



EMI TEST REPORT

Test Report No. : 26KE0327-YK-A

Applicant : Alps Electric Co., Ltd.

Type of Equipment : Bluetooth Transceiver Module

Model No. : UGPZ6

FCC ID : CWTUGPZ6

Test Item and Standard: **Conducted Emissions
Out of Band Emissions (Radiated)
FCC Part15 Subpart C,
Section 15.207, 15.209, 15.247: 2006**

Test Result : Complied

1. This test report shall not be reproduced except in full, 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 the above regulation.
4. The test results in this test report are traceable to the national or international standards.

Date of test: July 3 and 5, 2006

Tested by: T. Suzuki

Takahiro Suzuki

Approved by: O. Watatani

Osamu Watatani
Site Manager of Yamakita EMC Lab.

**UL Apex Co., Ltd.
YAMAKITA EMC LAB.**

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MF060b (14.06.06)

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1 Applicant Information

Company Name : Alps Electric Co., Ltd.
Brand Name : ALPS
Address : 1-7, Yukigaya, Otsuka-cho, Ota-ku, Tokyo, 145-8501 JAPAN
Telephone Number : +81 244 35 1207
Facsimile Number : +81 244 35 1602
Contact Person : Masaaki Ueki

2 Product Description

Type of Equipment : Bluetooth Transceiver Module
Model No. : UGPZ6
Serial No. : DCA3D6
Rating : DC3.3V
Country of Manufacture : Japan
Receipt Date of Sample : June 15, 2006
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.

Model: UGPZ6 (referred to as the EUT in this report) is a Bluetooth Transceiver Module.

Clock frequency : 26MHz
Equipment type : Transceiver
Frequency band : 2402-2480MHz
Bandwidth & Channel spacing: 79MHz & 1MHz
Type of modulation : FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Antenna type : PIFA
Antenna model : WDAN-SCMS6005-1F
Antenna connector type : U. FL (Hirose)
Antenna gain (with cable loss): +1.69dBi
ITU code : F1D, G1D
Operating temperature range: 15 - 35 deg. C.

FCC Part15.31 (e)

Host devise (ex. PC) provides the Bluetooth Transceiver Module with stable power supply (DC1.8V), and the power is not changed when voltage of the device is varied. Therefore, the equipment complies power supply regulation.

FCC Part15.203 Antenna requirement

Bluetooth Transceiver Module complies with the requirement. When it is put up for sale, one antenna is attached and the antenna is with a unique coupling to the intentional radiator.

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3 Test Specification, Procedures and Results

3.1 Test specification

Test specification : FCC Part15 Subpart C: 2006
 Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
 Section 15.207 Conducted limits
 Section 15.209 Radiated emission limits, general requirements
 Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Section 15.207	-	N/A	20.1dB (0.1845MHz, L1, QP, Tx 2402MHz)	Complied
Carrier Frequency Separation	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247 (a)(1)	Conducted	Excluded *1		N/A
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247 (a)(1)	Conducted	Excluded *1		N/A
Number of Hopping Frequency	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247 (a)(1)(iii)	Conducted	Excluded *1	-	N/A
Dwell time	ANSI C63.4:2003 13.Measurement of intentional radiators	Section15.247 (a)(1)(iii)	Conducted	Excluded *1		N/A
Maximum Peak Output Power	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247 (b)(1)	Conducted	Excluded *1		N/A
Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.209 Section15.247(d)	Conducted / Radiated	N/A	0.2dB (AV, 4804MHz, Vertical, Tx 2402MHz 4882MHz, Horizontal, Tx 2441MHz 4960MHz, Vertical Tx 2480MHz)	Complied

The measurements also referred to FCC Public Notice DA 00-705 "Guidance on Measurement for Frequency Hopping Spread Spectrum Systems".

*1) Results for these test items are described in the test report 25JE0028-YK-1. The Module has been certificated with other type antennas.

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

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3.3 Uncertainty

Conducted emission

The measurement uncertainty (with 95% confidence level) for this test is ± 2.7 dB.

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

Spurious emission test (Radiated)

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

The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ± 4.3 dB.

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

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

3.4 Test Location

UL Apex Co., Ltd. Yamakita EMC Lab.

907, Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken 258-0124 JAPAN

Telephone number : +81 465 77 1011

Fax number : +81 465 77 2112

NVLAP Lab. code : 200441-0

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on August 26, 2005 (Registration No.: 95486).

IC Registration No. : IC3489A

No. 2 test site has been fully described in a report submitted to FCC office, and accepted on April 4, 2005 (Registration No.: 466226).

IC Registration No. : IC3489A-2

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).

IC Registration No. : IC3489A-B

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 shielded room	8.0 x 5.0 x 2.5	No.1 EMS lab.	10.0 x 7.5 x 5.7
No.2 shielded room	5.0 x 4.0 x 2.5	(Semi-anechoic chamber)	
No.3 shielded room	4.0 x 5.0 x 2.7		

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4 System Test Configuration

4.1 Justification

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

Test mode: Transmitting

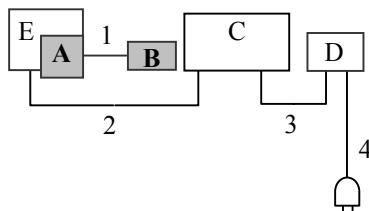
- Low channel : 2402MHz
- Middle channel : 2441MHz
- High channel : 2480MHz

Modulation type:

- GFSK (1Mbps)
- $\pi/4$ DQPSK (2Mbps)
- 8DPSK (3Mbps)

Preliminary measurement was carried out and there is no difference in GFSK, $\pi/4$ DQPSK and 8DPSK. The final measurement was performed with GFSK, normal operation.

4.2 Configuration of Tested System



* Test data was taken under worse case conditions.

AC120V/60Hz

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID (Remarks)
A	Bluetooth Transceiver Module	UGPZ6	DCA3D6	ALPS	CWTUGPZ6 (EUT)
B	PIFA Antenna	WDAN-SCMS6005-1F	-	FOXCONN Co., LTD.	(EUT)
C	Notebook PC	PS225N-4C1S60	Z0015973J	TOSHIBA	-
D	AC Adapter	PA3048U-1A	0222536P	TOSHIBA	-
E	Testing Board	-	-	-	(Test jig)

List of cables used

No.	Name	Length (m)	Shield	
			Connector	Cable
1	Antenna cable	0.10	Shielded	Shielded
2	USB cable	1.0	Shielded	Shielded
3	DC cable	1.8	Unshielded	Unshielded
4	AC cable	2.0	Unshielded	Unshielded

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5 Conducted Emissions

5.1 Operating environment

The test was carried out in No.3 shielded room.

5.2 Test configuration

EUT was placed on a wooden platform of nominal size, 1m by 1.8m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN) and excess AC cable was bundled in center. I/O cable were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.

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

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT operation mode : Transmitting

5.4 Test procedure

The EUT was connected to a LISN.

An overview sweep with peak detection has been performed.

The Conducted emission measurements were made with the following detector function of the test receiver.

Detector: QP/AV

IF Bandwidth: 10kHz

5.5 Results

Summary of the test results : Pass
Test data : APPENDIX 2 Page 14 to 18

Date : July 5, 2006 Test engineer : Takahiro Suzuki

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MF060b (14.06.06)

11 Out of Band Emissions (Radiated)

11.1 Operating environment

The test was carried out in No.1 anechoic chamber.

11.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. A drawing of the set up is shown in the photos of Appendix 1.

