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CERTIFICATION OF COMPLIANCE

LG Electronics USA.

1000 Sylvan Avenue Englewood Cliffs, New Jersey,
 United States

Dates of Tests: October 19 ~ 23, 2009
 Test Report S/N: DR50110911Y
 Test Site : DIGITAL EMC CO., LTD.

FCC ID

BEJLAEF10-R

APPLICANT

LG Electronics USA.

Purpose	:	Original Grant
FCC Equipment Class	:	Part 15 Low Power Transmitter Below 1705 kHz (DCD)
Device name	:	USB Fingerprint Reader
Manufacturer	:	LG Electronics Inc
FCC ID	:	BEJLAEF10-R
Model name	:	LAEF10-R
Test Device Serial number	:	Identical prototype
FCC Rule Part(s)	:	FCC Part 15.209 Subpart C ANSI C63.4-2003
Data of issue	:	November 25, 2009

The Test results relate only to the tested sample. It is not allowed to copy this report even partly without the allowance of DIGITAL EMC CO., LTD.

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1. General information

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.

Address: 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080

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

Tested by: Engineer

November 25, 2009

B.G. HAN

Date

Name

Signature

Reviewed by: Manager

November 25, 2009

W.J.LEE

Date

Name

Signature

Applicant:

Company name : LG Electronics USA.

Address : 1000 Sylvan Avenue Englewood Cliffs, New Jersey, United States

Date of order : September 11, 2009

2. Equipment information

BEJLAEF10-R

2.1 Equipment description

Equipment model no.	LAEF10-R
Equipment serial no.	Identical prototype
Type of equipment	USB Fingerprint Reader
Frequency band	125 kHz
Type of Modulation	ASK
Power	DC 5.0 V(USB Cable)
Type of antenna	☒ Internal Type: Loop Antenna ☐ External Type:



2.2 Ancillary equipment

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

3. Information about test items

BEJLAEF10-R

3.1 Tested frequency

Frequency	TX	RX
Frequency band of operation	125 kHz	125 kHz

3.2 Tested environment

Temperature	:	15 ~ 35 (°C)
Relative humidity content	:	20 ~ 75 %
Air pressure	:	86 ~ 103 kPa
Details of power supply	:	DC 5.0V (USB Cable)

3.3 Test mode

Test mode	Continuous Transmission Mode
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3.4 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Notebook	HP 520	CND73824M9	HP	-
Monitor	W2261VT	906NDQA8P924	LG Electronics Nanjing Display Co., Ltd	-
Mouse	MOC5UO	H0F00JYN	DELL	-

3.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing

→ None

4. Test Report

4.1 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 15.205	Radiated Emission		C
15.207	AC Conducted Emissions	AC Line Conducted	C
15.203	Antenna Requirements	-	C
Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable Note 2: The JBP(Computing device peripheral) portion was tested and approved by FCC DoC procedure.			

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

4.2 Transmitter requirements

4.2.1 20 dB Bandwidth

- Procedure:

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

The spectrum analyzer is set to:

Span = approximately 2 or 3 times of the 20 dB bandwidth

RBW = 1% of the span 20 dB bandwidth or more

Sweep = auto

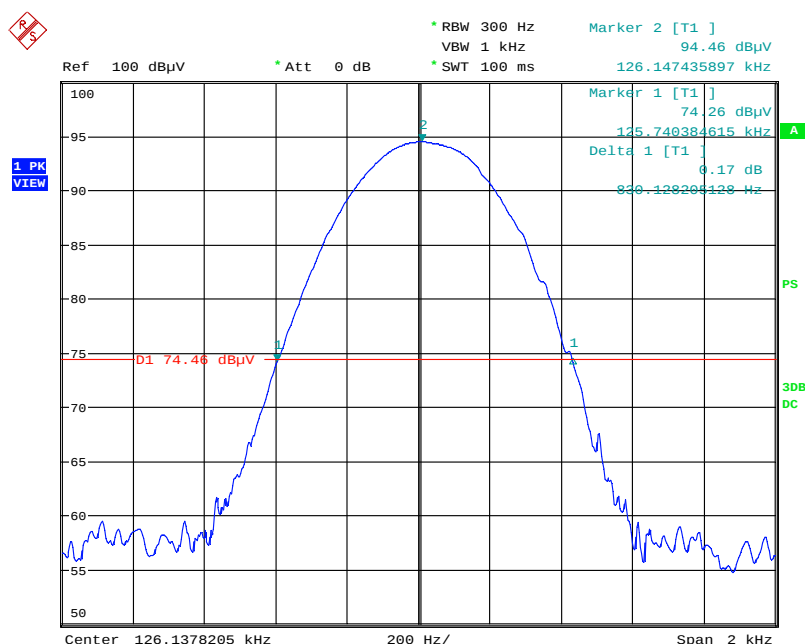
VBW = $\geq$ RBW

Detector function = peak

Trace = max hold

- Measurement Data: **Comply**

Tested Frequency(kHz)	Test Result(kHz)
125	0.830



Date: 21.OCT.2009 01:04:11

- Minimum Standard:

None

4.2.2 Field Strength of Fundamental

- 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 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:

Tested frequency = Fundamental Frequency

RBW and VBW = RBW: 200 Hz & VBW: $\geq$ RBW

Detector function = Average mode Sweep = auto

Trace = max hold

- Measurement Data: **Comply**

Frequency [MHz]	Reading [dBuV]	Detect Mode	Ant Pol.	T.F [dB/m]	Field Strength @ 3m [dBuV/m]	Field Strength @ 300m [dBuV/m]	Limit [dBuV/m]	Margin [dB]
0.125	94.41	AV	V	-10.69	83.72	3.72	25.67	21.95

Note 1. This test item was performed at 3m and the data were extrapolated to the specified measurement distance of 300m using the square of an inverse linear distance extrapolation factor (80 dB/decade).

▪ Extrapolation Factor = $20 \log_{10}(300/3)^2 = 80\text{dB}$

Note 2. 300m Limit(dBuV/m) = $20\log(2400/F_{(\text{kHz})})$
 = $20\log(2400/125)$
 = 25.67

Note 3. Sample Calculation.

Margin = Limit – Field Strength @ 300m / Field Strength @ 300m = Field Strength @ 3m – 80

Field Strength @ 3m = Reading + T.F / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

- Minimum Standard: FCC Part 15.209

Frequency (MHz)	Limit (uV/m)	Measurement Distance(m)
0.009 ~ 0.490	2400 / F(kHz)	300

4.2.3 Radiated Spurious Emissions

- 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 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:

Tested frequency = 125kHz

- RBW and VBW =
1. Frequency range: 9kHz ~ 150 kHz
RBW = 200 Hz / VBW = $\geq$ RBW
 2. Frequency range: 150kHz ~ 30MHz
RBW = 9 kHz / VBW = $\geq$ RBW
 3. Frequency range: 30M ~ 1GHz
RBW = 120 kHz / VBW = $\geq$ RBW

- Measurement Data: **Comply** (Refer to the next pages)

- Minimum Standard:

▪ FCC Part 15.209(a) and (b)

Frequency (MHz)	Limit (uV/m)	Measurement Distance(m)
0.009 ~ 0.490	2400 / F(kHz)	300
0.490 ~ 1.705	24000 / F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

