



EMI TEST REPORT

Test Report No. : 24HE0054-HO-1

Applicant : Matsushita Electric Industrial Co., Ltd.

Type of Equipment : KEYLESS REMOTE of
KEYLESS ACCESS SYSTEM

Model No. : EUE24A04

Test standard : FCC Part 15 Subpart C 2004
Section 15.209, Section 15.231
FCC Part 15 Subpart B 2004
Section 15.109

FCC ID : ACJ8D8E24A04

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.

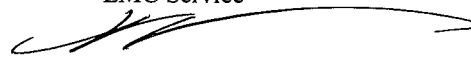
Date of test:

July 19, 20 and 30, 2004

Tested by:


Makoto Kosaka
EMC Service

Approved by :


Naoki Sakamoto
Group Leader of
EMC Service

UL Apex Co., Ltd.

Head Office EMC Lab.

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SECTION 1: Client information

Company Name : Matsushita Electric Industrial Co., Ltd.
Address : 1006 Oaza Kadoma Kadoma Osaka 571-8501 Japan
Telephone Number : +81-585-32-4709
Facsimile Number : +81-585-34-1310
Contact Person : Yoshio Takahashi, Group Manager

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

2.1 Identification of E.U.T.

Type of Equipment : KEYLESS REMOTE of KEYLESS ACCESS SYSTEM
Model No. : EUE24A04
Sample No. : 1
Country of Manufacture : Japan
Receipt Date of Sample : June 14, 2004
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Model No: EUE24A04 is the KEYLESS REMOTE of KEYLESS ACCESS SYSTEM.
The clock frequency of EUT is 4MHz, 60.24MHz

Equipment Type : Transceiver
Power Supply : DC 6.0V(CR2025 x 2 (Lithium cell battery))

Transmitter Section

Frequency operation	311.9MHz
Type of modulation	FSK
Information antenna	Internal / monopole antenna
Communication Device	RF Unit (FCC ID: ACJ8D8-EUE24B)

Receiver Section

	Receiver Section 1	Receiver Section 2
Receiving frequency	311.9MHz	125kHz
Receiver type	Super heterodyne	Direct detect
Intermediate frequency	10.7MHz	-
Local oscillator frequency	301.2MHz	-
Information antenna	Internal / monopole antenna	Internal /Loop coil antenna
Communication Device	RF Unit (FCC ID: ACJ8D8-EUE24B)	Smart ECU (FCC ID: ACJ932CY-MH646)

FCC 15.31 (e)

This EUT provides stable voltage(DC6.0V) constantly to Keyless Remote 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 Part 15 Subpart C 2004
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.231 Periodic operation in the band 40.66-40.70MHz
and above 70MHz

Test Specification : FCC Part 15 Subpart B 2004
Section 15.109 Radiated emission limits
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Results
1	Automatically Deactivate	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.231(a)(1)	N/A	-	Complied *1)
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.231(b)	N/A	4.2dB(AV(Pulse)) 311.929MHz Horizontal	Complied
3	Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.205 Section 15.209 Section 15.231(b)	N/A	0.7dB(AV) 1.87161Hz Horizontal	Complied
4	-20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.231(c)	N/A	-	Complied
5	Conducted emission AC Mains	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Section 15.207	N/A*2)	N/A	N/A
Note: UL Apex's EMI Work procedures No. QPM05 *1) EUT has the specification of Automatically cease within 5 seconds. *2) The test is not applicable since the EUT is DC drive and is not connected to the public utility (AC) power line.						

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2) FCC Part15 Subpart B : 2004

No.	Item	Test Procedure	Specification	Remarks	Worst margin	Result
1	Radiated emission	ANSI C63.4: 2003 8. Radiated emission measurements	FCC Section 15.109(a)	Radiated	13.0dB 1807.2MHz Horizontal and Vertical	Complied
2	Conducted Emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	FCC Section 15.107(a)	AC Mains only*1)	N/A	N/A

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

*1) This test is not applicable since the EUT does not have AC power port.

3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004	RSS-210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004	Conducted	N/A	N/A	N/A

3.4 Uncertainty

Radiated Emission Test

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

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

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

The data listed in this test report has enough margin.

