RADIO TEST REPORT

Test Report No. : 32KE0077-HO-01-R1

Applicant	:	**DENSO CORPORATION**
Type of Equipment	:	**Electronic Key**
Model No.	:	**14FGA**
Test regulation	:	**FCC Part 15 Subpart C: 2012**
FCC ID	:	**HYQ14FGA**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with 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 32KE0077-HO-01. 32KE0077-HO-01 is replaced with this report.

Date of test: June 28 and July 1, 2012

Representative test engineer: T. Shimada
Takumi Shimada
Engineer of WiSE Japan,
UL Verification Service

Approved by: T. Hatakeda
Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service

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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

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SECTION 1: Customer information

Company Name	:	DENSO CORPORATION
Address	:	1-1 Showa-cho, Kariya-shi, Aichi-ken, 448-8661 Japan
Telephone Number	:	+81-566-20-3957
Facsimile Number	:	+81-566-25-4837
Contact Person	:	TAKAYUKI AONO

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

2.1 Identification of E.U.T.

Type of Equipment	:	Electronic Key
Model No.	:	14FGA
Serial No.	:	Refer to Clause 4.2
Rating	:	DC 3.0V
Receipt Date of Sample	:	June 14, 2012
Country of Mass-production	:	Japan, United States of America, and China
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

2.2 Product Description

Model No: 14FGA (referred to as the EUT in this report) is the Electronic Key.

General Specification

Clock frequency(ies) in the system	:	33.6MHz, 8MHz

Radio Specification

Radio Type	:	Transmitter
Frequency of Operation	:	315.10MHz / 314.35 MHz *
Modulation	:	FSK (F1D)
Power Supply (radio part input)	:	DC 3.0V
Type of Battery	:	One lithium battery
Antenna type	:	Built-in type (Fixed) * These two different frequencies are not emitted simultaneously.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	Test specification: FCC Part 15 Subpart C: 2012, final revised on May 17, 2012 and effective June 18, 2012
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.231 Periodic operation in the band 40.66 - 40.70MHz and above 70MHz

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	N/A*1)	-
Automatically Deactivate	**FCC:** ANSI C63.4:2003 13. Measurement of intentional radiators **IC:** -	**FCC:** Section 15.231(a)(1) **IC:** RSS-210 A1.1.1	N/A	Complied	Radiated
Electric Field Strength of Fundamental Emission	**FCC:** ANSI C63.4:2003 13. Measurement of intentional radiators **IC:** RSS-Gen 4.8	**FCC:** Section 15.231(b) **IC:** RSS-210 A1.1.2	10.0dB Horizontal QP (Tx 314.35MHz)	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 15.231(b) **IC:** RSS-210 A1.1.2, 2.5.1 RSS-Gen 7.2.5	5.2dB 3143.527MHz Horizontal AV (Tx 314.35MHz)	Complied	Radiated
-20dB Bandwidth	**FCC:** ANSI C63.4:2003 13. Measurement of intentional radiators KDB 926416 **IC:** -	**FCC:** Section 15.231(c) **IC:** Reference data	N/A	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 does not have AC Mains.					

FCC 15.31 (e)
This test was performed with the New Battery (DC 3.0V) and the constant voltage was supplied to the EUT during the tests. Therefore, the 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.

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	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	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 test(3m)
The data listed in this test report has enough margin, more than the site margin.

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 Test set up, Data of EMI, Test instruments.

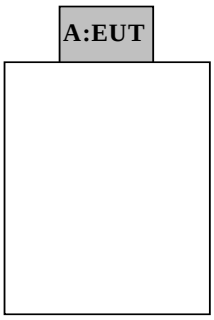
Refer to APPENDIX.

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

4.1 Operating Modes

Test Item*	Mode
Automatically Deactivate	Normal use mode, 315.10MHz*1) Normal use mode, 314.35MHz*1)
Electric Field Strength of Fundamental Emission Electric Field Strength of Spurious Emission -20dB & 99% Occupied Bandwidth	Transmitting mode (Tx), 315.10MHz *1) Transmitting mode (Tx), 314.35MHz *1)
* The system was configured in typical fashion (as a customer would normally use it) for testing. *1) Every time the button is pushed, the EUT switches back and forth 315.10MHz and 314.35MHz. The EUT does not transmit at these frequencies simultaneously.	

