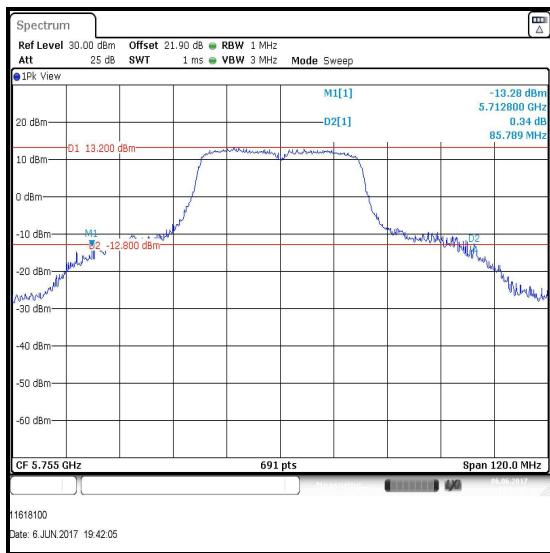


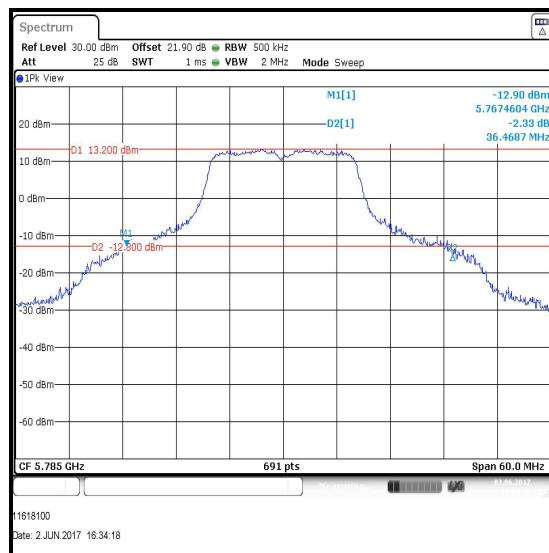
Transmitter 26 dB Emission Bandwidth (continued)**Results: 802.11n / 40 MHz / SISO / 5.725-5.85 GHz band / Port Wi-Fi 2**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	26 dB Emission Bandwidth (MHz)
Bottom	5755	BPSK	MCS0	85.789
Top	5795	BPSK	MCS0	74.674

**Bottom Channel****Top Channel**

Transmitter 26 dB Emission Bandwidth (continued)**Results: 802.11a / 20 MHz / MIMO / 5.725-5.85 GHz band**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	26 dB Emission Bandwidth (MHz)
Bottom	5745	BPSK	9	38.640
Middle	5785	BPSK	9	36.469
Top	5825	BPSK	9	36.122

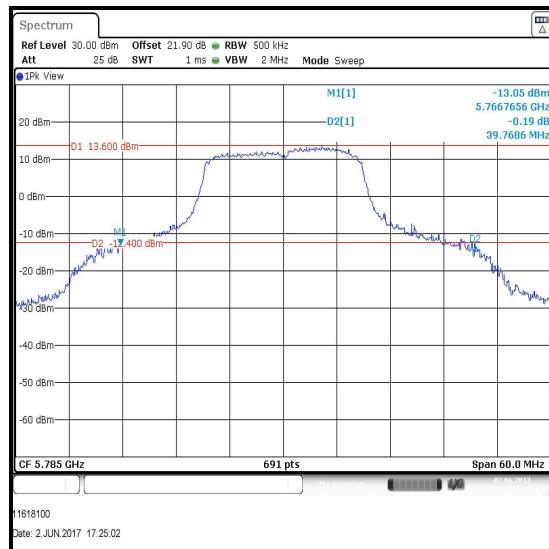
**Bottom Channel****Middle Channel****Top Channel**

Transmitter 26 dB Emission Bandwidth (continued)**Results: 802.11n / 20 MHz / MIMO / 5.725-5.85 GHz band**

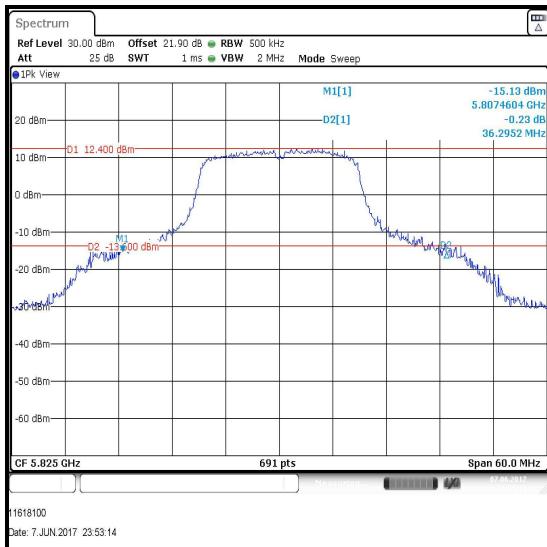
Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	26 dB Emission Bandwidth (MHz)
Bottom	5745	BPSK	MCS0	40.984
Middle	5785	BPSK	MCS0	39.769
Top	5825	BPSK	MCS0	36.295



Bottom Channel



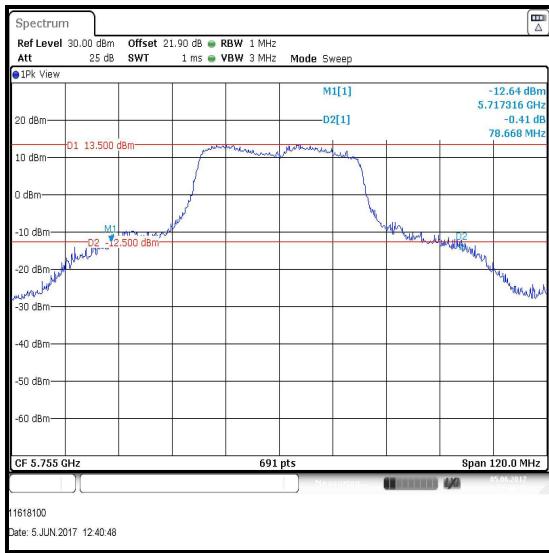
Middle Channel



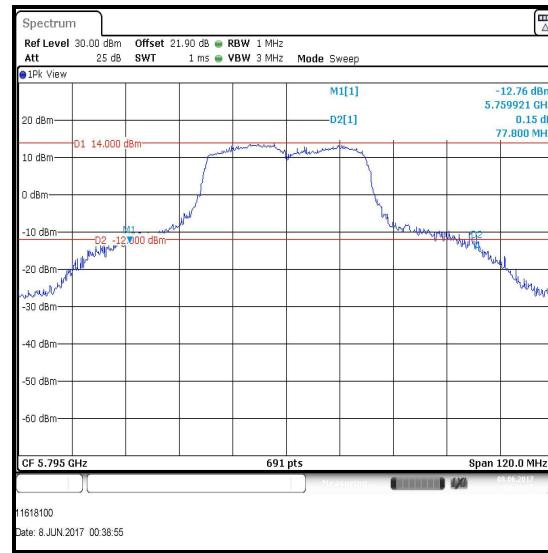
Top Channel

Transmitter 26 dB Emission Bandwidth (continued)**Results: 802.11n / 40 MHz / MIMO / 5.725-5.85 GHz band**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	26 dB Emission Bandwidth (MHz)
Bottom	5755	BPSK	MCS0	78.668
Top	5795	BPSK	MCS0	77.800



Bottom Channel



Top Channel

Transmitter 26 dB Emission Bandwidth (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2001	Thermohygrometer	Testo	608-H1	45041824	22 Feb 2018	12
M1883	Signal Analyser	Rohde & Schwarz	FSV-30	103084	02 May 2018	12
M1996	Signal Analyser	Rohde & Schwarz	FSV-13	100975	22 Nov 2017	12
M260	Signal Generator	Rohde & Schwarz	SMP 02	829076/008	11 Apr 2018	12
A2919	20 dB Attenuator	AtlanTecRF	AN18W5-20	832828#2	Calibrated before use	-
A2920	20 dB Attenuator	AtlanTecRF	AN18W5-20	832828#3	Calibrated before use	-
A2555	50Ω Termination	Micronde	R404610	Not marked or stated	Calibrated before use	-

