RADIO TEST REPORT

Test Report No. : 33AE0006-HO-01-A

Applicant	:	**TRCZ s.r.o.**
Type of Equipment	:	**Immobilizer**
Model No.	:	**RI-37BTY**
FCC ID	:	**PSIRI-37BTY**
Test regulation	:	**FCC Part 15 Subpart C: 2012**
Test Result	:	**Complied**

1. This test report shall not be reproduced 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 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 customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test: August 7 and 8, 2012

Representative test engineer:
S. Matsuyama
Satofumi Matsuyama
Engineer of WiSE Japan,
UL Verification Service

Approved by:
S. Watanabe
Shinya Watanabe
Leader of WiSE Japan,
UL Verification Service

NVLAP LAB CODE: 200572-0

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://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

CONTENTS PAGE

SECTION 1: Customer information

Company Name	:	TRCZ s.r.o.
Address	:	Prumyslova 1165, 410 02 Lovosice, CZ
Telephone Number	:	+420-416-421-126
Facsimile Number	:	+420-416-421-555
Contact Person	:	Naohisa Goto

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

2.1 Identification of E.U.T.

Type of Equipment	:	Immobilizer
Model No.	:	RI-37BTY
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 5.0V
Receipt Date of Sample	:	August 2, 2012
Country of Mass-production	:	Czech Republic
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

Radio type	:	Transceiver
Frequency of operation	:	134.2kHz
Modulation	:	ASK
Antenna type	:	coil antenna

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2012, final revised on August 13, 2012 and effective September 12, 2012
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted Emission Section 15.209 Radiated emission limits, general requirements

* The revision on August 13, 2012 does not affect the test specification applied to the EUT.

FCC 15.31 (e)
The stable voltage (DC5.0V) is constantly provided to RF Part through the regulator regardless of voltage fluctuation of car battery (DC12V). Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
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 antenna requirement of Section 15.203.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted Emission	<FCC> ANSI C63.4:2003 7. AC powerline conducted emission measurements <IC> RSS-Gen 7.2.4	<FCC> Section 15.207 <IC> RSS-Gen 7.2.4	-	N/A *1)	N/A	N/A
2	Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.8, 4.11	<FCC> Section 15.209 <IC> RSS-210 2.5.1 RSS-Gen 7.2.5	Radiated	N/A	34.5dB 0.13420MHz 180 deg., AV	Complied
3	Electric Field Strength of Spurious Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.9, 4.11	<FCC> Section 15.209 <IC> RSS-210 2.5.1 RSS-Gen 7.2.5	Radiated	N/A	4.9dB 80.110MHz, QP, Vertical	Complied
4	-26dB Bandwidth	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> -	<FCC> Reference data <IC> -	Radiated	N/A	N/A	N/A

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420.
*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

3.3 Addition to standard

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	N/A	N/A	N/A

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

3.4 Uncertainty

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

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(±dB)				(1m*)(±dB)		(0.5m*)(±dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.3dB	5.0dB	5.1dB	4.9dB	5.8dB	4.4dB	4.3dB
No.2	4.3dB	5.2dB	5.1dB	5.0dB	5.7dB	4.3dB	4.2dB
No.3	4.6dB	5.0dB	5.1dB	5.0dB	5.7dB	4.5dB	4.2dB
No.4	4.8dB	5.2dB	5.0dB	5.0dB	5.7dB	5.2dB	4.2dB

*3m/1m/0.5m = Measurement distance

Radiated emission test(3m)
[Electric Field Strength of Fundamental Emission]
The data listed in this test report has enough margin, more than the site margin.

