EMISSION TEST REPORT

Test Report No. : 18C0030-02-2
TAKAYA CORPORATION, Model: TX69W01
FCC Part 15 Subpart C

1. This test report shall not be reproduced except in full, without the written approval of A-Pex International Co., Ltd.

2. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

3. This equipment is in compliance with above regulation. We hereby certify that the data are contain a true representation of the emission profile.

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

5. This test report clearly shows that EUT, TX69W01, Wetness Sensor System (Transmitter) is in compliance with FCC Part 15 Subpart C.

Date of test: March 19, 1999 **Issued date:** March 31, 1999

Tested by: _____ **Approved by:** _____

Naoki Sakamoto
EMC Section

Kazutoyo Nakanishi
Group Leader of EMC section

Form Version No. 1

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Testing Laboratory
A-pex International Co., Ltd. Telephone: +81 596 39 1485
108 Yokowa-cho, Ise-shi Mie-ken 516-1106 JAPAN Facsimile: +81 596 39 0232

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1 GENERAL INFORMATION

APPLICANT	: TAKAYA CORPORATION
ADDRESS	: 1-1 Momiji-cho, Fukuyama-city, Hiroshima 720-0811 Japan Tel: +81-849-27-5133 Fax: +81-849-27-5130
REGULATION(S)	: FCC Part 15 SubpartC
MODEL NUMBER	: TX69W01
SERIAL NUMBER	: -
KIND OF EQUIPMENT	: Wetness Sensor System (Transmitter)
TESTED DATE	: March 19, 1999
RECEIPT DATE OF SAMPLE	: March 19, 1999
TEST REPORT NUMBER	: 18C0030-02-2
TEST SITE	: A-PEX Yokowa NO.3 Open Test Site

1.1 Tested Methodology

Radiated testing were performed according to the procedures in FCC/ANSI C63.4(1992).
Radiated testing was performed at a distance of 3 meters from the antenna to EUT .

1.2 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 108, Yokowa-cho, Ise-shi, Mie-ken, 516-1106 Japan.
This site has been fully described in a report dated Aug. 1, 1997 submitted to FCC office, and accepted in a letter dated Sep. 16, 1997 (31040/SIT 1300F2).

2 Product Description

TAKAYA CORPORATION, Model TX69W01 (referred to as the EUT in this report)
is a Wetness Sensor System (Transmitter).

Frequency : 318.125M, 318.500M, 318.875M, 319.250MHz
Frequency stability : ±0.001%
Identification : Area ID 1□99, Individual ID 1□99
Modulation system : Variable reactance frequency modulation
Maximum deviation : ±4kHz
Power source : 3V (lithium battery CR2032)
Battery life : about 3 months (dropped to 2.5V)

3 Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system are:

Model	FCC ID	Description	Cable description	Backshell Material
(1) TAKAYA M/N: TX69W01 (EUT)	MK4TX69W01	Wetness Sensor System (Transmitter)	—	—

4 SYSTEM TEST CONFIGURATION

4.1 Justification

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

4.2 EUT Exercise Software

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

The sequence is used:

Operation: Transmitting mode

Measurement of EUT was performed with four different types of transmitting frequency of the crystal oscillator as follows;
Transmitting frequency 318.125MHz, 318.500MHz, 318.875MHz and 319.250MHz.

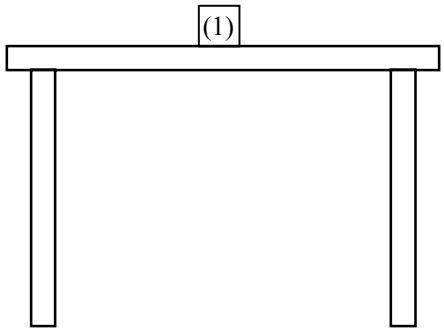
4.3 Test Procedure

Tabletop Equipment Radiated Emissions

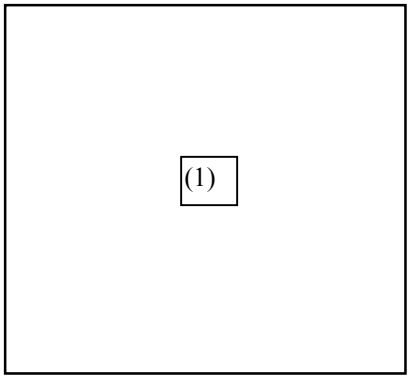
EUT was placed on a center of table of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
The measurement distance was 3m.

Figure 4.1 Configuration of Tested System

Front View



Top View



5 RADIATED MEASUREMENT PHOTOS

Figure 5.1 Radiated Measurement Photos

5.1 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 that 3.3dB).

■ The data listed in this test report has enough margin, more that 3.3dB.

