



EMI TEST REPORT

Test Report No. : 24CE0011-HO-3

Applicant : Matsushita Electric Industrial Co., Ltd.
Type of Equipment : Bluetooth Headset
Model No. : EB-BHX70
Test standard : FCC Part 15 Subpart C : 2003
Section 15.207, Section 15.247
FCC ID : ACJ29082EB-BHX70
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.
5. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

Date of test : October 23, 27 and 29, 2003

Tested by : 
Hiroka Umeyama
EMC Service

Approved by : 
Hironobu Shimoji
Group Leader of EMC Service

UL Apex Co., Ltd.

Head Office EMC Lab.

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MF060b(10.04.03)

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SECTION 1: Client information

Company Name	:	Matsushita Electric Industrial Co.,Ltd.
Address	:	1006 Oaza Kadoma, Kadoma, Osaka 571-0050 JAPAN
Telephone Number	:	+1-201-348-7758
Facsimile Number	:	+1-201-392-4564
Contact Person	:	Richard Mullen

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

2.1 Identification of E.U.T.

Type of Equipment	:	Bluetooth Headset
Model No.	:	EB-BHX70
Serial No.	:	001(for Conducted emission test) 002 (except for Conducted emission test)
Country of Manufacture	:	Philippines
Receipt Date of Sample	:	October 20, 2003
Condition of EUT	:	Production prototype

2.2 Product Description

Matsushita Electric Industrial Co.,Ltd., Model No: EB-BHX70 is the Bluetooth Headset.

The model number differs from the countries where the products are marketed. (eg: EB-BHX70** or EB-BHX70***)

The system is mainly used as a wireless Headset for mobile phone.

The clock frequency of EUT is 16MHz.

Frequency operation	:	2402-2480 MHz
Type of modulation	:	GFSK/FHSS
Bandwidth & Channel spacing	:	1 MHz & 79channel
Mode of operation	:	Simplex
Antenna Type	:	Chip Antenna
Antenna Gain	:	2.14 dBi
Antenna connector Type	:	Non
Power Supply	:	DC5.5 to 8.0V (Charging Terminal)/DC4.2 to 2.8V (Inner)
Temperature of operation	:	0 deg. C. -+ 45 deg. C.(Charging mode) -20 deg.C - +60 deg.C.(Operating mode)

FCC 15.31 (e)

This EUT provides stable voltage(DC3.7V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

Bluetooth Headset and its antenna comply with this requirement since they are built in host device EB-BHX70

When they are put up for sale and they are used with a particular antenna connector for this EUT.

Since Bluetooth Headset uses a transmitting antenna that is an integral part of the equipment, it is impossible for end users to replace the antenna without use of a special tool. Therefore, the equipment complies with the requirement of 15.203.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C:2003

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

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted emission	ANSI C63.4:2001	Section 15.207	-	N/A	6.7dB 1.3782MHz, L1	Complied
2	Carrier Frequency Separation	ANSI C63.4:2001	Section15.247(a)(1)	Conducted	N/A	-	Complied
3	20dB Bandwidth	ANSI C63.4:2001	Section15.247(a)(1)	Conducted	N/A	-	Complied
4	Number of Hopping Frequency	ANSI C63.4:2001	Section15.247(a)(1)(iii)	Conducted	N/A	-	Complied
5	Dwell time	ANSI C63.4:2001	Section15.247(a)(1)(iii)	Conducted	N/A	-	Complied
6	Maximum Peak Output Power	ANSI C63.4:2001	Section15.247(b)(1)	Conducted	N/A	-	Complied
7	Band Edge Compliance	ANSI C63.4:2001	Section15.247(c)	Conducted	N/A	-	Complied
8	Spurious Emission	ANSI C63.4:2001	Section15.247(c)	Conducted/ Radiated	N/A	7.9dB 12400.0MHz Vertical	Complied

Note: UL Apex's EMI Work Procedures No.QPM05.

*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.

3.3 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart C : 2003 Section 15.207 and 15.247.

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3.4 Uncertainty

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is $\pm 1.3\text{dB}$.

The data listed in this test report has enough margin.

Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is $\pm 4.5\text{dB}(3\text{m})$.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is $\pm 5.2\text{dB}(3\text{m})$.

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 test report has enough margin.

Other test except Conducted Emission and Spurious Emission (Radiated)

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.

3.5 Test Location

UL Apex Co., Ltd. Head Office EMC Lab.

No.2 semi anechoic chamber and No.3 measurement room

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No.2 semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on June 05, 2002. (Registration number: No.2:846015 Industry Canada: No.2: IC4247-2)

*NVLAP Lab. code: 200572-0

3.6 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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

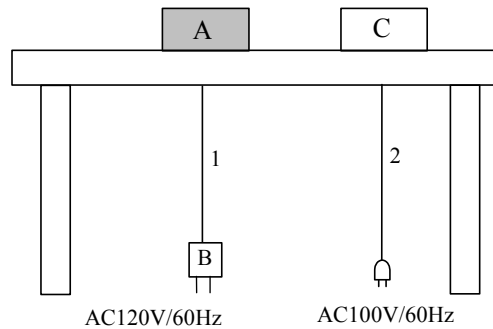
4.1 Operating Modes

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

The sequence is used : 1. Transmitting mode
2402MHz
2441MHz
2480MHz
*Continuous Transmitting mode (all three frequencies fixed)
2. Inquiry mode

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

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	Remarks	FCC ID
A	Bluetooth Headset	EB-BHX70	001(for Conducted emission test) 002 (except for Conducted emission test)	Mitsumi Electric Co.,Ltd.	EUT	ACJ29082EB-BHX70
B	AC Adaptor	EB-CAX70CN	-	Mitsumi Electric Co.,Ltd.	-	-
C	Jig	-	-	Mitsumi Electric Co.,Ltd.	-	*Conducted emission only

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	DC Power Cable	1.5	N	Polyvinyl chloride*Used only for the Conducted emission test
2	AC Power Cable	2.0	N	Polyvinyl chloride*Used only for the Conducted emission test

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SECTION 5: Conducted Emission, Section 15.207

Test Procedure

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. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN 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 on a horizontal conducting plane 4.0 x 4.0m and a vertical conducting plane 2.0 x 2.0m in a No.2 semi Anechoic Chamber. The EUT was connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection has been performed. The measurements have been performed with a 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: 20dB 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

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 connected to the antenna port.

Test data	: APPENDIX 3
Test result	: Pass

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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 power meter connected to the antenna port.

Test data : APPENDIX 3
Test result : Pass

SECTION 11: Band Edge Compliance, Section 15.247(c)

Test Procedure

The Band Edge Compliance was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 3
Test result : Pass

SECTION 12: Spurious Emission , Section 15.247(c)

[Conducted]

Test Procedure

The Spurious Emission (Conducted) 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, 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.2 semi anechoic chamber (7.5x5.8x5.2m) with a ground plane at a distance of 3m.

The measuring antenna height was varied between 1 to 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.

The result was also satisfied the general limits specified in section 15.209(a).

Test data : APPENDIX 3

Test result : Pass

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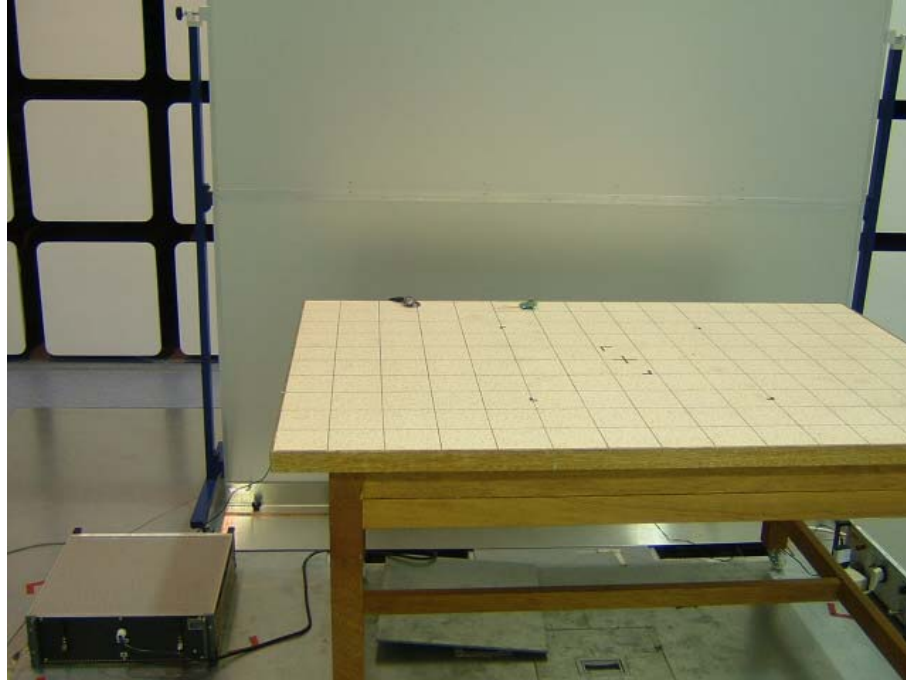
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APPENDIX 1: Photographs of test setup

Conducted Emission

Front



Rear

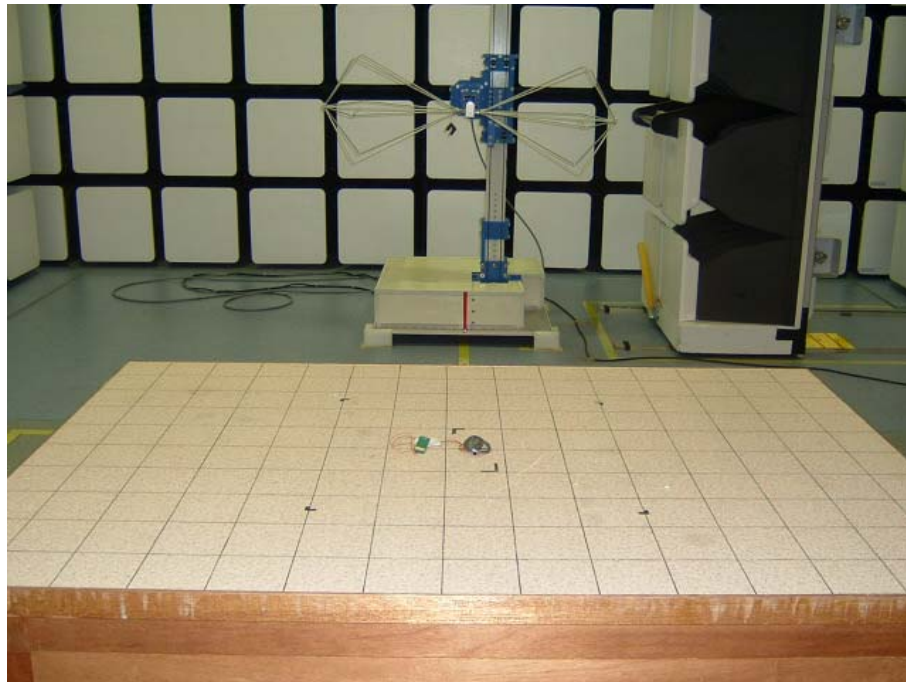


Spurious Emission (Radiated)

