horizontal										
1	80.894	27.6	6.8	7.1	27.6	13.9	40.0	26.1	218	131
2	98.453	32.6	10.1	7.2	27.6	22.3	43.5	21.2	311	134
3	295.725	19.9	20.1	8.3	26.8	21.5	46.0	24.5	100	-1
4	364.000	26.4	17.2	8.6	27.2	25.0	46.0	21.0	100	261
5	565.295	20.8	19.4	9.6	28.3	21.5	46.0	24.5	100	0
6	801.878	20.3	22.0	10.5	27.9	24.9	46.0	21.1	100	360
Vertical										
7	49.154	35.6	10.4	6.7	27.7	25.0	40.0	15.0	100	360
8	53.514	38.7	9.4	6.8	27.7	27.2	40.0	12.8	100	0
9	71.743	28.9	6.9	6.9	27.7	15.0	40.0	25.0	100	218
10	79.275	31.8	6.7	7.1	27.6	18.0	40.0	22.0	100	360
11	98.453	40.8	10.1	7.2	27.6	30.5	43.5	13.0	115	0
12	144.191	22.1	15.1	7.5	27.4	17.3	43.5	26.2	286	360

CHART:WITH FACTOR ANT TYPE : 30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

Radiated Spurious Emission (1-25GHz) / Band Edge compliance

Company : SHARP Corporation
Equipment : Tri-Band Mobile Cellular Phone
Model : Fantom
Sample No. : ES1-310
Power : AC120V / 60Hz
Mode : BT DH5, Tx2402MHz
Remarks : Tx antenna Y-axis(Hor)/X-axis(Ver)

REPORT NO : 25BE0189-HO
REGULATION : Fcc Part15 Subpart C 15.247(C)
TEST DISTANCE : 3/1m
DATE : 10/28/2004
TEMPERATURE : 22deg.C
HUMIDITY : 44%
ENGINEER : Yutaka Yoshida

PK DETECT (RBW: 1MHz, VBW:1MHz)

No.	FREQ	S/A READING		ANT	AMP	CABLE	Filter or	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	ATT	HOR	VER	PK	HOR	VER
	[MHz]	[dBuV/m]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass												
1	2390.0	46.9	47.3	30.8	36.3	6.4	0.0	47.8	48.2	74.0	26.2	25.8
2	4804.0	49.1	49.4	35.3	36.1	9.3	1.0	58.6	58.9	74.0	15.4	15.1
3	7206.0	42.0	42.3	37.9	35.6	11.8	0.4	56.5	56.8	74.0	17.5	17.2
4	9608.0	43.8	42.6	37.6	36.3	13.9	0.1	59.1	57.9	74.0	14.9	16.1
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac												
5	12010.0	42.1	42.2	41.0	35.7	6.0	0.1	44.0	44.1	74.0	30.0	29.9
6	14412.0	40.5	40.4	41.1	34.6	7.1	0.2	44.8	44.7	74.0	29.2	29.3
7	16814.0	43.4	43.4	45.9	35.6	9.1	1.1	54.4	54.4	74.0	19.6	19.6
8	19216.0	42.6	42.5	42.1	34.9	10.8	1.4	52.5	52.4	74.0	21.5	21.6
9	21618.0	43.8	43.6	40.8	35.4	12.6	1.4	53.7	53.5	74.0	20.3	20.5
10	24020.0	43.1	43.2	41.0	35.8	13.1	1.4	53.3	53.4	74.0	20.7	20.6

AV DETECT (RBW: 1MHz, VBW:10Hz)

