EMC Test Report

Project Number: 4148120

Report Number: 4148120EMC01 **Revision Level:** 0

Client: Arris Group, Inc.

Equipment Under Test: Digital Gateway Modem

Model: DG3450

FCC ID: UIDDG3450

IC ID: 6670A-DG3450

Applicable Standards: FCC Part 15 Subpart C, § 15.247
RSS-247, Issue 2
ANSI C63.10: 2013

Report issued on: 13 July 2017

Test Result: Compliant

Tested by: Jeremy Pickens, Senior EMC Engineer

Reviewed by: David Schramm, Operations Manager

Remarks: This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Table of Contents

1 Summary of Test Results

Test Description	Test Specification		Test Result
Bandwidth	15.247(d)	RSS-247 S5.2 (1) RSS-GEN S6.6	Compliant(1)
Transmitter Output Power	15.247(b)(3)	RSS-247 S5.4 (4)	Compliant(1)
Power Spectral Density	15.247(e)	RSS-247 S5.2 (2)	Compliant(1)
Conducted Spurious Emissions / Band edge	15.247(d)	RSS-247 S5.5	Compliant(1)
Radiated Spurious Emissions / Restricted Bands	15.35(b),15.209	RSS-GEN S6.13 RSS-GEN S8.10	Compliant
AC Powerline Conducted Emission	15.107, 15.207	RSS-GEN S8.8	Compliant

(1) Note: The DG3450 hardware is identical to that of the model TG3452 which has been tested and certified under FCC ID UIDTG3452 and IC ID: 6670A-TG3452. Therefore the antenna port conducted measurement data from the TG3452 filing also applies to the DG3450.

1.1 *Modifications Required for Compliance*

None

2 General Information

2.1 *Client Information*

Name:	ARRIS Group, Inc.
Address:	3871 Lakefield Drive, Suite 300
City, State, Zip, Country:	Suwanee, GA 30024, USA

2.1 *Test Laboratory*

Name:	SGS North America, Inc.
Address:	620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country:	Suwanee, GA 30024, USA
Accrediting Body:	A2LA
Type of lab:	Testing Laboratory
Certificate Number:	3212.01

2.2 *General Information of EUT*

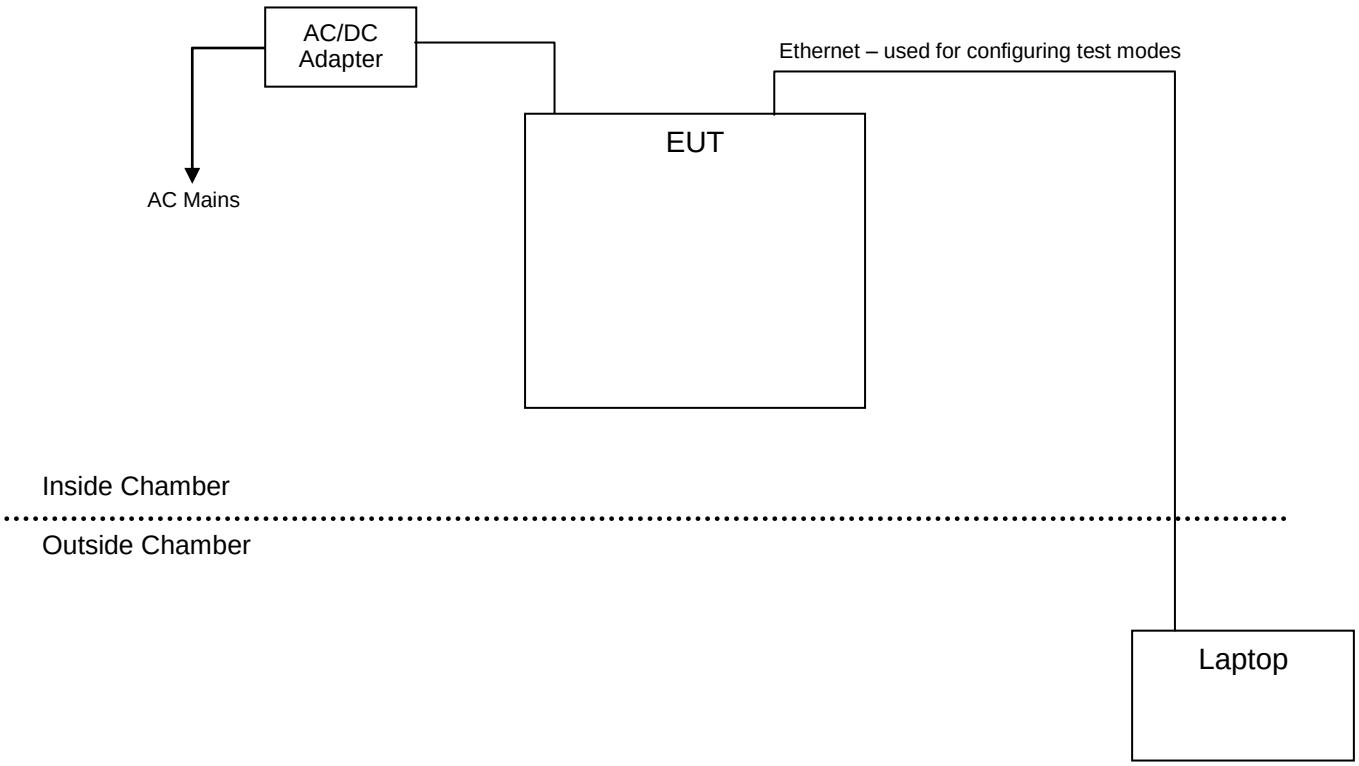
Type of Product:	Digital Gateway Modem
Model Number:	DG3450
Serial Number:	73R2XC333301541
Power Supply:	M/N: NBS36H120300VU, P/N: AREP05681
Frequency Range:	2400-2483.5MHz
Data Modes:	802.11b, 802.11g, 802.11n (HT20), 802.11n (HT40),
Antenna:	Internal, 3x3 MIMO
Rated Voltage:	100-240Vac, 50/60Hz (AC to 12VDC Adapter)
Test Voltage:	120Vac, 60Hz
Sample Received Date:	24 May 2017
Dates of testing:	30 May - 29 June 2017

2.3 *Operating Modes and Conditions*

For spurious emissions measurements, only the worst-case mode with respect to peak power was investigated: 802.11b, 1Mbps. Investigations covered the low, middle, and high channels in the 2400-2483.5MHz band.

Continuous traffic was generated using test commands. Where the duty cycle measured below 99% and an RMS detector was employed, corrections of 10*LOG(1/D) were applied according to KDB publication 558074 D01 DTS Meas Guidance v04.

2.4 *EUT Connection Block Diagram – Radiated Measurements*



2.5 *System Configurations*

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Arris	Digital Gateway Modem	DG3450	73R2XC333301541
B	LiteOn	AC/DC Supply	NBS36H120300VU P/N: AREP05681	Not Labeled

3 Field Strength of Spurious Radiation

3.1 *Test Result*

Test Description	Test Specification		Test Result
Spurious Emissions	15.247 (d) and 15.209	RSS-247 S5.5	Compliant

3.2 *Test Method*

Radiated spurious emissions measurements were recorded with the device configured to transmit at the lowest, middle, and highest channels. The frequency range investigated was up through the 10th harmonic of the fundamental transmit frequency. The methods defined in ANSI C63.10: 2013 were used.

Lowest, middle, and highest channels were investigated. Only the worst-case (802.11b, 1Mbps) was reported except at the restricted band edges where all three modulations were measured.

For this evaluation, only the fundamental and harmonics were investigated due to the layout differences of the antennas relative to the radio modules relative to the certified TG3452. The digital peripheral circuitry did not change. Measurements below 1GHz were not repeated.

Test distance:

9k to 30 MHz – Near field prescan to determine if there were any emissions.
30 to 1000 MHz - The EUT to measurement antenna distance was 3 meters
1 to 18 GHz - The EUT to measurement antenna distance was 3 meters
18 to 26 GHz - The EUT to measurement antenna distance was 1 meter

Limits within restricted bands of operation:

Frequency	Limits(1)		Peak Limits dBuV/m
	Microvolts/m	dBuV/m	
30 - 88 MHz	100	40 (2)	--
88 - 216 MHz	150	43.5 (2)	--
216 - 960 MHz	200	46 (2)	--
960 - 1000 MHz	500	54 (2)	--
1 - 40 GHz	500	54 (3)	74

(1) These limits are applicable to emissions outside of the intentional transmit frequency band.
(2) Quasi-peak limit
(3) Average limit

3.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.5 °C
Relative Humidity: 43.5 %

