EMI TEST REPORT

Test Report No. : 23JE0006-YK-1

Applicant	:	**Toyota Industries Corporation**
Type of Equipment	:	**Wireless LAN Card**
Model No.	:	**GIGAWAVE 6180010**
FCC ID	:	**M4B6180010**
Test standard	:	**FCC Part15 Subpart C, Section 15.247**
Test Result	:	**Complied**

1. This test report shall not be reproduced except 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.

Date of test: May 19-23, 2003

Tested by: T. Imamura
Toyokazu Imamura

Approved by: O. Watatani
Osamu Watatani
Site Manager of Yamakita EMC Lab.

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1 GENERAL INFORMATION

Company Name	: Toyota Industries Corporation
Brand Name	: -
Address	: Hamamatsucho-Centralbuil-6F, 1-29-6, Hamamatsu-cho, Minato-ku, Tokyo, 105-0013 JAPAN
Telephone Number	: +81 3 5733 5317
Facsimile Number	: +81 3 5401 0575
Contact Person	: Hideki Fujii
Type of Equipment	: Wireless LAN Card
Model No.	: GIGAWAVE 6180010
Serial No.	: 000016
Rating	: DC3.3V
Country of Manufacture	: Japan
Receipt Date of Sample	: May 19, 2003
Condition of E.U.T.	: Production prototype
Regulation(s)	: FCC Part15 Subpart C, Section 15.247
Test Site	: UL Apex Yamakita EMC Lab. No.1 Open Test Site and No.4 Shielded Room

1.1 Tested Methodology
The measurements were performed according to the procedures in ANSI C63.4 (2001).
These tests were also referred to FCC 97-114 “Guidance on Measurement for Direct Sequence Spread Spectrum Systems”.

1.2 Test Facility
This site has been fully described in a report submitted to FCC office, and accepted on September 20, 2002.
(No.1 Open Test Site Registration No.: 95486)
NVLAP Lab. code : 200441-0

2 PRODUCT DESCRIPTION

Model: GIGAWAVE 6180010, (referred to as the EUT in this report), is a Wireless LAN Card.

Clock frequency used in EUT : 44MHz

Frequency Characteristics	: 2412 - 2462MHz
Channel Characteristics	: 11 channel selectable by 16MHz and 5MHz spacing
Modulation	: DSSS [DBPSK (1M), DQPSK (2M), CCK (5.5M-11M)]
Antenna Type	: Chip dielectric antenna
Antenna Gain	: MAX 2dBi
ITU Emission Code(s)	: G1D
Power Supply	: DC 3.3V
Operation Temperature range	: -20 - 60 deg. C.
Antenna Connector Type	: none

*FccPart15.31(e)

The host device PC7NW5-URQ4C9110 provides the Wireless LAN Card with stable power supply (DC3.3V), and the power is not changed when voltage of the personal computer is varied.
Therefore, the Wireless LAN Card complies power supply regulation.

*FccPart15.203

The Wireless LAN Card and its antenna comply with this requirement since this antenna is built in Wireless LAN Card when they are put up for sale and they are used with a particular antenna connector.

3 SYSTEM TEST CONFIGURATION

3.1 Justification

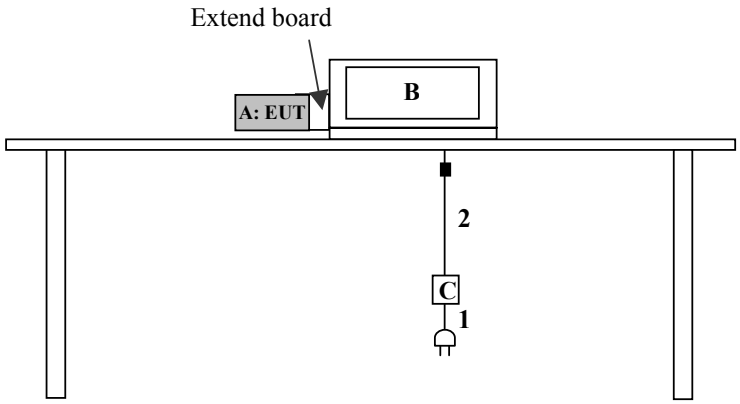
The system was configured in typical fashion (as a customer would normally use it) for testing.

Test mode:

1. Transmitting 2412MHz (Low)
2. Transmitting 2437MHz (Middle)
3. Transmitting 2462MHz (High)

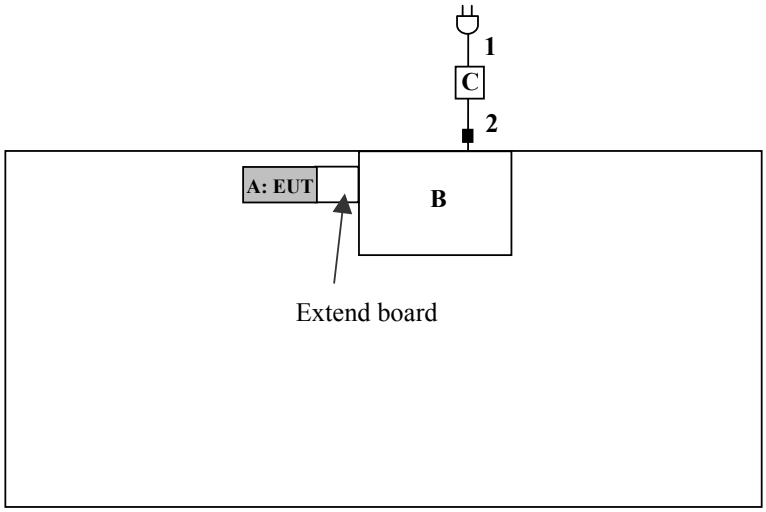
3.2 Configuration of Tested System

Front View



AC120V/60Hz

Top View



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID	Remarks
A	Wireless LAN Card	GIGAWAVE 6180010	000016	Toyota Industries Corporation	M4B6180010	EUT
B	Personal Computer	PC7NW5 -URQ4C9110	9143RZ101614901 4CQK	Hitachi	-	-
C	AC Adaptor	ADP-65DB	SWD0141025044	Hitachi	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	AC Power Cable	1.7	Unshielded	Polyvinyl chloride
2	DC Cable	1.8	Unshielded	Polyvinyl chloride

4 MEASUREMENT UNCERTAINTY

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

The data listed in this test report has enough margin, more than site margin.

Radiated emission test
The measurement uncertainty (with 95% confidence level) for this test using Biconical antenna is ±4.8dB.
The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ±5.2dB.
The measurement uncertainty (with 95% confidence level) for this test using Horn antenna is ±6.6dB.

The result is within Yamakita EMC lab's uncertainty.

5 SUMMARY OF TESTS

5.1 §15.207 Conducted Emissions (Limits by CISPR Pub.22 Class B)

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. The rear of EUT's host device and AC adapter were 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 LISN and excess AC cable was bundled in center.
Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source.
The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a shielded room.
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 9kHz).
Measurement range : 150kHz to 30MHz

Test data : APPENDIX Page 14 to 18
Photographs of test setup: Page 11
Test result : Pass
Worst margin: 11.7dB (0.1997MHz, L1)
*** This is the margin comparing QP value with Average limit.**
Test instruments : KCC-14/15/16/18/KPL-01, KLS-01, KSA-01, KTR-02

5.2 §15.247(a)(2) 6dB Bandwidth (Antenna Port Conducted)

Test Procedure
The minimum 6dB bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX Page 19
Test result : Pass
Test instruments : KTR-01, KCC-D7

5.3 § 15.247(b)(3) Maximum Peak Out Put Power (Antenna Port Conducted)

Test Procedure
The Maximum Peak Output power was measured with a power meter connected to the antenna port.
* Antenna Gain dose not exceed 6dBi.

Test data : APPENDIX Page 20
Test result : Pass
Test instruments : KPM-05, KPSS-01

5.4 § 15.247(c) Out of Band Emissions (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 measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane and at a distance of 3m.
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. EUT emission levels were compared when the EUT antenna position was vertical polarization and horizontal polarization. The equipment was also previously checked at each position of three axes X, Y and Z.
In below 1GHz, Y axis was worst under the vertical antenna polarization and X axis was worst under the horizontal antenna polarization. In above 1GHz, X axis was worst under the vertical antenna polarization and Z axis was worst under the horizontal antenna polarization. The position in which the maximum noise occurred was chosen to put into measurement. See the photographs in page 13.

Radiated spurious emissions
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.
The result was also satisfied the general limits specified in Sec.15.209 (a).
Measurement range : 30MHz to 1000MHz CISPR QP Detector, IF BW 120kHz
: 1GHz to 26GHz PK and AV Detector

Test data : APPENDIX 2 Page 21 to 23 (30 - 1000MHz)
: APPENDIX 2 Page 24 to 29 (1 - 26GHz)
: APPENDIX 2 Page 30 to 33
(Band Edges: 2390MHz/ 2483.5MHz, Restricted band Charts)
Photographs of test setup: Page 12
Test result : Pass
Test instruments: KAF-01, KAF-02, KAT10-S1, KAT6-01, KBA-01, KTR-01, KTR-02, KFL-01 KCC-10/11/12/13/18, KCC-D3/D7, KHA-01, KLA-01, KOTS-01, KSA-01

5.5 § 15.247(c) Out of Band Emissions (Antenna Port Conducted)

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

Test data : APPENDIX Page 34 to 39
Test result : Pass
Test instruments : KTR-01, KCC-D7

5.6 § 15.247(d) Power Density (Antenna Port Conducted)

Test Procedure
The Power Density was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX Page 40 to 41
Test result : Pass
Test instruments : KTR-01, KCC-D7

APPENDIX 1: Photographs of test setup

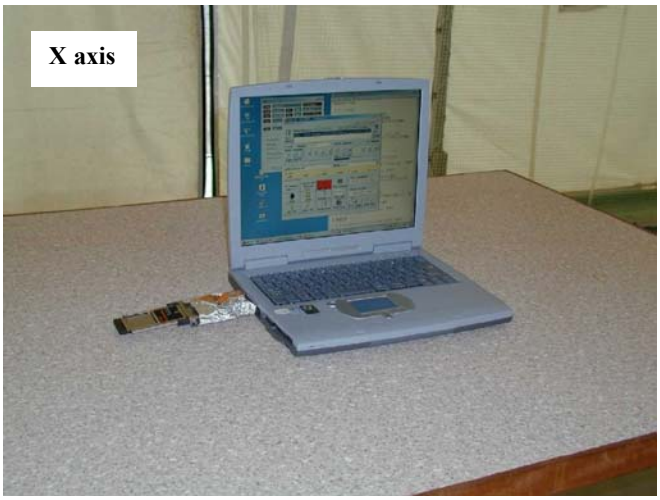
APPENDIX 2: Test Data

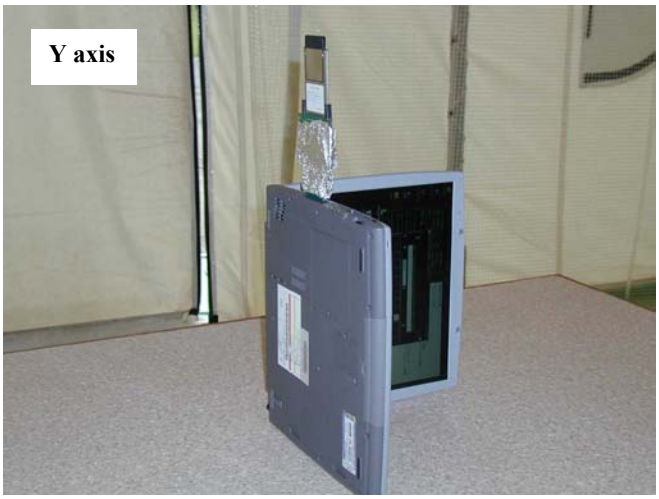
APPENDIX 3: Test instruments

Conducted emission

Radiated emission

Pre check of worse-case position





DATA OF CONDUCTION TEST

UL Apex Co., Ltd.
Yamakita No.1 Shielded Room
Report No. : 23JE0006-YK-1

Applicant	:	TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	:	Wireless LAN Card
Model No.	:	GIGAWAVE 6180010
Serial No.	:	000016
Power	:	AC120V/60Hz
Mode	:	Transmitting(2412MHz)
Remarks	:	
Date	:	5/22/2003
Phase	:	Single Phase
Temperature	:	26 ℃
Humidity	:	59 %
Regulation	:	FCC Part15C §15.207.(CISPR Pub.22)