[Electric Field Strength of Spurious Emission]
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	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	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
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	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* 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.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

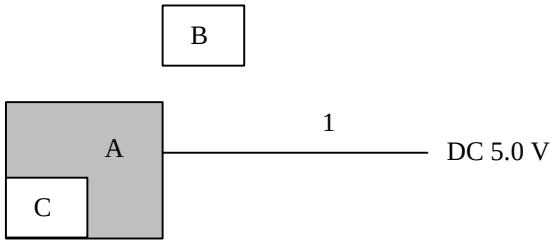
SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The mode is used : 1) Normal transmission mode (Tx) 134.2kHz

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

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Immobilizer	RI-37BTY	001	TRCZ s.r.o.	EUT
B	Transponder key	-	-	-	-
C	Key cylinder	-	-	-	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	0.95	Unshielded	Unshielded	-

SECTION 5: Radiated emission (Fundamental and Spurious Emission)

Test Procedure
The Radiated Electric Field Strength intensity has been measured on No 2 semi anechoic chamber 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 vertical polarization (antenna angle: 0deg., 45deg., 90deg., and 135 deg.) and horizontal polarization.
*Refer to Figure 1 about Direction of the Loop Antenna.

Frequency : From 30MHz to 1GHz at distance 3m
The measuring antenna height 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 a QP, PK, and AV detector.
The radiated emission measurements were made with the following detector function of the test receiver.

	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz
Detector Type	PK/AV *	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz

* For the carrier frequency, AV detector was applied to since it is continuation transmission of duty 100% and is not pulse emission.

- The noise levels were measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.
With the position, the noise levels of all the frequencies were measured.

This EUT has two modes which mechanical key is inserted or not. The worst case was confirmed with and without mechanical key, as a result, the test without mechanical key was the worst case. Therefore the test without mechanical key was performed only.

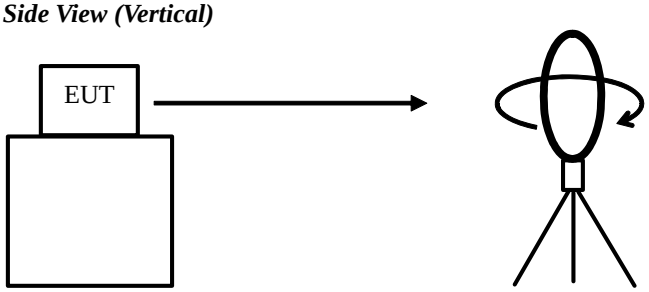
* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)
[Limit at 3m]=[Limit at 300m]-40 x log (3[m]/300[m])
[Limit at 3m]=[Limit at 30m]-40 x log (3[m]/30[m])

Test data **: APPENDIX 1**
Test result **: Pass**

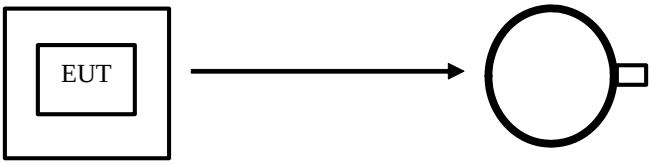
Date: August 7, 2012 Test engineer: Satofumi Matsuyama

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

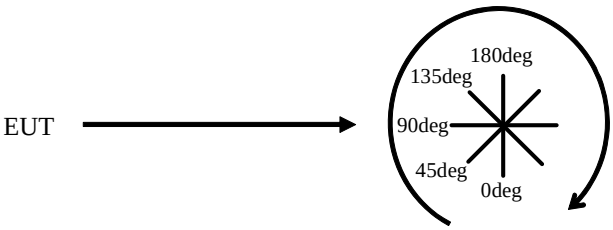


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

SECTION 6: -26dB Bandwidth

Test Procedure

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

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
-26dB Bandwidth	100kHz	1kHz	3kHz	Auto	Peak	Max Hold	Spectrum Analyzer

Test data : APPENDIX 1
Test result : Pass

SECTION 7: 99% Occupied Bandwidth

Test Procedure

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

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 % of Span	Three times of RBW	Enough time to sample bandwidth trace	Sample	Clear Write	Spectrum Analyzer

Test data : APPENDIX 1
Test result : Pass

APPENDIX 1: Data of EMI test

Radiated Emission below 30MHz (Fundamental and Spurious Emission)