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Electronic Key	14FGA	No.1 *1) No.2 *2)	DENSO CORPORATION	EUT

*1) Used for Transmitting mode
*2) Used for Normal use mode

SECTION 5: Radiated emission (Electric Field Strength of Fundamental and Spurious Emission)

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The EUT was set on the center of the tabletop.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
Photographs of the set up are shown in Appendix 1.

[Transmitting mode]

(Below 30MHz)
The noise level was checked by moving a search-coil (Loop Antenna) close to the EUT.

(Above 30MHz)
The Radiated Electric Field Strength has been measured on Semi anechoic chamber 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 strength.
The measurements were performed for both vertical and horizontal antenna polarization.
The radiated emission measurements were made with the following detector function of the test receiver/spectrum analyzer.
- The carrier level (or, noise levels) was (or were) measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined. Noise levels of all the frequencies were measured at the position.

*The result is rounded off to the second decimal place, so some differences might be observed.

Test Antennas are used as below;

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

	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz	Above 1GHz
Detector Type	Peak	Peak	Peak	Peak	QP	Peak and AV
IF Bandwidth	200Hz	200Hz	9.1kHz	9.1kHz	120kHz	PK: S/A:RBW 1MHz, VBW 3MHz AV: S/A:RBW 1MHz, VBW 10MHz

- The carrier level was measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.
Noise levels of all the frequencies were measured at the position.
This EUT has two modes which mechanical key is inserted or not. The worst case was confirmed with and without mechanical key, as a result, the test with mechanical key was the worst case. Therefore the test with mechanical key was performed only.

*The result is rounded off to the second decimal place, so some differences might be observed.

Measurement range : 9kHz-3.2GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Automatically deactivate

Test Procedure

The measurement was performed with Electric field strength using a spectrum analyzer.

Test data : APPENDIX
Test result : Pass

SECTION 7: -20dB 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	300kHz	3kHz	9.1kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 % of Span	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
*1) The measurement was performed with Peak detector, Max Hold since transmitting signal was outputted at burst condition.							

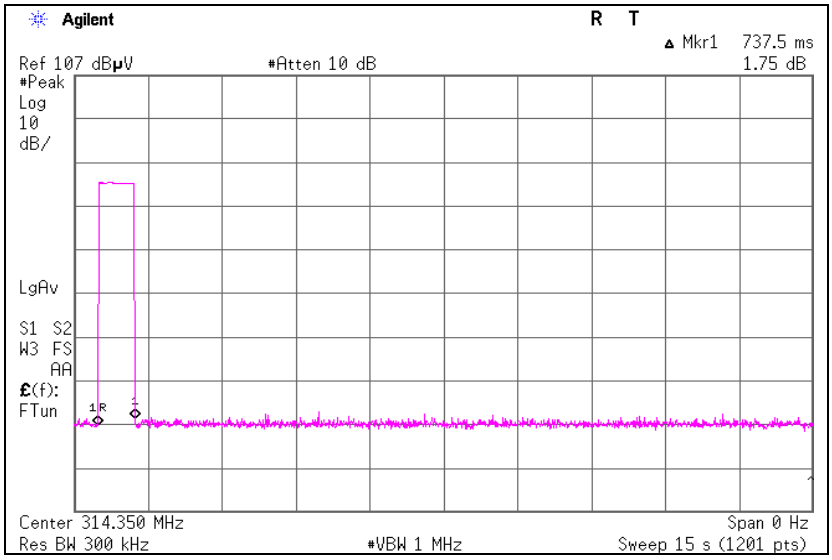
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Automatically deactivate

Test place	No.2 Semi Anechoic Chamber
Report No.	32KE0077-HO-01
Date	07/01/2012
Temperature/ Humidity	22 deg. C / 64% RH
Engineer	Shinya Watanabe
Mode	Transmitting 314.35MHz

