



243 Jubug-Ri, Yangji-Myeon, Yongin-Si, Gyeonggi-Do, Korea 449-822
 Tel: +82-31-323-6008 Fax: +82-31-323-6010
<http://www.ltalab.com>



Dates of Tests: : September 10~Octobre 04, 2013
 Test Report S/N: LR500111310E
 Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID.

OYJSYSCALL-MAIN-I

APPLICANT

NTT WORKS CO.,LTD.

TEST REPORT

Equipment Class : Part 15 Security/Remote Control Transmitter
Manufacturing Description : Wireless Calling System
Manufacturer : NTT WORKS CO.,LTD.
Model name : Syscall Main I
Test Device Serial No.: : Identification
Rule Part(s) : FCC Part 15 Subpart C ; ANSI C-63.4-2003
Frequency Range : 433.92 MHz
Data of issue : Octobre 04, 2013

This test report is issued under the authority of:

Jae-Ho Lee, Manager

The test was supervised by:

Young-Jin Lee, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.



NVLAP LAB Code.: 200723-0

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1. General information

1-1 Test Performed

Company name : LTA Co., Ltd.
 Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822
 Web site : <http://www.ltalab.com>
 E-mail : chahn@ltalab.com
 Telephone : +82-31-323-6008
 Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	UPDATING	ECT accredited Lab.
RRL	KOREA	KR0049	2015-03-06	EMC accredited Lab.
FCC	U.S.A	610755	2014-04-27	FCC filing
FCC	U.S.A	649054	UPDATING	FCC CAB
VCCI	JAPAN	R2133(10m), C2307	2014-06-21	VCCI registration
VCCI	JAPAN	T-2009	2013-12-23	VCCI registration
VCCI	JAPAN	G-563	2015-05-28	VCCI registration
IC	CANADA	5799A-1	2015-06-21	IC filing

2. Information about test item

2-1 Client & Manufacturer

Company name : NTT WORKS CO.,LTD.
 Address : 413-9 NTTWORKS Bldg, Galhyun-Dong, Eunpyong- Gu, Seoul, Korea
 Telephone / Facsimile : TEL No : +82-2-387-3190 / FAX No : +82-2-352-8672

2-2 Equipment Under Test (EUT)

Trade name : SYSCALL
 Model name : Syscall Main I
 Serial number : Identification
 Date of receipt : September 10, 2013
 EUT condition : Pre-production, not damaged
 Antenna type : ROD Antenna
 Frequency Range : 433.92 MHz
 RF Output Power : Below 10 mW
 Type of Modulation : FSK
 Power Source : DC 12.0V By Adapter
 Firmware version : V1.0

2-3 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
-	-	-	-

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Test Condition	Status (note 1)
FCC Part 15.205/209	Restricted Bands of Operation	Radiated	C
FCC Part 15.231 a)	Operation mode		C ²⁾
FCC Part 15.231 b)	Radiated emissions		C
FCC Part 15.231 c)	20dB Bandwidth		C
15.207 /15.107	AC Conducted Emissions	Line Conducted	C
15.203	Antenna requirement	-	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2 The emitting time of fundamental frequency is less than 5seconds.

Refer to the APPENDIX 2.

Note 3: The data in this test report are traceable to the national or international standards.

A sample calculation:

COR. F (correction factor)= Antenna factor + Cable loss- Amp.gain- Distance correction

Emission Level= meter reading + COR.F

Note 1: The sample was tested according to the following specification:

FCC Parts 15 Subpart C ; ANSI C-63.4-2003

Note 2: Antenna Requirement

→ The NTT WORKS CO.,LTD. FCC ID: **OYJSYSCALL-MAIN-I** unit complies with the requirement of §15.203.

The antenna connector is reverse polarity SMA type, The antenna type is ROD Antenna

3.2 Test Limits

Section 15.231. Periodic operation in the band 40.66 - 40.70 MHz and above 70 MHz.

