EMI TEST REPORT

Test Report No.: 27HE0382-YK-A

Applicant	:	**ASAHI DENSO CO., LTD.**
Type of Equipment	:	**Antenna for Immobilizer system**
Model No.	:	**CZ106**
FCC ID	:	**T8VCZ106**
Test regulation	:	**FCC Part15 Subpart C: 2007**
Test result	:	**Complied**

1. This test report shall not be reproduced except in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.

Date of test: January 27, 2008

Tested by: T. Arai
Tatsuya Arai

Approved by: O. Watatani
Osamu Watatani
Manager of Yamakita EMC Lab.

UL Japan, Inc.
YAMAKITA EMC LAB.

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

Company Name	:	ASAHI DENSO CO., LTD.
Brand Name		AD
Address	:	1126 Nakajo, Hamamatsu-shi, Shizuoka-ken, 434-0043 Japan
Telephone Number	:	+81-53-587-2195
Facsimile Number	:	+81-53-584-1589
Contact Person	:	Akihiko Tsuchikiri

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

2.1 Identification of E.U.T.

Type of Equipment	:	Antenna for Immobilizer system
Model No.	:	CZ106
Serial No.	:	7Y09
Rating	:	DC12.0V
Country of Manufacture	:	Japan
Receipt Date of Sample	:	November 13, 2007
Condition of EUT	:	Engineering 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: CZ106 is an Antenna for Immobilizer system.

Equipment type	:	Transceiver
Frequency of operation	:	134.2 kHz
Clock frequency	:	16MHz
Type of modulation	:	ASK
Antenna type	:	Coil
Antenna connector type	:	Soldering
ITU code	:	A1N
Operation temperature range	:	-20 ~ +80 deg. C.

*FCC Part 15.31 (e)

The module is provided stable power supply (DC 5V), and the power is not changed when voltage of the main unit is varied. Therefore, the equipment complies power supply regulation.

*FCC Part 15.203

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the vehicle. Therefore, the equipment complies with the requirement.

3 Test Specification, Procedures and Results

3.1 Test specification

Test specification : FCC Part15 Subpart C: 2007, final revised on November 13, 2007
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207: Conducted limits
Section 15.209: Radiated emission limits, general requirements

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	FCC Section 15.207	-	N/A *1)	N/A	N/A
Electric Field Strength of Fundamental Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	FCC Section 15.209	Radiated	N/A	33.9dB (Horizontal)	Complied
Electric Field Strength of Spurious Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	FCC Section 15.209	Radiated	N/A	9.5dB (212.50MHz, Horizontal)	Complied
26dB Bandwidth	ANSI C63.4: 2003 13. Measurement of intentional radiators	-	Radiated	N/A	-	Complied

*1) The test is not applicable since the EUT has no AC mains.
Note: UL Japan's EMI Work Procedures No.QPM05 and QPM15.

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	-	Complied

* Other than mentioned above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

	No.1 open site (±)	No.2 open site (±)	No.1 anechoic chamber (±)
Radiated emission (3m)			
<30MHz	2.3 dB	2.3 dB	2.2 dB
30-300MHz	4.5 dB	4.4 dB	4.5 dB
300-1000MHz	4.3 dB	4.3 dB	4.3 dB

Radiated Emission Test

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

3.5 Test Location

UL Japan, Inc. 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. : 2973B-1

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. : 2973B-3

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).
IC Registration No. : 2973B-2

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 Semi-anechoic chamber	10.0 x 7.5 x 5.7
No.2 shielded room	5.0 x 4.0 x 2.5		
No.3 shielded room	4.0 x 5.0 x 2.7		

Open test site	Maximum measurement distance
No.1 open test site	30m
No.2 open test site	10m

3.6 Test Setup, Data of EMI & Test instruments

Refer to Appendix 1 to 3.

