



FCC/IC Test Report

FOR:

Honeywell International Inc

Model: 70eL00

Product Description: Dolphin 70e Black Enterprise Digital Assistant (EDA)

FCC ID: HD570EL00

IC ID: 1693B-70E3

47 CFR Part 15. 407 (NII), 5GHz WLAN (UNII)

IC RSS-210 Issue 8, Annex 9 ((LE-LAN)

TEST REPORT #: EMC_HONEY_095_12003_70eL00_UNII
DATE: 2013-05-28



CTIA Authorized Test Lab
LAB CODE 20020328-00

**FCC:
Accredited**

**IC recognized #
3462B-1**

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1 Assessment

The following equipment (and as identified in Ch.3 of this test report) was evaluated against the applicable criteria specified in FCC CFR47 Part 15.407, 15.207, 15.209 and Industry Canada Standards RSS-210 Issue 8, Annex 9.

No deviations were ascertained during the course of the tests performed.

| Company | Description | Model # |
|-----------------------------|--|---------|
| Honeywell International Inc | Dolphin 70E Black Enterprise Digital Assistant (EDA) | 70eL00 |

Responsible for Testing Laboratory:

| 2013-05-28 | Compliance | Franz Engert (Acting Lab Manager) |
|------------|------------|--------------------------------------|
| Date | Section | Name |

Responsible for the Report:

| 2013-05-28 | Compliance | Tunji Yusuf (EMC Engineer) |
|------------|------------|-------------------------------|
| Date | Section | Name |

The test results of this test report relate exclusively to the test item specified in Section3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc USA.

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2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

| | |
|------------------------------------|--|
| Company Name: | CETECOM Inc. |
| Department: | Compliance |
| Address: | 411 Dixon Landing Road Milpitas, CA 95035 U.S.A. |
| Telephone: | +1 (408) 586 6200 |
| Fax: | +1 (408) 586 6299 |
| Acting Lab Manager: | Franz Engert |
| Responsible Project Leader: | Tunji Yusuf |

2.2 Identification of the Client

| | |
|--------------------------|---------------------------------|
| Applicant's Name: | Honeywell International Inc |
| Street Address: | 700 Visions Drive |
| City/Zip Code | Skaneateles Falls, NY 13153 |
| Country | USA |
| Contact Person: | Michael Robinson |
| Phone No. | +1 (315) 554 6387 |
| Fax: | +1 (315) 554 6393 |
| e-mail: | michael.robinson3@honeywell.com |

2.3 Identification of the Manufacturer

| | |
|-------------------------------|-----------------|
| Manufacturer's Name: | Same as client. |
| Manufacturers Address: | |
| City/Zip Code | |
| Country | |

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

| | |
|---|--|
| Marketing Name: | Dolphin 70e Black |
| Model Number: | 70eL00 |
| FCC-ID : | HD570EL00 |
| IC ID: | 1693B-70E3 |
| Product Description: | Dolphin 70e Black Enterprise Digital Assistant (EDA) |
| Technology / Type(s) of Modulation: | 5 GHz 802.11 a/n: BPSK, QPSK, 16QAM, 64QAM |
| Modes of Operation | Client; Per manufacturer documentation and attestation the device is a client device and does not support active scanning or adhoc modes in DFS bands (only passive beacon scanning is possible) TCP is supported; (though not required when mean EIRP < 27 dBm) |
| Channel Bandwidths | HT20 |
| Operating Frequency Ranges (MHz) / Channels: | Nominal bands: 5150 – 5250 (band 1), 5250 – 5350 (band 2), 5470 – 5725 (band 3), [(5.725 - 5.825 (band 4) tested under 15.247]; Center to center with HT20: 5180(ch 36) – 5240(ch 48), 5260(ch 52) – 5320(ch 64), 5500(ch 100) – 5700(ch 140), 16 channels in total; |
| Antenna info: | Internal PIFA; 1 transmit & 1 receive chain, no beam forming; Documented maximum antenna gain (5GHz): 3.1dBi |
| Max. Output Powers: | Conducted (Measured) 802.11 a/n: 13.63 dBm (0.023 W) Radiated –EIRP (Calculated with documented antenna gain) 802.11 a/n: 16.73 dBm (0.047 W) |
| Rated Operating Voltage Range: | Vmin: 3.3V/ Vnom: 3.6V/ Vmax: 4.3V |
| Rated Operating Temperature Range: | Tmin: -30°C/ Tmax: 70°C |
| Test Sample Status: | Prototype |

| | |
|---|--|
| Other Radios included in the device: | <ol style="list-style-type: none"> 1. Sierra Wireless SL9090 Radio Module <ul style="list-style-type: none"> • 850/900/1800/1900MHz GSM power class 4/1 GPRS Class B, Multislot 10 operation EDGE Multislot class 12 operation • 850/1900/2100 Mhz WCDMA / HSPA+ HSDPA Category 10 data rate - 14.4 Mbps HSUPA Category 6 data rate - 5.76 Mbps • 800/1900 Mhz CDMA 1xRTT / EV-D0 CDMA EVDO Rev A data rate - 3.1 Mbps 2. BT 2.1+ EDR Murata LBEH5Z9UWC module 2.4 GHz band of operation 3. GPS 1575.42 MHz 4. NFC (NXP PN65N Module; 13.56 MHz) |
|---|--|

3.2 Identification of the Equipment Under Test (EUT)

| EUT # | Serial Number | Sample | HW/SW Version | Notes |
|-------|---------------|----------|-------------------|-------|
| 1 | 12357J0086 | Radiated | DVT 1.5-WiFi/40.0 | - |

3.3 Identification of Accessory equipment

| STE # | Type | Manufacturer | Model | Serial Number |
|-------|---------------------------|--------------|--------------|---------------|
| 1 | AC Switching Power Supply | PHIHONG | PSAI05R-050Q | P112103004A1 |

3.4 Environmental conditions during Test:

The following environmental conditions were maintained during the course of testing:

Ambient Temperature: 20-25°C

Relative humidity: 40-60%

3.5 Dates of Testing:

01/08/2013 – 03/01/2013

3.6 Other Testing Notes:

The device was configured with a manufacturer provided test SW, capable of setting the unit in different supported modulation schemes, data rates and channels of operation.

The device was set to continuous framed tx (burst) mode per test SW and could thus be operated with 100% duty cycle during testing.

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The EUT was tested on the low, mid and high channels of the tested frequency bands (5GHz sub-bands 1, 2 and 3).

In the 5150-5250 MHz band

| Mode | Data Rate |
|----------------|------------------|
| 802.11a | 6M |
| 802.11n | 6.5M |

In the 5250-5350 MHz and 5470-5725 MHz bands,

| Mode | Data Rate |
|----------------|------------------|
| 802.11a | 6M |
| 802.11n | 6.5M |

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4 Subject of Investigation

The objective of the measurements applied by CETECOM Inc. was to establish compliance of the EUT as described under Ch. 3 of this Test Report, with the applicable criteria specified in

- FCC CFR47 Parts 15.407
- IC RSS-210 Issue 8

This test report is to support a request for new equipment authorization under the

FCC ID: HD570EL00 and IC ID: 1693B-70E3.

4.1 Summary of Measurement Results

| Test Specification | Test Case | Temperature and Voltage Conditions | Mode | Pass | Fail | NA | NP | Result |
|-------------------------------------|--------------------------------------|------------------------------------|-----------|--------------------------|--------------------------|--------------------------|--------------------------|------------|
| §15.407 (a)(1) RSS210 A9.2 | Power Spectral Density | Nominal | 802.11a/n | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 1 |
| N/A | Spectrum Bandwidth | Nominal | 802.11a/n | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 1 |
| §15.407 (a)(1) RSS210 A9.2 | Maximum Output Power | Nominal | 802.11a/n | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 1 |
| §15.407 (a)(6) | Peak Excursion | Nominal | 802.11a/n | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 1 |
| §15.407 (b)(1)(2)(3) RSS210 A9.3 | TX Spurious emissions- Conducted | Nominal | 802.11a/n | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 1 |
| §15.205 (a)(c) | Restricted Band Edge- Radiated | Nominal | 802.11a/n | ■ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Complies |
| §15.407 (b)(1)(2)(3) RSS210 A9.3 | TX Spurious emissions- Radiated | Nominal | 802.11a/n | ■ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Complies |
| §15.209(a) RSS Gen | TX Spurious Emissions Radiated<30MHz | Nominal | 802.11a/n | ■ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Complies |
| §15.207(a) RSS GEN 7.2.2 | Conducted Emissions <30MHz | Nominal | 802.11a/n | ■ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Complies |
| 15.407 (h) RSS-210 A9.4 | DFS | Nominal | 802.11a/n | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | See Note 2 |

Note: NA= Not Applicable; NP= Not Performed.

1. Measurement results leveraged from variant model 70eLGN and as available in Test report #EMC_HONEY_095_12003_70eLGN_UNII issued by CETECOM Inc. on 05/22/2013; and as listed on the FCC database under FCC ID: HD570ELGN.
2. Refer test report #EMC_HONEY_095_12003_70e_DFS issued by CETECOM Inc on 5/22/2013 and as available in FCC database under FCC ID: HD570ELGN.

5 Measurements

5.1 Radiated Measurement Procedure

5.2 Measurement Method:

All radiated and conducted testing is performed according to guidelines in FCC publication KDB789033 Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E, Apr, 2013.

5.3 Radiated Measurement Procedure

ANSI C63.4 (2009) Section 8.3.1.1: Exploratory radiated emission measurements

Exploratory radiated measurements shall be performed at the measurement distance or at a closer distance than that specified for compliance to determine the emission characteristics of the EUT. At near distances, for EUTs of comparably small size, it is relatively easy to determine the spectrum signature of the EUT and, if applicable, the EUT configuration that produces the maximum level of emissions. A shielded room may be used for exploratory testing, but may have anomalies that can lead to significant errors in amplitude measurements.

Broadband antennas and a spectrum analyzer or a radio-noise meter with a panoramic display are often useful in this type of testing. It is recommended that either a headset or loudspeaker be connected as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT when the exploratory and final testing is performed in an OATS with strong ambient signals. Caution should be taken if either antenna height between 1 and 4 meters or EUT azimuth is not fully explored. Not fully exploring these parameters during exploratory testing may require complete testing at the OATS or semi-anechoic chamber when the final full spectrum testing is conducted.

The EUT should be set up in its typical configuration and arrangement, and operated in its various modes. For tabletop systems, cables or wires should be manipulated within the range of likely arrangements. For floor-standing equipment, the cables or wires should be located in the same manner as the user would install them and no further manipulation is made. For combination EUTs, the tabletop and floor-standing portions of the EUT shall follow the procedures for their respective setups and cable manipulation. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions.

For each mode of operation required to be tested, the frequency spectrum shall be monitored. Variations in antenna height between 1 and 4 m, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) shall be explored to produce the emission that has the highest amplitude relative to the limit. A step-by-step technique for determining this emission can be found in Annex C.

When measuring emissions above 1 GHz, the frequencies of maximum emission shall be determined by manually positioning the antenna close to the EUT and by moving the antenna over all sides of the EUT while observing a spectral display. It will be advantageous to have prior knowledge of the frequencies of emissions above 1 GHz. If the EUT is a device with dimensions approximately equal to that of the measurement antenna beam width, the measurement antenna shall be aligned with the EUT.

ANSI C63.4 (2009) Section 8.3.1.2: Final radiated emission measurements

Based on the measurement results in 8.3.1.1, the one EUT, cable and wire arrangement, and mode of operation that produces the emission that has the highest amplitude relative to the limit is selected for the final measurement. The final measurement is then performed on a site meeting the requirements of 5.3, 5.4, or 5.5 as appropriate without variation of the EUT arrangement or EUT mode of operation. If the EUT is relocated from an exploratory test site to a final test site, the highest emission shall be re-maximized at the final test location before final radiated emissions measurements are performed. However, antenna height and polarity and EUT azimuth are to be varied. In addition, the full frequency spectrum (for the range to be checked for meeting compliance) shall be investigated.

This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. During the full frequency spectrum investigation, particular focus should be made on those frequencies found in exploratory testing that were used to find the final test configuration, mode of operation, and arrangement (associated with achieving the least margin with respect to the limit). This full spectrum test constitutes the compliance measurement.

For measurements above 1 GHz, use the cable, EUT arrangement, and mode of operation determined in the exploratory testing to produce the emission that has the highest amplitude relative to the limit. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the antenna in the “cone of radiation” from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response. The antenna may have to be higher or lower than the EUT, depending on the EUT’s size and mounting height, but the antenna should be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. If the transmission line for the measurement antenna restricts its range of height and polarization, the steps needed to ensure the correct measurement of the maximum emissions, shall be described in detail in the report of measurements. Data collected shall satisfy the report requirements of Clause 10.

NOTES

1—Where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

2—Use of waveguide and flexible waveguide may be necessary at frequencies above 10 GHz to achieve usable signal-to noise ratios at required measurement distances. If so, it may be necessary to restrict the height search of the antenna, and special care should be taken to ensure that maximum emissions are correctly measured.

3—All presently known devices causing emissions above 10 GHz are physically small compared with the beam-widths of typical horn antennas used for EMC measurements. For such EUTs and frequencies, it may be preferable to vary the height and polarization of the EUT instead of the receiving antenna to maximize the measured emissions.

Measurement Uncertainty: ±3dB

5.4 Sample Calculations for Radiated Measurements

5.4.1.1 Field Strength Measurements:

Measurements from the Spectrum Analyzer/ Receiver are used to calculate the Field Strength, taking into account the following parameters:

1. Measured reading in $\text{dB}\mu\text{V}$
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

$\text{FS (dB}\mu\text{V/m)} = \text{Measured Value on SA (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$

Eg:

| Frequency (MHz) | Measured SA ($\text{dB}\mu\text{V}$) | Cable Loss (dB) | Antenna Factor Correction (dB) | Field Strength Result ($\text{dB}\mu\text{V/m}$) |
|-----------------|--|-----------------|--------------------------------|--|
| 1000 | 80.5 | 3.5 | 14 | 98.0 |

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the above equation.

5.4.1.2 Power Measurements using Substitution Procedure:

The measurement on the Spectrum Analyzer is used as a basis for the Substitution procedure.

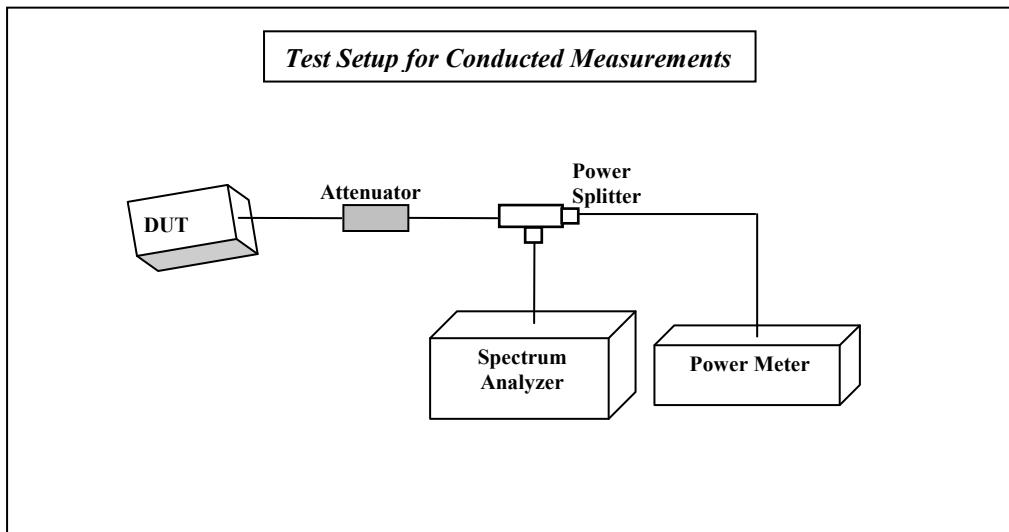
The EUT is replaced with a Signal Generator and an antenna. The setting on the Signal Generator is varied until the Spectrum Analyzer displays the original reading. EIRP is calculated as-

$\text{EIRP (dBm)} = \text{Signal Generator setting (dBm)} - \text{Cable Loss (dB)} + \text{Antenna Gain (dBi)}$

Eg:

| Frequency (MHz) | Measured SA ($\text{dB}\mu\text{V}$) | Signal Generator setting (dBm) | Antenna Gain (dBi) | Dipole Gain (dBd) | Cable Loss (dB) | EIRP (dBm) |
|-----------------|--|--------------------------------|--------------------|-------------------|-----------------|------------|
| 1000 | 95.5 | 24.5 | 6.5 | 0 | 3.5 | 27.5 |

5.5 Conducted Measurement Procedure



1. Connect the equipment as shown in the above diagram.
2. A test SW provided by the manufacturer is used to control the different modulations, data rates and max output power configurations.
3. Measurements are to be performed with the EUT set to the low, middle and high channels for 802.11 a/n modes.

5.6 Unwanted Emissions into Restricted Frequency Bands- Radiated

5.6.1 Limits:

§15.247/15.205/15.209

RSS-210 A8.5

15.247 (d) Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

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

| MHz | MHz | MHz | GHz |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| ¹ 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - 156.52525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2690 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 240 - 285 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 322 - 335.4 | 3600 - 4400 | (²) |
| 13.36 - 13.41 | | | |

15.209 (a) Emission Limits:

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field strength (microvolts/meter) | 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 |

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5.6.2 Test Conditions:

T_{nom}: 20°C; V_{nom}: 3.6 VDC

5.6.3 Test Procedure:

Peak measurements are made using a peak detector and RBW=1MHz.

*PEAK LIMIT= 74dB μ V/m

Average measurements performed using a peak detector and according to video averaging procedure with RBW=1MHz and VBW=10Hz.

*AVG. LIMIT= 54dB μ V/m

Measurement Uncertainty: ± 3.0 dB

5.6.3.1 Measurement Result

Pass.

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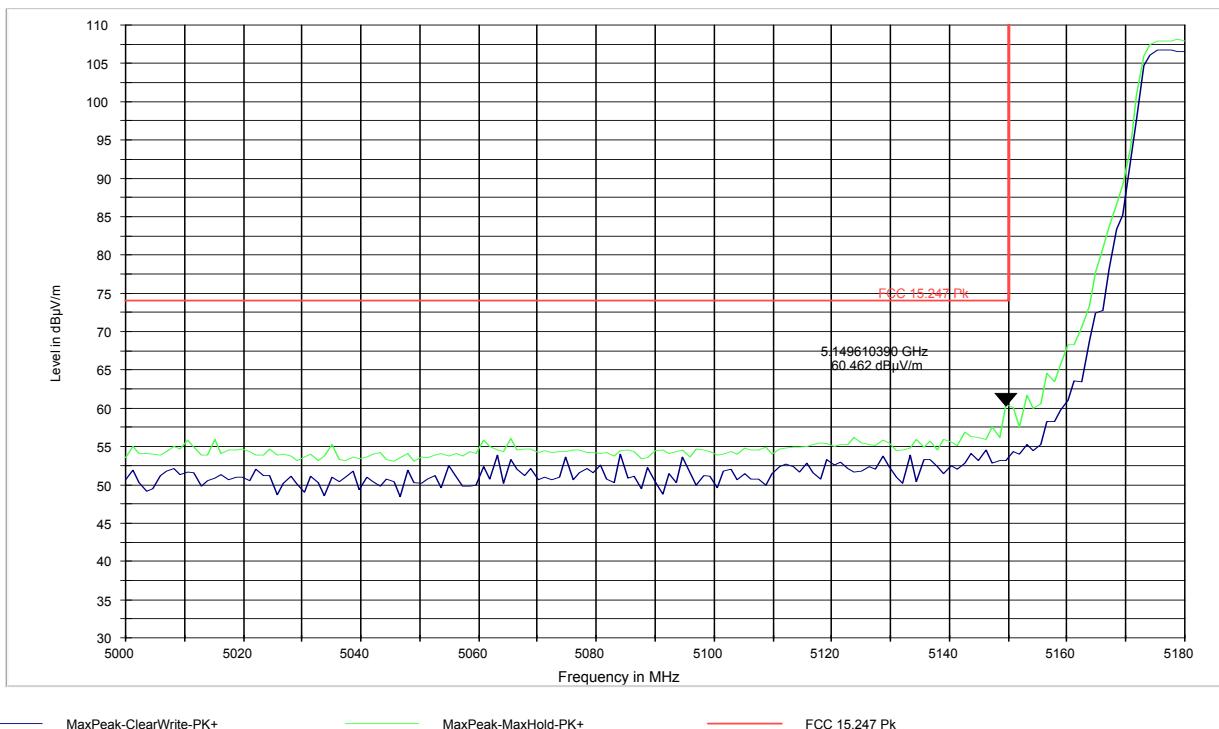
Date of Report: 2013-05-28

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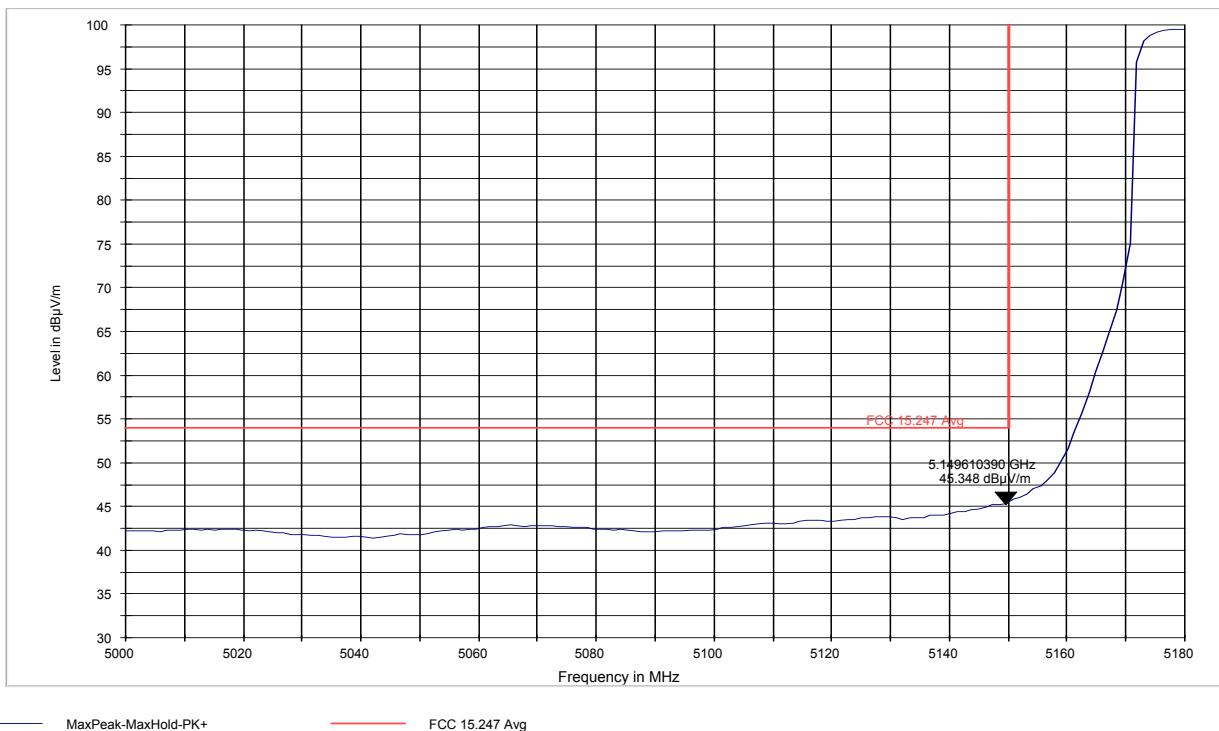
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5.6.4 Test Data/plots:

