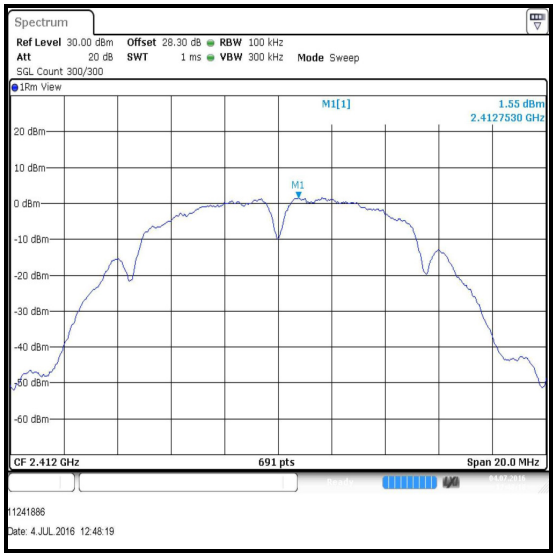
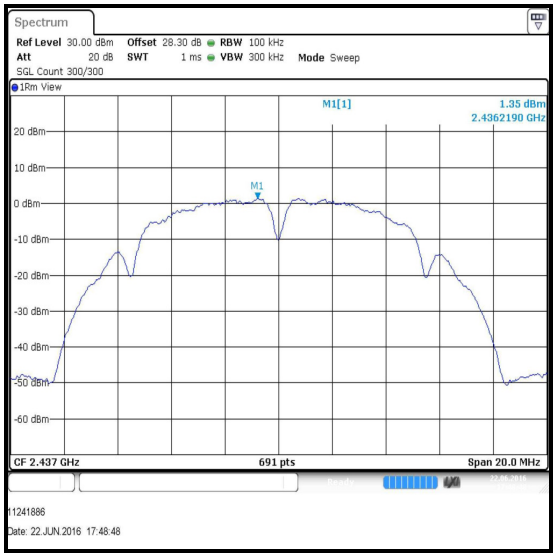
Transmitter Power Spectral Density (continued)

Results: 802.11b / 20 MHz / DBPSK / 1 Mbps

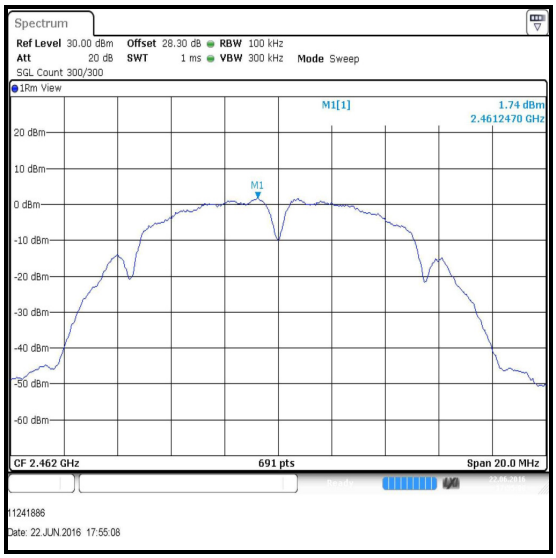
Channel	PSD (dBm / 100 kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
1	1.6	8.0	6.4	Complied
6	1.4	8.0	6.6	Complied
11	1.7	8.0	6.3	Complied
12	1.2	8.0	6.8	Complied
13	-0.8	8.0	8.8	Complied



