RF TEST REPORT

Test item	:	Touch Pen
Model No.	:	AN-TP300
Order No.	:	1110-01376
Date of receipt	:	2011-10-12
Test duration	:	2011-10-20~ 2011-11-18
Date of issue	:	2011-11-21
Use of report	:	FCC & IC Original Grant

Applicant : LG Electronics USA.
1000 Sylvan Avenue Englewood Cliffs, New Jersey, United States

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

Test specification	:	FCC Part 15.249 Subpart C RSS-210, RSS-Gen
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

Tested by:	Witnessed by:	Reviewed by:
Engineer S.K.Ryu	N/A	Technical Director Harvey Sung

CONTENTS

1. Equipment information

1.1 Equipment description

FCC Equipment Class	Part 15 Low Power Communication Device Transmitter
FCC ID	BEJTP300
IC ID	2703H- TP300
Equipment type	Touch Pen
Equipment model name	AN-TP300
Equipment add model name	N/A
Equipment serial no.	Identical prototype
Frequency band	2402 ~ 2480MHz
Power	DC 3.7 V
Antenna type	Internal Type: Chip Antenna (Max. peak gain: 1.99dBi)

1.2 Ancillary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
USB Cable	-	-	-	58 cm
-	-	-	-	-

2. Information about test items

2.1 Test mode

This device was tested in maximum duty mode at maximum power.

Test Case 1	EUT
Test Case 2	EUT + Notebook
Test Case 3	-

2.2 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Notebook	X51RL	85N0AS318314227	ASUS	-
-	-	-	-	-

2.3 Tested frequency

	TX Frequency (MHz)	RX Frequency (MHz)
Lowest Channel	2402	2402
Middle Channel	2439	2439
Highest Channel	2480	2480

2.4 Tested environment

Temperature	:	21 ~ 24 °C
Relative humidity content	:	32 ~ 48 % R.H.
Details of power supply	:	DC 3.7 V

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit (Using in 2400 ~ 2483.5MHz)	Test Condition	Status Note 1
I. Transmit mode (Tx)				
15.249 (a)	Field Strength Limits	Refer to the FCC 15.249(a)	Radiated	C Note.2
15.205, 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	< FCC 15.209 limits	Radiated	C Note.2
15.207	AC Conducted Emissions	< FCC 15.207 limits	Line Conducted	C Note.3
RSS Gen Issue 3	Occupied Bandwidth (99%)	RSS-Gen(4.6.1)	Conducted	C
II. Receive mode (Rx)				
RSS-Gen(7.2.4)	AC Conducted Emissions	RSS-Gen(7.2.4 Table 4)	Line Conducted	C Note.2
RSS-Gen(6)	Receiver Spurious Emissions	RSS-Gen(6 Table 2)	Radiated	C Note.3

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

Note 2: Both test case1 and test case 2 were performed and the worst case data was reported.

Note 3: This test item was performed at test case2 only.

The sample was tested according to the following specification:
ANSI C-63.4-2003, RSS-Gen Issue 3

3.2 Transmitter requirements

3.2.1 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 and average detector mode 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.

