



FCC/IC Test Report

**FOR:
Honeywell**

**Product Description: Dolphin 75e, Handheld Computer
Models: 75eL00, 75eL0N**

**FCC ID: HD5-75EL0N and HD5-75EL00
IC ID: 1693B-75EL0N and 1693B-75EL00**

**47 CFR Part 15B
ICES-003, issue 5**

**TEST REPORT #: EMC_HONEY_134_14001_15B_75e
DATE: 2015-Feb-02**



**FCC:
Accredited**

**IC recognized #
3462B-1**

CETECOM Inc.

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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

Test Report #:	EMC_HONEY_134_14001_15B_75e	FCC ID: HD5-75EL0N/HD5-75EL00	
Date of Report:	2015-02-02	IC ID: 1693B-75EL0N/1693B-75EL00	

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1 Assessment

The following device was tested against the applicable criteria specified in FCC rules Part 15B of the Code of Federal Regulations and ICES-003, issue 5 and no deviations were ascertained during the course of the tests performed.

Company	Description	Model #
Honeywell International, Inc	Dolphin 75e, Handheld Computer	75eL0N and 75eL00

Responsible for Testing Laboratory:

2015-02-02	Compliance	Franz Engert (Manager Compliance)	
Date	Section	Name	Signature

Responsible for the Report:

2015-02-02	Compliance	James Donnellan (Sr. EMC Test Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section 3. 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 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
Compliance Manager:	Franz Engert
Test Engineer:	James Donnellan

2.2 Identification of the Client

Applicant's Name:	Honeywell International Inc.
Street Address:	9680 Old Bailes Road
City/Zip Code	Fort Mill SC 29707
Country	USA
Contact Person:	Mandana Salahshour
Phone No.	(803)835-8190; (803)835-8097
Fax:	-----
e-mail:	mandana.salahshour@honeywell.com

2.3 Identification of the Manufacturer

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

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3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name / Model No:	75eL0N and 75eL00
HW Version :	2.0
FCC-ID:	HD5-75EL0N/ HD5-75EL00
IC-ID:	1693B-75EL0N and 1693B-75EL00
Product Description:	Dolphin 75e, Handheld Computer
Class:	Class B designed and marketed for unrestricted use
Rated Operating Voltage / Power Supply:	Li-ion Battery Vmin: 3.3V dc/ Vnom: 3.7V dc / Vmax: 4.2V dc
Operating temperature range:	-20oC – 50oC
Test Sample:	Prototype
Radios included in the device:	BT Basic/EDR, BT LE (2.4 GHz band of operation) Wi-Fi 802.11a/b/g/n (Band of operation: 2.4 GHz/5GHz) NFC (Frequency of operation @ 13.56 MHz)

3.2 Identification of the Equipment under Test (EUT)

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	14269J000A	2.0	54.0	Radiated RF Sample / model 75eL0N
1	14268J006E	2.0	54.0	Radiated RF Sample / model 75eL00

3.3 Identification of Accessory equipment

AE #	Type	Manufacturer	Model	Serial Number
1	Desktop charger	PhiHong	PSA105R-050Q	P142302677A1
2	Li-ion Battery small	BTEC	70e-BTSC	TGMS142110512
3	Li-ion Battery big	BTEC	70e-BTEC	TGMX142100879
4	Docking station	Honeywell	70e-EHB	MAC: 00 10 20 54 70 B1

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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:

10/24/2014 – 01/16/2015

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4 **Subject of Investigation**

The variant 75EL0N differs from the variant 75EL00 by having NFC function and the related HW and SW incorporated. As the NFC antenna is integrated into the cover of the battery packs both sizes of battery pack have been evaluated. There is a desktop charger and a docking station with Ethernet and charging functionality available as accessories so measurements have been taken with both configurations.

During the measurements WLAN, BT and NFC transmitters were disabled. To stimulate the display and other digital HW of the EUT the “movie studio” app was used to play back a movie that was prior downloaded from the WEB. For the test cases with docking station and Ethernet connection the movie was streamed via Ethernet during the testing. The micro USB was connected to a lap top computer (lab sample with low emissions)

All the above configurations have been evaluated against the applicable criteria of 47 CFR Part 15B And ICES-003, issue 5.

The lowest frequency generated in the EUT is 19.2MHz according to block diagram in “75e Paris FCC Functional Overview”). The highest frequency generated in the EUT is 800MHz according to block diagram in “75e Paris FCC Functional Overview” .

This results in a required measurement range of 30MHz to 5GHz according to FCC 15.33.

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5 Summary of Measurement Results

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§15.109 ICES-003, issue 5	RX Spurious Emissions Radiated	Nominal	Stream video via ethernet, 75EL0N, Docking station	■	□	□	□	Complies
§15.109 ICES-003, issue 5	RX Spurious Emissions Radiated	Nominal	Stream video via ethernet, 75EL00, Docking station	■	□	□	□	Complies
§15.109 ICES-003, issue 5	RX Spurious Emissions Radiated	Nominal	Playback video, 75EL0N, desktop charger, Big battery pack, USB connection to lap top	■	□	□	□	Complies
§15.109 ICES-003, issue 5	RX Spurious Emissions Radiated	Nominal	Playback video, 75EL0N, desktop charger, Small battery pack, USB connection to lap top	■	□	□	□	Complies
§15.109 ICES-003, issue 5	RX Spurious Emissions Radiated	Nominal	Playback video, 75EL00, desktop charger, Big battery pack	■	□	□	□	Complies
§15.107(a) ICES-003, issue 5	Conducted Emissions <30MHz	Nominal	Playback video, 75EL0N, desktop charger, Big battery pack	■	□	□	□	Complies

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

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6 Radiated Emissions

6.1 §15.109 Radiated emission limits- Unintentional Radiators:

Radiated emission limits- Unintentional Radiators quasi-peak power limits (or average-peak power limits) for a class B (residential) device:

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

For measurements below 1000MHz, the limits are based on using the quasi-peak or peak detector function in the measurement instrumentation. Above 1000MHz, the limits are based on using the average detector function.

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6.2 Measurement Procedure:

According to ANSI C63.4 (2014) Section 8.3

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 16 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 2 frequency ranges due to antenna bandwidth restrictions. A Bi-conilog antenna is used from 30MHz to 1GHz, a horn antennas are used to cover frequencies up to 20 GHz.

6.3 Sample Calculations for Radiated Measurements

6.3.1 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 dBμV
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

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

Eg:

Frequency (MHz)	Measured SA (dBμV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBμV/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.