5.2.3. Transmitter 99% Emission Bandwidth

Test Summary:

Test Engineer:	Philip Harrison	Test Dates:	05 June 2017 to 12 July 2017
Test Sample Serial Number:	04423851816340100265		

FCC Reference:	Part 15.407(h)(2)
Test Method Used:	KDB 789033 D02 Section II.C.2, KDB 905462 D02 v02, Table 4 and Notes below

Environmental Conditions:

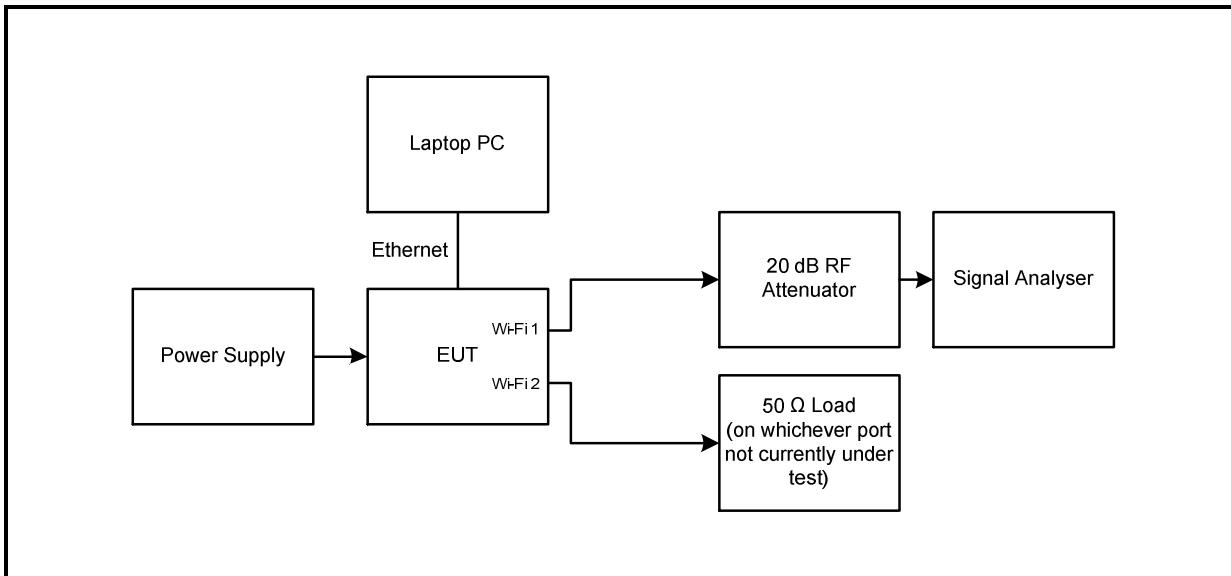
Temperature (°C):	20 to 24
Relative Humidity (%):	45 to 58

Note(s):

1. In accordance with 15.407(h)(2), if any of the 26 dB EBW falls within the 5.25 GHz to 5.725 GHz band then DFS testing is applicable. However, the requirements of KDB 905462 D02 v02, Table 4, *U-NII Detection Bandwidth* test state that the EUT only need detect radars across the 99% transmission power bandwidth. Therefore by definition, if the 99% bandwidth does not enter the 5.25 GHz to 5.725 GHz band, no DFS test is defined. This section therefore shows the widest modes give plots of 99% power bandwidth which remain at least 0.2 MHz outside the DFS bands (for worst-case HT20 modes), and therefore DFS tests are not applicable.
2. The 99% emission bandwidth was measured using the signal analyser occupied bandwidth function. The resolution bandwidth was set in the range of 1% to 5% of the occupied bandwidth and the video bandwidth set to 3 times the resolution bandwidth as the signal analyser allowed without being below 3 x RBW. A peak detector was used.
3. All configurations supported by the EUT were investigated on the one channel. The data rates that produced the widest bandwidth and therefore deemed worst case were:
 - o 5.15 GHz to 5.25 GHz Band
 - o 802.11a – 9 Mbit/s
 - o 802.11n HT20 – 6.5 Mbit/s / MCS0
 - o 802.11n HT40 – 13.5 Mbit/s / MCS0
 - o 5.725 GHz to 5.85 GHz Band
 - o 802.11a – 9 Mbit/s
 - o 802.11n HT20 – 6.5 Mbit/s / MCS0
 - o 802.11n HT40 – 13.5 Mbit/s / MCS0
4. Final measurements were performed in each supported operating band using the above configurations on the bottom, middle and top channels.
5. For 20 MHz channel measurements the signal analyser resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 60 MHz. The signal analyser function set the measurements to be made at 99% of the emission bandwidth. The results are given in the tables below.

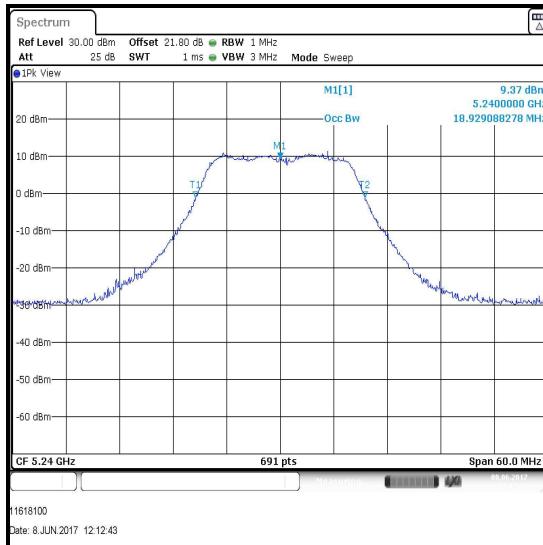
Transmitter 99% Emission Bandwidth (continued)**Note(s) (continued):**

6. For 40 MHz channel measurements the signal analyser resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 120 MHz. The signal analyser function set the measurements to be made at 99% of the emission bandwidth. The results are given in the tables below.
7. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.
8. Plots for all data rates are archived on the UL VS LTD IT server and available for inspection upon request.

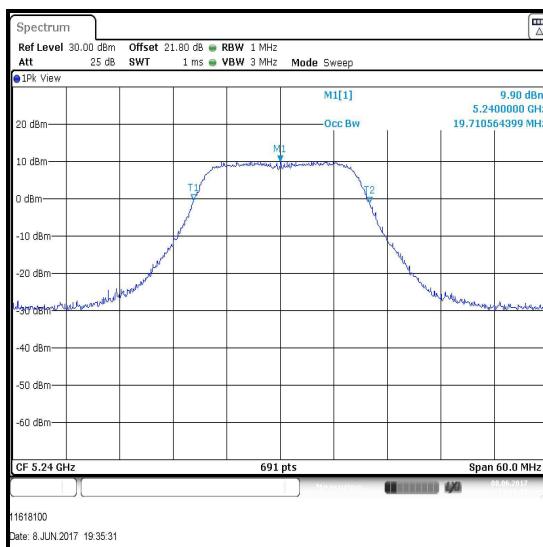
Test setup:

Transmitter 99% Emission Bandwidth (continued)**Results: 802.11a / 20 MHz / SISO / 5.15-5.25 GHz band / Port Wi-Fi 1**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s	99% Emission Bandwidth (MHz)
Top	5240	BPSK	9 Mbit/s	18.929

**Top Channel****Results: 802.11n / 20 MHz / SISO / 5.15-5.25 GHz band / Port Wi-Fi 1**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	99 % Emission Bandwidth (MHz)
Top	5240	BPSK	MCS0	19.711

**Top Channel**

Transmitter 99% Emission Bandwidth (continued)**Results: 802.11n / 40 MHz / SISO / 5.15-5.25 GHz band / Port Wi-Fi 1**

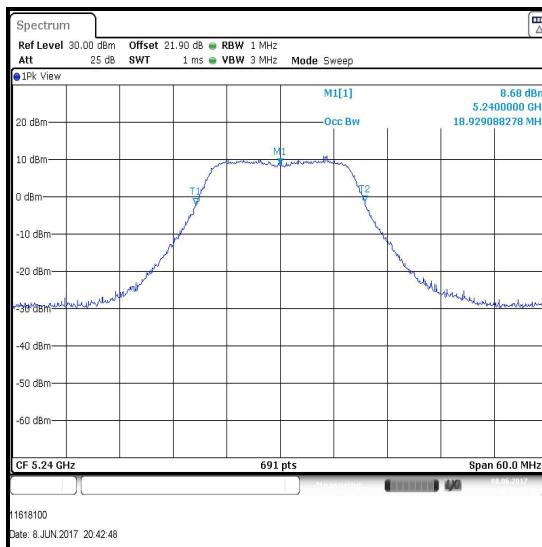
Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	99 % Emission Bandwidth (MHz)
Top	5230	BPSK	MCS0	37.858