Front



Rear

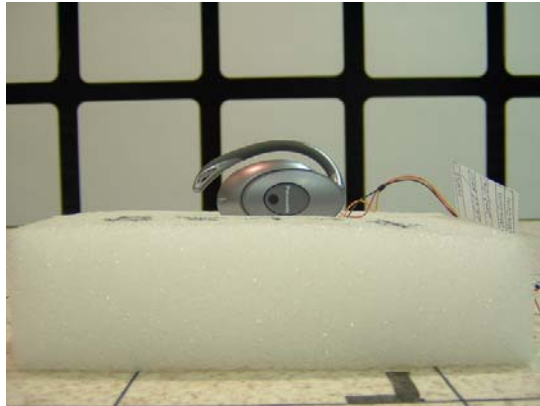


Worst Case Position (X-axis:Horizontal / Y-axis:Vertical)

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	1, 2	2003/04/11 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	2	2002/12/24 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	2	2003/05/08 * 12
MCC-13	Coaxial Cable	Fujikura/Agilent	-	1	2003/05/08 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	2	2003/04/28 * 12
MOS-02	Digital Humidity Indicator	N.T	NT-1800	1, 2	2002/12/10 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	1, 2	2003/01/31 * 12
SA-07	Spectrum Analyzer	Advantest	R3273	1, 2	2002/12/10 * 12
MPA-01	Pre Amplifier	Agilent	8449B	2	2003/02/08 * 12
MCC-24	Microwave Cable	Storm	-	2	2003/04/30 * 12
MCC-25	Microwave Cable	Suhner	SUCOFLEX1 04	2	2003/06/30 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	2	2003/01/11 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	1	2003/03/18 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	1(EUT)	2003/03/18 * 12
MBTR10	Spectrum Analyzer	Rohde & Schwarz	FSP30	4	2003/11/12 * 12
MPM-04	Power Meter	Agilent	E4416A	3	2003/03/13 * 12
MPSE-04	Power sensor	Agilent	E9327A	3	2003/03/18 * 12
MHF-02	High Pass Filter	Tokimec	TF323DCA	2	2003/09/19 * 12

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

Test Item:

- 1. Conducted emission**
- 2. Spurious emission (Radiated)**
- 3. Maximum Peak Output Power**
- 4. Except for 1, 2, 3**

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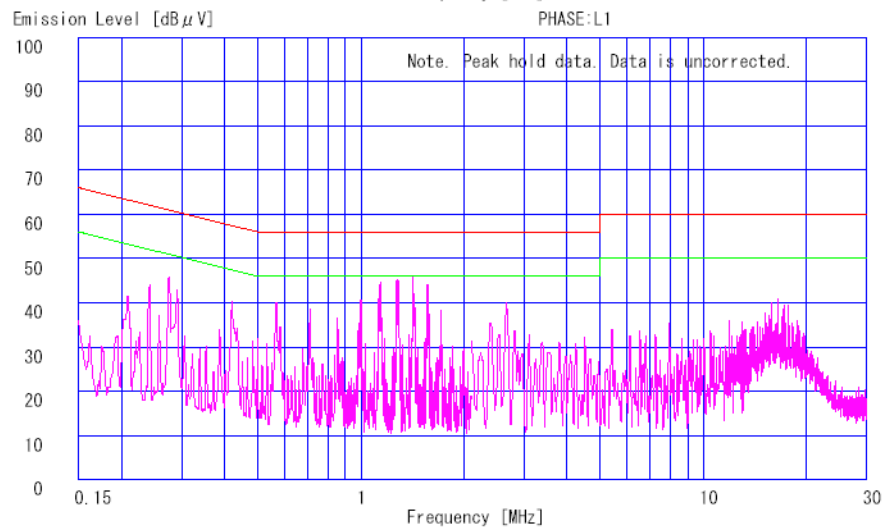
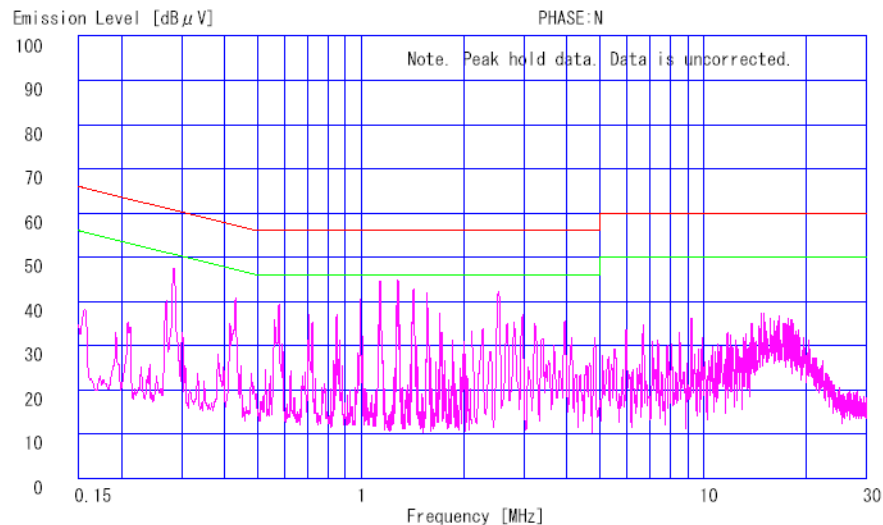
APPENDIX 3: Data of EMI test

Conducted Emission 2402MHz

DATA OF CONDUCTION TEST CHART

UL Apex Co., Ltd. Head Office EMC Lab.
No.2 Semi Anechoic Chamber
Report No. : 24CE0011-HO

Applicant : Matsushita Electric Industrial Co., Ltd.
Kind of Equipment : Bluetooth Headset
Model No. : EB-BHX70
Serial No. : 001
Power : AC120V/60Hz
Mode : Transmitting
Remarks : Tx2402
Date : 10/27/2003
Phase : Single Phase
Temperature : 24 °C
Humidity : 45 %
Regulation 1 : FCC Part15C § 15.207 (0.15-30MHz)
Regulation 2 : FCC Part15C § 15.207 (0.15-30MHz)



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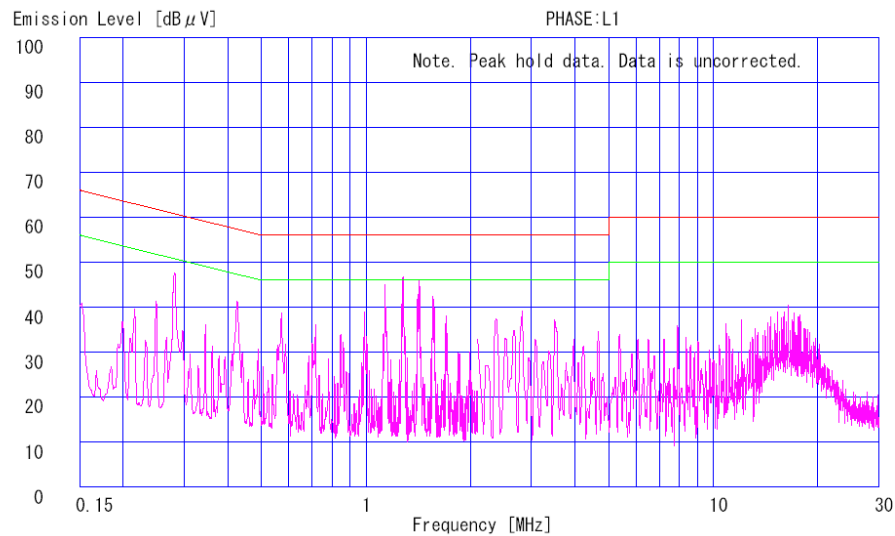
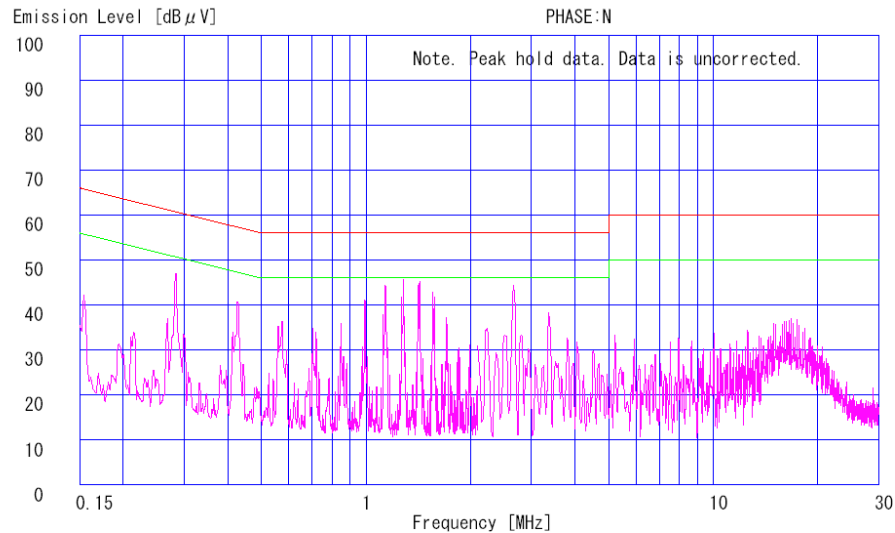
MF060b(10.04.03)

Conducted Emission 2441MHz

DATA OF CONDUCTION TEST CHART

UL Apex Co., Ltd. Head Office EMC Lab.
No.2 Semi Anechoic Chamber
Report No. : 24CE0011-HO

