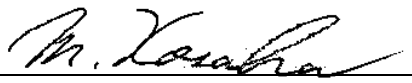
RADIO TEST REPORT

Test Report No. : 26DE0191-HO-1b

Applicant	:	**DENSO CORPORATION**
Type of Equipment	:	**Electronic Key**
Model No.	:	**14ABK**
Test standard	:	**FCC Part 15 Subpart C Section 15.231:2005**
FCC ID	:	**HYQ14ABK**
Test Result	:	**Complied**

1. This test report shall not be reproduced in full or partial, 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 above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.

Date of test : December 1, 2005

Tested by : 
Makoto Kosaka
EMC Services

Approved by : 
Naoki Sakamoto
Group Leader of EMC Services

UL Apex Co., Ltd.
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Facsimile : +81 596 24 8124

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SECTION 1: Client information

Company Name	:	DENSO CORPORATION
Address	:	1-1 Showa-cho Kariya-shi Aichi-ken, 448-8661 Japan
Telephone Number	:	+81-566-61-7934
Facsimile Number	:	+81-566-25-4915
Contact person	:	Mitsugi Ohtsuka

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

2.1 Identification of E.U.T.

Type of Equipment	:	Electronic Key
Model No.	:	14ABK
Serial No.	:	001
Country of Manufacture	:	Japan
Receipt Date of Sample	:	November 25, 2005
Condition of EUT	:	Production prototype (Not for Sale: this sample is equivalent to mass-produced items.)

2.2 Product Description

Model No: 14ABK is the Electronic Key.

Equipment Type	Transmitter
Nominal frequency	312.15MHz
Other clock frequency	4MHz
Type of modulation	AM
Antenna Type	Built-in (Fixed)
Method of frequency Generation	SAW Resonator
Operating voltage (inner)	DC3V (CR1632 x 1)
ITU Code	A1D

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C : 2005
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

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

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Results
1	Automatically Deactivate	ANSI C63.4:2003	Section 15.231(a)(1)	N/A	-	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003	Section 15.231(b)	N/A	6.1dB 312.17MHz Horizontal	Complied
3	Electric Field Strength of Spurious Emission	ANSI C63.4:2003	Section 15.205 Section 15.209 Section 15.231(b)	N/A	1.0dB 1872.99MHz Vertical, AV	Complied
4	-20dB Bandwidth	ANSI C63.4:2003	Section 15.231(c)	N/A	-	Complied
Note: UL Apex's EMI Work procedures No. QPM05						

3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.4.1	-	Conducted	N/A	N/A	N/A

3.4 Uncertainty

Radiated Emission Test
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ±4.5dB.
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ±5.2dB.
The measurement uncertainty (with a 95% confidence level) for this test using Horn Antenna is ±6.6dB.
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Apex Co., Ltd. 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 Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	IC4247A	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	846015	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.4 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-

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

3.6 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

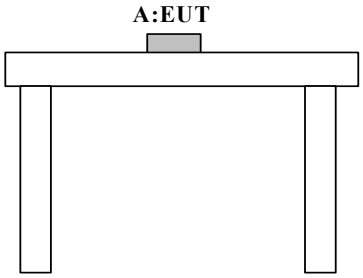
SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The mode is used : Transmitting mode

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

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT

No	Item	Model number	Serial number	Manufacturer	FCC ID
A	Electronic Key	14ABK	001	DENSO CORPORATION	HYQ14ABK (EUT)

SECTION 5: Radiated emission (Fundamental and Spurious Emission)

5.1 Operating environment

Test place : No.1 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a platform of nominal size, 0.5m by 1.0m, raised 80cm 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.
A drawing of the set up is shown in the photos of APPENDIX 1.

5.3 Test conditions

Frequency range : 30MHz-3200MHz
Test distance : 3m
EUT position : Top of Polyurethane
EUT operation mode : Transmitting

5.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a 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 intensity.
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.

	Below or equal to 1GHz	Above 1GHz
Detector Type	QP	Peak and Average
IF Bandwidth	120kHz	PK: S/A:RBW 1MHz, VBW:1MHz AV: S/A:RBW 1MHz, VBW:10Hz

- 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.
With the position, the noise levels of all the frequencies was measured.