No.	FREQ [MHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	Band-Pass Filter [dB]	RESULT		Limit AV [dBuV/m]	MARGIN	
		HOR [dBuV/m]	VER					HOR [dB]	VER [dB]			
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass												
1	2390.0	33.6	33.4	30.8	36.3	6.4	0.0	34.5	34.3	54.0	19.5	19.7
2	4804.0	41.3	41.7	35.3	36.1	9.3	1.0	50.8	51.2	54.0	3.2	2.8
3	7206.0	29.0	29.3	37.9	35.6	11.8	0.4	43.5	43.8	54.0	10.5	10.2
4	9608.0	29.7	29.7	37.6	36.3	13.9	0.1	45.0	45.0	54.0	9.0	9.0
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac												
5	12010.0	29.1	29.2	41.0	35.7	6.0	0.1	31.0	31.1	54.0	23.0	22.9
6	14412.0	28.3	28.3	41.1	34.6	7.1	0.2	32.6	32.6	54.0	21.4	21.4
7	16814.0	29.7	29.7	45.9	35.6	9.1	1.1	40.7	40.7	54.0	13.3	13.3
8	19216.0	29.8	29.8	42.1	34.9	10.8	1.4	39.7	39.7	54.0	14.3	14.3
9	21618.0	30.4	30.4	40.8	35.4	12.6	1.4	40.3	40.3	54.0	13.7	13.7
10	24020.0	30.4	30.5	41.0	35.8	13.1	1.4	40.6	40.7	54.0	13.4	13.3

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) = 9.5dB

*Except for the above table : All other spurious emissions were less than 20dB for the limit.

*In the frequency over the fifth harmonic, the noise from the EUT was not seen. The data above is its base noise.

UL Apex Co., Ltd.

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MF060b(10.04.03)

Radiated Spurious Emission (1-25GHz) / Band Edge compliance

Head Office EMC Lab. No.2 Semi Anechoic Chamber

Company : SHARP Corporation
Equipment : Tri-Band Mobile Cellular Phone
Model : Fantom
Sample No. : ES1-310
Power : AC120V / 60Hz
Mode : BT DH5, Tx2441MHz
Remarks : Tx antenna Y-axis(Hor)/X-axis(Ver)

REPORT NO : 25BE0189-HO
REGULATION : Fcc Part15 Subpart C 15.247(C)
TEST DISTANCE : 3/1m
DATE : 10/28/2004
TEMPERATURE : 22deg.C
HUMIDITY : 44%
ENGINEER : Yutaka Yoshida

PK DETECT (RBW: 1MHz, VBW:1MHz)

No.	FREQ [MHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	Filter or ATT [dB]	RESULT		Limit PK [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
		[dBuV/m]						[dB]	[dB]		[dB]	[dB]
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass												
1	4882.0	43.9	44.2	35.7	36.1	9.5	1.0	54.0	54.3	74.0	20.0	19.7
2	7323.0	41.9	42.2	38.2	35.7	12.0	0.5	56.9	57.2	74.0	17.1	16.8
3	9764.0	42.7	42.1	37.3	36.3	14.0	0.2	57.9	57.3	74.0	16.1	16.7
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac												
4	12205.0	42.1	42.1	41.5	35.6	6.1	0.3	44.9	44.9	74.0	29.1	29.1
5	14646.0	40.5	41.0	41.6	34.8	7.3	0.2	45.3	45.8	74.0	28.7	28.2
6	17087.0	43.3	43.1	46.5	35.4	9.3	1.1	55.3	55.1	74.0	18.7	18.9
7	19528.0	42.7	42.4	41.2	35.0	11.1	1.4	51.9	51.6	74.0	22.1	22.4
8	21969.0	43.5	43.5	41.1	35.0	12.8	1.4	54.3	54.3	74.0	19.7	19.7
9	24410.0	43.1	43.2	41.2	36.6	13.2	1.4	52.8	52.9	74.0	21.2	21.1

AV DETECT (RBW: 1MHz, VBW:10Hz)

No.	FREQ [MHz]	S/A READING HOR VER [dBuV/m]		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	Band-Pass Filter [dB]	RESULT HOR VER [dBuV/m]		Limit AV [dBuV/m]	MARGIN HOR VER [dB]	
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass												
1	4882.0	30.8	30.9	35.7	36.1	9.5	1.0	40.9	41.0	54.0	13.1	13.0
2	7323.0	29.2	29.2	38.2	35.7	12.0	0.5	44.2	44.2	54.0	9.8	9.8
3	9764.0	29.9	29.9	37.3	36.3	14.0	0.2	45.1	45.1	54.0	8.9	8.9
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac												
4	12205.0	29.1	29.2	41.5	35.6	6.1	0.3	31.9	32.0	54.0	22.1	22.0
5	14646.0	28.4	28.5	41.6	34.8	7.3	0.2	33.2	33.3	54.0	20.8	20.7
6	17087.0	29.9	29.8	46.5	35.4	9.3	1.1	41.9	41.8	54.0	12.1	12.2
7	19528.0	29.8	29.8	41.2	35.0	11.1	1.4	39.0	39.0	54.0	15.0	15.0
8	21969.0	30.4	30.3	41.1	35.0	12.8	1.4	41.2	41.1	54.0	12.8	12.9
9	24410.0	30.4	30.5	41.2	36.6	13.2	1.4	40.1	40.2	54.0	13.9	13.8

