Radio Test Report: EDCS - 1246690

For

CP-DX650

5725 – 5850MHz

Against the following Specifications:

FCC CFR 47 part 15.247

RSS-210

Cisco Systems

EMC Laboratory

170 West Tasman Drive

San Jose, CA 95134

Author: Phillip Carranco
Approved By: Dilip Patel
Title: Regulatory Compliance Manager

This report replaces any previously entered test report under EDCS - 1246690

This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

Section 1: Overview

Test Summary

The samples were assessed against the tests detailed in section 3 under the requirements of the following standards:

Emissions:
CFR47 Part 15.247
RSS-210

Notes:

1) Measurements were made in accordance with KDB Publication No. 558074 & measurement method of spurious emission tolerance to the International Telecommunication Union (ITU) Recommendation SM329.

Section 2: Assessment Information

2.1 General

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal Government.

With regard to this assessment, the following points should be noted:

a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results, due to production tolerances and measurement uncertainties.

b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.

c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).

d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%

e) All AC testing was performed at one or more of the following supply voltages:
110V (+/-10%) 60Hz
220V (+/-10%) 50 or 60Hz

f) Cisco Systems, Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). The scope of accreditation, certificate number 1178-01 is referenced in appendix C, along with further details.

2.2 Start Date of Testing

15-Oct-2012

2.3 Report Issue Date

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2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.,
170 West Tasman Drive
San Jose, CA 95134,
USA

Registration Numbers for Industry Canada

Cisco System Site	Site Identifier
Building P, 10m Chamber	Company #: 4624-2
Building P, 5m Chamber	Company #: 4624-1
Building N, 5m Chamber	Company #: 6111
Building I, 5m Chamber	Company #: 6112

Test Engineers

Phillip Carranco

2.5 Equipment Assessed (EUT)

CP-DX650

2.6 EUT Description

The CP-DX650 is the next generation 1080p Video Endpoint with key expansion module support. This new generation of desktop phone incorporates an Android based operating system. Three USB ports, one micro OTG USB port, one higher powered USB-proprietary connector combination (AUX) and one standard USB Port. Support HDMI with a maximum external resolution of 1920 x 1200, also includes a single 3.5mm headset jack.

WiFi (802.11 A/B/G/N) & Bluetooth 3.0 capabilities.

Murata module, LBEH1ZNSXC-526, supports for 802.11/a/b/g/n + Bluetooth 3.0 module

SDIO interface to WLAN – Omap4 SD host controller port 5

PCM (McBSP1) interface to Bluetooth

WiFi + BT chip - Marvell 88W8787

Clocks – 38.4MHz 20ppm for main clock, 32.768KHz sleep clock

Supports 802.11i security standard

Coexistence between WiFi and BT with one antenna to both connected to the 2.4GHz radios

Single antenna for 2.4 and 5GHz bands with diplex inside the module

Up to 72Mbps (20 MHz channel)
Non- HT20: 6 – 54Mbps
HT20: M0 – M7
HT40: M0 – M7

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2.7 Scope of Assessment

Tests have been performed in accordance with the relevant Test and Assessment Plan (TAP), a copy of which is contained in Appendix F of this report, and the relevant Cisco Systems, Inc. radio test procedures (EDCS-420238). This test report may not cover all of the tests highlighted in the test plan.

2.8 Units of Measurement

The units of measurements defined in the appendices are reported in specific terms, which are test dependent. Where radiated measurements are concerned these are defined at a particular distance. Basic voltage measurements are defined in units of [dBuV]

As an example, the basic calculation for all measurements is as follows:

Emission level [dBuV] = Indicated voltage level [dBuV] + Cable Loss [dB] + Other correction factors [dB]

The combinations of correction factors are dependent upon the exact test configurations [see test equipment lists for further details] and may include:-

Antenna Factors, Pre Amplifier Gain, LISN Loss, Pulse Limiter Loss and Filter Insertion Loss..

Note: to convert the results from dBuV/m to uV/m use the following formula:-

Level in uV/m = Common Antilogarithm [(X dBuV/m)/20] = Y uV/m

2.9 Report Template Control No.

EDCS#: 703457

Section 3: Result Summary

Conducted emissions

Basic Standard	Result
6dB Bandwidth	Pass
99% and 26dB Bandwidth	Pass
Peak Output Power	Pass
Power Spectral Density	Pass
Peak Excursion	Pass
Conducted Spurious Emissions	Pass
Restricted Band Edge Measurements	Pass

Radiated emissions

Basic Standard	Result
Radiated Spurious and Harmonic Emissions	Pass
Co-Locator Radiated Spurions Emissions	Pass

Section 4: Sample Details

Note: Each sample was evaluated to ensure that its condition was suitable to be used as a test sample prior to the commencement of testing. During preliminary testing all three planes (X,Y & Z) were evaluated to determine “Worst Case”. The orientation used for this report was demind “Worst Case”.

4.1 Sample Details

Sample Number	Equipment Details	Serial Number	Part Number
S01	CP-DX650	FCH1627A5AU	73-15144-01

The following antennas were evaluated as part of this testing process. The antennas listed reflect the maximum gain allowed for each family type of antenna:

Fixed internal Amphenol Dual Band Antenna at 5GHz, Gain: (no external antenna can be used.)

5745 – 5805MHz: 3.3 dBi

4.2 System Details

System #	Description	Samples
1	Radio Test Sample	S01

4.3 Mode of Operation Details

Mode#	Description	Comments
1	802.11AN Test Mode	System is placed in a continuous Tx State at various channels per Test Requirements. 802.11A running at 6Mbps , HT20 running at 6.5Mbps and HT40 running 13.5Mbps.

Section 5: Modifications

5.1 Sample Modifications Performed During Assessment

No modifications were performed during assessment.

Appendix A: Formal Test Results

6dB Bandwidth

15.247: Systems using digital modulation techniques may operate in the 2400-2483.5MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.

Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

Center Frequency:	Frequency from table below
Span:	2 x Nominal Bandwidth (e.g. 40MHz for a 20MHz channel)
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	5 s
Resolution Bandwidth:	100 kHz
Video Bandwidth:	100 kHz
X dB Bandwidth:	6 dB
Detector:	Peak
Trace:	Single

Place the radio in continuous transmit mode. View the transmitter waveform on the spectrum analyzer, and record the pertinent measurements:

Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
5745	6	16582	500	-16082
5785	6	16382	500	-15882
5825	6	16580	500	-16080

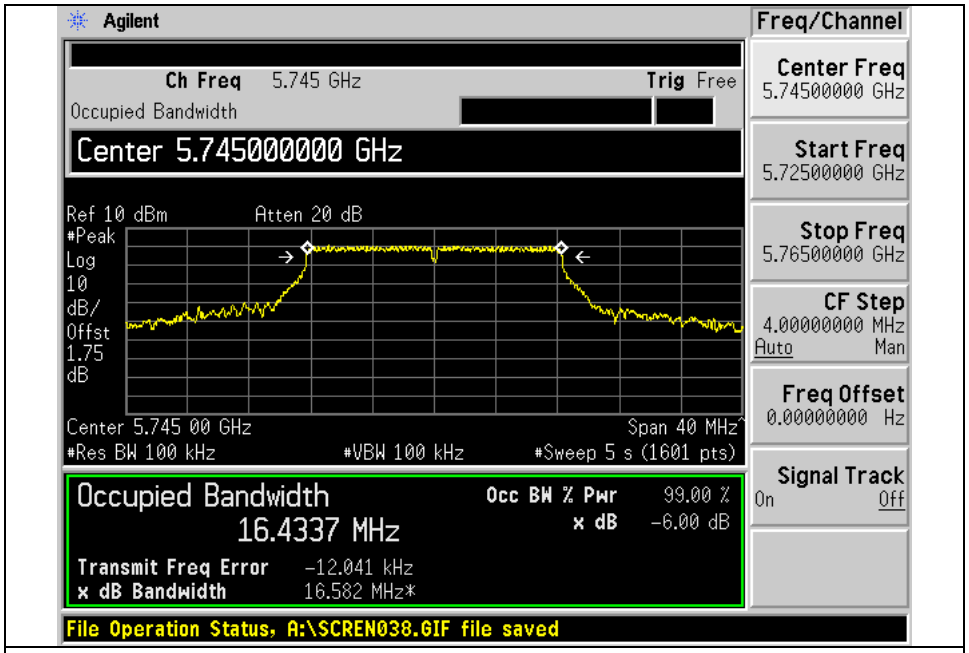
HT20 Mode:

Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
5745	6.5	17806	500	-17306
5785	6.5	17810	500	-17310
5825	6.5	17817	500	-17317

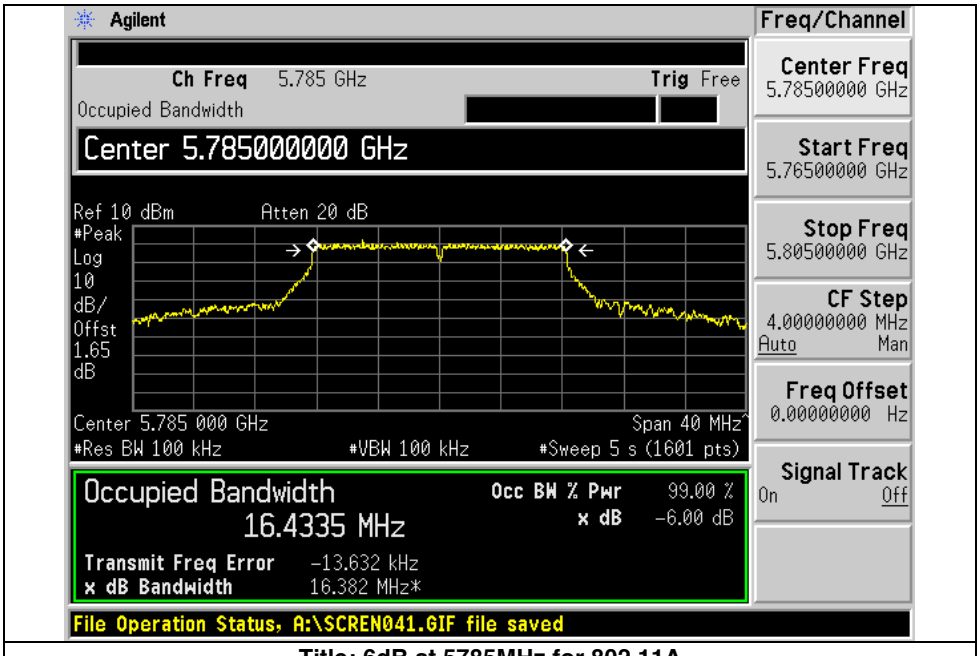
HT40 Mode:

Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
5755	13.5	36584	500	-36084
5795	13.5	36604	500	-36104

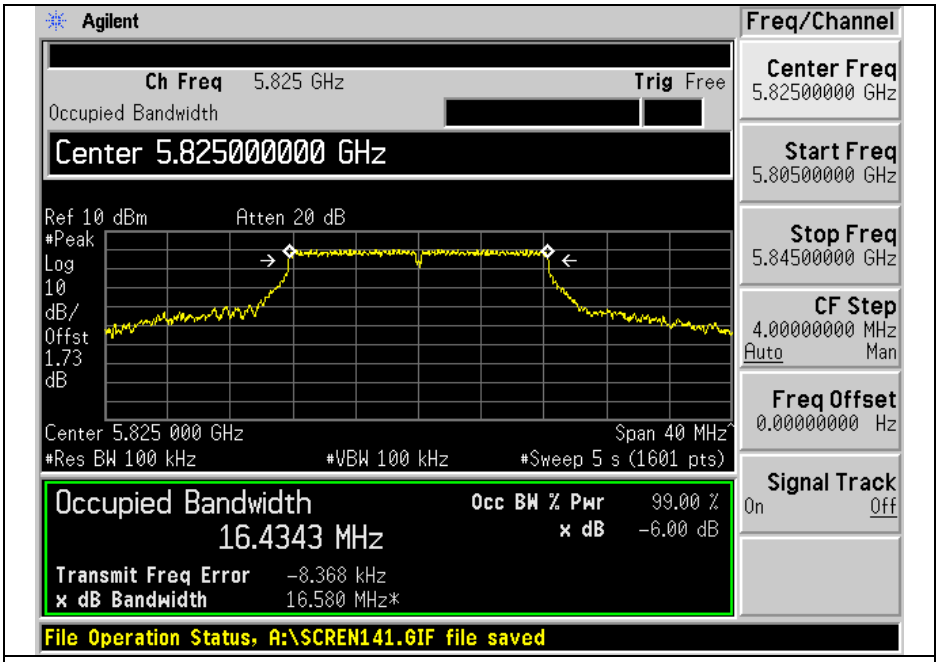
Graphical Test Results



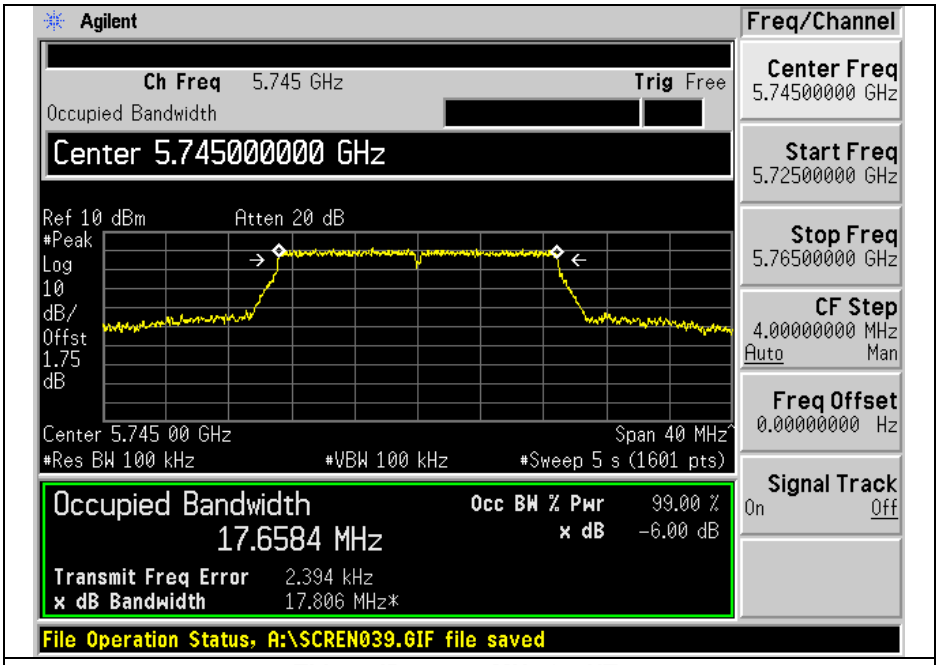
Title: 6dB at 5745MHz for 802.11A



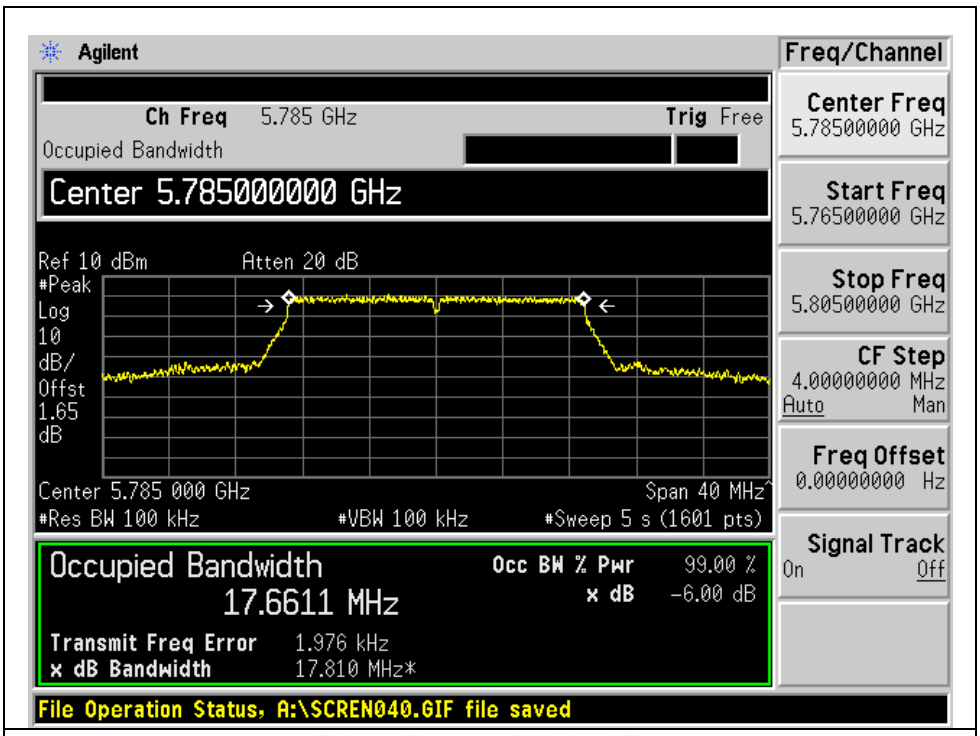
Title: 6dB at 5785MHz for 802.11A



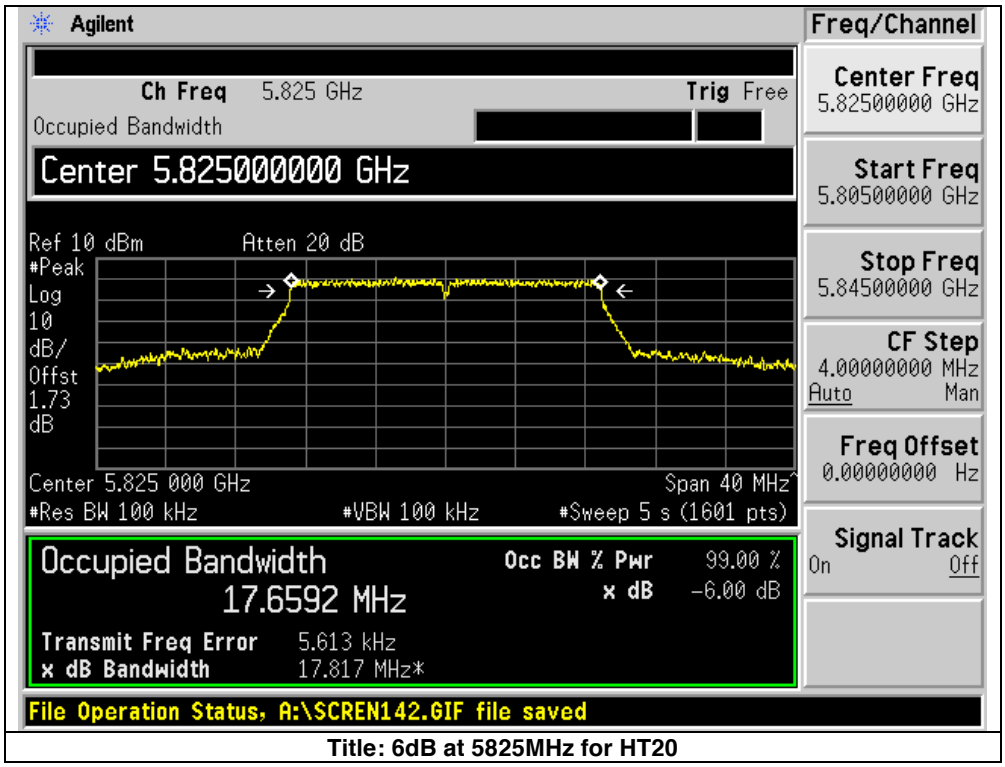
Title: 6dB at 5825MHz for 802.11A



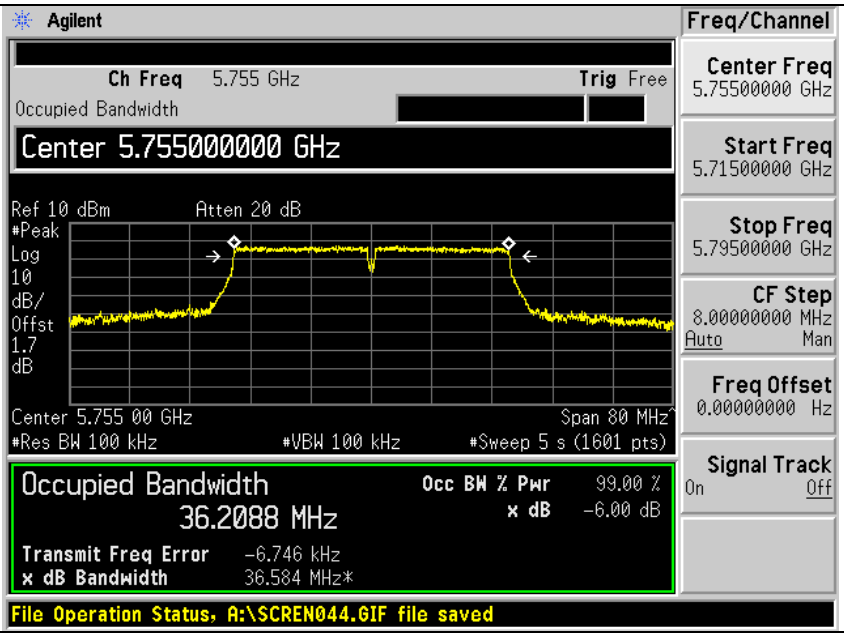
Title: 6dB at 5745MHz for HT20



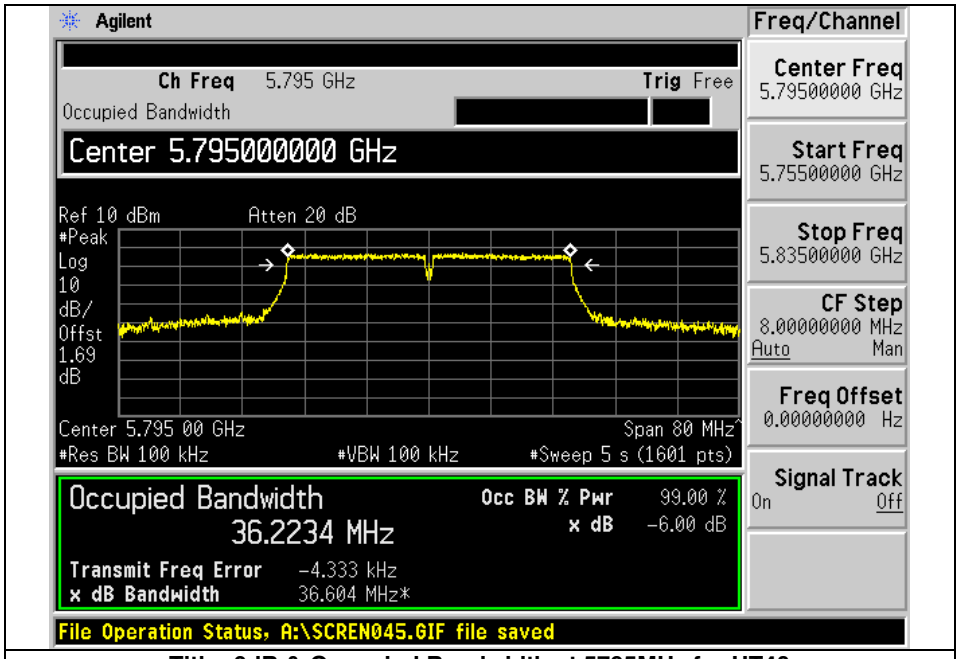
Title: 6dB at 5785MHz for HT20



Title: 6dB at 5825MHz for HT20



Title: 6dB at 5755MHz for HT40



Title: 6dB & Occupied Bandwidth at 5795MHz for HT40

99% and 26dB Bandwidth

Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

Center Frequency:	Frequency from table be.low
Span:	2 x Nominal Bandwidth (e.g. 40MHz for a 20MHz channel)
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	5 s
Resolution Bandwidth:	1%-3% of 26 dB Bandwidth
Video Bandwidth:	≥Resolution Bandwidth
X dB Bandwidth:	26 dB
Detector:	Peak
Trace:	Single

Place the radio in continuous transmit mode. View the transmitter waveform on the spectrum analyzer, and record the pertinent measurements

Frequency (MHz)	Data Rate (Mbps)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
5745	6	17.030	20.687
5785	6	17.070	20.79
5825	6	17.011	20.21