5.5 Results

Summary of the test results: Pass

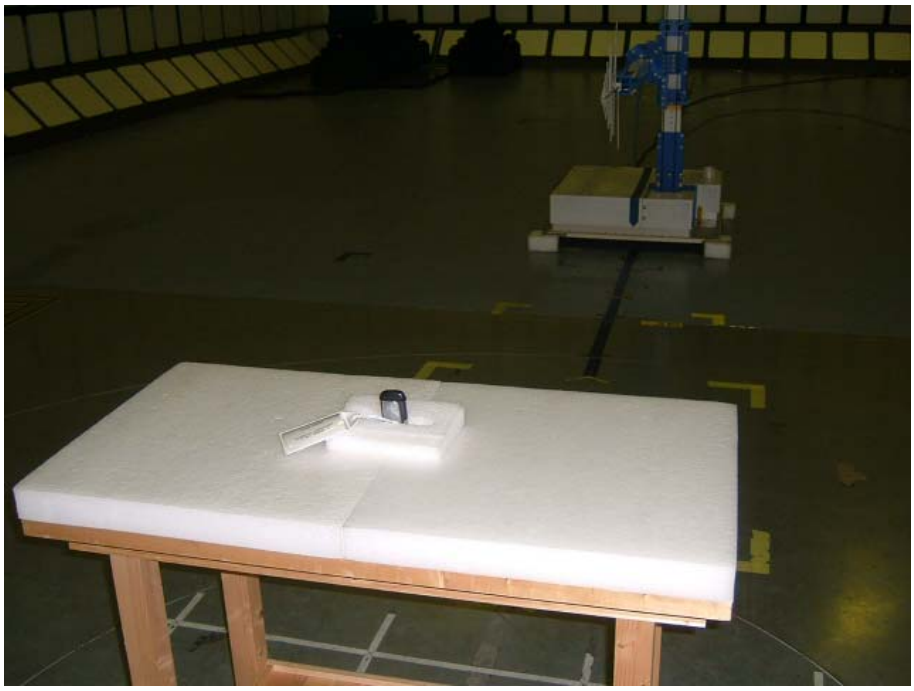
Date: December 1, 2005 Tested by: Makoto Kosaka

APPENDIX 1: Photographs of test setup

Radiated emission

Front

Rear



X, Y, Z axis (X-axis: Horizontal/ Z-axis: Vertical)

X-axis

Y-axis

Z-axis

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APPENDIX 2:Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	RE	2005/11/12 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2005/10/10 * 12
MLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2005/10/14 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2004/12/16 * 12
MCC-01	Coaxial Cable 0.1-3000MHz	Suhner/storm/Agilent/ TSJ	-	RE	2004/12/19 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2005/05/24 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2005/01/10 * 12
MPA-10	Pre Amplifier	Agilent	8449B	RE	2005/09/07 * 12
MCC-18	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX 104	RE	2005/02/03 * 12
MCC-26	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	RE	2005/08/30 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE	2005/11/10 * 12

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

Test Item:

RE: Radiated emission

APPENDIX 3: Data of EMI test

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

UL Apex Co., Ltd.
Head Office EMC Lab. No.1 Semi Anechoic Chamber

COMPANY : DENSO CORPORATION
EQUIPMENT : Electronic Key
MODEL : 14ABK
S/N : 001
POWER : DC 3.0V(CR1632)
Mode : Tx 312.15MHz
Axis : Hor.: X-axis , Ver.: Z-axis

REPORT NO : 26DE0191-HO
REGULATION : FCC Part15 Subpart C 231(b) / 205
TEST DISTANCE : 3m
DATE : 12/01/2005
TEMPERATURE : 18 deg.C.
HUMIDITY : 34 %
ENGINEER : Makoto Kosaka

No.	FREQ	T/R READING		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
1	312.17	71.9	69.0	14.6	27.2	10.0	0.0	69.3	66.4	75.4	6.1	9.0

(below 1GHz) **QP DETECT**

No.	FREQ	T/R READING : QP		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
2	624.33	34.2	33.4	19.5	28.6	11.9	0.0	37.0	36.2	55.4	18.4	19.2
3	936.50	32.6	30.8	22.0	28.2	13.1	0.0	39.5	37.7	55.4	15.9	17.7

(above 1GHz)
PK DETECT (RBW: 1MHz , VBW: 1MHz)

