



EMI TEST REPORT

Test Report No. : 26JE0089-HO

Applicant : HERUTU ELECTRONICS CORPORATION

Type of Equipment : POKAYOKE RECEIVER

Model No. : TWF-600R

FCC ID : T82TWF600R

Test standard : FCC Part 15 Subpart B Class B 2006

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 the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the client product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test:

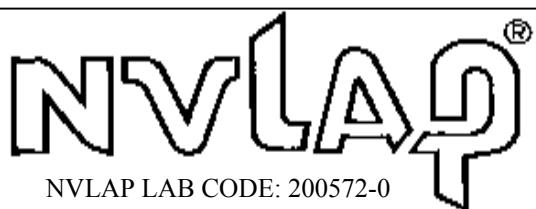
June 4, 2006

Tested by:

Kenichi Adachi
EMC Services

Approved by :

Tetsuo Maeno
Group Leader of EMC Services



This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.

*As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://ulapex.jp/emc/nvlap.htm>

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SECTION 1: Client information

Company Name : HERUTU ELECTRONICS CORPORATION
Address : 62-1 toyooka-cho Hamamatsu-shi Shizuoka, 433-8103 Japan
Telephone Number : +81-53-438-3511
Facsimile Number : +81-53-438-3411
Contact Person : Shinji Gotoda

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

2.1 Identification of E.U.T.

Type of Equipment : POKAYOKE RECEIVER
Model No. : TWF-600R
Serial No. : CS00001
Country of Manufacture : Japan
Receipt Date of Sample : May 30, 2006
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.

2.2 Product Description

Model No : TWF-600R is the POKAYOKE RECEIVER.

Clock frequency(ies) in the system	CPU : 12.288MHz, LOCAL1 415.400MHz / LOCAL2 10.250MHz
Type of receiver	Double Super Heterodyne
Frequency of Operation	426.100MHz
Intermediate frequency	1 st : 10.7MHz, 2 nd : 450kHz
Antenna Type	1/4 lambda
Antenna Connector Type	BNC
Method of frequency generation	Crystal
Operating voltage	DC 12V

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification : FCC Part 15 Subpart B 2006
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin *0)	Result
Conducted emission	ANSI C63.4: 2003 2. AC powerline conducted emission measurements	Class B	N/A	40.4dB 3.50702MHz, N, AV	Complied
Radiated emission	ANSI C63.4: 2003 8. Radiated emission measurements	Class B	N/A	16.1dB 799.400MHz, Horizontal/Vertical, QP	Complied

*Note: UL Apex's EMI Work Procedure QPM05.
*0) The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

3.3 Additions or deviations to standards

No addition, deviation, nor exclusion has been made from standards.

3.4 Uncertainty

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test was ± 2.6 dB.
The data listed in this test report has enough margin, more than the site margin.

Radiated Emission

The measurement uncertainty (with a 95% confidence level) for this test using Loop antenna is ± 4.41 dB(3m).
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.59 dB(3m).
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 4.62 dB(3m).
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ± 5.27 dB.
The data listed in this test report has enough margin, more than the site margin.

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3.5 Test Location

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	FCC Registration Number	IC Registration 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	655103	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247A-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247A-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	-
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 shielded room	-	-	6.0 x 6.0 x 3.9m	N/A	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	N/A	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	N/A	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 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, No.2, No.3 and No.4 semi-anechoic chambers and No.7 shielded room.

3.6 Test set up, Test instruments, Data of EMI and Label and label location

Refer to APPENDIX 1 to 4.

