

RF TEST REPORT

Test item : Multi Band GSM/WCDMA/LTE Phone with Bluetooth, WLAN and NFC
Model No. : LG-D855V, LGD855V, D855V, LG-D855v, LGD855v, D855v
Order No. : DTNC1411-04837
Date of receipt : 2014-11-05
Test duration : 2014-11-10 ~ 2014-11-18
Date of issue : 2014-11-20
Use of report : FCC Original Grant

Applicant : LG Electronics MobileComm U.S.A., Inc.
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Test specification : FCC Part 15.225
Test environment : See appended test report
Test result : Pass Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

Tested by:



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Test Report Version

Test Report No.	Date	Description
DRTFCC1411-1469	Nov. 20, 2014	Initial issue

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1. Equipment information

1.1 Equipment description

FCC Equipment Class	Low Power Communications Device Transmitter(DXX)
Equipment type	Multi Band GSM/WCDMA/LTE Phone with Bluetooth, WLAN and NFC
Equipment model name	LG-D855V
Equipment add model name	LGD855V, D855V, LG-D855v, LGD855v, D855v ※ 6 models are same mechanical, electrical and functional. ※ The only difference is the model name, which are changed for marketing purpose.
Equipment serial no.	Identical prototype
Frequency band	13.56MHz
Modulation type	ASK
Channel	1
Power	Li-ion Battery: DC 3.8V AC-DC Adaptor: AC 120V 60Hz
Antenna type	Loop Antenna

1.2 Ancillary equipment

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

2. Information about test items

2.1 Test mode

Test mode1	Continuous transmitting mode(Without Wireless Charging)
Test mode2	Continuous transmitting mode(With Wireless Charging)

Note: For this test mode, a test program was supported by manufacturer.

2.2 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Wireless Charger	WCP-310	-	LG	BEJWCP300
-	-	-	-	-

Note: The above equipments were supported by manufacturer.

2.3 Tested frequency

	TX Frequency(MHz)	RX Frequency(MHz)
Lowest Channel	13.56	13.56
Middle Channel	-	-
Highest Channel	-	-

2.4 Tested environment

Temperature	: 23 ~ 25 °C
Relative humidity content	: 47 ~ 50 % R.H.
Details of power supply	: DC 3.8 V

2.5 EMI Suppression Device(s)/Modifications

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

→ None

3. ANTENNA REQUIREMENTS

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 of this section.”

The antenna is attached to the battery cover, and antenna is coupled use the special tension. Therefore this E.U.T Complies with the requirement of §15.203

4. Test report

4.1 Summary of tests

FCC part section(s)	RSS section(s)	Parameter	Limit	Test condition	Status Note 1
2.1049	RSS-Gen [4.6.1]	Occupied bandwidth	NA	Radiated	C
15.225 (a)	RSS-210 [A2.6 (a)]	In-band emissions	15,848µV/m @ 30m 15.553 – 13.567 MHz		C ^{Note2}
15.225 (b)	RSS-210 [A2.6 (b)]	In-band emissions	334µV/m @ 30m 13.410 – 13.553 MHz 13.567 – 13.710 MHz		C ^{Note2}
15.225 (c)	RSS-210 [A2.6 (c)]	In-band emissions	106µV/m @ 30m 13.110 – 13.410 MHz 13.710 – 14.010 MHz		C ^{Note2}
15.225 (d) 15.209	RSS-210 [A2.6 (d)] RSS-Gen [7.2.5]	Out-of band emissions	Emissions outside of the specified band (13.110-14.010 MHz) must meet the radiated limits detailed in 15.209		C ^{Note2}
15.225 (e)	RSS-210 [A2.6]	Frequency stability	±0.01% of operating frequency	Conducted	C
15.207	RSS-Gen [7.2.4]	AC conducted emissions	FCC Part 15.207	AC Line Conducted	C
15.203	-	Antenna requirements	FCC Part 15.203	-	C

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

Note 2: There is no normal battery cover and there is only one kind of wireless charging battery cover for this handset. So per KDB 648474 D03 v01r02, the spurious emissions were tested with the wireless charging battery cover and with both not charging and charging conditions.

For wireless charging condition, the handset is placed on the representative charging pad under normal conditions and in a simulated call configuration.

Note 3: Semi anechoic chamber registration Number is 804488.

