LTA
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Nttworks
RF Communication System Top Company

Dates of Tests: : July 16~30, 2012
Test Report S/N: LR500111207K
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID. **OYJST-600**

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	**:**	**ST-600**
Test Device Serial No.:	**:**	**Identification**
Rule Part(s)	**:**	**FCC Part 15 Subpart C ; ANSI C-63.4-2003**
Frequency Range	**:**	**433.42 MHz**
Data of issue	**:**	**July 31, 2012**

This test report is issued under the authority of:

Kyu-Hyun Lee, Manager

The test was supervised by:

Jung-Moo Her, 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®
NVLAP LAB Code.: 200723-0

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1. General information's

1-1 Test Performed

Company name : LTA Co., Ltd.

Address : 243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 449-822

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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	2012-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2013-04-24	EMC accredited Lab.
FCC	U.S.A	610755	2014-04-27	FCC filing
FCC	U.S.A	649054	2013-04-13	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's 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	:	ST-600
Serial number	:	Identification
Date of receipt	:	July 4, 2012
EUT condition	:	Pre-production, not damaged
Antenna type	:	PCB Pattern Antenna
Frequency Range	:	433.42 MHz
RF Output Power	:	Below 10 mW
Type of Modulation	:	FSK
Power Source	:	DC 3.0V By Lithium Battery Power
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	NA[3)]

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: This device is only operated by battery.

Note 4: 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

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 Conducted Emission

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: Not applicable

- The EUT operates by the Battery
- According to the rule of section 15.207(c), The EUT exempt to the power line conducted test.

LIMIT:

Frequency Range	Near-peak	Average
0.15 ~ 0.5 MHz	66 ~ 56 dBuV	56 ~ 46 dBuV
0.5 ~ 5 MHz	56 dBuV	46 dBuV
5 ~ 30 MHz	60 dBuV	50 dBuV
Note: The limits will decrease with the frequency logarithmically within 0.15MHz to 0.5MHz		

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 ~ 10th 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
0.009 ~ 0.490	2400/F (kHz) @ 300 meter
0.490 ~ 1.705	24000/F (kHz) @ 30 meter
1.705 ~ 30.00	30 @ 30 meter
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] Peak	Pol.	Correction Factor	Duty Correction Factor *Note5)	Limits [dBuV/m] Peak	Result [dBuV/m] Peak	Margin [dB] Peak
433.43 *Note3)	84.34	H	-7.46	-11.03	100.8	76.88	23.92
866.89	43.24	H	1.18	-	80.8	44.42	36.38
1300.31 *Note4)	55.04	H	-4.73	-	53.97	50.31	3.66
1735.02	62.66	H	-3.30	-	80.8	59.36	21.44
2165.55	55.72	H	0.52	-	80.8	56.24	24.56
2598.69	52.80	H	1.82	-	80.8	54.62	26.18
3030.91	49.34	H	4.31	-	80.8	53.65	27.15
3470.14	47.23	H	4.92	-	80.8	52.15	28.65

***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: 433.43㎒ is Fundamental Frequency

Note 4: Restrict band of operation.

Note 5: Duty Correction factor is calculated over a 100ms period per FCC Part 15.35, this is based on the duty cycle as measured in section 2.6 = [20 log (Worst case dwell time / 100ms)] dB

Note 6: It was measured on both the vertical and horizontal, this is the worst case measurement.

Radiated Emissions

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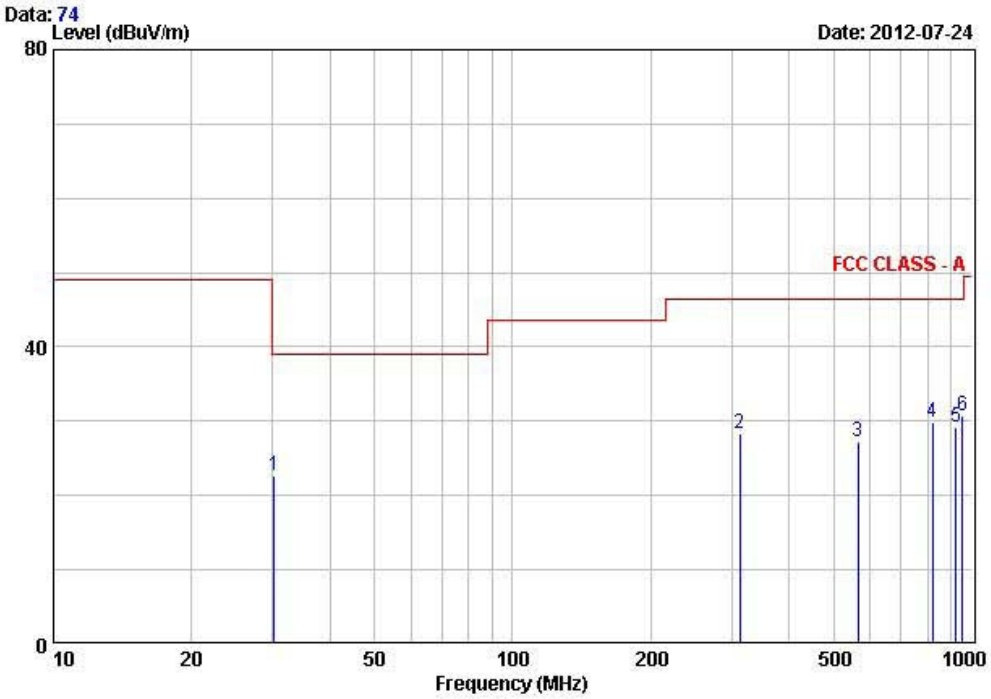
EUT/Model No.: ST-600 TEST MODE: Tx mode