11.3 Test conditions

Frequency range : 30MHz - 26GHz
Test distance : 3m (30MHz-18GHz), 1m (18-26GHz) *1
EUT operation mode : Transmitting

11.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m and 1m. 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.

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.

Measurements were performed with QP, PK, and AV detector.

The radiated emission measurements were made with the following detector function of the test receiver.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

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

The equipment and its antenna were previously checked at each position of three axes X, Y and Z. The position in which the maximum noise occurred was chosen to put into measurement. See the table below and photographs in page 12 to 13. With the position, the noise levels of all the frequencies were measured.

Combinations of the worst case

	Module	Antenna
Below 1GHz		
Horizontal	Y	Y
Vertical	X	X
Above 1GHz		
Horizontal	Y	Z
Vertical	X	Y

*1) Limit for 1m distance was calculated using the following formula:

$$1m \text{ limit } [dB\mu V/m] = 15.209 \text{ limit } [dB\mu V/m] + 20 \log (3m/1m) [dB]$$

11.5 Results

Summary of the test results : Pass
Test data : APPENDIX 2 Page 19 to 21 (30 - 1000MHz), Page 22 to 27 (1 - 26GHz)
Date : July 3, 2006 Test engineer : Takahiro Suzuki

UL Apex Co., Ltd.

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APPENDIX 1: Photographs of test setup

Page 10 : Conducted emission
Page 11 : Radiated emission
Page 12 - 13 : Pre-check of the worst position

APPENDIX 2: Test Data

Page 14 - 18 : Conducted Emission
Page 19- 27 : Out of Band Emissions (Radiated)
19 - 21 : 30-1000MHz
22 - 27 : 1-26GHz

APPENDIX 3: Test instruments

Page 28 : Test instruments

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Conducted emission



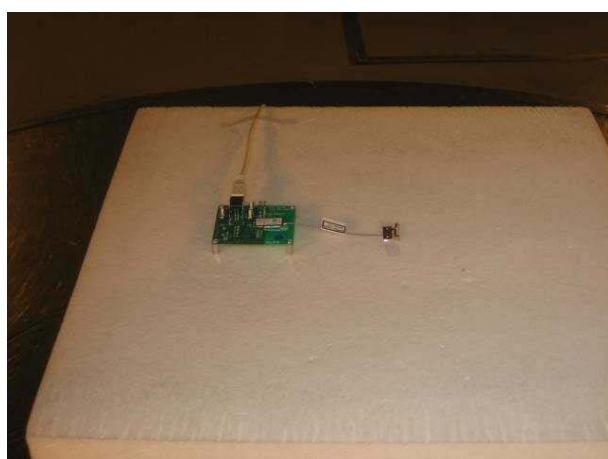
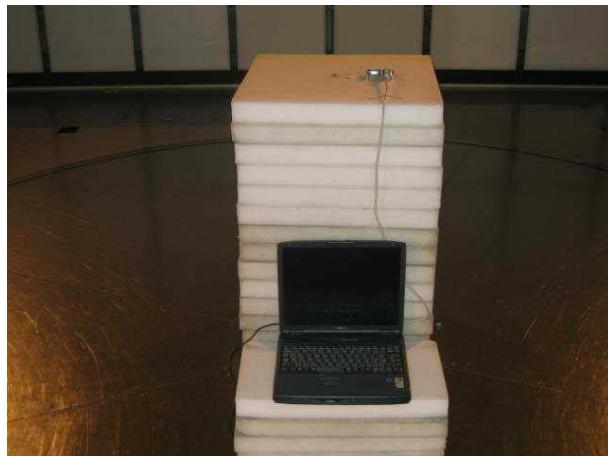
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Radiated emission



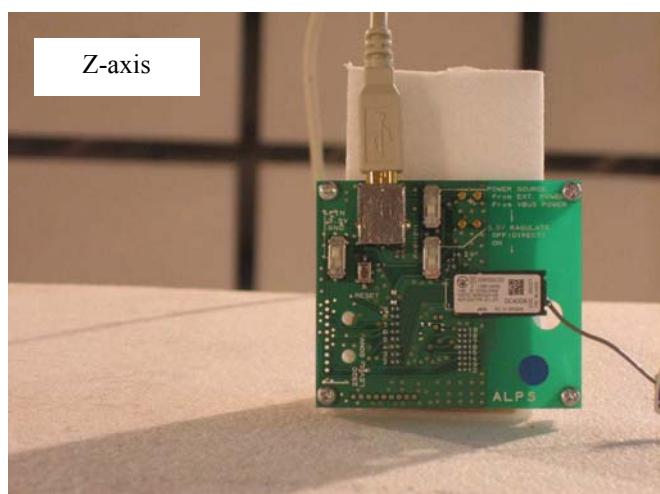
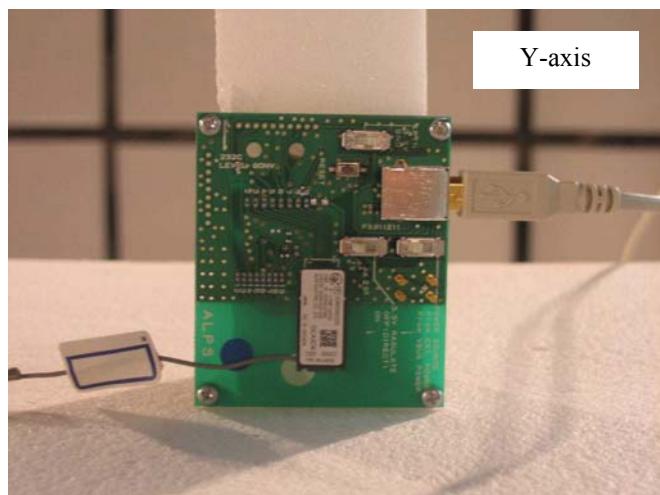
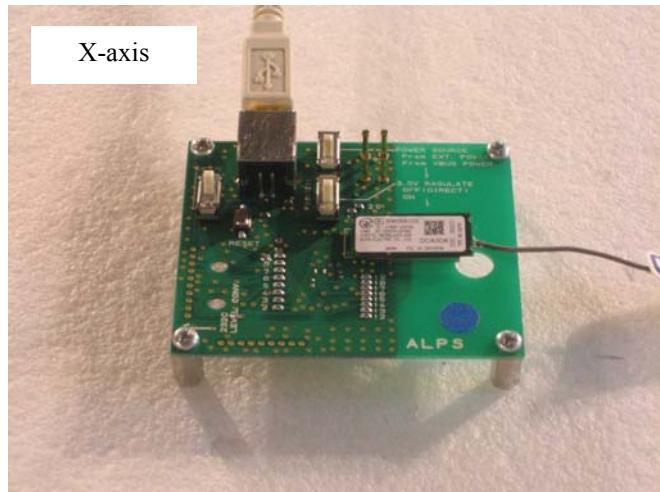
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Pre-check of the worst position (Module)



