

EMI TEST REPORT

Test Report No. : 26IE0025-YK

Applicant	:	MEIJI ELECTRIC INDUSTRIES CO., LTD.
Type of Equipment	:	Connector Check Gauge
Model No.	:	NWF-610
FCC ID	:	T6H-NWF610
Test Standard	:	FCC Part15 Subpart C Section 15.209, Section 15.231: 2006
Test Result	:	Complied

1. This test report shall not be reproduced except in full, 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 test report are traceable to the national or international standards.

Date of test:

April 20 and 28, 2006

Tested by:

Toyokazu Imamura

Approved by:

Osamu Watatani Site Manager of Yamakita EMC Lab.

FCC ID:T6H-NWF610Test report No.:26IE0025-YKPage:2 of 20Issued date:June 1, 2006

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1 Applicant Information

Company Name	:	MEIJI ELECTRIC INDUSTRIES CO., LTD.
Address	:	13-8 Kamejima 2-chome, Nakamura-ku, Nagoya-shi, Aichi-ken, 453-8580 JAPAN
Telephone Number	:	+81-52-451-7661
Facsimile Number	:	+81-52-451-7659
Contact Person	:	Kaoru Okada

UL Apex Co., Ltd. YAMAKITA EMC LAB. 907 Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken, 258-0124 JAPAN

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2 Product Description

Type of Equipment	:	Connector Check Gauge
Model No.	:	NWF-610
Serial No.	:	Sample 1
Rating	:	DC 3.0V
Country of Manufacture	:	Japan
Receipt Date of Sample	:	April 19, 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.

Model: NWF-610 (referred to as the EUT in this report) is a Connector Check Gauge which is composed of a fitting frame equipped with touch sensor and a radio transmitter.

Equipment type Operation temperature range Other clock frequency Emission designation	: : :	Transmitter 0 ~ 50 deg. C. 71.0166MHz, 213.05MHz 40K5F1D
Frequency of operation	:	426.1MHz (Single)
Modulation	:	FSK
Antenna type	:	Built-in

FCC Part15.31 (e)

The EUT provides stable voltage, DC2.2V constantly to RF module regardless of input voltage, and the test was performed with the new battery. Therefore, the EUT complies with the power supply regulation.

FCC Part15.203 Antenna requirement

It is impossible for users to replace the antenna because the antenna is mounted inside the EUT. Therefore, the EUT complies with the antenna requirement.

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3 Test Specification, Procedures and Results

3.1 Test specification

Test specification	: FCC Part15 Subpart C: 2006
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 - 40.70 MHz and above 70 MHz

3.2 **Procedures & Results**

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted Emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	Section 15.207(a)	AC Mains	N/A *1	-	N/A
Automatically Deactivate	ANSI C63.4: 2003	Section 15.231(a)(1)	Radiated	N/A	-	Complied
Electric Field Strength of Fundamental Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	Section 15.231(b)	Radiated	N/A	7.1dB (QP, Horizontal)	Complied
Electric Field Strength of Spurious Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	Section 15.209	Radiated	N/A	4.8dB (852.20MHz, QP, Horizontal)	Complied
-20dB Bandwidth	ANSI C63.4: 2003 Annex H.6 Occupied bandwidth measurements	Section 15.231(c)	Radiated	N/A	-	Complied

*1) The test is not applicable since the EUT has no AC mains.

Note: UL Apex's EMI Work Procedures No.QPM05.

3.3 Addition to standard

No addition, deviation or exclusion has been made from the standard.

3.4 Uncertainty

Radiated emission

The measurement uncertainty (with 95% confidence level) for this test using Biconical antenna is ± 4.5 dB. The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ± 4.3 dB. The measurement uncertainty (with 95% confidence level) for this test using Horn antenna is ± 5.2 dB.

The data listed in this test report has enough margin, more than site margin.

3.5 **Test Location**

UL Apex Co., Ltd. Yamakita EMC Lab. 907, Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken 258-0124 JAPAN Telephone number : +81 465 77 1011 Facsimile number : +81 465 77 2112 NVLAP Lab. code : 200441-0

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on August 26, 2005 (Registration No.: 95486). IC Registration No. : IC3489A

No. 2 test site has been fully described in a report submitted to FCC office, and accepted on April 4, 2005 (Registration No.: 466226). IC Registration No. : IC3489A-2

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).

