



RADIO TEST REPORT

Test Report No.: 30JE0058-YK-01-A

Applicant : Sony EMCS Corporation Kisarazu TEC
Type of Equipment : AV Navigation
Model No. : XNV-770BT
FCC ID : AK8XNV770BT
Test regulation : FCC Part15 Subpart C: 2010
Test result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.

Date of test: June 19, 21, 22 and 23, 2010

Representative test engineer:

Minoru Nakatake
Engineer of EMC Service

Approved by: Toyokazu Imamura
Manager of EMC Service

UL Japan, Inc.

Yamakita EMC Lab.

907 Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken, 258-0124 JAPA MF060b (06.08.09)

Telephone: +81 465 77 1011
Facsimile: +81 465 77 2112

CONTENTS

	PAGE
SECTION 1 : Customer information	3
SECTION 2 : Equipment under test (E.U.T.)	3
SECTION 3 : Test specification, procedures & results	5
SECTION 4 : Operation of E.U.T. during testing	7
SECTION 5 : Carrier frequency separation	10
SECTION 6 : 20dB bandwidth & Occupied bandwidth (99%)	10
SECTION 7 : Number of hopping frequency	10
SECTION 8 : Dwell time	10
SECTION 9 : Maximum peak output power	10
SECTION 10 : Out of band emissions (Antenna port conducted)	10
SECTION 11 : Out of band emissions (Radiated)	11
 <u>Contents of appendixes</u>	 12
APPENDIX 1: Photographs of test setup	13
APPENDIX 2: Test data	16
APPENDIX 3: Test instruments	80

UL Japan, Inc.

Yamakita EMC Lab.

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

Telephone: +81 465 77 1011

Facsimile: +81 465 77 2112

SECTION 1: Customer information

Company Name : Sony EMCS Corporation Kisarazu TEC
Address : 8-4 Shiomi Kisarazu-shi, Chiba, 292-0834 Japan
Telephone Number : +81-438-37-4704
Facsimile Number : +81-438-37-4705
Contact Person : Kengo Nakamura

Sony EMCS Corporation Kisarazu TEC is on behalf of the applicant: Sony corporation.

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

2.1 Identification of E.U.T.

Type of Equipment : AV Navigation
Model No. : XNV-770BT
Serial No. : 40
Rating : DC12V
Country of Mass-production : Thailand
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.
Receipt Date of Sample : June 8, 2010

UL Japan, Inc.

Yamakita EMC Lab.

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

Telephone: +81 465 77 1011
Facsimile: +81 465 77 2112

2.2 Product description

Model: XNV-770BT (referred to as the EUT in this report) is AV Navigation.

The angle of display can be changed.

Clock frequencies: 32.768kHz, 4MHz, 6MHz, 12MHz, 24MHz, 26MHz, 27MHz, 33MHz

Bluetooth specification:

Equipment type	: Transceiver
Frequency of operation	: 2402-2480MHz
Bandwidth & channel spacing	: 79MHz & 1MHz
Type of modulation	: FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Antenna type	: MITSUBISHI AMD0302-ST01 SMD
Antenna connector type	: I-PEX MHF III
Antenna gain with cable loss	: -5.8dBi
ITU code	: F1D, G1D
Operation temperature range	: -20 to +60 deg.C.

FCC Part15.31 (e)

The equipment provides the Bluetooth transmitter with stable power supply (DC 3.3 V), therefore, the equipment complies power supply regulation.

FCC Part15.203 Antenna requirement

The equipment and its antenna comply with this requirement since this antenna is built in the equipment and it cannot be replaced by end users.

UL Japan, Inc.

Yamakita EMC Lab.

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

Telephone: +81 465 77 1011

Facsimile: +81 465 77 2112

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2010,
final revised on January 22, 2010 and effective March 1, 2010
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

The EUT complies with FCC Part 15 Subpart B: 2010. Refer to the test report 30JE0058-YK-01-C.