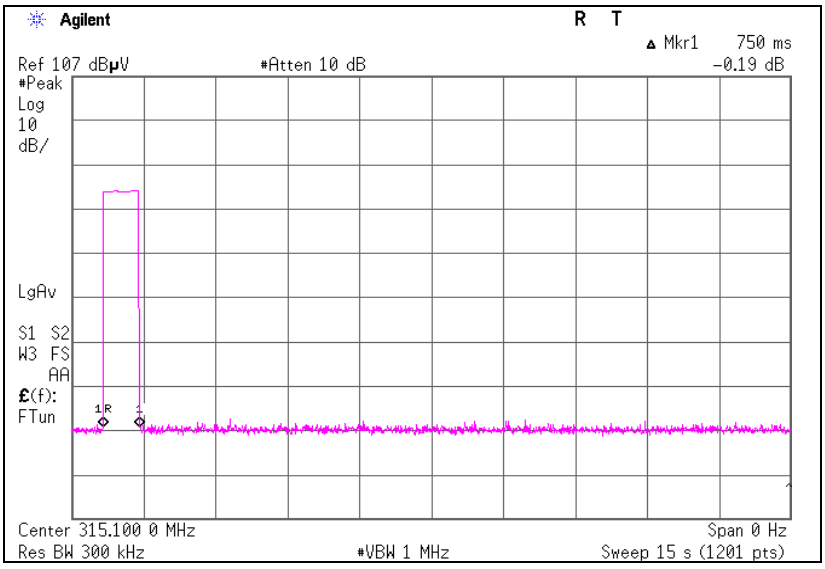
Time of Transmitting [sec]	Limit [sec]	Result
0.738	5.00	Pass



Automatically deactivate

Test place	No.2 Semi Anechoic Chamber
Report No.	32KE0077-HO-01
Date	07/01/2012
Temperature/ Humidity	22 deg. C / 64% RH
Engineer	Shinya Watanabe
Mode	Transmitting 315.10MHz

Time of Transmitting [sec]	Limit [sec]	Result
0.750	5.00	Pass



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

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32KE0077-HO-01
Date	06/28/2012
Temperature/ Humidity	24 deg. C / 61% RH
Engineer	Takumi Shimada
Mode	Transmitting 314.35MHz

PK or QP

Frequency	Detector	Reading [dBuV]		Ant Factor	Loss	Gain	Duty Factor	Result [dBuV/m]		Limit	Margin [dB]		Remark Inside or Outside
[MHz]		Hor	Ver	[dB/m]	[dB]	[dB]	[dB]	Hor	Ver	[dBuV/m]	Hor	Ver	of Restricted Bands
314.336	QP	72.7	68.7	14.8	10.1	32.1	-	65.5	61.5	75.5	10.0	14.0	Carrier
1571.674	PK	44.8	46.2	25.3	1.8	33.4	-	38.5	39.9	73.9	35.4	34.0	Inside
1886.009	PK	47.4	49.1	25.8	1.9	32.8	-	42.3	44.0	75.5	33.2	31.5	Outside
2200.346	PK	43.8	42.8	26.8	2.1	32.5	-	40.2	39.2	73.9	33.7	34.7	Inside
2514.678	PK	47.4	45.2	27.8	2.2	32.3	-	45.1	42.9	75.5	30.4	32.6	Outside
2829.014	PK	43.5	41.9	28.7	2.4	32.2	-	42.4	40.8	73.9	31.5	33.1	Inside
3143.347	PK	53.7	52.7	29.0	2.5	32.1	-	53.1	52.1	75.5	22.4	23.4	Outside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amprifier)

PK with Duty factor or AV(RBW=1MHz /VBW=3MHz)