IC3489A-B IC Registration No. :

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 shielded room	8.0 x 5.0 x 2.5	No.1 EMS lab.	10.0 x 7.5 x 5.7
No.2 shielded room	5.0 x 4.0 x 2.5	(Semi-anechoic chamber)	
No.3 shielded room	4.0 x 5.0 x 2.7		

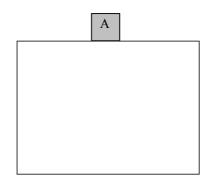
4 System Test Configuration

4.1 Justification

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

Test mode: Transmitting

4.2 Configuration of Tested System



* Test data was taken under worse case conditions.

Description of EUT

No.	Item	Model	Serial	Manufacturer	FCC ID (Remarks)
		number	number		
А	Connector Check Gauge	NWF-610	T T		T6H-NWF610
				INDUSTRIES	(EUT)

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5 Automatically deactivate

5.1 Operating environment

The test was carried out in No.1 anechoic chamber.

5.2 Results

Limit: A manually transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Summary of Test data	the test results : :	Pass APPENDIX 2 Page 14	
Date :	April 20, 2006	Test engineer :	Toyokazu Imamura

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6 Radiated Emissions

6.1 Operating environment

The test was carried out in No.1 anechoic chamber.

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. A drawing of the set up is shown in the photos of Appendix 1.

6.3 Test conditions

Frequency range	:	30 - 5000MHz
Test distance	:	3m
EUT operation mode	:	Transmitting

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m. The measuring antenna height was 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.

Measurements were performed with QP, PK, and AV detector.

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

Frequency	Below 1GHz	Above 1GHz
Detector	QP	PK/AV
IF Bandwidth	QP: BW 120kHz	PK: RBW: 1MHz/VBW: 1MHz
		AV: RBW: 1MHz/VBW: 10Hz

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

The equipment was previously checked at each position of three axes X, Y and Z. The position in which the maximum noise occurred was chosen to put into measurement. See the table below and photographs in page 13. With the position, the noise levels of all the frequencies were measured.

	EUT
Horizontal	Х
Vertical	Z

6.5 Results

Summary of the test results : Pass

Test data	:	APPENDIX 2 Page 15 (Fundamental)
	:	APPENDIX 2 Page 16 to 18 (Spurious)

Date : April 20 and 28, 2006

Test engineer : Toyokazu Imamura

7 20dB Bandwidth

7.1 **Operating environment**

The test was carried out in No.1 anechoic chamber.

7.2 **Test procedure**

The bandwidth was measured with a spectrum analyzer and an antenna which is placed by the EUT.

7.3 Results

-20dB Bandwidth	:	40.48kHz
Occupied Bandwidth (99%)	:	86.17kHz

Summary of the test results : Pass Test data APPENDIX 2 Page 19 :

Date	:	April 20, 2006	Test engineer :	Toyokazu Imamura
		1	-	•

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APPENDIX 1: Photographs of test setup

Page 12	:	Radiated emission
Page 13	:	Pre-check of the worst position

APPENDIX 2: Test Data

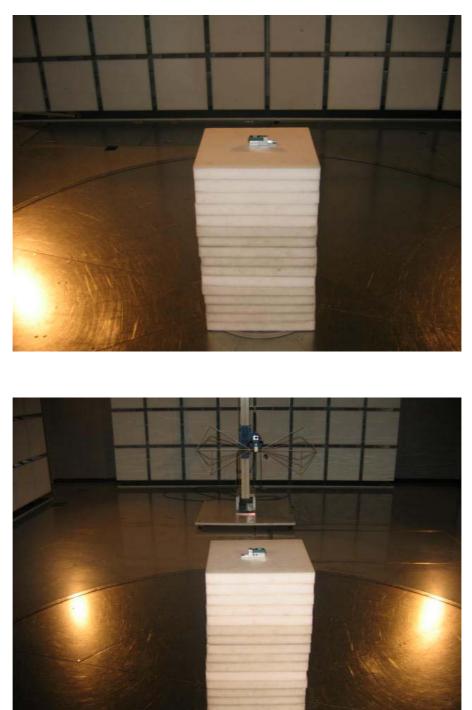
Page 14	:	Automatically deactivate
Page 15 - 18	:	Radiated emission
15	:	Fundamental
16 - 18	:	Spurious
Page 19	:	20dB bandwidth and Occupied bandwidth