** 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	8.37625 ~ 8.38675	73 ~ 74.6	399.90 ~ 410	2.655 ~ 2.900	10.6 ~ 12.7
0.495 ~ 0.505	8.41425 ~ 8.41475	74.8 ~ 75.2	608 ~ 614	3.260 ~ 3.267	13.25 ~ 13.4
2.1735 ~ 2.1905	12.29 ~ 12.293	108 ~ 121.94	960 ~ 1240	3.332 ~ 3.339	14.47 ~ 14.5
4.125 ~ 4.128	12.51975 ~ 12.52025	123 ~ 138	1300 ~ 1427	3.3458 ~ 3.358	15.35 ~ 16.2
4.17725 ~ 4.17775	12.57675 ~ 12.57725	149.9 ~ 150.05	1435 ~ 1626.5	3.6 ~ 4.4	17.7 ~ 21.4
4.20725 ~ 4.20775	13.36 ~ 13.41	156.52475 ~ 156.52525	1645.5 ~ 1646.5	4.5 ~ 5.15	22.01 ~ 23.12
6.215 ~ 6.218	16.42 ~ 16.423	156.7 ~ 156.9	1660 ~ 1710	5.35 ~ 5.46	23.6 ~ 24.0
6.26775 ~ 6.26825	16.69475 ~ 16.69525	162.0125 ~ 167.17	1718.8 ~ 1722.2	7.25 ~ 7.75	31.2 ~ 31.8
6.31175 ~ 6.31225	16.80425 ~ 16.80475	167.72 ~ 173.2	2200 ~ 2300	8.025 ~ 8.5	36.43 ~ 36.5
8.291 ~ 8.294	25.5 ~ 25.67	240 ~ 285	2310 ~ 2390	9.0 ~ 9.2	Above 38.6
8.362 ~ 8.366	37.5 ~ 38.25	322 ~ 335.4	2483.5 ~ 2500	9.3 ~ 9.5	

▪ **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.

- Measurement Data:

Tested Frequency : 125 kHz
 Measurement Distance : 3 Meters

Frequency [MHz]	Reading [dBuV]	Detect Mode	ANT Pol.	T.F [dB/m]	Field Strength @3m [dBuV/m]	Distance Factor [dB]	Field Strength @30m [dBuV/m]	Field Strength @300m [dBuV/m]	Limit [dBuV/m]	Margin [dB]
0.378	61.60	AV	V	-11.21	50.39	80.00	-	-29.61	63.49	93.10
0.883	50.20	QP	V	-12.16	38.04	40.00	-1.96	-	271.80	273.76

- Note 1. All measurements were recorded using a spectrum analyzer employing a Quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz.
 These three bands are based on measurements employing an average dectector.
- Note 2. Both Vertical and Horizontal polarities of the receiver antenna were evaluated with the worst case emissions being reported.
- Note 3. Sample Calculation.
 $\text{Margin} = \text{Limit} - \text{Field Strength}$ / $\text{T.F} = \text{AF} + \text{CL} - \text{AG}$
 $\text{Distance factor} = 20\log(\text{Measurement distance} / \text{The measured distance})^2$
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

