EMI TEST REPORT

Test Report No. : 25AE0324-HO-1

Applicant	:	**DENSO CORPORATION**
Type of Equipment	:	**Transmitter of Remote Keyless Entry System**
Model No.	:	**12BBY**
Test standard	:	**FCC Part 15 Subpart C Section 15.231:2004**
FCC ID	:	**HYQ12BBY**
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 : September 8, 2004

Tested by : K. Adachi
Kenichi Adachi
EMC Service

Approved by :
Naoki Sakamoto
Group Leader of EMC Service

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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	:	+81-566-25-5947
Facsimile Number	:	+81-566-25-4548
Contact Person	:	Yumiko Yabumoto

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

2.1 Identification of E.U.T.

Type of Equipment	:	Transmitter of Remote Keyless Entry System
Model No.	:	12BBY
Serial No.	:	1: For automatically deactivate test. 2: For other tests.
Country of Manufacture	:	Japan
Receipt Date of Sample	:	September 6, 2004
Condition of EUT	:	Engineering prototype (Not for Sale: this sample is equivalent to mass-produced items.)

2.2 Product Description

Model No: 12BBY (referred to as the EUT in this report) is a transmitter of remote keyless entry system.

This system is mainly used for locking or unlocking the doors of the vehicles.
The transmitter send a radio wave signal while the button is pushed.
The receiver becomes active in response to the signal from the transmitter.

The specification is as following;

Carrier frequency	:	314.35MHz
Local Frequency	:	13.097917MHz Crystal Oscillator
Type of Modulation	:	A1D
Power Supply	:	3VDC (One lithium battery)
Information Antenna	:	Built-in type (Fixed)

FCC 15.31 (e)
This test was performed with the New Battery (DC3V) 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.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C : 2004
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

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	2.6dB 314.35MHz 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	4.5dB 2514.82MHz Horizontal	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-210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004	RSS-210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004	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

	Listed date (for FCC)	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	February 01, 2002	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	June 05, 2002	846015	IC4247-2	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.

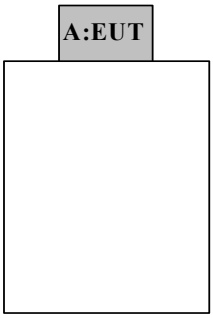
SECTION 4: Operation of E.U.T. during testing

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	Transmitter of Keyless Entry System	12BBY	1 (For automatically deactivate test) 2 (For other tests)	DENSO CORPORATION	HYQ12BBY

SECTION 5: Radiated emission (Fundamental and Spurious Emission)

5.1 Operating environment

Test place : No.2 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 0.5m, 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 : Tabletop
EUT operation mode : Transmitting

5.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on No.2 semi anechoic chamber with a ground plane and at a distance of 3m.
The measuring antenna height was varied between 1 to 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

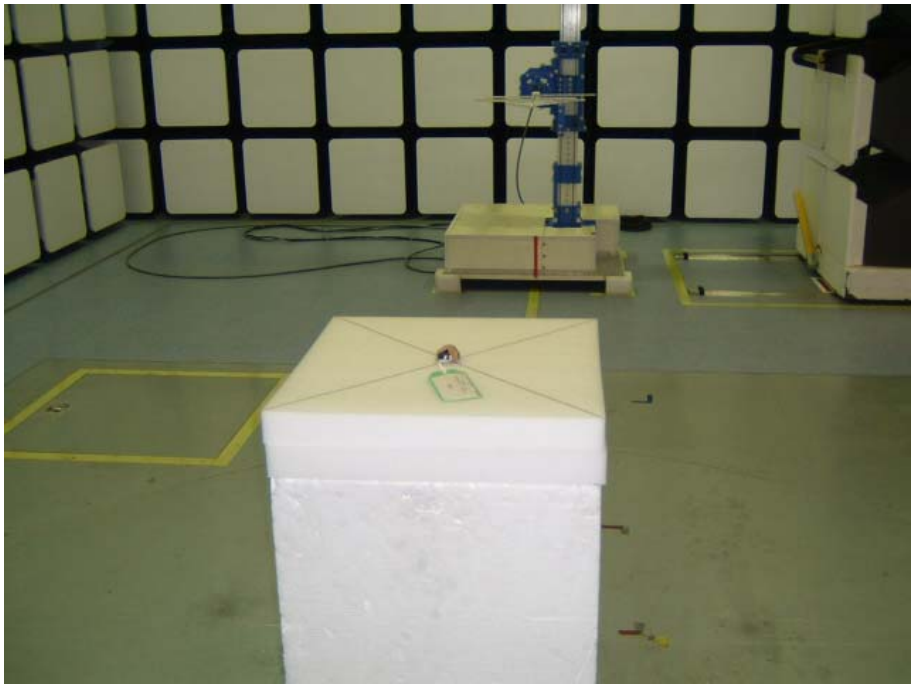
Date: September 8, 2004 Tested by: Kenichi Adachi