(a) The provisions of this Section are restricted to periodic operation within the band 40.66 - 40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
- (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

Reviewed Results:

Rule Part No.	Description of Rule	Yes	No	N/A
Part 15.231(a)	Continuous transmission		No	
Part 15.231(a)	Control Signals		No	
Part 15.231(a)	Data transmission with control signal	Yes		
Part 15.231(a)(1)	Manually operated	Yes		
	Automatically deactivate within 5 seconds of being released			N/A
Part 15.231(a)(2)	Automatically operated	Yes		
	Deactivate within 5 seconds after activation	Yes		
Part 15.231(a)(3)	Periodic transmission at regular predetermined intervals		No	
	Polling or supervision transmission, including data, to determine system integrity or transmitters used in security or safety applications requires no total duration of transmission not exceeding 2s/hr.	Yes		
Part 15.231(a)(4)	Operation involving fire, security, or safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.		No	

3.3 Transmitter requirements

3.3.1 AC Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement Data: **Complies**

- Refer to the next page.
- No other emissions were detected at a level greater than 20dB below limit
- It gave the worse case emissions

Minimum Standard: FCC Part 15.107

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	79 dBuV	66 dBuV
0.5 ~ 30	73 dBuV	60 dBuV

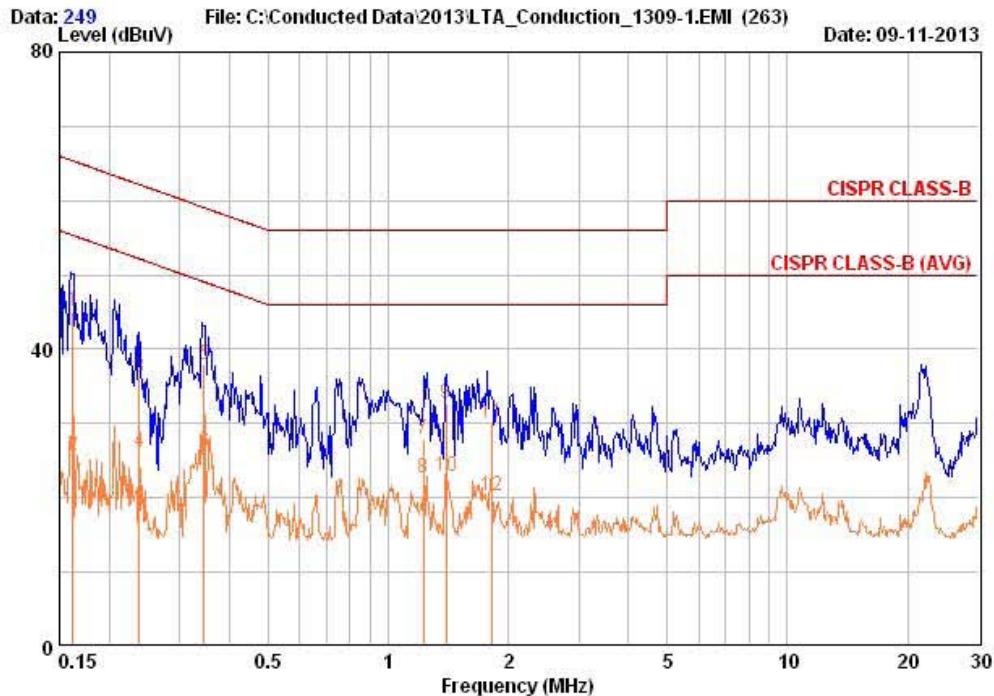
* Note: The limits will decrease with the frequency logarithmically within 0.15MHz to 0.5MHz

Conducted Emissions – LINE

243 Jubug-ri, yangji-Myeon, Youngin-si,
Gyeonggi-do 449-822 Korea
Tel : +82-31-3236008,9
Fax : +82-31-3236010

EUT / Model No. : Syscall Main I Phase : LINE

Test Mode : Wireless mode Test Power : 120 / 60
Temp./Humi. : 25 / 57 Test Engineer : YOO B C



Freq MHz	RD QP		RD AV		C. F dB	Result dBuV	Result dBuV	Limit		Margin	
	QP	AV	QP	AV				QP	AV	QP	AV
0.162	35.44	16.04	9.58	45.02	25.62	65.36	55.36	20.34	29.74		
0.238	26.65	16.65	9.58	36.23	26.23	62.17	52.17	25.94	25.94		
0.346	28.35	16.65	9.58	37.93	26.23	59.06	49.06	21.13	22.83		
1.228	18.35	13.05	9.63	27.98	22.68	56.00	46.00	28.02	23.32		
1.396	23.15	13.35	9.62	32.77	22.97	56.00	46.00	23.23	23.03		
1.810	20.55	10.65	9.60	30.15	20.25	56.00	46.00	25.85	25.75		