3.4 *Test Equipment – Radiated Measurements*

Test End Date: 5-Jun-2017 Tester: JOP/FN

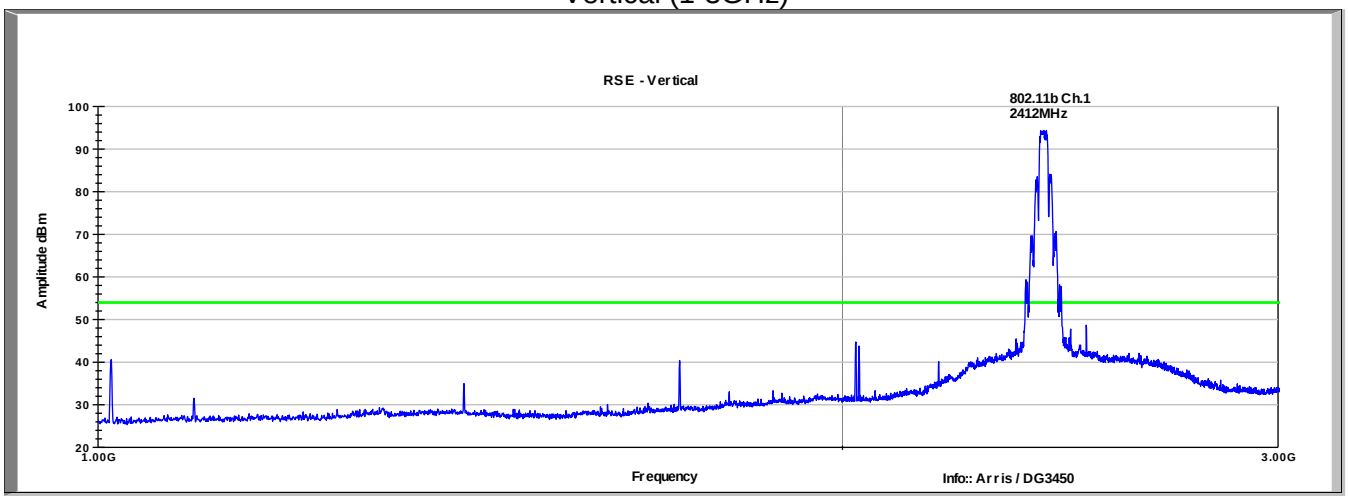
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	25-Apr-2018
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079661	29-Jul-2017
RF CABLE	NFS-290-78.7-NFS	FLORIDA RF LABS	B095019	28-Jul-2017
RF CABLE	NMS-290-236.2-NMS	FLORIDA RF LABS	B095020	29-Jul-2017
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	4-Aug-2017
HORN(SMALL)	LB-180400-20-C-KF	A-INFO	15007	21-Mar-2018
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2017
RF CABLE	SF102	HUBER & SUHNER	B079824	27-Jul-2017
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	29-Jul-2017

Note: The equipment calibration period is 1 year.

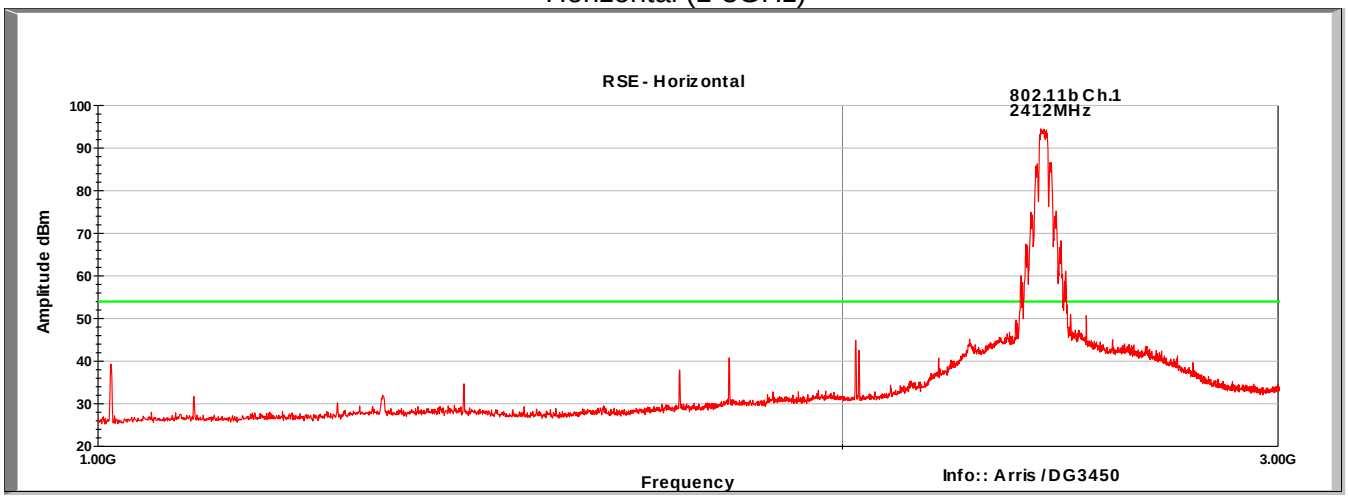
3.5 *Peak Plots*

No emissions were detected in the range 9kHz to 30MHz.

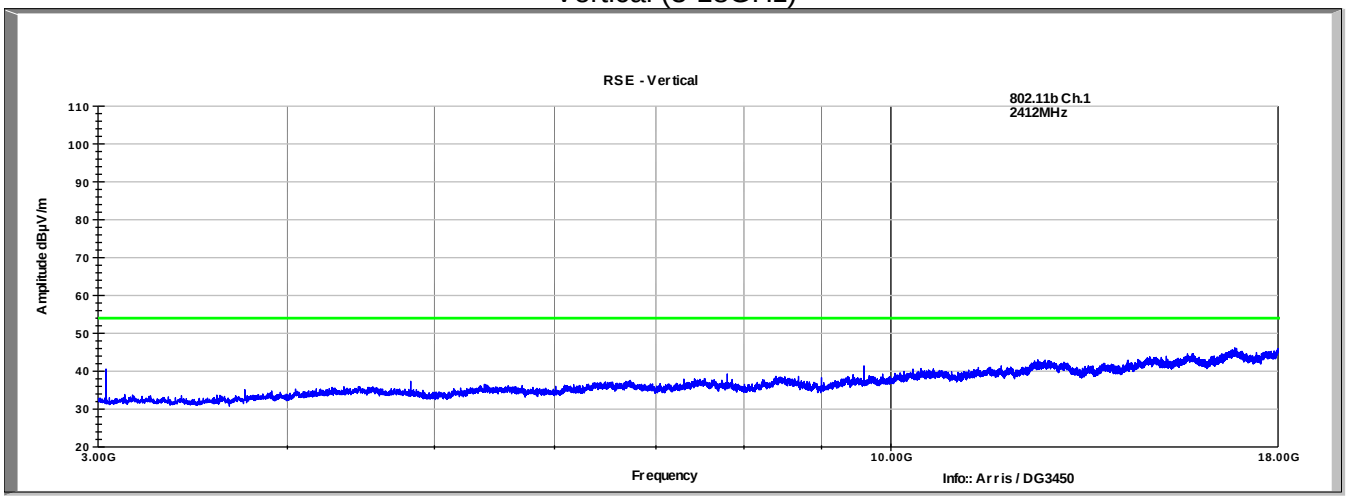
Channel 1
Vertical (1-3GHz)



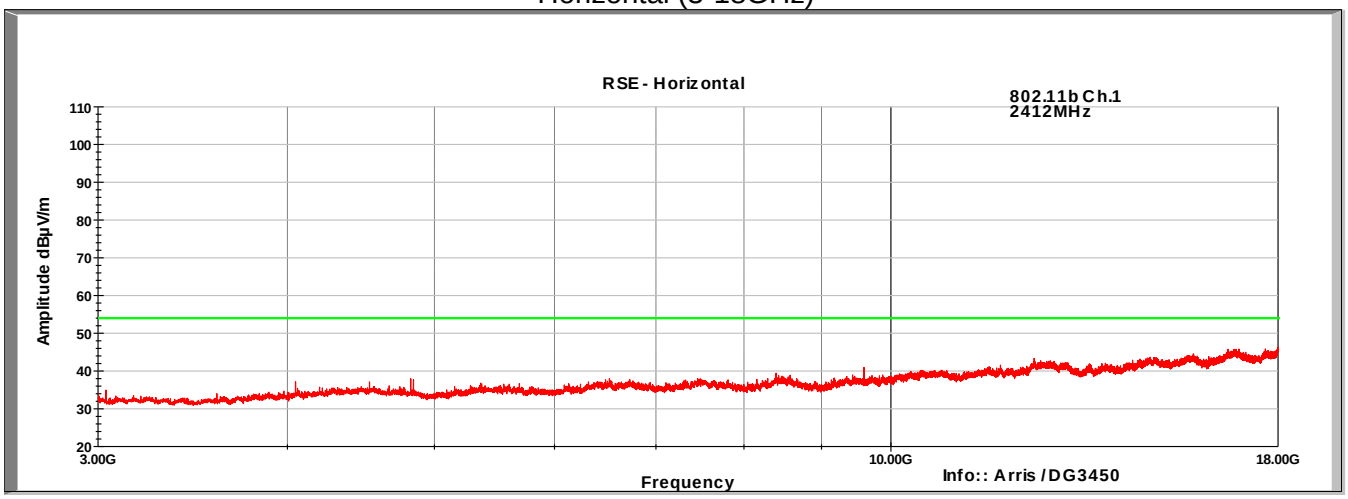
Channel 1
Horizontal (1-3GHz)