4 System Test Configuration

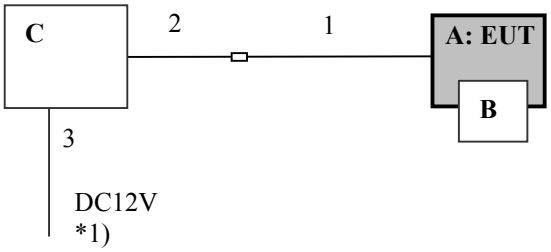
4.1 Justification

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

Operation: Key Access mode (Transmitting (134.2kHz))

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

4.2 Configuration of Tested System



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID (Remark)
A	Immobilizer	CZ106	7Y09	ASAHI DENSO CO., LTD.	T8VCZ106 (EUT)
B	Key chip	459A	-	Kubota	-
C	ECU	-	-	-	-

*1) DC Power Supply (Model: PAN35-10A) was used for DC 12V input.

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC & Signal cable	0.4	Unshielded	Unshielded	-
2	DC & Signal cable	1.5	Unshielded	Unshielded	-
3	DC cable	2.5	Unshielded	Unshielded	-

5 Radiated Emissions (Fundamental and Spurious)

5.1 Operating environment

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

Temperature : See test data
Humidity : See test data

5.2 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.

5.3 Test conditions

Frequency range : 9kHz - 1GHz
EUT position : Table top
EUT operation mode : Transmitting

5.4 Test procedure

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

Frequency: From 9kHz to 30MHz at distance 3m
The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for each antenna angle 0deg., 45deg. and 90deg.

Frequency: From 30MHz to 1GHz at distance 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.

	9kHz to 90kHz & 110kHz to 150kHz	90kHz to 110kHz	150kHz to 490kHz	490kHz to 30MHz	30MHz to 1GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz
Measuring antenna	Loop antenna				Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz)

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 and photographs in page 11. With the position, the noise levels of all the frequencies were measured.

* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)
9kHz – 490kHz [Limit at 3m]= [Limit at 300m]-40log (3[m]/300[m])
490kHz – 30MHz [Limit at 3m]= [Limit at 30m]-40log (3[m]/30[m])

5.5 Results

Summary of the test results : Pass

Date : January 27, 2008 Test engineer : Tatsuya Arai

6 26dB Bandwidth & Occupied Bandwidth (99%)

6.1 Operating environment

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

6.2 Test procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

6.3 Results

Summary of the test results : Pass

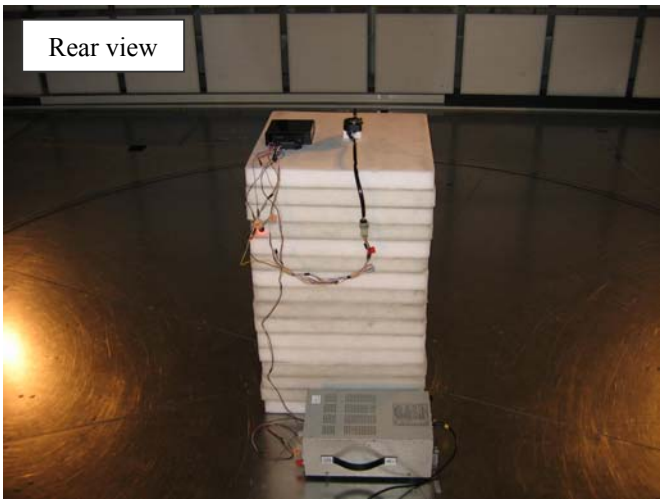
Date : January 27, 2008 Test engineer : Tatsuya Arai