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	FCC Section 15.207	-	N/A *1)	N/A	N/A
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)	Conducted	N/A	*See data.	Complied
20dB bandwidth	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)	Conducted	N/A		Complied
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)(iii)	Conducted	N/A		Complied
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)(iii)	Conducted	N/A		Complied
Maximum peak output power	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (b)(1)	Conducted	N/A		Complied
Band edge compliance & Spurious emission	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (d) Section15.209	Conducted / Radiated	N/A	9.2dB (12205MHz, Tx 2441MHz (DH5), Horizontal, PK)	Complied
Note: UL Japan's EMI Work Procedures No.QPM05 and QPM15. *1) The test is not applicable since the EUT has no AC mains.						

UL Japan, Inc.

Yamakita EMC Lab.

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

Telephone: +81 465 77 1011

Facsimile: +81 465 77 2112

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.6.1	RSS-Gen 4.6.1	Conducted	-	Complied

* Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

	No.1 open site (±)	No.2 open site (±)	No.1 semi-anechoic chamber (±)
Radiated emission (3m)			
30-300MHz	4.4 dB	4.5 dB	4.6 dB
300-1000MHz	4.6 dB	4.7 dB	4.7 dB
1-18GHz	3.8 dB	4.2 dB	4.5 dB
18-26.5GHz	4.4 dB	4.5 dB	4.5 dB

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

Antenna port conducted test	(±)
Below 1GHz	0.4 dB
1GHz and above	0.7 dB

3.5 Test location

UL Japan, Inc. Yamakita EMC Lab.

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

Telephone number : +81 465 77 1011

Facsimile number : +81 465 77 2112

JAB Accreditation No. : RTL02610

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☐ No.1 open area test site	95486	2973B-1	-	12.0 x 41.2	30m
☐ No.2 open area test site	466226	2973B-3	-	9.5 x 17.8	10m
☒ No.1 Semi-anechoic chamber	95967	2973B-2	10.0 x 7.5 x 5.7	10.0 x 7.5	3m
☐ No.2 Full-anechoic chamber	-	-	8.0 x 4.7 x 4.0	8.0 x 4.7	2.5m
☐ No.1 shielded room	-	-	8.0 x 5.0 x 2.5	8.0 x 5.0	-
☐ No.2 shielded room	-	-	5.0 x 4.0 x 2.5	5.0 x 4.0	-
☐ No.3 shielded room	-	-	4.0 x 5.0 x 2.7	4.0 x 5.0	-
☒ No.4 shielded room	-	-	5.0 x 4.0 x 2.7	5.0 x 4.0	-
☐ No.5 shielded room	-	-	4.5 x 4.3 x 2.7	4.5 x 4.3	-

UL Japan, Inc.

Yamakita EMC Lab.

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

Telephone: +81 465 77 1011

Facsimile: +81 465 77 2112

SECTION 4: Operation of E.U.T. during testing**4.1 Operating mode**

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

Test item	Operating mode	Tested frequency
Carrier frequency separation	Transmitting Hopping ON (DH5/3DH5)/Inquiry, Payload: PRBS9	-
20dB bandwidth	Transmitting Hopping OFF (DH5/3DH5)/Inquiry, Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Number of hopping frequency	Transmitting Hopping ON (DH5/3DH5)/Inquiry, Payload: PRBS9	-
Dwell time	Transmitting (Hopping ON) -DH1, -DH3, -DH5 -3DH1, -3DH3, -3DH5 -Inquiry	-
Maximum peak output power	Transmitting Hopping OFF (DH5/3DH5)/Inquiry, Payload: PRBS9 -DH5, -2DH5, -3DH5	2402MHz, 2441MHz, 2480MHz
Band edge compliance & Spurious emission (Conducted) (Radiated)	Transmitting (DH5/3DH5), Payload: PRBS9 -Hopping ON/Inquiry -Hopping OFF Transmitting (DH5/3DH5), Payload: PRBS9	Band edge compliance: 2402MHz, 2480MHz Spurious emission: 2402MHz, 2441MHz, 2480MHz
99% occupied bandwidth	Transmitting (DH5/3DH5), Payload: PRBS9 -Hopping ON -Hopping OFF	2402MHz, 2441MHz, 2480MHz

*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload (except Dwell time test)

*Remarks: Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT. However, the limit level 125mWof AFH mode was used for the test.