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

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3.5 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

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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.

3.6 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

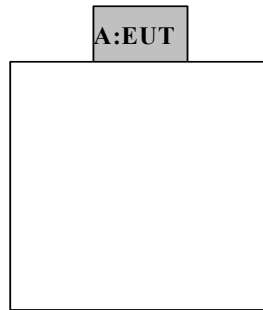
SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The EUT was operated in a manner similar to typical use during the tests.

The mode is used : Transmitting mode and Receiving mode (311.9MHz)
*a) As for 125kHz mode, its test was excluded based on section 15.101(b).
*b) As for 311.9MHz mode, the test was made with the continuous receiving mode (intentionally).

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Sample No.	Manufacturer	FCC ID
A	KEYLESS REMOTE	EUE24A04	1	Matsushita Electric Industrial Co., Ltd.	ACJ8D8E24A04

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SECTION 5: Radiated emission (Fundamental and Spurious Emission)

5.1 Operating environment

Test place : No.2 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane.

The EUT was set on the center of the tabletop.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

A drawing of the set up is shown in the photos of APPENDIX 1.

5.3 Test conditions

Frequency range : 30MHz-3200MHz (Tx mode) and 30MHz-2000MHz (Rx mode)
Test distance : 3m
EUT position : Top of Polyurethane
EUT operation mode : Transmitting and Receiving

5.4 Test procedure

The measuring antenna height was 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.

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

- The carrier level (or, noise levels) was (or 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.

5.5 Test result

Summary of the test results: Pass

Date: July 19 and 20, 2004

Tested by: Makoto Kosaka

UL Apex Co., Ltd.

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APPENDIX 1: Photographs of test setup

This page has been submitted for a seperate exhibit.

Test report No. : 24HE0054-HO-1
Page : 10 of 18
Issued date : August 9, 2004
FCC ID : ACJ8D8E24A04

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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
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/10/15 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/10/15 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MPA-02	Pre Amplifier	Agilent	87405A	RE	2004/04/16 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2004/01/10 * 12
MCC-04	Microwave Cable	Storm	421-011	RE	2004/01/06 * 12
MCC-24	Microwave Cable	Storm	-	RE	2004/05/01 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2004/02/06 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2004/02/03 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	RE	2004/02/18 * 12

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

Test Item:

RE: Radiated emission

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APPENDIX 3: Data of EMI test

Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

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

COMPANY : Matsushita Electric Industrial Co., Ltd.
EQUIPMENT : Keyless Remote
MODEL : EUE24A04
SAMPLE No. : 1
FCC ID : ACJ8D8E24A04
IC No. : 216J-EUE24A04
POWER : DC 6.0V(CR2025 X 2)
Mode : Transmitting (311.9MHz)
EUT Position : X-axis(Hor) and Z-axis(Ver)

REPORT NO : 24HE0054-HO
REGULATION : FCC Part 15 Subpart C 15.209 & 231
TEST DISTANCE : 3m
DATE : 2004/07/19-20
Temperature : 25, 25deg.C
Humidity : 56, 58%
Engineer : Makoto Kosaka

PK DETECT(T/R : IF BW 120kHz)

No.	FREQ [MHz]	T/R READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN [dB]	Duty Factor [dB]	RESULT		Limit AV(pulse) [dBuV/m]	MARGIN	
		HOR	VER						HOR	VER		HOR	VER
1	311.929	77.2	74.3	14.5	22.8	2.3	6.0	-6.0	71.2	68.3	75.4	4.2	7.1
2	623.869	28.1	25.6	19.7	22.7	3.7	6.2	-6.0	29.0	26.5	55.4	26.4	28.9
3	935.804	39.3	34.7	22.0	22.6	4.8	6.2	-6.0	43.7	39.1	55.4	11.7	16.3

PK DETECT(S/A : RBW 1MHz and VBW 1MHz)