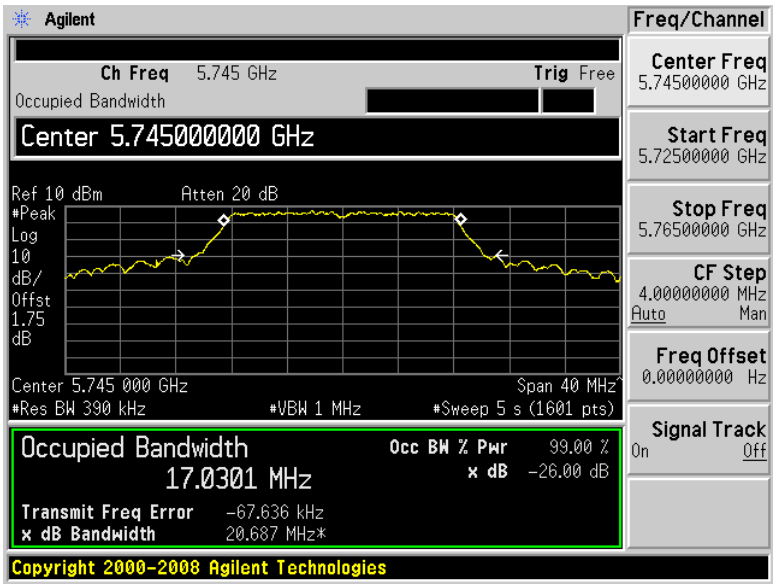
HT20 Mode:

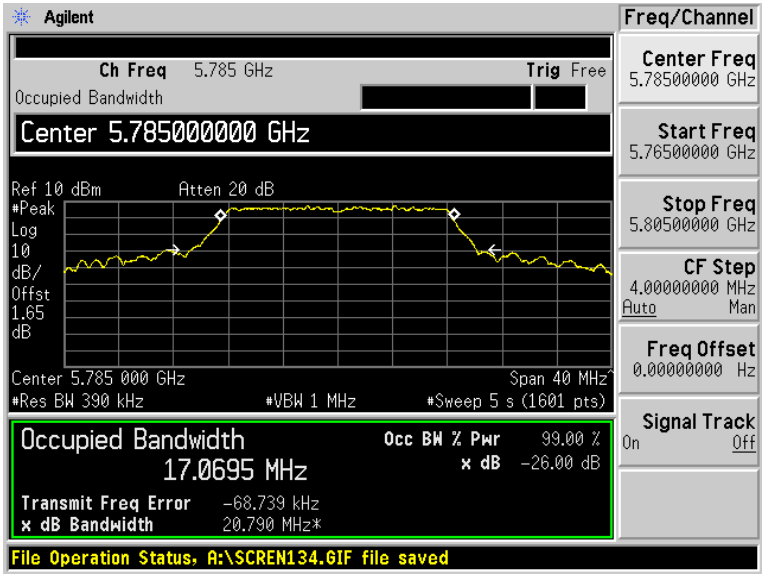
Frequency (MHz)	Data Rate (Mbps)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
5745	6.5	17.969	21.129
5785	6.5	17.991	20.69
5825	6.5	17.990	20.661

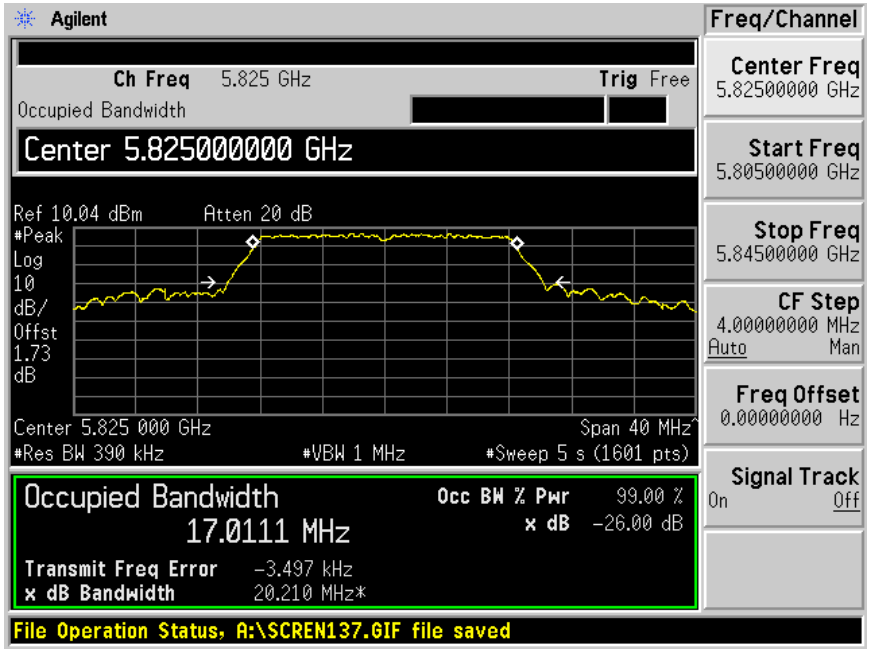
HT40 Mode:

Frequency (MHz)	Data Rate (Mbps)	99% Bandwidth (MHz)	26dB Bandwidth (MHz)
5755	13.5	36.369	41.062
5795	13.5	36.420	41.038

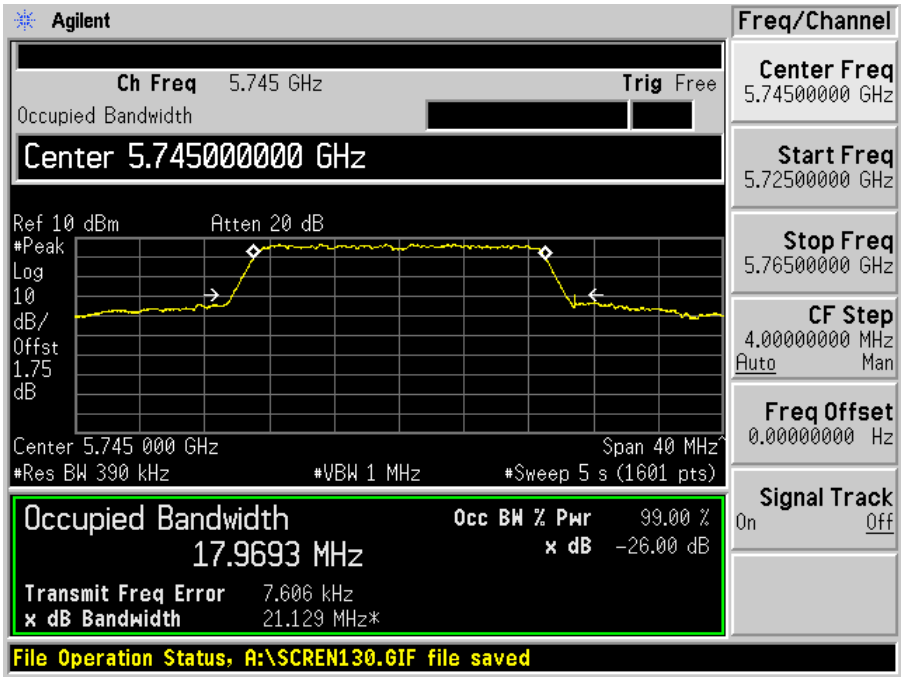
Graphical Test Results for 11A:

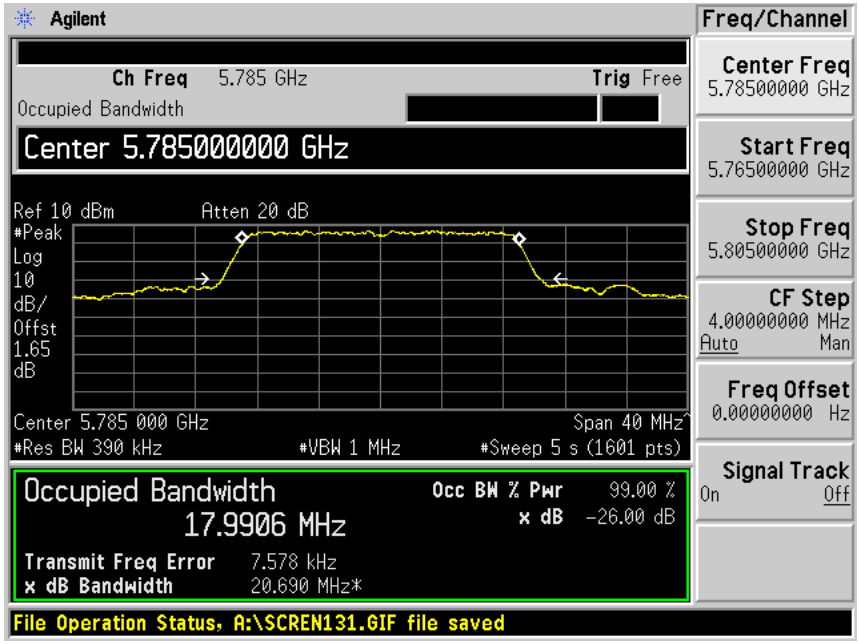


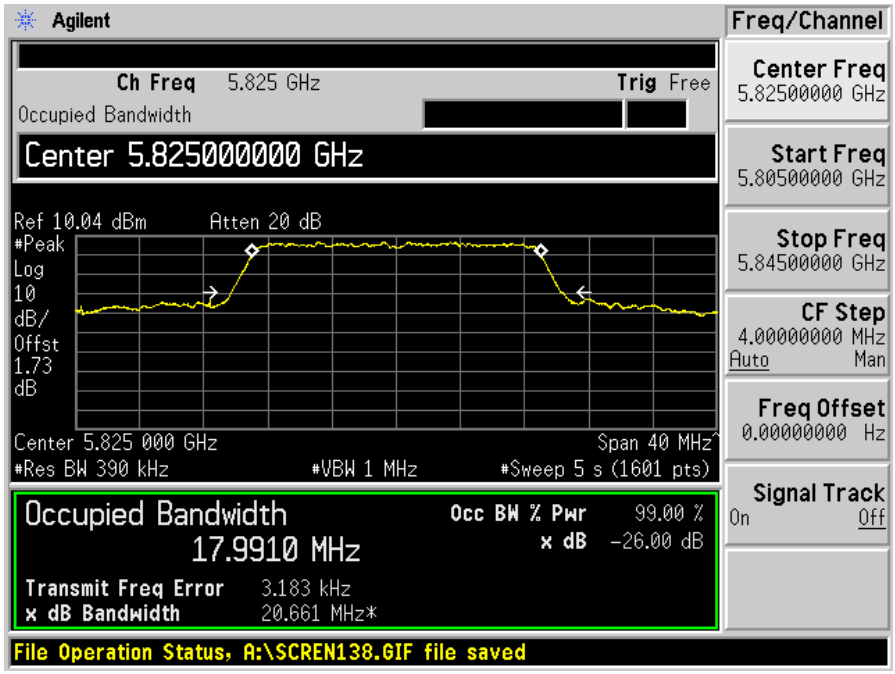




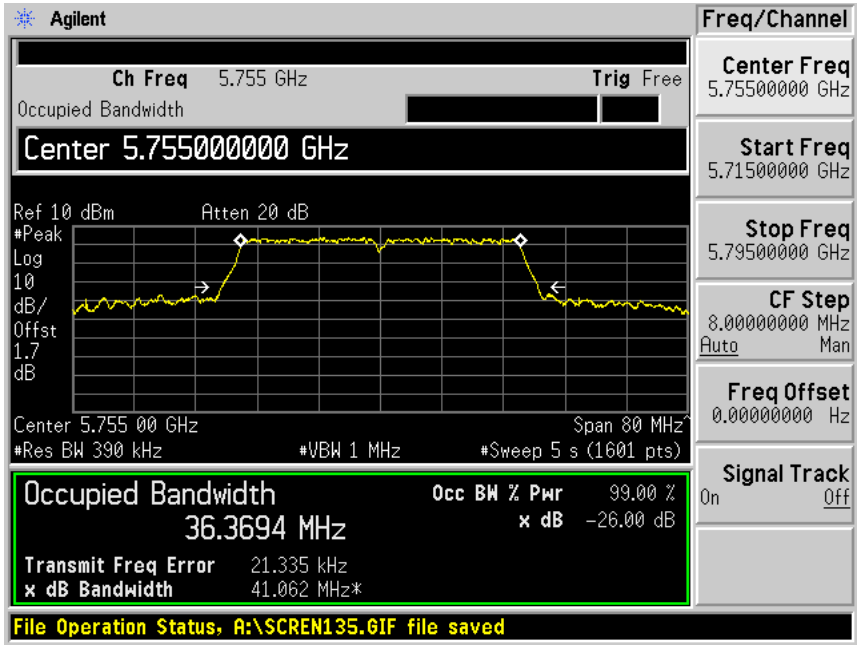
Graphical Test Results for HT20:

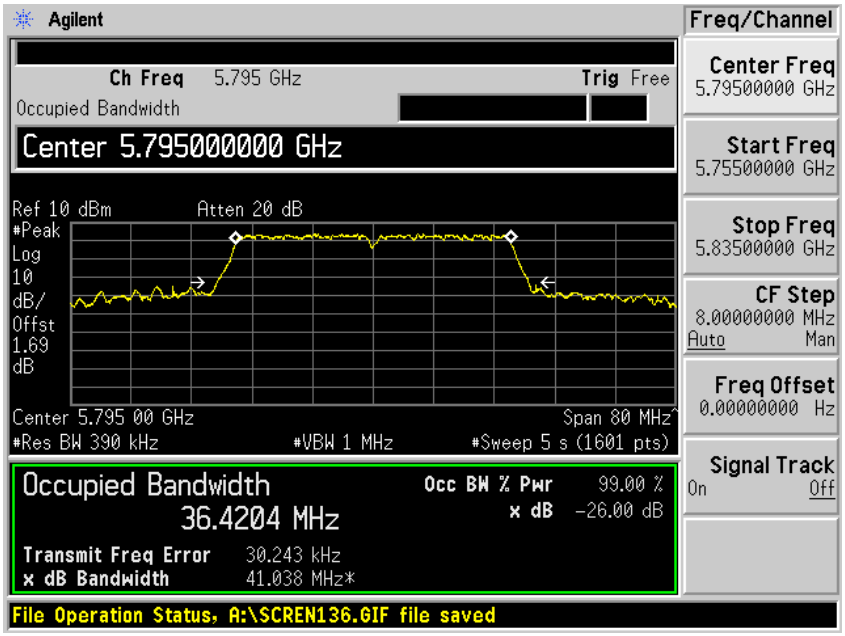






Graphical Test Results for HT40:





Peak Output Power:

15.247 & RSS-210(A8.4):

The maximum conducted output power of the intentional radiator for systems using digital modulation in the 5725-5850MHz band shall not exceed 1 Watt (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below.

Enable "Channel Power" function of analyzer
Center Frequency: Frequency from table below
Span: 20 MHz (must be greater than 26dB bandwidth, adjust as necessary)
Ref Level Offset: Correct for attenuator and cable loss.
Reference Level: 20 dBm
Attenuation: 20 dB
Sweep Time: 100ms, Single sweep
Resolution Bandwidth: 1 MHz
Video Bandwidth: 3 MHz
Detector: Sample
Trace: Trace Average 100 traces in Power Averaging Mode
Integration BW: =26 dB BW from 26 dB Bandwidth Data

After averaging 100 traces of the transmitter waveform on the spectrum analyzer, record the spectrum analyzer Channel Power

Frequency (MHz)	Data Rate (Mbps)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
5745	6	15.04	30	-14.96
5785	6	14.79	30	-15.21
5825	6	14.84	30	-15.16

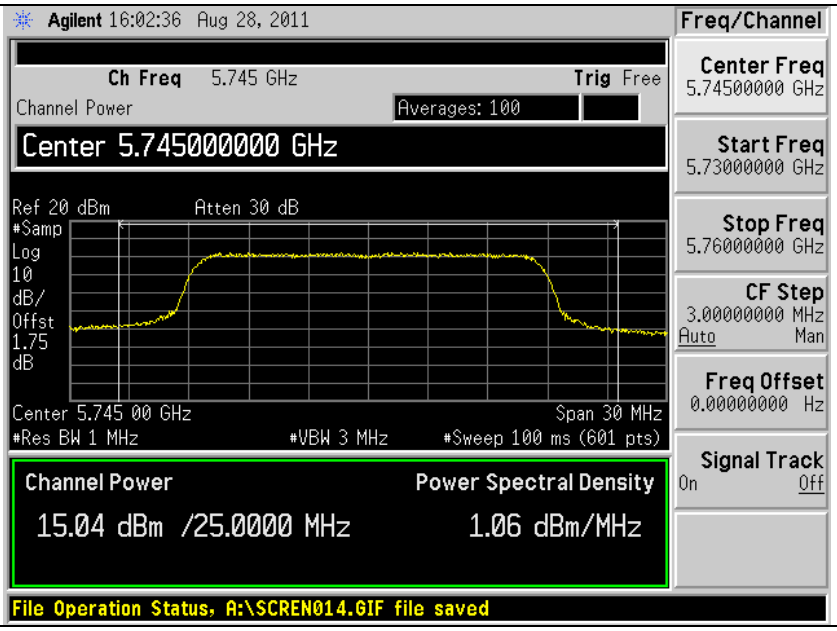
HT20 Mode:

Frequency (MHz)	Data Rate (Mbps)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
5745	6.5	15.02	30	-14.98
5785	6.5	14.72	30	-15.28
5825	6.5	14.77	30	-15.23

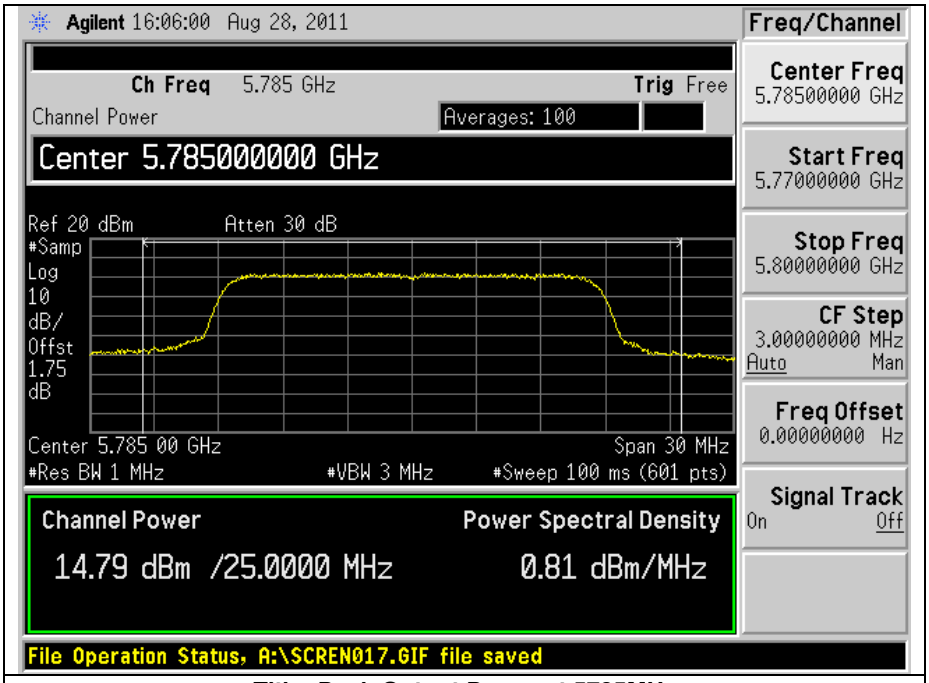
HT40 Mode:

Frequency (MHz)	Data Rate (Mbps)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
5755	13.5	14.90	30	-15.10
5795	13.5	14.65	30	-15.35