Engineer : Toyokazu Imamura

No.	FREQ.	READING(N) QP		READING(L1) QP		LISN FACTOR	CABLE LOSS	ATTEN.	RESULT QP		LIMITS QP		MARGIN QP	
	[MHz]	[dBuV]	AV	[dBuV]	AV	[dB]	[dB]	[dB]	[dBuV]	AV	[dBuV]	AV	[dB]	AV
1.	0.1500	41.0	-	40.5	-	0.0	0.1	0.0	41.1	-	66.0	56.0	24.9	-
2.	0.1997	41.6	-	41.8	-	0.0	0.1	0.0	41.9	-	63.6	53.6	21.7	-
3.	0.2645	33.1	-	34.9	-	0.0	0.1	0.0	35.0	-	61.3	51.3	26.3	-
4.	0.3312	30.0	-	31.7	-	0.0	0.1	0.0	31.8	-	59.4	49.4	27.6	-
5.	0.6194	22.4	-	22.3	-	0.0	0.2	0.0	22.6	-	56.0	46.0	33.4	-
6.	5.3620	26.5	-	25.5	-	0.2	0.6	0.0	27.3	-	60.0	50.0	32.7	-

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

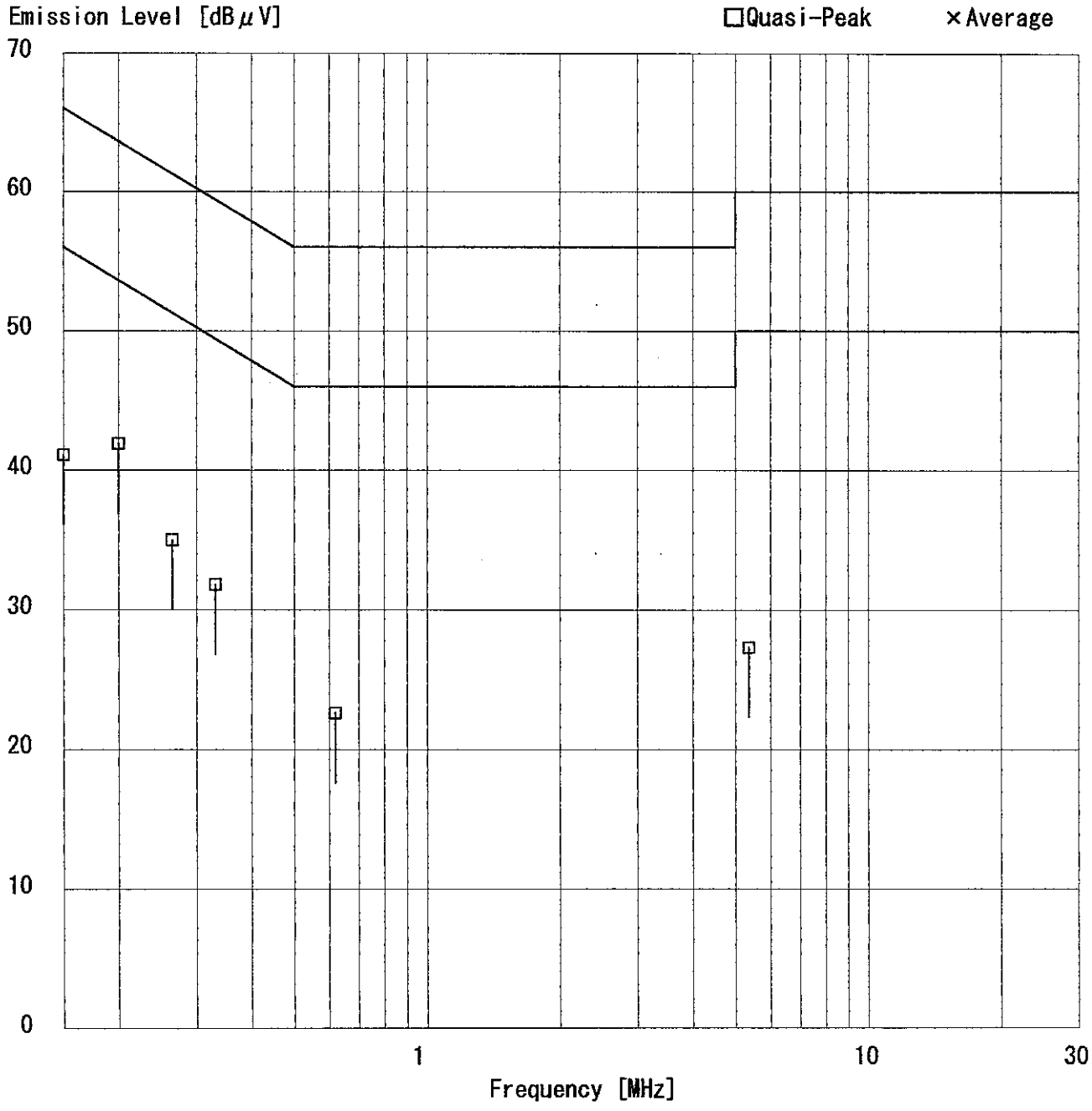
■LISN :KLS-01(NSLK8126) ■COAXIAL CABLE:KCC-14/15/16/18
■PULSE LIMITTER:KPL-01(PL01) ■EMI RECEIVER:KTR-02(ESCS30)

DATA OF CONDUCTION TEST

UL Apex Co., Ltd.
Yamakita No.1 Shielded Room
Report No. : 23JE0006-YK-1

Applicant	:	TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	:	Wireless LAN Card
Model No.	:	GIGAWAVE 6180010
Serial No.	:	000016
Power	:	AC120V/60Hz
Mode	:	Transmitting(2412MHz)
Remarks	:	
Date	:	5/22/2003
Phase	:	Single Phase
Temperature	:	26 ℃
Humidity	:	59 %
Regulation	:	FCC Part15C §15.207, (CISPR Pub.22)

Engineer : Toyokazu Imamura

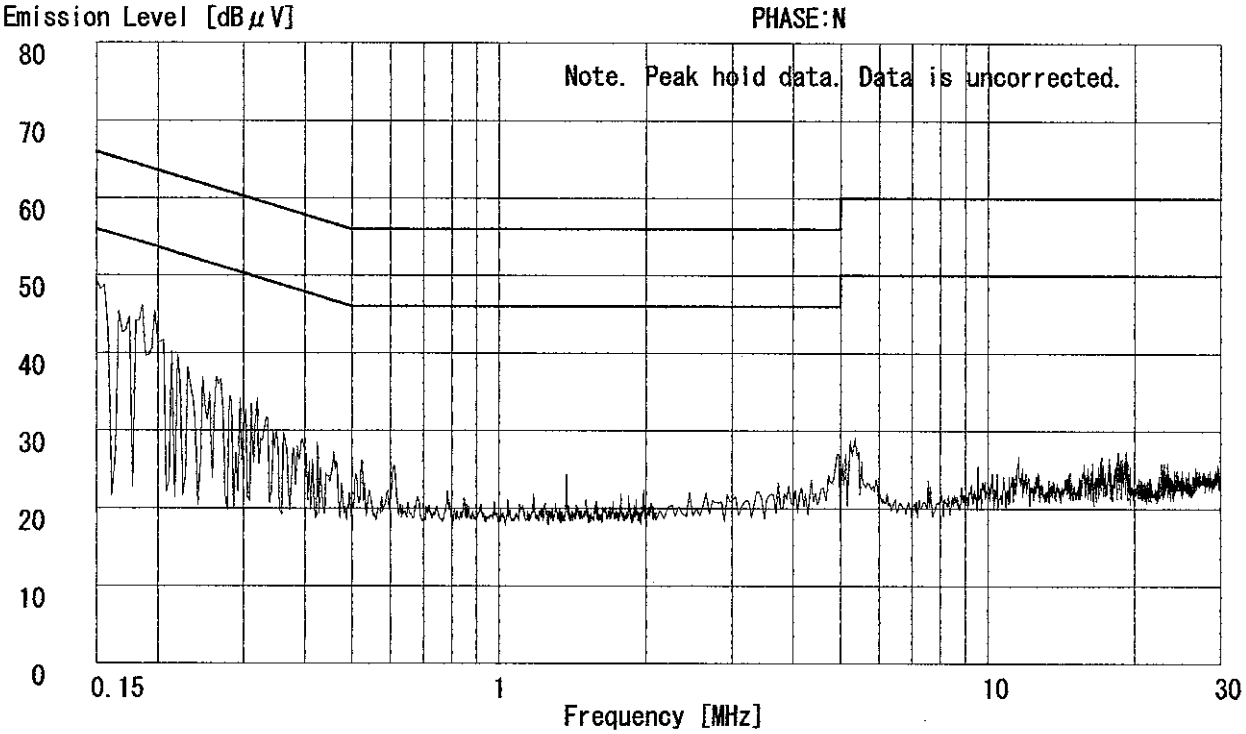


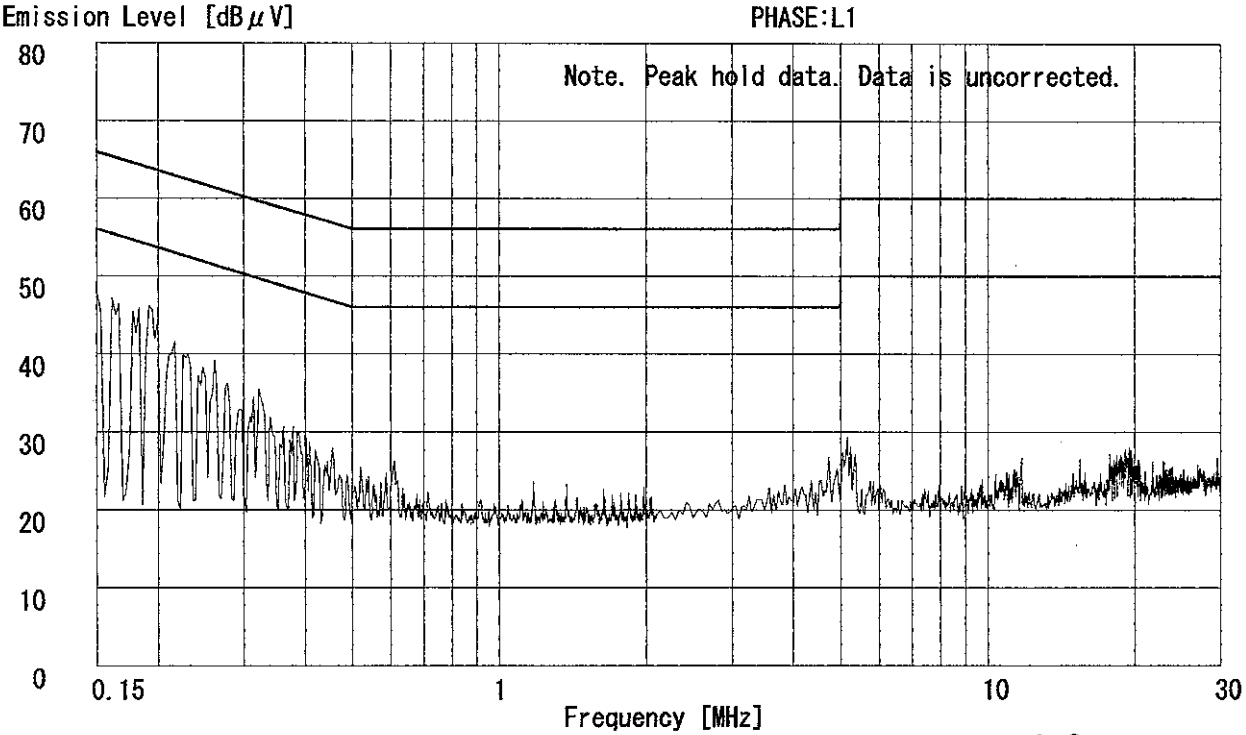
DATA OF CONDUCTION TEST CHART

UL Apex Co., Ltd.
Yamakita No.1 Shielded Room
Report No.: 23JE0006-YK-1

Applicant	: TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	: Wireless LAN Card
Model No.	: GIGAWAVE 6180010
Serial No.	: 000016
Power	: AC120V/60Hz
Mode	: Transmitting(2412MHz)
Remarks	:
Date	: 5/22/2003
Phase	: Single Phase
Temperature	: 26 ℃
Humidity	: 59 %
Regulation 1	: FCC Part15C §15.207.(CISPR Pub.22)
Regulation 2	: None