Frequency	Detector	Reading [dBuV]		Ant Factor	Loss	Gain	Duty Factor	Result [dBuV/m]		Limit	Margin [dB]		Remark
[MHz]		Hor	Ver	[dB/m]	[dB]	[dB]	[dB]	Hor	Ver	[dBuV/m]	Hor	Ver	
1571.754	AV	33.7	36.1	25.3	1.8	33.4	0.0	27.4	29.8	53.9	26.5	24.1	Inside
1886.134	AV	39.8	43.5	25.8	1.9	32.8	0.0	34.7	38.4	55.5	20.8	17.1	Outside
2200.440	AV	32.3	32.0	26.8	2.1	32.5	0.0	28.7	28.4	53.9	25.2	25.5	Inside
2514.816	AV	42.3	41.4	27.8	2.2	32.3	0.0	40.0	39.1	55.5	15.5	16.4	Outside
2829.188	AV	32.7	30.7	28.7	2.4	32.2	0.0	31.6	29.6	53.9	22.3	24.3	Inside
3143.527	AV	50.9	49.2	29.0	2.5	32.1	0.0	50.3	48.6	55.5	5.2	6.9	Outside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amprifier) + Duty factor (Refer to Duty factor data sheet)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
*No signal detected at 9kHz - 30MHz.

* Second, third and fourth harmonics were not detected.

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

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32KE0077-HO-01
Date	06/28/2012
Temperature/ Humidity	24 deg. C / 61% RH
Engineer	Takumi Shimada
Mode	Transmitting 315.10MHz

PK or QP

Frequency	Detector	Reading [dBuV]		Ant Factor	Loss	Gain	Duty Factor	Result [dBuV/m]		Limit	Margin [dB]		Remark Inside or Outside
[MHz]		Hor	Ver	[dB/m]	[dB]	[dB]	[dB]	Hor	Ver	[dBuV/m]	Hor	Ver	of Restricted Bands
315.085	QP	72.4	68.3	14.9	10.1	32.1	-	65.3	61.2	75.6	10.3	14.4	Carrier
1575.426	PK	43.7	45.2	25.3	1.8	33.4	-	37.4	38.9	73.9	36.5	35.0	Inside
1890.509	PK	47.3	49.2	25.8	1.9	32.8	-	42.2	44.1	75.6	33.4	31.5	Outside
2205.594	PK	43.5	43.3	26.8	2.1	32.5	-	39.9	39.7	73.9	34.0	34.2	Inside
2520.678	PK	47.5	47.4	27.8	2.2	32.3	-	45.2	45.1	75.6	30.4	30.5	Outside
2835.765	PK	44.2	42.8	28.8	2.4	32.2	-	43.2	41.8	73.9	30.7	32.1	Inside
3150.847	PK	53.0	51.0	29.0	2.5	32.0	-	52.5	50.5	75.6	23.1	25.1	Outside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amprifier)

PK with Duty factor or AV(RBW=1MHz /VBW=3MHz)

Frequency	Detector	Reading [dBuV]		Ant Factor	Loss	Gain	Duty Factor	Result [dBuV/m]		Limit	Margin [dB]		Remark
[MHz]		Hor	Ver	[dB/m]	[dB]	[dB]	[dB]	Hor	Ver	[dBuV/m]	Hor	Ver	
1575.527	AV	32.2	35.9	25.3	1.8	33.4	0.0	25.9	29.6	53.9	28.0	24.3	Inside
1890.610	AV	40.1	43.5	25.8	1.9	32.8	0.0	35.0	38.4	55.6	20.6	17.2	Outside
2205.727	AV	32.7	32.4	26.8	2.1	32.5	0.0	29.1	28.8	53.9	24.8	25.1	Inside
2520.813	AV	42.2	40.9	27.8	2.2	32.3	0.0	39.9	38.6	55.6	15.7	17.0	Outside
2835.920	AV	33.8	30.9	28.8	2.4	32.2	0.0	32.8	29.9	53.9	21.1	24.0	Inside
3151.020	AV	50.1	47.5	29.0	2.5	32.0	0.0	49.6	47.0	55.6	6.0	8.6	Outside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amprifier) + Duty factor (Refer to Duty factor data sheet)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
*No signal detected at 9kHz - 30MHz.

* Second, third and fourth harmonics were not detected.