Software & Setting (Hopping ON/OFF, Receiving)

Software: CSR plc. Blue test Ver. 1.24

Setting: TX DATA 1: Modulated, Hopping OFF

TX DATA 2: Modulated, Hopping ON

Parameter setting value (Worst duty setting)

		CFG PKT		CFG FREQ			POWER *1)		
Data rate	Packet	Packet type (code)	Packet length (size)	TX/RX Int	Loop back	Report Int	CX	Int	Modulation Freq
BDR	DH1	4	27	625	1875	1	255	44	0
	DH3	11	183	625	1875	1			
	DH5	15	339	625	1875	1			
EDR	2DH1	20	54	625	1875	1	255	48	0
	2DH3	26	367	625	1875	1			
	2DH5	30	679	625	1875	1			
EDR	3DH1	24	83	625	1875	1	255	48	0
	3DH3	27	552	625	1875	1			
	3DH5	31	1021	625	1875	1			

BDR: Basic data rate, EDR: Enhance data rate

DH5 (EDR) and 3DH5 (BDR) of the packet size were chosen since there were no difference in the data.

Software & Setting (Inquiry)

Software: CSR plc. Btcli Ver. 1.24

Setting: Command input "i"

*1) Customer's specification

UL Japan, Inc.

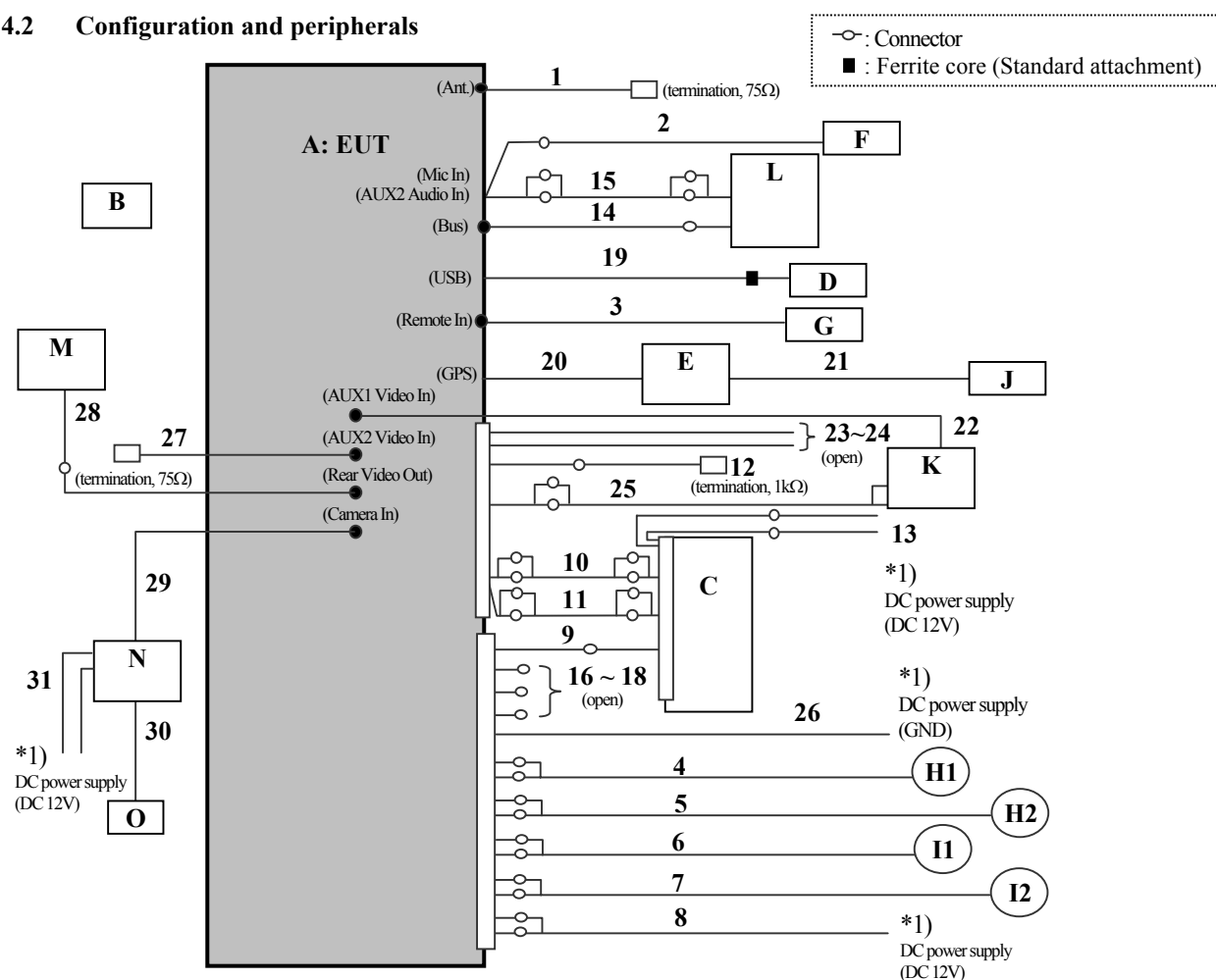
Yamakita EMC Lab.