The sample was tested according to the following specification:
ANSI C-63.10-2009, KDB 648474 D03 v01r02

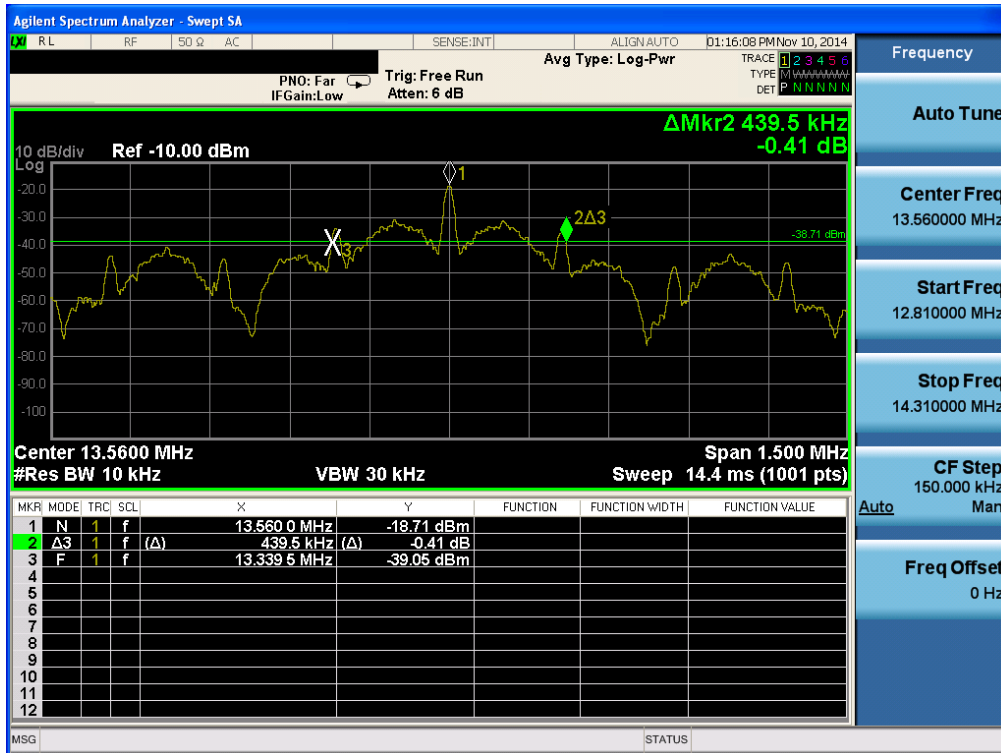
4.2 Transmitter requirements

4.2.1 Occupied 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.

- Measurement Data: Comply



- Minimum Standard: NA

4.2.2 In-band emissions

- Procedure:

The EUT was placed on a 0.8m high wooden table inside a 10m semi anechoic chamber. An antenna was placed at 3 m distance from the EUT. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions. A loop antenna was used for this test item. And the loop antenna was rotated about vertical axis.

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

- Minimum Standard: Part 15.225(a), (b), (c) & RSS-210 A2.6(a), (b), (c)

Frequency Band [MHz]	Limit	
	[uV/m]	[dBuV/m]
13.553-13.567	15,848	84.00
13.410-13.553 13.567-13.710	334	50.47
13.110-13.410 13.710-14.010	106	40.51

- Measurement Data:

Tested Frequency : 13.56MHz
 Measurement Distance : 3 Meters

- Without Wireless Charging

Test Frequency Band [MHz]	Freq. [MHz]	EUT Posi.	Reading Level [dBuV]	T.F	Field Strength @3m [dBuV/m]	Field Strength @30m [dBuV/m]	Limit [dBuV/m]	Margin [dB]
13.110 ~ 13.410	13.349	Y	15.30	20.24	35.54	-4.46	40.51	44.97
13.410 ~ 13.553	13.553	Y	26.20	20.25	46.45	6.45	50.47	44.02
13.553 ~ 13.567	13.560	Y	30.30	20.25	50.55	10.55	84.00	73.45
13.567 ~ 13.710	13.567	Y	24.20	20.25	44.45	4.45	50.47	46.02
13.710 ~ 14.010	13.772	Y	14.70	20.26	34.96	-5.04	40.51	45.55

- With Wireless Charging

Test Frequency Band [MHz]	Freq. [MHz]	EUT Posi.	Reading Level [dBuV]	T.F	Field Strength @3m [dBuV/m]	Field Strength @30m [dBuV/m]	Limit [dBuV/m]	Margin [dB]
13.110 ~ 13.410	13.348	X	17.20	20.24	37.44	-2.56	40.51	43.07
13.410 ~ 13.553	13.553	X	29.40	20.25	49.65	9.65	50.47	40.82
13.553 ~ 13.567	13.560	X	33.20	20.25	53.45	13.45	84.00	70.55
13.567 ~ 13.710	13.567	X	27.10	20.25	47.35	7.35	50.47	43.12
13.710 ~ 14.010	13.770	X	19.70	20.26	39.96	-0.04	40.51	40.55

Note 1. This test item was performed using a loop antenna.

