



RADIO TEST REPORT

Test Report No. : 32HE0015-HO-01-A-R1

Applicant : DENSO CORPORATION
Type of Equipment : MILLIMETER WAVE RADAR SENSOR (76GHz VEHICLE MOUNT)
Model No. : DNMWR004
FCC ID : HYQDNMWR004
Test regulation : FCC Part 15 Subpart C: 2012
(Permissive Change Class II Application)
* Power Density and Spurious Emission tests only
Test Result : Complied

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2. The results in this report apply only to the sample tested.
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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 32HE0015-HO-01-A. 32HE0015-HO-01-A is replaced with this report.

Date of test: March 20, 2012

Representative test engineer:

Hironobu Ohnishi
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Masanori Nishiyama
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

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SECTION 1: Customer information

Company Name : DENSO CORPORATION
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Telephone Number : +81-566-25-6519
Facsimile Number : +81-566-25-4683
Contact Person : KOUICHI HOSHINO

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

2.1 Identification of E.U.T.

Type of Equipment : MILLIMETER WAVE RADAR SENSOR (76GHz VEHICLE MOUNT)
Model No. : DNMWR004
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 12.0V(Nominal), DC10V-16V(Operating range)
Receipt Date of Sample : March 12, 2012
Country of Mass-production : Japan
Condition of EUT : Production model
Modification of EUT : No Modification by the test lab

2.2 Product Description

General Specification

Clock frequency(ies) in the system : 20MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 76-77GHz (Nominal: 76.5GHz)
Modulation : FM-CW
Antenna Type : Integral slotted waveguide array antenna
Antenna Gain : 25dBi
Steerable Antenna : Electronically (Receiving Part only)
Usage location : Forward-looking, vehicle-mounted
Rating : DC 12.0V(Nominal), DC10V-16V(Operating range)
Power Supply (inner) : DC +6.5V/-5V

<Contents of the change from original model>

Test Report Number of original model is 07J11347-1, Revision B1 issued by COMPLIANCE CERTIFICATION SERVICES.

Specification was changed from the original model as follows:

-“Not in motion” mode was added.

Therefore only Power Density and Spurious Emission tests were performed for the modified model in this report.

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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 15.253 Operation within the bands 46.7-46.9GHz and 76.0-77.0GHz.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Power Density	FCC: "MILLIMETER WAVE TEST PROCEDURES" ----- IC: -	FCC: Section 15.253(b), (d) ----- IC: RSS-210 A13.1.2(1)	See data.	Complied	Radiated
Spurious Emissions	FCC: ANSI C63.4:2003, "MILLIMETER WAVE TEST PROCEDURES" ----- IC: RSS-Gen 4.9	FCC: Section 15.253(c), (d) ----- IC: RSS-210 A13.1.2(2), A13.1.4, RSS-Gen 7.2.3	11.0dB 128.002MHz, QP, Hori.	Complied	Radiated
RF Exposure	FCC: - ----- IC: RSS-Gen 5.5	FCC: Section 15.253(f) ----- IC: RSS-102 4.2	-	Complied *1)	-

*1) For RF Exposure test, please see the test report number 32HE0015-HO-01-C issued by UL Japan, Inc.

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

Millimeter wave measurement was performed accordance with FCC KDB 200443 (MILLIMETER WAVE TEST PROCEDURES).

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

FCC 15.31 (e)

This EUT provides stable voltage (DC +6.5V/-5V) 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.

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3.3 Addition to standard

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	4.7dB	5.7dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	4.8dB	5.6dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	4.8dB	5.6dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	4.8dB	5.6dB	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
110GHz-170GHz	5.2dB
170GHz-260GHz	5.2dB

Radiated emission test(3m)

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

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3.5 Test Location

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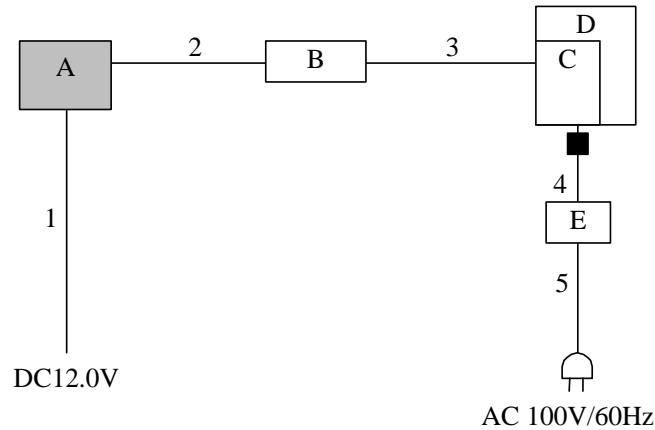
	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	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, Duty Cycle, Test instruments, and Test set up

Refer to APPENDIX.