6 RADIATED EMISSION DATA

The initial step in collecting radiated data was a spectrum analyzer peak scan of the measurement range (318.125MHz-3192.500MHz).
The final data was reported in the worst-case emissions.
The minimum margin to the limit is as follows :

Regarding measurement above 1000MHz, the measurement was performed on following conditions:
□ Resolution bandwidth: 1MHz
□ Video bandwidth: 1MHz

*** 318.125MHz 1000MHz (Quasi-Peak detect)**

ch 2: Transmitter frequency 318.500MHz type.

Frequency (MHz)	Receiver Reading (dBμV)	Correction Factor (dBμV)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dBμV)
318.49	61.7	0	61.7	67.8	6.1

*** 1000MHz 3192.500MHz (Peak detect)**

ch 4: Transmitter frequency 319.250MHz type.

Frequency (MHz)	Receiver Reading (dBμV)	Correction Factor (dBμV)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dBμV)
3192.50	44.5	-3.8	40.7	47.8	7.1

The Fandamental Frequencies of this equipment are 318.125□319.250MHz(375kHz step).
The peak of output level of fandamental frequencies were confirmed by perfarming the meaurement.
It was corroborated that equipment was within of the tolerance which is prescribed
in the FCC regulation Part 15 Subpart C sec. 15.231 (c).
Since the fandamental frequencies are 318.125□319.250MHz(375kHz step), we selected most severe conditions,
the limits were ±397.6kHz at 318.125MHz.
The measurement result was 171.0kHz (ch 1, upper) and 179.0kHz (ch 2, 3, lower).

6.1 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 :

*** 318.125MHz 1000MHz**
FS = RA + AF + CF + AT - AG

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

Assume a receiver reading of 61.7 dBμV is obtained. The antenna Factor of 16.4 dB, Cable Factor of 4.7 dB is added The Antenna Pad of 6.0 dB and Amplifier Gain of 27.1 dB is subtracted, giving a field strength of 61.7 dBμV/m.

FS = 61.7 + 16.4 + 4.7 + 6.0 – 27.1 =61.7 dBμV/m

*** 1000MHz 3192.500MHz**
FS = RA + AF + CF + AT - AG

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

Assume a spectrun analyzer reading of 44.5dBμV is obtained. The antenna Factor of 30.4, the Cable Factor of 2.0 dB is added. The Amplifier Gain of 36.2 dB is subtracted, giving a field strength of 40.7 dBμV/m.

FS = 44.5 + 30.4+ 2.0 – 36.2 = 40.7 dBμV/m

7 TEST EQUIPMENT USED

	NAME	MANUFACTURER	MODEL	Control No.	Calibrated Until
■	Pre Amplifier	Hewlett Packard	8447D	AF1	June 10, 1999
■	Pre Amplifier	Hewlett Packard	8449B	AF4	January 31, 2000
□	Biconical Antenna	Schwarzbeck	BBA9106	BA1	May 3, 1999
□	Biconical Antenna	Schwarzbeck	BBA9106	BA2	July 6, 1999
■	Biconical Antenna	Schwarzbeck	BBA9106	BA5	July 6, 1999
□	Logperiodic Antenna	Schwarzbeck	UHALP9108A	LA5	July 6, 1999
□	Logperiodic Antenna	Schwarzbeck	UHALP9108A	LA6	February 14, 2000
■	Logperiodic Antenna	Schwarzbeck	UKLP9104-A	LA8	August 8, 1999
■	Horn Antenna	AH System, Inc	SAS-200/571	HA1	February 5, 2000
□	LISN	Rohde & Schwarz	ESH2-Z5	LS1	November 24, 1999
□	LISN	Rohde & Schwarz	ESH3-Z5	LS2	November 24, 1999
□	LISN	Schwarzbeck	NSLK8127	LS3	November 24, 1999
□	LISN	Rohde & Schwarz	ESH3-Z5	LS4	November 24, 1999
□	LISN	Schwarzbeck	NNLK8121	LS5	November 24, 1999
□	LISN	Rolf Heine	NNB-4/200	LS6	November 24, 1999
□	LISN	Schwarzbeck	NNLK8126	LS7	November 24, 1999
□	Spectrum Analyzer	Hewlett Packard	8567A	SA1	May 31, 1999
■	Spectrum Analyzer	Hewlett Packard	8567A	SA4	June 12, 1999
■	Spectrum Analyzer	Advantest	R3271	SA5	May 17, 1999
□	Test Receiver	Rohde & Schwarz	ESHS-20	TR1	April 3, 1999
□	Test Receiver	Rohde & Schwarz	ESVS-30	TR2	July 5, 1999
□	Test Receiver	Rohde & Schwarz	ESHS-30	TR3	July 14, 1999
□	Test Receiver	Rohde & Schwarz	ESVS-10	TR4	July 14, 1999
□	Test Receiver	Rohde & Schwarz	ESHS-10	TR5	March 23, 1999
■	Test Receiver	Rohde & Schwarz	ESVS-10	TR6	March 23, 1999

■ indicates EMI Test Equipment used.

*All measurement equipment is traceable to national standard.

APPENDIX

Test Data

Radiated emissions	A 1 - A 16