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6.4 Testing Notes:

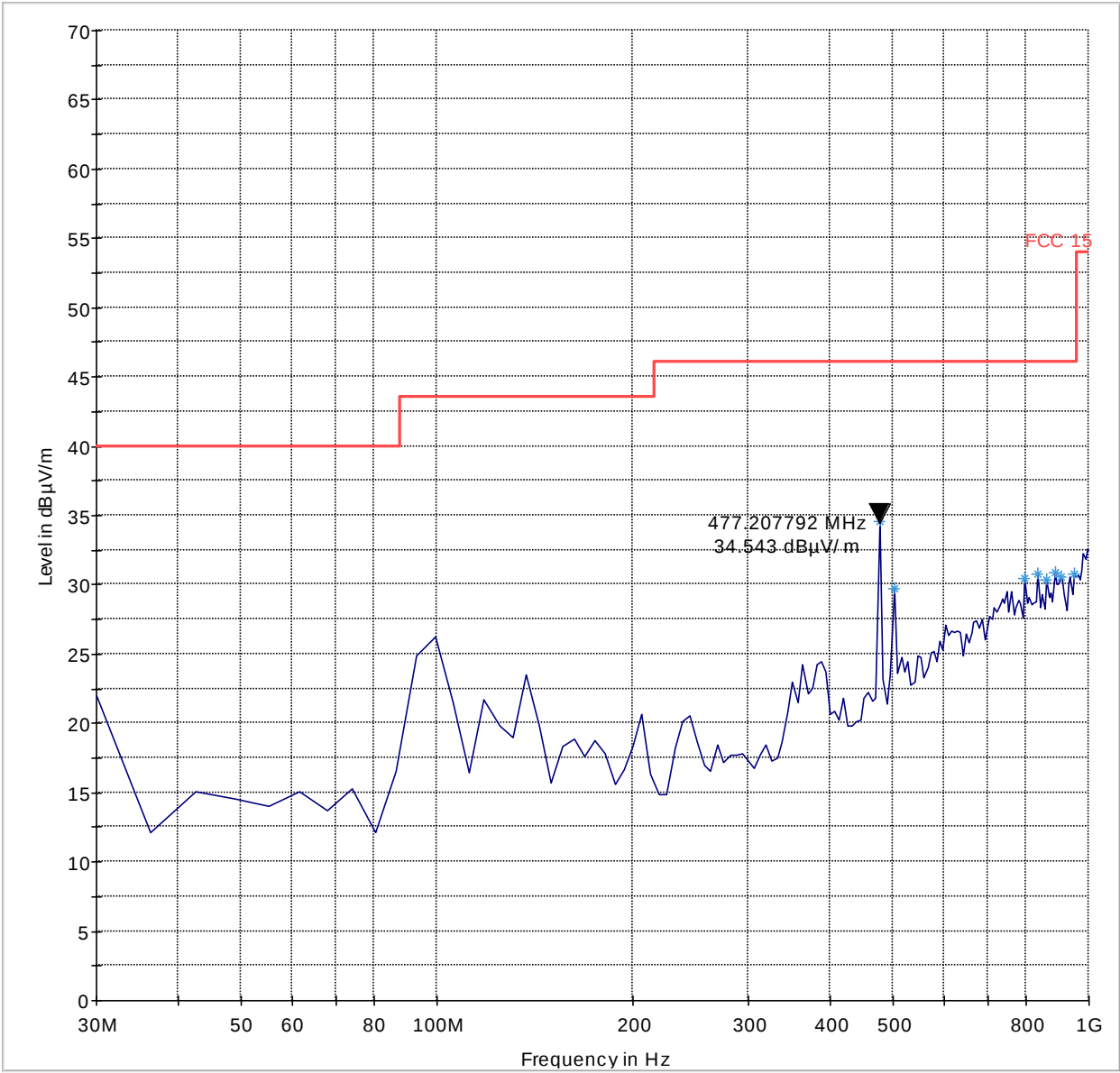
The relevant procedures of ANSI C63.4: 2014 have been followed.

All radiated test data in this report shows the worst case emissions for H/V measurement antenna polarizations and for all three orthogonal orientations of the EUT.

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6.5 Results

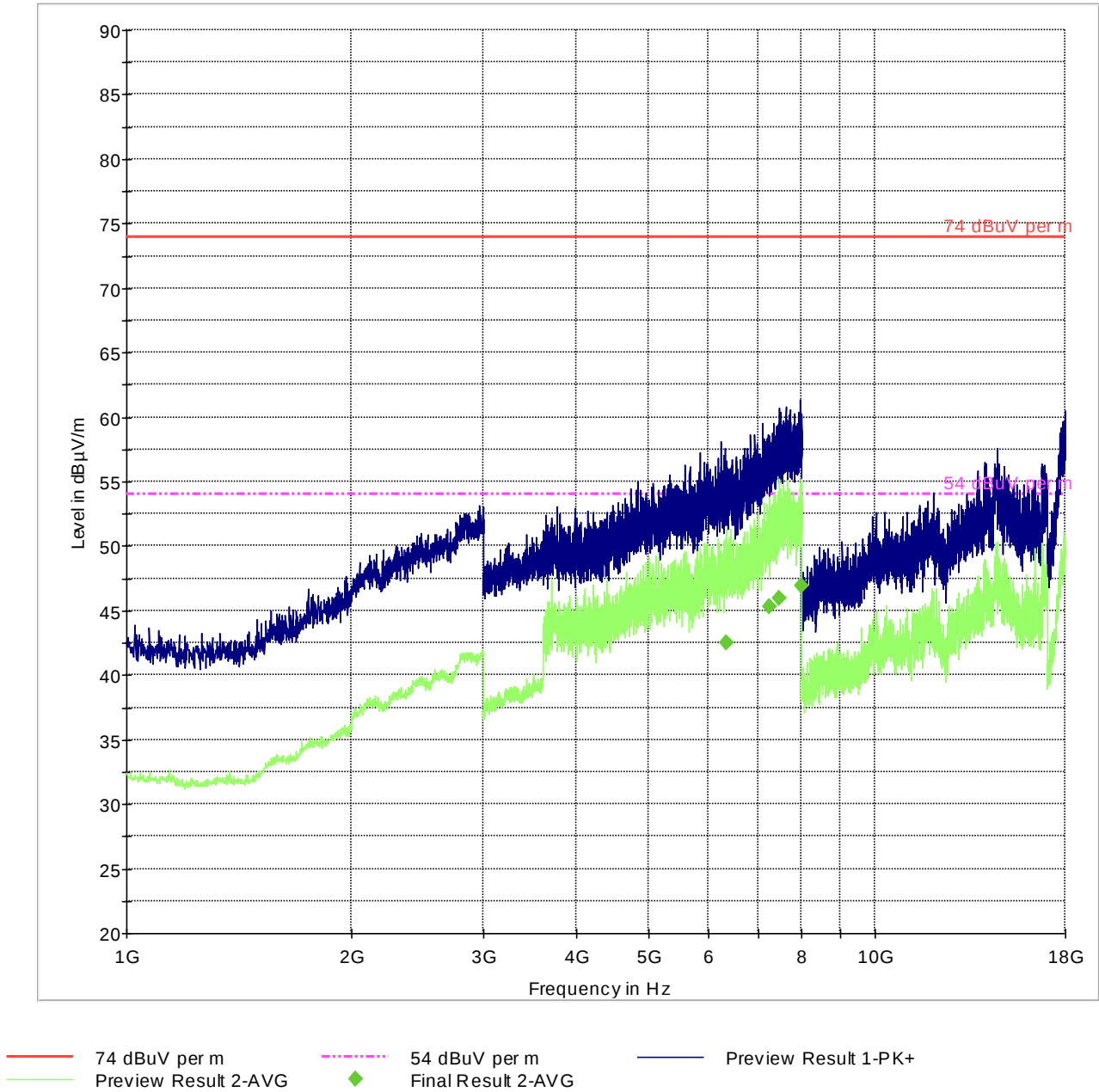
6.5.1 Stream video via Ethernet, 75EL0N, Docking station 30M- 1GHz



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

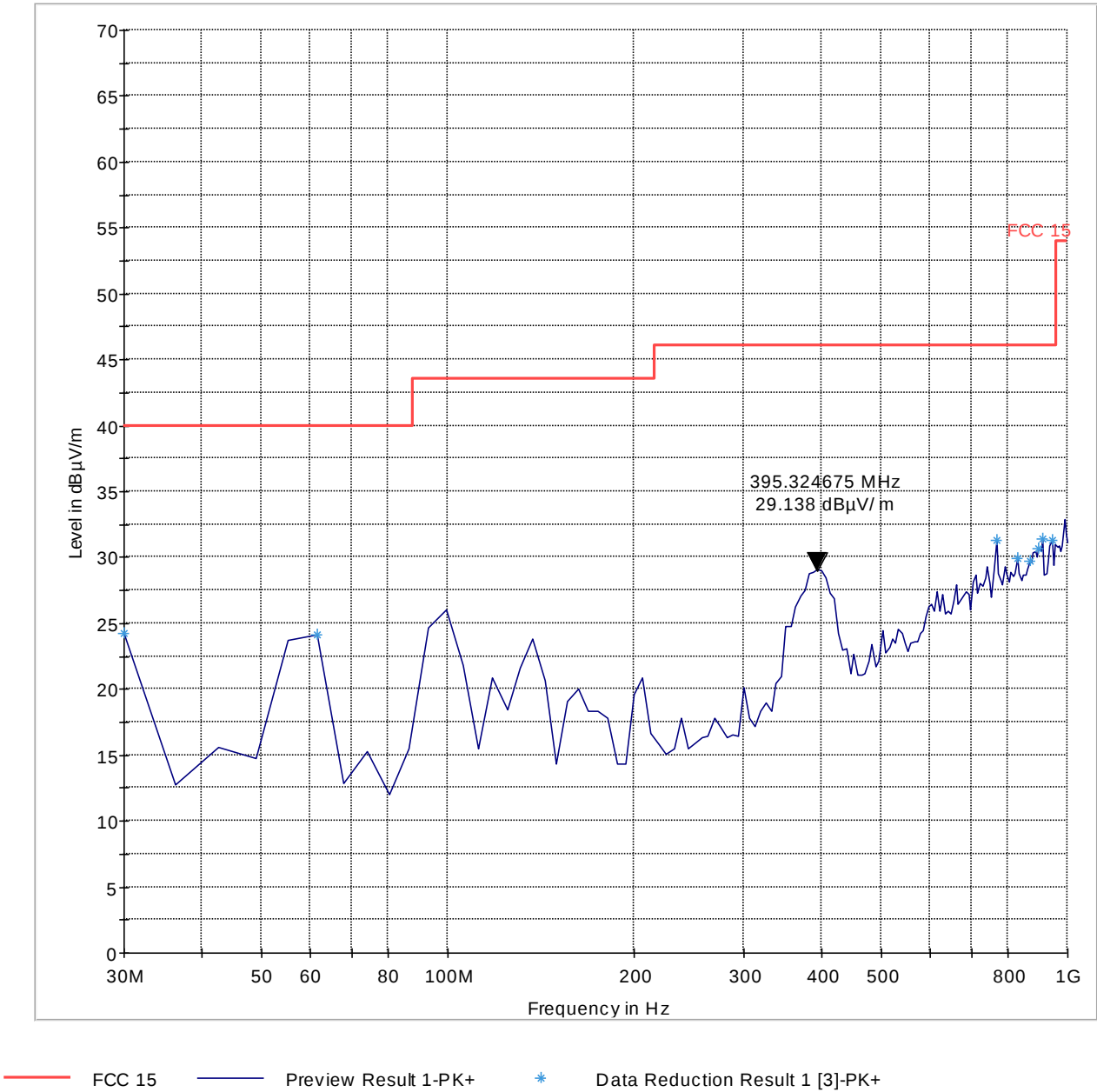
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6.5.2 Stream video via Ethernet, 75EL0N, Docking station 1GHz-18GHz



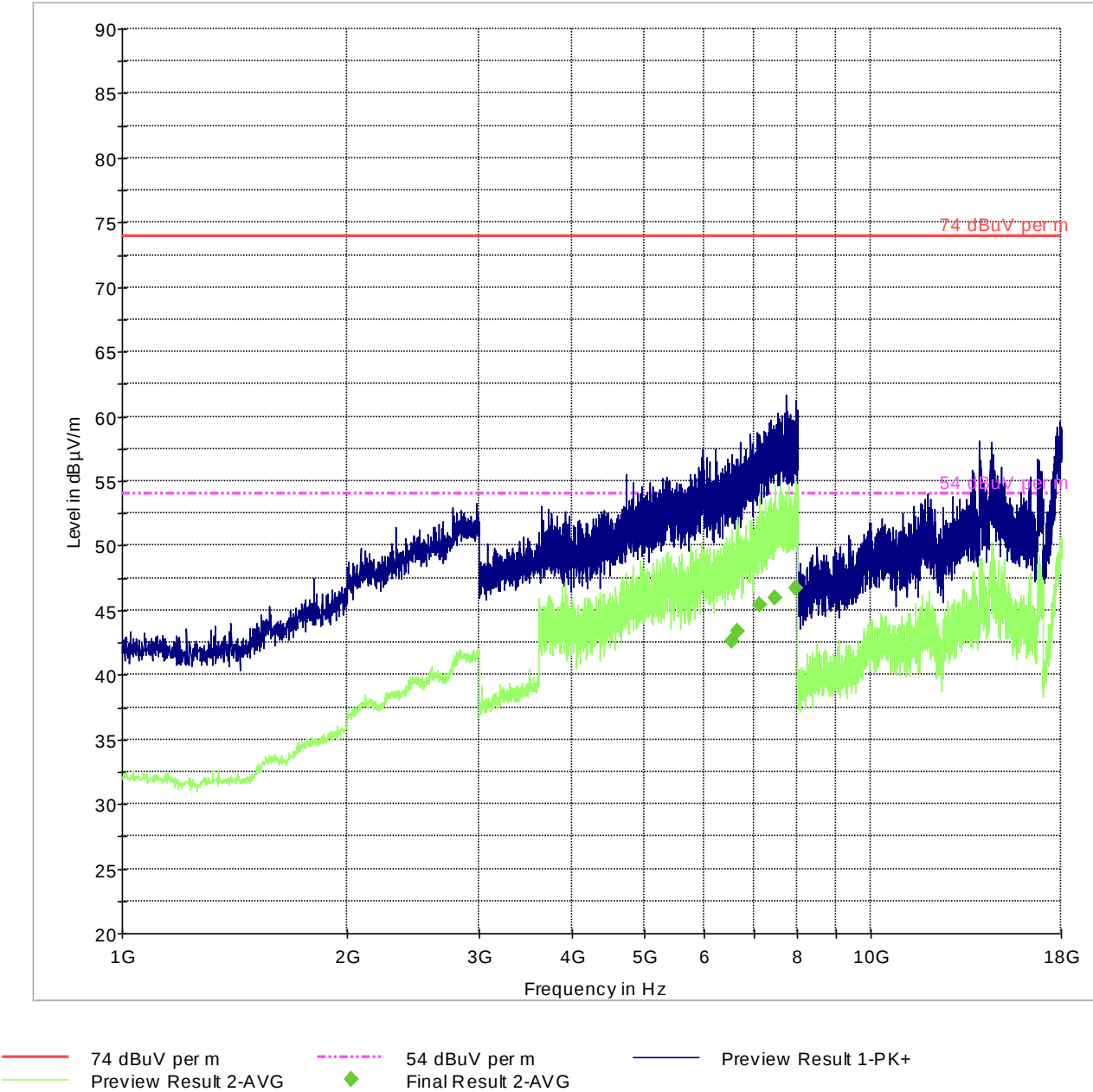
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Date of Report:	2015-02-02	IC ID: 1693B-75EL0N/1693B-75EL00	

6.5.3 Stream video via Ethernet, 75EL00, Docking station 30M- 1GHz



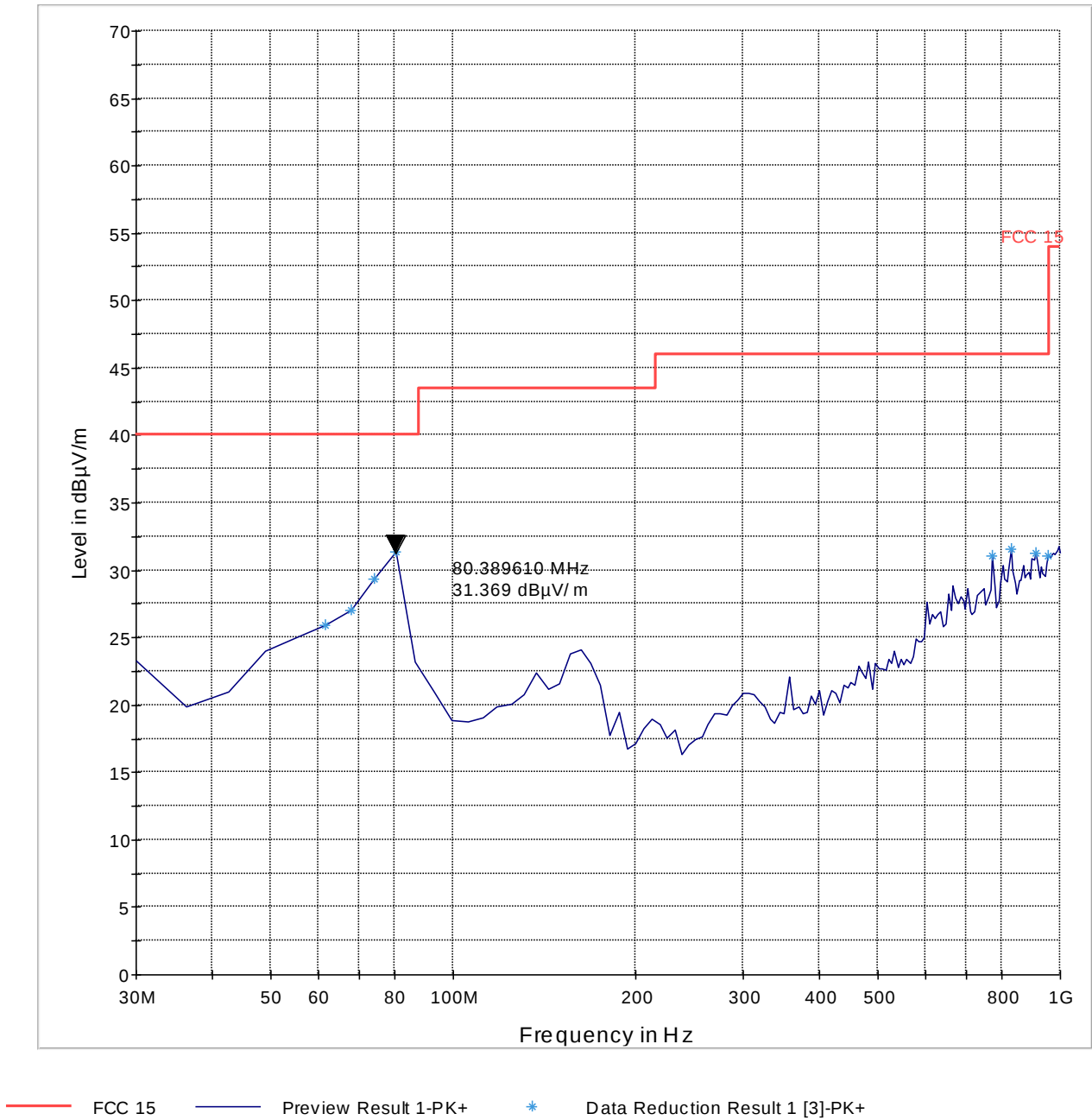
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Date of Report:	2015-02-02	IC ID: 1693B-75EL0N/1693B-75EL00	

6.5.4 Stream video via Ethernet, 75EL00, Docking station 1GHz-18GHz



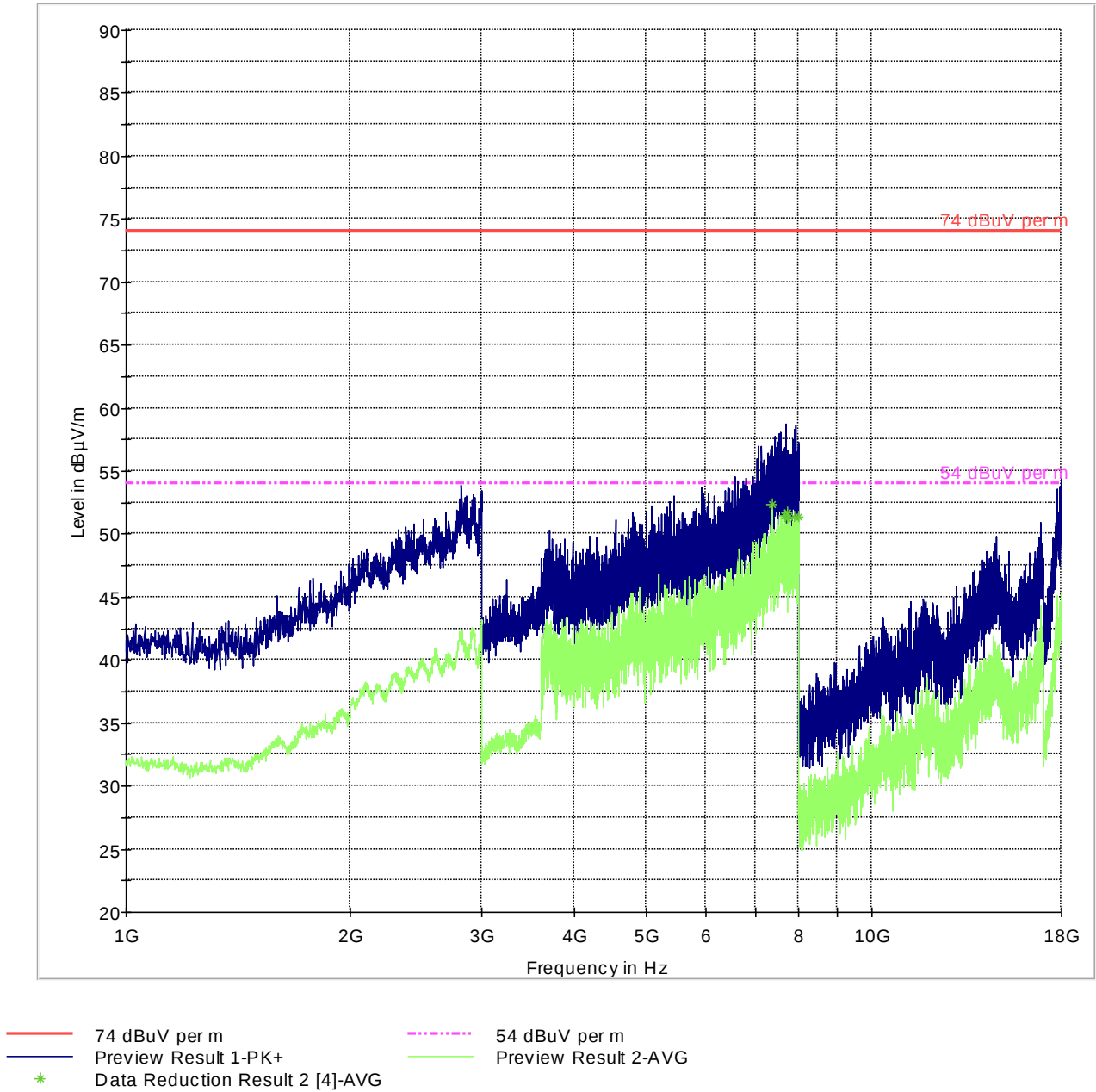
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**6.5.5 Playback video, 75EL0N, desktop charger, Big battery pack, USB connection to lap top
30M- 1GHz**



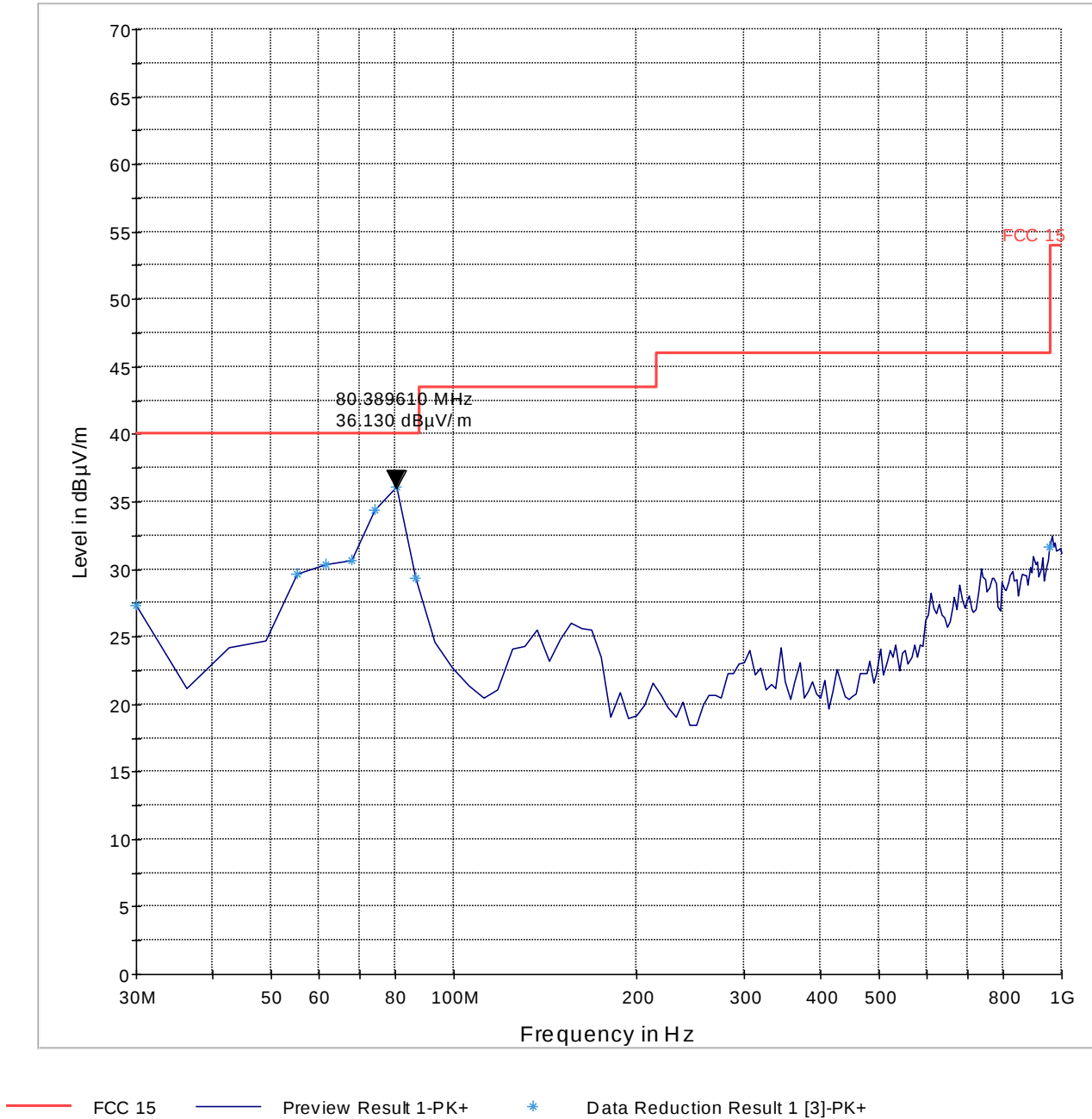
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6.5.6 Playback video, 75EL0N, desktop charger, Big battery pack, USB connection to lap top 1GHz-18GHz



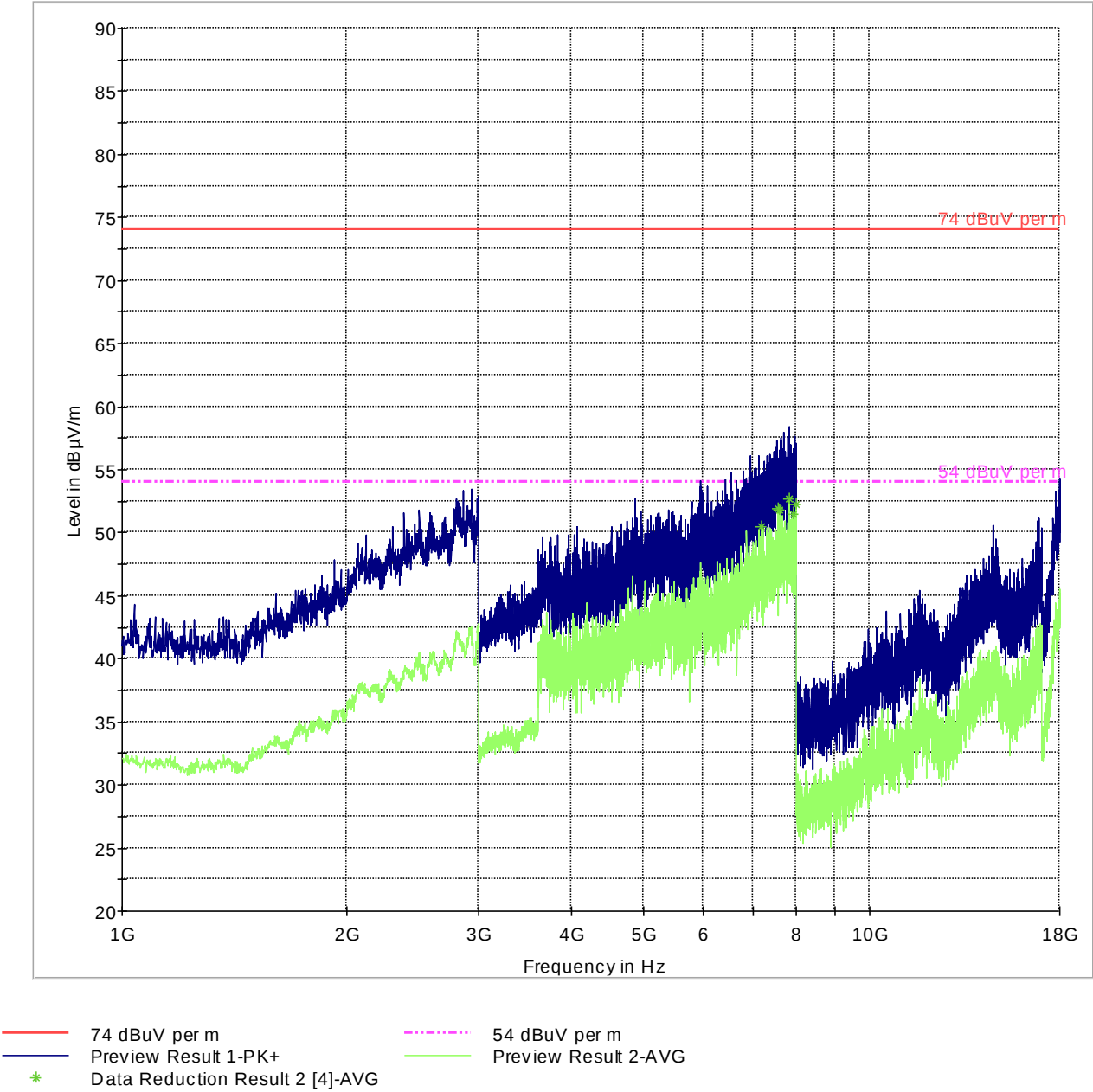
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**6.5.7 Playback video, 75EL0N, desktop charger, Small battery pack, USB connection to lap top
30M- 1GHz**



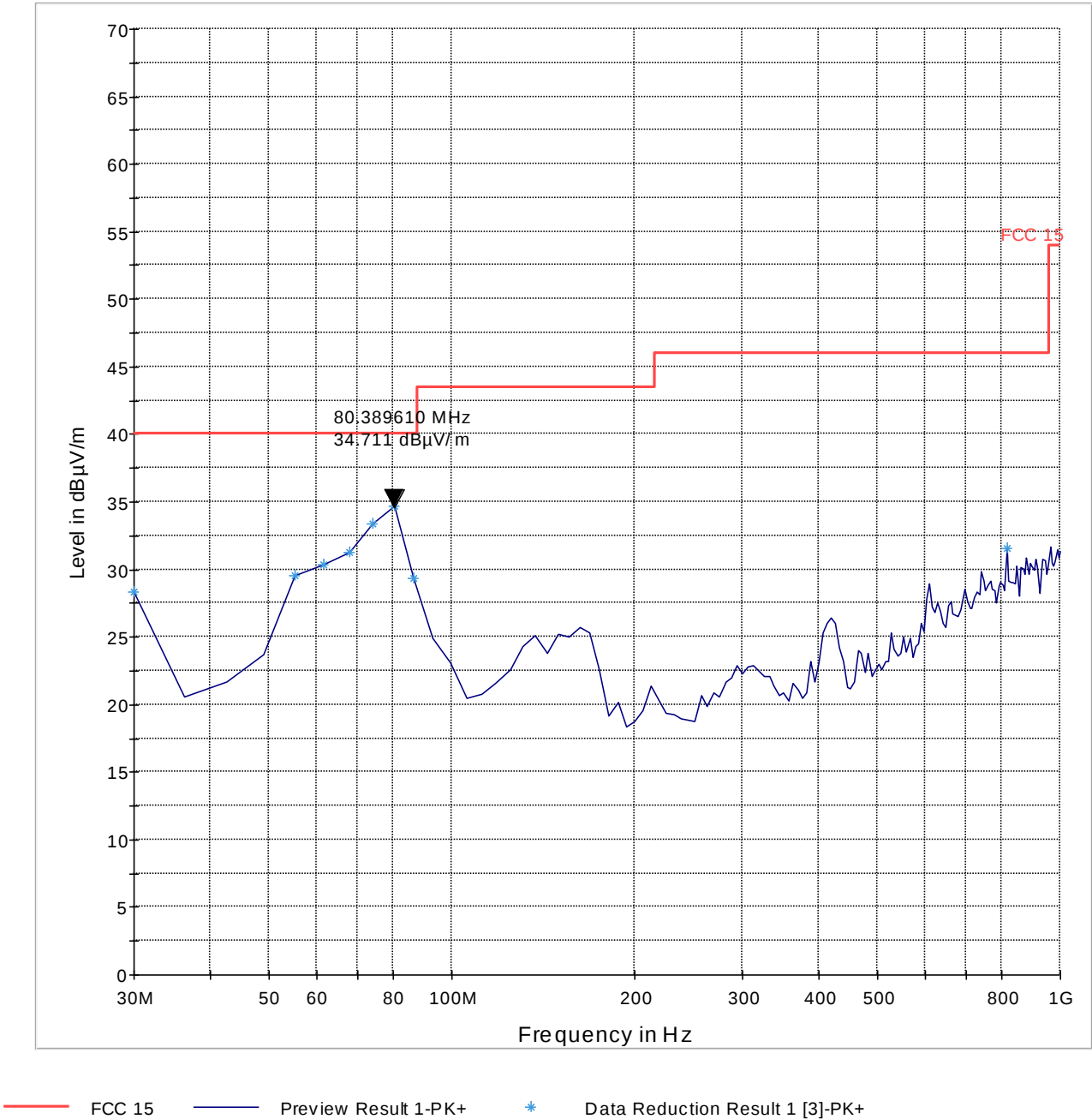
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6.5.8 Playback video, 75EL0N, desktop charger, Small battery pack, USB connection to lap top
1GHz-18GHz



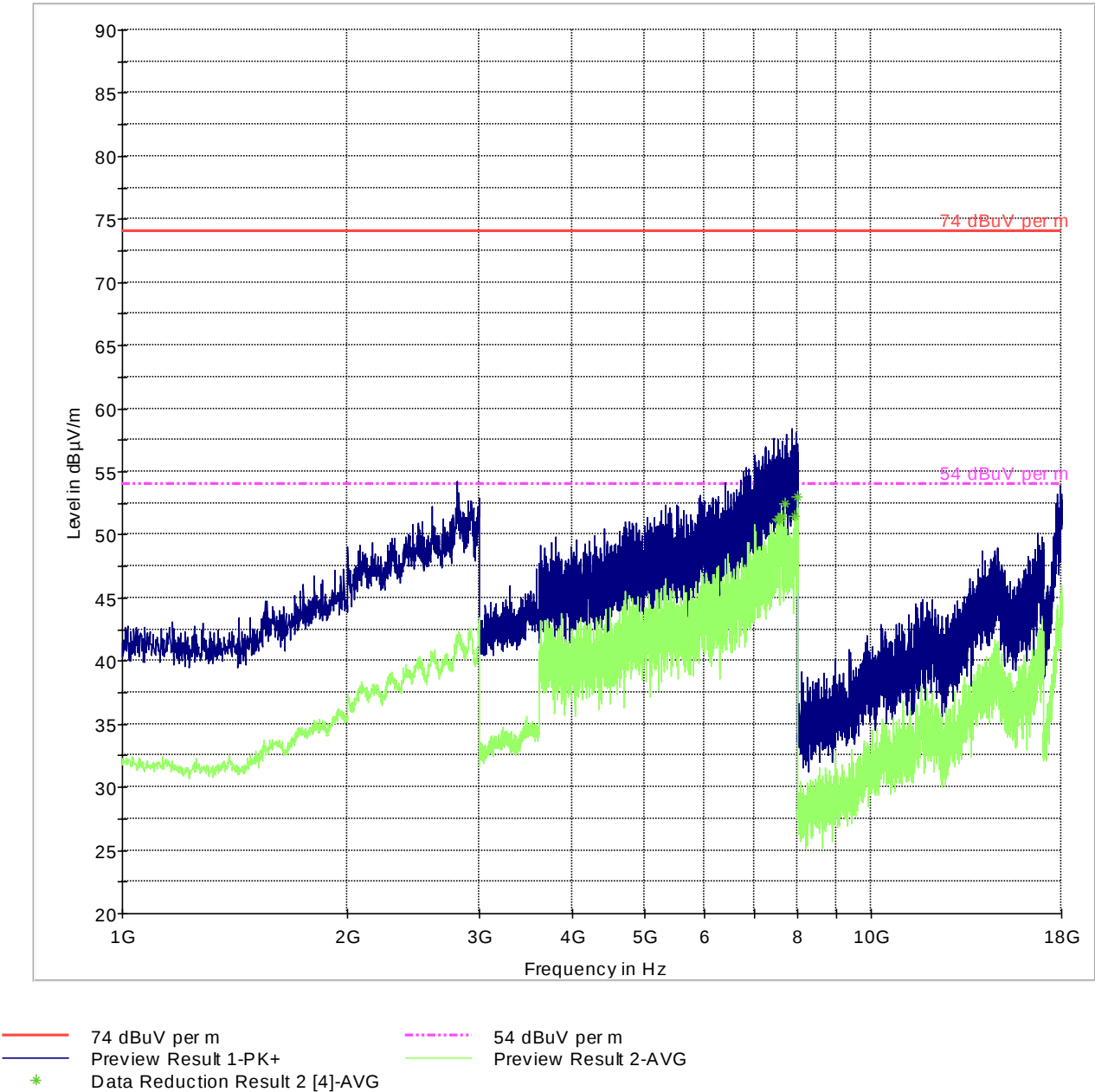
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6.5.9 Playback video, 75EL00, desktop charger, Big battery pack 30M- 1GHz



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6.5.10 Playback video, 75EL00, desktop charger, Big battery pack 1GHz-18GHz



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7 AC Power Line Conducted Emissions

7.1 § 15.107 Conducted limits- Unintentional Radiators

(a) Except for Class A digital devices, for equipment 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). 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 band edges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	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.

7.2 Measurement Procedure:

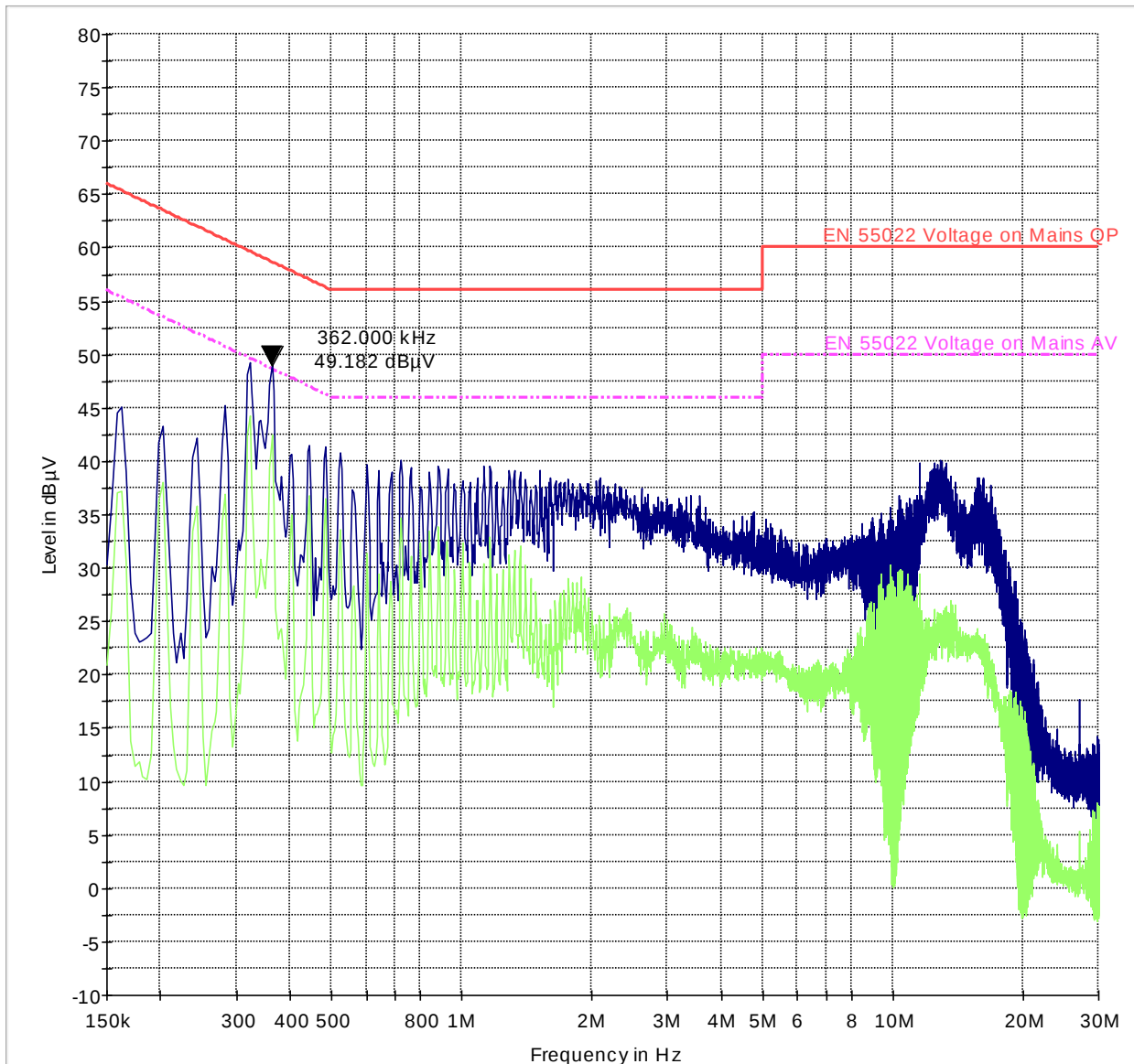
According to ANSI C63.4 (2014) Section 7.3

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7.3 Results:

Plots below show the worst case representation of emissions into LINE and NEUTRAL.