Engineer : Toyokazu Imamura



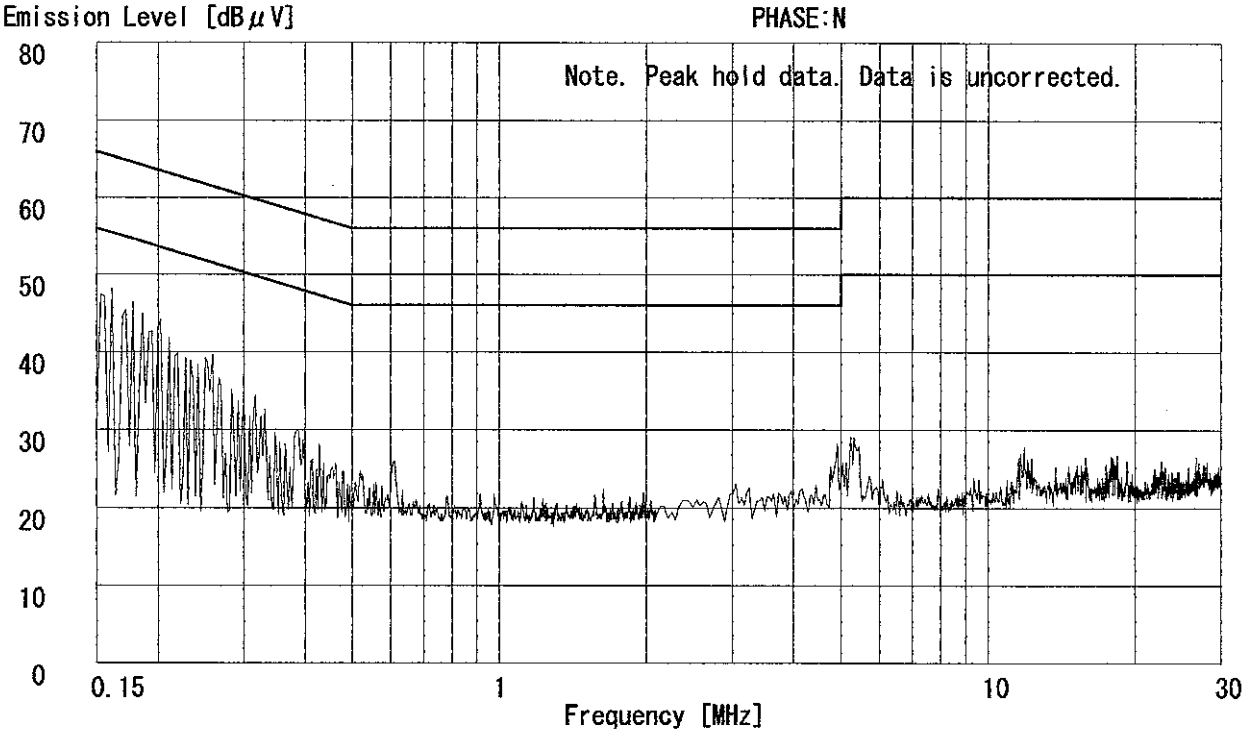


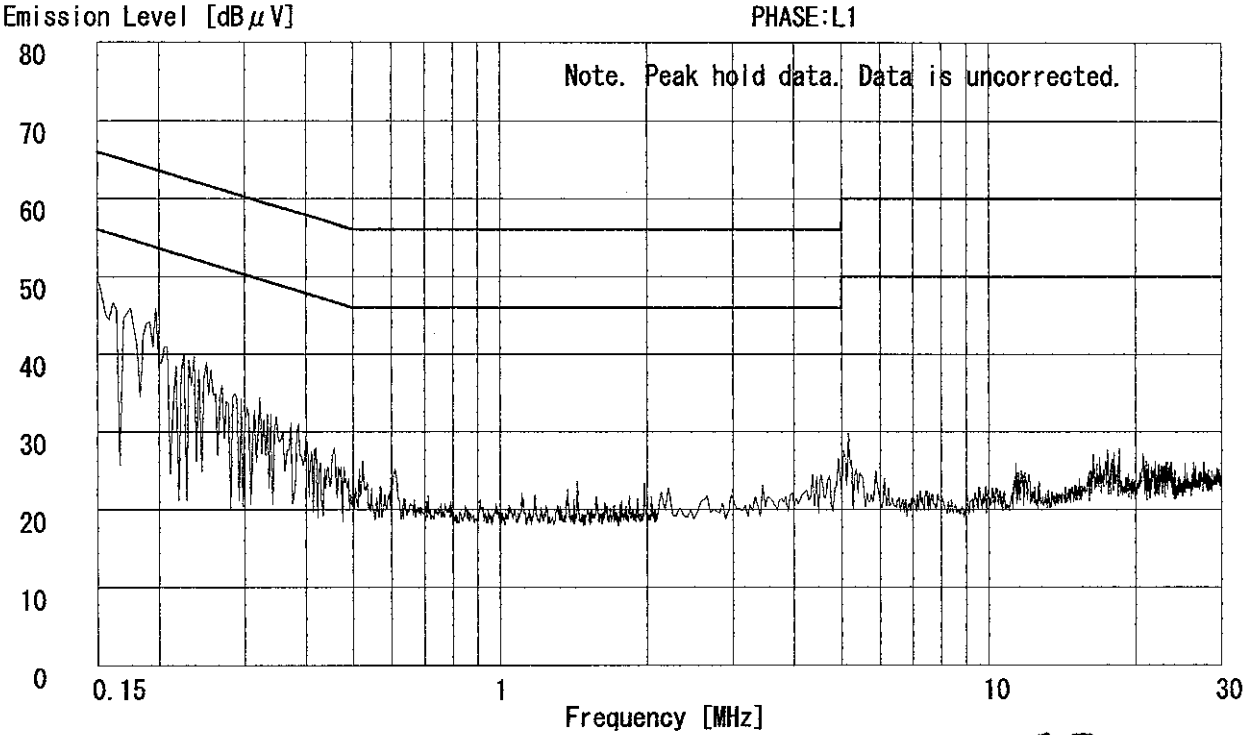
DATA OF CONDUCTION TEST CHART

UL Apex Co., Ltd.
Yamakita No.1 Shielded Room
Report No.: 23JE0006-YK-1

Applicant	: TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	: Wireless LAN Card
Model No.	: GIGAWAVE 6180010
Serial No.	: 000016
Power	: AC120V/60Hz
Mode	: Transmitting(2437MHz)
Remarks	:
Date	: 5/22/2003
Phase	: Single Phase
Temperature	: 26 ℃
Humidity	: 59 %
Regulation 1	: FCC Part15C §15.207.(CISPR Pub.22)
Regulation 2	: None

Engineer : Toyokazu Imamura



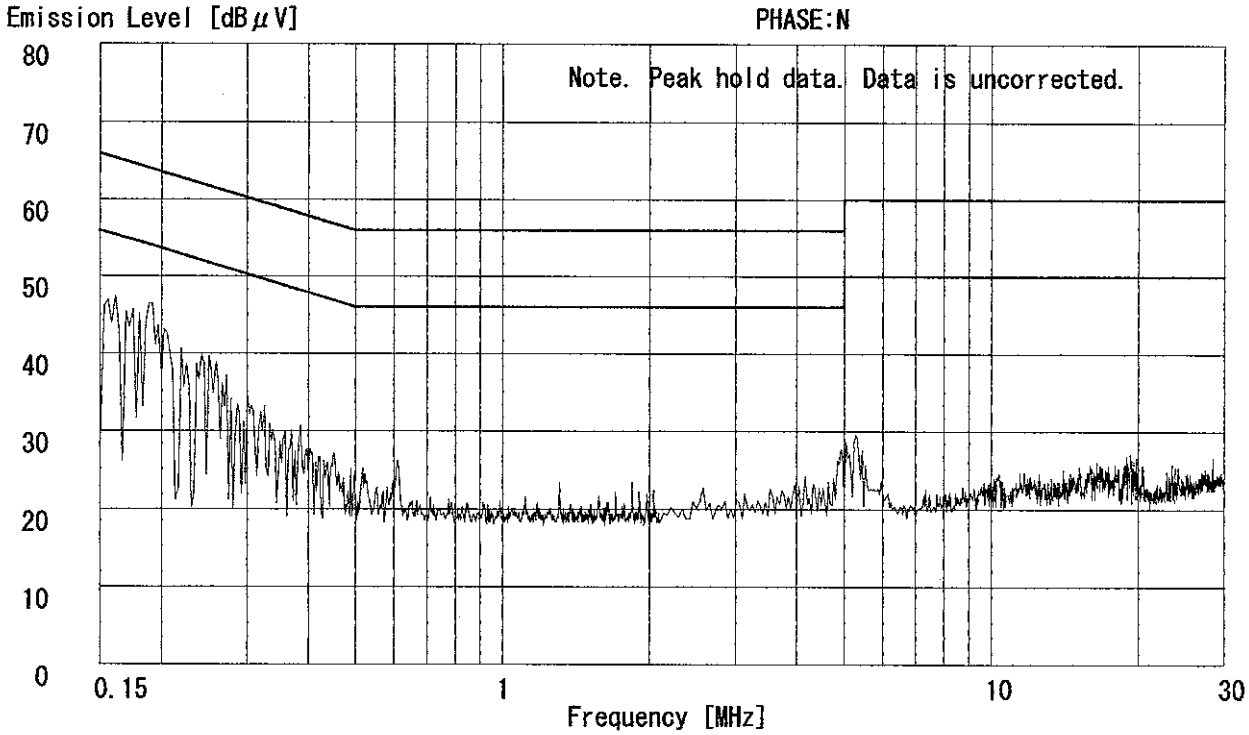


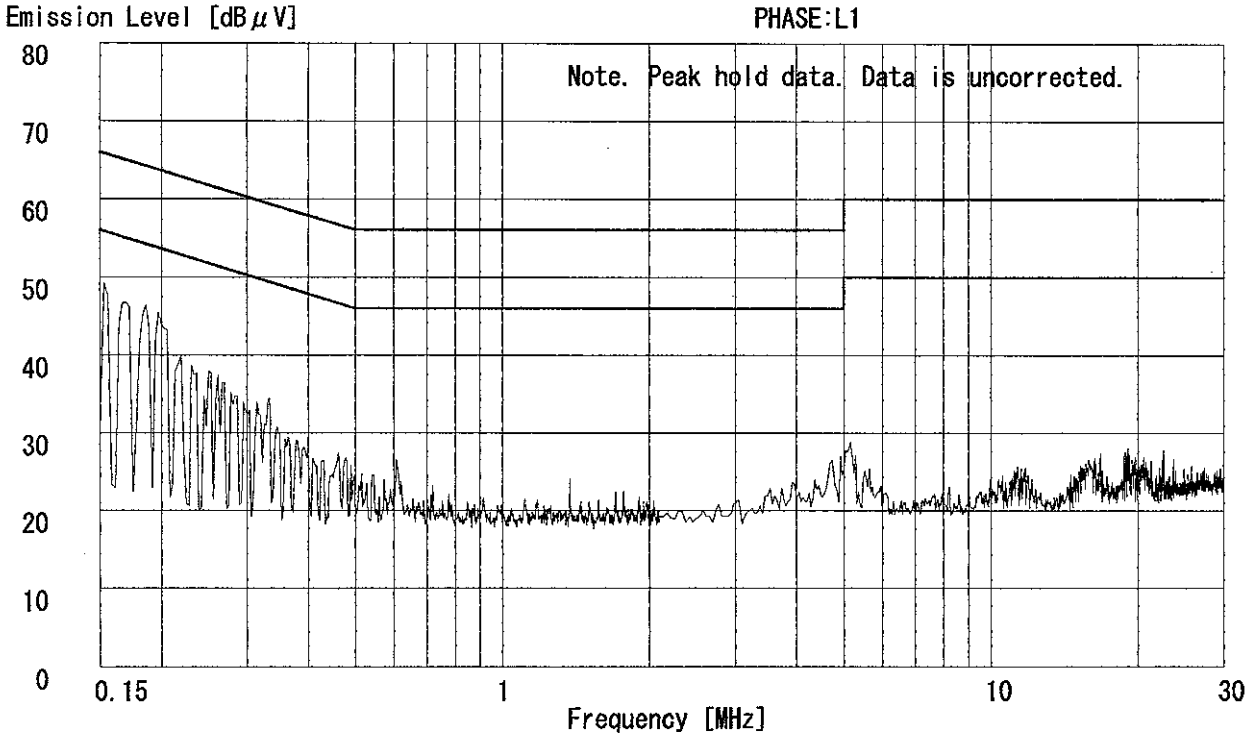
DATA OF CONDUCTION TEST CHART

UL Apex Co., Ltd.
Yamakita No.1 Shielded Room
Report No.: 23JE0006-YK-1

Applicant	: TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	: Wireless LAN Card
Model No.	: GIGAWAVE 6180010
Serial No.	: 000016
Power	: AC120V/60Hz
Mode	: Transmitting(2462MHz)
Remarks	:
Date	: 5/22/2003
Phase	: Single Phase
Temperature	: 26 ℃
Humidity	: 59 %
Regulation 1	: FCC Part15C §15.207.(CISPR Pub.22)
Regulation 2	: None

