



TEST REPORT

REPORT NUMBER : ANKK-102013

APPLICANT : MITSUMI ELECTRIC CO., LTD.

MODEL NUMBER : Wavit 11 Wireless LAN
(DWL-A001)

FCC ID : EW4DWLA001

REGURATION : FCC Part15C Section 15.247



NVLAP accreditation is valid for
FCC Part15 (Digital Devices),
CISPR22 and AS/NZS 3548.
NVLAP accreditation does not cover
ICES-003.

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ABBREVIATIONS

LISN = Line Impedance Stabilization Network

AMN = Artificial Mains Network

ANT = Antenna

BBA = Broad-band Antenna

DIP = Dipole Antenna

AMP = Amplifier

ATT = Attenuator

EUT = Equipment Under Test

Q-P = Quasi-peak

AVG = Average

ch = Channel

CCK = Complementary Code Keying

SECTION 1. TEST CERTIFICATION**APPLICANT INFORMATION**

Company	: MITSUMI ELECTRIC CO., LTD.
Address	: 1601, Sakai Atsugi-shi, Kanagawa-ken, 243-8533 Japan
Telephone number	: +81 46 230 3420
Fax number	: +81 46 230 3500

DESCRIPTION OF TEST ITEM

Kind of equipment	: Wireless LAN
Condition of equipment	: Prototype
Type	: Combination type of Table-top and Wall-hanging
Trademark	: MITSUMI
FCC ID	: EW4DWLA001
Model number	: Wavit 11 Wireless LAN (DWL-A001)
Serial number	: 001

TEST PERFORMED

Location	: Kashima No. 3 Test Site (FCC File No. : 31040/SIT)
EUT received	: January 17, 2002
Test started	: January 17, 2002
Test completed	: February 1, 2002
Regulation	: FCC Part15 Subpart C Section 15.247 Intentional Radiators
Test setup	: ANSI C63.4-1992

Report issue date : May 31, 2002

Test engineer : Koji Setoguchi



Report approved by : Junichi Okada



[Site Manager]

Note

- The test result of this report is effective for equipment under test itself and under the test configuration described on the report.
- This test report does not assure that whether the test result taken in other testing laboratory is compatible or reproducible to the test result on this report or not.
- This test report shall not be reproduced except in full, without issuer's permission.

SECTION 2. SUMMARY OF RESULTS

Test	Reference	Result
Minimum 6dB Bandwidth	15.247(a)(2)	Pass
Maximum Peak Output Power	15.247(b)	Pass
Spurious Emissions - RF Antenna Conducted Test	15.247(c)	Pass
Spurious Emissions - Radiated Emission Test	15.247(c) 15.205 15.209	Pass
Power Spectral Density	15.247(d)	Pass
Antenna Requirement	15.203	Pass ^{Note}
Restricted Bands of Operation	15.247(c) 15.205 15.209	Pass
AC Conducted Emission	15.207	Pass
Variation of Input Power	15.31(e)	Pass

Note : As for the detail of the Antenna Requirement, refer to separate attachment.

SECTION 3. EQUIPMENT UNDER TEST

The equipment under test (EUT) consisted of the following equipment. Indication in the following left side column corresponds to Section 6.

Symbol	Item	Model No.	Serial	FCC ID / DoC	Manufacturer	Remarks
A)	Wireless LAN	Wavit 11 Wireless LAN (DWL-A001)	001	EW4DWLA001	MITSUMI ELECTRIC CO., LTD.	
B)	AC Adaptor	R2087	None	N.A.	MITSUMI ELECTRIC CO., LTD.	

Power ratings of EUT : [Wireless LAN] DC 5V, 0.6 A
[AC Adaptor] Input : AC 100-120V, 50-60 Hz, 0.28 A
Output : DC 5V, 1.6 A

DoC : Device for Declaration of Conformity

3.1 Overview of EUT

Frequency Band	2400 – 2483.5 MHz
Number of Channel	11
Modulation Method	CCK
Spread Method	Direct Sequence Spread Spectrum
Data Transfer Rate	1 Mbps / 2 Mbps / 5.5 Mbps / 11 Mbps
Rated RF Output	33.9 mW
Antenna Gain	1.0 dBi

3.2 Operating channels and frequencies

Ch	Frequency (MHz)	Ch	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

Note:

1. This is for sure that all frequencies are in 2412 MHz to 2462 MHz.
2. Section 15.31(m): Measurements on intentional radiators or receivers shall be performed at three frequencies for operating frequency range over 10 MHz. (The locations of these frequencies one near the low, one near the middle and one near the high.)
3. After test, the EUT operating frequencies are in 2412 MHz to 2462 MHz. So all the items as followed in testing report are need to test these three frequencies:
low: ch 1, middle: ch 6, high: ch 11.

3.3 Port(s)/Connector(s) :

Port name	Connector type	Connector pin	Remarks
10 BASE-T	RJ-45	8 pin	

3.4 Oscillator(s)/Crystal(s) :

Oscillator	Operating frequency	Board name	Remarks
44 MHz	2132 - 2192 MHz	RF Board	Highest Frequency
	560 MHz	RF Board	
	44 MHz	Main Board	
	22 MHz	Main Board	
20 MHz	20 MHz	Main Board	

SECTION 4. SUPPORT EQUIPMENT USED

The EUT was supported by the following equipment during the test.
Indication in the following left side column corresponds to Section 6.

Symbol	Item	Model No.	Serial No.	FCC ID / DoC	Manufacturer	Remarks
C)	Computer	DCM	SNT4Z	97028	DELL	
D)	CRT Display	D1726T-HS	2000176	AK8GDM17SE2T	DELL	
E)	Keyboard	SK-1000REW	M97082741	GYUR36SK	DELL	
F)	Mouse	90741	02193504	C3KKMP3	Microsoft	
G)	Printer	P12PB	0E11397879	BKM9A8P12PB	EPSON	
H)	Modem	C202A	010058	BKM552C202A	EPSON	
I)	AC Adaptor	HOOCAA	019516	N.A.	EPSON	

DoC : Device was tested and authorized under a Declaration of Conformity to the applicable FCC rules.

SECTION 5. CABLE (S) USED

The following cable(s) was used for the test.

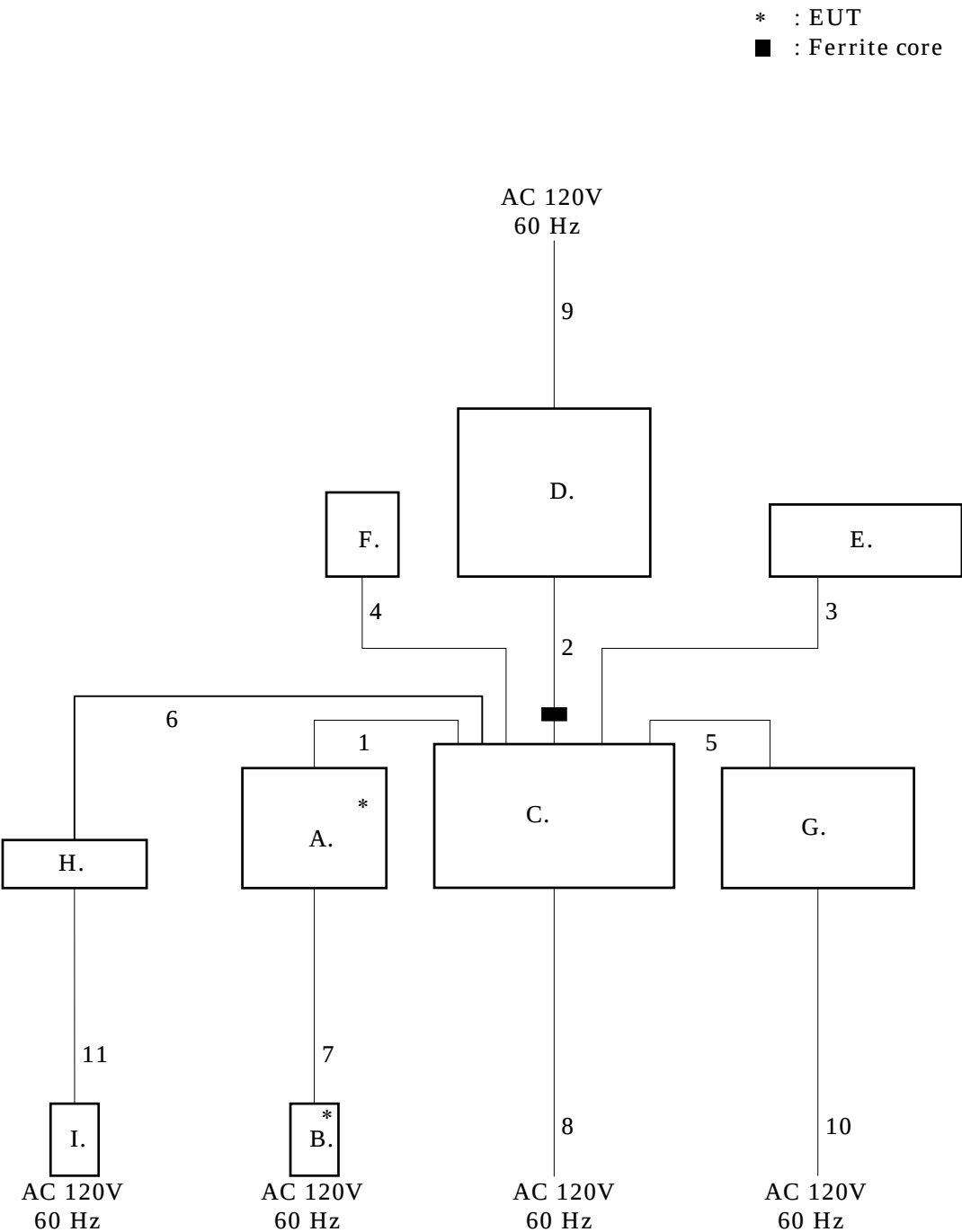
Indication number in the following left side column corresponds to Section 6.

Number	Name	Length	Shield	Connector	Core
1)	LAN cable	1.00 m	None	Plastic	
2)	Video cable	1.70 m	Yes	Metal	Fixed × 1
3)	Keyboard cable	1.90 m	Yes	Metal	
4)	Mouse cable	1.90 m	Yes	Metal	
5)	Centronics cable	2.40 m	Yes	Metal	
6)	RS-232C cable	3.00 m	Yes	Metal	
7)	Power cable for Wireless LAN	1.90 m	None		
8)	Power cable for Computer	1.90 m	None		
9)	Power cable for CRT Display	1.90 m	None		
10)	Power cable for Printer	1.90 m	None		
11)	Power cable for Modem	2.10 m	None		

SECTION 6. CONSTRUCTION OF EQUIPMENT

The construction of EUT during the test was as follows.

System configuration



Symbols or numbers assigned to equipment or cables on this diagram are corresponded to the symbols or numbers assigned to equipment or cables on tables in Sections 3 to 5.

SECTION 7. OPERATING CONDITIONS

The EUT was operated under the following conditions during the test.

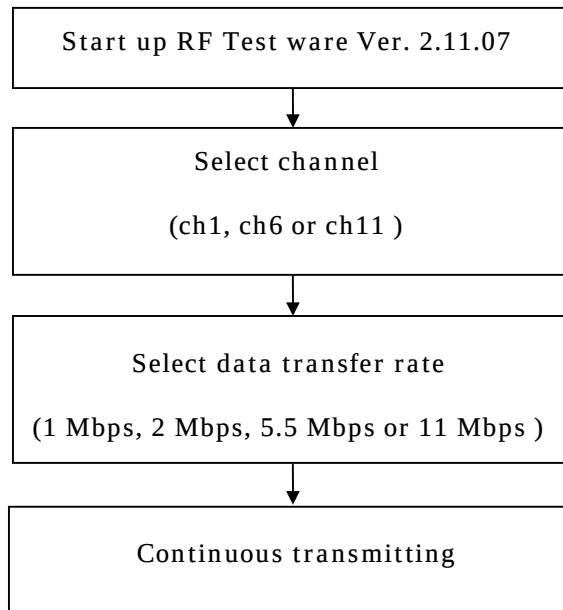
7.1 Operating condition

The test was carried out under Tx mode.

