



RADIO TEST REPORT

Test Report No. : 32EE0108-HO-01-R2

Applicant : YOKOWO CO.,LTD.
Type of Equipment : Short Range Radar
Model No. : YOS-3807
FCC ID : A7HYOS-3807
Test regulation : FCC Part 15 Subpart C: 2012
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 above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 32EE0108-HO-01-R1. 32EE0108-HO-01-R1 is replaced with this report.

Date of test: December 23 and 25, 2011

Representative test engineer:

Hironobu Ohnishi
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

13-EM-F0429

CONTENTS	PAGE
SECTION 1: Customer information	3
SECTION 2: Equipment under test (E.U.T.)	3
SECTION 3: Test specification, procedures & results	4
SECTION 4: Operation of E.U.T. during testing	7
SECTION 5: Radiated emission (Fundamental and Spurious Emission)	8
SECTION 6: 20dB Bandwidth and 99% Occupied bandwidth	10
APPENDIX 1: Data of EMI test	11
Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)	11
-20dB and 99% Occupied Bandwidth	13
Duty Cycle	14
APPENDIX 2: Test Instruments	15
APPENDIX 3: Photographs of test setup	16
Radiated emission	16

SECTION 1: Customer information

Company Name : YOKOWO CO.,LTD.
Address : No.5-11 Takinogawa 7-chome, Kita-ku, Tokyo 114-8515, Japan
Telephone Number : +81-3-3916-3111
Facsimile Number : +81-3-3916-3184
Contact Person : Yui Koda

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

2.1 Identification of E.U.T.

Type of Equipment : Short Range Radar
Model No. : YOS-3807
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC12V
Receipt Date of Sample : December 22, 2011
Country of Mass-production : Japan
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

2.2 Product Description

Feature of EUT

Short Range Radar is mounted on the vehicle.

General Specification

Clock frequency(ies) in the system : 20MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 24.085GHz - 24.165GHz
Modulation : ASK
Power Supply (radio part input) : DC5.0V, DC-0.4V
Antenna type : PCB Antenna
Antenna Gain : 16dBi

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2012, final revised on February 1, 2012

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.245 Operation within the bands 902 – 928MHz, 2435 – 2465MHz,
5785 – 5815MHz, 10500 – 10550MHz, and 24075 – 24175MHz.

*The revision on February 1, 2012 does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4:2003 7. AC powerline Conducted Emission measurements ----- IC: RSS-Gen 7.2.4	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.4	N/A *1)	N/A	N/A
Electric Field Strength of Fundamental Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators ----- IC: RSS-Gen 4.8	FCC: Section15.245(b) ----- IC: RSS-210 A7.1 RSS-Gen 7.2.3	26.6dB 24151.550MHz, AV, Hori.	Complied	Radiated
Electric Field Strength of Spurious Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators ----- IC: RSS-Gen 4.9	FCC: Section 15.205 Section 15.209 Section 15.245(b) ----- IC: RSS-210 A7.1, A7.2 RSS-Gen 7.2.5	2.2dB 24175.000MHz, PK, Hori.	Complied	Radiated
-20dB Bandwidth	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators ----- IC: -	FCC: Section15.215(c) ----- IC: Reference data	See Data	Complied	Radiated
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. *1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.					

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

FCC 15.31 (e)

This EUT provides stable voltage (DC5.0V, DC-0.4V) constantly to RF Part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	N/A	-	Radiated

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

3.4 Uncertainty

EMI

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

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.2dB	5.0dB	5.1dB	5.6dB	5.9dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	5.7dB	5.8dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	5.7dB	5.8dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	5.7dB	5.8dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Radiated emission (+dB)	
40GHz-50GHz	3.9dB
50GHz-75GHz	5.1dB
75GHz-110GHz	5.4dB

Radiated emission test(3m)

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

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up.

Refer to APPENDIX.