No.	FREQ [GHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN [dB]	none	RESULT		Limit PK [dBuV/m]	MARGIN	
		HOR	VER						HOR	VER		HOR	VER
4	1.24776	46.2	44.8	23.2	36.8	4.4	0.0	0.0	37.0	35.6	75.4	38.4	39.8
5	1.55969	49.5	48.6	24.8	36.5	5.0	0.0	0.0	42.8	41.9	74.0	31.2	32.1
6	1.87161	58.0	50.9	28.6	36.4	5.6	0.0	0.0	55.8	48.7	75.4	19.6	26.7
7	2.18353	53.7	50.0	30.5	36.3	6.1	0.0	0.0	54.0	50.3	75.4	21.4	25.1
8	2.49546	49.5	48.3	31.0	36.2	6.5	0.0	0.0	50.8	49.6	74.0	23.2	24.4
9	2.80736	47.1	48.1	31.9	36.4	6.9	0.0	0.0	49.5	50.5	74.0	24.5	23.5
10	3.11930	47.2	48.0	32.1	36.4	7.4	0.0	0.0	50.3	51.1	75.4	25.1	24.3

AV DETECT(S/A : RBW 1MHz and VBW 10Hz)

No.	FREQ [GHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN [dB]	none	RESULT		Limit AV [dBuV/m]	MARGIN	
		HOR	VER						HOR	VER		HOR	VER
4	1.24776	33.2	33.0	23.2	36.8	4.4	0.0	0.0	24.0	23.8	55.4	31.4	31.6
5	1.55969	43.0	42.3	24.8	36.5	5.0	0.0	0.0	36.3	35.6	54.0	17.7	18.4
6	1.87161	56.9	47.1	28.6	36.4	5.6	0.0	0.0	54.7	44.9	55.4	0.7	10.5
7	2.18353	51.8	45.9	30.5	36.3	6.1	0.0	0.0	52.1	46.2	55.4	3.3	9.2
8	2.49546	45.3	43.3	31.0	36.2	6.5	0.0	0.0	46.6	44.6	54.0	7.4	9.4
9	2.80736	41.0	41.9	31.9	36.4	6.9	0.0	0.0	43.4	44.3	54.0	10.6	9.7
10	3.11930	39.8	41.6	32.1	36.4	7.4	0.0	0.0	42.9	44.7	55.4	12.5	10.7

Sample Calculation :

RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + ATT + Duty Factor (below 1GHz)

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

*ATTEN was not used for Antenna Factor 0.0dB of the above table.

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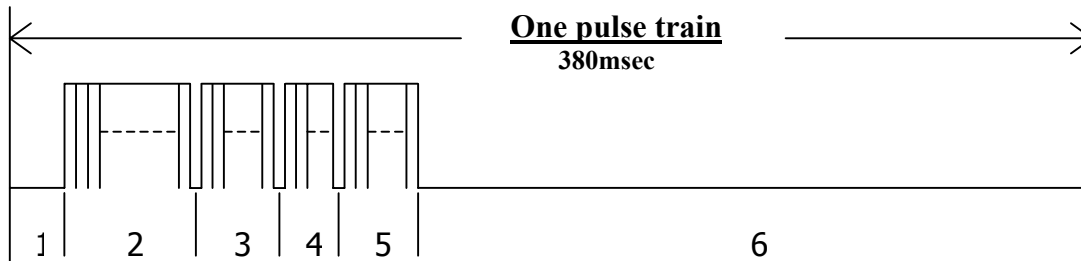
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Duty Factor

The Keyless Remote starts to transmit as following sequences when the transmit button is pressed.



<The detail of Communication mode of KEYLESS REMOTE above>

Start bit	 750us 750us
Bit "0"	 250us 250us
Bit "1"	 250us 250us

- | | | |
|---|-------------------------|---------|
| 1 | Waiting time | 10msec |
| 2 | Preamble | 150msec |
| 3 | ID code + Function code | 35msec |
| 4 | Preamble | 10msec |
| 5 | ID code + Function code | 35msec |
| 6 | Waiting time | 140msec |

Duty Factor Calculation

The Pulse line of Keyless Remote is 50% Duty Cycle as above with Manual operating.