EUT was examined in the operating conditions that had maximum disturbances.

7.2 Operating flow [Tx mode]

Following operations were performed continuously.



SECTION 8. TEST PROCEDURE(S)

Test was carried out under the following conditions.

Test was carried out with no deviations from standards and test methods.

8.1 Conducted Emission Test [15.207]

8.1.1 Equipment Setup

System configuration and Equipment setup are shown on Section 6 and Section 10.

8.1.1.1 Table-Top Equipment

EUT is placed on the wooden table, the top of which is 0.8meter above the metal ground plane.

8.1.1.2 Interconnecting Cables

Excess part of the interconnecting cables longer than 1 meter are bundled in the center. Cables that hang closer than 40 cm to the ground plane is folded back and forth forming bundle 30 to 40 cm long, hanging approx, in the middle between ground plane and table.

8.1.1.3 AC Power Cable

AC power cable for EUT is connected to one LISN which is placed on the ground plane. The LISN is placed in 80 cm from the nearest part of EUT chassis. The excess power cable is bundled in the center, or shortened to appropriate length. AC cables except from the EUT are connected second LISN.

8.1.2 Measuring Instruments

Brief description of Measuring Instruments are as follows;

8.1.2.1 Spectrum Analyzer

The Spectrum analyzer is used for preliminary measurement.

8.1.2.2 EMI Test Receiver

The Quasi-peak detector (IF bandwidth : 10 kHz) and average detector (IF bandwidth : 10 kHz) built in test receiver is used for final measurement. The test receiver is complied with the specification of the CISPR publication 16.

8.1.2.3 LISN

Two 50 μ H//50 Ω LISN are used. The chassis of the LISN is bonded to the ground plane by the copper blade. One LISN is connected to the EUT. Other LISN (2nd LISN) is connected to the support equipment. The signal output of the 2nd LISN is terminated with a 50 Ω termination.

8.1.3 Test Procedure

8.1.3.1 Preliminary Measurement

EUT is tested on all operating conditions.

The spectrum analyzer is controlled by the computer program to sweep regulation frequency, then spectrum chart are plotted out to detect the worst conditions in operating mode and/or configuration for the final test.

All leads other than safety ground are tested.

8.1.3.2 Final Measurement

The EUT is operated in the worst condition where maximum emission is detected by the preliminary test. The equipment and cables are arranged or manipulated within the range of the test standard in the above condition.

The each spectrum to be tested are measured in quasi-peak using the test receiver. When the value in the quasi-peak mode is higher than the limit in the standard, the measurement in the average mode is done to compare to the value in the quasi-peak mode. If the value in the quasi-peak mode exceeds the value in the average mode by more than 6 dB, the value reducing 13 dB from the value in the quasi-peak mode is used to compare to the limit.

8.2 Radiated Emission Test [15.247(b), 15.247(c), 15.205, 15.209]

8.2.1 Equipment Setup

System configuration and Equipment setup are shown on Section 6 and Section 10.

8.2.1.1 Table-Top Equipment

EUT is placed on the wooden table, the top of which is 0.8meter above the metal ground plane (turntable).

8.2.1.2 Interconnecting Cables

Excess part of the interconnecting cables longer than 1 meter are bundled in the center. Cables that hang closer than 40 cm to the ground plane is folded back and forth forming bundle 30 to 40 cm long, hanging approx, in the middle between ground plane and table.

8.2.2 Measuring Instruments

Brief description of Measuring Instruments are as follows;

8.2.2.1 Antennas

The broadband Tri-log antenna is used for measurement on the frequency range 30 – 1000 MHz.

The Double ridged guide antenna and the Standard gain horn antennas are used for frequency higher than 1000 MHz.

If uncertain result was obtained, the broadband antenna is replaced by the half wave length dipole, then measurement is carried out over again.

8.2.2.2 Pre-amplifier

The broadband pre-amplifier is used for radiated emission measurement.

The signal to noise ratio is improved by using pre-amplifier.

8.2.2.3 Spectrum Analyzer

The spectrum analyzer is used for preliminary measurement of frequency range 30 – 1000 MHz, and also used for final measurement of higher than 1000 MHz

8.2.2.4 EMI Test Receiver

The Quasi-peak detector (IF bandwidth : 120 kHz) built in test receiver is used for final measurement of the frequency 30 – 1000 MHz.

The test receiver is complied with the specification of the CISPR publication 16.

8.2.2.5 Turntable

The turntable is capable for EUT weight and rotatable 0 to 360 degree horizontally by remote control in the test room.

8.2.2.6 Antenna Mast

The antenna mast is attachable to all antennas described on clause 8.2.2.1 and antenna height is adjustable 1 to 4 meters continuously by remote control at the test room, and antenna polarization is also changed by the remote control.

8.2.3 Test Procedure

8.2.3.1 Preliminary Measurement

EUT is tested on all operating conditions.

The spectrum analyzer is set max-hold mode and swept during turntable was rotated 0 to 360 degree. Then spectrum chart are plotted out to detect the worst conditions in configuration, operating mode, or ambient noise notation.

8.2.3.2 Final Measurement

The EUT operated in the condition where maximum emission is detected in the preliminary test.

The turntable azimuth (EUT direction) and antenna height are adjusted the position so that maximum field strength is obtained for each frequency spectrum to be measured. The equipment and cables are arranged or manipulated within the range of the test standard in the above condition.

When the uncertain result was obtained, the measurement is retried by using the half wave dipole antenna instead of the broadband antenna.

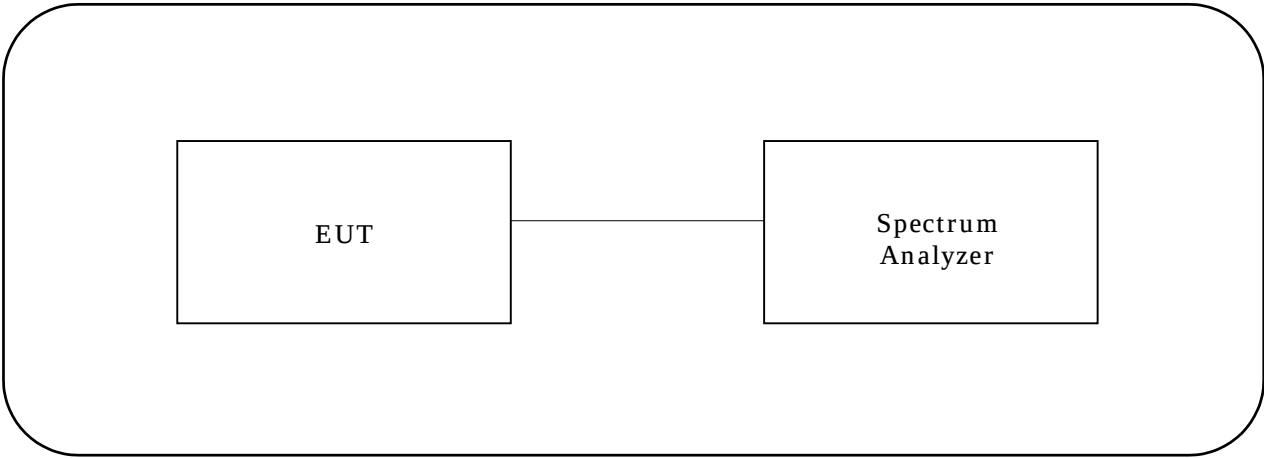
SECTION 9. TEST DATA**9.1 Power Spectral Density [15.247(d)]****MEASUREMENT PROCEDURE:**

1. The EUT was set to operate with following conditions.
 - ch1 / ch6 / ch11
 - Data Transfer Rate (1 Mbps / 2 Mbps / 5.5 Mbps / 11 Mbps)
2. The Spectrum Analyzer was connected directly to the transmitter output.
3. The Spectrum Analyzer was setup using RBW = 3kHz, VBW = 10kHz, span = 300kHz and sweep = 100sec.(span/3kHz).
4. As for the typical chart of the observed RF profiles, refer to page 18-19.

Test date : January 31, 2002
 Temperature : 18 °C
 Humidity : 42 %

ch	Frequency (MHz)	Data Transfer Rate (Mbps)	Reading (dBm)	Cable Loss (dB)	Peak Power Spectral Dencity (dBm)	15.247(d) Limit (dBm)	Chart
1	2412	1	-8.0	0.9	-7.1	8	-
		2	-8.2	0.9	-7.3	8	-
		5.5	-7.8	0.9	-6.9	8	-
		11	-7.8	0.9	-6.9	8	Page 18
6	2437	1	-8.3	0.9	-7.4	8	-
		2	-8.0	0.9	-7.1	8	-
		5.5	-7.7	0.9	-6.8	8	Page 18
		11	-8.3	0.9	-7.4	8	-
11	2462	1	-8.7	0.9	-7.8	8	-
		2	-8.5	0.9	-7.6	8	-
		5.5	-10.0	0.9	-9.1	8	-
		11	-8.5	0.9	-7.6	8	Page 19

TEST INSTRUMENTS CONFIGURATION



TEST INSTRUMENTS

Instrument	Model No.	Serial No.	Manufacturer	Last cal. date	Period
Spectrum Analyzer	8564E	3643A00665	HEWLETT PACKARD	Jun. 19, 01	1 Year

