

FCC NFC REPORT

FCC Certification

Applicant Name:

LG Electronics MobileComm U.S.A., Inc.

Address:

1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue:

April 20, 2016

Test Site/Location:

HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majang-myeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-R-1604-F059

HCT FRN: 0005866421

IC Recognition No.: 5944A-5

FCC ID : ZNFDM02H

APPLICANT :LG Electronics MobileComm U.S.A., Inc.

Model(s): DM-02H

Additional Model(s): DS1604

EUT Type: Cellular/PCS GSM/WCDMA Phone with WLAN, Bluetooth and NFC

RF Output Field Strength: 13.57 dBuV/m @30 m

Frequency of Operation: 13.5600 MHz

Modulation type: ASK

FCC Classification: Low Power Communication Device – Transmitter

FCC Rule Part(s): FCC Part 15.225 Subpart C

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)



Report prepared by

: Seoul Ki Lee

Test Engineer of RF Team



Approved by

: Jong Seok Lee

Manager of RF Team

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HCT CO.,LTD.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1604-F059	April 20, 2016	- First Approval Report

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1. GENERAL INFORMATION

Applicant: LG Electronics MobileComm U.S.A., Inc
Address: 1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID: ZNFDM02H
EUT Type: Cellular/PCS GSM/WCDMA Phone with WLAN, Bluetooth and NFC
Model (s): DM-02H
Additional Model(s): DS1604
Date(s) of Tests: March 29, 2016 ~ April 15, 2016
Place of Tests: HCT Co., Ltd.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
(IC Recognition No. : 5944A-5)

2. EUT DESCRIPTION

Model	DM-02H
Additional Model	DS1604
EUT Type	Cellular/PCS GSM/WCDMA Phone with WLAN, Bluetooth and NFC
Power Supply	DC 3.85 V
Battery Information	Model: BL-T25 Type: Li-ion Battery
Frequency of Operation	13.5600 MHz
Transmit Power	13.57 dBuV/m @30 m
Modulation Type	ASK
Antenna Specification	Manufacturer: KOMATECH Co., Ltd. Antenna type: FPCB Antenna

3. TEST METHODOLOGY

The measurement procedure described in ANSI C63.10 (Version :2013) 'the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices'.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.225 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.3 of ANSI C63.10. (Version: 2013).

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The 10 m semi anechoic chamber used to collect the Conducted and Radiated data is located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4 (Version: 2014). Detailed description of test facilities was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned loop, dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

"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 antennas of this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of §15.203

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (\pm dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	6.07

8. TEST SUMMARY

The results in this report apply only to sample tested

Regulation	Test Type	Range	Result
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(a)	Radiated Electric Field Emissions	13.553MHz to 13.567MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(b)	Radiated Electric Field Emissions	13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(c)	Radiated Electric Field Emission	13.110 MHz to 13.410 MHz and 13.710 MHz to 14.010 MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.209 (d)	Radiated Electric Field Emissions	9kHz to 30MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.209	Radiated Electric Field Emissions	30MHz to 1GHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.207	AC power conducted emissions	150kHz to 30MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(e)	Frequency Stability	0.01% of nominal	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.215(c)	20 dB Bandwidth	-	Pass

9. RADIATED EMISSION MEASUREMENT

Requirement(s): 15.209, 15.225

Except as provided elsewhere in this paragraph the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Minimum Standard: FCC Part 15.225 / 15.209

Rule Part	Frequency (MHz)	Limit
Part 15.209	0.009 ~ 0.490	2400/F(kHz) uV/m@300 m
	0.490 ~1.705	24000/F(kHz) uV/m@30 m
	1.705 ~ 30	30 uV/m@30 m
	30 ~ 88	100 ** uV/m@3 m
	88 ~ 216	150 ** uV/m@3 m
	216 ~ 960	200 ** uV/m@3 m
	Above 960	500 uV/m@3 m

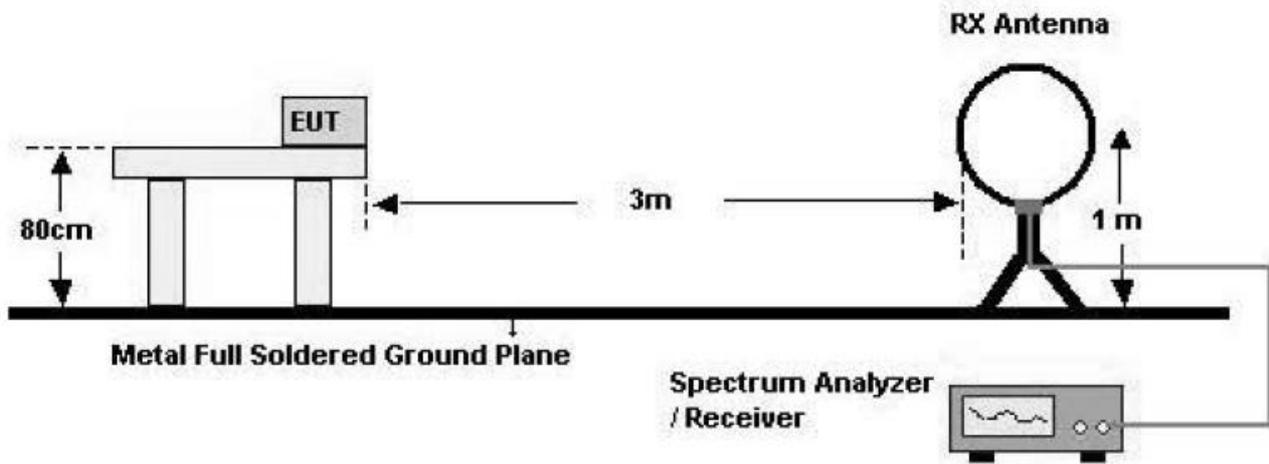
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

15.225 Operation within the band 13.110 MHz – 14.010 MHz

- (a) The field strength of any emissions within the band 13.553 MHz-13.567 MHz shall not exceed 15,848 microvolts/meter (= 84 dBuV/m) at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567 MHz-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (=50.5dBuV/m) at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710 MHz-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter (=40.5 dBuV/m) at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110 MHz-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.
- (e) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.
- (f) In the case of radio frequency powered tags designed to operate with a device authorized under this section, the tag may be approved with the device or be considered as a separate device subject to its own authorization. Powered tags approved with a device under a single application shall be labeled with the same identification number as the device.

9.1. RADIATED EMISSION 9 kHz – 30 MHz

Test Set-up



Test Procedure

The EUT was placed on a non-conductive table located on semi-anechoic chamber.

The loop antenna was placed at a location 3m from the EUT. Radiated emissions were measured with the loop antenna both parallel and perpendicular to the plane of the EUT loop antenna and with x, y, z planes in EUT.

The limit is converted from microvolts/meter to decibel microvolts/meter. Sample Calculation:

Corrected Amplitude = Raw Amplitude(dB μ V/m) + ACF(dB) + Cable Loss(dB) – Distance Correction Factor

The spectrum analyzer is set to:

Frequency Range = 9 kHz ~ 1 GHz

RBW = 9 kHz (9 kHz ~ 30 MHz)

= 120 kHz (30 MHz ~ 1 GHz)

Trace Mode = max hold

Detector Mode = peak / Quasi-peak

Sweep time = auto

Test Mode

- Stand alone with normal cover
- Stand alone with quick cover (open)
- Stand alone with quick cover (close)

■ Test Results (Worst case : y-H) Stand alone with normal cover

13.553 MHz-13.567 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5600(H)	32.24	21.33	-40.00	13.57	84.00	70.43
13.5601(V)	30.17	21.33	-40.00	11.50	84.00	72.50

13.410 MHz-13.553 MHz and 13.567 MHz-13.710 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.553	20.19	21.33	-40.00	1.52	50.47	48.95
13.567	19.36	21.33	-40.00	0.69	50.47	49.78

13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.3206	8.09	21.33	-40.00	-10.58	40.51	51.09
13.8978	8.69	21.33	-40.00	-9.98	40.51	50.49

9 kHz -30 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
5.1297	10.35	21.31	-40.00	-8.34	29.54	37.88
15.9627	8.76	21.33	-40.00	-9.91	29.54	39.45
27.5628	7.17	21.75	-40.00	-11.08	29.54	40.62
27.5567	6.95	21.75	-40.00	-11.3	29.54	40.84

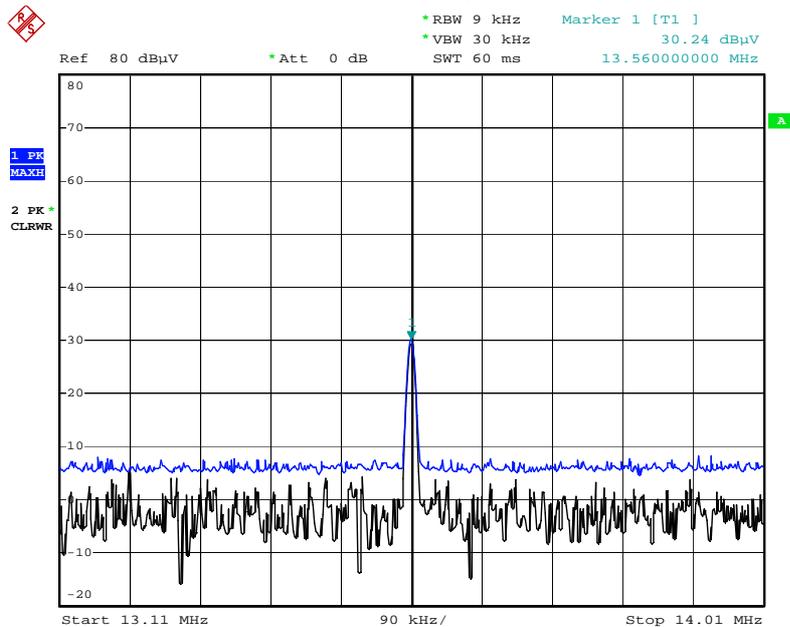
Note : The test results for below 30 MHz is correlated to an open site.

The result on OATS is about 2 dB higher than semi-anechoic chamber(10 m chamber)

1. Distance Correction Below 30 MHz = $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$
Measurement Distance : 3 m (Below 30 MHz)
2. Factor = Antenna Factor + Cable Loss
3. Result Level = Read Level + Factor + Distance Correction
4. Margin = Limit – Result Level
5. We have done x, y, z planes in EUT
6. Antenna rotated about its vertical/horizontal axis for maximum response at each azimuth position around the EUT.
7. Worst case of operating mode is type A, analog mode and 106 kbps.

■ **RESULT PLOTS**

Radiated Emissions (9 kHz~30 MHz) plot



Date: 29.MAR.2016 15:49:27

Note : Only the worst case plots for Radiated Emissions.

■ Test Results (Worst case : y-H) Stand alone with quick cover (open)

13.553 MHz-13.567 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5600(H)	32.08	21.33	-40.00	13.41	84.00	70.59
13.5599(V)	30.60	21.33	-40.00	11.93	84.00	72.07

13.410 MHz-13.553 MHz and 13.567 MHz-13.710 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.553	19.96	21.33	-40.00	1.29	50.47	49.18
13.567	19.35	21.33	-40.00	0.68	50.47	49.79

13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.1364	7.98	21.33	-40.00	-10.69	40.51	51.20
13.7706	8.72	21.33	-40.00	-9.95	40.51	50.46

9 kHz -30 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
9.1536	10.14	21.39	-40.00	-8.47	29.54	38.01
15.2755	8.27	21.33	-40.00	-10.40	29.54	39.94
27.5606	7.35	21.75	-40.00	-10.90	29.54	40.44
27.5632	6.79	21.75	-40.00	-11.46	29.54	41.00

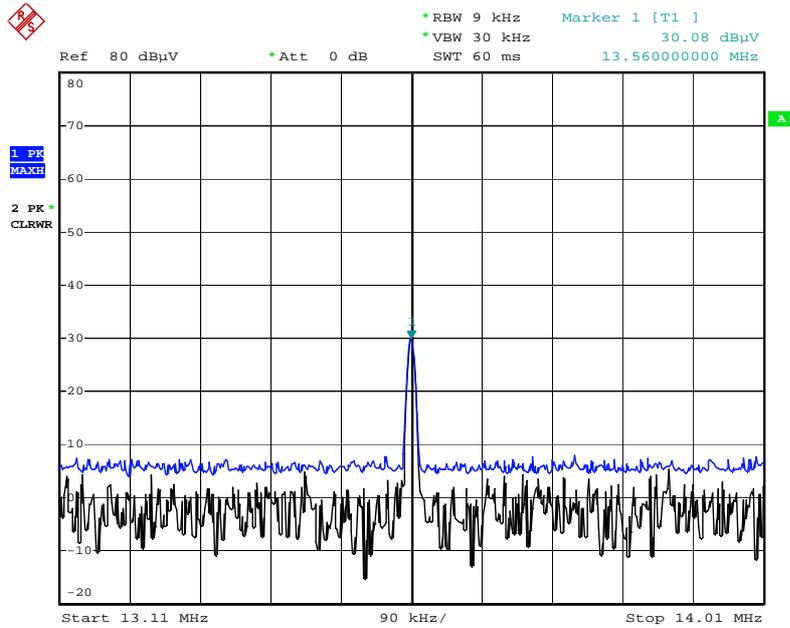
Note : The test results for below 30 MHz is correlated to an open site.

The result on OATS is about 2 dB higher than semi-anechoic chamber(10 m chamber)

1. Distance Correction Below 30 MHz = $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$
Measurement Distance : 3 m (Below 30 MHz)
2. Factor = Antenna Factor + Cable Loss
3. Result Level = Read Level + Factor + Distance Correction
4. Margin = Limit – Result Level
5. We have done x, y, z planes in EUT
6. Antenna rotated about its vertical/horizontal axis for maximum response at each azimuth position around the EUT.
7. Worst case of operating mode is type A, analog mode and 106 kbps.

■ **RESULT PLOTS**

Radiated Emissions (9 kHz~30 MHz) plot



Date: 29.MAR.2016 16:35:51

Note : Only the worst case plots for Radiated Emissions.

■ Test Results (Worst case : y-H) Stand alone with quick cover (close)

13.553 MHz-13.567 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5600(H)	32.12	21.33	-40.00	13.45	84.00	70.55
13.5596(V)	30.34	21.33	-40.00	11.67	84.00	72.33

13.410 MHz-13.553 MHz and 13.567 MHz-13.710 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.553	20.06	21.33	-40.00	1.39	50.47	49.08
13.567	19.45	21.33	-40.00	0.78	50.47	49.69

13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.1364	8.11	21.33	-40.00	-10.56	40.51	51.07
13.7706	8.53	21.33	-40.00	-10.14	40.51	50.65

9 kHz -30 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
8.0825	10.27	21.40	-40.00	-8.33	29.54	37.87
14.8612	8.48	21.33	-40.00	-10.19	29.54	39.73
27.5620	7.08	21.75	-40.00	-11.17	29.54	40.71
27.5582	6.91	21.75	-40.00	-11.34	29.54	40.88

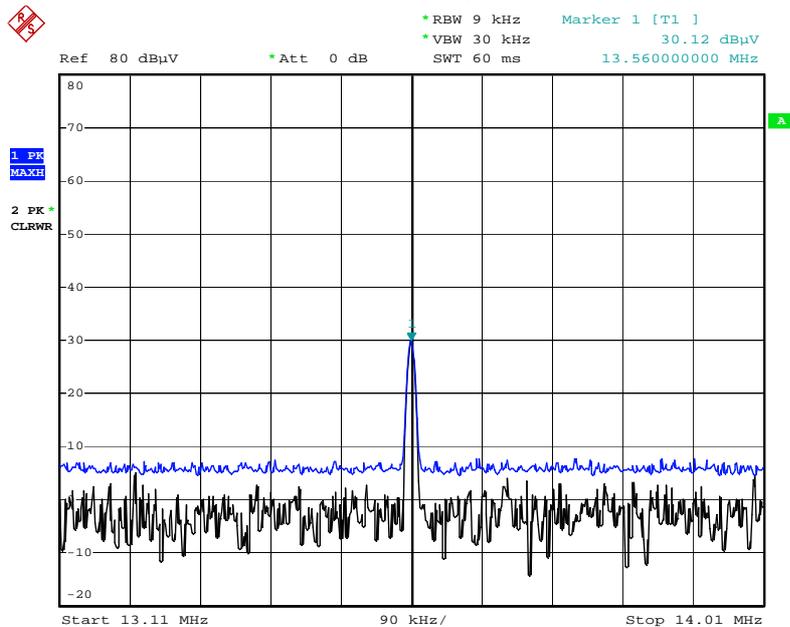
Note : The test results for below 30 MHz is correlated to an open site.

The result on OATS is about 2 dB higher than semi-anechoic chamber(10 m chamber)

1. Distance Correction Below 30 MHz = $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$
Measurement Distance : 3 m (Below 30 MHz)
2. Factor = Antenna Factor + Cable Loss
3. Result Level = Read Level + Factor + Distance Correction
4. Margin = Limit – Result Level
5. We have done x, y, z planes in EUT
6. Antenna rotated about its vertical/horizontal axis for maximum response at each azimuth position around the EUT.
7. Worst case of operating mode is type A, analog mode and 106 kbps.

■ **RESULT PLOTS**

Radiated Emissions (9 kHz~30 MHz) plot

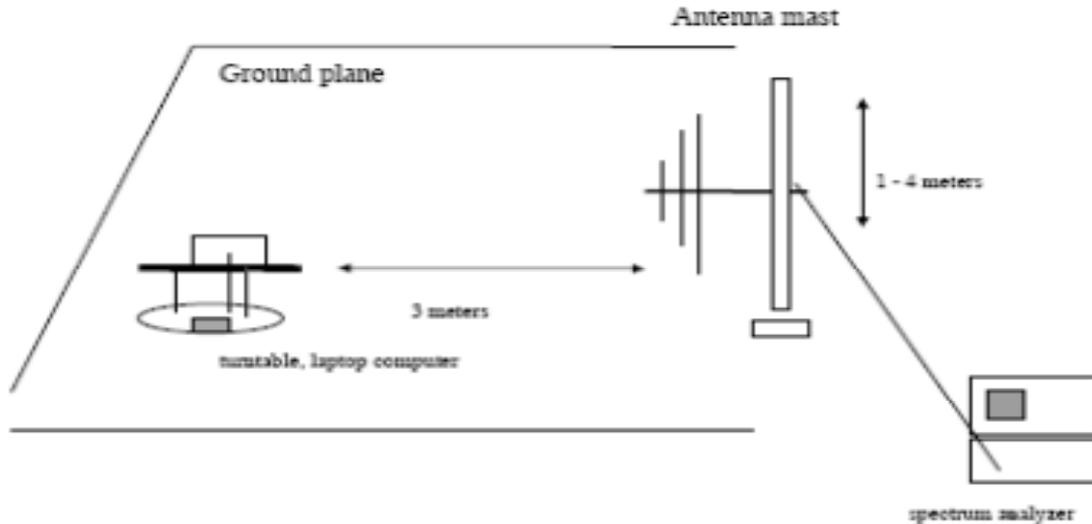


Date: 29.MAR.2016 16:30:18

Note : Only the worst case plots for Radiated Emissions.

9.2. RADIATED EMISSION 30 MHz – 1000 MHz

Test Set-up



Test Procedures: Radiated emissions were measured according to ANSI C63.10.

The EUT was set to transmit at the highest output power.

The EUT was set 3 meter away from the measuring antenna.

■ Test Results_Stand alone with normal cover

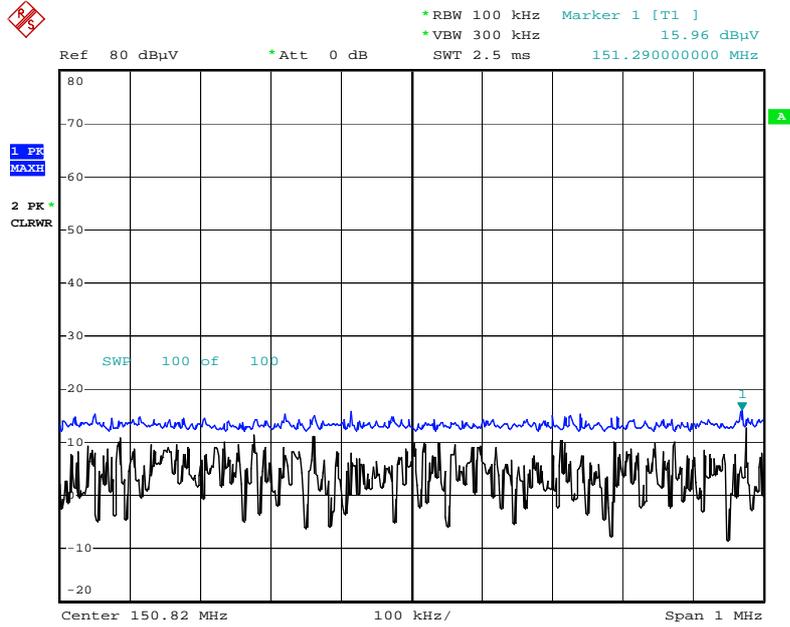
Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV	dB/m	dB	(H/V)	dBuV/m	dBuV/m	dB
31.830	14.67	11.24	0.58	H	26.49	40.00	13.51
*73.250	15.11	10.32	0.77	H	26.20	40.00	13.80
82.140	14.64	8.19	0.78	V	23.61	40.00	16.39
*115.600	15.68	11.64	0.97	H	28.29	43.50	15.21
*134.290	15.45	12.84	1.00	H	29.29	43.50	14.21
151.290	15.96	13.03	1.07	V	30.06	43.50	13.44

Remark

1. Result Level = Read Level + (Antenna Factor+ Cable Loss)
2. Margin = Limit – Result Level
3. '*' is the result for restricted band.

■ **RESULT PLOTS**

Radiated Emissions (30 MHz ~ 1000 MHz) plot



Date: 14.APR.2016 12:15:54

Note : Only the worst case plots for Radiated Emissions.

■ Test Results_Stand alone with quick cover (open)

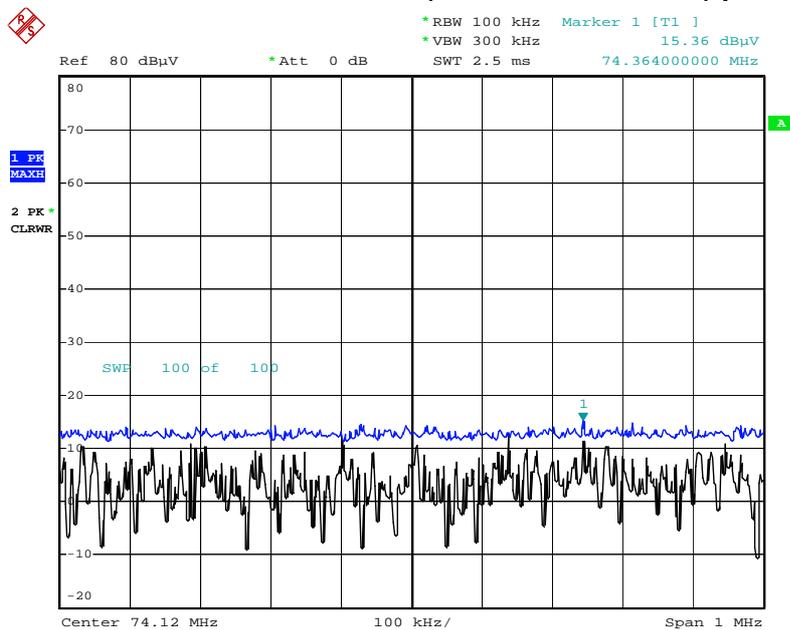
Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV	dB/m	dB	(H/V)	dBuV/m	dBuV/m	dB
40.56	14.53	11.95	0.66	H	27.14	40	12.86
*74.36	15.36	9.25	0.77	H	25.38	40	14.62
93.68	14.52	7.73	0.87	V	23.12	43.5	20.38
*120.24	14.24	11.64	0.96	H	26.84	43.5	16.66
*135.36	15.11	12.54	1.02	H	28.67	43.5	14.83
160.59	14.39	13.41	1.12	V	28.92	43.5	14.58

Remark

1. Result Level = Read Level + (Antenna Factor+ Cable Loss)
2. Margin = Limit – Result Level
3. ‘*’ is the result for restricted band.

■ RESULT PLOTS

Radiated Emissions (30 MHz ~ 1000 MHz) plot



Date: 14.APR.2016 12:29:02

Note : Only the worst case plots for Radiated Emissions.

■ Test Results_Stand alone with quick cover (close)

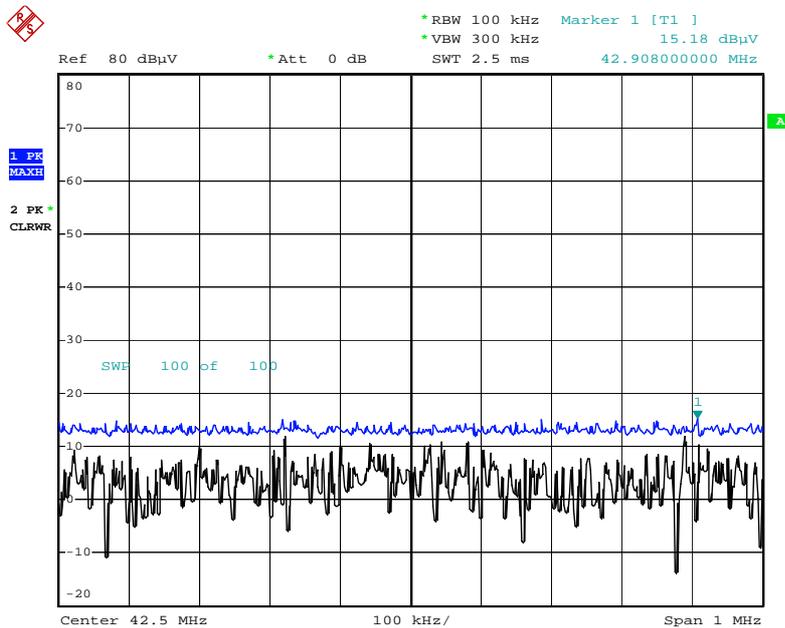
Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV	dB/m	dB	(H/V)	dBuV/m	dBuV/m	dB
*37.86	14.76	11.72	0.64	H	27.12	40.00	12.88
42.91	15.18	12.13	0.66	H	27.97	40.00	12.03
*75.08	14.59	9.21	0.77	V	24.57	40.00	15.43
105.44	15.08	9.27	0.92	H	25.27	43.50	18.23
145.36	14.61	12.84	1.05	H	28.50	43.50	15.00
*170.15	14.95	12.50	1.09	V	28.54	43.50	14.96

Remark

1. Result Level = Read Level + (Antenna Factor+ Cable Loss)
2. Margin = Limit – Result Level
3. ‘*’ is the result for restricted band.

■ RESULT PLOTS

Radiated Emissions (30 MHz ~ 1000 MHz) plot



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Note : Only the worst case plots for Radiated Emissions.

10. EMISSION BANDWIDTH PLOT.

Requirement(s):

Test Set-up: The EUT was connected to a spectrum analyzer.

Test Procedure: The 20 dB bandwidth was measured by using a spectrum analyzer.

RBW = Auto

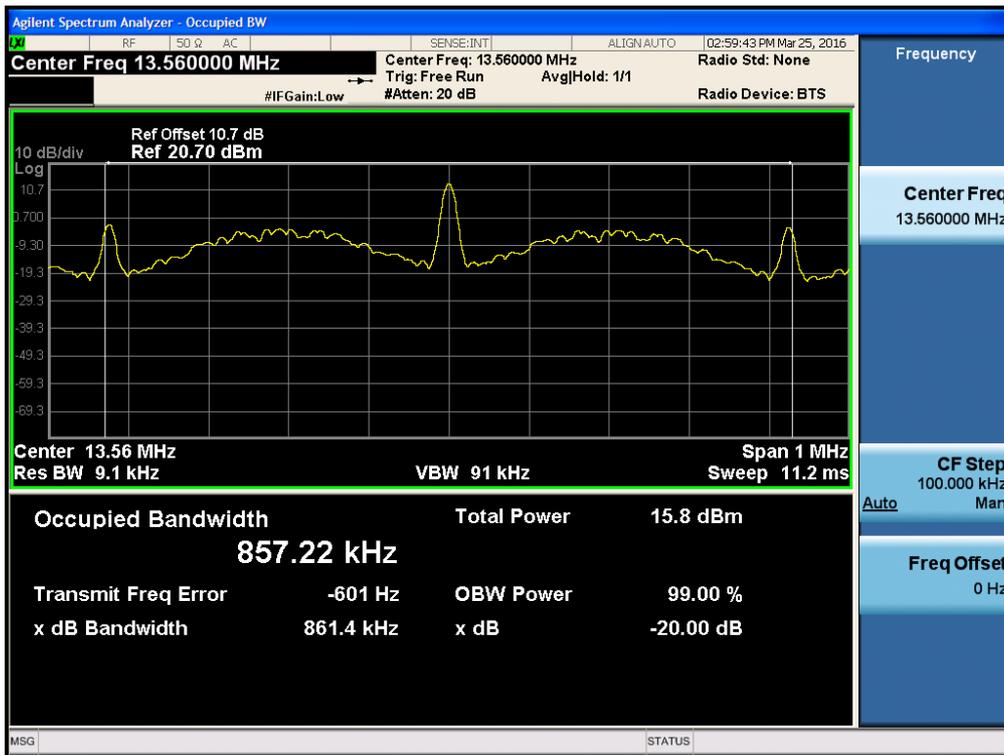
VBW = Auto

Span = Adequately in the operating Tx.

Detector = Peak

Trace mode = Max hold

Allow the trace to stabilize



11. FREQUENCY TOLERANCE

Procedure: Part 15.225, ANSI 63.10 (Version : 2013)

If required, the operating or transmitting frequency of an intentional radiator should be measured in accordance with the following procedure to ensure that the device operates outside certain precluded frequency bands and within the frequency range. No modulation needs to be supplied to the intentional radiator during these tests, unless modulation is required to produce an output, e.g., single-sideband suppressed carrier transmitters.

The frequency stability of the transmitter is measured by:

- a) Temperature: The temperature is varied from -20°C to + 50°C using an environmental chamber.
- b) For battery operated equipment, the equipment tests shall be performed using a new battery.
- c) Test Procedure
 - Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.
 - Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.
 - While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.
- d) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

Note : Below the measurement result is worst value of the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized

Startup

Measurement Result:

OPERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 3.85 VDC
 DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100	3.85	-20	13.559803	-197	-0.0014528
100		-10	13.559809	-191	-0.0014086
100		0	13.559816	-184	-0.0013569
100		+10	13.559828	-172	-0.0012684
100		+20(Ref.)	13.559831	-169	-0.0012463
100		+30	13.559845	-155	-0.0011431
100		+40	13.559857	-143	-0.0010546
100		+50	13.559866	-134	-0.0009882
Maximum		4.40	+20	13.559842	-158
End point	3.60	+20	13.559868	-132	-0.0009735

2 minutes

Measurement Result:

OPERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 3.85 VDC
 DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100	3.85	-20	13.559812	-188	-0.0013864
100		-10	13.559816	-184	-0.0013569
100		0	13.559819	-181	-0.0013348
100		+10	13.559826	-174	-0.0012832
100		+20(Ref.)	13.559830	-170	-0.0012537
100		+30	13.559836	-164	-0.0012094
100		+40	13.559841	-159	-0.0011726
100		+50	13.559846	-154	-0.0011357
Maximum		4.40	+20	13.559833	-167
End point	3.60	+20	13.559858	-142	-0.0010472

5 minutes

Measurement Result:

OPERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 3.85 VDC
 DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100	3.85	-20	13.559817	-183	-0.0013496
100		-10	13.559821	-179	-0.0013201
100		0	13.559825	-175	-0.0012906
100		+10	13.559828	-172	-0.0012684
100		+20(Ref.)	13.559831	-169	-0.0012463
100		+30	13.559839	-161	-0.0011873
100		+40	13.559843	-157	-0.0011578
100		+50	13.559847	-153	-0.0011283
Maximum		4.40	+20	13.559833	-167
End point	3.60	+20	13.559851	-149	-0.0010988

10 minutes

Measurement Result:

OPERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 3.85 VDC
 DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100	3.85	-20	13.559819	-181	-0.0013348
100		-10	13.559821	-179	-0.0013201
100		0	13.559825	-175	-0.0012906
100		+10	13.559827	-173	-0.0012758
100		+20(Ref.)	13.559831	-169	-0.0012463
100		+30	13.559837	-163	-0.0012021
100		+40	13.559841	-159	-0.0011726
100		+50	13.559843	-157	-0.0011578
Maximum		4.40	+20	13.559840	-160
End point	3.60	+20	13.559852	-148	-0.0010914

12. POWERLINE CONDUCTE EMISSIONS

LIMIT

For an intentional radiator which 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 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

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 attached in Appendix 1 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.
5. The EUT is the device operating below 30 MHz.
 - For unterminated the Antenna, the AC line conducted tests are performed with the antenna connected
 - For terminated the Antenna, the AC line conducted tests are performed with a dummy load connected to the EUT antenna output terminal.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor

Test Plots

Untermine the Antenna

Conducted Emissions (Line 1)