4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	MILLIMETER WAVE RADAR SENSOR (76GHz VEHICLE MOUNT)	DNMWR004	10022271	DENSO CORPORATION	EUT
B	CANcab	251	-	Vector	-
C	CANcardXL	007100	027872	Vector	-
D	Laptop PC	FMV4MCSTL7	R3700011	FUJITSU LIMITED	-
E	AC Adaptor	FMV-AC313S	03601970D	FUJITSU LIMITED	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.4	Unshielded	Unshielded	-
2	CAN Cable	2.7	Unshielded	Unshielded	-
3	Signal Cable	0.3	Shielded	Shielded	-
4	DC Cable	1.2	Unshielded	Unshielded	-
5	AC Cable	1.9	Unshielded	Unshielded	-

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SECTION 5: Radiated Emission (Spurious Emission, Power Density)

Test Procedure

[Up to 40GHz]

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m(9kHz – 10GHz), 0.5m by 0.5m(10GHz – 40GHz), raised 0.8m(9kHz – 10GHz), 1.0m(10GHz – 40GHz) 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-231GHz	
Instrument used	Test Receiver	Test Receiver	Test Receiver	Spectrum Analyzer	
Detector	QP, AV	QP, AV	QP	PK	AV
IF Bandwidth	BW 200Hz	BW 9kHz	BW 120kHz	RBW: 1MHz VBW: 3MHz	*1) Peak with Duty factor *2) RBW: 1MHz VBW: 10Hz
Test Distance	3m	3m	3m	3m (below 10GHz), 1m*3) (10GHz – 40GHz) Above 40GHz: For more details, refer to next page.	

*1) Applied for Power Density measurement.

*2) Applied for Spurious Emission measurement, since any emission was not detected.

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

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[Above 40GHz]

The test was performed based on "MILLIMETER WAVE TEST PROCEDURES".
 The EUT was placed on a urethane platform, raised 1.0m above the conducting ground plane.
 The measurements were performed on handheld method.

Set spectrum analyzer RBW, VBW, span, etc., to the proper values. Note these values. Enable two traces—one set to “clear write,” and the other set to “max hold.”

Begin hand-held measurements with the test antenna (horn) at a distance of 1 m from the EUT in a horizontally polarized position. Slowly adjust its position, entirely covering the plane 1 m from the EUT.

Observation of the two active traces on the spectrum analyzer will allow refined horn positioning at the point(s) of maximum field intensity. Repeat with the horn in a vertically polarized position. If the emission cannot be detected at 1 m, reduce the RBW to increase system sensitivity. Note the value. If the emission still cannot be detected, move the horn closer to the EUT, noting the distance at which a measurement is made.

Note the maximum level indicated on the spectrum analyzer. Adjust this level, if necessary, by the antenna gain, conversion loss of the external mixer and gain of LNA used, at the frequency under investigation. Calculate the field strength of the emission at the measurement distance from the Friis' transmission equation.

[About 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 far 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
Lambda is the wavelength of the emission under investigation [300/f (MHz)], in m

Frequency [GHz]	Lambda [mm]	Maximum Dimention			Far Field Boundary r [m]
		W [mm]	L [mm]	Diagonal D [m]	
77.0	3.9	20	65	0.068	2.4

The test was made on EUT at the normal use position except for the carrier measurement, since the installation position is decided.

For the carrier measurement, the EUT was placed on the jig because the antenna array was mounted on angularly-tilted.

