

Arris Group, Inc. / DG3450

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EMC Test Report

Project Number: 4	14	81	20
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Report Number: 4148120EMC02 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, § 15.407

ANSI C63.10: 2013

Report issued on: 13 July 2017

Test Result: Compliant

Tested by:

Jeremy Pickens, Senior EMC Engineer

Reviewed by:

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.

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Summary of Test Results

Test Description	Test Specification	Test Result
Emission Bandwidth	15.407(a), 15.407(e)	Compliant(1)
Spectral Density	15.407(a)	Compliant(1)
Peak Power Output	15.407(a)	Compliant(1)
Unwanted Emissions	15.407(b)	Compliant
AC Powerline Conducted Emission	15.107, 15.207	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.

Modifications Required for Compliance

None



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General Information

Client Information 2.1

Name: ARRIS Group, Inc.

Address: 3871 Lakefield Drive, Suite 300 City, State, Zip, Country: Suwanee, GA 30024, USA

Test Laboratory 2.2

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

General Information of EUT 2.3

Type of Product: Digital Gateway Modem

Model Number: DG3450

Serial Number: 73R2XC333301541

Power Supply: M/N: NBS36H120300VU, P/N: AREP05681

Frequency Range: 5150 to 5250 MHz and 5725 to 5825MHz

802.11a, 802.11n (HT20), 802.11n (HT40), 802.11ac (VHT20), 802.11ac Data Modes:

(VHT40), 802.11ac (VHT80)

Antenna: Internal, 4x4 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

Operating Modes and Conditions

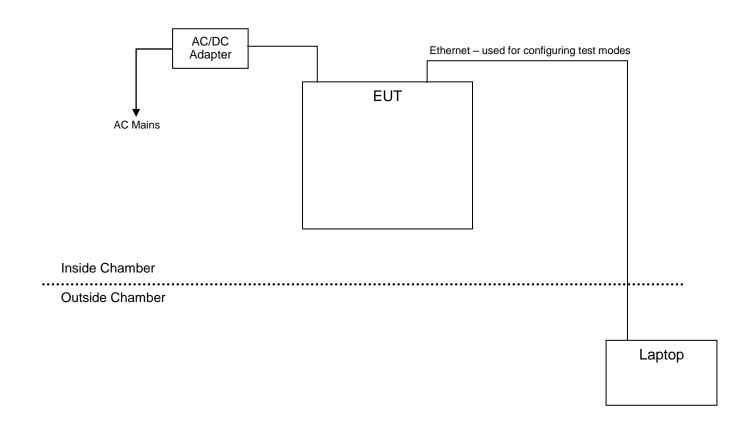
Using test commands, the EUT would transmit continuously on any of the UNII Band 1 or UNII Band 3 channels at full power. Worst-case power and PSD were achieved at the lowest data rate. For radiated spurious emissions measurements, only the worst-case mode with respect to peak power was investigated.



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2.5 EUT Connection Block Diagram – Radiated Measurements



System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
А	A Arris Digital C		DG3450	73R2XC333301541
В	B NetBit AC/DC Supply		NBS36H120300VU P/N: AREP05681	Not Labeled



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Unwanted Emissions

Test Result 3.1

Test Description	Test Specification	Test Result
Spurious Emissions	15.407(b) ANSI C63.10: 2013	Compliant

Test Method 3.2

Testing was performed using the radiated and conducted methods defined in ANSI C63.10: 2013 clause 12.7 and KDB 789033 D02 General UNII Test Procedures New Rules v01r03. In lieu of the marker-delta or integration methods, band edge compliance was shown using a peak detector and a 1MHz resolution bandwidth.

Lowest, middle, and highest channels were investigated for each band. Only the modulation providing the worst-case power was reported except at the band edges where all modulations and bandwidths were measured. The frequency range examined was 9kHz to 40GHz. A pre-scan was performed in the 9kHz-30MHz range and no emissions associated with the radio were observed.

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. Measurements below 1GHz were not repeated.

Limit:

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 e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 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 e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

Test Site 3.3

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.5 °C Relative Humidity: 43.5 %



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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

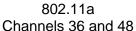
Note: The equipment calibration period is 1 year.