Chart of ch 1 with 11 Mbps

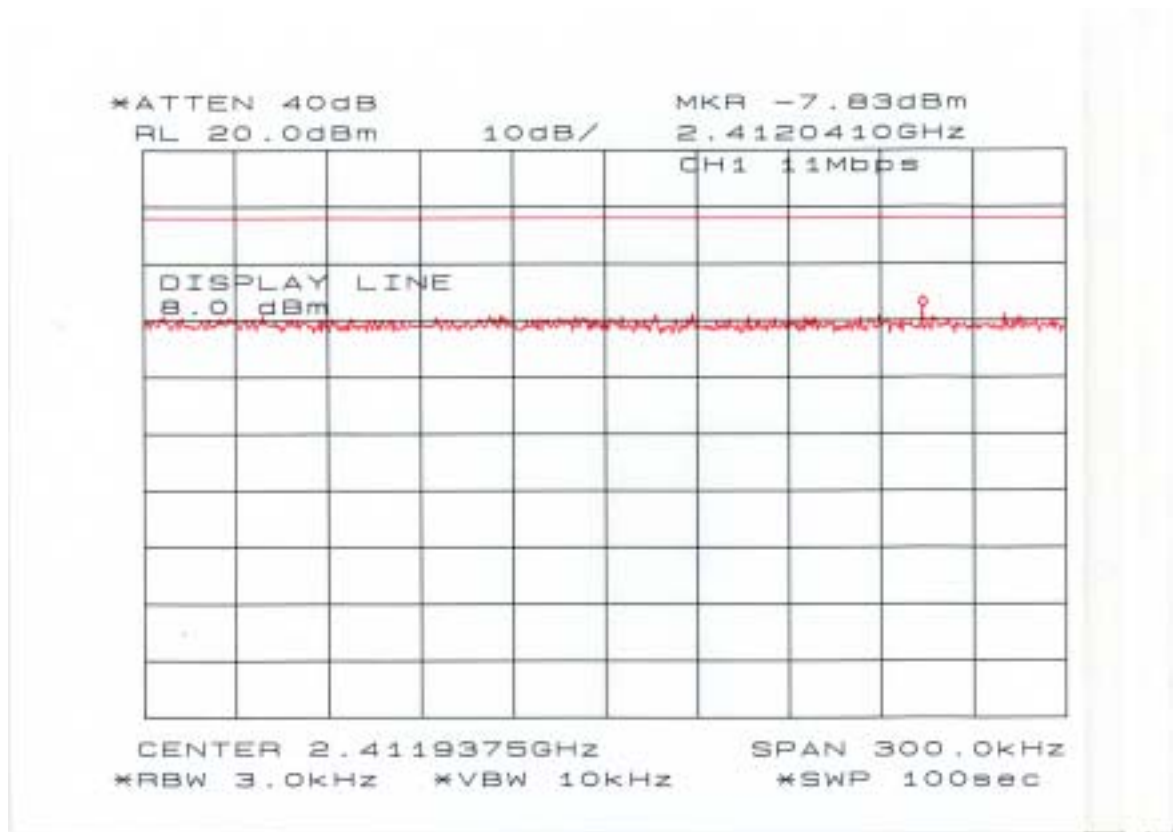


Chart of ch 6 with 5.5 Mbps

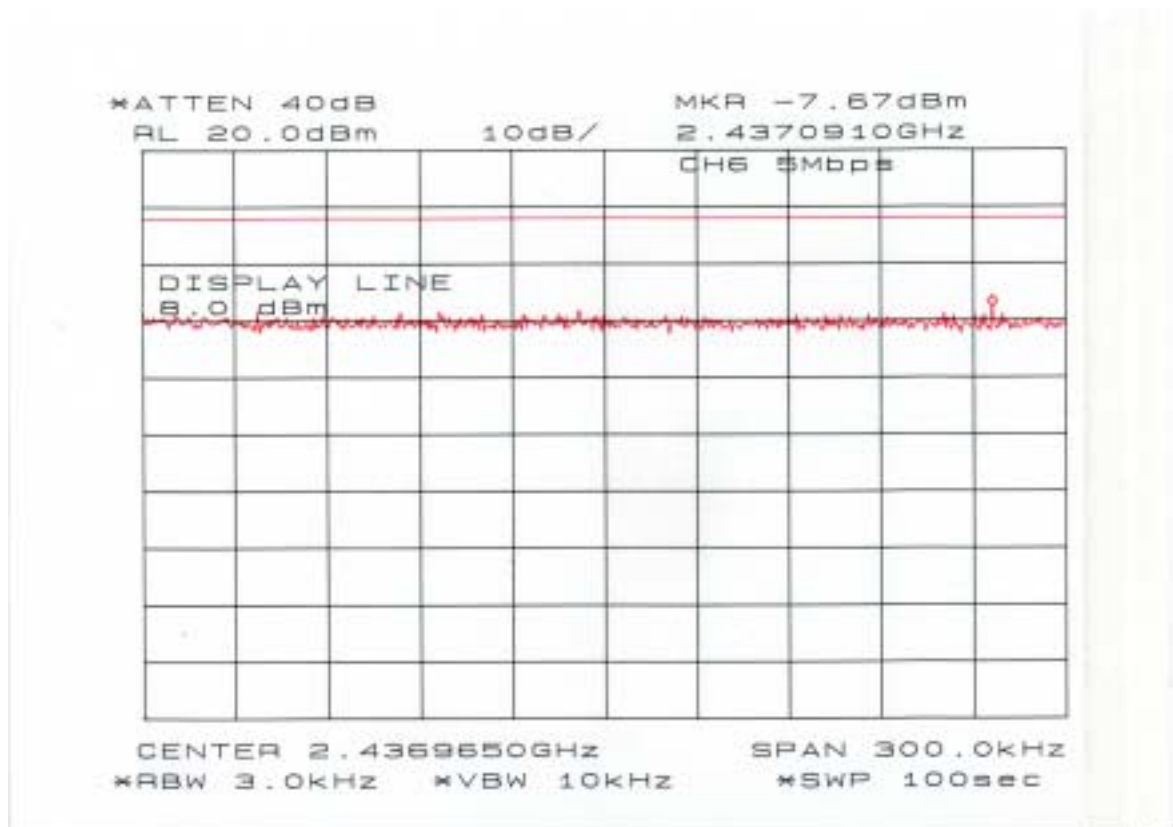
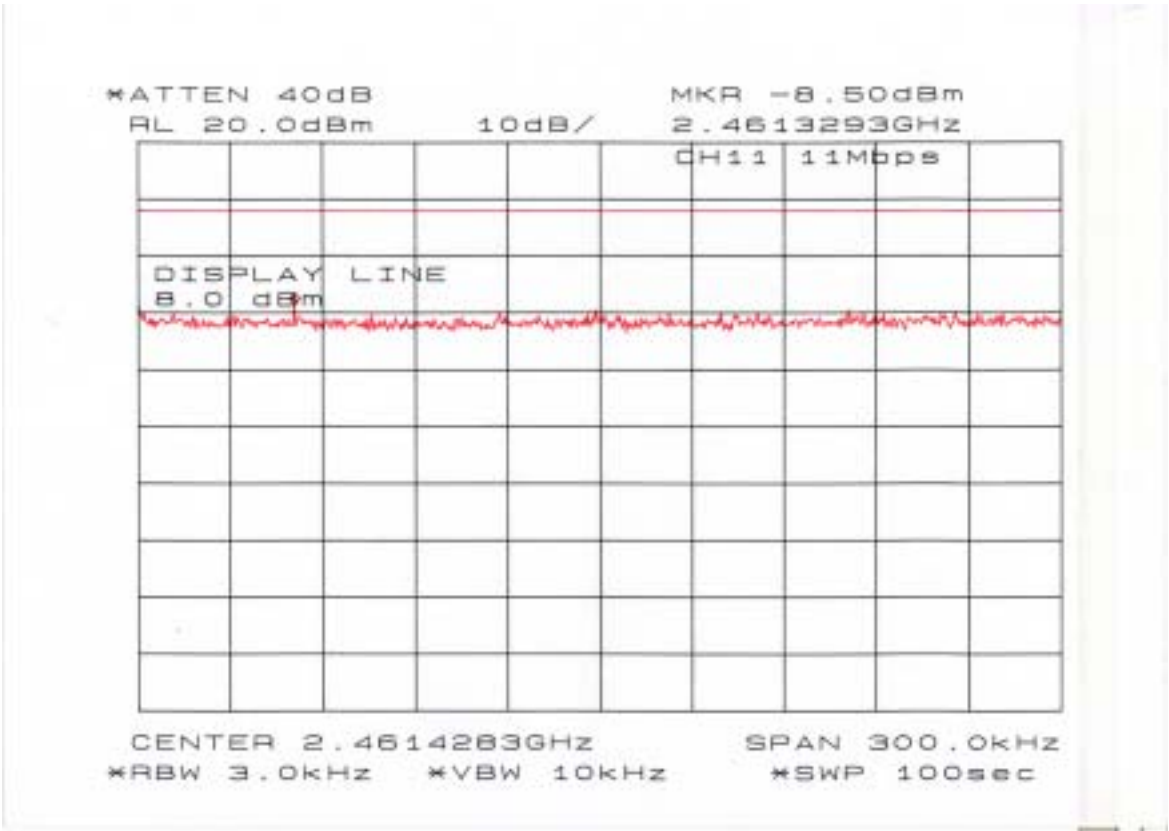


Chart of ch 11 with 11 Mbps



9.2 Minimum 6dB Bandwidth [15.247(a)(2)]

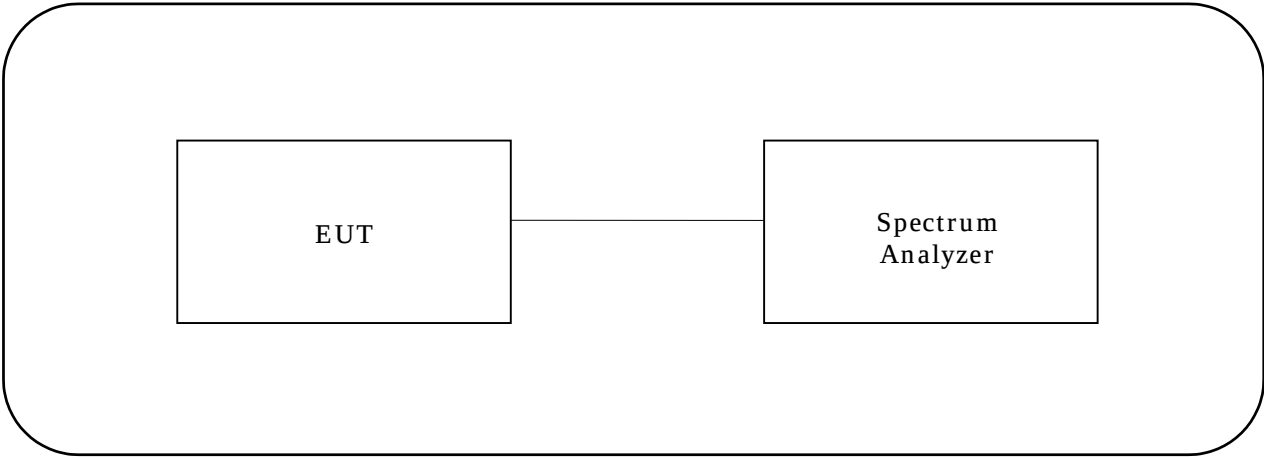
MEASUREMENT PROCEDURE:

1. The EUT was set to operate with following conditions.
 - ch1 / ch6 / ch11
 - Data Transfer Rate (1 Mbps / 2 Mbps / 5.5 Mbps / 11 Mbps)
2. The Spectrum Analyzer was connected directly to the transmitter output.
3. The Spectrum Analyzer was setup using RBW = 100kHz, VBW = 100kHz, and span = 50MHz (span>>RBW).
4. As for the typical chart of the observed RF profiles, refer to page 22-23.

Test date : January 31, 2002
 Temperature : 18 °C
 Humidity : 42 %

ch	Frequency (MHz)	Data Transfer Rate (Mbps)	6dB Bandwidth (MHz)	15.247(a)(2) Minimum (kHz)	Chart
1	2412	1	7.00	500	Page 22
		2	10.25	500	-
		5.5	8.58	500	-
		11	10.25	500	-
6	2437	1	8.08	500	-
		2	8.50	500	-
		5.5	7.75	500	Page 22
		11	8.08	500	-
11	2462	1	7.17	500	Page 23
		2	8.58	500	-
		5.5	8.67	500	-
		11	8.67	500	-

TEST INSTRUMENTS CONFIGURATION



TEST INSTRUMENTS

Instrument	Model No.	Serial No.	Manufacturer	Last cal. date	Period
Spectrum Analyzer	8564E	3643A00665	HEWLETT PACKARD	Jun. 19, 01	1 Year