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

Measurement range : 9k-231GHz
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Power Density

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 32HE0015-HO-01
Date 03/20/2012
Temperature/ Humidity 23 deg. C / 32% RH
Engineer Hironobu Ohnishi
Mode Operating mode (In motion / Not in motion)

Mode	Frequency [GHz]	Measurement Distance [m]	Measured Power [dBm]	Rx Antenna Gain [dBi]	System Loss [dB]	LNA Gain [dB]	Free field Attenuation [dB]
In motion	76.6293	3.0	-60.94	22.34	42.32	0.00	79.67
Not in motion	76.6553	3.0	-60.80	22.34	42.38	0.00	79.68

Mode	Peak EIRP		Specification Distance [m]	Power Density Peak [uW/cm ²]	Limit Peak [uW/cm ²]	Margin Peak [dB]	Field Strength [dBuV/m 3m]
	[dBm]	[mW]					
In motion	38.71	7438.6	3.0	6.577	6000	29.60	133.9
Not in motion	38.91	7788.0	3.0	6.886	20	4.63	134.1

Mode	Duty Factor * [dB]	Average EIRP (Peak with Duty Factor)		Specification Distance [m]	Power Density Average [uW/cm ²]	Limit Average [uW/cm ²]	Margin Average [dB]	Field Strength [dBuV/m 3m]
		[dBm]	[mW]					
In motion	-8.66	30.05	1011.6	3.0	0.894	60	18.27	125.3
Not in motion	-16.99	21.93	155.8	3.0	0.138	0.2	1.62	117.2

* Refer to APPENDIX 2: Duty Cycle

Calculating formula:

Free Field Attenuation = $10 * \log((4 * \pi * \text{Measurement Distance} / \lambda)^2)$
Peak EIRP = Measured Power - Rx Antenna Gain + System Loss - LNA Gain + Free Field Attenuation
Average EIRP = Peak EIRP + Duty Factor
Power Density = $\text{EIRP} / (4 * \pi * \text{Specification Distance}^2)$
Field Strength = $\sqrt{30 * \text{EIRP}} / \text{Specification Distance}$

In motion mode:

The test result is reference data. There is no deviation from original model.

As for the limit, 60uW/cm² of section 15.253 (b) (2) was applied to the EUT based on the product description.

Not in motion mode:

As for the limit, 200nW/cm² of section 15.253 (b) (1) was applied to the EUT.

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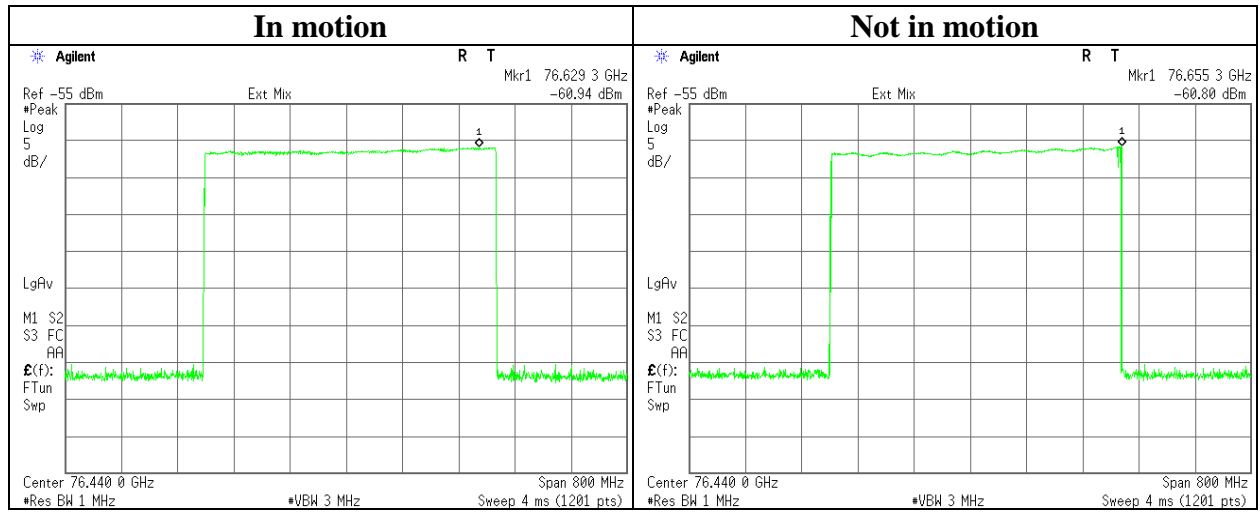
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Power Density



The peak power is no difference between In motion mode and Not in motion mode.