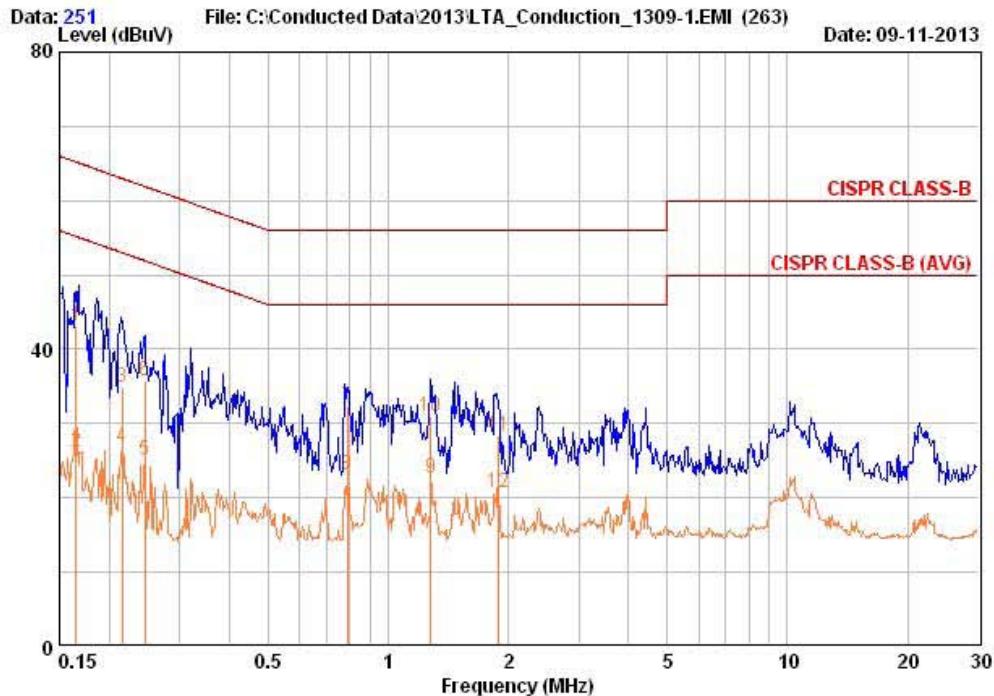
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

Conducted Emissions – NEUTRAL

243 Jubug-ri, yangji-Myeon, Youngin-si,
Gyeonggi-do 449-822 Korea
Tel : +82-31-3236008,9
Fax : +82-31-3236010

EUT / Model No. : Syscall Main I Phase : NEUTRAL

Test Mode : Wireless mode Test Power : 120 / 60
Temp./Humi. : 25 / 57 Test Engineer : YOO B C



Freq MHz	RD QP dBuV	RD AV dBuV	C. F dB	Result QP dBuV	Result AV dBuV	Limit QP dBuV	Limit AV dBuV	Margin QP dB	Margin AV dB
0.165	33.64	16.64	9.61	43.25	26.25	65.21	55.21	21.96	28.96
0.215	25.35	17.25	9.57	34.92	26.82	63.01	53.01	28.09	26.19
0.245	26.25	15.45	9.58	35.83	25.03	61.92	51.92	26.10	26.90
0.791	22.75	13.55	9.58	32.33	23.13	56.00	46.00	23.67	22.87
1.275	21.45	13.05	9.61	31.06	22.66	56.00	46.00	24.94	23.34
1.887	18.65	11.05	9.68	28.33	20.73	56.00	46.00	27.67	25.27

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

3.3.2 Radiated Emission

Definition:

The field strength of emissions from intentional radiators was measured.

Test method	: FCC Part 15.205 / 209
Transmit Frequency	: 433.42 MHz
Frequency Range	: 30 MHz ~ 10 th harmonic.
Bandwidth	: 120 kHz (F < 1GHz) 1 MHz (F > 1GHz)
Distance of antenna	: 3 meters
Test mode	: Tx mode
Result	: Complies

Measurement Data:

- No other emissions were detected at a level greater than 20dB below limit.
- Refer to the next page.

Field Strength Limit of fundamental and Harmonics: Part 15.231(b)

Frequency (MHz)	Limit @ 3m
433.42	41.6667(433.42) – 7083.3333 = 10975 uV/m = 80.8 dBuV/m (Average) 100.8dBuV/m (Peak)
Harmonics	60.8 dBuV/m (The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.)