Temp Humi : 28 / 57 Tested by: Ko Gun

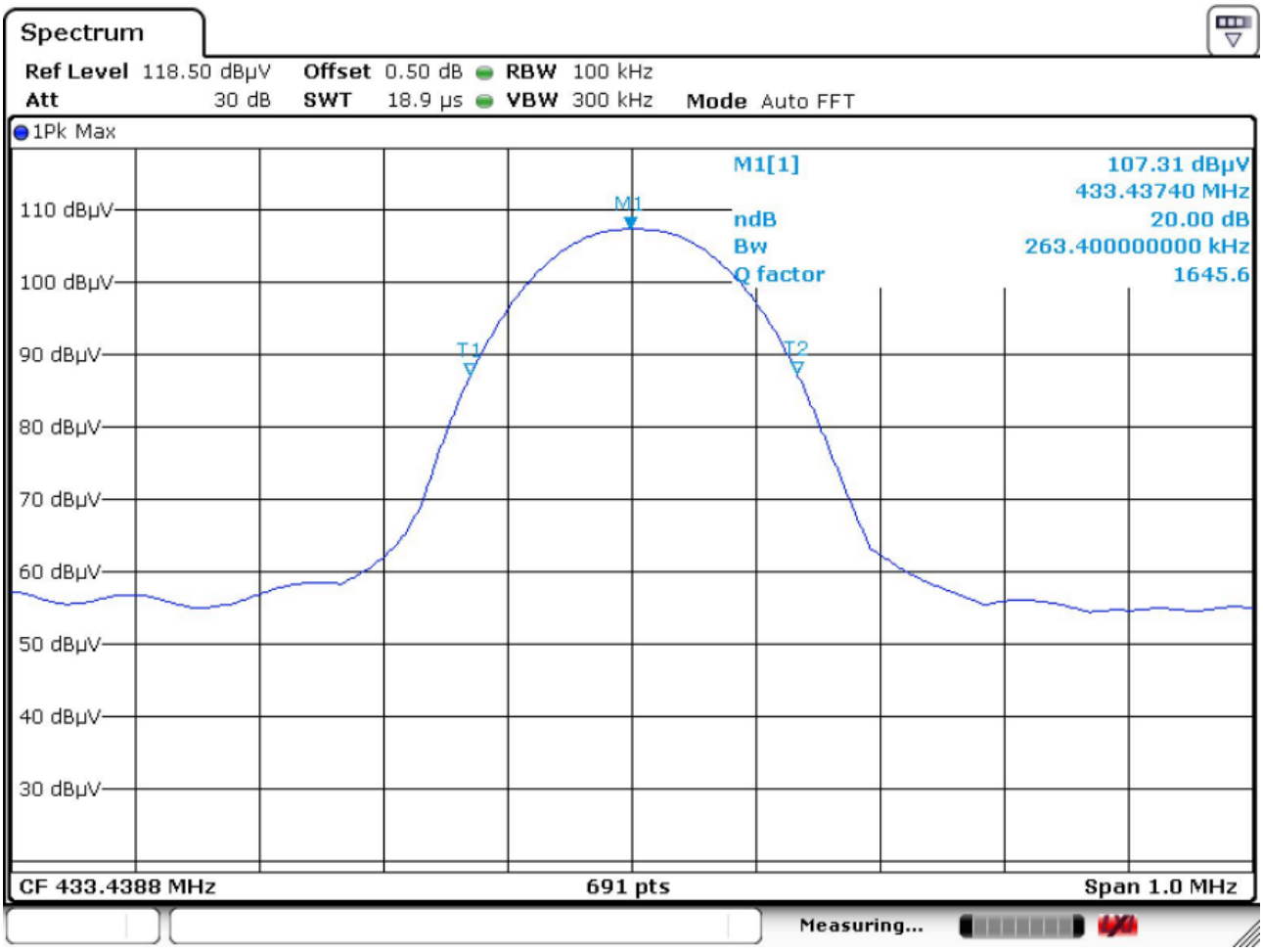


	Freq	Reading	C.F	Result	Limit QP	Margin	Height	Angle	Polarity
	MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	30.22	39.50	-16.84	22.66	39.00	16.34	100	255	VERTICAL
2	312.26	38.80	-10.47	28.33	46.40	18.07	345	269	HORIZONTAL
3	565.12	31.70	-4.36	27.34	46.40	19.06	299	245	VERTICAL
4	822.60	28.10	1.68	29.78	46.40	16.62	361	217	HORIZONTAL
5	922.27	25.60	3.71	29.31	46.40	17.09	400	112	HORIZONTAL
6	953.44	25.90	4.74	30.64	46.40	15.76	400	289	HORIZONTAL

