




EMI TEST REPORT

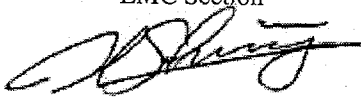
Test Report No. : 23KE0004-HO-1

Applicant : TOHOKU ALPS CO., LTD.
Type of Equipment : REMOTE CONTROL
FOR THE VEHICLE
Model No. : 6 921 553
Test standard : FCC Part 15 Subpart C
Section 15.209 and Section 15.231
FCC ID : NHVWZU11
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.
5. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

Date of test : June 5, 2003

Tested by : 
Yoshiaki Iwasa
EMC Section

Approved by : 
Hironobu Shimoji
Group Leader of EMC Section

UL Apex Co., Ltd.

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

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SECTION 1: Client information

Company Name : TOHOKU ALPS CO.,LTD.
Brand name : TOHOKU ALPS
Address : 6-3-36 NAKAZATO, FURUKAWA-CITY, MIYAGI-PREF.989-6181, JAPAN
Telephone Number : +81-229-23-5111
Facsimile Number : +81-229-22-3755
Contact Person : Koichi Yamamoto

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

2.1 Identification of E.U.T.

Type of Equipment : REMOTE CONTROL FOR THE VEHICLE
Model No. : 6 921 553
Serial No. : 8
Rating : DC 3.0V
Country of Manufacture : Japan
Receipt Date of Sample : June 2, 2003
Condition of E.U.T. : Production prototype

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2.2 Product Description

TOHOKU ALPS CO.,LTD. Model: 6 921 553 (referred to as the EUT in this report) is the REMOTE CONTROL FOR THE VEHICLE.

GENERAL

	MODEL No.	6 921 553
1	Operation Frequency	315MHz
2	Number of channel	1
3	Antenna	Integrated
4	Identification Codes	24 bit
5	Modulation	FSK
6	Coding	Manchester
7	Bit Rate	4.803kbps
8	Operating Temperature	-20 ~ +65 degrees C.
9	BATTERY	3V DC (2 Dry Batteries/ size AAA) (Option)
10	Operating Current	20mA Maximum
11	Standby Current	35uA Maximum
12	BATTERY LIFE	ABOUT 1 YEAR (ACCORDING TO THE OPERATING CONDITION)

SECTION 3: Test specification, procedures and results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
 Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
 Section 15.209 Radiated emission limits, general requirements
 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 C63.4:2001	Section 15.231(a)(1)	N/A	-	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2001	Section 15.231(b)	N/A	8.8dB 315.00MHz Horizontal	Complied
3	Electric Field Strength of Spurious Emission	ANSI C63.4:2001	Section 15.205 Section 15.209 Section 15.231(b)	N/A	3.8dB 630.01MHz Horizontal	Complied
4	-20dB Bandwidth	ANSI C63.4:2001	Section 15.231(c)	N/A	-	Complied

3.3 Additions to standards

No addition, deviation or exclusion has been made from standards.

3.4 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T. , in the configuration tested, complies with the specifications FCC Part15 Subpart C Section 15.209 and Section 15.231.

3.5 Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.5 dB.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB.

The measurement uncertainty (with a 95% confidence level) for this test using Horn Antenna is ± 6.6 dB.

☒ The result is within Head Office EMC lab's uncertainty.

☐ The data listed in this test report has enough margin.

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3.6 Test Location

UL Apex Co., Ltd. Head Office EMC Lab. No.2 semi anechoic chamber, 7.5 x 5.8 x 5.2m.

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

Telephone: +81 596 24 8116 Facsimile: +81 596 24 8124

This site has been fully described in a report submitted to FCC office, and listed on June 05, 2002 (Registration number: 846015).

Industry Canada number: IC4247-2

*NVLAP Lab. code: 200572-0

3.7 Test setup, Data of EMI and Test instruments

Refer to APPENDIX 1 to 3.

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

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

4.1 Operating Modes

The EUT exercise program used during radiated testing was designed to exercise the various system components in a manner similar to typical use.

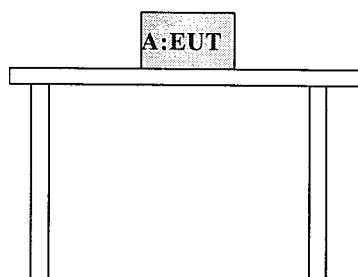
The operating mode/system was as follows:

Operation mode : Transmitting

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

4.2 Configuration and peripherals

Front View



* Cabling was taken into consideration and test data was taken under worst case conditions.

Description of EUT and Support equipment

No	Item	Model number	Serial number	Manufacturer	FCC ID
A	REMOTE CONTROL FOR THE VEHICLE	6 921 553	8	TOHOKU ALPS CO.,LTD.	NHVWZU11

UL Apex Co., Ltd.

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SECTION 5: Radiated emission (Fundamental and Spurious Emission)

5.1 Operating environment

The test was carried out in No.2 semi anechoic chamber, 7.5 x 5.8 x 5.2m.

Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, 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.

Measurements were performed with a Quasi-peak and peak detector (Below 1GHz), Average and Peak detector (Above 1GHz).

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 1GHz	Above 1GHz
Detector Type	Quasi-peak/Peak	Average/Peak
IF Bandwidth	120kHz	1MHz

-The noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise level was recorded.

-The relative measurements were performed on the fundamental and the spurious emissions with each conduction of the key folded and the key set up. The key set-up condition was worse case under both the fundamental and the spurious emissions, we, therefore, tested while the key was set up.

See the data in APPENDIX 3.

5.5 Results

Summary of the test results: Pass

Date: June 5, 2003

Tested by: Yoshiaki Iwasa

UL Apex Co., Ltd.

Head Office EMC Lab.

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Contents of Appendixes

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APPENDIX 2: Test instruments

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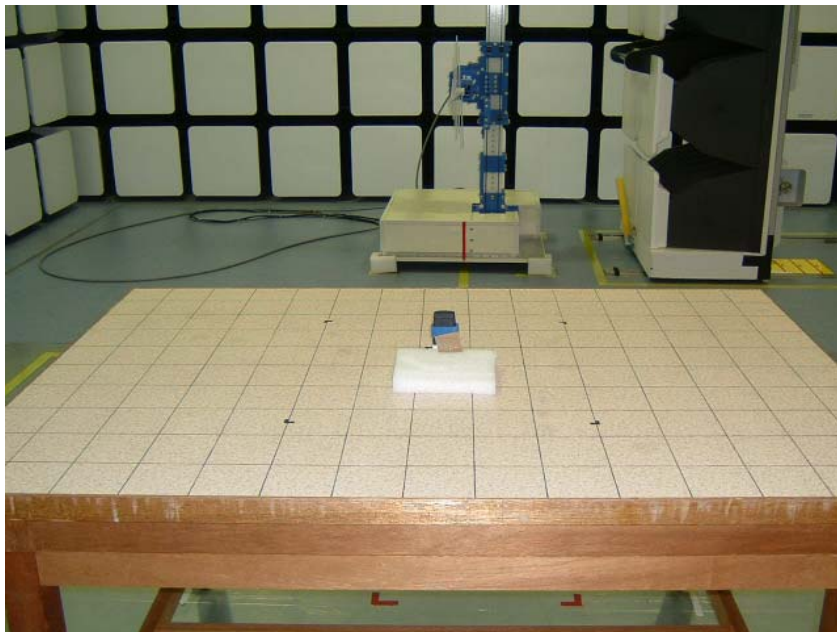
Page 13 : Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

Page 14 : -20dB Bandwidth

Page 15 : 99% Occupied bandwidth

APPENDIX 1: Photographs of test setup

Radiated emission



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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	2003/04/11 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2002/12/24 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	MCC-12-01(8D-2W15m),MCC-12-02(5D-2W-0.7),MCC-12-03(5D-2W-0.8),MCC-12-04(5D-2W-1m),MCC-12-05(RF SW),MCC-12-06(RF SW),※MCC-12-07(5D-2W-0.4m)5/8追加	RE	2003/05/08 * 12
MOS-02	Digital Humidity Indicator	N.T	NT-1800	RE	2002/12/10 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2003/03/13 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2003/01/31 * 12
SA-07	Spectrum Analyzer	Advantest	R3273	RE	2002/12/10 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2002/10/16 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2002/10/16 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2003/01/11 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2003/02/08 * 12
MCC-01	Coaxial Cable	Suhner/storm/Agilent/TSJ	-	RE	2002/12/19 * 12
MCC-24	Microwave Cable	Storm	-	RE	2003/04/30 * 12

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

Test Item:

RE: Radiated emission,

DATA OF AUTOMATICALLY DEACTIVATE

UL Apex Co., Ltd.

Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : TOHOKU ALPS CO.,LTD.

EQUIPMENT : REMOTE CONTROL FOR THE VEHICLE REGULATION : Fcc Part15 Subpart C 231(a) / 205

MODEL : 6 921 553

S/N : 8

FCC ID : NHVWZU11

IC No. : 3495A-FWZ1U11

POWER : DC3.0V

Mode : Transmitting

REPORT NO : 23KE0004-HO - 1

TEST DISTANCE : -

DATE : 06/05/2003

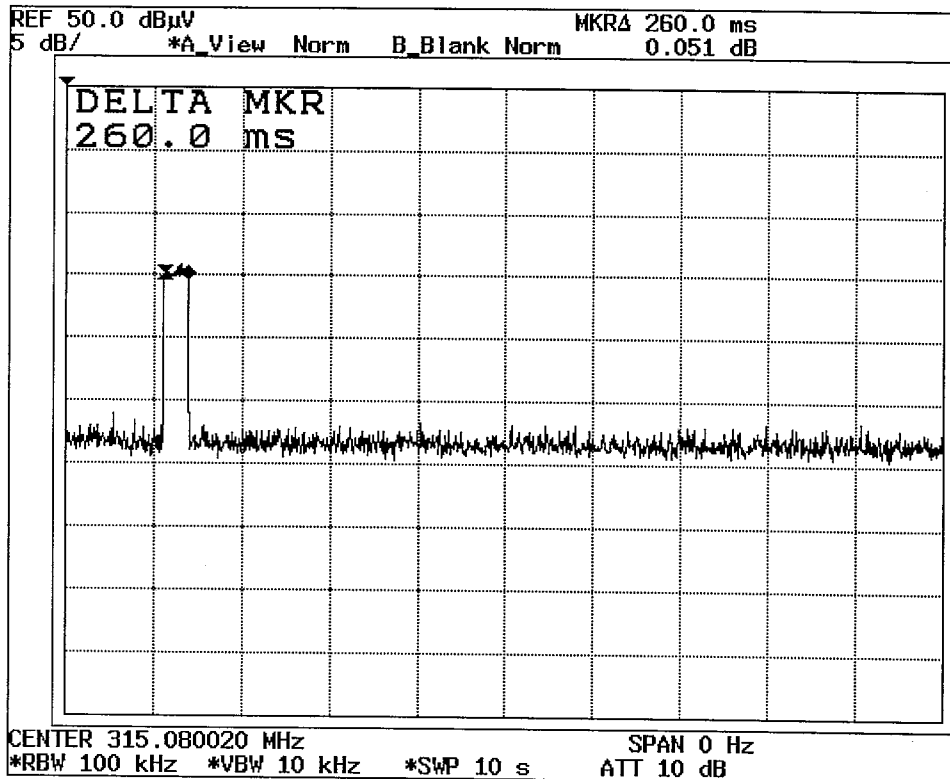
TEMPERATURE : 26°C

HUMIDITY : 48%

Y. Iwasa

ENGINEER : Yoshiaki Iwasa

Time of Transmitting [sec]	Limit [sec]	Result
0.26	5.00	Pass



DATA OF RADIATED EMISSIONS

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

COMPANY : TOHOKU ALPS CO.,LTD.
EQUIPMENT : REMOTE CONTROL FOR THE VEHICLE
MODEL : 6 921 553
S/N : 8
FCC ID : NHVWZU11
IC No. : 3495A-FWZ1U11
POWER : DC3.0V
Mode : Transmitting
Axis : Hor.: X-axis , Ver.: Z-axis

REPORT NO : 23KE0004-HO-1
REGULATION : Fcc Part15 Subpart C 231(b) / 205
TEST DISTANCE : 3m
DATE : 06/05/2003
TEMPERATURE : 26°C
HUMIDITY : 48%