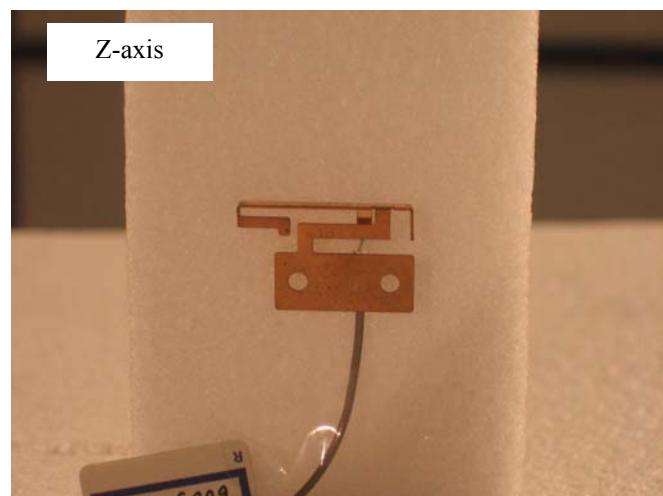
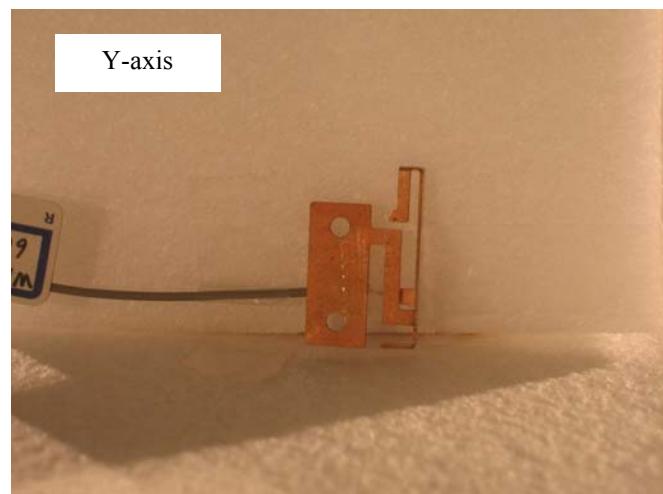
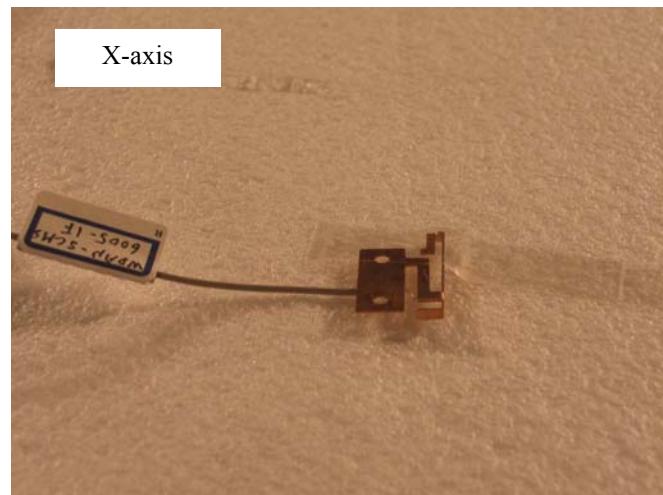
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Pre-check of the worst position (Antenna)



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DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
YAMAKITA No.3 SHIELD ROOM
Report No. : 26KE0327-YK - A

No.	FREQ. [MHz]	READING (N)		READING (L1)		LISN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
		QP [dB μ V]	AV	QP [dB μ V]	AV				QP [dB μ V]	AV	QP [dB μ V]	AV	QP	AV
1.	0.1500	35.5	—	35.6	—	0.1	0.1	0.0	35.8	—	66.0	56.0	30.2	—
2.	0.1845	43.4	—	44.0	—	0.1	0.1	0.0	44.2	—	64.3	54.3	20.1	—
3.	0.2473	40.8	—	41.2	—	0.1	0.1	0.0	41.4	—	61.8	51.8	20.4	—
4.	0.3092	31.6	—	34.0	—	0.1	0.1	0.0	34.2	—	60.0	50.0	25.8	—
5.	0.4950	21.9	—	29.4	—	0.1	0.2	0.0	29.7	—	56.1	46.1	26.4	—
6.	0.5551	29.0	—	28.9	—	0.1	0.2	0.0	29.3	—	56.0	46.0	26.7	—

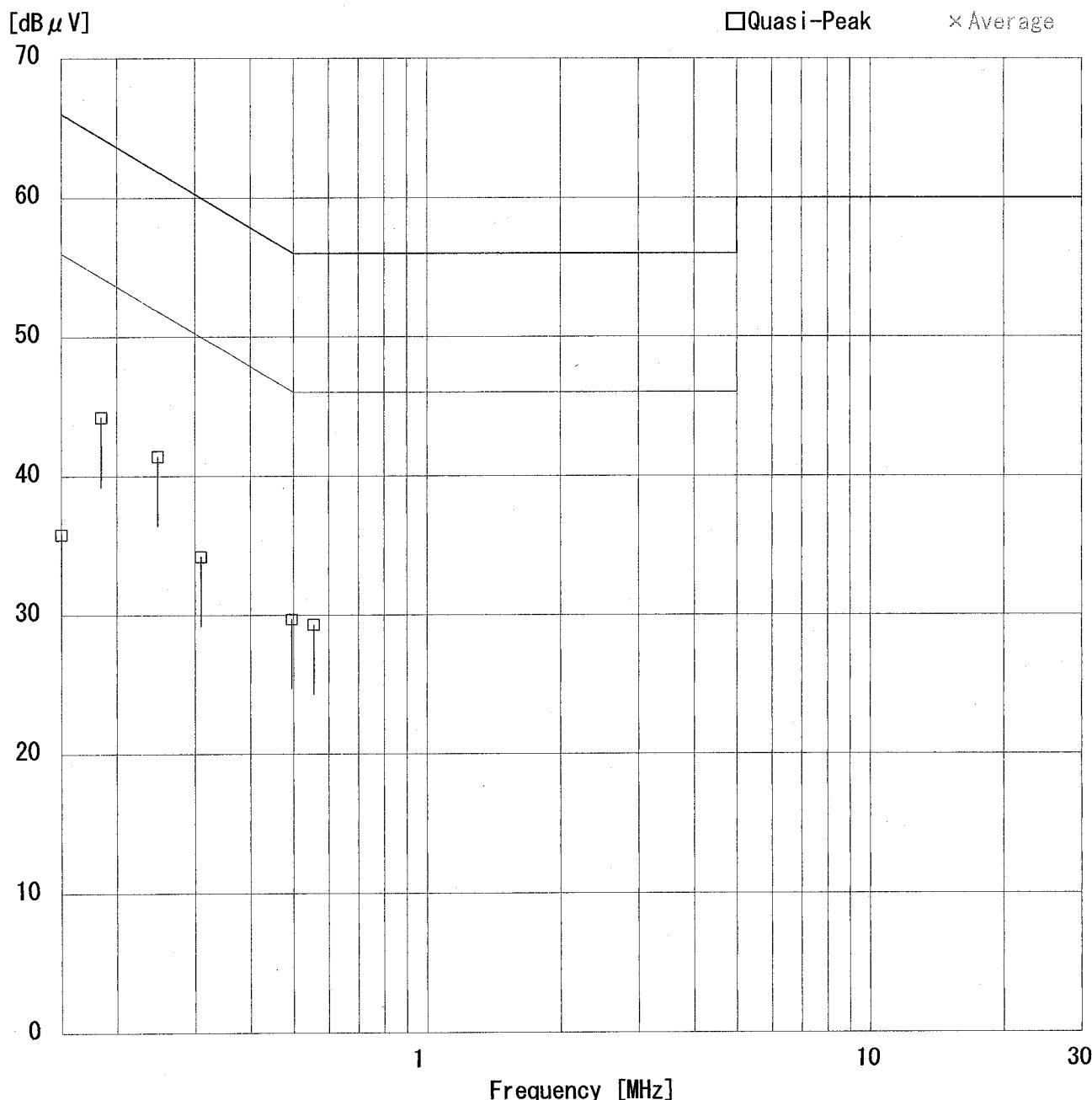
CALCULATION: READING + LISN FACTOR + CABLE LOSS + ATTEN.

