

TEST REPORT



DT&C Co., Ltd.

42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC1708-0132(2)
2. Customer
 - Name : LG Electronics MobileComm USA, Inc.
 - Address : 1000 Sylvan Ave., Englewood Cliffs, New Jersey, United States, 07632
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : Mobile Phone / LG-H930
FCC ID : ZNFH930
5. Test Method Used : ANSI C63.10-2013
Test Specification : FCC Part 15.225
6. Date of Test : 2017.07.22 ~ 2017.07.30
7. Testing Environment : Refer to appended test report.
8. Test Result : Refer to the attached test result.

Affirmation	Tested by	Technical Manager
	Name : JaeHyeok Bang 	Name : GeunKi Son  (Signature)

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.

2017 . 08 . 18 .

DT&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRTFCC1708-0132	Aug. 03, 2017	Initial issue
DRTFCC1708-0132(1)	Aug. 09, 2017	Added the note on page 19
DRTFCC1708-0132(2)	Aug. 18, 2017	Added the note on page 7

CONTENTS

1. General Information.....	4
1.1. Testing Laboratory.....	4
1.2. Testing Environment.....	4
1.3. Measurement Uncertainty	4
1.4. Details of Applicant.....	5
1.5. Description of EUT	5
1.6. EUT CAPABILITIES	5
2. Information about test items.....	6
2.1 Test mode	6
2.2 Tested frequency	6
2.3 EMI Suppression Device(s)/Modifications	6
3. Antenna requirements.....	6
4. Test report	7
4.1 Summary of tests	7
4.2 Transmitter requirements	8
4.2.1 20dB bandwidth	8
4.2.2 In-band emissions.....	9
4.2.4 Out-of-band emissions.....	11
4.2.5 Frequency Stability	14
4.2.6 AC Line Conducted Emissions.....	15
APPENDIX.....	18

1. General Information

1.1. Testing Laboratory

DT&C Co., Ltd.

The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The site is constructed in conformance with the requirements.

- FCC MRA Accredited Test Firm No. : KR0034

www.dtcn.net

Telephone : + 82-31-321-2664

FAX : + 82-31-321-1664

1.2. Testing Environment

Ambient Condition	
▪ Temperature	+23 ~ 25 °C
▪ Relative Humidity	40 % ~ 47 %

1.3. Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
AC conducted emission	± 2.4 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (Below 1 GHz)	± 5.1 dB (The confidence level is about 95 %, $k = 2$)

1.4. Details of Applicant

Applicant : LG Electronics MobileComm USA, Inc.
Address : 1000 Sylvan Ave., Englewood Cliffs, New Jersey, United States, 07632
Contact person : Kyung-Su Han

1.5. Description of EUT

FCC Equipment Class	Low Power Communications Device Transmitter(DXX)
EUT	Mobile Phone
Model Name	LG-H930
Add Model Name	LG-H930DS, LG-H930K, LG-H930G
Serial Number	Identical prototype
Power Supply	DC 3.85 V
Frequency Band	13.56 MHz
Modulation Type	ASK
Channel(s)	1
Antenna type	Loop Antenna

1.6. EUT CAPABILITIES

This ETU contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSUPA, Multi-band LTE, 802.11b/g/n/ac WLAN(2.4GHz), 802.11a/n/ac WLAN(5GHz), Bluetooth(BDR, EDR, LE), NFC

2. Information about test items

2.1 Test mode

Test mode1	Continuous transmitting mode
Test mode2	Continuous transmitting mode(With Wireless charging pad)

Note: The radiated test items were performed up to 424kbps about

This device supports wireless charging capability.

So per KDB 648474 D03 v01r04, the radiated test items were performed both normal 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.