4.2.4 AC Line 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**

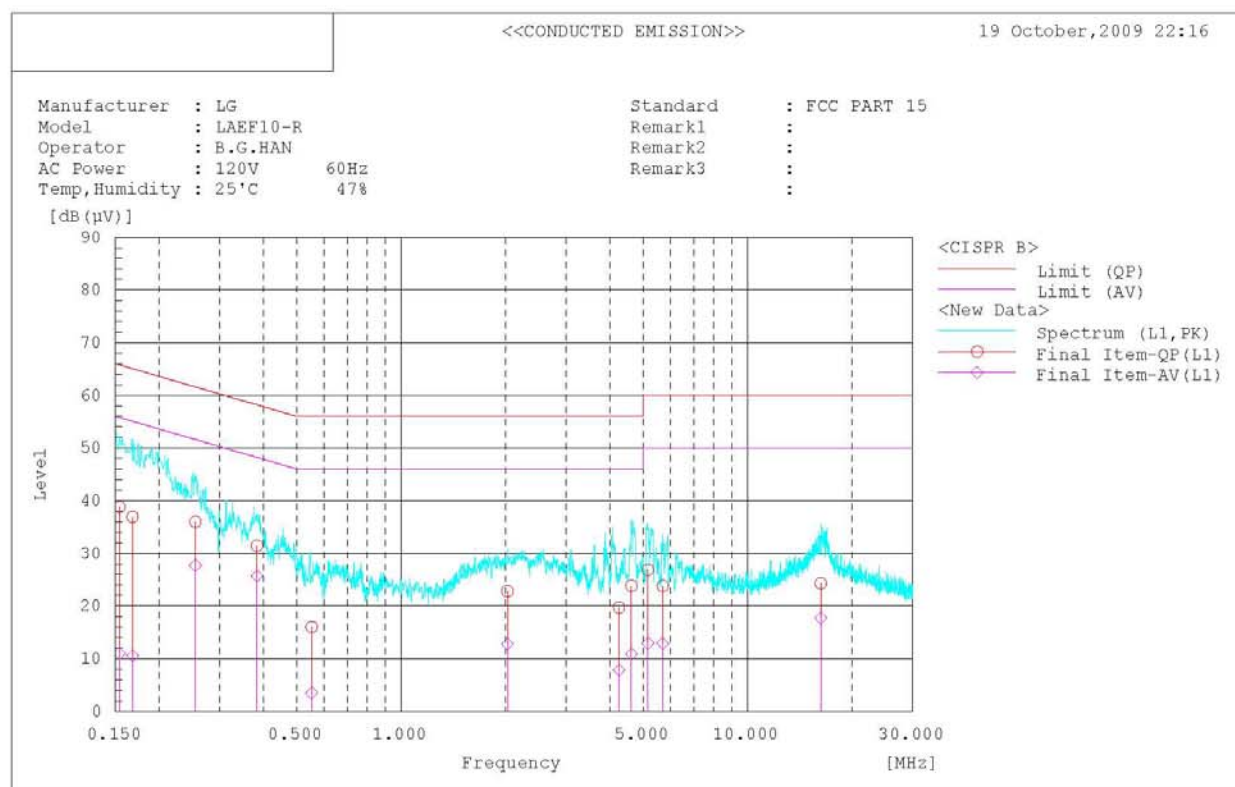
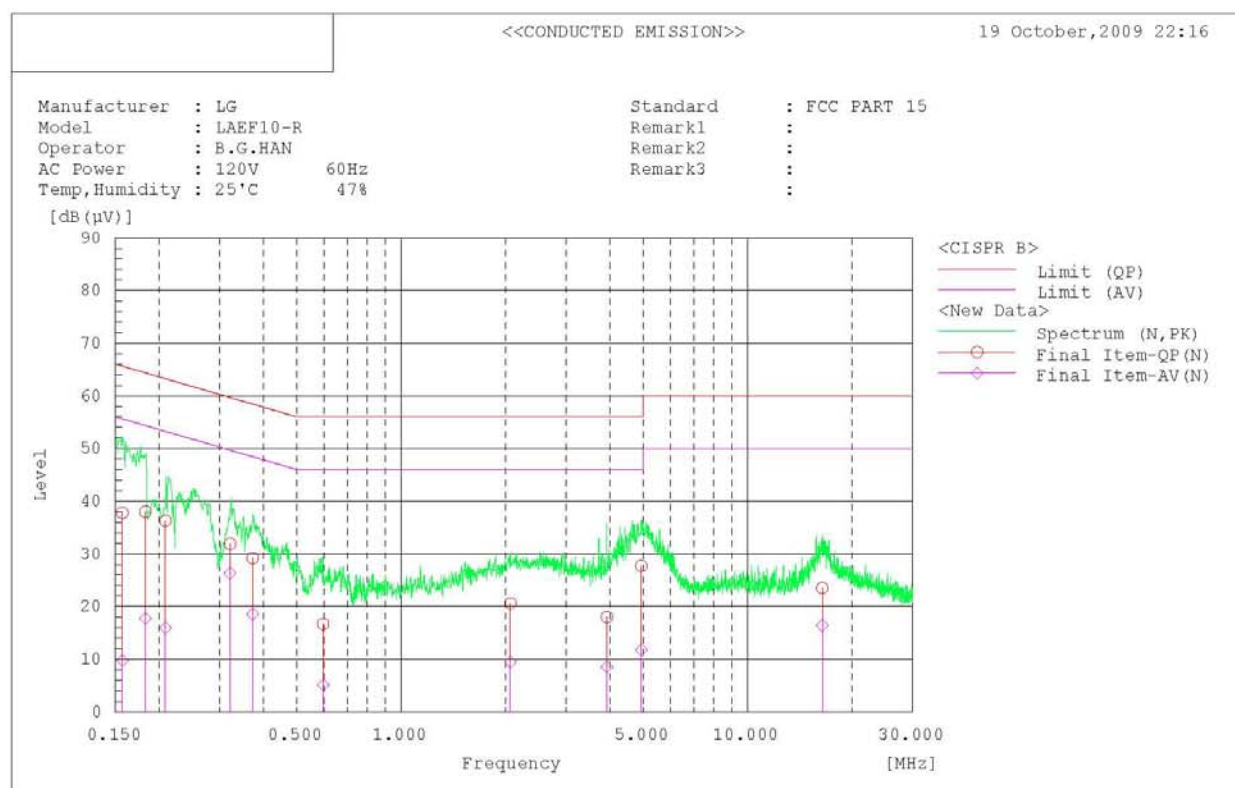
- Minimum Standard: FCC Part 15.207(a)/EN 55022