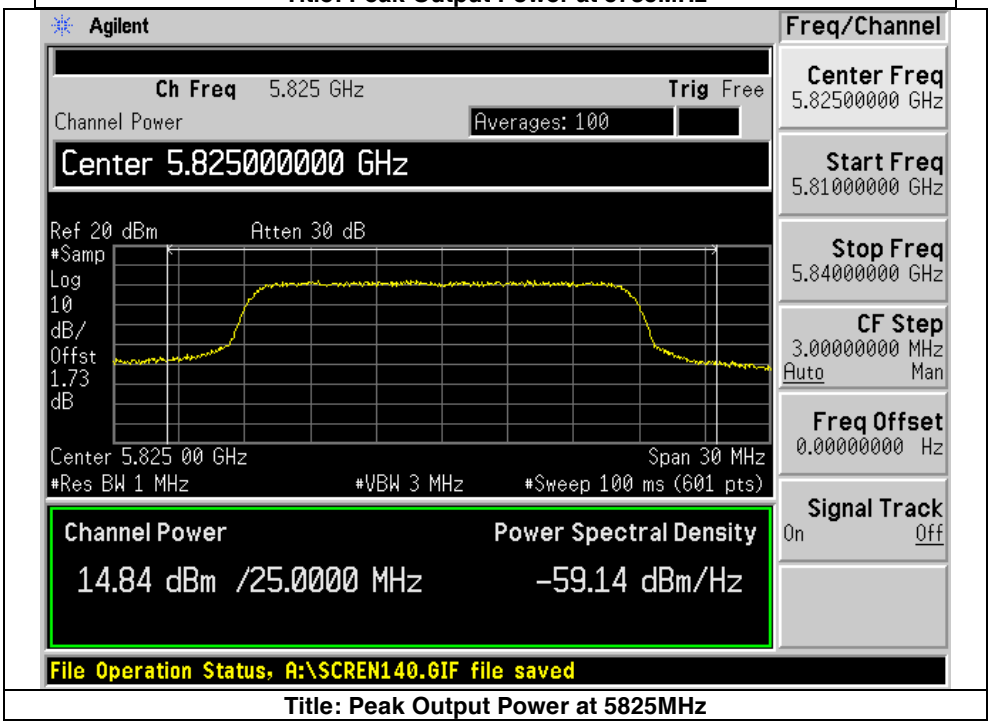
Graphical Test Results



Title: Peak Output Power at 5745MHz

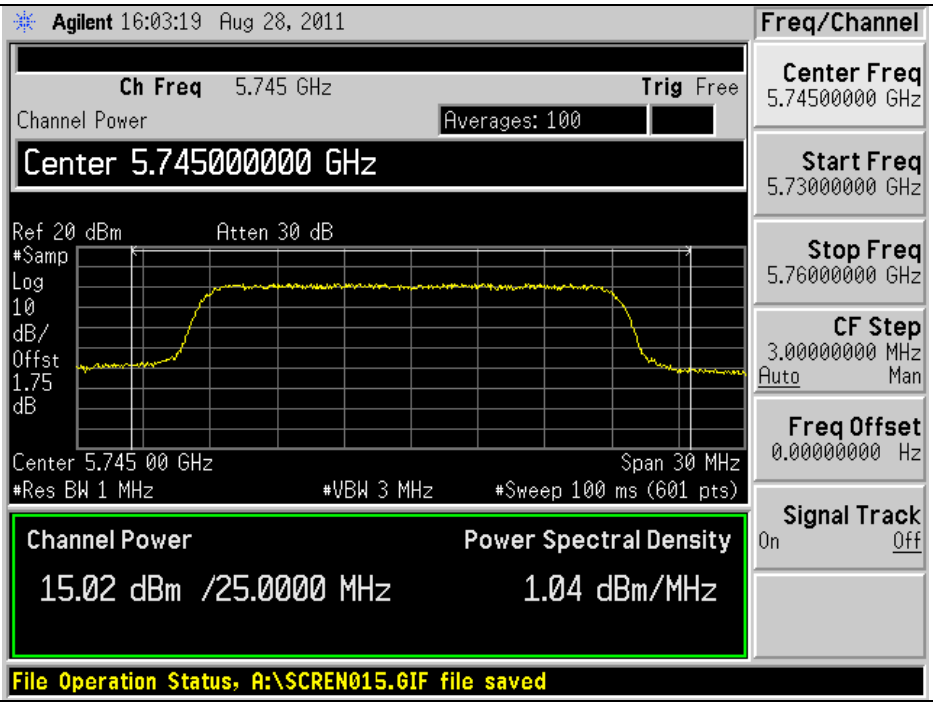


Title: Peak Output Power at 5785MHz

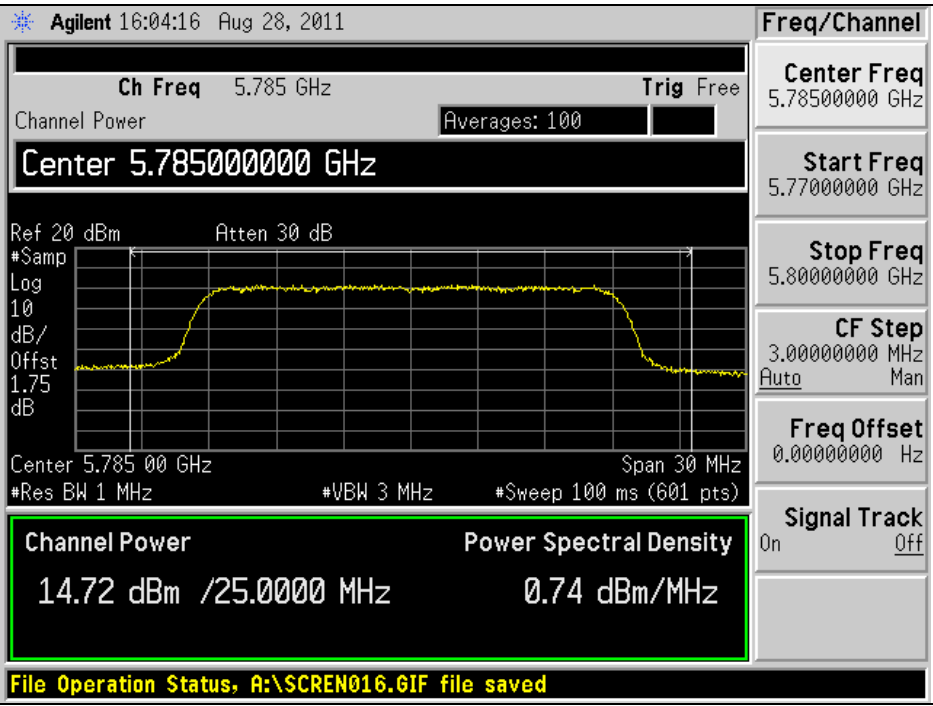


Title: Peak Output Power at 5825MHz

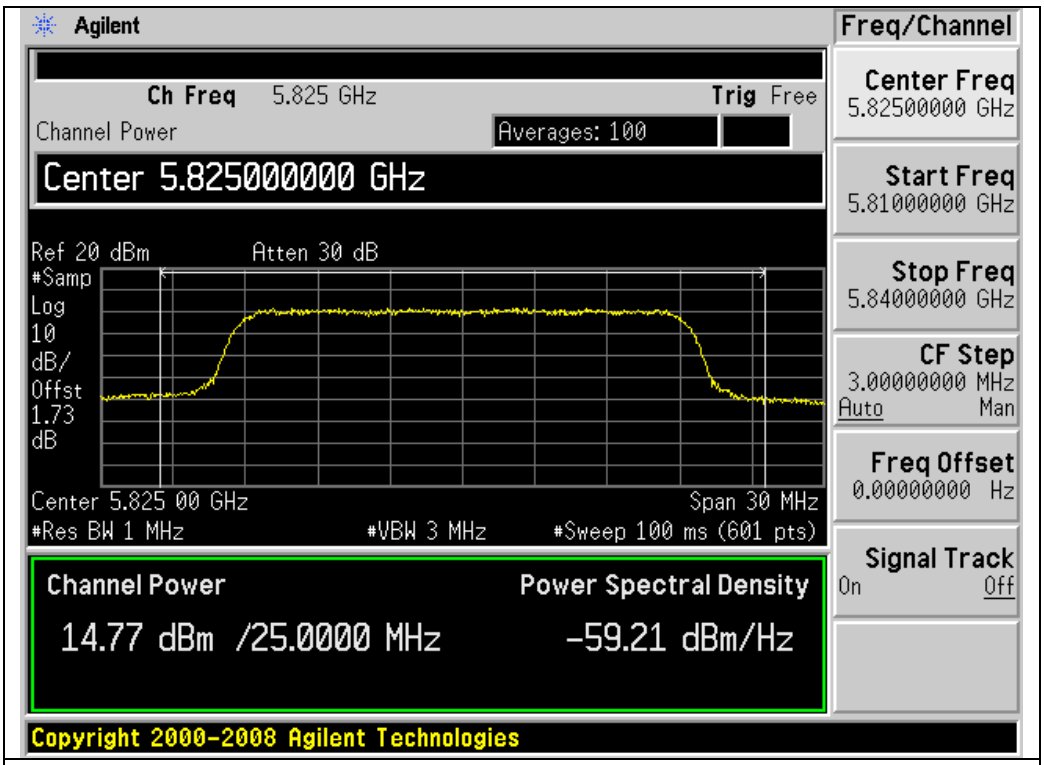
Graphical Test Results for HT20:



Title: Peak Output Power at 5745MHz for HT20

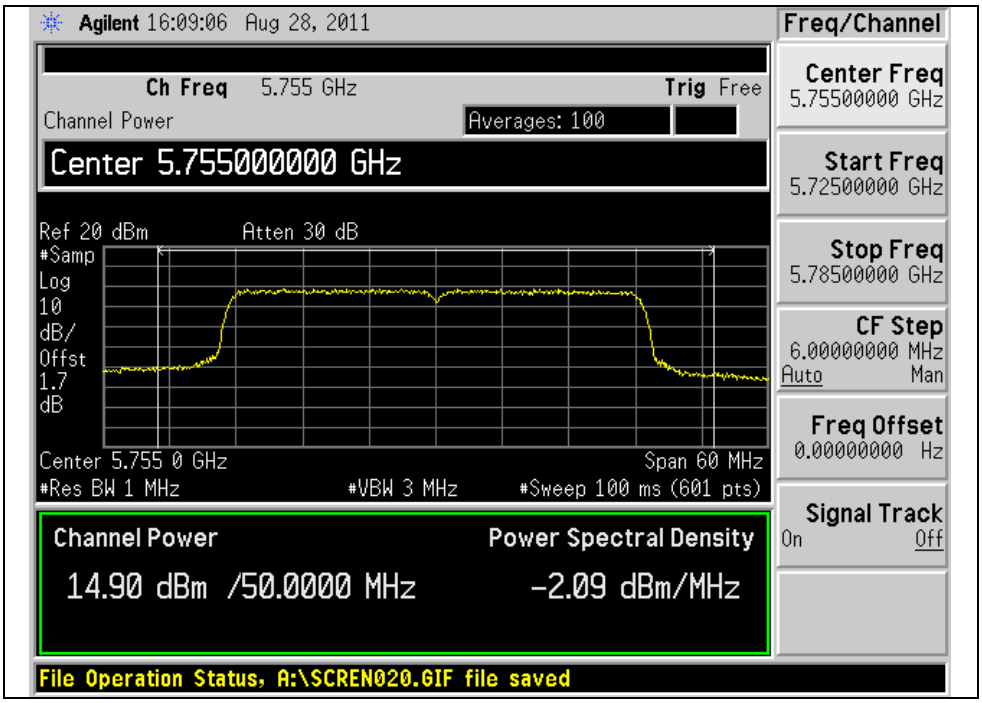


Title: Peak Output Power at 5785MHz for HT20

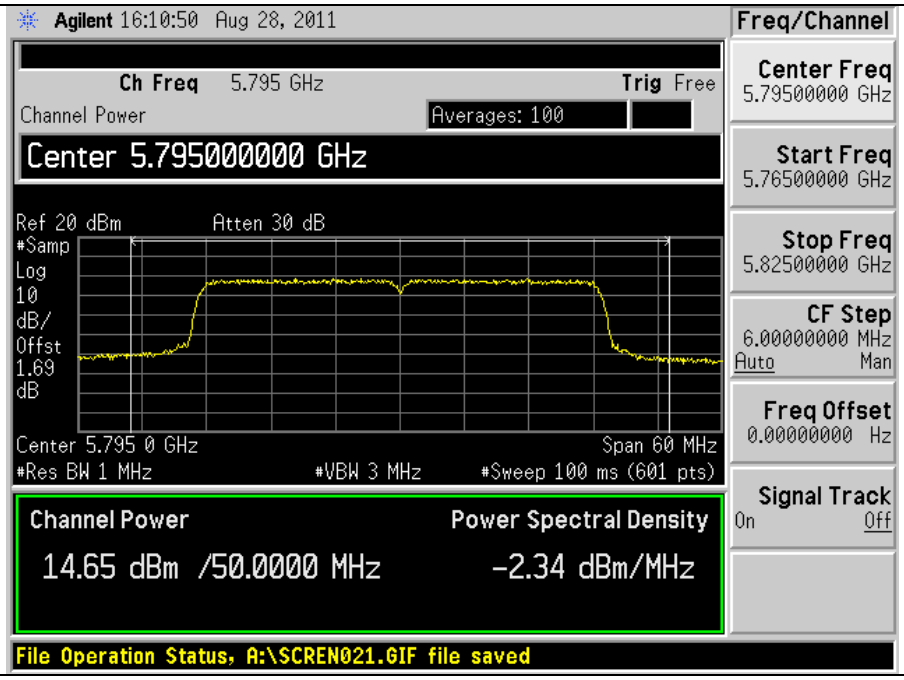


Title: Peak Output Power at 5825MHz for HT20

Graphical Test Results for HT40:



Title: Peak Output Power at 5755MHz for HT40



Title: Peak Output Power at 5795MHz for HT40

Power Spectral Density:

15.247 & RSS-210(A8.2):

For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below.

Center Frequency:	Frequency from table below
Span:	20 MHz
Ref Level Offset:	Correct for attenuator and cable loss.
Reference Level:	20 dBm
Attenuation:	20 dB
Sweep Time:	10s
Resolution Bandwidth:	3 kHz
Video Bandwidth:	10 kHz
Detector:	Peak
Trace:	Single
Marker:	Peak Search

Record the Marker value.

Frequency (MHz)	Data Rate (Mbps)	Peak Power Spectral Density (dBm/3kHz)	Limit (dBm)	Margin (dB)
5745	6	-14.85	8	-22.85
5785	6	-14.1	8	-22.1
5805	6	-15.06	8	-23.06

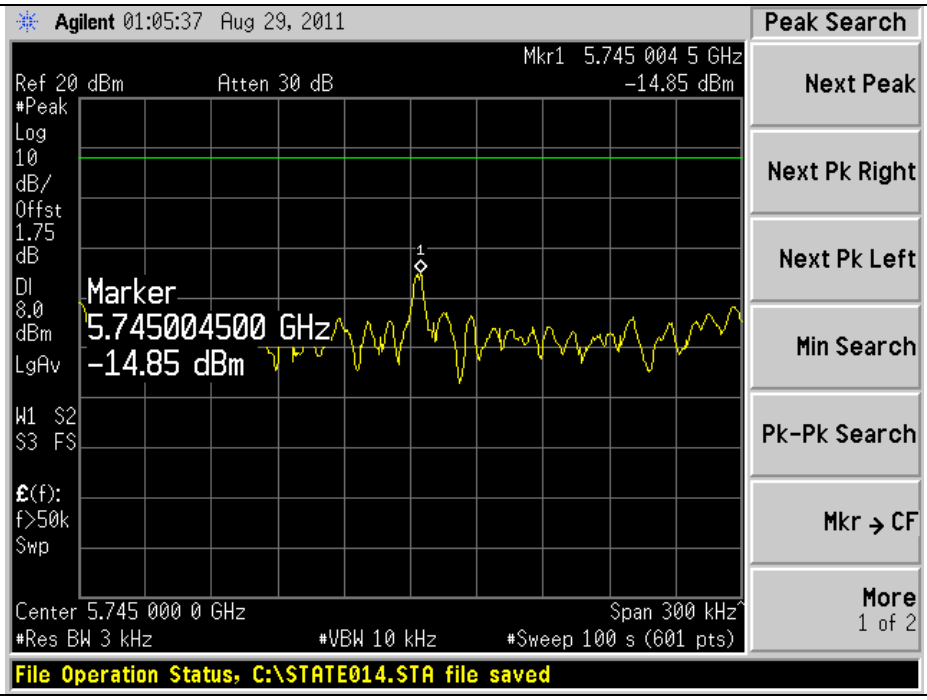
HT20 Mode:

Frequency (MHz)	Data Rate (Mbps)	Peak Power Spectral Density (dBm/3kHz)	Limit (dBm)	Margin (dB)
5745	6.5	-14.85	8	-22.85
5785	6.5	-13.53	8	-21.53
5805	6.5	-13.34	8	-21.34

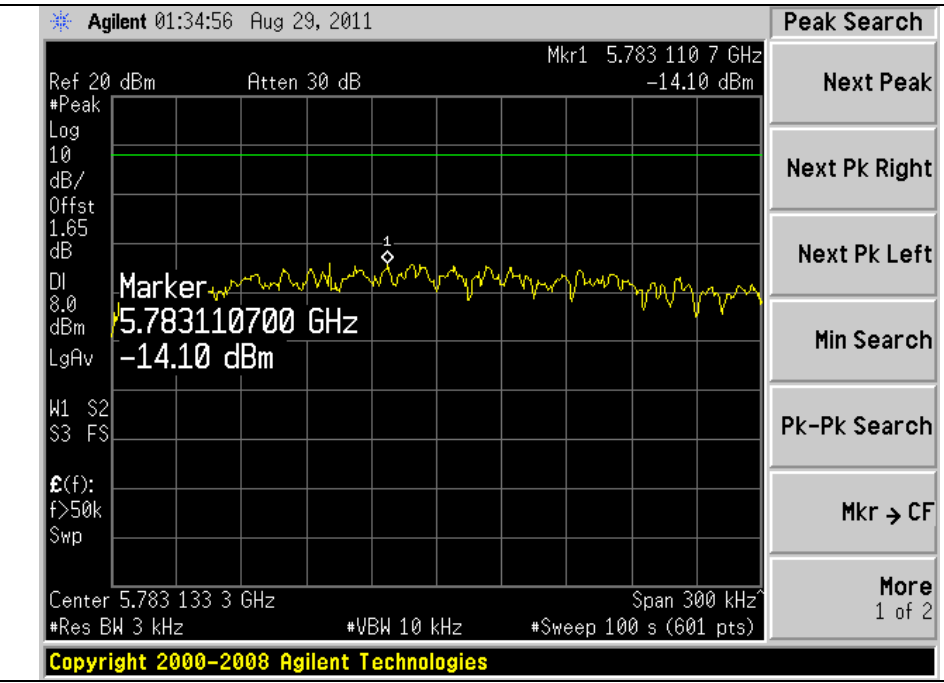
HT40 Mode:

Frequency (MHz)	Data Rate (Mbps)	Peak Power Spectral Density (dBm/3kHz)	Limit (dBm)	Margin (dB)
5755	13.5	-13.41	8	-21.41
5784	13.5	-13.53	8	-21.53

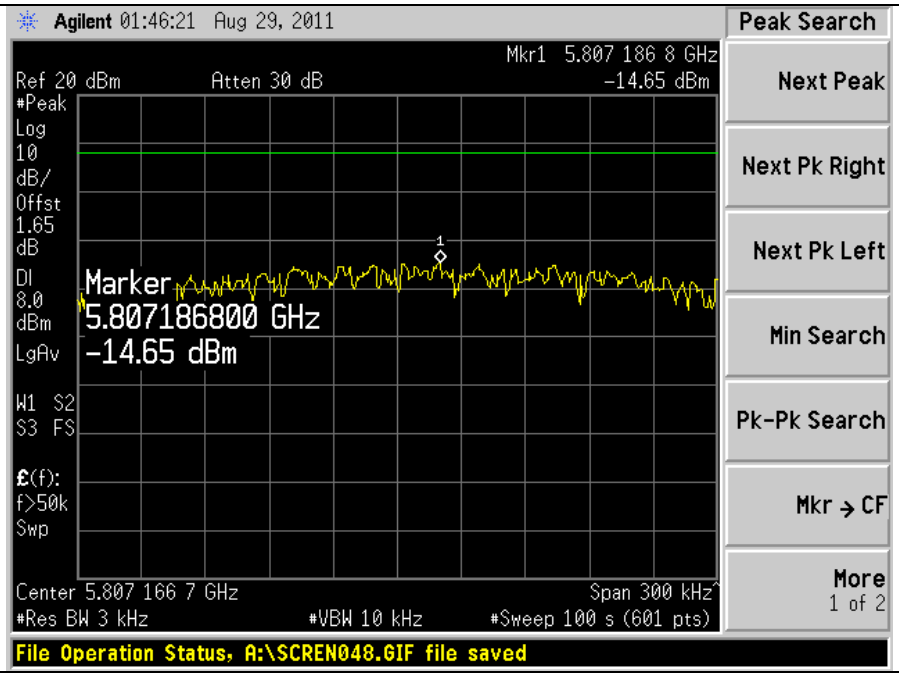
Graphical Test Results



Title: Peak Power Spectral Density for 5745MHz , 6Mbps

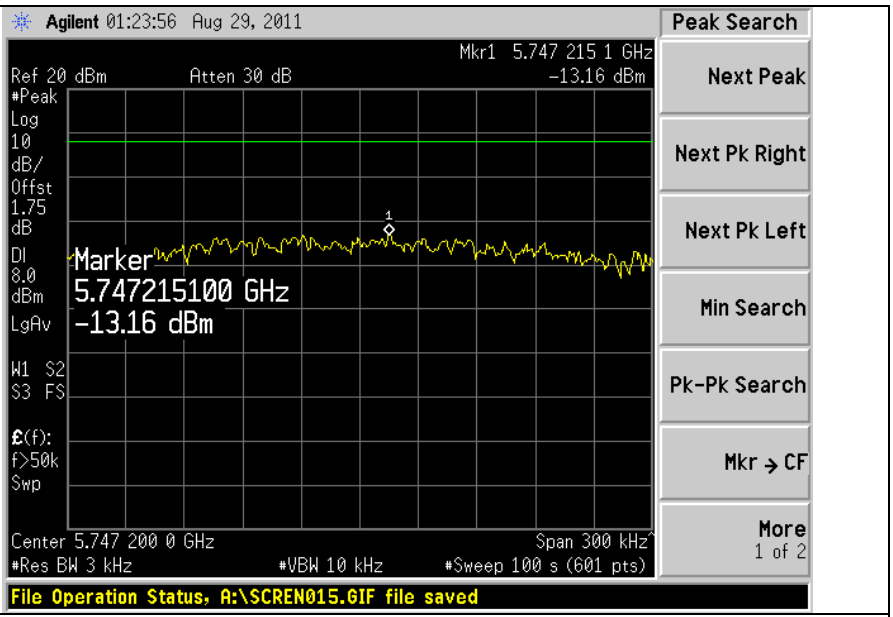


Title: Peak Power Spectral Density at 5785MHz, 6Mbps

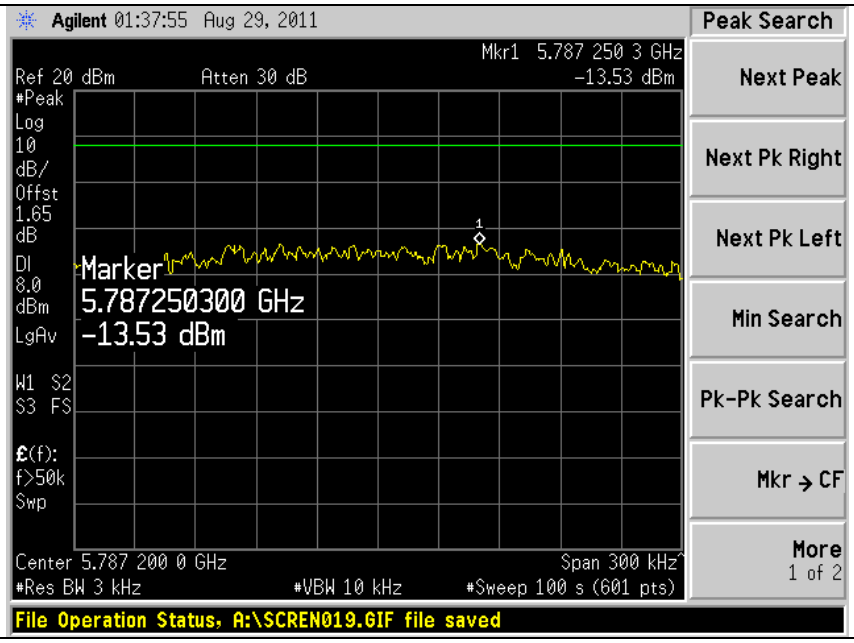


Title: Peak Power Spectral Density for 5805MHz , 6Mbps

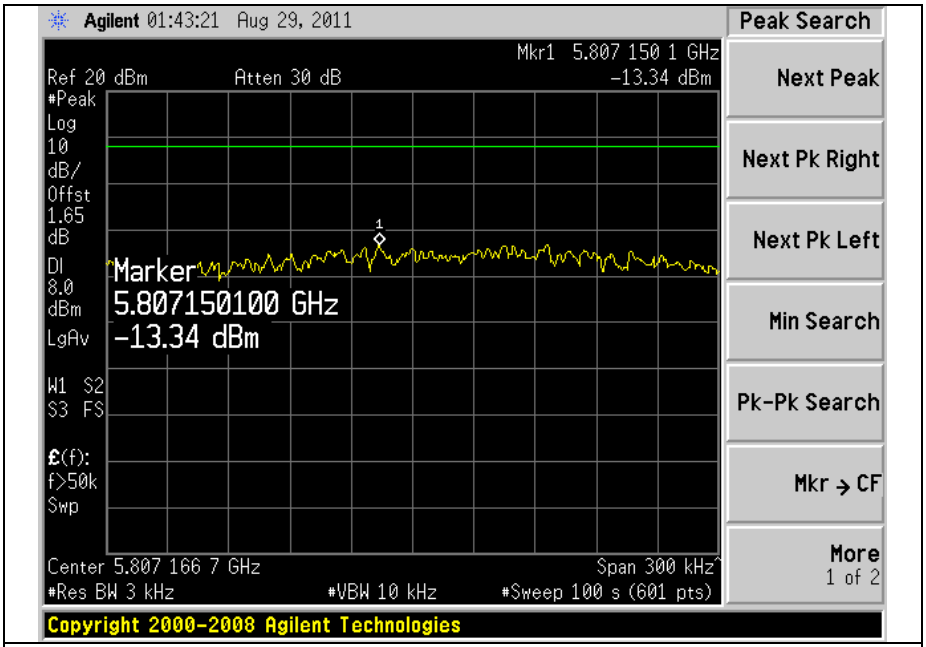
Graphical Test Results for HT20:



Title: Peak Power Spectral Density for 5745MHz , 6.5Mbps

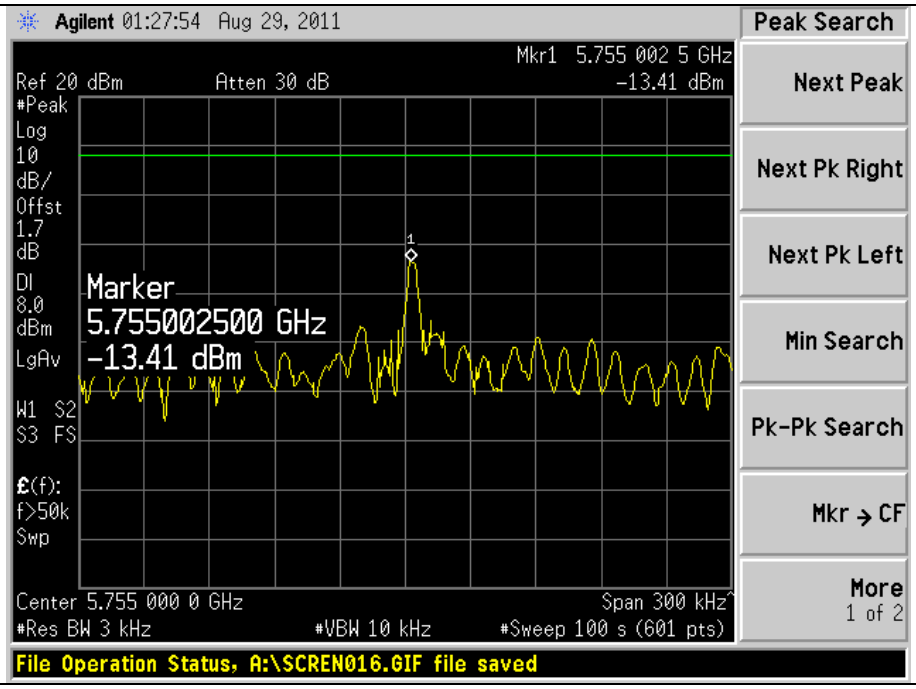


Title: Peak Power Spectral Density at 5785MHz, 6.5Mbps

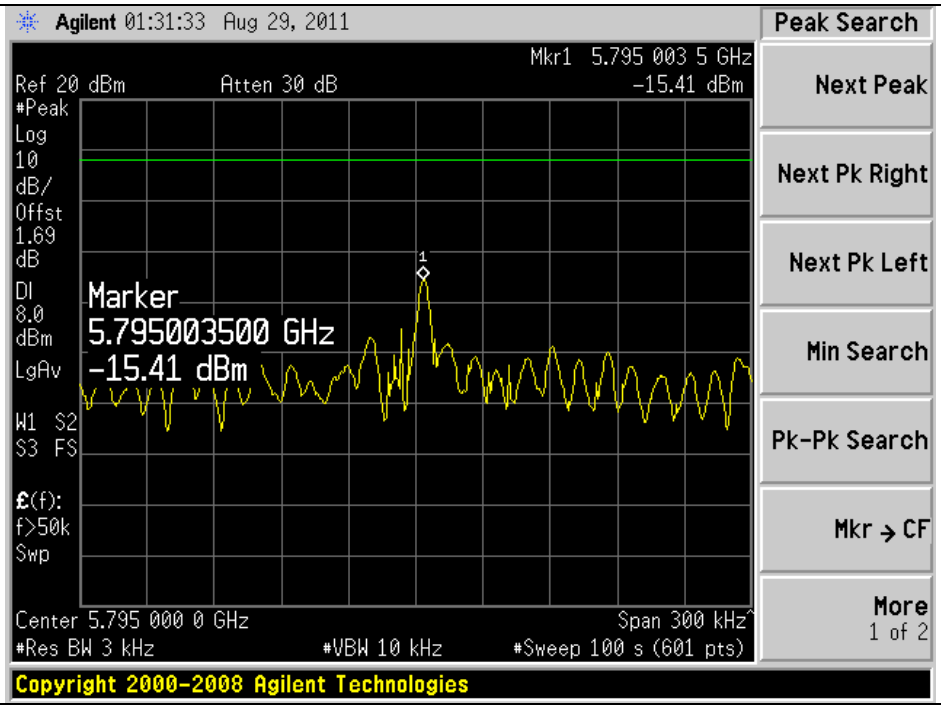


Title: Peak Power Spectral Density for 5805MHz , 6.5Mbps

Graphical Test Results for HT40:



Title: Peak Power Spectral Density at 5755MHz, 13.5Mbps



Title: Peak Power Spectral Density for 5795MHz , 13.5Mbps

Conducted Spurious Emissions

15.247 & RSS-210(A8.5):

In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

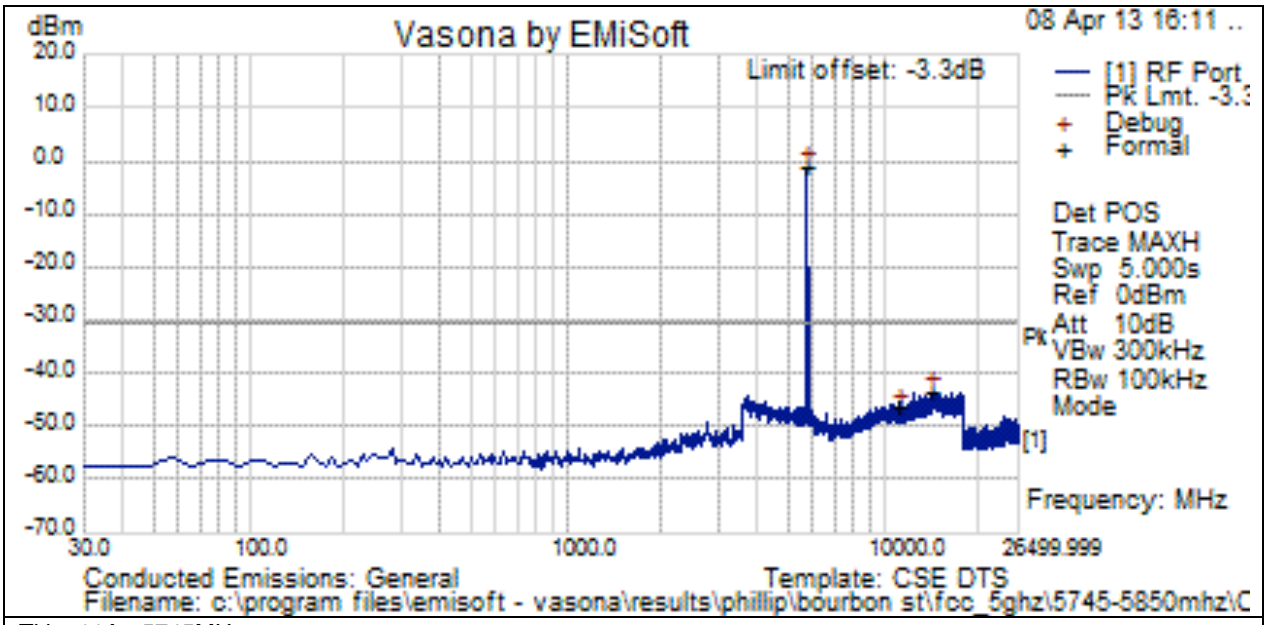
Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

Span:	30 MHz-26 GHz
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	5s
Resolution Bandwidth:	100 kHz
Video Bandwidth:	300 kHz
Detector:	Peak
Trace:	Single
Marker:	Peak

Record the marker waveform peak to spur difference

Graphical Test Results for 5745MHz in 802.11A Mode:

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



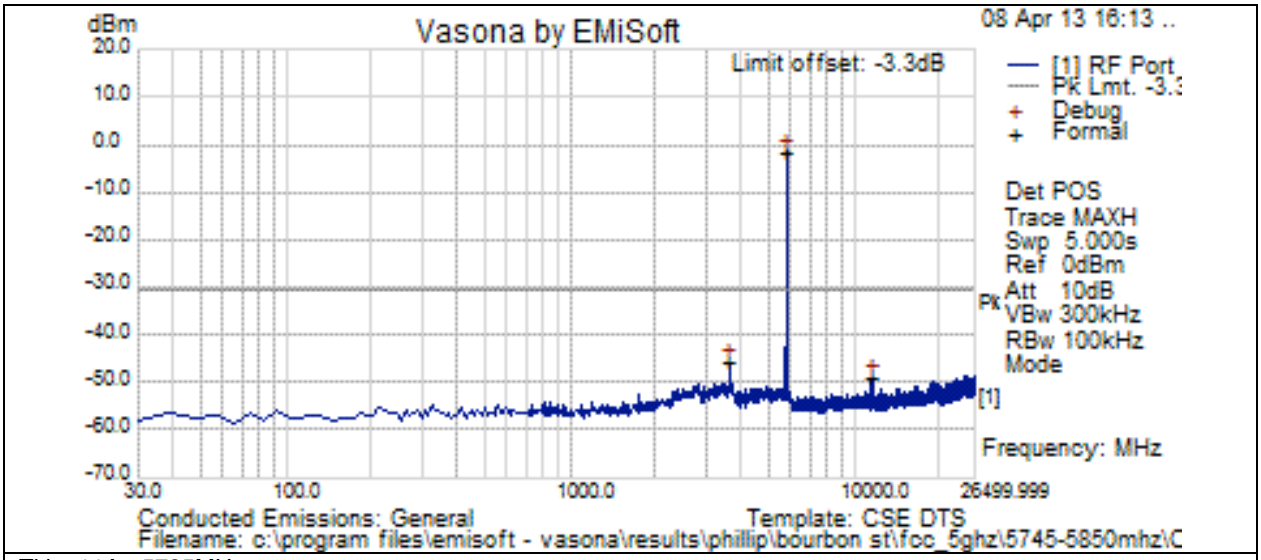
Title: 11A - 5745MHz

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5744.460	-23.4	22.3	.0	-1.1	Peak.	RF Port	-30.3	29.2	Fail	Tx Signal
14235.285	-64.8	21.2	.0	-43.6	Peak.	RF Port	-30.3	-13.3	Pass	
11490.831	-67.5	21.0	.0	-46.5	Peak.	RF Port	-30.3	-16.2	Pass	

Graphical Test Results for 5785MHz in 802.11A Mode:

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



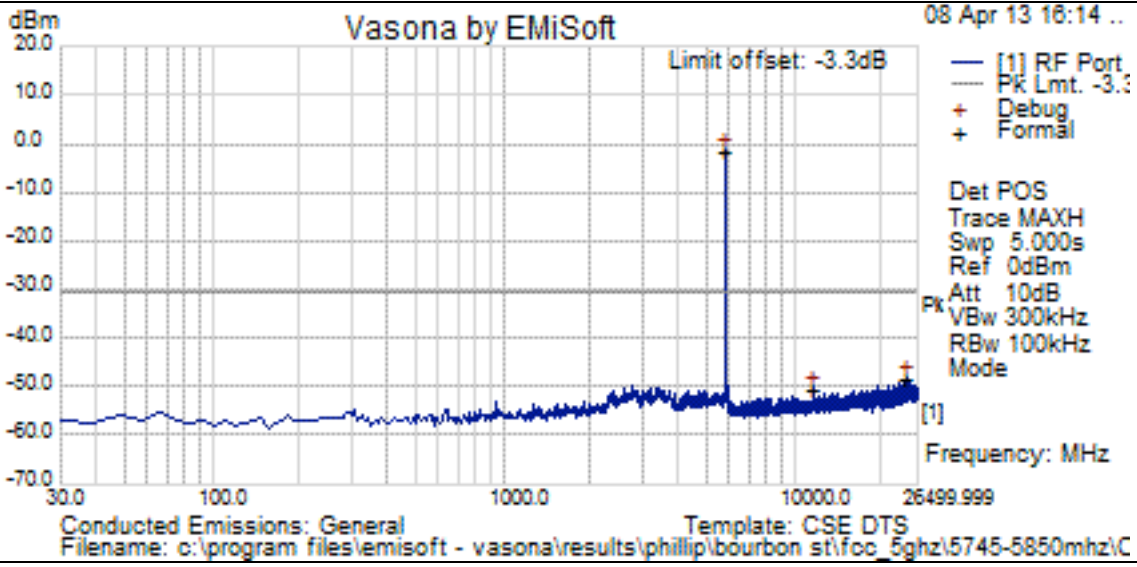
Title: 11A - 5785MHz

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5780.400	-23.8	22.2	.0	-1.5	Peak.	RF Port	-30.3	28.8	Fail	Tx Signal
3668.925	-67.3	21.5	.0	-45.8	Peak.	RF Port	-30.3	-15.5	Pass	
11575.725	-70.1	21.0	.0	-49.1	Peak.	RF Port	-30.3	-18.8	Pass	

Graphical Test Results for 5825MHz in 802.11A Mode:

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



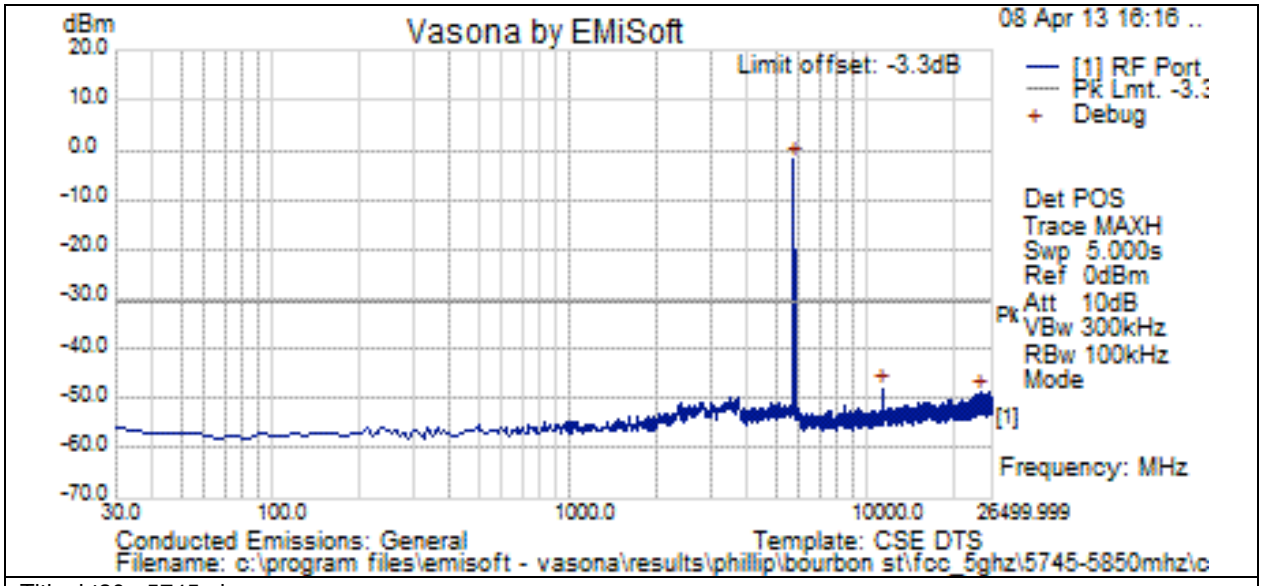
Title: 11A - 5825MHz

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5816.340	-23.8	22.3	.0	-1.6	Peak.	RF Port	-30.3	28.7	Fail	Tx Signal
24243.249	-70.2	21.9	.0	-48.2	Peak.	RF Port	-30.3	-17.9	Pass	
11653.002	-71.6	21.0	.0	-50.6	Peak.	RF Port	-30.3	-20.3	Pass	

Graphical Test Results for 5745MHz in HT20 Mode:

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



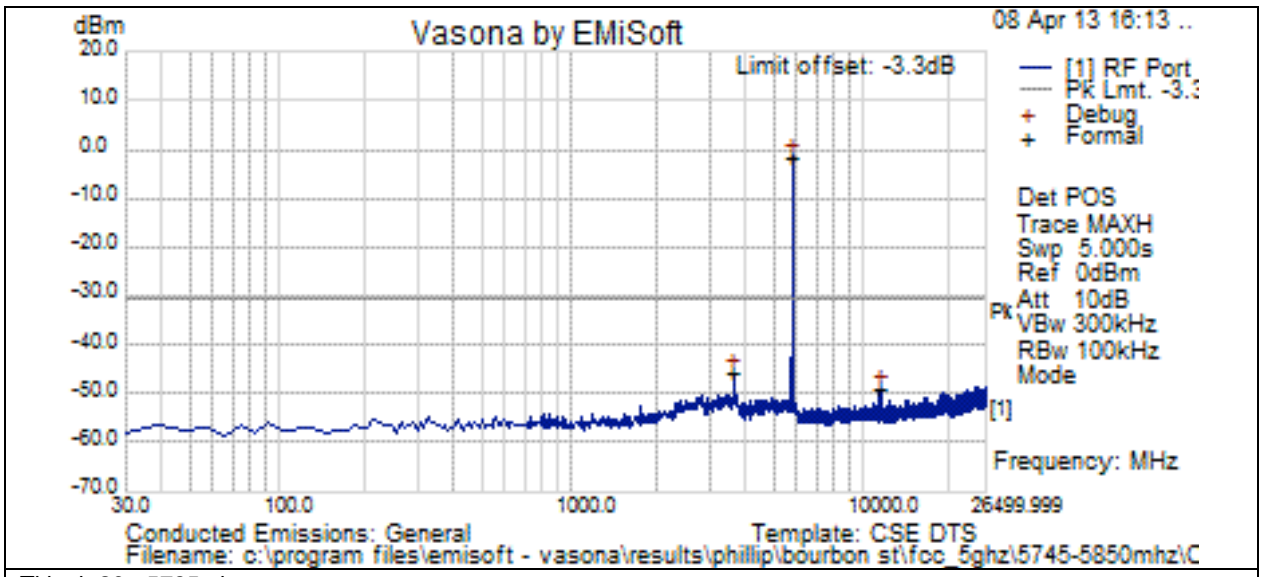
Title: ht20 - 5745mhz

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5744.460	-24.3	22.3	.0	-2.0	Peak.	RF Port	-30.3	28.3	Fail	Tx Signal
11485.875	-69.1	21.0	.0	-48.1	Peak.	RF Port	-30.3	-17.8	Pass	
24357.999	-70.8	21.9	.0	-48.8	Peak.	RF Port	-30.3	-18.5	Pass	

Graphical Test Results for 5785MHz in HT20 Mode:

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



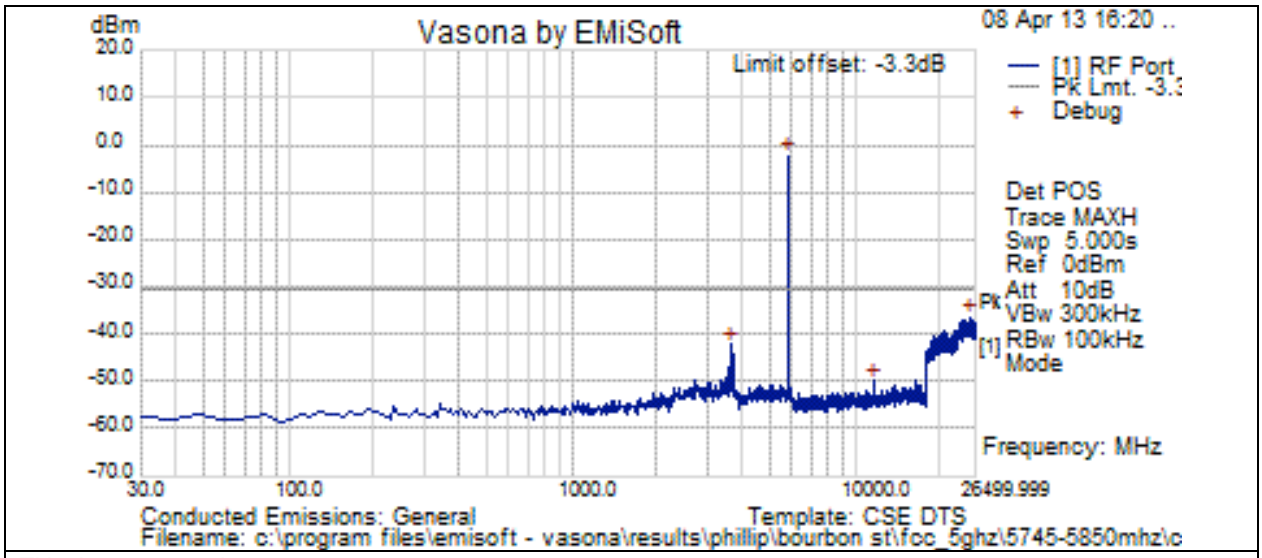
Title: ht20 - 5785mhz

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5789.385	-23.8	22.2	.0	-1.6	Peak.	RF Port	-30.3	28.7	Fail	Tx Signal
3650.955	-63.3	21.5	.0	-41.8	Peak.	RF Port	-30.3	-11.5	Pass	
25012.499	-70.5	22.0	.0	-48.5	Peak.	RF Port	-30.3	-18.2	Pass	
11566.740	-70.5	21.0	.0	-49.5	Peak.	RF Port	-30.3	-19.2	Pass	

Graphical Test Results for 5825MHz in HT20 Mode:

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



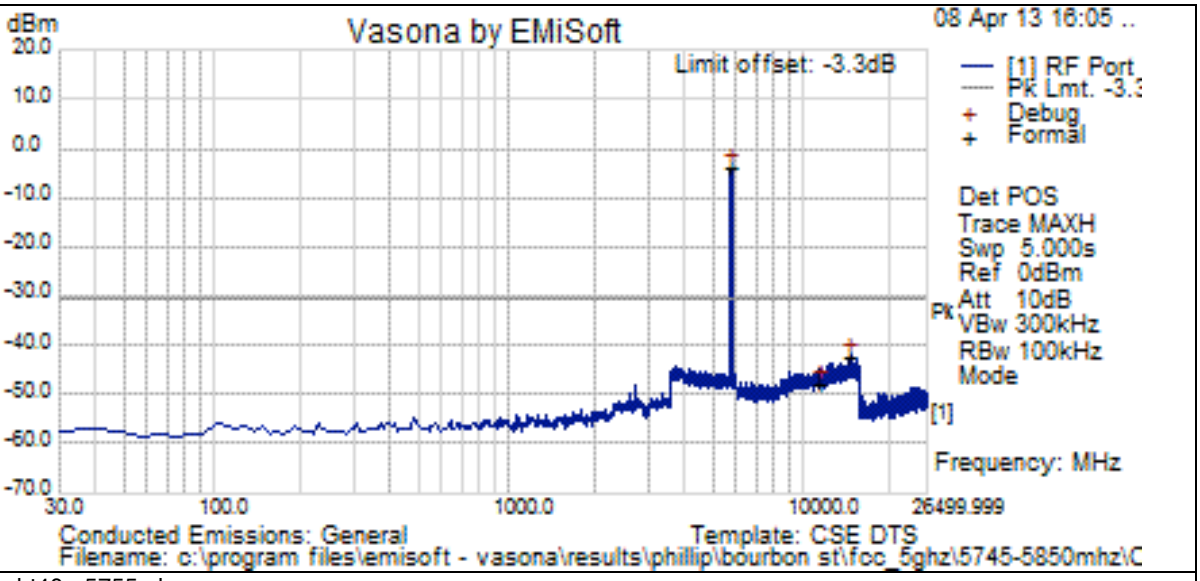
Title: ht20 - 5805mhz

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5816.340	-24.6	22.3	.0	-2.3	Peak.	RF Port	-30.3	28.0	Fail	Tx Signal
25301.499	-58.5	22.0	.0	-36.4	Peak.	RF Port	-30.3	-6.1	Pass	
3641.970	-63.8	21.5	.0	-42.2	Peak.	RF Port	-30.3	-11.9	Pass	
11647.790	-71.0	21.0	.0	-50.0	Peak.	RF Port	-30.3	-19.7	Pass	

Graphical Test Results for 5755MHz in HT40 Mode:

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



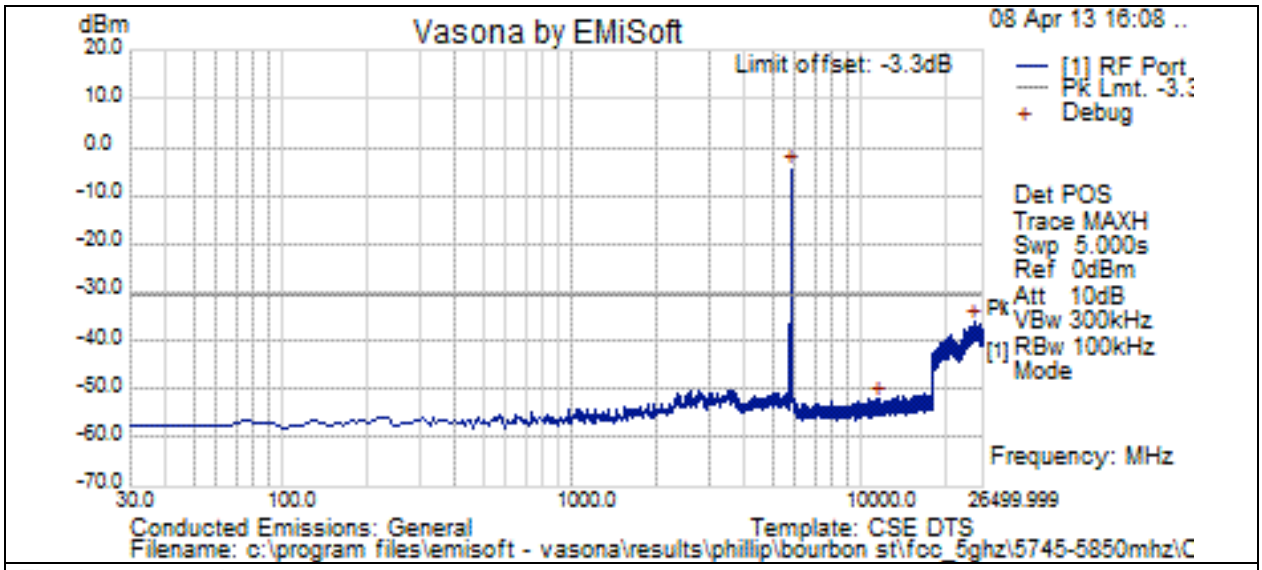
Title: ht40 - 5755mhz

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5735.475	-26.3	22.3	.0	-4.0	Peak.	RF Port	-30.3	26.3	Fail	Tx Signal
14747.430	-63.4	21.2	.0	-42.2	Peak.	RF Port	-30.3	-11.9	Pass	
11510.709	-69.0	21.0	.0	-48.0	Peak.	RF Port	-30.3	-17.7	Pass	

Graphical Test Results for 5795MHz in HT40 Mode:

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

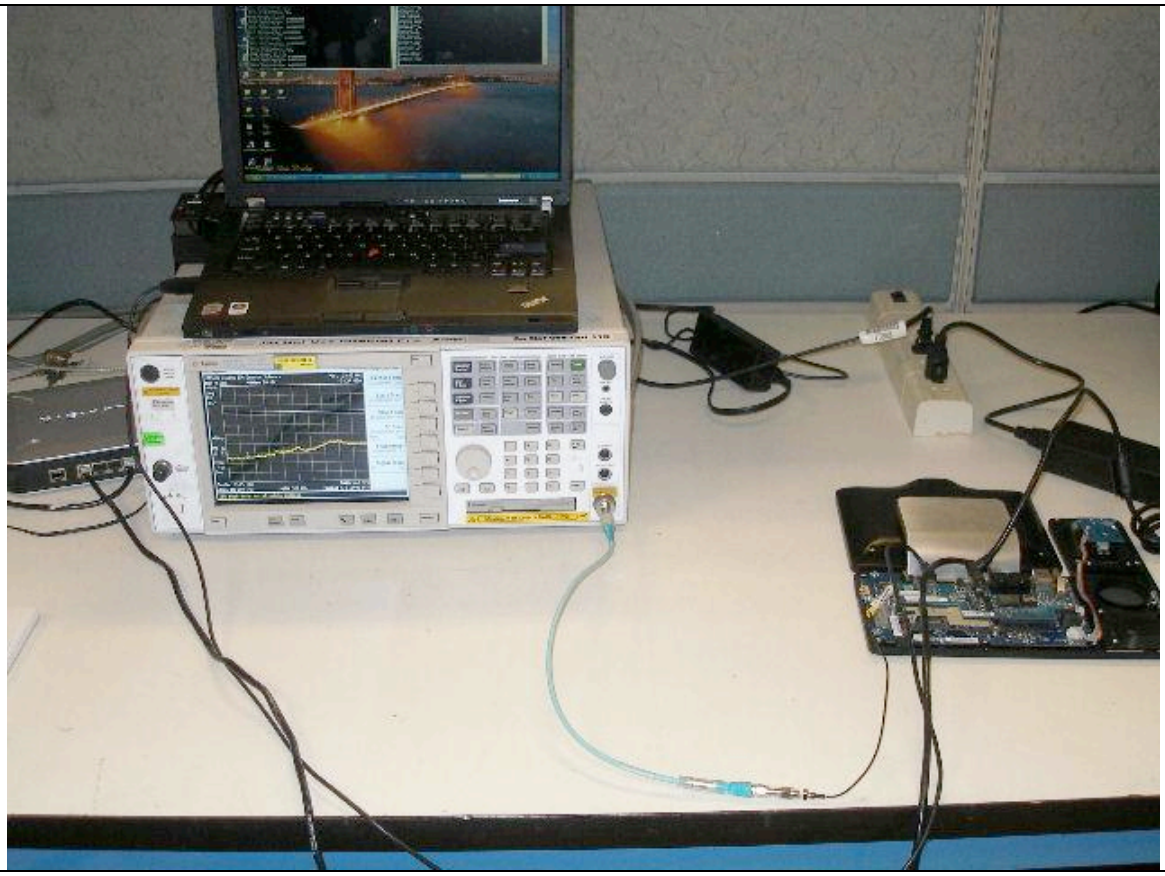


Title: ht40 - 5795mhz

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5798.370	-26.7	22.2	.0	-4.5	Peak.	RF Port	-30.3	25.8	Fail	Tx Signal
25016.749	-58.1	22.0	.0	-36.1	Peak.	RF Port	-30.3	-5.8	Pass	
11589.636	-73.2	21.0	.0	-52.3	Peak.	RF Port	-30.3	-22.0	Pass	

Physical Test arrangement Photograph:



Title: Conducted Spurious Emissions Test Configuration

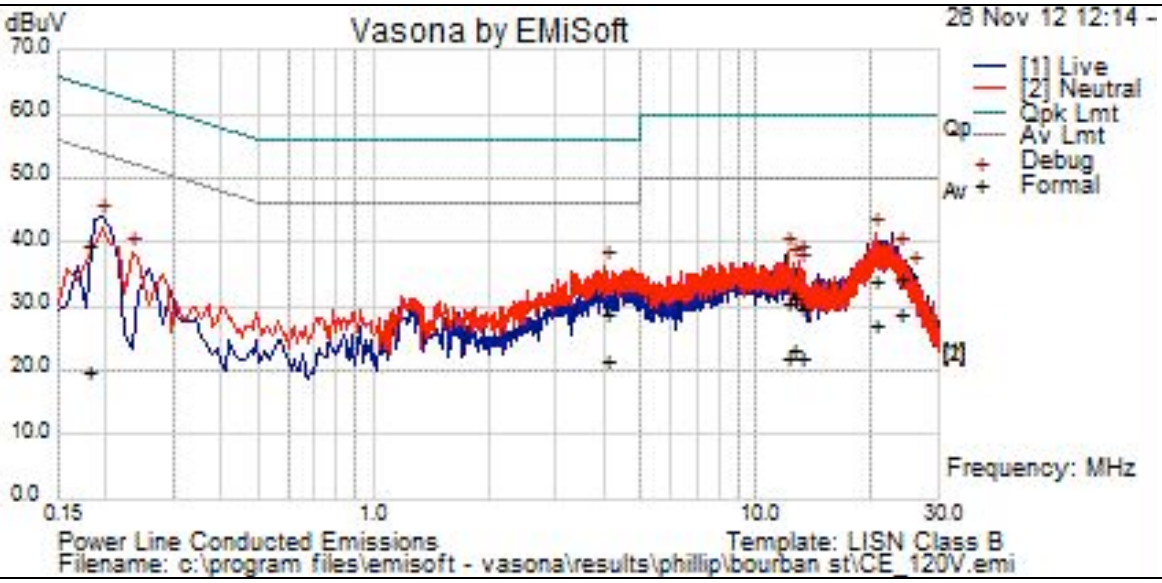
Comments on the above Photograph:

No further comments

Conducted Emissions

Test Number: 113492 **Spec ID:** 484				
Basic Standard	**Applied to**	**Class**	**Freq Range**	**Test Details / Comments**
CFR47 Part 15: 2008 (CAN/CSA-CISPR 22-02)	AC Power Line	B	0.15MHz - 30MHz	U.S line voltages must be used (e.g. 110V/ 208V 60Hz).
Operating Mode	**Mode :** 1, Adapter Mode			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

Graphical Test Results
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Conducted Emissions Test Results from 150k - 30MHz

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
23.664	7.5	21	0.2	28.6	Av	L	50	-21.4	Pass	
20.566	6.5	20.4	0.2	27.1	Av	N	50	-22.9	Pass	
4.035	1.5	20	0	21.6	Av	N	46	-24.4	Pass	
0.1799	18.6	21	0	39.6	Qp	L	64.5	-24.9	Pass	
23.664	13.4	21	0.2	34.5	Qp	L	60	-25.5	Pass	
20.566	13.2	20.4	0.2	33.8	Qp	N	60	-26.2	Pass	
12.47	2.7	20.2	0.1	23.1	Av	N	50	-26.9	Pass	
4.035	8.5	20	0	28.6	Qp	N	56	-27.4	Pass	
13.054	1.4	20.3	0.1	21.8	Av	N	50	-28.2	Pass	
12.136	1.5	20.2	0.1	21.8	Av	N	50	-28.2	Pass	
12.47	10.8	20.2	0.1	31.2	Qp	N	60	-28.8	Pass	
12.136	10	20.2	0.1	30.3	Qp	N	60	-29.7	Pass	
13.054	9.1	20.3	0.1	29.5	Qp	N	60	-30.5	Pass	
0.1799	-1.2	21	0	19.8	Av	L	54.5	-34.7	Pass	

Physical Test arrangement Photograph:

Title: Conducted Emissions Test Configuration

Conducted Band Edge Measurements

15.247: In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

Span:	30 MHz-26 GHz
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	10s
Resolution Bandwidth:	100 kHz
Video Bandwidth:	300 kHz
Detector:	Peak
Trace:	Single
Marker:	Peak

Record the marker waveform peak to spur difference

Frequency (MHz)	Data Rate (Mbps)	Conducted Bandedge Delta (dB)	Limit (dBm)	Margin (dB)
5745	6	39.73	>30	9.73
5825	6	49.06	>30	19.06

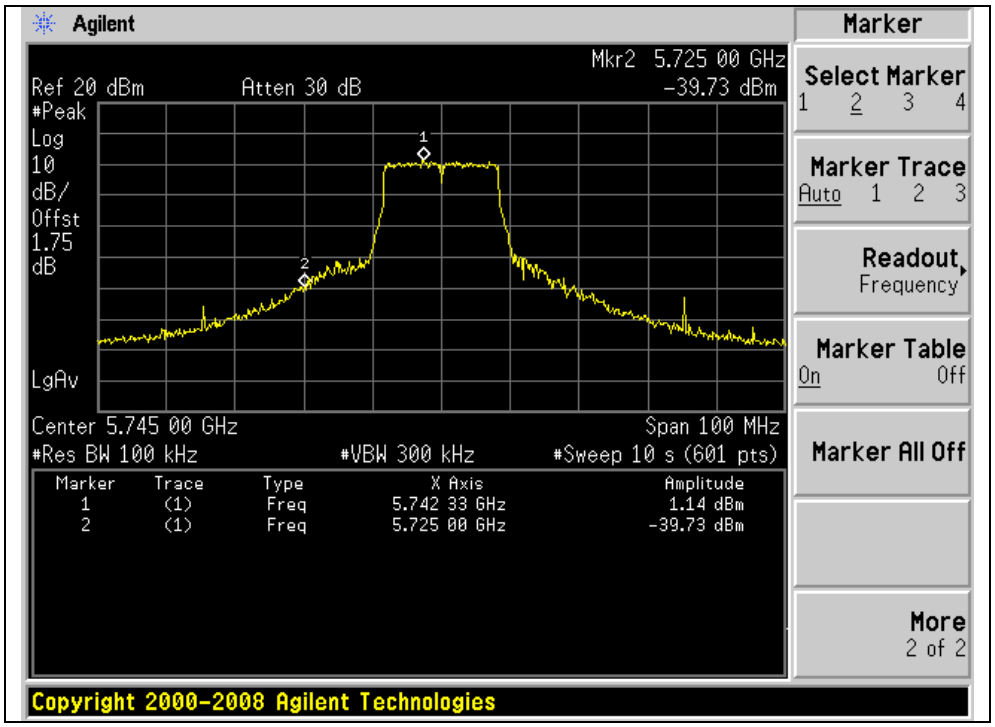
HT20 Mode:

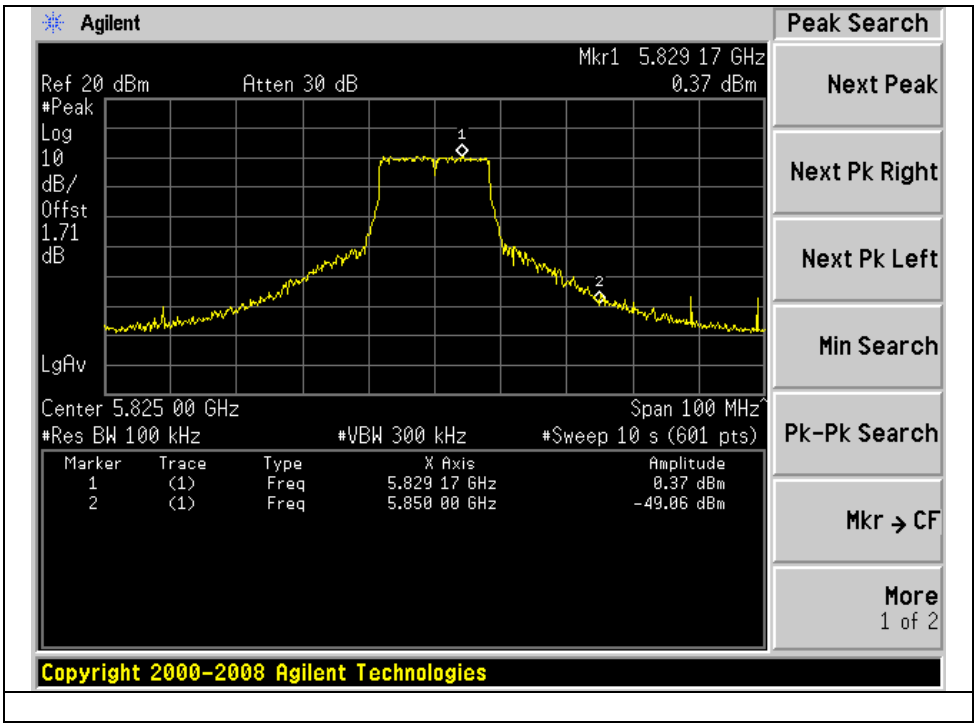
Frequency (MHz)	Data Rate (Mbps)	Conducted Bandedge Delta (dB)	Limit (dBm)	Margin (dB)
5745	6.5	39.73	>30	9.73
5825	6.5	49.06	>30	19.06

HT40 Mode:

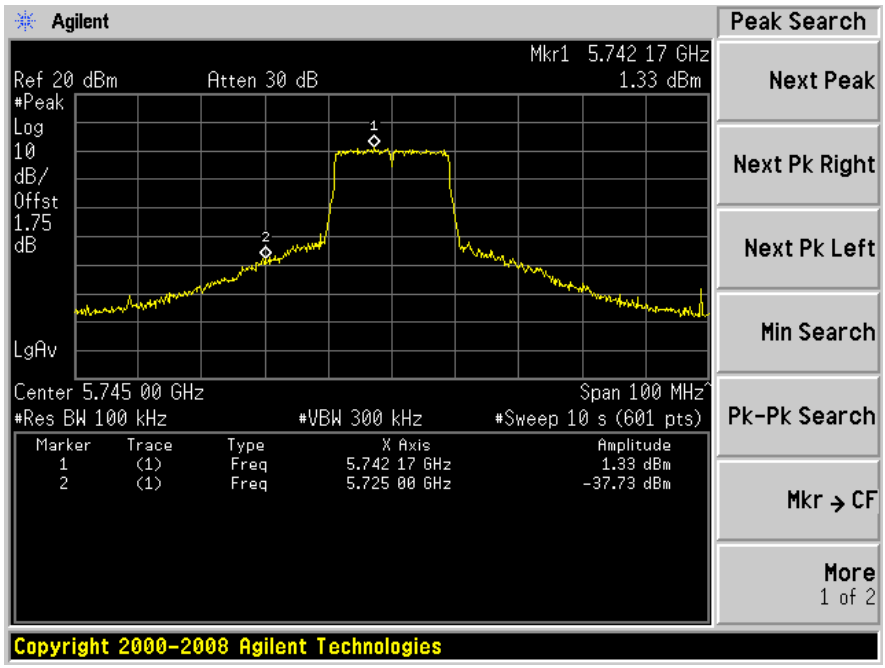
Frequency (MHz)	Data Rate (Mbps)	Conducted Bandedge Delta (dB)	Limit (dBm)	Margin (dB)
5745/5765	13.5	38.17	>30	8.17
5785/5805	13.5	48.49	>30	18.49

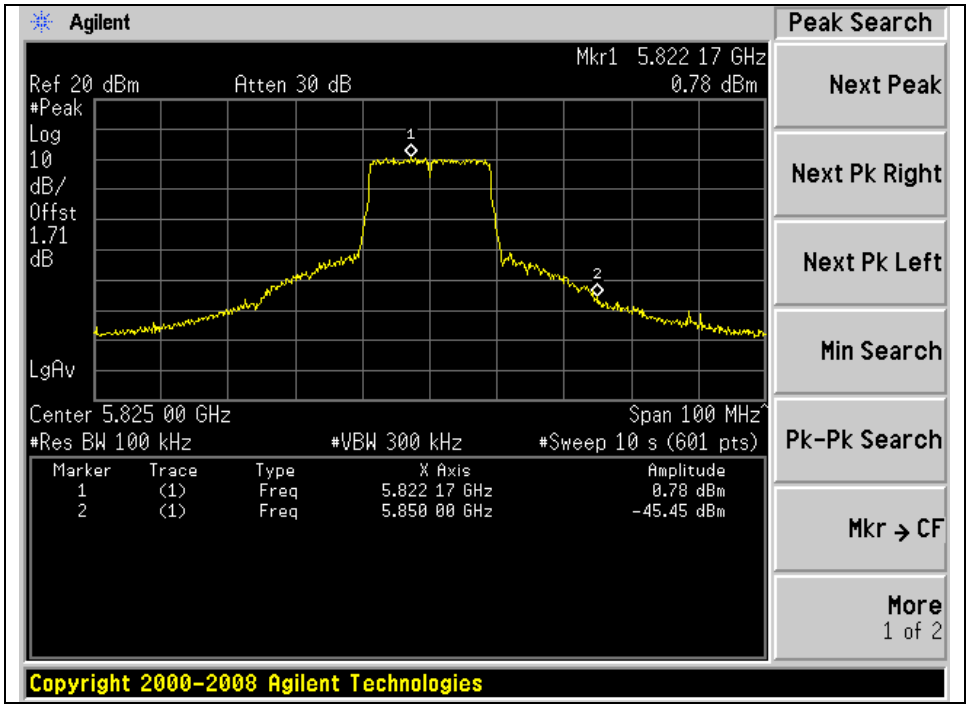
Graphical Test Results for 802.11A:



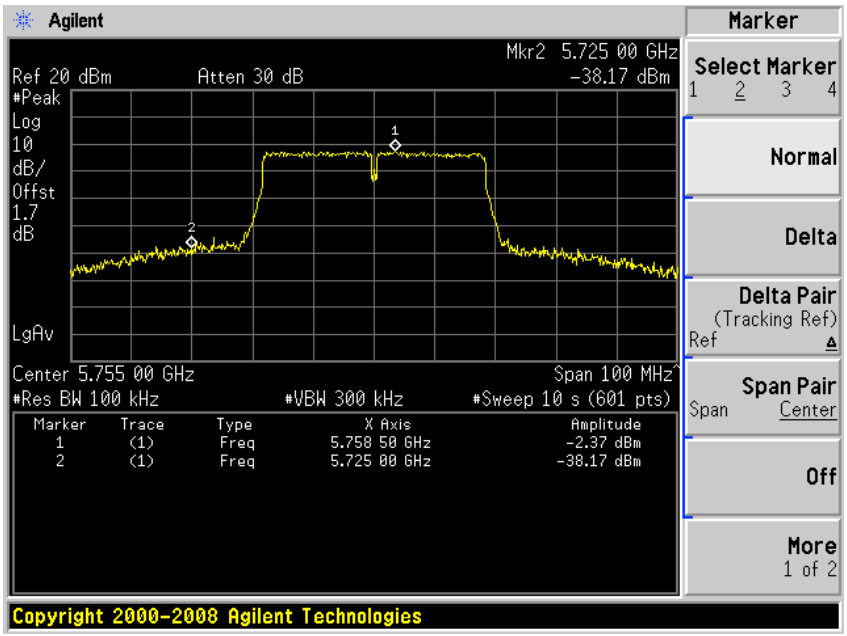


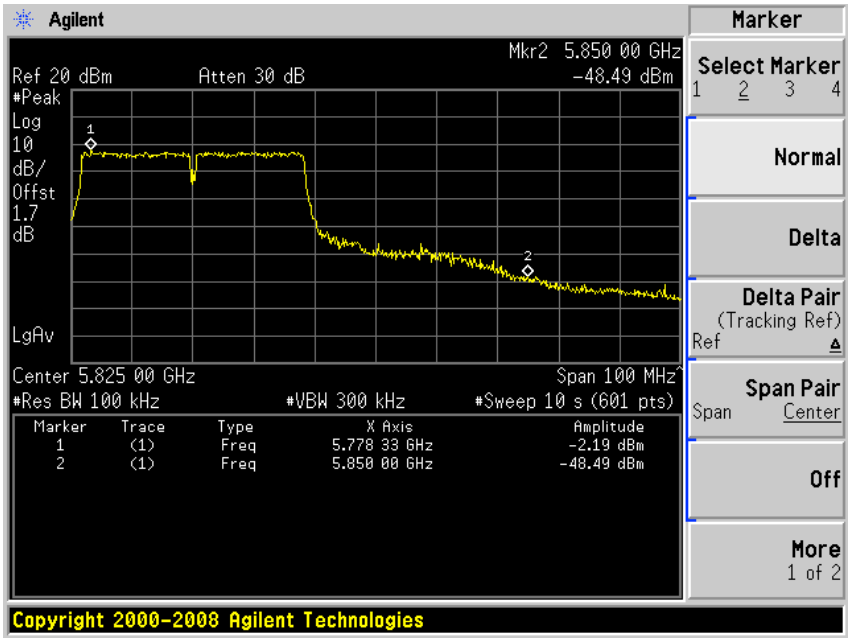
Graphical Test Results for 802.11A – HT20 Mode:





Graphical Test Results for 802.11A – HT40 Mode:

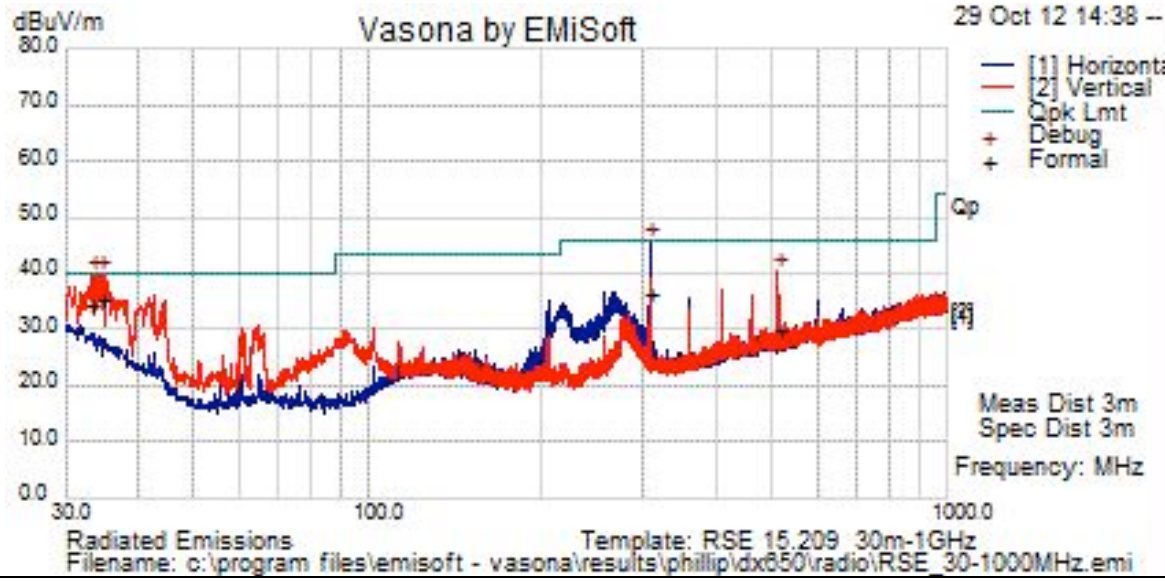




Radiated Emissions

Graphical Test Results: 30 – 1000MHz

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: 30 - 1000MHz Test Results

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
34.38	16.9	0.5	18	35.4	Qp	V	110	66	40	-4.6	Pass	
33.179	14.9	0.5	18.9	34.3	Qp	V	105	38	40	-5.7	Pass	
307.047	21.2	1.6	13.6	36.4	Qp	H	103	97	46	-9.6	Pass	
511.908	10	2.1	17.8	29.8	Qp	V	101	148	46	-16.2	Pass	

Radiated Transmitter Spurious Emissions

15.205 / RSS-210 2.7: Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span:	1GHz – 15 GHz
Reference Level:	80 dBuV
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	1 MHz for peak, 10 Hz for average
Detector:	Peak

Terminate the access Point RF ports with 50 ohm loads.

Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= 54dBuV/m @3m
2) Peak plot (Vertical and Horizontal), Limit = 74dBuV/m @3m

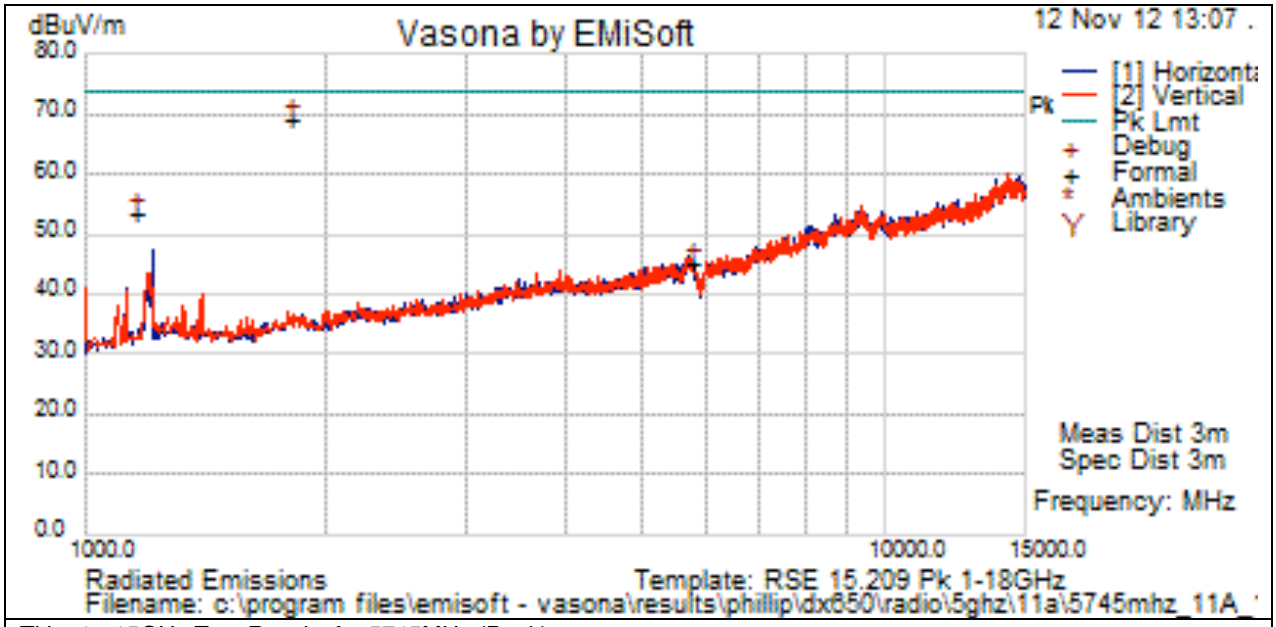
This report represents the worst case data for all supported operating modes and antennas. System was evaluated up to 40GHz but there were no measurable emissions above 15 GHz.