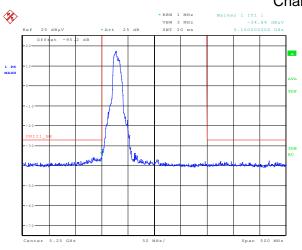


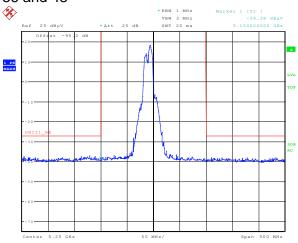
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Test Data - UNII Band 1 - Radiated Band Edge



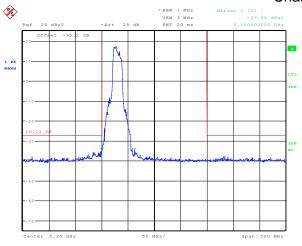


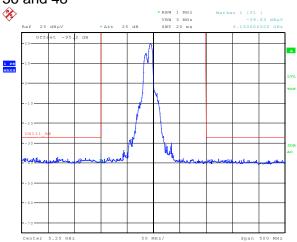


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802.11n (HT20) Channels 36 and 48





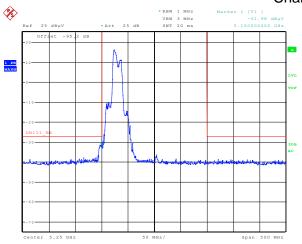
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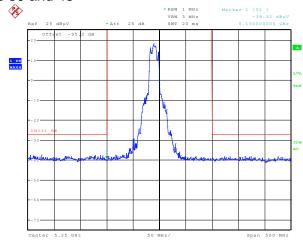
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802.11ac (VHT20) Channels 36 and 48

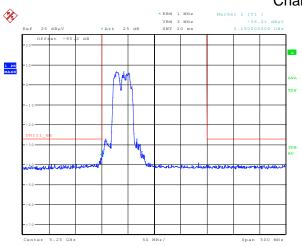


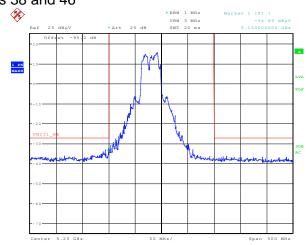


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Date: 22.JUN.2017 11:14:38

802.11n (HT40) Channels 38 and 46





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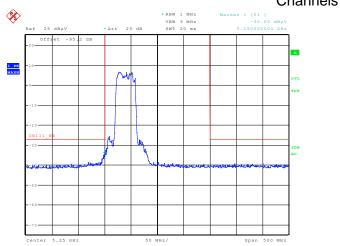
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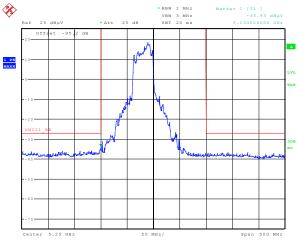


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802.11ac (VHT40) Channels 38 and 46

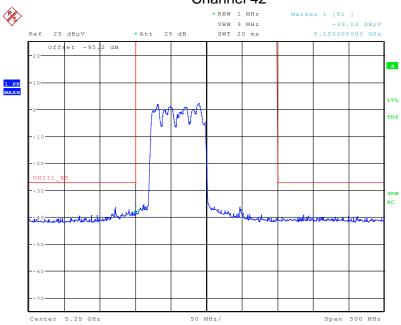




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802.11ac (VHT80) Channel 42

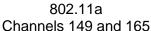


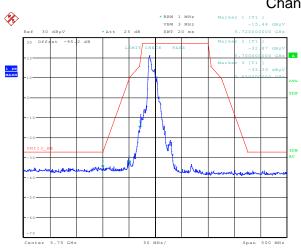
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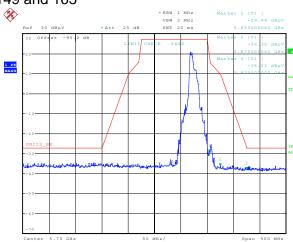
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Test Data - UNII Band 1 - Radiated Band Edge

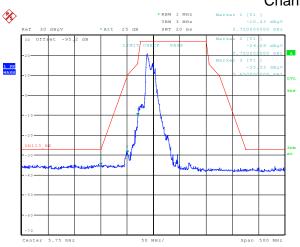


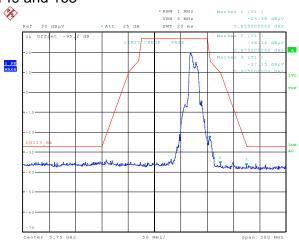




Date: 22.JUN.2017 13:36:17 Date: 22.JUN.2017 13:34:33

802.11n (HT20) Channels 149 and 165





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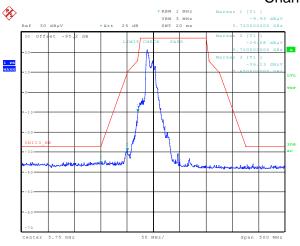
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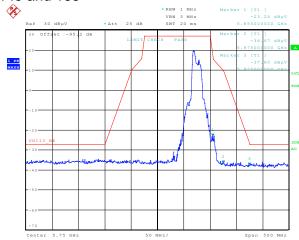


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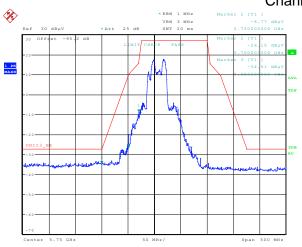
802.11ac (VHT20) Channels 149 and 165

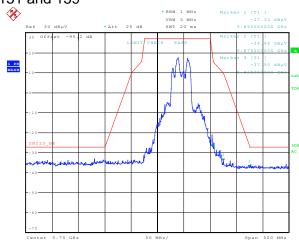




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802.11n (HT40) Channels 151 and 159





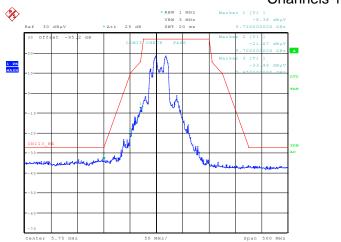
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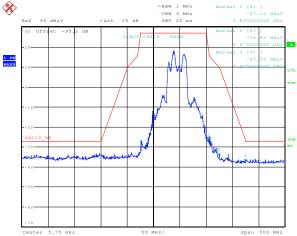


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802.11ac (VHT40) Channels 151 and 159

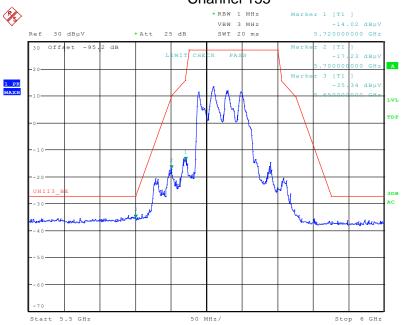




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802.11ac (VHT80) Channel 155



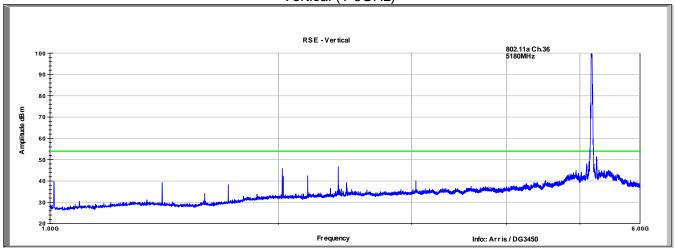
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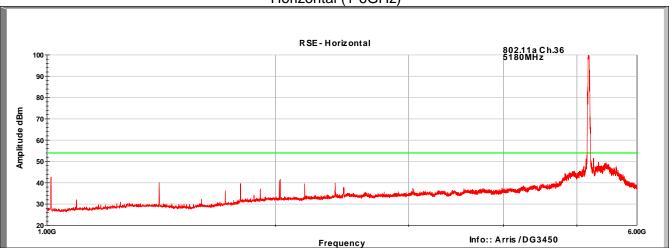
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Unwanted Emissions – Cabinet Radiation

Channel 36 Vertical (1-6GHz)



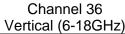
Channel 36 Horizontal (1-6GHz)

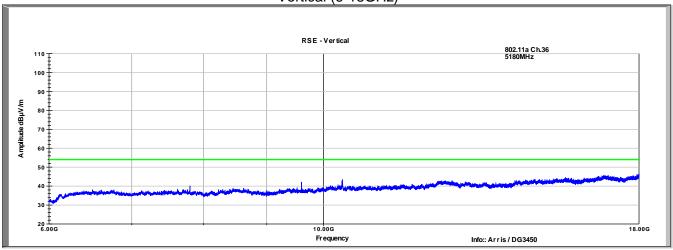




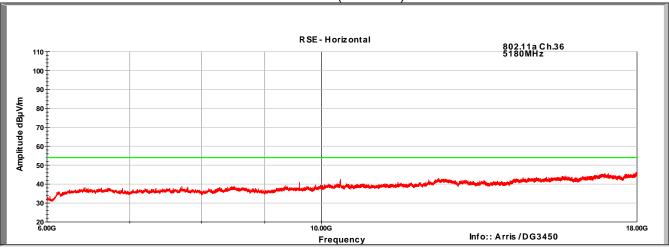
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Channel 36 Horizontal (6-18GHz)

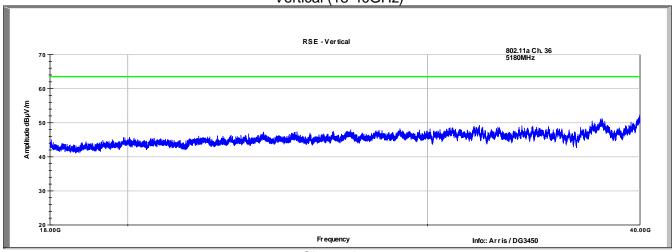




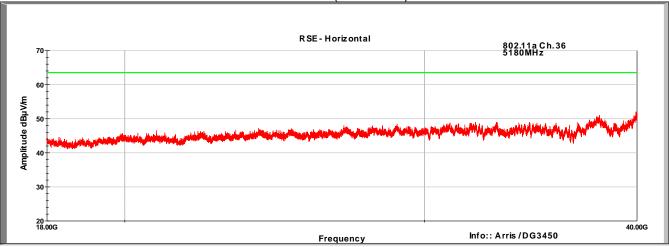
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Channel 36 Horizontal (18-40GHz)

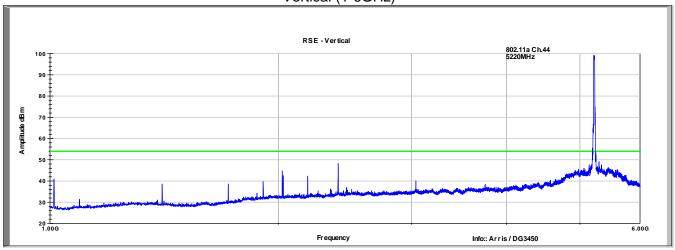




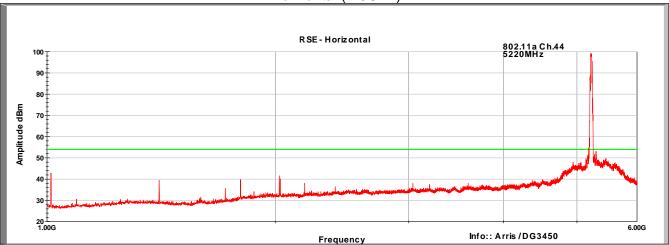
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Channel 44 Vertical (1-6GHz)



Channel 44 Horizontal (1-6GHz)

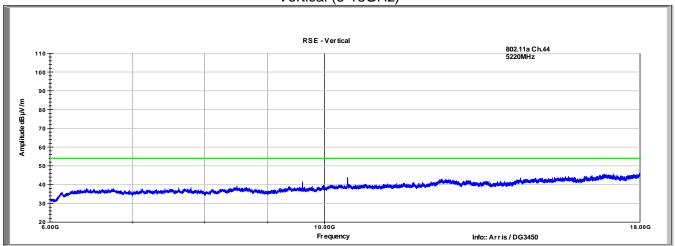




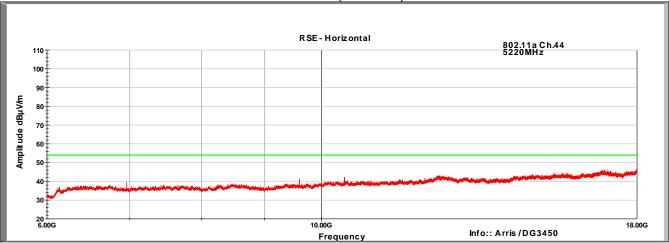
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Channel 44 Vertical (6-18GHz)



Channel 44 Horizontal (6-18GHz)

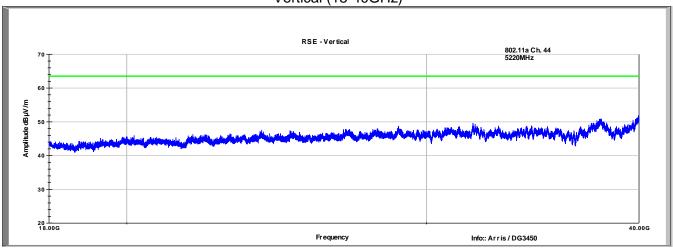




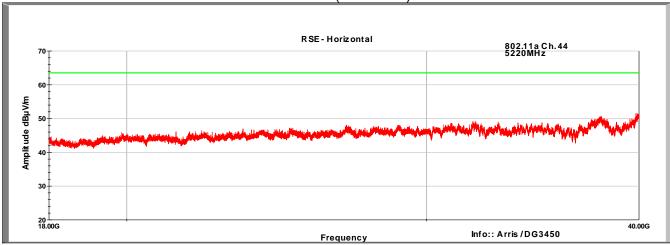
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Channel 44 Vertical (18-40GHz)



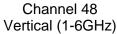
Channel 44 Horizontal (18-40GHz)

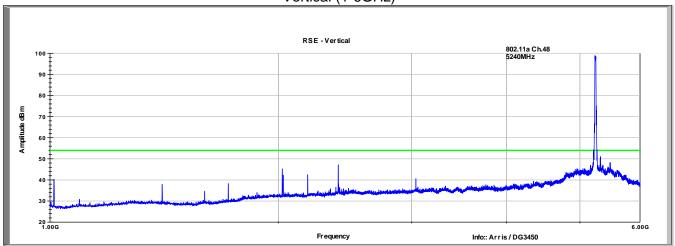




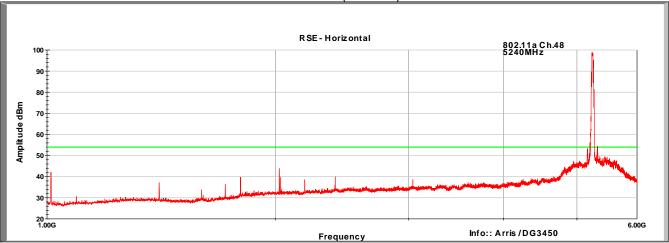
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Channel 48 Horizontal (1-6GHz)

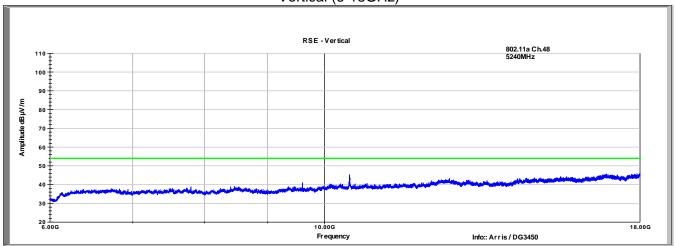




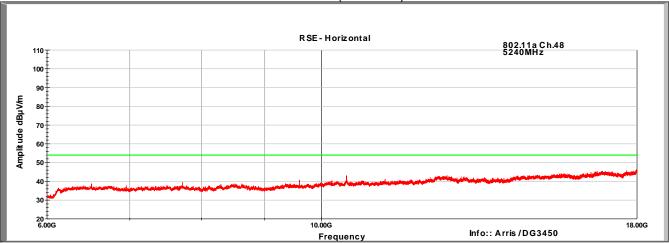
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Channel 48 Vertical (6-18GHz)



Channel 48 Horizontal (6-18GHz)

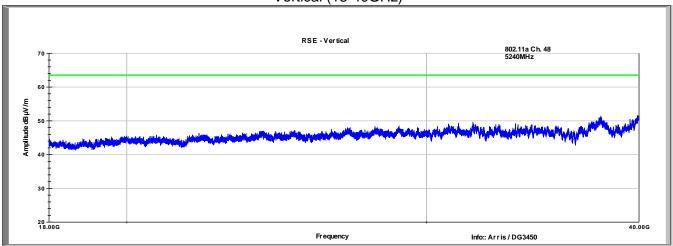




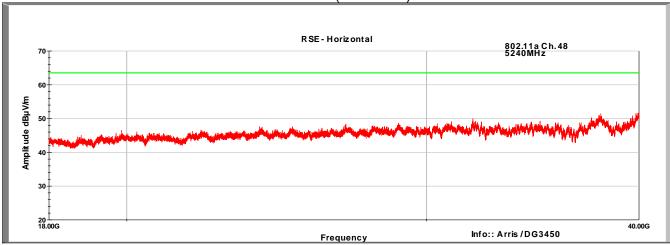
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Channel 48 Vertical (18-40GHz)



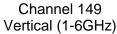
Channel 48 Horizontal (18-40GHz)

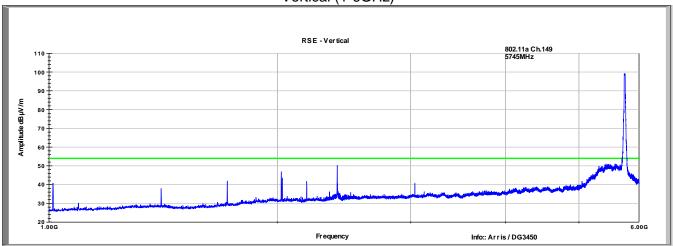




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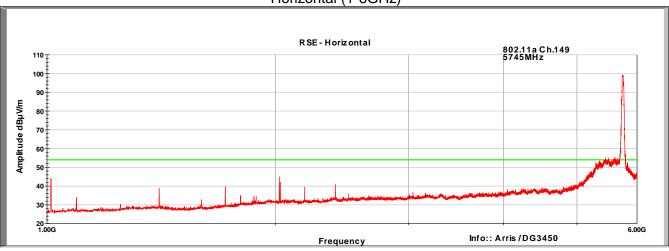
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Worst case spur (digital): 50.3dBµV/m @ 2.4GHz

Channel 149 Horizontal (1-6GHz)

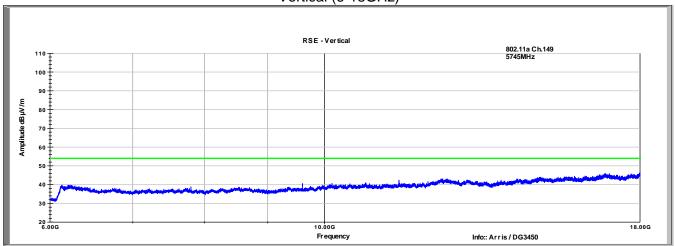




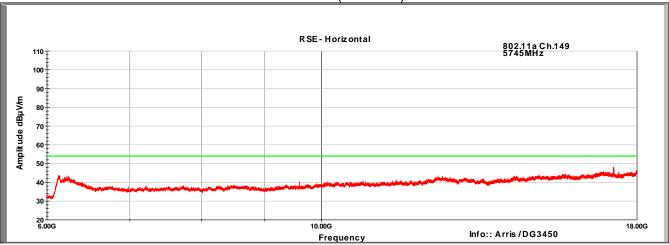
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Channel 149 Vertical (6-18GHz)



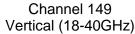
Channel 149 Horizontal (6-18GHz)

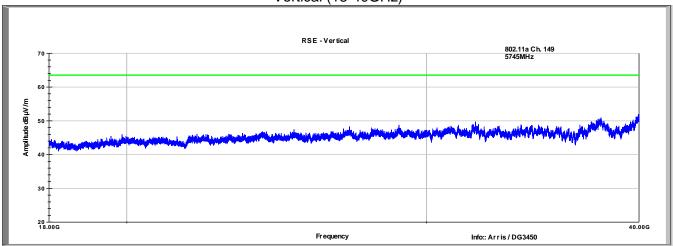




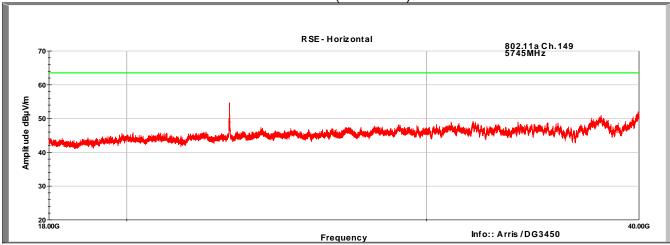
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Channel 149 Horizontal (18-40GHz)

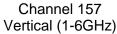


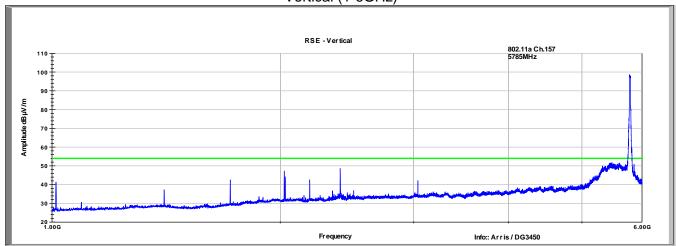
Worst case spur (harmonic): 54.7dBµV/m @ 22.98GHz



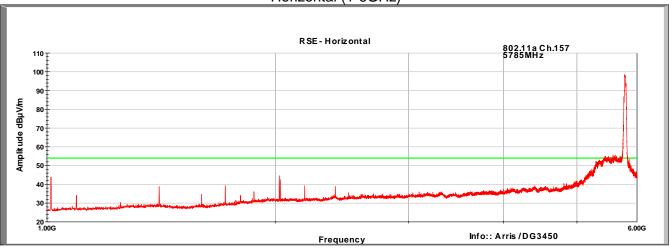
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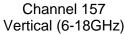
Channel 157 Horizontal (1-6GHz)

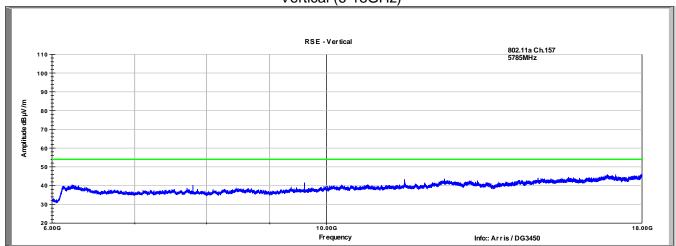




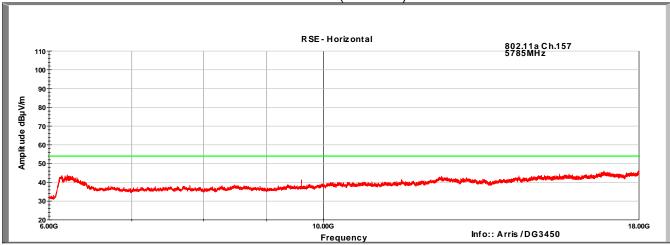
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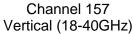
Channel 157 Horizontal (6-18GHz)

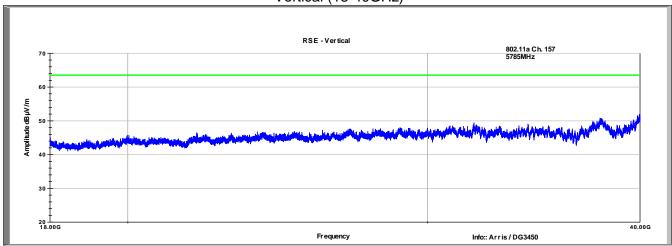




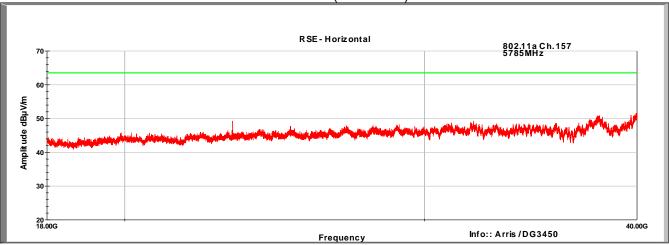
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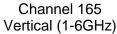
Channel 157 Horizontal (18-40GHz)

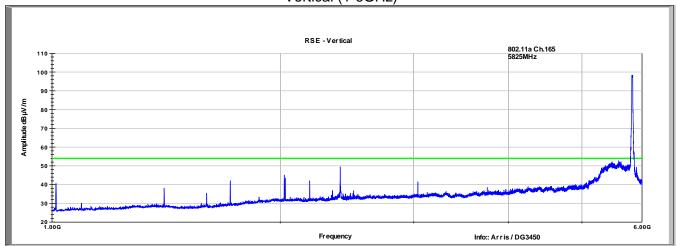




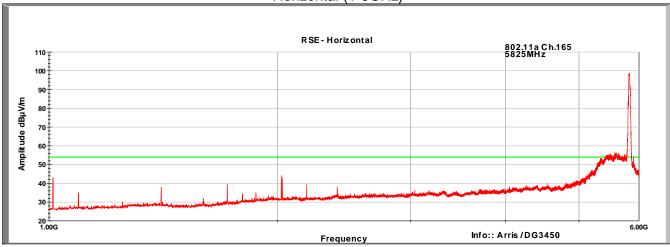
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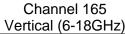
Channel 165 Horizontal (1-6GHz)