APPENDIX 1: Photographs of test setup

Radiated emission

Front

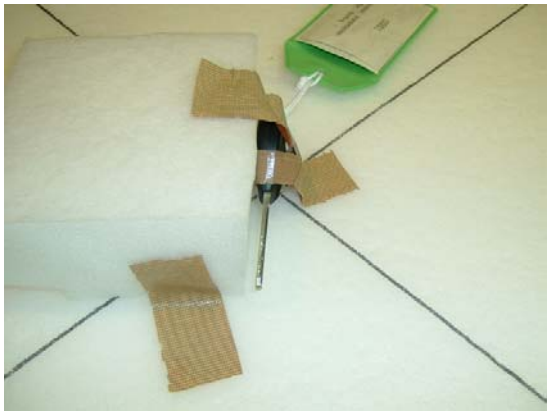
Rear



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

X-axis

Y-axis



Z-axis

APPENDIX 2:Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2004/04/12 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2004/02/03 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	RE	2004/02/18 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MPA-06	Pre Amplifier	Hewlett Packard	8447D	RE	2004/08/29 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/10/15 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/10/15 * 12
MCC-04	Microwave Cable	Storm	421-011	RE	2004/01/06 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2004/02/06 * 12
MCC-24	Microwave Cable	Storm	-	RE	2004/05/01 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2004/01/10 * 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.2 Semi Anechoic Chamber

COMPANY	: DENSO CORPORATION	REPORT NO	: 25AE0324-HO
EQUIPMENT	: Remote Keyless Entry System (Transmitter)	REGULATION	: Fcc Part15 Subpart C 231(b) / 205
MODEL	: 12BBY	TEST DISTANCE	: 3m
S/N	: 2	DATE	: 09/08/2004
POWER	: DC 3.0V	TEMPERATURE	: 25 deg.C.
Mode	: Continuous Transmitting	HUMIDITY	: 60 %
Axis	: Hor.: X-axis , Ver.: Z-axis	ENGINEER	: Kenichi Adachi

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	314.35	76.9	74.4	14.6	26.9	8.4	0.0	73.0	70.5	75.6	2.6	5.1

(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	628.70	32.7	31.9	19.8	28.2	9.9	0.0	34.2	33.4	55.6	21.4	22.2
3	943.04	28.9	28.5	22.2	27.7	11.0	0.0	34.4	34.0	55.6	21.2	21.6

(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	1257.55	53.7	51.8	23.2	36.8	4.5	0.0	44.6	42.7	75.6	31.0	32.9
5	1571.72	50.4	48.1	25.0	36.5	5.0	0.0	43.9	41.6	74.0	30.1	32.4
6	1885.99	51.9	48.7	28.8	36.4	5.6	0.0	49.9	46.7	75.6	25.7	28.9
7	2200.43	55.2	53.3	30.5	36.3	6.2	0.0	55.6	53.7	74.0	18.4	20.3
8	2514.82	66.4	58.8	31.0	36.2	6.6	0.0	67.8	60.2	75.6	7.8	15.4
9	2829.22	55.5	49.6	31.9	36.4	6.9	0.0	57.9	52.0	74.0	16.1	22.0
10	3143.32	51.7	52.6	32.0	36.4	7.4	0.0	54.7	55.6	75.6	20.9	20.0

AV DETECT (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	1257.55	42.6	40.9	23.2	36.8	4.5	0.0	33.5	31.8	55.6	22.1	23.8
5	1571.72	39.1	36.2	25.0	36.5	5.0	0.0	32.6	29.7	54.0	21.4	24.3
6	1885.99	41.0	37.5	28.8	36.4	5.6	0.0	39.0	35.5	55.6	16.6	20.1
7	2200.43	42.6	41.3	30.5	36.3	6.2	0.0	43.0	41.7	54.0	11.0	12.3
8	2514.82	49.7	43.8	31.0	36.2	6.6	0.0	51.1	45.2	55.6	**4.5**	10.4
9	2829.22	43.3	38.5	31.9	36.4	6.9	0.0	45.7	40.9	54.0	8.3	13.1
10	3143.32	38.3	35.7	32.0	36.4	7.4	0.0	41.3	38.7	55.6	14.3	16.9

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.