Part 15.209 LIMIT:

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100**
88 ~ 216	150**
216 ~ 960	200**
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

Measurement Data:

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor	Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV	Peak			AV	Peak	AV	Peak	AV	Peak
433.92	80.26	102.8	V	-7.42	80.80	100.80	72.84	95.38	7.96	5.42
867.83	57.23	70.12	V	1.20	60.80	80.80	58.43	71.32	2.37	9.48
1301.78	55.23	57.59	V	-4.74	60.80	80.80	50.49	52.85	10.31	27.95
1733.86	49.26	51.87	V	-3.30	60.80	80.80	45.96	48.57	14.84	32.23

*restricted band of operation §15.205

* Result level = Reading value + Antenna factor – Amp Gain + Cable Loss

* This EUT was tested in 3 orthogonal positions and the worst-case data was presented.

Note 1: No other emission were detected at a level greater than 20 dB below limit.

Note 2: All readings above 1GHz were taken using a peak detector function at a distance of 3 meters.

Note 3: 433.43MHz is Fundamental Frequency

Radiated Emissions

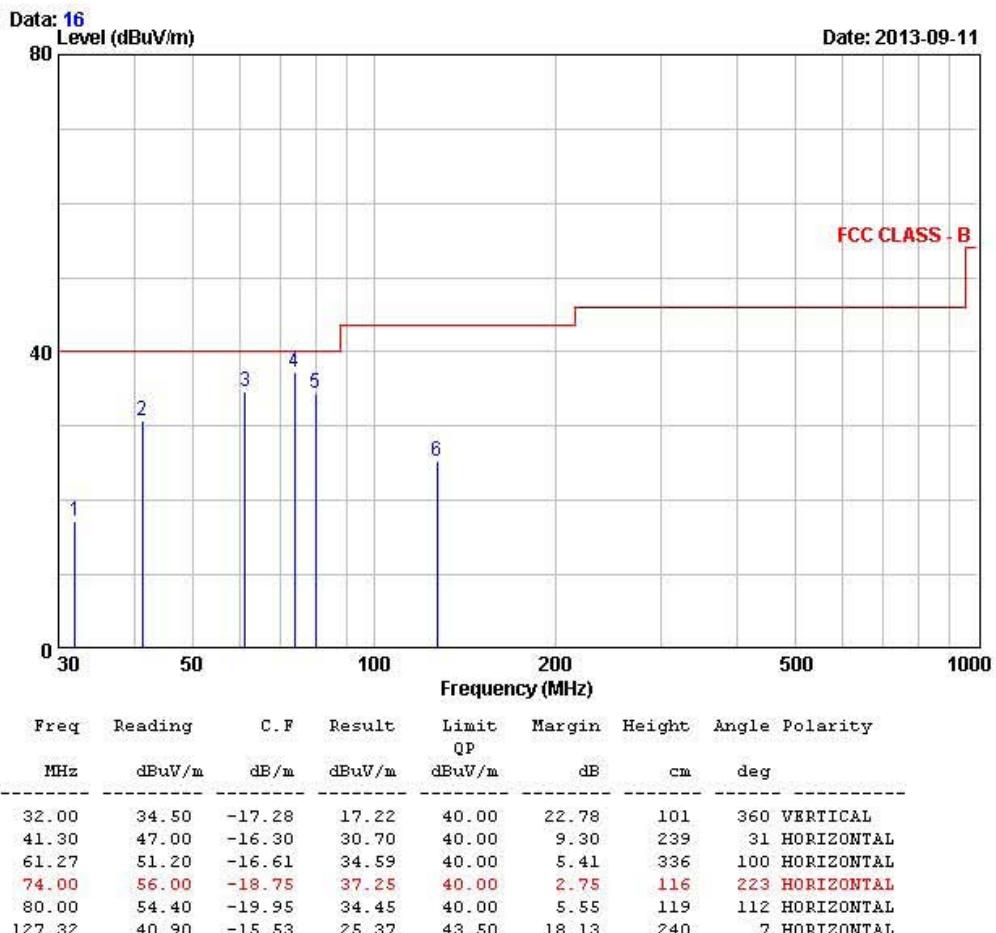
243 Jibug-ri, yangji-Myeon, Youngin-si,
Gyeonggi-do 449-822 Korea
Tel :+82-31-3236008,9
Fax :+82-31-3236010