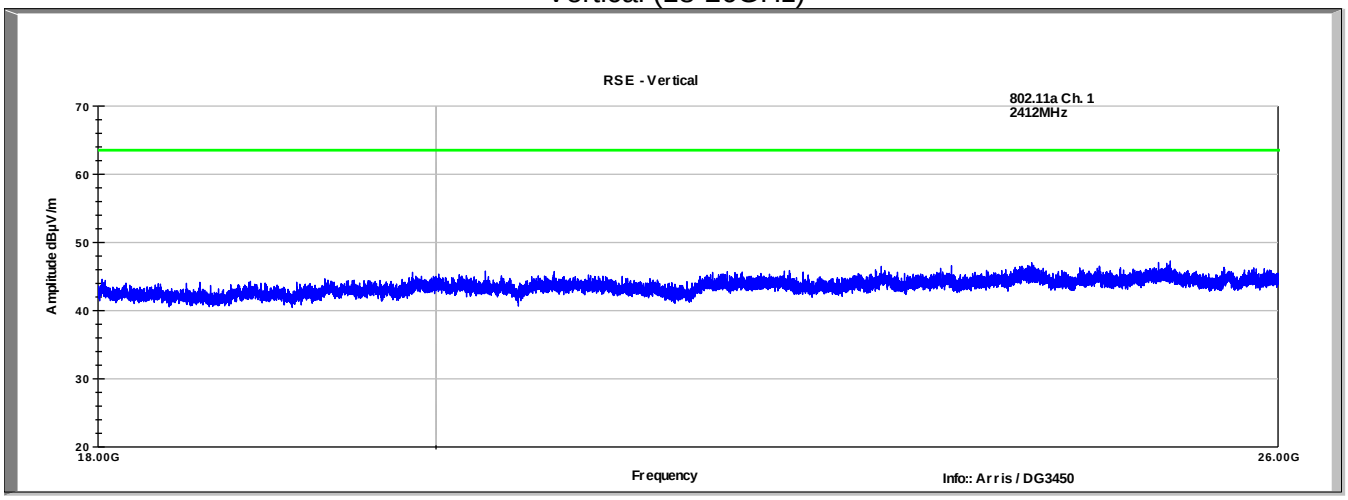
Channel 1
Vertical (3-18GHz)



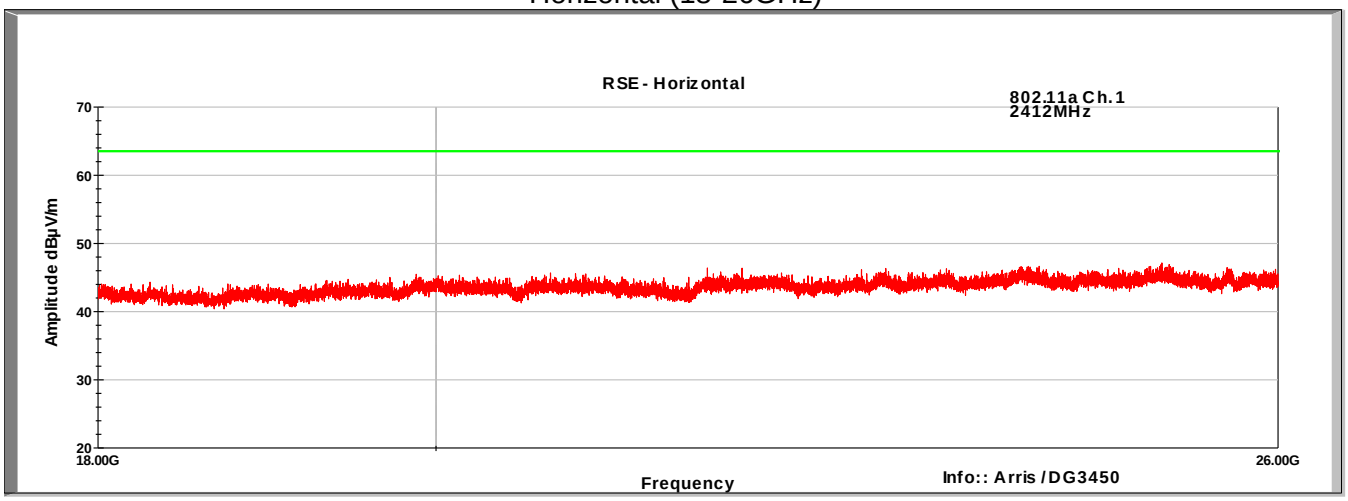
Channel 1
Horizontal (3-18GHz)



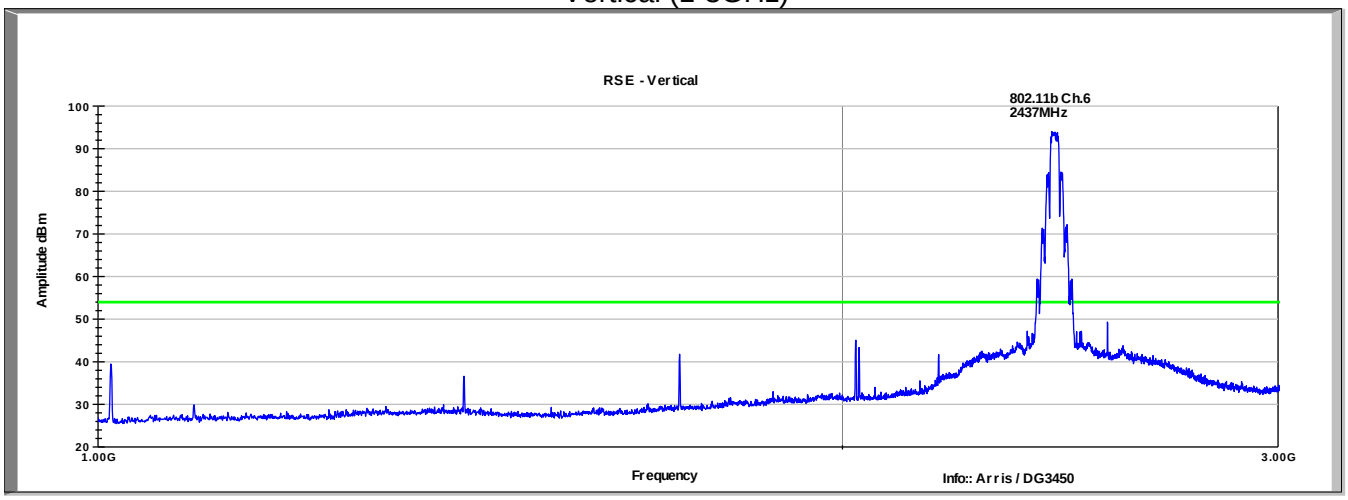
Channel 1
Vertical (18-26GHz)



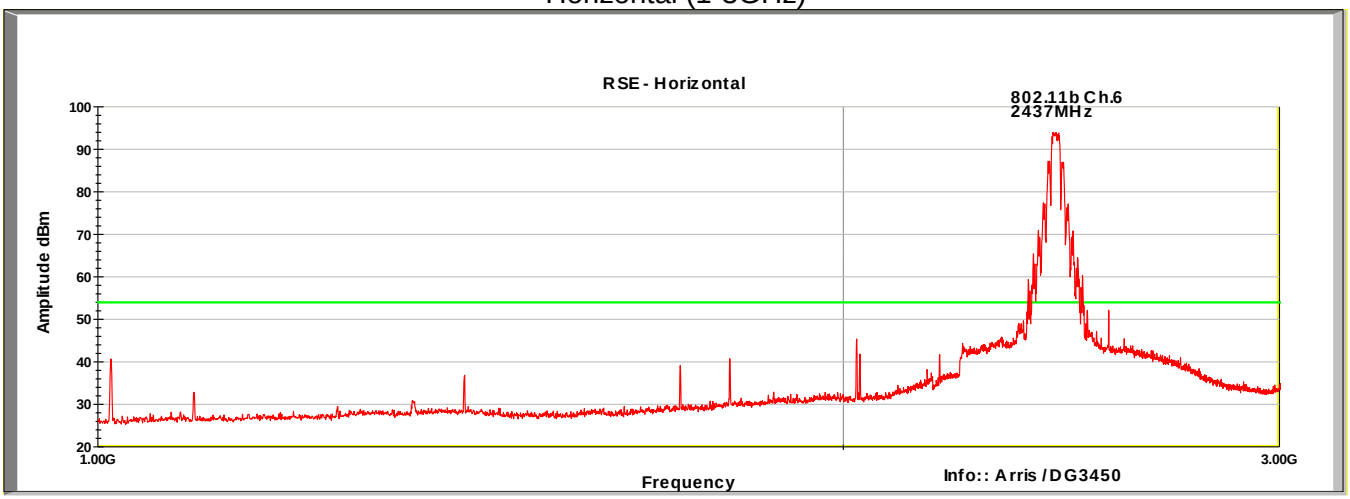
Channel 1
Horizontal (18-26GHz)