802.11a Channel 36 Low Band Edge Peak measurement



802.11a Channel 36 Low Band Edge Average measurement



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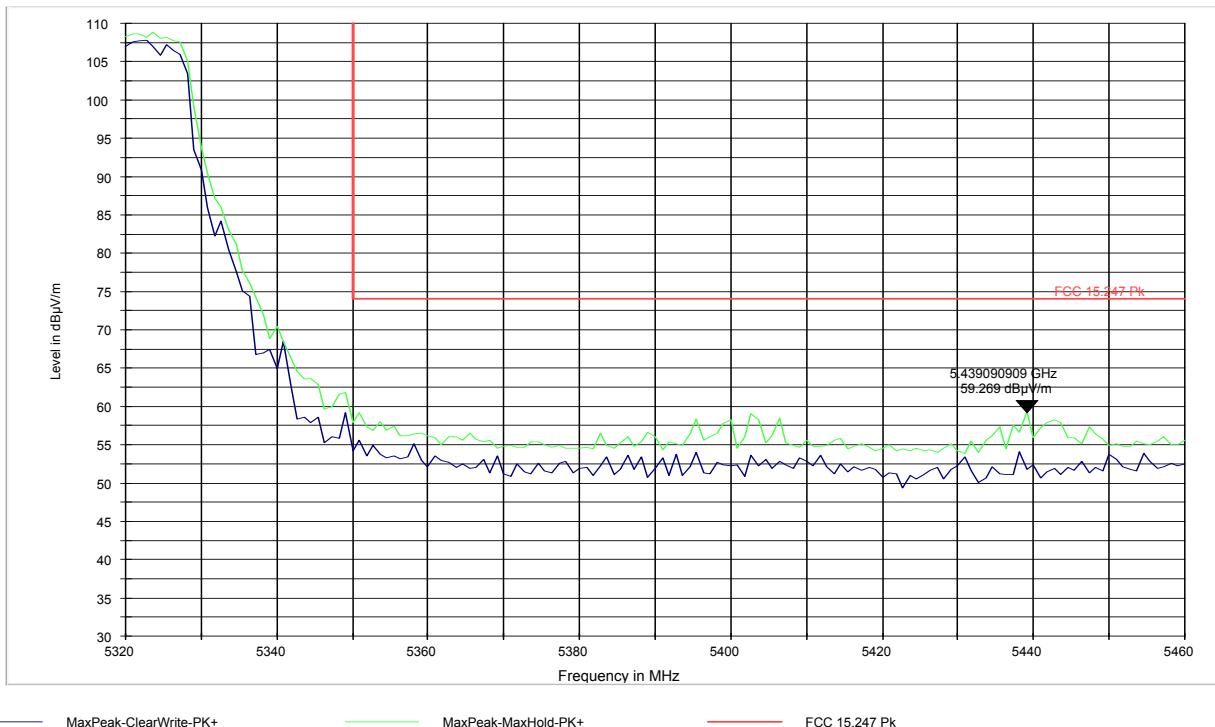
FCC ID: HD570EL00

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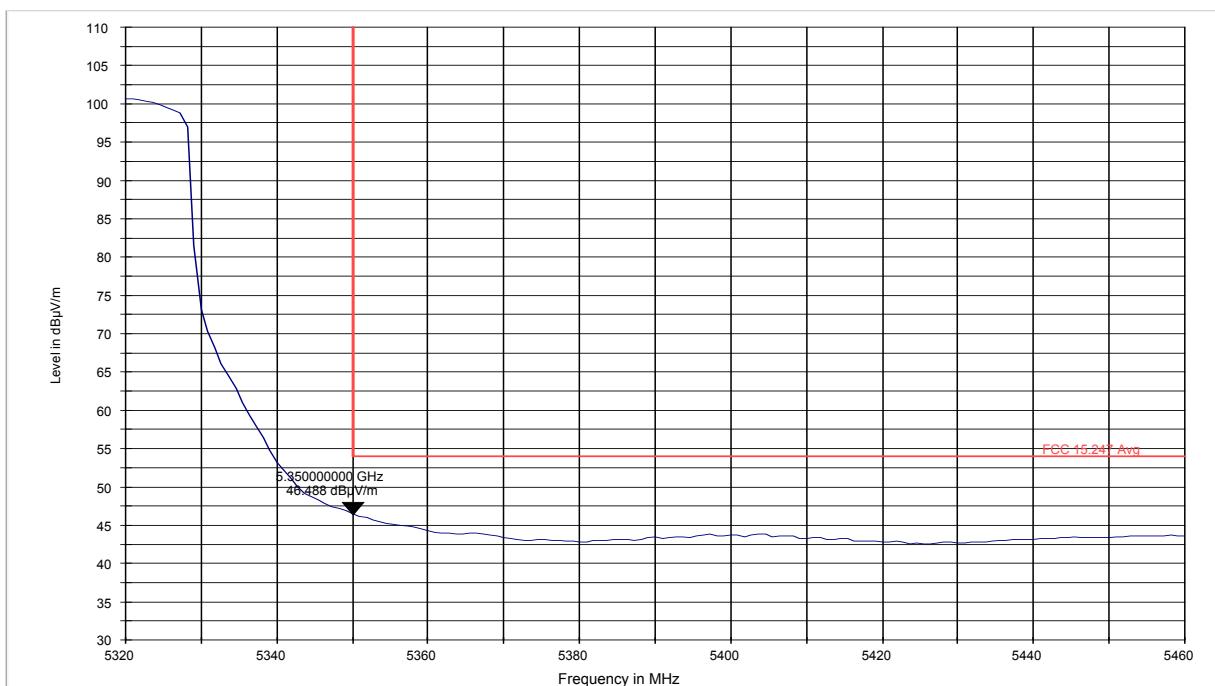
IC ID: 1693B-70E3

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802.11a Channel 64 High Band Edge Peak measurement



802.11a Channel 64 High Band Edge Average measurement



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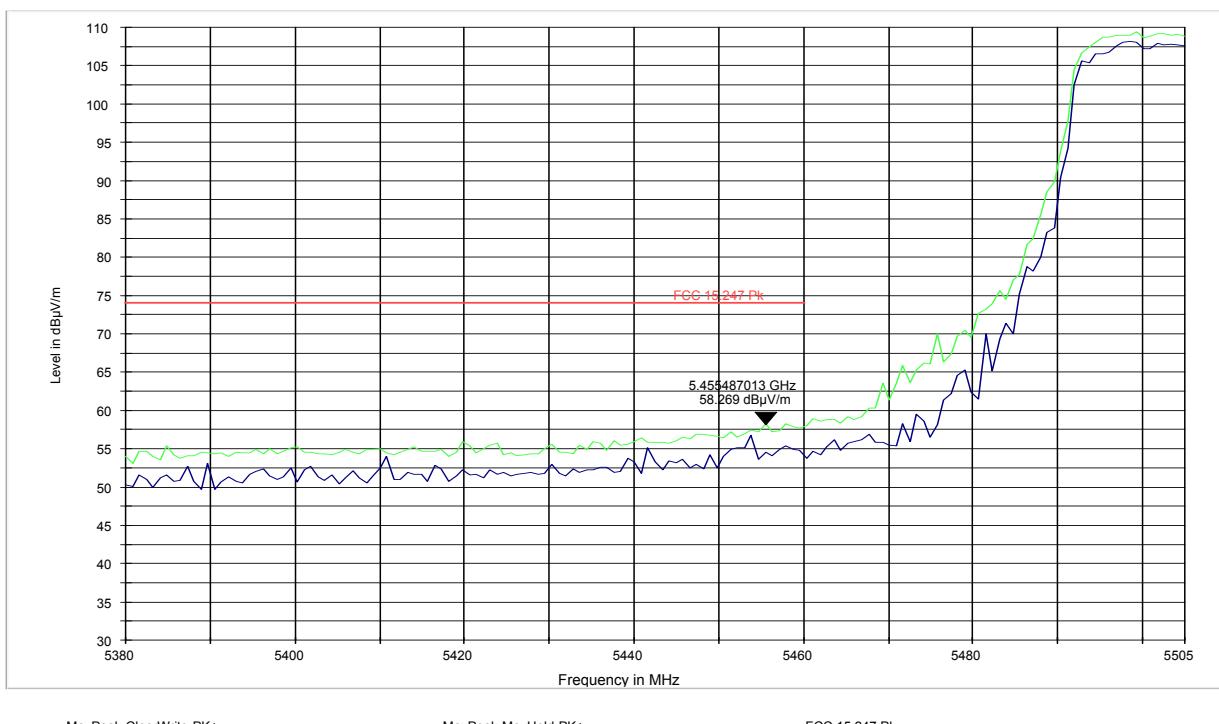
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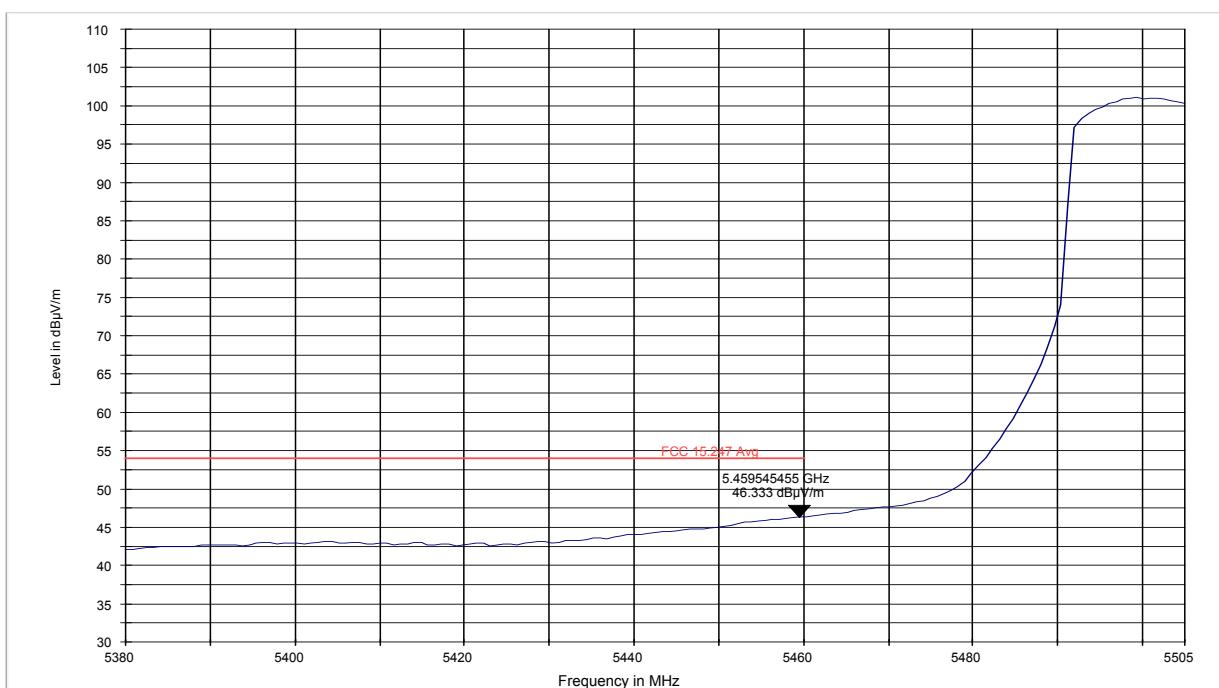
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802.11a Channel 100 Low Band Edge Peak measurement



802.11a Channel 100 Low Band Edge Average measurement



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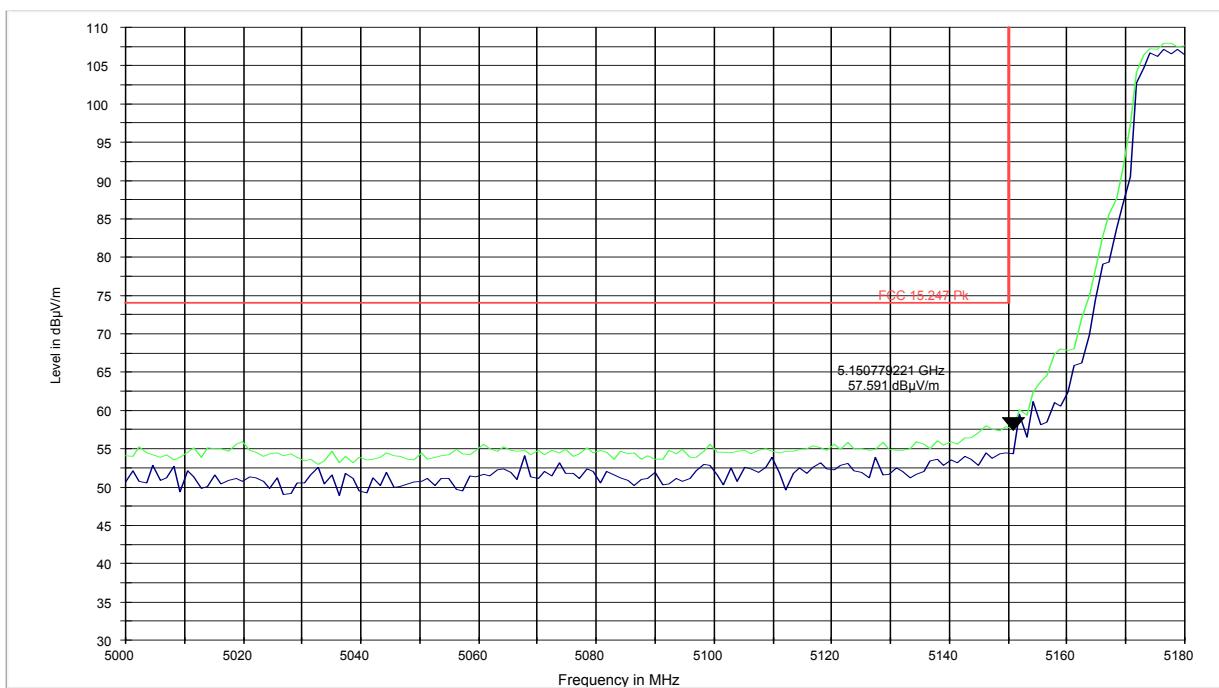
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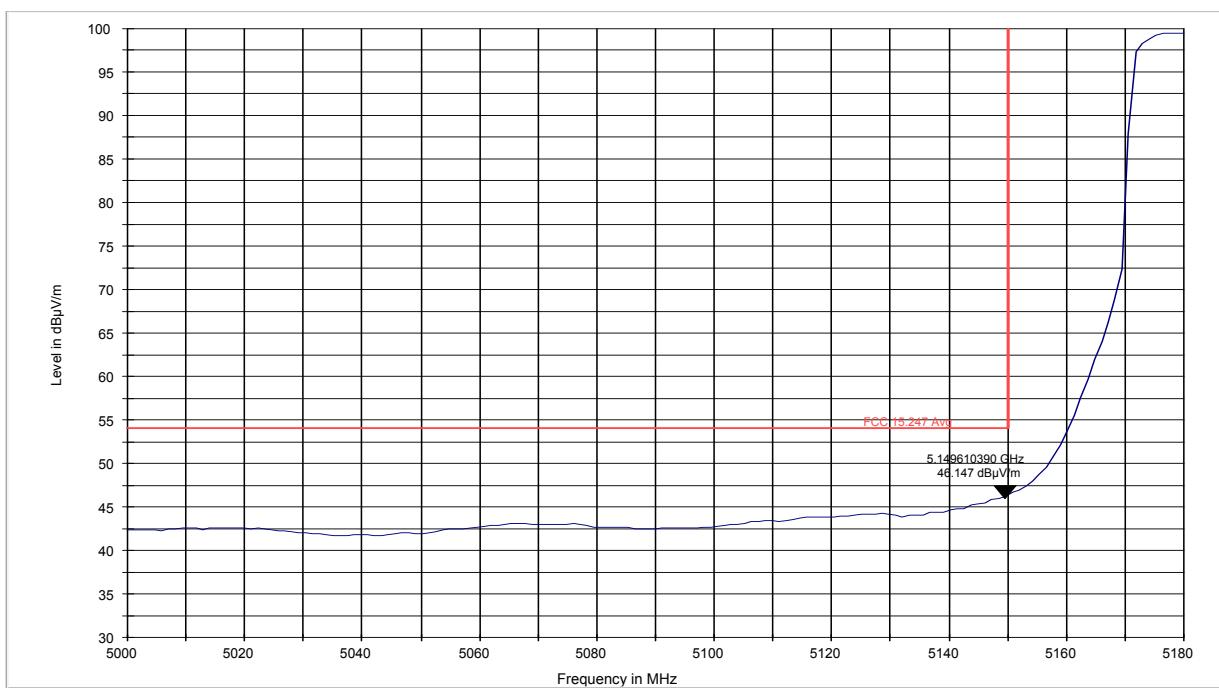
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802.11n Channel 36 Low Band Edge Peak measurement



802.11n Channel 36 Low Band Edge Average measurement



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

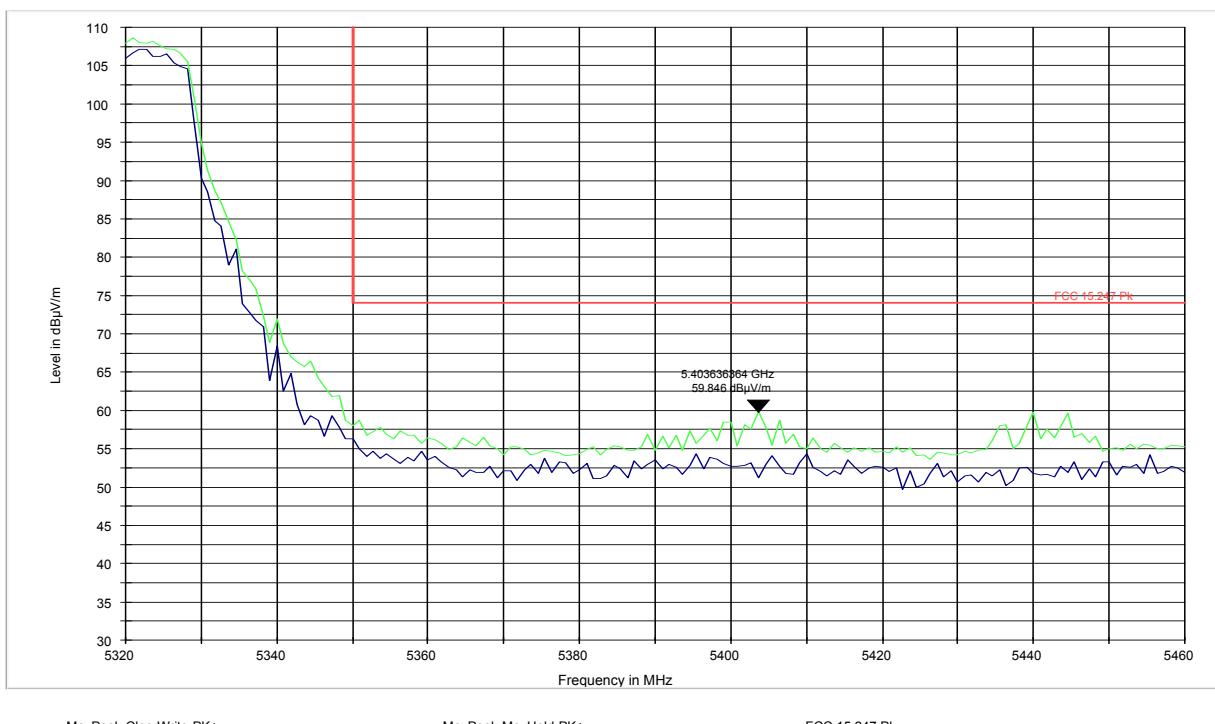
FCC ID: HD570EL00

Date of Report: 2013-05-28

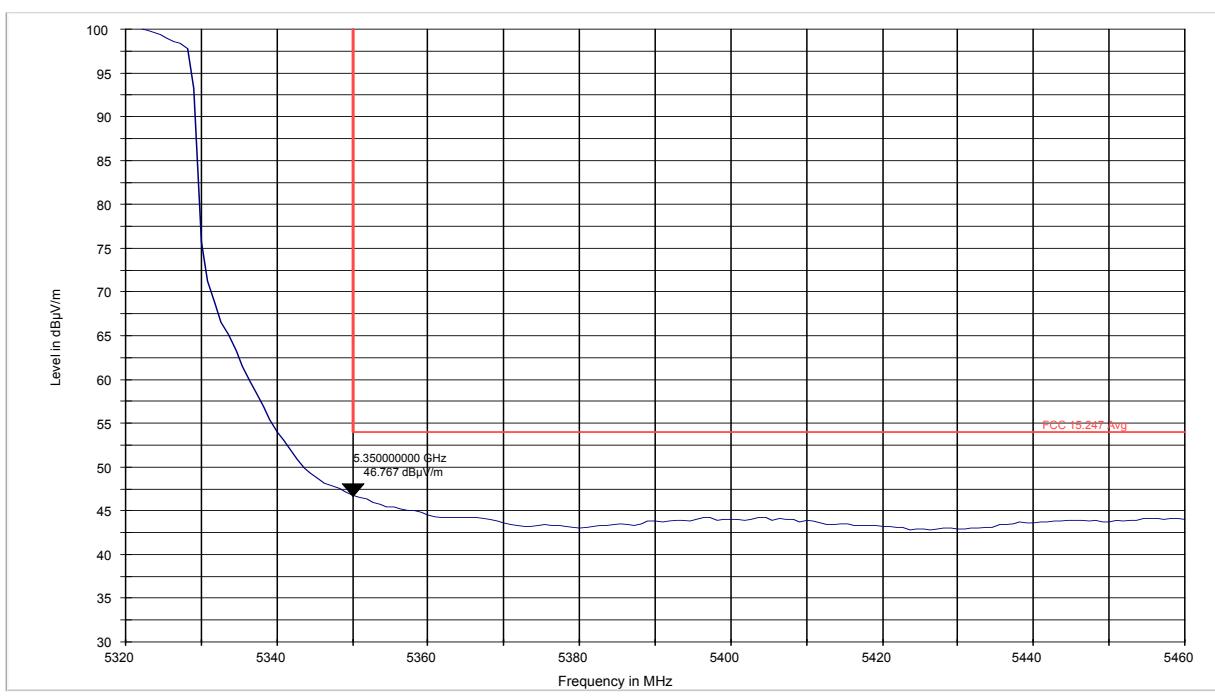
IC ID: 1693B-70E3

CETECOM

802.11n Channel 64 High Band Edge Peak measurement



802.11n Channel 64 High Band Edge Average measurement



MaxPeak-MaxHold-PK+

FCC 15.247 Avg

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

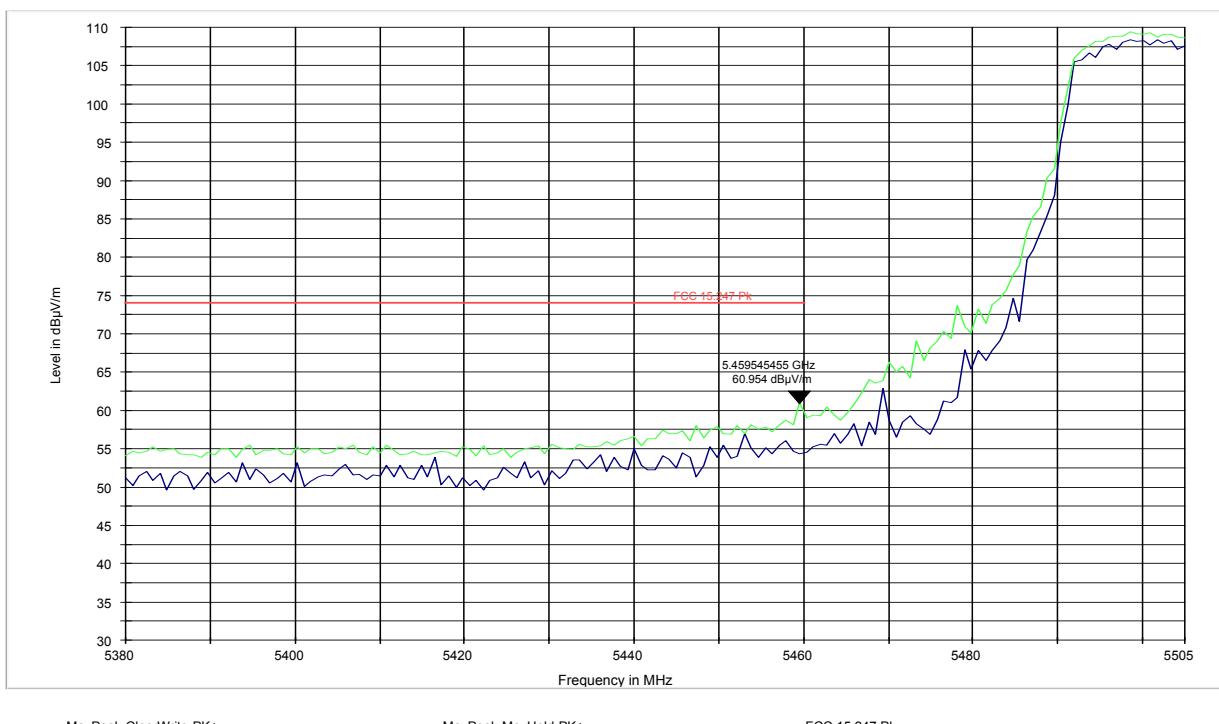
FCC ID: HD570EL00

Date of Report: 2013-05-28

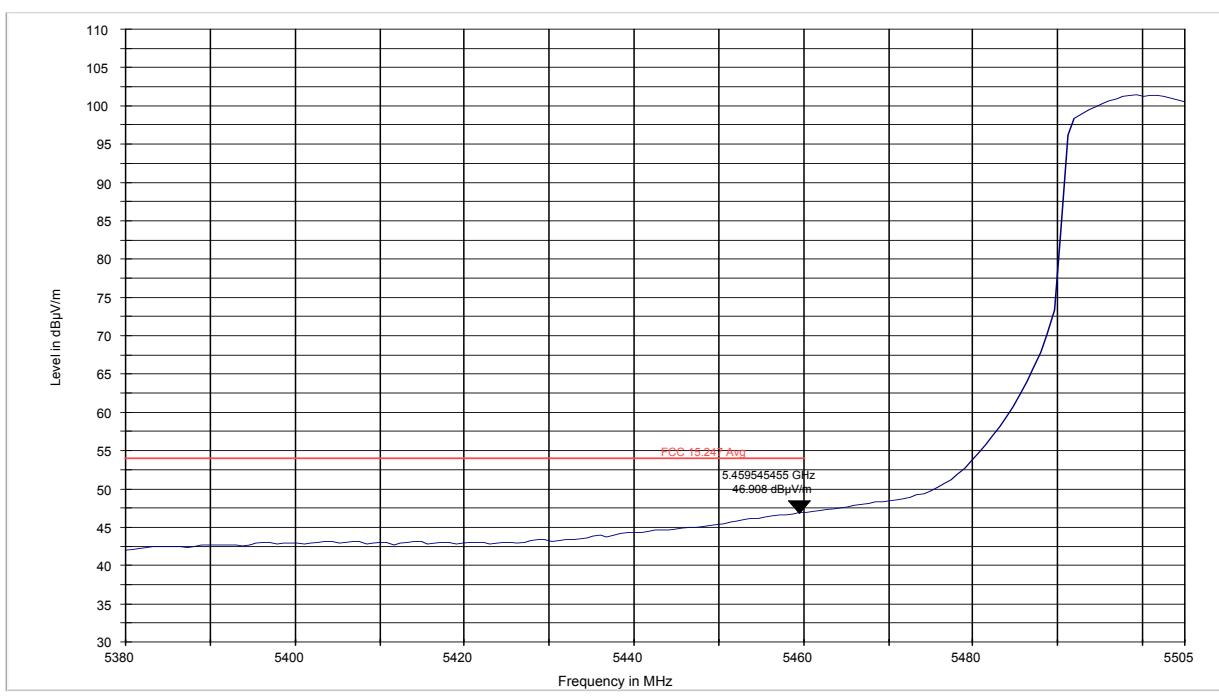
IC ID: 1693B-70E3

CETECOM

802.11n Channel 100 Low Band Edge Peak measurement



802.11n Channel 100 Low Band Edge Average measurement



5.7 Transmitter Spurious Emissions- Radiated

5.7.1 Limits: §15.407

(b) Undesirable emission limits: Except as shown in paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz.