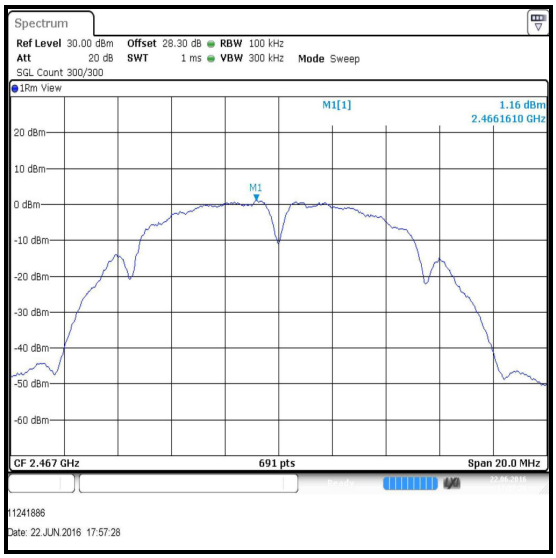
Channel 1



Channel 6



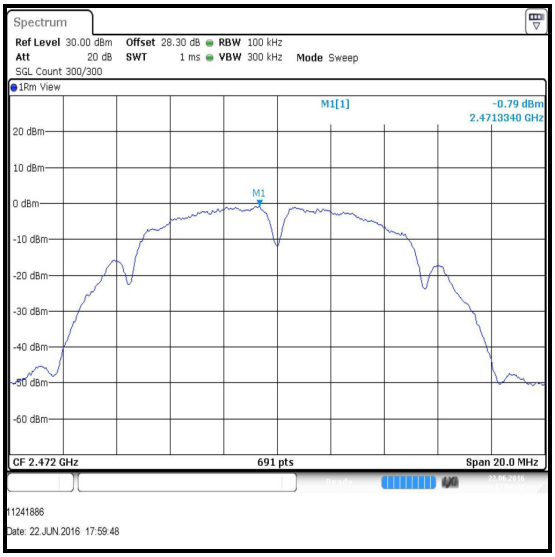
Channel 11



Channel 12

Transmitter Power Spectral Density (continued)

Results: 802.11b / 20 MHz / DBPSK / 1 Mbps

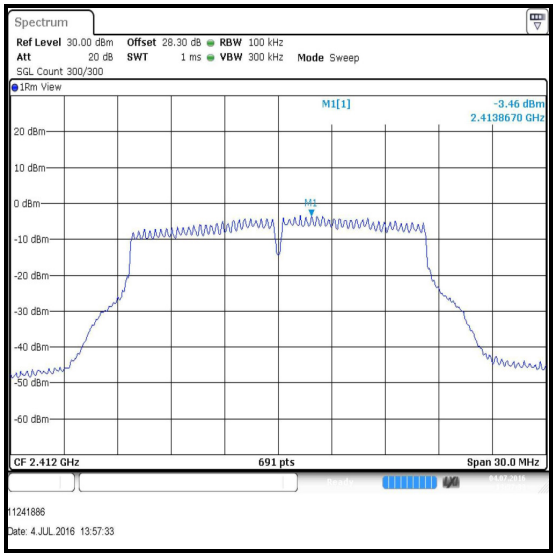


Channel 13

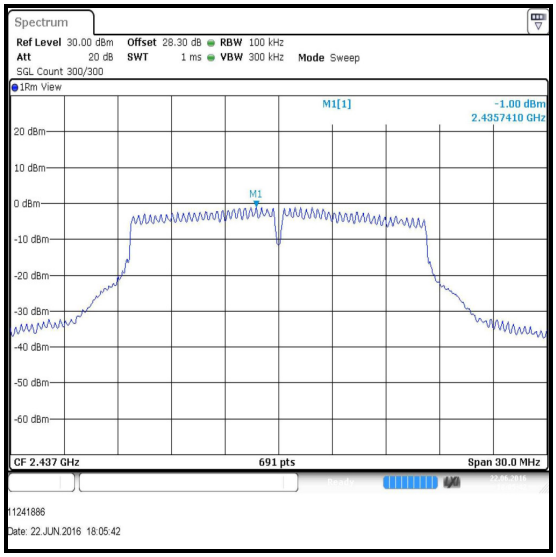
Transmitter Power Spectral Density (continued)

Results: 802.11g / 20 MHz / BPSK / 6 Mbps

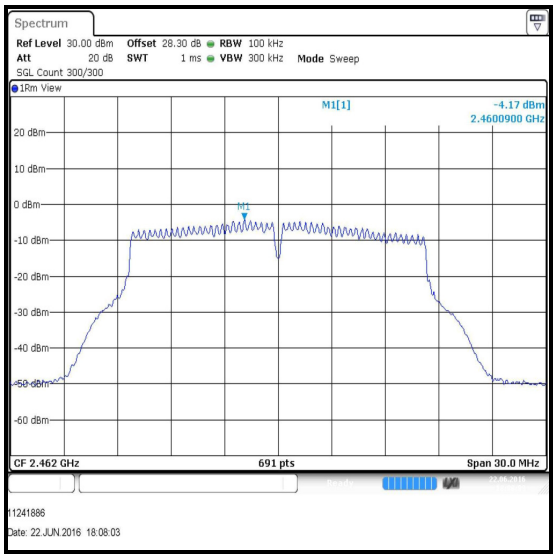
Channel	PSD (dBm / 100 kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
1	-3.5	8.0	11.5	Complied
6	-1.0	8.0	9.0	Complied
11	-4.2	8.0	12.2	Complied
12	-5.4	8.0	13.4	Complied
13	-14.9	8.0	22.9	Complied



