



RADIO TEST REPORT

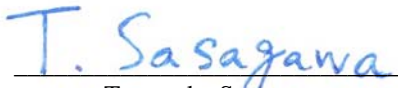
Test Report No. : 32LE0207-HO-01-A

Applicant : Tokai Rika Co., Ltd.
Type of Equipment : RKE Transmitter
Model No. : B95TH
Test regulation : FCC Part 15 Subpart C: 2012
FCC ID : MOZB95TH
Test Result : Complied

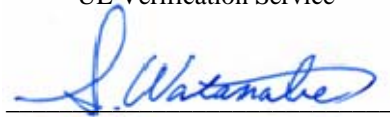
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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be 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 30, 2012

Tested by:


Tomotaka Sasagawa
Engineer of WiSE Japan,
UL Verification Service

Approved by:


Shinya Watanabe
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

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13-EM-F0429

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SECTION 1: Customer information

Company Name : Tokai Rika Co., Ltd.
Address : 260 Toyota 3-chome, Oguchi-cho, Niwa-gun, Aichi-ken 480-0195 Japan
Telephone Number : +81-587-95-0093
Facsimile Number : +81-587-95-5471
Contact Person : Masahiro Kato

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

2.1 Identification of E.U.T.

Type of Equipment : RKE Transmitter
Model No. : B95TH
Serial No. : Refer to Clause 4.2
Rating : DC 2.5 to 3.2V
Receipt Date of Sample : August 28, 2012
Country of Mass-production : Japan
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: B95TH (referred to as the EUT in this report) is the RKE Transmitter.

Radio Specification

Radio Type : Transmitter
Frequency of Operation : 314.35MHz
Modulation : ASK
Antenna type : Pattern Antenna

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2012, final revised on July 23, 2012 and effective August 22, 2012

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.231 Periodic operation in the band 40.66 - 40.70MHz and above 70MHz

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	FCC: ANSI C63.4:2003 7. AC powerline conducted emission measurements IC: RSS-Gen 7.2.2	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.2	N/A	N/A*1)	-
Automatically Deactivate	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: -	FCC: Section 15.231(a)(1) ----- IC: RSS-210 A1.1.1	N/A	Complied	Radiated
Electric Field Strength of Fundamental Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.8	FCC: Section 15.231(b) ----- IC: RSS-210 A1.1.2	9.1dB 314.350MHz Horizontal, PK with Duty factor	Complied	Radiated
Electric Field Strength of Spurious Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.9	FCC: Section 15.205 Section 15.209 Section 15.231(b) IC: RSS-210 A1.1.2, 2.6, 2.7	4.0dB 2514.800MHz Horizontal, PK with Duty factor	Complied	Radiated
-20dB Bandwidth	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: -	FCC: Section 15.231(c) ----- IC: Reference data	N/A	Complied	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) The test is not applicable since the EUT does not have AC Mains.

FCC 15.31 (e)

This test was performed with the New Battery (DC 3.0V) and the constant voltage was supplied to the EUT during the tests. Therefore, the 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 EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	N/A	Complied	Radiated

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.

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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	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 Test set up, Data of EMI, Test instruments.

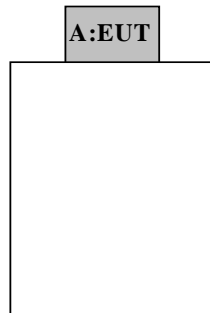
Refer to APPENDIX.

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

4.1 Operating Modes

Test Item*	Mode
Automatically Deactivate Duty Cycle	Normal use mode
Electric Field Strength of Fundamental Emission Electric Field Strength of Spurious Emission -20dB & 99% Occupied Bandwidth	Transmitting mode (Tx)
* The system was configured in typical fashion (as a customer would normally use it) for testing.	

