


**AT4 wireless, S.A.**

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**TEST REPORT (Modification 2)**
**REFERENCE STANDARD:**
**FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-10 Edition)**
**FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B:**
**Radio frequency devices Subpart B. Unintentional radiators**

<b>NIE</b> .....	39687REM.001A2
Approved by (name / position & signature) .....	Rafael López EMC Lab Manager
Elaboration date .....	2014-02-10
<b>Identification of item tested</b> .....	BLACK
Trademark .....	Boeing
Model and/or type reference .....	Model: BLACK / Type: BLK1
Other identification of the product .....	S/N : 9304084001 HW Version: 4.0.2 SW Version: 1.2.0 FCCID: H8V-BLK1
Features .....	Data/Voice GSM (Worldwide) at 850/900/1800/1900 Mhz (2G). Data/Voice UMTS/HSPA at 850/1800/2100Mhz (3G). Data and LTE FDD band 1 (2100Mhz), Band 4 (1700Mhz) and Band 17 (700Mhz). Bluetooth, WLAN, USB, HDMI, PDMI.
Description .....	Smartphone.
<b>Applicant</b> .....	The Boeing Company
Address .....	7700 Boston Blvd. Springfield, VA 22153
CIF/NIF/Passport .....	N/A
Contact person .....	Brian Chapman
Telephone / Fax .....	703.270.6714
e-mail .....	brian.s.chapman@boeing.com

<b>Test samples supplier</b> .....	Same as applicant
<b>Manufacturer</b> .....	Same as applicant
<b>Test method requested</b> .....	
Standard.....	FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-10 Edition).
Test procedure.....	PEEM103
Report template No.....	FDT11_14

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## Competences and guarantees

This certificate of conformity was issued in accordance with the decision N° 3/2000 of the Joint Committee established under the Agreement on Mutual Recognition between the European Community and the United States of America. By this decision, AT4 wireless can act as Conformity Assessment Body (CAB) on Electromagnetic Compatibility. This Certificate applies to the samples listed at technical reports.

This laboratory is designed by the Federal Communications Commission (ES0004)

AT4 wireless is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance programme for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

## General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

## Uncertainty

Uncertainty (factor k=2) was calculated according to the following AT4 wireless's internal documents:

1. PODT000: Procedure for the measure uncertainty calculation.

## Usage of samples

Samples under test have been selected by: The client.

Sample S/01 is composed of the following elements:

<u>Control Nº</u>	<u>Description</u>	<u>Model</u>	<u>Serial Nº</u>	<u>Date of reception</u>
39687/10	Smartphone	Model: BLACK Type: BLK1	9304084001	2013-07-02
39687/28	AC/DC Adapter	LFS051000D-A8S	---	2013-07-08

## Testing period

The performed test started on 2013-07-08 and finished on the 2013-07-09.

The tests have been performed at AT4 wireless.

## Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 80 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

In the semianechoic chamber (21 meters x 11 meters x 8 meters), the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 30 °C
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 30 °C
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

## Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 39687REM.001 related with the same samples, in the next clauses and sub-clauses:

By client request it was modified the “Test samples supplier” and “Manufacturer” fields to indicate “Same as applicant”. It was modified too the “Other identification of the product” field to remove the PCTRB model number and the FCC Grantee Code. It was added new photographs to the appendix B.

## Summary

Considering the results of the performed test according to standard **FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-10 Edition)**, the items under test are **IN COMPLIANCE** with the requested specifications specified in the standard.

NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, “**USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS**”.

## Remarks and comments

The tests have been realized by the technical personnel: Margarita Haro, Antonio Jurado & Pedro Manuel Valenzuela Comino.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 150 kHz to 30 MHz is  $I = \pm 3,60$  dB for quasi-peak measurements,  $I = \pm 3,48$  dB for peak measurements ( $k = 2$ ).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1 GHz is  $I = \pm 4,57$  dB for quasi-peak measurements,  $I = \pm 4,48$  dB for peak measurements ( $k = 2$ ) and from 1 to 12,75 GHz is  $I = \pm 3,43$  dB for average and peak measurements.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 12,75 GHz to 26 GHz is  $I = \pm 4,09$  dB for average and peak measurements.

## Testing verdicts

Not applicable ..... : NA  
 Pass ..... : P  
 Fail ..... : F  
 Not measured ..... : NM

## List of equipment used during the test

CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1999	EMI Receptor	ROHDE & SCHWARZ	ESIB 26	2011-11-03	2013-11-03
2942	EMI Receptor	ROHDE & SCHWARZ	ESU 40	2012-03-05	2014-03-05
245	Horn Antenna	HEWLETT PACKARD	11966E	2011-03-18	2014-03-18
246	Horn Antenna	HEWLETT PACKARD	11966E	2013-03-06	2015-03-06
1658	RF Amplifier	SCHAFFNER	CPA9231A	2013-06-17	2015-06-17
3541	Bilog Hybrid antenna	SUNOL SCIENCES CORPORATION	JB6	2012-06-01	2015-06-01
3556	Thermohygrograph	T&D	TR-72W	2012-11-30	2013-11-30
3822	Horn Antenna	ROHDE & SCHWARZ	HF907	2010-11-03	2013-11-03

## APPENDIX A

### Test Result

#### APPENDIX A CONTENT:

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## DESCRIPTION OF THE OPERATION MODES

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

In the following table appears the operation modes used by the samples tested to that it refers the present test report.

OPERATION MODE	DESCRIPTION
OM#01	EUT ON. Idle 1900MHz. Equipment charging battery. Power supply: 115Vac.
OM#02	EUT ON. TCH 1900MHz. Equipment charging battery. Power supply: 115Vac.

## RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE.

<b>LIMITS:</b>	Product standard:	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B
	Test standard:	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B

### LIMITS OF INTERFERENCE CLASS B

The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15.109, Subpart B & IC RSS-Gen Issue 2, June 2007 in the frequency range 30 MHz to 25 GHz, for Class B equipment, which is a transmitter in a band over 500 MHz, was:

Frequency range (MHz)	Limit for 3 m ( $\mu$ V/m)	Limit for 3 m (dB $\mu$ V/m)
30 to 88	100	40
88 to 216	150	43,52
216 to 960	200	46,02
Above 960	500	53,98

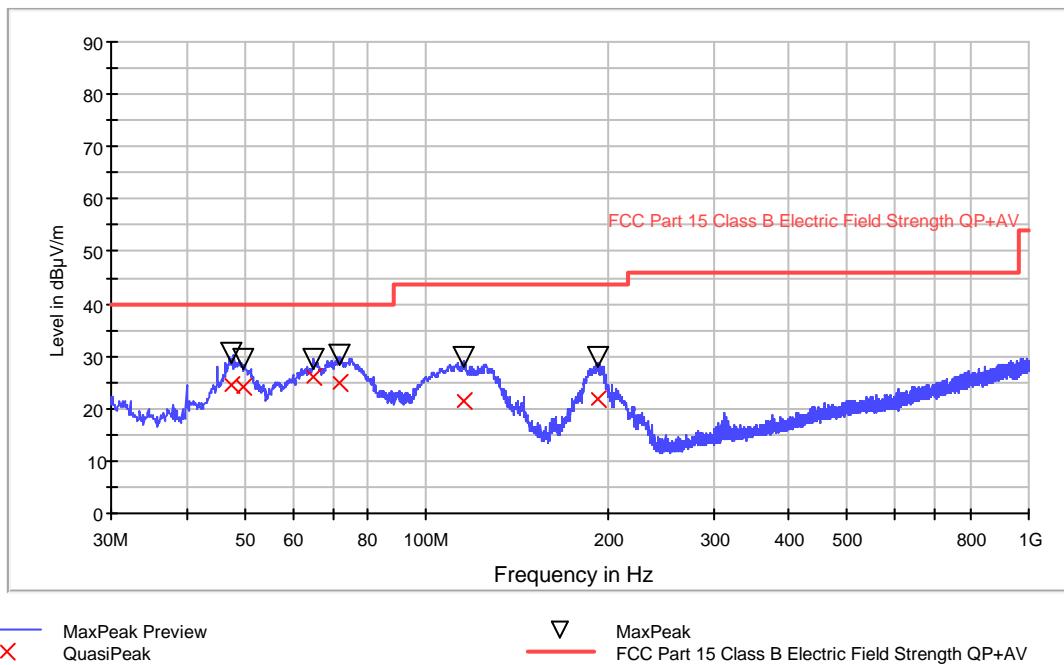
<b>TESTED SAMPLES:</b>	S/01
<b>TESTED OPERATION MODES:</b>	OM#01
<b>TEST RESULTS :</b>	CRmmnn: CR, Radiation Condition; mm: Sample number; nn: Operation mode, xx: Polarisation.

CRmmnn	Description	Result
CR0101	EUT ON. Idle Bluetooth. Range 30MHz-1 GHz.	P
CR0101_RA1_PH	EUT ON. Idle Bluetooth. Range 1-18 GHz. Horizontal Pol.	P
CR0101_RA1_PV	EUT ON. Idle Bluetooth. Range 1-18 GHz. Vertical Pol.	P
CR0101_RA2_PH	EUT ON. Idle Bluetooth. Range 18-26 GHz. Horizontal Pol.	P
CR0101_RA2_PV	EUT ON. Idle Bluetooth. Range 18-26 GHz. Vertical Pol.	P

### Radiated Emission: CR0101 (30MHz to 1GHz)

Project: 39687REM.001  
 Company: THE BOEING COMPANY  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. IDLE 1900 MHz.

### ER FCC Class B Bilog Hybrid

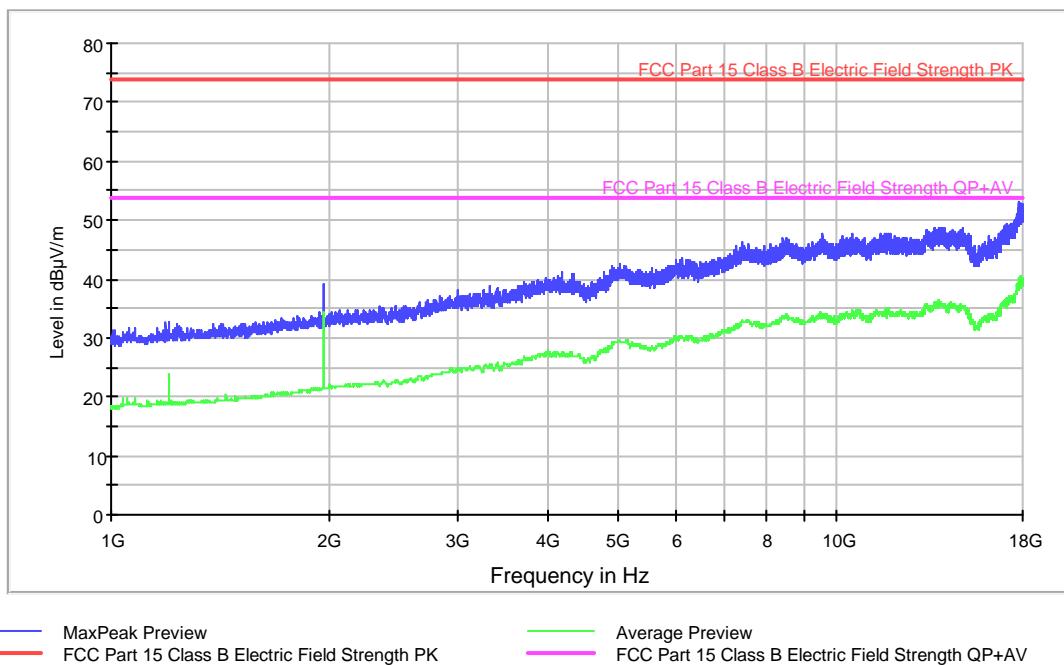


### Maximizations

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	QuasiPeak (dB $\mu$ V/m)	Polarization	Azimuth (deg)
47.539078	30.7	24.4	V	190.0
49.783567	29.5	24.2	V	263.0
64.999800	29.5	26.0	V	128.0
71.833667	30.1	24.8	V	13.0
115.097395	29.9	21.3	V	-3.0
192.149098	29.9	21.9	V	94.0

**Radiated Emission: CR0101\_RA1\_PH (1 – 18 GHz)**

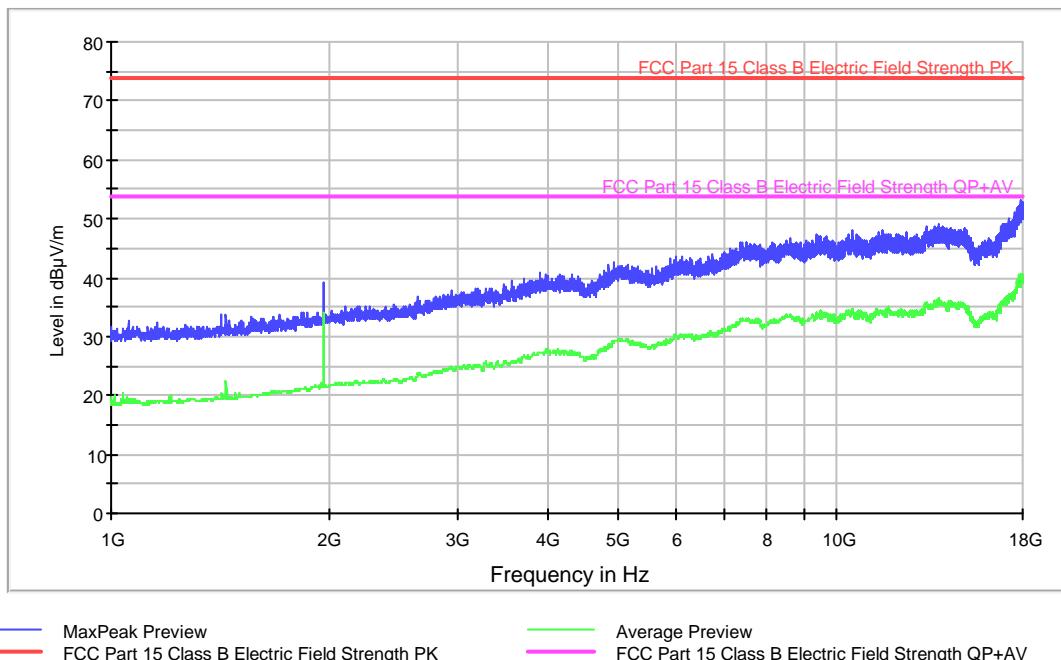
Project: 39687REM.001  
 Company: THE BOEING COMPANY  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. IDLE 1900 MHz. Horizontal Polarization.

**FCC 1-18GHz class B ESU Horn0245 AMP3783**

**Max PK&AVG**

Frequency (MHz)	MaxPeak-ClearWrite (dB $\mu$ V/m)	Average-ClearWrite (dB $\mu$ V/m)
1200.000000	32.7	23.8
1720.000000	33.4	20.6
1960.000000	39.1	34.2
3006.000000	38.1	24.7
4167.000000	41.1	27.1
5027.000000	42.7	29.5
7393.000000	46.4	32.7
9524.000000	47.8	33.9
13243.000000	48.4	35.5
17828.000000	53.2	40.2

**Radiated Emission: CR0101\_RA1\_PV (1 – 18 GHz)**

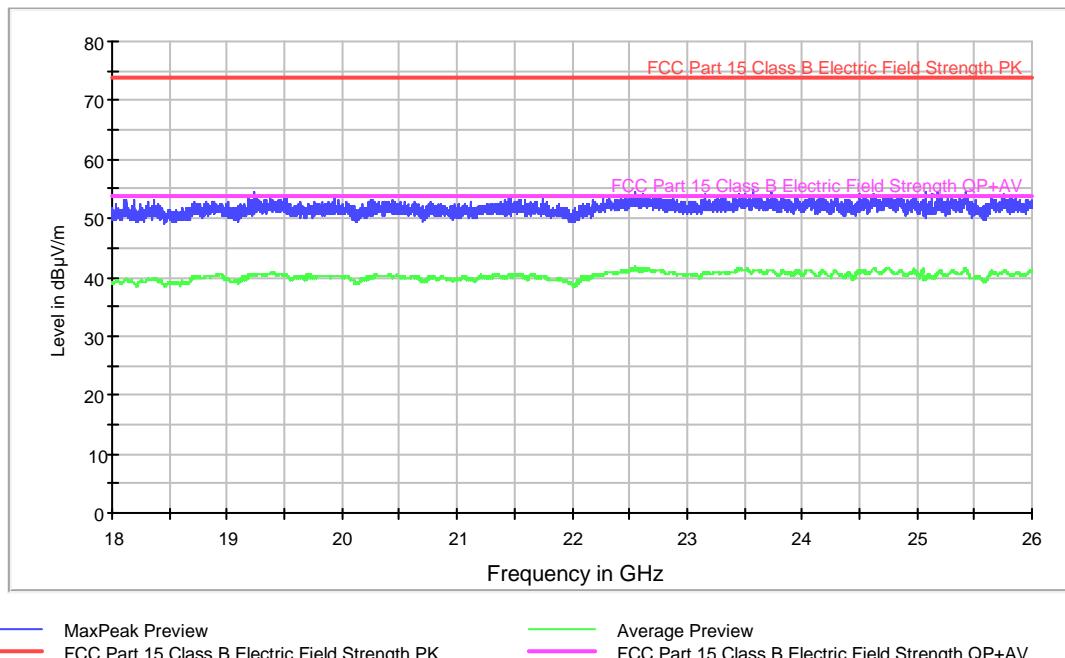
Project: 39687REM.001  
 Company: THE BOEING COMPANY  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. IDLE 1900 MHz. Vertical Polarization.

**FCC 1-18GHz class B ESU Horn0245 AMP3783**

**Max PK&AVG**

Frequency (MHz)	MaxPeak-ClearWrite (dB $\mu$ V/m)	Average-ClearWrite (dB $\mu$ V/m)
1056.000000	32.6	19.3
1440.000000	33.8	22.5
1960.000000	39.2	34.1
3176.000000	38.1	25.1
3887.000000	40.7	27.1
4913.000000	42.4	29.2
7354.000000	46.1	32.9
9352.000000	47.2	33.9
13276.000000	48.7	35.6
17926.000000	53.1	40.6

**Radiated Emission: CR0101\_RA2\_PH (18 – 26 GHz)**

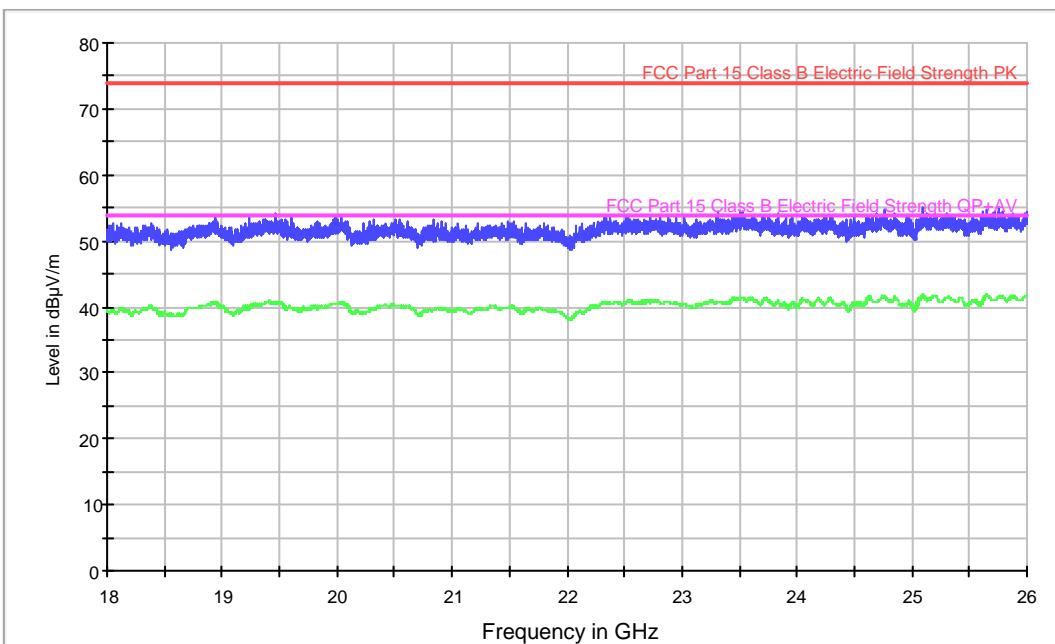
Project: 39687REM.001  
 Company: THE BOEING COMPANY  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. IDLE 1900 MHz. Horizontal Polarization.

**FCC 18-26GHz class B ESU Horn1920 AMP1975**

**Max PK&AVG**

Frequency (MHz)	MaxPeak-ClearWrite (dB $\mu$ V/m)	Average-ClearWrite (dB $\mu$ V/m)
18199.000000	53.2	38.8
19232.000000	54.5	40.3
19937.000000	53.8	40.2
20263.000000	53.1	40.0
21450.000000	53.4	40.3
22428.000000	53.9	41.2
22549.000000	54.5	41.7
23579.000000	54.7	41.0
24500.000000	54.1	41.1
25430.000000	54.5	41.4

**Radiated Emission: CR0101\_RA2\_PV (18 – 26 GHz)**

Project: 39687REM.001  
 Company: THE BOEING COMPANY  
 Sample: S/01  
 Operation mode: OM#01  
 Description: EUT ON. IDLE 1900 MHz. Vertical Polarization.

**FCC 18-26GHz class B ESU Horn1920 AMP1975**

**Max PK&AVG**

Frequency (MHz)	MaxPeak-ClearWrite (dB $\mu$ V/m)	Average-ClearWrite (dB $\mu$ V/m)
18055.000000	52.7	39.4
19237.000000	53.8	39.8
19468.000000	54.3	40.8
20322.000000	53.4	39.7
21542.000000	52.8	39.9
22383.000000	53.6	40.5
22875.000000	53.9	40.7
23514.000000	54.6	41.4
24757.000000	54.7	41.6
25754.000000	55.1	41.4

## CONTINUOUS CONDUCTED EMISSION ON POWER LEADS

<b>LIMITS:</b>	Product standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-12 ED)
	Test standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-12 ED)

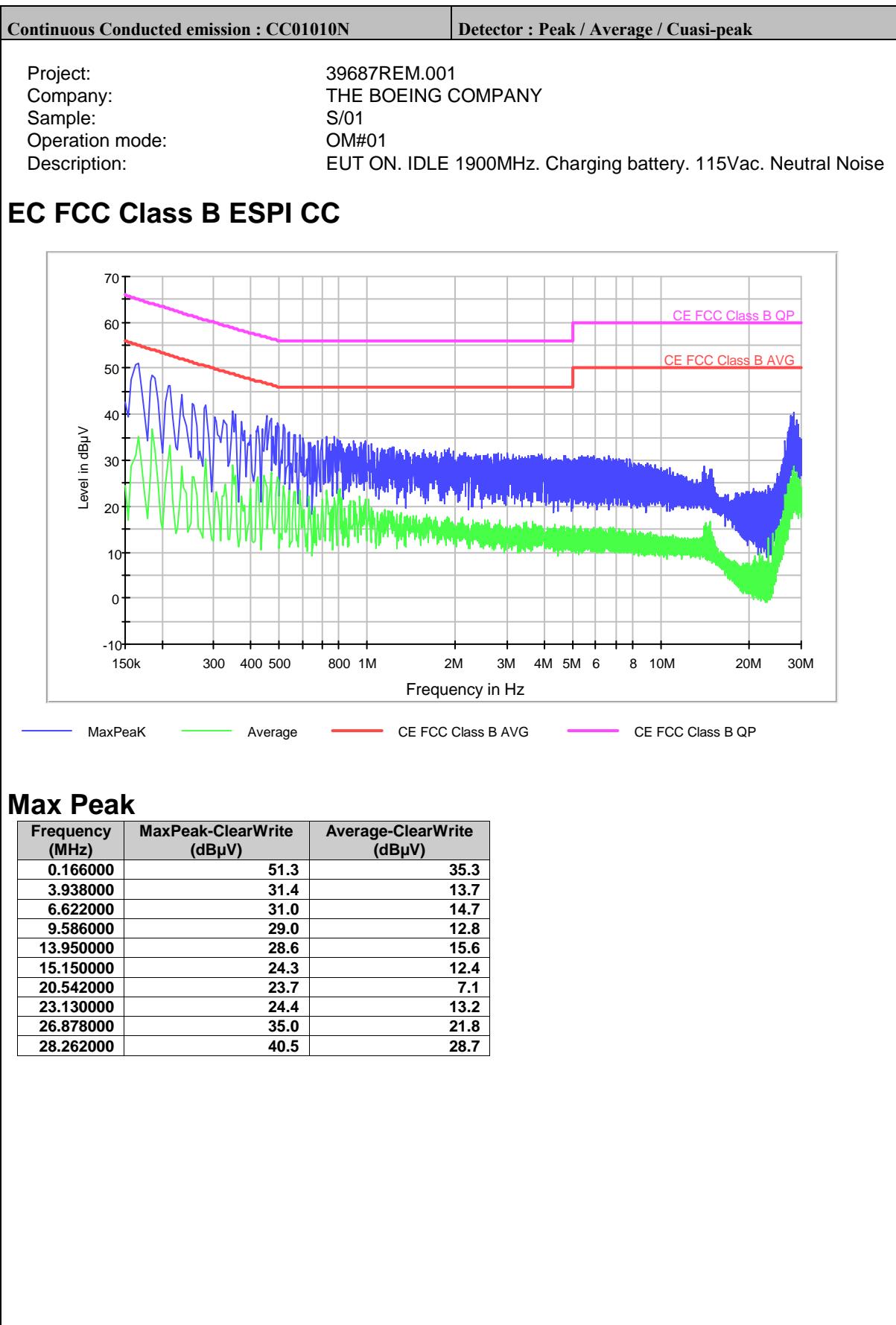
### **CLASS B**

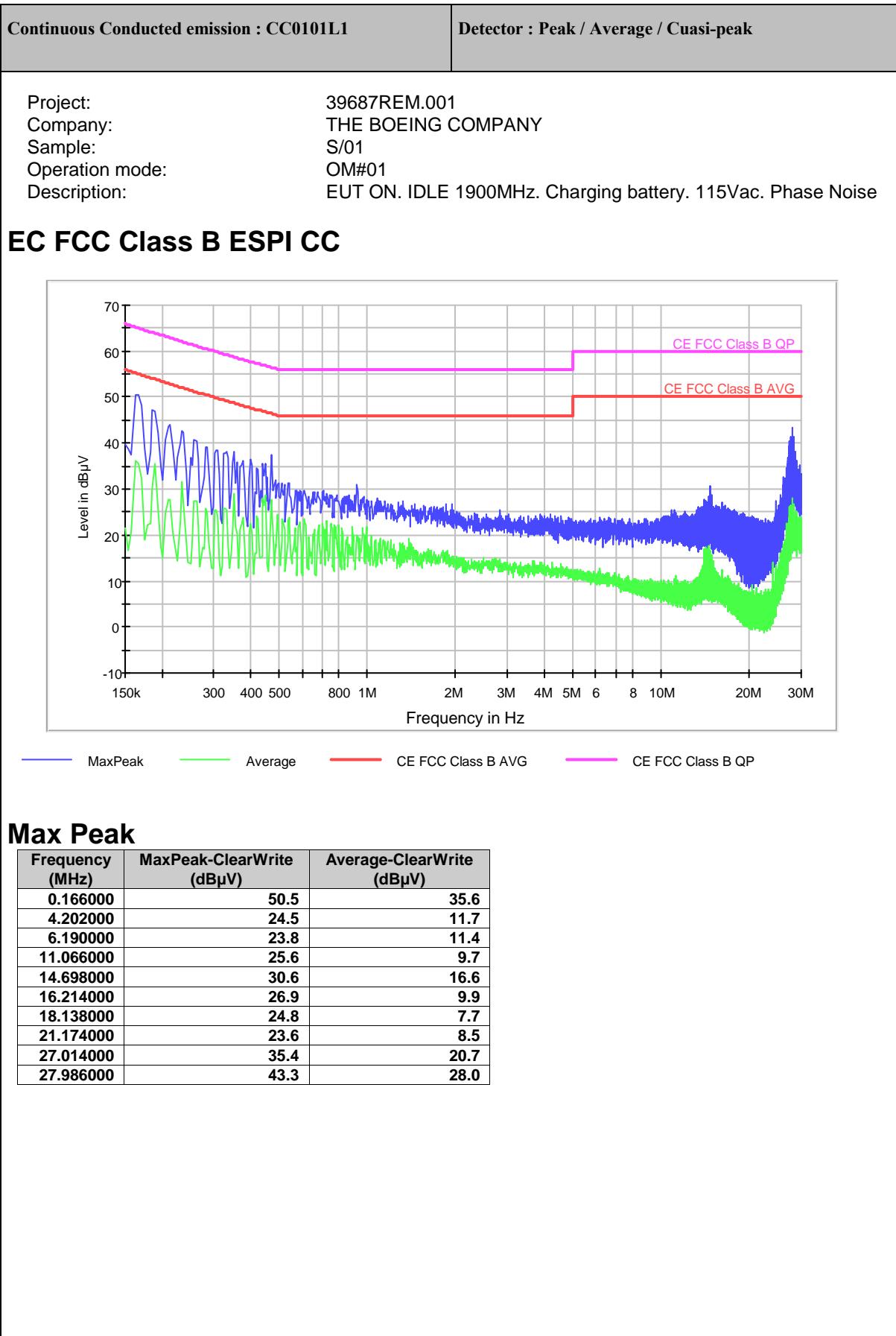
The applied limit for continuous conducted emissions in power leads, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B & IC RSS-Gen Issue 2, June 2007 in the frequency range 0,15 to 30 MHz, for Class B equipment was:

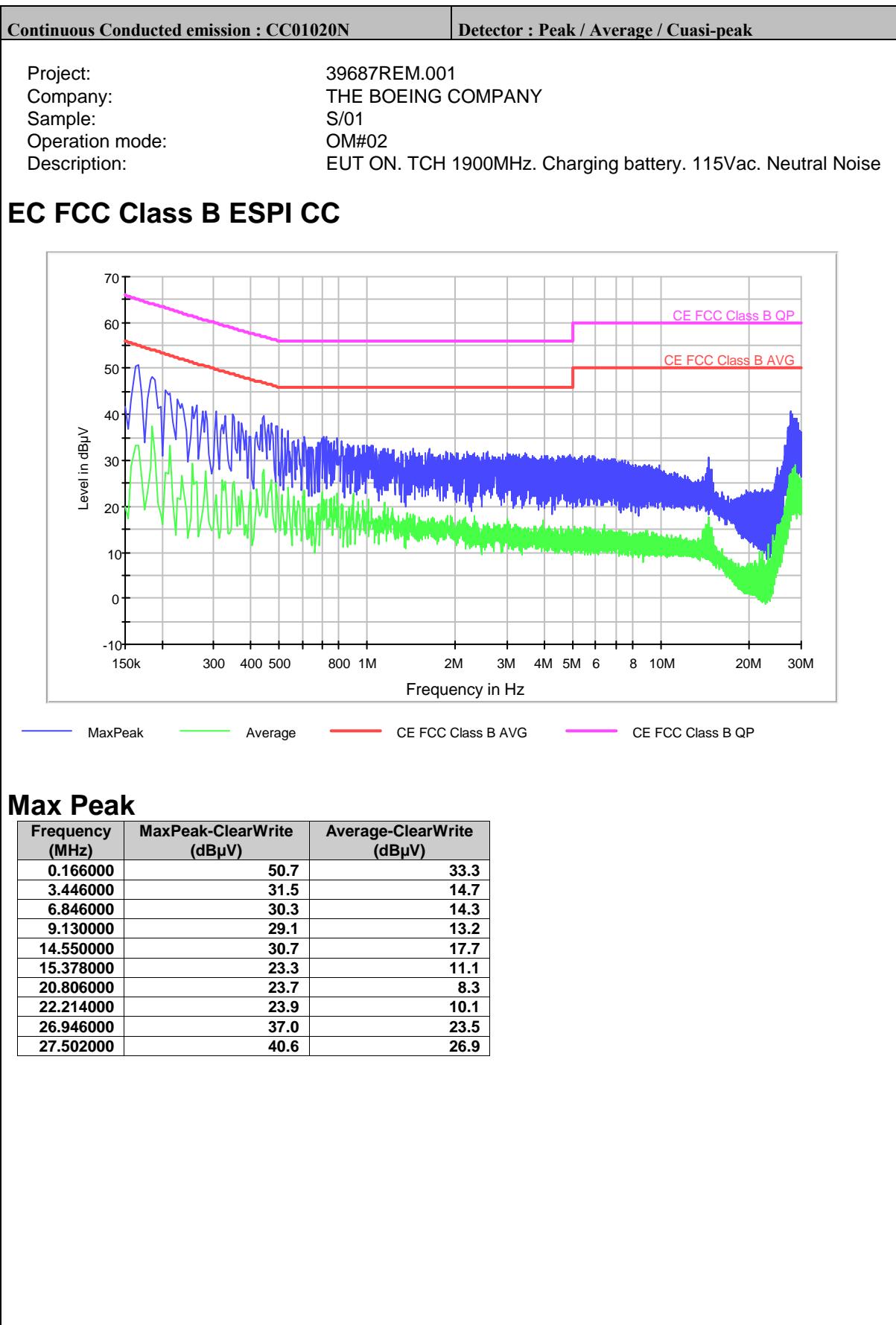
<b>Frequency range (MHz)</b>	<b>Limit (dB<math>\mu</math>V)</b>	
	<b>Quasi-peak</b>	<b>Average</b>
0,15 to 0,5	66-56	56-46
0,5 to 5	56	46
5 to 30	60	50

<b>TESTED SAMPLES:</b>	S/01
<b>TESTED OPERATION MODES:</b>	OM#01 & 02
<b>TEST RESULTS :</b>	CCmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

<b>CCmnnhh</b>	<b>Description</b>	<b>Result</b>
CC01010N	Neutral wire noise	P
CC0101L1	Phase wire noise	P
CC01020N	Neutral wire noise	P
CC0102L1	Phase wire noise	P



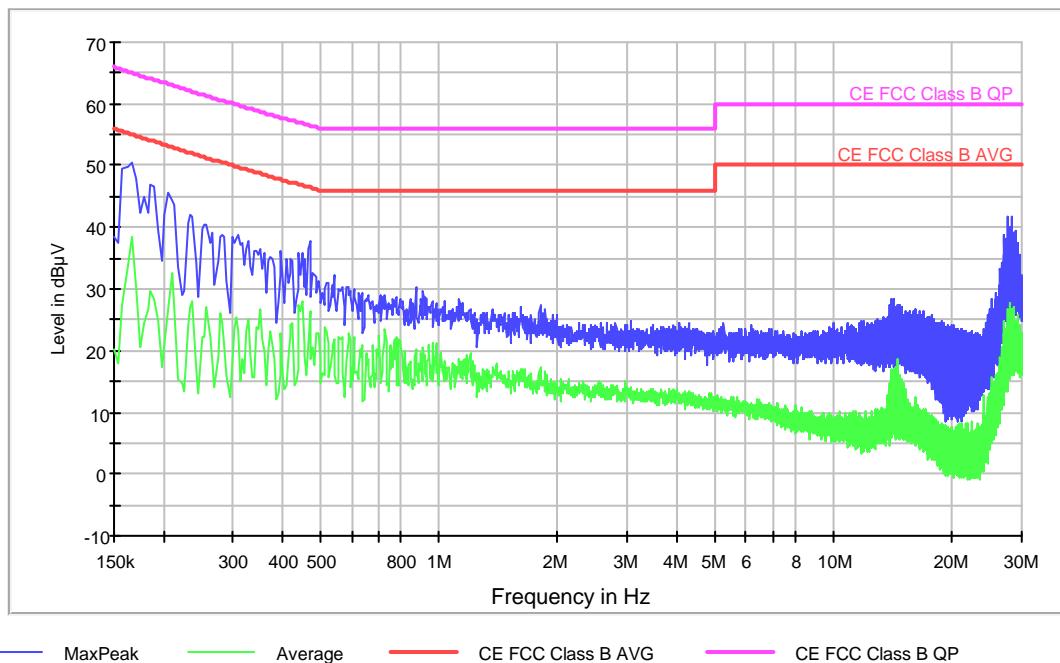




Continuous Conducted emission : CC0102L1	Detector : Peak / Average / Cuasi-peak
--	--

Project: 39687REM.001  
 Company: THE BOEING COMPANY  
 Sample: S/01  
 Operation mode: OM#02  
 Description: EUT ON. TCH 1900MHz. Charging battery. 115Vac. Phase Noise

## EC FCC Class B ESPI CC



## Max Peak

Frequency (MHz)	MaxPeak-ClearWrite (dB $\mu$ V)	Average-ClearWrite (dB $\mu$ V)
0.166000	50.4	38.4
4.058000	24.6	11.4
6.162000	24.1	11.2
11.970000	24.8	8.8
14.026000	28.4	14.8
16.202000	26.9	10.2
18.834000	24.7	7.5
21.082000	23.4	6.7
26.878000	34.4	18.3
27.778000	41.8	26.7