Note 2. This test item was performed at 3m and the data were extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)2.

$$\text{Extrapolation Factor} = 20 \log_{10}(30/3)^2 = 40\text{dB}$$

Note 3. All data were recorded using a spectrum analyzer employing a peak detector.

If PK results were meet Quasi-peak limit, Quasi-peak measurements were omitted.

Note 4. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Field Strength @ 30m} \quad / \quad \text{Field Strength @ 30m} = \text{Field Strength @ 3m} - 40\text{dB}$$

$$\text{Field Strength @ 3m} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

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

4.2.3 Out-of-band emissions

- Procedure:

The EUT was tested from 9kHz up to the 1GHz excluding the band 13.110-14.010MHz. All measurements were recorded with spectrum analyzer employing a peak detector for emissions below 30MHz. Above 30MHz a Quasi-peak detector was used. All out-of-band emissions must not exceed the limits §15.209. A loop antenna was used for searching for emissions below 30MHz.

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

- Minimum Standard: Part 15.209, 225(d) & RSS-210 A2.6 (d), RSS-Gen 7.2.5

• 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	200	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 15.209(b):

In the emission table above, the tighter limit applies at the band edges.

- Measurement Data:

Tested Frequency : 13.56MHz
 Measurement Distance : 3 Meters

- Without Wireless Charging

Frequency [MHz]	EUT Posi.	ANT Pol	Reading [dBuV]	T.F [dB/m]	Distance factor	Field Strength [dBuV/m]	Limit [dBuV/m]	Margin [dB]
2.221	X	N/A	14.2	19.17	40	-6.63	29.5	36.13
12.520	Y	N/A	6.1	20.21	40	-13.69	29.5	43.19
38.003	Y	H	19.3	-16.43	0	2.87	40	37.13
73.407	Y	H	19.4	-18.40	0	1	40	39
967.471	Y	H	19.9	3.24	0	23.14	54	30.86
987.482	Y	V	19.3	3.49	0	22.79	54	31.21

- With Wireless Charging

Frequency [MHz]	EUT Posi.	ANT Pol	Reading [dBuV]	T.F [dB/m]	Distance factor	Field Strength [dBuV/m]	Limit [dBuV/m]	Margin [dB]
0.142	X	N/A	50.7	19.14	80	-10.16	24.6	34.76
34.365	X	V	42.6	-16.79	0	25.81	40	14.19
37.518	X	V	38.2	-16.48	0	21.72	40	18.28
53.644	X	V	35.6	-16.01	0	19.59	40	20.41
58.130	X	H	30.6	-16.27	0	14.33	40	25.67
843.769	X	V	19.3	1.26	0	20.56	46	25.44

Note 1. All measurements were recorded using a spectrum analyzer employing a peak detector for below 30MHz and a Quasi-peak detector for above 30MHz.

Note 2. Both Vertical and Horizontal polarities of the receiver antenna were evaluated with the worst case emissions being reported. For 30MHz below the loop antenna was rotated about vertical axis.

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

Note 4. Sample calculation

$$\text{Margin} = \text{Limit} - \text{Field Strength}$$

$$\text{Field Strength} = \text{Reading} + \text{T.F} - \text{Distance factor}$$

$$\text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

$$\text{Distance factor} = 20\log(\text{Measurement distance} / \text{The measured distance})^2$$

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

4.2.4 Frequency Stability

- Procedure:

Part 15.225 requires that devices operating in the 13.553 – 13.567 MHz shall maintain the carrier frequency within 0.01% of the operating frequency over the temperature variation of -20 degrees to + 50 degrees C at normal supply voltage.

- Measurement Data: Comply

Operating Frequency : 13,560,000Hz

VOLTAGE (%)	POWER (V _{DC})	TEMP (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100%	3.800	+25(ref)	13,559,352	-648	0.004779
100%		-20	13,559,408	-592	0.004366
100%		-10	13,559,395	-605	0.004462
100%		0	13,559,399	-601	0.004432
100%		+10	13,559,376	-624	0.004602
100%		+20	13,559,355	-645	0.004757
100%		+30	13,559,323	-677	0.004993
100%		+40	13,559,292	-708	0.005222
100%		+50	13,559,272	-728	0.005369
115%		4.370	+25	13,559,348	-652
BATT.ENDPOINT	3.100	+25	13,559,354	-646	0.004764

- Minimum Standard: Part 15. 225(e) & RSS-210 A2.6

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency.