Therefore, Duty Factor is $20\log(50\text{ms}/100\text{ms}) = -6.0\text{dB}$

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-20dB Bandwidth

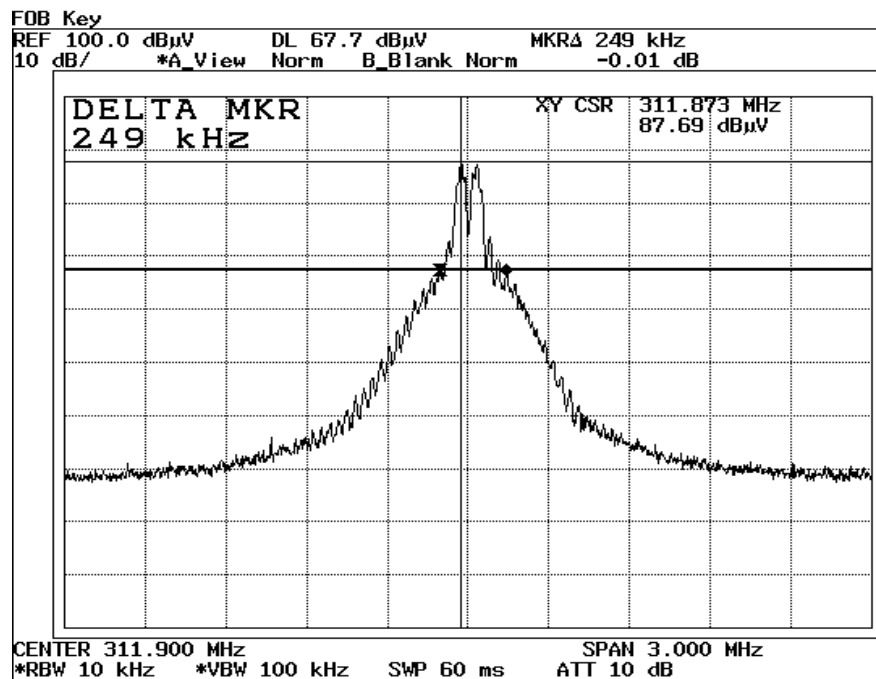
UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : Matsushita Electric Industrial Co., Ltd.
EQUIPMENT : Keyless Remote
MODEL : EUE24A04
Sample No. : 1
FCC ID : ACJ8D8E24A04
IC No. : 216J-EUE24A04
POWER : DC6.0V
Mode : Transmitting

REPORT NO : 24HE0054-HO
REGULATION : Fcc Part15 Subpart C 231(c) / 205
DATE : 07/20/2004
TEMPERATURE : 23°C
HUMIDITY : 59%
ENGINEER : Makoto Kosaka

Bandwidth Limit : Fundamental Frequency 311.9MHz X 0.25% = 779.75 kHz

-20dB Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
249.00	779.75	Pass



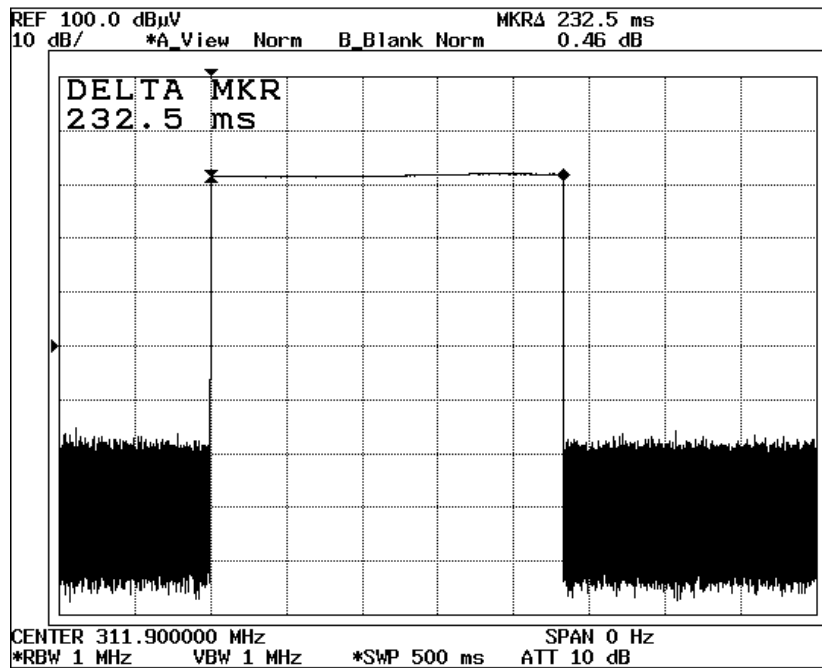
Automatically deactivate

UL Apex Co., Ltd.
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COMPANY : Matsushita Electric Industrial Co., Ltd.
EQUIPMENT : Keyless Remote
MODEL : EUE24A04
S/N : 1
FCC ID : ACJ8D8E24A04
IC No. : 216J-EUE24A04
POWER : DC6.0V
Mode : Transmitting