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>>

19 October, 2009 22:16

Standard : FCC PART 15
Manufacturer : LG
Model : LAEF10-R
Operator : B.G.HAN
AC Power : 120V 60Hz
Temp, Humidity : 25°C 47%
Remark1 :
Remark2 :
Remark3 :
:

Final Result

--- N Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
	[MHz]	[dB(μV)]	[dB(μV)]		[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.157	37.7	9.7	0.1	37.8	9.8	65.6	55.6	27.8	45.8	
2	0.183	37.9	17.6	0.1	38.0	17.7	64.3	54.3	26.3	36.6	
3	0.209	36.2	15.8	0.1	36.3	15.9	63.2	53.2	26.9	37.3	
4	0.321	31.8	26.2	0.1	31.9	26.3	59.7	49.7	27.8	23.4	
5	0.373	29.1	18.5	0.1	29.2	18.6	58.4	48.4	29.2	29.8	
6	0.596	16.6	5.0	0.1	16.7	5.1	56.0	46.0	39.3	40.9	
7	3.928	17.7	8.3	0.3	18.0	8.6	56.0	46.0	38.0	37.4	
8	4.937	27.4	11.5	0.3	27.7	11.8	56.0	46.0	28.3	34.2	
9	2.069	20.4	9.3	0.2	20.6	9.5	56.0	46.0	35.4	36.5	
10	16.426	22.5	15.4	1.0	23.5	16.4	60.0	50.0	36.5	33.6	

--- L1 Phase ---

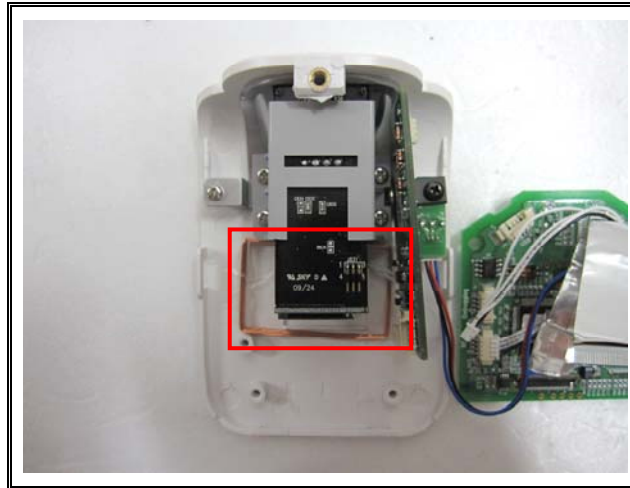
No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
	[MHz]	[dB(μV)]	[dB(μV)]		[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.154	38.6	10.8	0.2	38.8	11.0	65.8	55.8	27.0	44.8	
2	0.168	36.6	10.3	0.3	36.9	10.6	65.1	55.1	28.2	44.5	
3	0.255	35.7	27.4	0.3	36.0	27.7	61.6	51.6	25.6	23.9	
4	0.384	31.0	25.3	0.4	31.4	25.7	58.2	48.2	26.8	22.5	
5	4.256	19.0	7.1	0.7	19.7	7.8	56.0	46.0	36.3	38.2	
6	4.625	23.1	10.2	0.7	23.8	10.9	56.0	46.0	32.2	35.1	
7	0.552	15.5	3.0	0.5	16.0	3.5	56.0	46.0	40.0	42.5	
8	5.155	26.2	12.2	0.7	26.9	12.9	60.0	50.0	33.1	37.1	
9	5.697	23.1	12.2	0.7	23.8	12.9	60.0	50.0	36.2	37.1	
10	16.266	23.0	16.4	1.3	24.3	17.7	60.0	50.0	35.7	32.3	
11	2.030	22.2	12.2	0.6	22.8	12.8	56.0	46.0	33.2	33.2	