Spurious Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 32HE0015-HO-01
Date : 03/20/2012
Temperature/ Humidity : 23 deg. C / 32% RH
Engineer : Hironobu Ohnishi
(9kHz - 40GHz)
Mode : Not in motion 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	48.001	QP	26.0	11.8	7.4	32.2	13.0	40.0	27.0	
Hori	88.390	QP	36.3	8.1	8.0	32.2	20.2	43.5	23.3	
Hori	128.002	QP	42.7	13.6	8.5	32.3	32.5	43.5	11.0	
Hori	133.280	QP	41.9	13.9	8.5	32.3	32.0	43.5	11.5	
Hori	299.720	QP	28.4	19.8	10.0	32.1	26.1	46.0	19.9	
Hori	454.766	QP	35.7	18.1	11.0	32.0	32.8	46.0	13.2	
Hori	19061.300	PK	42.9	37.9	-2.6	32.2	46.0	73.9	27.9	No signal.
Hori	38122.600	PK	44.1	41.9	-2.9	24.0	59.1	73.9	14.8	No signal.
Hori	19061.300	AV	31.4	37.9	-2.6	32.2	34.5	53.9	19.4	No signal.
Hori	38122.600	AV	31.6	41.9	-2.9	24.0	46.6	53.9	7.3	No signal.
Vert	48.001	QP	37.1	11.8	7.4	32.2	24.1	40.0	15.9	
Vert	88.390	QP	42.6	8.1	8.0	32.2	26.5	43.5	17.0	
Vert	128.002	QP	37.6	13.6	8.5	32.3	27.4	43.5	16.1	
Vert	133.280	QP	37.1	13.9	8.5	32.3	27.2	43.5	16.3	
Vert	299.720	QP	30.3	19.8	10.0	32.1	28.0	46.0	18.0	
Vert	454.766	QP	33.9	18.1	11.0	32.0	31.0	46.0	15.0	
Vert	19061.300	PK	43.5	37.9	-2.6	32.2	46.6	73.9	27.3	No signal.
Vert	38122.600	PK	43.7	41.9	-2.9	24.0	58.7	73.9	15.2	No signal.
Vert	19061.300	AV	31.4	37.9	-2.6	32.2	34.5	53.9	19.4	No signal.
Vert	38122.600	AV	31.6	41.9	-2.9	24.0	46.6	53.9	7.3	No signal.

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

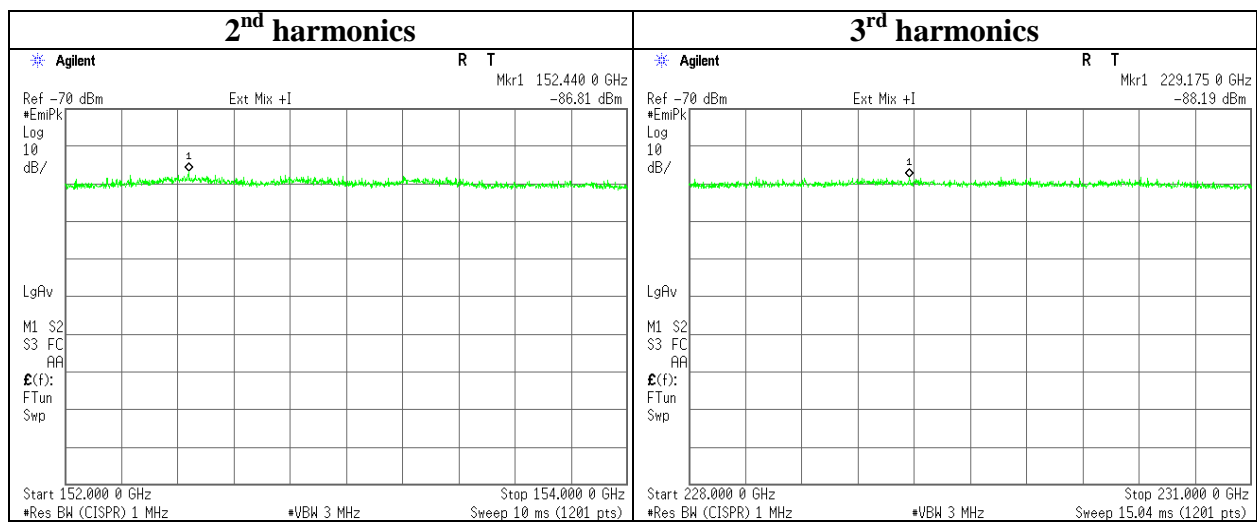
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Spurious Emission (above 40GHz)