REPORT NO : 24HE0054-HO
REGULATION : Fcc Part15 Subpart C 231(a)(1)
TEST DISTANCE : 3m
DATE : 07/30/2004
TEMPERATURE : 23deg.C
HUMIDITY : 59%
ENGINEER : Makoto Kosaka

Time of Transmitting [msec]	Limit [sec]	Result
232.50	5.00	Pass



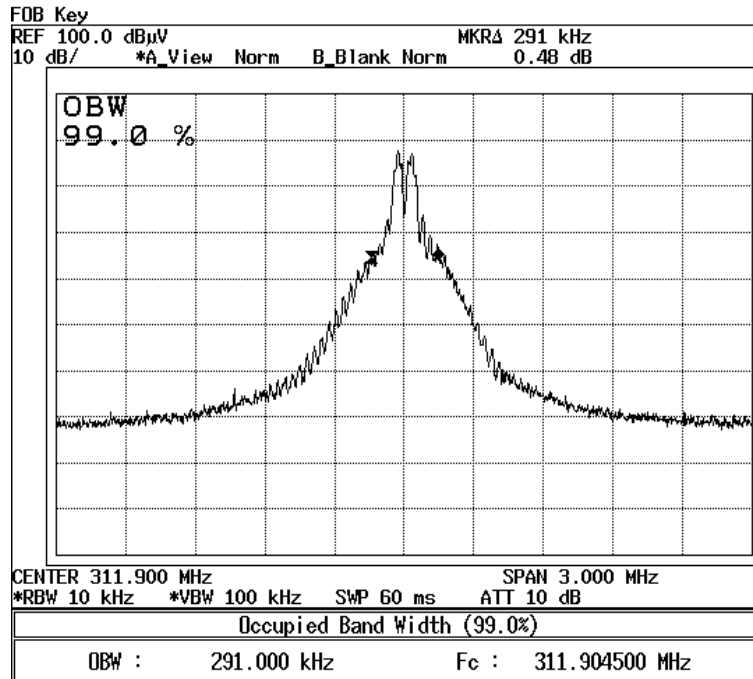
99%Occupied Bandwidth

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Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : Matsushita Electric Industrial Co., Ltd.
EQUIPMENT : Keyless Remote
MODEL : EUE24A04
S/N : 1
FCC ID : ACJ8D8E24A04
IC No. : 216J-EUE24A04
POWER : DC6.0V
Mode : Transmitting

REPORT NO. : 24HE0054-HO
REGULATION : RSS210
DATE : 07/20/2004
TEMPERATURE : 23deg.C
HUMIDITY : 59%
ENGINEER : Makoto Kosaka

99% Occpied Bandwidth
[kHz]
291.00



Radiated Emission (Receiving)

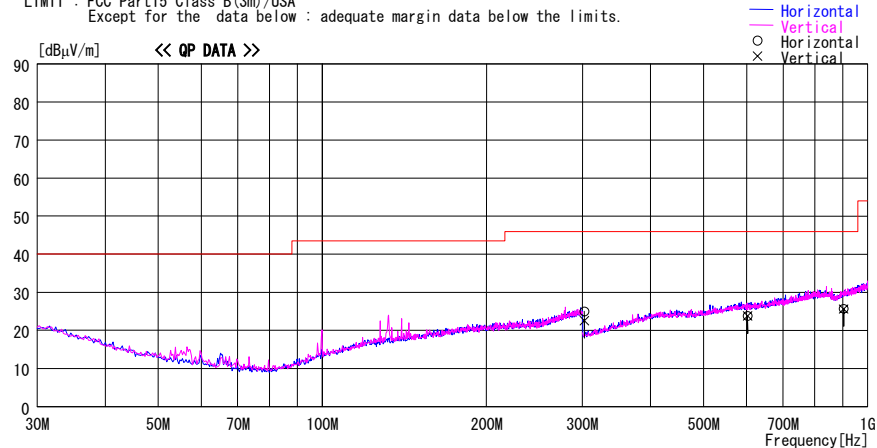
DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/07/20 16:38:17