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) = 9.5dB

*Except for the above table : All other spurious emissions were less than 20dB for the limit.

*In the frequency over the fifth harmonic, the noise from the EUT was not seen. The data above is its base noise.

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MF060b(10.04.03)

Radiated Spurious Emission (1-25GHz) / Band Edge compliance

Company : SHARP Corporation
Equipment : Tri-Band Mobile Cellular Phone
Model : Fantom
Sample No. : ES1-310
Power : AC120V / 60Hz
Mode : BT DH5, Tx2480MHz
Remarks : Tx antenna Y-axis(Hor)/X-axis(Ver)

REPORT NO : 25BE0189-HO
REGULATION : Fcc Part15 Subpart C 15.247(C)
TEST DISTANCE : 3/1m
DATE : 10/28/2004
TEMPERATURE : 22deg.C
HUMIDITY : 44%
ENGINEER : Yutaka Yoshida

PK DETECT (RBW: 1MHz, VBW:1MHz)

No.	FREQ [MHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	Filter or ATT [dB]	RESULT		Limit PK [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
		[dBuV/m]	[dBuV/m]					[dB]	[dB]		[dB]	[dB]
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass												
1	2483.5	44.8	44.8	31.0	36.2	6.5	0.0	46.1	46.1	74.0	27.9	27.9
2	4960.0	44.6	45.2	36.1	36.1	9.5	1.1	55.2	55.8	74.0	18.8	18.2
3	7440.0	42.7	44.4	38.5	35.7	12.0	0.7	58.2	59.9	74.0	15.8	14.1
4	9920.0	42.2	41.8	37.0	36.3	14.1	0.3	57.3	56.9	74.0	16.7	17.1
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac												
5	12400.0	42.1	41.8	41.9	35.5	6.2	0.4	45.6	45.3	74.0	28.4	28.7
6	14880.0	40.5	42.1	42.6	35.0	7.6	0.5	46.7	48.3	74.0	27.3	25.7
7	17360.0	43.5	43.2	46.9	35.2	9.5	0.9	56.1	55.8	74.0	17.9	18.2
8	19840.0	42.5	42.4	41.2	35.3	11.4	1.4	51.7	51.6	74.0	22.3	22.4
9	22320.0	43.4	43.5	41.4	35.1	12.9	1.4	54.5	54.6	74.0	19.5	19.4
10	24800.0	43.2	43.2	41.2	36.7	13.4	1.4	53.0	53.0	74.0	21.0	21.0

AV DETECT (RBW: 1MHz, VBW:10Hz)

No.	FREQ	S/A READING		ANT	AMP	CABLE	Band-Pass	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN	LOSS	Filter	HOR	VER	AV	HOR	VER
	[MHz]	[dBuV/m]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass												
1	2483.5	33.7	33.0	31.0	36.2	6.5	0.0	35.0	34.3	54.0	19.0	19.7
2	4960.0	32.2	33.3	36.1	36.1	9.5	1.1	42.8	43.9	54.0	11.2	10.1
3	7440.0	29.5	29.6	38.5	35.7	12.0	0.7	45.0	45.1	54.0	9.0	8.9
4	9920.0	29.9	29.9	37.0	36.3	14.1	0.3	45.0	45.0	54.0	9.0	9.0
Test distance 1meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Band Pass - Dfac												
5	12400.0	29.2	29.2	41.9	35.5	6.2	0.4	32.7	32.7	54.0	21.3	21.3
6	14880.0	28.3	28.4	42.6	35.0	7.6	0.5	34.5	34.6	54.0	19.5	19.4
7	17360.0	29.8	29.8	46.9	35.2	9.5	0.9	42.4	42.4	54.0	11.6	11.6
8	19840.0	29.8	29.7	41.2	35.3	11.4	1.4	39.0	38.9	54.0	15.0	15.1
9	22320.0	30.3	30.4	41.4	35.1	12.9	1.4	41.4	41.5	54.0	12.6	12.5
10	24800.0	30.5	30.4	41.2	36.7	13.4	1.4	40.3	40.2	54.0	13.7	13.8