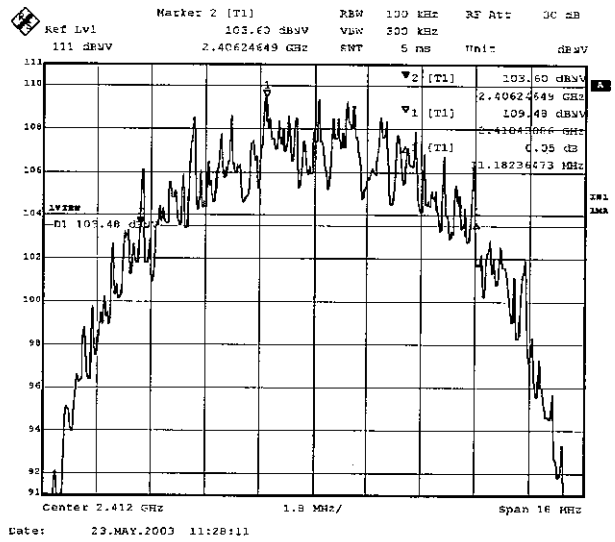
Engineer : Toyokazu Imamura



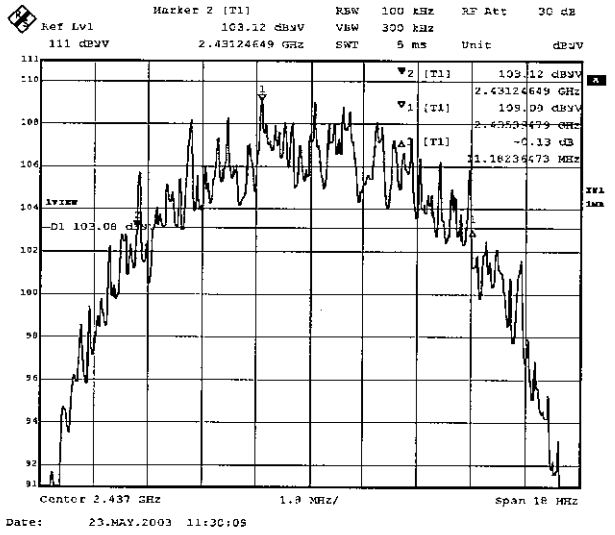


T. Imamura

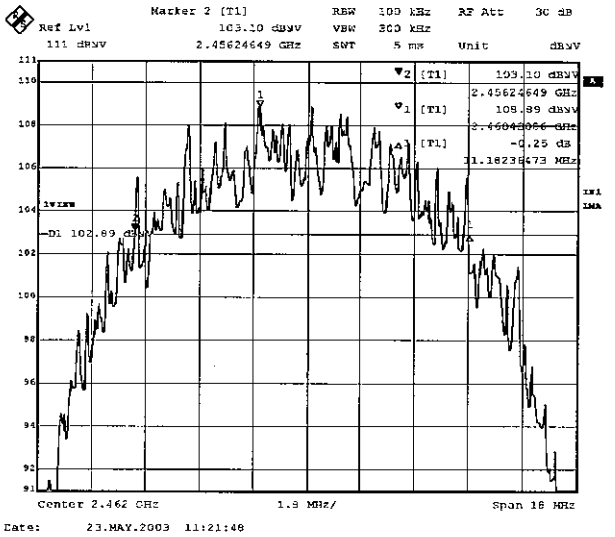
1. Ch Low:2412MHz



2. Ch Mid:2437MHz



3. Ch High:2462MHz



Peak Out Put Power (Conducted)

UL Apex Co., Ltd
YAMAKITA NO. 1 OPEN SITE

COMPANY : TOYOTA INDUSTRIES CORPORATION
EQUIPMENT : Wireless LAN Card
MODEL : GIGAWAVE 6180010
FCC ID : M4B6180010
POWER : AC120V/60Hz
Mode : Transmitting

REPORT NO : 23JE0006-YK-1
REGULATION : Fcc Part15SubpartC 247 (b)
DATE : 2003/ 05/23
Temp. /Humi. : 24℃/58%

ENGINEER : Toyokazu Imamura

CH	FREQ [GHz]	PM Reading [dBm]	Cable Loss [dB]	Results [dBm]	Limit (1W) [dBm]	MARGIN [dB]
Low	2412.00	14.90	0.10	15.00	30.0	15.00
Mid	2437.00	14.70	0.10	14.80	30.0	15.20
High	2462.00	14.10	0.10	14.20	30.0	15.80

DATA OF RADIATION TEST

UL Apex Co., Ltd.
Yamakita No.1 Open Test Site
Report No.: 23JE0006-YK-1

Applicant	: TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	: Wireless LAN Card
Model No.	: GIGAWAVE 6180010
Serial No.	: 000016
Power	: AC120V/60Hz
Mode	: Transmitting(2412MHz)
Remarks	: -
Date	: 5/19/2003
Test Distance	: 3 m
Temperature	: 19 ℃
Humidity	: 61 %
Regulation	: FCC Part15C §15.209

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	66.43	BB	47.1	44.3	7.2	28.6	2.0	6.0	33.7	30.9	40.0	6.3	9.1
2.	132.93	BB	44.7	40.5	14.2	28.4	2.9	6.1	39.5	35.3	43.5	4.0	8.2
3.	208.90	BB	33.2	35.0	16.7	28.1	3.8	6.1	31.7	33.5	43.5	11.8	10.0
4.	326.62	BB	42.8	29.5	15.3	27.9	4.9	6.1	41.2	27.9	46.0	4.8	18.1
5.	391.96	BB	43.7	39.0	17.2	28.5	5.4	6.1	43.9	39.2	46.0	2.1	6.8
6.	497.69	BB	33.2	35.6	18.1	29.1	6.2	6.1	34.5	36.9	46.0	11.5	9.1
7.	528.08	BB	29.1	34.4	18.5	29.5	6.4	6.1	30.6	35.9	46.0	15.4	10.1
8.	896.71	BB	28.6	28.6	21.7	28.7	8.9	6.1	36.6	36.6	46.0	9.4	9.4

CALCULATION: READING[dBμV] + ANT.FACTOR[dB/m] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

■ANTENNA:KBA-01(BBA9106)30-299.99MHz/KLA-01(USLP9143)300-1000MHz
■CABLE:KCC-10/11/12/13/18■PREAMP:KAF-01(8447D)■EMI RECEIVER:KTR-02(ESCS30)

DATA OF RADIATION TEST

UL Apex Co., Ltd.
Yamakita No.1 Open Test Site
Report No.: 23JE0006-YK-1

Applicant	: TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	: Wireless LAN Card
Model No.	: GIGAWAVE 6180010
Serial No.	: 000016
Power	: AC120V/60Hz
Mode	: Transmitting(2437MHz)
Remarks	: -
Date	: 5/20/2003
Test Distance	: 3 m
Temperature	: 27 °C
Humidity	: 74 %
Regulation	: FCC Part15C §15.209

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	66.44	BB	47.2	44.1	7.2	28.6	2.0	6.0	33.8	30.7	40.0	6.2	9.3
2.	132.93	BB	46.3	37.0	14.2	28.4	2.9	6.1	41.1	31.8	43.5	2.4	11.7
3.	208.90	BB	33.1	33.0	16.7	28.1	3.8	6.1	31.6	31.5	43.5	11.9	12.0
4.	326.63	BB	33.4	30.6	15.3	27.9	4.9	6.1	31.8	29.0	46.0	14.2	17.0
5.	391.96	BB	37.6	33.1	17.2	28.5	5.4	6.1	37.8	33.3	46.0	8.2	12.7
6.	498.42	BB	35.2	35.3	18.1	29.1	6.2	6.1	36.5	36.6	46.0	9.5	9.4
7.	528.07	BB	34.3	36.6	18.5	29.5	6.4	6.1	35.8	38.1	46.0	10.2	7.9
8.	896.27	BB	32.7	28.0	21.7	28.7	8.9	6.1	40.7	36.0	46.0	5.3	10.0

CALCULATION: READING[dBμV] + ANT.FACTOR[dB/m] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

■ANTENNA:KBA-01(BBA9106)30-299.99MHz/KLA-01(USLP9143)300-1000MHz
■CABLE:KCC-10/11/12/13/18■PREAMP:KAF-01(8447D)■EMI RECEIVER:KTR-02(ESCS30)

DATA OF RADIATION TEST

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Applicant	: TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	: Wireless LAN Card
Model No.	: GIGAWAVE 6180010
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Mode	: Transmitting(2462MHz)
Remarks	: -
Date	: 5/20/2003
Test Distance	: 3 m
Temperature	: 27 ℃
Humidity	: 74 %
Regulation	: FCC Part15C §15.209

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	66.42	BB	47.9	42.8	7.2	28.6	2.0	6.0	34.5	29.4	40.0	5.5	10.6
2.	132.93	BB	45.1	38.5	14.2	28.4	2.9	6.1	39.9	33.3	43.5	3.6	10.2
3.	208.90	BB	35.9	29.8	16.7	28.1	3.8	6.1	34.4	28.3	43.5	9.1	15.2
4.	326.62	BB	32.7	30.7	15.3	27.9	4.9	6.1	31.1	29.1	46.0	14.9	16.9
5.	391.96	BB	31.6	35.6	17.2	28.5	5.4	6.1	31.8	35.8	46.0	14.2	10.2
6.	498.61	BB	36.0	36.0	18.1	29.1	6.2	6.1	37.3	37.3	46.0	8.7	8.7
7.	528.08	BB	32.9	35.2	18.5	29.5	6.4	6.1	34.4	36.7	46.0	11.6	9.3
8.	896.70	BB	31.8	33.2	21.7	28.7	8.9	6.1	39.8	41.2	46.0	6.2	4.8

CALCULATION: READING[dBμV] + ANT.FACTOR[dB/m] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

■ANTENNA:KBA-01(BBA9106)30-299.99MHz/KLA-01(USLP9143)300-1000MHz
■CABLE:KCC-10/11/12/13/18■PREAMP:KAF-01(8447D)■EMI RECEIVER:KTR-02(ESCS30)

DATA OF RADIATION TEST

UL Apex Co., Ltd.
Yamakita No.1 Open Test Site
Report No. : 23JE0006-YK-1

Applicant	:	TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	:	Wireless LAN Card
Model No.	:	GIGAWAVE 6180010
Serial No.	:	000016
Power	:	AC120V/60Hz
Mode	:	Transmitting(2412MHz)
Remarks	:	-
Date	:	5/22/2003
Test Distance	:	3 m
Temperature	:	26 ℃
Humidity	:	49 %
Regulation	:	FCC Part15C §15.209(PK Detection)