2.2 Tested frequency

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

2.3 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 on the device by means of unique coupling method (Spring 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	-	20 dB Bandwidth	-	Radiated	C ^{Note4}
-	RSS-Gen [6.6]	Occupied Bandwidth	-		NA
15.225 (a)	RSS-210 [B6(a)]	In-Band Emissions	15,848 $\mu\text{V/m}$ @ 30 m 13.553 – 13.567 MHz		C ^{Note 2,3,4}
15.225 (b)	RSS-210 [B6(b)]	In-Band Emissions	334 $\mu\text{V/m}$ @ 30 m 13.410 – 13.553 MHz 13.567 – 13.710 MHz		C ^{Note 2,3,4}
15.225 (c)	RSS-210 [B6(c)]	In-Band Emissions	106 $\mu\text{V/m}$ @ 30 m 13.110 – 13.410 MHz 13.710 – 14.010 MHz		C ^{Note 2,3,4}
15.225 (d) 15.209	RSS-210 [B6(d)] RSS-GEN [8.9]	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 ^{Note 2,3,4}
15.225 (e)	RSS-210 [B6]	Frequency Stability	± 0.01 % of operating frequency	Temp & Humid Test Chamber	C
15.207	RSS-Gen [8.8]	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: This test items were performed both normal and charging conditions.

Note 3: For radiated emission tests below 30 MHz were performed on semi-anechoic chamber which is correlated with OATS.

Note 4: This test items were performed up to 424kbps data rate. And the worst case data were reported.

4.2 Transmitter requirements

4.2.1 20dB bandwidth

- Procedure:

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

And spectrum analyzer setting use following test procedure of **ANCSI C63.10-2013 – Section 6.9.2.**

1. Center frequency = EUT channel center frequency
2. Span = 2 ~ 5 times the OBW
3. RBW = 1 % ~ 5 % OBW
4. VBW $\geq 3 \times$ RBW
5. Detector = Peak
6. Trace = Max hold
7. The trace was allowed to stabilize
8. Determine the reference value = Set the spectrum analyzer marker to the highest level of the displayed trace
9. Using the marker-delta function of the instrument, determine the “-xx dB down amplitude” using [(reference value) – xx].
10. Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

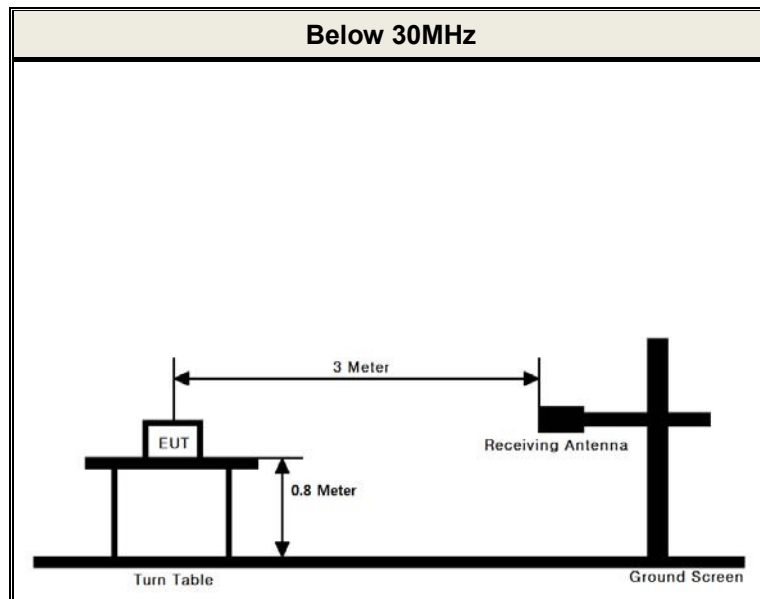
- Measurement Data: **Comply**



- Minimum Standard: NA

4.2.2 In-band emissions

- Test Configuration



- Procedure: The radiated emission was tested according to the **section 6.4 of the ANSI C63.10-2013**.

The EUT was placed on a 0.8 m high non-conductive table and it was placed at 3m distance from the antenna. Measurements were performed for each of the three antenna orientations. (ie. parallel, perpendicular, and ground-parallel)

Also, measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

RBW = As specified in below table, VBW $\geq 3 \times$ RBW, Sweep = Auto, Detector = Peak
Trace mode = Max Hold until the trace stabilizes.

