RF TEST REPORT

Test item	:	Wireless Charger
Model No.	:	IWB-C1
Order No.	:	1012-01376
Date of receipt	:	2010-12-09
Test duration	:	2011-08-01
Date of issue	:	2011-08-12
Use of report	:	FCC Original Grant

Applicant : Samsung Electronics Co., Ltd.
416, Maetan 3-Dong, Yeongtong-Gu, Suwon-City, Gyunggi-Do, 443-742, Korea

Test laboratory : Digital EMC Co., Ltd.
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080, Korea

Test specification	:	FCC Part 15 Subpart C
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

Tested by:	Witnessed by:	Reviewed by:
Engineer S.K. Ryu	N/A	Manager W.J. Lee

CONTENTS

1. Equipment information

1.1 Equipment description

FCC Equipment Class	Part 15 Low Power Transmitter Below 1705 kHz (DCD)
FCCID	A3LIWB-C1
Equipment type	Wireless Charger
Equipment model name	IWB-C1
Equipment add model name	N/A
Equipment serial no.	Identical prototype
Frequency range	118 ~ 124KHz 144 ~ 150KHz
Charging power range	Max. DC 4.1V, 61mA
Communication mode Note 2	Analog ping mode, Digital communication mode
Power	AC-DC Adaptor: AC 120 V 60 Hz
Antenna type	Internal Loop Antenna

Note 1: Description of communication mode,

- Analog ping mode

In order to find the pen(RX), the charger(TX) applies a short pulse to its primary coil regularly. The charger(TX) can know the presence of the pen(RX) on the charger(TX) through monitoring its primary coil current.

- Digital communication mode

After finding the pen(RX), the charger(TX) initiates power signal and then receives data PACKETS from the pen(RX). If the pen(RX) is removed on the position of the charger(TX) then this communication is stopped at once and the transmitting power signal of the charger(TX) is immediately stopped.

Note 2: Operational description

The pens each have resonant circuits. Essentially primary circuit is tuned so that it resonates at the same frequency as the secondary circuit. The primary and secondary coils are thus magnetically coupled, creating a dual-tuned resonant air-core transformer. Resonance of the primary varies to improve efficiencies in power transfer to the secondaries. The pens use Adaptive Inductive Coupling. Adaptive Inductive Coupling uses principles of magnetic induction to transfer power. The implementation involves tuning the coil circuits and adaptively adjusting power intelligently to maximize total power transferred. This adaptive inductive coupling through system intelligent tuning increases system Q dramatically which, in turn, maximizes the system efficiency. The tuning of the circuitry occurs through the use of proprietary power controlling protocols.

And each pens can be charged in both frequency ranges allowed by the charger.

1.2 Ancillary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Adapter	SAD1212	CN06BN4400133CDC07DB82687	SAMSUNG	-

2. Information about test items

2.1 Operating mode

Operating Mode 1 (OP 1)	**Charging and communication mode** (Charging and Communication)
Operating Mode 2 (OP 2)	**Analog ping mode** (Transmitting a very short pulse to find a client device)

2.2 Test mode

This device has been tested to simulate the various load conditions of the client device.
For simulating the various load condition, electronic loads are used to control charging currents.
It means that the impedance electronic loads can be adjusted by operator.
So that it can control the charging current of the circuit.
The charging current was controlled from 35mA (Min) to 60mA (MAX) by 10 mA step using the electronic loads.

Charging current	Test Mode 1 (TM1)	Test Mode 2 (TM2)	Test Mode 3 (TM3)
35mA(Min.)	TM1-35	TM2-35	TM3-35
40mA	TM1-40	TM2-40	TM3-40
50mA	TM1-50	TM2-50	TM3-50
60mA(Max.)	TM1-60	TM2-60	TM3-60

Note 1: The test mode 3 was tested using 2 electronic loads for charging 2 pens at the same time.
Pen 1 was connected with electronic load 1 using red and black wire. And Pen 2 was connected with electronic load 2 using red and green wire.
(Refer to test setup photo for more details.)

Note 2: Additional Information for PEN
The USB dongle is a device for short distance communication with the Touch Pen.
And using touch pen, general user can send location data and input necessary data to USB Dongle using Zigbee. Then Dongle send received data from Touch Pen to PC via USB port.

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Pen(RX)	IWB-P1	N/A	SAMSUNG	FCCID: A3LIWB-P1 (Pending)

Note: This Pen(RX) is used to control the charging currents.

2.4 Tested environment

Temperature	:	24 ~ 26 °C
Relative humidity content	:	35 ~ 49 % R.H.
Details of power supply	:	AC 120V 60Hz

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
→ A ferrite core is used to enhance more the technical specification.
Please refer to the external photo.

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Test Condition	Status Note 1
I. Test Items			
2.1049	20 dB Bandwidth	Radiated	**C**
15.209	Radiated Emission		**C**
15.207	AC Conducted Emissions	AC Line Conducted	**C**