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	1296.20	BB	53.4	52.2	25.5	37.9	3.3	10.0	54.3	53.1	74.0	19.7	20.9
2.	2374.09	BB	52.5	51.6	30.6	36.9	4.1	10.0	60.3	59.4	74.0	13.7	14.6
3.	2390.00	BB	51.5	51.6	30.6	36.9	4.1	10.0	59.3	59.4	74.0	14.7	14.6
4.	4824.00	BB	50.6	51.6	34.7	35.2	5.6	0.6	56.3	57.3	74.0	17.7	16.7
5.	7236.00	BB	45.1	45.2	37.7	36.8	6.5	0.5	53.0	53.1	74.0	21.0	20.9
6.	9648.00	BB	48.4	47.5	39.0	36.9	7.2	0.5	58.2	57.3	74.0	15.8	16.7
7.	12060.00	BB	45.3	45.4	42.1	36.3	8.1	0.5	59.7	59.8	74.0	14.3	14.2
8.	14472.00	BB	45.8	45.8	41.2	35.2	7.3	0.2	59.3	59.3	74.0	14.7	14.7
9.	16884.00	BB	44.5	44.5	41.6	35.0	8.8	0.5	60.4	60.4	74.0	13.6	13.6
10.	19296.00	BB	44.7	44.7	39.1	34.7	9.4	0.0	58.5	58.5	74.0	15.5	15.5
11.	21708.00	BB	45.3	45.3	39.2	34.3	9.9	0.0	60.1	60.1	74.0	13.9	13.9
12.	24120.00	BB	44.2	44.2	40.3	35.5	10.9	0.0	59.9	59.9	74.0	14.1	14.1

CALCULATION: READING[dBμV] + ANT.FACTOR[dB/m] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-02(8449B)■EMI RECEIVER:KTR-01(ESI40)

DATA OF RADIATION TEST

UL Apex Co., Ltd.
Yamakita No.1 Open Test Site
Report No.: 23JE0006-YK-1

Applicant	:	TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	:	Wireless LAN Card
Model No.	:	GIGAWAVE 6180010
Serial No.	:	000016
Power	:	AC120V/60Hz
Mode	:	Transmitting(2412MHz)
Remarks	:	-
Date	:	5/22/2003
Test Distance	:	3 m
Temperature	:	26 ℃
Humidity	:	49 %
Regulation	:	FCC Part15C §15.209(AV Detection)

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	1296.20	BB	37.3	37.5	25.5	37.9	3.3	10.0	38.2	38.4	54.0	15.8	15.6
2.	2374.09	BB	41.7	40.6	30.6	36.9	4.1	10.0	49.5	48.4	54.0	4.5	5.6
3.	2390.00	BB	38.6	41.0	30.6	36.9	4.1	10.0	46.4	48.8	54.0	7.6	5.2
4.	4824.00	BB	46.1	46.6	34.7	35.2	5.6	0.6	51.8	52.3	54.0	2.2	1.7
5.	7236.00	BB	32.4	32.2	37.7	36.8	6.5	0.5	40.3	40.1	54.0	13.7	13.9
6.	9648.00	BB	41.3	38.8	39.0	36.9	7.2	0.5	51.1	48.6	54.0	2.9	5.4
7.	12060.00	BB	32.3	32.3	42.1	36.3	8.1	0.5	46.7	46.7	54.0	7.3	7.3
8.	14472.00	BB	32.8	32.8	41.2	35.2	7.3	0.2	46.3	46.3	54.0	7.7	7.7
9.	16884.00	BB	31.9	31.9	41.6	35.0	8.8	0.5	47.8	47.8	54.0	6.2	6.2
10.	19296.00	BB	32.1	32.1	39.1	34.7	9.4	0.0	45.9	45.9	54.0	8.1	8.1
11.	21708.00	BB	32.9	33.0	39.2	34.3	9.9	0.0	47.7	47.8	54.0	6.3	6.2
12.	24120.00	BB	31.7	32.0	40.3	35.5	10.9	0.0	47.4	47.7	54.0	6.6	6.3

CALCULATION: READING[dBμV] + ANT.FACTOR[dB/m] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-02(8449B)■EMI RECEIVER:KTR-01(ESI40)

DATA OF RADIATION TEST

UL Apex Co., Ltd.
Yamakita No.1 Open Test Site
Report No. : 23JE0006-YK-1

Applicant	: TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	: Wireless LAN Card
Model No.	: GIGAWAVE 6180010
Serial No.	: 000016
Power	: AC120V/60Hz
Mode	: Transmitting(2437MHz)
Remarks	: -
Date	: 5/22/2003
Test Distance	: 3 m
Temperature	: 26 ℃
Humidity	: 49 %
Regulation	: FCC Part15C §15.209(PK Detection)

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	1296.20	BB	51.3	51.0	25.5	37.9	3.3	10.0	52.2	51.9	74.0	21.8	22.1
2.	4874.00	BB	51.8	49.2	35.0	35.2	5.6	0.6	57.8	55.2	74.0	16.2	18.8
3.	7311.00	BB	44.8	44.2	37.8	36.8	6.6	0.5	52.9	52.3	74.0	21.1	21.7
4.	9748.00	BB	46.5	48.4	39.0	37.0	7.2	0.6	56.3	58.2	74.0	17.7	15.8
5.	12185.00	BB	44.7	45.1	42.3	36.1	8.1	0.4	59.4	59.8	74.0	14.6	14.2
6.	14622.00	BB	44.9	44.9	41.7	35.2	7.7	0.3	59.4	59.4	74.0	14.6	14.6
7.	17059.00	BB	44.8	44.8	41.7	34.9	8.7	0.5	60.8	60.8	74.0	13.2	13.2
8.	19496.00	BB	44.1	44.2	39.0	34.7	9.5	0.0	57.9	58.0	74.0	16.1	16.0
9.	21933.00	BB	46.3	46.2	39.3	33.6	10.2	0.0	62.2	62.1	74.0	11.8	11.9
10.	24370.00	BB	44.5	44.5	40.4	36.3	10.8	0.0	59.4	59.4	74.0	14.6	14.6

CALCULATION: READING[dBμV] + ANT.FACTOR[dB/m] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-02(8449B)■EMI RECEIVER:KTR-01(ESI40)

DATA OF RADIATION TEST

UL Apex Co., Ltd.
Yamakita No.1 Open Test Site
Report No. : 23JE0006-YK-1

Applicant	:	TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	:	Wireless LAN Card
Model No.	:	GIGAWAVE 6180010
Serial No.	:	000016
Power	:	AC120V/60Hz
Mode	:	Transmitting(2437MHz)
Remarks	:	-
Date	:	5/22/2003
Test Distance	:	3 m
Temperature	:	26 ℃
Humidity	:	49 %
Regulation	:	FCC Part15C §15.209(AV Detection)

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	1296.20	BB	35.7	36.5	25.5	37.9	3.3	10.0	36.6	37.4	54.0	17.4	16.6
2.	4874.00	BB	46.9	42.8	35.0	35.2	5.6	0.6	52.9	48.8	54.0	1.1	5.2
3.	7311.00	BB	31.7	31.7	37.8	36.8	6.6	0.5	39.8	39.8	54.0	14.2	14.2
4.	9748.00	BB	36.3	40.6	39.0	37.0	7.2	0.6	46.1	50.4	54.0	7.9	3.6
5.	12185.00	BB	32.1	32.1	42.3	36.1	8.1	0.4	46.8	46.8	54.0	7.2	7.2
6.	14622.00	BB	31.5	31.6	41.7	35.2	7.7	0.3	46.0	46.1	54.0	8.0	7.9
7.	17059.00	BB	32.0	32.2	41.7	34.9	8.7	0.5	48.0	48.2	54.0	6.0	5.8
8.	19496.00	BB	31.7	31.7	39.0	34.7	9.5	0.0	45.5	45.5	54.0	8.5	8.5
9.	21933.00	BB	33.8	33.4	39.3	33.6	10.2	0.0	49.7	49.3	54.0	4.3	4.7
10.	24370.00	BB	32.3	32.3	40.4	36.3	10.8	0.0	47.2	47.2	54.0	6.8	6.8

CALCULATION: READING[dBμV] + ANT.FACTOR[dB/m] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-02(8449B)■EMI RECEIVER:KTR-01(ESI40)

DATA OF RADIATION TEST

UL Apex Co., Ltd.
Yamakita No.1 Open Test Site
Report No. : 23JE0006-YK-1

Applicant	:	TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	:	Wireless LAN Card
Model No.	:	GIGAWAVE 6180010
Serial No.	:	000016
Power	:	AC120V/60Hz
Mode	:	Transmitting(2462MHz)
Remarks	:	-
Date	:	5/22/2003
Test Distance	:	3 m
Temperature	:	26 ℃
Humidity	:	49 %
Regulation	:	FCC Part15C §15.209(PK Detection)

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	1296.20	BB	50.8	51.3	25.5	37.9	3.3	10.0	51.7	52.2	74.0	22.3	21.8
2.	2483.50	BB	52.7	52.9	30.6	36.9	4.1	10.0	60.5	60.7	74.0	13.5	13.3
3.	2488.00	BB	52.0	51.5	30.6	36.9	4.1	10.0	59.8	59.3	74.0	14.2	14.7
4.	2499.00	BB	49.3	48.6	30.6	36.9	4.1	10.0	57.1	56.4	74.0	16.9	17.6
5.	4924.00	BB	51.6	50.6	35.3	35.2	5.6	0.5	57.8	56.8	74.0	16.2	17.2
6.	7386.00	BB	44.8	44.8	37.9	36.9	6.6	0.5	52.9	52.9	74.0	21.1	21.1
7.	9848.00	BB	49.2	48.0	39.0	37.0	7.2	0.7	59.1	57.9	74.0	14.9	16.1
8.	12310.00	BB	45.2	45.2	42.5	35.9	8.1	0.4	60.3	60.3	74.0	13.7	13.7
9.	14772.00	BB	45.3	45.3	42.2	35.1	8.1	0.4	60.9	60.9	74.0	13.1	13.1
10.	17234.00	BB	44.2	44.2	42.3	34.8	8.5	0.6	60.8	60.8	74.0	13.2	13.2
11.	19696.00	BB	44.5	44.6	39.5	35.0	9.6	0.0	58.6	58.7	74.0	15.4	15.3
12.	22158.00	BB	45.9	45.9	39.2	33.7	10.3	0.0	61.7	61.7	74.0	12.3	12.3
13.	24620.00	BB	45.6	45.6	40.4	36.0	10.9	0.0	60.9	60.9	74.0	13.1	13.1

CALCULATION: READING[dBμV] + ANT.FACTOR[dB/m] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-02(8449B)■EMI RECEIVER:KTR-01(ESI40)

DATA OF RADIATION TEST

UL Apex Co., Ltd.
Yamakita No.1 Open Test Site
Report No.: 23JE0006-YK-1

Applicant	: TOYOTA INDUSTRIES CORPORATION
Kind of Equipment	: Wireless LAN Card
Model No.	: GIGAWAVE 6180010
Serial No.	: 000016
Power	: AC120V/60Hz
Mode	: Transmitting(2462MHz)
Remarks	: -
Date	: 5/22/2003
Test Distance	: 3 m
Temperature	: 26 ℃
Humidity	: 49 %
Regulation	: FCC Part15C §15.209(AV Detection)

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	1296.20	BB	36.0	36.7	25.5	37.9	3.3	10.0	36.9	37.6	54.0	17.1	16.4
2.	2483.50	BB	41.6	40.9	30.6	36.9	4.1	10.0	49.4	48.7	54.0	4.6	5.3
3.	2488.00	BB	39.4	39.0	30.6	36.9	4.1	10.0	47.2	46.8	54.0	6.8	7.2
4.	2499.00	BB	37.8	36.9	30.6	36.9	4.1	10.0	45.6	44.7	54.0	8.4	9.3
5.	4924.00	BB	46.9	45.7	35.3	35.2	5.6	0.5	53.1	51.9	54.0	0.9	2.1
6.	7386.00	BB	32.0	32.2	37.9	36.9	6.6	0.5	40.1	40.3	54.0	13.9	13.7
7.	9848.00	BB	41.0	38.5	39.0	37.0	7.2	0.7	50.9	48.4	54.0	3.1	5.6
8.	12310.00	BB	31.9	31.7	42.5	35.9	8.1	0.4	47.0	46.8	54.0	7.0	7.2
9.	14772.00	BB	32.1	32.1	42.2	35.1	8.1	0.4	47.7	47.7	54.0	6.3	6.3
10.	17234.00	BB	31.8	31.8	42.3	34.8	8.5	0.6	48.4	48.4	54.0	5.6	5.6
11.	19696.00	BB	31.9	31.8	39.5	35.0	9.6	0.0	46.0	45.9	54.0	8.0	8.1
12.	22158.00	BB	33.1	33.1	39.2	33.7	10.3	0.0	48.9	48.9	54.0	5.1	5.1
13.	24620.00	BB	32.4	32.3	40.4	36.0	10.9	0.0	47.7	47.6	54.0	6.3	6.4

CALCULATION: READING[dBμV] + ANT.FACTOR[dB/m] + CABLE LOSS[dB] - AMP.GAIN[dB] + ATTEN[dB].