Note: All 3-axis (X,Y, Z) were evaluated during preliminary testing and the worst case orientation was for all formal testing shown below.

Note: A Notch Filter was used during formal testing from 1 – 15GHz to help prevent the front end of the analyzer from over loading. The Notch filters used are designed to suppress Tx fundamental frequency but do not effect harmonics of the fundamental frequency from being measured

Graphical Test Results 802.11A: 1 – 15GHz (5745MHz – Peak)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



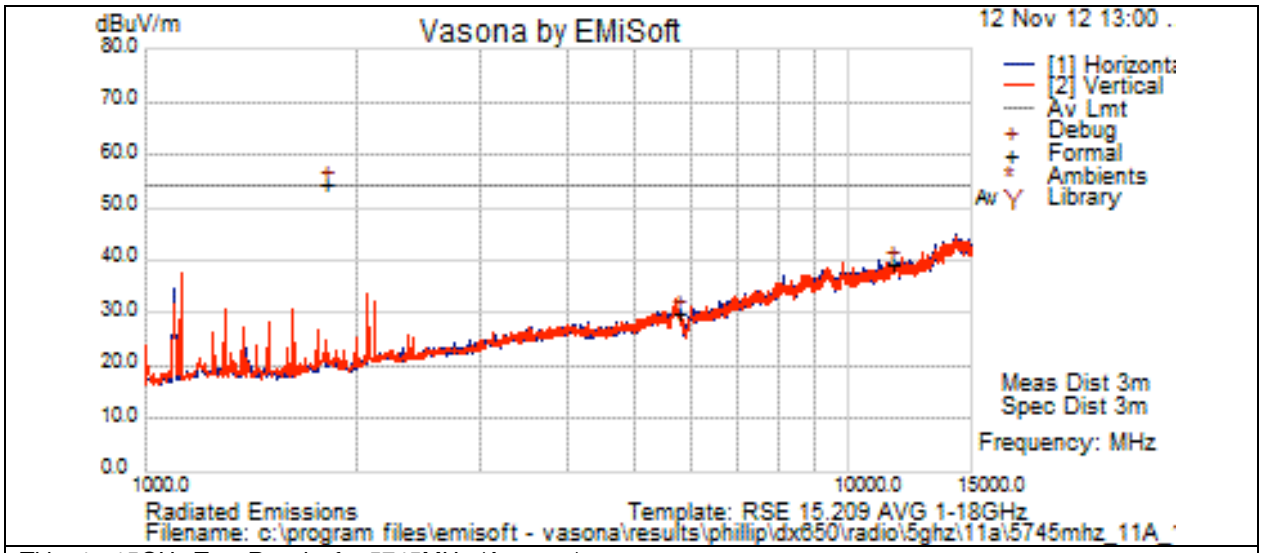
Title: 1 - 15GHz Test Results for 5745MHz (Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5745.000	41.5	7.4	-3.9	45.1	Peak.	H	99	360	74.0	-29.0	Pass	Tx Signal
1149.000	36.3	11.8	5.2	53.3	Peak.	H	99	360	74.0	-20.7	Pass	
1799.000	39.8	17.0	12.3	69.2	Peak.	V	100	0	74.0	-4.8	Pass	Noise Floor

Graphical Test Results 802.11A: 1 – 15GHz (5745MHz – Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



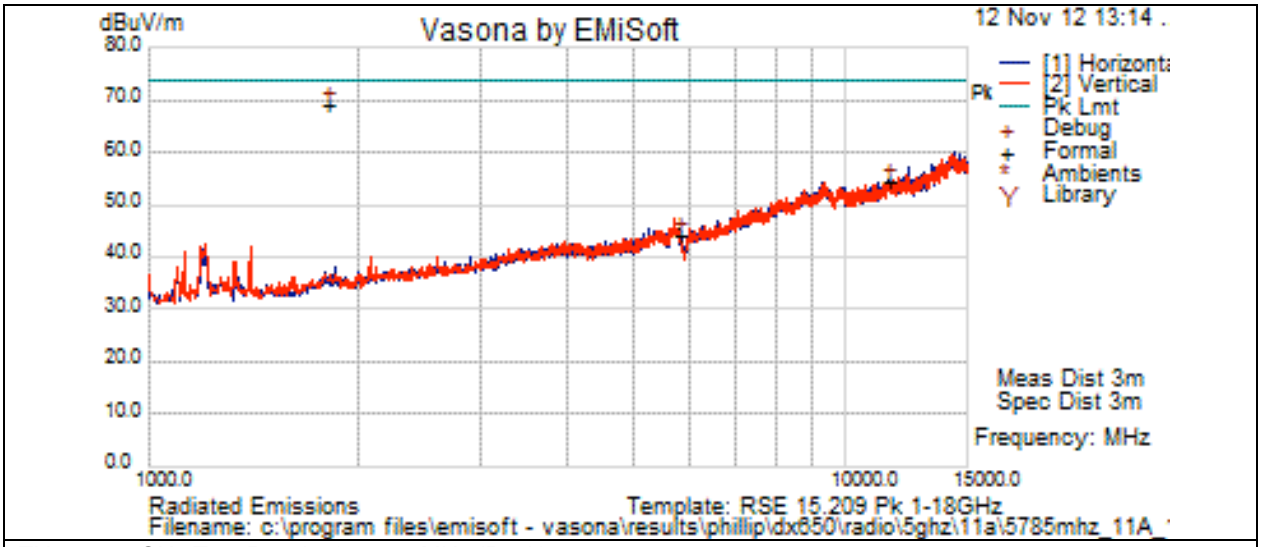
Title: 1 - 15GHz Test Results for 5745MHz (Average)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5745	26.5	7.4	-3.9	30.1	Av	H	99	360	54	-23.9	Pass	Tx Signal
11490.016	22.3	11.8	5.2	39.4	Av	H	99	360	54	-14.6	Pass	

Graphical Test Results 802.11A: 1 – 15GHz (5785MHz – Peak)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



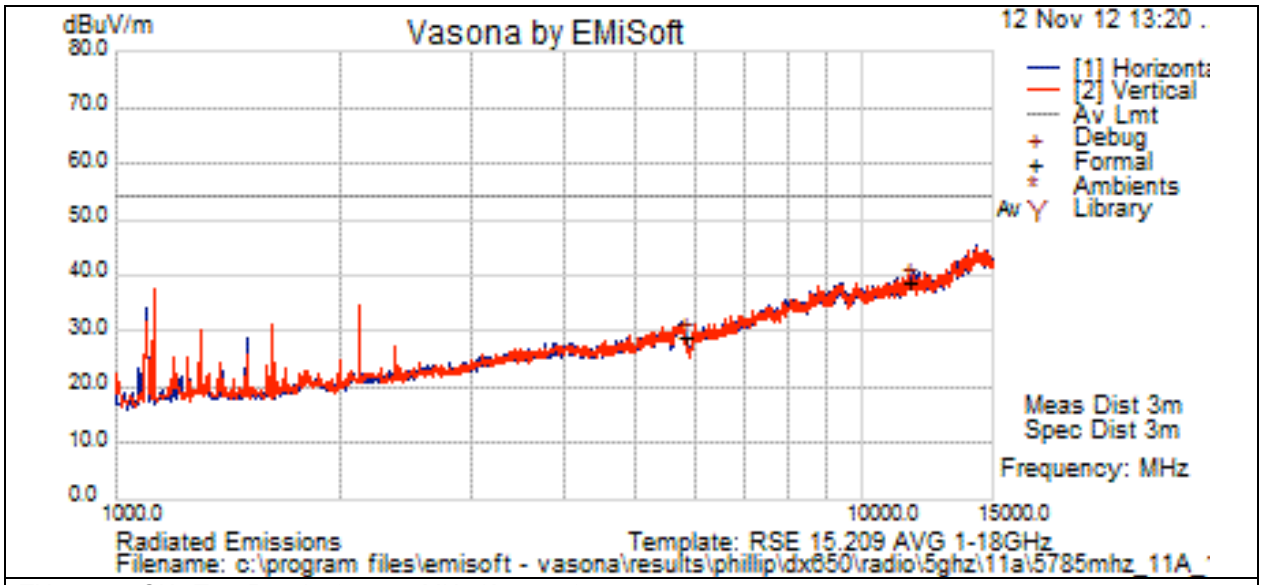
Title: 1 - 15GHz Test Results for 5785MHz (Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5785.002	40.7	7.5	-3.8	44.4	Pk	H	99	360	74	-29.6	Pass	Tx Signal
11570.009	37.4	11.9	5.1	54.4	Pk	H	99	360	74	-19.6	Pass	

Graphical Test Results 802.11A: 1 – 15GHz (5785MHz – Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



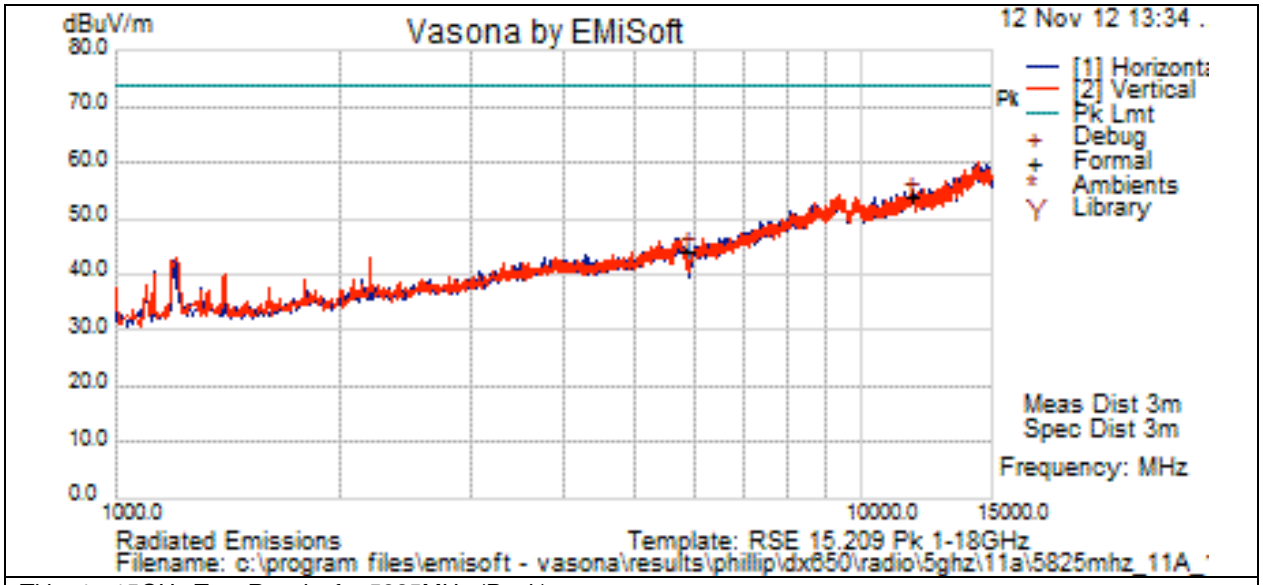
Title: 1 - 15GHz Test Results for 5785MHz (Average)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
18000	25.9	17	12.4	55.3	Av	V	100	0	54	1.3	Fail	Noise Floor
11570.021	21.9	11.9	5.1	38.9	Av	H	99	360	54	-15.1	Pass	
5785.001	25.5	7.5	-3.8	29.1	Av	H	99	360	54	-24.9	Pass	Tx Signal

Graphical Test Results 802.11A: 1 – 15GHz (5825MHz – Peak)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



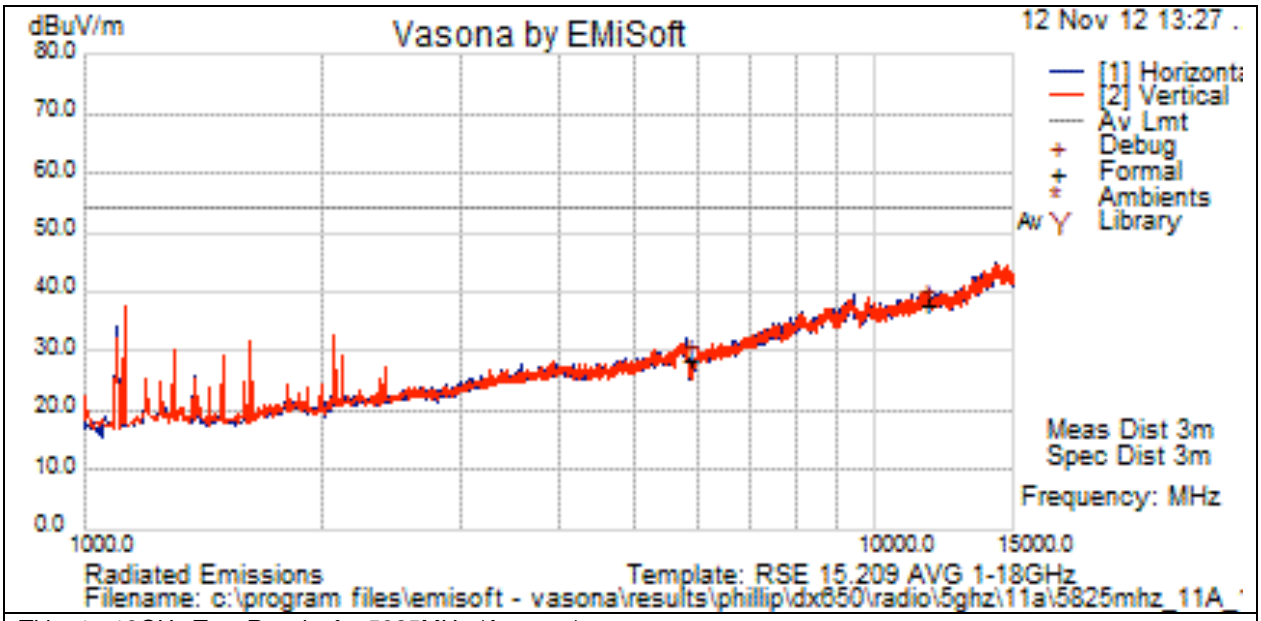
Title: 1 - 15GHz Test Results for 5825MHz (Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5825.018	40.6	7.5	-4	44.1	Pk	H	99	360	74	-29.9	Pass	Tx Signal
11650.017	36.4	12	5.4	53.9	Pk	H	99	360	74	-20.1	Pass	

Graphical Test Results 802.11A: 1 – 15GHz (5825MHz – Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



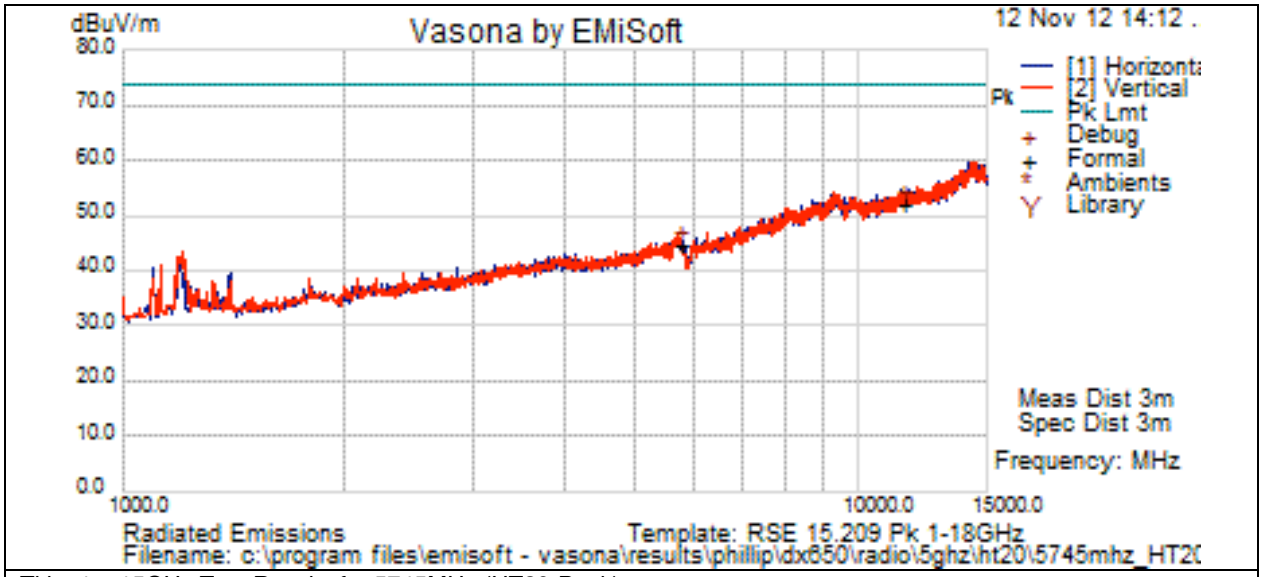
Title: 1 - 18GHz Test Results for 5825MHz (Average)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5825.01	24.9	7.5	-4	28.4	Av	H	99	361	54	-25.7	Pass	Tx Signal
11650.003	20.5	12	5.4	38	Av	H	99	361	54	-16	Pass	

Graphical Test Results HT20: 1 – 15GHz (5745MHz – Peak)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



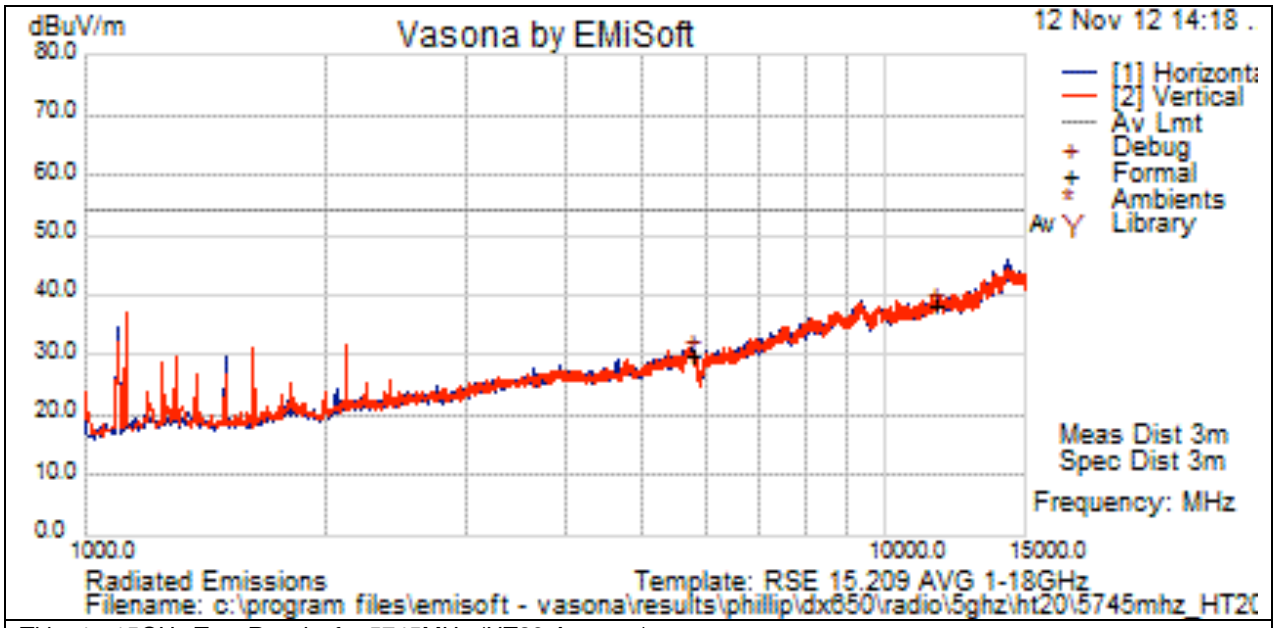
Title: 1 – 15GHz Test Results for 5745MHz (HT20-Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5745.002	40.9	7.4	-3.9	44.5	Pk	H	99	361	74	-29.5	Pass	Tx Signal
11490.021	35.1	11.8	5.2	52.1	Pk	H	99	361	74	-21.9	Pass	

Graphical Test Results HT20: 1 – 15GHz (5745MHz – Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



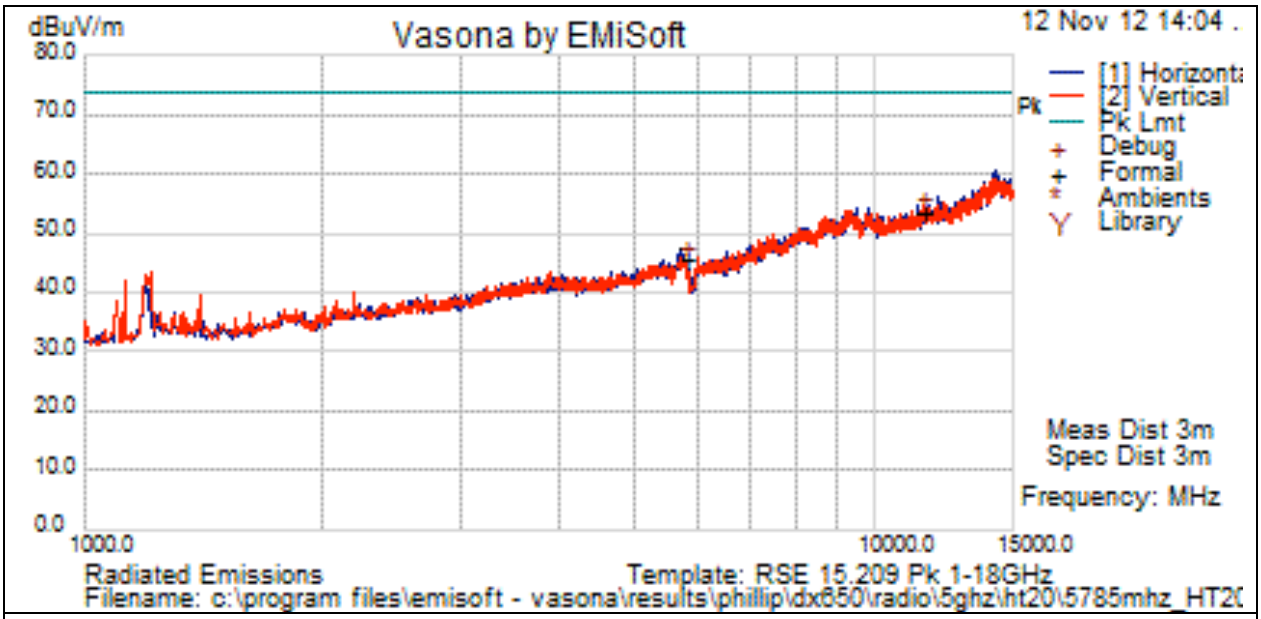
Title: 1 - 15GHz Test Results for 5745MHz (HT20-Average)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5745.004	26.2	7.4	-3.9	29.8	Av	H	99	361	54	-24.3	Pass	Tx Signal
11490.027	21	11.8	5.2	38	Av	H	99	361	54	-16	Pass	

Graphical Test Results HT20: 1 – 15GHz (5785MHz – Peak)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