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	RKE Transmitter	B95TH	1 *1) 2 *2)	Tokai Rika Co., Ltd.	EUT

*1) Used for Normal use mode

*2) Used for Transmitting mode

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SECTION 5: Radiated emission (Electric Field Strength of Fundamental and Spurious Emission)

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. The EUT was set on the center 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. Photographs of the set up are shown in Appendix 1.

[Transmitting mode]

(Below 30MHz)

The noise level was checked by moving a search-coil (Loop Antenna) close to the EUT.

(Above 30MHz)

The Radiated Electric Field Strength has been measured on Semi anechoic chamber 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 strength.

The measurements were performed for both vertical and horizontal antenna polarization.

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

Test Antennas are used as below;

Frequency	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

	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	Above 1GHz
Detector Type	Peak	Peak	Peak	Peak	Peak and Peak with Duty factor	Peak and Peak with Duty factor
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz	PK: S/A:RBW 1MHz, VBW:3MHz

*For the test below 30MHz, the noise was not detected when it was confirmed with PK detect.

- The carrier level was 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 was measured.

This EUT has two modes which mechanical key is folded in or out. The worst case was confirmed that mechanical key is folded in and out, as a result, the test which mechanical key was folded out was the worst case. Therefore the test was performed under the worst condition.

*The result is rounded off to the second decimal place, so some differences might be observed.

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[Limit Calculation Method in dBuV/m at 3m According to section 15.231(b)]

1) Electric Field Strength of Fundamental Emission
Limit(Peak)=Limit(Peak with Duty factor)+20dB [dBuV/m]
Limit(Peak with Duty factor)
=20Log{ 3750+((12500-3750) x (314.35-260)/(470-260)) }
[dBuV/m]

2) Electric Field Strength of Spurious Emission
Limit(Peak)=Limit(Peak with Duty factor)+20dB [dBuV/m]
Limit(Peak with Duty factor)
=20Log{ 375+((1250-375) x (314.35-260)/(470-260)) }
[dBuV/m]

Measurement range : **9kHz-3.2GHz**
Test data : **APPENDIX**
Test result : **Pass**

SECTION 6: Automatically deactivate

Test Procedure

The measurement was performed with Electric field strength using a spectrum analyzer.

Test data : APPENDIX
Test result : Pass

SECTION 7: -20dB and 99% Occupied Bandwidth

Test Procedure

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

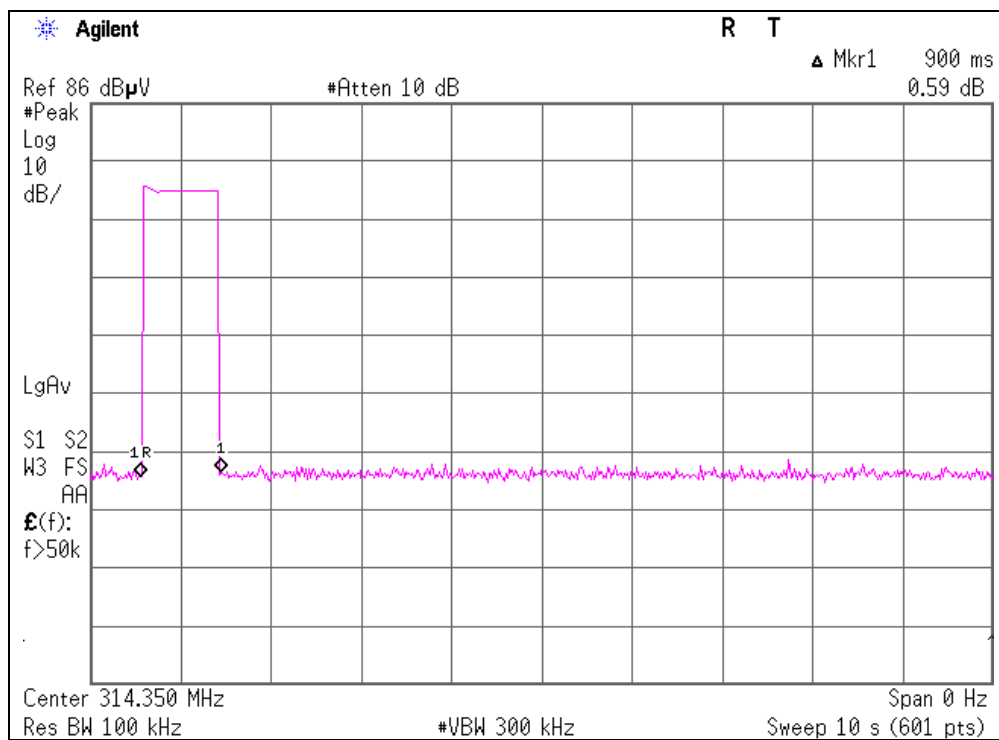
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Automatically deactivate