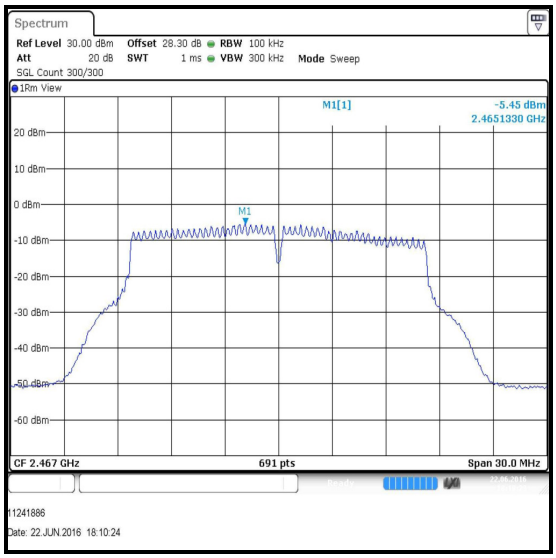
Channel 1



Channel 6



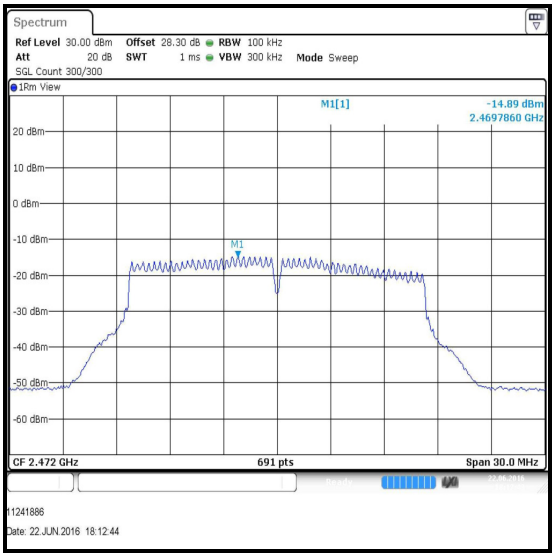
Channel 11



Channel 12

Transmitter Power Spectral Density (continued)

Results: 802.11g / 20 MHz / BPSK / 6 Mbps

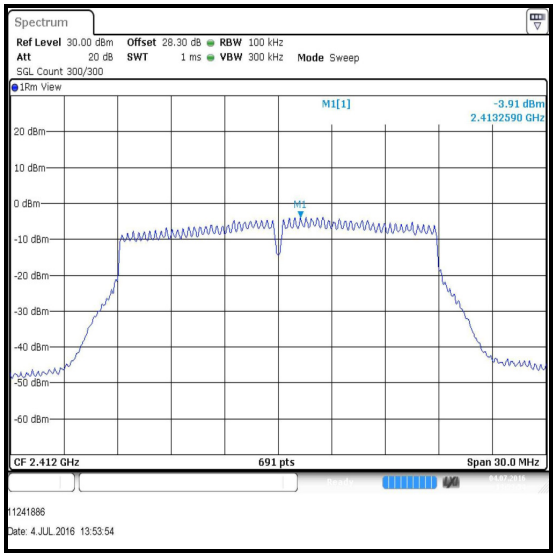


Channel 13

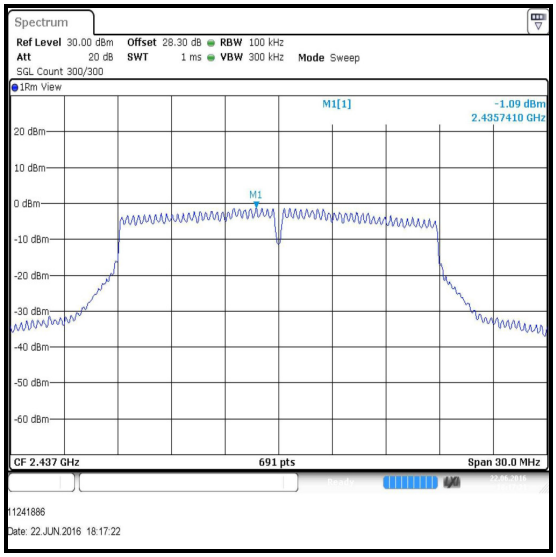
Transmitter Power Spectral Density (continued)