Top Channel

Results: 802.11a / 20 MHz / MIMO / 5.15-5.25 GHz band / Port Wi-Fi 2

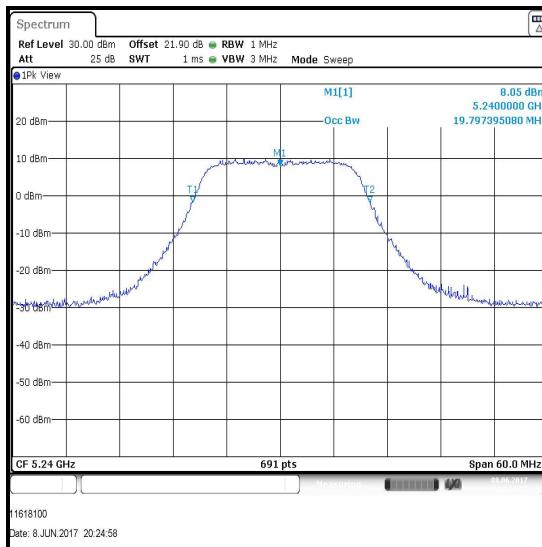
Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s	99 % Emission Bandwidth (MHz)
Top	5240	BPSK	9 Mbit/s	18.929



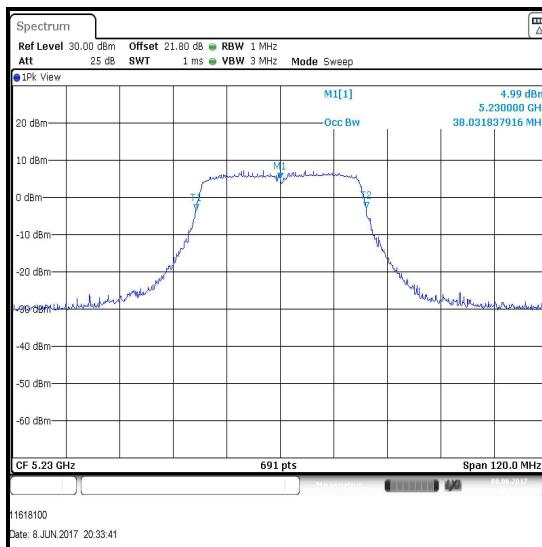
Top Channel

Transmitter 99% Emission Bandwidth (continued)**Results: 802.11n / 20 MHz / MIMO / 5.15-5.25 GHz band / Port Wi-Fi 2**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	99 % Emission Bandwidth (MHz)
Top	5240	BPSK	MCS0	19.797

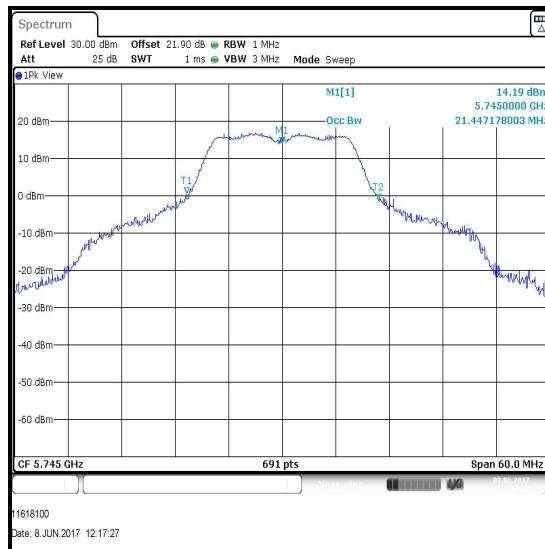
**Top Channel****Results: 802.11n / 40 MHz / MIMO / 5.15-5.25 GHz band / Port Wi-Fi 2**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	99 % Emission Bandwidth (MHz)
Top	5230	BPSK	MCS0	38.032

**Top Channel**

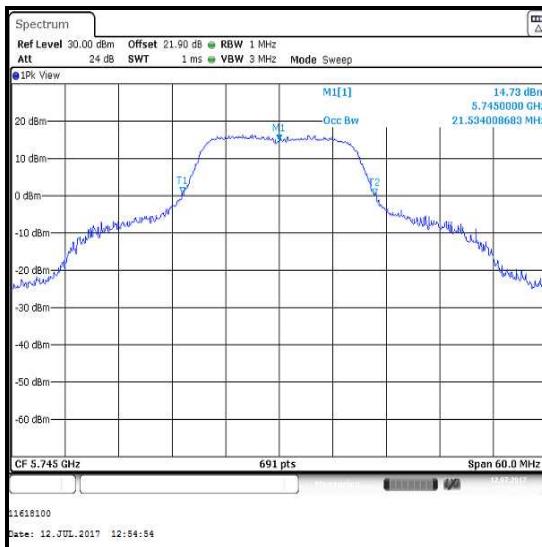
Transmitter 99% Emission Bandwidth (continued)**Results: 802.11a / 20 MHz / SISO / 5.725-5.85 GHz band / Port Wi-Fi 1**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s	99 % Emission Bandwidth (MHz)
Bottom	5745	BPSK	9 Mbit/s	21.447

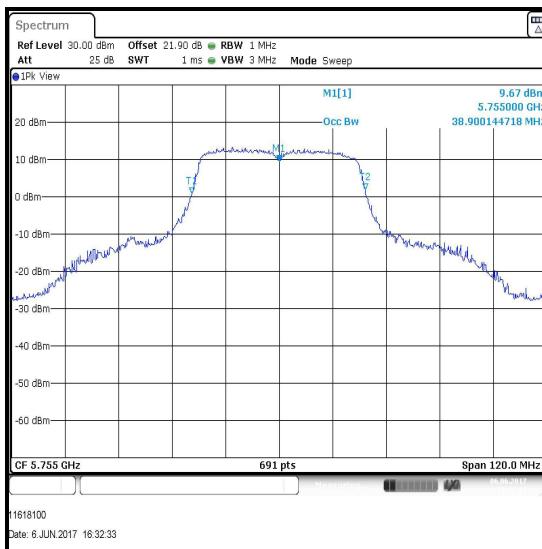
**Bottom Channel**

Transmitter 99% Emission Bandwidth (continued)**Results: 802.11n / 20 MHz / SISO / 5.725-5.85 GHz band / Port Wi-Fi 1**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	99 % Emission Bandwidth (MHz)
Bottom	5745	BPSK	MCS0	21.534

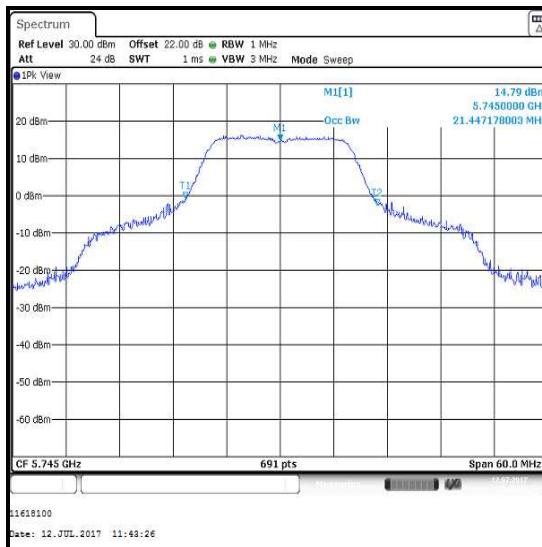
**Bottom Channel****Results: 802.11n / 40 MHz / SISO / 5.725-5.85 GHz band / Port Wi-Fi 1**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	99 % Emission Bandwidth (MHz)
Bottom	5755	BPSK	MCS0	38.900

**Bottom Channel**

Transmitter 99% Emission Bandwidth (continued)**Results: 802.11a / 20 MHz / MIMO / 5.725-5.85 GHz band / Port Wi-Fi 2**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s	99 % Emission Bandwidth (MHz)
Bottom	5745	BPSK	9 Mbit/s	21.447