4.2.5 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**



- 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.

APPENDIX

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.Due.Date (dd/mm/yy)	Next.Due.Date (dd/mm/yy)	S/N
☐	Spectrum Analyzer	Agilent	E4440A	25/09/09	25/09/10	MY45304199
☐	Spectrum Analyzer	Rohde Schwarz	FSQ26	05/06/09	05/06/10	200445
☐	Spectrum Analyzer(RE)	H.P	8563E	13/10/09	13/10/10	3551A04634
☐	Power Meter	H.P	EMP-442A	02/07/09	02/07/10	GB37170413
☐	Power Sensor	H.P	8481A	02/07/09	02/07/10	3318A96332
☐	Power Divider	Agilent	11636B	13/10/09	13/10/10	56471
☐	Power Splitter	Anritsu	K241B	13/10/09	13/10/10	20611
☐	Power Splitter	Anritsu	K241B	02/07/09	02/07/10	017060
☐	Frequency Counter	H.P	5342A	13/07/09	13/07/10	2119A04450
☐	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	10/10/09	10/10/10	30604493/021031
☒	Digital Multimeter	H.P	34401A	13/03/09	13/03/10	3146A13475, US36122178
☐	Multifunction Synthesizer	HP	8904A	06/10/09	06/10/10	3633A08404
☐	Signal Generator	Rohde Schwarz	SMR20	13/03/09	13/03/10	101251
☐	Signal Generator	H.P	ESG-3000A	02/07/09	02/07/10	US37230529
☐	Vector Signal Generator	Rohde Schwarz	SMJ100A	02/02/09	02/02/10	100148
☐	Audio Analyzer	H.P	8903B	02/07/09	02/07/10	3011A09448
☐	Modulation Analyzer	H.P	8901B	02/07/09	02/07/10	3028A03029
☐	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	02/07/09	02/07/10	GB43461134
☐	Universal Radio communication Tester	Rohde Schwarz	CMU 200	19/05/09	19/05/10	106760
☐	Bluetooth Tester	TESCOM	TC-3000B	02/07/09	02/07/10	3000B000268
☐	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-3
☒	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-2
☐	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-4
☐	AC Power supply	DAEKWANG	5KVA	13/03/09	13/03/10	20060321-1
☐	DC Power Supply	HP	6622A	13/03/09	13/03/10	3448A03760
☐	DC Power Supply	HP	6633A	13/03/09	13/03/10	3524A06634
☐	BAND Reject Filter	Microwave Circuits	N0308372	06/10/09	06/10/10	3125-01DC0352
☐	BAND Reject Filter	Wainwright	WRCG1750	06/10/09	06/10/10	2
☐	High-Pass Filter	ANRITSU	MP526D	06/10/09	06/10/10	M27756
☐	High-pass filter	Wainwright	WHKX2.1	N/A	N/A	1
☐	High-Pass Filter	Wainwright	WHKX3.0	N/A	N/A	9
☐	Tunable Notch Filter	Wainwright	WRCT800.0 /960.0-0.2/40-8SSK	N/A	N/A	10
☐	Tunable Notch Filter	Wainwright	WRCD1700.0 /2000.0-0.2/40-10SSK	N/A	N/A	27
☐	Tunable Notch Filter	Wainwright	WRCT1900.0 /2200.0-5/40-10SSK	N/A	N/A	7
☐	HORN ANT	ETS	3115	17/06/09	17/06/10	6419
☐	HORN ANT	ETS	3115	23/09/09	23/09/10	21097
☐	HORN ANT	A.H.Systems	SAS-574	10/06/09	10/06/10	154
☐	HORN ANT	A.H.Systems	SAS-574	10/06/09	10/06/10	155