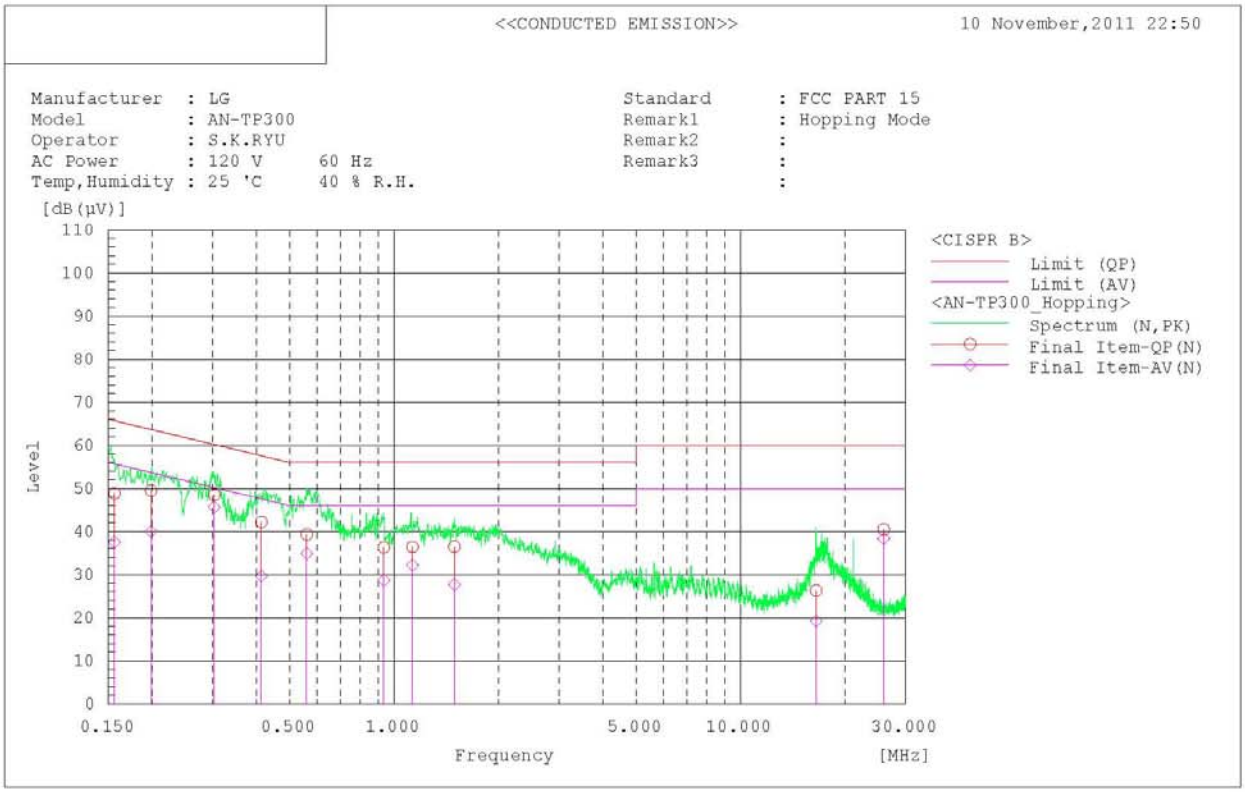
- Measurement Data: Comply

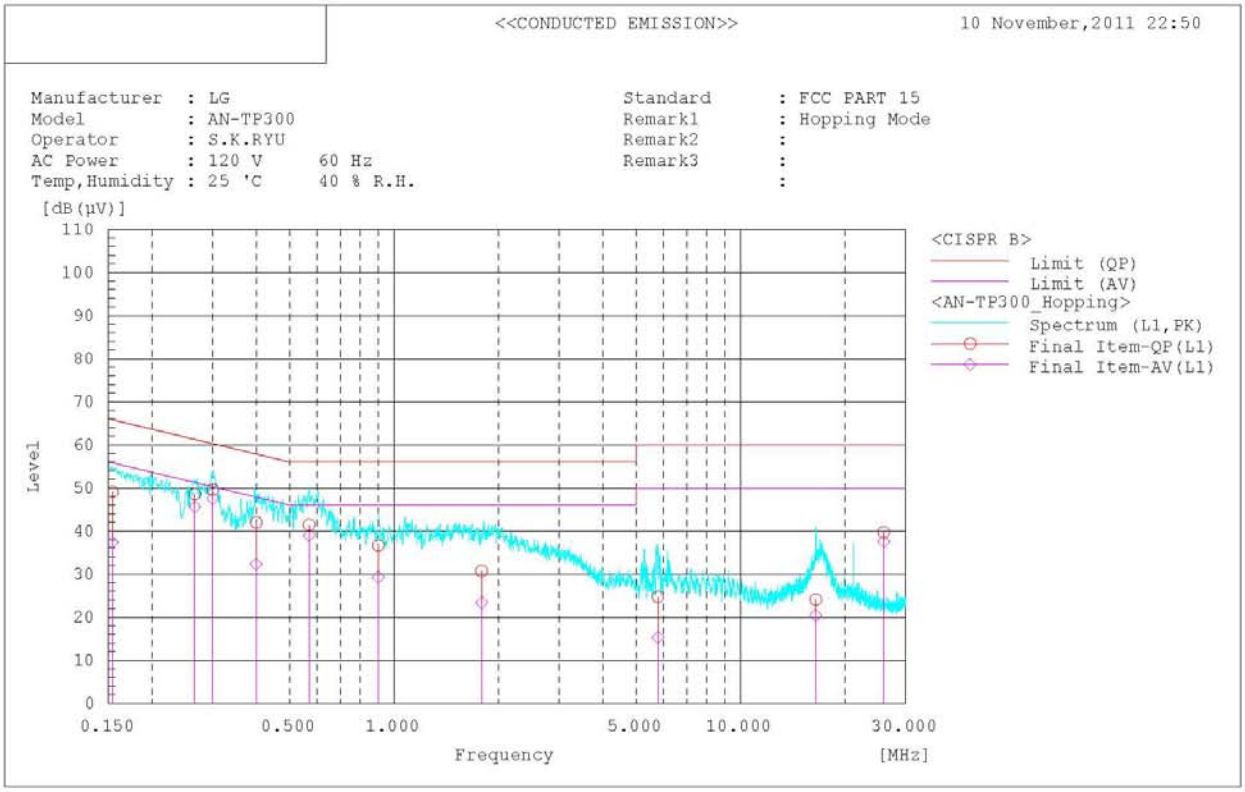
Minimum Standard: FCC Part 15.207(a)