NFC MODE UNTERM N

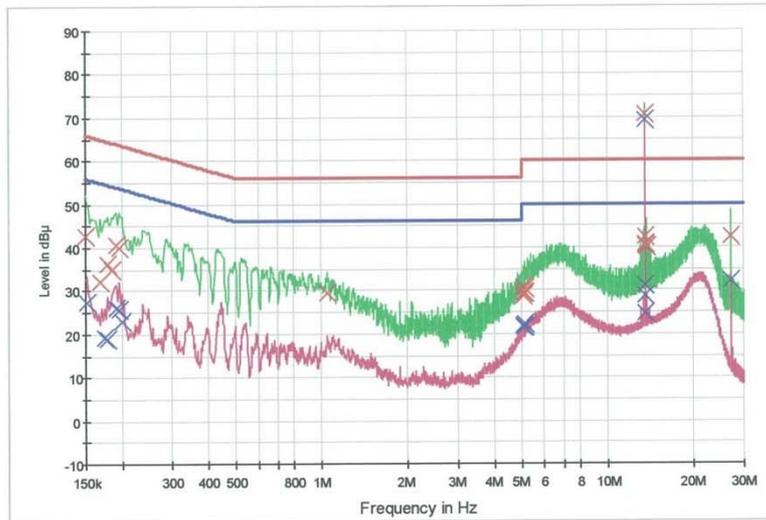
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HCT TEST Report

Common Information

EUT: DM-02H
 Manufacturer: LG
 Test Site: SHIELD ROOM
 Operating Conditions: NFC MODE_ UNTERMINATION

FCC CLASS B



— FCC CLASS B_QP — FCC CLASS B_AV — Preview Result 1-PK+
 — Preview Result 2-AVG x Final Result 1-QPK x Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	42.8	9.000	Off	N	9.6	23.2	66.0
0.168000	32.2	9.000	Off	N	9.6	32.9	65.1
0.178000	36.2	9.000	Off	N	9.6	28.4	64.6
0.186000	35.0	9.000	Off	N	9.6	29.2	64.2
0.192000	40.6	9.000	Off	N	9.6	23.4	63.9
0.196000	40.0	9.000	Off	N	9.6	23.7	63.8
1.046000	29.5	9.000	Off	N	9.7	26.5	56.0
5.048000	29.6	9.000	Off	N	9.8	30.4	60.0
5.056000	28.7	9.000	Off	N	9.8	31.3	60.0
5.094000	30.8	9.000	Off	N	9.8	29.2	60.0
5.102000	30.6	9.000	Off	N	9.8	29.4	60.0
5.116000	29.3	9.000	Off	N	9.8	30.7	60.0
13.466000	40.2	9.000	Off	N	10.1	19.8	60.0
13.514000	42.5	9.000	Off	N	10.1	17.5	60.0
13.560000	70.7	9.000	Off	N	10.1	-10.7	60.0
13.604000	40.6	9.000	Off	N	10.1	19.4	60.0
13.654000	39.9	9.000	Off	N	10.1	20.1	60.0
27.124000	42.3	9.000	Off	N	10.4	17.7	60.0

Final Result 2

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NFC MODE UNTERM N

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Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.152000	27.5	9.000	Off	N	9.6	28.4	55.9
0.174000	19.4	9.000	Off	N	9.6	35.4	54.8
0.178000	18.9	9.000	Off	N	9.6	35.7	54.6
0.192000	26.1	9.000	Off	N	9.6	27.8	53.9
0.196000	25.6	9.000	Off	N	9.6	28.2	53.8
0.200000	23.2	9.000	Off	N	9.6	30.5	53.6
5.088000	21.7	9.000	Off	N	9.8	28.3	50.0
5.096000	21.9	9.000	Off	N	9.8	28.1	50.0
5.100000	21.8	9.000	Off	N	9.8	28.2	50.0
5.104000	21.6	9.000	Off	N	9.8	28.4	50.0
5.130000	22.3	9.000	Off	N	9.8	27.7	50.0
5.148000	22.2	9.000	Off	N	9.8	27.8	50.0
13.466000	28.6	9.000	Off	N	10.1	21.4	50.0
13.512000	31.1	9.000	Off	N	10.1	18.9	50.0
13.542000	24.6	9.000	Off	N	10.1	25.4	50.0
13.560000	69.3	9.000	Off	N	10.1	-19.3	50.0
13.604000	28.6	9.000	Off	N	10.1	21.4	50.0
27.120000	32.3	9.000	Off	N	10.4	17.7	50.0

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Conducted Emissions (Line 2)

NFC MODE UNTERM L1

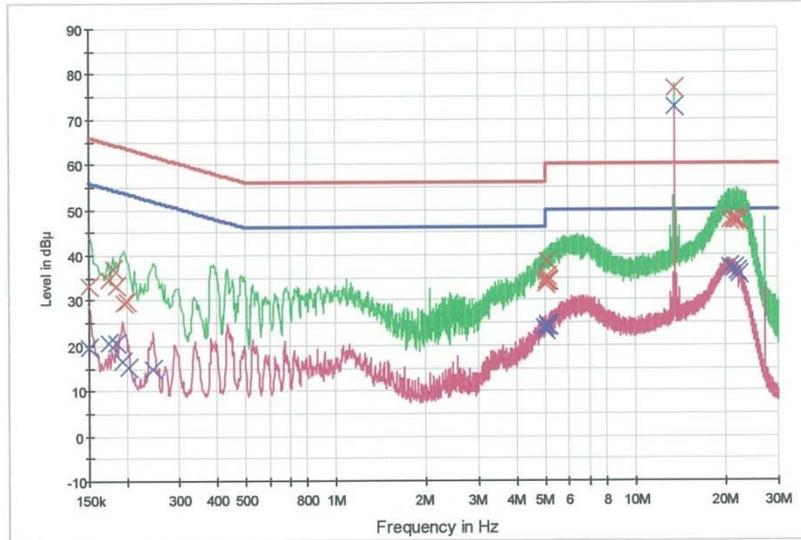
1 / 2

HCT TEST Report

Common Information

EUT: DM-02H
 Manufacturer: LG
 Test Site: SHIELD ROOM
 Operating Conditions: NFC MODE _ UNTERMINATION