(2) For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz. Devices operating in the 5.25–5.35 GHz band that generate emissions in the 5.15–5.25 GHz band must meet all applicable technical requirements for operation in the 5.15–5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of –27 dBm/MHz in the 5.15–5.25 GHz band.

(3) For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of –27 dBm/MHz.

(4) For transmitters operating in the 5.725–5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of –17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of –27 dBm/MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

5.7.2 Limits: §15.209

(For measurement distance of 3m)

| Frequency of emission (MHz) | Field strength (μ V/m) |
|-----------------------------|-----------------------------|
| 30–88 | 100 (40 dB μ V/m) |
| 88–216 | 150 (43.5 dB μ V/m) |
| 216–960 | 200 (46 dB μ V/m) |
| Above 960 | 500 (54 dB μ V/m) |

NOTE: The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels.

2. All measurements are done in Peak mode using an Average limit, unless specified within the plots.

5.7.3 Limits: §15.209

| Frequency of emission (MHz) | Field strength (μ V/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 |

Note: Measurements done with antenna factors scaled to 3m measurement distance.

5.7.4 Test Conditions:

T_{nom}: 20°C; V_{nom}: 3.6 VDC

Measurement distance: 3m.

5.7.5 Test Result:

Plots reported here represent the worst case emissions for horizontal and vertical antenna polarizations and for three orientations of the EUT.

Unless mentioned otherwise, the emissions outside the limit lines in the plots are from the transmit signal.

Low/Mid/High channels in each sub-band of operation were tested and results reported for both 802.11a and n modes of operation.

Only worst case mid channel test results reported for 9k-1GHz and >18 GHz ranges of test.

Measurement Uncertainty: $\pm 3.0\text{dB}$

5.7.6 Testing Notes:

For the measurement range up to 30 MHz in the following plots the field strength results from 3m distance measurement are extrapolated to 300m and 30m distance respectively, by 40dB/decade, according to part 15.31(f)(2), per antenna factor scaling. The red limit line shows the 300 m limit up to 490 kHz, the 30m limit up to 30 MHz and 3m limit above 30MHz.

5.7.6.1 Measurement Verdict

Pass.

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

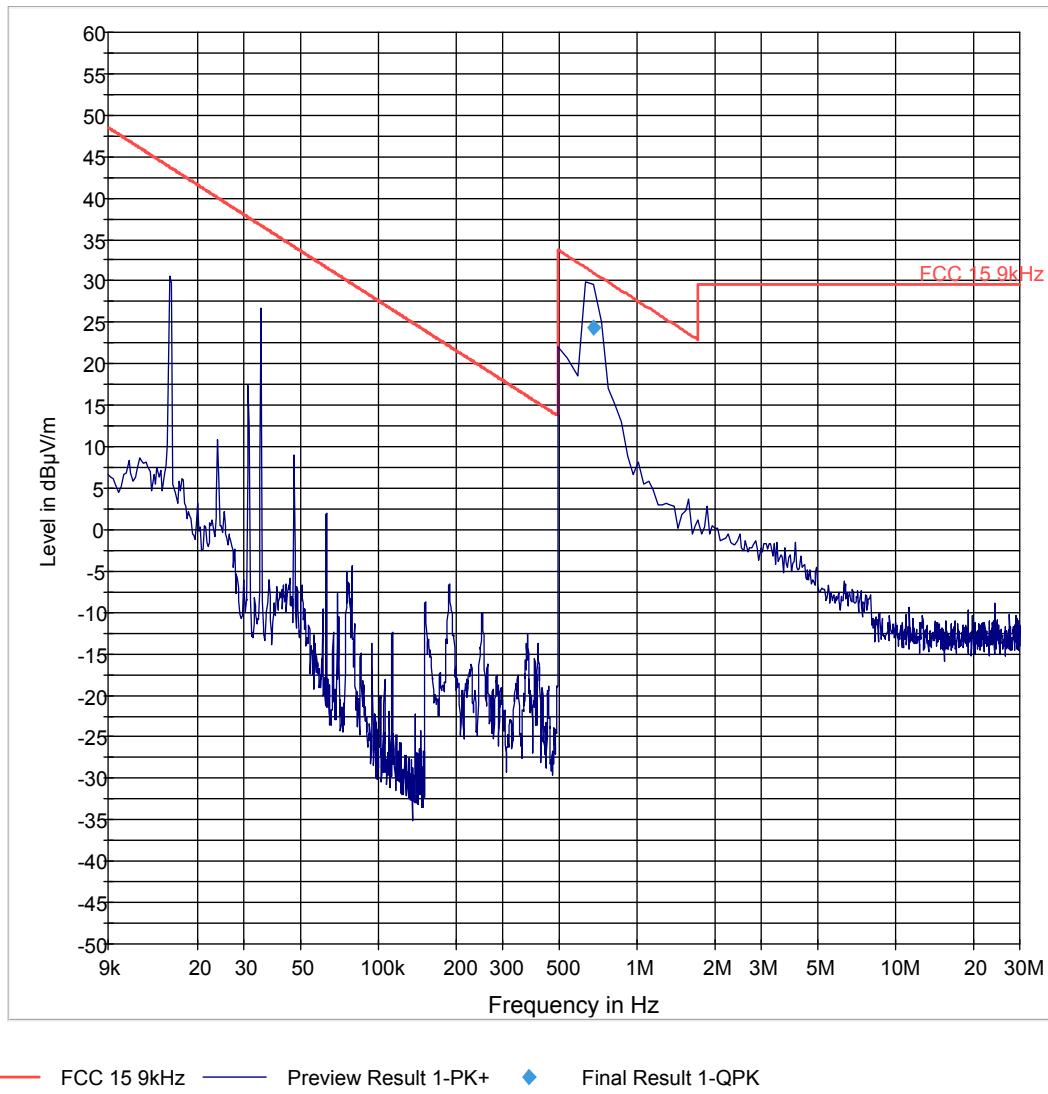
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

**5.7.7 Test data/ plots:
9kHz-30MHz mode: 802.11 a Ch40; Band 1**



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

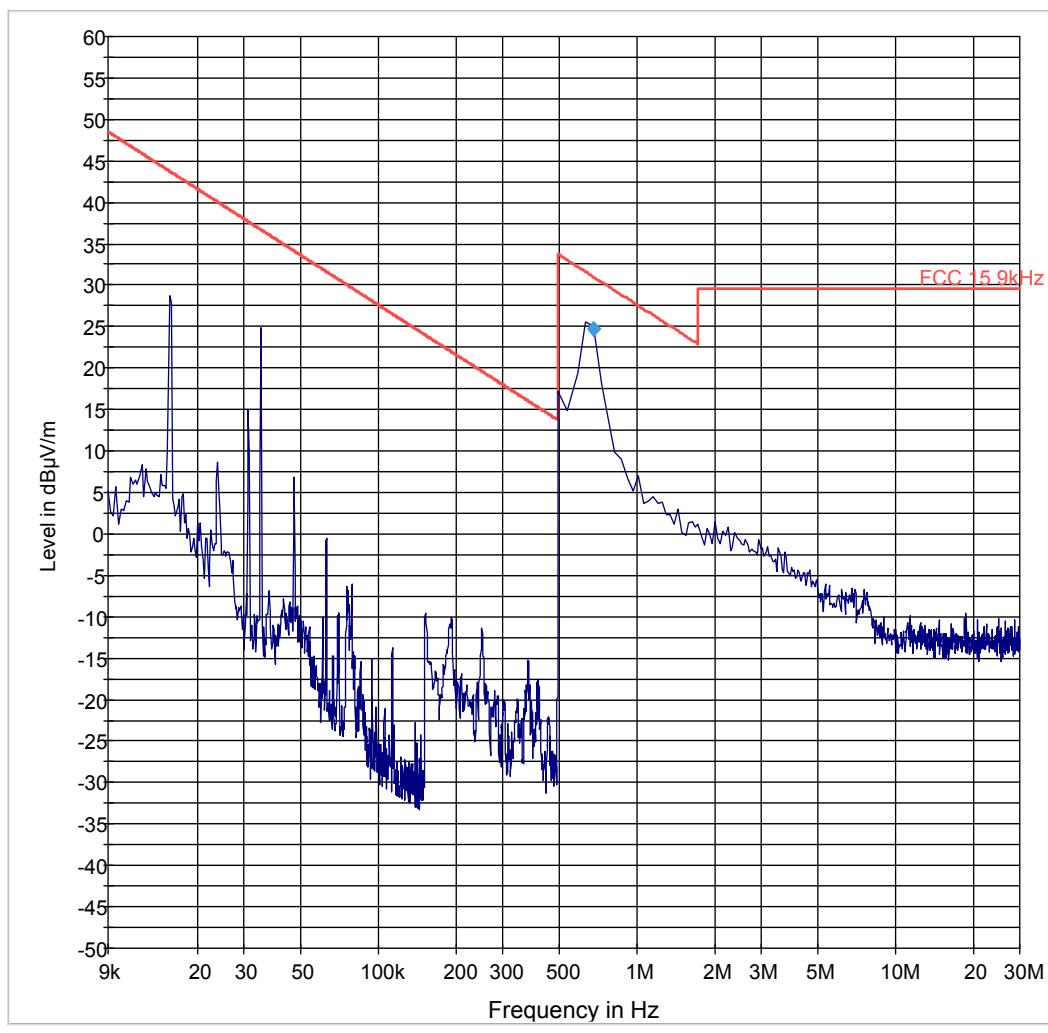
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

9kHz-30MHz mode: 802.11 a Ch60; Band 2



— FCC 15.9kHz — Preview Result 1-PK+ ◆ Final Result 1-QPK

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

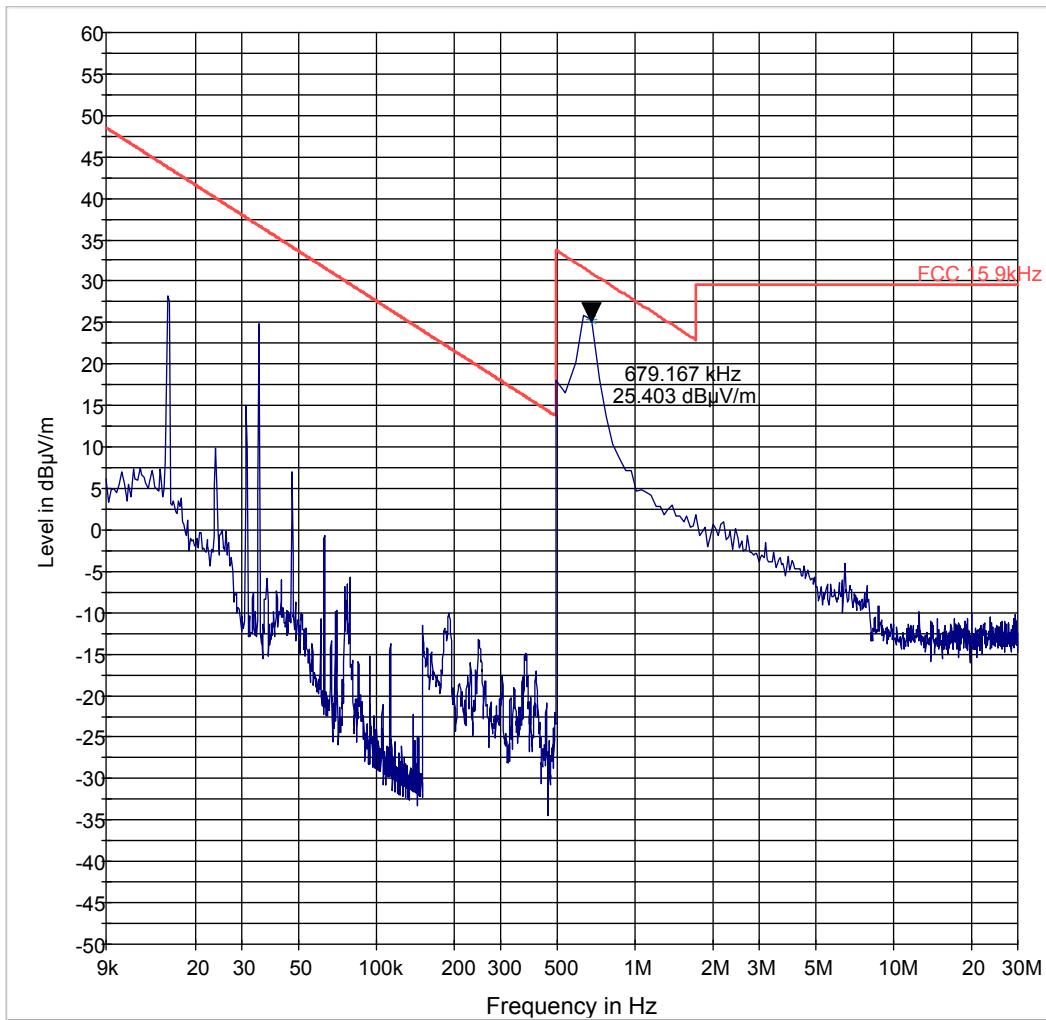
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

9kHz-30MHz mode: 802.11 a Ch120; Band 3



— FCC 15 9kHz — Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

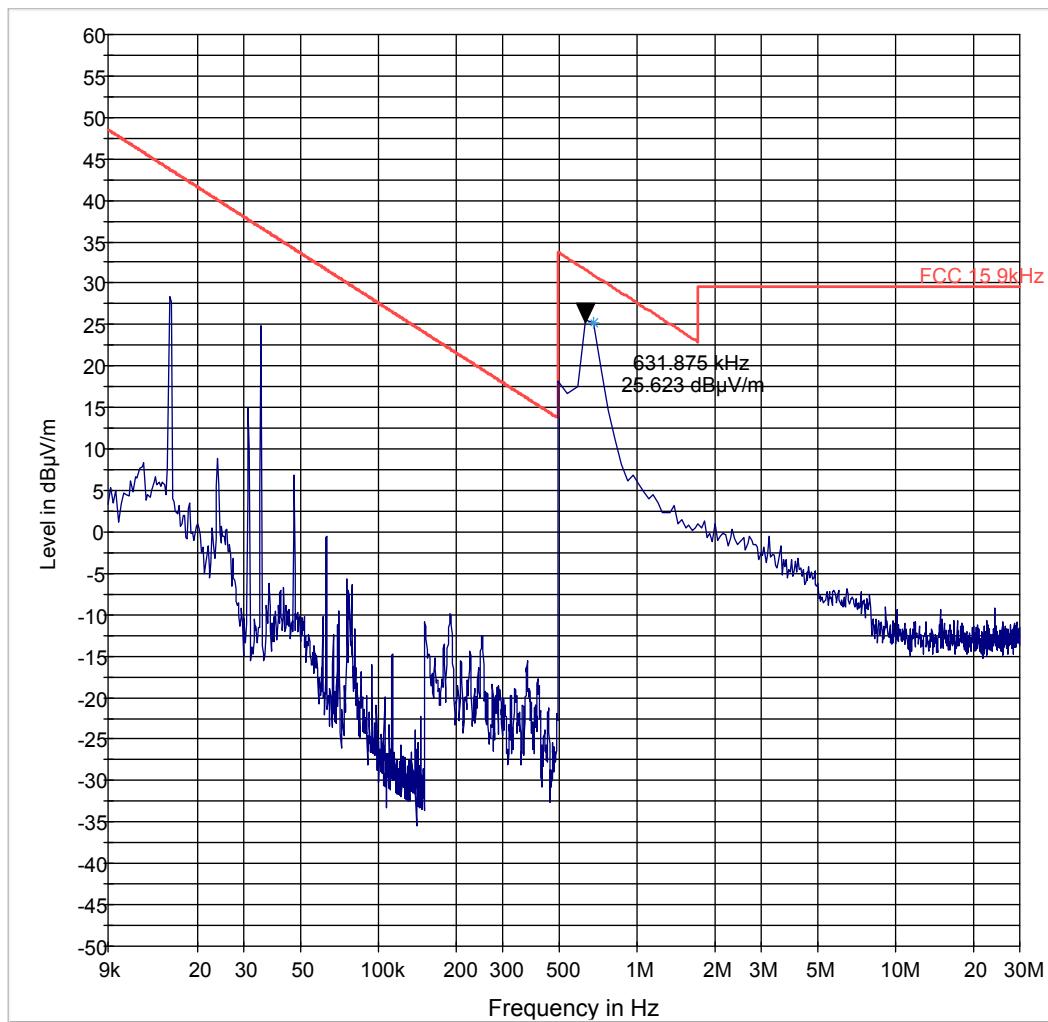
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

9kHz-30MHz mode: 802.11 n Ch40; Band 1



— FCC 15 9kHz — Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

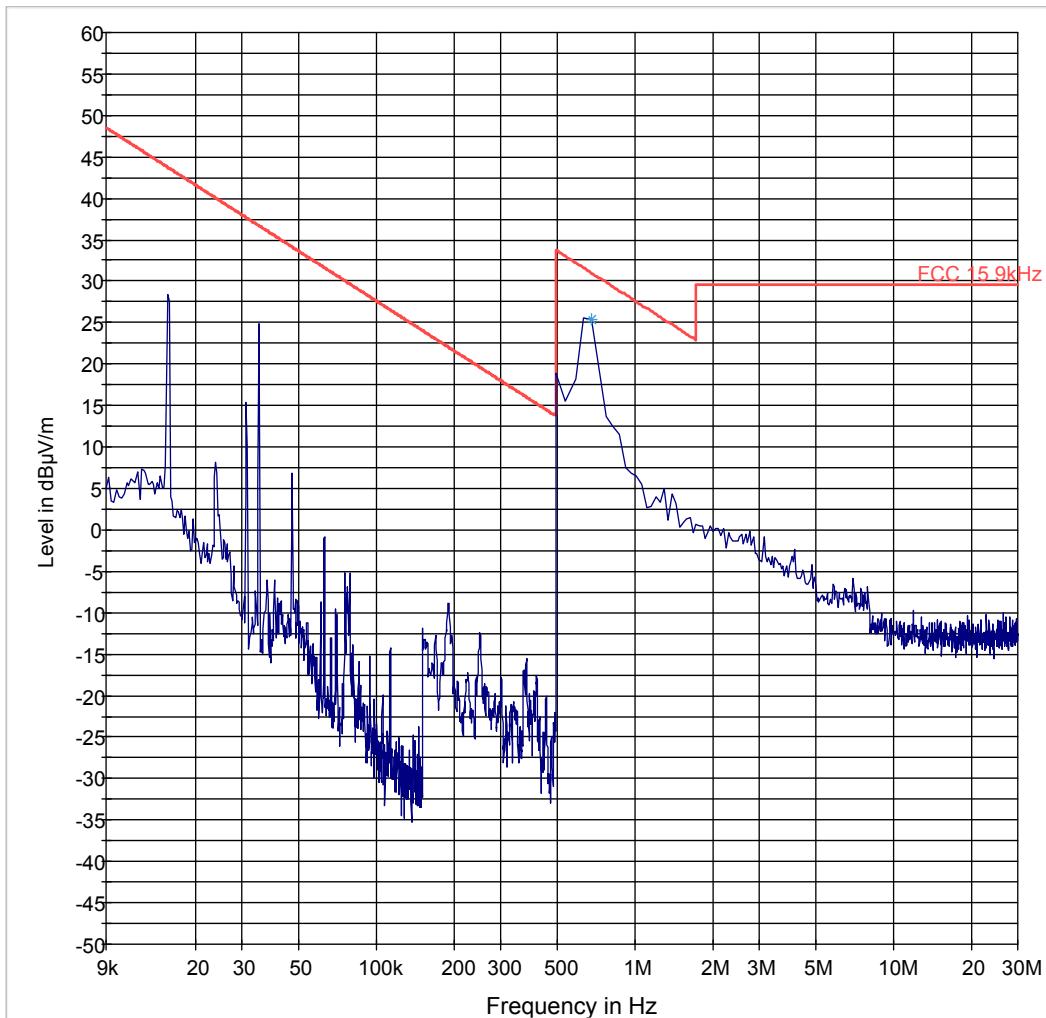
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