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

AC Line Conducted Emissions (Graph)





AC Line Conducted Emissions (Data List)

<<CONDUCTED EMISSION>>

10 November,2011 22:50

Standard : FCC PART 15
Manufacturer : LG
Model : AN-TP300
Operator : S.K.RYU
AC Power : 120 V 60 Hz
Temp,Humidity : 25 'C 40 % R.H.
Remark1 : Hopping 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	0.156	48.7	37.5	0.1	48.8	37.6	65.7	55.7	16.9	18.1	
2	0.199	49.4	39.9	0.1	49.5	40.0	63.7	53.7	14.2	13.7	
3	0.303	48.4	45.6	0.1	48.5	45.7	60.2	50.2	11.7	4.5	
4	0.414	42.1	29.6	0.1	42.2	29.7	57.6	47.6	15.4	17.9	
5	0.560	39.2	34.8	0.1	39.3	34.9	56.0	46.0	16.7	11.1	
6	0.935	36.2	28.6	0.1	36.3	28.7	56.0	46.0	19.7	17.3	
7	1.131	36.3	32.1	0.1	36.4	32.2	56.0	46.0	19.6	13.8	
8	1.493	36.3	27.5	0.2	36.5	27.7	56.0	46.0	19.5	18.3	
9	16.528	25.4	18.3	0.9	26.3	19.2	60.0	50.0	33.7	30.8	
10	25.878	39.2	37.1	1.3	40.5	38.4	60.0	50.0	19.5	11.6	

--- 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	0.154	48.9	37.2	0.2	49.1	37.4	65.8	55.8	16.7	18.4	
2	0.266	48.4	45.4	0.2	48.6	45.6	61.2	51.2	12.6	5.6	
3	0.300	49.4	47.3	0.2	49.6	47.5	60.2	50.2	10.6	2.7	
4	0.400	41.8	32.1	0.2	42.0	32.3	57.9	47.9	15.9	15.6	
5	0.569	41.2	38.8	0.2	41.4	39.0	56.0	46.0	14.6	7.0	
6	0.901	36.4	29.1	0.2	36.6	29.3	56.0	46.0	19.4	16.7	
7	1.789	30.4	23.1	0.3	30.7	23.4	56.0	46.0	25.3	22.6	
8	5.776	24.2	14.8	0.5	24.7	15.3	60.0	50.0	35.3	34.7	
9	16.496	23.1	19.4	1.0	24.1	20.4	60.0	50.0	35.9	29.6	
10	25.900	38.4	36.3	1.3	39.7	37.6	60.0	50.0	20.3	12.4	

3.2.2 Radiated Emission

- Procedure:

The EUT was placed on a 0.8m high wooden table inside a semi anechoic chamber. An antenna was placed at 3m distance from the EUT. Measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed on OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions

The spectrum analyzer is set to:

Frequency Range = 30 MHz ~ 10th harmonic.

RBW = 100 kHz (30MHz ~ 1 GHz) VBW ≥ RBW
= 1 MHz (1 GHz ~ 10th harmonic)

Distance = 3m Detector function = peak

Trace = max hold Sweep = auto

Measurement Data: Comply

Note 1: See next pages for actual measured spectrum plots and data.

Fundamental / Harmonics emission: FCC Part 15.249(a)

Frequency (MHz)	Limit @ 3m	
	Fundamental (mV/m)	Harmonics (uV/m)
2400 ~ 2483.5	50	500

General Standard: FCC Part 15.209(a)

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.