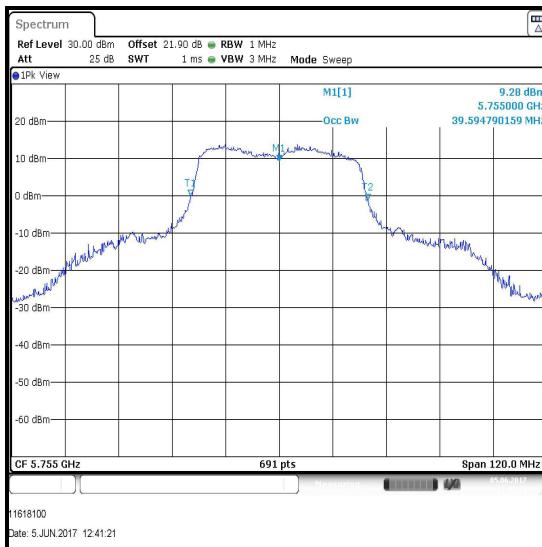
**Bottom Channel****Results: 802.11n / 20 MHz / MIMO / 5.725-5.85 GHz band / Port Wi-Fi 2**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	99 % Emission Bandwidth (MHz)
Bottom	5745	BPSK	MCS0	21.968

**Bottom Channel**

Transmitter 99% Emission Bandwidth (continued)**Results: 802.11n / 40 MHz / MIMO / 5.725-5.85 GHz band / Port Wi-Fi 2**

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbit/s / MCS	99 % Emission Bandwidth (MHz)
Bottom	5755	BPSK	MCS0	39.595

**Bottom Channel****Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2001	Thermohygrometer	Testo	608-H1	45041824	22 Feb 2018	12
M1883	Signal Analyser	Rohde & Schwarz	FSV-30	103084	02 May 2018	12
M260	Signal Generator	Rohde & Schwarz	SMP 02	829076/008	11 Apr 2018	12
A2919	20 dB Attenuator	AtlanTecRF	AN18W5-20	832828#2	Calibrated before use	-
A2920	20 dB Attenuator	AtlanTecRF	AN18W5-20	832828#3	Calibrated before use	-
A2555	50Ω Termination	Micronde	R404610	Not marked or stated	Calibrated Before Use	-

5.2.4. Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band)

Test Summary:

Test Engineer:	Philip Harrison	Test Dates:	02 June 2017 to 12 July 2017
Test Sample Serial Number:	04423851816340100265		

FCC Reference:	Part 15.407(e)
Test Method Used:	KDB 789033 D02 Section II.C.2

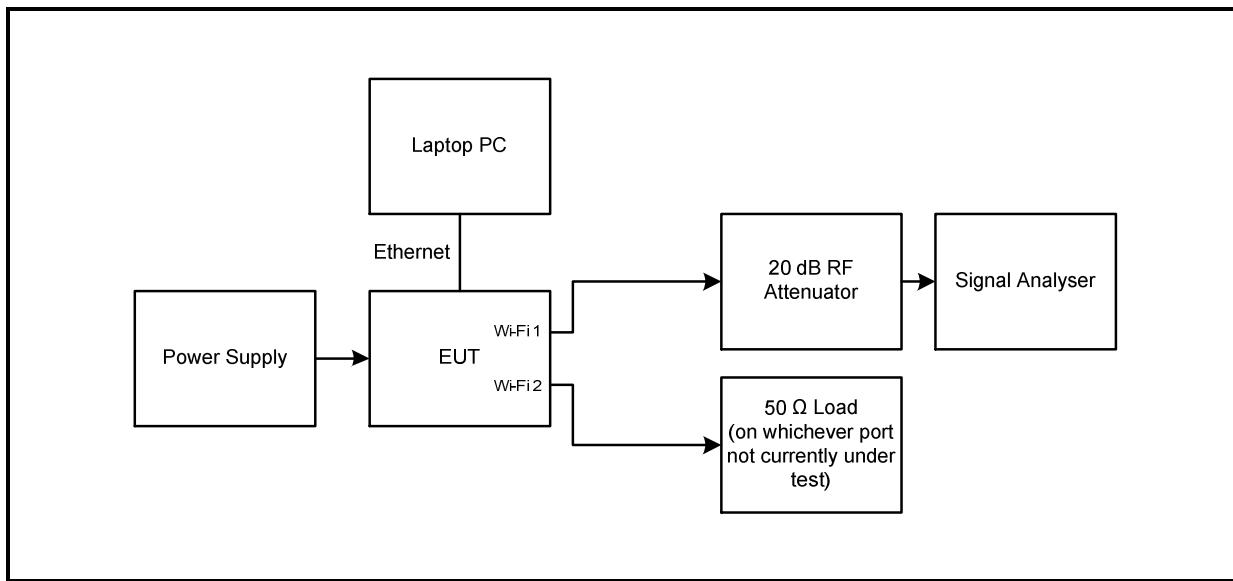
Environmental Conditions:

Temperature (°C):	20 to 24
Relative Humidity (%):	45 to 58

Note(s):

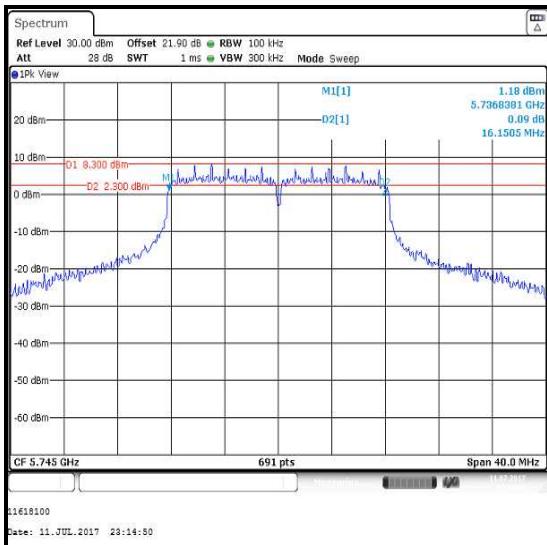
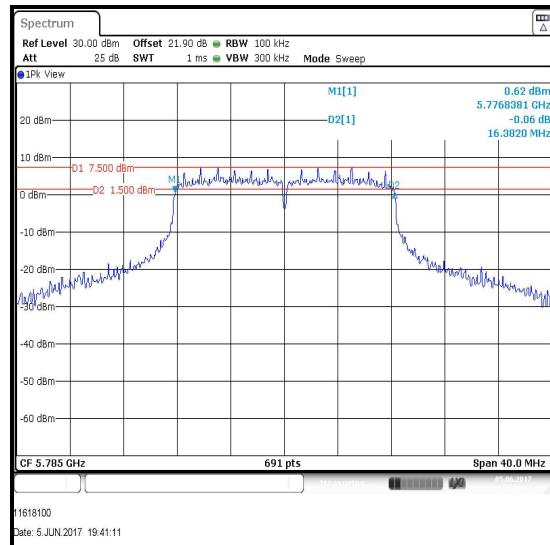
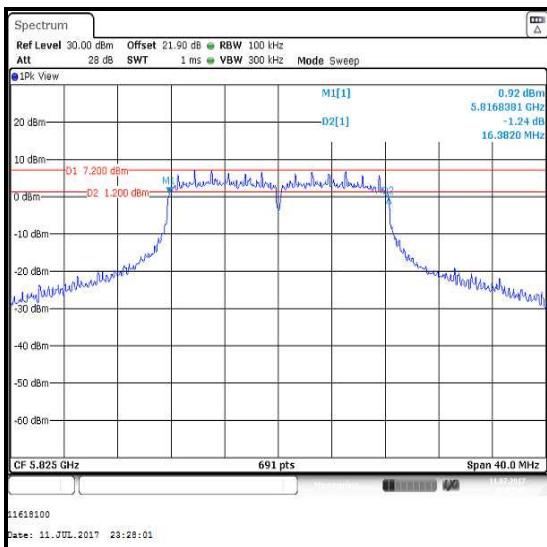
1. All configurations supported by the EUT were investigated on the middle channel of each band in accordance with KDB 789033 Section II.C.2. Minimum Emission Bandwidth test procedure. The data rates that produced the narrowest bandwidth were then also tested on the bottom and top channels and reported here. The signal analyser resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 40 MHz for 20 MHz channels, and 80 MHz for 40 MHz channels. The bandwidth was measured at 6 dB down from the peak of the signal. The data rates that produced the narrowest bandwidth and therefore deemed worst case were then additionally tested on bottom and top channels and are reported below.
2. Plots for all data rates are archived on the UL VS LTD IT server and available for inspection upon request.
3. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.