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	Next.Due.Date (dd/mm/yy)	S/N
☐	Dipole Antenna	Schwarzbeck	VHA9103	06/10/09	06/10/10	2116
☐	Dipole Antenna	Schwarzbeck	VHA9103	06/10/09	06/10/10	2117
☐	Dipole Antenna	Schwarzbeck	UHA9105	05/10/09	05/10/10	2261
☐	Dipole Antenna	Schwarzbeck	UHA9105	05/10/09	05/10/10	2262
☒	LOOP Antenna	ETS	6502	14/09/09	14/09/10	3471
☐	Coaxial Fixed Attenuators	Agilent	8491B	02/07/09	02/07/10	MY39260700
☐	Coaxial Fixed Attenuators	Agilent	8491B	02/07/09	02/07/10	MY39260699
☐	Attenuator (10dB)	WEINSCHTEL	23-10-34	01/10/09	01/10/10	BP4386
☐	Attenuator (10dB)	WEINSCHTEL	23-10-34	19/01/09	19/01/10	BP4387
☐	Attenuator (20dB)	WEINSCHTEL	86-20-11	06/10/09	06/10/10	432
☐	Attenuator (10dB)	WEINSCHTEL	31696	06/10/09	06/10/10	446
☐	Attenuator (10dB)	WEINSCHTEL	31696	06/10/09	06/10/10	408
☐	Attenuator (40dB)	WEINSCHTEL	57-40-33	01/10/09	01/10/10	NN837
☐	Attenuator (30dB)	JFW	50FH-030-300	13/03/09	13/03/10	060320-1
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	02/07/09	02/07/10	788
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	02/07/09	02/07/10	790
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0215CAN	02/07/09	02/07/10	112
☐	Amplifier (30dB)	Agilent	8449B	10/10/09	10/10/10	3008A01590
☐	Amplifier	EMPOWER	BBS3Q7ELU	02/02/09	02/02/10	1020
☐	RF Power Amplifier	OPHIRRF	5069F	02/07/09	02/07/10	1006
☒	EMI TEST RECEIVER	R&S	ESU	02/02/09	02/02/10	100014
☒	BILOG ANTENNA	SCHAFFNER	CBL6112B	02/06/09	02/06/10	2737
☒	Amplifier (22dB)	H.P	8447E	05/02/09	05/02/10	2945A02865
☐	EMI TEST RECEIVER	R&S	ESCI	12/05/09	12/05/10	100364
☐	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A	30/05/09	30/05/10	590
☐	BICONICAL ANT.	Schwarzbeck	VHA 9103	02/06/09	02/06/10	2233
☐	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A1	07/10/09	07/10/10	1098
☐	BICONICAL ANT.	Schwarzbeck	VHA 9103	06/10/09	06/10/10	91031946
☐	Low Noise Pre Amplifier	TSJ	MLA-100K01-B01-2	13/03/09	13/03/10	1252741
☐	Amplifier (25dB)	Agilent	8447D	12/05/09	12/05/10	2944A10144
☐	Amplifier (25dB)	Agilent	8447D	03/07/09	03/07/10	2648A04922
☒	Spectrum Analyzer(CE)	H.P	8591E	26/04/09	26/04/10	3649A05889
☐	LISN	Kyoritsu	KNW-407	03/07/09	03/07/10	8-317-8
☒	LISN	Kyoritsu	KNW-242	13/10/09	13/10/10	8-654-15
☒	CVCF	NF Electronic	4420	13/03/09	13/03/10	304935/337980
☒	DC BLOCK	Hyuplip	KEL-007	N/A	N/A	7-1581-5
☐	50 ohm Terminator	HME	CT-01	22/01/09	22/01/10	N/A
☒	RFI/FIELD Intensity Meter	Kyoritsu	KNM-2402	03/07/09	03/07/10	4N-170-3