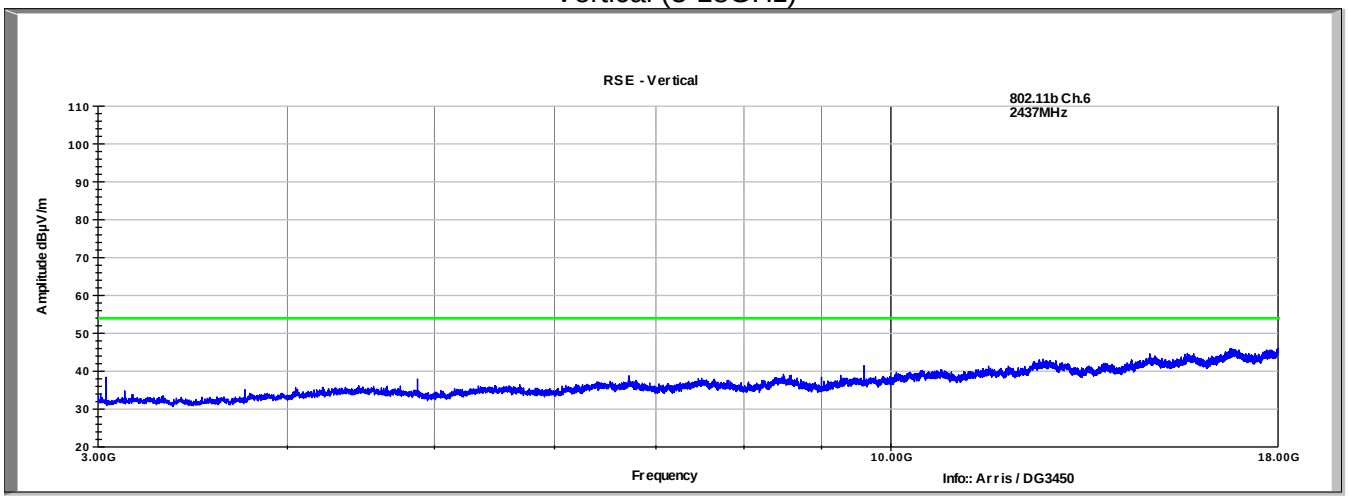
Channel 6
Vertical (1-3GHz)



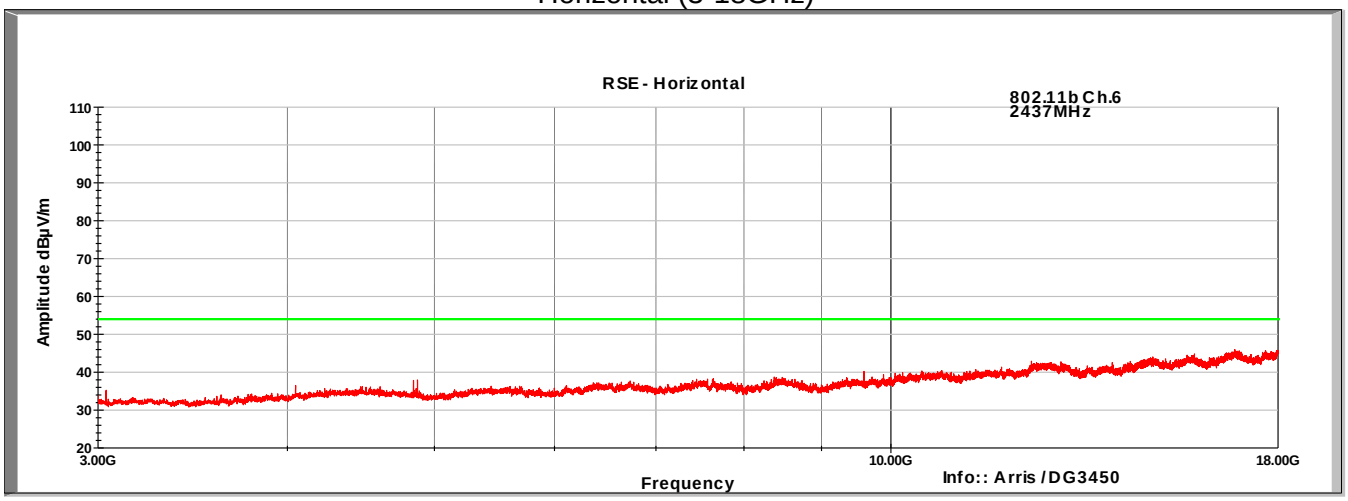
Channel 6
Horizontal (1-3GHz)



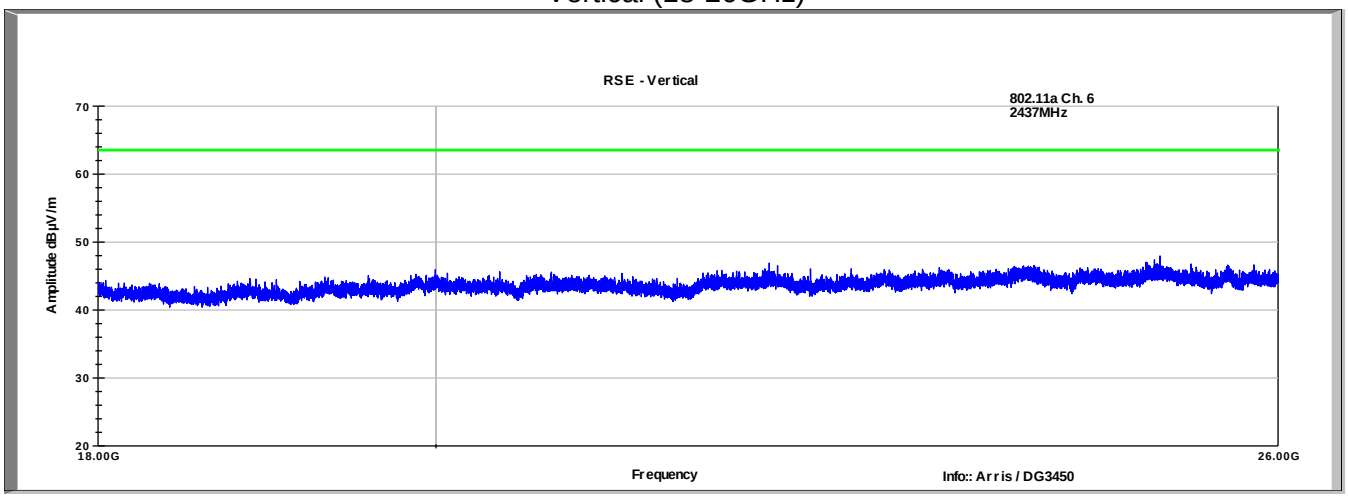
Channel 6
Vertical (3-18GHz)



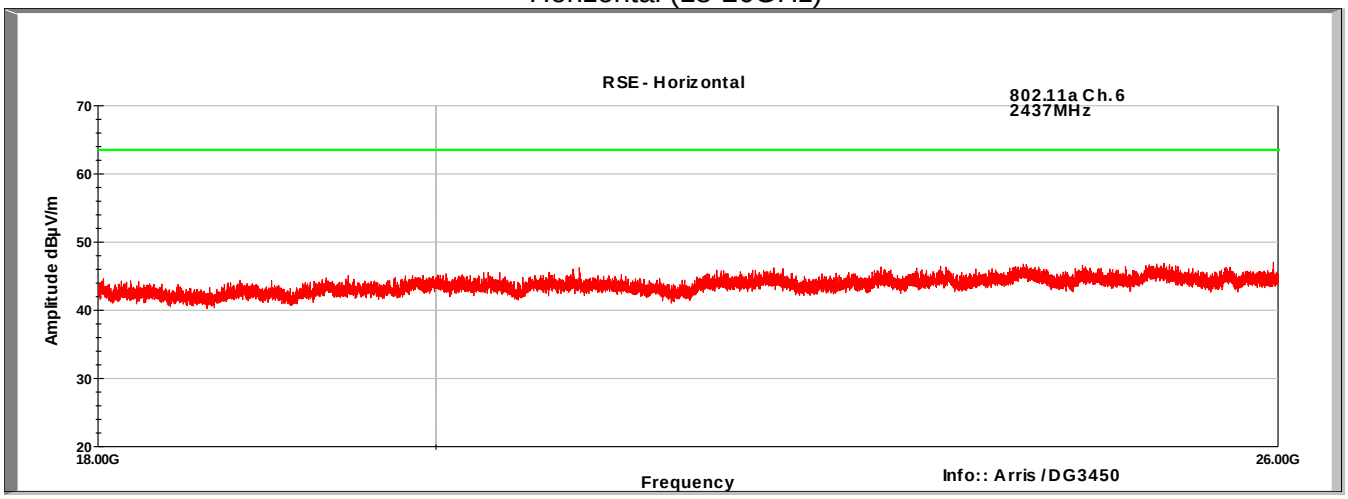
Channel 6
Horizontal (3-18GHz)