Y. Iwasa

ENGINEER : Yoshiaki Iwasa

No.	FREQ [MHz]	T/R READING : PK		ANT Factor [dB]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT		Limit [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
1	315.00	70.2	66.5	14.9	26.8	8.5	0.0	66.8	63.1	75.6	8.8	12.5

No.	FREQ [MHz]	T/R READING : QP		ANT Factor [dB]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT		Limit [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
2	630.01	51.0	50.5	19.7	28.6	9.7	0.0	51.8	51.3	55.6	3.8	4.3
3	944.98	46.1	45.4	23.0	28.5	10.8	0.0	51.4	50.7	55.6	4.2	4.9

No.	FREQ [MHz]	T/R READING : PK		ANT Factor [dB]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT		Limit [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
4	1260.01	60.6	61.2	23.5	37.6	3.2	0.0	49.6	50.3	75.6	26.0	25.3
5	1575.17	48.9	48.9	25.2	37.2	3.6	0.0	40.5	40.5	74.0	33.5	33.5
6	1890.89	48.0	47.2	29.3	37.0	3.9	0.0	44.2	43.4	75.6	31.4	32.2
7	2205.00	46.6	44.9	30.7	36.9	4.3	0.0	44.7	43.0	75.6	30.9	32.6
8	2520.48	46.2	47.0	30.8	36.9	4.6	0.0	44.7	45.5	75.6	30.9	30.1
9	2835.00	45.6	45.6	32.0	37.1	4.9	0.0	45.4	45.4	74.0	28.6	28.6
10	3150.00	45.2	44.1	32.2	37.1	5.2	0.0	45.5	44.5	75.6	30.1	31.1

No.	FREQ [MHz]	T/R READING : AV		ANT Factor [dB]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT		Limit [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
4	1260.01	52.3	52.4	23.5	37.6	3.2	0.0	41.4	41.4	55.6	14.2	14.2
5	1575.17	37.2	36.2	25.2	37.2	3.6	0.0	28.8	27.8	54.0	25.2	26.2
6	1890.89	38.2	36.5	29.3	37.0	3.9	0.0	34.4	32.7	55.6	21.2	22.9
7	2205.00	33.2	33.0	30.7	36.9	4.3	0.0	31.3	31.1	55.6	24.3	24.5
8	2520.48	34.3	35.6	30.8	36.9	4.6	0.0	32.7	34.1	55.6	22.9	21.5
9	2835.00	33.7	33.5	32.0	37.1	4.9	0.0	33.5	33.3	54.0	20.5	20.7
10	3150.00	33.4	33.4	32.2	37.1	5.2	0.0	33.7	33.7	55.6	21.9	21.9

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

*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 noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise.

DATA OF -20dB-Bandwidth

UL Apex Co., Ltd.

Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : TOHOKU ALPS CO.,LTD.