Applicant : Matsushita Electric Industrial Co., Ltd.
Kind of Equipment : Bluetooth Headset
Model No. : EB-BHX70
Serial No. : 001
Power : AC120V/60Hz
Mode : Transmitting
Remarks : Tx2441
Date : 10/27/2003
Phase : Single Phase
Temperature : 24 °C
Humidity : 45 %
Regulation 1 : FCC Part15C § 15.207 (0.15-30MHz)
Regulation 2 : FCC Part15C § 15.207 (0.15-30MHz)

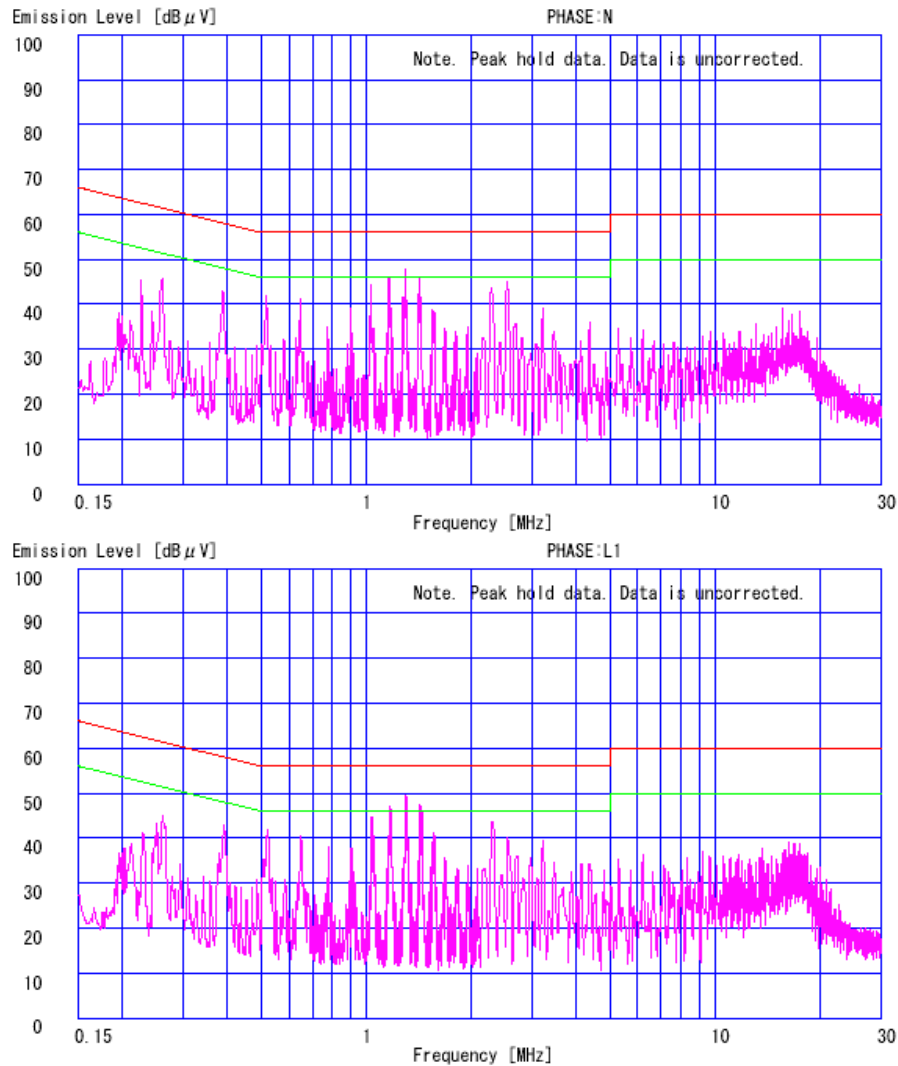


Conducted Emission
2480MHz

DATA OF CONDUCTION TEST CHART

UL Apex Co., Ltd. Head Office EMC Lab.
No.2 Semi Anechoic Chamber
Report No.: 24CE0011-HO

Applicant : Matsushita Electric Industrial Co., Ltd.
Kind of Equipment : Bluetooth Headset
Model No. : EB-BHX70
Serial No. : 001
Power : AC120V/60Hz
Mode : Running
Remarks : Tx2480
Date : 10/27/2003
Phase : Single Phase
Temperature : 24 °C
Humidity : 45 %
Regulation 1 : FCC Part15C § 15.207 (0.15-30MHz)
Regulation 2 : FCC Part15C § 15.207 (0.15-30MHz)



DATA OF CONDUCTION TEST

UL Apex Co., Ltd. Head Office EMC Lab.
No.2 Semi Anechoic Chamber
Report No. : 24CE0011-HO

Applicant : Matsushita Electric Industrial Co., Ltd.
Kind of Equipment : Bluetooth Headset
Model No. : EB-BHX70
Serial No. : 001
Power : AC120V/60Hz
Mode : Running
Remarks : Tx2480
Date : 10/27/2003
Phase : Single Phase
Temperature : 24 °C
Humidity : 45 %
Regulation : FCC Part15C § 15.207 (0.15-30MHz)

No.	FREQ. [MHz]	READING (N)		READING (L1)		LISN FACTOR [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
		QP	AV	QP	AV				QP	AV	QP	AV	QP	AV
		[dBuV]		[dBuV]					[dBuV]		[dBuV]		[dB]	
1.	0.2673	40.8	36.1	41.5	36.4	0.0	0.1	0.0	41.6	36.5	61.2	51.2	19.6	14.7
2.	0.5409	37.2	33.2	37.1	33.8	0.1	0.1	0.0	37.4	34.0	56.0	46.0	18.6	12.0
3.	1.2367	41.5	37.0	43.6	38.2	0.1	0.2	0.0	43.9	38.5	56.0	46.0	12.1	7.5
4.	1.3782	41.5	37.8	44.0	38.9	0.1	0.3	0.0	44.4	39.3	56.0	46.0	11.6	6.7
5.	1.4983	38.5	34.3	40.7	35.6	0.1	0.3	0.0	41.1	36.0	56.0	46.0	14.9	10.0
6.	2.7349	38.6	36.1	40.2	36.1	0.1	0.3	0.0	40.6	36.5	56.0	46.0	15.4	9.5

CALCULATION: READING[dB μ V] + LISN FACTOR[dB] + CABLE LOSS[dB] + ATTEN[dB].

All other spurious emission were less than 20dB for the limit.

Carrier Frequency Separation

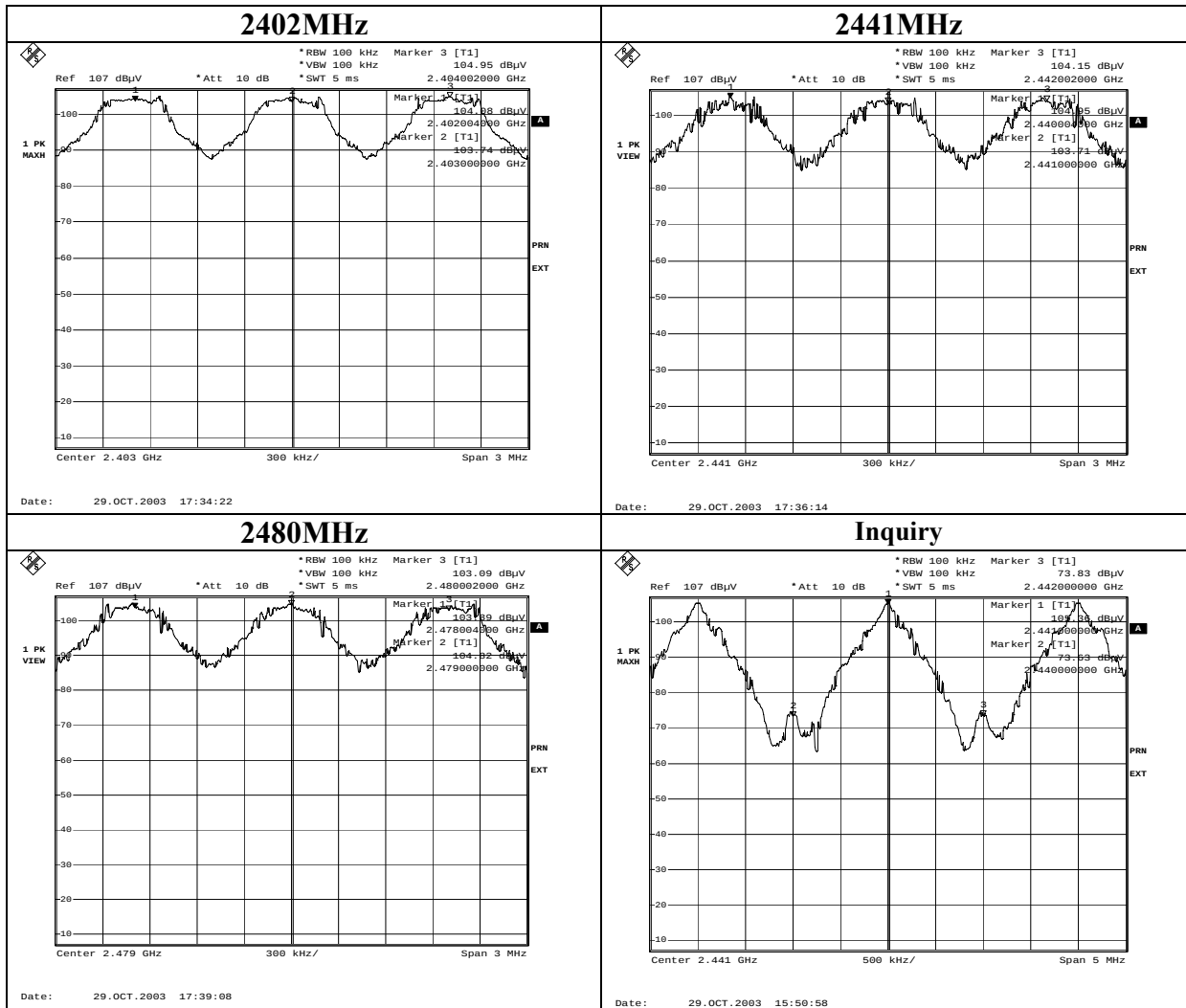
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Head Office EMC Lab. No.3 Measurement Room