Test setup:



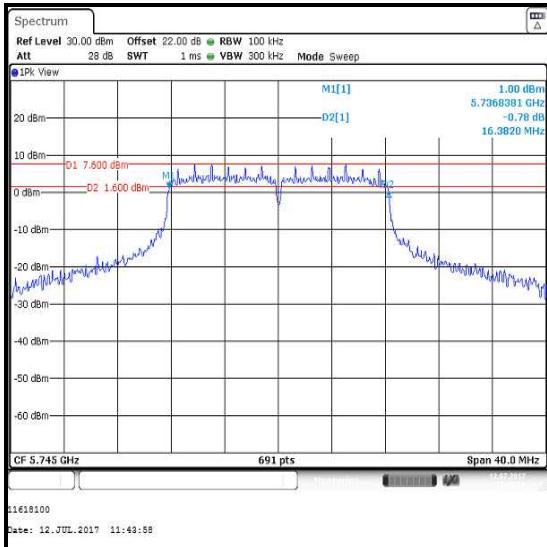
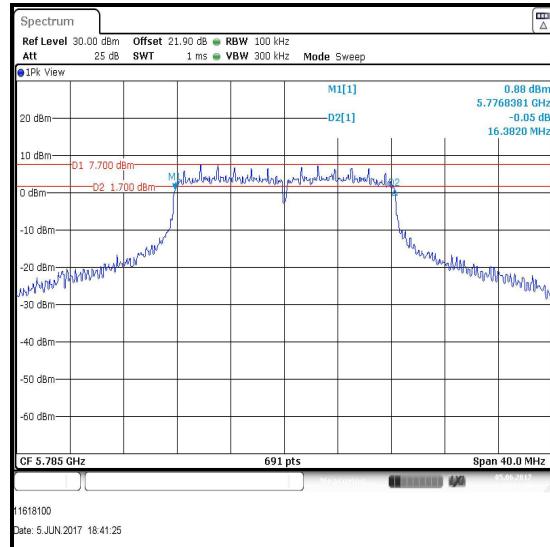
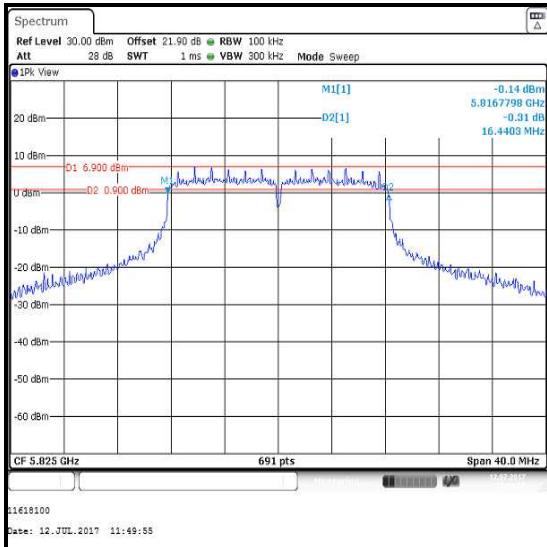
Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11a / 20 MHz / SISO / BPSK / 6 Mbit/s / Port Wi-Fi 1**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	16151	≥500	15651	Complied
Middle	16382	≥500	15882	Complied
Top	16382	≥500	15882	Complied

**Bottom Channel****Middle Channel****Top Channel**

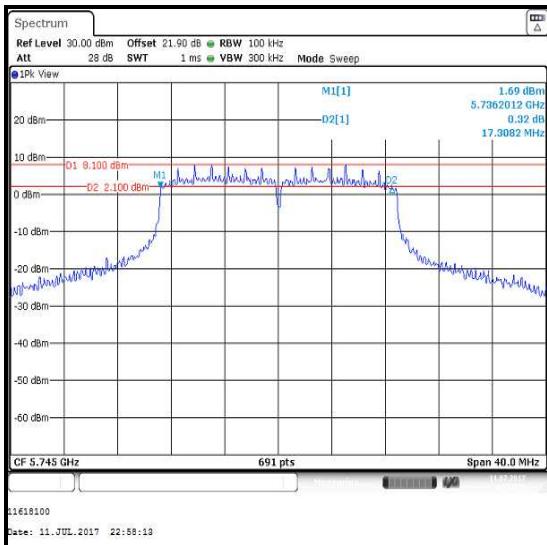
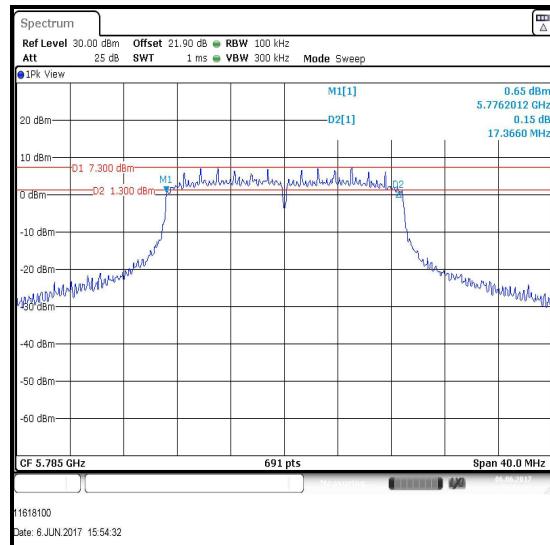
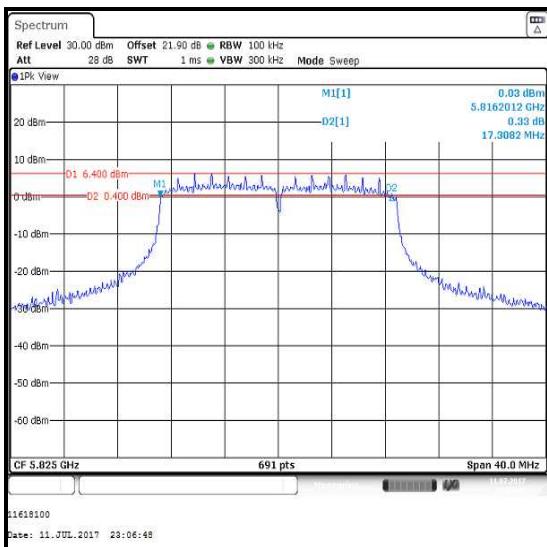
Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11a / 20 MHz / SISO / BPSK / 6 Mbit/s / Port Wi-Fi 2**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	16382	≥500	15882	Complied
Middle	16382	≥500	15882	Complied
Top	16440	≥500	15940	Complied