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

- Minimum Standard: Part 15.225(a), (b), (c) & RSS-210 [B6(a), (b), (c)]

Frequency Band [MHz]	Limit at 30 m measurement distance	
	[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: Test mode 1

Tested Frequency : 13.56 MHz
Measurement Distance : 3 Meters

Frequency Band [MHz]	Freq. [MHz]	EUT Axis.	ANT (Note 1)	Reading Level [dBuV]	T.F [dB/m]	Field Strength @3 m [dBuV/m]	Field Strength @30 m [dBuV/m]	Limit [dBuV/m]	Margin [dB]
13.110 ~ 13.410	13.349	Y	P	12.70	20.21	32.91	-7.09	40.51	47.60
13.410 ~ 13.553	13.453	Y	P	16.20	20.21	36.41	-3.59	50.47	54.06
13.553 ~ 13.567	13.560	Y	P	28.40	20.22	48.62	8.62	84.00	75.38
13.567 ~ 13.710	13.568	Y	P	16.40	20.22	36.62	-3.38	50.47	53.85
13.710 ~ 14.010	13.773	Y	P	12.80	20.23	33.03	-6.97	40.51	47.48

- Measurement Data: Test mode 2

Tested Frequency : 13.56 MHz
Measurement Distance : 3 Meters

Test Frequency Band [MHz]	Freq. [MHz]	EUT Axis.	ANT (Note 1)	Reading Level [dBuV]	T.F [dB/m]	Field Strength @3 m [dBuV/m]	Field Strength @30 m [dBuV/m]	Limit [dBuV/m]	Margin [dB]
13.110 ~ 13.410	13.349	X	P	16.70	20.21	36.91	-3.09	40.51	43.60
13.410 ~ 13.553	13.458	X	P	19.40	20.21	39.61	-0.39	50.47	50.86
13.553 ~ 13.567	13.561	X	P	32.20	20.22	52.42	12.42	84.00	71.58
13.567 ~ 13.710	13.568	X	P	19.70	20.22	39.92	-0.08	50.47	50.55
13.710 ~ 14.010	13.774	X	P	15.30	20.23	35.53	-4.47	40.51	44.98

Note 1. Loop antenna orientation

“P”: Parallel, “V”: perpendicular, “G”: ground-parallel

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

▪ 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.

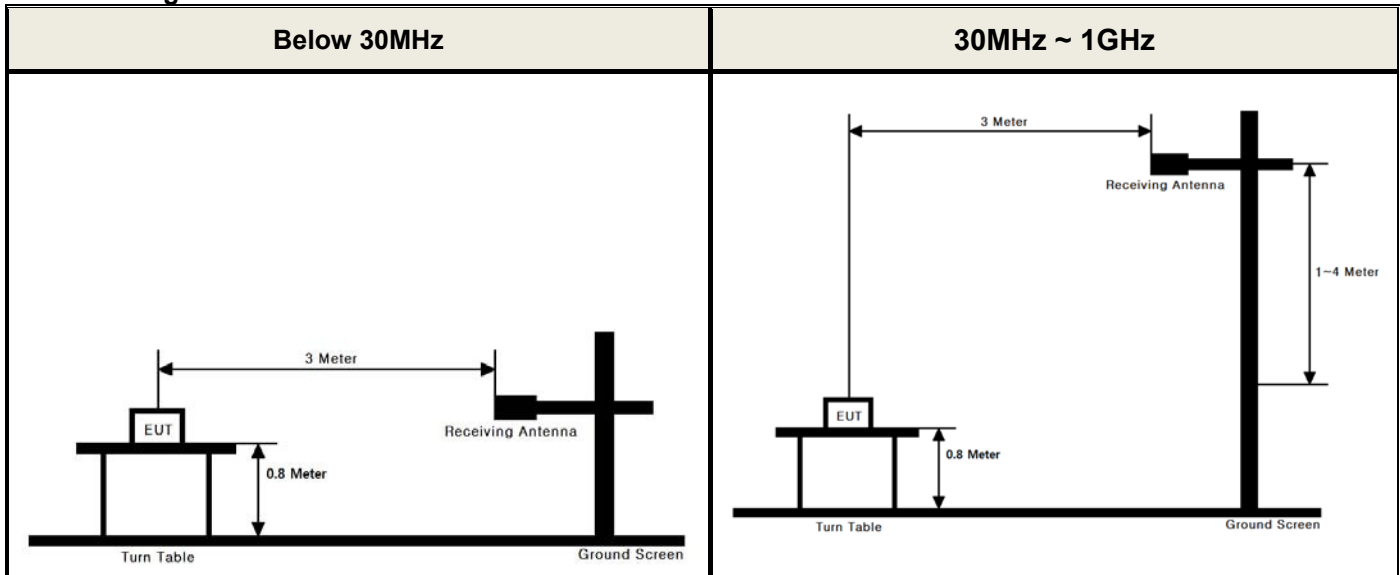
Margin = Limit – Field Strength @ 30 m / Field Strength @ 30 m = Field Strength @ 3 m – 40 dB

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

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

4.2.4 Out-of-band emissions

- Test configuration



- **Procedure:** The radiated emission was tested according to the **section 6.4, 6.5 of the ANSI C63.10-2013.**

The EUT was tested from 9 kHz up to the 1 GHz excluding the band 13.110-14.010 MHz.