COMPANY : Matsushita Electric Industrial Co.,Ltd. REGULATION : Fcc Part15 Subpart C 15.247(a)(1)
EQUIPMENT : Bluetooth Headset TEST DISTANCE : -
MODEL : EB-BHX70 DATE : 10/29/2003
S/ N : 002 TEMPERATURE : 22deg.C
POWER : AC120 / 60Hz HUMIDITY : 40%
MODE : Tx(Hopping on)/Inquiry ENGINEER : Hiroka Umeyama

PK DETECT(S/A :span 3MHz, RBW 100kHz,VBW 100kHz, sweep time AUTO)

CH	FREQ	Channel separation	Limit
	[MHz]	[MHz]	
Low	2402.0	1.000	>20dB Bandwidth and 25[kHz]
Mid	2441.0	1.000	>20dB Bandwidth and 25[kHz]
High	2480.0	1.000	>20dB Bandwidth and 25[kHz]
Inquiry	2441.0	2.000	>20dB Bandwidth and 25[kHz]

Carrier Frequency Separation



20dB Bandwidth

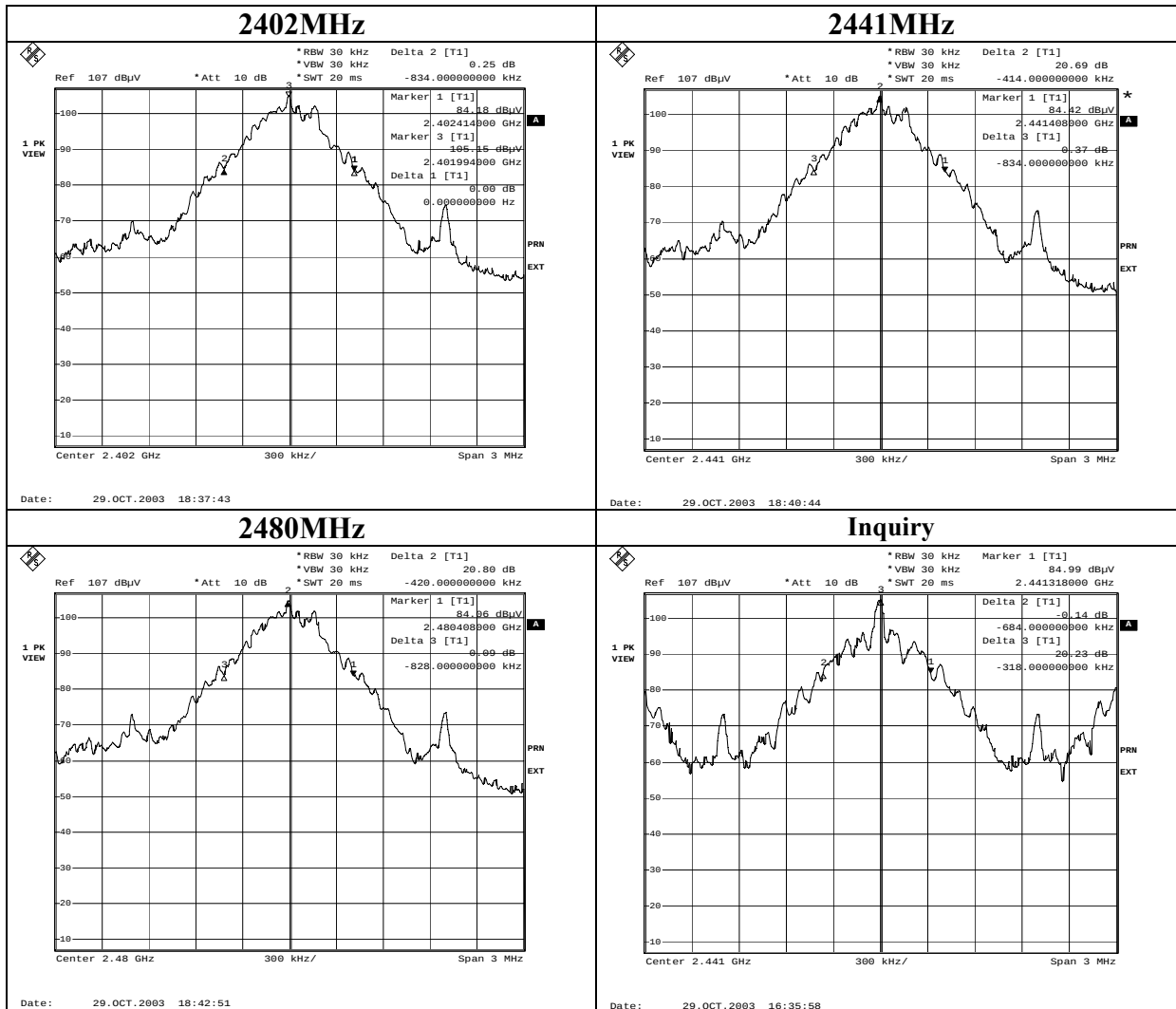
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Head Office EMC Lab. No.3 Measurement Room

COMPANY	: Matsushita Electric Industrial Co.,Ltd.	REGULATION	: Fcc Part15 Subpart C 15.247(a)(1)
EQUIPMENT	: Bluetooth Headset	TEST DISTANCE	: -
MODEL	: EB-BHX70	DATE	: 10/29/2003
S/ N	: 002	TEMPERATURE	: 22deg.C
POWER	: AC120V / 60Hz	HUMIDITY	: 40%
MODE	: Tx (Hopping off) /Inquiry	ENGINEER	: Hiroka Umeyama

PK DETECT(S/A: span 3MHz, RBW 30kHz,VBW 30kHz, sweep time AUTO)

CH	FREQ	20dB Bandwidth	Limit
	[MHz]	[MHz]	[MHz]
Low	2402.0	0.834	1.0
Mid	2441.0	0.834	1.0
High	2480.0	0.828	1.0
Inquiry	2441.0	0.684	1.0

20dB Bandwidth



Number of Hopping Frequency

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

COMPANY	: Matsushita Electric Industrial Co.,Ltd.	REGULATION	: Fcc Part15 Subpart C 15.247(a)(1)(iii)
EQUIPMENT	: Bluetooth Headset	TEST DISTANCE	: -
MODEL	: EB-BHX70	DATE	: 10/29/2003
S/ N	: 002	TEMPERATURE	: 22deg.C
POWER	: AC120V / 60Hz	HUMIDITY	: 40%
MODE	: Tx (Hopping on) /Inquiry	ENGINEER	: Hiroka Umeyama

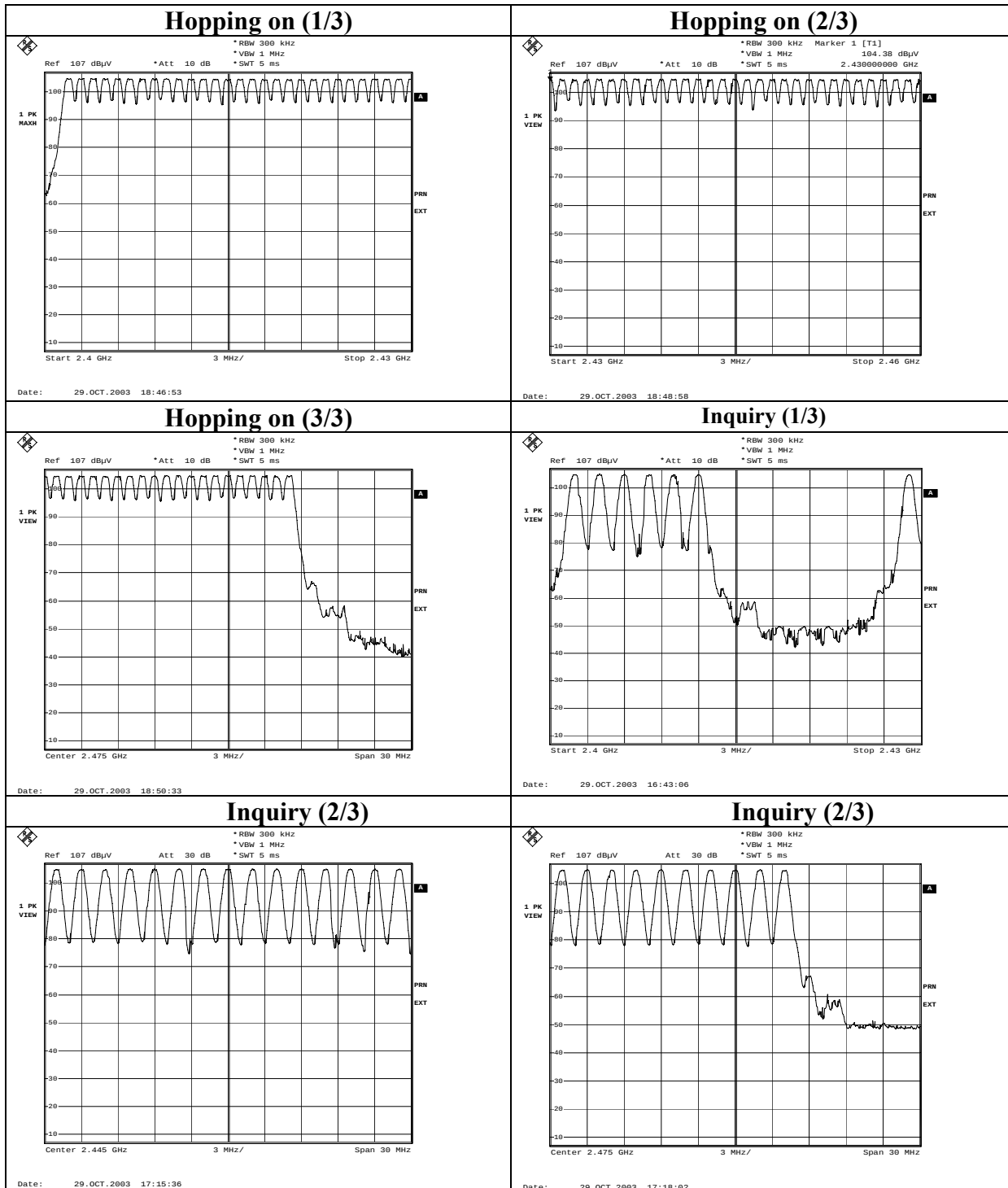
PK DETECT(S/A : RBW 300kHz ,VBW 1MHz, sweep time AUTO)

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

PK DETECT(S/A : RBW 300kHz ,VBW 1MHz, sweep time AUTO)