Chart of ch 1 with 1 Mbps

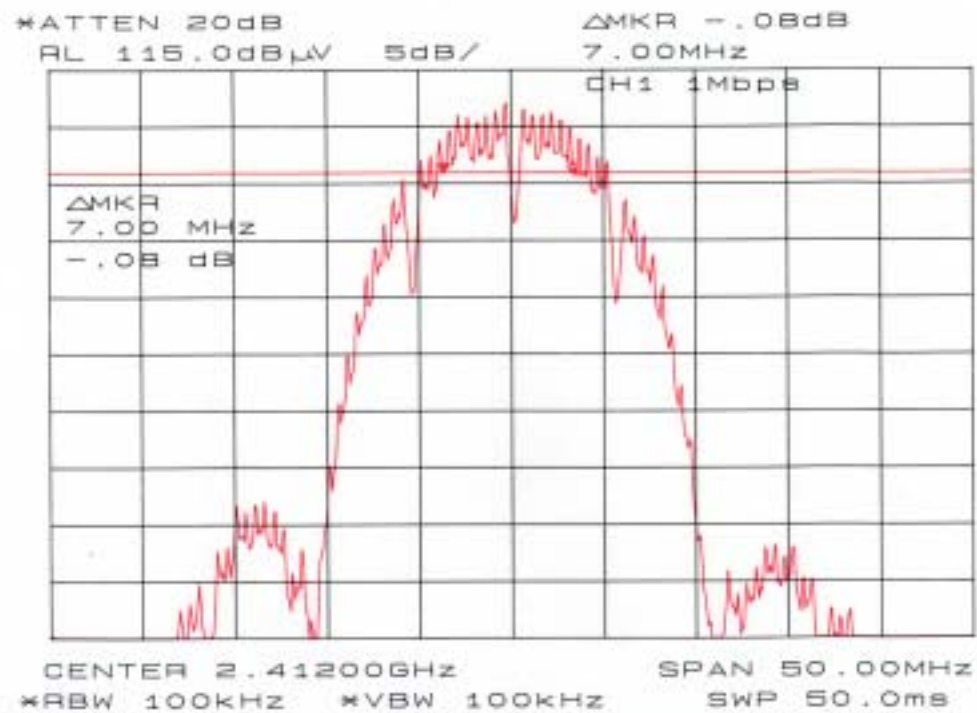
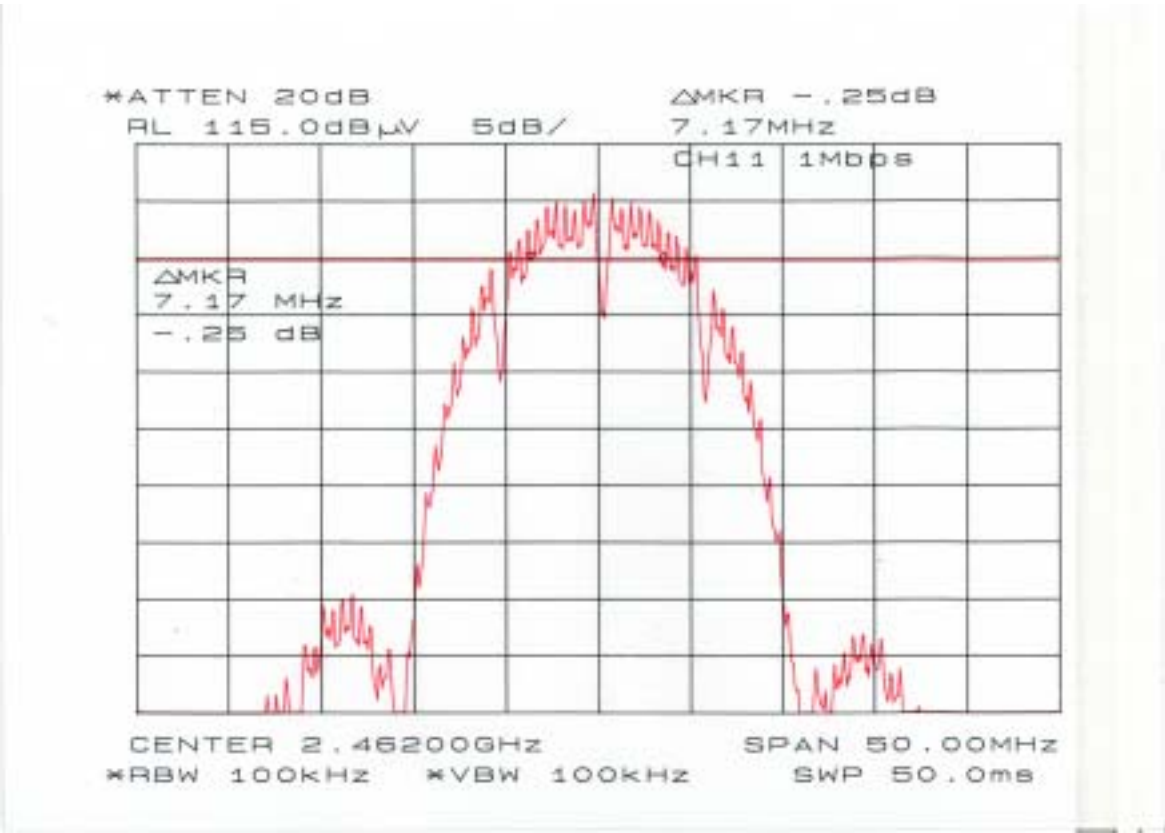


Chart of ch 6 with 5.5 Mbps



Chart of ch 11 with 1 Mbps



9.3 Maximum Peak Output Power [15.247(b)]

MEASUREMENT PROCEDURE:

1. The EUT was set to operate with following conditions.
 - ch1 / ch6 / ch11
 - Unmodulated-carrier
2. The Power Meter was connected directly to the transmitter output.
3. Maximum Antenna Gain : 1.0 dBi

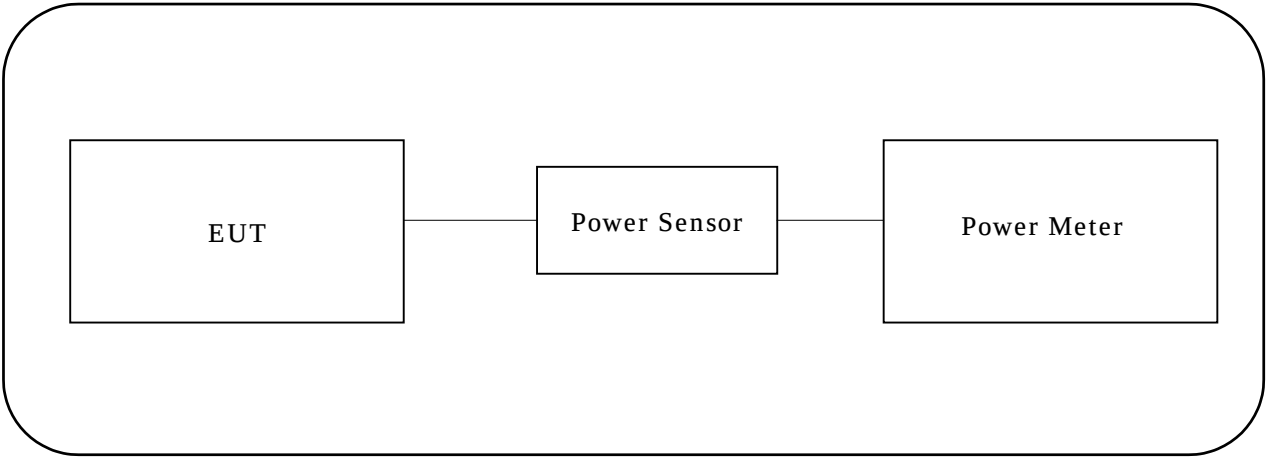
Test date : February 1, 2002
 Temperature : 19 °C
 Humidity : 40 %

ch	Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	Maximum Peak Output Power (dBm)	Maximum Peak Output Power (mW)	15.247(b) Limit (mW)
1	2412	14.4	0.9	15.3	33.9	1000
6	2437	13.9	0.9	14.8	30.2	1000
11	2462	13.1	0.9	14.0	25.1	1000

Note : Maximum peak output power was detected at ch1.
 = 15.3 dBm (= 33.9 mW)

Therefore, the maximum EIRP = 15.3 dBm + 1.0 dBi = 16.3 dBm (= 42.7 mW)

TEST INSTRUMENTS CONFIGURATION



TEST INSTRUMENTS

Instrument	Model No.	Serial No.	Manufacturer	Last cal. date	Period
Power Meter	E4418B	GB38410265	HEWLETT PACKARD	Dec. 20, 01	1 Year
Power Sensor	8481A	3318A99780	HEWLETT PACKARD	Dec. 20, 01	1 Year

9.4 Spurious Emissions – RF Antenna Conducted Test [15.247(c)]

MEASUREMENT PROCEDURE:

1. The EUT was set to operate with following conditions.
 - ch1 / ch6 / ch11
 - Data Transfer Rate (1 Mbps / 2 Mbps / 5.5 Mbps / 11 Mbps)
2. The Spectrum Analyzer was connected directly to the transmitter output.
3. The Spectrum Analyzer was setup using RBW = 100kHz, VBW = 100kHz.
4. As for the typical chart of the observed RF profiles, refer to Annex A.

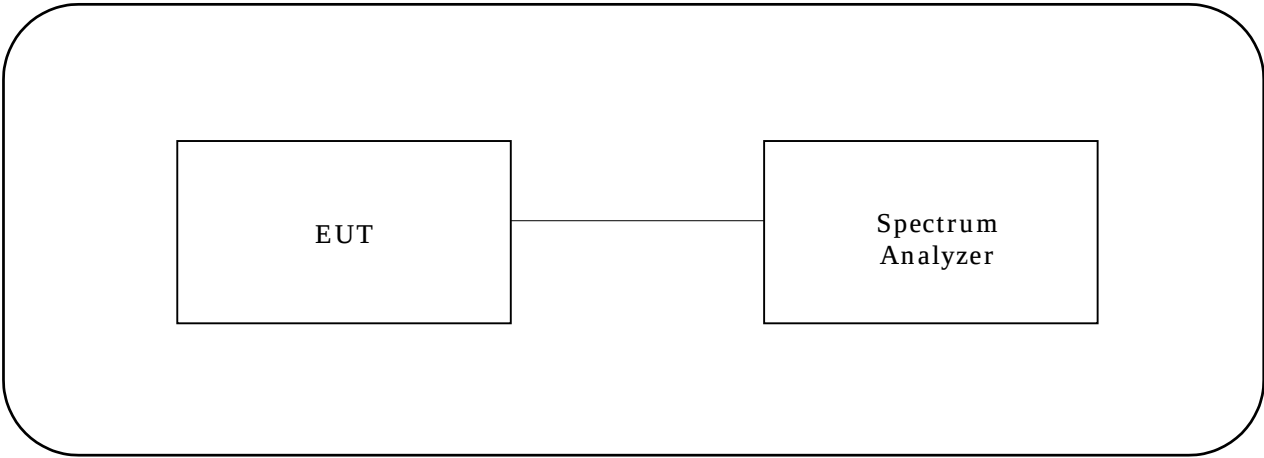
Test date : February 1, 2002
Temperature : 19 °C
Humidity : 40 %

ch	Frequency (MHz)	Chart
1	2412	Annex A page 2-4
6	2437	Annex A page 5-7
11	2462	Annex A page 8-10

Note:

1. All out-of-band conducted emissions were more than 20 dB below a carrier.

TEST INSTRUMENTS CONFIGURATION



TEST INSTRUMENTS

Instrument	Model No.	Serial No.	Manufacturer	Last cal. date	Period
Spectrum Analyzer	8564E	3643A00665	HEWLETT PACKARD	Jun. 19, 01	1 Year

9.5 Spurious Emissions – Radiated Emission Test [15.247(c), 15.205, 15.209]

MEASUREMENT PROCEDURE:

1. The EUT was set to operate with following conditions.
 - ch1 / ch6 / ch11
 - Data Transfer Rate (1 Mbps / 2 Mbps / 5.5 Mbps / 11 Mbps)
2. The Spectrum Analyzer was setup using
 - Peak mode: RBW = 1MHz, VBW = 1MHz
 - Average mode: RBW = 1MHz, VBW = 10Hz
3. Measurement distance was 3 meters.
4. Following data is the worst case.