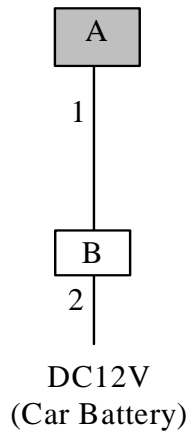
SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The mode: 1) Side looking mode
 2) Rear looking mode

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

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	Remarks
A	Short Range Radar	YOS-3807	1	YOKOWO CO.,LTD.	EUT
B	Jig	-	-	YOKOWO CO.,LTD.	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC and Signal Cable	7.9	Unshielded	Unshielded	-
2	DC Cable	0.7	Unshielded	Unshielded	-

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 5: Radiated emission (Fundamental and Spurious Emission)

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m (40GHz – 100GHz: 0.5m by 0.5m), raised 0.8m (40GHz – 100GHz: 1.5m) above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane. The height of the measuring antenna varied between 1 and 4m (frequency 9kHz – 30MHz: loop antenna was fixed height at 1.0m) and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength. The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table. When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

Frequency	9kHz-150kHz	150kHz-30MHz	30MHz-1GHz	1GHz-100GHz	
Instrument used	Test Receiver	Test Receiver	Test Receiver	Spectrum Analyzer	
Detector	QP, AV	QP, AV	QP	Peak	Average
IF Bandwidth	BW 200Hz	BW 9kHz	BW 120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz
Test Distance	3m	3m	3m	3m (below 10GHz), 1m*1) (10GHz – 40GHz), 0.5m*2) (40GHz – 50GHz), 0.3m*3) (above 50GHz)	

*1) Distance Factor: $20 \times \log (3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

*2) Distance Factor: $20 \times \log (3.0\text{m}/0.5\text{m}) = 15.6\text{dB}$

*3) Distance Factor: $20 \times \log (3.0\text{m}/0.3\text{m}) = 20.0\text{dB}$

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

[About the carrier measurement]

The carrier levels were confirmed at maximum direction of transmission. The maximum direction was searched under carefully since beam-widths are extremely narrow.

The carrier levels were measured in the far field. The distance of the fair field was calculated from follow equation.

$$r = \frac{2D^2}{\lambda}$$

where

r is the distance from the radiating element of the EUT to the edge of the far field, in m

D is the largest dimension of both the radiating element and the test antenna (horn), in m

λ is the wavelength of the emission under investigation [$300/f$ (MHz)], in m

Frequency [GHz]	Lambda [mm]	Maximum Dimention D [m]	Far Field Boundary r [m]
24.2	12.4	0.073	0.900

The test was made on EUT at the normal use position.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range	: 9kHz-100GHz
Test data	: APPENDIX
Test result	: Pass

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 6: 20dB Bandwidth and 99% Occupied bandwidth

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20dB Bandwidth	10MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied bandwidth	10MHz	100kHz	300kHz	Auto	Sample	Single	Spectrum Analyzer

Test data : APPENDIX 1

Test result : Pass

APPENDIX 1: Data of EMI test

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

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 32EE0108-HO-01
Date 12/23/2011 12/25/2011
Temperature/ Humidity 20 deg. C / 30% RH 22 deg. C / 33% RH
Engineer Hironobu Ohnishi Hironobu Ohnishi
1GHz – 100GHz 9kHz – 1GHz
Mode Side looking mode