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	32LE0207-HO-01
Date	08/30/2012
Temperature/ Humidity	22 deg. C / 57% RH
Engineer	Tomotaka Sasagawa
Mode	Normal use mode

Time of Transmitting [sec]	Limit [sec]	Result
0.9	5.00	Pass



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Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32LE0207-HO-01
Date : 08/30/2012
Temperature/ Humidity : 22 deg.C / 57% RH
Engineer : Tomotaka Sasagawa
Mode : Transmitting mode

QP or PK

Frequency [MHz]	Detector	Reading [dBuV]		Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]		Remark Inside or Outside of Restricted Bands
		Hor	Ver					Hor	Ver		Hor	Ver	
314.350	PK	77.7	70.9	16.3	9.7	32.0	-	71.7	64.9	95.5	23.8	30.6	Carrier
628.700	PK	47.8	46.8	21.0	11.6	32.1	-	48.3	47.3	75.5	27.2	28.2	Outside
943.050	PK	40.9	36.8	25.2	13.0	31.1	-	48.0	43.9	75.5	27.5	31.6	Outside
1257.400	PK	45.0	49.5	25.0	1.8	34.1	-	37.7	42.2	75.5	37.8	33.3	Outside
1571.750	PK	45.4	46.5	25.7	2.0	33.3	-	39.8	40.9	73.9	34.1	33.0	Inside
1886.100	PK	46.5	45.2	27.2	2.1	32.7	-	43.1	41.8	75.5	32.4	33.7	Outside
2200.450	PK	52.9	53.2	27.6	2.3	32.4	-	50.4	50.7	73.9	23.5	23.2	Inside
2514.800	PK	59.0	58.1	27.5	2.5	32.2	-	56.8	55.9	75.5	18.7	19.6	Outside
2829.150	PK	54.1	52.8	28.2	2.6	32.1	-	52.8	51.5	73.9	21.1	22.4	Inside
3143.500	PK	54.0	52.6	28.7	2.8	31.9	-	53.6	52.2	75.5	21.9	23.3	Outside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

PK with Duty factor

Frequency [MHz]	Detector	Reading [dBuV]		Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]		Remark
		Hor	Ver					Hor	Ver		Hor	Ver	
314.350	PK	77.7	70.9	16.3	9.7	32.0	-5.3	66.4	59.6	75.5	9.1	15.9	Carrier
628.700	PK	47.8	46.8	21.0	11.6	32.1	-5.3	43.0	42.0	55.5	12.5	13.5	Outside
943.050	PK	40.9	36.8	25.2	13.0	31.1	-5.3	42.7	38.6	55.5	12.8	16.9	Outside
1257.400	PK	45.0	49.5	25.0	1.8	34.1	-5.3	32.4	36.9	55.5	23.1	18.6	Outside
1571.750	PK	45.4	46.5	25.7	2.0	33.3	-5.3	34.5	35.6	53.9	19.4	18.3	Inside
1886.100	PK	46.5	45.2	27.2	2.1	32.7	-5.3	37.8	36.5	55.5	17.7	19.0	Outside
2200.450	PK	52.9	53.2	27.6	2.3	32.4	-5.3	45.1	45.4	53.9	8.8	8.5	Inside
2514.800	PK	59.0	58.1	27.5	2.5	32.2	-5.3	51.5	50.6	55.5	4.0	4.9	Outside
2829.150	PK	54.1	52.8	28.2	2.6	32.1	-5.3	47.5	46.2	53.9	6.4	7.7	Inside
3143.500	PK	54.0	52.6	28.7	2.8	31.9	-5.3	48.3	46.9	55.5	7.2	8.6	Outside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier) + Duty factor (Refer to Duty factor data sheet)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