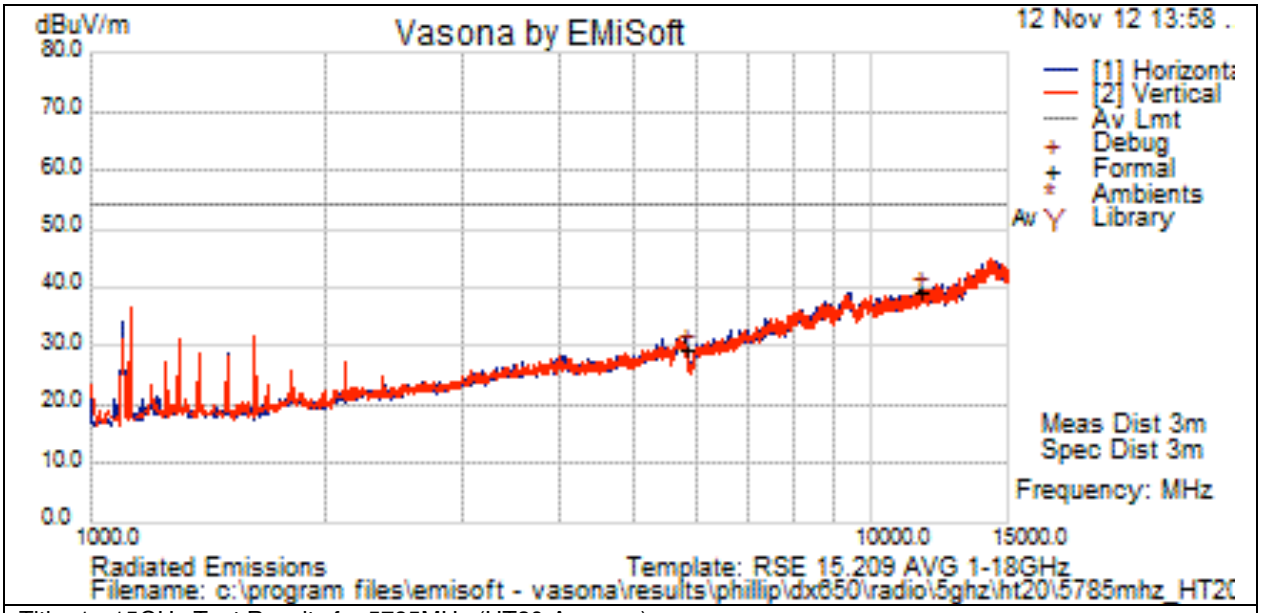
Title: 1 - 15GHz Test Results for 5785MHz (HT20-Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5785.005	41.7	7.5	-3.8	45.4	Pk	H	99	360	74	-28.6	Pass	Tx Signal
11570.001	36.6	11.9	5.1	53.6	Pk	H	99	360	74	-20.4	Pass	

Graphical Test Results HT20: 1 – 15GHz (5785MHz – Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



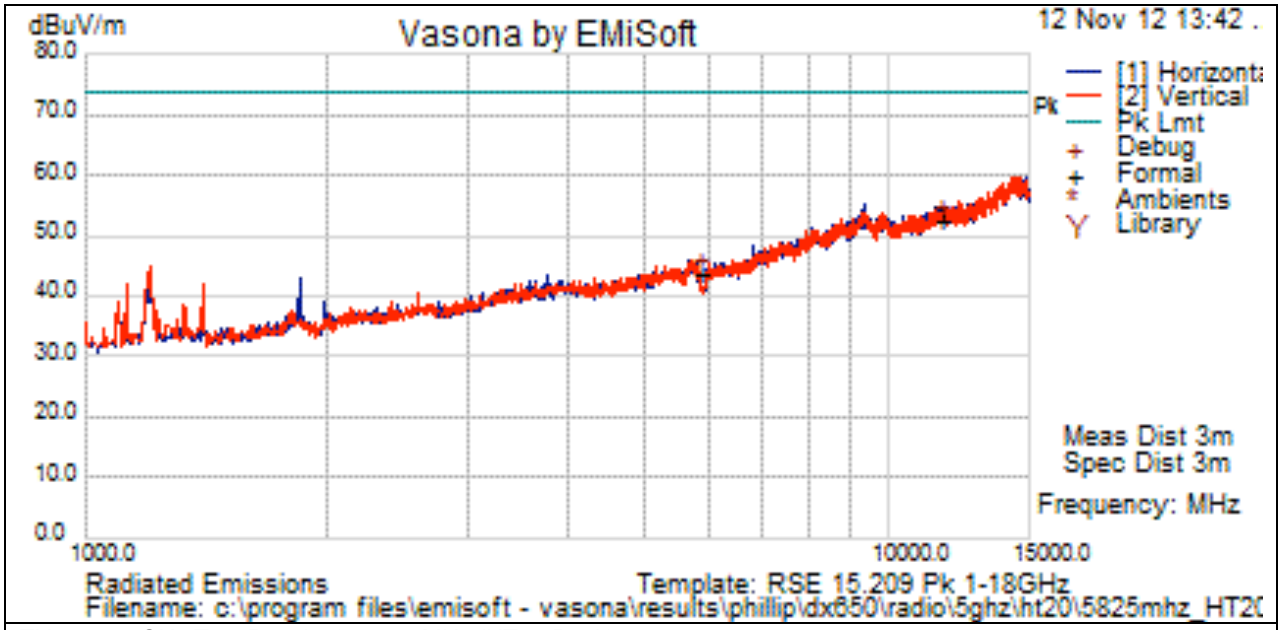
Title: 1 - 15GHz Test Results for 5785MHz (HT20-Average)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5785.003	25.7	7.5	-3.8	29.3	Av	H	99	360	54	-24.7	Pass	Tx Signal
11570.015	22.3	11.9	5.1	39.3	Av	H	99	360	54	-14.7	Pass	

Graphical Test Results HT20: 1 – 15GHz (5825MHz – Peak)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



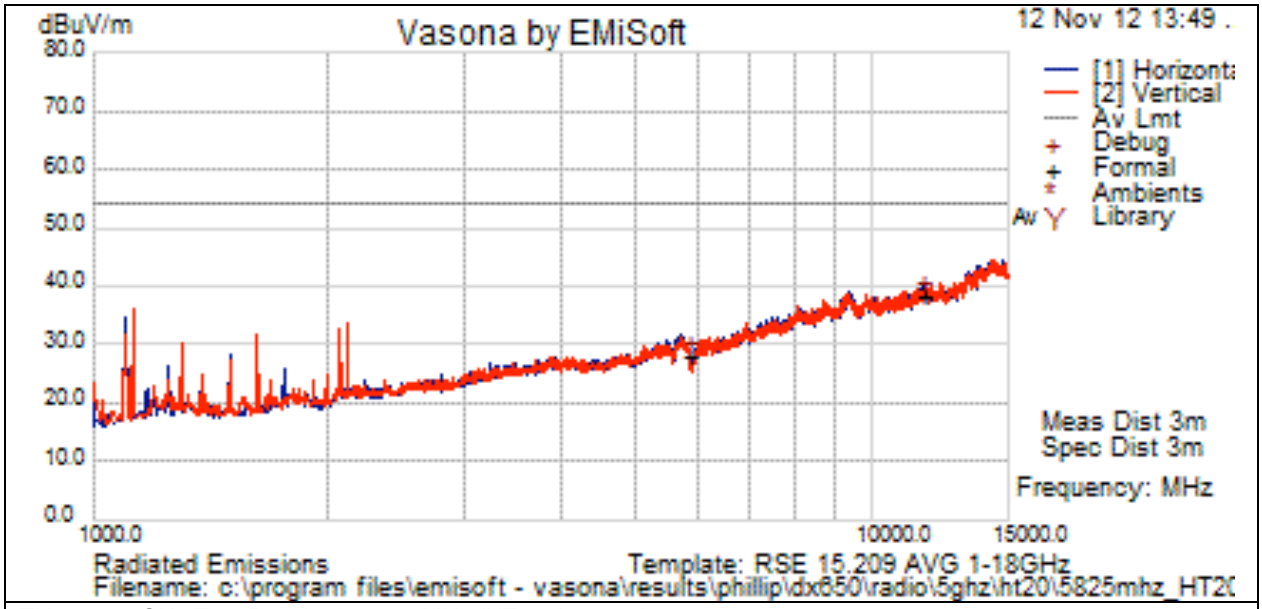
Title: 1 - 15GHz Test Results for 5825MHz (HT20-Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5825.003	40	7.5	-4	43.4	Pk	V	99	360	74	-30.6	Pass	Tx Signal
11650.001	35.3	12	5.4	52.7	Pk	H	99	360	74	-21.3	Pass	

Graphical Test Results HT20: 1 – 15GHz (5825MHz – Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



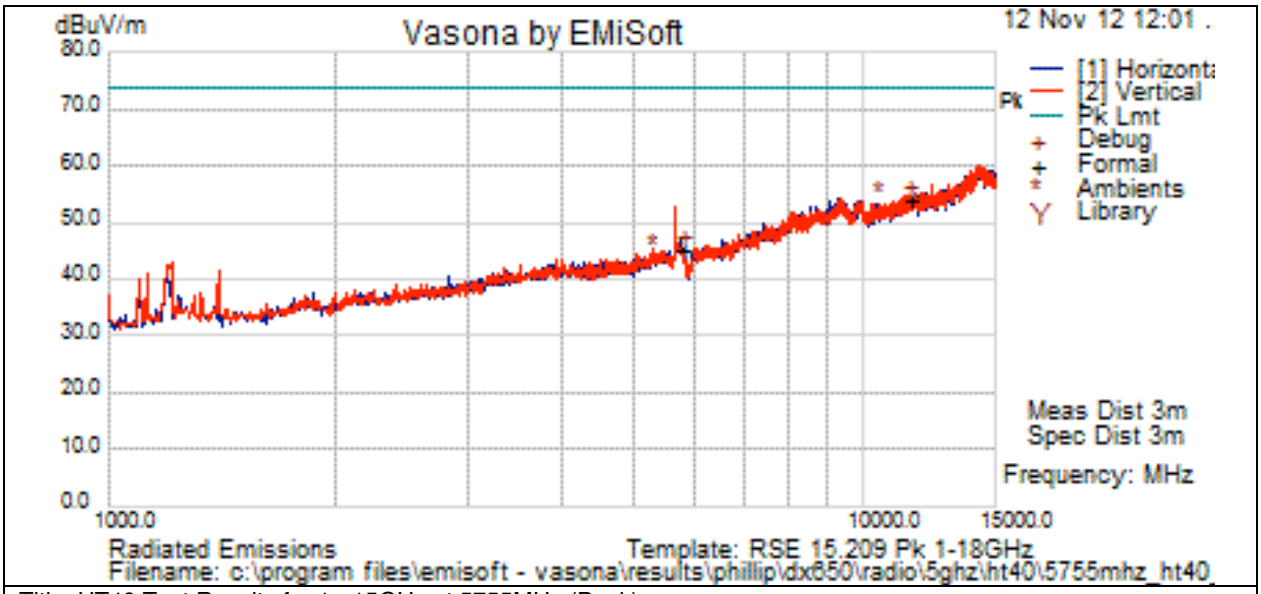
Title: 1 - 15GHz Test Results for 5825MHz (HT20-Average)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5825.004	24.6	7.5	-4	28.1	Av	H	99	360	54	-25.9	Pass	Tx Signal
11650.024	20.8	12	5.4	38.2	Av	H	99	360	54	-15.8	Pass	

Graphical Test Results HT40: 1 – 15GHz (5755MHz – Peak)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



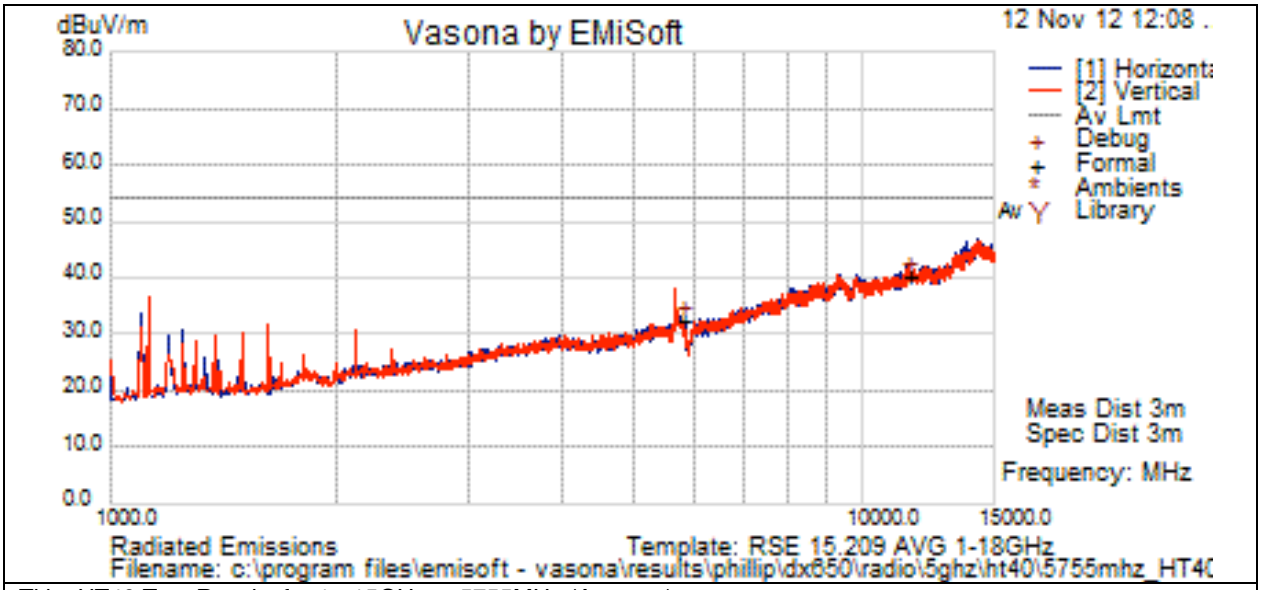
Title: HT40 Test Results for 1 - 15GHz at 5755MHz (Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5755.016	41.6	7.4	-3.9	45.2	Pk	H	99	360	74	-28.9	Pass	Tx Signal
11510.008	36.8	11.9	5.1	53.8	Pk	H	99	360	74	-20.2	Pass	

Graphical Test Results HT40: 1 – 15GHz (5755MHz – Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



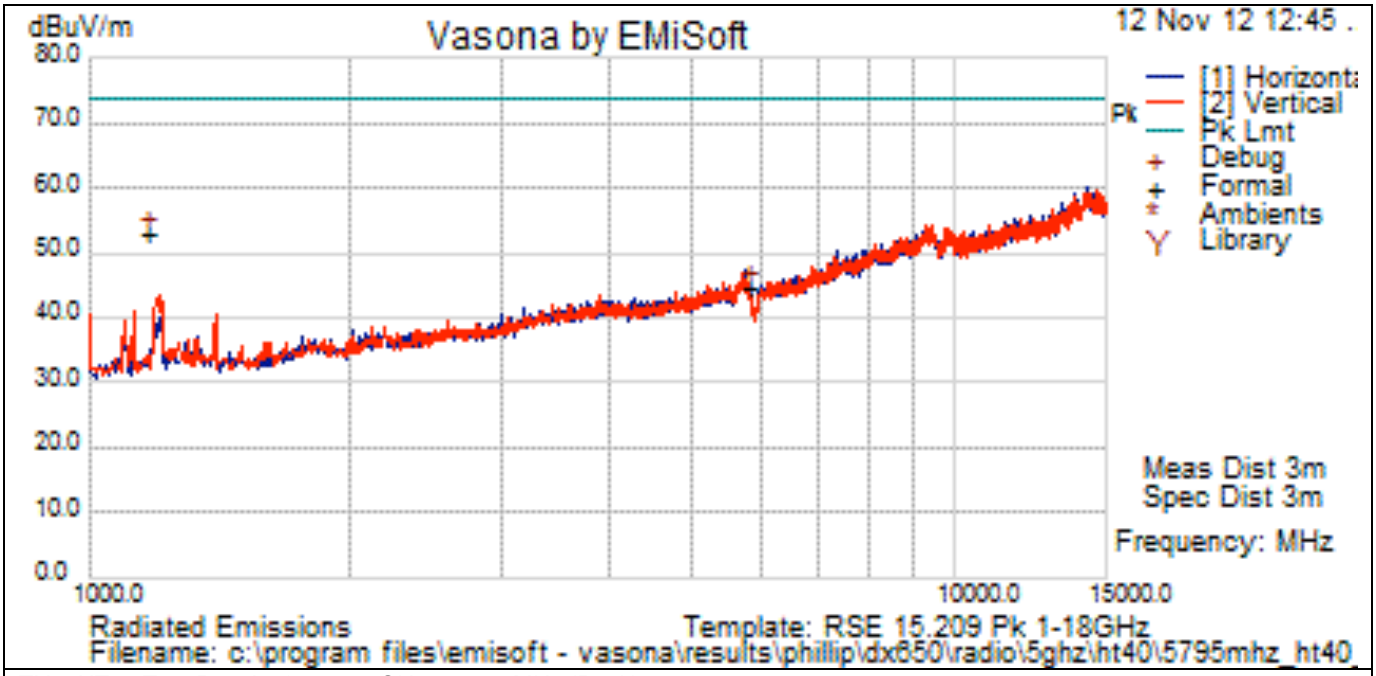
Title: HT40 Test Results for 1 - 15GHz at 5755MHz (Average)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5755.006	28.8	7.4	-3.9	32.3	Av	H	99	360	54	-21.7	Pass	Tx Signal
11510.009	23.3	11.9	5.1	40.3	Av	H	99	360	54	-13.7	Pass	

Graphical Test Results HT40: 1 – 15GHz (5795MHz – Peak)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



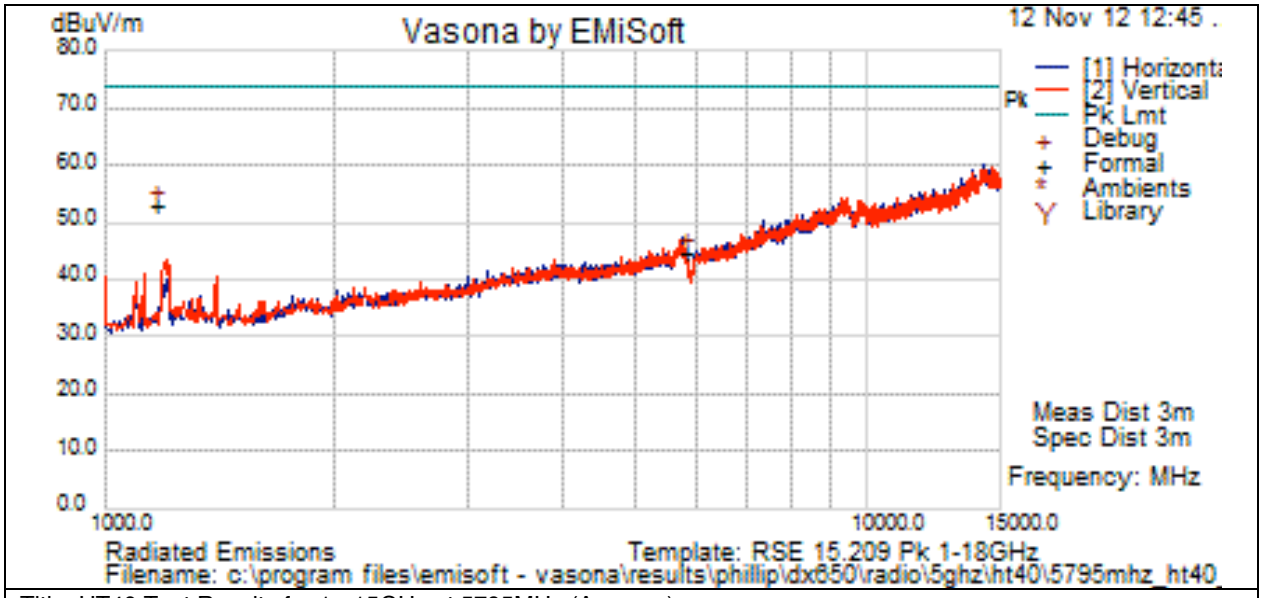
Title: HT40 Test Results for 1 - 15GHz at 5795MHz (Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5795.009	40.9	7.5	-3.8	44.5	Pk	H	99	360	74	-29.5	Pass	Tx Signal
11590.06	35.8	11.9	5.1	52.8	Pk	H	99	360	74	-21.2	Pass	

Graphical Test Results HT40: 1 – 15GHz (5795MHz – Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: HT40 Test Results for 1 - 15GHz at 5795MHz (Average)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5795.036	25.6	7.5	-3.8	29.3	Av	H	99	360	54	-24.7	Pass	Tx Signal
11590.005	21.3	11.9	5.1	38.4	Av	H	99	360	54	-15.6	Pass	

Co-Locator Radiated Spurious Emissions

15.205 / RSS-210 2.7: Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span: 1GHz – 18 GHz
Reference Level: 80 dBuV
Attenuation: 10 dB
Sweep Time: Coupled
Resolution Bandwidth: 1MHz
Video Bandwidth: 1 MHz for peak, 10 Hz for average
Detector: Peak

Terminate the access Point RF ports with 50 ohm loads.

Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

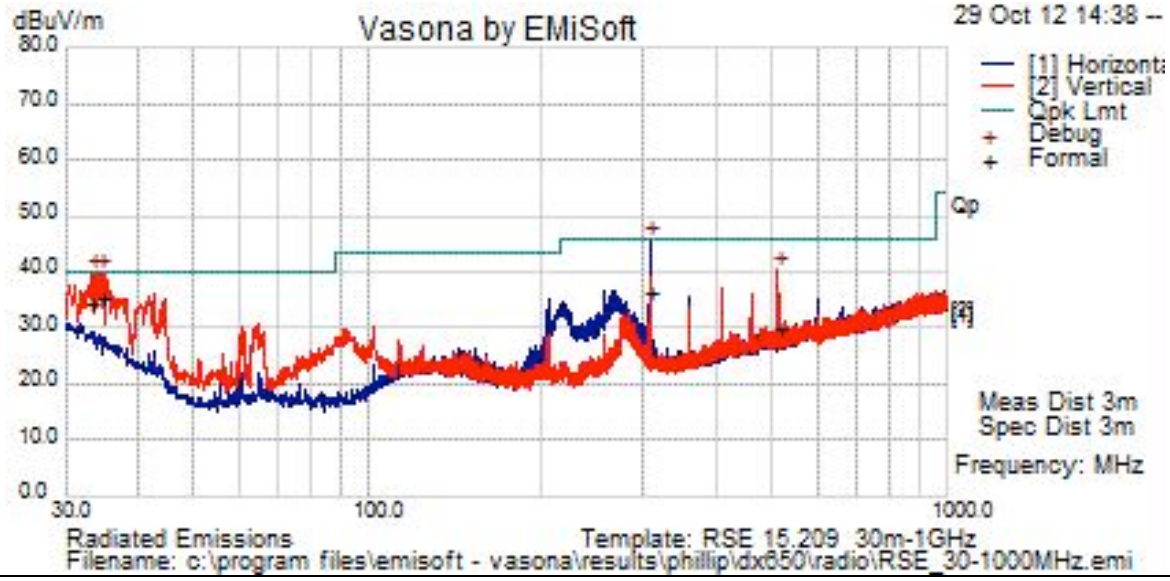
Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= 54dBuV/m @3m
2) Peak plot (Vertical and Horizontal), Limit = 74dBuV/m @3m

This report represents the worst case data for all supported operating modes and antennas. System was evaluated up to 40GHz but there were no measurable emissions above 15 GHz.