**Bottom Channel****Middle Channel****Top Channel**

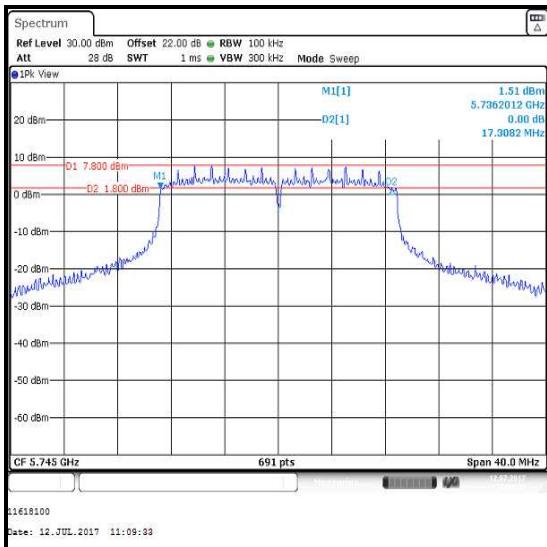
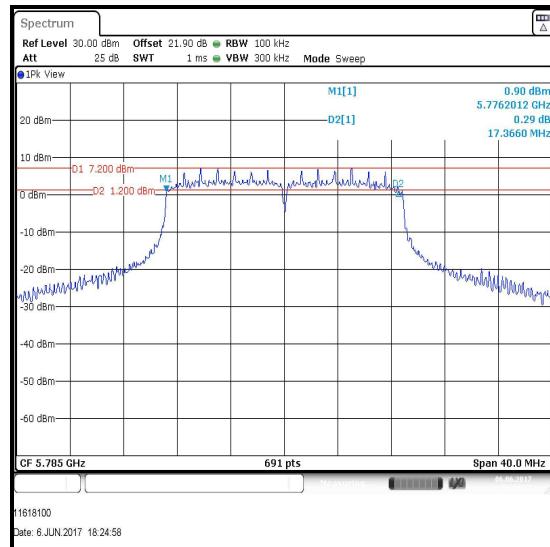
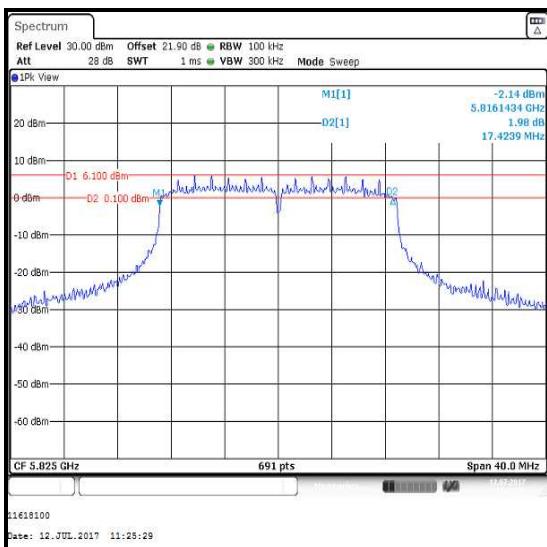
Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11n / 20 MHz / SISO / QPSK / MCS1 / Port Wi-Fi 1**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	17308	≥500	16808	Complied
Middle	17366	≥500	16866	Complied
Top	17308	≥500	16808	Complied

**Bottom Channel****Middle Channel****Top Channel**

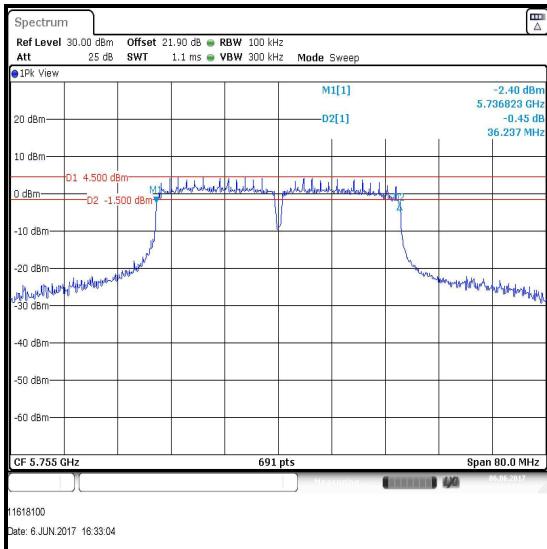
Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11n / 20 MHz / SISO / QPSK / MCS1 / Port Wi-Fi 2**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	17308	≥500	16808	Complied
Middle	17366	≥500	16866	Complied
Top	17424	≥500	16924	Complied

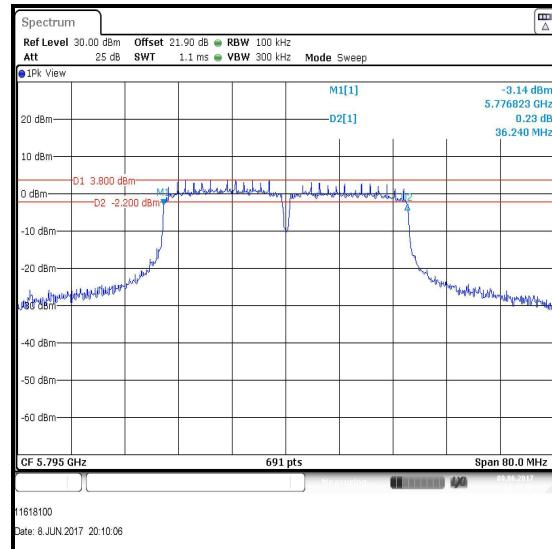
**Bottom Channel****Middle Channel****Top Channel**

Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11n / 40 MHz / SISO / BPSK / MCS0 / Port Wi-Fi 1**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	36237	≥500	35737	Complied
Top	36240	≥500	35740	Complied



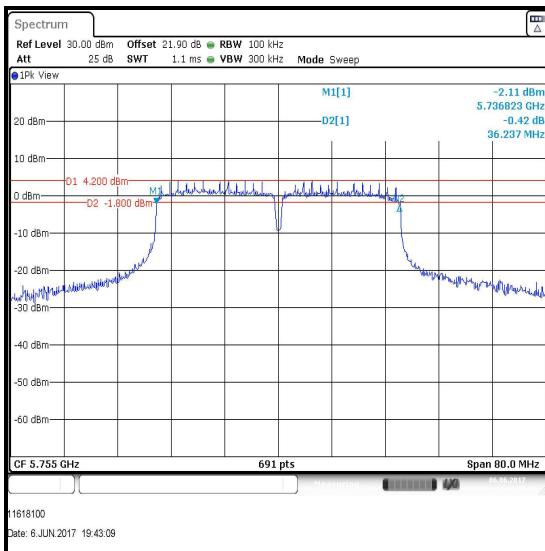
Bottom Channel



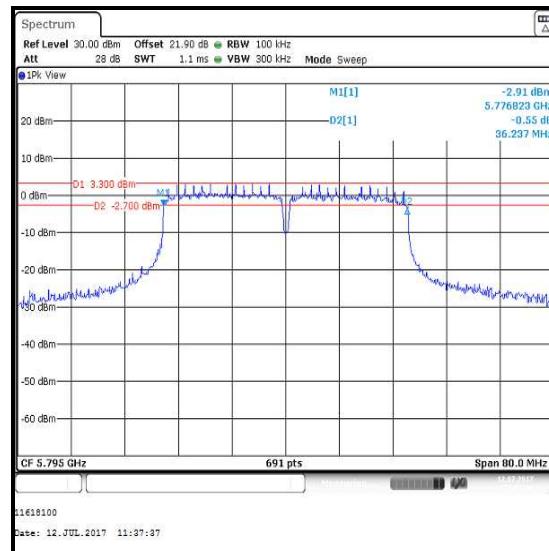
Top Channel

Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11n / 40 MHz / SISO / BPSK / MCS0 / Port Wi-Fi 2**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	36237	≥500	35737	Complied
Top	36237	≥500	35737	Complied



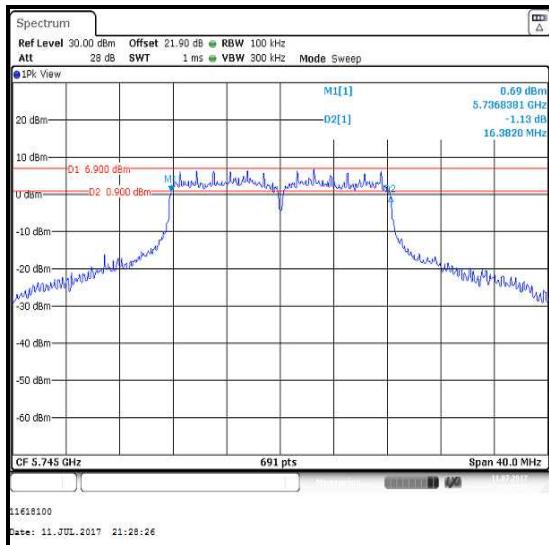
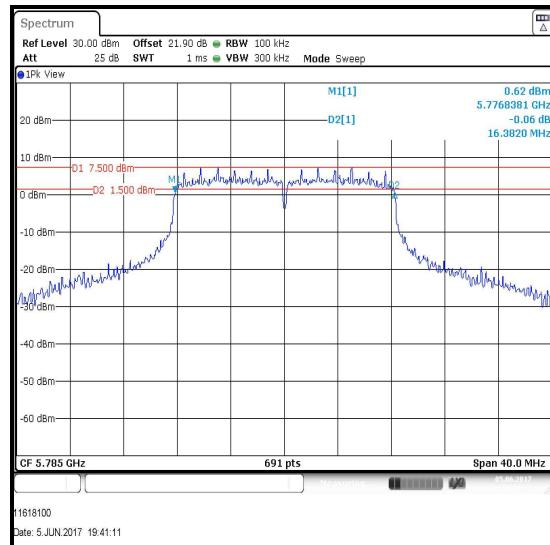
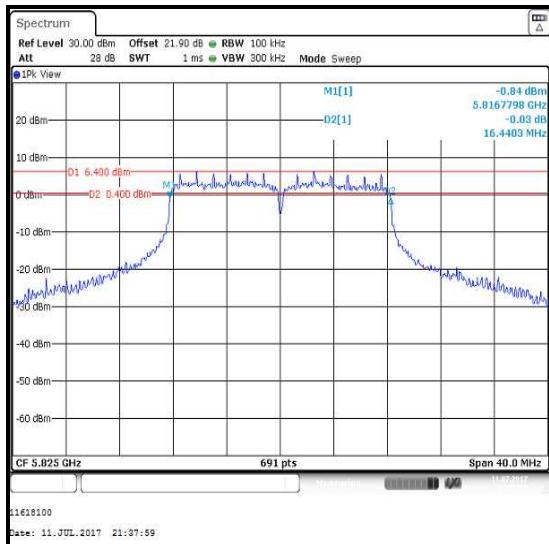
Bottom Channel