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

Number of Hopping Frequency



Dwell time

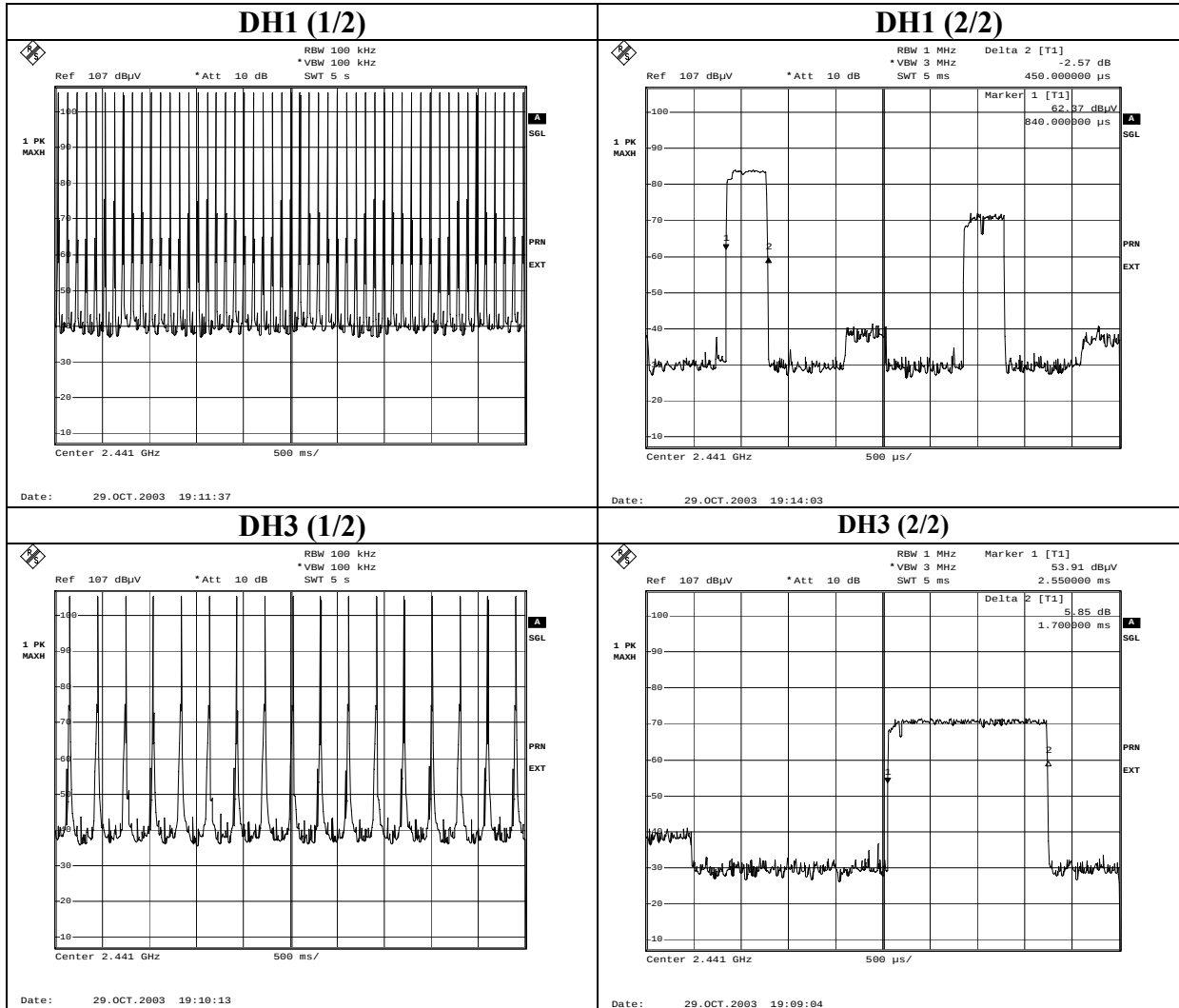
UL Apex Co., Ltd.
Head Office EMC Lab. No.3 Measurement Room

COMPANY	: Matsushita Electric Industrial Co.,Ltd.	REGULATION	: Fcc Part15 Subpart C 15.247(a)(1)(iii)
EQUIPMENT	: Bluetooth Headset	TEST DISTANCE	: -
MODEL	: EB-BHX70	DATE	: 10/29/2003
S/ N	: 002	TEMPERATURE	: 22deg.C
POWER	: AC120V / 60Hz	HUMIDITY	: 40%
MODE	: Tx (Hopping off) /Inquiry	ENGINEER	: Hiroka Umeyama

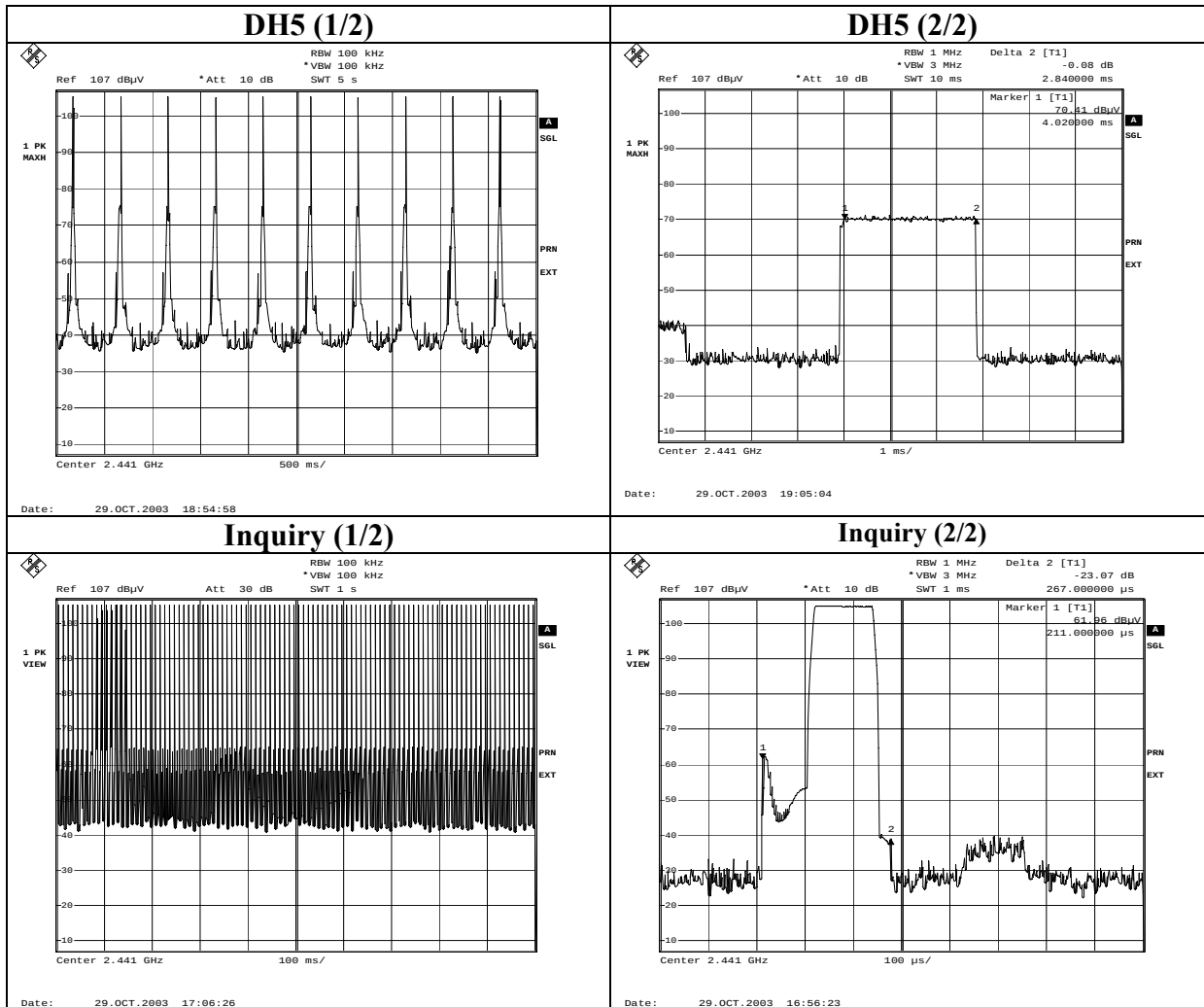
PK DETECT(S/A :span ZERO, RBW 1MHz,VBW 3MHz, sweep time 1ms-10ms)

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	51 times /5sec. x 31.6 = 322.3 times	0.450	145	400
DH3	17 times / 5sec. x 31.6 = 107 times	1.700	182	400
DH5	10 times / 5 sec. x 31.6 = 63 times	2.840	179	400
Inquiry	100 times / 1sec. x 12.8 = 1280 times	0.267	342	400

Dwell time



Dwell time



Maximum Peak Output Power

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

COMPANY : Matsushita Electric Industrial Co.,Ltd. REGULATION : Fcc Part15 Subpart C 15.247(b)(1)
EQUIPMEN : Bluetooth Headset TEST DISTANCE : -
MODEL : EB-BHX70 DATE : 10/29/2003
S/ N : 002 TEMPERATURE : 22deg.C
POWER : AC120V / 60Hz HUMIDITY : 40%
MODE : Tx (Hopping off) /Inquiry ENGINEER : Hiroka Umeyama

CH	FREQ	P/M Reading	Result	Limit
	[MHz]	[dBm]	[dBm]	[dBm]
Low	2402.0	-0.12	2401.88	30.0
Mid	2441.0	-0.17	2440.83	30.0
High	2480.0	-0.18	2479.82	30.0
Inquiry	2441.0	-0.14	2440.86	21.0

Sample Calculation:

Result = P/M Reading + Cable Loss + Attenuator

UL Apex Co., Ltd.