Applicant : Matsushita Electric Industrial
Kind of EUT : Keyless Remote
Model No. : EUE24A04
Sample No. : 1
Report No. : 24HE0054-HO-1
Power : DC 6V (CR2025 X 2)
Temp°C/Humi% : 26deg. C / 58%
Operator : Makoto Kosaka

Mode / Remarks : RX (311.9MHz) / FOB X-axis(Hor)/Z-axis(Ver)

LIMIT : FCC Part15 Class B(3m)/USA
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	302.205	25.4	14.1	8.3	22.8	25.0	46.0	21.0	100	169
2	602.404	17.0	19.6	9.8	22.6	23.8	46.0	22.2	100	0
3	903.614	16.0	21.4	10.9	22.6	25.7	46.0	20.3	100	0
----- Vertical -----										
4	302.205	22.9	14.1	8.3	22.8	22.5	46.0	23.5	182	196
5	602.404	17.0	19.6	9.8	22.6	23.8	46.0	22.2	100	0
6	903.614	15.9	21.4	10.9	22.6	25.6	46.0	20.4	100	0

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:

Radiated Emission (Receiving)

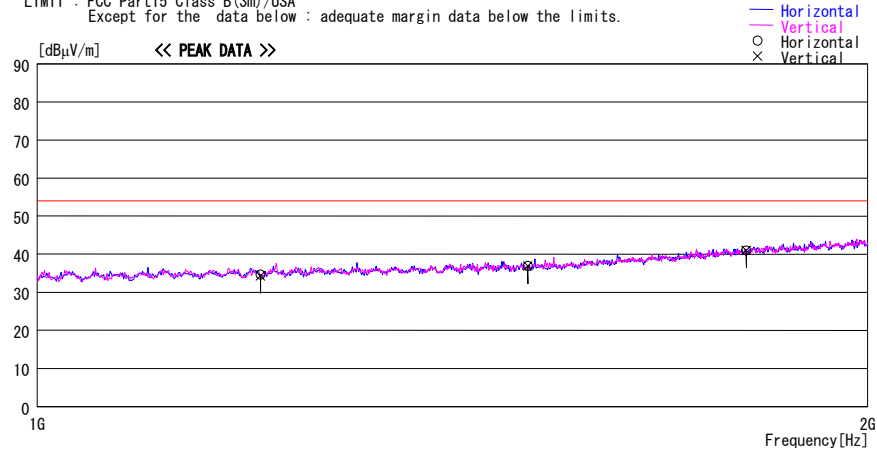
DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/07/20 11:41:58

Applicant : Matsushita Electric Industrial
Kind of EUT : Keyless Remote
Model No. : EUE24A04
Sample No. : 1
Report No. : 24HE0054-HO-1
Power : DC 6.0V (CR2025 X 2)
Temp°C/Humi% : 22deg. C / 63%
Operator : Makoto Kosaka

Mode / Remarks : Receiving (311.9MHz) / X-axis(Hor)/Z-axis(Ver)

LIMIT : FCC Part15 Class B(3m)/USA
Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING PK [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	1204.800	44.2	23.0	4.4	36.9	34.7	54.0	19.3	100	0
2	1506.000	44.2	24.2	5.0	36.5	36.9	54.0	17.1	100	0
3	1807.200	44.1	27.8	5.5	36.4	41.0	54.0	13.0	100	0
----- Vertical -----										
4	1204.800	43.8	23.0	4.4	36.9	34.3	54.0	19.7	100	0
5	1506.000	44.2	24.2	5.0	36.5	36.9	54.0	17.1	100	0
6	1807.200	44.1	27.8	5.5	36.4	41.0	54.0	13.0	100	0

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: