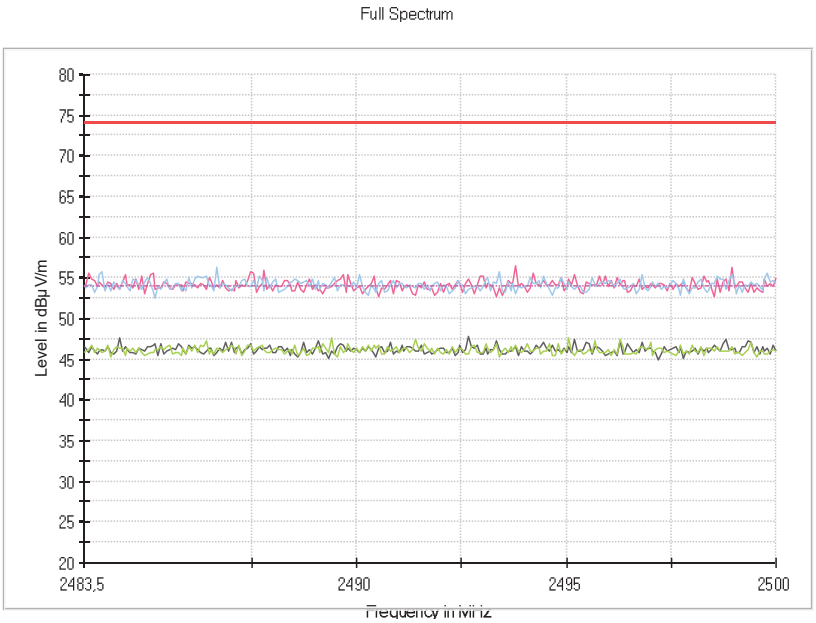
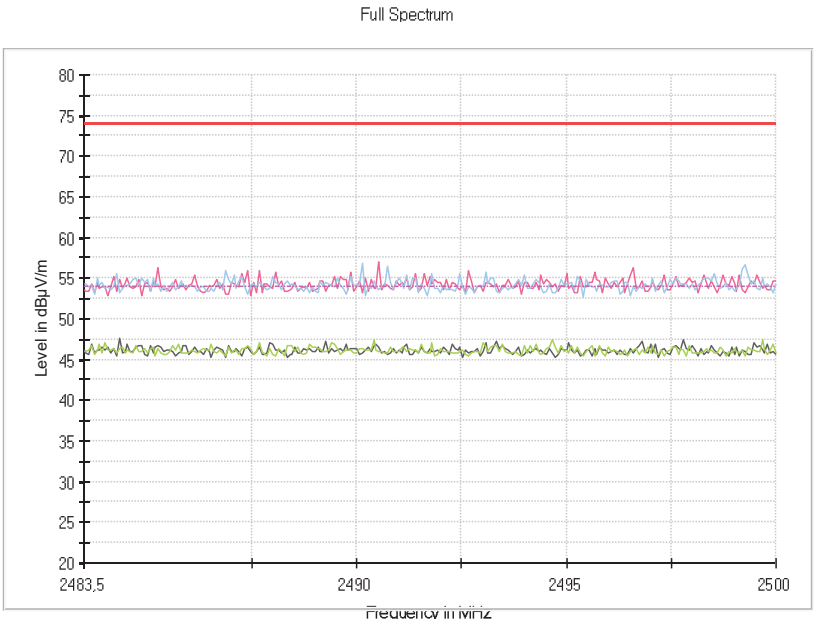
- **8-DPSK modulation (3DH5):**