A The EUT was placed on a 0.8 m high non-conductive table and it was placed at 3m distance from the antenna. For measurements below 30MHz were performed for each of the three antenna orientations. (ie. parallel, perpendicular, and ground-parallel) For measurements above 30MHz were performed for each of the both horizontal and vertical polarizations.

Also, measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

RBW = As specified in below table, VBW $\geq 3 \times$ RBW, Sweep = Auto, Detector = Peak
Trace mode = Max Hold until the trace stabilizes.

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

- **Minimum Standard: Part 15.209, 225(d) & RSS-210[B6(d)], RSS-GEN[8.9]**

• **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, 76-88 MHz, 174-216 MHz or 470-806 MHz. 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: Test mode 1

Tested Frequency : 13.56 MHz
Measurement Distance : 3 Meters

Frequency [MHz]	EUT Axis.	ANT (Note 1)	Reading [dBuV]	T.F [dB/m]	Distance factor [dB]	Field Strength [dBuV/m]	Limit [dBuV/m]	Margin [dB]
1.818	Y	P	19.00	19.87	40	-1.13	29.5	30.63
2.274	Y	P	19.80	19.89	40	-0.31	29.5	29.81
2.706	Y	P	14.60	19.92	40	-5.48	29.5	34.98
3.647	Y	P	12.40	19.96	40	-7.64	29.5	37.14
32.425	Y	H	28.50	-18.68	0	9.82	40	30.18
98.142	Y	H	35.50	-20.73	0	14.77	40	25.23
45.156	Y	V	40.20	-17.57	0	22.63	40	17.37
174.890	Y	V	40.20	-16.92	0	23.28	43.5	20.22
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

Note 1. Loop antenna orientation (30 MHz Below)

“P”= Parallel, “V”= perpendicular, “G”= ground-parallel

Bilog antenna polarization (30 MHz above)

“H”= Horizontal, “V”= Vertical

Note 2. 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 3. No other spurious and harmonic emissions were reported greater than listed emissions above table.

Note 4. Sample calculation

Margin = Limit – Field Strength

Field Strength = Reading + T.F – Distance factor

T.F = AF + CL – AG

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

- Measurement Data: Test mode 2

Tested Frequency : 13.56 MHz
Measurement Distance : 3 Meters

Frequency [MHz]	EUT Axis.	ANT (Note 1)	Reading [dBuV]	T.F [dB/m]	Distance factor [dB]	Field Strength [dBuV/m]	Limit [dBuV/m]	Margin [dB]
0.189	X	P	44.90	19.62	80	-15.48	22.1	37.58
0.567	X	P	25.50	18.76	40	4.26	32.5	28.24
1.838	X	P	18.30	19.87	40	-1.83	29.5	31.33
2.260	X	P	19.50	19.89	40	-0.61	29.5	30.11
27.120	X	P	11.00	20.55	40	-8.45	29.5	37.95
54.129	X	H	39.30	-17.39	0	21.91	40	18.09
135.485	X	H	44.40	-17.03	0	27.37	43.5	16.13
40.670	X	V	51.70	-17.98	0	33.72	40	6.28
54.129	X	V	49.30	-17.39	0	31.91	40	8.09
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

Note 1. Loop antenna orientation (30 MHz Below)

“P”= Parallel, “V”= perpendicular, “G”= ground-parallel

Bilog antenna polarization (30 MHz above)

“H”= Horizontal, “V”= Vertical

Note 2. 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 3. No other spurious and harmonic emissions were reported greater than listed emissions above table.