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

The sample was tested according to the following specification:
ANSI C-63.4-2003

3.2 Transmitter requirements

3.2.1 20dB Bandwidth Measurement

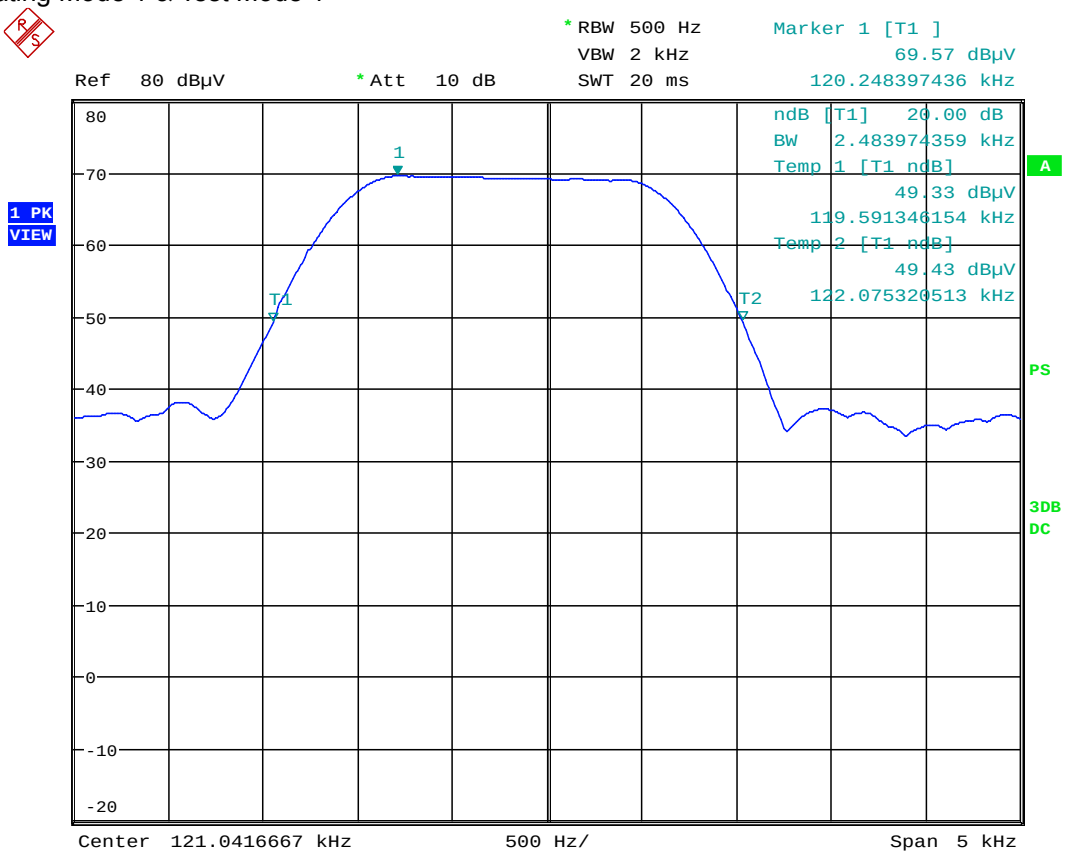
- Procedure:

The 20dB Bandwidth is measured with a spectrum analyzer connected via a receiving antenna placed near the EUT while the EUT is operating.