9kHz-30MHz mode: 802.11 n Ch60; Band 2



— FCC 15 9kHz — Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

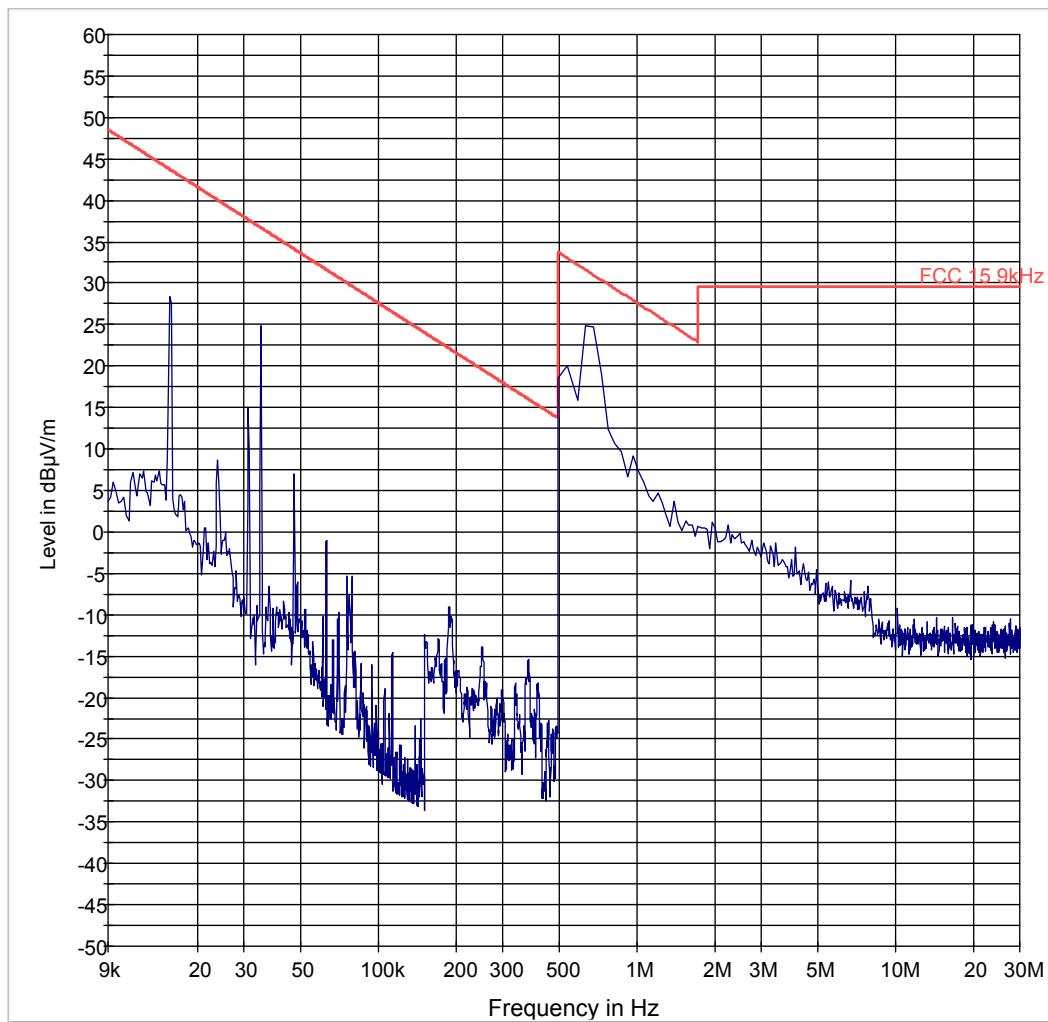
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

9kHz-30MHz mode: 802.11 n Ch120; Band 3



— FCC 15 9kHz — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

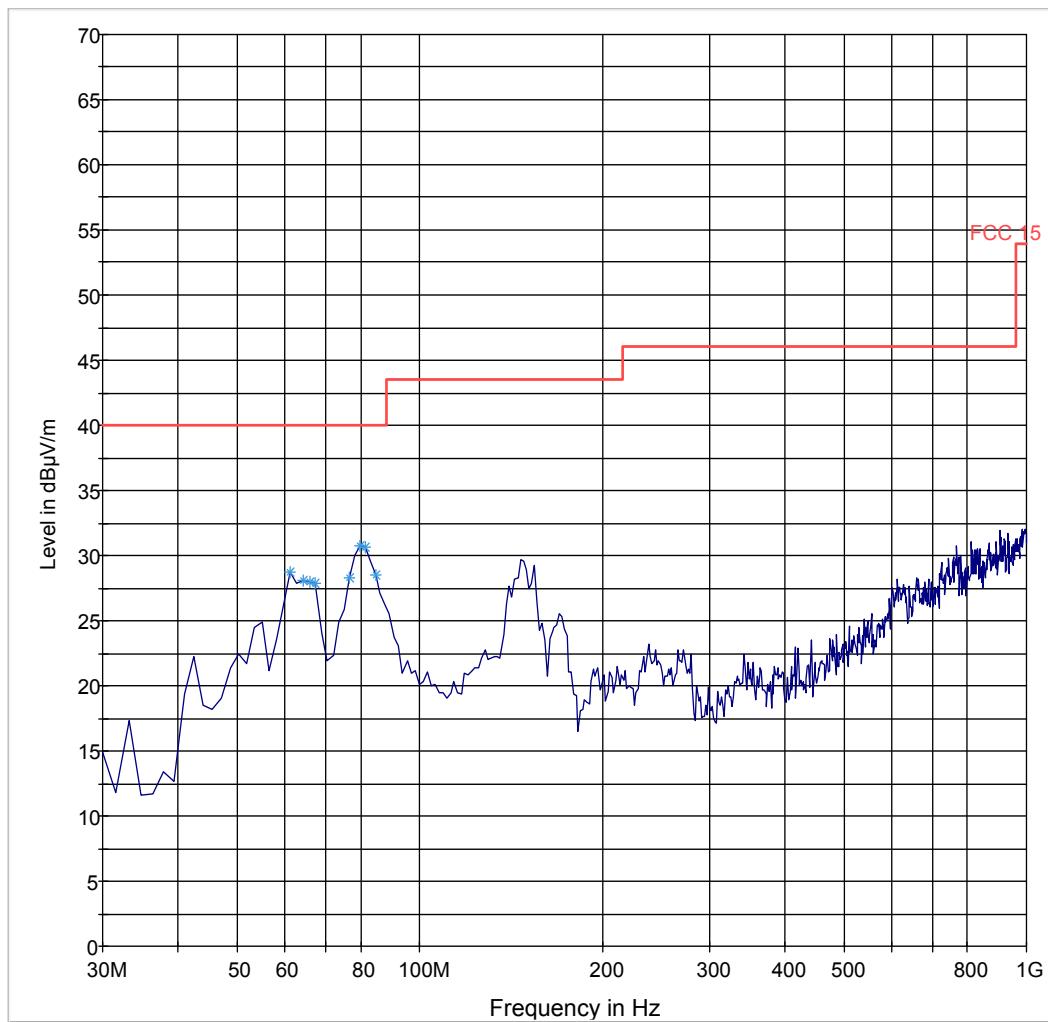
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

30MHz-1GHz mode: 802.11 a Ch40; Band 1



— FCC 15 — Preview Result 1-PK+ * Data Reduction Result 1 [3]-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

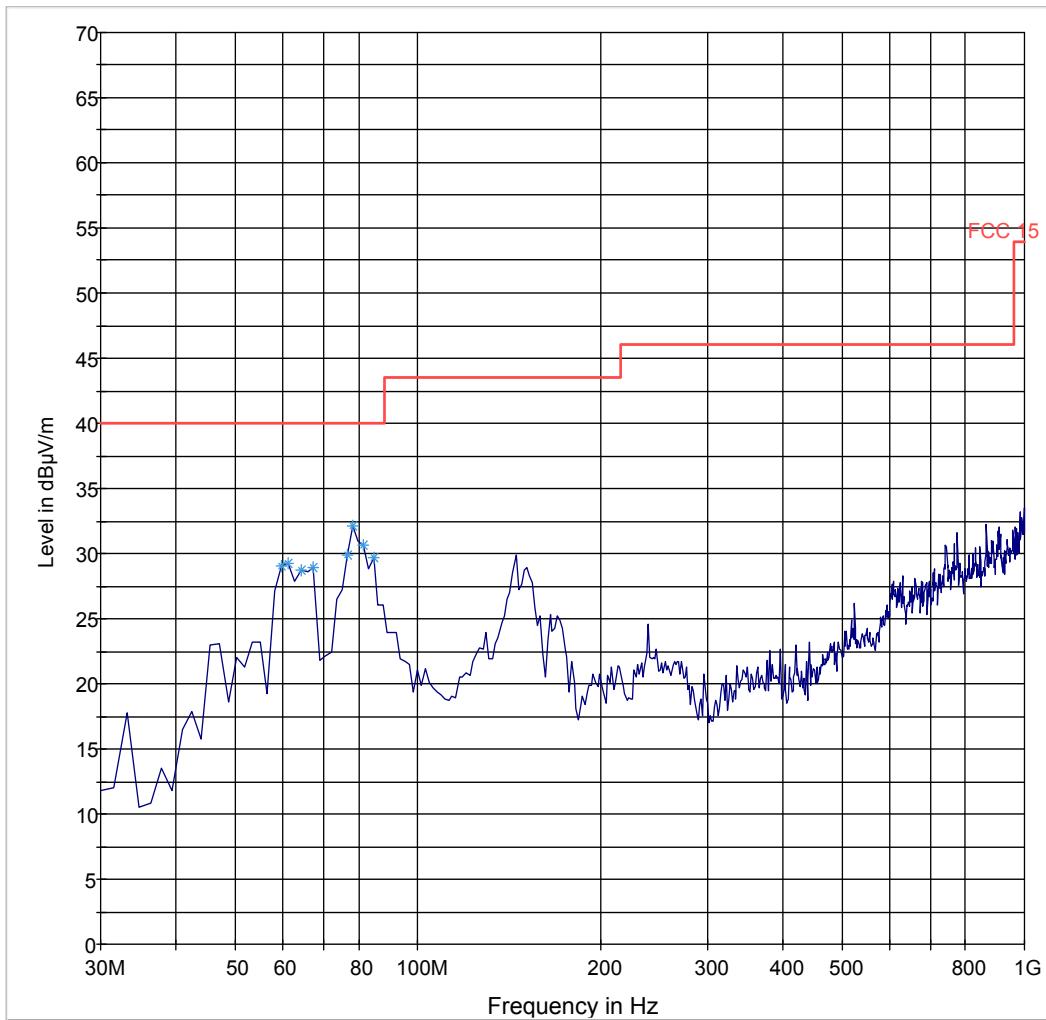
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

30MHz-1GHz mode: 802.11 a Ch60; Band 2



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

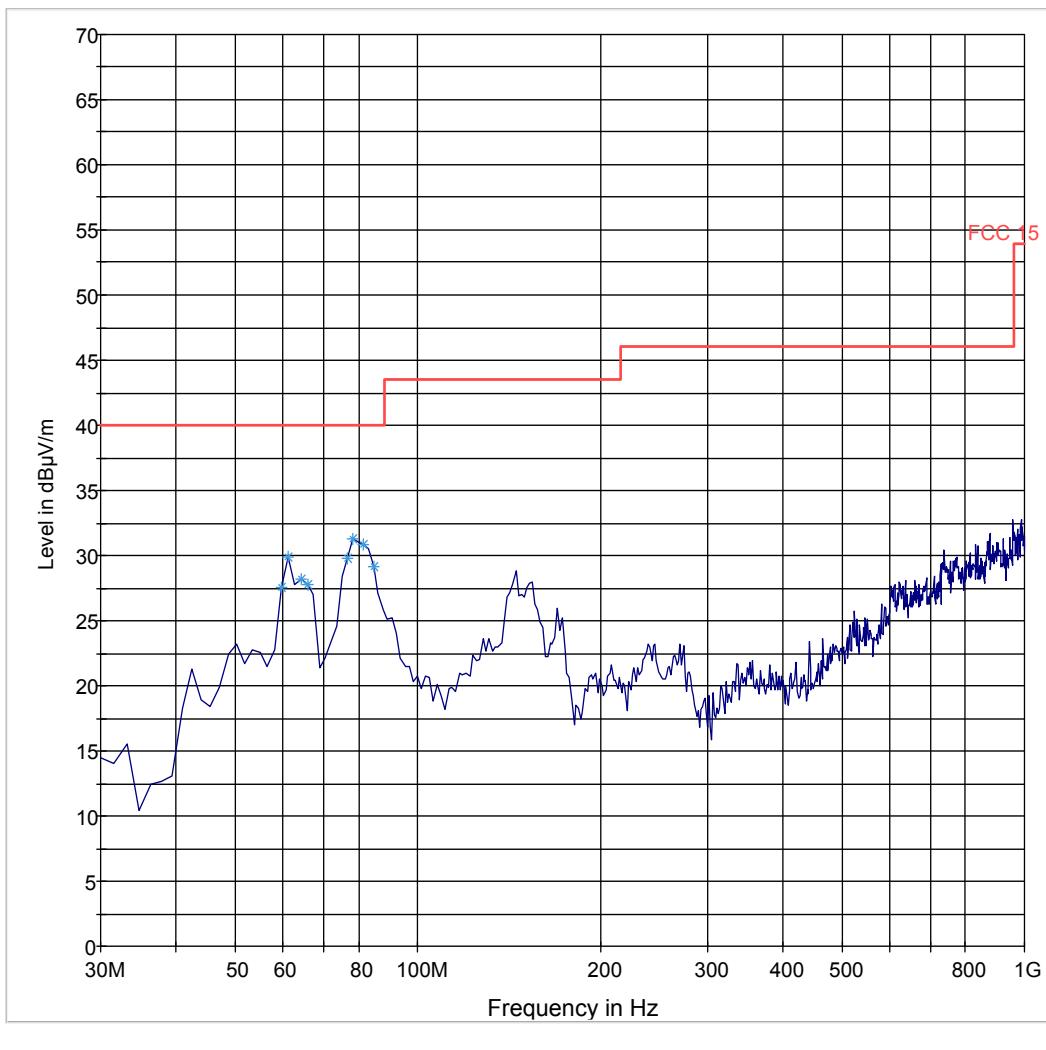
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

30MHz-1GHz mode: 802.11 a Ch120; Band 3



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

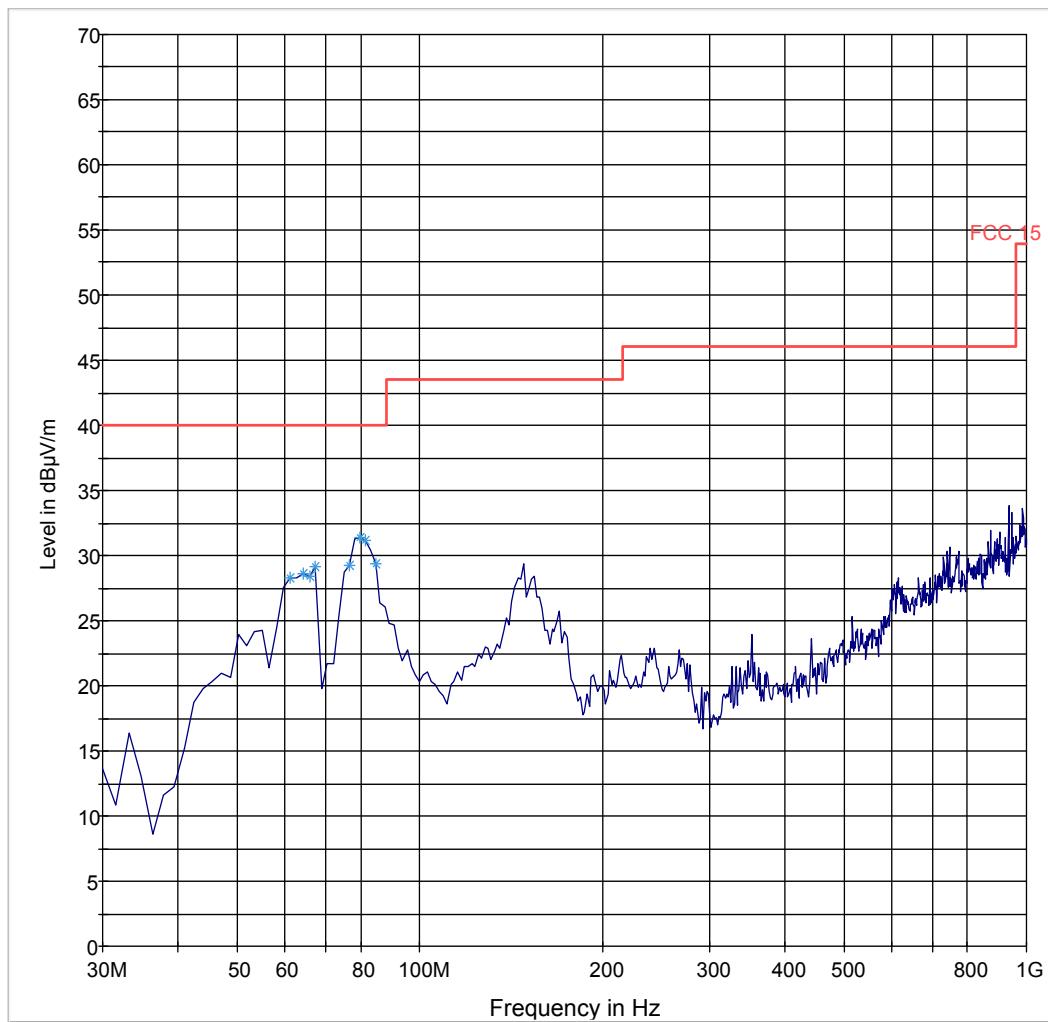
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

30MHz-1GHz mode: 802.11 n Ch40; Band 1



— FCC 15 — Preview Result 1-PK+ * Data Reduction Result 1 [3]-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

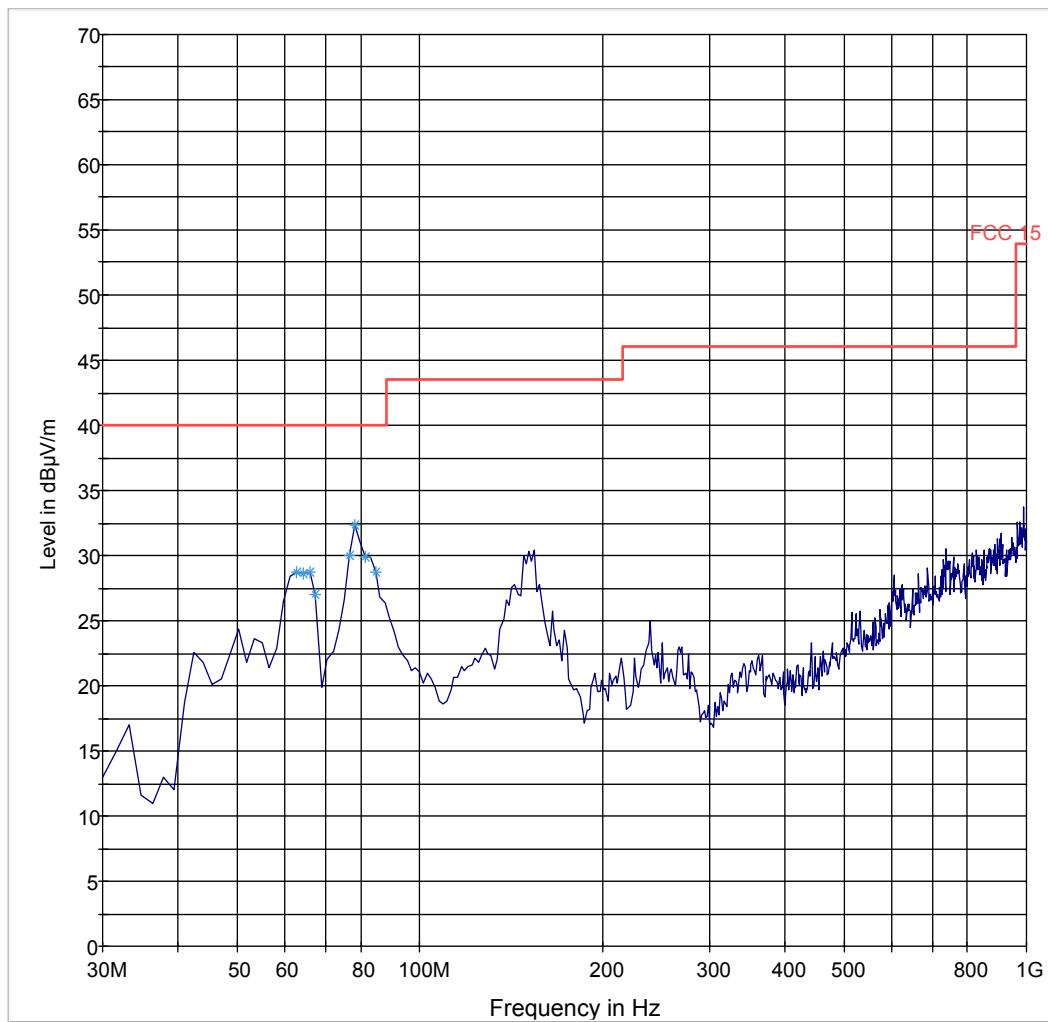
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

30MHz-1GHz mode: 802.11 n Ch60; Band 2



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

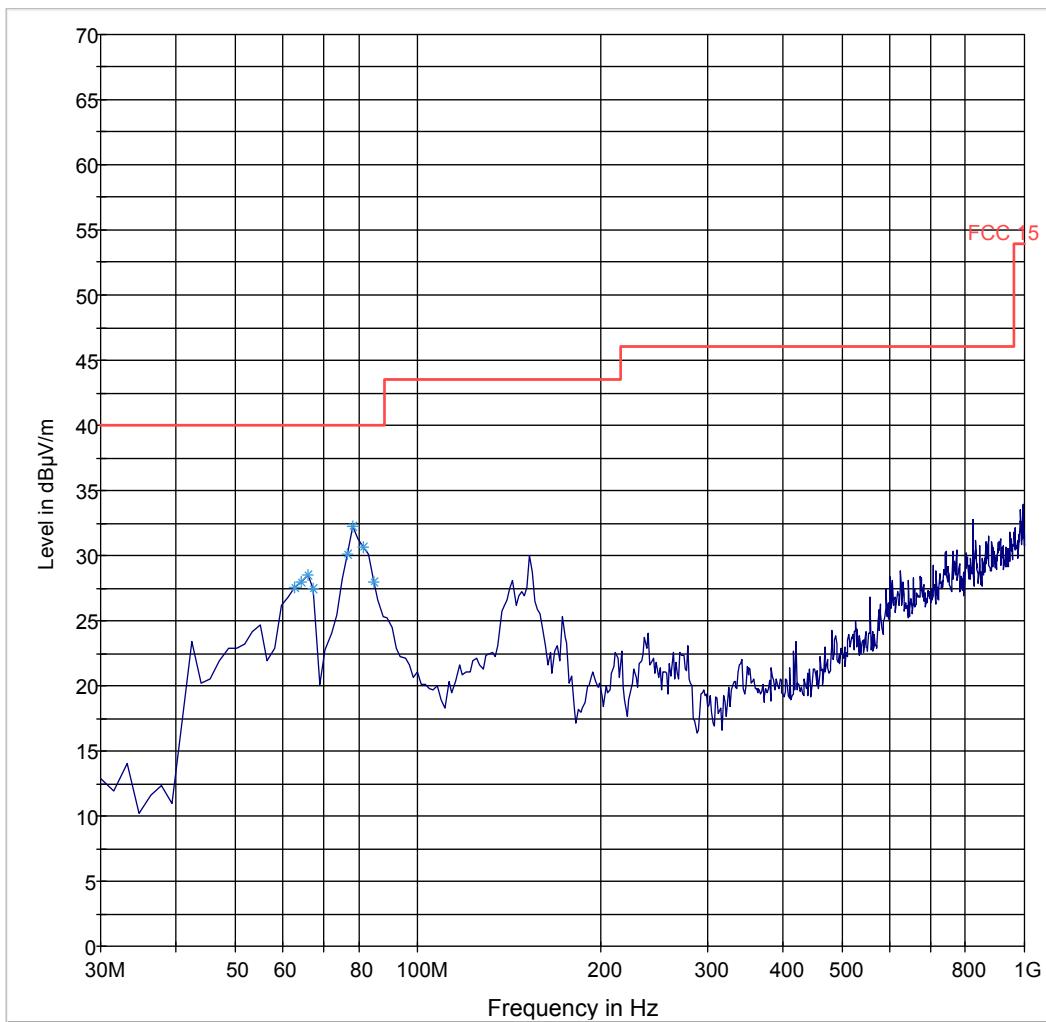
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