Data of ch 1 with 11 Mbps**Akzo Nobel K. K.****Kashima No.3 Test Site****Radiated Electric Field**

APPLICANT : MITSUMI ELECTRIC CO., LTD.
 EUT NAME : Wireless LAN
 MODEL NO. : Wavit 11 Wireless LAN (DWL-A001)
 SERIAL NO. : 001
 TEST MODE : 1ch. 11Mbps.
 POWER SOURCE : AC120V/60Hz
 DATE TESTED : Jan 29 2002

FILE NO. : ANKK-102013
 REGULATION : 15.247(C), 15.209
 TEST METHOD : ANSI C63.4:1992
 DISTANCE : 3.0 [m]
 TEMPERATURE : 19.0 [degC]
 HUMIDITY : 41.0 [%]

ENGINEER : Koji Setoguchi

FREQUENCY No	ANT. [MHz]		READING [dBuV]		FACTOR [dB/m]		EMISSION [dBuV/m]		LIMIT [dBuV/m]	MARGIN [dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	135.48	BBA	38.2	38.7	-7.4	-7.4	30.8	31.3	43.5	12.7	12.2
2	329.58	BBA	38.3	-	-4.2	-4.2	34.1	-	46.0	11.9	-
3	572.00	BBA	-	32.6	2.7	2.7	-	35.3	46.0	-	10.7
4	616.00	BBA	-	32.6	3.7	3.7	-	36.3	46.0	-	9.7
5	676.27	BBA	-	32.6	4.5	4.5	-	37.1	46.0	-	8.9
6	724.92	BBA	-	30.7	5.0	5.0	-	35.7	46.0	-	10.3
7	782.92	BBA	-	27.0	6.9	6.9	-	33.9	46.0	-	12.1
8	901.69	BBA	-	30.2	8.7	8.7	-	38.9	46.0	-	7.1
9	926.74	BBA	-	27.8	9.1	9.1	-	36.9	46.0	-	9.1
10	976.83	BBA	-	26.8	9.9	9.9	-	36.7	54.0	-	17.3

Other frequencies : Below the 15.247(C), 15.209 limit Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamp) ANT. : Used antenna(BBA = Broadband antenna, DIP = Dipole antenna)											

Data of ch 1 with 11 Mbps**Akzo Nobel K. K.****Kashima No.3 Test Site****INTERFERENCE RADIATION TEST**

APPLICANT : MITSUMI ELECTRIC CO.,LTD.
 EUT NAME : Wireless LAN
 MODEL NO. : Wavit 11 Wireless LAN (DWL-A001)
 SERIAL NO. : 001
 TEST MODE : 1ch. 11Mbps.
 POWER SOURCE : AC120V/60Hz
 DATE TESTED : Jan 31 2002

FILE NO. : ANKK-102013
 REGULATION : FCC Part15C (15.209,247(C))
 TEST METHOD : ANSI C63.4:1992
 DISTANCE : 3.0 [m]
 TEMPERATURE : 18.0 [degC]
 HUMIDITY : 42.0 [%]

ENGINEER : Koji Setoguchi

No	FREQUENCY MODE		READING		FACTOR		EMISSION		LIMIT	MARGIN	
	[MHz]		[dBuV]		[dB]		[dBuV/m]		[dBuV/m]	[dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	1100.14	PEK	-	48.4	-11.8	-11.8	-	36.6	74.0	-	37.4
2	1100.14	AVG	-	44.8	-11.8	-11.8	-	33.0	54.0	-	21.0
3	1252.33	PEK	-	55.0	-11.3	-11.3	-	43.7	74.0	-	30.3
4	1252.33	AVG	-	39.0	-11.3	-11.3	-	27.7	54.0	-	26.3
5	2692.17	PEK	-	39.5	-3.4	-3.4	-	36.1	74.0	-	37.9
6	2692.17	AVG	-	32.3	-3.4	-3.4	-	28.9	54.0	-	25.1
7	4264.26	PEK	38.3	37.5	4.5	4.5	42.8	42.0	74.0	31.2	32.0
8	4264.26	AVG	30.0	24.3	4.5	4.5	34.5	28.8	54.0	19.5	25.2
9	4822.30	PEK	-	38.9	5.9	5.9	-	44.8	74.0	-	29.2
10	4822.30	AVG	-	31.9	5.9	5.9	-	37.8	54.0	-	16.2
11	6396.03	PEK	37.3	38.9	11.1	11.1	48.4	50.0	74.0	25.6	24.0
12	6396.03	AVG	26.2	31.9	11.1	11.1	37.3	43.0	54.0	16.7	11.0

Other frequencies : Below the FCC Part15C (15.209,247(C)) limit											
Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamplifier)											

Data of ch 6 with 11 Mbps**Akzo Nobel K. K.****Kashima No.3 Test Site****Radiated Electric Field**

APPLICANT : MITSUMI ELECTRIC CO., LTD.
 EUT NAME : Wireless LAN
 MODEL NO. : Wavit 11 Wireless LAN (DWL-A001)
 SERIAL NO. : 001
 TEST MODE : 6ch. 11Mbps.
 POWER SOURCE : AC120V/60Hz
 DATE TESTED : Jan 29 2002

FILE NO. : ANKK-101013
 REGULATION : 15.247(C), 15.209
 TEST METHOD : ANSI C63.4:1992
 DISTANCE : 3.0 [m]
 TEMPERATURE : 19.0 [degC]
 HUMIDITY : 41.0 [%]

ENGINEER : Koji Setoguchi

FREQUENCY No	ANT. [MHz]		READING [dBuV]		FACTOR [dB/m]		EMISSION [dBuV/m]		LIMIT [dBuV/m]	MARGIN [dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	135.48	BBA	37.7	39.0	-7.4	-7.4	30.3	31.6	43.5	13.2	11.9
2	270.97	BBA	39.2	-	-6.6	-6.6	32.6	-	46.0	13.4	-
3	300.00	BBA	-	37.6	-4.8	-4.8	-	32.8	46.0	-	13.2
4	330.02	BBA	38.0	-	-4.2	-4.2	33.8	-	46.0	12.2	-
5	572.01	BBA	-	34.0	2.7	2.7	-	36.7	46.0	-	9.3
6	616.00	BBA	-	32.1	3.7	3.7	-	35.8	46.0	-	10.2
7	676.27	BBA	-	27.4	4.5	4.5	-	31.9	46.0	-	14.1
8	725.00	BBA	-	31.4	5.0	5.0	-	36.4	46.0	-	9.6
9	782.92	BBA	-	26.3	6.9	6.9	-	33.2	46.0	-	12.8
10	901.69	BBA	-	27.2	8.7	8.7	-	35.9	46.0	-	10.1
11	926.74	BBA	-	26.0	9.1	9.1	-	35.1	46.0	-	10.9

Other frequencies : Below the 15.247(C), 15.209 limit											
Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamp)											
ANT. : Used antenna(BBA = Broadband antenna, DIP = Dipole antenna)											

Data of ch 6 with 11 Mbps**Akzo Nobel K. K.****Kashima No.3 Test Site****INTERFERENCE RADIATION TEST**

APPLICANT : MITSUMI ELECTRIC CO.,LTD.
 EUT NAME : Wireless LAN
 MODEL NO. : Wavit 11 Wireless LAN (DWL-A001)
 SERIAL NO. : 001
 TEST MODE : 6ch. 11Mbps.
 POWER SOURCE : AC120V/60Hz
 DATE TESTED : Jan 31 2002

FILE NO. : ANKK-102013
 REGULATION : FCC Part15C (15.209,247(C))
 TEST METHOD : ANSI C63.4:1992
 DISTANCE : 3.0 [m]
 TEMPERATURE : 18.0 [degC]
 HUMIDITY : 42.0 [%]

ENGINEER : Koji Setoguchi

No	FREQUENCY MODE		READING		FACTOR		EMISSION		LIMIT	MARGIN	
	[MHz]		[dBuV]		[dB]		[dBuV/m]		[dBuV/m]	[dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	1100.00	PEK	-	49.2	-11.7	-11.7	-	37.5	74.0	-	36.5
2	1100.00	AVG	-	41.2	-11.7	-11.7	-	29.5	54.0	-	24.5
3	1252.59	PEK	-	54.4	-11.3	-11.3	-	43.1	74.0	-	30.9
4	1252.59	AVG	-	38.7	-11.3	-11.3	-	27.4	54.0	-	26.6
5	2718.03	PEK	-	42.1	-3.2	-3.2	-	38.9	74.0	-	35.1
6	2717.03	AVG	-	29.1	-3.2	-3.2	-	25.9	54.0	-	28.1
7	4313.97	PEK	42.7	42.5	4.5	4.5	47.2	47.0	74.0	26.8	27.0
8	4313.97	AVG	31.1	33.4	4.5	4.5	35.6	37.9	54.0	18.4	16.1
9	4874.50	PEK	-	40.2	6.1	6.1	-	46.3	74.0	-	27.7
10	4874.50	AVG	-	27.7	6.1	6.1	-	33.8	54.0	-	20.2
11	6470.93	PEK	41.0	43.5	11.2	11.2	52.2	54.7	74.0	21.8	19.3
12	6470.93	AVG	29.6	32.6	11.2	11.2	40.8	43.8	54.0	13.2	10.2

 Other frequencies : Below the FCC Part15C (15.209,247(C)) limit
 Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamp)
 ANT. : Used antenna(BBA = Broadband antenna, DIP = Dipole antenna)

Data of ch 11 with 11 Mbps

Akzo Nobel K. K.
Kashima No.3 Test Site
Radiated Electric Field

APPLICANT : MITSUMI ELECTRIC CO., LTD.
 EUT NAME : Wireless LAN
 MODEL NO. : Wavit 11 Wireless LAN (DWL-A001)
 SERIAL NO. : 001
 TEST MODE : 11ch, 11Mbps.
 POWER SOURCE : AC120V/60Hz
 DATE TESTED : Jan 29 2002

FILE NO. : ANKK-101013
 REGULATION : 15.247(C), 15.209
 TEST METHOD : ANSI C63.4:1992
 DISTANCE : 3.0 [m]
 TEMPERATURE : 19.0 [degC]
 HUMIDITY : 41.0 [%]

ENGINEER : Koji Setoguchi

FREQUENCY No	ANT. [MHz]		READING [dBuV]		FACTOR [dB/m]		EMISSION [dBuV/m]		LIMIT [dBuV/m]	MARGIN [dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	135.48	BBA	38.0	39.0	-7.4	-7.4	30.6	31.6	43.5	12.9	11.9
2	270.97	BBA	39.2	-	-6.6	-6.6	32.6	-	46.0	13.4	-
3	300.00	BBA	-	37.6	-4.8	-4.8	-	32.8	46.0	-	13.2
4	329.99	BBA	37.9	-	-4.2	-4.2	33.7	-	46.0	12.3	-
5	572.01	BBA	-	33.4	2.7	2.7	-	36.1	46.0	-	9.9
6	616.00	BBA	-	31.5	3.7	3.7	-	35.2	46.0	-	10.8
7	676.31	BBA	-	28.7	4.5	4.5	-	33.2	46.0	-	12.8
8	725.00	BBA	-	33.0	5.0	5.0	-	38.0	46.0	-	8.0
9	782.92	BBA	-	26.1	6.9	6.9	-	33.0	46.0	-	13.0
10	901.69	BBA	-	27.3	8.7	8.7	-	36.0	46.0	-	10.0
11	926.74	BBA	-	26.0	9.1	9.1	-	35.1	46.0	-	10.9

Other frequencies : Below the 15.247(C), 15.209 limit											
Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamp)											
ANT. : Used antenna(BBA = Broadband antenna, DIP = Dipole antenna)											

Data of ch 11 with 11 Mbps**Akzo Nobel K. K.****Kashima No.3 Test Site****INTERFERENCE RADIATION TEST**

APPLICANT : MITSUMI ELECTRIC CO.,LTD.
 EUT NAME : Wireless LAN
 MODEL NO. : Wavit 11 Wireless LAN (DWL-A001)
 SERIAL NO. : 001
 TEST MODE : 11ch, 11Mbps.
 POWER SOURCE : AC120V/60Hz
 DATE TESTED : Jan 31 2002