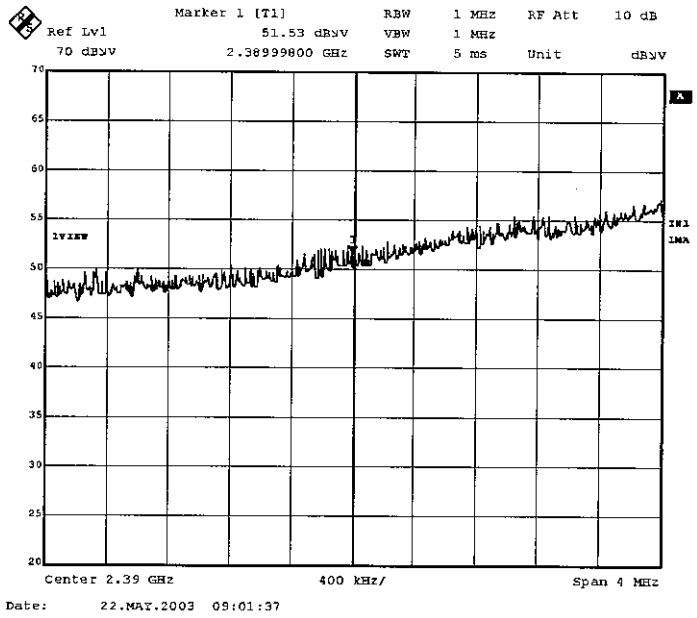
■ANTENNA:KHA-01(SAS-200 571)1-18GHz/KHA-03(3160-09)18-26GHz
■CABLE:KCC-D3/D7■PREAMP:KAF-02(8449B)■EMI RECEIVER:KTR-01(ESI40)

T. Imamura

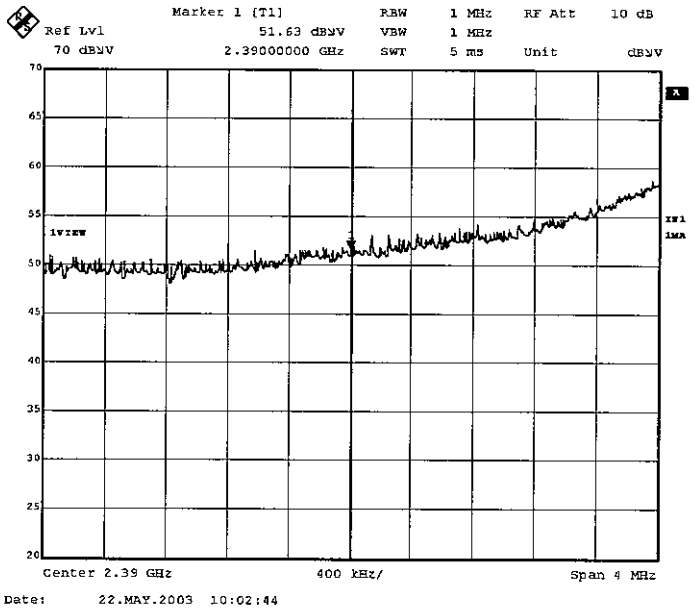
Restricted band edges: FCC 15.247(c)

2.39GHz (Ch 1:2412MHz)

1. **Horizontal/ PK**



2. **Vertical/ PK**



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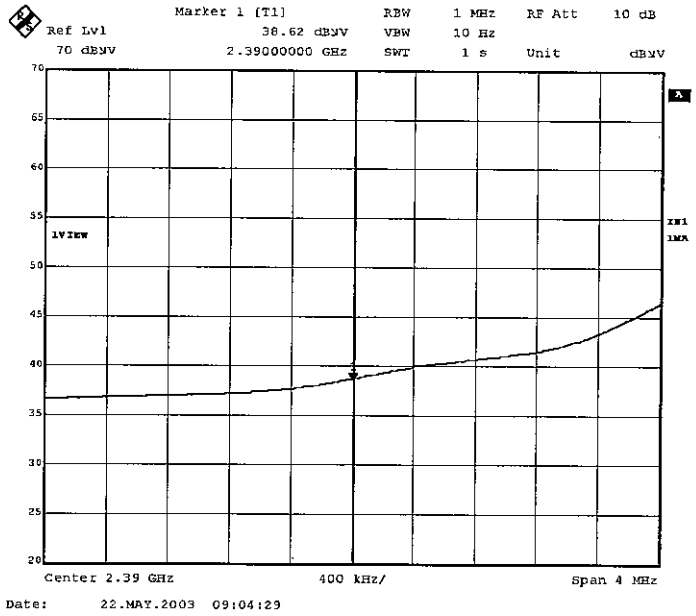
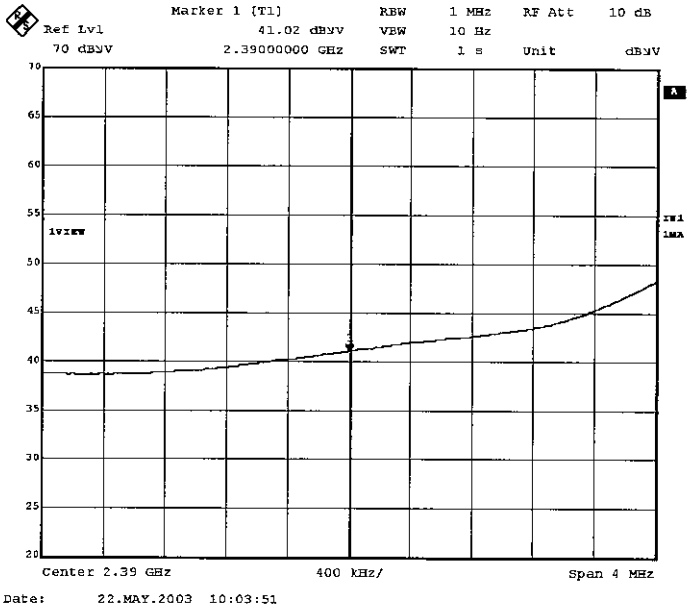
3. Horizontal/ AV



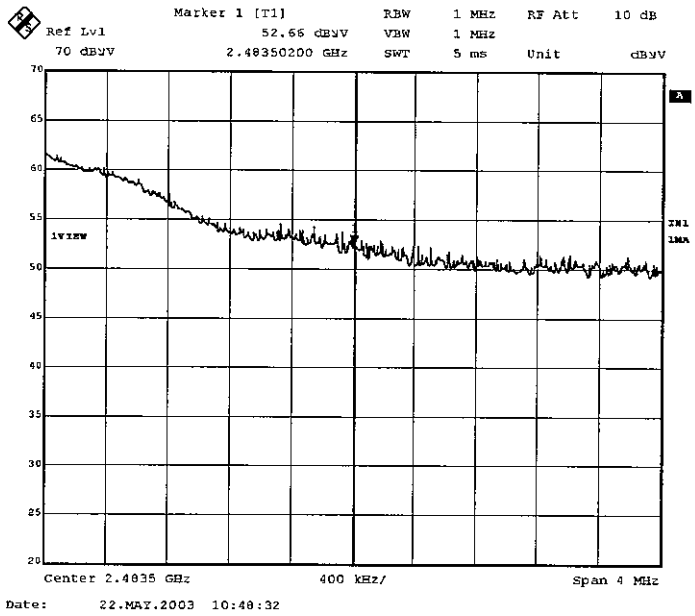
4. Vertical/ AV



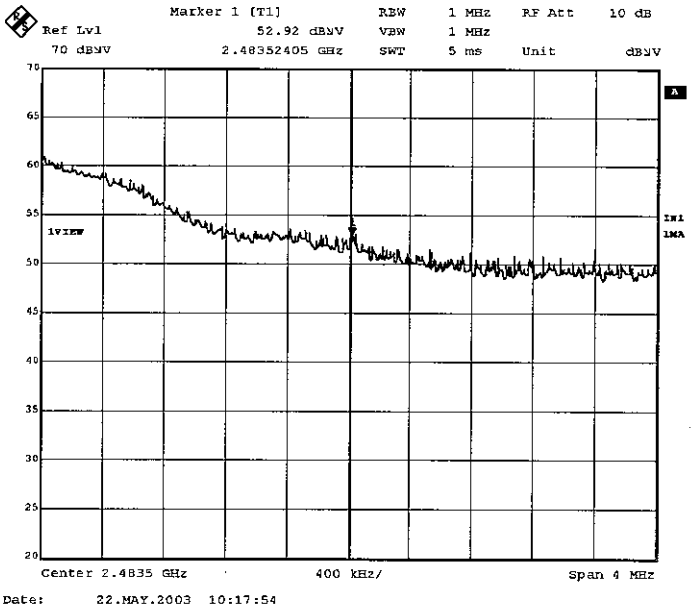
T. Imamura

2.4835GHz (Ch 11:2462MHz)