30MHz-1GHz mode: 802.11 n Ch120; Band 3



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

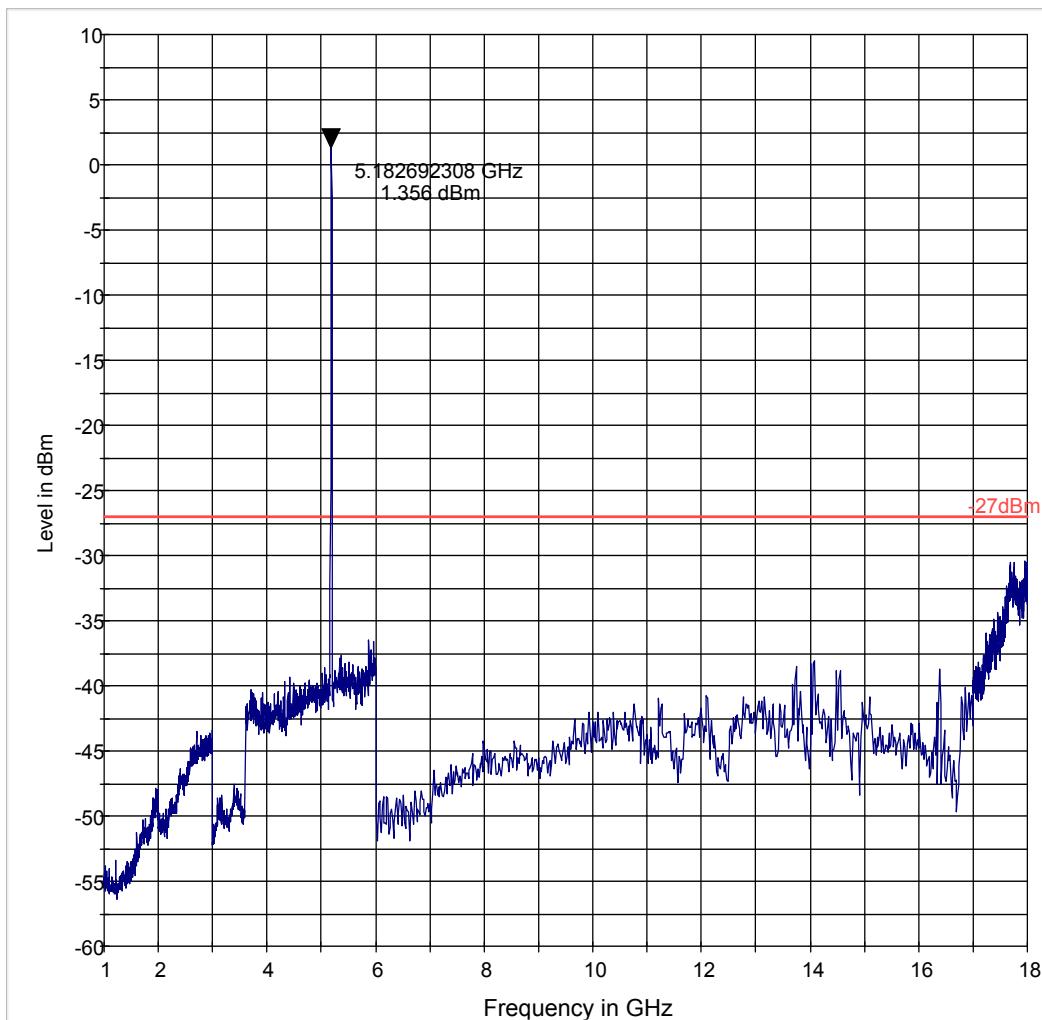
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 a Ch36; Band 1



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

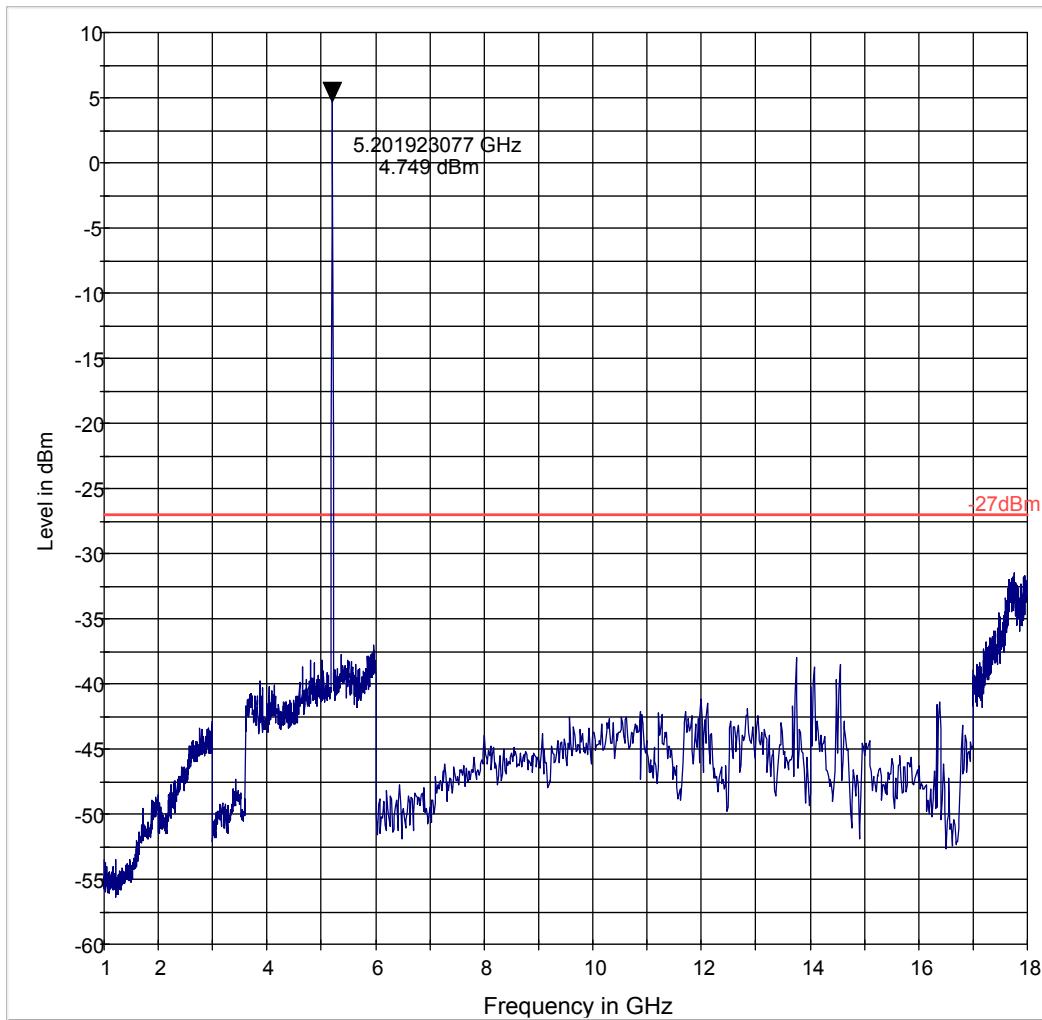
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 a Ch40; Band 1



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

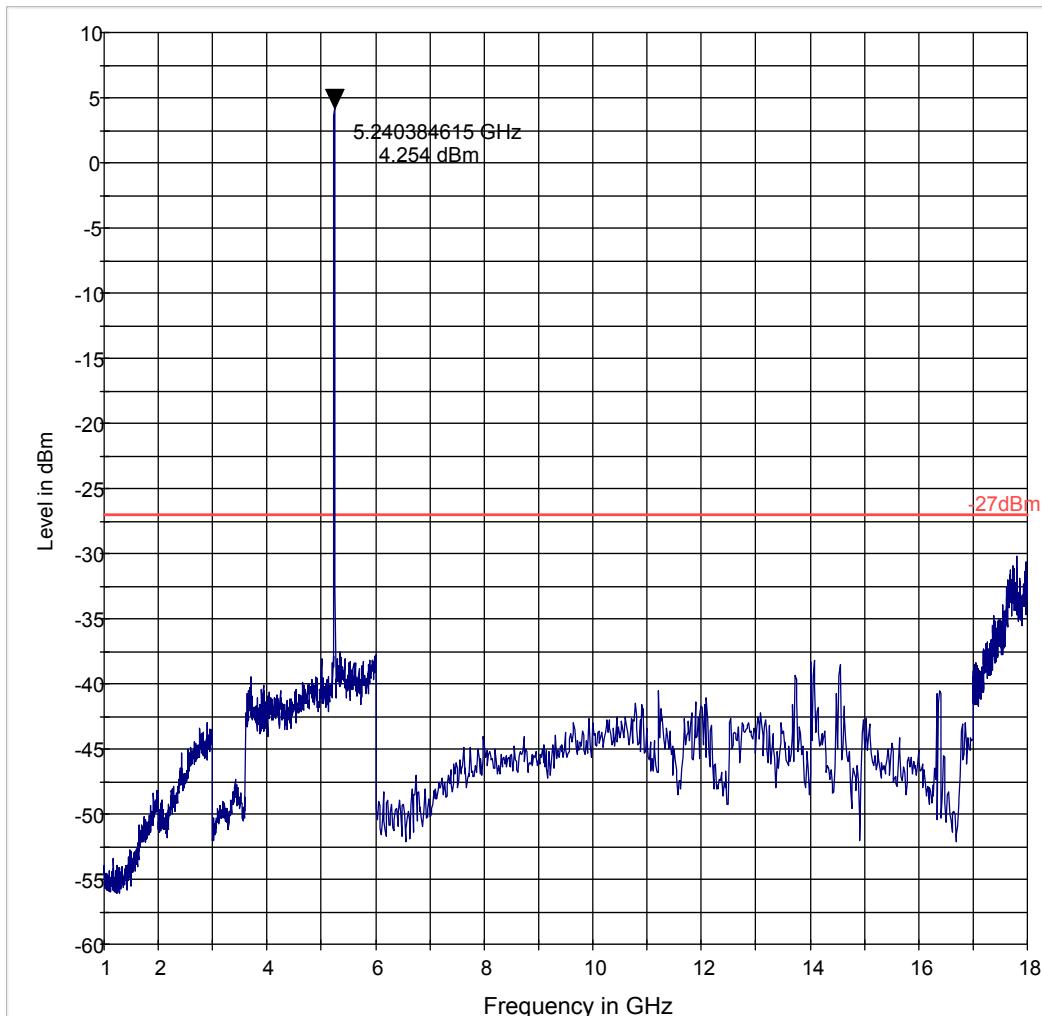
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 a Ch48; Band 1



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

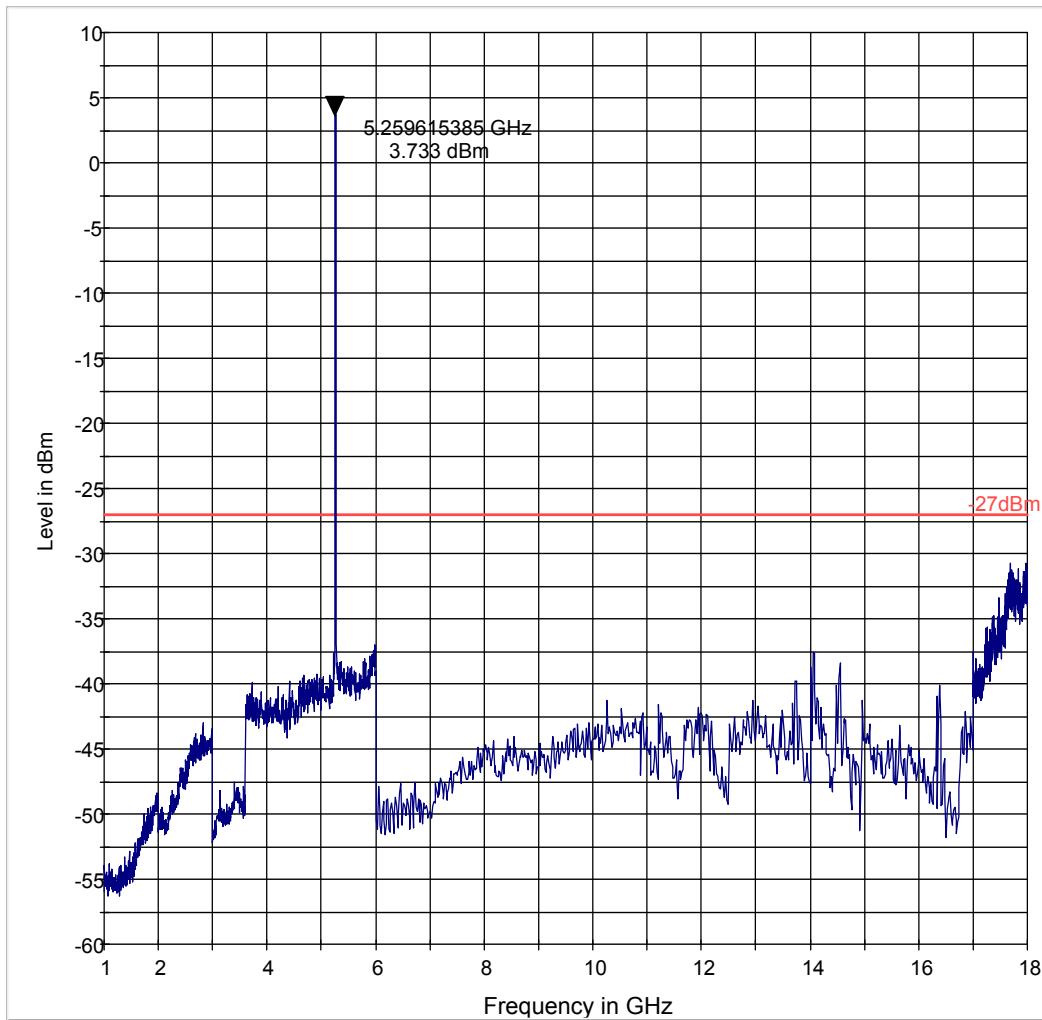
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 a Ch52; Band 2



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

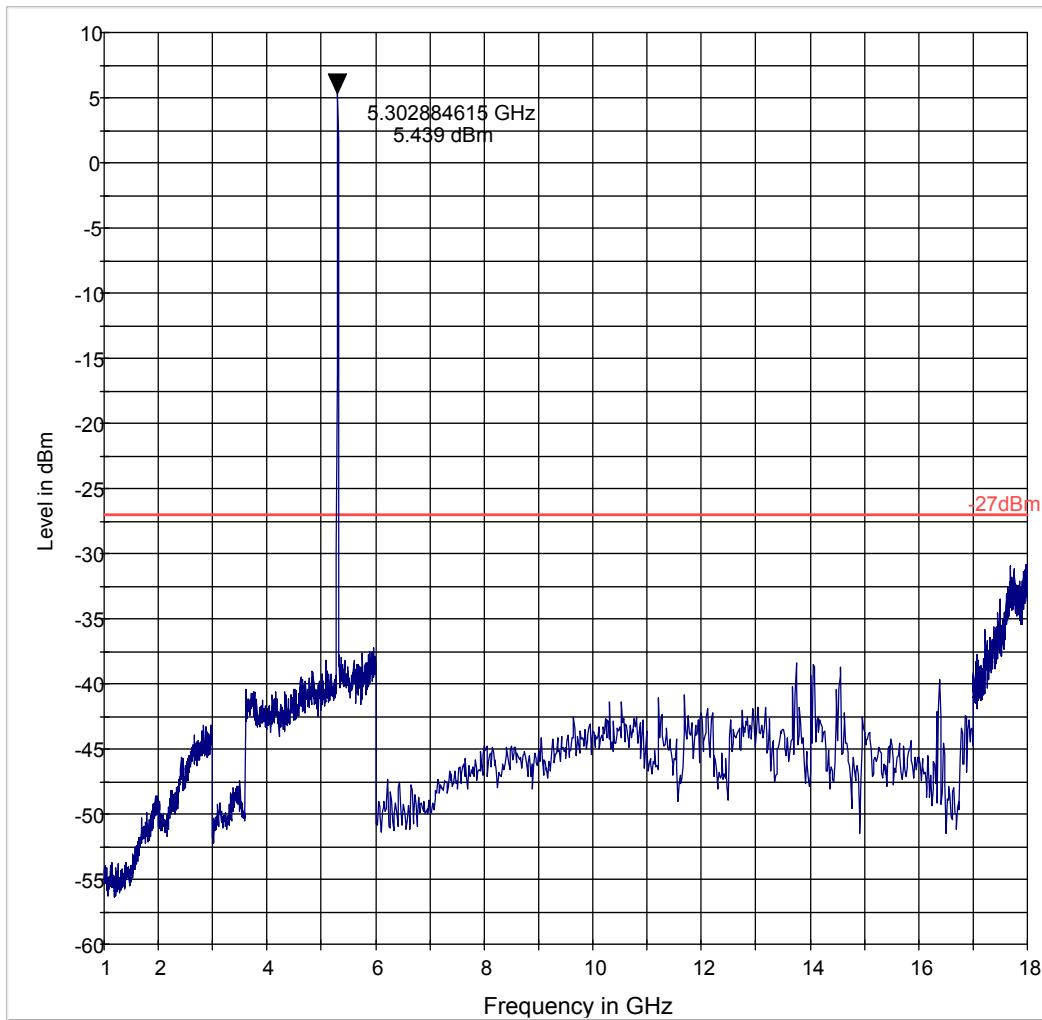
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 a Ch60; Band 2



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

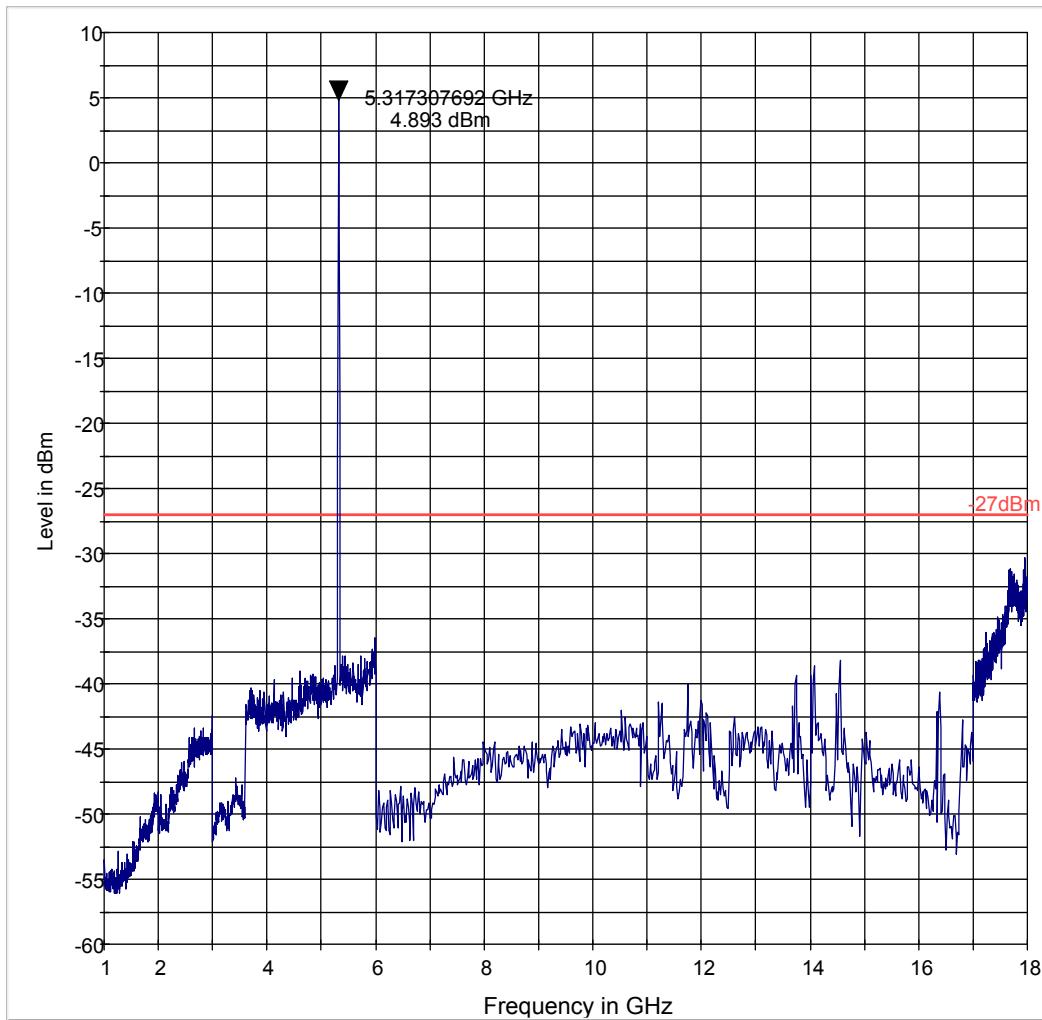
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 a Ch64; Band 2



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

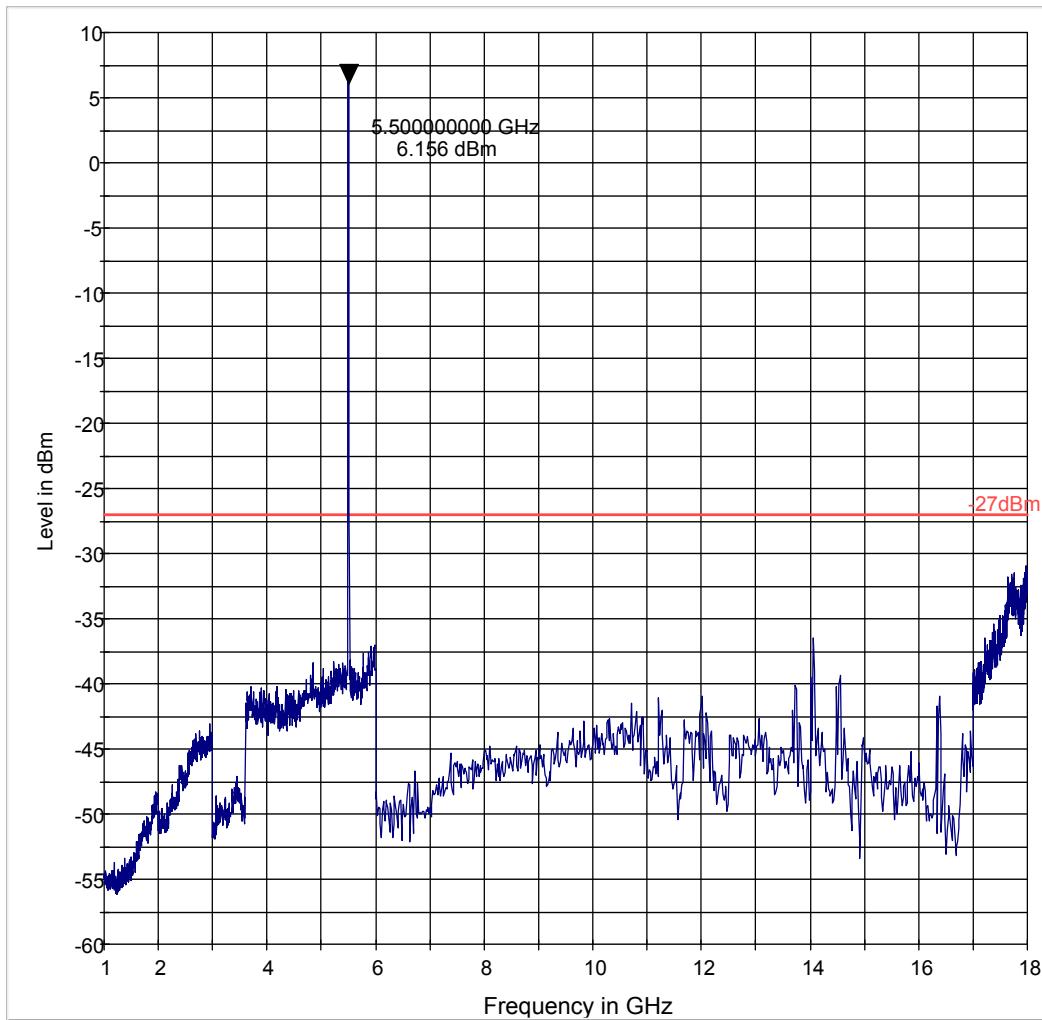
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 a Ch100; Band 3