DATA OF RADIATED EMISSION TEST

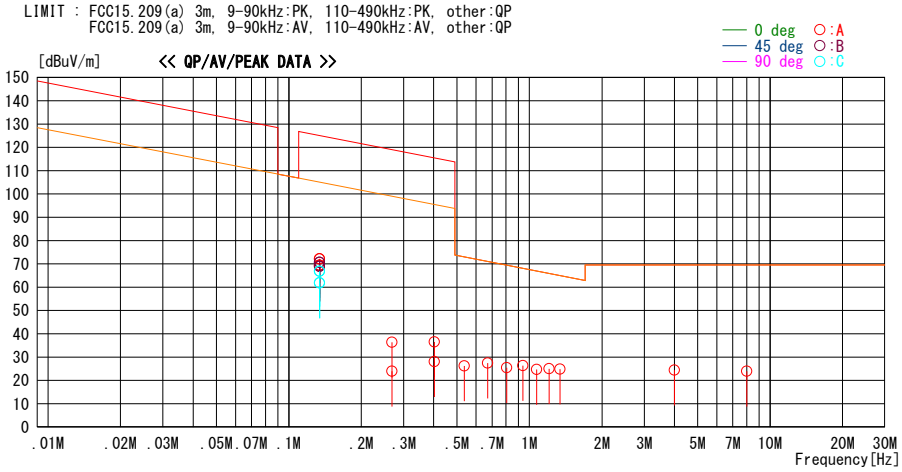
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/08/07

Report No. : 33AE0006-HO-01

Temp./ Humi. : 18deg. C / 63% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : Tx 134.2kHz, Worst Axis (X-axis)

LIMIT : FCC15.209(a) 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a) 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq.	Reading	DET	Ant.Fac	Loss	Gain	Result	Limit	Margin	Antenna		Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]		[deg]	
0.13420	78.4	PEAK	19.9	6.0	32.2	72.1	125.1	53.0	0	A	175	
0.13420	78.4	AV	19.9	6.0	32.2	72.1	105.1	33.0	0	A	175	
0.13420	75.3	PEAK	19.9	6.0	32.2	69.0	125.1	56.1	45	B	337	
0.13420	75.3	AV	19.9	6.0	32.2	69.0	105.1	36.1	45	B	337	
0.13420	73.1	PEAK	19.9	6.0	32.2	66.8	125.1	58.3	90	C	272	
0.13420	73.1	AV	19.9	6.0	32.2	66.8	105.1	38.3	90	C	272	
0.13420	75.7	PEAK	19.9	6.0	32.2	69.4	125.1	55.7	135	A	206	
0.13420	75.7	AV	19.9	6.0	32.2	69.4	105.1	35.7	135	A	206	
0.13420	76.9	PEAK	19.9	6.0	32.2	70.6	125.1	54.5	180	B	174	
0.13420	76.9	AV	19.9	6.0	32.2	70.6	105.1	34.5	180	B	174	
0.13420	68.2	PEAK	19.9	6.0	32.2	61.9	125.1	63.2	0	C	174	Hol
0.13420	68.1	AV	19.9	6.0	32.2	61.8	105.1	43.3	0	C	174	Hol
0.26840	42.8	PEAK	19.7	6.1	32.2	36.4	119.0	82.6	0	A	359	NS
0.26840	30.4	AV	19.7	6.1	32.2	24.0	99.0	75.0	0	A	359	NS
0.40260	43.1	PEAK	19.6	6.1	32.2	36.6	115.5	78.9	0	A	6	NS
0.40260	34.6	AV	19.6	6.1	32.2	28.1	95.5	67.4	0	A	6	NS
0.53680	32.8	QP	19.6	6.1	32.2	26.3	73.0	46.7	0	A	359	NS
0.67100	33.8	QP	19.6	6.2	32.2	27.4	71.1	43.7	0	A	187	NS
0.80520	31.8	QP	19.6	6.2	32.2	25.4	69.5	44.1	0	A	359	NS
0.93940	32.9	QP	19.5	6.2	32.2	26.4	68.1	41.7	0	A	171	NS
1.07360	31.2	QP	19.5	6.2	32.2	24.7	66.9	42.2	0	A	359	NS
1.20780	31.5	QP	19.5	6.2	32.2	25.0	65.9	40.9	0	A	359	NS
1.34200	31.1	QP	19.6	6.3	32.2	24.8	65.0	40.2	0	A	359	NS
4.00000	30.5	QP	19.7	6.5	32.3	24.4	69.5	45.1	0	A	359	NS
8.00000	29.8	QP	19.8	6.7	32.3	24.0	69.5	45.5	0	A	359	NS