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) = 9.5dB

*Except for the above table : All other spurious emissions were less than 20dB for the limit.

*In the frequency over the fifth harmonic, the noise from the EUT was not seen. The data above is its base noise.

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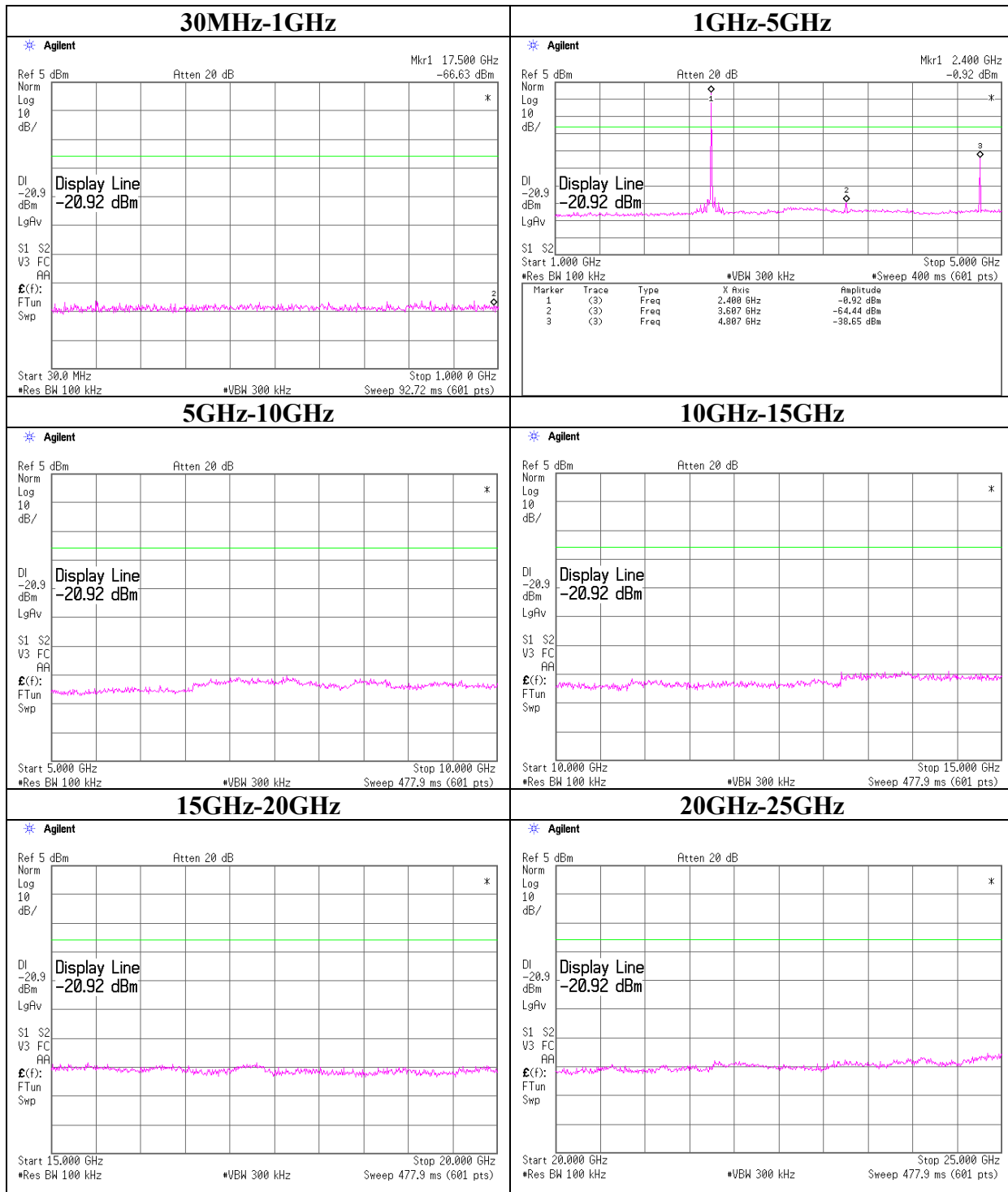
Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