Top Channel

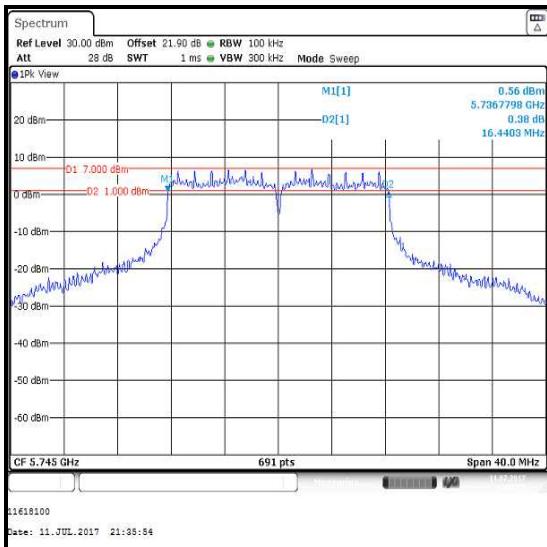
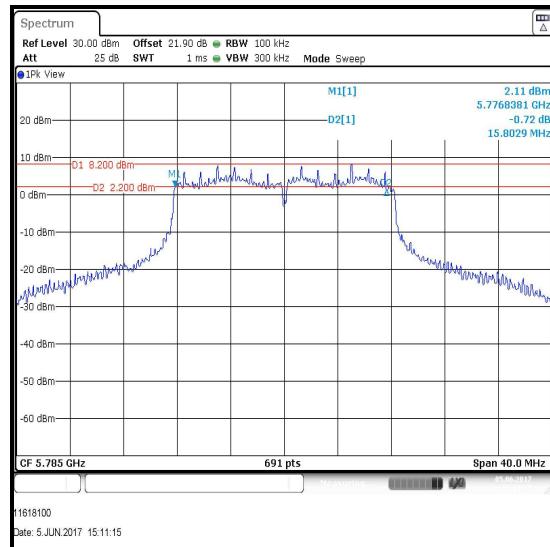
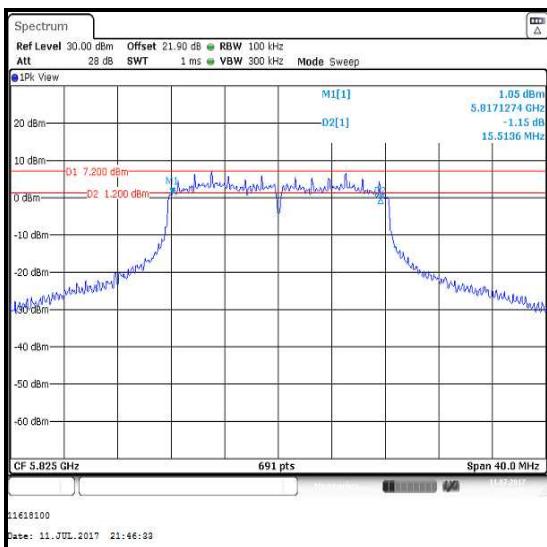
Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11a / 20 MHz / MIMO / BPSK / 6 Mbit/s / Port Wi-Fi 1**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	16382	≥500	15882	Complied
Middle	16382	≥500	15882	Complied
Top	16440	≥500	15940	Complied

**Bottom Channel****Middle Channel****Top Channel**

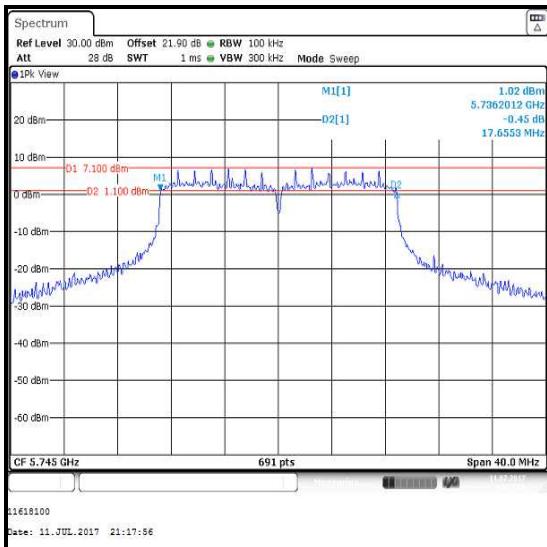
Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11a / 20 MHz / MIMO / QPSK / 12 Mbit/s / Port Wi-Fi 2**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	16440	≥500	15940	Complied
Middle	15803	≥500	15303	Complied
Top	15514	≥500	15014	Complied

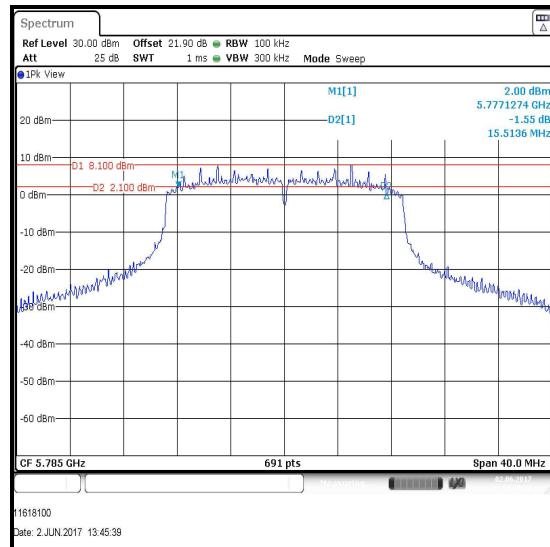
**Bottom Channel****Middle Channel****Top Channel**

Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11n / 20 MHz / MIMO / QPSK / MCS1 / Port Wi-Fi 1**

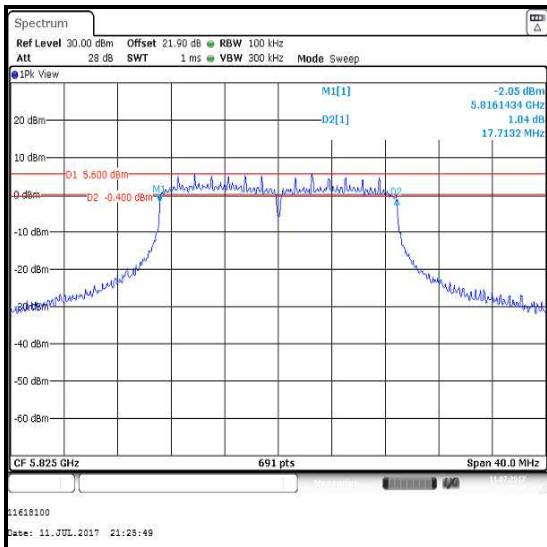
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	17655	≥500	17155	Complied
Middle	15514	≥500	15014	Complied
Top	17713	≥500	17213	Complied