4.2.5 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 15.21(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 (refer to the next page)

- Minimum Standard: FCC Part 15.207(a) & RSS-Gen 7.2.4

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

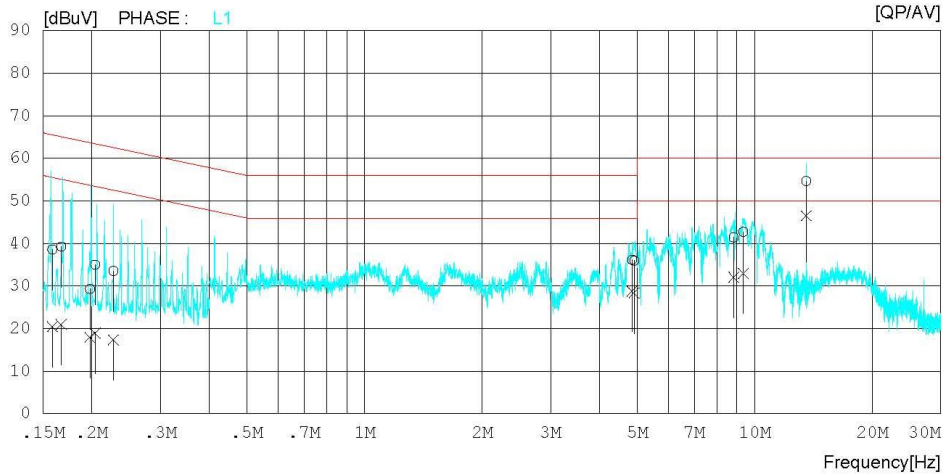
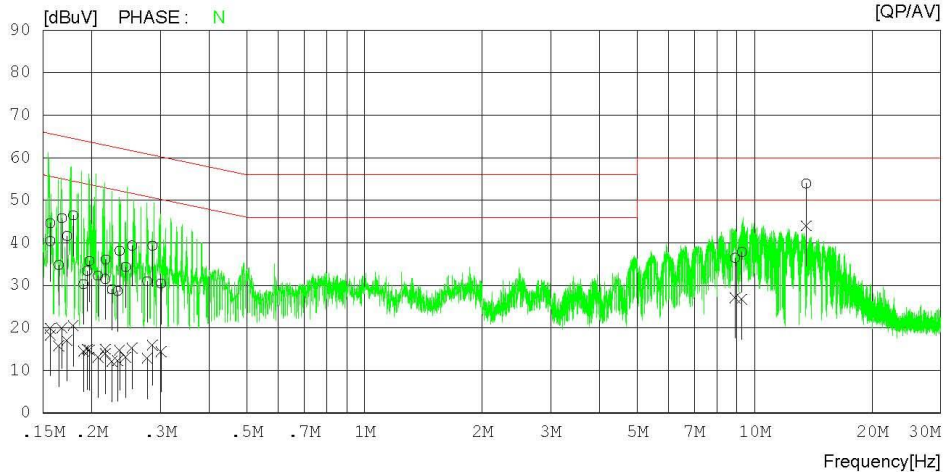
* Decreases with the logarithm of the frequency

Measurement Data

Results of Conducted Emission

Date : 2014-11-11

Model No.	: LG-D855v	Reference No.	:
Type	:	Power Supply	: 120 V 60 Hz
Serial No.	:	Temp/Humi.	: 24 'C 50 % R.H.
Test Condition	: NFC	Operator	: H.P LEE
Memo	: FINAL		
LIMIT	: FCC P15.207 QP		
	: FCC P15.207 AV		



Measurement Data

Results of Conducted Emission

Date : 2014-11-11

Model No. : LG-D855v
 Type :
 Serial No. :
 Test Condition : NFC
 Reference No. :
 Power Supply : 120 V 60 Hz
 Temp/Humi. : 24 °C 50 % R.H.
 Operator : H.P LEE