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

APPENDIX 1

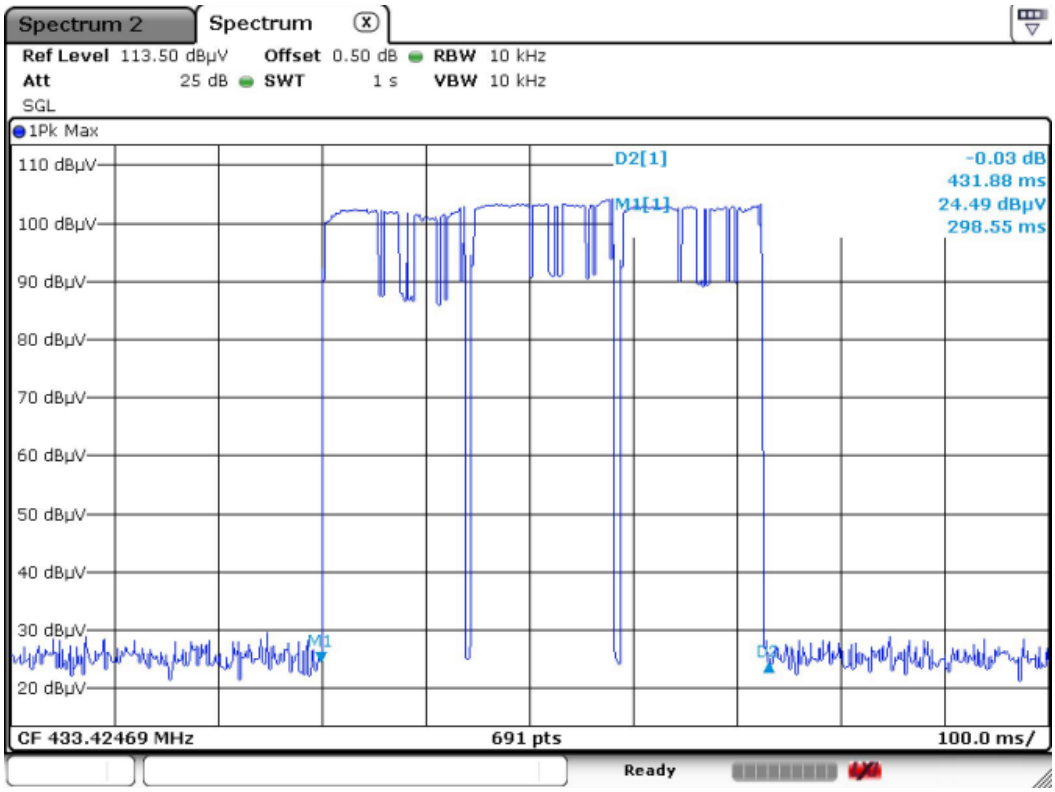
BANDWIDTH OF EMISSION

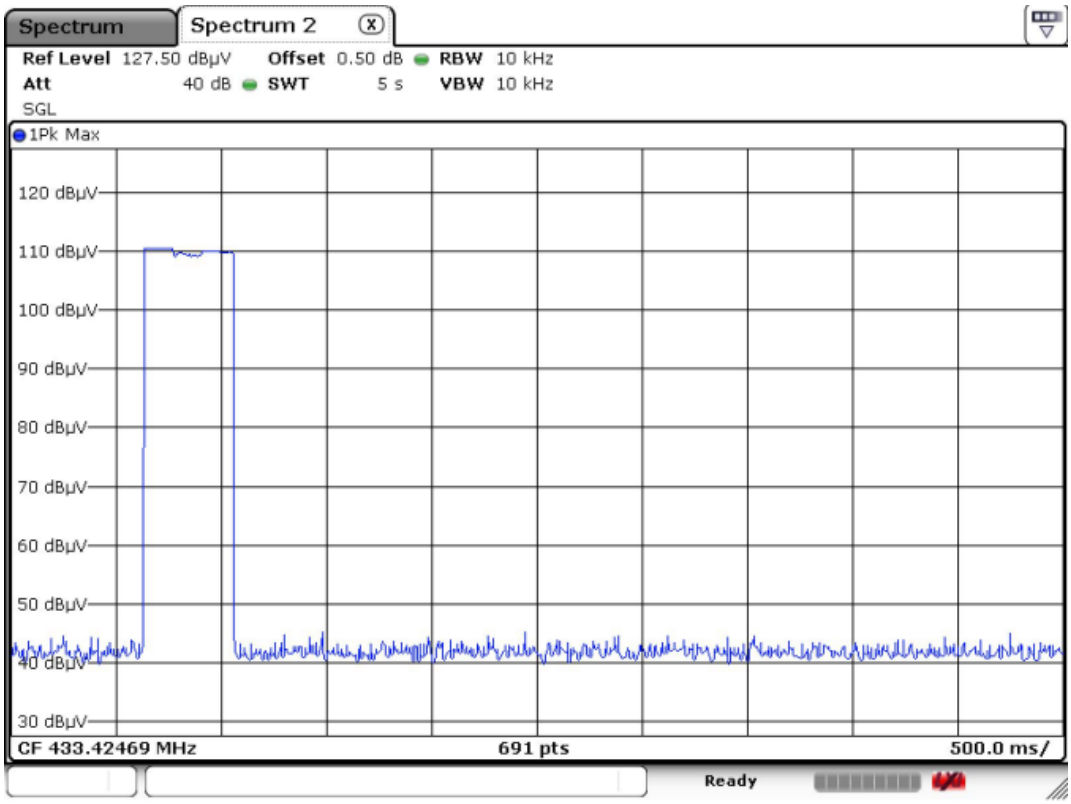


APPENDIX 2

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	2012-01-10
2	Signal Generator (~3.2GHz)	8648C	3623A02597	HP	1 year	2012-03-26
3	Signal Generator (1~20GHz)	83711B	US34490456	HP	1 year	2012-03-26
4	Attenuator (3dB)	8491A	37822	HP	2 year	2010-10-08
5	Attenuator (10dB)	8491A	63196	HP	2 year	2010-10-08
6	Attenuator (30dB)	8498A	3318A10929	HP	2 year	2011-01-05
7	Test Receiver (~30MHz)	ESHS10	828404/009	R&S	1 year	2012-03-26
8	EMI Test Receiver (~1GHz)	ESCI7	100722	R&S	1 year	2011-10-07
9	RF Amplifier (~1.3GHz)	8447D	2439A09058	HP	2 year	2010-10-08
10	RF Amplifier (1~18GHz)	8449B	3008A02126	HP	2 year	2012-03-26
11	Horn Antenna (1~18GHz)	BBHA 9120D	9120D122	SCHWARZBECK	2 year	2010-12-24
12	Horn Antenna (18 ~ 40GHz)	SAS-574	154	Schwarzbeck	2 year	2010-11-25
13	Horn Antenna (18 ~ 40GHz)	SAS-574	155	Schwarzbeck	2 year	2010-11-25
14	TRILOG Antenna	VULB 9160	9160-3172	SCHWARZBECK	2 year	2010-10-07
