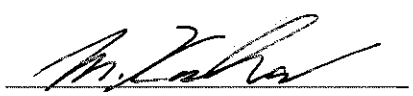
EMISSION TEST REPORT

Test Report No. : 21JE0023-YW-1

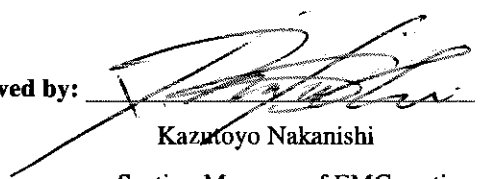
Applicant:	**TOHOKU ALPS CO., LTD.**
Type of Equipment:	**Keyless Entry System (Transmitter)**
Model No.:	**TFWB1U427A**
FCC ID	**NHVBU427**
Test standard:	**FCC Part 15 Subpart C Section 15.231**
Test Result:	**Complies**

The results in this report apply only to the sample tested.

Date of test: June 6, 2001

Tested by: 

Makoto Kosaka

Approved by: 

Issued date: June 12, 2001

Kazutoyo Nakanishi

Section Manager of EMC section

Testing Laboratory

A-pex International Co., Ltd.

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1 GENERAL INFORMATION

APPLICANT	: TOHOKU ALPS CO., LTD.
ADDRESS	: 6-3-6, Nakazato, Furukawa-City, Miyagi-Pref 989-6143 Japan
Telephon Number	: +81-229-23-5111
Facsimile Number	: +81-229-22-3755
REGULATION(S)	: FCC Part 15 Subpart C Section 15.231
MODEL NUMBER	: TFWBU427A
FCC ID	: NHVBU427
SERIAL NUMBER	: smple No.1
Condition EUT	: Engineerring Prototype
KIND OF EQUIPMENT	: Keyless Entry System (Transmitter)
TESTED DATE	: June 6, 2001
RECEIPT DATE OF SAMPLE	: June 3, 2001
REPORT FILE NUMBER	: 21JE0023-YW-1
TEST SITE	: A-PEX Yokowa No.3 Open Test Site

1.1 Product Description

Model: TFWB1U427A (referred to as the EUT in this report) is a Keyless Entry System (Transmitter).

The specification is as following :
Carrier Frequency : 315 MHz
Operation Voltage : Lithium Battery DC 3.0V(CR2025)
Modulation : AM

1.2 Test Specification

Test Specification : FCC Part 15 Subpart C
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart C Intentional Radiators
§ 15.231 Periodic operation in the band 40.66 – 40.70 MHz and above 70MHz

1.3 Methods & Procedures

No.	Item	Test Procedure	Specification	Remarks
1	Electric Field Strength of Fundamental Emission	ANSI C63.4:1992	§ 15.231	3m
2	Electric Field Strength of Spurious Emission	ANSI C63.4:1992	§ 15.205 § 15.209 § 15.231	3m
3	-20dB Bandwidth	ANSI C63.4:1992	§ 15.231	-

1.4 Test Location

A-PEX International Co.,Ltd. Yokowa No.3 test site
108 Yokowa-cho, Ise-shi, Mie-ken 516-1106 Japan
Telephone number : +81-596-39-1485
Facsimile number : +81-596-39-0232

This site has been fully described in a report submitted to FCC office, and listed on September 12, 2000 (Registration number: 90412).

*NVLAP Lab. code : 200109-0

2 SYSTEM TEST CONFIGURATION

2.1 Operation Environment

Temperature : 21℃

Humidity : 60%

2.2 Justification

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

2.3 EUT Exercise Software

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

The sequence is used:

Operation Mode : Transmitting

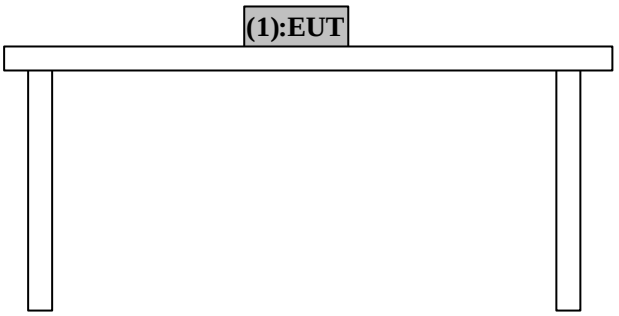
2.4 Test Procedure

Tabletop Equipment Radiated Emissions

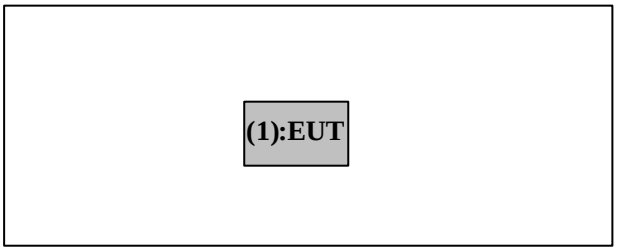
EUT was placed on a platform of nominal size, 1m by 1m, raised 80cm above the conducting ground plane.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
The measurement distance was 3m.

Figure2.1 Configuration of Tested System

Front View



Top View



*Test data was taken under worse case conditions.

No.	Item	Model number	Serial number	Manufacturer	FCC ID
1	Keyless Entry System (Transmitter)	TFWB1U427A	Sample No.1	TOHOKU ALPS	NHVBU427

3 RADIATED EMISSION DATA

The initial step in collecting radiated data was a spectrum analyzer peak scan of the measurement range (30MHz-3200MHz). The final data was reported in the worst-case emissions.
The minimum margin to the limit is as follows :

No	Ant Pol	Freq [MHz]	Reading [dBì V]	Antena Facter [dB]	Cable Loss [dB]	ATT [dB]	AMP Gain [dB]	Result [dBì V/m]	Limit [dBì V/m]	Margin [dB]	Remark
1	H	314.94	75.3	14.4	3.6	5.8	27.6	71.5	75.6	4.1	Fundamental
2	H	2519.63	52.5	29.0	7.2	-	34.5	54.2	55.6	1.4	Spurious

Remark
Below 1GHz: Test Receiver Setting : QP Detect / IF Bandwidth 120kHz
Above 1GHz: Spectrum Analyzer Setting : AV Detect / RBW 1MHz, VBW 10Hz

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, Cable Factor and Antenna Pad, and subtracting the Amplifier Gain from the measured reading. The sample calculation is as follows :

FS = RA + AF + CF + AT - AG

where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Factor
AT = Antenna Pad
AG = Amplifier Gain

Assume a receiver reading of 75.3 dBμV is obtained. The antenna Factor of 14.4 dB, Cable Factor of 3.6 dB and Antenna Pad of 5.8 dB is added. The Amplifier Gain of 27.6 dB is subtracted, giving a field strength of 71.5 dBμV/m.

FS = 75.3 + 14.4 + 3.6 + 5.98– 27.6 = 71.5 dBμV/m

3.2 –20dB Bandwidth

Bandwidth Limit: Fundamental Frequency 315.00MHz × 0.25% = 787.5kHz

Bandwidth Limit	measurement data (20dB down) Center Freq: 314.947MHz	Result
Upper frequency Limit (315.39375MHz:393.75kHz)	315.117MHz(170kHz)	Pass
Lower frequency Limit (314.60625MHz:393.75kHz)	314.773MHz(174kHz)	Pass
-20dB Bandwidth (787.5kHz)	Uf + Lf = 344kHz	Pass

* See Appendix A2 and A3

3.3 Measurement Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was ±3.3dB.

■ The data listed in this test report may exceed the test limit because it does not have enough margin (more than 3.3dB).

□ The data listed in this test report has enough margin, more than 3.3dB.

4 Test EQUIPMENT USED

Instrument	Mfr.	Model No.	Control No.	Calibration Until / / Interval
Pre Amplifier	Hewlett Packard	8447D	AF-01	March 31, 2001 / 1 year
Pre Amplifier	Hewlett Packard	8449B	AF-04	November 5, 2000 / 1 year
Attenuator	Anritsu	MP721B	AT-06	March 31, 2001 / 1 year
Biconical Antenna	Schwarzbeck	BBA9106	BA-03	May 1, 2001 / 1 year
Logperiodic Antenna	Schwarzbeck	UHALP9108-A	LA-06	May 1, 2001 / 1 year
Horn Antenna	A.H. Systems	SAS200/571	HA-01	May 20, 2001 / 1 year
Spectrum Analyzer	Hewlett Packard	8567A	SA-04	March 31, 2001 / 1 year
Spectrum Analyzer	Advantest	R3271	SA-05	February 1, 2001 / 1 year
Test Receiver	Rohde & Schwarz	ESVS10	TR-06	August 10, 2000 / 1 year
Test Receiver	Rohde & Schwarz	ESCS30	TR-07	August 8, 2000 / 1 year

*All measurement equipment is traceable to national standard.