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	12.29 ~ 12.293	149.9 ~ 150.05	1645.5 ~ 1646.5	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.51975 ~ 12.52025	156.52475 ~ 156.52525	1660 ~ 1710	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.57675 ~ 12.57725	156.7 ~ 156.9	1718.8 ~ 1722.2	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	13.36 ~ 13.41	162.0125 ~ 167.17	2200 ~ 2300	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	16.42 ~ 16.423	167.72 ~ 173.2	2310 ~ 2390	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.69475 ~ 16.69525	240 ~ 285	2483.5 ~ 2500	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.80425 ~ 16.80475	322 ~ 335.4	2655 ~ 2900	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	25.5 ~ 25.67	399.90 ~ 410	3260 ~ 3267	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	37.5 ~ 38.25	608 ~ 614	3332 ~ 3339		
8.291 ~ 8.294	73 ~ 74.6	960 ~ 1240	3345.8 ~ 3358		
8.362 ~ 8.366	74.8 ~ 75.2	1300 ~ 1427	3600 ~ 4400		
8.37625 ~ 8.38675	108 ~ 121.94	1435 ~ 1626.5			
8.41425 ~ 8.41475	123 ~ 138				

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

30MHz ~ 25GHz Radiated Spurious Emissions

▪ Lowest Channel

Freq. (MHz)	ANT Pol	The worst case EUT Position	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2402.320	V	Z axis	PK	102.08	-3.75	98.33	114.00	15.67
-	-	-	-	-	-	91.42 **	94.00	2.58
2389.760	V	Z axis	PK	64.85	-3.75	61.10	74.00	12.90
2386.000	V	Z axis	AV	38.09	-3.75	34.34	54.00	19.66
2400.000	V	Z axis	PK	66.43	-3.75	62.68	64.00	1.32
2400.000	V	Z axis	AV	40.57	-3.75	36.82	44.00	7.18
4804.261	V	Y axis	PK	55.63	5.89	61.52	74.00	12.48
4803.991	V	Y axis	AV	41.98	5.89	47.87	54.00	6.13

Note.

1. No other spurious and harmonic emissions were detected greater than listed emissions on above table. And above listed data is the worst case data.
2. ** Duty cycle correction factors
   Duty cycle = on time/100 milliseconds or period, whichever is less(On time = N1L1+N2L2+...+NN-1LN-1+NNLN)
   20log(0.21*215/100ms), Duty cycle factor= -6.91dB
   AV(dBuV/m): PK + duty cycle factor
3. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

30MHz ~ 25GHz Radiated Spurious Emissions

▪ Middle Channel

Freq. (MHz)	ANT Pol	The worst case EUT Position	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2438.640	V	Z axis	PK	100.88	-3.75	97.13	114.00	16.87
-	-	-	-	-	-	90.22 **	94.00	3.78
4877.658	V	Y axis	PK	56.27	4.86	61.13	74.00	12.87
4877.997	V	Y axis	AV	42.86	4.86	47.72	54.00	6.28

Note.

1. No other spurious and harmonic emissions were detected greater than listed emissions on above table. And above listed data is the worst case data.
2. ** Duty cycle correction factors
   Duty cycle = on time/100 milliseconds or period, whichever is less(On time = N1L1+N2L2+...+NN-1LN-1+NNLN)
   20log(0.21*215/100ms), Duty cycle factor= -6.91dB
   AV(dBuV/m): PK + duty cycle factor
3. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

30MHz ~ 25GHz Radiated Spurious Emissions

▪ Highest Channel

Freq. (MHz)	ANT Pol	The worst case EUT Position	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2479.982	V	Z axis	PK	101.76	-3.75	98.01	114.00	15.99
-	-	-	-	-	-	91.1 **	94.00	2.9
2483.530	V	Z axis	PK	75.70	-3.75	71.95	74.00	2.05
2483.500	V	Z axis	AV	39.00	-3.75	35.25	54.00	18.75
4960.234	V	Y axis	PK	56.05	6.34	62.39	74.00	11.61
4960.003	V	Y axis	AV	42.83	6.34	49.17	54.00	4.83

Note.

1. No other spurious and harmonic emissions were detected greater than listed emissions on above table.
   And above listed data is the worst case data.
2. ** Duty cycle correction factors
   Duty cycle = on time/100 milliseconds or period, whichever is less(On time = N1L1+N2L2+...+NN-1LN-1+NNLN)
   20log(0.21*215/100ms), Duty cycle factor= -6.91dB
   AV(dBuV/m): PK + duty cycle factor
3. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

3.2.3 Antenna Requirements

- Procedure:

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.

- Conclusion: Comply

The antenna is permanently attached by soldering. (Refer to Internal Photo file.)

- Minimum Standard:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions.

3.2.4 Occupied Bandwidth (99%)

- Procedure: (RSS-Gen Issue 3)
- The 99% power bandwidth was measured with a calibrated spectrum analyzer.
- Spectrum analyzer plots are included on the following pages.