Results: 802.11n / HT20 / BPSK / MCS0 / SISO

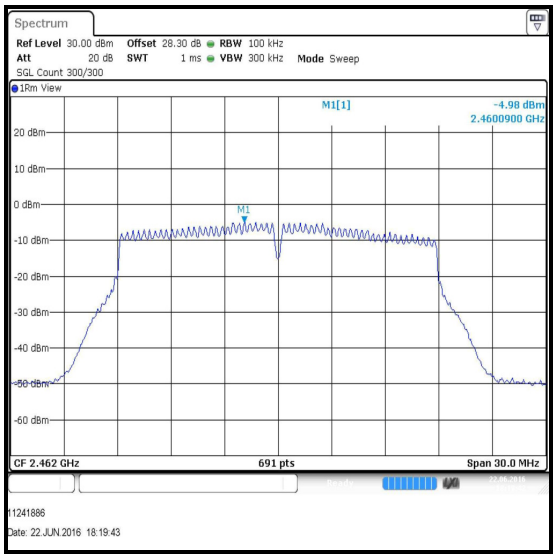
Channel	PSD (dBm / 100 kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
1	-3.9	8.0	11.9	Complied
6	-1.1	8.0	9.1	Complied
11	-5.0	8.0	13.0	Complied
12	-5.7	8.0	13.7	Complied
13	-15.4	8.0	23.4	Complied



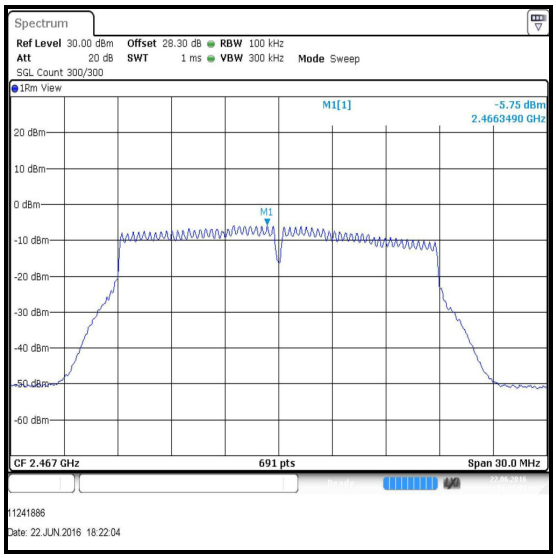
Channel 1



Channel 6



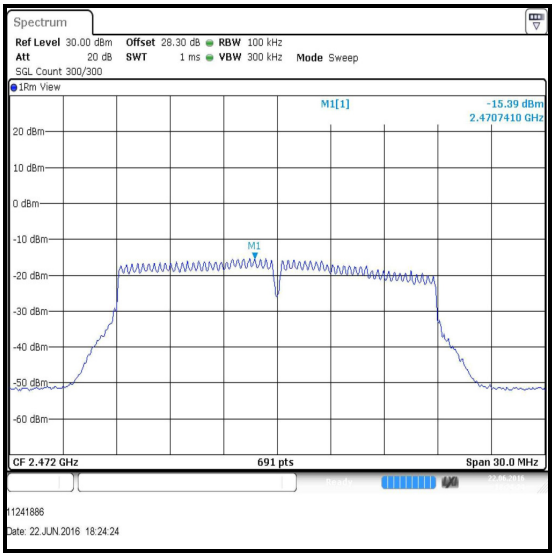
Channel 11



Channel 12

Transmitter Power Spectral Density (continued)

Results: 802.11n / HT20 / BPSK / MCS0 / SISO



Channel 13

Transmitter Power Spectral Density (continued)

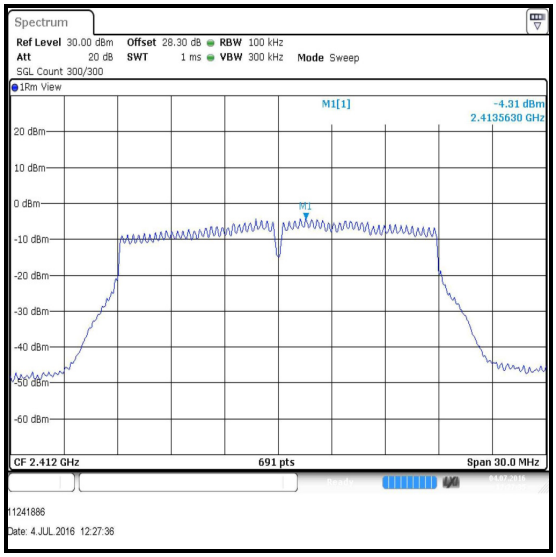
Results: 802.11n / HT20 / BPSK / MCS0 / MIMO

Channel	PSD at Port 1 (dBm / 100 kHz)	PSD at Port 2 (dBm / 100 kHz)	Combined PSD (dBm / 100 kHz)
1	-4.3	-4.6	-1.4
6	-0.9	-0.4	2.4
11	-5.3	-5.7	-2.5
12	-6.6	-7.4	-4.0
13	-15.3	-16.3	-12.8