Bottom Channel



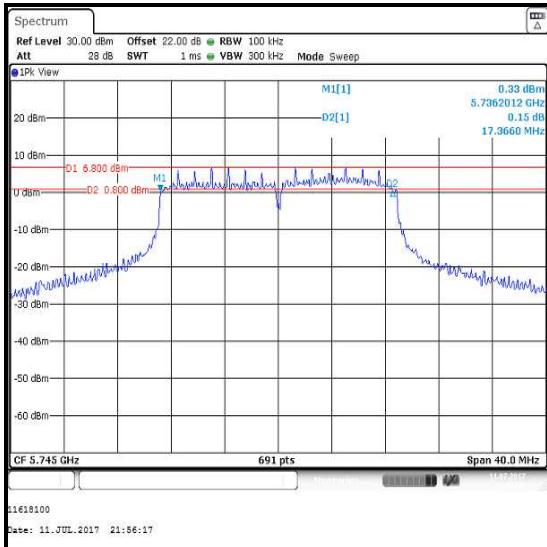
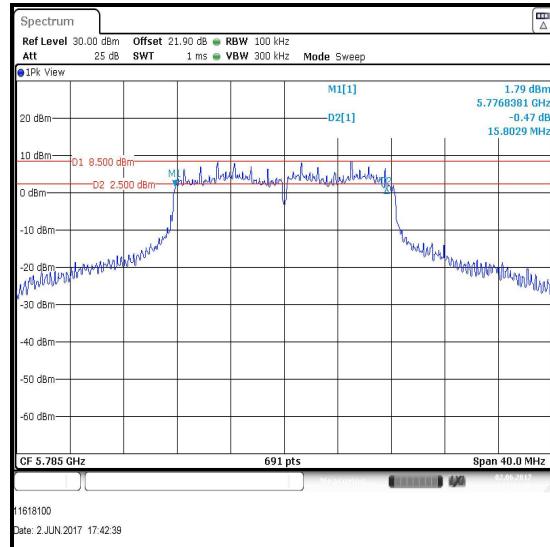
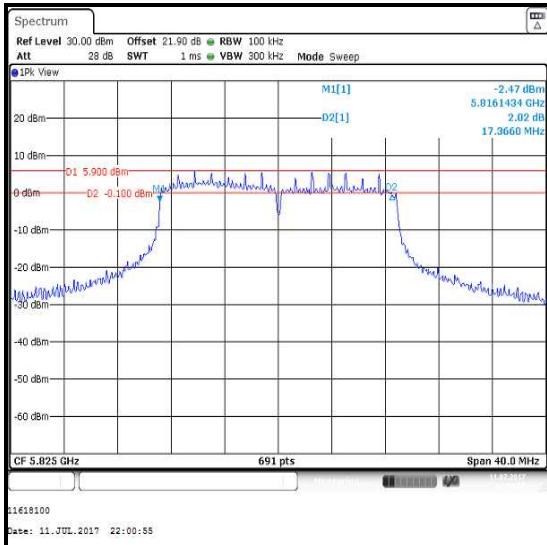
Middle Channel



Top Channel

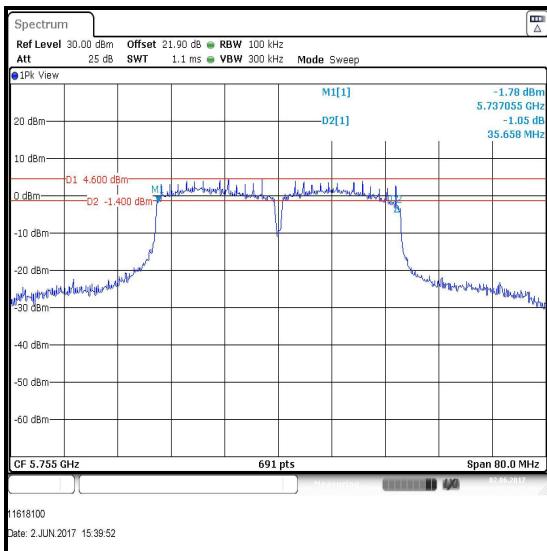
Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11n / 20 MHz / MIMO / QPSK / MCS1 / Port Wi-Fi 2**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	17366	≥500	16866	Complied
Middle	15803	≥500	15303	Complied
Top	17366	≥500	16866	Complied

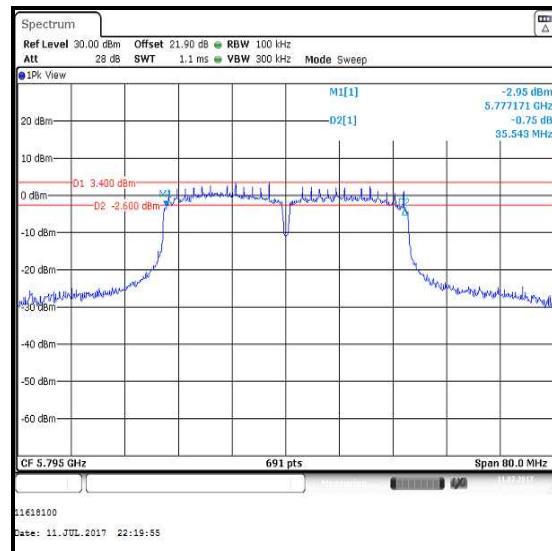
**Bottom Channel****Middle Channel****Top Channel**

Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11n / 40 MHz / MIMO / BPSK / MCS0 / Port Wi-Fi 1**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	35658	≥500	35158	Complied
Top	35543	≥500	35043	Complied



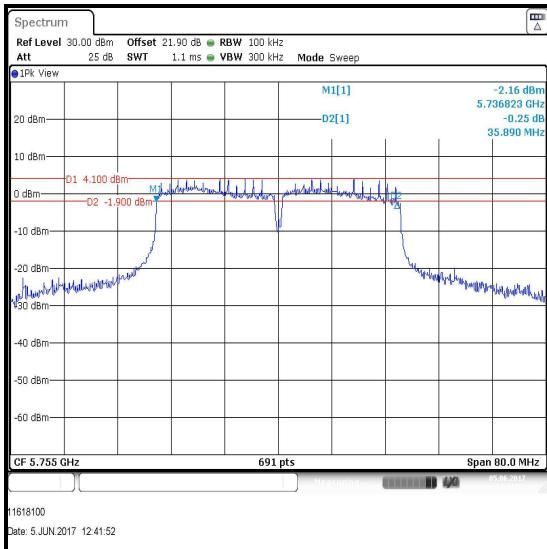
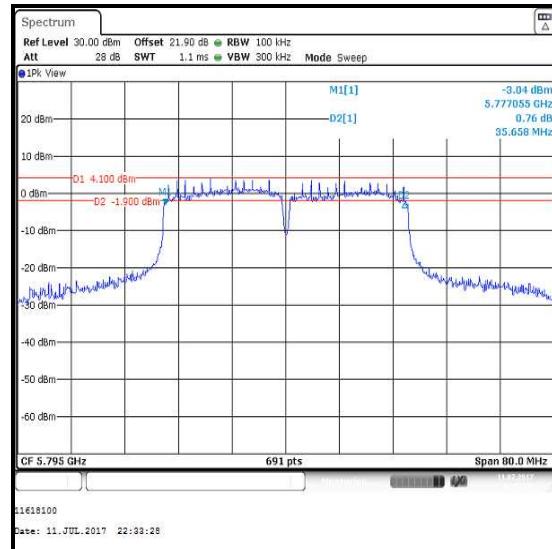
Bottom Channel



Top Channel

Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Results: 802.11n / 40 MHz / MIMO / BPSK / MCS0 / Port Wi-Fi 2**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	35890	≥500	35390	Complied
Top	35658	≥500	35158	Complied

**Bottom Channel****Top Channel**

Transmitter Minimum 6 dB Bandwidth (5.725-5.85 GHz band) (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2001	Thermohygrometer	Testo	608-H1	45041824	22 Feb 2018	12
M1883	Signal Analyser	Rohde & Schwarz	FSV-30	103084	02 May 2018	12
M260	Signal Generator	Rohde & Schwarz	SMP 02	829076/008	11 Apr 2018	12
A2919	20 dB Attenuator	AtlanTecRF	AN18W5-20	832828#2	Calibrated before use	-
A2920	20 dB Attenuator	AtlanTecRF	AN18W5-20	832828#3	Calibrated before use	-
A2555	50Ω Termination	Micronde	R404610	Not marked or stated	Calibrated before use	-