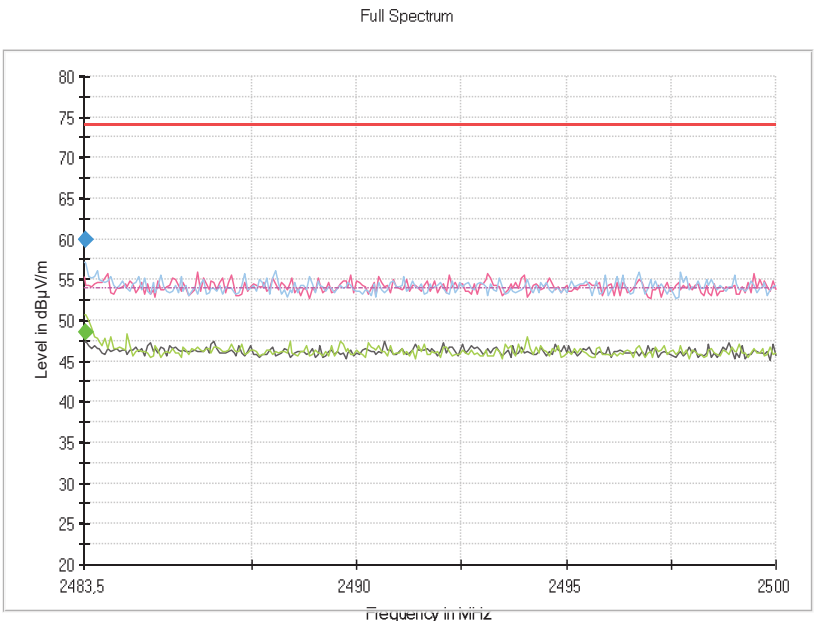
  - Low Channel:



  - Middle Channel:



- High Channel:



Appendix B: Test results. 802.11 bgn20 2x2

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TEST CONDITIONS

POWER SUPPLY (V):

V nonimal: 12 Vdc

Type of Power Supply: DC voltage from external power supply (car battery).

ANTENNAS:

Type of Antenna: External.

Maximum Declared Antenna Gain:

CORE1_Port4: +2.4 dBi
CORE0_Port2: -0.3 dBi

Directional Antenna Gain Calculations for CDD MIMO:

For 2Tx CDD MIMO modes, in accordance with KDB 662911 D01 v02r01 Section F)2)f)(ii), directional gain was calculated as (worst case):

N_{ss} = 1, N_{ANT} = 2, G_{CORE1} = +2.4 dBi, G_{CORE1} = -0.3 dBi:

$$\text{Directional Gain} = 10\log\left[\frac{\sum_{j=1}^{N_{SS}}\left(\sum_{k=1}^{N_{ANT}} g_{j,k}\right)^2}{N_{ANT}}\right] = 10\log\left[\frac{\sum_{j=1}^{1}\left(\sum_{k=1}^{3} g_{j,k}\right)^2}{2}\right]$$

$$= 10\log\left[\frac{\left(g_{1,1}+g_{1,2}\right)^2}{2}\right] = 10\log\left[\frac{\left(10^{\frac{G_1}{20}}+10^{\frac{G_2}{20}}\right)^2}{2}\right] = 10\log\left[\frac{\left(10^{\frac{-0.3}{20}}+10^{\frac{+2.4}{20}}\right)^2}{2}\right] = +4.16\ \text{dBi}$$

TEST FREQUENCIES:

For 802.11b/g/n20:

Low Channel (1): 2412 MHz

Middle Channel (6): 2437 MHz

High Channel (11): 2462 MHz

The sample was used to configure the EUT to continuously transmit at a specified output power in all channels with different modes and modulation schemes.

The field strength at the band edges was evaluated for each mode for the channel under test.

During transmitter test the EUT was being controlled by the SW tool to operate in a continuous transmit mode on the test channel as required and in each of the different modulation modes.

The EUT has four separate antennas which correspond to one port of the equipment.

The data rates of 1Mb/s for 802.11b, 6.5Mb/s for 802.11g and MCS0 for 802.11n20 were selected based on preliminary testing that identified those rates corresponding to the worst cases for output power and band edge levels at restricted bands.

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to the spectrum analyser using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.