- * The test above 1GHz was performed with PK detect. Average emission measurements were calculated with PK detect and Duty cycle factor.
- * Duty Factor was calculated with the assumption of the worst condition in 100msec.
- * The noise measured with PK detect was pulse emission.

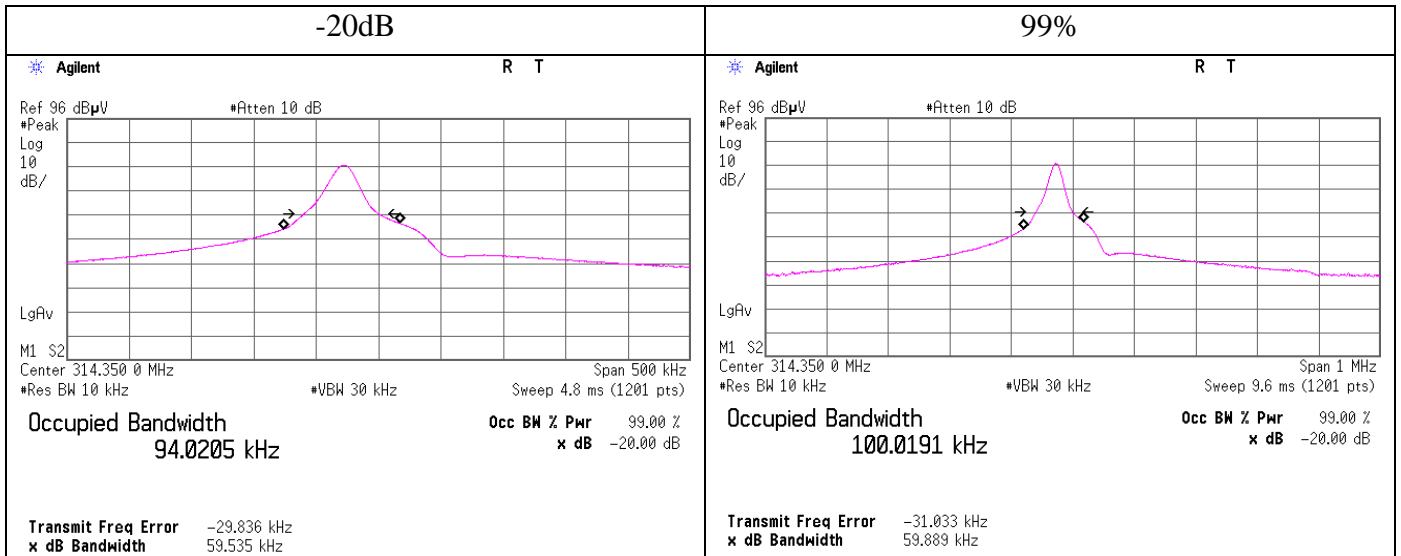
-20dB and 99% Occupied Bandwidth

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 32LE0207-HO-01
Date 08/30/2012
Temperature/ Humidity 22 deg.C / 57% RH
Engineer Tomotaka Sasagawa
Mode Transmitting mode

Bandwidth Limit : Fundamental Frequency 314.35 MHz x 0.25% = 785.88 kHz

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
59.54	785.88	Pass

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
100.02	785.88	Pass



Duty Cycle

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 32LE0207-HO-01
Date 08/30/2012
Temperature/ Humidity 22 deg. C / 57% RH
Engineer Tomotaka Sasagawa
Mode Noraml use mode