No.	FREQ	S/A READING		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
4	1248.66	49.5	54.4	23.1	33.4	2.6	0.0	41.7	46.6	75.4	33.7	28.8
5	1560.82	54.1	57.3	24.5	32.9	2.8	0.0	48.4	51.6	74.0	25.6	22.4
6	1872.99	59.1	61.2	29.5	32.5	2.9	0.0	59.1	61.2	75.4	16.3	14.2
7	2185.15	44.8	45.1	31.3	32.4	3.1	0.0	46.8	47.1	75.4	28.6	28.3
8	2497.31	48.7	48.2	30.8	32.4	3.1	0.0	50.2	49.7	74.0	23.8	24.3
9	2809.46	#	#	-	-	-	0.0	-	-	74.0	-	-
10	3121.61	#	#	-	-	-	0.0	-	-	75.4	-	-

AV VALUE (RBW: 1MHz , VBW: 10Hz)

No.	FREQ	S/A READING		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
		HOR	VER	Factor	GAIN		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
4	1248.66	49.5	54.4	23.1	33.4	2.6	-6.7	35.0	39.9	55.4	20.4	15.5
5	1560.82	54.1	57.3	24.5	32.9	2.8	-6.7	41.7	44.9	54.0	12.3	9.1
6	1872.99	59.1	61.2	29.5	32.5	2.9	-6.7	52.3	54.4	55.4	3.1	1.0
7	2185.15	44.8	45.1	31.3	32.4	3.1	-6.7	40.1	40.4	55.4	15.3	15.0
8	2497.31	48.7	48.2	30.8	32.4	3.1	-6.7	43.5	43.0	54.0	10.5	11.0
9	2809.46	#	#	-	-	-	-6.7	-	-	54.0	-	-
10	3121.61	#	#	-	-	-	-6.7	-	-	55.4	-	-

REMARKS

ANTENNA TYPE:30-300MHz Biconical / 300-1000MHz Logperiodic / 1-3.2GHz Horn

CALCULATION RESULT=Reading + ANT Factor - Amp Gain + LOSS (Cable+ ATTEN.)+Duty factor

* The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

*Except for the above table : All other spurious emissions were less than 20dB for the limit.

*EUT was placed in X axis when the measurement antenna was positioned horizontally.
*EUT was placed in Z axis when the measurement antenna was positioned vertically.
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.
With the position, the noise levels of all the frequencies was measured.
non signal

Duty Cycle

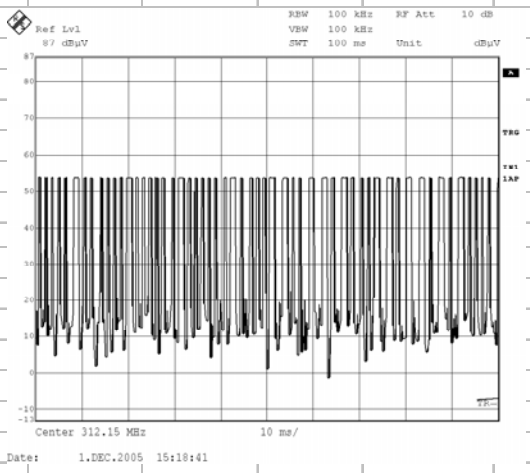
		UL Apex Co., Ltd.	
		Head Office EMC Lab. No.1 Semi Anechoic Chamber	
COMPANY	: DENSO CORPORATION	REPORT NO.	: 26DE0191-HO
EQUIPMENT	: Electronic Key	REGULATION	: FCC Part15 Subpart C 231(b)
MODEL	: 14ABK	TEST DISTANCE	: -
S/N	: 001	DATE	: 12/01/2005
POWER	: DC 3.0V(CR1632)	TEMPERATURE	: 18 deg.C.
Mode	: Tx 312.15MHz	HUMIDITY	: 34 %
		ENGINEER	: Makoto Kosaka

	Length(ms)	times	Total(msec)
Pulse width 1	1.3627	15	20.4
Pulse width 2	0.6413	40	25.7
			46.1