5 RADIATED MEASUREMENT PHOTOS

5.1 Radiated Measurement Photos

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APPENDIX

A : Test Data

Radiated emissions	A1 – A3

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DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
YOKOWA NO.3 OPEN SITE

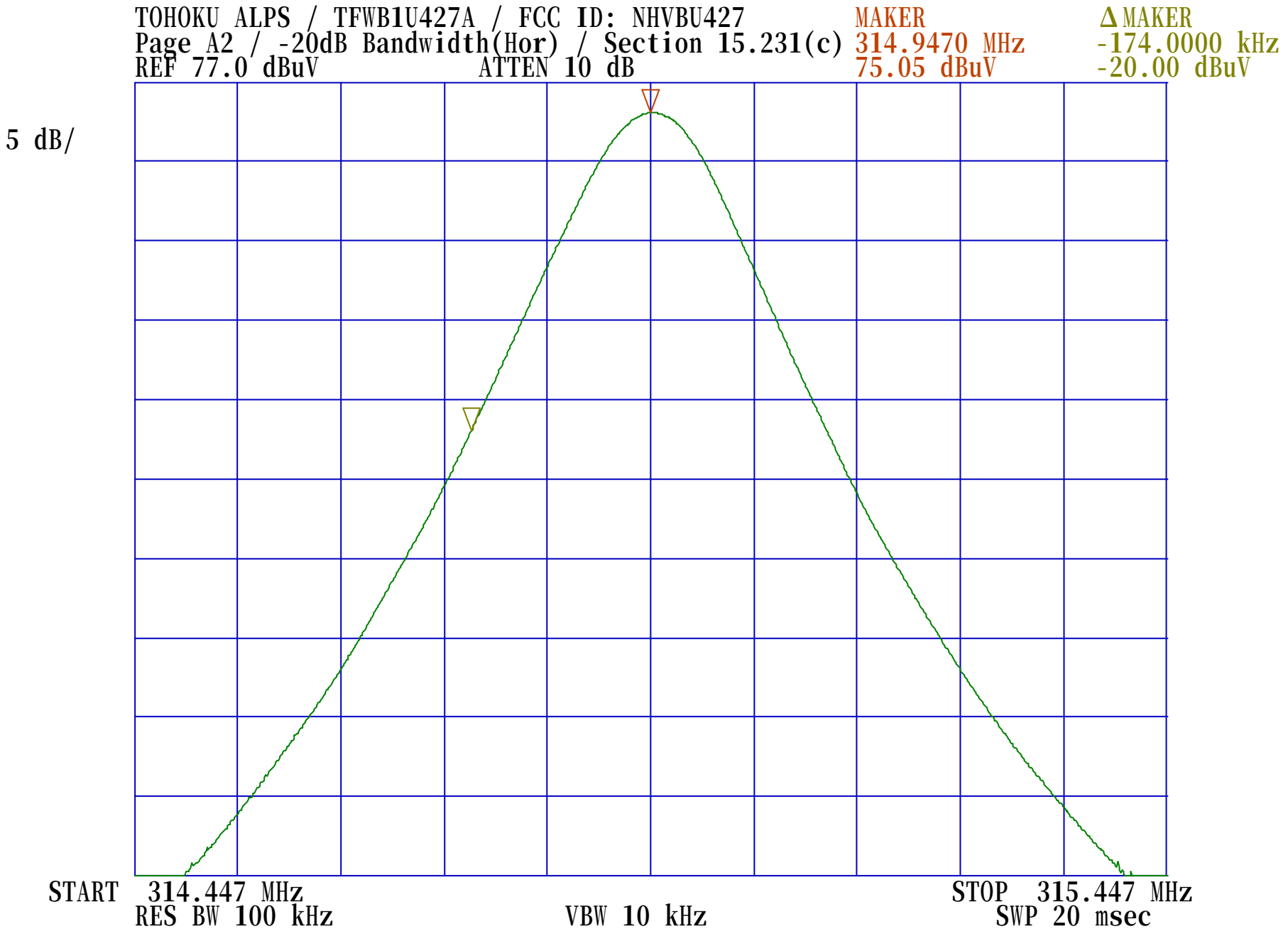
COMPANY : TOHOKU ALPS CO., LTD
TRADE NAMI: ALPS
EQUIPMENT : Keyless Entry System(Transmitter)
MODEL : TFWB1U427A
POWER : DC3.0V (CR2025)
Mode : Transmiting
Serial No. : sample No.1
Temperature : 21deg
Humidity : 60%