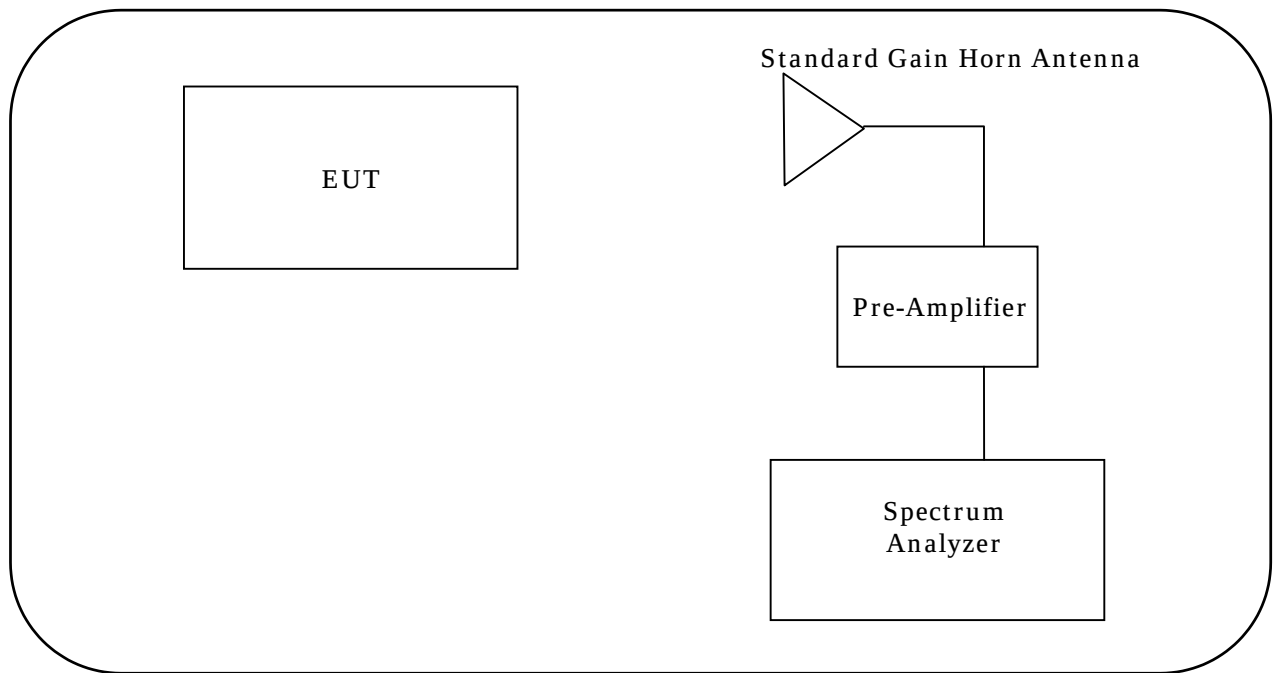
FILE NO. : ANKK-102013
 REGULATION : FCC Part15C (15.209,247(C))
 TEST METHOD : ANSI C63.4:1992
 DISTANCE : 3.0 [m]
 TEMPERATURE : 18.0 [degC]
 HUMIDITY : 42.0 [%]

ENGINEER : Koji Setoguchi

No	FREQUENCY MODE		READING		FACTOR		EMISSION		LIMIT	MARGIN	
	[MHz]		[dBuV]		[dB]		[dBuV/m]		[dBuV/m]	[dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	1100.10	PEK	-	48.4	-11.8	-11.8	-	36.6	74.0	-	37.4
2	1100.10	AVG	-	41.0	-11.8	-11.8	-	29.2	54.0	-	24.8
3	1252.47	PEK	-	55.3	-11.3	-11.3	-	44.0	74.0	-	30.0
4	1252.47	AVG	-	37.5	-11.3	-11.3	-	26.2	54.0	-	27.8
5	2800.03	PEK	-	41.9	-2.5	-2.5	-	39.4	74.0	-	34.6
6	2800.03	AVG	-	29.7	-2.5	-2.5	-	27.2	54.0	-	26.8
7	4363.94	PEK	41.7	41.4	4.7	4.7	46.4	46.1	74.0	27.6	27.9
8	4363.94	AVG	30.6	29.1	4.7	4.7	35.3	33.8	54.0	18.7	20.2
9	4923.92	PEK	-	39.7	6.2	6.2	-	45.9	74.0	-	28.1
10	4923.92	AVG	-	27.1	6.2	6.2	-	33.3	54.0	-	20.7
11	6545.99	PEK	42.3	43.8	11.4	11.4	53.7	55.2	74.0	20.3	18.8
12	6545.99	AVG	30.5	33.3	11.4	11.4	41.9	44.7	54.0	12.1	9.3

 Other frequencies : Below the FCC Part15C (15.209,247(C)) limit
 Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamp)
 ANT. : Used antenna(BBA = Broadband antenna, DIP = Dipole antenna)

TEST INSTRUMENTS CONFIGURATION



TEST INSTRUMENTS

Instrument	Model No.	Serial No.	Manufacturer	Last cal. date	Period
Spectrum Analyzer	8564E	3643A00665	HEWLETT PACKARD	Jun. 19, 01	1 Year
Pre-Amplifier	83051A	3332A00329	HEWLETT PACKARD	Aug. 21, 01	1 Year
Standard Gain Horn Antenna	3160-01	1042	EMCO	Jan. 10, 02	1 Year
	3160-02	1069	EMCO	Jan. 10, 02	1 Year
	3160-03	1097	EMCO	Jan. 10, 02	1 Year
	3160-04	1080	EMCO	Jan. 10, 02	1 Year
	3160-05	1114	EMCO	Jan. 10, 02	1 Year
	3160-06	1075	EMCO	Jan. 10, 02	1 Year
	3160-07	1160	EMCO	Jan. 10, 02	1 Year
	3160-08	1144	EMCO	Jan. 10, 02	1 Year
	3160-09	9703-1074	EMCO	Feb. 24, 99	3 Year

9.6 Restricted Bands of Operation [15.247(c), 15.205, 15.209]

MEASUREMENT PROCEDURE:

1. The EUT was set to operate with following conditions.
 - ch1 / ch11
 - Data Transfer Rate (1 Mbps / 2 Mbps / 5.5 Mbps / 11 Mbps)
2. Measurement distance was 1 meter.
3. The Spectrum Analyzer was setup using
 - Peak mode: RBW = 1MHz, VBW = 1MHz
 - Average mode: RBW = 1MHz, VBW = 10Hz
4. Following data is the worst case.
5. As for the typical chart of the observed RF profiles, refer to Page 40-41.

Data of ch 1 with 11 Mbps

Akzo Nobel K. K.
Kashima No.3 Test Site
INTERFERENCE RADIATION TEST

APPLICANT : MITSUMI ELECTRIC CO.,LTD.
EUT NAME : Wireless LAN
MODEL NO. : Wavit 11 Wireless LAN (DWL-A001)
SERIAL NO. : 001
TEST MODE : 1ch. 11Mbps.
POWER SOURCE : AC120V/60Hz
DATE TESTED : Jan 31 2002

FILE NO. : ANKK-102013
REGULATION : FCC Part15C (15.209,247(C))
TEST METHOD : ANSI C63.4:1992
DISTANCE : 1.0 [m]
TEMPERATURE : 18.0 [degC]
HUMIDITY : 42.0 [%]

ENGINEER : Koji Setoguchi

FREQUENCY MODE			READING		FACTOR		EMISSION		LIMIT	MARGIN	
No	[MHz]		[dBuV]		[dB/m]		[dBuV/m]		[dBuV/m]	[dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	2390.00	PEK	40.3	40.8	25.5	25.5	65.8	66.3	74.0	8.2	7.7
2	2390.00	AVG	24.4	24.5	25.5	25.5	49.9	50.0	54.0	4.1	4.0

Other frequencies : Below the FCC Part15C (15.209,247(C)) limit											
Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamp)											

Data of ch 11 with 11 Mbps

Akzo Nobel K. K.
Kashima No.3 Test Site
INTERFERENCE RADIATION TEST

APPLICANT : MITSUMI ELECTRIC CO.,LTD.

EUT NAME : Wireless LAN

MODEL NO. : Wavit 11 Wireless LAN (DWL-A001)

SERIAL NO. : 001

TEST MODE : 11ch, 11Mbps.

POWER SOURCE : AC120V/60Hz

DATE TESTED : Jan 31 2001

FILE NO. : ANKK-102013

REGULATION : FCC Part15C (15.209,247(C))

TEST METHOD : ANSI C63.4:1992

DISTANCE : 1.0 [m]

TEMPERATURE : 18.0 [degC]

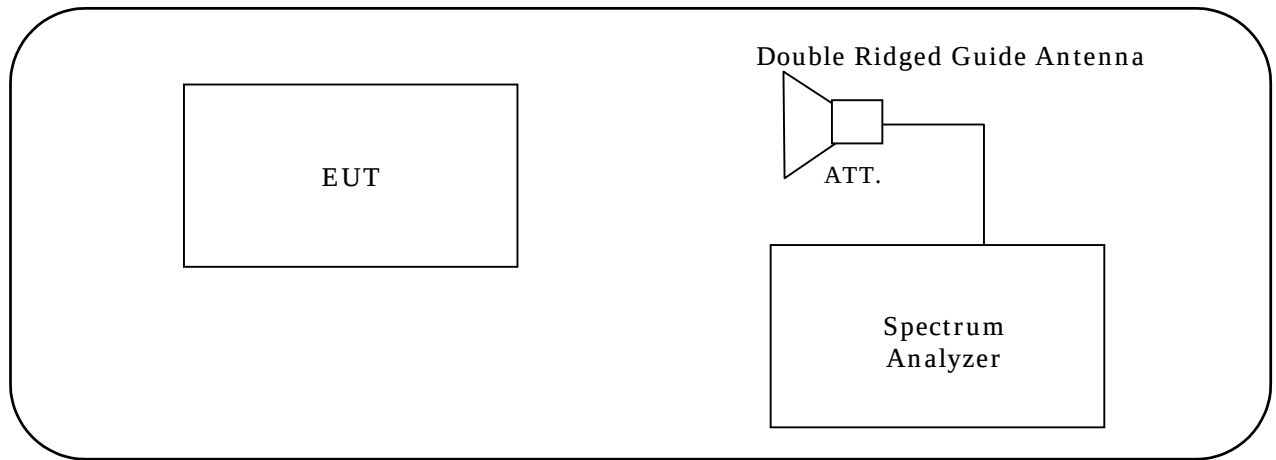
HUMIDITY : 42.0 [%]

ENGINEER : Koji Setoguchi

FREQUENCY MODE			READING		FACTOR		EMISSION		LIMIT	MARGIN	
No	[MHz]		[dBuV]		[dB/m]		[dBuV/m]		[dBuV/m]	[dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	2483.50	PEK	39.0	41.3	25.7	25.7	64.7	67.0	74.0	9.3	7.0
2	2483.50	AVG	25.2	25.9	25.7	25.7	50.9	51.6	54.0	3.1	2.4

Other frequencies : Below the FCC Part15C (15.209,247(C)) limit											
Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamplifier)											

TEST INSTRUMENTS CONFIGURATION



TEST INSTRUMENTS

Instrument	Model No.	Serial No.	Manufacturer	Last cal. date	Period
Spectrum Analyzer	8564E	3643A00665	HEWLETT PACKARD	Jun. 19, 01	1 Year
3dB Attenuator	6803.17.B	None	SUHNER	Mar. 18, 01	1 Year
Double Ridged Guide Antenna	3115	5044	EMCO	Jul. 19, 01	1 Year