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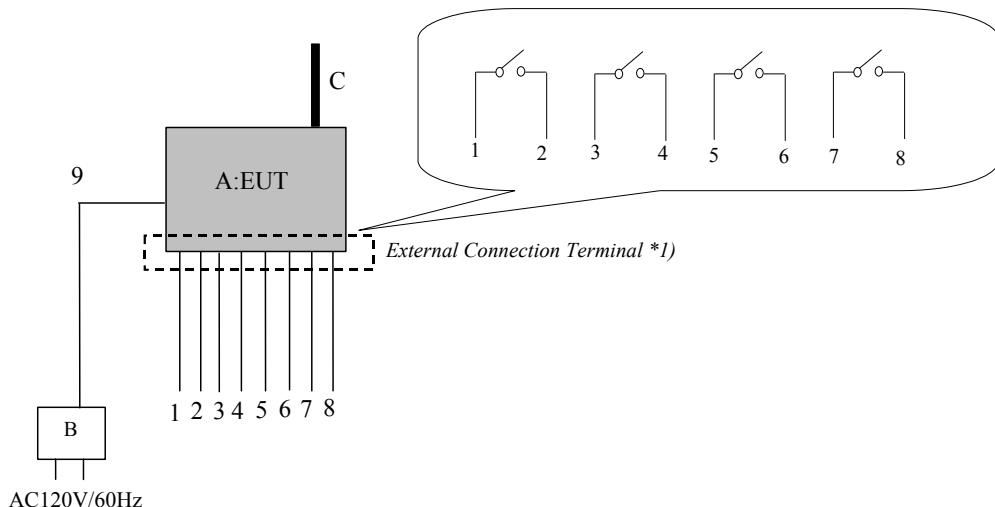
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SECTION 4: Operation of E.U.T. during testing

4.1 Operating modes

The mode is used : Receiving mode

4.2 Configuration and peripherals



*Cabling and setup were taken into consideration and test data was taken under worse case conditions.

*1) The external connection terminals are the output of MOS-FET Relay that indicates the receiving signal as ON/OFF.

A FET switch is isolated with Photo-coupler. Therefore, the test result is not affected by the length of cable.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	POKAYOKE RECEIVER	TWF-600R	CS00001	HERUTU ELECTRONICS CORPORATION	EUT
B	AC Adaptor	PA-3B	-	YAMAHA	-
C	Antenna	-	-	HERUTU ELECTRONICS CORPORATION	-

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	Cable	2.0	Unshielded	Unshielded
2	Cable	2.0	Unshielded	Unshielded
3	Cable	2.0	Unshielded	Unshielded
4	Cable	2.0	Unshielded	Unshielded
5	Cable	2.0	Unshielded	Unshielded
6	Cable	2.0	Unshielded	Unshielded
7	Cable	2.0	Unshielded	Unshielded
8	Cable	2.0	Unshielded	Unshielded
9	DC Cable	1.8	Unshielded	Unshielded

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SECTION 5: Conducted 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 wooden table of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT and its peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from the LISN/AMN and excess DC cable was bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/AMN to the input power source.

A drawing of the set up is shown in the photos of APPENDIX 1.

5.3 Test conditions

Frequency range : 0.15 MHz-30MHz
EUT position : Table top
EUT operation mode : See Clause 4.1

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT within a semi anechoic chamber. The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains network (AMN). An overview sweep with peak detection has been performed. The measurements have been performed with a quasi-peak detector and if required, with an average detector.

The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type : Quasi-Peak and Average
IF Bandwidth : 9 kHz

5.5 Test result

Summary of the test results: Pass

Date: June 4, 2006

Test engineer: Kenichi Adachi

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SECTION 6: Radiated Emission

6.1 Operating environment

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

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0m by 0.5m, raised 80cm above the conducting ground plane. The EUT was set on the edge 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.

6.3 Test conditions

Frequency range : 30MHz – 300MHz (Biconical antenna) / 300MHz – 1000MHz (Logperiodic antenna)
1GHz-2GHz (Horn antenna)
Test distance : 3m
EUT position : Table top
EUT operation mode : See Clause 4.1

6.4 Test procedure

The height of the measuring 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 with the Test Receiver, or the Spectrum Analyzer.