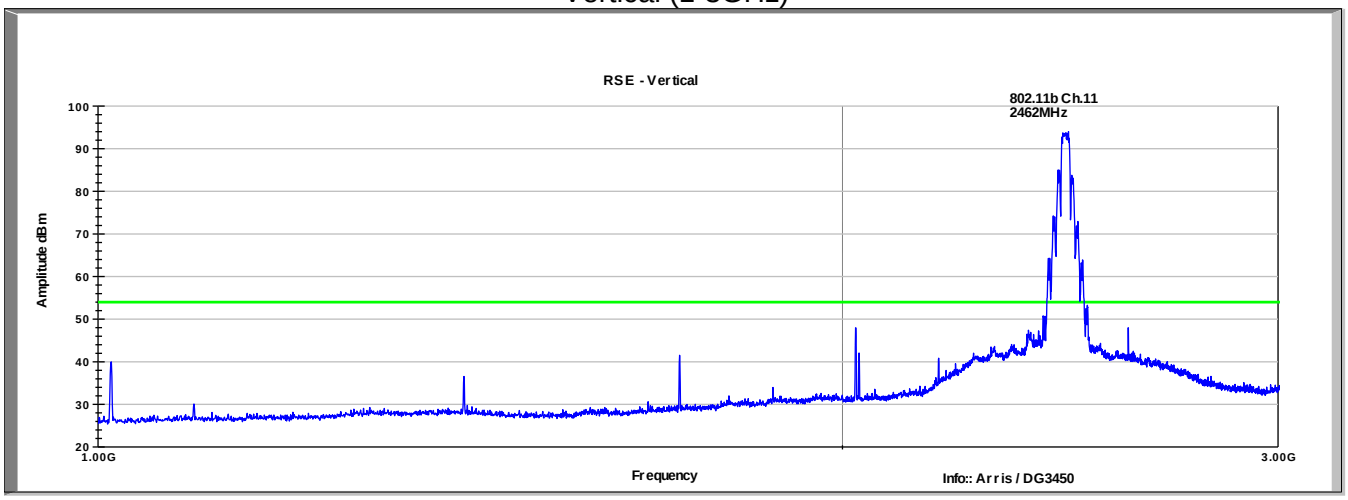
Channel 6
Vertical (18-26GHz)



Channel 6
Horizontal (18-26GHz)

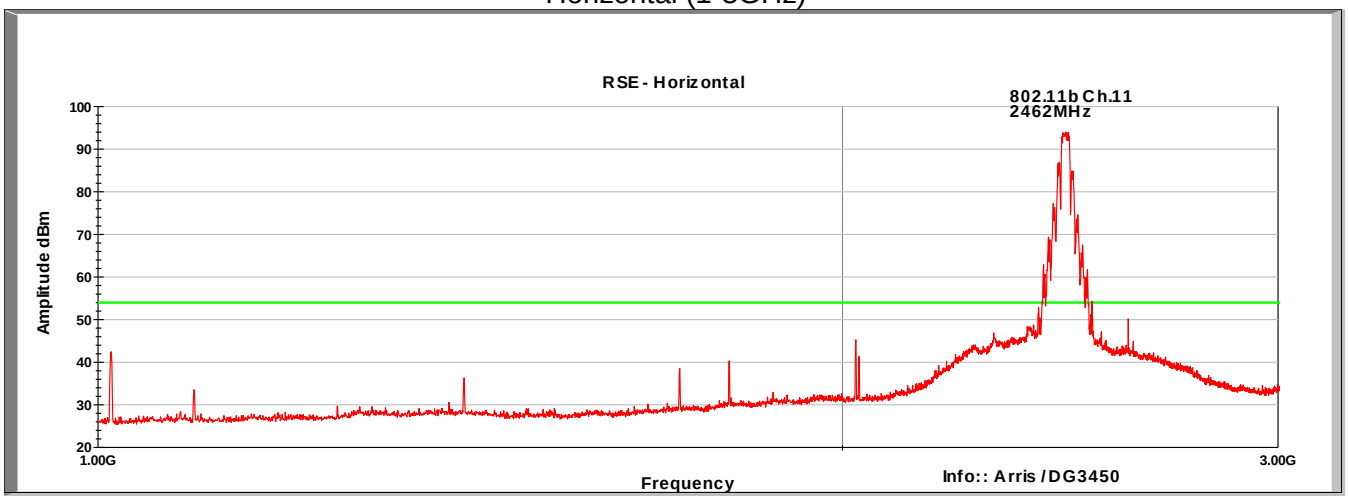


Channel 11
Vertical (1-3GHz)

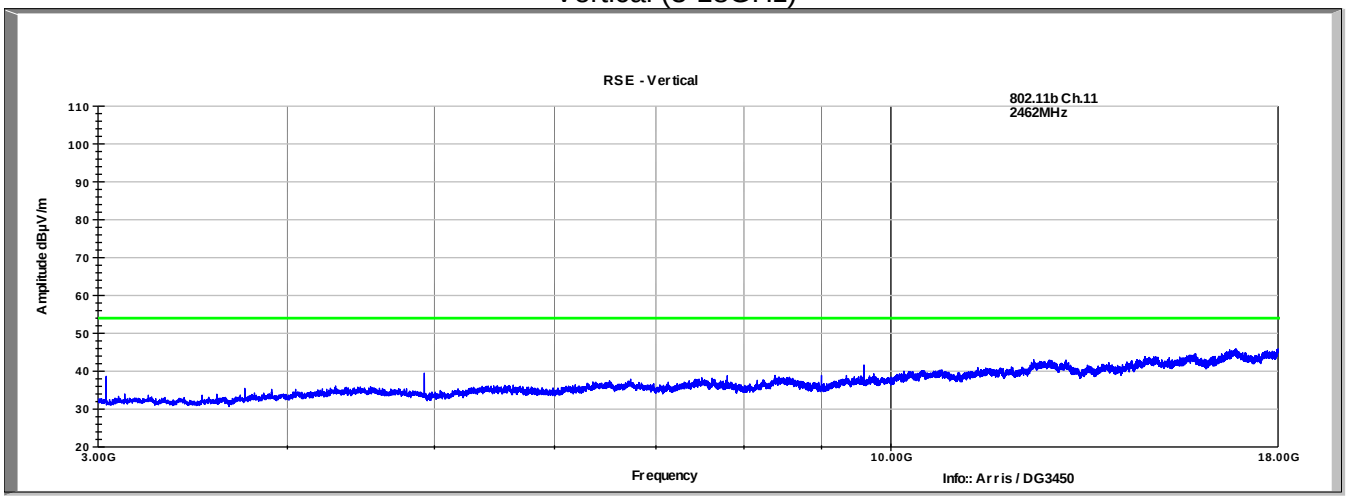


Worst-case spur (digital): 48.0dBµV/m @ 2024.5MHz

Channel 11
Horizontal (1-3GHz)

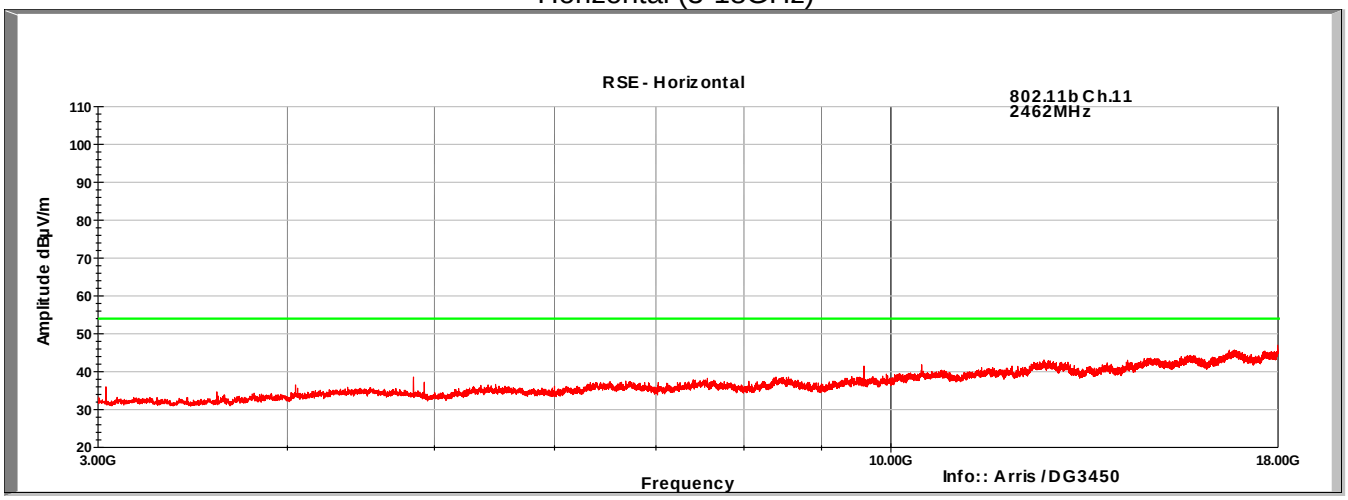


Channel 11
Vertical (3-18GHz)