APPENDIX 3: Test instruments

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Radiated emission



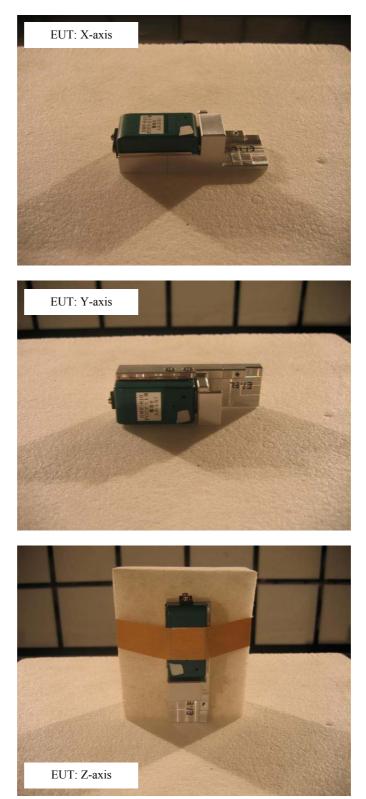
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Pre-check of worst position



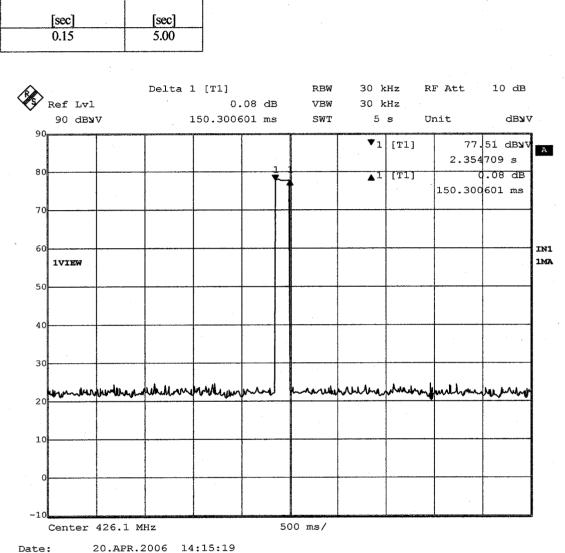
UL Apex Co., Ltd. YAMAKITA EMC LAB.

907 Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken, 258-0124 JAPAN

Telephone: +81 465 77 1011 Facsimile: +81 465 77 2112

Automatically deactivate: FCC 15.231(a)(1) UL Apex Co.,Ltd. Yamakita No.1 Anechoic Chanber

		ULAPEX CO., Liu.	iamakna ivo.i Anechoic Changer
COMPANY	: MEIJI ELECTRIC INDUSTRIES CO., LTD.	REPORT NO	: 26IE0025-YK
EQUIPMENT	: CONNECTOR CHECK GAUGE	REGULATION	: Fcc Part15SubpartC 231(a)(1)
MODEL NUMBE	R: NWF-610	DATE	: 2006/04/20
SERIAL NUMBEI	R : Sample1	TEMP./HUMI	: 22°C/55%
FCC ID	: T6H-NWF610	TEST MODE	: Transmitting
POWER	: DC3V	ENGINEER	: Toyokazu Imamura



Date:

Time of Transmitting

Limit

Electric Field Strength of Fundamental

UL Apex Co.,Ltd. YAMAKITA NO.1 ANECHOIC CHAMBER Report No. : 26IE0025-YK

Company	: MEIJI ELECTRIC INDUSTRIES CO., LTD.
Equipment	: CONNECTOR CHECK GAUGE
Model	: NWF-610
Sample No.	: Sample1
Power	: DC3V
Mode	: Transmitting
FCC ID	: T6H-NWF610
Remark	: Type E1-2