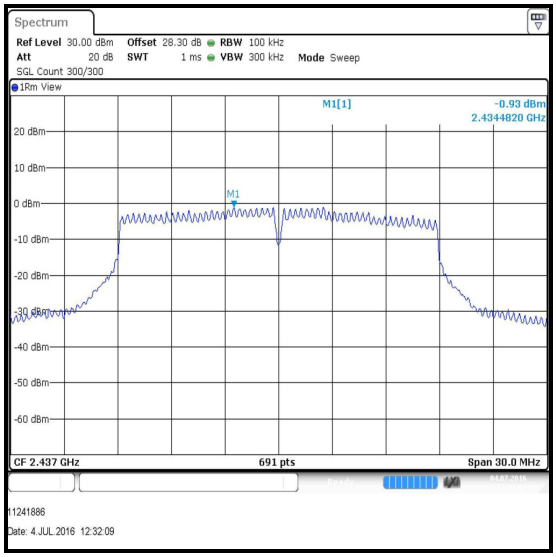
Channel	Combined PSD (dBm / 100 kHz)	PSD Limit (dBm / 3 kHz)	Margin (dB)	Result
1	-1.4	8.0	9.4	Complied
6	2.4	8.0	5.6	Complied
11	-2.5	8.0	10.5	Complied
12	-4.0	8.0	12.0	Complied
13	-12.8	8.0	20.8	Complied

Transmitter Power Spectral Density (continued)

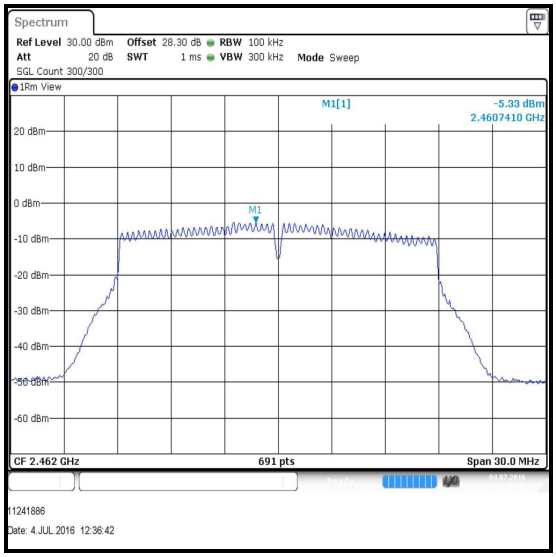
Results: 802.11n / HT20 / BPSK / MCS0 / MIMO / Port 1



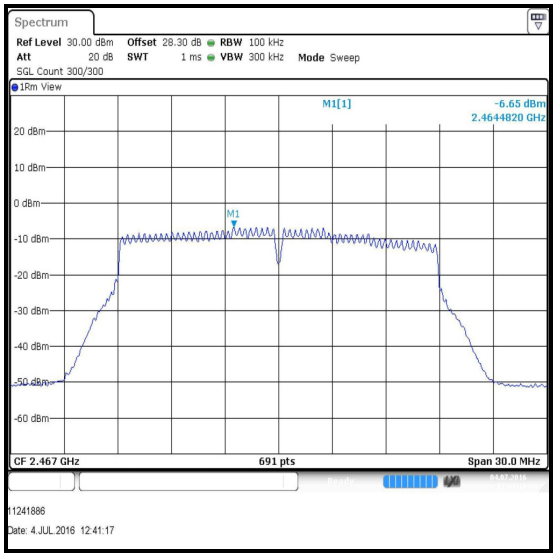
Channel 1



Channel 6



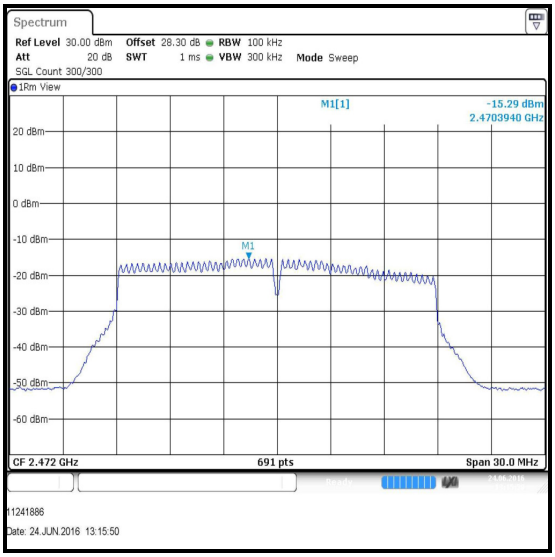
Channel 11



Channel 12

Transmitter Power Spectral Density (continued)

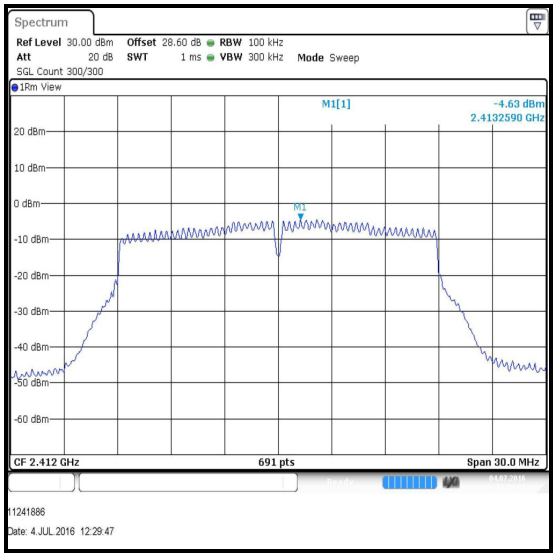
Results: 802.11n / HT20 / BPSK / MCS0 / MIMO / Port 1



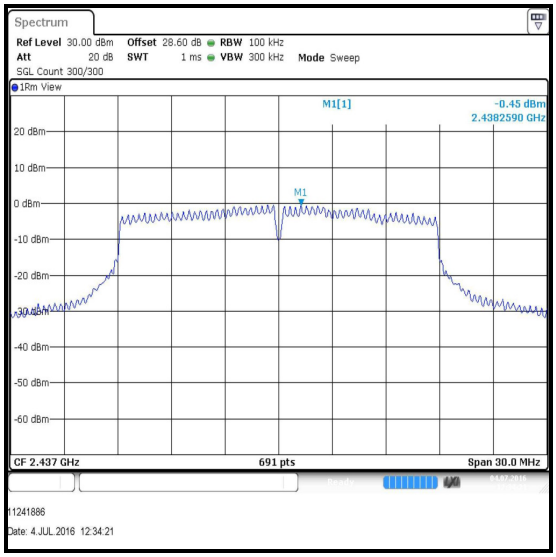
Channel 13

Transmitter Power Spectral Density (continued)

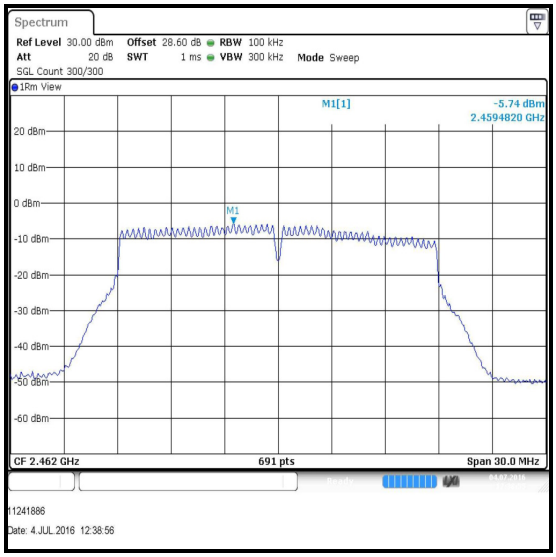
Results: 802.11n / HT20 / BPSK / MCS0 / MIMO / Port 2