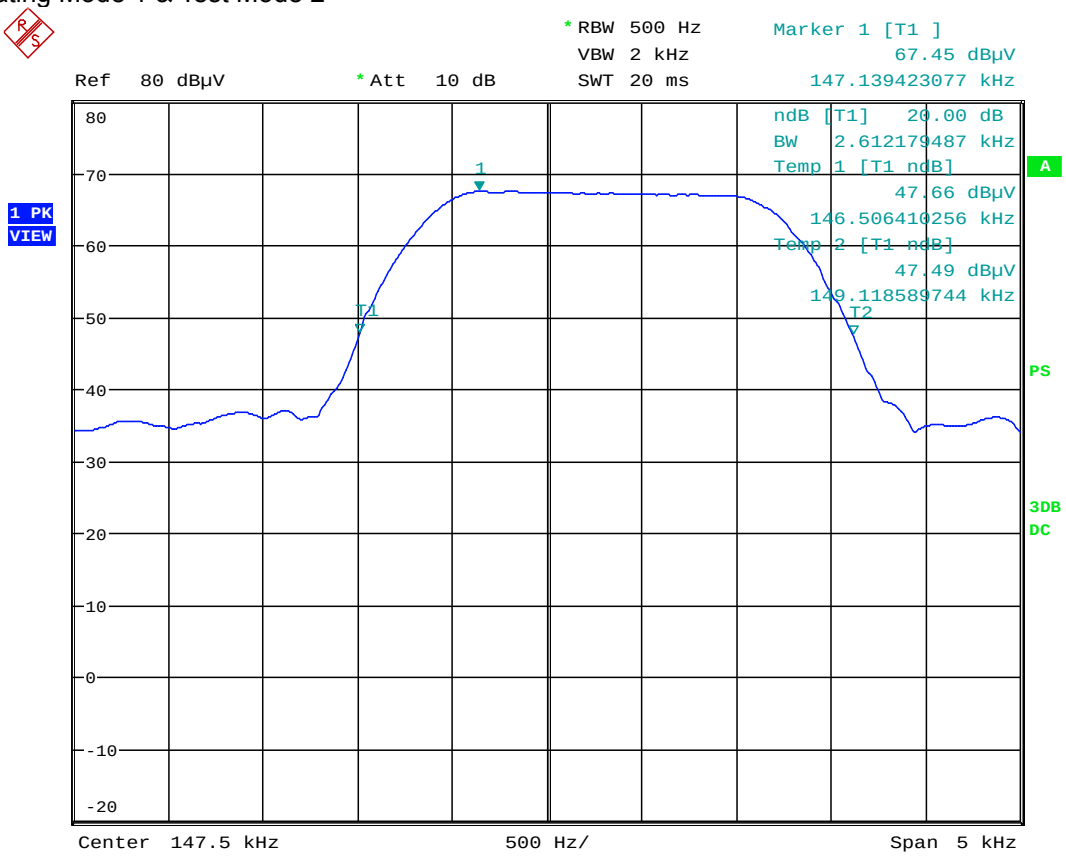
- Measurement Data: Refer to next page

- Measurement Data

▪ Operating Mode 1 & Test Mode 1

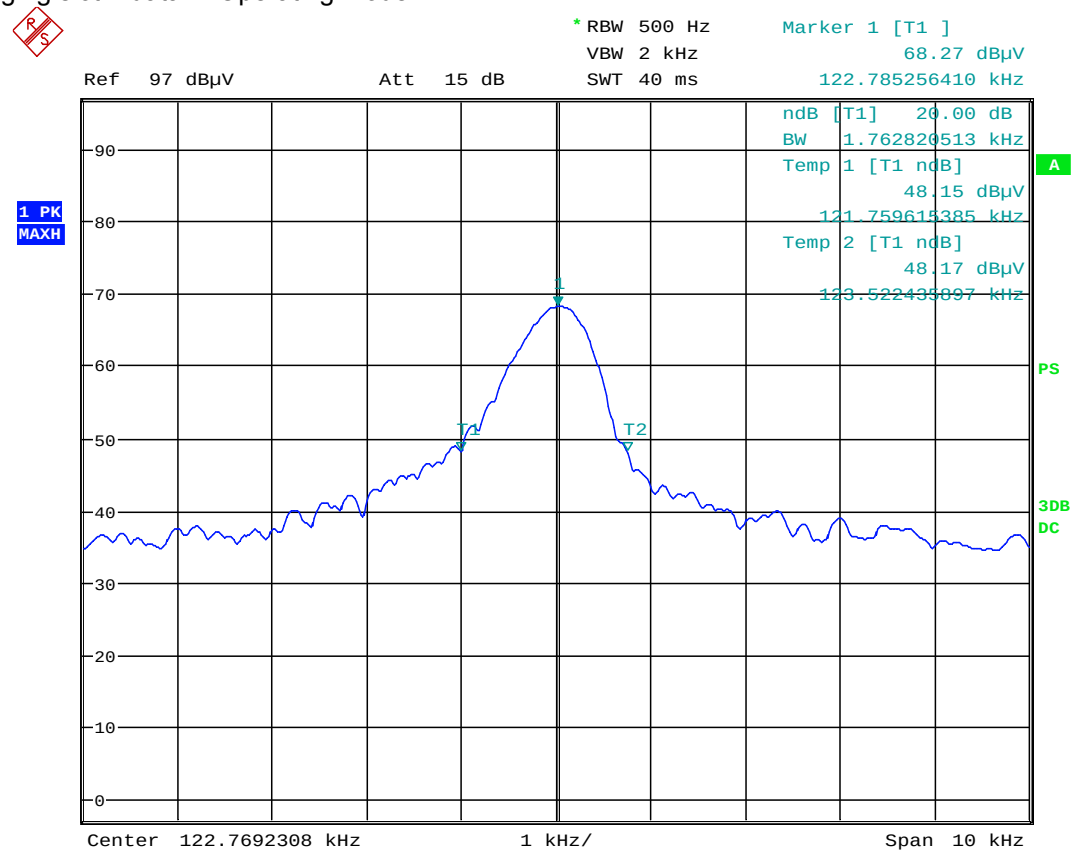


▪ Operating Mode 1 & Test Mode 2

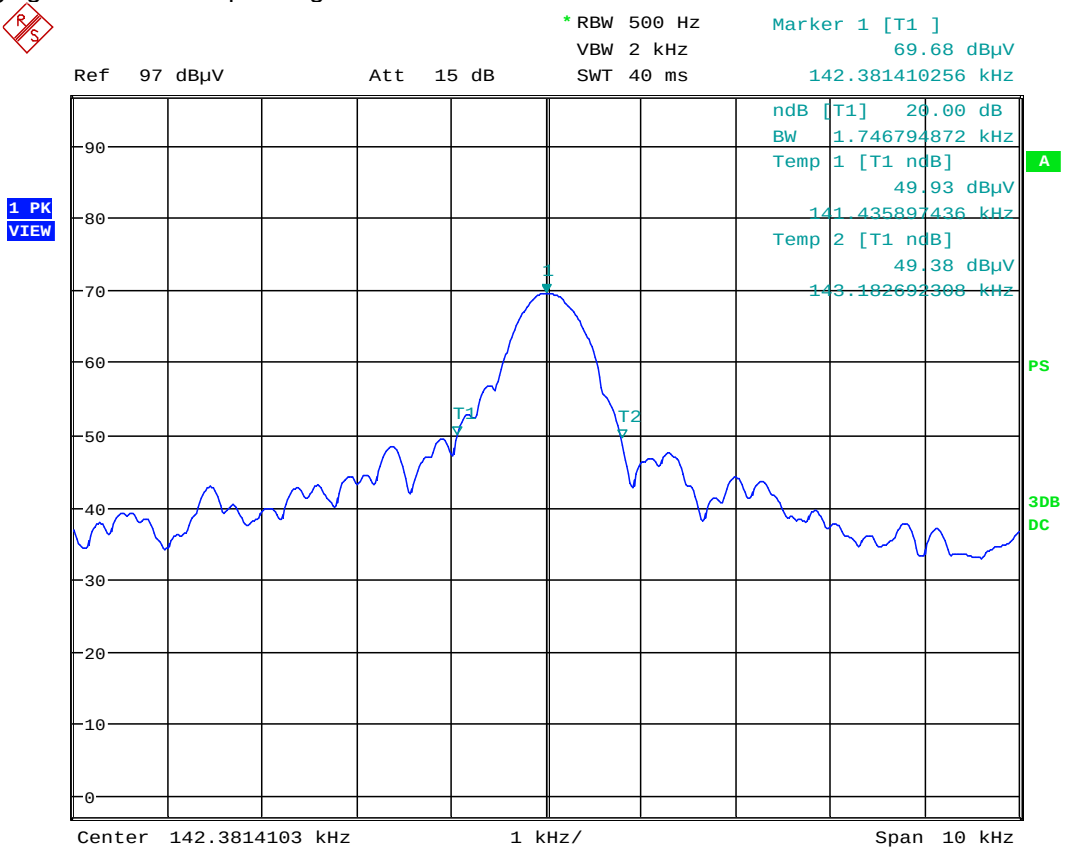


- Measurement Data

▪ Charging slot 1 data in Operating Mode 2



▪ Charging slot 2 data in Operating Mode 2



3.2.2 Radiated Emissions

- Limit: FCC Part 15.209(a):

Frequency [MHz]	Field Strength [uV/m]	Measurement Distance [Meters]
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

- Procedure: ANCI C63.4

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. A loop antenna is used for radiated emissions below 30MHz. And the loop antenna was varied in horizontal and vertical orientations and also around it`s axis.
3. During performing radiated emission below 1 ㎓, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 ㎓, the EUT was set 3 meter away from the interference-receiving antenna.
4. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
5. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
6. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 10 ㏈ lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 ㏈ margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- Measurement Data: Comply (refer to the next page)

- Measurement Data:

Measurement Distance : **3 Meters**

Operating Mode	Test Mode	Note.2	Frequency [MHz]	Detector Mode	ANT Pol	Reading [dBuV]	T.F [dB/m]	Distance factor	Field Strength [dBuV/m]	Limit [dBuV/m]	Margin [dB]
OP 1	**TM1-50**	**F**	**0.120**	**PK**	**N/A**	**70.24**	**11.65**	**80.00**	**1.89**	**26.06**	**24.17**
OP 1	TM1-60	F	0.122	PK	N/A	68.04	11.65	80.00	-0.31	25.87	26.18
OP 1	TM1-40	F	0.146	PK	N/A	68.12	11.60	80.00	-0.28	24.29	24.57
OP 1	TM1-60	F	0.149	PK	N/A	66.77	11.60	80.00	-1.63	24.17	25.80
OP 2	N/A	F	0.123	PK	N/A	68.27	11.65	80.00	-0.08	25.82	25.90
OP 2	N/A	F	0.142	PK	N/A	69.68	11.60	80.00	1.28	24.54	23.26
OP 1	TM3-50	S	0.603	PK	N/A	60.45	-11.54	40.00	8.91	31.99	23.08
OP 1	TM3-50	S	0.613	PK	N/A	59.22	-11.48	40.00	7.74	31.85	24.11
OP 1	TM3-50	S	1.037	PK	N/A	52.53	-11.63	40.00	0.90	27.29	26.39
OP 1	TM3-50	S	1.056	PK	N/A	51.68	-11.64	40.00	0.04	27.13	27.09
OP 1	TM3-50	S	73.134	QP	H	47.80	-14.70	0.00	33.10	40.00	6.90
OP 1	TM3-50	S	73.775	QP	V	49.00	-14.70	0.00	34.30	40.00	5.70
OP 1	TM3-50	S	311.335	QP	H	46.40	-7.20	0.00	39.20	46.00	6.80
OP 1	TM3-50	S	320.000	QP	H	49.50	-7.00	0.00	42.50	46.00	3.50
OP 2	N/A	S	0.556	PK	N/A	59.26	-11.45	40.00	7.81	32.71	24.90
OP 2	N/A	S	1.006	PK	N/A	49.95	-11.62	40.00	-1.67	27.55	29.22
OP 2	N/A	S	43.990	QP	V	36.10	-7.50	0.00	28.60	40.00	11.40

Note 1. Distance Factor(DF)
For 300m: 40*log(300/3) = 80dB
For 30m: 40*log(30/3) = 40dB

Note 2. " F " = Fundamental
" S " = Spurious
" * " = Noise Floor

Note 3. No other spurious and harmonic emissions were reported greater than listed emissions above table.

Note 4. Sample calculation
T.F = AF + CL – AG / Field Strength = Reading + T.F + DF
Margin = Limit – Field Strength
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

3.2.3 AC Line Conducted Emissions

- Minimum Standard: FCC Part 15.207

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

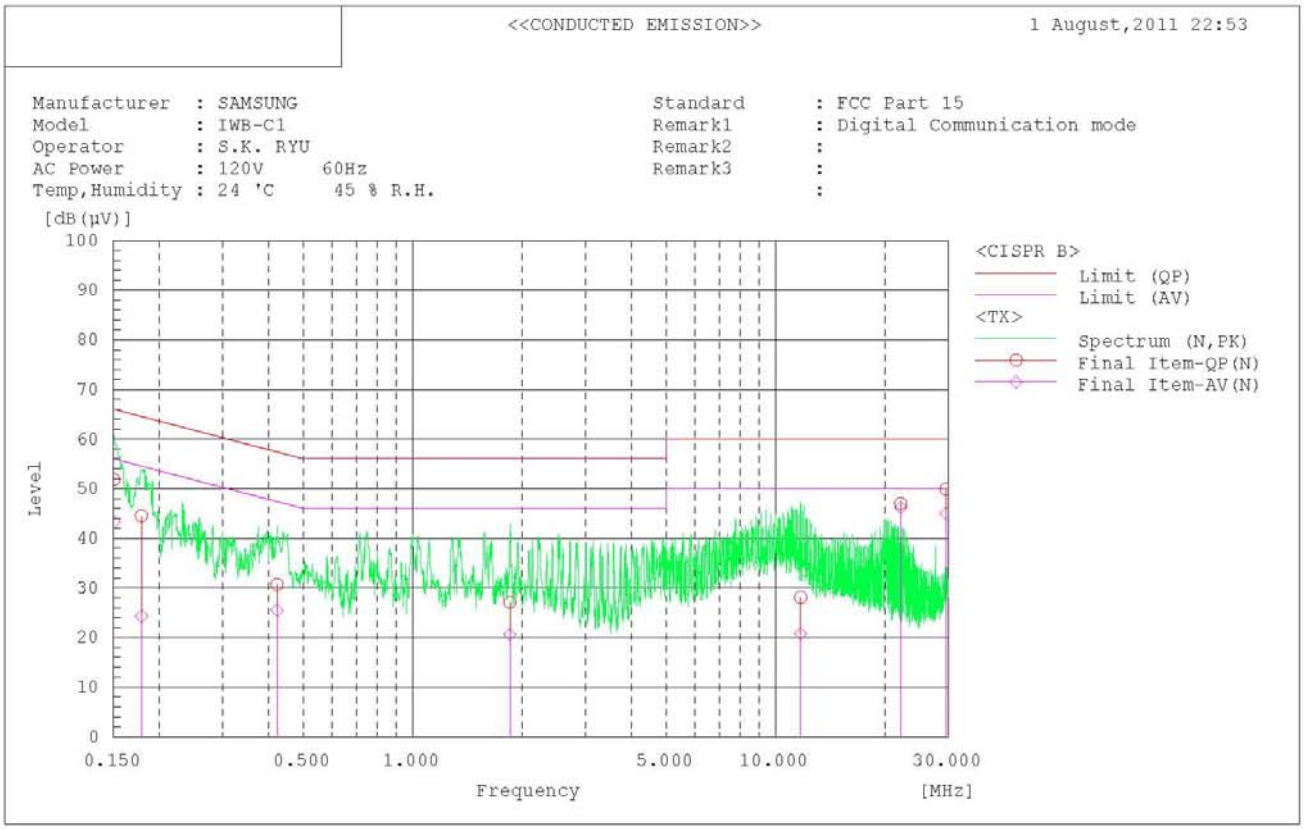
* Decreases with the logarithm of the frequency