- Measurement Data: Comply

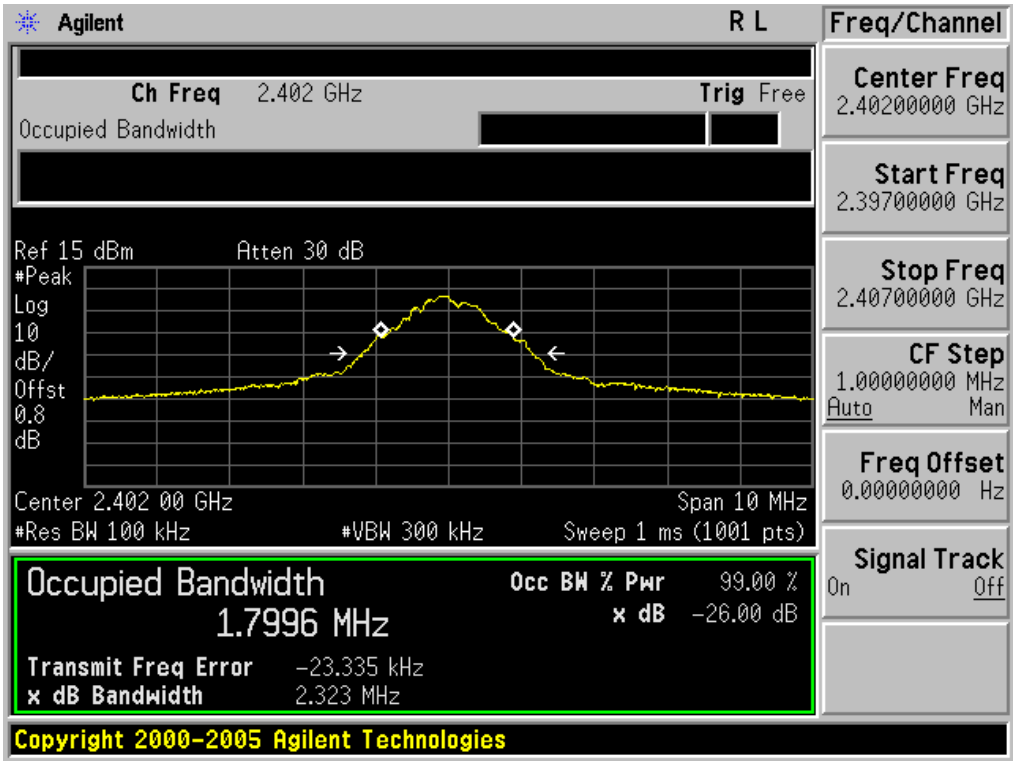
Tested Channel	Test Results (MHz)
Lowest	**1.7996**
Middle	**2.0527**
Highest	**2.2339**

Note 1: See next pages for actual measured spectrum plots.