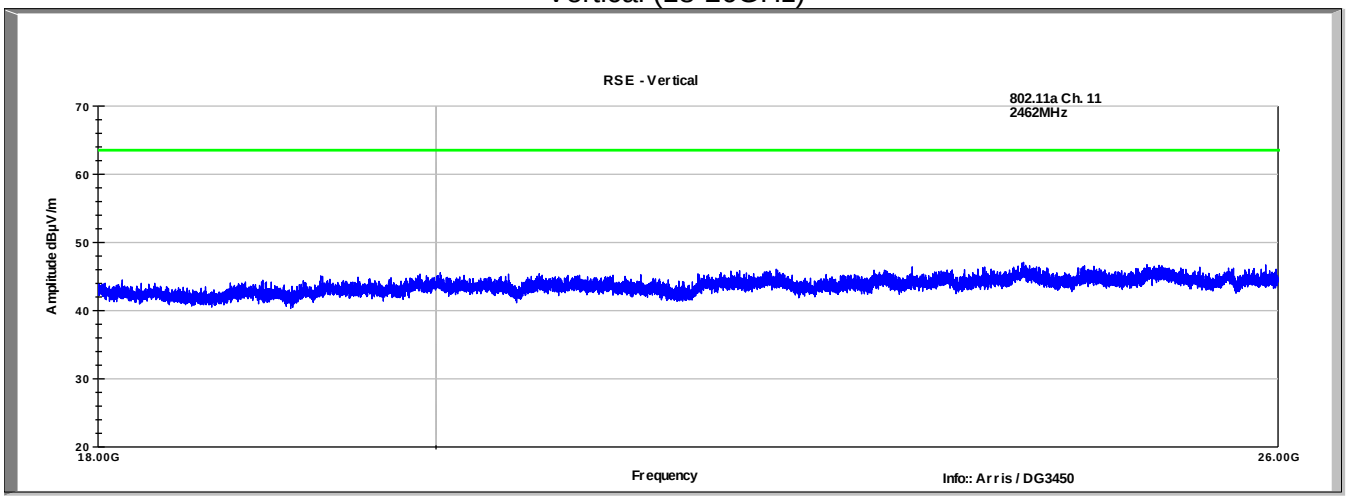


Worst-case spur (harmonic): 39.5dBµV/m @ 4924MHz

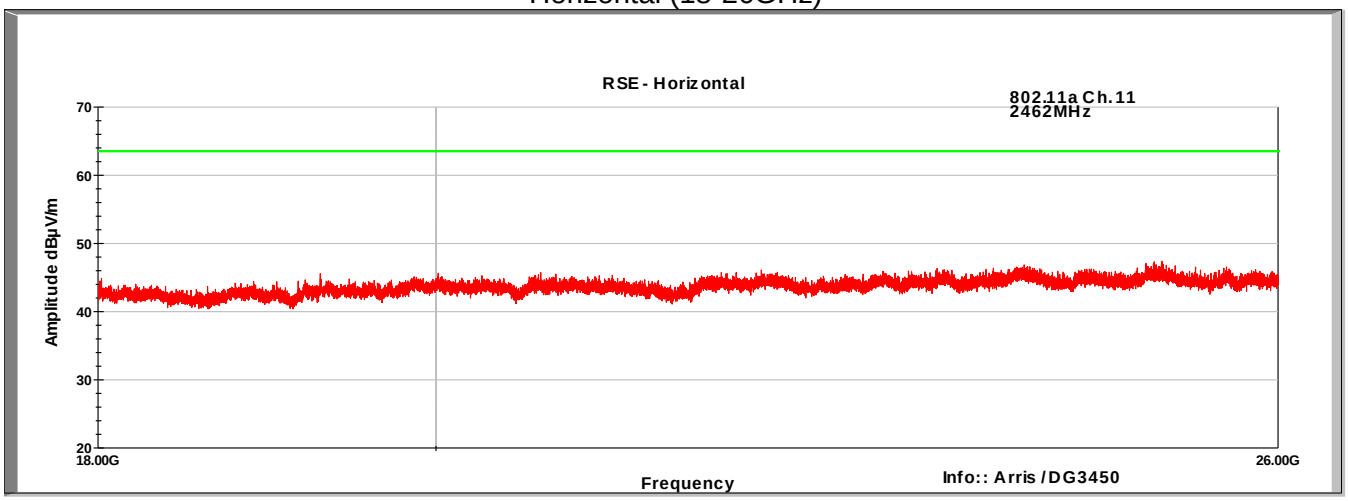
Channel 11
Horizontal (3-18GHz)



Channel 11
Vertical (18-26GHz)



Channel 11
Horizontal (18-26GHz)



4 Radiated Emissions at Band Edge / Restricted Band

4.1 *Test Result*

Test Description	Test Specification	Test Result
Field strength of spurious radiation	15.247 (d) and 15.209	Compliant

4.2 *Test Method*

Peak and average field strength measurements were performed at the restricted band edges of 2390MHz and 2483.5MHz. Measurements were made using the radiated methods defined in FCC KDB publication 558074 D01 DTS Meas Guidance v04.

4.3 *Test Site*

3m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions
Temperature: 23.5 °C
Relative Humidity: 43.5 %

4.4 *Test Equipment*

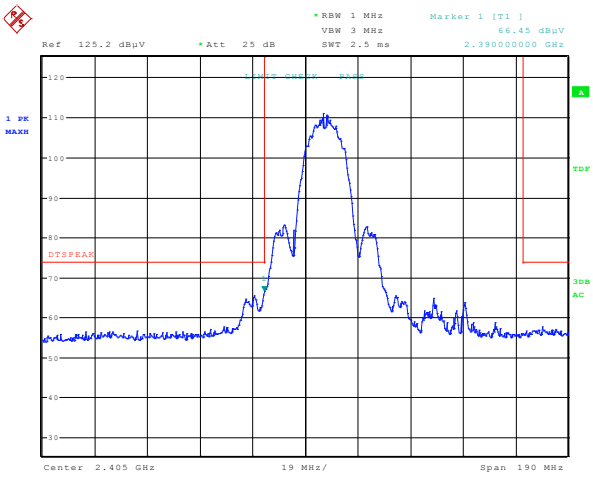
Test End Date: 22-Jun-2017 Tester: JOP/FN

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	25-Apr-2018
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079661	29-Jul-2017
RF CABLE	NFS-290-78.7-NFS	FLORIDA RF LABS	B095019	28-Jul-2017
RF CABLE	NMS-290-236.2-NMS	FLORIDA RF LABS	B095020	29-Jul-2017
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	4-Aug-2017
HORN(SMALL)	LB-180400-20-C-KF	A-INFO	15007	21-Mar-2018
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2017
RF CABLE	SF102	HUBER & SUHNER	B079824	27-Jul-2017
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	29-Jul-2017

Note: The equipment calibration period is 1 year.

4.5 *Test Data*

802.11b
Channel 1 / Channel 11
Peak



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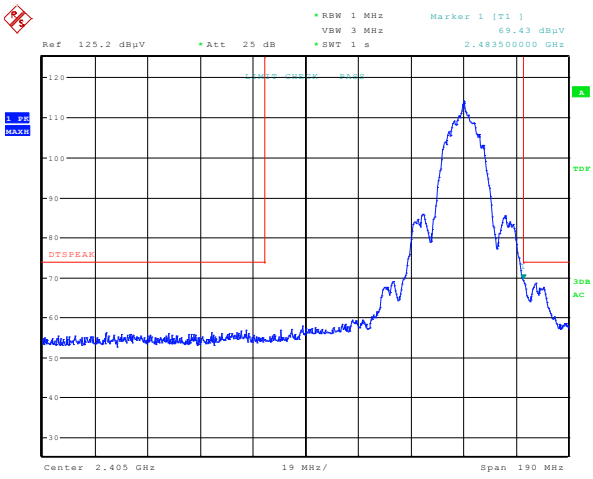

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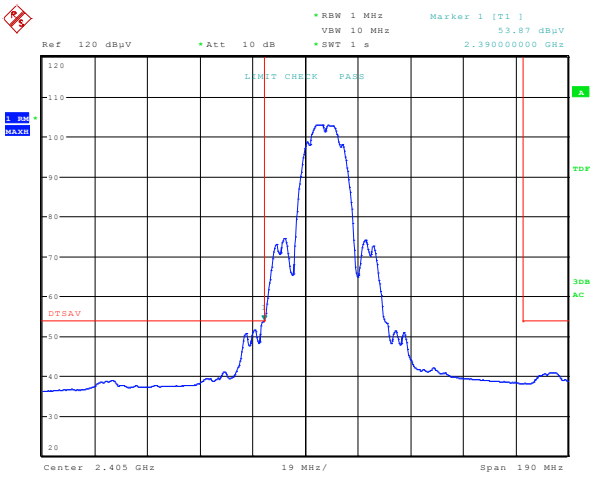
802.11b
Channel 1 / Channel 11
Average



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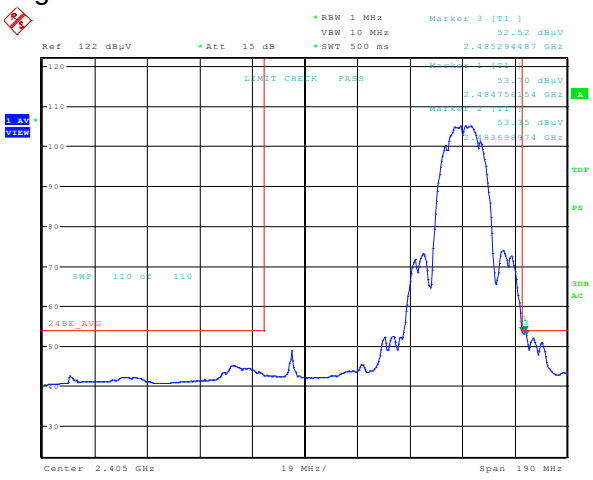
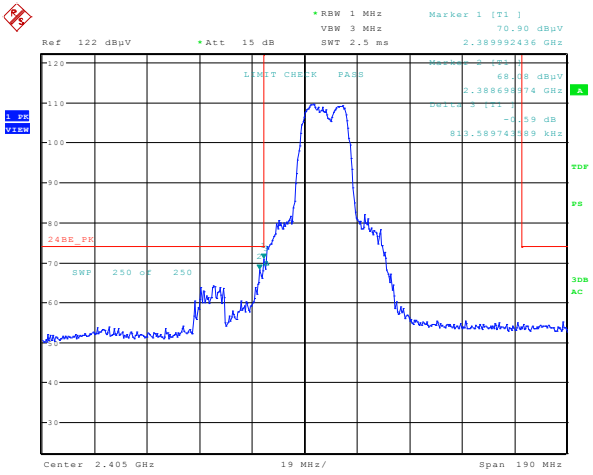