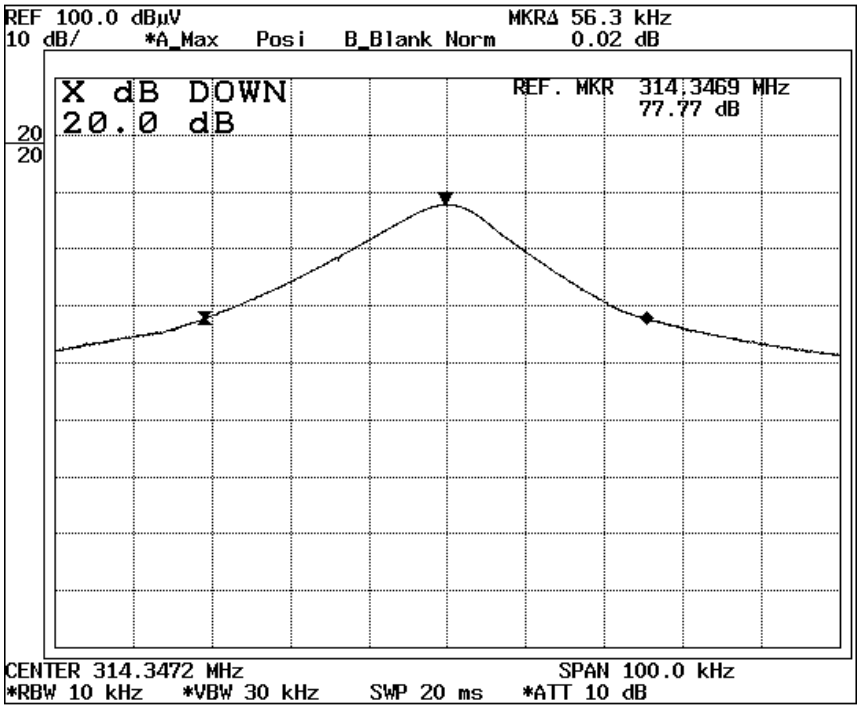
-20dB Bandwidth

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY	: DENSO CORPORATION	REPORT NO	: 25AE0324-HO
EQUIPMENT	: Remote Keyless Entry System (Transmitter)	REGULATION	: Fcc Part15 Subpart C 231(c) / 205
MODEL	: 12BBY	TEST DISTANCE	: 3m
S/N	: 2	DATE	: 09/08/2004
POWER	: DC 3.0V	TEMPERATURE	: 25 deg.C.
Mode	: Transmitting	HUMIDITY	: 60 %
		ENGINEER	: Kenichi Adachi

Bandwidth Limit : Fundamental Frequency 314.35 MHz X 0.25% = 785.875 kHz

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result	Margin [kHz]
56.30	785.88	Pass	729.58