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	37.459	QP	24.7	15.9	7.2	32.2	15.6	40.0	24.4	
Hori	40.796	QP	24.2	14.6	7.3	32.2	13.9	40.0	26.1	
Hori	184.690	QP	31.3	16.4	9.0	32.0	24.7	43.5	18.8	
Hori	12075.390	PK	45.2	37.6	-4.0	32.8	46.0	73.9	27.9	
Hori	24075.000	PK	65.6	38.6	-1.7	31.6	70.9	73.9	3.0	* 1)
Hori	24151.550	PK	105.8	38.6	-1.7	31.5	111.2	147.9	36.7	* 1), Fundamental
Hori	24175.000	PK	66.3	38.6	-1.7	31.5	71.7	73.9	2.2	* 1)
Hori	48301.580	PK	71.9	40.4	-3.2	22.9	86.2	107.9	21.7	* 1)
Hori	60377.210	PK	15.9	41.6	24.3	26.6	55.2	73.9	18.7	
Hori	72452.630	PK	23.6	41.7	28.0	5.0	88.3	107.9	19.6	* 1)
Hori	96603.580	PK	33.4	45.6	26.5	28.7	76.8	97.5	20.7	* 1)
Hori	12075.390	AV	38.7	37.6	-4.0	32.8	39.5	53.9	14.4	VBW=10Hz
Hori	24075.000	AV	42.5	38.6	-1.7	31.6	47.8	53.9	6.1	VBW=10Hz
Hori	24151.550	AV	95.7	38.6	-1.7	31.5	101.1	127.9	26.8	VBW=10Hz, Fundamental
Hori	24175.000	AV	43.2	38.6	-1.7	31.5	48.6	53.9	5.3	VBW=10Hz
Hori	48301.580	AV	60.8	40.4	-3.2	22.9	75.1	87.9	12.8	VBW=10Hz
Hori	60377.210	AV	9.8	41.6	24.3	26.6	49.1	53.9	4.8	VBW=10Hz
Hori	72452.630	AV	3.6	41.7	28.0	5.0	68.3	87.9	19.6	VBW=10Hz
Hori	96603.580	AV	20.3	45.6	26.5	28.7	63.7	77.5	13.8	VBW=10Hz
Vert	37.459	QP	32.8	15.9	7.2	32.2	23.7	40.0	16.3	
Vert	40.796	QP	32.8	14.6	7.3	32.2	22.5	40.0	17.5	
Vert	184.690	QP	25.0	16.4	9.0	32.0	18.4	43.5	25.1	
Vert	12075.390	PK	49.1	37.6	-4.0	32.8	49.9	73.9	24.0	
Vert	24075.000	PK	58.6	38.6	-1.7	31.6	63.9	73.9	10.0	* 1)
Vert	24151.550	PK	92.1	38.6	-1.7	31.5	97.5	147.9	50.4	* 1), Fundamental
Vert	24175.000	PK	58.8	38.6	-1.7	31.5	64.2	73.9	9.7	* 1)
Vert	48301.580	PK	67.1	40.4	-3.2	22.9	81.4	107.9	26.5	* 1)
Vert	60377.210	PK	14.5	41.6	24.3	26.6	53.8	73.9	20.1	
Vert	72452.630	PK	22.1	41.7	28.0	5.0	86.8	107.9	21.1	* 1), No signal.
Vert	96603.580	PK	29.9	45.6	26.5	28.7	73.3	97.5	24.2	* 1)
Vert	12075.390	AV	44.3	37.6	-4.0	32.8	45.1	53.9	8.8	VBW=10Hz
Vert	24075.000	AV	35.3	38.6	-1.7	31.6	40.6	53.9	13.3	VBW=10Hz
Vert	24151.550	AV	82.0	38.6	-1.7	31.5	87.4	127.9	40.5	VBW=10Hz, Fundamental
Vert	24175.000	AV	35.5	38.6	-1.7	31.5	40.9	53.9	13.0	VBW=10Hz
Vert	48301.580	AV	55.1	40.4	-3.2	22.9	69.4	87.9	18.5	VBW=10Hz
Vert	60377.210	AV	6.0	41.6	24.3	26.6	45.3	53.9	8.6	VBW=10Hz
Vert	72452.630	AV	0.6	41.7	28.0	5.0	65.3	87.9	22.6	No signal.
Vert	96603.580	AV	15.0	45.6	26.5	28.7	58.4	77.5	19.1	VBW=10Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-40GHz 20log(3.0m/1.0m)= 9.5dB
40GHz-50GHz 20log(3.0m/0.5m)=15.6dB
50GHz-100GHz 20log(3.0m/0.3m)=20.0dB

*4th harmonics exceeded the limit of § 15.209, but as its operation is limited to specific activities of limited duration, the limit of Spurious emission complied based on §15.245(b)(i)(iii)

*1) 10 dB was added to the reading value, since the spectrum analyzer might not accurately measure the peak emission. More details are shown on page 14.