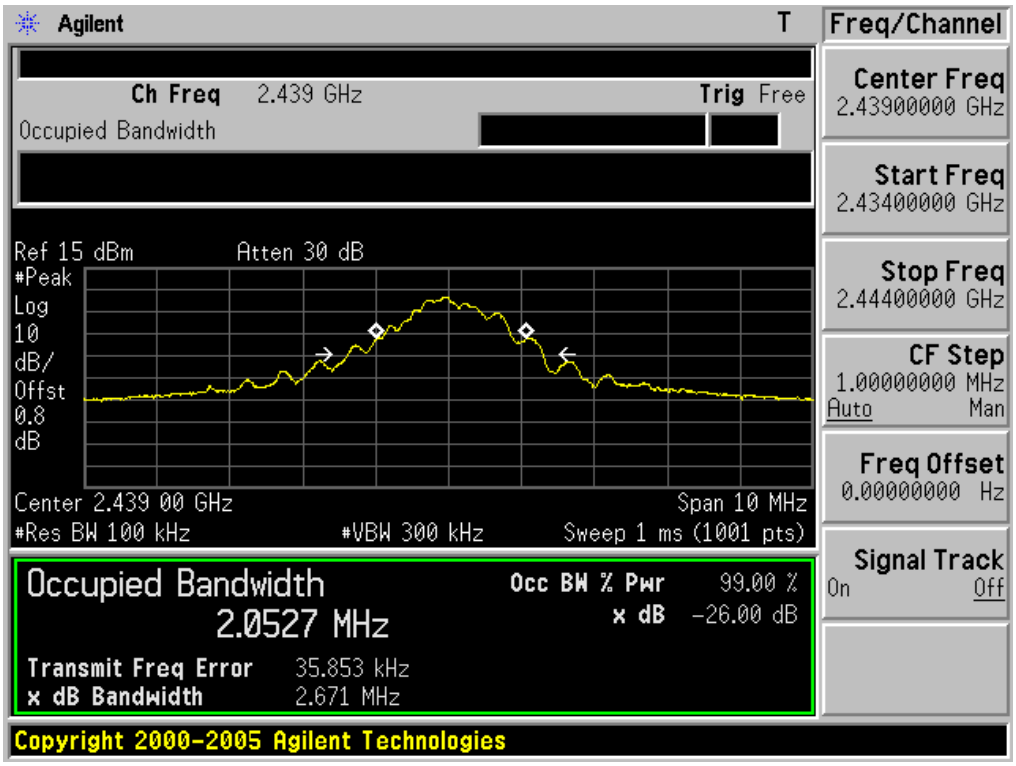
- **Minimum Standard:**

N/A

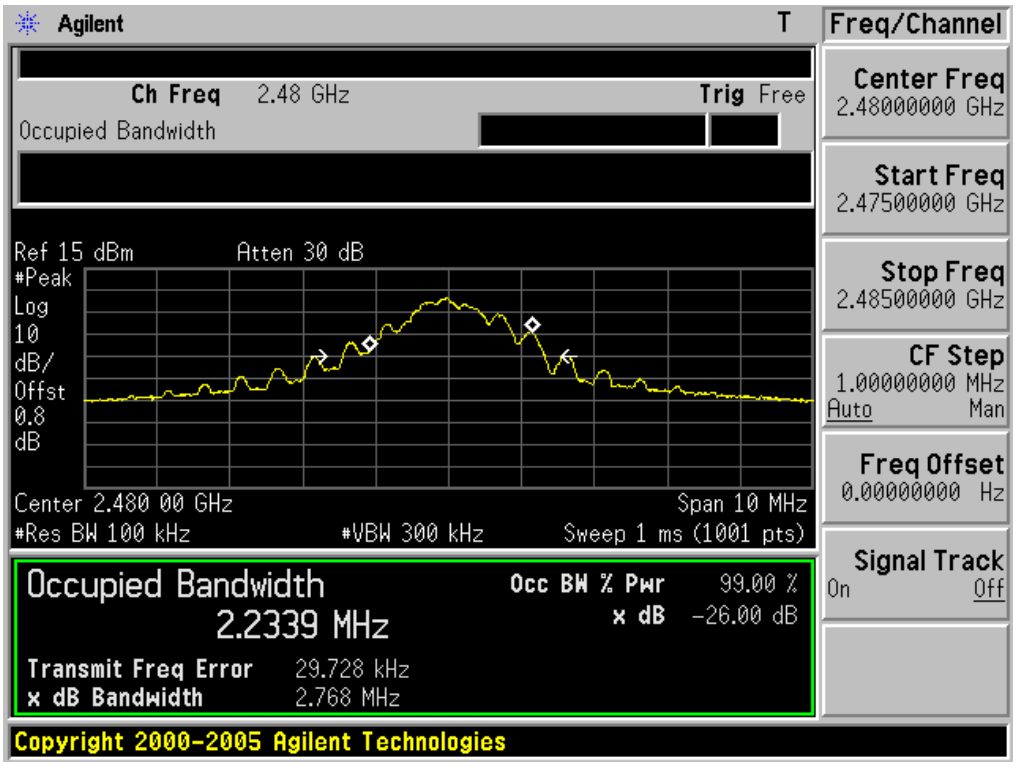
Occupied Bandwidth (99%) Lowest Frequency



Occupied Bandwidth (99%) Middle Frequency



Occupied Bandwidth (99%) Highest Frequency



3.3 Receiver requirements

3.3.1 AC Conducted Emissions (Receiver Mode)

- Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its receiving function. Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) 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.