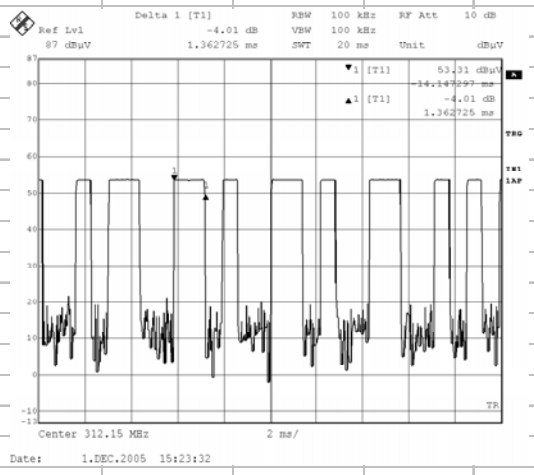
$$\text{Duty Factor} = 20\log_{10}\left(\frac{\text{Total pulse width}}{1000\text{ms}}\right)$$

$$20\log_{10} = \left(\frac{46.1\text{msec}}{100\text{ms}}\right)$$

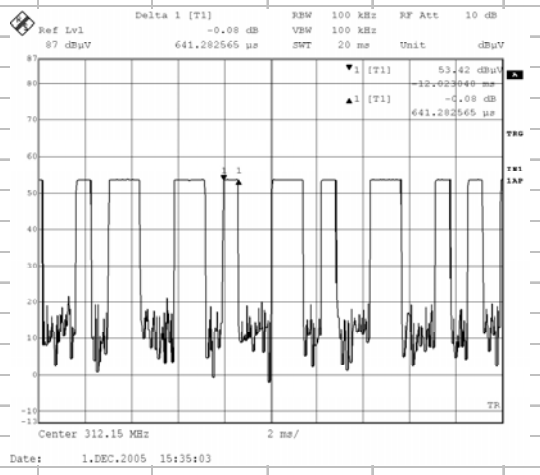
$$= -6.7$$



Pulse width 1



Pulse width 2



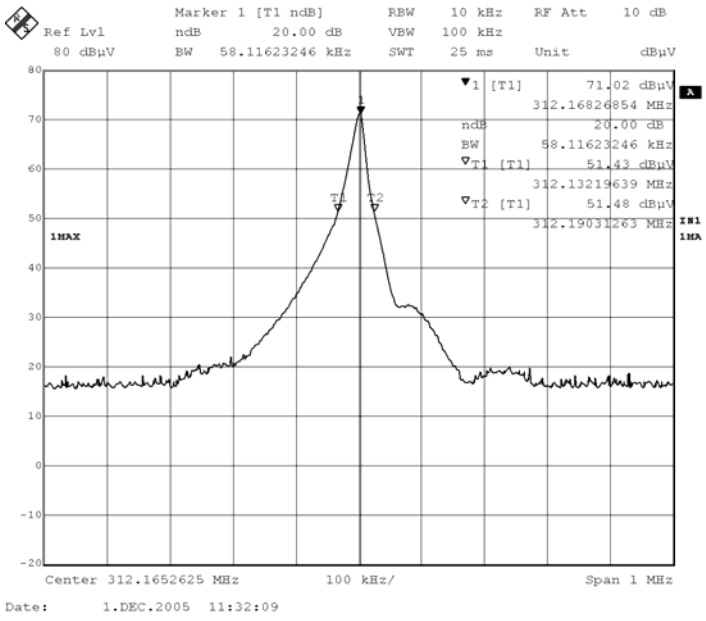
-20dB Bandwidth

UL Apex Co., Ltd.
Head Office EMC Lab. No.1 Semi Anechoic Chamber

COMPANY	: DENSO CORPORATION	REPORT NO	: 26DE0191-HO
EQUIPMENT	: Electronic Key	REGULATION	: FCC Part15 Subpart C 231(c)
MODEL	: 14ABK	TEST DISTANCE	: 3m
S/N	: 001	DATE	: 12/01/2005
POWER	: DC 3.0V(CR1632)	TEMPERATURE	: 18 deg.C.
Mode	: Tx 312.15MHz	HUMIDITY	: 34 %
		ENGINEER	: Makoto Kosaka

Bandwidth Limit : Fundamental Frequency 312.15 MHz X 0.25% = 780.375 kHz

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result	Margin [kHz]
58.12	780.38	Pass	722.26