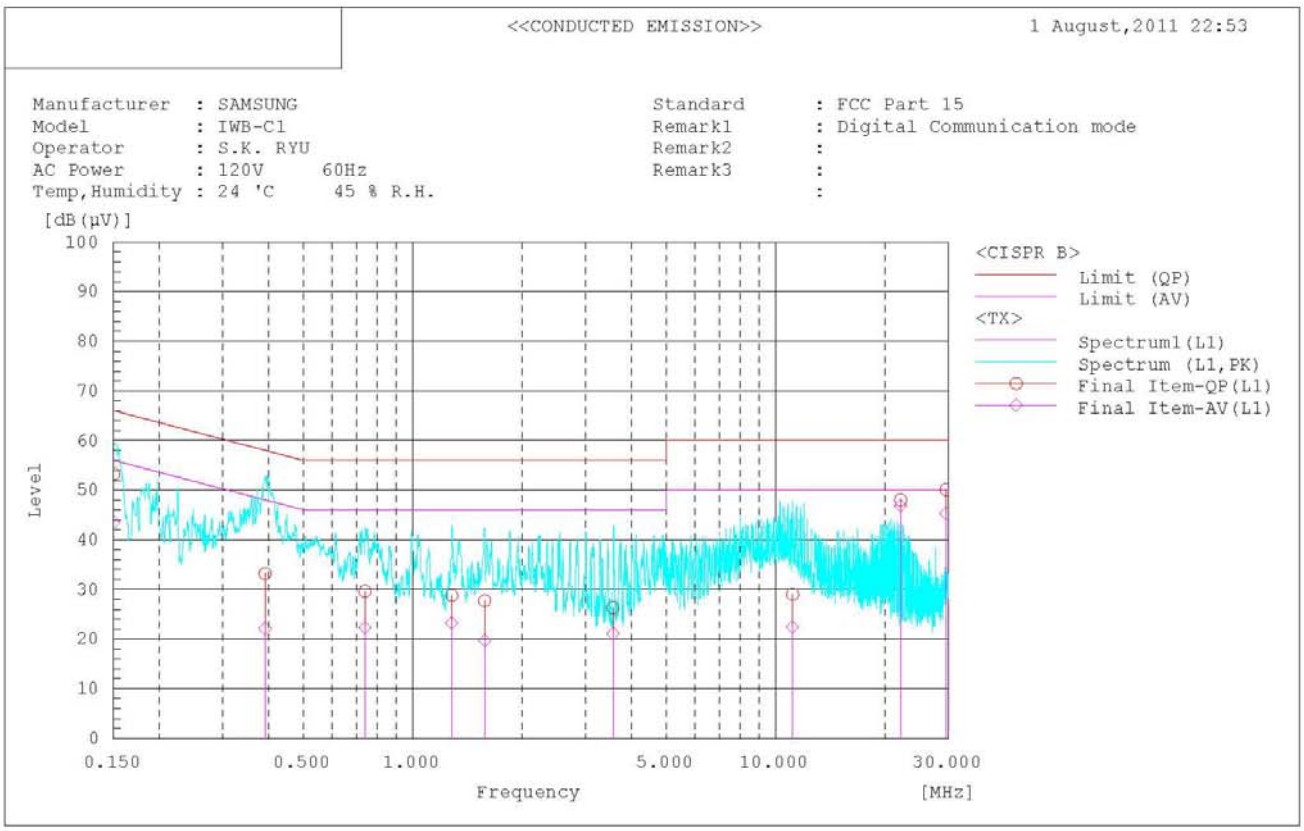
- Procedure:

1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

- Measurement Data: Comply (refer to the next page)

- Measurement Data(Graph): Operating mode 1 & TM3-50





- Measurement Data(List) : Operating mode 1 & TM3-50

<<CONDUCTED EMISSION>>

1 August,2011 22:53

Standard : FCC Part 15
Manufacturer : SAMSUNG
Model : IWB-C1
Operator : S.K. RYU
AC Power : 120V 60Hz
Temp,Humidity : 24 'C 45 % R.H.
Remark1 : Digital Communication mode
Remark2 :
Remark3 :
:

Final Result

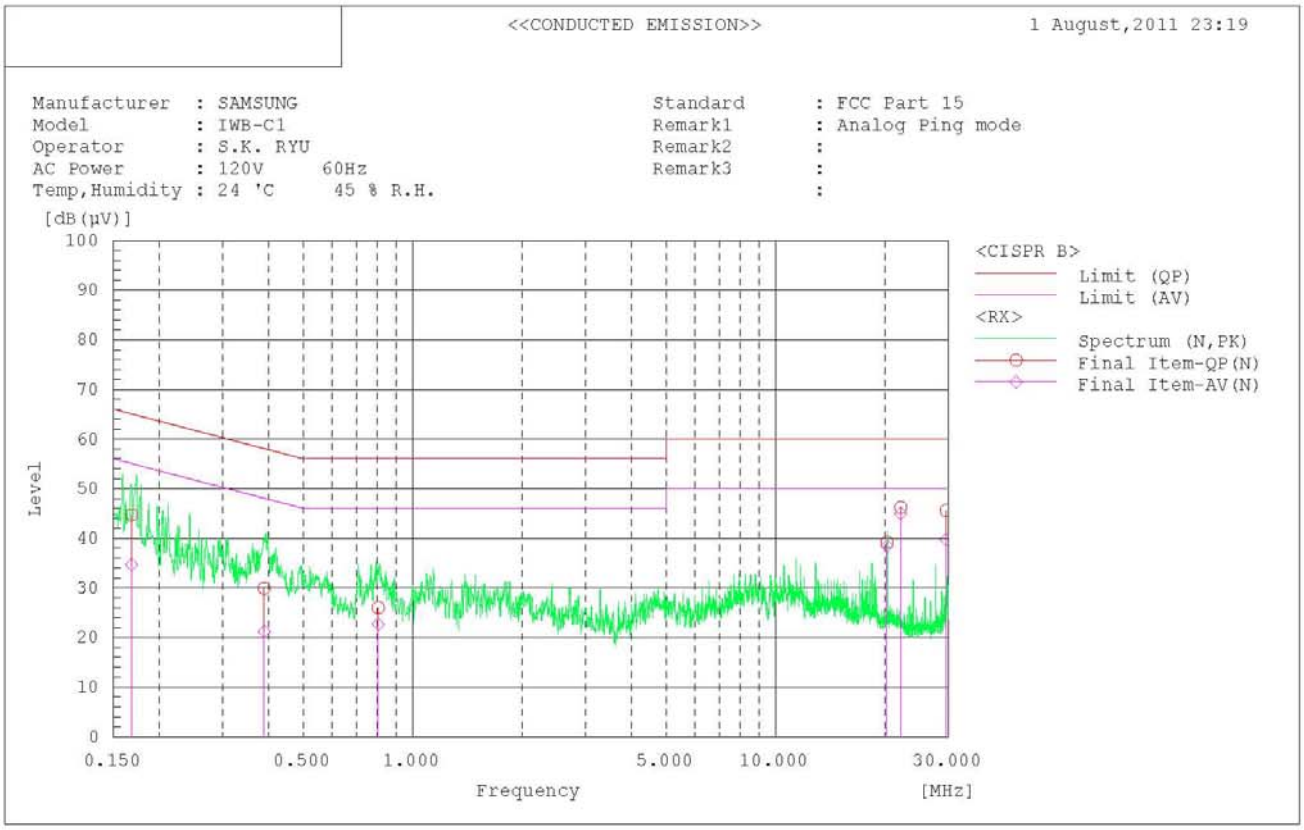
--- N Phase ---

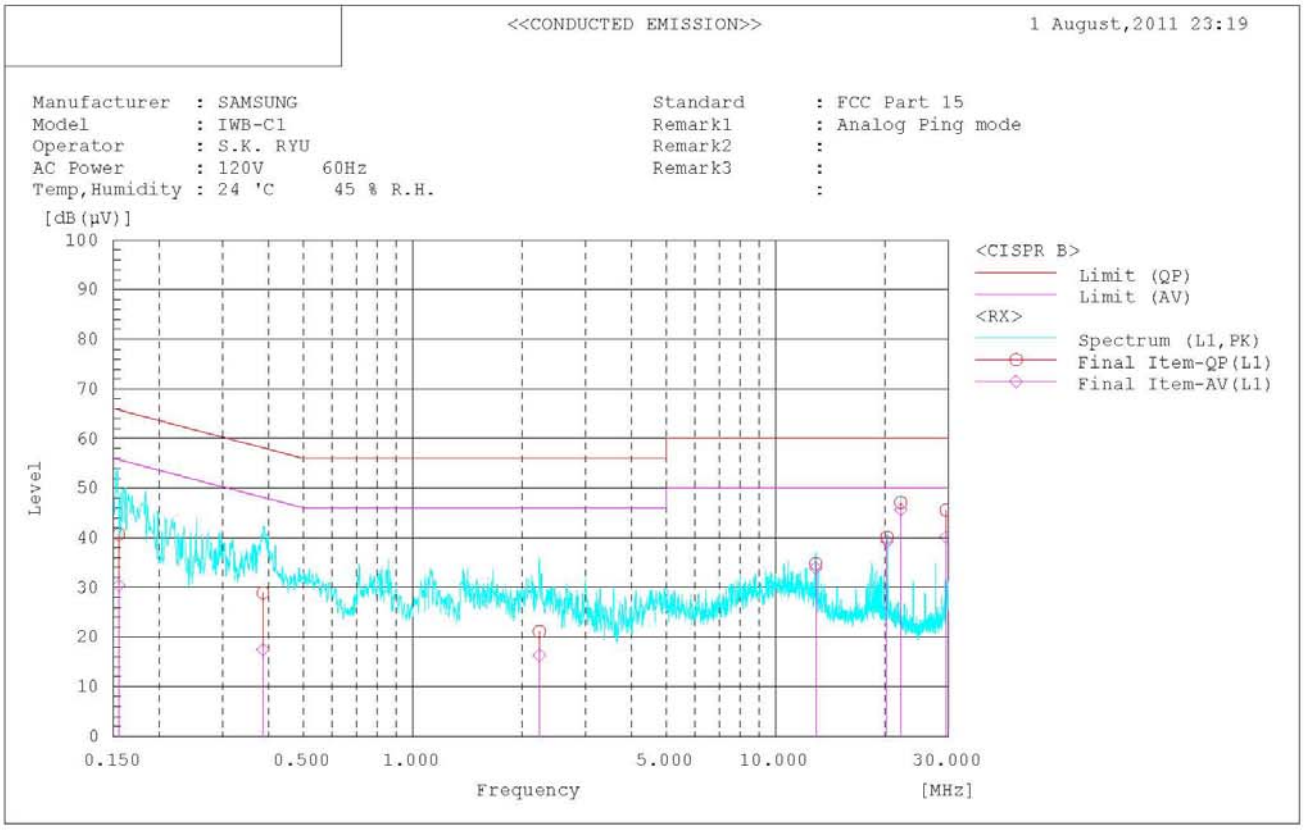
No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]	Remark
1	0.150	51.7	43.2	0.1	51.8	43.3	66.0	56.0	14.2	12.7	
2	0.179	44.4	24.2	0.1	44.5	24.3	64.5	54.5	20.0	30.2	
3	0.423	30.6	25.4	0.1	30.7	25.5	57.4	47.4	26.7	21.9	
4	1.854	26.9	20.4	0.2	27.1	20.6	56.0	46.0	28.9	25.4	
5	11.717	27.5	20.2	0.6	28.1	20.8	60.0	50.0	31.9	29.2	
6	22.118	45.8	45.0	1.2	47.0	46.2	60.0	50.0	13.0	3.8	
7	29.491	48.3	43.4	1.6	49.9	45.0	60.0	50.0	10.1	5.0	