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
IF Bandwidth	QP: BW 120kHz	PK: RBW:1MHz/VBW: 1MHz AV: RBW:1MHz/VBW:10Hz

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

6.5 Test result

Summary of the test results: Pass

Date: June 4, 2006

Test engineer: Kenichi Adachi

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APPENDIX 1: Photographs of test setup

Conducted Emission

Front



Rear



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Radiated Emission

Front



Rear



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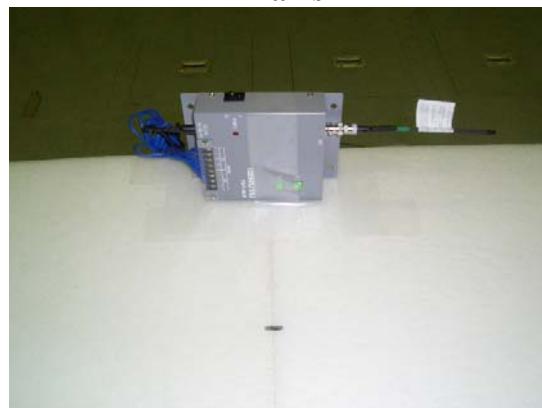
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Worst Case Position (Horizontal: Z-axis/ Vertical:Z-axis)

X-axis



Y-axis



Z-axis



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APPENDIX 2: Test instruments

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	RE / CE	2005/11/14 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE / CE	2005/11/10 * 12
MCC-01	Coaxial Cable 0.1-3000MHz	Suhner/storm/Agilent/ TSJ	-	RE	2006/02/20 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2005/12/16 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2005/10/10 * 12
MLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2005/10/14 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2006/05/27 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2006/02/09 * 12
MCC-26	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	RE	2005/08/30 * 12
MCC-18	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX 104	RE	2006/02/02 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2006/01/09 * 12
MOS-01	Digital Humidity Indicator	N.T	NT-1800	RE/CE	2004/11/25 * 24
MLS-02	LISN(AMN)	Schwarzbeck	NSLK8127	CE(EUT)	2006/06/01 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/Agilent/ TSJ	-	CE	2005/12/18 * 12
MPL-01	Pulse Limiter	Rohde & Schwarz	ESH3Z2	CE	2006/01/10 * 12
MSTW-14	EMI measurement program	TSJ	TEPTO-DV	RE/CE	

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

Test Item:

CE: Conducted emission

RE: Radiated emission

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APPENDIX 3: Data of EMI test

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

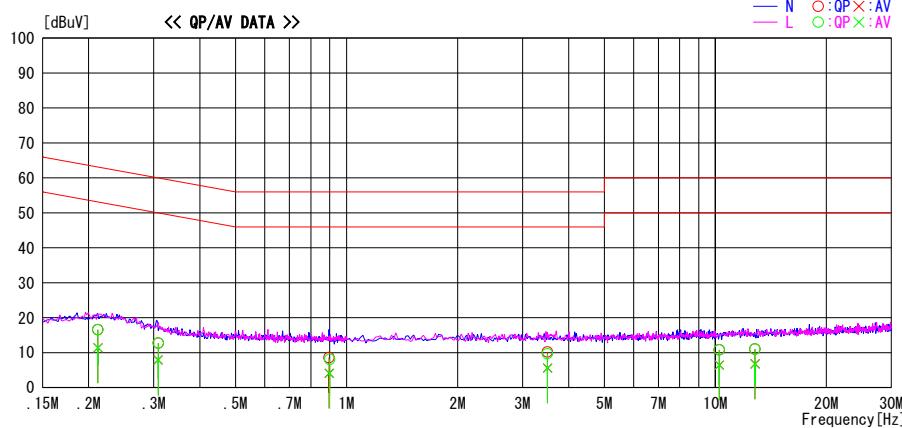
UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
 Date : 2006/06/04 18:01:23

Applicant : HERUTU ELECTRONICS CORPORATION Report No. : 26JE0089-HO
 Kind of EUT : POKAYOKE RECEIVER Power : DC 12V
 Model No. : TWF-600R Temp. / Humi. : 24deg.C / 55%
 Serial No. : CS0001 Operator : Kenichi Adachi

Mode / Remarks : Receiving mode/ Z-axis (Hor, Ver)

LIMIT : FCC15B ClassB (QP) (0.15-30MHz) / RSS-Gen
 FCC15B ClassB (AV) (0.15-30MHz) / RSS-Gen