APPENDIX 1: Photographs of test setup

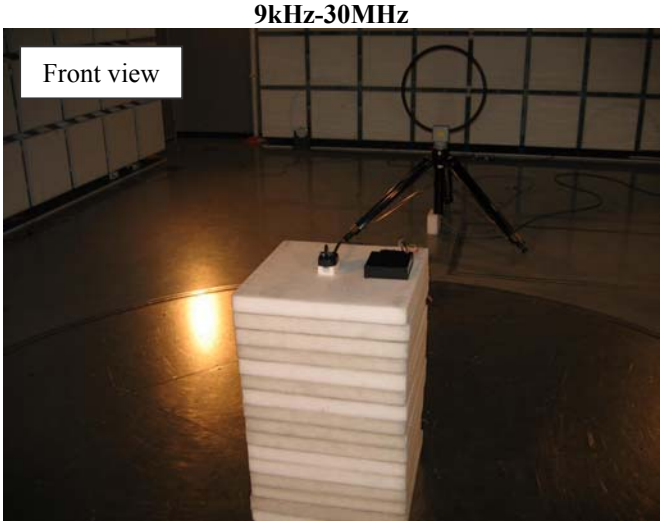
APPENDIX 2: Test Data

APPENDIX 3: Test instruments

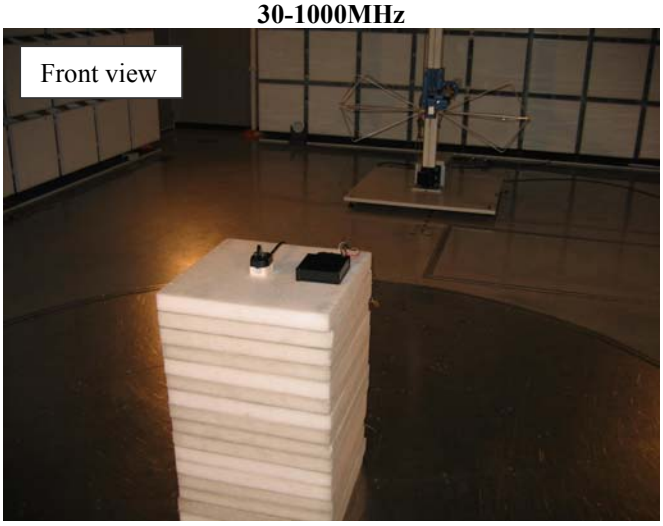
Radiated emission



9kHz-30MHz



30-1000MHz



Pre-check of the worst position

	Below 30MHz	Above 30MHz
Horizontal	Y	Y
Vertical	Y	Y

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA NO.1 ANECHOIC CHAMBER
Report No. : 27HE0382-YK-A

Company : ASAHIDENSO CO., LTD
Equipment : Antenna for Immobilizer system
Model : CZ106
Sample No. : 7Y09
Power : DC12V
Mode : KeyAccess mode

Regulation : FCC Part15C Section 15.209
Test Distance : 3m
Date : 2008/1/27
Temperature : 22deg.C
Humidity : 41%

ENGINEER : Tatsuya Arai

PK DETECT

No.	FREQ	READING		ANT	AMP	CABLE	ATTEN	Distance	RESULT		LIMIT	MARGIN	
		HOR	VER	Factor	GAIN	LOSS		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB]	[dB]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
1	0.1342	81.5	78.5	19.2	26.5	0.1	6.1	80.0	0.4	-2.6	45.0	44.6	47.6
2	0.2684	38.7	38.5	19.2	27.8	0.1	6.0	80.0	-43.8	-44.0	39.0	82.8	83.0
3	0.4026	45.5	43.3	19.2	28.1	0.1	6.0	80.0	-37.3	-39.5	35.5	72.8	75.0

Sample Calculation :
RESULT=Reading + ANT Factor - Amp Gain + Cabele Loss + ATT + Duty Factor - Distance Factor
Distance Factor calculation: 40*log (300.0[m]/3.0[m]) = 80.0[dB]

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA NO.1 ANECHOIC CHAMBER
Report No. : 27HE0382-YK-A

Company : ASAHIDENSO CO., LTD
Equipment : Antenna for Immobilizer system
Model : CZ106
Sample No. : 7Y09
Power : DC12V
Mode : KeyAccess mode

Regulation : FCC Part15C Section 15.209
Test Distance : 3m
Date : 2008/1/27
Temperature : 22deg.C
Humidity : 41%

ENGINEER : Tatsuya Arai

AV DETECT

No.	FREQ	READING		ANT	AMP	CABLE	ATTEN	Distance	RESULT		LIMIT	MARGIN	
		HOR	VER	Factor	GAIN	LOSS		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB]	[dB]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
1	0.1342	72.2	68.8	19.2	26.5	0.1	6.1	80.0	-8.9	-12.3	25.0	33.9	37.3
2	0.2684	27.1	26.9	19.2	27.8	0.1	6.0	80.0	-55.4	-55.6	19.0	74.4	74.6
3	0.4026	36.0	33.3	19.2	28.1	0.1	6.0	80.0	-46.8	-49.5	15.5	62.3	65.0