Note: A Notch Filter was used during formal testing from 1 – 15GHz to help prevent the front end of the analyzer from over loading. The Notch filters used are designed to suppress Tx fundamental frequency but do not effect harmonics of the fundamental frequency from being measured

Graphical Test Results: 30 – 1000MHz

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: 30 - 1000MHz Test Results

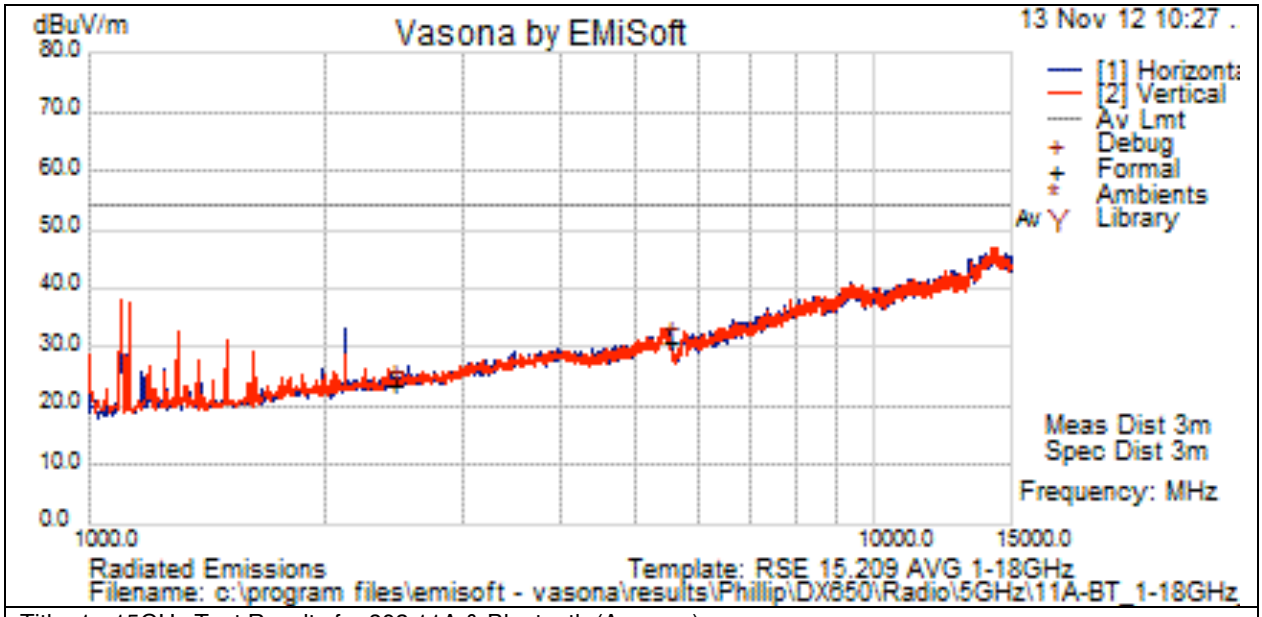
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
34.38	16.9	0.5	18	35.4	Qp	V	110	66	40	-4.6	Pass	

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
33.179	14.9	0.5	18.9	34.3	Qp	V	105	38	40	-5.7	Pass	
307.047	21.2	1.6	13.6	36.4	Qp	H	103	97	46	-9.6	Pass	
511.908	10	2.1	17.8	29.8	Qp	V	101	148	46	-16.2	Pass	

Graphical Test Results for 802.11A & Bluetooth: 1 – 15GHz (Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



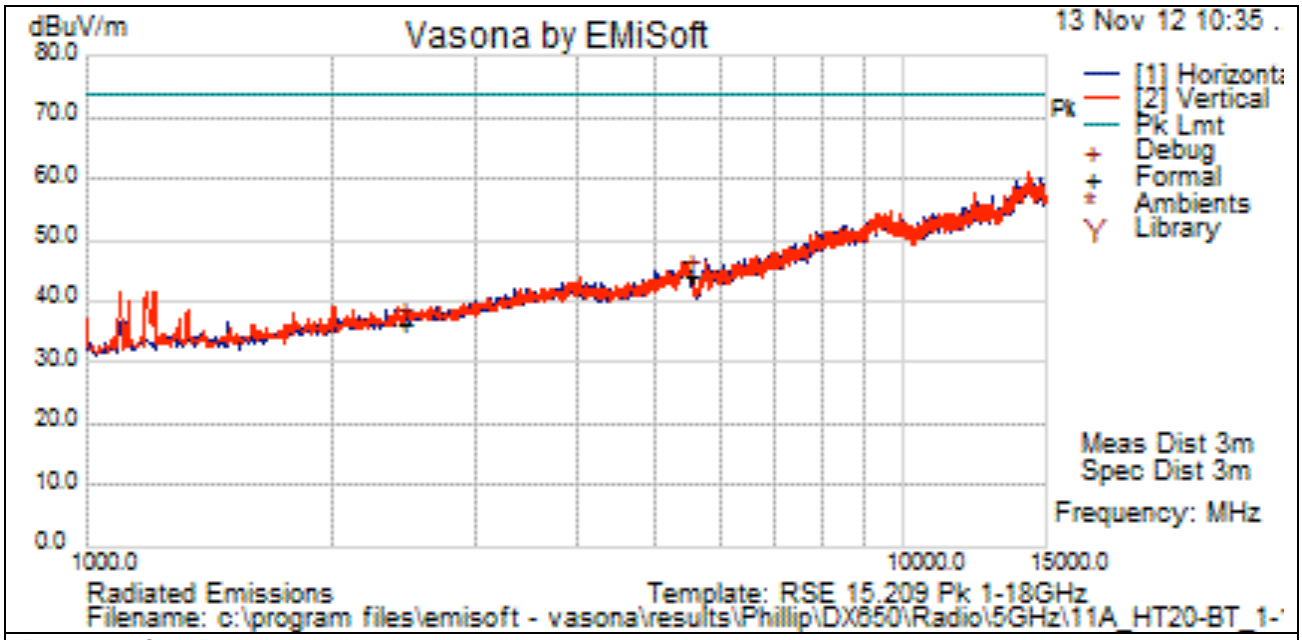
Title: 1 - 15GHz Test Results for 802.11A & Bluetooth (Average)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2441.026	24.4	4.6	-5.2	23.7	Av	H	99	360	54	-30.3	Pass	Tx Signal
5500.106	26.9	7.2	-3.4	30.7	Av	H	99	360	54	-23.3	Pass	Tx Signal

Graphical Test Results for HT20 & Bluetooth: 1 – 15GHz (Peak)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



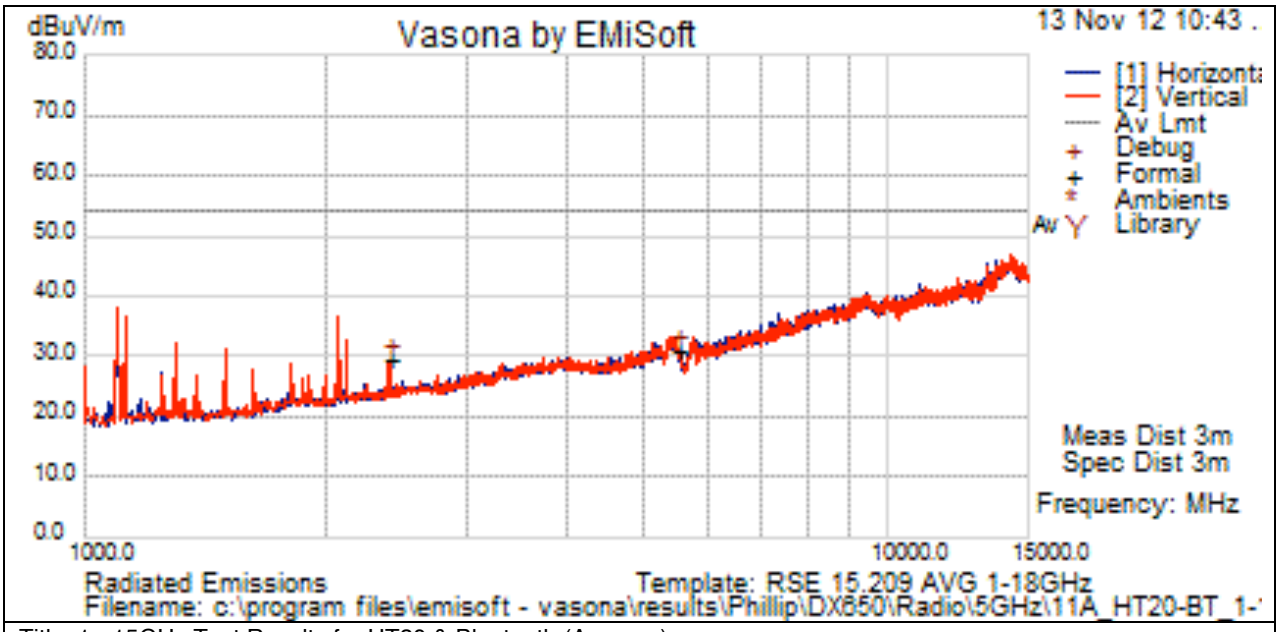
Title: 1 - 15GHz Test Results for HT20 & Bluetooth (Peak)

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2441.01	37	4.6	-5.2	36.4	Pk	V	99	360	74	-37.6	Pass	Tx Signal
5500.006	40.2	7.2	-3.4	44	Pk	H	99	360	74	-30	Pass	Tx Signal

Graphical Test Results for HT20 & Bluetooth: 1 – 15GHz (Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: 1 - 15GHz Test Results for HT20 & Bluetooth (Average)

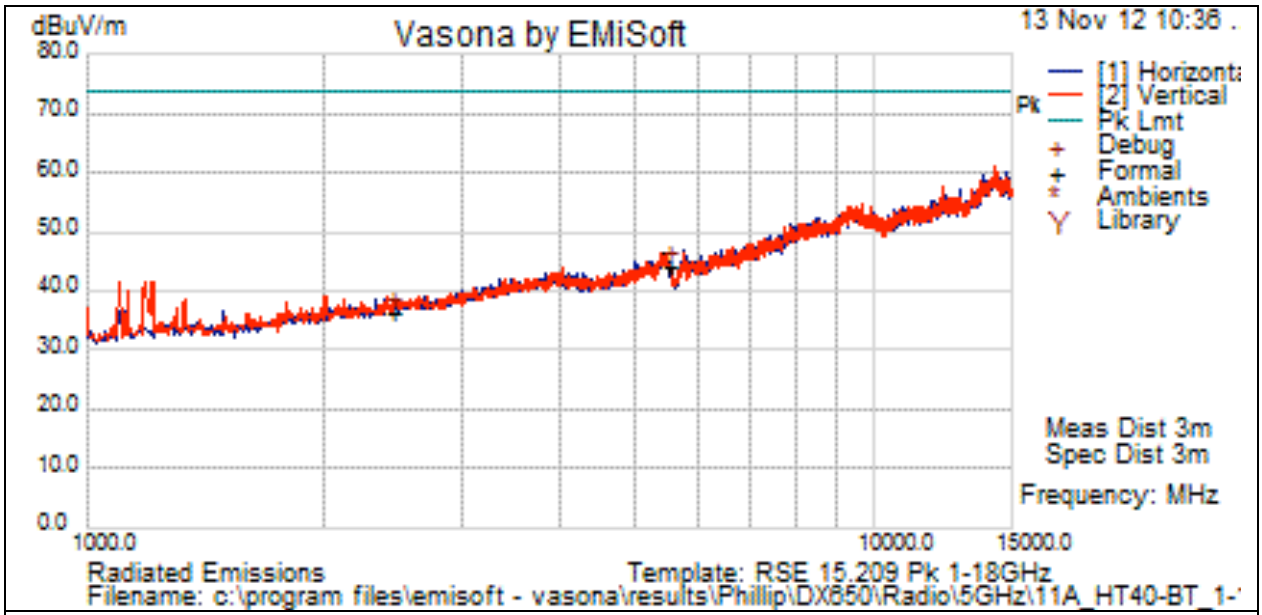
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2402.02	29.8	4.6	-5.1	29.3	Av	V	99	360	54	-24.7	Pass	Tx Signal

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5500.154	26.9	7.2	-3.4	30.8	Av	H	99	360	54	-23.2	Pass	Tx Signal

Graphical Test Results for HT40 & Bluetooth: 1 – 15GHz (Peak)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: 1 - 15GHz Test Results for HT40 & Bluetooth (Peak)

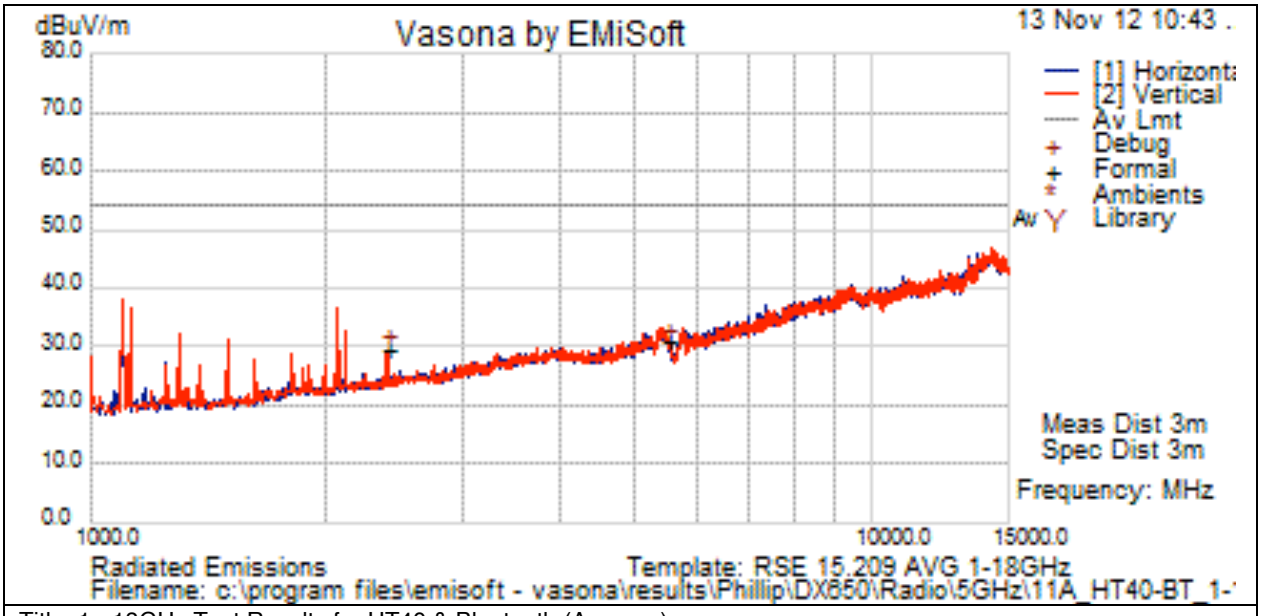
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2441.01	37	4.6	-5.2	36.4	Pk	V	99	360	74	-37.6	Pass	Tx Signal
5509.999	40.3	7.3	-3.3	44.2	Pk	H	99	360	74	-29.8	Pass	Tx Signal

Graphical Test Results for HT40 & Bluetooth: 1 – 15GHz (Average)

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



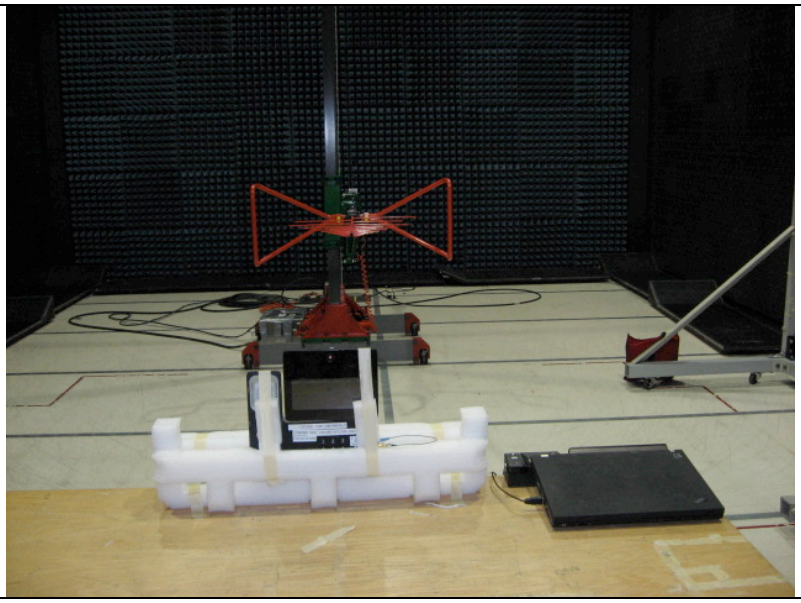
Title: 1 - 18GHz Test Results for HT40 & Bluetooth (Average)

Test Results Table

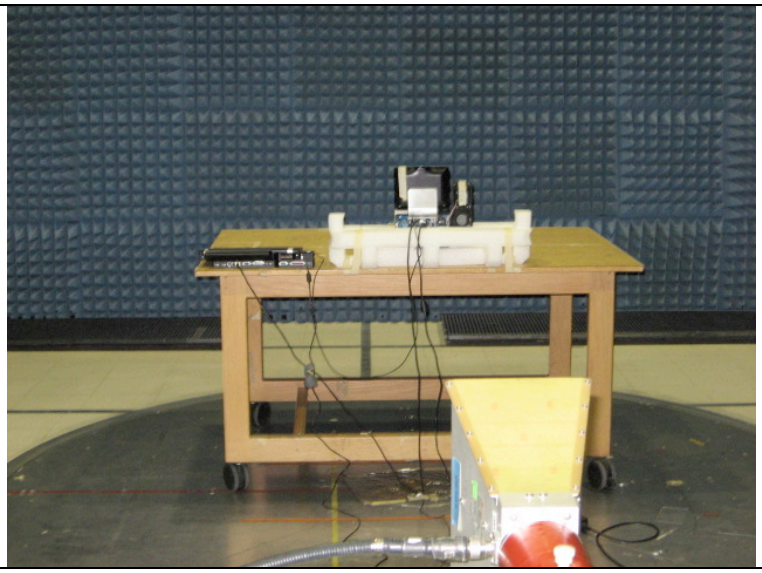
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2402.02	29.8	4.6	-5.1	29.3	Av	V	99	360	54	-24.7	Pass	Tx Signal
5510.019	26.8	7.3	-3.3	30.7	Pk	H	99	360	54	-23.3	Pass	Tx Signal

Physical Test arrangement Photograph:

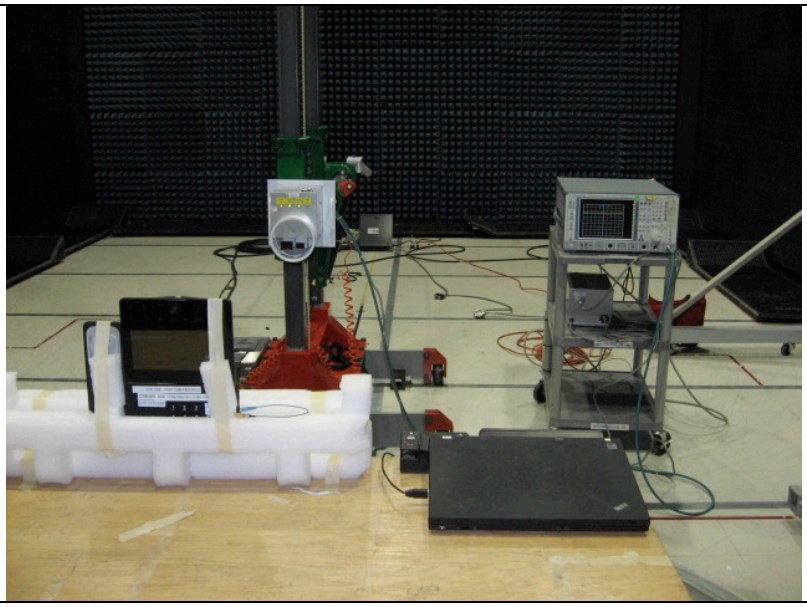
Note: All 3-axis (X,Y, Z) were evaluated during preliminary testing and the worse case orientation was for all formal testing shown below.



Title: Radiated Spurious Emissions Test Configuration from 30M to 1000MHz



Title: Radiated Spurious Emissions 1G to 18GHz Test Configuration



Title: Radiated Spurious Emissions 18 – 40GHz Test Configuration

Appendix B: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	RMS	Root mean square
EDCS	Engineering Document Control System	Qp	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Pk	Peak
Cal	Calibration	kHz	Kilohertz ($1x10^3$)
EN	European Norm	MHz	MegaHertz ($1x10^6$)
IEC	International Electro technical Commission	GHz	Gigahertz ($1x10^9$)
CISPR	International Special Committee on Radio Interference	H	Horizontal
CDN	Coupling/Decoupling Network	V	Vertical
LISN	Line Impedance Stabilization Network	dB	decibel
PE	Protective Earth	V	Volt
GND	Ground	kV	Kilovolt ($1x10^3$)
L1	Line 1	µV	Microvolt ($1x10^{-6}$)
L2	Line2	A	Amp
L3	Line 3	µA	Micro Amp ($1x10^{-6}$)
DC	Direct Current	mS	Milli Second ($1x10^{-3}$)
RAW	Uncorrected measurement value, as indicated by the measuring device	µS	Micro Second ($1x10^{-6}$)
RF	Radio Frequency	µS	Micro Second ($1x10^{-6}$)
SLCE	Signal Line Conducted Emissions	m	Meter
Meas dist	Measurement distance	Spec dist	Specification distance
N/A or NA	Not Applicable	SL	Signal Line (or Telecom Line)
P	Power Line	L	Live Line
N	Neutral Line	R	Return
S	Supply	AC	Alternating Current

Appendix C: Test Equipment Used to perform the test

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due
041986	Murata Electronics MXGS83RK3000	Special Radio Test Adaptor Cable	29-MAY-2012	29-MAY-2013
034974	Midwest Microwave ATT-0640-20-29M-02	Attenuator, 20dB, DC-40GHz	25-MAY-2012	25-MAY-2013
035609	Micro-Tronics BRC50703-02	Notch Filter, SB: 5.150-5.350 GHz, to 11 GHz	06-JUL-2012	06-JUL-2013
033988	Agilent E4446A	Precision Spectrum Analyzer	27-NOV-2012	27-NOV-2013
008024	Huber + Suhner SF106A	3 meter Sucoflex cable	05-NOV-2012	05-NOV-2013
030443	Micro-Coax UFB311A-0-1560-520520	RF Coaxial Cable, to 18GHz, 156 In.	05-NOV-2012	05-NOV-2013
033602	Midwest Microwave CSY-NMNM-80-273001	RF Coaxial Cable, 27ft. to 18GHz	05-NOV-2012	05-NOV-2013
045588	Sunol Sciences JB1	Combination Antenna	14-DEC-2011	14-DEC-2012
045051	Rohde & Schwarz ESCI	EMI Test Receiver	02-NOV-2012	02-NOV-2013
002119	EMC Test Systems/ 3115	Double Ridged Guide Horn Antenna	07-AUG-2012	07-AUG-2013
008022	Huber + Suhner SF106A	1m Sucoflex cable	16-DEC-2011	16-DEC-2012
005691	Miteq NSP1800-25-S1	Broadband Preamplifier (1-18GHz)	31-JAN-2012	31-JAN-2013
035613	Micro-Tronics BRM50702-02	Notch Filter, SB: 2.4 - 2.5 GHz, to 18 GHz	30-MAY-2012	30-MAY-2013
042000	Agilent E4440A	Spectrum Analyzer	29-JUN-2012	29-JUN-2013
024201	Rohde & Schwarz FSEK30	EMI Test Receiver	30-NOV-2012	30-NOV-2013
028072	CISCO 1840	18-40GHz EMI Test Fixture	15-FEB-2012	15-FEB-2013
035095	Micro-Coax UFA147A-0-0180-110200	RF Coax Cable to 40 GHz, 18in	25-OCT-2012	25-OCT-2-13
043023	Anritsu MT8852B	Bluetooth Test Set	14-SEP-2012	14-SEP-2013
035639	Micro-Tronics BRC50704-02	Notch Filter, SB: 5.470-5.725 GHz, to 12 GHz	09-AUG-2012	09-AUG-2013
031700	Micro-Tronics BRC50705	Notch Filter, SB: 5.725-5.875 GHz, to 12 GHz	30-MAY-2012	30-MAY-2013
008097	Huber + Suhner/ RG-223	RG-233 Cable 9m	24-JUL-2012	24-JUL-2013
004924	Rohde & Schwarz/ ESHS30	EMI Receiver (9KHz-30MHz)	29-NOV-12	29-NOV-13
008185	Fischer Custom Communications/ FCC-450B-2.4-N	Instrumentation Limiter	01-AUG-2012	01-AUG-2013
008197	TTE/ H613-150K-50-21378	Hi Pass Filter - 150KHz cutoff	10-APR-2012	10-APR-2013
008394	Coleman/ RG-223	RG-223 Cable 6 ft	23-MAY-2012	23-MAY-2013

008490	Bird/ 5-T-MN	5W 50 Ohm Terminator	01-JUN-2012	01-JUN-2013
007036	HP/ E7401A	Spectrum Analyzer	12-SEP-2012	12-SEP-2013
018981	Fischer Custom Communications/ FCC-801-M2-32A	Power Line Coupling/Decoupling Network	03-MAY-2012	03-MAY-2013
020767	Fischer Custom Communications/ FCC-450B-2.4-N	Instrumentation Limiter	01-AUG-2012	01-AUG-2013
023874	Fischer Custom Communications/ FCC-LISN-PA-NEMA-5-15	Power Adaptor, Polarized 120VAC	07-SEP-2012	07-SEP-2013
036033	York/ CNE V	Comparison Noise Emitter	Cal Not Required	N/A

Appendix D: Test Procedures

Measurements were made in accordance with

- KDB Publication No. 558074
- Measurement method of spurious emission tolerance to the International Telecommunication Union (ITU) Recommendation SM329.
- ANSI C63.4
- ANSI C63.10/D8

Test procedures are summarized below

6dB Bandwidth	EDCS # - 422115
26dB Bandwidth	EDCS # - 422115
Average Output Power	EDCS # - 422117
Co-Located Transmitter	EDCS # - 422118
Conducted Spurious Test	EDCS # - 422119
Peak Transmit Power Measurement	EDCS # - 422123
Power Spectral Density	EDCS # - 422113
Peak Excursion Test	EDCS # - 422121
Radiated Band Edge	EDCS # - 422124
Radiated Spurious Test	EDCS # - 422125