■ L I S N : KLS-05 (NSLK8126) ■ C O A X I A L C A B L E : KCC-24/25/26/28
■ P U L S E L I M I T T E R : KPL-02 ■ E M I R E C E I V E R : KTR-03 (E S H S 10)

DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
YAMAKITA No.3 SHIELD ROOM
Report No. : 26KE0327-YK - A

Applicant : Alps Electric Co., Ltd.
Kind of Equipment : Bluetooth Transceiver Module
Model No. : UGPZ6
Serial No. :
Power : DC3.3V (AC120V/60Hz)
Mode : Tx:2402MHz
Remarks : ANT:WDAN-SCMS6005-1F
Date : 7/5/2006
Phase : Single Phase
Temperature : 20 °C
Humidity : 66 %
Regulation : Engineer : Takahiro Suzuki
FCC Part15C § 15.207. (CISPR Pub. 22)



DATA OF CONDUCTION TEST CHART

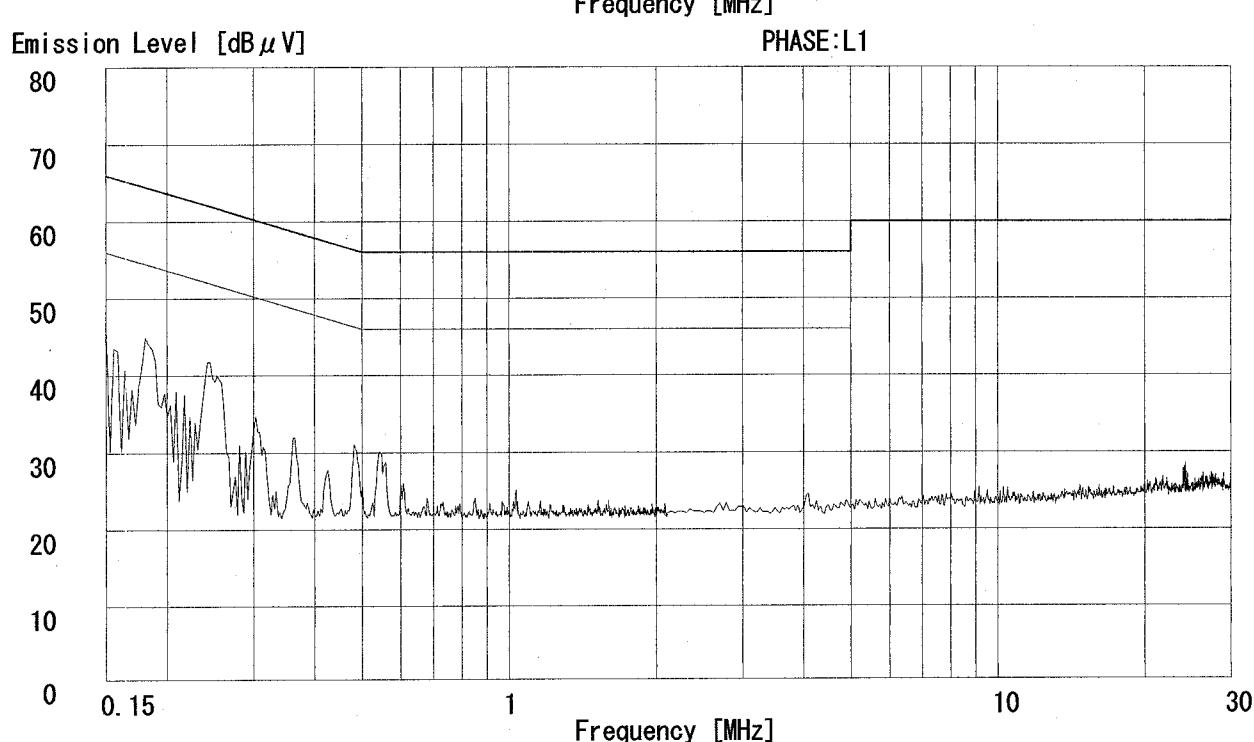
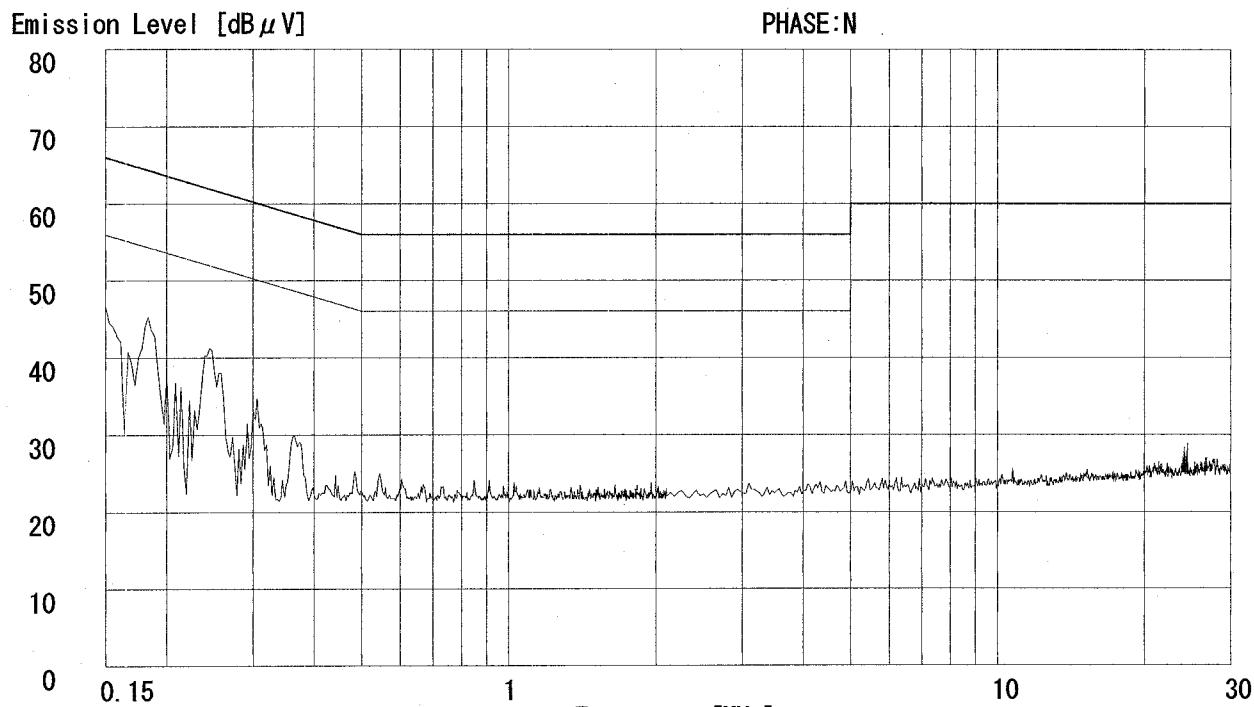
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YAMAKITA No.3 SHIELD ROOM

Report No. : 26KE0327-YK - A

Applicant : Alps Electric Co.,Ltd.
Kind of Equipment : Bluetooth Transceiver Module
Model No. : UGPZ6
Serial No.
Power : DC3.3V (AC120V/60Hz)
Mode : Tx:2402MHz
Remarks : ANT:WDAN-SCMS6005-1F
Date : 7/5/2006
Phase : Single Phase
Temperature : 20 °C
Humidity : 66 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
Regulation 2 : FCC Part15C § 15.207. (CISPR Pub. 22)

Engineer : Takahiro Suzuki



Page:

DATA OF CONDUCTION TEST CHART

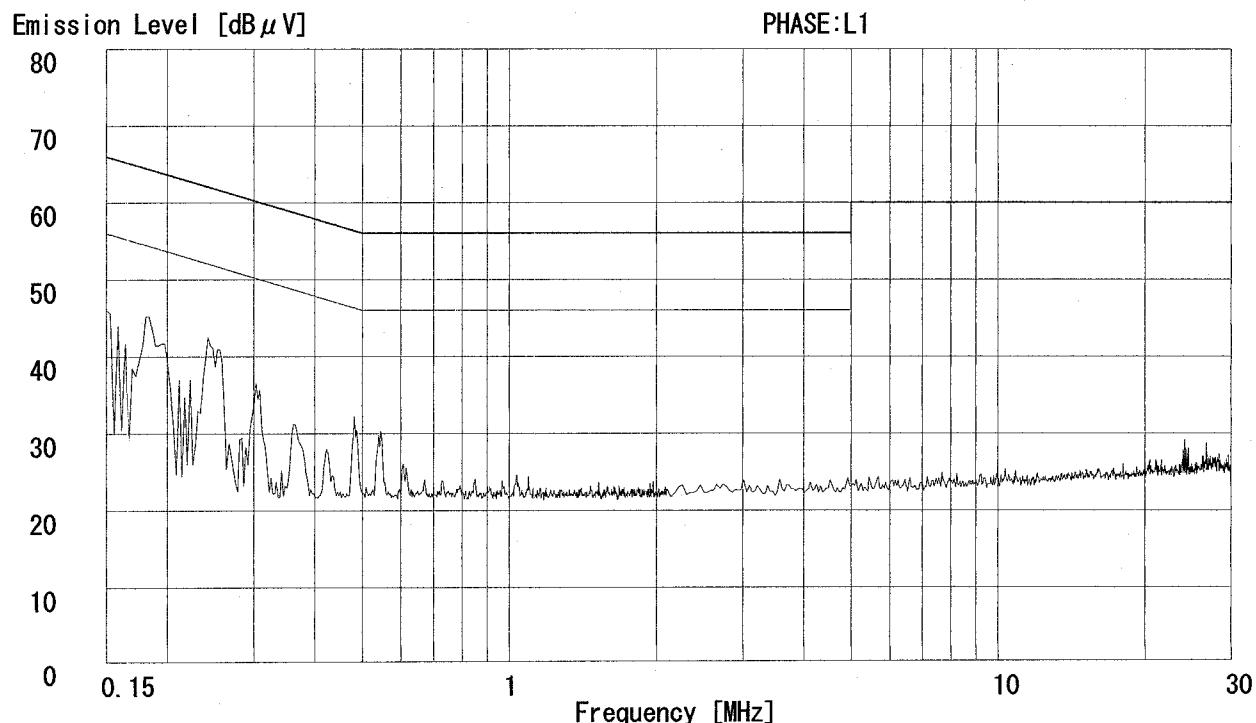
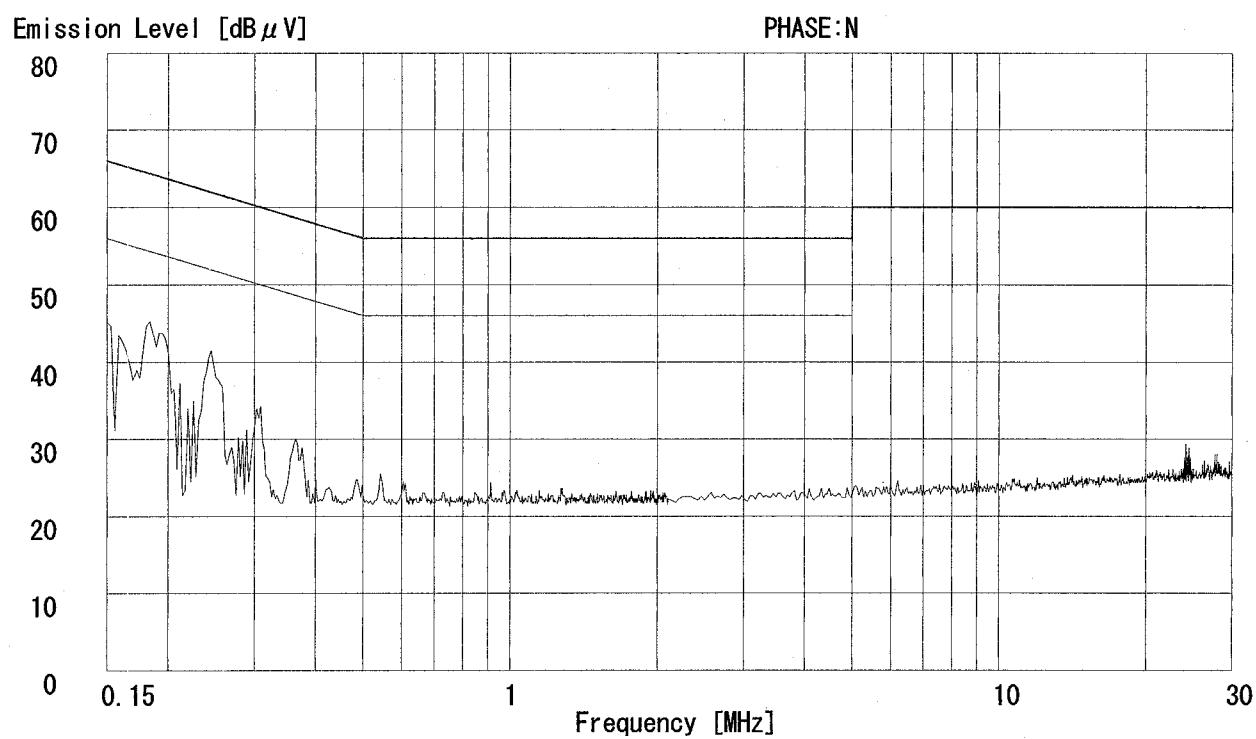
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YAMAKITA No.3 SHIELD ROOM

Report No. : 26KE0327-YK-A

Applicant : Alps Electric Co.,Ltd.
 Kind of Equipment : Bluetooth Transceiver Module
 Model No. : UGPZ6
 Serial No.
 Power : DC3.3V (AC120V/60Hz)
 Mode : Tx:2441MHz
 Remarks : ANT:WDAN-SCMS6005-1F
 Date : 7/5/2006
 Phase : Single Phase
 Temperature : 20 °C
 Humidity : 66 %
 Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
 Regulation 2 : FCC Part15C § 15.207. (CISPR Pub. 22)

Engineer : Takahiro Suzuki



Page:

DATA OF CONDUCTION TEST CHART

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YAMAKITA No.3 SHIELD ROOM

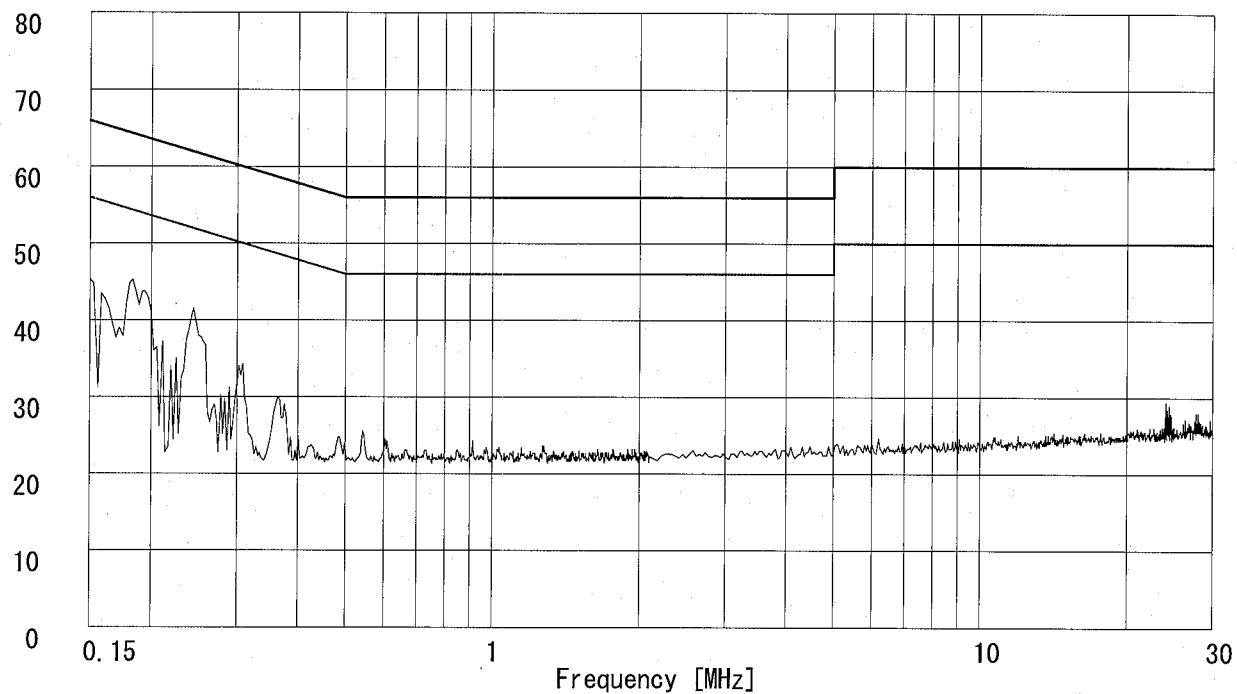
Report No. : 26KE0327-YK-A

Applicant : Alps Electric Co.,Ltd.
 Kind of Equipment : Bluetooth Transceiver Module
 Model No. : UGPZ6
 Serial No.
 Power : DC3.3V (AC120V/60Hz)
 Mode : Rx:2480MHz
 Remarks : ANT:WDAN-SCMS6005-1F
 Date : 7/5/2006
 Phase : Single Phase
 Temperature : 20 °C
 Humidity : 66 %
 Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
 Regulation 2 : FCC Part15C § 15.207. (CISPR Pub. 22)

Engineer : Takahiro Suzuki

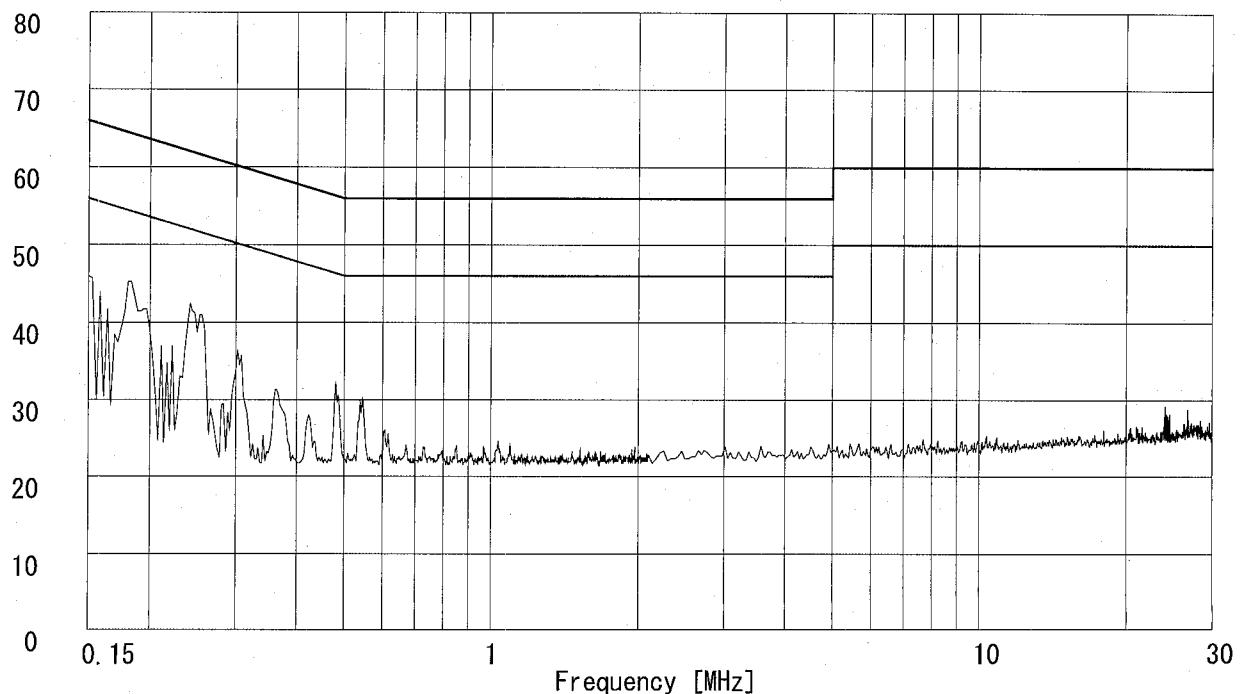
Emission Level [dB μ V]

PHASE:N



Emission Level [dB μ V]

PHASE:L1



Page:

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26KE0327-YK- A

Applicant : Alps Electric Co.,Ltd.
 Kind of Equipment : Bluetooth Transceiver Module
 Model No. : UGPZ6
 Serial No.
 Power : DC3.3V
 Mode : Tx:2402MHz
 Remarks : ANT:WDAN-SCMS6005-1F
 Date : 7/3/2006
 Test Distance : 3 m
 Temperature : 21 °C
 Humidity : 66 %
 Regulation : FCC Part15C § 15. 209

Engineer : Takahiro Suzuki

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μ V]	VER					HOR [dB μ V/m]	VER [dB μ V/m]	HOR [dB]	VER [dB]	HOR [dB]	VER [dB]
1.	144.02	BB	28.3	35.3	14.8	28.2	2.5	6.1	23.5	30.5	43.5	20.0	13.0	
2.	162.86	BB	26.2	31.3	15.8	28.1	2.7	6.0	22.6	27.7	43.5	20.9	15.8	
3.	228.02	BB	26.4	30.9	17.3	27.7	3.2	6.0	25.2	29.7	46.0	20.8	16.3	
4.	488.62	BB	29.0	26.4	18.5	29.0	5.1	6.0	29.6	27.0	46.0	16.4	19.0	
5.	499.87	BB	34.8	33.6	18.5	29.0	5.1	6.0	35.4	34.2	46.0	10.6	11.8	
6.	543.28	BB	27.8	28.3	19.0	29.2	5.3	6.0	28.9	29.4	46.0	17.1	16.6	

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

■ ANTENNA: KBA-03 (BBA9106) 30-299MHz/KLA-03 (USLP9143) 300-1000MHz

■ CABLE: KCC-30/31/32/34 ■ PREAMP: KAF-05 (8449D) ■ EMI RECEIVER: KTR-02 (ESCS30)

Page:

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26KE0327-YK - A

Applicant : Alps Electric Co., Ltd.
Kind of Equipment : Bluetooth Transceiver Module
Model No. : UGPZ6
Serial No.
Power : DC3.3V
Mode : Tx:2441MHz
Remarks : ANT:WDAN-SCMS6005-1F
Date : 7/3/2006
Test Distance : 3 m
Temperature : 21 °C
Humidity : 66 %
Regulation : FCC Part15C § 15.209
Engineer : Takahiro Suzuki