Sample Calculation :
RESULT=Reading + ANT Factor - Amp Gain + Cabele Loss + ATT + Duty Factor - Distance Factor
Distance Factor calculation: 40*log (300.0[m]/3.0[m]) = 80.0[dB]

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA NO.1 ANECHOIC CHAMBER
Report No. : 27HE0382-YK-A

Company : ASAHIDENSO CO., LTD
Equipment : Antenna for Immobilizer system
Model : CZ106
Sample No. : 7Y09
Power : DC12V
Mode : KeyAccess mode

Regulation : FCC Part15C Section 15.209
Test Distance : 3m
Date : 2008/1/27
Temperature : 22deg.C
Humidity : 41%

ENGINEER : Tatsuya Arai

QP DETECT

No.	FREQ	READING		ANT	AMP	CABLE	ATTEN	Distance	RESULT		LIMIT	MARGIN	
		HOR	VER	Factor	GAIN	LOSS		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB]	[dB]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
1	0.5368	35.0	30.5	19.2	28.2	0.1	6.0	40.0	-7.9	-12.4	33.0	40.9	45.4
2	0.6710	37.0	34.4	19.1	28.2	0.2	6.0	40.0	-5.9	-8.5	31.0	36.9	39.5
3	0.8052	29.4	28.7	19.1	28.2	0.2	6.0	40.0	-13.5	-14.2	29.4	42.9	43.6
4	0.9394	37.8	35.0	19.1	28.3	0.2	6.0	40.0	-5.2	-8.0	28.1	33.3	36.1
5	1.0736	28.0	27.8	19.1	28.3	0.2	6.0	40.0	-15	-15.2	26.9	41.9	42.1
6	1.2078	34.1	31.9	19.1	28.3	0.2	6.0	40.0	-8.9	-11.1	25.9	34.8	37.0
7	1.3420	27.5	27.9	19.1	28.3	0.2	6.0	40.0	-15.5	-15.1	25.0	40.5	40.1

Sample Calculation :
RESULT=Reading + ANT Factor - Amp Gain + Cabele Loss + ATT + Duty Factor - Distance Factor
Distance Factor calculation: 40*log (30.0[m]/3.0[m]) = 40.0[dB]

DATA OF RADIATION TEST

UL Japan, Inc.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 27HE0382-YK-A

Applicant : ASAHIDENSO CO.,LTD
Kind of Equipment : ANTENNA for Immobilizer System
Model No. : CZ106
Serial No. : 7Y09
Power : DC12.0V
Mode : KeyAccess mode
Remarks :
Date : 1/27/2008
Test Distance : 3 m
Temperature : 22 ℃ Engineer : Tatsuya Arai
Humidity : 41 %
Regulation : FCC Part15C §15.209

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	49.40	BB	23.6	34.9	10.4	28.9	1.4	5.8	12.3	23.6	40.0	27.7	16.4
2.	167.49	BB	37.7	35.3	15.6	28.2	2.7	5.8	33.6	31.2	43.5	9.9	12.3
3.	172.50	BB	37.3	34.3	15.9	28.2	2.8	5.8	33.6	30.6	43.5	9.9	12.9
4.	192.51	BB	35.1	28.2	16.6	28.0	2.9	5.8	32.4	25.5	43.5	11.1	18.0
5.	207.52	BB	36.0	30.3	16.9	27.9	3.1	5.8	33.9	28.2	43.5	9.6	15.3
6.	212.50	BB	36.0	32.3	17.0	27.9	3.1	5.8	34.0	30.3	43.5	9.5	13.2