CHART: WITH FACTOR , ANT TYPE: LOOP Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN.) - GAIN(AMP.)

*NS: No Signal detected.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission above 30MHz (Spurious Emission)

DATA OF RADIATED EMISSION TEST

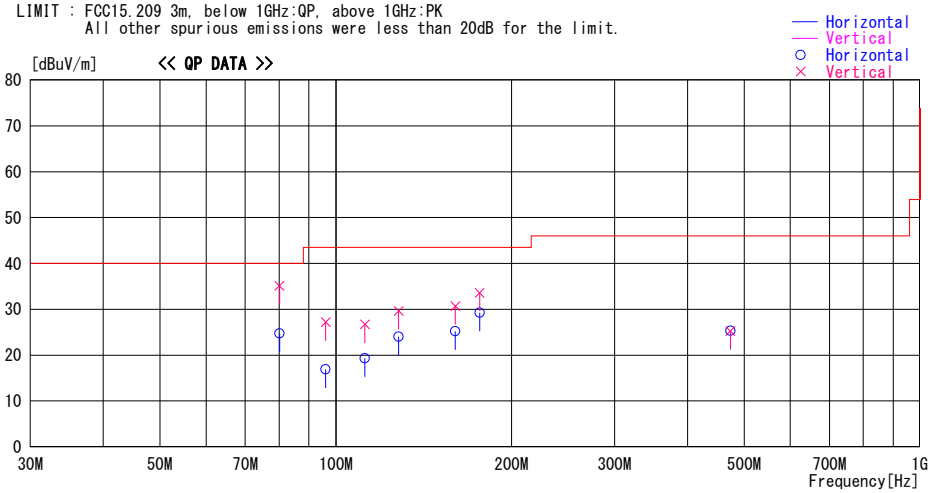
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/08/08

Report No. : 33AE0006-HO-01

Temp./Humi. : 18deg. C / 63% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : Tx 134.2kHz Worst Axis(X-axis)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
All other spurious emissions were less than 20dB for the limit.



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
80.110	39.7	QP	6.2	-21.2	24.7	267	259	Hori.	40.0	15.3	
80.110	50.1	QP	6.2	-21.2	35.1	209	100	Vert.	40.0	4.9	
96.128	29.1	QP	8.8	-21.0	16.9	268	338	Hori.	43.5	26.6	
96.128	39.4	QP	8.8	-21.0	27.2	203	100	Vert.	43.5	16.3	
112.153	28.5	QP	11.5	-20.7	19.3	63	303	Hori.	43.5	24.2	
112.153	35.9	QP	11.5	-20.7	26.7	188	100	Vert.	43.5	16.8	
128.173	31.2	QP	13.3	-20.5	24.0	234	315	Hori.	43.5	19.5	
128.173	36.8	QP	13.3	-20.5	29.6	251	100	Vert.	43.5	13.9	
160.216	30.0	QP	15.4	-20.2	25.2	58	224	Hori.	43.5	18.3	
160.216	35.5	QP	15.4	-20.2	30.7	210	100	Vert.	43.5	12.8	
176.237	33.5	QP	15.9	-20.1	29.3	60	190	Hori.	43.5	14.2	
176.237	37.8	QP	15.9	-20.1	33.6	222	100	Vert.	43.5	9.9	
473.832	26.2	QP	18.1	-19.0	25.3	359	100	Hori.	46.0	20.7	
473.832	26.2	QP	18.1	-19.0	25.3	359	100	Vert.	46.0	20.7	