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	144.01	BB	28.6	35.4	14.8	28.2	2.5	6.1	23.8	30.6	43.5	19.7	12.9
2.	162.88	BB	26.6	31.0	15.8	28.1	2.7	6.0	23.0	27.4	43.5	20.5	16.1
3.	228.00	BB	26.7	30.7	17.3	27.7	3.2	6.0	25.5	29.5	46.0	20.5	16.5
4.	488.64	BB	29.3	27.1	18.5	29.0	5.1	6.0	29.9	27.7	46.0	16.1	18.3
5.	500.00	BB	34.9	33.8	18.5	29.0	5.2	6.0	35.6	34.5	46.0	10.4	11.5
6.	543.30	BB	27.5	28.9	19.0	29.2	5.3	6.0	28.6	30.0	46.0	17.4	16.0

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

■ ANTENNA: KBA-03 (BBA9106) 30-299MHz/KLA-03 (USLP9143) 300-1000MHz

CABLE: KCC-30/31/32/34 ■ PREAMP: KAF-05 (8449D) ■ EMI RECEIVER: KTR-02 (ESCS30)

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DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26KE0327-YK - A

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	144.02	BB	28.7	35.4	14.8	28.2	2.5	6.1	23.9	30.6	43.5	19.6	12.9
2.	162.84	BB	26.2	31.9	15.8	28.1	2.7	6.0	22.6	28.3	43.5	20.9	15.2
3.	228.01	BB	26.6	30.4	17.3	27.7	3.2	6.0	25.4	29.2	46.0	20.6	16.8
4.	488.67	BB	29.5	26.8	18.5	29.0	5.1	6.0	30.1	27.4	46.0	15.9	18.6
5.	499.92	BB	35.2	33.7	18.5	29.0	5.1	6.0	35.8	34.3	46.0	10.2	11.7
6.	543.29	BB	28.2	28.6	19.0	29.2	5.3	6.0	29.3	29.7	46.0	16.7	16.3

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

■ ANTENNA: KBA-03 (BBA9106) 30-299MHz/KLA-03 (USLP9143) 300-1000MHz

■CABLE:KCC-30/31/32/34 ■PREAMP:KAF-05 (8449D) ■EMI RECEIVER:KTR-02 (ESCS30)

Page:

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER
Report No. : 26KE0327-YK-A

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	1601.49	BB	46.0	48.4	25.6	35.0	3.4	10.0	50.0	52.4	74.0	24.0	21.6
2.	2390.00	BB	40.4	40.1	28.7	34.8	4.0	9.9	48.2	47.9	74.0	25.8	26.1
3.	4804.00	BB	56.7	57.0	32.9	34.6	5.8	0.5	61.3	61.6	74.0	12.7	12.4
4.	7206.00	BB	39.6	39.7	36.4	34.4	6.6	0.5	48.7	48.8	74.0	25.3	25.2
5.	9608.00	BB	39.8	39.8	38.4	34.6	7.6	1.0	52.2	52.2	74.0	21.8	21.8
6.	12010.00	BB	38.8	39.3	40.6	34.1	9.0	0.4	54.7	55.2	74.0	19.3	18.8
7.	14412.00	BB	39.6	39.8	43.0	32.1	9.1	0.7	60.3	60.5	74.0	13.7	13.5
8.	16814.00	BB	41.7	40.8	42.1	33.1	9.6	0.3	60.6	59.7	74.0	13.4	14.3
9.	19216.00	BB	42.2	41.8	40.9	32.0	10.1	0.0	61.2	60.8	83.5	22.3	22.7
10.	21618.00	BB	42.4	42.5	40.6	31.7	10.8	0.0	62.1	62.2	83.5	21.4	21.3
11.	24020.00	BB	42.3	42.8	40.5	31.6	11.5	0.0	62.7	63.2	83.5	20.8	20.3

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

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz

CABLE: KCC-D3/D7 ■ PREAMP: KAF-04 (8449B) ■ SPECTRUMANALYZER: R3271A (KSA-04)

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DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26KE0327-YK - A

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	1601.49	BB	36.3	39.6	25.6	35.0	3.4	10.0	40.3	43.6	54.0	13.7	10.4
2.	2390.00	BB	29.8	29.9	28.7	34.8	4.0	9.9	37.6	37.7	54.0	16.4	16.3
3.	4804.00	BB	49.1	49.2	32.9	34.6	5.8	0.5	53.7	53.8	54.0	0.3	0.2
4.	7206.00	BB	28.9	28.8	36.4	34.4	6.6	0.5	38.0	37.9	54.0	16.0	16.1
5.	9608.00	BB	29.0	29.2	38.4	34.6	7.6	1.0	41.4	41.6	54.0	12.6	12.4
6.	12010.00	BB	28.7	28.8	40.6	34.1	9.0	0.4	44.6	44.7	54.0	9.4	9.3
7.	14412.00	BB	28.5	28.7	43.0	32.1	9.1	0.7	49.2	49.4	54.0	4.8	4.6
8.	16814.00	BB	31.2	31.1	42.1	33.1	9.6	0.3	50.1	50.0	54.0	3.9	4.0
9.	19216.00	BB	31.4	31.6	40.9	32.0	10.1	0.0	50.4	50.6	63.5	13.1	12.9
10.	21618.00	BB	32.6	32.4	40.6	31.7	10.8	0.0	52.3	52.1	63.5	11.2	11.4
11.	24020.00	BB	32.5	32.8	40.5	31.6	11.5	0.0	52.9	53.2	63.5	10.6	10.3

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

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz

■ CABLE: KCC-D3/D7 ■ PREAMP: KAF-04 (8449B) ■ SPECTRUMANALYZER: R3271A (KSA-04)

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DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26KE0327-YK — A

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	1627.33	BB	45.6	48.9	25.8	35.0	3.4	10.0	49.8	53.1	74.0	24.2	20.9
2.	4882.00	BB	57.8	59.8	33.1	34.7	5.8	0.5	62.5	64.5	74.0	11.5	9.5
3.	7323.00	BB	39.1	39.8	36.6	34.4	6.7	0.5	48.5	49.2	74.0	25.5	24.8
4.	9764.00	BB	39.6	39.7	38.5	34.6	7.6	0.9	52.0	52.1	74.0	22.0	21.9
5.	12205.00	BB	38.7	39.5	40.5	33.8	8.8	0.5	54.7	55.5	74.0	19.3	18.5
6.	14646.00	BB	39.4	39.9	43.0	32.5	9.3	0.7	59.9	60.4	74.0	14.1	13.6
7.	17087.00	BB	41.2	40.9	43.2	32.8	9.7	0.4	61.7	61.4	74.0	12.3	12.6
8.	19528.00	BB	42.5	42.0	40.9	32.3	10.2	0.0	61.3	60.8	83.5	22.2	22.7
9.	21969.00	BB	42.6	42.4	40.8	32.9	11.0	0.0	61.5	61.3	83.5	22.0	22.2
10.	24410.00	BB	42.5	43.0	40.7	31.1	11.5	0.0	63.6	64.1	83.5	19.9	19.4

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

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz

■ CABLE: KCC-D3/D7 ■ PREAMP: KAF-04 (8449B) ■ SPECTRUMANALYZER: R3271A (KSA-04)

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DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26KE0327-YK - A