15	Dipole Antenna	VHA9103	2116	SCHWARZBECK	2 year	2010-11-25
16	Dipole Antenna	VHA9103	2117	SCHWARZBECK	2 year	2010-11-25
17	Dipole Antenna	VHA9105	2261	SCHWARZBECK	2 year	2010-11-25
18	Dipole Antenna	VHA9105	2262	SCHWARZBECK	2 year	2010-11-25
19	Hygro-Thermograph	THB-36	0041557-01	ISUZU	2 year	2013-04-26
20	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
21	Power Divider	11636A	6243	HP	2 year	2010-10-08
22	DC Power Supply	6622A	3448A03079	HP	-	-
23	Frequency Counter	5342A	2826A12411	HP	1 year	2012-03-26
24	Power Meter	EPM-441A	GB32481702	HP	1 year	2012-03-26
25	Power Sensor	8481A	US41030291	HP	1 year	2011-10-07
26	Audio Analyzer	8903B	3729A18901	HP	1 year	2011-10-07
27	Modulation Analyzer	8901B	3749A05878	HP	1 year	2011-10-07
28	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2011-10-07
29	Stop Watch	HS-3	601Q09R	CASIO	2 year	2012-03-26
30	LISN	ENV216	100408	R&S	1 year	2011-10-07
31	Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	-	-
32	Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	-	-
33	Loop Antenna	FMZB 1516	151602/94	SCHWARZBECK	2 year	2011-04-05