Chart of ch 1 with 11 Mbps

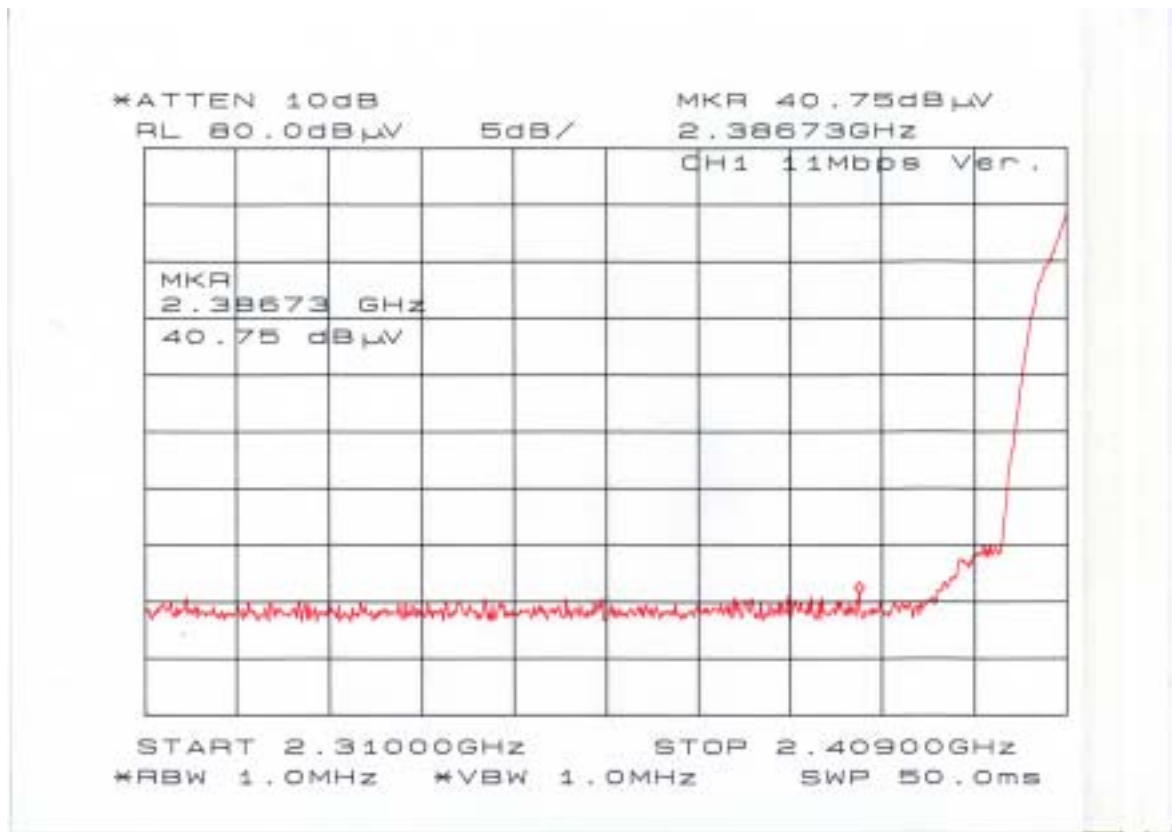


Chart of ch 1 with 11 Mbps

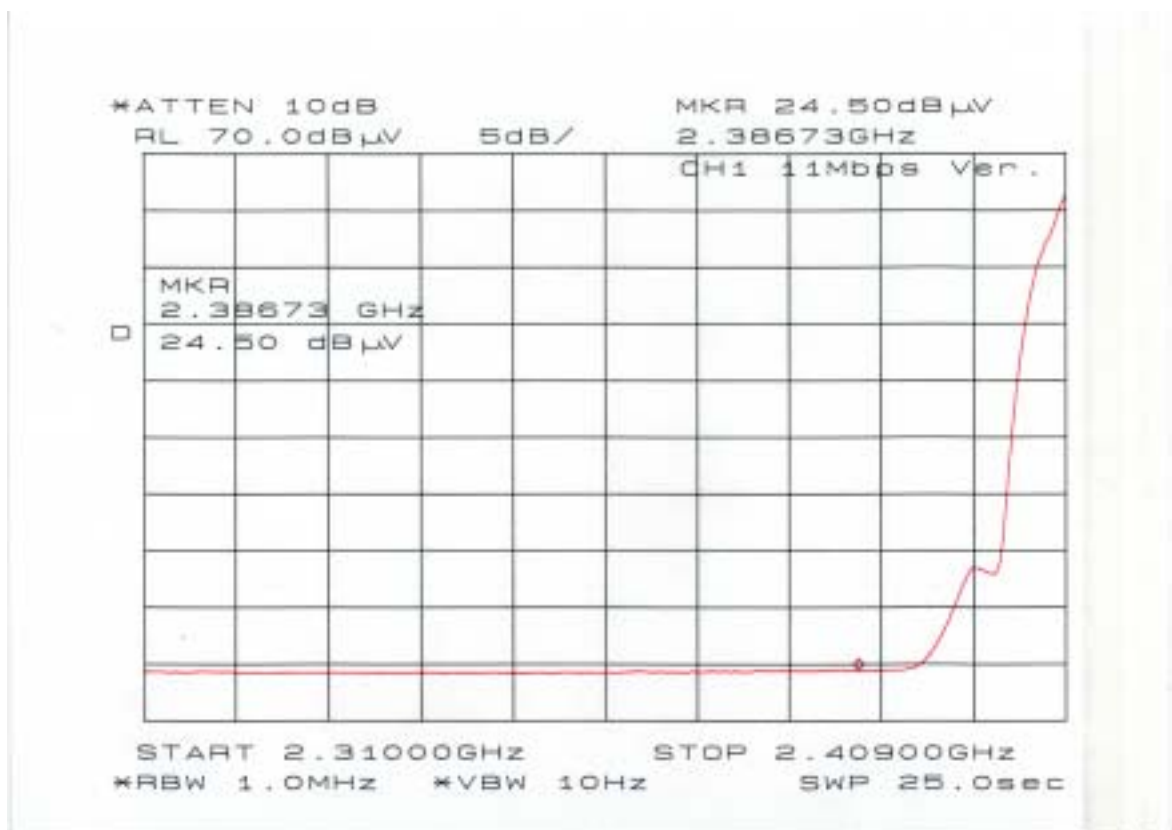


Chart of ch 11 with 11 Mbps

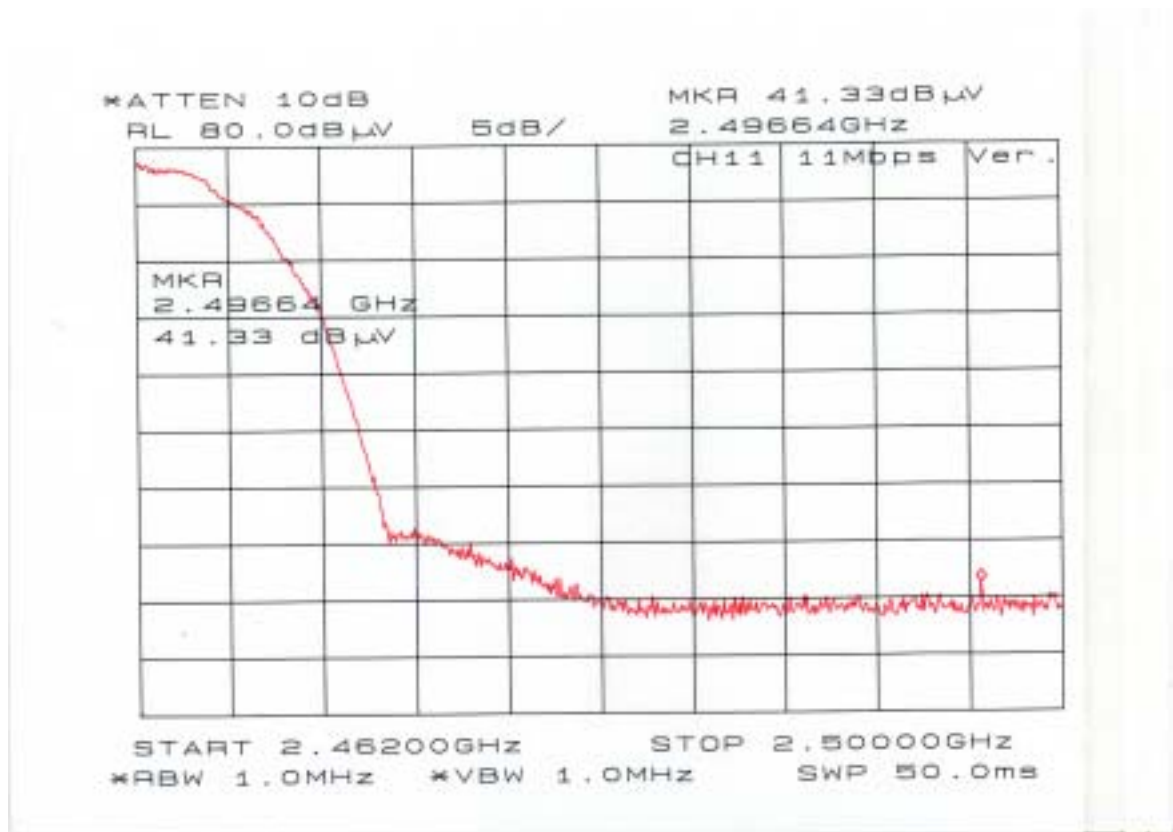
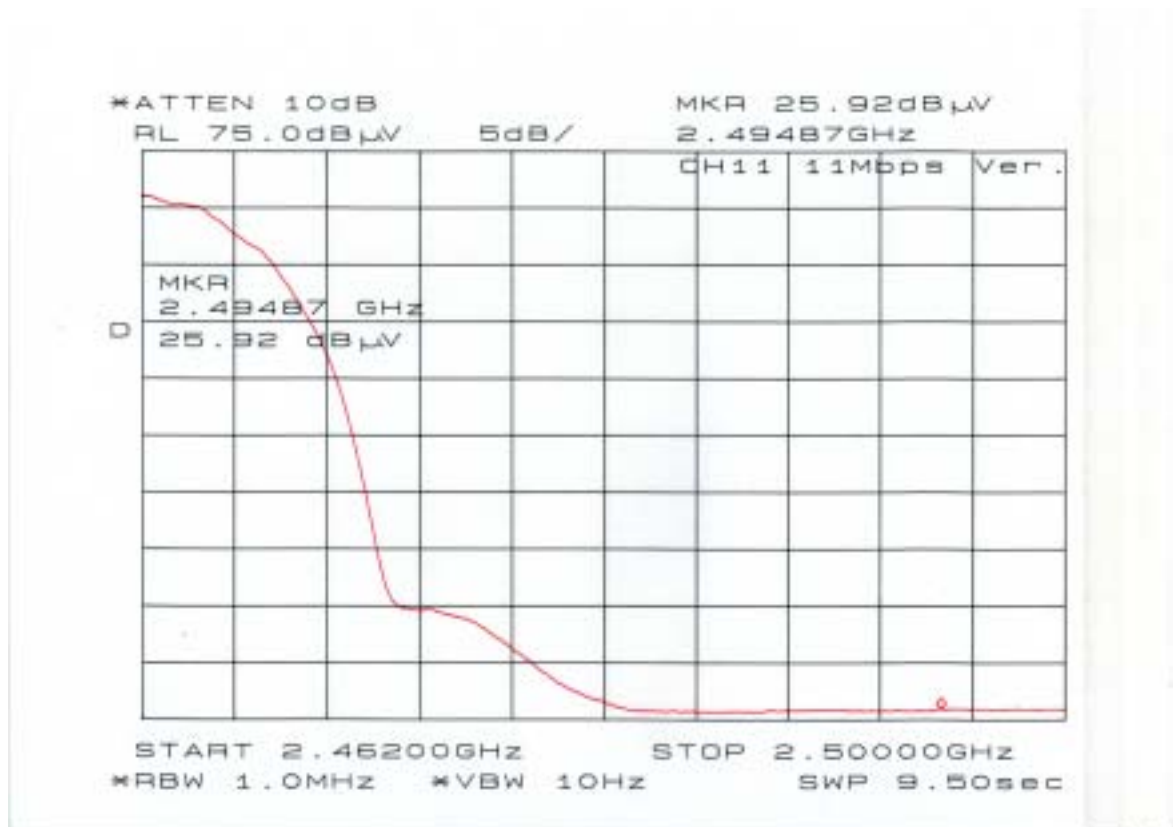


Chart of ch 11 with 11 Mbps



9.7 AC Conducted Emissions [15.207]

MEASUREMENT PROCEDURE:

1. The EUT was set to operate with following conditions.
 - ch1 / ch6 / ch11
 - Data Transfer Rate (1 Mbps / 2 Mbps / 5.5 Mbps / 11 Mbps)
2. The Test Receiver is complied with the specification of the CISPR publication 16.
3. Following data is the worst case.