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

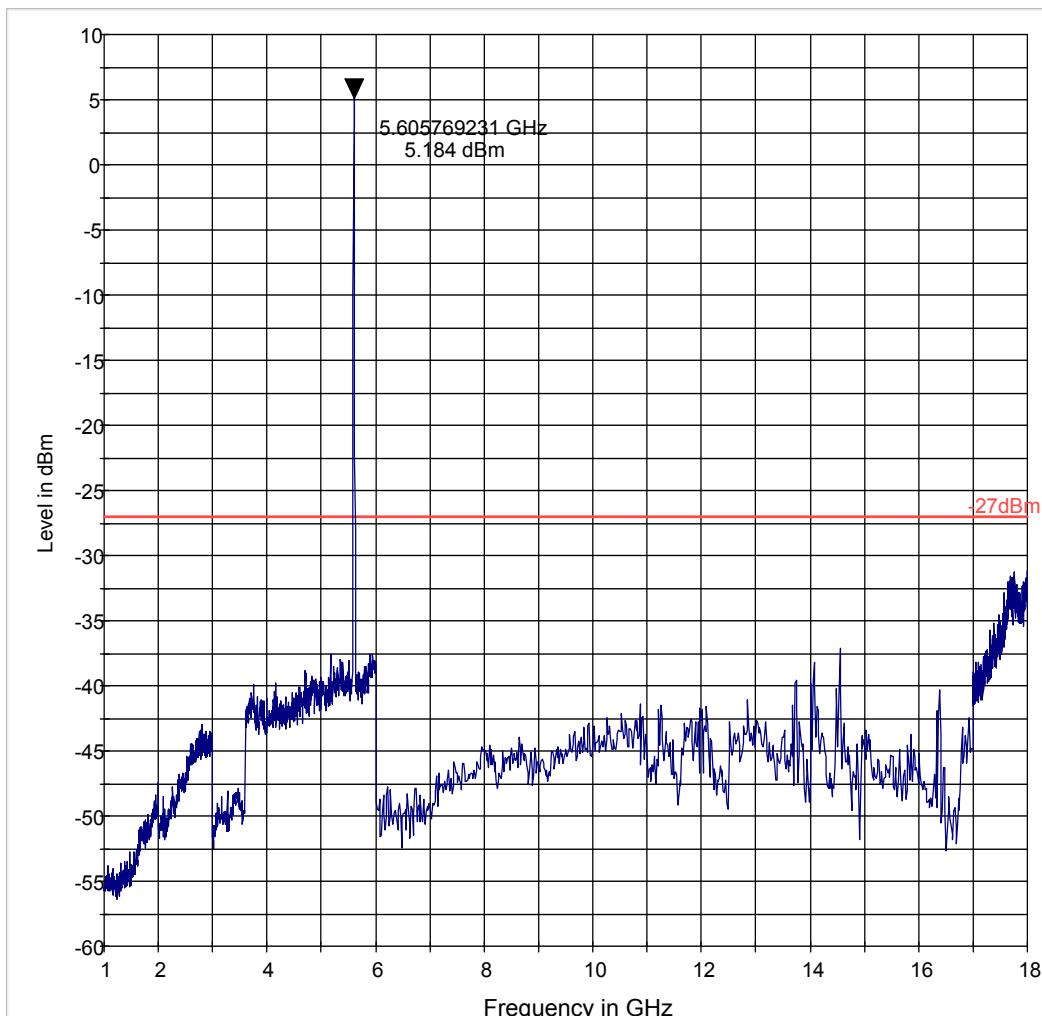
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 a Ch120; Band 3



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

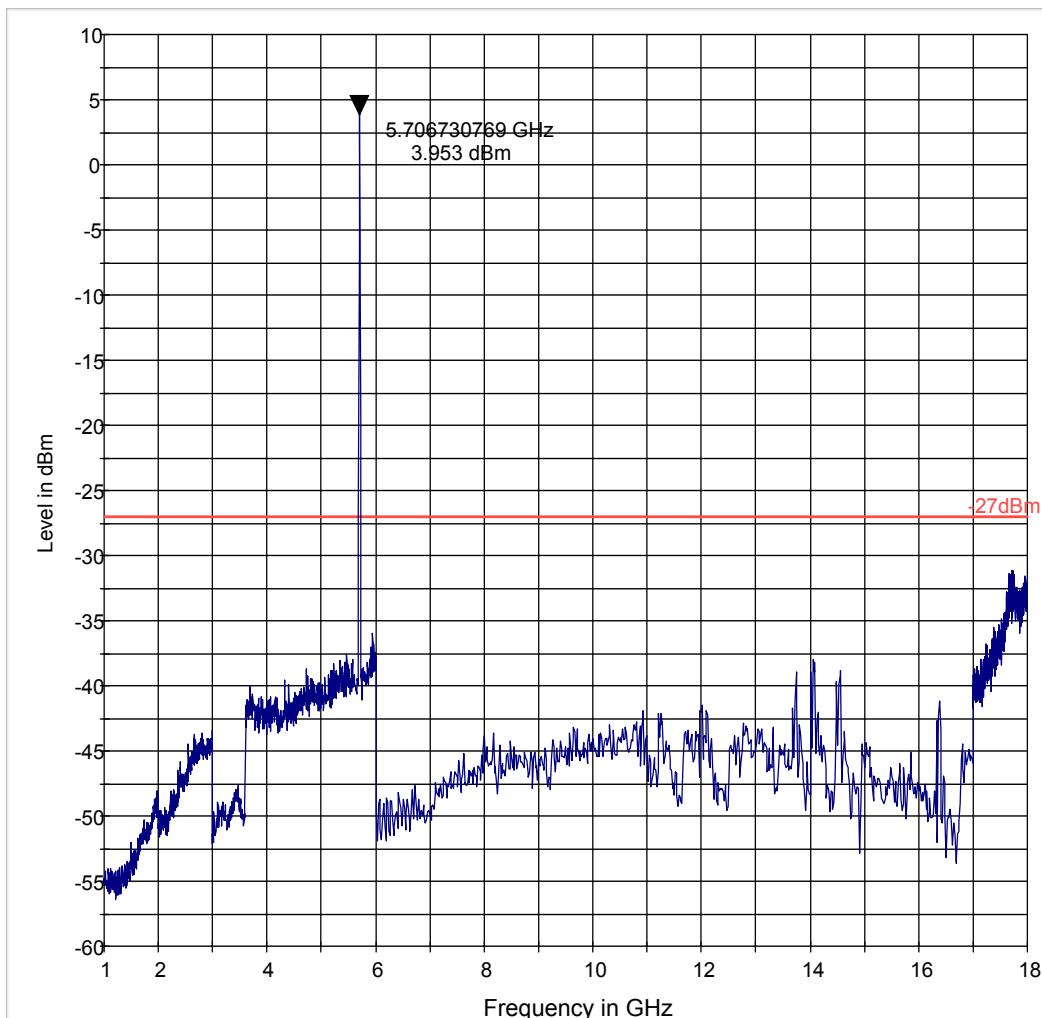
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 a Ch140; Band 3



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

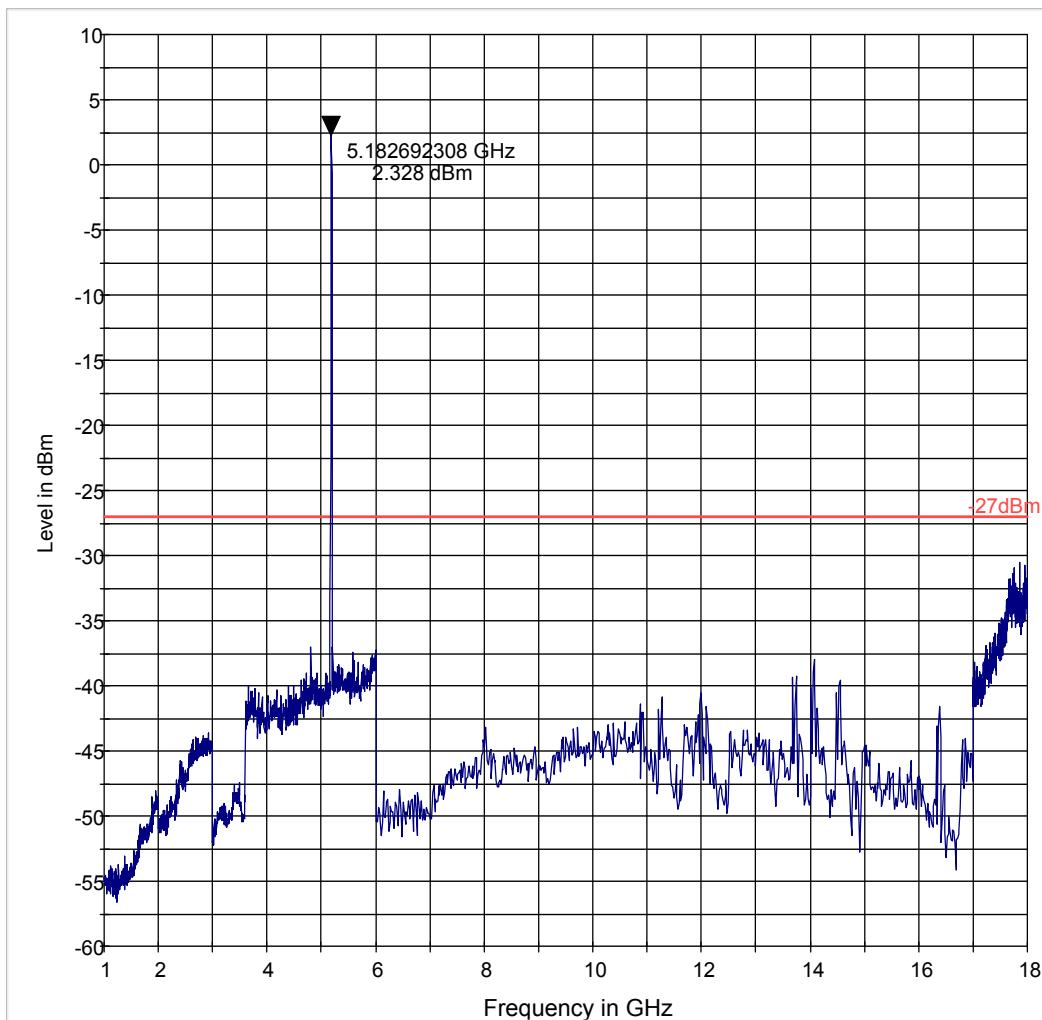
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 n Ch36; Band 1



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

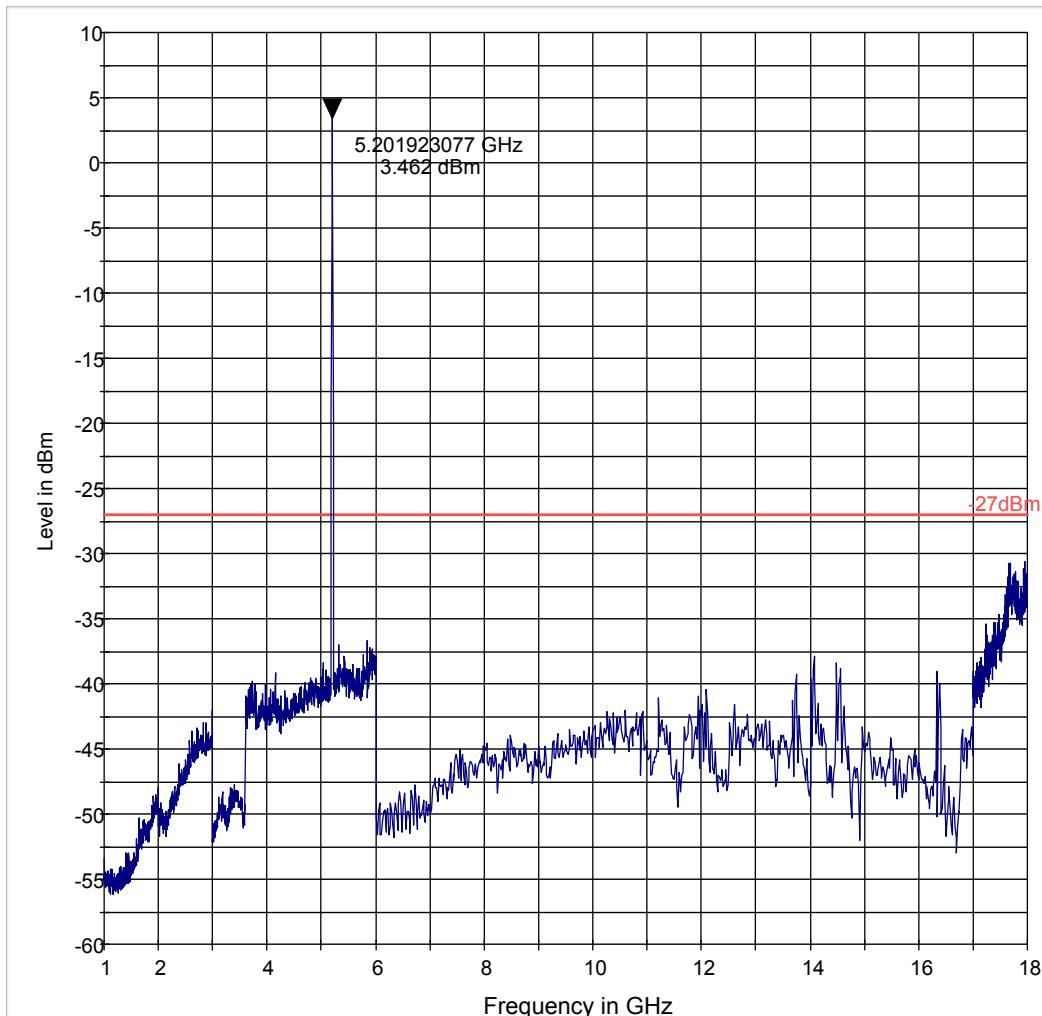
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 n Ch40; Band 1



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

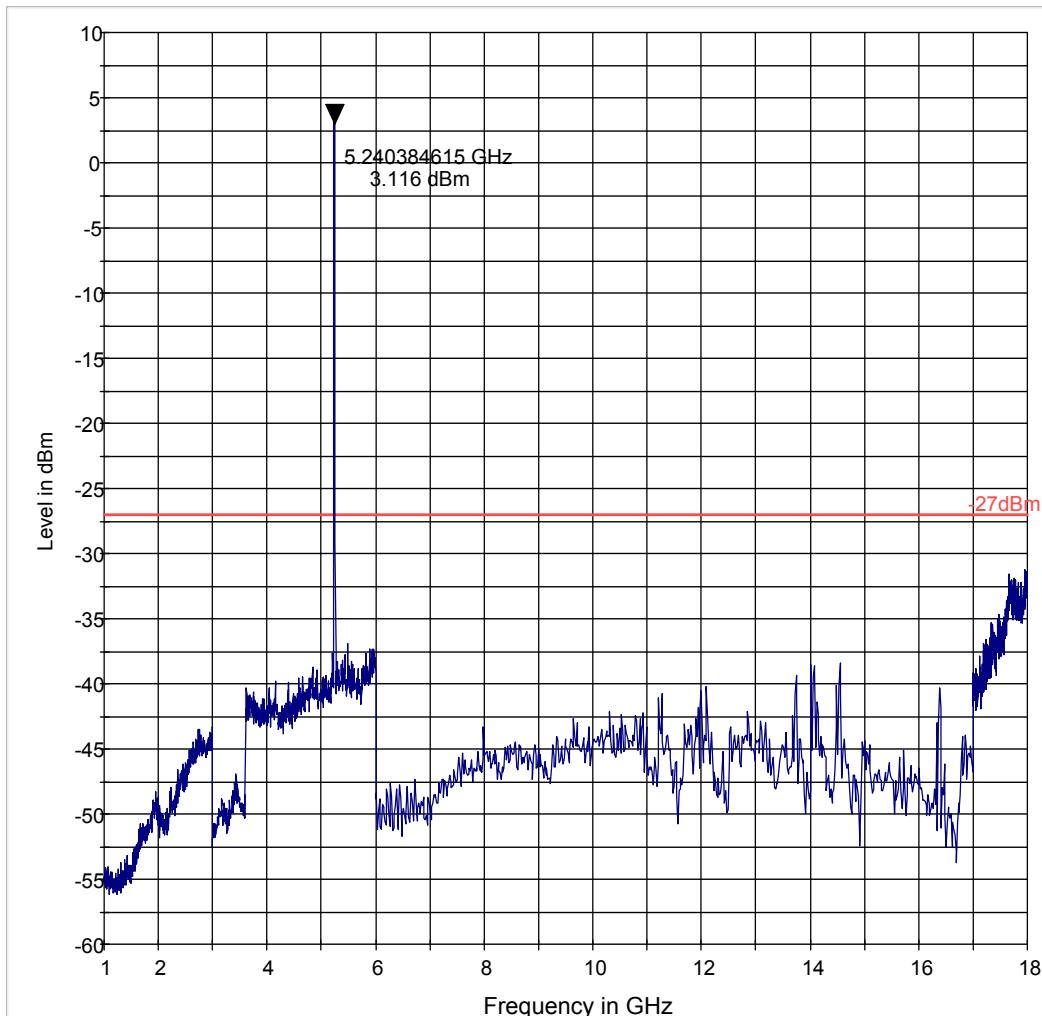
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 n Ch48; Band 1



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

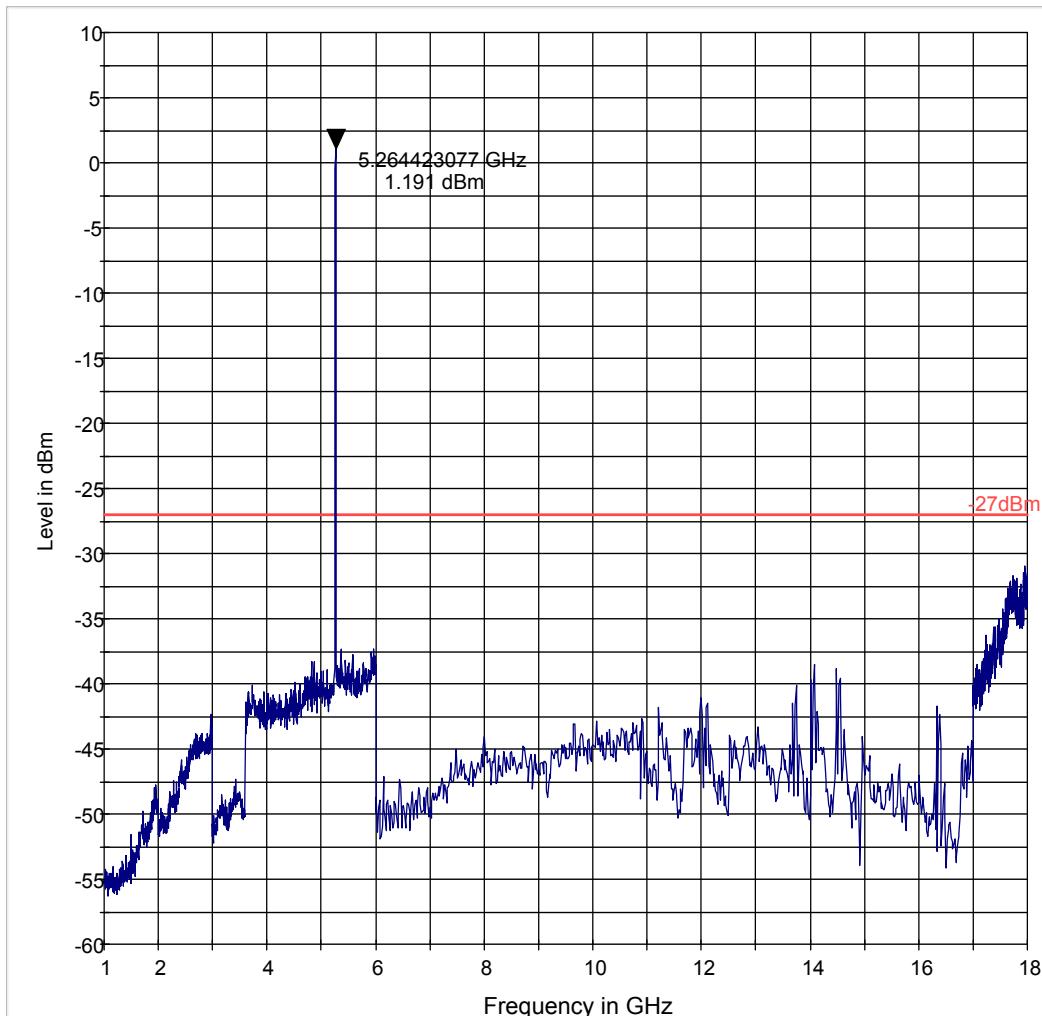
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 n Ch52; Band 2



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

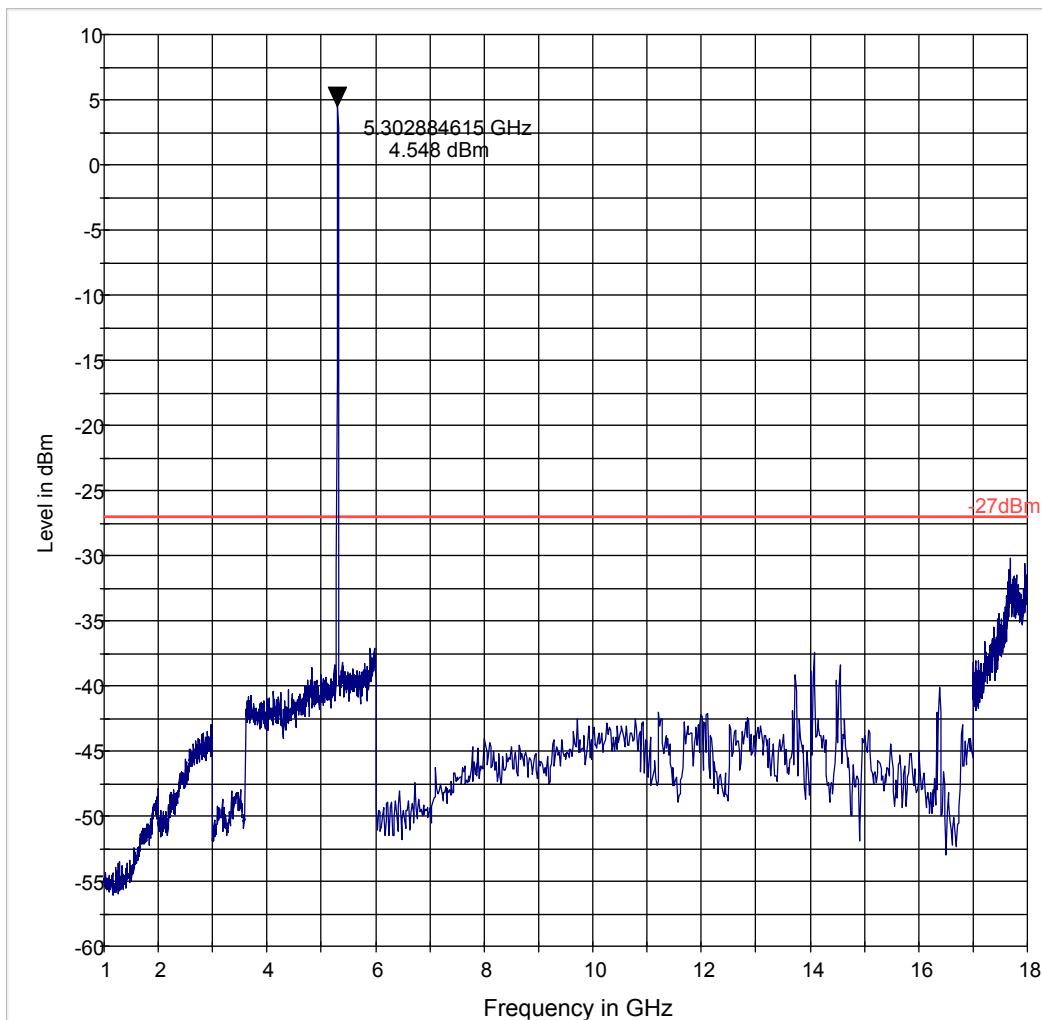
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 n Ch60; Band 2