Regulation	: FCC Part15C Section 15.231(b)
Test Distance	: 3m
Date	: 2006/4/20
Temperature	: 22deg.C
Humidity	: 55%

ENGINEER

: Toyokazu Imamura

Fundamental : QP DETECT(Test Receiver : IF BW 120kHz)

No.	FREQ	REA	DING	ANT	AMP	CABLE	ATTEN	RESULT		LIMIT	MAF	RGIN
		HOR	VER	Factor	GAIN	LOSS		HOR	VER		HOR	VER
	[MHz]	[dB	uV]	[dB]	[dB]	[dB]	[dB]	[dBu]	V/m]	[dBuV/m]	[d	B]
1	426.10	71.8	71.2	18.2	27.5	5.0	6.0	73.5	72.9	80.6	7.1	7.7

Sample Calculation : RESULT=Reading + ANT Factor - Amp Gain + Cabele Loss + ATT

DATA OF RADIATION TEST

UL Apex Co.,Ltd. YAMAKITA No.1 ANECHOIC CHAMBER Report No.: 261E0025-YK

Kind Mode Seri Powe Mode Rema Date Test Temp Humi	al No. r rks Distan erature	се		CONN NWF- Samp DC3V Tran Type 4/20 3 m 22 °C 55 9	ECTOR C 610 le1 smittin E1-2 /2006 C	HECK (AUGE	ES CO.,I	_TD. gineer	: T	oyokazu	Imamul	ra
No.	FREQ.	ANT TYPE	REAL HOR [db]	VER	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESU HOR [dB µ]	ULT VER V/m] [d	LIMITS BµV/m]	HOR	RGIN VER IB]
1. 2. 3. 4. 5. 6.	71. 01 213. 04 355. 07 497. 11 852. 20 994. 22	BB BB BB BB	25. 8 28. 0 25. 2 25. 7 34. 2 30. 7	26. 6 23. 5 21. 2 27. 3 33. 9 32. 3	$\begin{array}{c} 7.4 \\ 17.2 \\ 16.6 \\ 18.5 \\ 22.1 \\ 24.1 \end{array}$	27.5 27.0 27.0 27.9 27.6 27.5	3.0 4.4 5.1 6.4	6.0 6.0	13. 427. 225. 227. 441. 240. 5	14. 222. 721. 229. 040. 942. 1	$\begin{array}{c} 40.\ 0\\ 43.\ 5\\ 46.\ 0\\ 46.\ 0\\ 46.\ 0\\ 54.\ 0\end{array}$	26.616.320.818.64.813.5	25.820.824.817.0 $5.111.9$

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KBA-03 (BBA9106) 30-299MHz/KLA-03 (USLP9143) 300-1000MHz ■ AMP: KAF-05 (8447D) ■ RECEIVER: KTR-01 (ESI40) ■ KCC-30_31_32_34 (RE)

Page:

DATA OF RADIATION TEST

UL Apex Co.,Ltd. YAMAKITA No.1 ANECHOIC CHAMBER Report No. : 261E0025-YK

Kind Mode Seri Powe Rema Date Test Temp Humi	irks	nent	: CONN : NWF- : Samp : DC3V : Tran : Type : 4/28 : 3 m : 19 °C : 53 9	ECTOR C 610 le1 smittin E1-2 /2006 C 6	heck g PK De	AUGE	ES CO.,L RBW:1MH Eng Detecti	lz, VBW gineer	: To	oyokazu 1∕26−400		ra
No.	FREQ. AN	T RE PE HOR	ADING VER	ANT FACTOR	AMP GAIN	CABLE LOSS	ATTEN.	RESI HOR	ULT L VER	IMITS.	MAR HOR	GIN VER
	[MHz]		BμV]	[dB/m]	[dB]	[dB]	[dB]		V/m] [dB	βμV/m]		IB]
1.		B 51.3		24.4	37.6		0.0	42.4	43.9	74.0	31.6	30.1
2.		B 52.1		24.6	37.3		0.0	44.1	43.4	74.0	29.9 31.8	30.6 29.9
3.		BB 49.1 BB 50.4		$24.9 \\ 26.4$	36.9 36.8		$\begin{array}{c} 0.0\\ 0.0\end{array}$	$42.2 \\ 45.5$	44. 1 47. 7	74. 0 74. 0	28.5	29.9 26.3
4. 5.		BB 48.5		27.9	36.7		0.0	45.6	49.0	74.0	28.4	25.0
6.		3B 46.9		28.6	36.7		0.0	45.0	45.2	74.0	29.0	28.8
7.		B 46.7		28.7	36.8	6.5	0.0	45.1	45.3	74.0	28.9	28.7
8.	2556.60 E	BB 46.7	46.2	29.0	36.9		0.0	45.6	45.1	74.0	28.4	28.9
9.		BB 45.8		30.2	37.4		0.0	46.2	46.1	74.0	27.8	27.9
10.		BB 45.4		30.1	37.1		0.0	46.6	46.7	74.0	27.4	27.3
11. 12.		3B 43.9 3B 44.1	44.3 43.7	31.4 32.1	36.8 36.7		$\begin{array}{c} 0.0\\ 0.0\end{array}$	$47.1 \\ 48.6$	$47.5 \\ 48.2$	74. 0 74. 0	26.9 25.4	26.5 25.8
± 64 •	1201.00											

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz ■ CABLE: KCC-D11/D12 ■ PREAMP: KAF-02 (8449B) ■ SPECTRUMANALYZER: KSA-04 (R3271A)

Page:

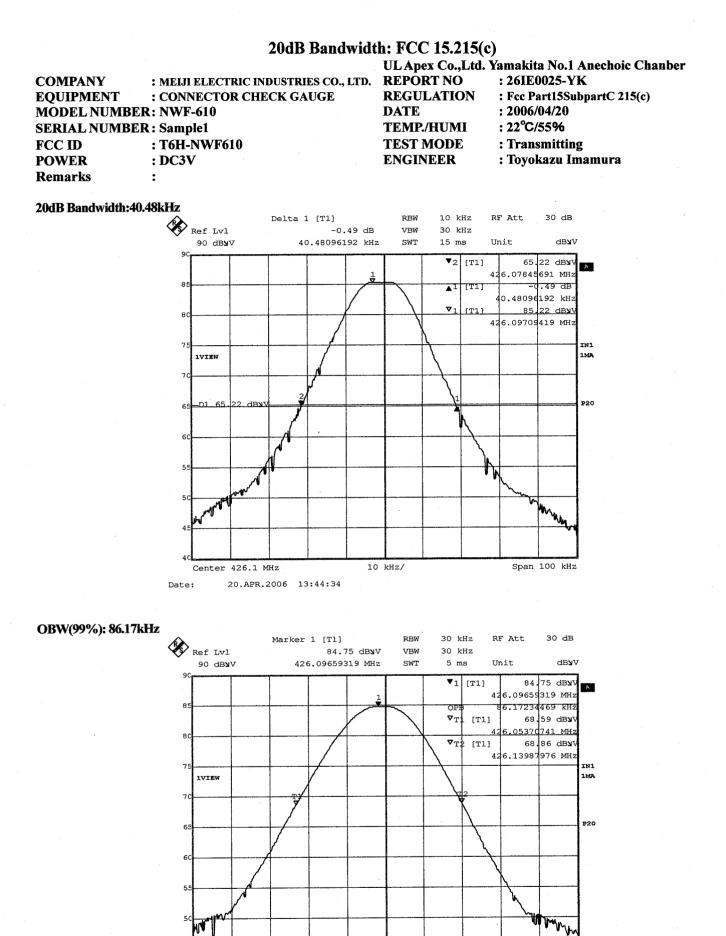
DATA OF RADIATION TEST

UL Apex Co.,Ltd. YAMAKITA No.1 ANECHOIC CHAMBER Report No.: 261E0025-YK

Kind Mode Seri Powe Mode Rema Date Test Temp Humi	irks			CONN NWF- Samp DC3V Tran Type 4/28 3 m 19 °C 53 9	ECTOR C 610 le1 smittin E1-2 /2006 C 6	g AV De	AUGE	ES CO., L RBW:1MH Eng Detect	Hz, VBW gineer	: To	oyokazu n/26-40		
No.	FREQ.	ANT TYPE	REAI HOR		ANT FACTOR	AMP GAIN	CABLE LOSS	ATTEN.	RESU HOR	JLT I VER	LIMITS	MA HOR	RGIN VER
	[MHz]	IIIE	[dB		[dB/m]	[dB]	[dB]	[dB]		//m] [dE	3μV/m]		dB]
1.	1065.29	BB	42.7	44.5	24.4	37.6		0.0	33.8	35.6	54.0	20.2	18.4
2.	1278.30	BB	47.0	46.1	24.6	37.3		0.0	39.0	38.1	54.0	15.0	15.9
3.	1491.36	BB	41.2	46.2	24.9	36.9	5.1	0.0	34.3	39.3	54.0	19.7	14.7
4.	1704.40	BB	44.0	48.0	26.4	36.8		0.0	39.1	43.1	54.0	14.9	10.9
5.	1917.46	BB	39.1	47.3	27.9	36.7	5.9	0.0	36.2	44.4	54.0	17.8	9.6
6.	2130.50	BB	35.4	36.7	28.6	36.7	6.2	0.0	33.5	34.8	54.0	20.5	19.2
7.	2343.63	BB	35.2	35.5	28.7	36.8		0.0	33.6	33.9	54. 0 54. 0	20.4	20. 1 19. 7
8.	2556.60	BB	36.1	35.4	29.0	36.9		0.0	35. 0 35. 0	34.3	54.0 54.0	19. 0 19. 0	19.7 19.0
9.	2982.70	BB	34.6	34.6	30.2	37.4 37.1	7.6	0.0	35.0 34.8	35.0 35.1	54, 0 54, 0	19.0	19.0
10.	3408.80	BB	33.6	33.9	30.1			0.0	34. o 36. 5	36. 4	54.0 54.0	19.2	17.6
$11. \\ 12.$	3834.90 4261.00	BB BB	33. 3 32. 7	33. 2 32. 5	$\begin{array}{c} 31.4\\ 32.1 \end{array}$	36.8 36.7	9.1	0.0	37.2	37.0	54.0	16.8	17.0

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KHA-01 (SAS-200 571) 1-18GHz ■ CABLE: KCC-D11/D12 ■ PREAMP: KAF-02 (8449B) ■ SPECTRUMANALYZER: KSA-04 (R3271A)



Span 200 kHz

20 kHz/

Center 426.1 MHz

Date:

20.APR.2006 13:47:55

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APPENDIX 3 Test Instruments

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
YA-RE	Radiated emission(software)	UL-Apex	RE(Ver.1.5)	RE	-
KAEC-01(NS A)	Anechoic Chamber	JSE	Semi 3m	RE/BW/A D	2005/09/03 * 12
KAF-05	Pre Amplifier	Agilent	8447D	RE/BW/A D	2005/05/11 * 12 2006/04/21 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE/BW/A D	2006/03/24 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2006/01/17 * 12
KCC-30/31/3 2/34/KRM-03	Coaxial Cable/RF Relay Matrix	Fujikura/Suhner/TSJ	5D-2W/S04272B/RF M-E421	RE/BW/A D	2005/12/22 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE/BW/A D	2006/01/17 * 12
KSA-04	Spectrum Analyzer	Advantest	R3271A	RE	2005/09/13 * 12
KTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE/BW/A D	2005/08/05 * 12
KOS-02	Digital Humidity Indicator	Custom	CTH-190	RE/BW/A D	2004/07/22 * 24
KAF-02	Pre Amplifier	Hewlett Packard	8449B	RE	2005/04/28 * 12 2006/04/24 * 12
KCC-D11/D1 2	Coaxial cable	Suhner/storm	SCOFLEX103/ 90-388-020	RE	2005/09/09 * 12
KHA-01	Horn Antenna	A.H.Systems	SAS-200/571	RE	2005/08/20 * 12

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

RE: Radiated emission

BW: Bandwidth

AD: Automatically deactivate