Note 4. Sample calculation

Margin = Limit – Field Strength

Field Strength = Reading + T.F – Distance factor

T.F = AF + CL – AG

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

4.2.5 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 : 13,560,000 Hz

VOLTAGE (%)	POWER (V _{DC})	TEMP (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100%	3.850	+20(ref)	13,560,191	191	0.001407
100%		-20	13,560,181	181	0.001337
100%		-10	13,560,185	185	0.001361
100%		0	13,560,189	189	0.001392
100%		+10	13,560,189	189	0.001396
100%		+20	13,560,192	192	0.001414
100%		+30	13,560,193	193	0.001421
100%		+40	13,560,195	195	0.001438
100%		+50	13,560,202	202	0.001486
85%	3.273	+20	13,560,190	190	0.001403
115%	4.428	+20	13,560,191	191	0.001411
BATT.ENDPOINT	3.200	+20	13,560,189	189	0.001395

- Minimum Standard: Part 15. 225(e) & RSS-210 [B6]

The frequency tolerance of the carrier signal shall be maintained within ± 0.01 % of the operating frequency.

4.2.6 AC Line Conducted Emissions

- Test Requirements and limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

- Test Configuration

See test photographs for the actual connections between EUT and support equipment.

- Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

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

Measurement Data

Results of Conducted Emission

DT&C

Date 2017-07-22

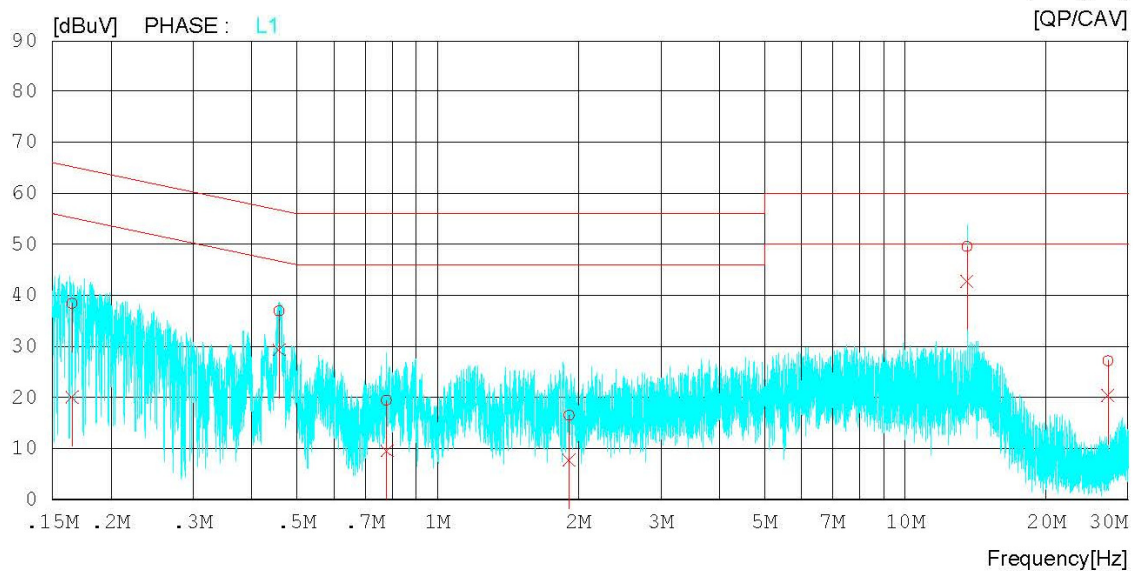
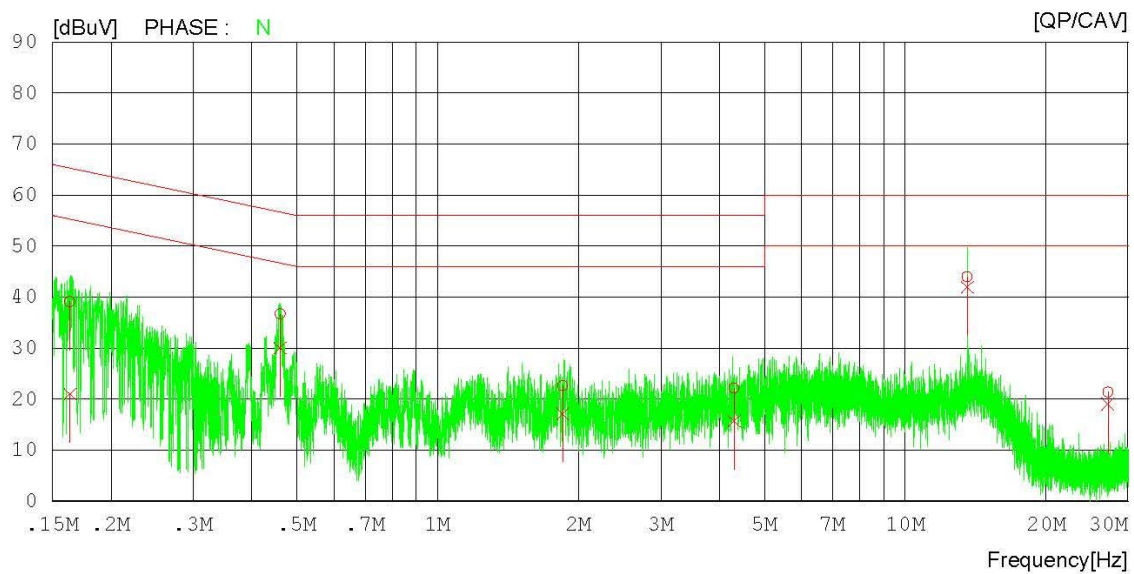
Model H930
Function NFC
Mode
Test condition