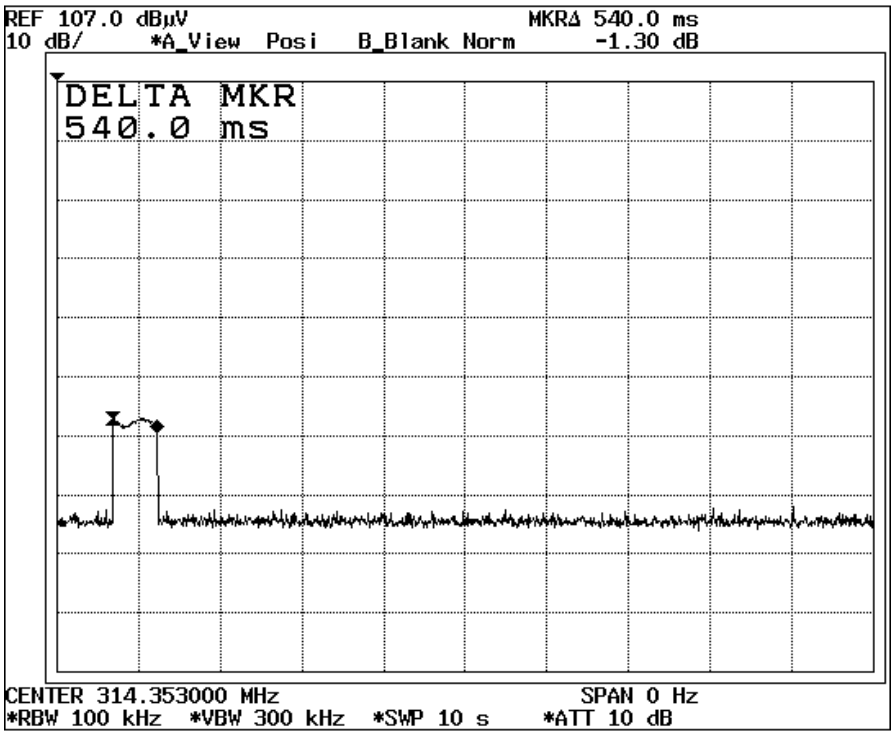


Automatically deactivate

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY	: DENSO CORPORATION	REPORT NO	: 25AE0324-HO
EQUIPMENT	: Remote Keyless Entry System (Transmitter)	REGULATION	: Fcc Part15 Subpart C 231(a)
MODEL	: 12BBY	TEST DISTANCE	: -
S/N	: 1	DATE	: 09/08/2004
POWER	: DC 3.0V	TEMPERATURE	: 25 deg.C.
Mode	: Transmitting	HUMIDITY	: 60%
		ENGINEER	: Kenichi Adachi

Time of Transmitting [sec]	Limit [sec]	Result	Margin [sec]
0.54	5.00	Pass	4.46

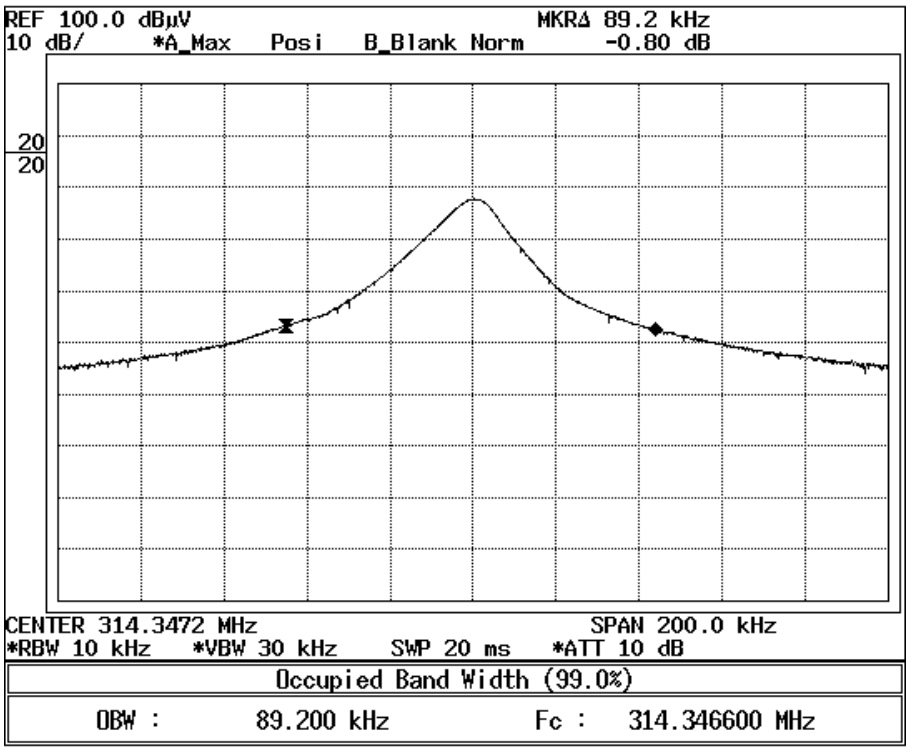


99% Occupied Bandwidth

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY	: DENSO CORPORATION	REPORT NO	: 25AE0324-HO
EQUIPMENT	: Remote Keyless Entry System (Transmitter)	REGULATION	: RSS-210
MODEL	: 12BBY	TEST DISTANCE	: 3m
S/N	: 2	DATE	: 09/08/2004
POWER	: DC 3.0V	TEMPERATURE	: 25 deg.C.
Mode	: Transmitting	HUMIDITY	: 60 %
		ENGINEER	: Kenichi Adachi

99% Occupied Bandwidth (RSS-210)



* 99% Occupied Bandwidth : 89.20 kHz