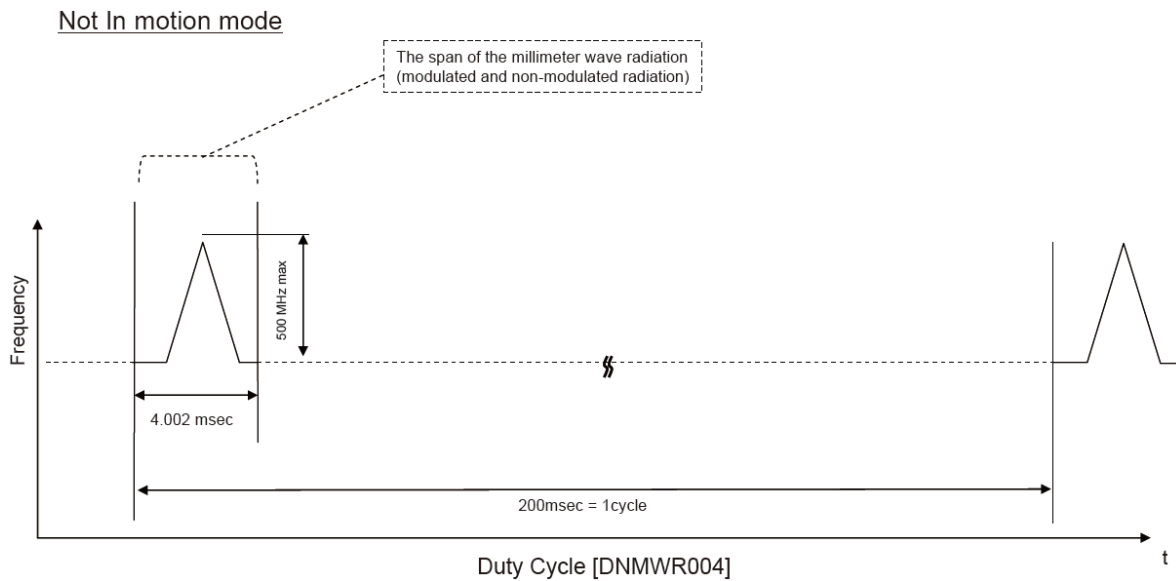
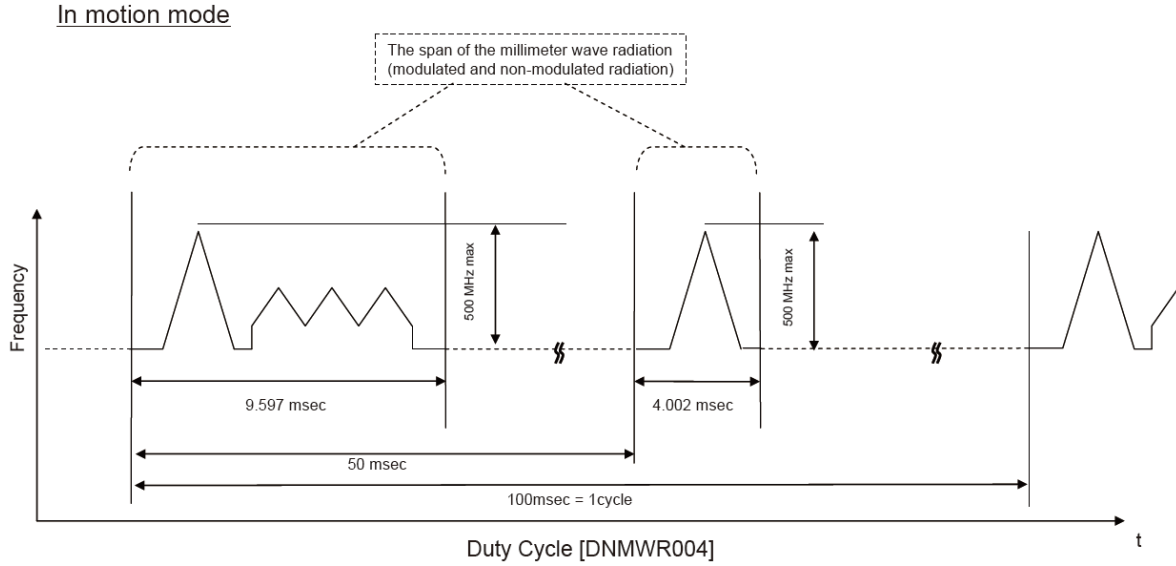
Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32HE0015-HO-01
Date	03/20/2012
Temperature/ Humidity	23 deg. C / 32% RH
Engineer	Hironobu Ohnishi (40GHz – 231GHz)
Mode	Not in motion