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MF060b(10.04.03)

Band Edge compliance

UL Apex Co., Ltd.
Head Office EMC Lab. No.1 Semi Anechoic Chamber

COMPANY : Matsushita Electric Industrial Co.,Ltd. REGULATION : Fcc Part15 Subpart C 15.247(c)
EQUIPMENT : Bluetooth Headset TEST DISTANCE : -
MODEL : EB-BHX70 DATE : 10/29/2003
S/N : 002 TEMPERATURE : 22deg.C
POWER : AC120V / 60Hz HUMIDITY : 40%
MODE : Tx (Hopping on/off) ENGINEER : Hiroka Umeyama

PK DETECT(S/A :Span 10/20MHz, RBW 100kHz/300kHz/1MHz,VBW 100kHz/300kHz/1MHz/3MHz, sweep time AUTO)

[Hopping on] Conducted

Frequency [MHz]	Reading [dBuV]	Cable Loss [dB]	E [dBuV]	P [nW]	Difference of level [dB]	Field Strength [dBuV/m]	Limit
2390.0	42.9	0.7	43.6	0.46	-	34.0	<74[dBuV/m]
2400.0	61.4	0.8	62.2	-	43.3*	-	>20[dB]
2484.5	56.3	0.9	57.2	10.40	-	47.5	<74[dBuV/m]

* Reference : Reading (104.72[dBuV]) + Cable Loss (0.8[dB]) = E (105.52[dBuV]) at 2402.00MHz.

[Hopping off Tx (2402/2480MHz)] Conducted

Frequency [MHz]	Reading [dBuV]	Cable Loss [dB]	E [dBuV]	P [nW]	Difference of level [dB]	Field Strength [dBuV/m]	Limit
2390.0	47.1	0.7	47.9	1.22	-	38.2	<74[dBuV/m]
2400.0	84.2	0.8	85.1	-	20.9*	-	>20[dB]
2484.5	59.6	0.9	60.5	22.13	-	50.8	<74[dBuV/m]

* Reference : Reading (105.19[dBuV]) + Cable Loss (0.8[dB]) = E (105.99[dBuV]) at 2401.84MHz.

Sample Calculation:

Field Strength = $20\log((\sqrt{30} \cdot P \cdot 10^{-9} \cdot G) / d \cdot 10^6)$

E : Reading + Cable Loss

P : Converted to nW

d : Test distance(m) 3

G : Numeric Antenna Gain 1.64

UL Apex Co., Ltd.

Head Office EMC Lab.

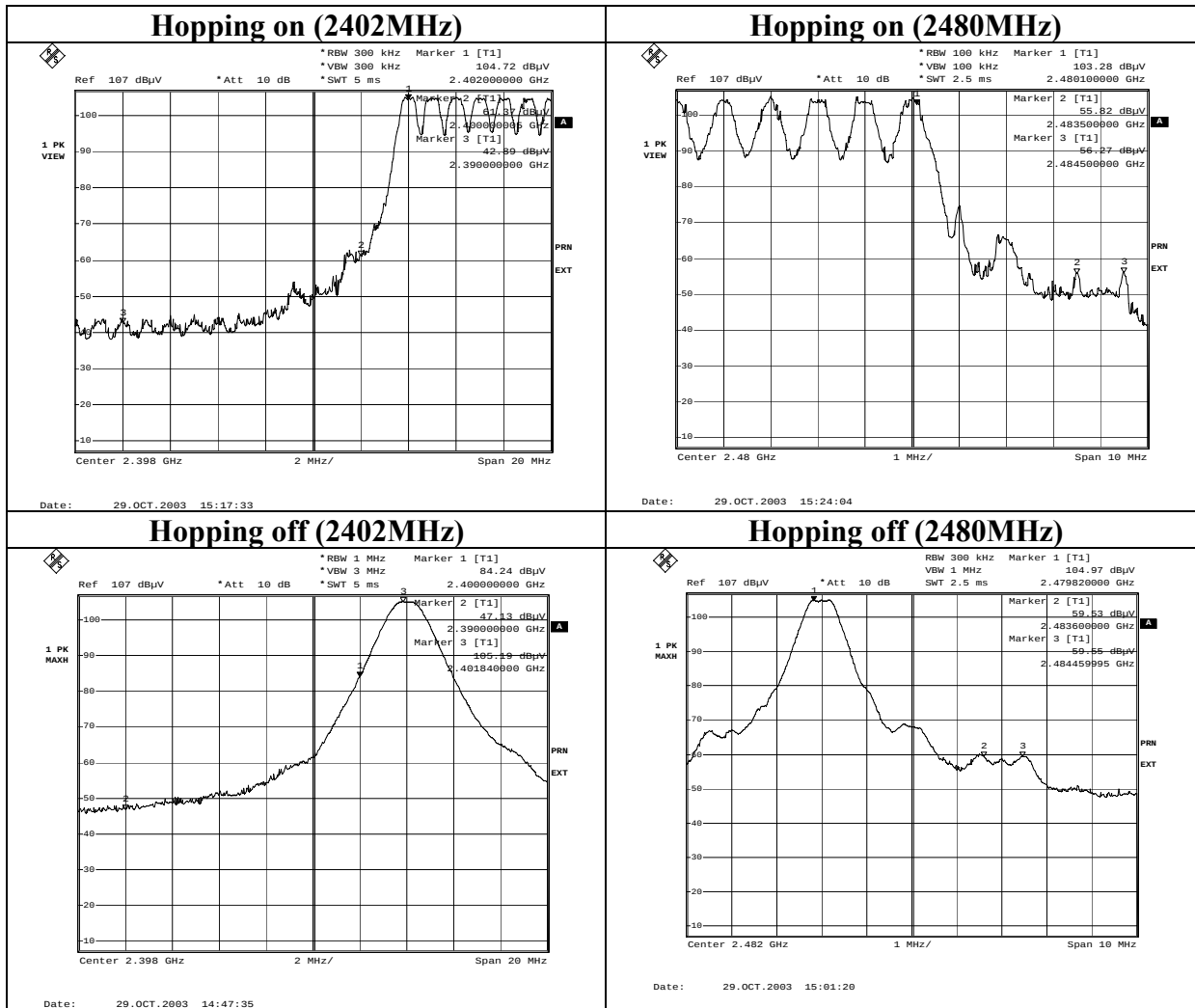
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Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

Band Edge compliance



Spurious Emission(Radiated)
2402MHz

DATA OF RADIATION TEST

UL Apex Co., Ltd. Head Office EMC Lab.
No.2 Semi Anechoic Chamber
Report No. : 24EC0011-H0

Applicant : Matsushita Electric Industrial Co.,Ltd.
Kind of Equipment : BT Headset
Model No. : EB-BHX70
Serial No. : 002
Power : AC120V/60Hz
Mode : Running
Remarks : Max Axis / Tx2402
Date : 10/23/2003
Test Distance : 3 m
Temperature : 23 °C
Humidity : 40 %
Regulation : FCC § 15. 247 (C)

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	48.01	BB	23.2	28.0	10.8	23.7	0.1	6.0	16.4	21.2	40.0	23.6	18.8
2.	84.00	BB	23.8	29.9	6.9	23.5	0.2	6.0	13.4	19.5	40.0	26.6	20.5
3.	95.90	BB	19.5	21.4	9.2	23.6	0.2	6.1	11.4	13.3	43.5	32.1	30.2
4.	286.47	BB	16.6	15.5	19.5	23.1	0.5	6.0	19.5	18.4	46.0	26.5	27.6
5.	331.25	BB	19.0	15.6	15.3	23.2	0.6	6.1	17.8	14.4	46.0	28.2	31.6
6.	974.25	BB	19.2	15.6	23.1	23.0	1.8	6.1	27.2	23.6	54.0	26.8	30.4

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

All other spurious emission were less than 20dB for the limit.

Spurious Emission(Radiated)
2441MHz

DATA OF RADIATION TEST

UL Apex Co., Ltd. Head Office EMC Lab.
No.2 Semi Anechoic Chamber
Report No. : 24CE0011-HO

Applicant : Matsushita Electric Industrial Co., Ltd.
Kind of Equipment : Bluetooth Headset
Model No. : EB-BHX70
Serial No. : 002
Power : AC120V/60Hz
Mode : Running
Remarks : Max Axis / Tx2441
Date : 10/23/2003
Test Distance : 3 m
Temperature : 23 °C
Humidity : 40 %
Regulation : FCC § 15.247 (C)

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	48.01	BB	22.5	28.6	10.8	23.7	0.1	6.0	15.7	21.8	40.0	24.3	18.2
2.	84.00	BB	25.9	29.9	6.9	23.5	0.2	6.0	15.5	19.5	40.0	24.5	20.5
3.	96.02	BB	18.3	21.5	9.2	23.6	0.2	6.1	10.2	13.4	43.5	33.3	30.1
4.	286.45	BB	16.0	16.1	19.5	23.1	0.5	6.0	18.9	19.0	46.0	27.1	27.0
5.	331.25	BB	16.2	16.3	15.3	23.2	0.6	6.1	15.0	15.1	46.0	31.0	30.9
6.	974.25	BB	15.5	15.7	23.1	23.0	1.8	6.1	23.5	23.7	54.0	30.5	30.3

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

All other spurious emission were less than 20dB for the limit.

Spurious Emission(Radiated)
2480MHz

DATA OF RADIATION TEST

UL Apex Co., Ltd. Head Office EMC Lab.
No.2 Semi Anechoic Chamber
Report No. : 24EC0011-HO

Applicant : Matsushita Electric Industrial Co., Ltd.
Kind of Equipment : Bluetooth Headset
Model No. : EB-BHX70
Serial No. : 002
Power : AC120V/60Hz
Mode : Running
Remarks : Max Axis /Tx2480
Date : 10/23/2003
Test Distance : 3 m
Temperature : 23 °C
Humidity : 40 %
Regulation : FCC § 15. 247 (C)

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	48.00	BB	19.6	28.2	10.8	23.7	0.1	6.0	12.8	21.4	40.0	27.2	18.6
2.	84.00	BB	26.0	29.9	6.9	23.5	0.2	6.0	15.6	19.5	40.0	24.4	20.5
3.	96.01	BB	18.0	19.7	9.2	23.6	0.2	6.1	9.9	11.6	43.5	33.6	31.9
4.	285.89	BB	16.1	16.1	19.5	23.1	0.5	6.0	19.0	19.0	46.0	27.0	27.0
5.	302.15	BB	16.4	14.0	14.5	23.2	0.6	6.0	14.3	11.9	46.0	31.7	34.1
6.	960.10	BB	15.5	15.5	22.8	22.9	1.8	6.1	23.3	23.3	54.0	30.7	30.7

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

All other spurious emission were less than 20dB for the limit.