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

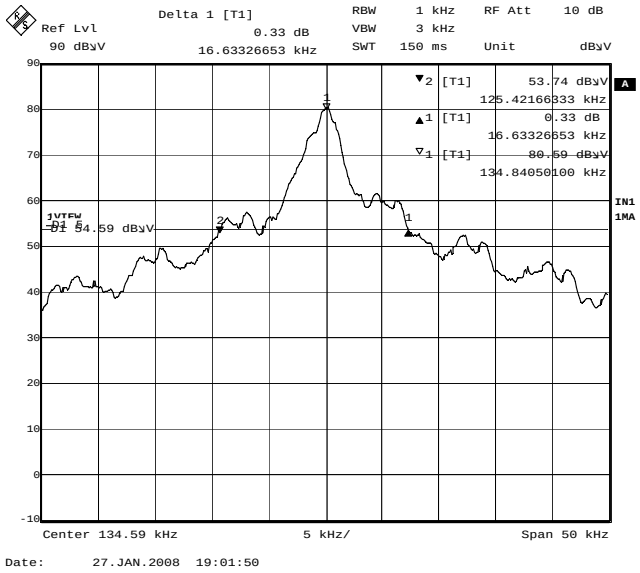
■ANTENNA:KBA-03(BBA9106)30-299.99MHz/KLA-03(USLP9143)300-1000MHz
■AMP:KAF-05(8447D) ■RECEIVER:KTR-04(ESVS10) ■KCC-30_31_32_34(RE)

-26dB Bandwidth & Occupied Bandwidth(99%)

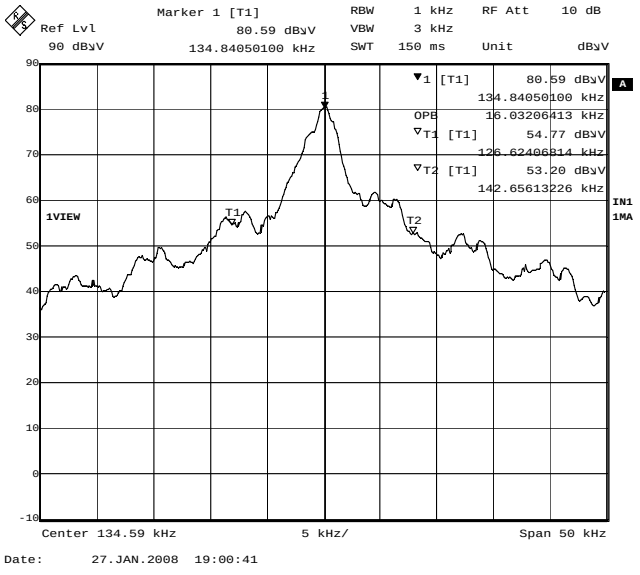
UL Japan, Inc. Yamakita No.1 Anechoic Chamber

COMPANY	: ASAHIDENSO CO., LTD	REPORT NO	: 27HE0382-YK-A
EQUIPMENT	: Antenna for Immobilizer system	DATE	: 2007/01/27
MODEL NUMBER	: CZ106	TEMP./HUMI	: 22℃/41%
SERIAL NUMBER	: 7Y09	TEST MODE	: Transmitting
POWER	: DC12V	ENGINEER	: Tatsuya Arai

-26dB Bandwidth: 16.633kHz



99% Occupied Bandwidth: 16.032kHz



APPENDIX 3
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
YA-RE	Radiated emission(software)	UL Japan	RE(Ver.1.5)	RE	-
KAEC-01	Anechoic Chamber	JSE	Semi 3m	RE	2007/08/26 * 12
KAF-05	Pre Amplifier	Agilent	8447D	RE	2007/04/13 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE	2007/03/28 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2007/12/27 * 12
KCC-30/31/32 /34/KRM-03	Coaxial Cable/RF Relay Matrix	Fujikura/Suhner/TSJ	5D-2W/S04272B/RFM-E421	RE	2007/11/01 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2007/12/27 * 12
KOS-02	Humidity Indicator	Custom	CTH-190	RE	2006/07/10 * 24
KSA-04	Spectrum Analyzer	Advantest	R3271A	RE	2007/09/25 * 12
KJM-01	Measure	TAJIMA	GL19-55	RE	-
KTR-03	Test Receiver	Rohde & Schwarz	ESHS10	RE	2007/02/05 * 12
KTR-04	Test Receiver	Rohde & Schwarz	ESVS10	RE	2007/10/30 * 12
KLP-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	RE	2007/06/11 * 12
KTR-01	Test Receiver	Rohde & Schwarz	ESI40	BW	2007/04/12 * 12
KSCA-01	Search coil	TSJ	SC01	BW	Pre Check
KCC-A7	Coaxial Cable	Fujikura	5D-2W	BW	2007/11/01 * 12

The expiration date of the calibration is the end of the expired month .

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

Test Item :

RE: Radiated emission,

BW: Bandwidth