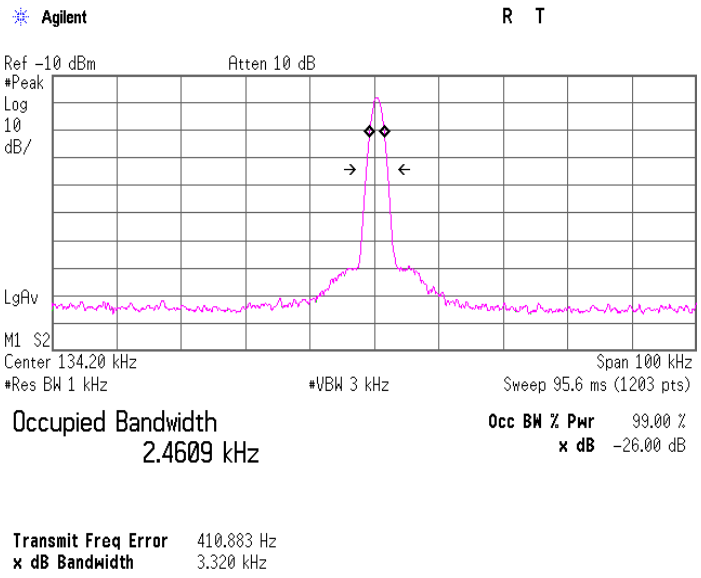
CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

*The test result is rounded off to one or two decimal places, so some differences might be observed.

-26dB Bandwidth

REPORT NO : 33AE0006-HO-01
REGULATION : Reference data
TEST DISTANCE : 3m
DATE : 08/07/2012
POWER : DC 5V
TEMPERATURE : 18 deg. C
MODE : Tx 134.2kHz
HUMIDITY : 63 % RH
Engineer : Satofumi Matsuyama

FREQ [kHz]	-26dB Bandwidth [kHz]
134.2	3.320



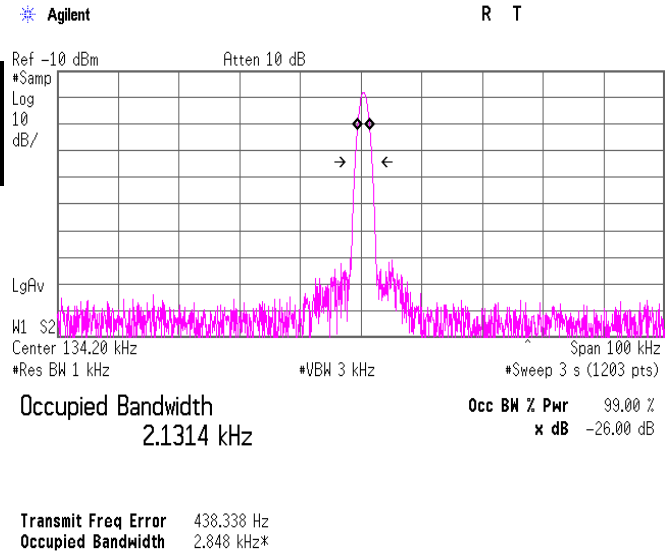
UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

99% Occupied Bandwidth

REPORT NO : 33AE0006-HO-01
REGULATION : RSS-Gen 4.6.1
TEST DISTANCE : 3m
DATE : 08/07/2012
TEMPERATURE : 18 deg. C
HUMIDITY : 63 % RH
Engineer : Satofumi Matsuyama

S/ N : 001
POWER : DC 5V
MODE : Tx 134.2kHz

FREQ [kHz]	99% Occupied Bandwidth [kHz]
134.2	2.1314



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2012/06/29 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2012/02/06 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2012/04/06 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2012/04/03 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2011/10/19 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	RE	2012/02/16 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2012/07/27 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2011/11/02 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2011/10/23 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2011/10/23 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2012/02/16 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2011/09/26 * 12

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

RE: Spurious emission