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

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	32EE0108-HO-01	
Date	12/23/2011	12/25/2011
Temperature/ Humidity	20 deg. C / 30% RH	22 deg. C / 33% RH
Engineer	Hironobu Ohnishi	Hironobu Ohnishi
	1GHz – 100GHz	9kHz – 1GHz
Mode	Rear looking mode	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	37.528	QP	25.1	15.8	7.2	32.2	15.9	40.0	24.1	
Hori	41.328	QP	24.1	14.4	7.3	32.2	13.6	40.0	26.4	
Hori	184.946	QP	31.1	16.4	9.0	32.0	24.5	43.5	19.0	
Hori	12075.390	PK	44.8	37.6	-4.0	32.8	45.6	73.9	28.3	
Hori	24075.000	PK	65.6	38.6	-1.7	31.6	70.9	73.9	3.0	* 1)
Hori	24151.550	PK	105.9	38.6	-1.7	31.5	111.3	147.9	36.6	* 1), Fundamental
Hori	24175.000	PK	65.9	38.6	-1.7	31.5	71.3	73.9	2.6	* 1)
Hori	48301.610	PK	72.0	40.4	-3.2	22.9	86.3	107.9	21.6	* 1)
Hori	60376.990	PK	16.2	41.6	24.3	26.6	55.5	73.9	18.4	
Hori	72452.370	PK	23.2	41.7	28.0	5.0	87.9	107.9	20.0	* 1)
Hori	96603.580	PK	33.0	45.6	26.5	28.7	76.4	97.5	21.1	* 1)
Hori	12075.390	AV	38.9	37.6	-4.0	32.8	39.7	53.9	14.2	VBW=10Hz
Hori	24075.000	AV	42.8	38.6	-1.7	31.6	48.1	53.9	5.8	VBW=10Hz
Hori	24151.550	AV	95.9	38.6	-1.7	31.5	101.3	127.9	26.6	VBW=10Hz, Fundamental
Hori	24175.000	AV	43.1	38.6	-1.7	31.5	48.5	53.9	5.4	VBW=10Hz
Hori	48301.610	AV	60.7	40.4	-3.2	22.9	75.0	87.9	12.9	VBW=10Hz
Hori	60376.990	AV	10.2	41.6	24.3	26.6	49.5	53.9	4.4	VBW=10Hz
Hori	72452.370	AV	4.1	41.7	28.0	5.0	68.8	87.9	19.1	VBW=10Hz
Hori	96603.580	AV	20.0	45.6	26.5	28.7	63.4	77.5	14.1	VBW=10Hz
Vert	37.528	QP	34.0	15.8	7.2	32.2	24.8	40.0	15.2	
Vert	41.328	QP	32.6	14.4	7.3	32.2	22.1	40.0	17.9	
Vert	184.946	QP	25.3	16.4	9.0	32.0	18.7	43.5	24.8	
Vert	12075.390	PK	48.7	37.6	-4.0	32.8	49.5	73.9	24.4	
Vert	24075.000	PK	58.7	38.6	-1.7	31.6	64.0	73.9	9.9	* 1)
Vert	24151.550	PK	91.5	38.6	-1.7	31.5	96.9	147.9	51.0	* 1), Fundamental
Vert	24175.000	PK	57.9	38.6	-1.7	31.5	63.3	73.9	10.6	* 1)
Vert	48301.610	PK	67.6	40.4	-3.2	22.9	81.9	107.9	26.0	* 1)
Vert	60376.990	PK	14.3	41.6	24.3	26.6	53.6	73.9	20.3	
Vert	72452.370	PK	21.8	41.7	28.0	5.0	86.5	107.9	21.4	* 1), No signal.
Vert	96603.580	PK	30.5	45.6	26.5	28.7	73.9	97.5	23.6	* 1)
Vert	12075.390	AV	44.8	37.6	-4.0	32.8	45.6	53.9	8.3	VBW=10Hz
Vert	24075.000	AV	34.8	38.6	-1.7	31.6	40.1	53.9	13.8	VBW=10Hz
Vert	24151.550	AV	81.3	38.6	-1.7	31.5	86.7	127.9	41.2	VBW=10Hz, Fundamental
Vert	24175.000	AV	35.3	38.6	-1.7	31.5	40.7	53.9	13.2	VBW=10Hz
Vert	48301.610	AV	55.1	40.4	-3.2	22.9	69.4	87.9	18.5	VBW=10Hz
Vert	60376.990	AV	6.5	41.6	24.3	26.6	45.8	53.9	8.1	VBW=10Hz
Vert	72452.370	AV	0.6	41.7	28.0	5.0	65.3	87.9	22.6	No signal.
Vert	96603.580	AV	15.3	45.6	26.5	28.7	58.7	77.5	18.8	VBW=10Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-40GHz 20log(3.0m/1.0m)= 9.5dB
 40GHz-50GHz 20log(3.0m/0.5m)=15.6dB
 50GHz-100GHz 20log(3.0m/0.3m)=20.0dB