— N ○ : QP × : AV
 — L ○ : QP × : AV



Frequency [MHz]	Reading Level			Corr.		Results		Limit		Margin		Phase
	QP [dBuV]		AV [dBuV]	Factor		QP [dB]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
	OP	AV		OP	AV	OP	AV	OP	AV	OP	AV	
0.21177	6.7	1.5	9.9	16.6	11.4	63.1	53.1	46.5	41.7	N		
0.21177	6.7	1.5	9.9	16.6	11.4	63.1	53.1	46.5	41.7	L		
0.30842	2.7	-2.1	10.0	12.7	7.9	60.0	50.0	47.3	42.1	N		
0.30842	2.7	-2.1	10.0	12.7	7.9	60.0	50.0	47.3	42.1	L		
0.89609	-1.5	-6.0	10.1	8.6	4.1	56.0	46.0	47.4	41.9	N		
0.89949	-2.0	-6.0	10.1	8.1	4.1	56.0	46.0	47.9	41.9	L		
3.50702	-0.5	-5.1	10.7	10.2	5.7	56.0	46.0	45.8	40.4	N		
3.50702	-1.0	-5.2	10.7	9.7	5.5	56.0	46.0	46.3	40.5	L		
10.25000	-0.5	-4.8	11.3	10.8	6.5	60.0	50.0	49.2	43.5	N		
10.25000	-0.5	-4.9	11.3	10.8	6.5	60.0	50.0	49.2	43.6	L		
12.80000	-0.5	-4.7	11.5	11.0	6.8	60.0	50.0	49.0	43.2	N		
12.80000	-0.5	-4.8	11.5	11.0	6.8	60.0	50.0	49.0	43.3	L		

CHART: WITH FACTOR, Peak hold data. Data is uncorrected. CALCULATION: RESULT=READING+C. F(LISN LOSS+CABLE LOSS)
 Except for the above table : adequate margin data below the limits.

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Radiated Emission

DATA OF RADIATED EMISSION TEST

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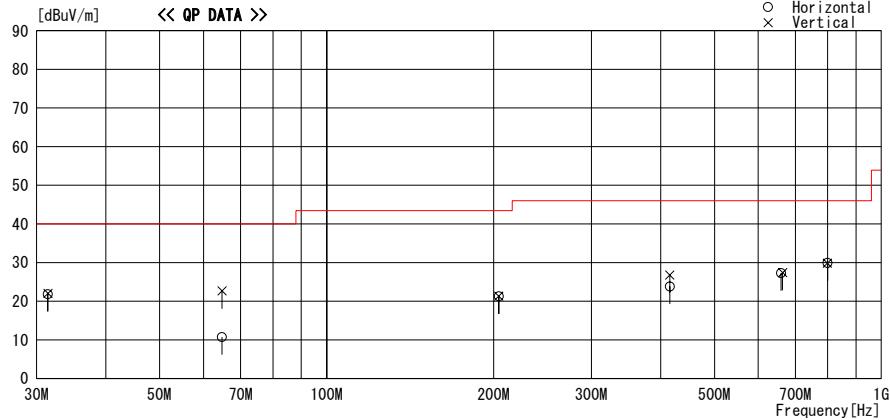
Date : 2006/06/04 12:51:48

Company : HERUTU ELECTRONICS CORPORATION Report No. : 26JE0089-HO
 Kind of EUT : POKAYOKE RECEIVER Power : DC 12V
 Model No. : TWF-600R Temp. /Humi. : 24deg.C. / 55%
 Serial No. : CS00001 Operator : Kenichi Adachi

Mode / Remarks : Receiving mode/ Z-axis (Hor, Ver)