Data of ch 1 with 11 Mbps**Akzo Nobel K. K.****Kashima No.3 Test Site****Conducted Voltages on Mains Port**

APPLICANT : MITSUMI ELECTRIC CO., LTD.
EUT NAME : Wireless LAN
MODEL NO. : Wavit 11 Wireless LAN (DWL-A001)
SERIAL NO. : 001
TEST MODE : 1ch. 11Mbps
POWER SOURCE : AC120V/60Hz
DATE TESTED : Jan 17 2002

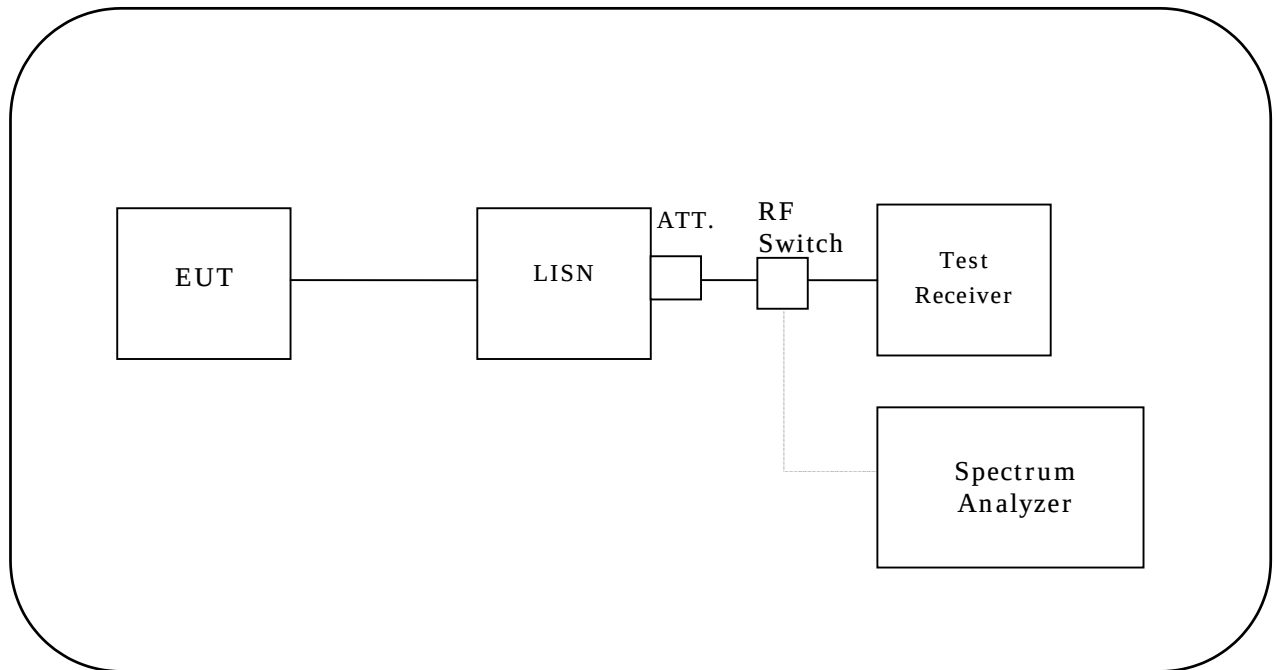
FILE NO. : ANKK-102013
REGULATION : 15.207
TEST METHOD : ANSI C63.4-1992
TEMPERATURE : 17.0 [degC]
HUMIDITY : 38.0 [%]

ENGINEER : Koji Setoguchi

FREQUENCY No	[MHz]	READING [dBuV]		FACTOR [dB]		EMISSION [dBuV]		LIMIT [dBuV]	MARGIN [dB]	
		Line1	Line2	Line1	Line2	Line1	Line2		Line1	Line2
1	0.7110	14.8	16.8	6.7	6.6	21.5	23.4	48.0	26.5	24.6
2	1.4224	14.7	16.8	6.7	6.8	21.4	23.6	48.0	26.6	24.4
3	1.9293	16.1	18.3	6.7	6.8	22.8	25.1	48.0	25.2	22.9
4	2.3360	17.0	20.2	6.9	6.9	23.9	27.1	48.0	24.1	20.9
5	3.1492	23.3	24.5	6.9	6.9	30.2	31.4	48.0	17.8	16.6
6	8.5315	20.2	19.2	7.0	7.0	27.2	26.2	48.0	20.8	21.8
7	18.3862	17.9	18.8	7.2	7.4	25.1	26.2	48.0	22.9	21.8

Other frequencies : Below the 15.207 limit										
Emission Level = Read + Factor(LISN,Pad,Cable)										

TEST INSTRUMENTS CONFIGURATION



TEST INSTRUMENTS

Instrument	Model No.	Serial No.	Manufacturer	Last cal. date	Period
Test receiver	ESS	842886/011	ROHDE & SCHWARZ	Mar. 9, 01	1 Year
LISN (EUT)	ESH2-Z5	882395/022	ROHDE & SCHWARZ	Jul. 6. 01	1 Year
6dB Attenuator	CFA-01	None	TME	Jan. 10, 02	1 Year
LISN (Peripheral)	KNW-407	8-532-11	KYORITSU	Mar. 1, 01	1 Year
50Ω Termination	CT-01	A030CON50	TME	Jun. 1, 01	1 Year
RF Switch	ACX-150	None	AKZO NOBEL	Jan. 11, 02	1 Year

9.8 Variation of Input Power [15.31(e)]

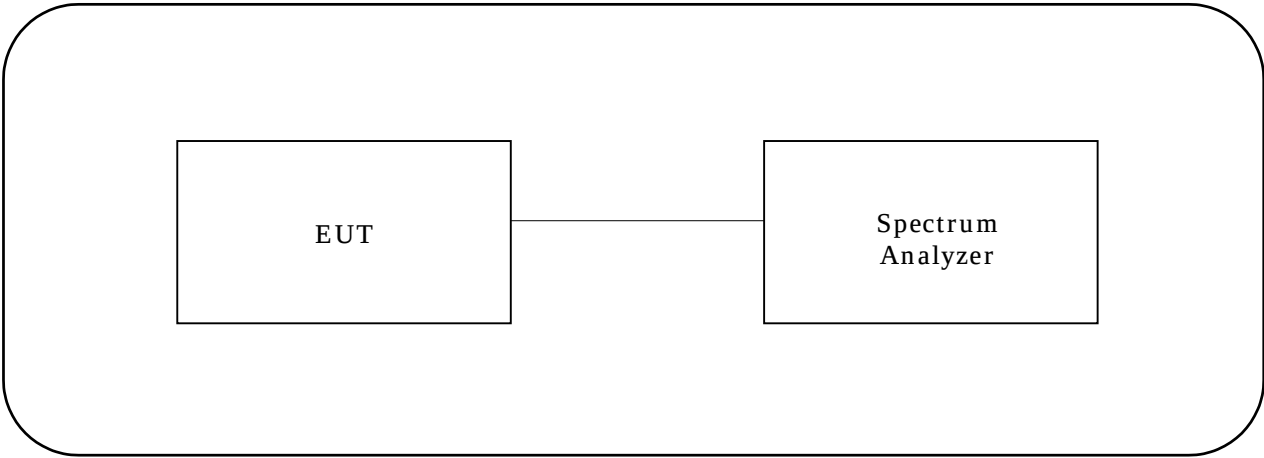
MEASUREMENT PROCEDURE:

1. The EUT was set to operate with following conditions.
 - ch1 / ch6 / ch11
 - Unmodulated-carrier
2. The measurements were carried out with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.
3. The Spectrum Analyzer was connected directly to the transmitter output.
4. The Spectrum Analyzer was setup using RBW = 2MHz, VBW = 3MHz.
5. Following data is the worst case.

Test date : January 29, 2002
 Temperature : 19 °C
 Humidity : 41 %

ch	Percentage of Rated Supply	AC Voltage (Vac 60Hz)	Peak Level (dBm)	Deviation (dBm)
1	85%	102	15.75	0
	100%	120	15.75	-
	115%	138	15.75	0
6	85%	102	15.50	0
	100%	120	15.50	-
	115%	138	15.50	0
11	85%	102	14.83	0
	100%	120	14.83	-
	115%	138	14.83	0

TEST INSTRUMENTS CONFIGURATION



TEST INSTRUMENTS

Instrument	Model No.	Serial No.	Manufacturer	Last cal. date	Period
Spectrum analyzer	8564E	3643A00665	HEWLETT PACKARD	Jun. 19, 01	1 Year

SECTION 10. PHOTOGRAPHS OF MAXIMUM EMISSION SET-UP

10.1 RF Conducted Emission Test

Test setup in accordance with ANSI C63.4-1992



Front view

10.2 Radiated Emission Test

Test setup in accordance with ANSI C63.4-1992



Front view



Rear view

10.3 Conducted Emission Test

Test setup in accordance with ANSI C63.4-1992



Front view



Side view

SECTION 11. MEASUREMENT UNCERTAINTY

The uncertainty of the measurements performed for this report lies:

Minimum 6dB Bandwidth	[15.247(a)(2)]	
Above 1 GHz		+/- 46.7kHz
Maximum Peak Output Power	[15.247(b)]	
Above 1 GHz		+/- 3.9 dB
Spurious Emissions		
- RF Antenna Conducted Test	[15.247(c)]	
Above 1 GHz		+/- 2.9 dB
Spurious Emissions		
- Radiated Emission Test	[15.247(c), 15.205, 15.209]	
30 MHz - 1000 MHz		+/- 3.6 dB
Above 1 GHz		+/- 3.9 dB
Power Spectral Density	[15.247(d)]	
Above 1 GHz		+/- 2.9 dB
AC Conducted Emission	[15.207]	
9 kHz – 30 MHz		+/- 1.8 dB
Variation of Input Power	[15.31(e)]	
Above 1 GHz		+/- 2.9 dB

Note on Radiated Emission measurement uncertainty

The following items are not included in the calculations in spite of their own uncertainty components because it is impracticable to find the value.
It is our problem awaiting solution in future.

(1) Repeatability of measurement

It is not possible to calculate repeatability since the measurement was carried out only one time.

(2) Antenna factor variation

The definition of measured (radiated electric field strength) is not completed on the referred standard(s).

(3) Loss of EUT radiation propagation

It is certainly one of the uncertainty components, however is not able to calculate.

Please note that these uncertainties are not reflected to the compliance judgement of the test results in this report.

SECTION 12. DESCRIPTION OF TEST LABORATORY

12.1 Outline of Akzo Nobel K. K. (formerly Akzo Kashima Limited), EMC Division

Akzo Nobel K. K., the country organization in Japan for Akzo Nobel NV, was established in 1968. The shares are owned by Akzo Nobel NV (100%). Akzo Nobel NV, headquartered in the Netherlands, is one of the world's leading companies in selected areas of chemicals, coatings, healthcare products and fibers with work force of approximately 70,000 people in over 50 countries.

In 1984, in order to respond to the growing testing demand, in particular, for FCC filing, Akzo Nobel K. K. started EMI testing business, installing the first open air test site in Kashima, Ibaraki prefecture. Further the business has been expanded by installing additional testing facilities not only in Ibaraki but also in other areas such as Shizuoka, Nagano, Kanagawa and Tochigi. As results, Akzo Nobel K. K. has now 16 open air test sites and 4 anechoic chambers for EMI/EMC testing. As the largest EMC testing laboratory in number of testing facilities and staffs, EMC Division has been organized separately in the company and independently operated in conformity with the requirements of ISO/IEC17025 for its competency as a testing laboratory.

Akzo Nobel K. K. EMC Division is the first foreign private laboratory accredited by NVLAP, National Voluntary Laboratory Accreditation Program-NIST, USA. The division has been certified, authorized and/or filed as a competent testing laboratory by various testing organizations/authorities as described below.

12.2 Filing, certification, authorization and accreditation list

EMI/EMC testing

FCC	(USA)
NVLAP	(USA)
NEMKO	(Norway)
VCCI	(Japan)
ETL SEMKO Japan	(Sweden)
TÜV PRODUCT SERVICE	(Germany)

Telecommunications terminal testing

FCC	(USA)
NVLAP	(USA)
NATA	(Australia)
IC	(Canada)

Note 1 : NVLAP accreditation does not constitute any product endorsement by NVLAP or any agent of the U.S. Government.