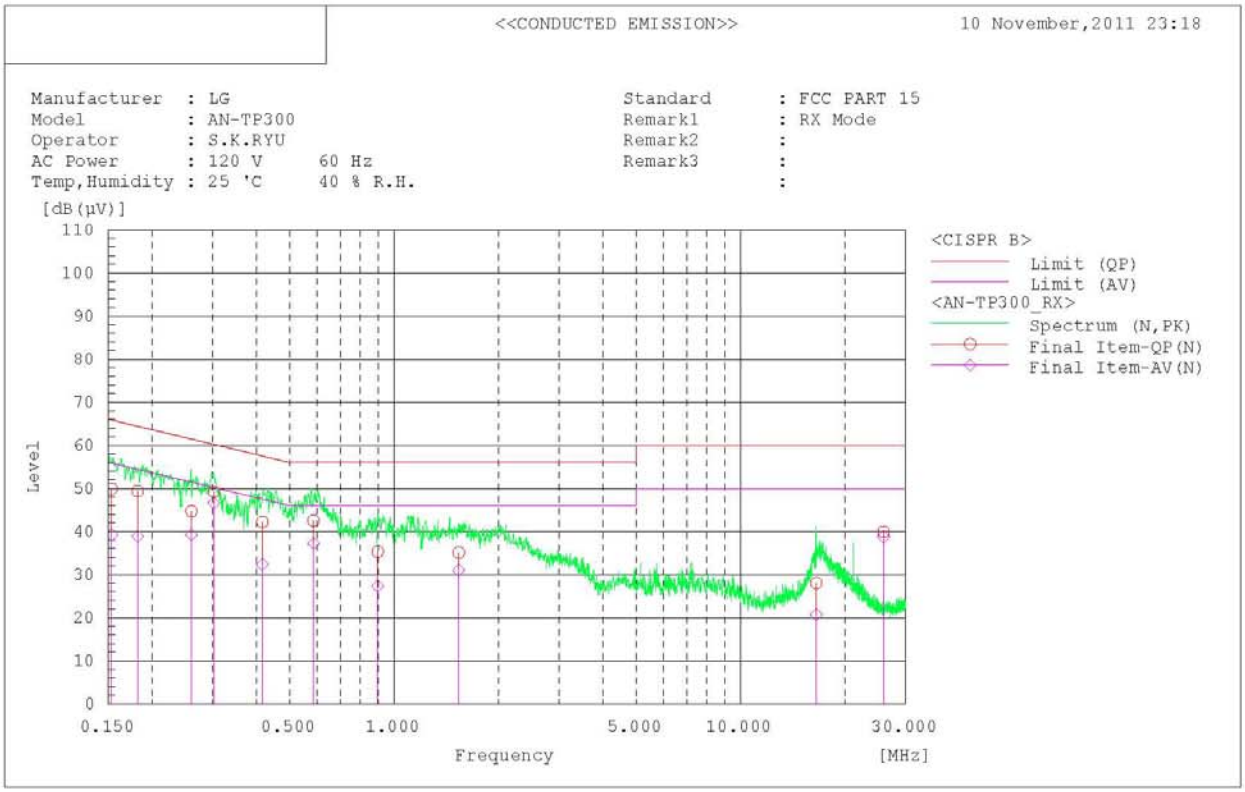
- Measurement Data: Comply

- Minimum Standard: FCC Part 15.207(a)/EN 55022

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

AC Line Conducted Emissions (Graph)



AC Line Conducted Emissions (Data List)

<<CONDUCTED EMISSION>>

10 November,2011 23:18

Standard : FCC PART 15
Manufacturer : LG
Model : AN-TP300
Operator : S.K.RYU
AC Power : 120 V 60 Hz
Temp,Humidity : 25 'C 40 % R.H.
Remark1 : RX 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	0.153	49.8	39.1	0.1	49.9	39.2	65.8	55.8	15.9	16.6	
2	0.182	49.3	38.8	0.1	49.4	38.9	64.4	54.4	15.0	15.5	
3	0.260	44.6	39.1	0.1	44.7	39.2	61.4	51.4	16.7	12.2	
4	0.302	49.1	46.5	0.1	49.2	46.6	60.2	50.2	11.0	3.6	
5	0.417	42.1	32.2	0.1	42.2	32.3	57.5	47.5	15.3	15.2	
6	0.586	42.4	37.1	0.1	42.5	37.2	56.0	46.0	13.5	8.8	
7	0.897	35.2	27.2	0.1	35.3	27.3	56.0	46.0	20.7	18.7	
8	1.536	34.9	30.8	0.2	35.1	31.0	56.0	46.0	20.9	15.0	
9	16.535	27.1	19.8	0.9	28.0	20.7	60.0	50.0	32.0	29.3	
10	25.870	38.6	37.5	1.3	39.9	38.8	60.0	50.0	20.1	11.2	

--- 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	0.153	48.8	37.2	0.2	49.0	37.4	65.8	55.8	16.8	18.4	
2	0.182	46.1	38.8	0.2	46.3	39.0	64.4	54.4	18.1	15.4	
3	0.302	48.6	46.1	0.2	48.8	46.3	60.2	50.2	11.4	3.9	
4	0.466	39.9	35.1	0.2	40.1	35.3	56.6	46.6	16.5	11.3	
5	0.568	41.6	39.4	0.2	41.8	39.6	56.0	46.0	14.2	6.4	
6	0.841	34.6	30.8	0.2	34.8	31.0	56.0	46.0	21.2	15.0	
7	2.036	31.2	24.1	0.3	31.5	24.4	56.0	46.0	24.5	21.6	
8	5.721	24.5	15.8	0.5	25.0	16.3	60.0	50.0	35.0	33.7	
9	16.553	27.1	18.1	1.0	28.1	19.1	60.0	50.0	31.9	30.9	
10	25.899	38.4	36.2	1.3	39.7	37.5	60.0	50.0	20.3	12.5	

3.3.2 Out of Band Emissions – Radiated (Receiver Mode)

- Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in a OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Frequency Range = 30 MHz ~ 10th harmonic.