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	1627.33	BB	37.2	39.9	25.8	35.0	3.4	10.0	41.4	44.1	54.0	12.6	9.9
2.	4882.00	BB	49.1	49.0	33.1	34.7	5.8	0.5	53.8	53.7	54.0	0.2	0.3
3.	7323.00	BB	28.7	28.7	36.6	34.4	6.7	0.5	38.1	38.1	54.0	15.9	15.9
4.	9764.00	BB	29.2	29.3	38.5	34.6	7.6	0.9	41.6	41.7	54.0	12.4	12.3
5.	12205.00	BB	28.9	28.9	40.5	33.8	8.8	0.5	44.9	44.9	54.0	9.1	9.1
6.	14646.00	BB	28.6	28.8	43.0	32.5	9.3	0.7	49.1	49.3	54.0	4.9	4.7
7.	17087.00	BB	31.0	31.2	43.2	32.8	9.7	0.4	51.5	51.7	54.0	2.5	2.3
8.	19528.00	BB	31.5	31.4	40.9	32.3	10.2	0.0	50.3	50.2	63.5	13.2	13.3
9.	21969.00	BB	32.5	32.6	40.8	32.9	11.0	0.0	51.4	51.5	63.5	12.1	12.0
10.	24410.00	BB	32.4	32.7	40.7	31.1	11.5	0.0	53.5	53.8	63.5	10.0	9.7

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

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz

■ CABLE: KCC-D3/D7 ■ PREAMP: KAF-04 (8449B) ■ SPECTRUMANALYZER: R3271A (KSA-04)

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DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 26KE0327-YK - A

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN HOR [dB]	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	
1.	1653.31	BB	46.3	49.9	26.0	35.0	3.4	10.0	50.7	54.3	74.0	23.3	19.7
2.	2483.50	BB	43.7	42.8	28.8	34.8	4.0	9.9	51.6	50.7	74.0	22.4	23.3
3.	4960.00	BB	52.3	56.2	33.3	34.7	5.8	0.4	57.1	61.0	74.0	16.9	13.0
4.	7440.00	BB	38.6	39.3	36.9	34.5	6.7	0.5	48.2	48.9	74.0	25.8	25.1
5.	9920.00	BB	39.4	39.6	38.6	34.6	7.6	0.8	51.8	52.0	74.0	22.2	22.0
6.	12400.00	BB	38.8	39.0	40.4	33.4	8.6	0.6	55.0	55.2	74.0	19.0	18.8
7.	14880.00	BB	39.2	39.6	42.3	32.9	9.5	0.6	58.7	59.1	74.0	15.3	14.9
8.	17360.00	BB	40.8	40.7	44.5	32.8	9.7	0.2	62.4	62.3	74.0	11.6	11.7
9.	19840.00	BB	42.6	41.9	40.9	31.8	10.3	0.0	62.0	61.3	83.5	21.5	22.2
10.	22320.00	BB	42.3	42.5	40.9	32.1	11.0	0.0	62.1	62.3	83.5	21.4	21.2
11.	24800.00	BB	42.6	42.8	40.9	31.7	11.7	0.0	63.5	63.7	83.5	20.0	19.8

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

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz/KHA-03 (3160-09) 18-26GHz

■CABLE: KCC-D3/D7 ■PREAMP: KAF-04 (8449B) ■SPECTRUMANALYZER: R3271A (KSA-04)

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DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No. : 26KE0327-YK - A

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	1653.31	BB	37.9	43.0	26.0	35.0	3.4	10.0	42.3	47.4	54.0	11.7	6.6
2.	2483.50	BB	37.8	36.8	28.8	34.8	4.0	9.9	45.7	44.7	54.0	8.3	9.3
3.	4960.00	BB	45.8	49.0	33.3	34.7	5.8	0.4	50.6	53.8	54.0	3.4	0.2
4.	7440.00	BB	28.7	28.6	36.9	34.5	6.7	0.5	38.3	38.2	54.0	15.7	15.8
5.	9920.00	BB	29.4	29.4	38.6	34.6	7.6	0.8	41.8	41.8	54.0	12.2	12.2
6.	12400.00	BB	28.8	28.7	40.4	33.4	8.6	0.6	45.0	44.9	54.0	9.0	9.1
7.	14880.00	BB	28.7	28.7	42.3	32.9	9.5	0.6	48.2	48.2	54.0	5.8	5.8
8.	17360.00	BB	31.2	30.9	44.5	32.8	9.7	0.2	52.8	52.5	54.0	1.2	1.5
9.	19840.00	BB	31.6	31.8	40.9	31.8	10.3	0.0	51.0	51.2	63.5	12.5	12.3
10.	22320.00	BB	32.4	32.5	40.9	32.1	11.0	0.0	52.2	52.3	63.5	11.3	11.2
11.	24800.00	BB	32.6	32.5	40.9	31.7	11.7	0.0	53.5	53.4	63.5	10.0	10.1

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

■ ANTENNA : KHA-01 (SAS-200 571) 1-18GHz / KHA-03 (3160-09) 18-26GHz
■ CABLE : KCC-D3/D7 ■ PREAMP : KAF-04 (8449B) ■ SPECTRUMANALYZER : R3271A (KSA-04)

Test Report No :26KE0327-YK-A

APPENDIX 3
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
KAEC-01(NSA)	Anechoic Chamber	JSE	Semi 3m	RE	2005/09/03 * 12
KAF-05	Pre Amplifier	Agilent	8447D	RE	2006/04/21 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE	2006/03/24 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2006/01/17 * 12
KCC-30/31/32 /34/KRM-03	Coaxial Cable/RF Relay Matrix	Fujikura/Suhner/TSJ	5D-2W/S04272B/RFM-E421	RE	2005/12/22 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2006/01/17 * 12
KSA-04	Spectrum Analyzer	Advantest	R3271A	RE	2005/09/13 * 12
KTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2005/11/10 * 12
KOS-02	Digital Humidity Indicator	Custom	CTH-190	RE	2004/07/22 * 24
KAF-04	Pre Amplifier	Agilent	8449B	RE	2006/04/24 * 12
KAT10-S1	Attenuator	Agilent	8449D 010	RE	2006/04/11 * 12
KCC-D3/D7	Coaxial Cable	Rosenberger/Advantest	2201/JUN-08-01-061	RE	2006/04/11 * 12
KFL-01	Highpass Filter	Hewlett Packard	84300 80038	RE	2006/04/11 * 12
KHA-01	Horn Antenna	A.H.Systems	SAS-200/571	RE	2005/08/20 * 12
KHA-03	Horn Antenna	EMCO	3160-09	RE	2006/04/10 * 12
YA-CE	Conducted emission(software)	UL-Apex	CE(Ver.1.6)	CE	-
YA-RE	Radiated emission(software)	UL-Apex	RE(Ver.1.5)	RE	-
KCC-24/25/26 /28/KPL-02/K RM-02	Coaxial Cable/Pulse Limiter/RF Relay Matrix	Fujikura/Suhner/PMM/ TSJ	5D-2W/5D-2W/S04272 B/S04272B/PL01/RFM-E321	CE	2005/09/02 * 12
KLS-05	LISN(AMN)	Schwarzbeck	NSLK8126	CE (EUT)	2005/09/06 * 12
KSA-02	Spectrum Analyzer	Advantest	R3265A	CE	2005/11/10 * 12
KTR-03	Test Receiver	Rohde & Schwarz	ESHS10	CE	2006/02/02 * 12
KOS-10	Digital Humidity Indicator	Custom	CTH-190	CE	2004/07/22 * 24

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

Test Item :**CE: Conducted emission,****RE: Radiated emission**