EQUIPMENT : REMOTE CONTROL FOR THE VEHICLE

MODEL : 6 921 553

S/N : 8

FCC ID : NHVWZU11

IC No. : 3495A-FWZ1U11

POWER : DC3.0V

Mode : Transmitting

REPORT NO : 23KE0004-HO- **1**

REGULATION : Fcc Part15 Subpart C 231(c) / 205

TEST DISTANCE : 3m

DATE : 06/05/2003

TEMPERATURE : 26°C

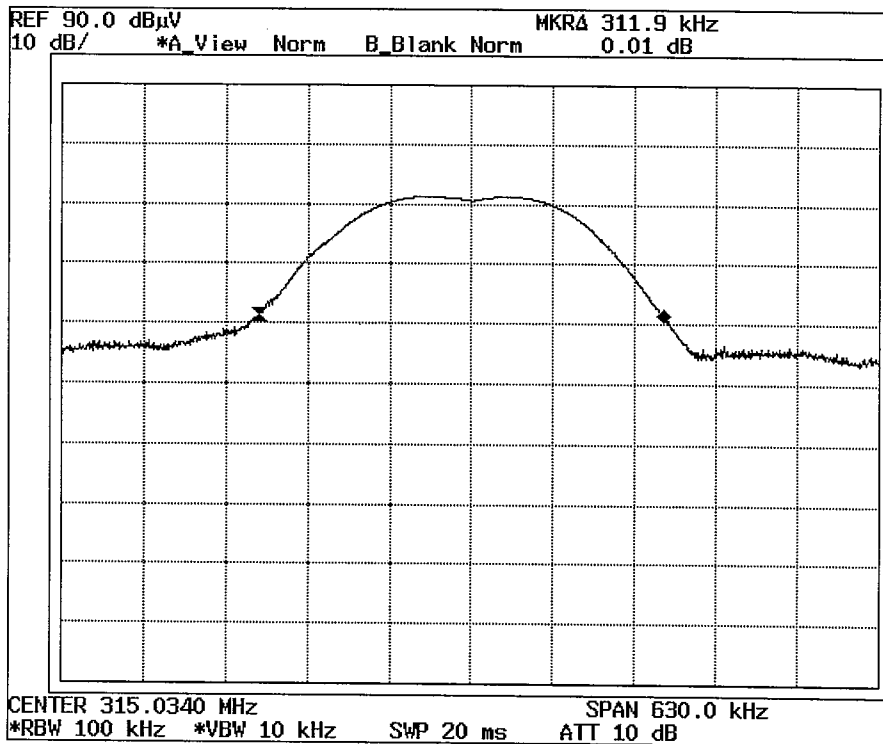
HUMIDITY : 48%

Y. Iwasa

ENGINEER : Yoshiaki Iwasa

Bandwidth Limit : Fundamental Frequency 315MHz X 0.25% = 787.5 kHz

-20dB Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
311.90	787.50	Pass



99% Occupied Bandwidth

UL Apex Co., Ltd.

Head Office EMC Lab. No.2 Semi Anechoic Chamber

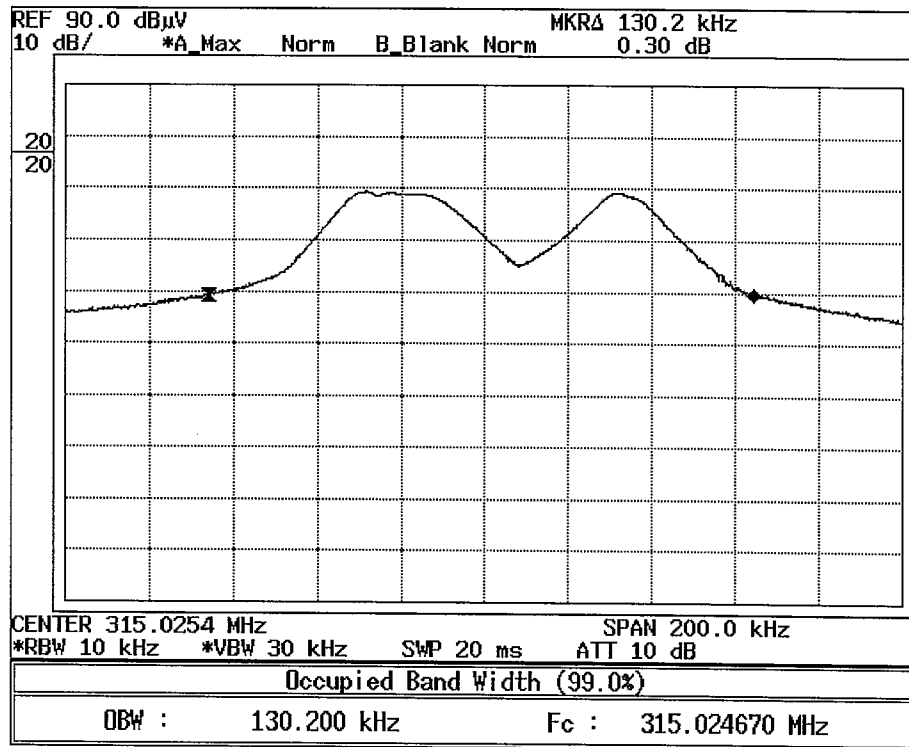
COMPANY : TOHOKU ALPS CO.,LTD.
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REPORT NO : 23KE0004-HO - 1
REGULATION : Fcc Part15 Subpart C 231(b) / 205
TEST DISTANCE : 3 m
DATE : 06/05/2003
TEMPERATURE : 26°C
HUMIDITY : 48%

Y. Iwasa

ENGINEER : Yoshiaki Iwasa

99% Occupied Bandwidth (RSS-210)



* 99% Occupied Bandwidth : 130.20 kHz