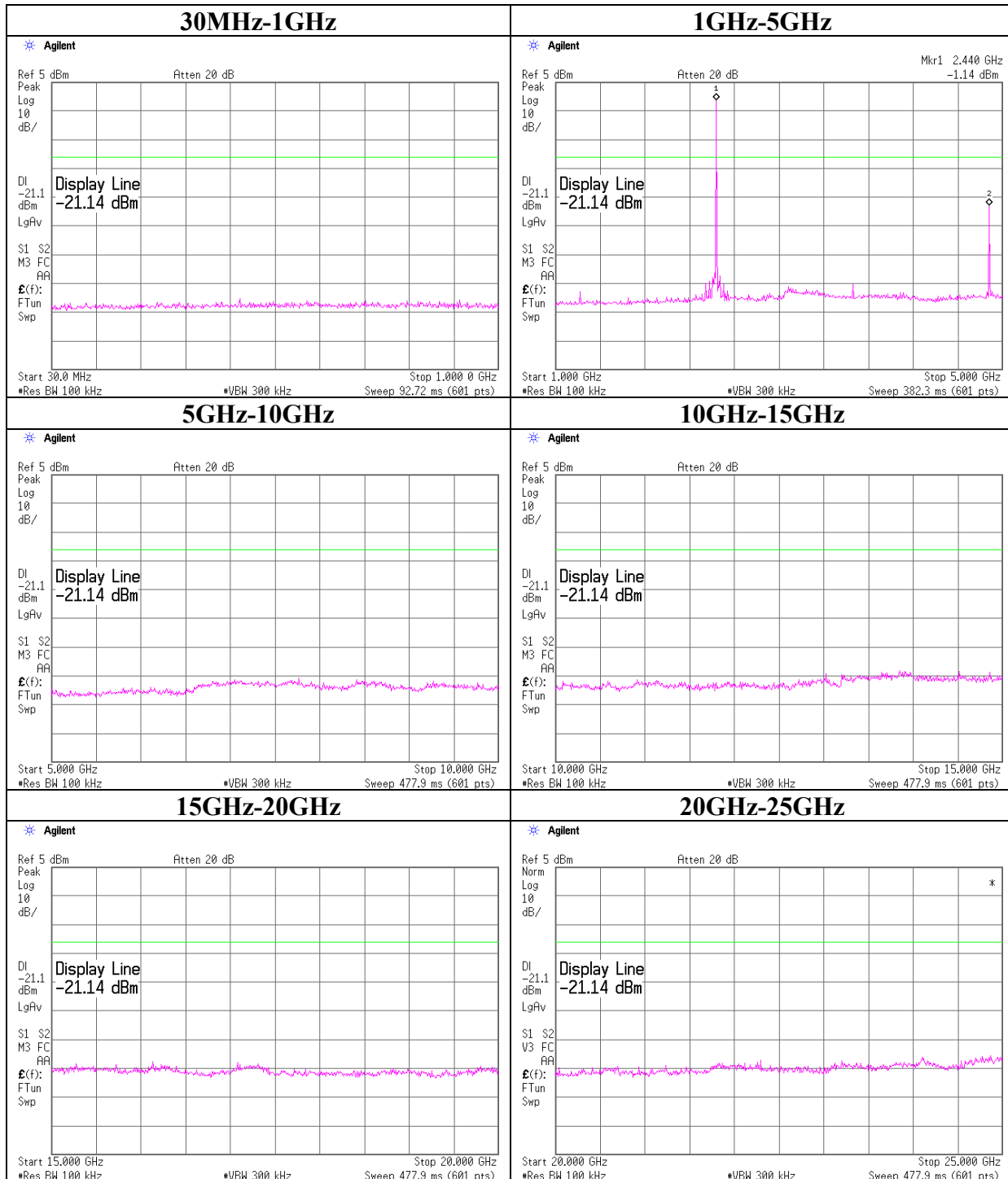
Conducted Spurious Emission (FHSS)