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]	Remark
1	0.150	53.1	43.4	0.2	53.3	43.6	66.0	56.0	12.7	12.4	
2	0.392	33.0	21.9	0.2	33.2	22.1	58.0	48.0	24.8	25.9	
3	0.739	29.4	22.1	0.2	29.6	22.3	56.0	46.0	26.4	23.7	
4	1.281	28.6	23.0	0.2	28.8	23.2	56.0	46.0	27.2	22.8	
5	1.579	27.5	19.5	0.2	27.7	19.7	56.0	46.0	28.3	26.3	
6	3.563	25.9	20.7	0.4	26.3	21.1	56.0	46.0	29.7	24.9	
7	11.132	28.3	21.7	0.7	29.0	22.4	60.0	50.0	31.0	27.6	
8	22.118	46.8	45.7	1.2	48.0	46.9	60.0	50.0	12.0	3.1	
9	29.491	48.6	43.8	1.5	50.1	45.3	60.0	50.0	9.9	4.7	

- Measurement Data(Graph) : Operating mode 2





- Measurement Data(List) : Operating mode 2

<<CONDUCTED EMISSION>>

1 August,2011 23:19

Standard : FCC Part 15
Manufacturer : SAMSUNG
Model : IWB-C1
Operator : S.K. RYU
AC Power : 120V 60Hz
Temp,Humidity : 24 'C 45 % R.H.
Remark1 : Analog Ping mode
Remark2 :
Remark3 :
:

Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]	Remark
1	0.168	44.6	34.6	0.1	44.7	34.7	65.1	55.1	20.4	20.4	
2	0.390	29.8	21.1	0.1	29.9	21.2	58.1	48.1	28.2	26.9	
3	0.803	25.9	22.6	0.1	26.0	22.7	56.0	46.0	30.0	23.3	
4	20.274	38.1	37.4	1.1	39.2	38.5	60.0	50.0	20.8	11.5	
5	22.118	45.0	43.8	1.2	46.2	45.0	60.0	50.0	13.8	5.0	
6	29.491	44.0	38.2	1.6	45.6	39.8	60.0	50.0	14.4	10.2	

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading AV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]	Remark
1	0.155	40.5	30.2	0.2	40.7	30.4	65.7	55.7	25.0	25.3	
2	0.387	28.7	17.3	0.2	28.9	17.5	58.1	48.1	29.2	30.6	
3	2.234	20.8	16.0	0.3	21.1	16.3	56.0	46.0	34.9	29.7	
4	12.902	34.0	33.1	0.8	34.8	33.9	60.0	50.0	25.2	16.1	
5	20.275	39.0	38.1	1.1	40.1	39.2	60.0	50.0	19.9	10.8	
6	22.118	45.9	44.5	1.2	47.1	45.7	60.0	50.0	12.9	4.3	
7	29.491	44.1	38.6	1.5	45.6	40.1	60.0	50.0	14.4	9.9	

APPENDIX I

TEST EQUIPMENT FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☐	Spectrum Analyzer	Agilent	E4440A	10/09/30	11/09/30	MY45304199
☐	Spectrum Analyzer	Rohde Schwarz	FSQ26	11/01/11	12/01/11	200445
☐	Spectrum analyzer	Agilent	E4404B	11/03/08	12/03/08	US41061134
☐	Spectrum Analyzer(RE)	H.P	8563E	10/10/04	11/10/04	3551A04634
☒	MXA Signal Analyzer	Agilent Technologies, Inc	N9020A	11/01/07	12/01/07	MY49100833
☐	Power Meter	H.P	EPM-442A	11/07/01	12/07/01	GB37170413
☐	Power Sensor	H.P	8481A	11/07/01	12/07/01	3318A96332
☐	Wideband Power Sensor	Rohde Schwarz	NRP-Z81	11/06/04/	12/06/04	1137.9009.02-101001
☐	Power Divider	Agilent	11636B	10/10/05	11/10/05	56471
☐	4-Way Power Divider	ET Industries	D-0526-4	10/12/24	11/12/24	210195001
☐	Power Splitter	Anritsu	K241B	10/10/05	11/10/05	020611
☐	Power Splitter	Anritsu	K241B	11/07/01	12/07/01	017060
☐	Power Splitters & Dividers	Aeroflex/Weinschel	1594	11/02/21	12/02/21	1177
☐	Frequency Counter	H.P	5342A	11/07/01	12/07/01	2119A04450
☐	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	10/10/04	11/10/04	30604493/021031
☒	Digital Multimeter	H.P	34401A	11/03/07	12/03/07	3146A13475, US36122178
☐	Multifunction Synthesizer	HP	8904A	10/10/11	11/10/11	3633A08404
☐	Signal Generator	Rohde Schwarz	SMR20	11/03/08	12/03/08	101251
☐	Signal Generator	H.P	ESG-3000A	11/07/01	12/07/01	US37230529
☐	Vector Signal Generator	Rohde Schwarz	SMJ100A	11/01/11	12/01/11	100148
☐	Vector Signal Generator	Rohde Schwarz	SMBV100A	11/01/11	12/01/11	255571
☐	Audio Analyzer	H.P	8903B	11/07/02	12/07/02	3011A09448
☐	Modulation Analyzer	H.P	8901B	11/07/01	12/07/01	3028A03029
☐	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	11/03/07	12/03/07	GB43461134
☐	Universal Radio communication Tester	Rohde Schwarz	CMU200	11/03/07	12/03/07	106760
☐	Bluetooth Tester	TESCOM	TC-3000B	11/07/01	12/07/01	3000B640046
☐	Thermo hygrometer	BODYCOM	BJ5478	11/01/13	12/01/13	090205-3
☒	Thermo hygrometer	BODYCOM	BJ5478	11/01/13	12/01/13	090205-2
☐	Thermo hygrometer	BODYCOM	BJ5478	11/01/13	12/01/13	090205-4
☐	AC Power supply	DAEKWANG	5KVA	11/03/08	12/03/08	20060321-1
☐	DC Power Supply	HP	6622A	11/03/07	12/03/07	3448A03760
☐	DC Power Supply	HP	6633A	11/03/07	12/03/07	3524A06634
☐	DC Power Supply	Protek	PWS-3010D	10/10/04	11/10/04	4072702
☐	DC Power Supply	SM techno	SDP30-5D	11/05/20	12/05/20	305DKA013
☐	BAND Reject Filter	Microwave Circuits	N0308372	10/10/05	11/10/05	3125-01DC0352
☐	BAND Reject Filter	Wainwright	WRCG1750	10/10/05	11/10/05	2
☐	High-Pass Filter	ANRITSU	MP526D	10/10/04	11/10/04	M27756
☐	High-pass filter	Wainwright	WHNX2.1	N/A	N/A	1
☐	High-pass filter	Wainwright	WHNX3.0	N/A	N/A	9
☐	High-pass filter	Wainwright	WHNX5.0	N/A	N/A	8