Spurious Emission(Radiated) 2402MHz

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

COMPANY : Matsushita Electric Industrial Co.,Ltd.
EQUIPMENT : Bluetooth Headset
MODEL : EB-BHX70
S/N : 002
POWER : AC120V / 60Hz
MODE : Tx (2402MHz)
AXIS : Hor: X-axis , Ver: Y-axis

REGULATION : FCC Part 15 Subpart C 15.247(c)
TEST DISTANCE : 3 and 1m
DATE : 10/27/2003
TEMPERATURE : 23deg.C
HUMIDITY : 40%
ENGINEER : Hiroka Umeyama

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

No.	FREQ [MHz]	S/A READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. OR FILTER [dB]	RESULT		LIMIT PK [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
		[dBuV/m]	[dBuV/m]					[dBuV/m]	[dBuV/m]		[dB]	[dB]
Test distance 3meters RESULT=READING + ANT FACTOR -AMP GAIN + CABLE LOSS + ATTEN. OR FILTER.												
1	2390.0	46.7	47.3	30.5	36.0	4.4	0.0	45.6	46.2	74.0	28.4	27.8
2	4804.0	46.2	48.0	35.1	36.4	6.4	1.0	52.3	54.1	74.0	21.7	19.9
3	7206.0	45.0	44.9	37.6	36.0	7.6	0.5	54.7	54.7	74.0	19.3	19.3
4	9608.0	46.3	45.9	37.3	36.0	8.9	0.5	57.1	56.6	74.0	16.9	17.4
Test distance 1meters RESULT=READING + ANT FACTOR - AMP GAIN + CABLE LOSS + ATTEN OR FILTER - Dfac												
5	12010.0	46.3	45.6	40.1	36.8	9.9	0.0	50.0	49.2	74.0	24.0	24.8
6	14412.0	44.9	45.0	43.0	35.3	11.0	0.0	54.1	54.2	74.0	19.9	19.8
7	16814.0	47.2	47.2	44.7	36.5	12.2	0.0	58.1	58.0	74.0	15.9	16.0
8	19216.0	47.6	46.4	41.0	35.8	13.0	0.0	56.2	55.0	74.0	17.8	19.0
9	21618.0	47.1	47.0	40.5	36.8	14.1	0.0	55.4	55.4	74.0	18.6	18.6
10	24020.0	47.3	46.4	40.2	36.4	14.7	0.0	56.3	55.4	74.0	17.7	18.6

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

No.	FREQ [MHz]	S/A READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. OR FILTER [dB]	RESULT		LIMIT AV [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
		[dBuV/m]	[dBuV/m]					[dBuV/m]	[dBuV/m]		[dB]	[dB]
Test distance 3meters RESULT=READING + ANT FACTOR -AMP GAIN + CABLE LOSS + ATTEN. OR FILTER.												
1	2390.0	33.7	34.4	30.5	36.0	4.4	0.0	32.7	33.3	54.0	21.3	20.7
2	4804.0	32.8	34.8	35.1	36.4	6.4	1.0	38.9	40.9	54.0	15.1	13.2
3	7206.0	32.3	32.3	37.6	36.0	7.6	0.5	42.1	42.1	54.0	11.9	11.9
4	9608.0	33.5	33.5	37.3	36.0	8.9	0.5	44.2	44.2	54.0	9.8	9.8
Test distance 1meters RESULT=READING + ANT FACTOR - AMP GAIN + CABLE LOSS + ATTEN OR FILTER - Dfac												
5	12010.0	41.4	40.2	40.1	36.8	9.9	0.0	45.0	43.9	54.0	9.0	10.1
6	14412.0	32.7	32.7	43.0	35.3	11.0	0.0	41.9	41.9	54.0	12.1	12.1
7	16814.0	34.6	34.6	44.7	36.5	12.2	0.0	45.5	45.5	54.0	8.5	8.5
8	19216.0	34.4	34.4	41.0	35.8	13.0	0.0	43.0	43.0	54.0	11.0	11.0
9	21618.0	35.0	34.9	40.5	36.8	14.1	0.0	43.3	43.2	54.0	10.7	10.8
10	24020.0	34.5	34.6	40.2	36.4	14.7	0.0	43.5	43.6	54.0	10.5	10.4

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

9.5 dB

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

*2: ATTEN : 1 to 3.5GHz, FILTER : 3.5 to 26GHz.

ATTEN. or FILTER was not used for factor 0.0dB of the above table.

*3: Result is calculated to two places of decimals. Therefore, there may be 0.1 difference for the result.

Spurious Emission(Radiated)2441MHz

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

COMPANY : Matsushita Electric Industrial Co.,Ltd.
EQUIPMENT : Bluetooth Headset
MODEL : EB-BHX70
S/ N : 002
POWER : AC120V / 60Hz
MODE : Tx (2441MHz)
AXIS : Hor: X-axis , Ver: Y-axis

REGULATION : FCC Part 15 Subpart C 15.247(c)
TEST DISTANCE : 3 and 1m
DATE : 10/27/2003
TEMPERATURE : 23deg.C
HUMIDITY : 40%
ENGINEER : Hiroka Umeyama

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

No.	FREQ [MHz]	S/A READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. OR FILTER [dB]	RESULT		LIMIT PK [dBuV/m]	MARGIN	
		HOR [dBuV/m]	VER					HOR [dBuV/m]	VER		HOR [dB]	VER [dB]
Test distance 3meters RESULT=READING + ANT FACTOR -AMP GAIN + CABLE LOSS + ATTEN. OR FILTER.												
1	4882.0	47.4	48.2	36.0	36.8	6.4	1.0	54.1	54.9	74.0	19.9	19.1
2	7323.0	45.7	44.8	37.8	36.5	7.6	0.5	55.1	54.2	74.0	18.9	19.8
3	9764.0	45.2	45.1	37.4	37.2	8.8	0.5	54.7	54.6	74.0	19.3	19.4
Test distance 1meters RESULT=READING + ANT FACTOR - AMP GAIN + CABLE LOSS + ATTEN OR FILTER - Dfac												
4	12205.0	46.0	45.3	41.1	36.7	10.0	0.0	50.9	50.2	74.0	23.1	23.8
5	14646.0	45.4	44.8	43.2	35.5	11.1	0.0	54.7	54.1	74.0	19.3	19.9
6	17087.0	46.2	46.1	44.9	36.2	12.3	0.0	57.7	57.6	74.0	16.3	16.4
7	19528.0	46.3	46.4	40.5	36.0	13.0	0.0	54.4	54.5	74.0	19.6	19.5
8	21969.0	47.0	47.2	40.6	36.0	14.3	0.0	56.4	56.6	74.0	17.6	17.4
9	24410.0	47.6	47.2	40.4	36.9	14.9	0.0	56.4	56.0	74.0	17.6	18.0

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]	ATTEN. OR 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 + ATTEN. OR FILTER.												
1	4882.0	34.9	35.4	36.0	36.8	6.4	1.0	41.6	42.1	54.0	12.4	11.9
2	7323.0	32.3	32.7	37.8	36.5	7.6	0.5	41.7	42.1	54.0	12.3	11.9
3	9764.0	32.1	33.2	37.4	37.2	8.8	0.5	41.6	42.7	55.0	13.4	12.3
Test distance 1meters RESULT=READING + ANT FACTOR - AMP GAIN + CABLE LOSS + ATTEN OR FILTER - Dfac												
4	12205.0	40.2	39.6	41.1	36.7	10.0	0.0	45.1	44.5	54.0	8.9	9.5
5	14646.0	32.1	31.7	43.2	35.5	11.1	0.0	41.4	41.0	54.0	12.6	13.0
6	17087.0	33.2	31.1	44.9	36.2	12.3	0.0	44.7	42.6	54.0	9.3	11.4
7	19528.0	34.8	33.2	40.5	36.0	13.0	0.0	42.9	41.3	54.0	11.1	12.7
8	21969.0	33.5	34.3	40.6	36.0	14.3	0.0	42.9	43.7	54.0	11.1	10.3
9	24410.0	33.7	33.8	40.4	36.9	14.9	0.0	42.5	42.6	54.0	11.5	11.4

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

9.5 dB

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

*2: ATTEN : 1 to 3.5GHz, FILTER : 3.5 to 26GHz

ATTEN. or FILTER was not used for factor 0.0dB of the above table.

*3: Result is calculated to two places of decimals. Therefore, there may be 0.1 difference for the result.

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MF060b(10.04.03)

Spurious Emission(Radiated) 2480MHz

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

COMPANY : Matsushita Electric Industrial Co.,Ltd.
EQUIPMENT : Bluetooth Headset
MODEL : EB-BHX70
S/ N : 002
POWER : AC120V / 60Hz
MODE : Tx (2480MHz)
AXIS : Hor: Z-axis , Ver: Y-axis

REGULATION : FCC Part 15 Subpart C 15.247(c)
TEST DISTANCE : 3 and 1m
DATE : 10/27/2003
TEMPERATURE : 23deg.C
HUMIDITY : 40%
ENGINEER : Hiroka Umeyama

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

No.	FREQ [MHz]	S/A READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. OR FILTER [dB]	RESULT		LIMIT PK [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
		[dBuV/m]	[dBuV/m]					[dBuV/m]	[dBuV/m]		[dB]	[dB]
Test distance 3meters RESULT=READING + ANT FACTOR -AMP GAIN + CABLE LOSS + ATTEN. OR FILTER.												
1	1064.4	50.3	47.8	21.8	37.8	3.0	0.0	37.3	34.8	74.0	36.7	39.2
2	2483.7	58.2	55.6	30.6	36.9	4.5	0.0	56.4	53.7	74.0	17.6	20.3
3	4960.0	47.2	48.5	36.8	36.7	6.5	1.0	54.8	56.1	74.0	19.2	17.9
4	7440.0	46.3	47.0	37.9	36.5	7.7	0.5	56.0	56.6	74.0	18.0	17.4
5	9920.0	46.3	47.0	38.3	37.5	9.0	0.5	56.6	57.3	74.0	17.4	16.7
Test distance 1meters RESULT=READING + ANT FACTOR - AMP GAIN + CABLE LOSS + ATTEN OR FILTER - Dfac												
6	12400.0	45.6	45.5	42.1	36.6	10.1	0.0	51.7	51.6	74.0	22.3	22.4
7	14880.0	45.7	44.9	43.4	35.7	11.2	0.0	55.1	54.3	74.0	18.9	19.7
8	17360.0	46.9	46.2	45.9	36.2	12.4	0.0	59.5	58.8	74.0	14.5	15.2
9	19840.0	48.0	46.0	40.7	36.1	13.1	0.0	56.2	54.2	74.0	17.8	19.8
10	22320.0	47.2	46.2	40.7	35.5	14.4	0.0	57.3	56.3	74.0	16.7	17.7
11	24800.0	46.8	47.4	40.4	36.7	15.1	0.0	56.1	56.7	74.0	17.9	17.3