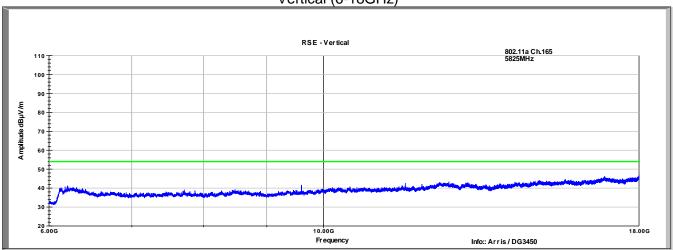




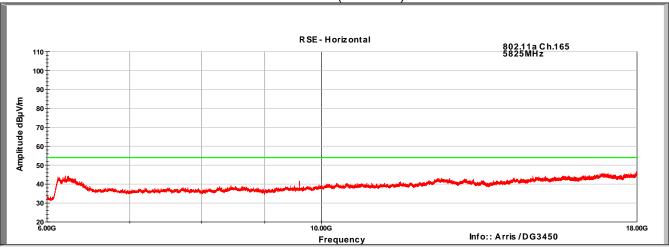
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Channel 165 Horizontal (6-18GHz)

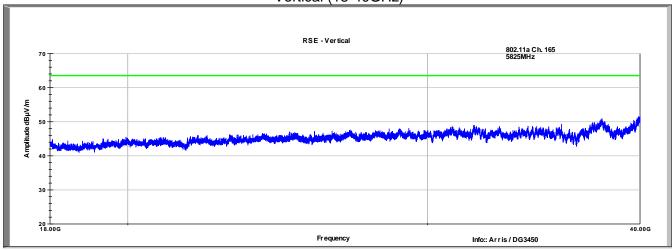




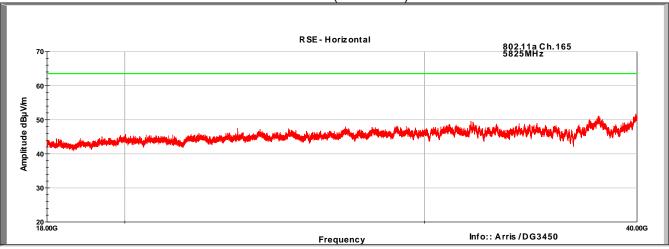
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Channel 165 Horizontal (18-40GHz)





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Conducted Emissions

Test Result 4.1

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

Test Method 4.2

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

Test Site 4.3

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.7°C Relative Humidity: 47.8%

Test Equipment 4.4

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:

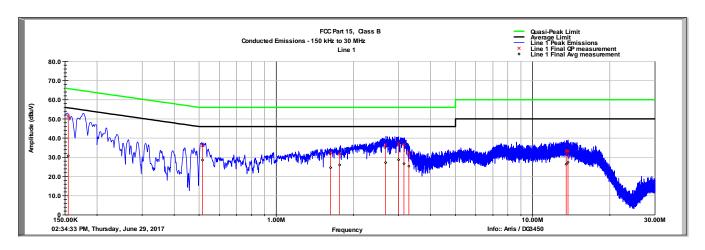
"Conducted Emissions" TILE! profile dated Dec 2015

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Test Data 4.5

Line 1 Conducted Emissions Plot 150-30MHz



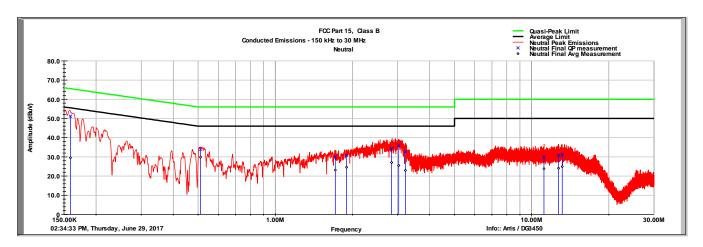
Line 1 Conducted Emissions Data 150-30MHz

Frequency	QP Value	QP Limit	QP Margin	Avg Value	Avg Limit	Avg Margin
MHz	dBuV	dBuV	dB	dBuV	dBuV	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

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Neutral Conducted Emissions Plot 150-30MHz



Neutral Conducted Emissions Data 150-30MHz

Frequency	QP Value	QP Limit	QP Margin	Avg Value	Avg Limit	Avg Margin
MHz	dBuV	dBuV	dB	dBuV	dBuV	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



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5 Revision History

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