Memo : FINAL

LIMIT : FCC P15.207 QP
 FCC P15.207 AV

NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15627	34.7	10.0	9.9	44.6	19.9	65.7	55.7	21.1	35.8	N
2	0.15646	30.5	8.4	9.9	40.4	18.3	65.6	55.6	25.2	37.3	N
3	0.16453	24.9	5.9	9.9	34.8	15.8	65.2	55.2	30.4	39.4	N
4	0.16758	35.9	10.1	9.9	45.8	20.0	65.1	55.1	19.3	35.1	N
5	0.17274	31.7	7.2	9.9	41.6	17.1	64.8	54.8	23.2	37.7	N
6	0.17904	36.5	10.7	9.9	46.4	20.6	64.5	54.5	18.1	33.9	N
7	0.19027	20.4	4.6	9.9	30.3	14.5	64.0	54.0	33.7	39.5	N
8	0.19472	23.5	5.1	9.9	33.4	15.0	63.8	53.8	30.4	38.8	N
9	0.19706	25.8	4.9	9.9	35.7	14.8	63.7	53.7	28.0	38.9	N
10	0.20727	22.4	3.2	9.9	32.3	13.1	63.3	53.3	31.0	40.2	N
11	0.21644	21.6	4.1	9.9	31.5	14.0	63.0	53.0	31.5	39.0	N
12	0.21681	26.2	5.1	9.9	36.1	15.0	62.9	52.9	26.8	37.9	N
13	0.22495	19.1	2.2	9.9	29.0	12.1	62.6	52.6	33.6	40.5	N
14	0.23285	18.8	2.4	9.9	28.7	12.3	62.3	52.3	33.6	40.0	N
15	0.23554	28.2	4.9	9.9	38.1	14.8	62.3	52.3	24.2	37.5	N
16	0.24420	24.4	3.2	9.9	34.3	13.1	62.0	52.0	27.7	38.9	N
17	0.25360	29.5	5.4	9.9	39.4	15.3	61.6	51.6	22.2	36.3	N
18	0.27723	21.1	3.0	9.9	31.0	12.9	60.9	50.9	29.9	38.0	N
19	0.28579	29.4	6.1	9.9	39.3	16.0	60.6	50.6	21.3	34.6	N
20	0.30081	20.5	4.6	9.9	30.4	14.5	60.2	50.2	29.8	35.7	N
21	8.91220	26.2	16.9	10.2	36.4	27.1	60.0	50.0	23.6	22.9	N
22	9.27480	27.6	16.5	10.2	37.8	26.7	60.0	50.0	22.2	23.3	N
23	13.55840	43.6	33.7	10.3	53.9	44.0	60.0	50.0	6.1	6.0	N
24	0.15823	28.7	10.5	9.9	38.6	20.4	65.6	55.6	27.0	35.2	L1
25	0.16695	29.4	11.1	9.9	39.3	21.0	65.1	55.1	25.8	34.1	L1
26	0.19772	19.4	8.0	9.9	29.3	17.9	63.7	53.7	34.4	35.8	L1
27	0.20379	25.1	9.0	9.9	35.0	18.9	63.5	53.5	28.5	34.6	L1
28	0.22712	23.6	7.4	9.9	33.5	17.3	62.6	52.6	29.1	35.3	L1
29	4.85500	26.0	18.6	10.1	36.1	28.7	56.0	46.0	19.9	17.3	L1
30	4.91480	25.9	18.3	10.1	36.0	28.4	56.0	46.0	20.0	17.6	L1
31	8.83560	31.2	21.9	10.2	41.4	32.1	60.0	50.0	18.6	17.9	L1
32	9.35240	32.5	22.8	10.2	42.7	33.0	60.0	50.0	17.3	17.0	L1
33	13.55800	45.1	36.4	10.2	55.3	46.6	60.0	50.0	4.7	3.4	L1

APPENDIX

TEST EQUIPMENT FOR TESTS

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	N9020A	14/03/28	15/03/28	MY50510026
Multimeter	Fluke	17B	14/05/12	15/05/12	26030065WS
DC Power Supply	H.P	6633A	14/02/27	15/02/27	3524A06634
Thermo hygrometer	BODYCOM	BJ5478	14/03/03	15/03/03	1209
Vector Signal Generator	Rohde Schwarz	SMBV100A	14/01/08	15/01/08	255571
Temp & Humid Test Chamber	SJ Science	SJ-TH-S50	14/10/21	15/10/21	SJ-TH-S50-130930
LOOP Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
BILOG ANTENNA	Schwarzbeck	VULB 9160	14/04/04	16/04/04	3357
Low Noise Pre Amplifier	tsj	MLA-010K01-B01-27	14/04/09	16/04/09	1844538
EMI TEST RECEIVER	R&S	ESU 8	14/10/21	15/10/21	100348
EMI TEST RECEIVER	R&S	ESCI	14/02/27	15/02/27	100910
CVCF	NF	4420	14/05/26	15/05/26	3049354420023
LISN	R&S	ESH2-Z5	14/09/11	15/09/11	828739/006
PULSE LIMITER	R&S	ESH3-Z2	14/01/08	15/01/08	101334