RADIATED MEASUREMENTS

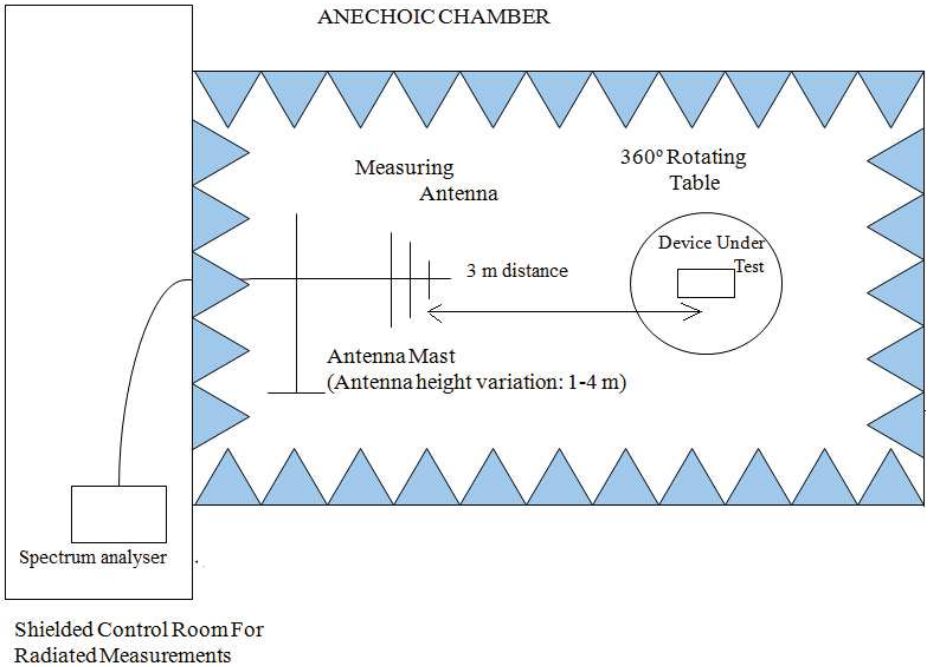
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1 GHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1m for the frequency range 17 GHz-26 GHz (17 GHz-26 GHz horn antenna).

For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

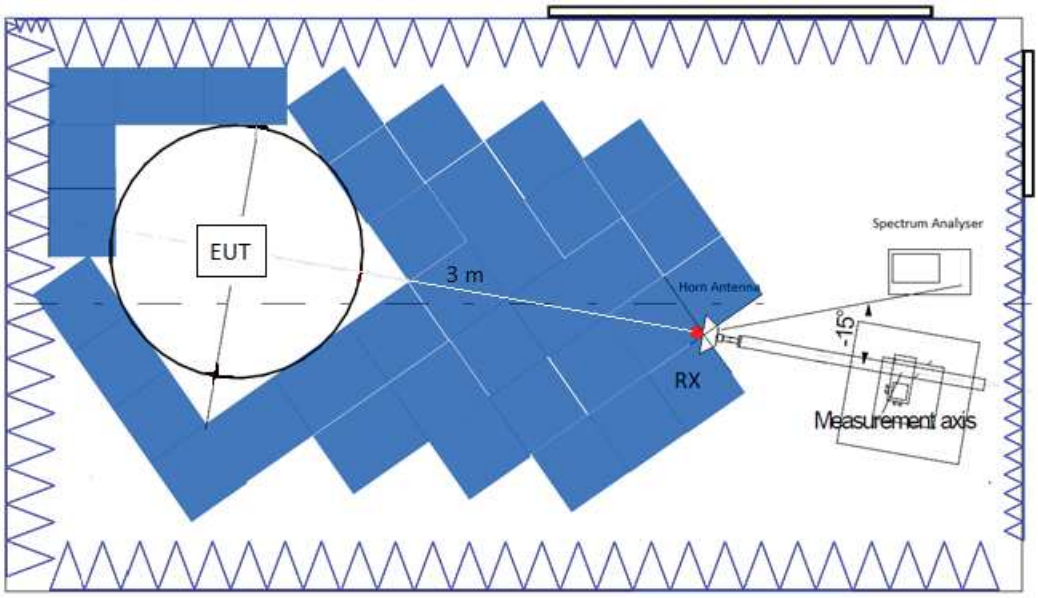
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