LIMIT : FCC Part15 Subpart B Class B(3m)/USA, below1GHz:QP / RSS-Gen

— Horizontal
 — Vertical
 ○ Horizontal
 ✕ Vertical



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss& Gain [dB]	Level [dBuV/m]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Gain [dB]				
31.449	24.4	QP	18.1	-20.7	21.8	Hori.	40.0	18.2
31.449	24.7	QP	18.1	-20.7	22.1	Vert.	40.0	17.9
64.795	22.6	QP	7.8	-19.7	10.7	Hori.	40.0	29.3
64.795	34.6	QP	7.8	-19.7	22.7	Vert.	40.0	17.3
204.349	21.8	QP	17.1	-17.6	21.3	Vert.	43.5	22.2
204.349	21.8	QP	17.1	-17.6	21.3	Hori.	43.5	22.2
415.400	25.7	QP	17.7	-16.6	26.8	Vert.	46.0	19.2
415.400	22.7	QP	17.7	-16.6	23.8	Hori.	46.0	22.2
659.120	23.1	QP	20.0	-15.8	27.3	Hori.	46.0	18.7
663.333	23.1	QP	20.0	-15.7	27.4	Vert.	46.0	18.6
799.400	23.3	QP	21.6	-15.0	29.9	Hori.	46.0	16.1
799.400	23.3	QP	21.6	-15.0	29.9	Vert.	46.0	16.1

CHART:WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

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DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
 Date : 2006/06/04 15:54:36

Company : HERUTU ELECTRONICS CORPORATION Report No. : 26JE0089-HO
 Kind of EUT : POKAYOKE RECEIVER Power : DC 12V
 Model No. : TWF-600R Temp. /Humi. : 24deg. C. / 55%
 Serial No. : CS00001 Operator : Kenichi Adachi

Mode / Remarks : Receiving mode/ Z-axis (Hor, Ver)

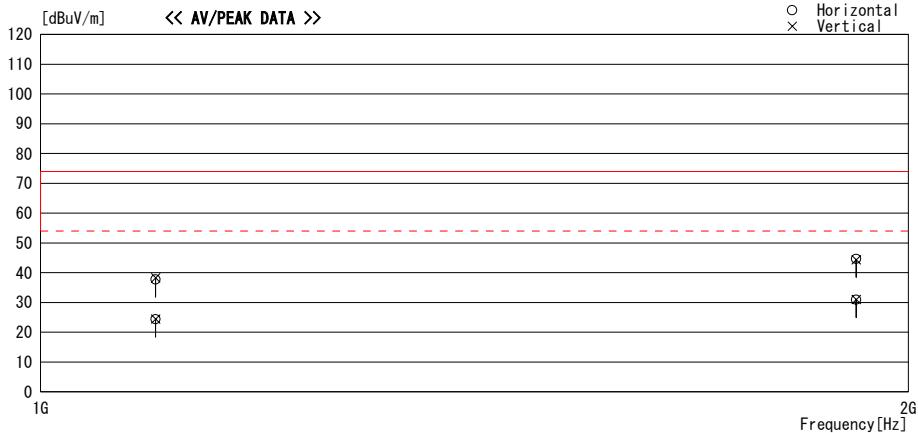
LIMIT : FCC Part15 Subpart B Class B (3m)/USA, above1GHz:PK / RSS-Gen
 FCC Part15 Subpart B Class B (3m)/USA, above1GHz:AV / RSS-210 / RSS-Gen

— Horizontal

— Vertical

○ Horizontal

× Vertical



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss& Gain		Level [dBuV/m]	Polar.	Limit [dBuV/m]	Margin [dB]
				Factor [dB/m]	Gain [dB]				
1096.143	48.3	PK		23.5	-34.1	37.7	Hori.	73.9	36.2
1096.143	48.8	PK		23.5	-34.1	38.2	Vert.	73.9	35.7
1096.143	35.0	AV		23.5	-34.1	24.4	Hori.	53.9	29.5
1096.143	35.0	AV		23.5	-34.1	24.4	Vert.	53.9	29.5
1918.146	47.3	PK		30.4	-33.1	44.6	Hori.	73.9	29.3
1918.146	33.7	AV		30.4	-33.1	31.0	Hori.	53.9	22.9
1918.146	47.0	PK		30.4	-33.1	44.3	Vert.	73.9	29.6
1918.146	33.7	AV		30.4	-33.1	31.0	Vert.	53.9	22.9

CHART:WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

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APPENDIX 4: Label and Label location