Temp/Humi.
Power Supply
Operator

25 'C 43 %
AC 120 V 60 Hz
S.G LEE

Memo

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



Measurement Data

Results of Conducted Emission

DT&C

Date 2017-07-22

Model H930
Function NFC
Mode
Test condition

Temp/Humi. 25 'C 43 %
Power Supply AC 120 V 60 Hz
Operator S.G LEE

Memo

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

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	CAV [dBuV]		QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	
1	0.16359	38.91	20.81	0.21	39.12	21.02	65.28	55.28	26.16	34.26	N
2	0.46010	36.45	29.79	0.22	36.67	30.01	56.69	46.69	20.02	16.68	N
3	1.85060	22.28	16.86	0.29	22.57	17.15	56.00	46.00	33.43	28.85	N
4	4.30660	21.73	15.27	0.42	22.15	15.69	56.00	46.00	33.85	30.31	N
5	13.56120	43.05	40.99	0.95	44.00	41.94	60.00	50.00	16.00	8.06	N
6	27.12040	19.48	17.19	1.87	21.35	19.06	60.00	50.00	38.65	30.94	N
7	0.16521	38.15	19.85	0.18	38.33	20.03	65.20	55.20	26.87	35.17	L1
8	0.45783	36.67	29.09	0.20	36.87	29.29	56.73	46.73	19.86	17.44	L1
9	0.77839	19.11	9.27	0.23	19.34	9.50	56.00	46.00	36.66	36.50	L1
10	1.90940	16.16	7.46	0.29	16.45	7.75	56.00	46.00	39.55	38.25	L1
11	13.55960	48.53	41.77	0.99	49.52	42.76	60.00	50.00	10.48	7.24	L1
12	27.11900	25.03	18.18	2.13	27.16	20.31	60.00	50.00	32.84	29.69	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 Technologies	N9020A	16/08/18	17/08/18	MY46471601
Multimeter	FLUKE	17B	17/04/12	18/04/12	26030065WS
DC Power Supply	Agilent	66332A	17/01/11	18/01/11	US37473831
Signal Generator	Rohde Schwarz	SMBV100A	17/01/04	18/01/04	255571
Thermohygrometer	HCT	HCT-1	16/09/09	17/09/09	NONE
Loop Antenna	Schwarzbeck	FMZB1513	16/04/22	18/04/22	1513-128
BILOG ANTENNA	Schwarzbeck	VULB 9160	16/11/11	18/11/11	3151
PreAmplifier	TSJ	MLA-010K01-B01-27	17/03/06	18/03/06	1844539
EMI Test Receiver	Rohde Schwarz	ESR7	17/02/16	18/02/16	101061
EMI Test Receiver	R&S	ESCI	17/02/26	18/02/16	100364
SINGLE-PHASE MASTER	NF	4420	16/09/08	17/09/08	3049354420023
Temp & Humi Test Chamber	SJ Science	SJ-TH-S50	16/09/09	17/09/09	U5542113
Artificial Mains Network	Rohde Schwarz	ESH2-Z5	16/09/08	17/09/08	828739/006

Note: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2006.