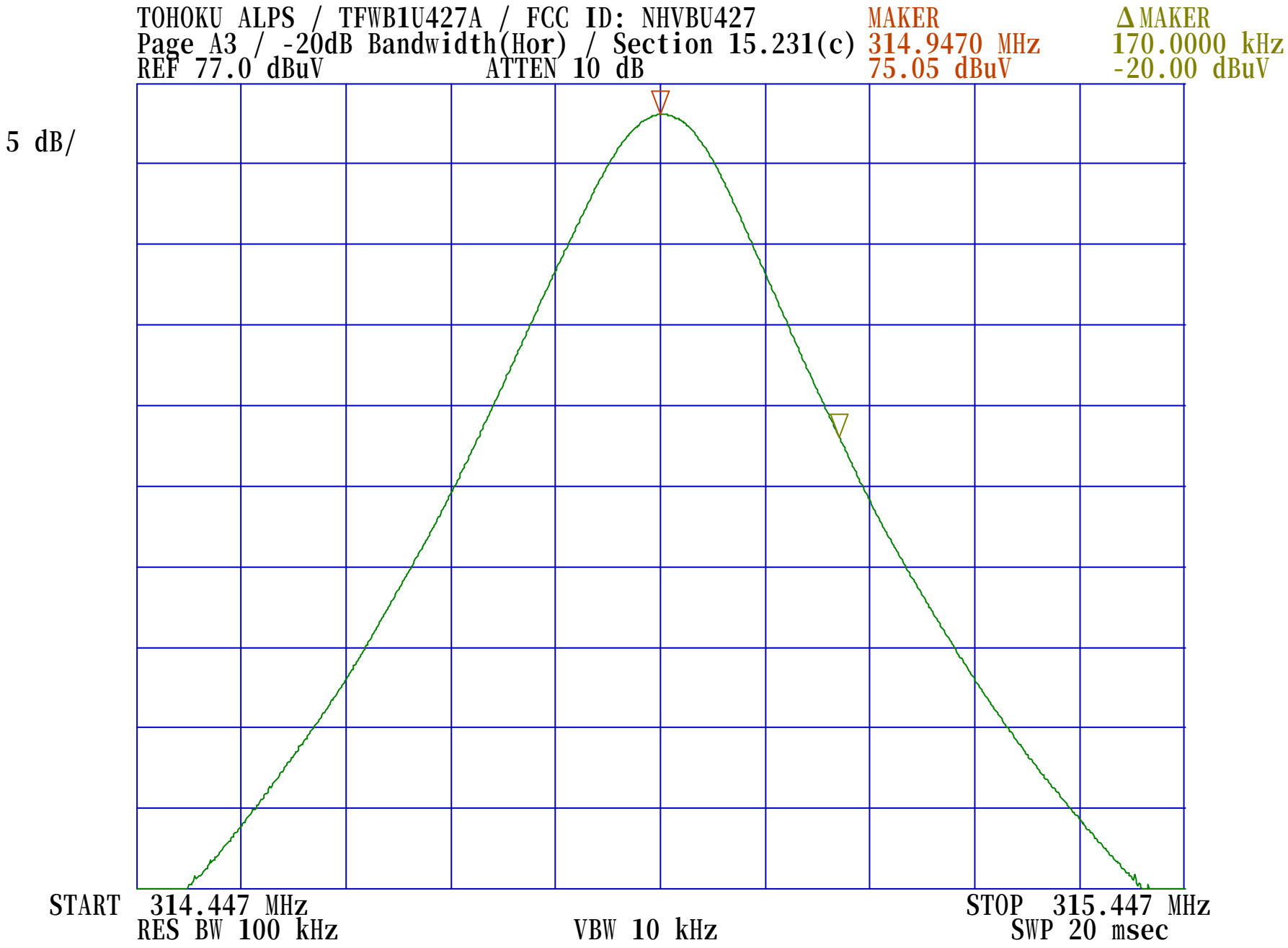
REPORT NO : 21JE0023-YW-1
REGULATION : FCC15.231(b)/15.205
TEST DISTANCE : 3m
DATE : 2001/6/6
FCC ID : NHVBU427