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

Telephone: +81 465 77 1011

Facsimile: +81 465 77 2112

4.2 Configuration and peripherals



* Cabling and setup were 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 *2)	Remarks
A	AV Navigation	XNV-770BT	40	SONY	EUT
B	Remote Controller	RM-X170	-	SONY	-
C	Stereo Power Amplifier	XM-423SL	0020316	SONY	-
D	USB Memory	USM64D	B05019AB	SONY	-
E	Navigation Unit	B1-37	-	SONY	-
F	Microphone	XA-MC10	-	SONY	-
G	Wired Remote Controller	RM-X4S	-	SONY	-
H	Speaker (1), (2)	XS-F1611	-	SONY	x2
I	Speaker (3), (4)	1-544-814-31	-	AIWA	x2
J	GPS Antenna	VCA-42	1K7	SONY	-
K	Digital Video Cassette Recorder	GV-D900	30729	SONY	-
L	CD changer	CDX-T67	22634	SONY	-
M	Mobile Monitor	XVM-B62	3504390	SONY	-
N	Rear View CCD Camera Unit	HCE-C100	W80316932	ALPINE	-
O	CCD Camera	-	-	ALPINE	-

*1) DC power supply (Model No.: PAN35-10A) was used for DC 12.0V input.

*2) "SONY" means Sony Corporation or Sony EMCS Corporation.

UL Japan, Inc.

Yamakita EMC Lab.

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

Telephone: +81 465 77 1011

Facsimile: +81 465 77 2112

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	Antenna cable	3.0	Shielded	Shielded	-
2	Microphone cable	0.23+4	Shielded	Shielded	-
3	Wired Remote Controller cable	1.9	Unshielded	Unshielded	-
4	Speaker cable (1)	0.25+2	Unshielded	Unshielded	-
5	Speaker cable (2)	0.25+2	Unshielded	Unshielded	-
6	Speaker cable (3)	0.25+2	Unshielded	Unshielded	-
7	Speaker cable (4)	0.25+2	Unshielded	Unshielded	-
8	DC cable	0.25+1.5	Unshielded	Unshielded	-
9	Amp Remote cable	0.25+0.5	Unshielded	Unshielded	-
10	Audio cable (Front Audio Out)	0.15+5.2+0.1	Unshielded	Shielded	-
11	Audio cable (Rear Audio Out)	0.15+5.2+0.1	Unshielded	Shielded	-
12	Audio cable (Sub Audio Out)	0.15+1.5	Unshielded	Shielded	-
13	DC cable	0.65+0.6	Unshielded	Unshielded	-
14	BUS Control cable	5.5+0.15	Shielded	Shielded	-
15	Audio cable (AUX2 Audio In)	0.23+5.5+0.15	Unshielded	Shielded	-
16	ATT cable	0.25	Unshielded	Unshielded	-
17	ANT Remote cable	0.25	Unshielded	Unshielded	-
18	Illumination cable	0.25	Unshielded	Unshielded	-
19	USB cable	1.5	Shielded	Shielded	-
20	Navigation Unit cable	1.6	Unshielded	Unshielded	-
21	GPS Antenna cable	5.0	Unshielded	Unshielded	-
22	Video cable (AUX1 Video In)	1.5	Unshielded	Shielded	-
23	Speed In cable	2.5	Unshielded	Unshielded	-
24	Reverse In cable	5.0	Unshielded	Unshielded	-
25	Audio cable (AUX1 Audio In)	0.2+1.5	Unshielded	Shielded	-
26	Parking Brake cable	0.7	Unshielded	Shielded	-
27	Video cable (AUX2 Video In)	1.8	Unshielded	Shielded	-
28	Video cable (Rear Video Out)	3.0+1.5	Unshielded	Shielded	-
29	Video cable (Camera In)	5.0	Unshielded	Shielded	-
30	Camera cable	3.0	Unshielded	Unshielded	-
31	DC cable	1.0	Unshielded	Unshielded	-