Date: 20.JUN.2017 13:05:51

802.11g
Channel 1 / Channel 11
Peak



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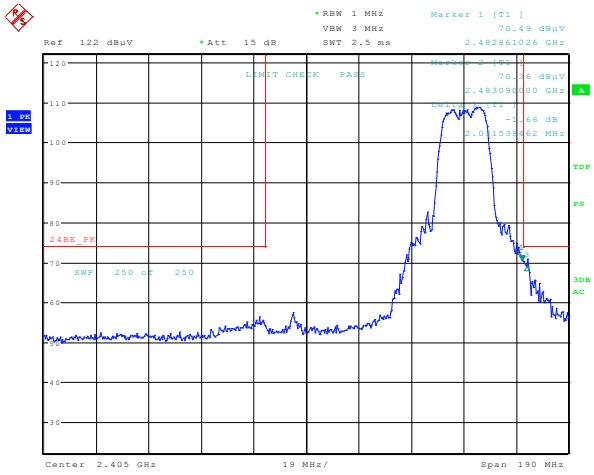

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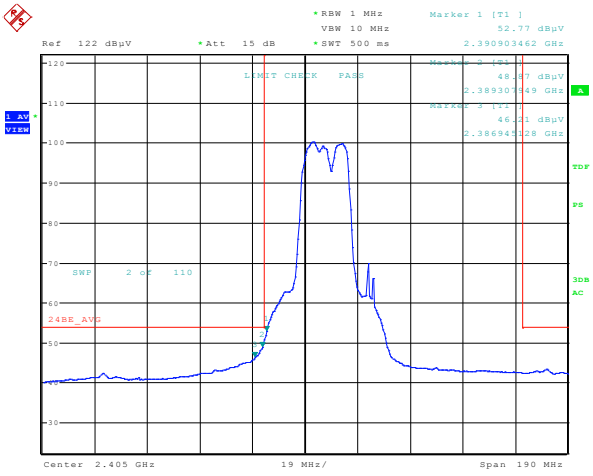
802.11g
Channel 1 / Channel 11
Average



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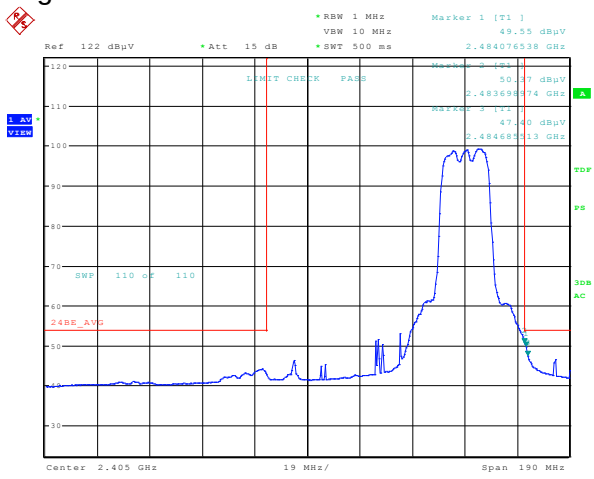

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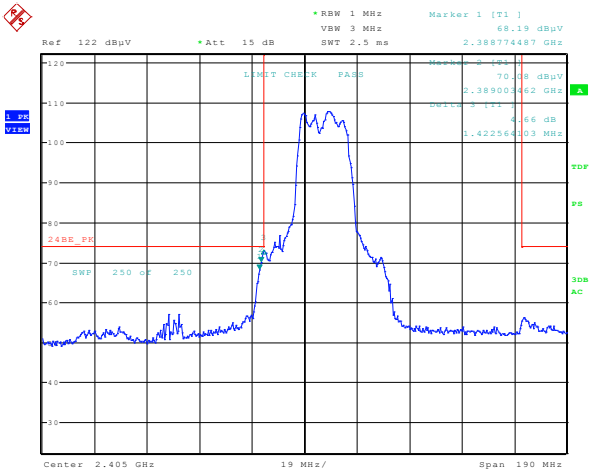
802.11n HT20
Channel 1 / Channel 11
Peak



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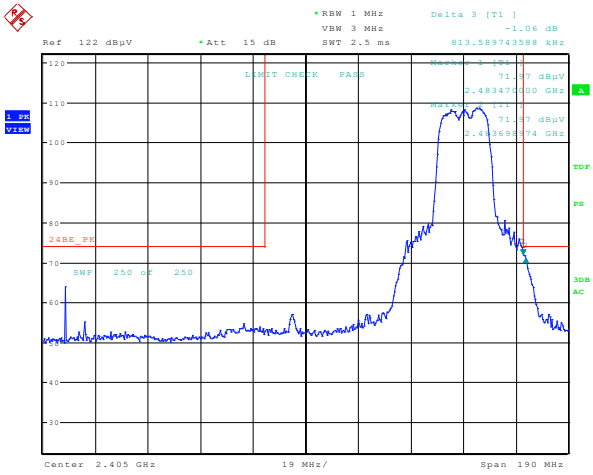

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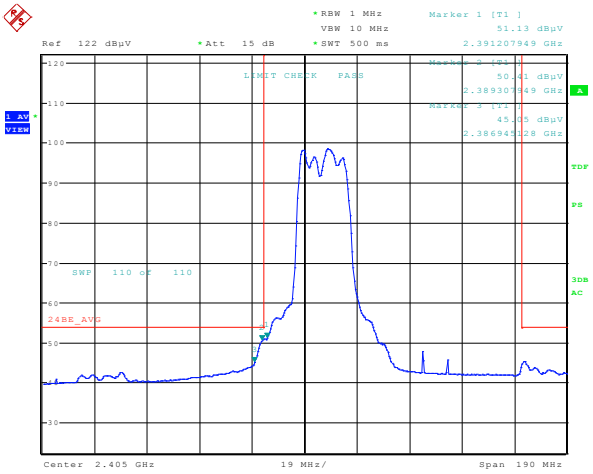
802.11n HT20
Channel 1 / Channel 11
Average



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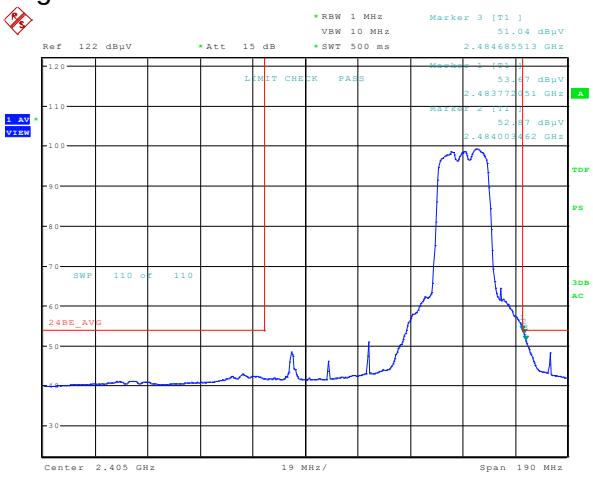

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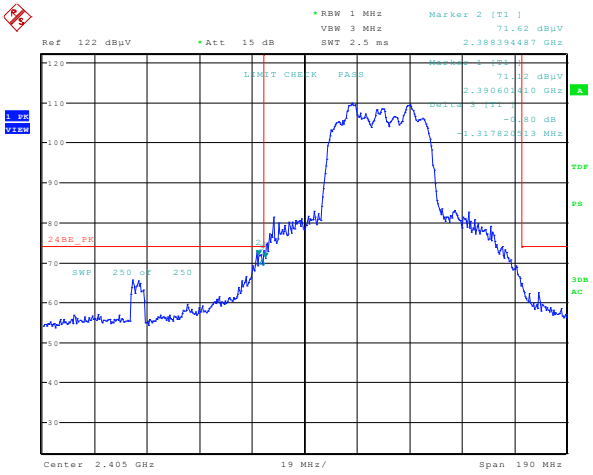
802.11n HT40
Channel 3 / Channel 9
Peak



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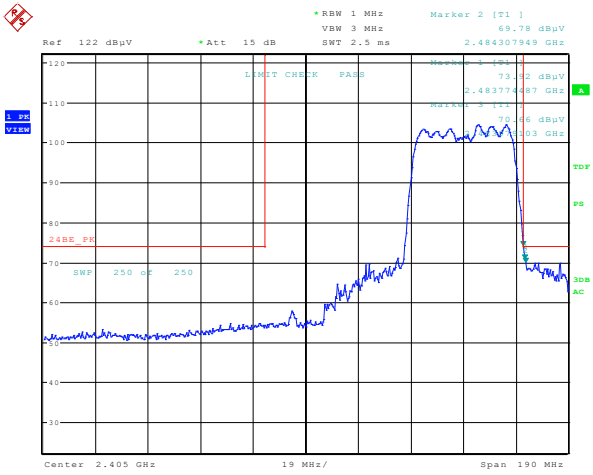