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☐	High-Pass Filter	Wainwright	WHKX8.5	N/A	N/A	1
☐	High-Pass Filter	Wainwright	D82346	N/A	N/A	9
☐	Tunable Notch Filter	Wainwright	WRCT800.0 /960.0-0.2/40-8SSK	N/A	N/A	32
☐	Tunable Notch Filter	Wainwright	WRCD1700.0 /2000.0-0.2/40-10SSK	N/A	N/A	53
☐	Tunable Notch Filter	Wainwright	WRCT1900.0/ 2200.0-5/40-10SSK	N/A	N/A	30
☐	HORN ANT	ETS	3115	10/10/04	11/10/04	21097
☐	HORN ANT	ETS	3115	11/03/22	12/03/22	6419
☐	HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	154
☐	HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	155
☐	HORN ANT	SCHWARZBECK	BBHA9120A	10/04/13	12/04/13	322
☐	Dipole Antenna	Schwarzbeck	VHA9103	10/11/29	11/11/29	2116
☐	Dipole Antenna	Schwarzbeck	VHA9103	10/11/29	11/11/29	2117
☐	Dipole Antenna	Schwarzbeck	UHA9105	10/11/29	11/11/29	2261
☐	Dipole Antenna	Schwarzbeck	UHA9105	10/11/29	11/11/29	2262
☒	LOOP Antenna	ETS	6502	10/11/29	11/11/29	3471
☐	Coaxial Fixed Attenuators	Agilent	8491B	11/07/02	12/07/02	MY39260700
☒	Attenuator (3dB)	WEINSCHEL	56-3	10/10/05	11/10/05	Y2342
☐	Attenuator (3dB)	WEINSCHEL	56-3	10/10/05	11/10/05	Y2370
☐	Attenuator (10dB)	WEINSCHEL	23-10-34	10/10/01	11/10/01	BP4386
☐	Attenuator (10dB)	WEINSCHEL	23-10-34	11/01/11	12/01/11	BP4387
☐	Attenuator (10dB)	WEINSCHEL	86-10-11	10/10/05	11/10/05	446
☐	Attenuator (10dB)	WEINSCHEL	86-10-11	10/10/05	11/10/05	408
☐	Attenuator (20dB)	WEINSCHEL	86-20-11	10/10/05	11/10/05	432
☐	Attenuator (30dB)	JFW	50FH-030-300	11/03/07	12/03/07	060320-1
☐	Attenuator (40dB)	WEINSCHEL	57-40-33	10/10/01	11/10/01	NN837
☐	Termination	H.P	HP-909D	11/07/02	12/07/02	02750
☐	Termination	H.P	HP-909D	11/07/02	12/07/02	02702
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	11/07/01	12/07/01	788
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	11/07/01	12/07/01	790
☐	Amplifier (30dB)	Agilent	8449B	11/03/07	12/03/07	3008A01590
☐	Amplifier (30dB)	H.P	8449B	11/03/07	12/03/07	3008A00370
☐	Amplifier	EMPOWER	BBS3Q7ELU	10/10/04	11/10/04	1020
☐	RF Power Amplifier	OPHIRRF	5069F	11/07/01	12/07/01	1006
☒	EMI TEST RECEIVER	R&S	ESU	11/01/20	12/01/20	100014
☒	BILOG ANTENNA	SCHAFFNER	CBL6112B	10/07/14	12/07/14	2737
☒	Amplifier (22dB)	H.P	8447E	11/01/11	12/01/11	2945A02865
☒	EMI TEST RECEIVER	R&S	ESCI	11/03/08	12/03/08	100364

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☐	BICONICAL ANT.	Schwarzbeck	VHA 9103	10/11/29	11/11/29	91032789
☐	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A1	10/11/29	12/11/29	1098
☐	BICONICAL ANT.	Schwarzbeck	VHA 9103	10/12/21	12/12/21	91031946
☐	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A1	10/07/07	12/07/07	0590
☐	Low Noise Pre Amplifier	TSJ	MLA-100K01-B01-2	11/03/07	12/03/07	1252741
☐	Low Noise Pre Amplifier	TSJ	MLA-00108-B02-36	11/01/11	12/01/11	1518831
☐	Amplifier (25dB)	Agilent	8447D	11/03/07	12/03/07	2944A10144
☐	Amplifier (25dB)	Agilent	8447D	11/07/01	12/07/01	2648A04922
☒	Spectrum Analyzer(CE)	H.P	8591E	11/03/07	12/03/07	3649A05889
☒	LISN	Kyoritsu	KNW-407	11/01/11	12/01/11	8-317-8
☒	LISN	Kyoritsu	KNW-242	11/07/02	12/07/02	8-654-15
☐	CVCF	NF Electronic	4420	11/03/08	12/03/08	304935/337980
☒	50 ohm Terminator	HME	CT-01	11/01/11	12/01/11	N/A
☒	RFI/FIELD Intensity Meter	Kyoritsu	KNM-2402	11/07/02	12/07/02	4N-170-3
☐	Wideband Radio Communication Tester	R&S	CMW500	10/10/21	11/10/21	100988
☒	Electronic Load[Note.1]	KIKUSUI	PLZ334W	11/03/01	12/03/01	HK000921
☒	Electronic Load [Note.1]	Dae Gil	EL-500P	11/03/01	12/03/01	031250004