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

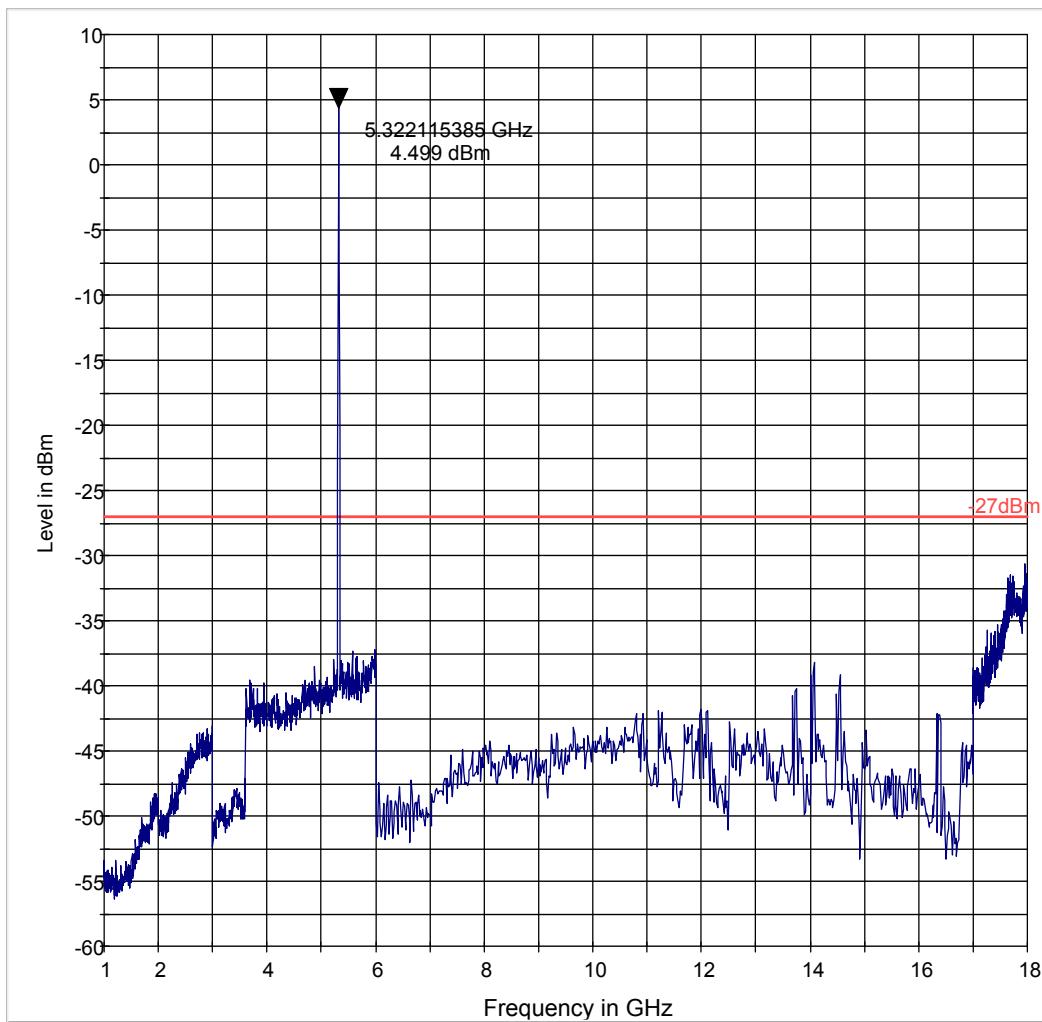
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 n Ch64; Band 2



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

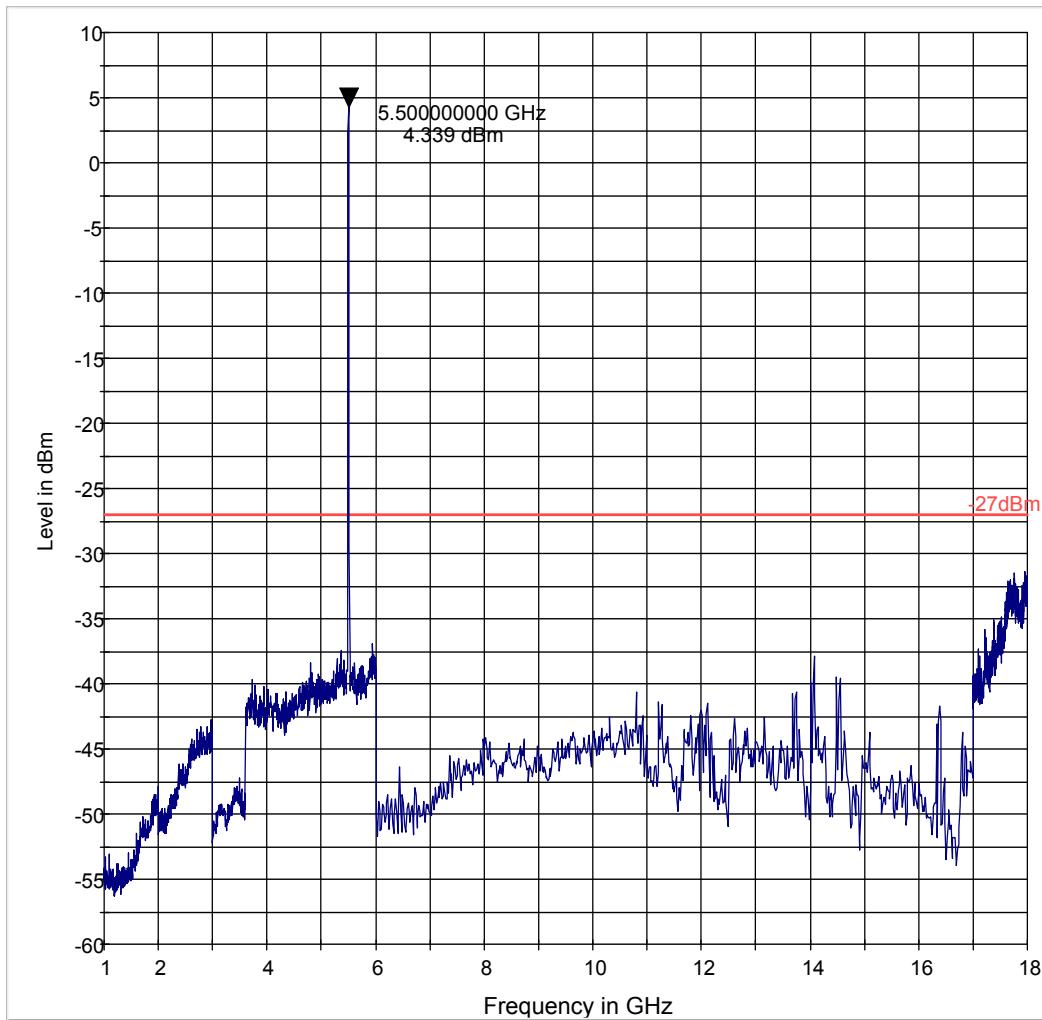
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 n Ch100; Band 3



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

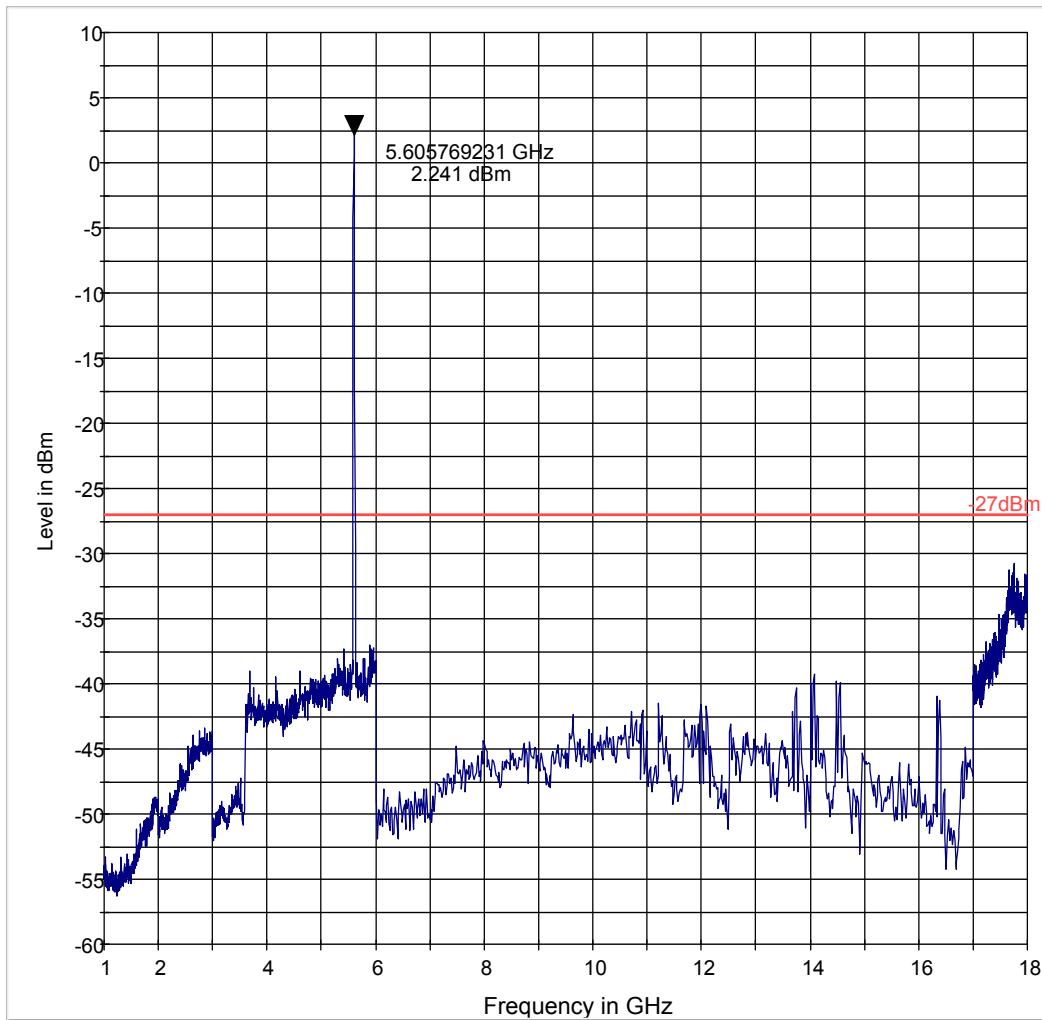
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 n Ch120; Band 3



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

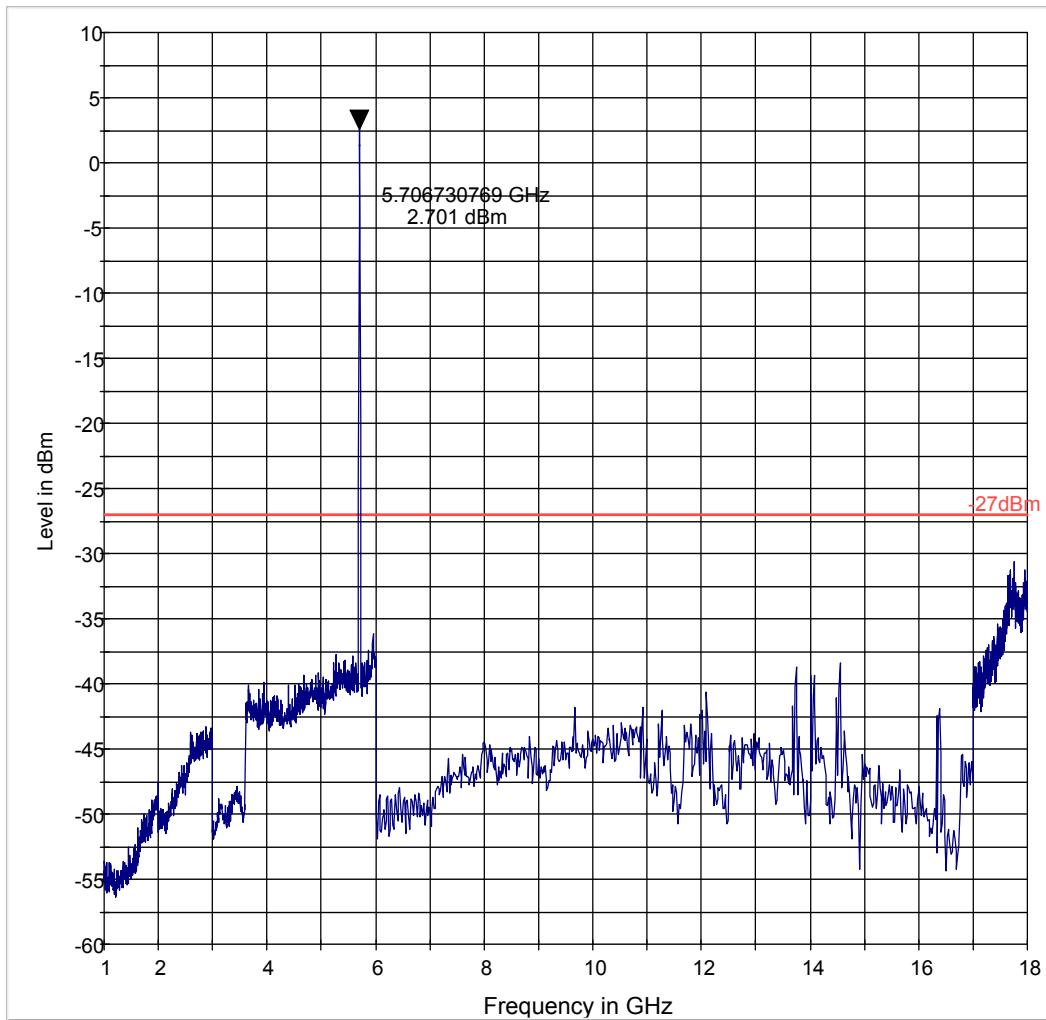
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

1GHz-18GHz mode: 802.11 n Ch140; Band 3



— -27dBm — Preview Result 1-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

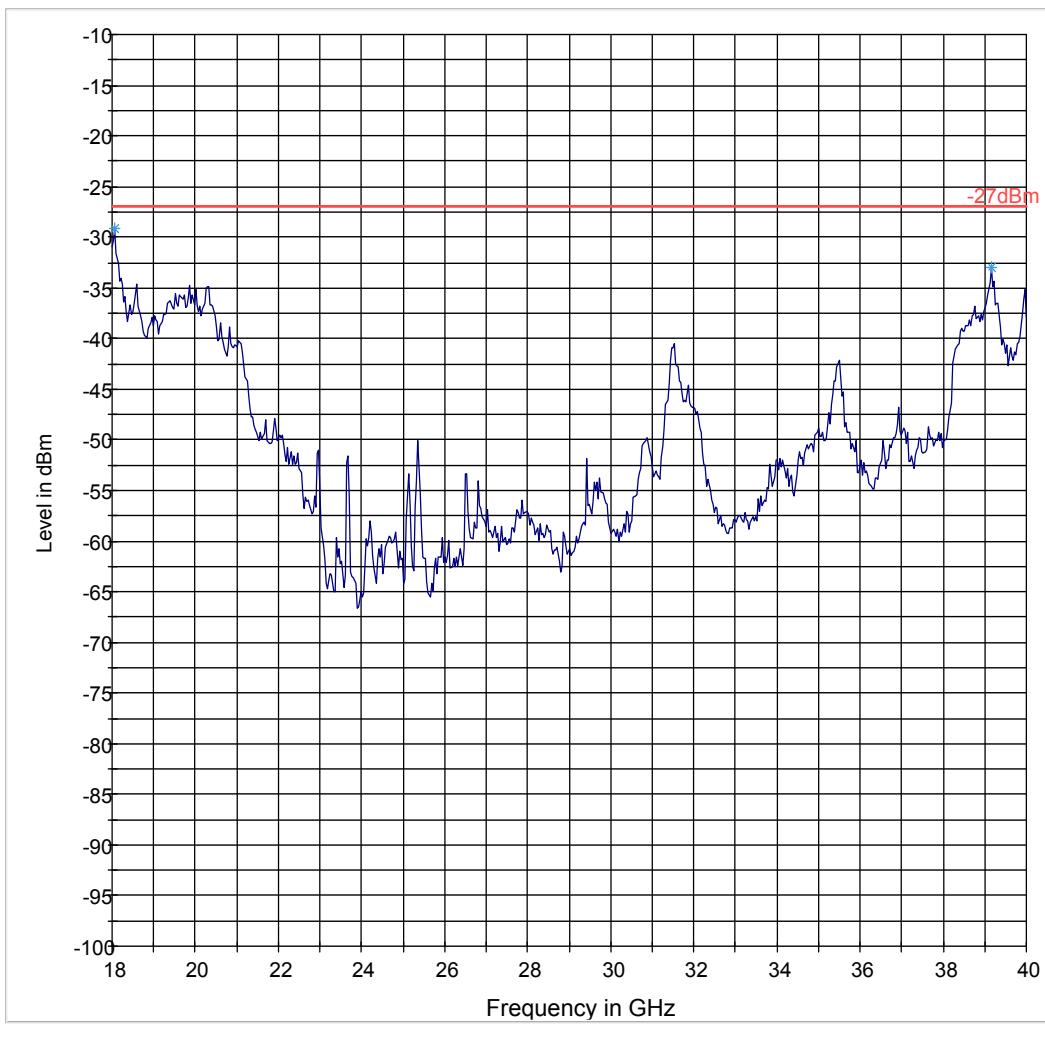
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

18GHz-40GHz mode: 802.11 a Ch40; Band 1



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

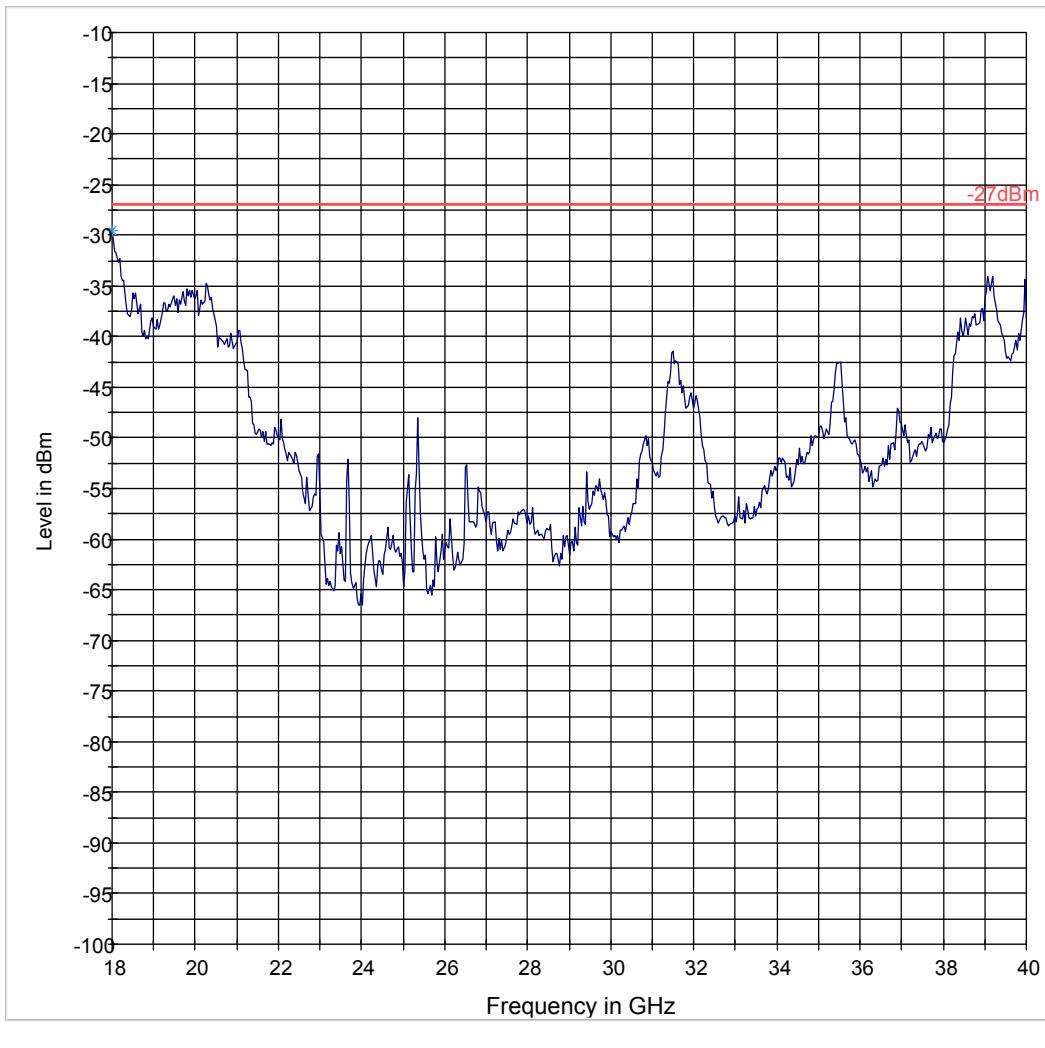
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

18GHz-40GHz mode: 802.11 a Ch60; Band 2



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

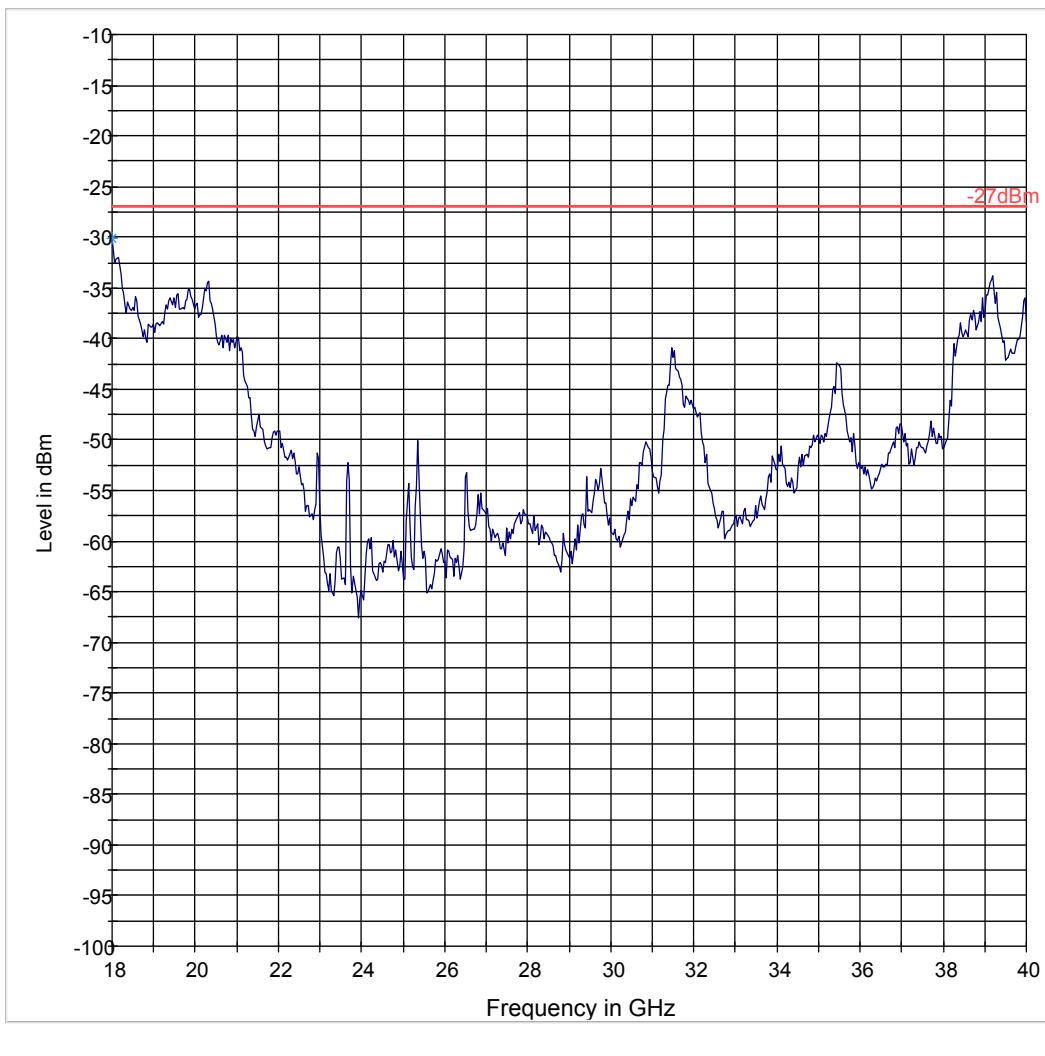
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