-20dB and 99% Occupied Bandwidth

Test place	No.2 Semi Anechoic Chamber
Report No.	32KE0077-HO-01
Date	07/01/2012
Temperature/ Humidity	22 deg. C / 64% RH
Engineer	Shinya Watanabe
Mode	Transmitting 314.35MHz / 315.10MHz

314.35MHz

-20dB Bandwidth [kHz]
45.48

315.10MHz

-20dB Bandwidth [kHz]
45.44

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
45.48+45.44=90.92	785.88	Pass

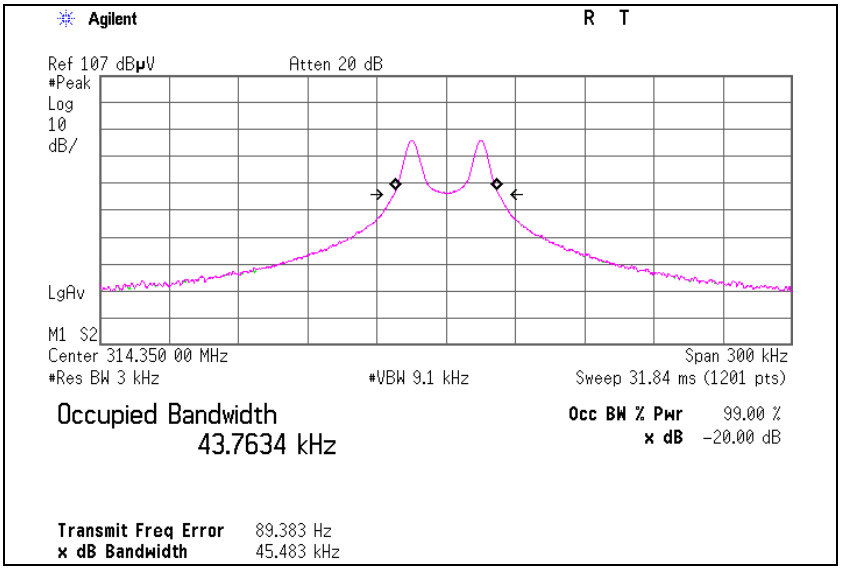
Bandwidth Limit : Fundamental Frequency **314.35** MHz x 0.25% = 785.88 kHz

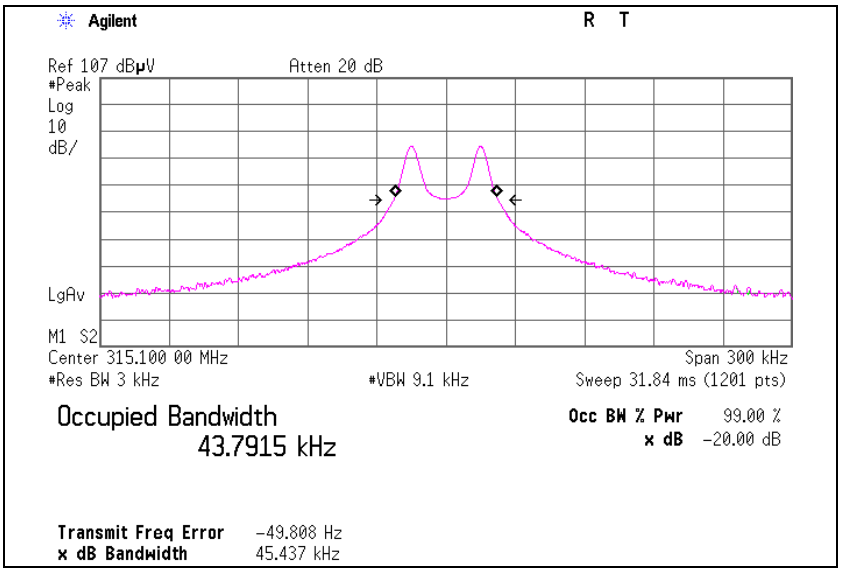
99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
43.76	785.88	Pass

Bandwidth Limit : Fundamental Frequency **315.10** MHz x 0.25% = 787.75 kHz

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
43.79	787.75	Pass

-20dB and 99% Occupied Bandwidth





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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	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	2012/04/06 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2012/04/05 * 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
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2011/11/02 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2012/05/25 * 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	2012/03/29 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2012/02/06 * 12
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2012/06/19 * 12
MLPA-06	Loop Antenna	UL Japan	-	-	RE	Pre Check

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, 99% Occupied Bandwidth, -20dB bandwidth , Automatically deactivate and Duty cycle tests