Ch:Low



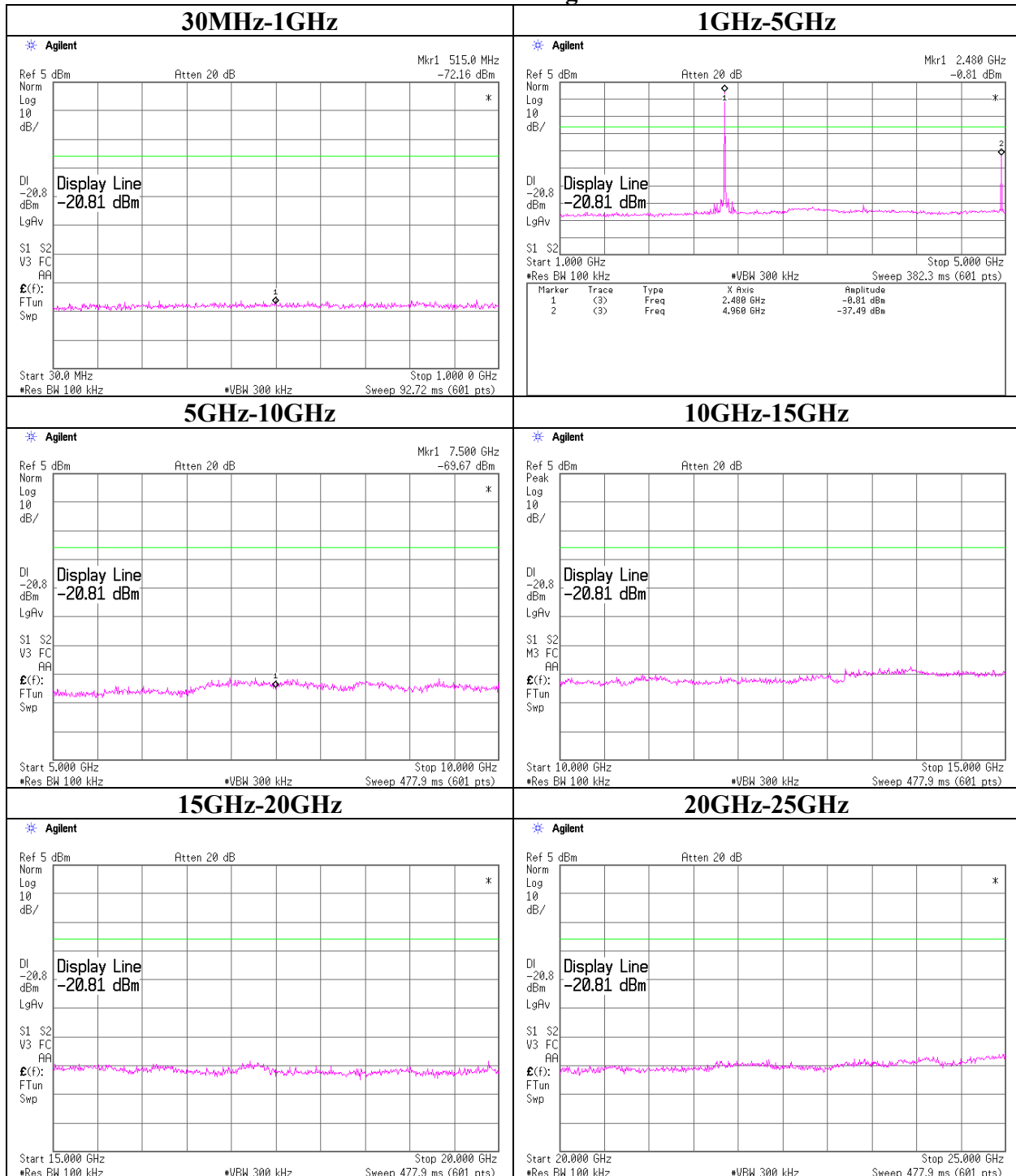
Conducted Spurious Emission (FHSS)