FCC CLASS B



— FCC CLASS B_QP — FCC CLASS B_AV — Preview Result 1-PK+
 — Preview Result 2-AVG × Final Result 1-QPK × Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	33.4	9.000	Off	L1	9.7	32.6	66.0
0.174000	34.5	9.000	Off	L1	9.6	30.3	64.8
0.180000	36.9	9.000	Off	L1	9.6	27.6	64.5
0.186000	33.3	9.000	Off	L1	9.6	30.9	64.2
0.196000	29.6	9.000	Off	L1	9.6	34.2	63.8
0.202000	29.6	9.000	Off	L1	9.6	33.9	63.5
5.012000	33.4	9.000	Off	L1	9.9	26.6	60.0
5.018000	34.1	9.000	Off	L1	9.9	25.9	60.0
5.066000	34.3	9.000	Off	L1	9.9	25.7	60.0
5.072000	35.1	9.000	Off	L1	9.9	24.9	60.0
5.090000	38.8	9.000	Off	L1	9.9	21.2	60.0
5.112000	34.1	9.000	Off	L1	9.9	25.9	60.0
13.560000	76.6	9.000	Off	L1	10.1	-16.6	60.0
20.646000	47.6	9.000	Off	L1	10.3	12.4	60.0
21.312000	47.5	9.000	Off	L1	10.3	12.5	60.0
21.386000	47.7	9.000	Off	L1	10.3	12.3	60.0
21.778000	47.4	9.000	Off	L1	10.3	12.6	60.0
22.214000	47.5	9.000	Off	L1	10.3	12.5	60.0

Final Result 2

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NFC MODE UNTERM L1

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Frequency (MHz)	C Average (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	19.6	9.000	Off	L1	9.7	36.4	56.0
0.174000	20.6	9.000	Off	L1	9.6	34.1	54.8
0.186000	20.6	9.000	Off	L1	9.6	33.6	54.2
0.194000	16.5	9.000	Off	L1	9.6	37.4	53.9
0.204000	15.0	9.000	Off	L1	9.6	38.4	53.4
0.246000	14.9	9.000	Off	L1	9.6	37.0	51.9
4.954000	24.2	9.000	Off	L1	9.9	21.8	46.0
5.012000	23.4	9.000	Off	L1	9.9	26.6	50.0
5.018000	23.5	9.000	Off	L1	9.9	26.5	50.0
5.066000	24.4	9.000	Off	L1	9.9	25.6	50.0
5.070000	24.6	9.000	Off	L1	9.9	25.4	50.0
5.112000	24.5	9.000	Off	L1	9.9	25.5	50.0
13.560000	72.7	9.000	Off	L1	10.1	-22.7	50.0
20.646000	37.1	9.000	Off	L1	10.3	12.9	50.0
21.312000	37.0	9.000	Off	L1	10.3	13.0	50.0
21.386000	36.8	9.000	Off	L1	10.3	13.2	50.0
21.778000	36.2	9.000	Off	L1	10.3	13.8	50.0
22.214000	35.7	9.000	Off	L1	10.3	14.3	50.0

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**Terminate the Antenna
Conducted Emissions (Line 1)**

NFC MODE TERM N

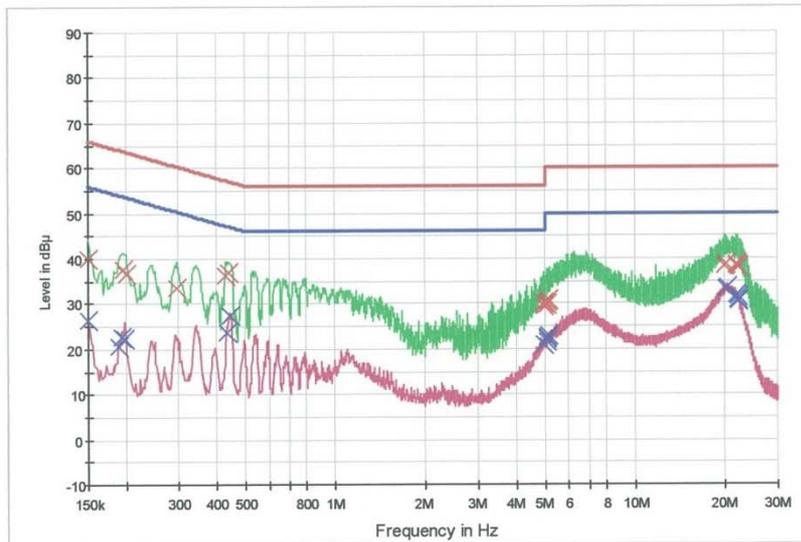
1 / 2

HCT TEST Report

Common Information

EUT: DM-02H
 Manufacturer: LG
 Test Site: SHIELD ROOM
 Operating Conditions: NFC MODE_ TERMINATION

FCC CLASS B



— FCC CLASS B_QP — FCC CLASS B_AV — Preview Result 1-PK+
 — Preview Result 2-AVG × Final Result 1-QPK × Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	40.0	9.000	Off	N	9.6	26.0	66.0
0.196000	37.7	9.000	Off	N	9.6	26.1	63.8
0.200000	36.6	9.000	Off	N	9.6	27.0	63.6
0.296000	33.6	9.000	Off	N	9.6	26.8	60.4
0.432000	36.3	9.000	Off	N	9.6	20.9	57.2
0.442000	36.9	9.000	Off	N	9.6	20.1	57.0
4.926000	30.2	9.000	Off	N	9.8	25.8	56.0
4.930000	29.3	9.000	Off	N	9.8	26.7	56.0
5.044000	29.9	9.000	Off	N	9.8	30.1	60.0
5.080000	30.6	9.000	Off	N	9.8	29.4	60.0
5.088000	30.6	9.000	Off	N	9.8	29.4	60.0
5.128000	30.9	9.000	Off	N	9.8	29.1	60.0
19.842000	38.3	9.000	Off	N	10.3	21.7	60.0
20.126000	38.6	9.000	Off	N	10.3	21.4	60.0
21.834000	38.4	9.000	Off	N	10.3	21.6	60.0
21.938000	38.6	9.000	Off	N	10.3	21.4	60.0
22.044000	38.3	9.000	Off	N	10.3	21.7	60.0
22.236000	37.8	9.000	Off	N	10.3	22.2	60.0

Final Result 2

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NFC MODE TERM N

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Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	26.5	9.000	Off	N	9.6	29.5	56.0
0.190000	20.5	9.000	Off	N	9.6	33.5	54.0
0.194000	22.8	9.000	Off	N	9.6	31.1	53.9
0.198000	22.2	9.000	Off	N	9.6	31.5	53.7
0.434000	23.7	9.000	Off	N	9.6	23.4	47.2
0.444000	27.3	9.000	Off	N	9.6	19.7	47.0
4.926000	20.9	9.000	Off	N	9.8	25.1	46.0
4.930000	20.9	9.000	Off	N	9.8	25.1	46.0
5.042000	21.6	9.000	Off	N	9.8	28.4	50.0
5.082000	22.2	9.000	Off	N	9.8	27.8	50.0
5.090000	22.6	9.000	Off	N	9.8	27.4	50.0
5.128000	22.9	9.000	Off	N	9.8	27.1	50.0
20.126000	33.3	9.000	Off	N	10.3	16.7	50.0
20.472000	33.5	9.000	Off	N	10.3	16.5	50.0
21.834000	32.0	9.000	Off	N	10.3	18.0	50.0
22.044000	31.5	9.000	Off	N	10.3	18.5	50.0
22.162000	31.0	9.000	Off	N	10.3	19.0	50.0
22.236000	30.6	9.000	Off	N	10.3	19.4	50.0