1. **Horizontal/ PK**

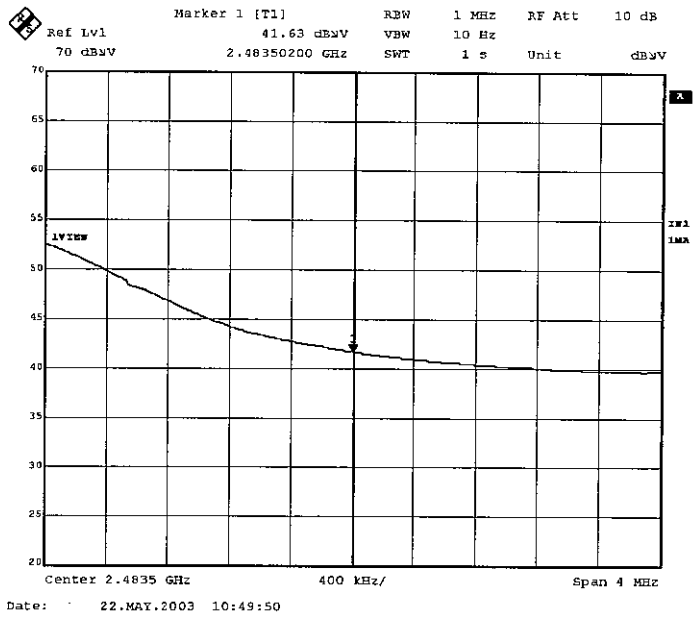


2. **Vertical/ PK**

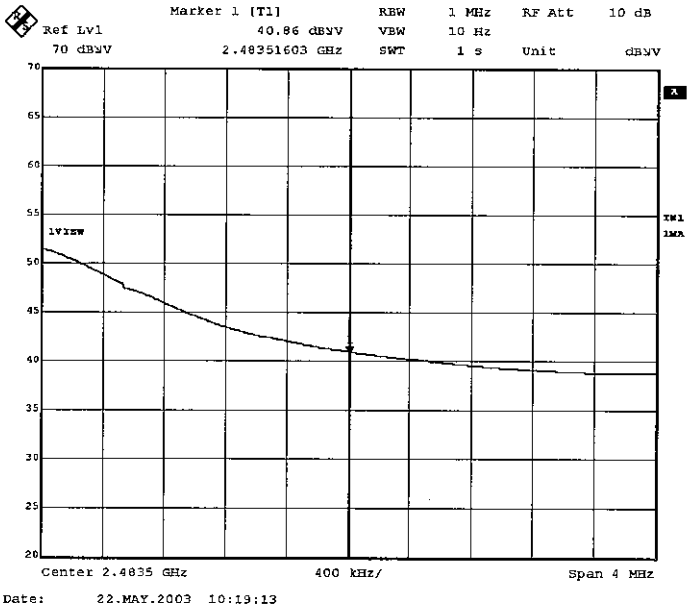


T. Imamura

3. Horizontal/ AV



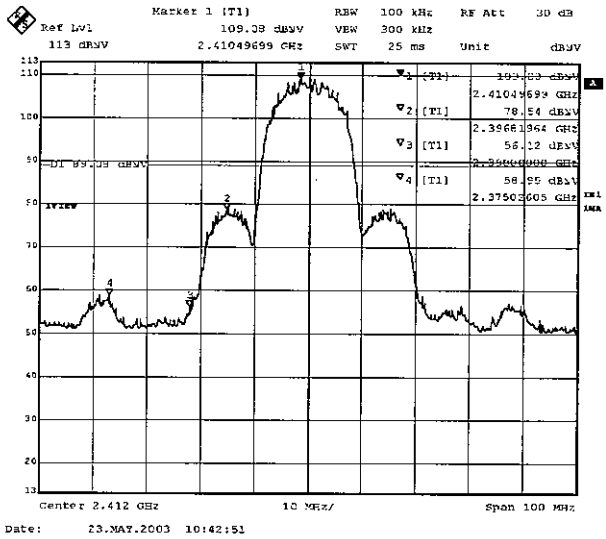
4. Vertical/ AV



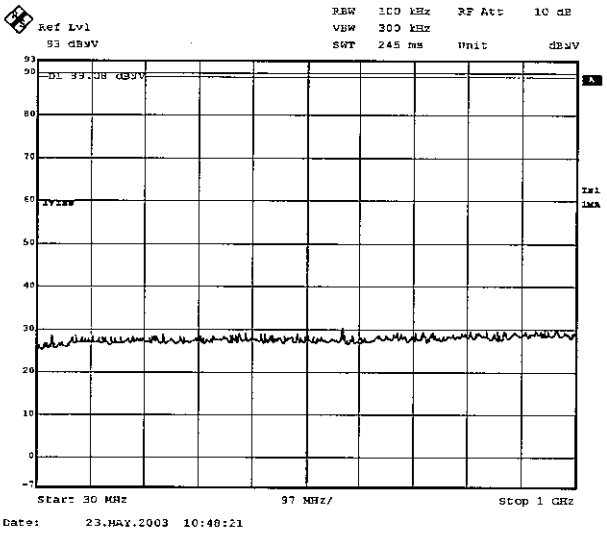
T. Imamura

Ch 1: 2412MHz

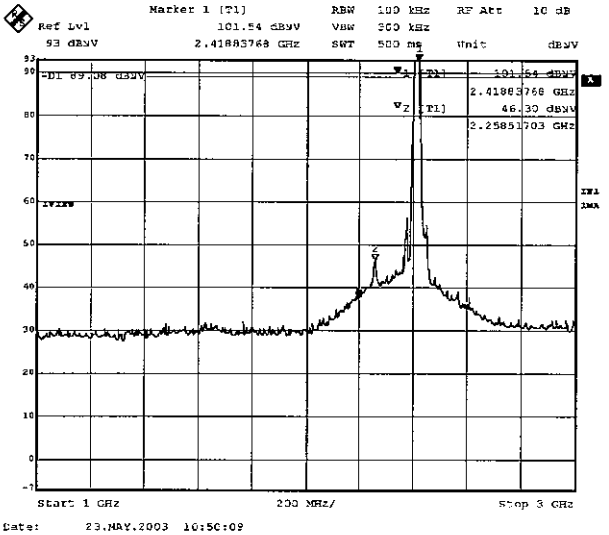
1.



2.

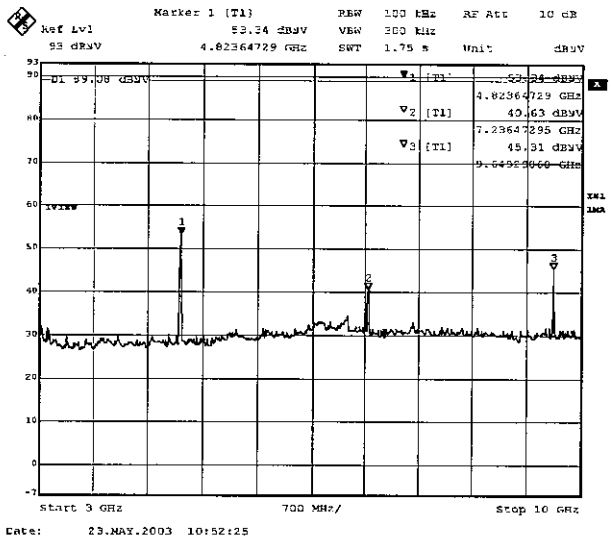


3.

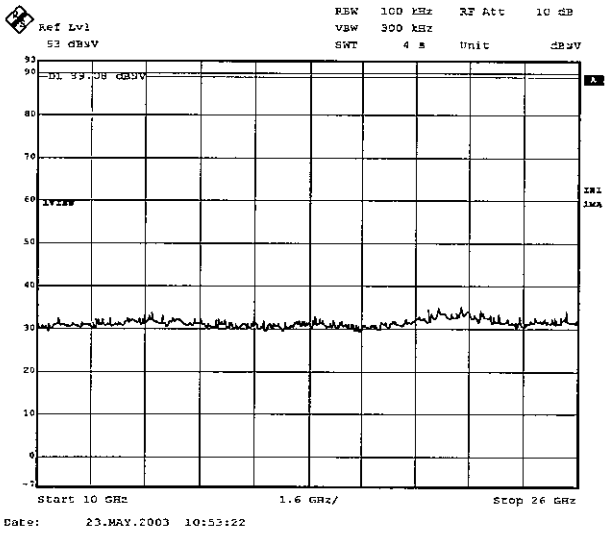


T. Imamura

4.


Marker 1 [T1]
Ref Lvl
93 dBµV
93.34 dBµV
4.82364729 GHz
RBW 100 kHz
VBW 300 kHz
SWT 1.75 s
RF Att 10 dB
Unit dBµV
D1 89.08 dBµV
T1
4.82364729 GHz
T2 [T1]
40.63 dBµV
7.23647295 GHz
T3 [T1]
45.31 dBµV
9.64925060 GHz
1VIEW
Start 3 GHz
700 MHz/
Stop 10 GHz
Date: 23.MAY.2003 10:52:25

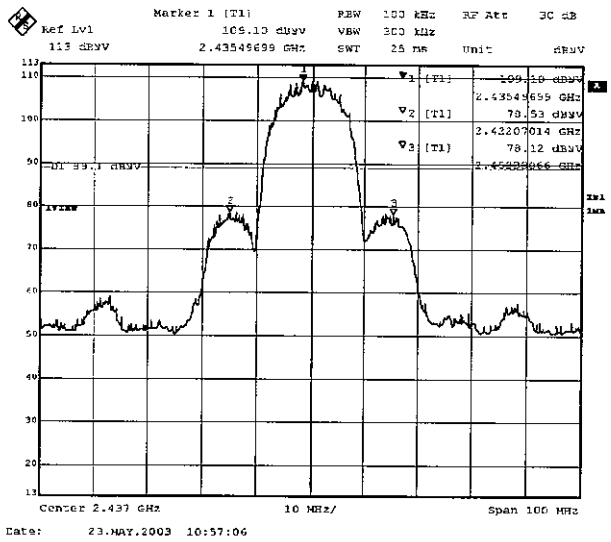
5.


Ref Lvl
93 dBµV
RBW 100 kHz
VBW 300 kHz
SWT 4 s
RF Att 10 dB
Unit dBµV
D1 89.08 dBµV
1VIEW
Start 10 GHz
1.6 GHz/
Stop 26 GHz
Date: 23.MAY.2003 10:53:22

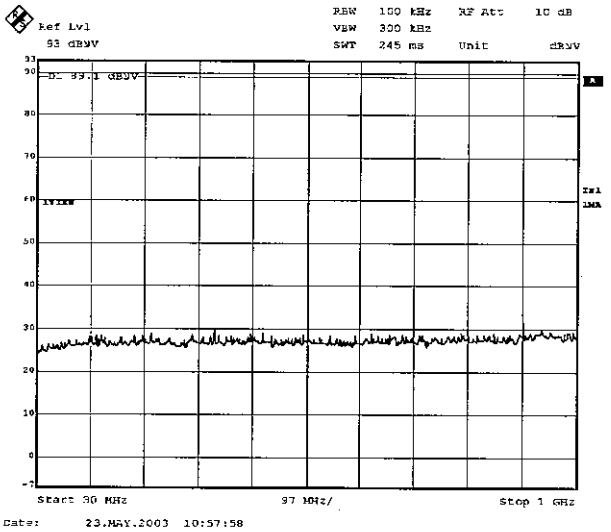
T. Imamura

Ch 6: 2437MHz

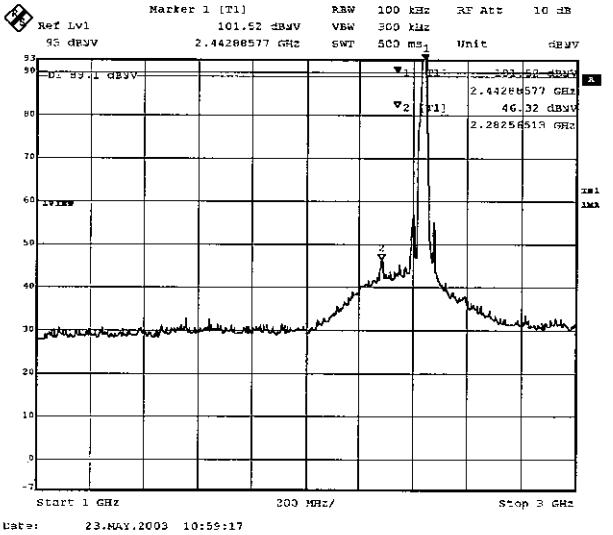
1.



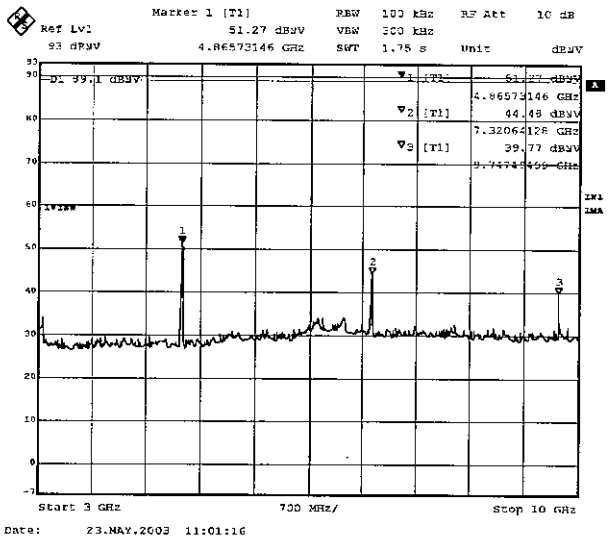
2.



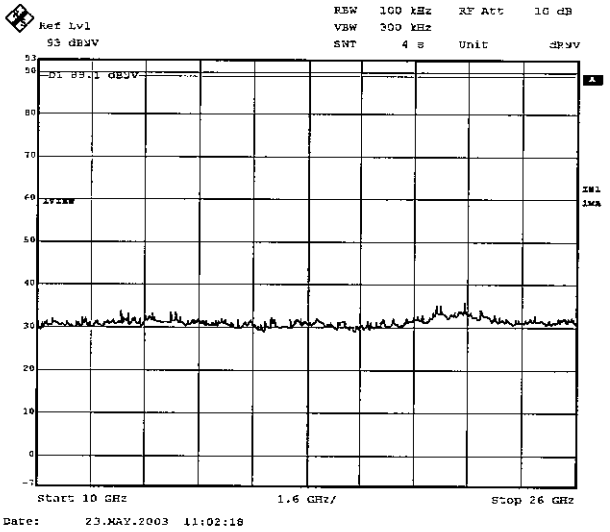
3.



4.


Marker 1 [T1]
Ref Lvl
93 dBµV
51.27 dBµV
4.86573146 GHz
RBW 100 kHz
VBW 300 kHz
SWT 1.75 s
RF Att 10 dB
Unit dBµV
D1 99.1 dBµV
1 [T1] 51.27 dBµV
4.86573146 GHz
2 [T1] 44.48 dBµV
7.32064128 GHz
3 [T1] 39.77 dBµV
Start 3 GHz
700 MHz/
Stop 10 GHz
Date: 23.MAY.2003 11:01:16

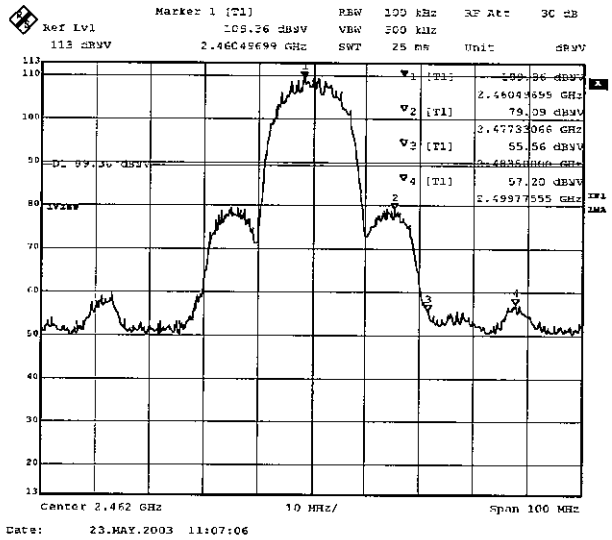
5.