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

No.	FREQ [MHz]	S/A READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. OR FILTER [dB]	RESULT		LIMIT AV [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
		[dBuV/m]	[dBuV/m]					[dBuV/m]	[dBuV/m]		[dB]	[dB]
Test distance 3meters RESULT=READING + ANT FACTOR -AMP GAIN + CABLE LOSS + ATTEN. OR FILTER.												
1	1064.4	35.3	34.8	21.8	37.8	3.0	0.0	22.4	21.8	54.0	31.6	32.2
2	2483.7	38.4	38.6	30.6	36.9	4.5	0.0	36.5	36.8	54.0	17.5	17.2
3	4960.0	33.3	34.2	36.8	36.7	8.8	1.0	43.2	44.1	54.0	10.8	9.9
4	7440.0	32.5	32.5	37.9	36.5	7.7	0.5	42.1	42.1	55.0	12.9	12.9
5	9920.0	33.1	33.2	37.9	36.5	7.7	0.5	42.7	42.8	56.0	13.3	13.2
Test distance 1meters RESULT=READING + ANT FACTOR - AMP GAIN + CABLE LOSS + ATTEN OR FILTER - Dfac												
6	12400.0	38.7	40.0	42.1	36.6	10.1	0.0	44.8	46.1	54.0	9.2	7.9
7	14880.0	32.6	32.1	43.4	35.7	11.2	0.0	42.0	41.5	54.0	12.0	12.5
8	17360.0	31.8	33.3	45.9	36.2	12.4	0.0	44.4	45.9	54.0	9.6	8.1
9	19840.0	34.7	34.1	40.7	36.1	13.1	0.0	42.9	42.3	54.0	11.1	11.7
10	22320.0	35.1	34.5	40.7	35.5	14.4	0.0	45.2	44.6	54.0	8.8	9.4
11	24800.0	34.9	34.2	40.4	36.7	15.1	0.0	44.2	43.5	54.0	9.8	10.5

Test Distance 1.0m : Distance Factor(Dfac) = $20\log(3/1.0) =$

9.5 dB

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

*2: ATTEN : 1 to 3.5GHz, FILTER : 3.5 to 26GHz

ATTEN. or FILTER was not used for factor 0.0dB of the above table.

*3: Result is calculated to two places of decimals. Therefore, there may be 0.1 difference for the result.

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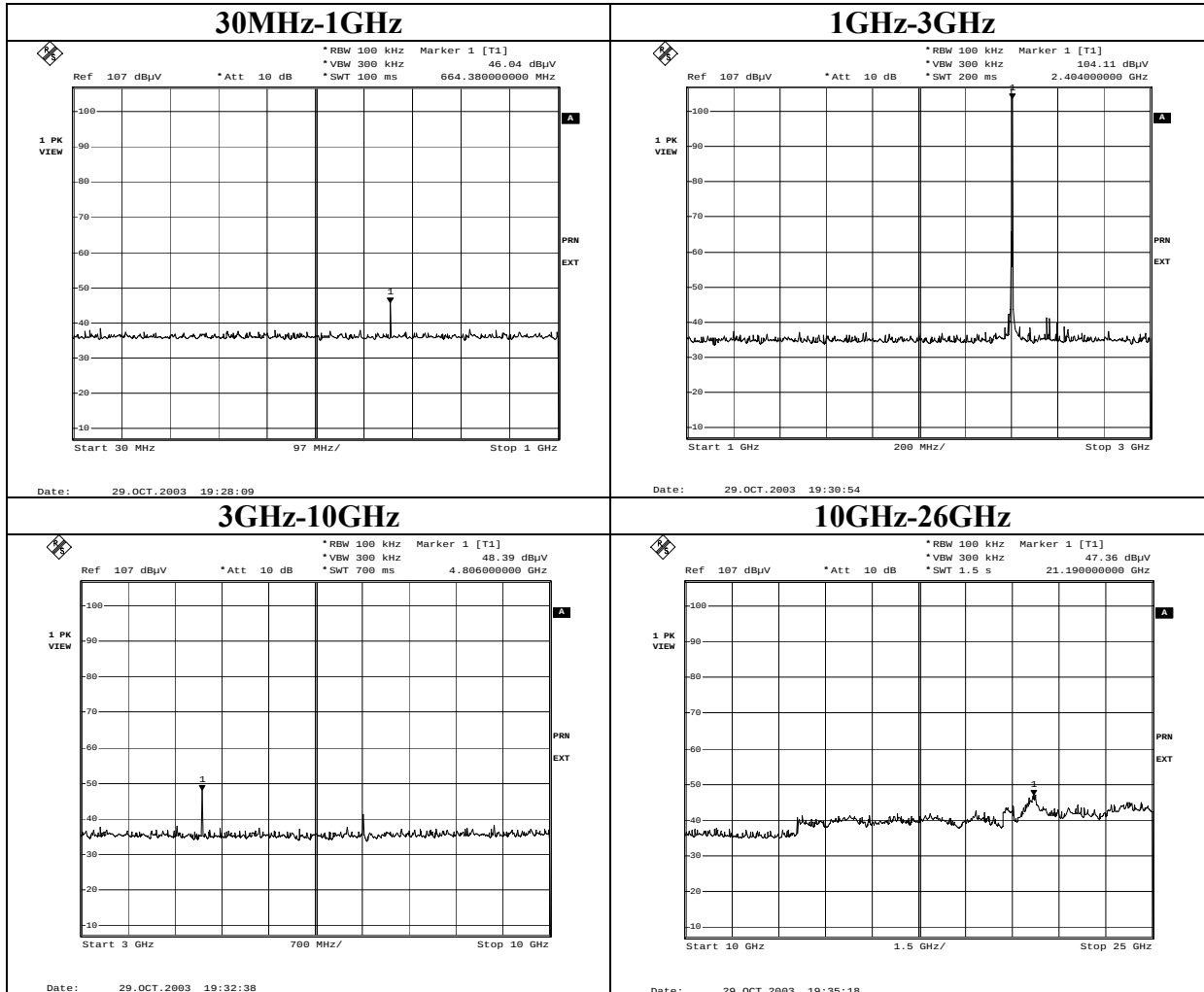
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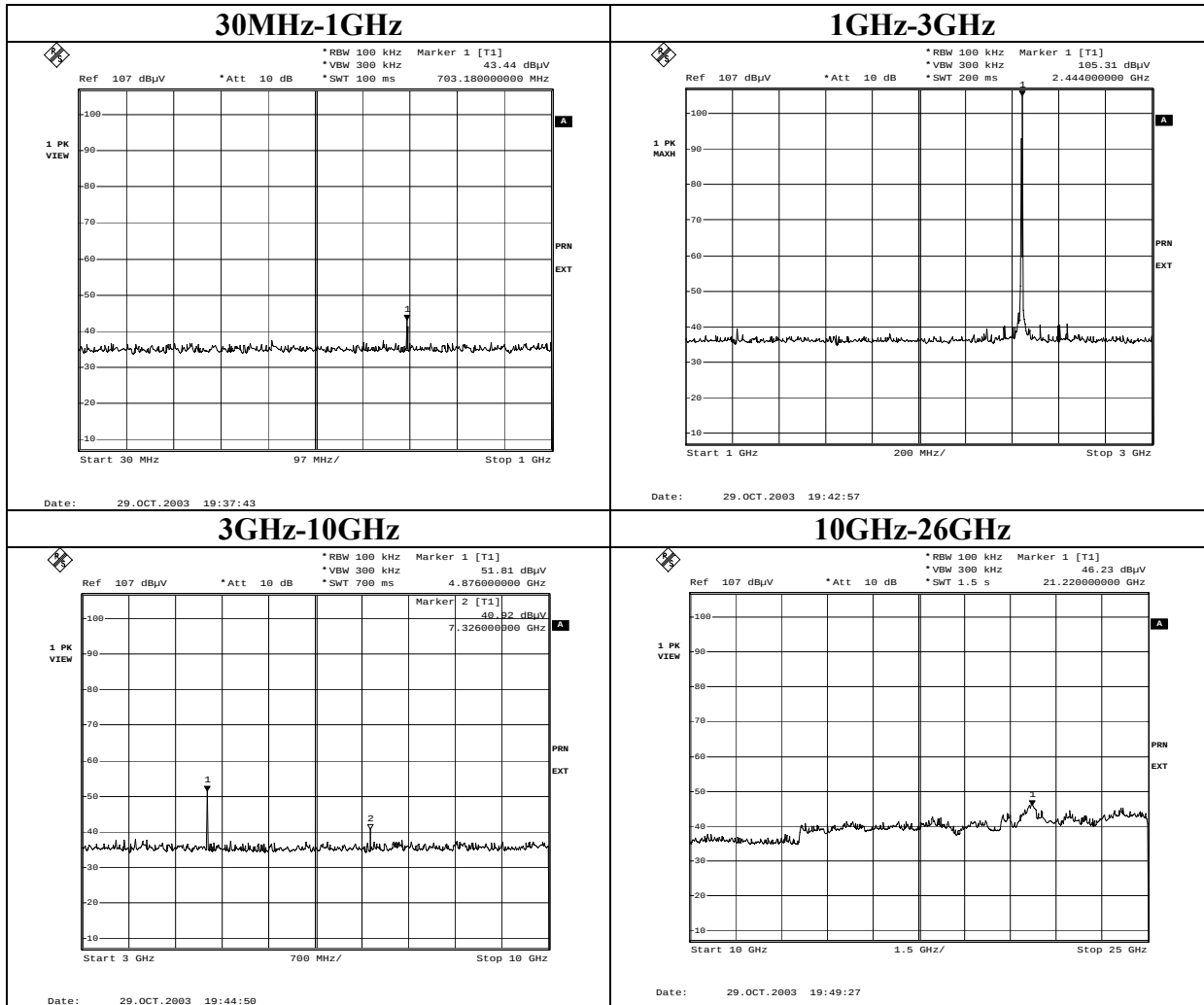
Spurious Emission(Conducted)

2402MHz



Spurious Emission(Conducted)

2441MHz



Spurious Emission(Conducted)

2480MHz