Type	Times	ON time(One pulse) [ms]	ON time(in 100ms) [ms]
A	56	0.500	28
B	28	0.900	25.2
C	1	1.300	1.3

*1)ON time(in 100ms) = Times * ON time(One pulse)

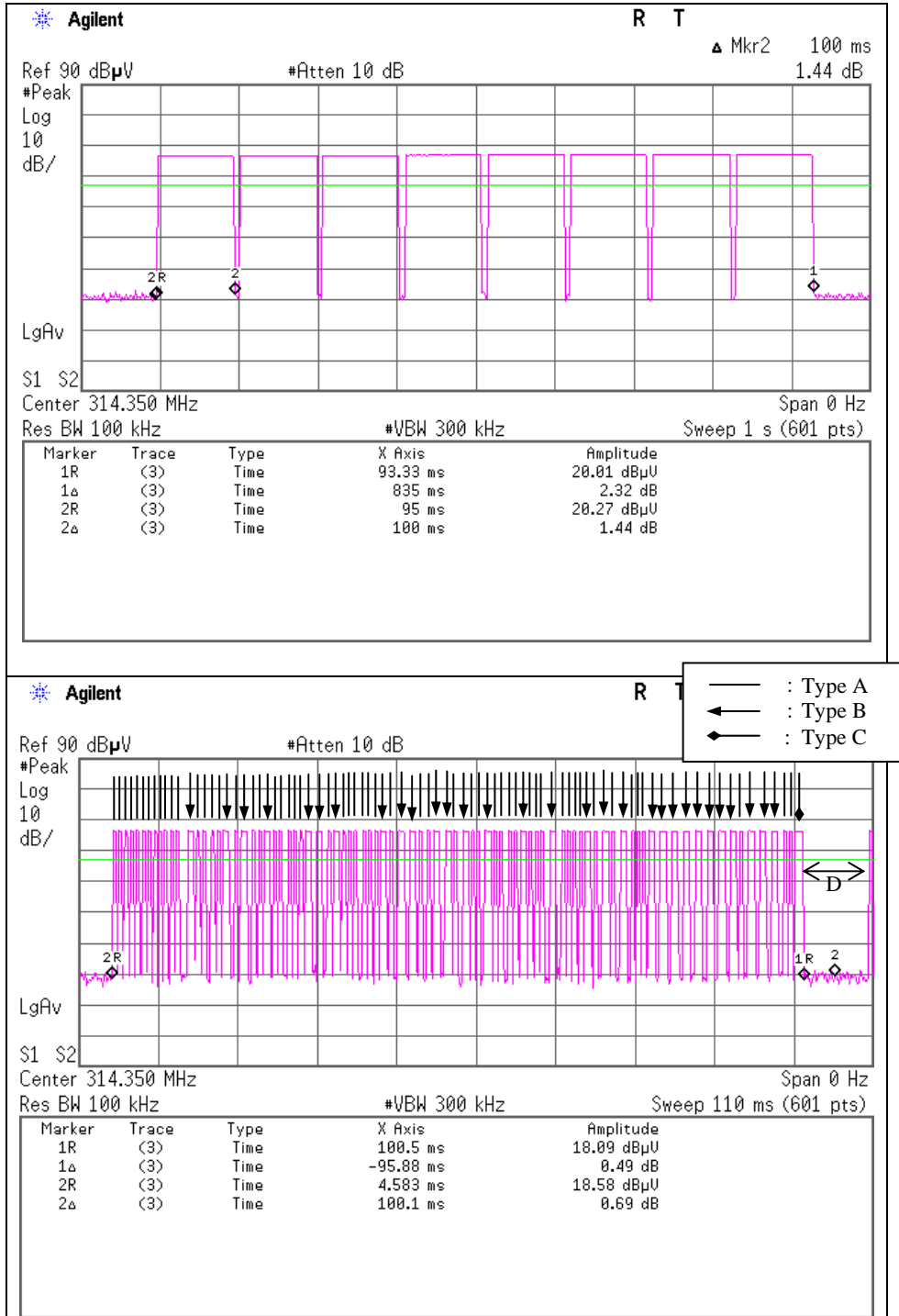
(Total)