Ref Lvl
93 dBµV
RBW 100 kHz
VBW 300 kHz
SWT 4 s
RF Att 10 dB
Unit dBµV
D1 89.1 dBµV
Start 10 GHz
1.6 GHz/
Stop 26 GHz
Date: 23.MAY.2003 11:02:18

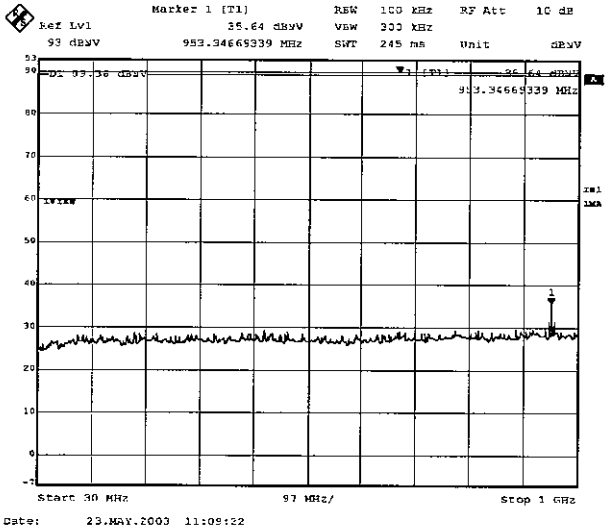
T. Imamura

Ch 11: 2462MHz

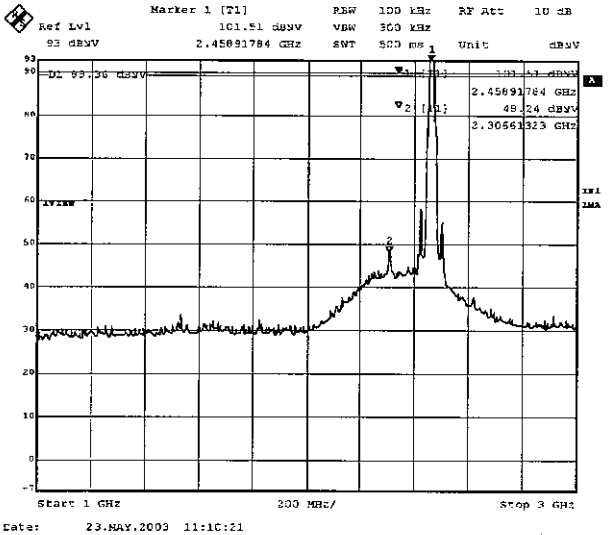
1.



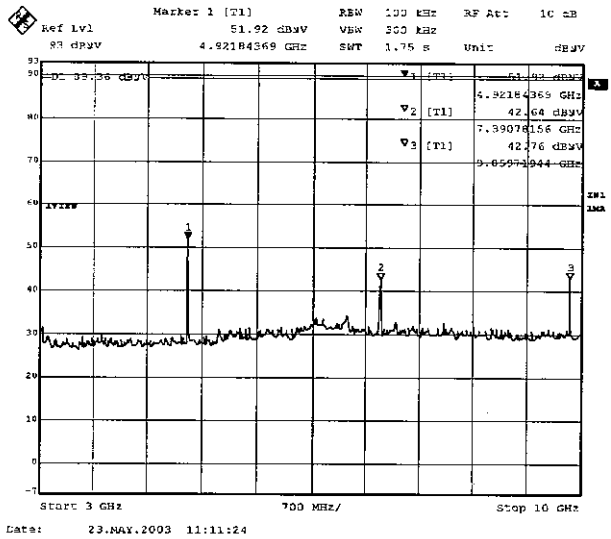
2.



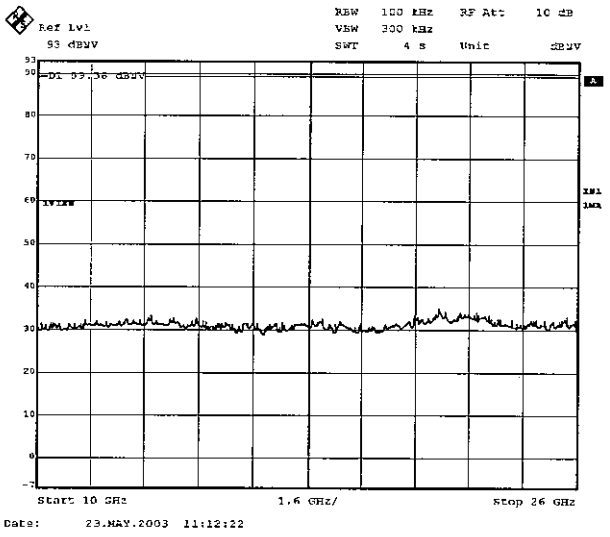
3.



4.


Marker 1 [T1]
Ref Lvl
93 dBµV
51.92 dBµV
4.92184369 GHz
RBW 100 kHz
VBW 300 kHz
SWT 1.75 s
RF Att 10 dB
Unit dBµV
D1 93.36 dBµV
[T1]
42.64 dBµV
7.39078156 GHz
[T1]
42.76 dBµV
Start 3 GHz
700 MHz/
Stop 10 GHz
Date: 23.MAY.2003 11:11:24

5.


Ref Lvl
93 dBµV
RBW 100 kHz
VBW 300 kHz
SWT 4 s
RF Att 10 dB
Unit dBµV
D1 93.36 dBµV
Start 10 GHz
1.6 GHz/
Stop 26 GHz
Date: 23.MAY.2003 11:12:22

Power Density (Conducted)

UL Apex Co., Ltd
YAMAKITA NO. 1 OPEN SITE

COMPANY : TOYOTA INDUSTRIES CORPORATION
EQUIPMENT : Wireless LAN Card
MODEL : GIGAWAVE 6180010
FCC ID : M4B6180010
POWER : AC120V/60Hz
Mode : Transmitting

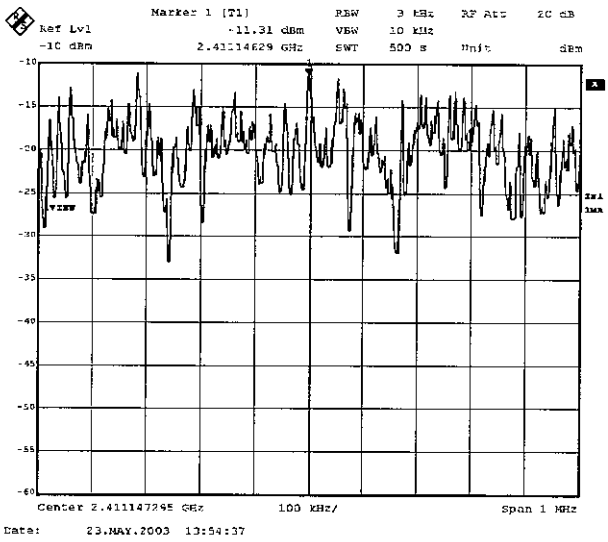
REPORT NO : 23JE0006-YK-1
REGULATION : Fcc Part15SubpartC 247 (d)
DATE : 2003/ 05/23
Temp. /Humi. : 24℃/58%

T. Imamura
ENGINEER : Toyokazu Imamura

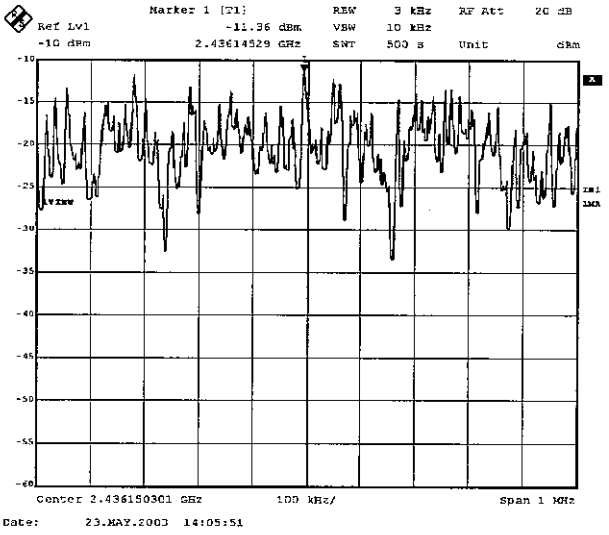
CH	FREQ [GHz]	S/A Reading [dBm]	Cable Loss [dB]	Results [dBm]	Limit [dBm]	MARGIN [dB]
Low	2.411146	-11.31	0.6	-10.71	8.0	18.7
Mid	2.436145	-11.36	0.6	-10.76	8.0	18.8
High	2.462185	-12.53	0.6	-11.93	8.0	19.9

T. Imamura

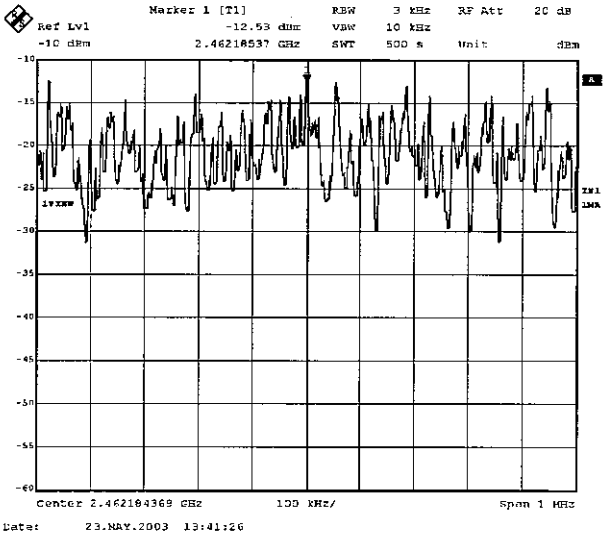
1. **ch 1: 2412MHz**



2. **ch 6: 2437MHz**



3. **ch 11: 2462MHz**



Test Report No :23JE0006-YK-1

APPENDIX 3
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
KAF-01	Pre Amplifier	Hewlett Packard	8447D	RE	2002/08/03 * 12
KAF-02	Pre Amplifier	Hewlett Packard	8449B	RE	2003/05/08 * 12
KAT10-S1	Attenuator	Agilent	8449D 010	RE	2003/04/18 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE	2003/05/12 * 12
KBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2002/08/17 * 12
KCC-10/11/12/13/18	Coaxial Cable	Fujikura/Suhner	8D-2W/12D-SFA/S04272B/S04272B/S04272B	RE	2002/08/17 * 12
KCC-14/15/16/18/KPL-01	Coaxial Cable/Pulse Limitter	Fujikura/Suhner/PMM	5D-2W/8D-2W/S04272B/S04272B/PL01	CE	2002/08/17 * 12
KCC-D3/D7	Coaxial Cable	Rosenberger/Advantest	2201/JUN-08-01-061	RE	2003/04/18 * 12
KFL-01	Highpass Filter	Hewlett Packard	84300 80038	RE	2003/04/18 * 12
KHA-01	Horn Antenna	A.H.Systems	SAS-200/571	RE	2002/07/14 * 12
KLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/02/19 * 12
KLS-01	LISN(AMN)	Schwarzbeck	NSLK8126	CE	2002/08/16 * 12
KOTS-01	Open Test Site	JSE	30m	RE	2002/08/18 * 12
KPM-05	Power meter	Agilent	E4417A	AT	2003/02/17 * 12
KPSS-01	Power sensor	Agilent	E9327A	AT	2003/02/21 * 12
KSA-01	Spectrum Analyzer	Advantest	R3365	CE/RE	2003/06/09 * 12
KTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE/AT	2002/07/22 * 12
KTR-02	Test Receiver	Rohde & Schwarz	ESCS30	CE/RE	2002/11/25 * 12
KCC-D7	Coaxial Cable	Advantest	A01002	AT	2003/04/18 * 12

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

Test Item:

CE: Conducted emission test
RE: Radiated emission test
AT: Antenna terminal conducted test