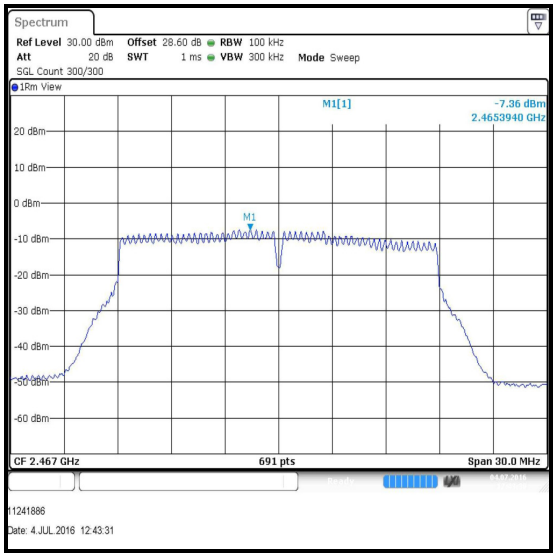
Channel 1



Channel 6



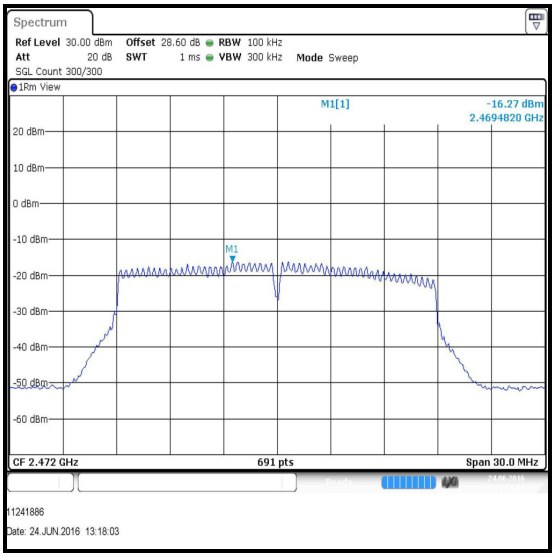
Channel 11



Channel 12

Transmitter Power Spectral Density (continued)

Results: 802.11n / HT20 / BPSK / MCS0 / MIMO / Port 2



Channel 13

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	02 Apr 2017	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	27 Feb 2017	12
M1867	Attenuator	Huber + Suhner AG	6820.17.B	07101	Calibrated before use	-
A2847	Attenuator	Radiall	R411.820.121	24671450	Calibrated before use	-
A2345	Attenuator	Macom	2082-6043-20	None stated	Calibrated before use	-
A2952	RF Switch	Pickering Interfaces	64-102-002 & 40-881-001	XZ361012 & X361507	Calibrated before use	-
S0538	DC Power Supply	TTi	PL154	250135	Calibrated before use	-
M1818	Multimeter	Fluke	79III	71811580	27 Apr 2017	12
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	26 Oct 2017	24

5.2.3. Transmitter Maximum (Average) Output Power

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Dates:**	22 June 2016 to 04 July 2016
Test Sample Serial Number:	C7CRR02BHCPX		

FCC Reference:	Part 15.247(b)(3)
Test Method Used:	FCC KDB 558074 Section 9.2.2.2

Environmental Conditions:

Temperature (°C):	24 to 25
Relative Humidity (%):	36 to 45

Note(s):

1. The customer declared the following data rates to be used for all measurements as:
   - 802.11b – DBPSK / 1 Mbps / Port 1
   - 802.11g – BPSK / 6 Mbps / Port 1
   - 802.11n HT20 SISO – BPSK / 6.5 Mbps / MCS0 (GI = 800 ns) / Port 1
   - 802.11n HT20 MIMO – BPSK / 6.5 Mbps / MCS0 (GI = 800 ns)
3. Final measurements were performed using the above configurations on the relevant channels. The power has been integrated over the 99% emission bandwidth. Plots for the occupied bandwidth are archived on the company server and available for inspection upon request.
4. The EUT was transmitting at at ≥98% duty cycle and testing was performed in accordance with KDB 558074 Section 9.2.2.2 Method AVGSA-1. The signal analyser's integration function was used to integrate across the 99% occupied bandwidth. The signal analyser resolution bandwidth was set to 200 kHz and video bandwidth 1 MHz. An RMS detector was used and sweep time set manually to perform trace averaging over 300 traces. The span was set to at least 1.5 times the 99% occupied emission bandwidth.
5. For 802.11n MIMO, power was measured on both ports and then combined using the measure-and-sum technique stated in FCC KDB 662911 D01 Section E)1).
6. As the data streams are correlated for 802.11n MIMO MCS0 to MCS7, the directional antenna gain has been calculated in accordance with KDB 662911 D01 Section F)2)f)(ii):

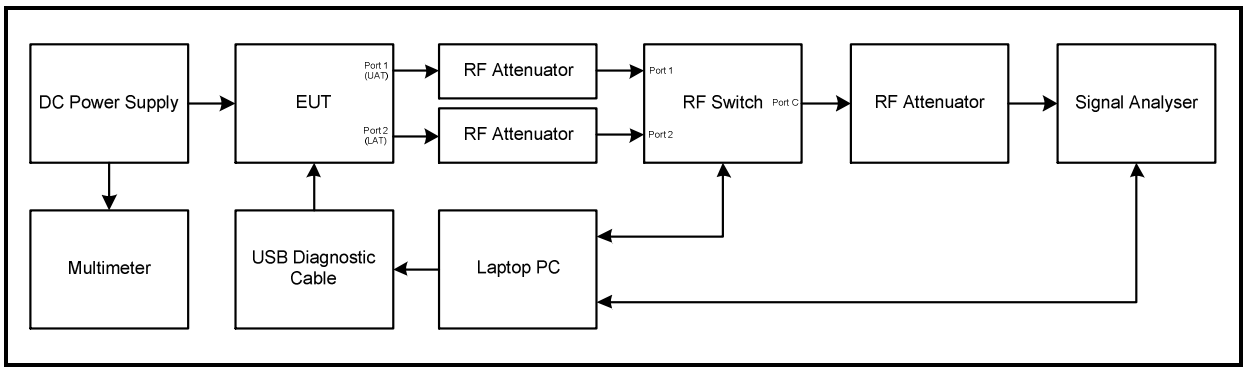
$$\text{Directional Gain} = 10\log\left[\frac{\sum_{j=1}^{NSS}\left(\sum_{k=1}^{N_{ANT}} g_{jk}\right)^2}{N_{ANT}}\right] = 10\log\left[\frac{\sum_{j=1}^{1}\left(\sum_{k=1}^{2} g_{jk}\right)^2}{2}\right] =$$