UL Japan, Inc.**Yamakita EMC Lab.**

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

Telephone: +81 465 77 1011

Facsimile: +81 465 77 2112

SECTION 5: Carrier frequency separation

Test procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass

SECTION 6: 20dB bandwidth & Occupied bandwidth (99%)

Test procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

The channel separation in Hopping mode and Inquiry mode was separated by 25kHz and 2/3 of the 20dB bandwidth.

Summary of the test results: Pass

SECTION 7: Number of hopping frequency

Test procedure

The number of hopping frequency was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass

SECTION 8: Dwell time

Test procedure

The dwell time was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass

SECTION 9: Maximum peak output power

Test procedure

The maximum peak output power was measured with a power meter connected to the antenna port.

Summary of the test results: Pass

SECTION 10: 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.

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 conducted measurement.

Summary of the test results: Pass

UL Japan, Inc.

Yamakita EMC Lab.

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

Telephone: +81 465 77 1011

Facsimile: +81 465 77 2112

SECTION 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, 0.9m by 1.8m, raised 80cm above the conducting ground plane to prevent the reflection influence. The configuration was set in accordance with ANSI C63.4: 2003. Photographs of the set up are shown in Appendix 1.

11.3 Test conditions

Frequency range : 30MHz - 26GHz
Test distance : 3m

11.4 Test procedure

The Radiated Electric Field Strength intensity has been measured 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.

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

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

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
Detector IF Bandwidth	QP: BW 120kHz	PK: RBW: 1MHz/VBW: 3MHz, AV*1): RBW: 1MHz/VBW: See data
Measuring antenna	Biconical (30-300MHz) Logperiodic (300MHz-1GHz)	Horn

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

The EUT was tested in the direction normally used.

However, the carrier level and noise levels were confirmed at each angle of the monitor to see the position of maximum noise, and the test was made at the angle that has the maximum noise.

Frequency	Worst position	
	Horizontal	Vertical
Below 1GHz	Angle 3	Angle 3
Above 1GHz	Angle 3	Angle 1

11.5 Band edge

Band edge level at 2390MHz and 2483.5MHz is below the limits of FCC 15.209 and band edge level at 2400MHz is below the 20dBc. Refer to the data.

11.6 Results

Summary of the test results : Pass *No noise was detected above the 5th order harmonics.

UL Japan, Inc.

Yamakita EMC Lab.

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

Telephone: +81 465 77 1011

Facsimile: +81 465 77 2112

APPENDIX 1: Photographs of test setup

Page 13	:	Radiated emission
Page 14 - 15	:	Pre-check of the worst position

APPENDIX 2: Test data

Page 16	:	Carrier frequency separation
Page 17 - 19	:	20dB bandwidth
Page 20 - 24	:	Number of hopping frequency
Page 25 - 38	:	Dwell time
Page 39	:	Maximum peak output power
Page 40 - 57	:	Out of band emissions (Antenna Port Conducted)
Page 58 - 75	:	Out of band emissions (Radiated)
Page 76	:	Duty cycle
Page 77 - 79	:	Occupied bandwidth

APPENDIX 3: Test instruments

Page 80	:	Test instruments
---------	---	------------------

UL Japan, Inc.

Yamakita EMC Lab.

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

Telephone: +81 465 77 1011

Facsimile: +81 465 77 2112