*4th harmonics exceeded the limit of § 15.209, but as its operation is limited to specific activities of limited duration, the limit of Spurious emission complied based on §15.245(b)(i)(iii)

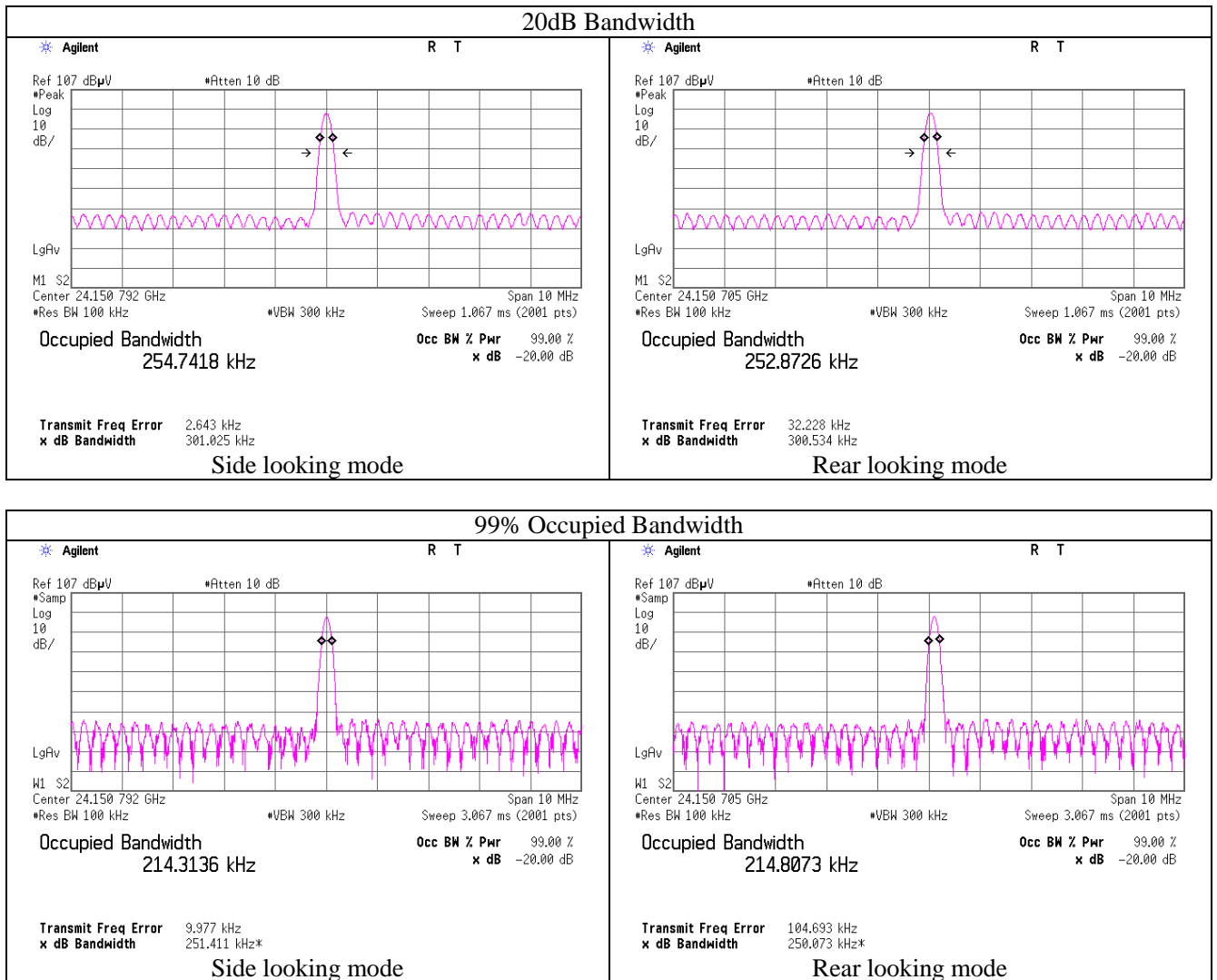
*1) 10 dB was added to the reading value, since the spectrum analyzer might not accurately measure the peak emission.