EUT/Model No.: Syscall Main I

TEST MODE: Wireless mode

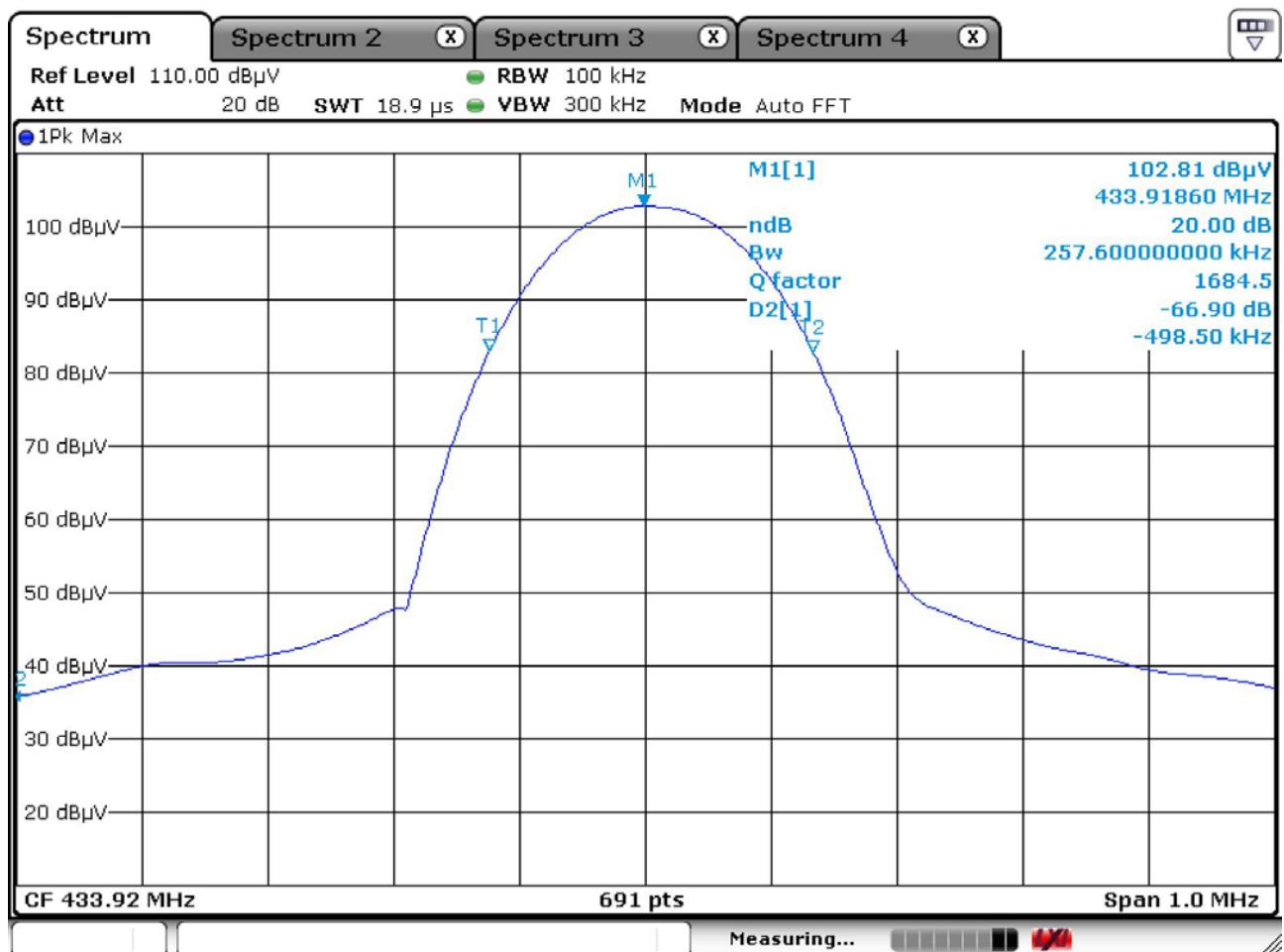
Temp Humi : 22 / 58

Tested by: YOO B C



Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

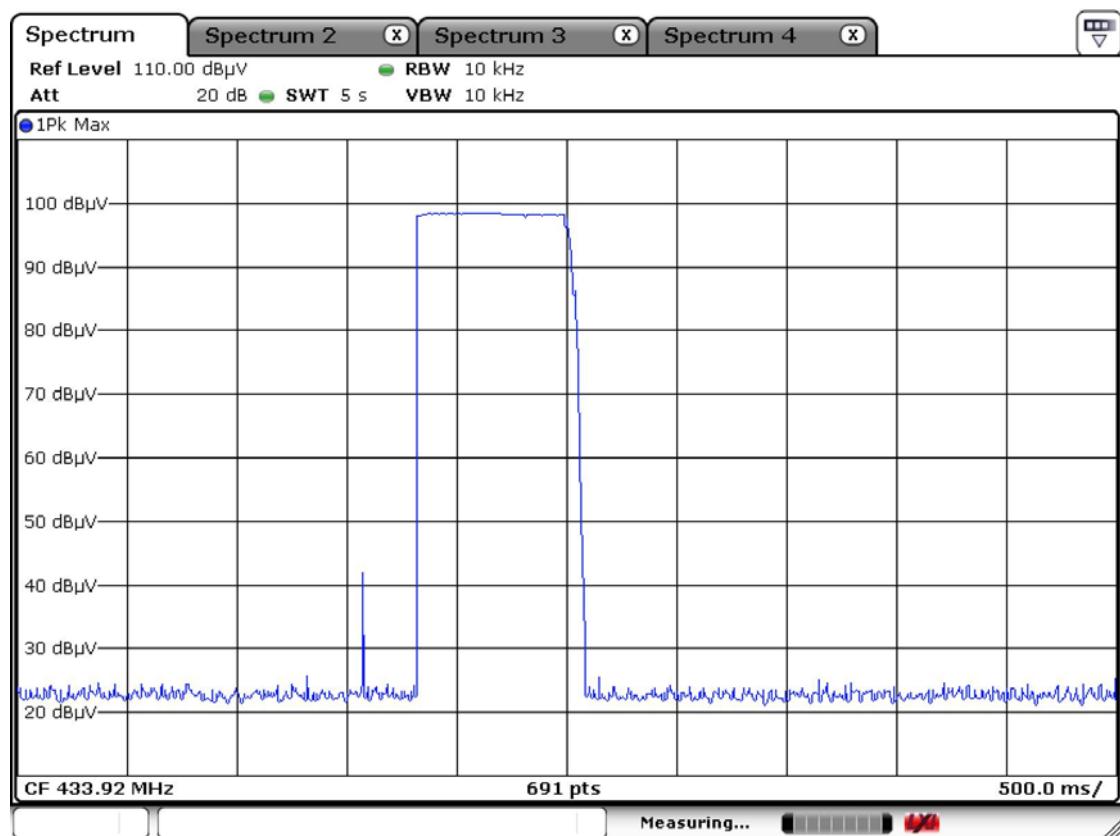
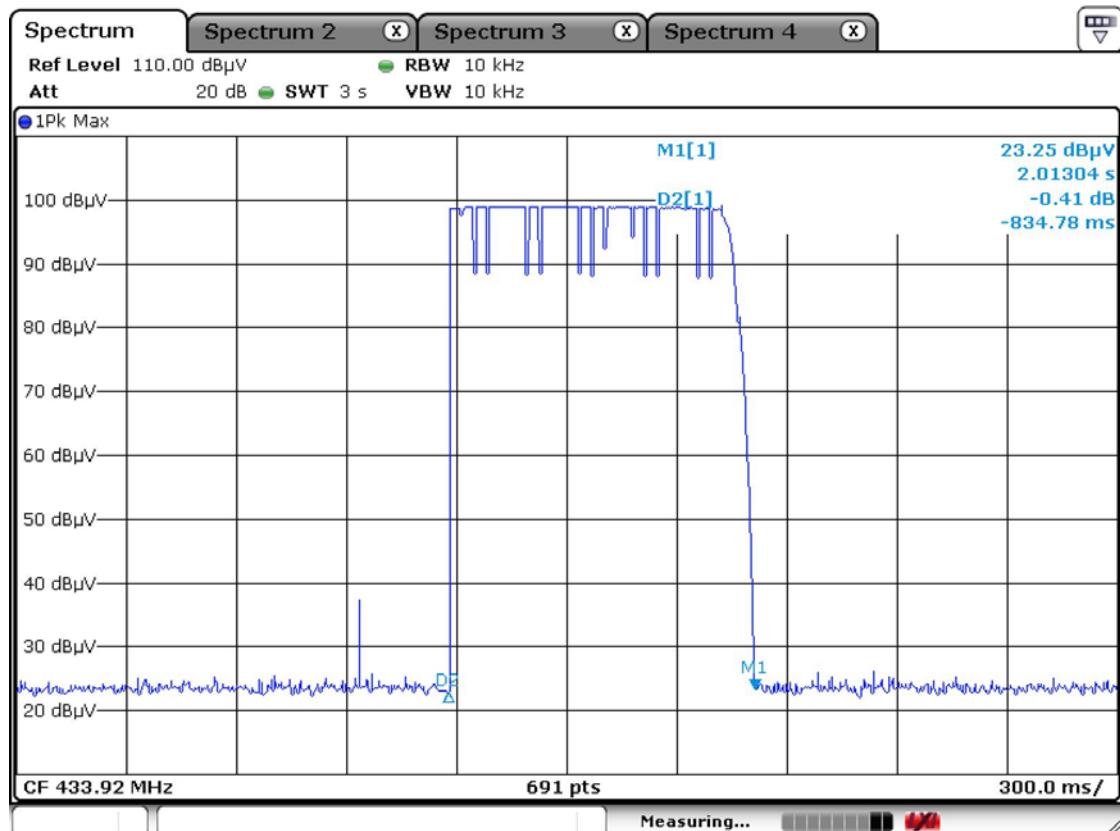
APPENDIX 1
BANDWIDTH OF EMISSION