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Conducted Emissions (Line 2)

NFC MODE TERM L1

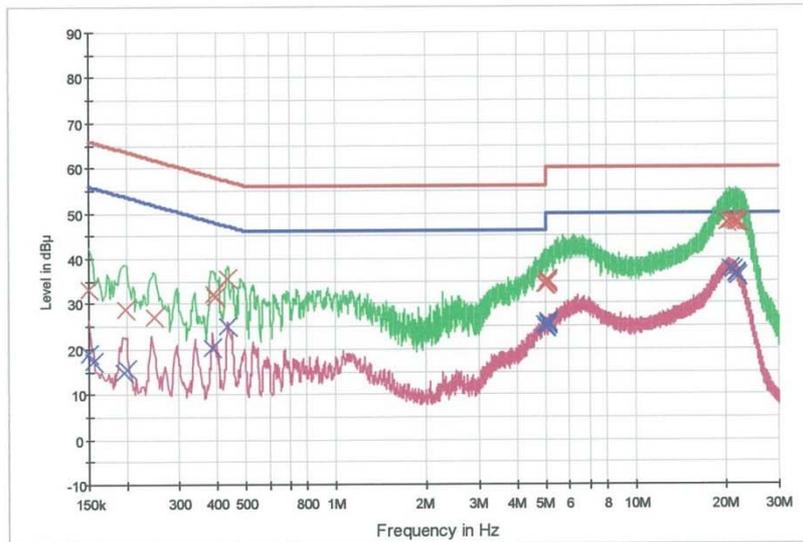
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HCT TEST Report

Common Information

EUT: DM-02H
 Manufacturer: LG
 Test Site: SHIELD ROOM
 Operating Conditions: NFC MODE_ TERMINATION

FCC CLASS B



— FCC CLASS B_QP — FCC CLASS B_AV — Preview Result 1-PK+
 — Preview Result 2-AVG × Final Result 1-QPK × Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	33.2	9.000	Off	L1	9.7	32.8	66.0
0.198000	28.7	9.000	Off	L1	9.6	35.0	63.7
0.248000	27.2	9.000	Off	L1	9.6	34.6	61.8
0.390000	32.3	9.000	Off	L1	9.7	25.7	58.1
0.396000	31.3	9.000	Off	L1	9.7	26.6	57.9
0.436000	35.5	9.000	Off	L1	9.7	21.6	57.1
4.952000	34.1	9.000	Off	L1	9.9	21.9	56.0
4.964000	34.2	9.000	Off	L1	9.9	21.8	56.0
5.020000	34.3	9.000	Off	L1	9.9	25.7	60.0
5.052000	34.4	9.000	Off	L1	9.9	25.6	60.0
5.074000	35.3	9.000	Off	L1	9.9	24.7	60.0
5.098000	34.9	9.000	Off	L1	9.9	25.1	60.0
20.198000	47.8	9.000	Off	L1	10.3	12.2	60.0
20.746000	48.2	9.000	Off	L1	10.3	11.8	60.0
21.106000	48.3	9.000	Off	L1	10.3	11.7	60.0
21.560000	48.0	9.000	Off	L1	10.3	12.0	60.0
21.622000	48.2	9.000	Off	L1	10.3	11.8	60.0
22.176000	47.9	9.000	Off	L1	10.3	12.1	60.0

Final Result 2

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NFC MODE TERM L1

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Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	18.8	9.000	Off	L1	9.7	37.2	56.0
0.156000	17.1	9.000	Off	L1	9.6	38.6	55.7
0.196000	14.9	9.000	Off	L1	9.6	38.8	53.8
0.200000	15.5	9.000	Off	L1	9.6	38.1	53.6
0.388000	20.3	9.000	Off	L1	9.7	27.8	48.1
0.436000	24.9	9.000	Off	L1	9.7	22.2	47.1
4.952000	25.3	9.000	Off	L1	9.9	20.7	46.0
5.002000	24.8	9.000	Off	L1	9.9	25.2	50.0
5.024000	25.0	9.000	Off	L1	9.9	25.0	50.0
5.052000	25.3	9.000	Off	L1	9.9	24.7	50.0
5.078000	25.9	9.000	Off	L1	9.9	24.1	50.0
5.100000	25.7	9.000	Off	L1	9.9	24.3	50.0
20.688000	37.8	9.000	Off	L1	10.3	12.2	50.0
20.746000	37.7	9.000	Off	L1	10.3	12.3	50.0
21.106000	37.3	9.000	Off	L1	10.3	12.7	50.0
21.560000	36.6	9.000	Off	L1	10.3	13.4	50.0
21.622000	36.4	9.000	Off	L1	10.3	13.6	50.0
21.944000	35.8	9.000	Off	L1	10.3	14.2	50.0

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13. LIST OF TEST EQUIPMENT

13.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216/ LISN	12/28/2015	Annual	100073
Rohde & Schwarz	ESCI / TEST RECEIVER	12/28/2015	Annual	100584
Agilent	E4440A/ Spectrum Analyzer	03/18/2015	Annual	US45303008
Agilent	N9020A / SIGNAL ANALYZER	06/30/2015	Annual	MY51110085
Agilent	N9030A / SIGNAL ANALYZER	11/24/2015	Annual	MY49431210
Agilent	N1911A/Power Meter	07/09/2015	Annual	MY45100523
Agilent	N1921A /Power Sensor	03/11/2016	Annual	MY52260025
Agilent	87300B/Directional Coupler	11/30/2015	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/15/2015	Annual	5001
Hewlett Packard	E3632A / DC POWER SUPPLY	03/09/2016	Annual	KR75303962
Agilent	8493C / Attenuator(10 dB)	07/23/2015	Annual	07560
ESPAC.	SH-642 / Temp & Humidity Chamber	07/23/2015	Annual	93000717

13.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Schwarzbeck	VULB 9160/ TRILOG Antenna	10/10/2014	Biennial	3368
Audix	AM4000 / Antenna Position Tower	N/A	N/A	N/A
Audix	Turn Table	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
CERNEX	CBL18265035 / POWER AMP	07/27/2015	Annual	22966
Schwarzbeck	BBHA 9120D/ Horn Antenna	05/07/2015	Biennial	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	09/03/2015	Biennial	BBHA9170541
Rohde & Schwarz	FSP / Spectrum Analyzer	09/24/2015	Annual	100688
Rohde & Schwarz	LOOP ANTENNA	02/23/2016	Biennial	1513-175
CERNEX	CBLU1183540 / POWER AMP	07/21/2015	Annual	22964
CERNEX	CBL06185030 / POWER AMP	07/21/2015	Annual	22965