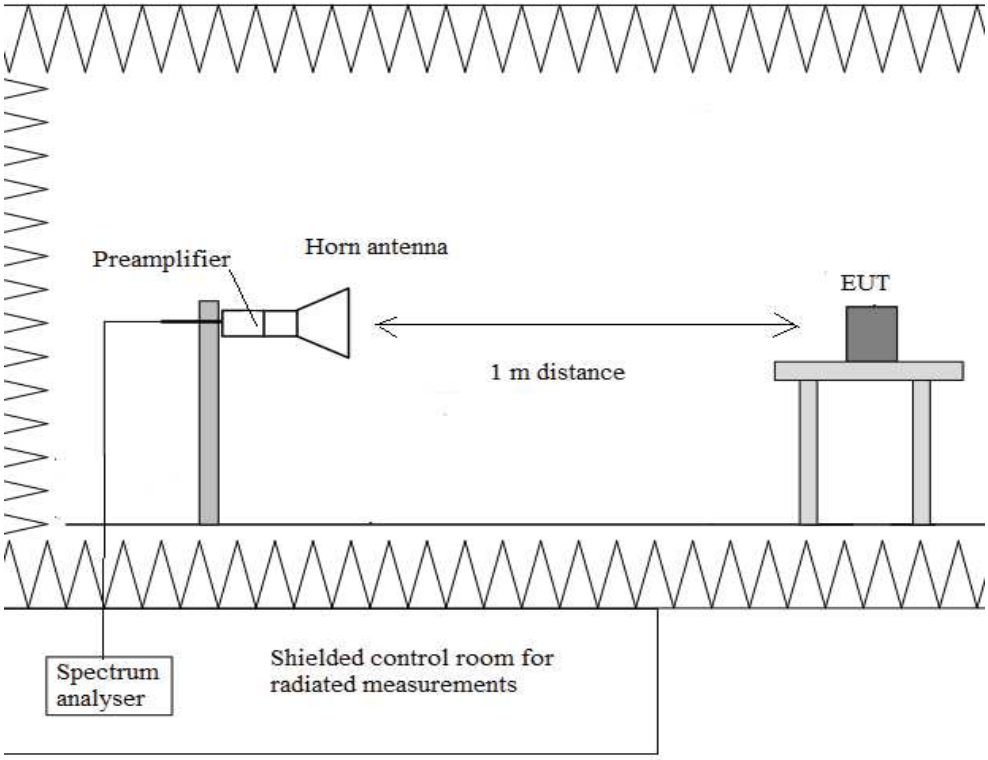
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17GHz:



Radiated measurements setup f > 17GHz:



Occupied Bandwidth

RESULTS:

SISO CORE1_Port4 Antenna:

- **Mode 802.11 b:**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% bandwidth (MHz)	10.204	10.22	10.196
Measurement uncertainty (kHz)	<± 36.96		

- **Mode 802.11 g:**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% bandwidth (MHz)	16.848	16.848	16.848
Measurement uncertainty (kHz)	<± 36.96		

- **Mode 802.11 n20**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% bandwidth (MHz)	18.016	17.98	18.044
Measurement uncertainty (kHz)	<± 36.96		

Verdict: PASS

SISO CORE0_Port2 Antenna:

- **Mode 802.11 b:**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% bandwidth (MHz)	10.256	10.24	10.2
Measurement uncertainty (kHz)	<± 36.96		

- **Mode 802.11 g:**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% bandwidth (MHz)	16.848	16.852	16.872
Measurement uncertainty (kHz)	<± 36.96		

- **Mode 802.11 n20**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% bandwidth (MHz)	17.984	18.012	18.012
Measurement uncertainty (kHz)	<± 36.96		

Verdict: PASS

MIMO – CORE1_Port4 Antenna & CORE0_Port2 Antenna:

- **Mode 802.11 b**

	Low Channel		Middle Channel		High Channel	
	CORE1_ Port4	CORE0_ Port2	CORE1_ Port4	CORE0_ Port2	CORE1_ Port4	CORE0_ Port2
99% bandwidth (MHz)	10.24	10.276	10.252	10.288	10.188	10.236
Measurement uncertainty (kHz)	<± 36.96					

- **Mode 802.11 g**

	Low Channel		Middle Channel		High Channel	
	CORE1_ Port4	CORE0_ Port2	CORE1_ Port4	CORE0_ Port2	CORE1_ Port4	CORE0_ Port2
99% bandwidth (MHz)	16.796	16.848	16.808	16.852	16.788	16.848
Measurement uncertainty (kHz)	<± 36.96					