APPENDIX 2

THE EMITTING TIME OF FUNDAMENTAL FREQUENCY

The Emitting time of Fundamental Frequency



Note . The above plots is the worst case plots generated with the full data rate.

APPENDIX 3

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Interval	Last Cal. Date
1	Spectrum Analyzer (~30GHz)	FSV-30	100757	R&S	1 year	2013-01-15
2	Spectrum Analyzer (~2.9GHz)	8594E	3649A03649	HP	2 year	2012-03-26
3	VECTOR SIGNAL GENERATOR (~6GHz)	8648C	3623A02597	HP	1 year	2013-03-25
4	Signal Generator (1~20GHz)	83711B	US34490456	HP	1 year	2013-03-25
5	Attenuator (3dB)	8491A	37822	HP	1 year	2013-09-22
6	Attenuator (10dB)	8491A	63196	HP	1 year	2013-09-22
7	Test Receiver (~30MHz)	ESHS10	828404/009	R&S	1 year	2013-03-25
8	EMI Test Receiver (~7GHz)	ESCI7	100722	R&S	1 year	2013-09-22
9	RF Amplifier (~1.3GHz)	8447D OPT 010	2944A07684	HP	1 year	2013-09-22
10	RF Amplifier (1~18GHz)	8449B	3008A02126	HP	1 year	2013-03-25
11	Horn Antenna (1~18GHz)	3115	114105	ETS	2 year	2013-05-14
12	DRG Horn (Small)	3116B	81109	ETS-Lindgren	2 year	2012-03-15
13	DRG Horn (Small)	3116B	133350	ETS-Lindgren	2 year	2012-03-15
14	TRILOG Antenna	VULB 9160	9160-3172	SCHWARZBECK	2 year	2012-09-20
15	Hygro-Thermograph	THB-36	0041557-01	ISUZU	1 year	2012-10-12
16	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
17	Power Divider	11636A	06243	HP	2 year	2012-09-22
18	DC Power Supply	6674A	3637A01657	Agilent	-	-
19	Frequency Counter	5342A	2826A12411	HP	1 year	2013-03-25
20	Power Meter	EPM-441A	GB32481702	HP	1 year	2013-03-25
21	Power Sensor	8481A	US41030291	HP	1 year	2013-09-16
22	Audio Analyzer	8903B	3729A18901	HP	1 year	2013-09-16
23	Modulation Analyzer	8901B	3749A05878	HP	1 year	2013-09-16
24	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2013-09-16
25	Stop Watch	HS-3	601Q09R	CASIO	2 year	2012-03-26
26	LISN	ENV216	100408	R&S	1 year	2013-09-22
27	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	1 year	2013-07-25
28	Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	-	-
29	Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	-	-
30	Active Loop Antenna	FMZB 1519	1519-031	SCHWARZBECK	1 year	2012-12-14