$$= 10\log\left[\frac{(g_{11}+g_{12})^2}{2}\right] = 10\log\left[\frac{\left(10^{\frac{G_1}{20}}+10^{\frac{G_2}{20}}\right)^2}{2}\right] = 10\log\left[\frac{\left(10^{\frac{-1.87}{20}}+10^{\frac{-1.25}{20}}\right)^2}{2}\right] = 1.46\ \text{dBi}$$

7. The signal analyser was connected to the RF port on the EUT using an RF switch, suitable attenuation and RF cables. An RF level offset was entered on the signal analyser to compensate for the loss of the switch, attenuators and RF cables.

Transmitter Maximum (Average) Output Power (continued)

Test setup:



Transmitter Maximum (Average) Output Power (continued)

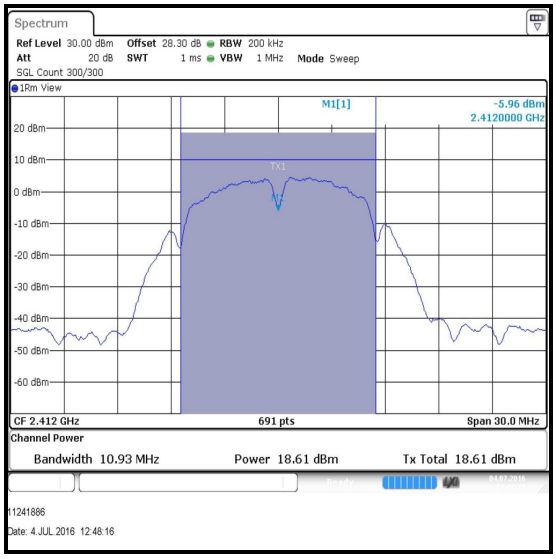
Results: 802.11b / 20 MHz / DBPSK / 1 Mbps

Conducted Peak Limit Comparison

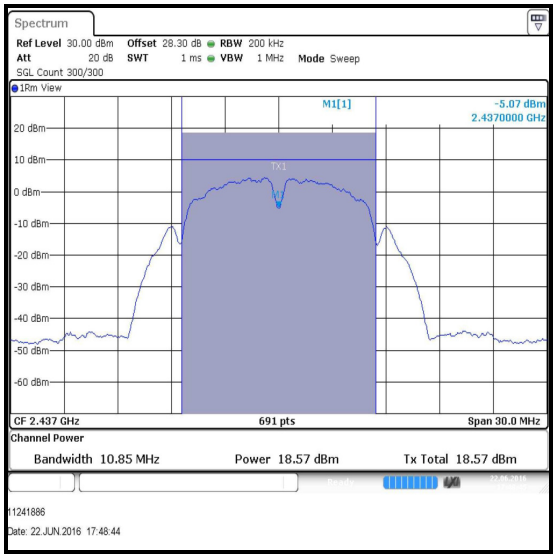
Channel	Conducted Power (dBm)	Conducted Power Limit (dBm)	Margin (dB)	Result
1	18.6	30.0	11.4	Complied
6	18.6	30.0	11.4	Complied
11	18.5	30.0	11.5	Complied
12	18.1	30.0	11.9	Complied
13	16.3	30.0	13.7	Complied

De Facto EIRP Limit Comparison

Channel	Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
1	18.6	-1.8	16.8	36.0	19.2	Complied
6	18.6	-1.8	16.8	36.0	19.2	Complied
11	18.5	-1.8	16.7	36.0	19.3	Complied
12	18.1	-1.8	16.3	36.0	19.7	Complied
13	16.3	-1.8	14.5	36.0	21.5	Complied



Channel 1



Channel 6