ON time [ms]	Cycle [ms]	Duty (On time/Cycle)	Duty [dB]
54.50	100.00	0.55	-5.3

*3)ON time = Type A's ON time (in 100ms) + Type B's ON time (in 100ms)

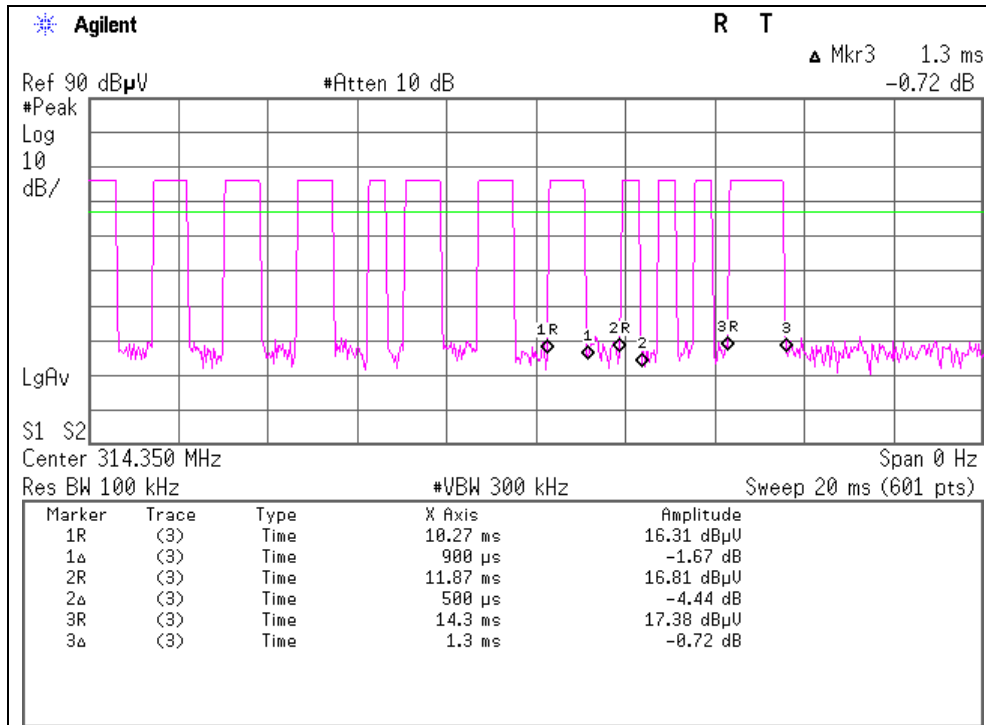
*4)Duty = $20\log_{10}(\text{ON time/Cycle})$

Duty Cycle



D: Intentional off time

Duty Cycle



APPENDIX 2:Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE	2011/11/23 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2012/04/05 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2011/11/16 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2011/11/16 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2012/06/01 * 12
AT-38	Attenuator	Anritsu	MP721B	6200961025	RE	2011/12/08 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2012/03/05 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2012/08/17 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1203S212(1m)/ 1204S062(5m)	RE	2012/04/23 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2012/03/28 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2011/10/19 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/ TSJ	5D-2W(10m)/ SFM141(5m)/ 421-010(1m)/ suciform141-PE(1m)/ RFM-E121(Switcher)	-/04178	RE	2012/07/12 * 12
MCC-31	Coaxial cable	UL Japan	-	-	RE	Pre Check

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: Radiated emission, 99% Occupied Bandwidth, -20dB bandwidth, Automatically deactivate and Duty cycle tests

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