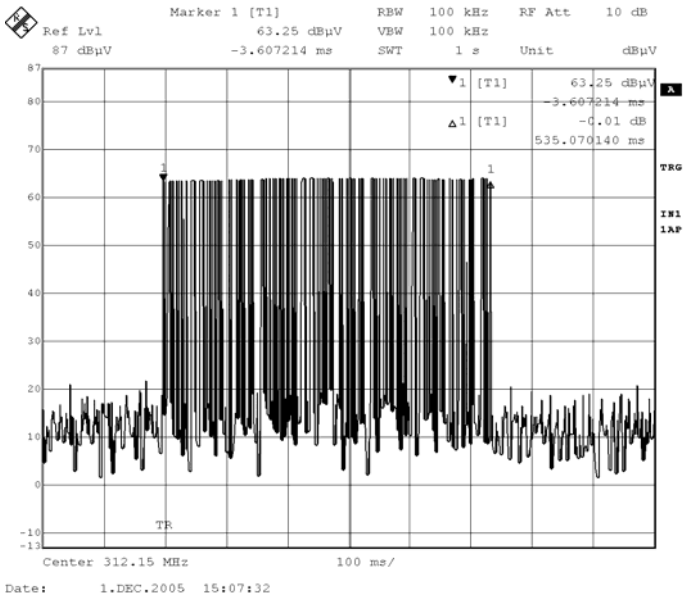


Automatically deactivate

UL Apex Co., Ltd.
Head Office EMC Lab. No.1 Semi Anechoic Chamber

COMPANY	: DENSO CORPORATION	REPORT NO	: 26DE0191-HO
EQUIPMENT	: Electronic Key	REGULATION	: FCC Part15 Subpart C 231(a)
MODEL	: 14ABK	TEST DISTANCE	: -
S/N	: 001	DATE	: 12/01/2005
POWER	: DC 3.0V(CR1632)	TEMPERATURE	: 18 deg.C.
Mode	: Tx 312.15MHz	HUMIDITY	: 34 %
		ENGINEER	: Makoto Kosaka

Time of Transmitting [sec]	Limit [sec]	Result	Margin [sec]
0.535	5.00	Pass	4.46

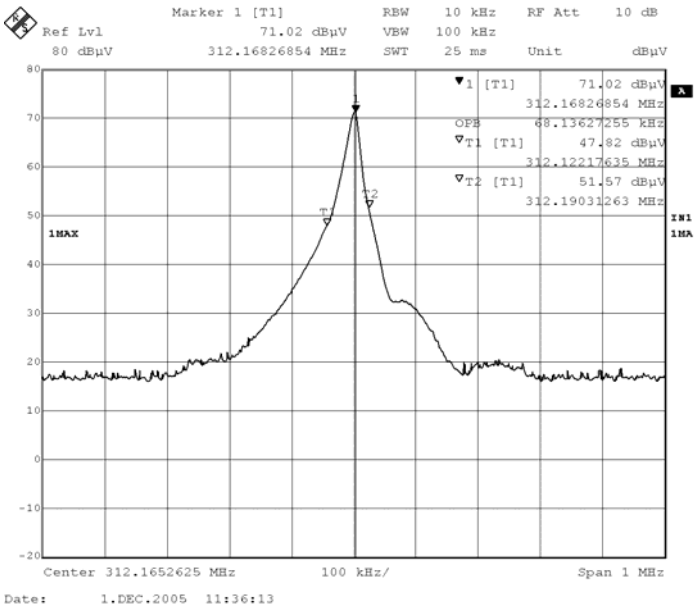


99% Occupied Bandwidth

UL Apex Co., Ltd.
Head Office EMC Lab. No.1 Semi Anechoic Chamber

COMPANY	: DENSO CORPORATION	REPORT NO	: 26DE0191-HO
EQUIPMENT	: Electronic Key	REGULATION	: RSS-210
MODEL	: 14ABK	TEST DISTANCE	: 3m
S/N	: 001	DATE	: 12/01/2005
POWER	: DC 3.0V(CR1632)	TEMPERATURE	: 18 deg.C.
Mode	: Tx 312.15MHz	HUMIDITY	: 34 %
		ENGINEER	: Makoto Kosaka

99% Occupied Bandwidth (RSS-210)



* 99% Occupied Bandwidth : 68.14 kHz