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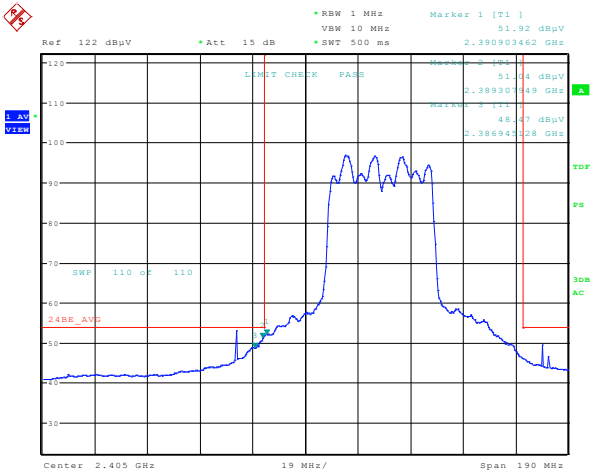
802.11n HT40
Channel 3 / Channel 9
Average



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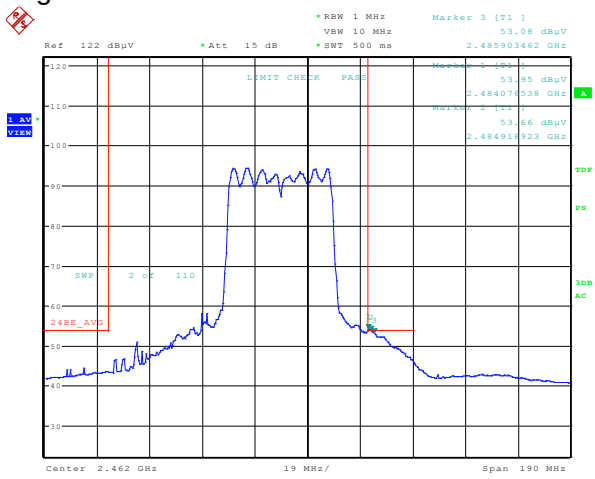

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5 Conducted Emissions

5.1 *Test Result*

Test Description	Basic Standards	Test Result
Conducted Emissions, Class B	RSS-GEN, Issue 4 ANSI C63.4:2014	Compliant

5.2 *Test Method*

With the receivers resolution bandwidth was set to 9 kHz the initial preliminary exploratory scans were performed over the measuring frequency range (0.15MHz to 30MHz) using a max hold mode incorporating a Peak detector and Average detector and using the TILE! software. The final test data was measured using a Quasi-Peak detector and Average detector and compared against the limits indicated in the table below.

Frequency Range	Class A Limits (dBuV)	Class B Limits (dBuV) CISPR
0.15 to 0.5 MHz	Avg 66 QP 79	Avg 56 to 46 QP 66 to 56
0.5 to 5 MHz	Avg 60 QP 73	Avg 46 Pk 56
5 to 30 MHz	Avg 60 QP 73	Avg 50 Pk 60

5.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions
Temperature: 23.7°C
Relative Humidity: 47.8%

5.4 *Test Equipment*

Test Date: 29-Jun-2017 Tester: FL

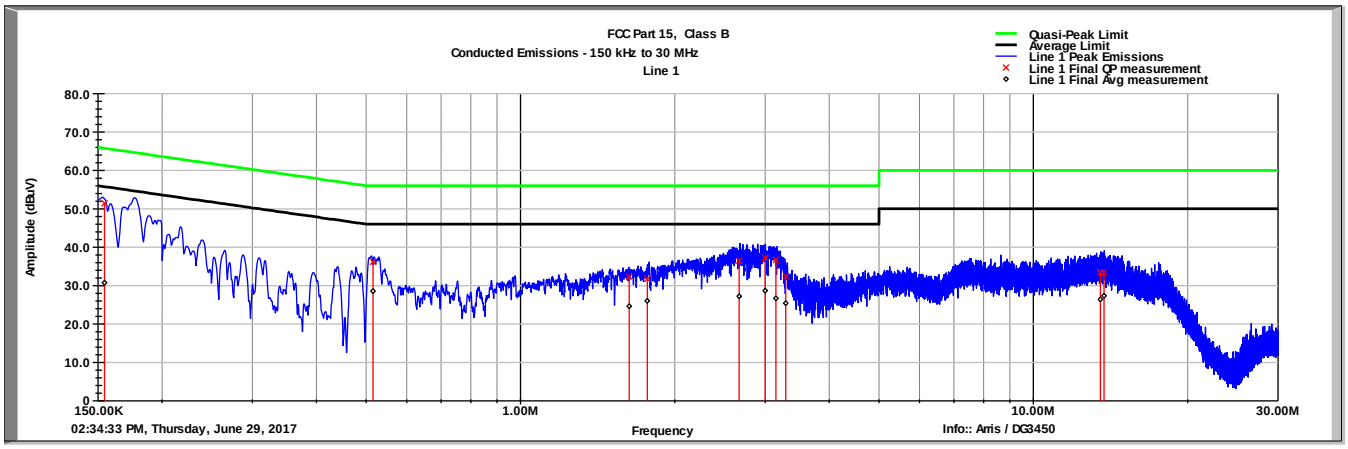
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	21-Jul-2017
LINE IMPEDANCE STABILIZATION NETWORK	NNB 51	TESEQ	B087573	16-Nov-2017
RF CABLE	SF106	HUBER & SUHNER	B079660	25-Jul-2017

Note: The equipment calibration period is 1 year.

Software:
“Conducted Emissions” TILE! profile dated Dec 2015

5.5 *Test Data*

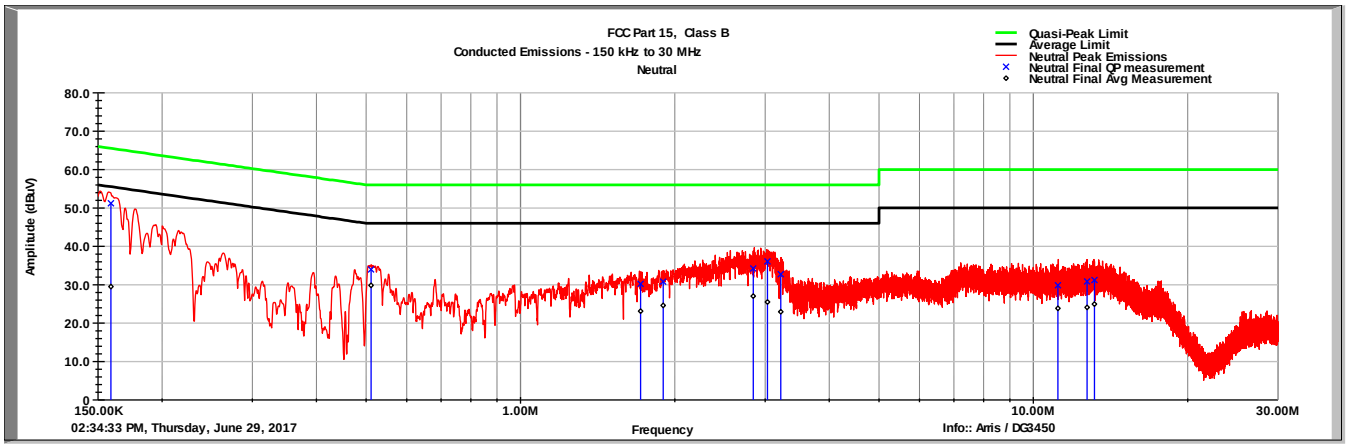
Line 1 Conducted Emissions Plot 150-30MHz



Line 1 Conducted Emissions Data 150-30MHz

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.155	51.4	65.7	-14.3	30.7	55.7	-25.0
0.516	36.2	56.0	-19.8	28.6	46.0	-17.4
1.630	32.4	56.0	-23.6	24.6	46.0	-21.4
1.767	31.8	56.0	-24.2	26.0	46.0	-20.0
2.669	36.5	56.0	-19.5	27.2	46.0	-18.8
3.000	37.2	56.0	-18.8	28.7	46.0	-17.3
3.148	36.7	56.0	-19.3	26.7	46.0	-19.3
3.290	32.4	56.0	-23.6	25.4	46.0	-20.6
13.515	33.4	60.0	-26.6	26.4	50.0	-23.6
13.734	33.4	60.0	-26.6	27.4	50.0	-22.6

Neutral Conducted Emissions Plot 150-30MHz



Neutral Conducted Emissions Data 150-30MHz

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.159	51.2	65.5	-14.3	29.5	55.5	-26.0
0.511	34.0	56.0	-22.0	29.8	46.0	-16.2
1.715	30.2	56.0	-25.8	23.1	46.0	-22.9
1.898	30.8	56.0	-25.2	24.6	46.0	-21.4
2.843	34.2	56.0	-21.8	27.0	46.0	-19.0
3.031	36.1	56.0	-19.9	25.5	46.0	-20.5
3.217	32.7	56.0	-23.3	23.0	46.0	-23.0
11.167	29.9	60.0	-30.1	23.9	50.0	-26.1
12.734	30.8	60.0	-29.2	24.1	50.0	-25.9
13.158	31.2	60.0	-28.8	25.0	50.0	-25.0

6 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	13 July 2017