ENGINEER : Makoto Kosaka

No.	FREQ	READING		ANT	CABLE	ATTEN	AMP	RESULT		LIMIT	MARGIN	
		HOR	VER	Factor	LOSS		GAIN	HOR	VER		HOR	VER
	[MHz]	[dB μ V]	[dB μ V]	[dB]	[dB]	[dB]	[dB]	[dB μ V/m]	[dB μ V/m]	[dB μ V/m]	[dB]	[dB]
1	314.94	75.3	58.0	14.4	3.6	5.8	27.6	71.5	54.2	75.6	4.1	21.4
2	629.90	50.5	34.5	19.3	5.4	5.9	27.2	53.9	37.9	55.6	1.7	17.7
3	944.85	34.1	26.9	22.8	7.1	5.9	26.7	43.2	36.0	55.6	12.4	19.6
4	1259.81	47.1	38.5	24.4	4.9	0.0	35.1	41.3	32.7	55.6	14.3	22.9
5	1575.15	55.0	51.5	25.6	5.5	0.0	34.6	51.5	48.0	54.0	2.5	6.0
6	1889.70	48.0	48.2	27.2	6.2	0.0	34.5	46.9	47.1	55.6	8.7	8.5
7	2204.67	48.0	48.9	28.2	6.7	0.0	34.4	48.5	49.4	54.0	5.5	4.6
8	2519.63	52.5	50.8	29.0	7.2	0.0	34.5	54.2	52.5	55.6	1.4	3.1
9	2834.57	43.4	45.3	30.0	7.5	0.0	34.9	46.0	47.9	54.0	8.0	6.1
10	3150.26	31.1	31.3	30.3	7.9	0.0	34.9	34.4	34.6	55.6	21.2	21.0

REMARKS
Below 1GHz: QP DETECT(Test Receiver: BW 120kHz)
Above 1GHz: AV DETECT (Spectrum Analyzer : RBW 1MHz and VBW 10Hz)
ANTENNA TYPE: 30-300MHz Biconical / 300-1000MHz Logperiodic / 1-3.2GHz DRG Horn
CALCULATION(30MHz to 1000MHz) : READING + ANT Factor + Cable Loss + ATTEN - AMP Gain
CALCULATION(1.0GHz to 3.3GHz) : READING + ANT Factor + Cable Loss - AMP Gain
*Except for the above table : adequate margin data below the limits.


TOHOKU ALPS / TFWB1U427A / FCC ID: NHVBU427
Page A2 / -20dB Bandwidth(Hor) / Section 15.231(c)
REF 77.0 dBuV
ATTEN 10 dB
MAKER
314.9470 MHz
75.05 dBuV
ΔMAKER
-174.0000 kHz
-20.00 dBuV
5 dB/
START 314.447 MHz
RES BW 100 kHz
VBW 10 kHz
STOP 315.447 MHz
SWP 20 msec


TOHOKU ALPS / TFWB1U427A / FCC ID: NHVBU427
Page A3 / -20dB Bandwidth(Hor) / Section 15.231(c)
REF 77.0 dBuV
ATTEN 10 dB
MAKER
314.9470 MHz
75.05 dBuV
ΔMAKER
170.0000 kHz
-20.00 dBuV
5 dB/
START 314.447 MHz
RES BW 100 kHz
VBW 10 kHz
STOP 315.447 MHz
SWP 20 msec