RBW = 120 kHz (30MHz ~ 1 GHz)

= 1 MHz (1 GHz ~ 10th harmonic)

VBW = 10Hz (Average), VBW ≥ RBW (Peak)

Trace = max hold

Detector function = peak

Sweep = auto

Measurement Data: Comply

Note 1: See next pages for actual measured spectrum plots and data.

- Minimum Standard: FCC Part 15.109(a)

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.

30MHz ~ 25GHz Radiated Spurious Emissions

▪ Lowest Channel

Freq. (MHz)	ANT Pol	The worst case EUT Position	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5500.000	V	X axis	PK	44.40	6.6	51.00	74.00	23.00
5500.000	V	X axis	AV	28.40	6.6	35.00	54.00	19.00

▪ Middle Channel

Freq. (MHz)	ANT Pol	The worst case EUT Position	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5500.000	V	X axis	PK	44.6	6.6	51.20	74.00	22.80
5500.000	V	X axis	AV	28.4	6.6	35.00	54.00	19.00

▪ Highest Channel

Freq. (MHz)	ANT Pol	The worst case EUT Position	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5500.000	H	X axis	PK	44.40	6.6	51.00	74.00	23.00
5500.000	H	X axis	AV	27.90	6.6	34.50	54.00	19.50

Note.

1. No other spurious and harmonic emissions were detected greater than listed emissions on above table. And above listed data is the worst case data.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

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	11/09/30	12/09/30	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	11/10/04	12/10/04	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	11/09/30	12/09/30	56471
☐	4-Way Power Divider	ET Industries	D-0526-4	10/12/24	11/12/24	210195001
☐	Power Splitter	Anritsu	K241B	11/09/30	12/09/30	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	11/09/30	12/09/30	30604493/021031
☐	Digital Multimeter	H.P	34401A	11/03/07	12/03/07	3146A13475, US36122178
☐	Multifunction Synthesizer	HP	8904A	11/10/06	12/10/06	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	3000B000268
☐	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	11/09/30	12/09/30	4072702
☐	DC Power Supply	SM techno	SDP30-5D	11/05/20	12/05/20	305DKA013
☐	BAND Reject Filter	Microwave Circuits	N0308372	11/09/30	12/09/30	3125-01DC0352
☐	BAND Reject Filter	Wainwright	WRCG1750	11/09/30	12/09/30	2
☐	High-Pass Filter	ANRITSU	MP526D	11/09/30	12/09/30	M27756

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☐	High-pass filter	Wainwright	WHNX2.1	11/09/30	12/09/30	1
☒	High-pass filter	Wainwright	WHNX3.0	11/09/30	12/09/30	9
☐	High-pass filter	Wainwright	WHNX5.0	11/09/19	12/09/19	8
☐	High-Pass Filter	Wainwright	WHKX8.5	11/09/19	12/09/19	1
☐	High-Pass Filter	Wainwright	WHKX1.0	11/09/30	12/09/30	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	11/09/06	12/09/06	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	10/10/29	12/10/29	3471
☐	Coaxial Fixed Attenuators	Agilent	8491B	11/07/02	12/07/02	MY39260700
☐	Attenuator (3dB)	WEINSCHEL	56-3	11/09/30	12/09/30	Y2342
☐	Attenuator (3dB)	WEINSCHEL	56-3	11/09/30	12/09/30	Y2370
☐	Attenuator (10dB)	WEINSCHEL	23-10-34	11/09/30	12/09/30	BP4386
☐	Attenuator (10dB)	WEINSCHEL	23-10-34	11/01/11	12/01/11	BP4387
☐	Attenuator (10dB)	WEINSCHEL	86-10-11	11/09/30	12/09/30	446
☐	Attenuator (10dB)	WEINSCHEL	86-10-11	11/09/30	12/09/30	408
☐	Attenuator (20dB)	WEINSCHEL	86-20-11	11/09/30	12/09/30	432
☐	Attenuator (30dB)	JFW	50FH-030-300	11/03/07	12/03/07	060320-1
☐	Attenuator (40dB)	WEINSCHEL	57-40-33	11/09/30	12/09/30	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	11/09/30	12/09/30	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

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☒	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
☐	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	11/09/30	12/09/30	100989