Ch:Mid

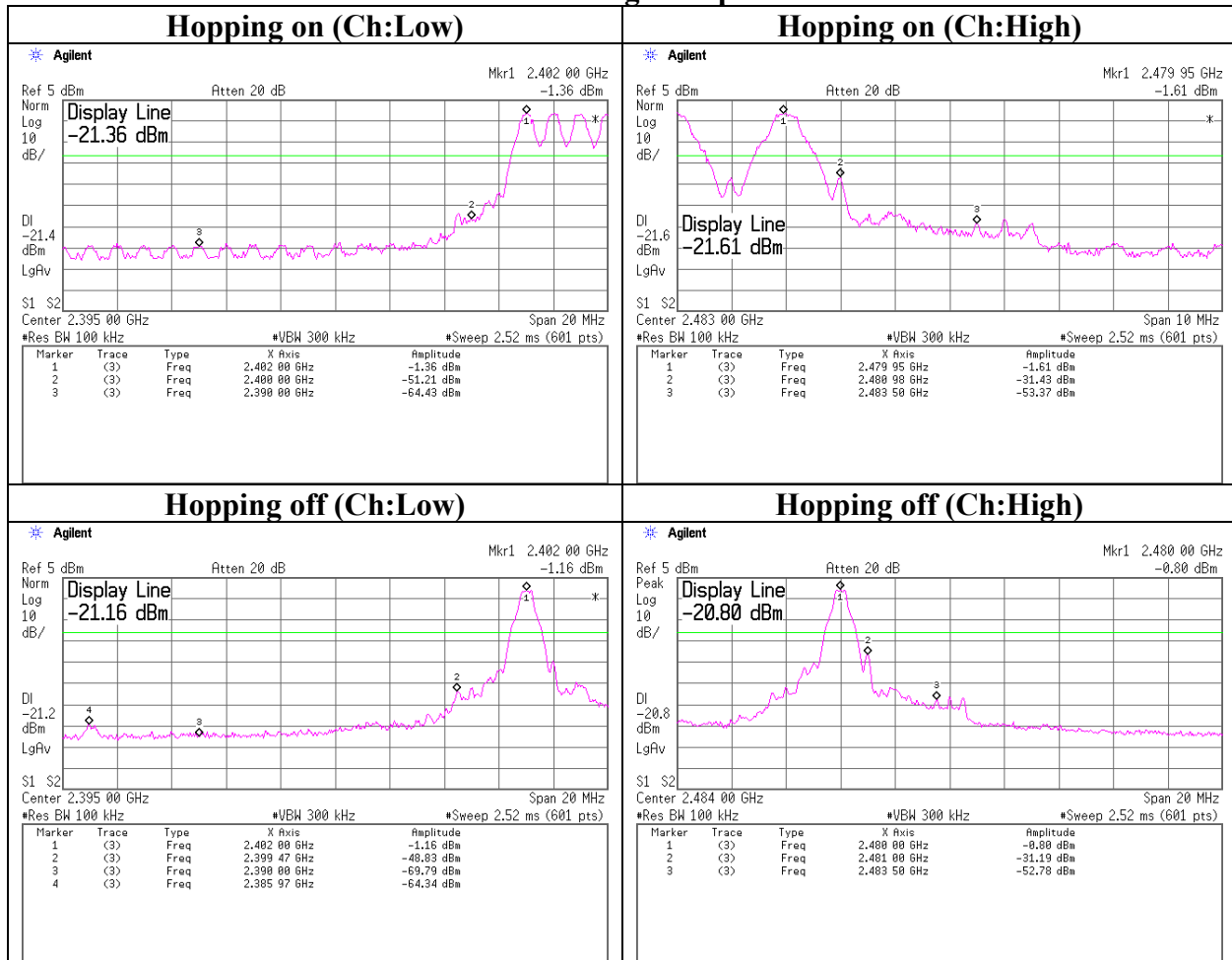


Conducted Spurious Emission (FHSS)

Ch:High



Conducted Spurious Emission (FHSS) Band Edge compliance



99% Occupied Bandwidth(FHSS)