7.3.1 Playback video, 75EL0N, desktop charger, Big battery pack



— EN 55022 Voltage on Mains QP - - - EN 55022 Voltage on Mains AV
— Preview Result 1-PK+ — Preview Result 2-AVG

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8 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	Sep 2013	2 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
	Horn Antenna	EMCO	3115	35114	Mar 2012	3 Years
Other Equipment						
	Spectrum Analyzer	Rohde&Schwarz	FSU 8	200256	Jun 2013	2 Years
	Spectrum Analyzer	Rohde&Schwarz	FSU 26.5	100189	Jun 2013	2 Years
	Spectrum Analyzer	Rohde&Schwarz	FSU 26.5	200065	Jun 2013	2 Years
	Vector Signal Generator (Interferer)	Rohde&Schwarz	SMU200A	101935	Feb 2013	2 Years
	Signal Generator (Blocker)	Rohde&Schwarz	SMP04	100151	Jun 2013	2 Years
	Fast Power Detector 5Ms/s	ETS Lindgren	7002-006	00160034	Sep 2014	2 Years
	Temperature Sensor	Dickson	SM320	0929600	Apr 2014	2 Years
	Temperature Chamber	Test Equity	115	150384	N/A	N/A
	Vector Signal generator (Interferer)	Keysight	EE4438C	MY45094596	Jun 2013	2 Years
	WLAN AP (companion device)	Rhode&Schwarz	CMW500	125754	Jun 2013	2 Years
	WLAN AP (companion device)	Cisco	Aironet 1260	FTX1553E037	N/A	N/A
	DC Power Supply	HP	E3610A	KR83023316	N/A	N/A

Calibration details valid at the time of testing.

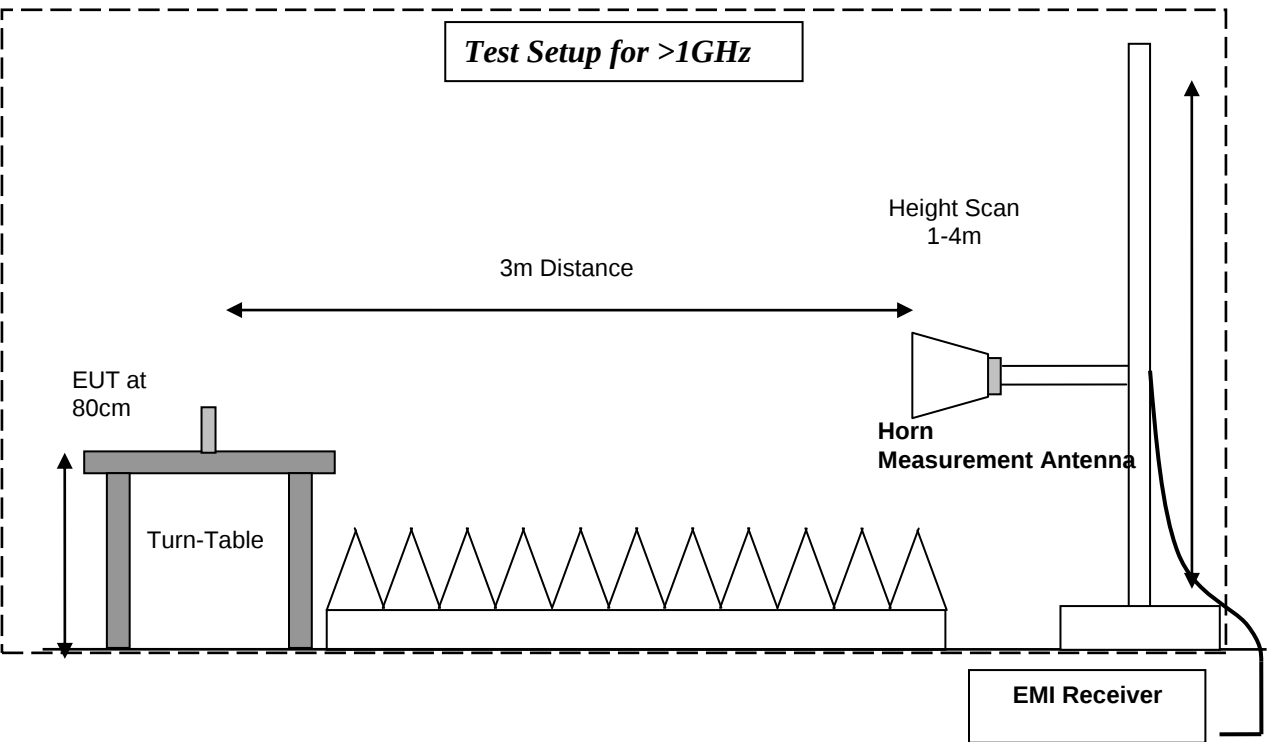
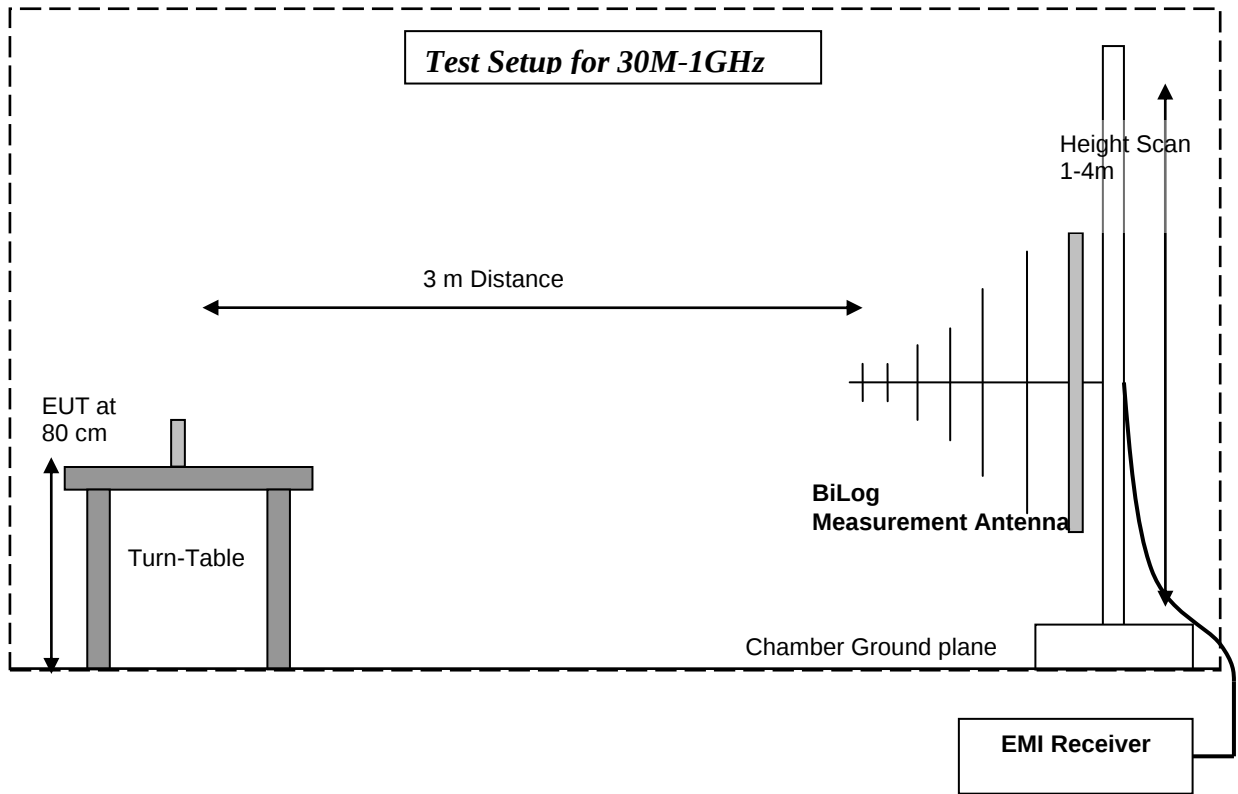
Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

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.

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9 Test Setup Diagrams



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10 Revision History

Date	Report Name	Changes to report	Report prepared by
2015-02-02	EMC_HONEY_134_14001_15B_75E	First Version	Franz Engert