18GHz-40GHz mode: 802.11 a Ch120; Band 3



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

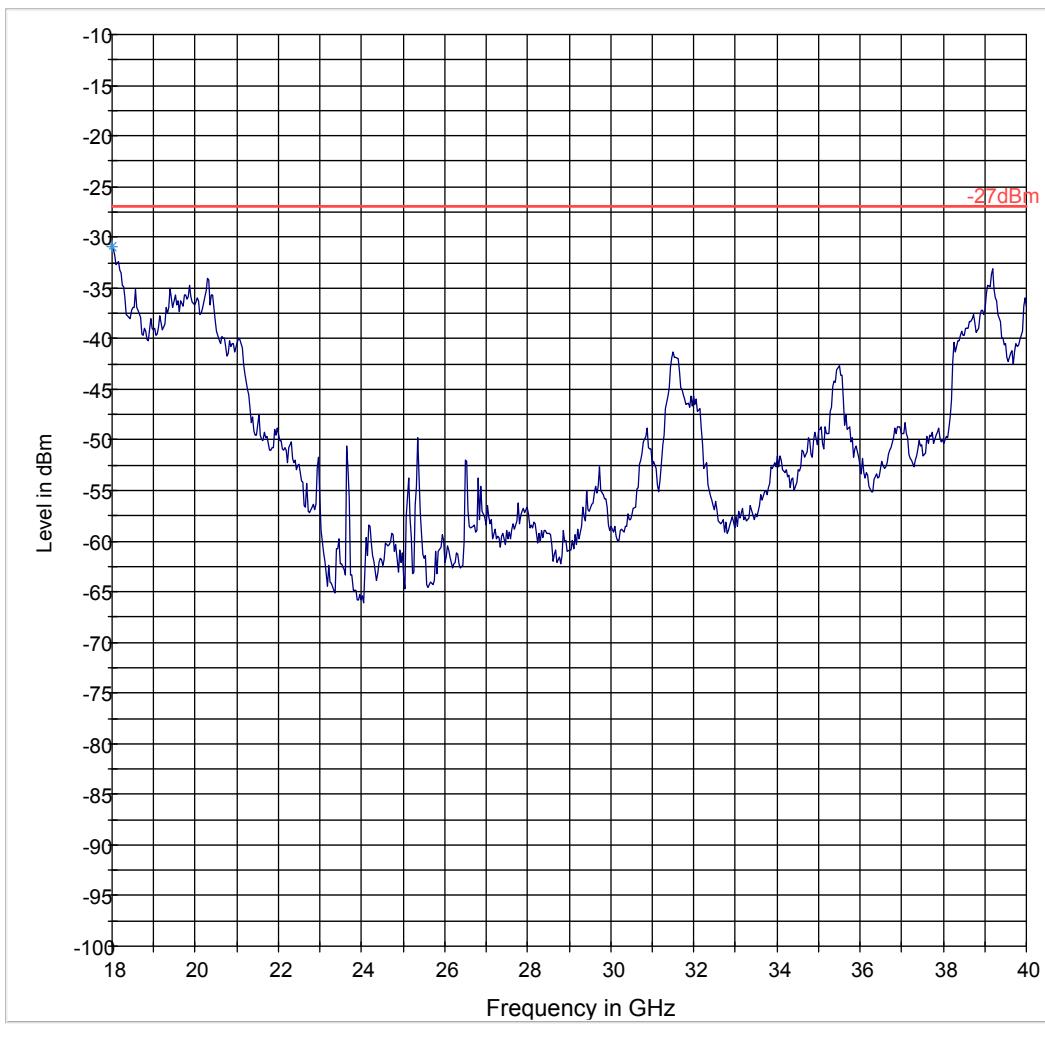
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

18GHz-40GHz mode: 802.11 n Ch40; Band 1



— -27dBm — Preview Result 1-PK+ * Data Reduction Result 1 [5]-PK+

Test Report #: EMC_HONEY_095_12003_70eL00_UNII

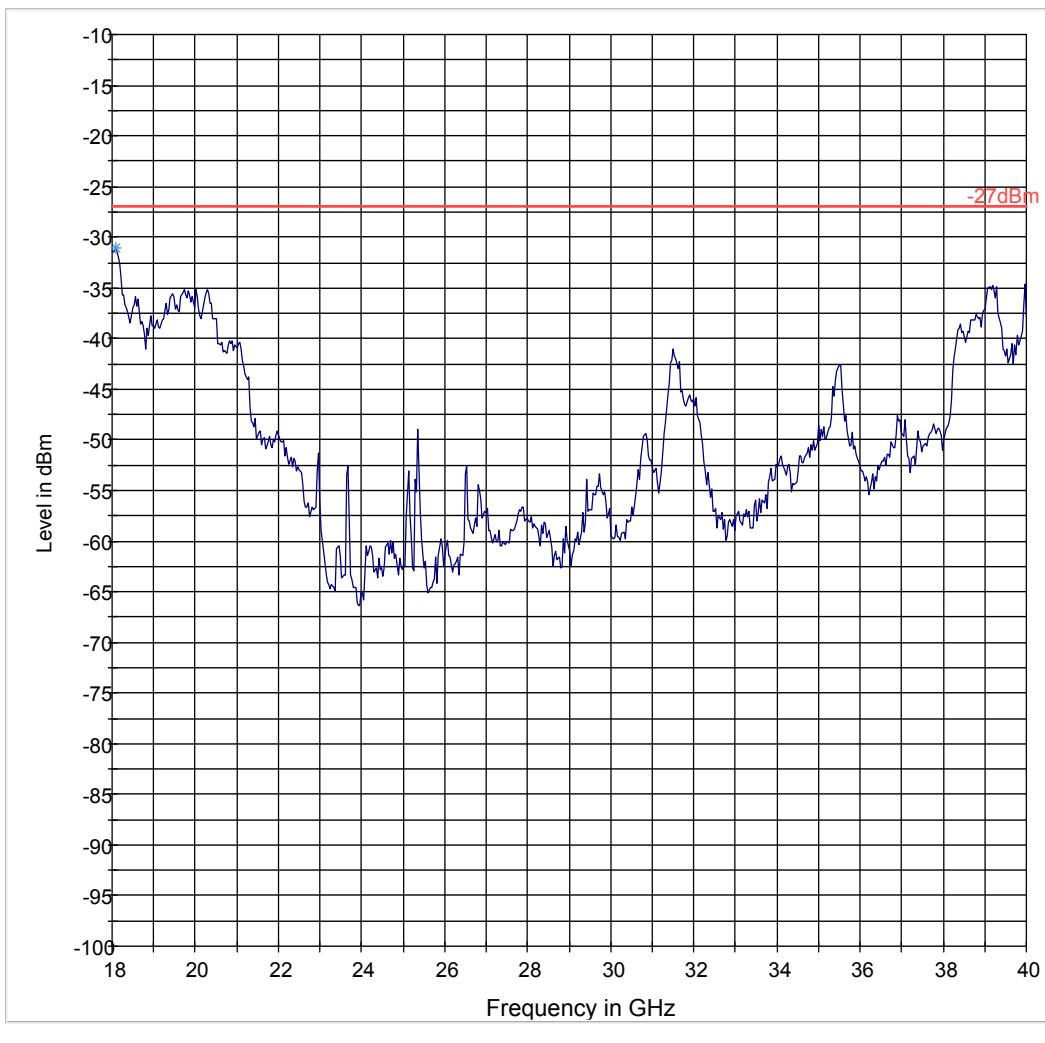
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

18GHz-40GHz mode: 802.11 n Ch60; Band 2



Test Report #: EMC_HONEY_095_12003_70eL00_UNII

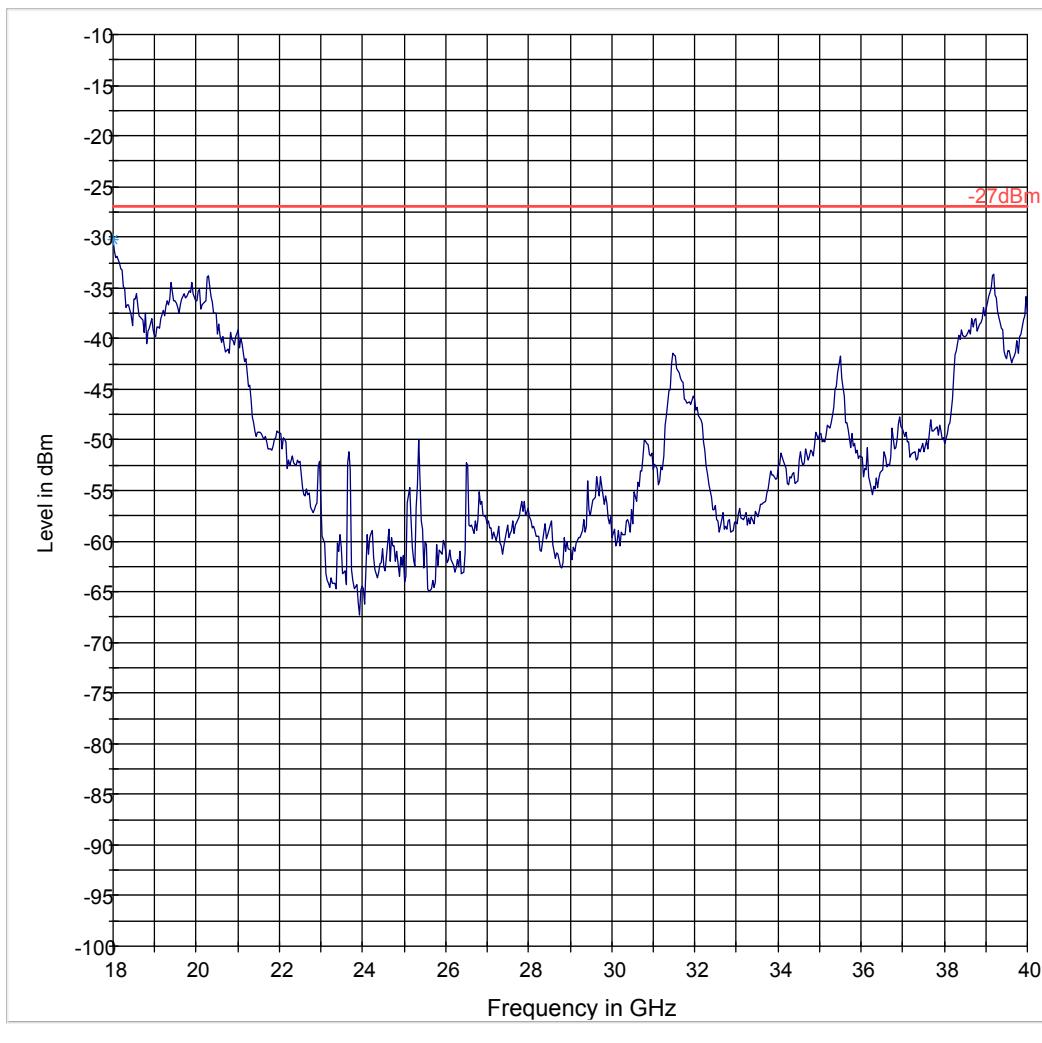
FCC ID: HD570EL00

Date of Report: 2013-05-28

IC ID: 1693B-70E3

CETECOM

18GHz-40GHz mode: 802.11 n Ch120; Band 3



6 AC Power Line Conducted Emissions

6.1.1 References:

FCC: CFR Part 15.207

IC: RSS-Gen Section 7.2.2

The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network.

6.1.2 Limits:

6.1.2.1 §15.207 Conducted limits- Intentional Radiators:

(a) Except as shown in paragraphs (b) and (c) of this section of the CFR, 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 (1), as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

6.1.2.2 RSS-Gen 7.2.2

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown below. The tighter limit applies at the frequency range boundaries.

Table 1:

| Frequency of emission (MHz) | Conducted limit (dBμV) | |
|------------------------------------|--|----------------|
| | 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.

Analyzer Settings: CISPR Bandwidth- 9 KHz.

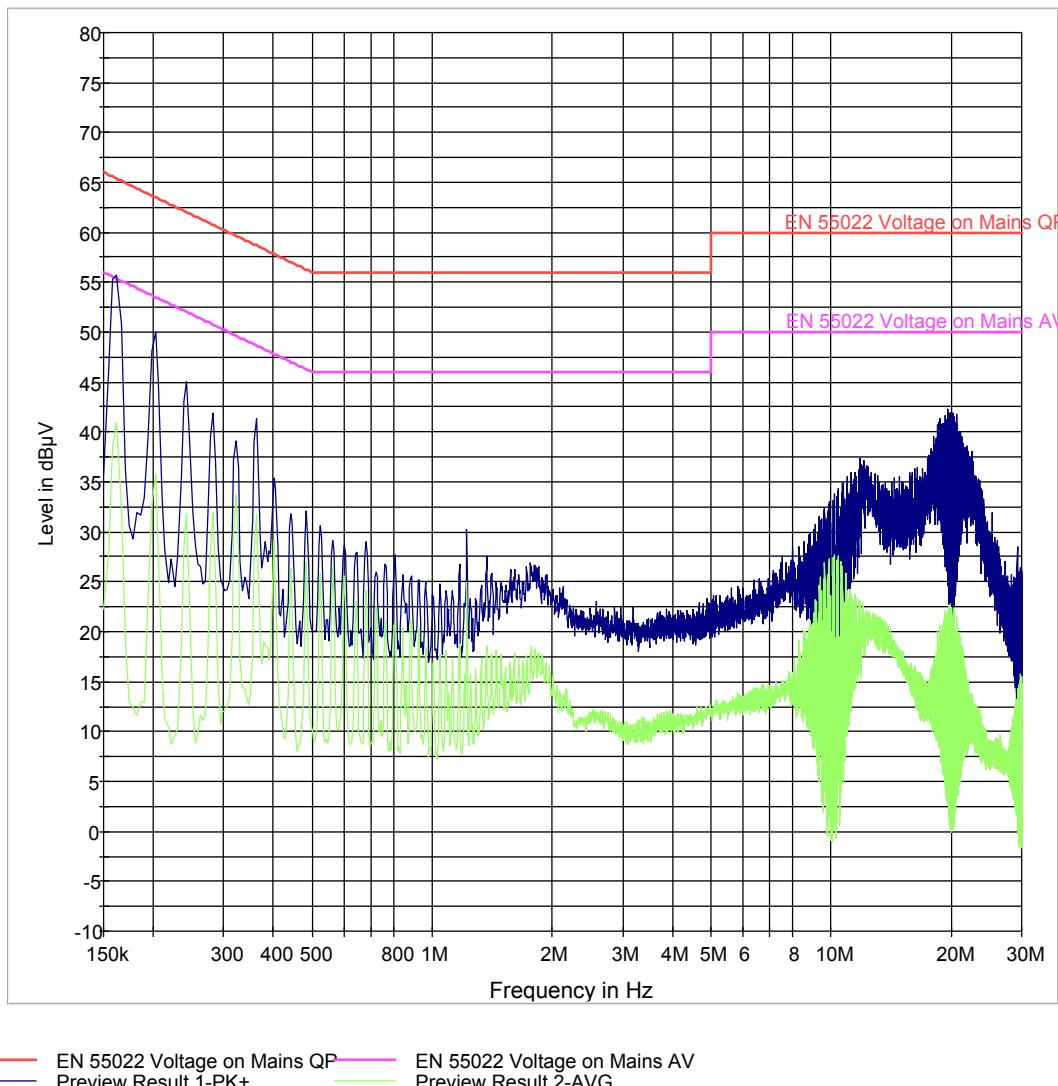
6.1.3 Test Conditions:

Modulation: 802.11a mode; mid channel of operation.

Measurement Uncertainty: ± 3.0 dB

Note: Plots shown here represent the combined worse case emissions for power lines, phases and neutral line.

6.1.4 Test Plots:



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7 Test Equipment and Ancillaries used for tests

| No. | Equipment Name | Manufacturer | Type/model | Serial No. | Cal Date | Cal Interval |
|----------------------------|-----------------------------|---------------|------------|------------|----------|--------------|
| 3m Semi- Anechoic Chamber: | | | | | | |
| | Turn table | EMCO | 2075 | N/A | N/A | N/A |
| | MAPS Position Controller | ETS Lindgren | 2092 | 0004-1510 | N/A | N/A |
| | Antenna Mast | EMCO | 2075 | N/A | N/A | N/A |
| | Relay Switch Unit | Rohde&Schwarz | RSU | 338964/001 | N/A | N/A |
| | EMI Receiver/Analyzer | Rohde&Schwarz | ESU 40 | 100251 | Aug 2012 | 1 Year |
| | Spectrum Analyzer | Agilent | E4440A | MY46186445 | Dec 2012 | 1 Year |
| | 1500MHz HP Filter | Filtek | HP12/1700 | 14c48 | N/A | N/A |
| | 2800 MHz HP Filter | Filtek | HP12/2800 | 14C47 | N/A | N/A |
| | Pre-Amplifier | Miteq | JS40010260 | 340125 | N/A | N/A |
| | Binconilog Antenna | EMCO | 3141 | 0005-1186 | Apr 2012 | 3 Years |
| | Binconilog Antenna | ETS | 3149 | J000123908 | Feb 2012 | 3 years |
| | Horn Antenna | EMCO | 3115 | 35114 | Mar 2012 | 3 Years |
| | Horn Antenna (18-40GHz) | 3116 | ETS | 00070497 | Aug 2011 | 3 years |
| | LISN | FCC | 50-25-2-08 | 08014 | Jul 2012 | 1 Year |
| Ancillary equipment | | | | | | |
| | Multimeter | Klein Tools | MM200 | 001 | Apr 2011 | 2 Years |
| | Humidity Temperature Logger | Dickson | TM320 | 03280063 | Mar 2012 | 1 Year |
| | Digital Barometer | VWR | 35519-055 | 91119547 | Nov 2011 | 2 Years |
| | DC Power Supply | HP | E3610A | KR83023316 | N/A | N/A |
| | DC Power Supply | Protek | 3003B | H012771 | N/A | N/A |
| | Communication Antenna | IBP5-900/1940 | Kathrein | N/A | N/A | N/A |

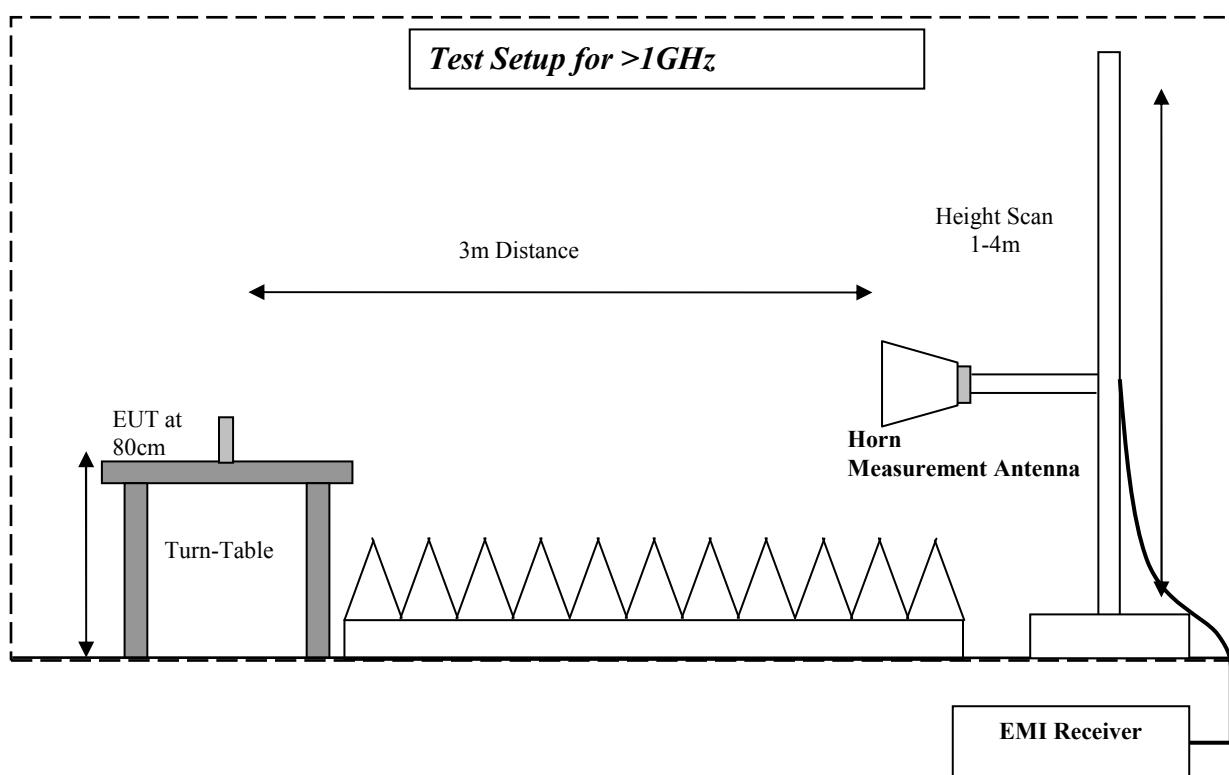
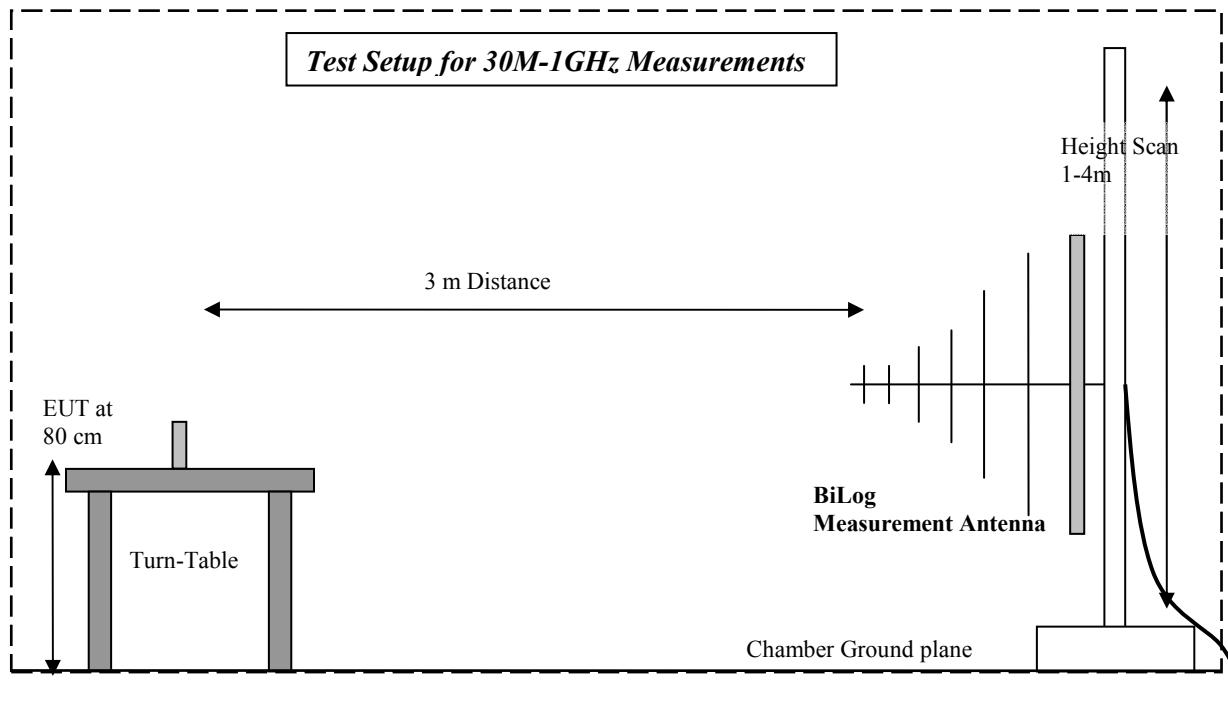
Calibration status valid at the time of testing.

Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month.

Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

8 Test Setup Diagrams:



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9 Revision History

| Date | Report Name | Changes to report | Report prepared by |
|------------|---------------------------------|-------------------|--------------------|
| 2013-05-28 | EMC_HONEY_095_12003_70eL00_UNII | First Version | Tunji Yusuf |