* The peak density is less than the average limit.
 There is no spurious emission from 40GHz to 231GHz except for operating band.
 The following shows the measurement results of the harmonics.



APPENDIX 2: Duty Cycle

[Technical document for the Duty Cycle]



[Duty Factor for average measurements]

A [ms]	Pulse On time		Period [ms]	Duty [%]	Duty Factor [dB]	Mode
	B [ms]	Total [ms]				
9.597	4.002	13.599	100.0	13.6	-8.66	In motion
4.002	-	4.002	200.0	2.0	-16.99	Not in motion

Calculating formula:

$$\text{Duty} = \text{Total Pulse On time} / \text{Period} * 100$$

$$\text{Duty Factor} = 10 * \log (\text{Total Pulse On time} / \text{Period})$$

This Duty is the worst case. Transmitting time does not exceed it.

APPENDIX 3: Test instruments

EMI test equipment [1/2]

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	2012/02/24 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE	2012/02/06 * 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
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)/sucoform141-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	2012/03/16 * 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
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
MPA-03	Microwave System Power Amplifier	Agilent	83050A	3950M00205	RE	2011/06/15 * 12
MCC-140	Microwave Cable	Junkosha	J12J101596-00	JAN-31-12-001	RE	2012/02/24 * 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
MMX-01	Preselected Millimeter Mixer	Agilent	11974V-E01	3001A00412	RE	2011/06/13 * 12
MPA-08	Pre Amplifier	WiseWave	ALN-61226028-51	11576-01-071	RE	2011/08/27 * 12
MHA-11	Horn Antenna	WiseWave	ARH1023-02	10766-01	RE	2011/10/31 * 12
MMX-02	Harmonic Mixer	Agilent	11970W	2521 A01909	RE	2011/06/14 * 12

EMI test equipment [2/2]

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPA-18	Pre Amplifier	AmTechs Corporation	LNA-7511025	9601	RE	2011/08/27 * 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
MCC-135	Microwave Cable	HUBER+SUHNER	SUCOFLEX102	37511/2	RE	2011/08/31 * 12
MHA-24	Horn Antenna	Custom Microwave Inc.	HO6R	-	RE	2011/09/19 * 12
MMX-03	Harmonic Mixer	OML Inc.	M06HWD	D100709-1	RE	2011/09/30 * 12
MHA-27	Horn Antenna	Custom Microwave Inc.	HO4R	-	RE	2011/09/19 * 12
MMX-04	Harmonic Mixer	OML Inc.	M04HWD	Y100709-1	RE	2011/09/30 * 12
MDPLX-01	Diplexer	OML Inc.	DPL26	-	RE	2011/09/19 * 12

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

[Below 40GHz]

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

[Above 40GHz]

Acceptance criteria for untraceable equipment was formulated according to ISO/IEC 17025 5.6.2.2.2, and the regular inspection was performed based on it annually.

For 40-110GHz, power sensor is calibrated by manufacturer, and the measured calibration data is used as in-house reference. The calibration data by manufacturer is checked for acceptance by a calorie meter except for some frequency bands.

For above 110GHz, output level of millimeter wave source module is used as the reference, and inspection by the calorie meter is performed.

Electric power is checked with the calorie meter by measuring resistance and voltage of reference resistor.

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

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