More details are shown on page 14.

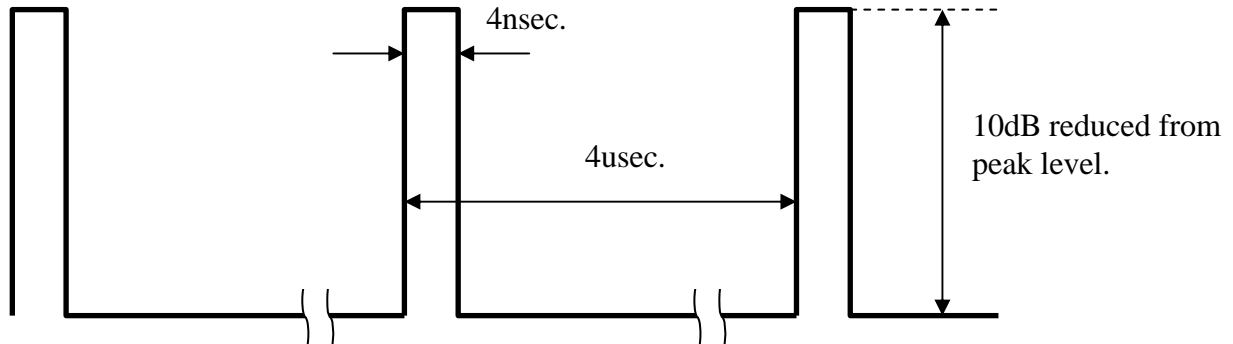
-20dB and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32EE0108-HO
Date	12/23/2011
Temperature/ Humidity	20 deg. C / 30% RH
Engineer	Hironobu Ohnishi
Mode	Side / Rear looking mode

Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
Side looking mode	301.025	214.314
Rear looking mode	300.534	214.807



Duty Cycle



The duty cycle was declared by the manufacturer.

The EUT always transmits continuously and has 10dB difference in level except “while both BSI and CTA are not working.” means the speed of vehicle is less than 10km/h, and the gear of vehicle is not put into the back.

The transmitting time of peak level is extremely short. Therefore the spectrum analyzer might not accurately measure the peak emission.

However, there is enough margin to the result of fundamental emissions level added 10 dB.

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

APPENDIX 2: Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2011/02/22 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE	2011/02/23 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE	
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2011/04/08 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2011/05/23 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2011/09/07 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2011/03/10 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2011/05/23 * 12
MCC-05	Microwave Cable 1G-40GHz 2m	Storm	421-011 (90-1394-079)	01-12-002	RE	2011/01/20 * 12
MPA-03	Microwave System Power Amplifier	Agilent	83050A	3950M00205	RE	2011/06/15 * 12
MHA-07	Horn Antenna	Custom	HO22R	10766-01	RE	2011/10/31 * 12
MHA-09	Horn Antenna	WiseWave	ARH1523-02	10766-01	RE	2011/10/31 * 12
MPA-08	Pre Amplifier	WiseWave	ALN-61226028-51	11576-01-071	RE	2011/08/27 * 12
MMX-01	Preselected Millimeter Mixer	Agilent	11974V-E01	3001A00412	RE	2011/06/13 * 12
MHA-11	Horn Antenna	WiseWave	ARH1023-02	10766-01	RE	2011/10/31 * 12
MPA-18	Pre Amplifier	AmTechs Corporation	LNA-7511025	9601	RE	2011/08/27 * 12
MMX-02	Harmonic Mixer	Agilent	11970W	2521 A01909	RE	2011/06/14 * 12
MCC-66	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28636/2	RE	2011/04/22 * 12
MCC-67	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28635/2	RE	2011/04/22 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2011/08/11 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2011/10/19 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/sucoform 141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	RE	2011/07/15 * 12
MCC-31	Coaxial cable	UL Japan	-	-	RE	2011/07/28 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2011/03/04 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2011/11/02 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2011/10/15 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2011/10/15 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2011/07/15 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: RE: Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission),
-20dB and 99% Occupied Bandwidth

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124