- **Mode 802.11 n20**

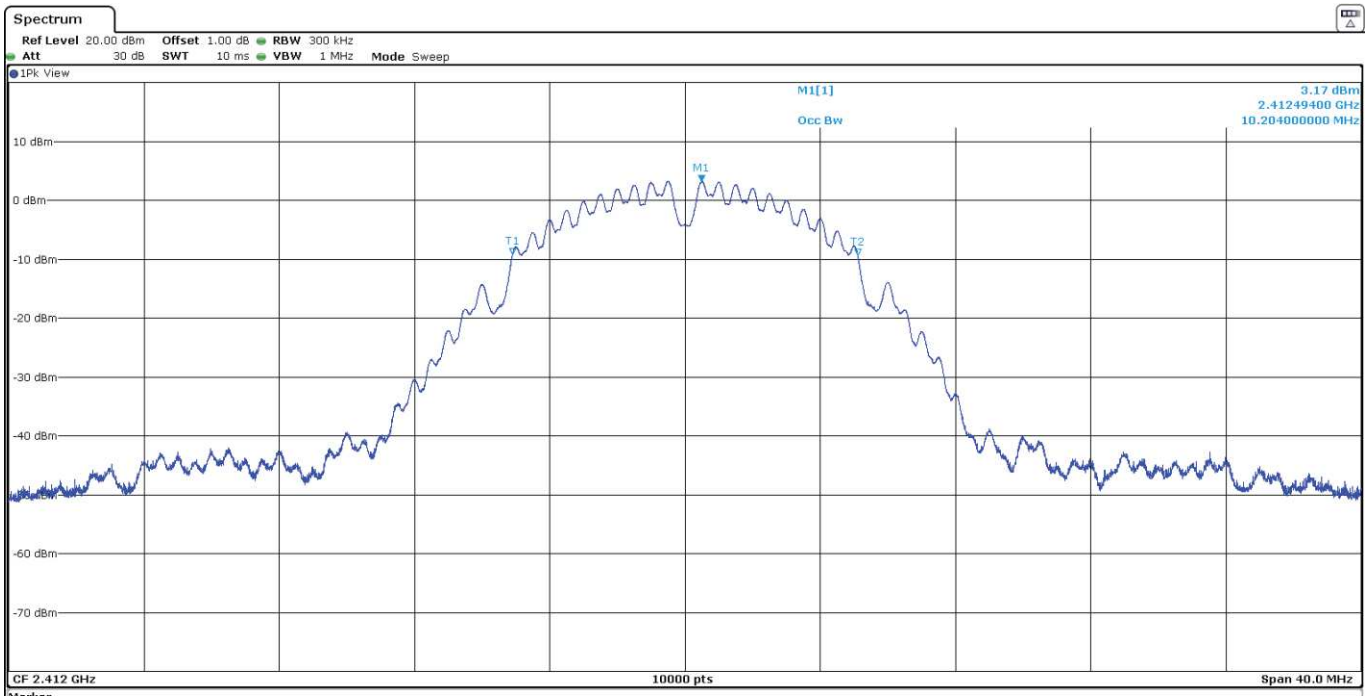
	Low Channel		Middle Channel		High Channel	
	CORE1_ Port4	CORE0_ Port2	CORE1_ Port4	CORE0_ Port2	CORE1_ Port4	CORE0_ Port2
99% bandwidth (MHz)	17.736	18.004	17.732	18.016	17.728	18.024
Measurement uncertainty (kHz)	<± 36.96					

Verdict: PASS

SISO CORE1_Port4 Antenna:

- **Mode 802.11 b – Occupied Bandwidth**

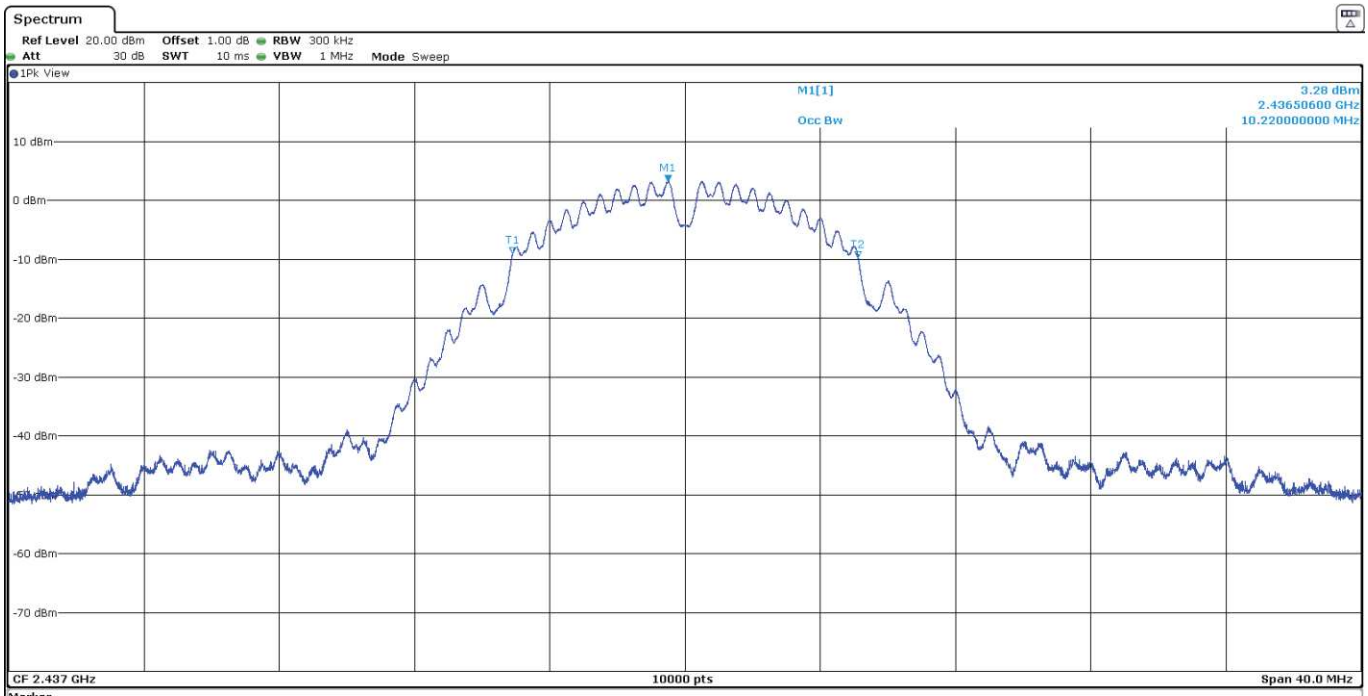
- Low Channel:



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.412494 GHz	3.17 dBm		
T1		1	2.406906 GHz	-9.14 dBm	Occ Bw	10.204 MHz
T2		1	2.41711 GHz	-9.29 dBm		

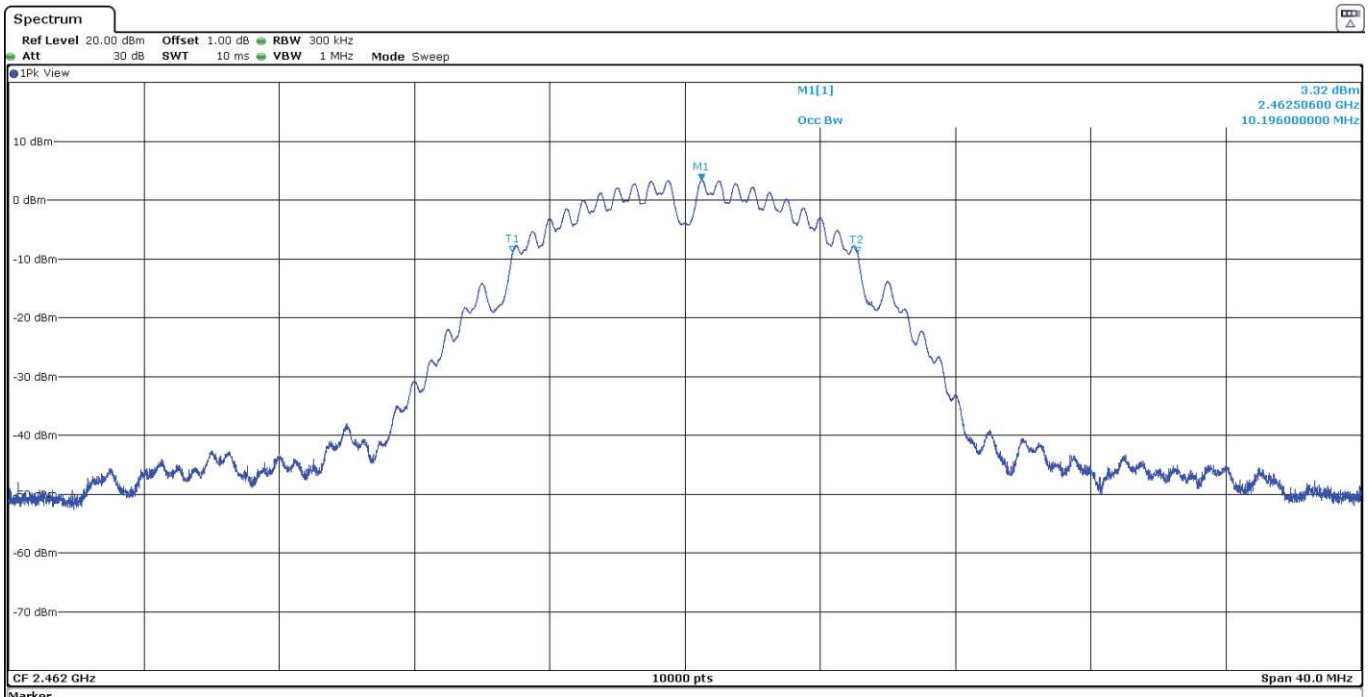
- Middle Channel:



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.436506 GHz	3.28 dBm		
T1		1	2.431902 GHz	-9.10 dBm	Occ Bw	10.22 MHz
T2		1	2.442122 GHz	-9.74 dBm		

- High Channel:

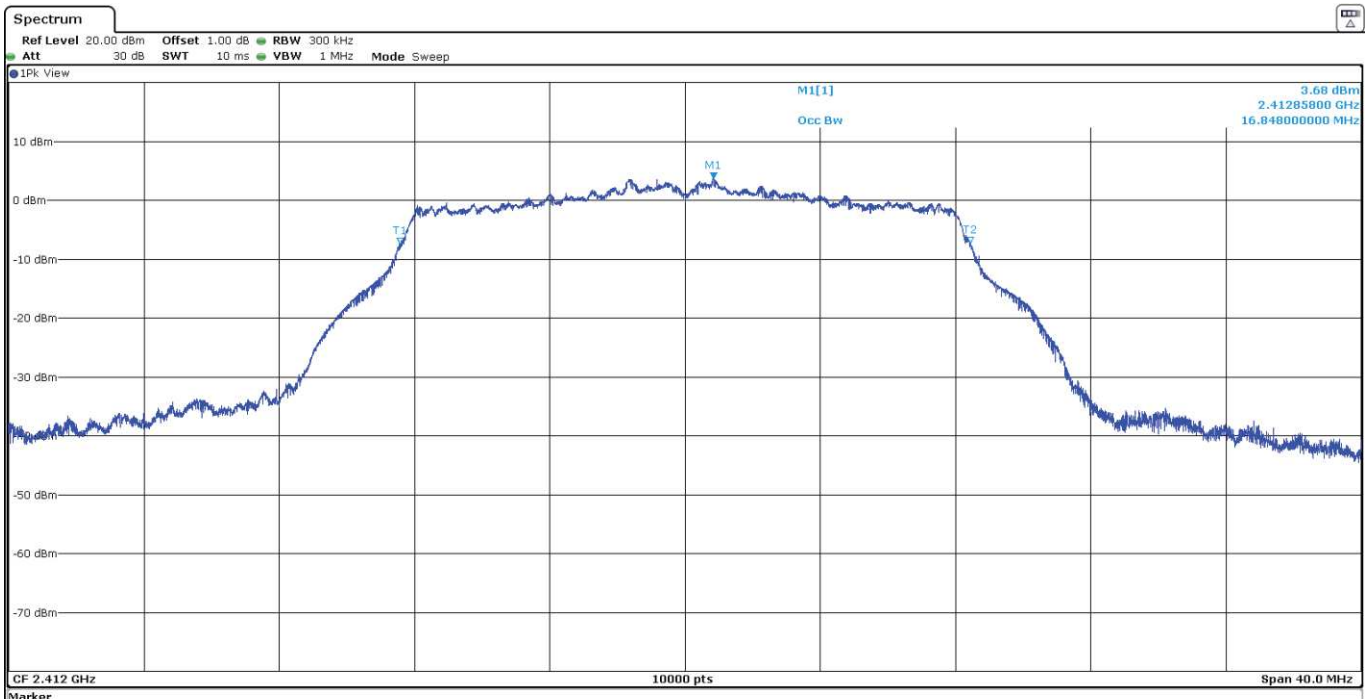


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.462506 GHz	3.32 dBm		
T1		1	2.456906 GHz	-8.93 dBm	Occ Bw	10.196 MHz
T2		1	2.467102 GHz	-9.01 dBm		

- **Mode 802.11 g – Occupied Bandwidth**

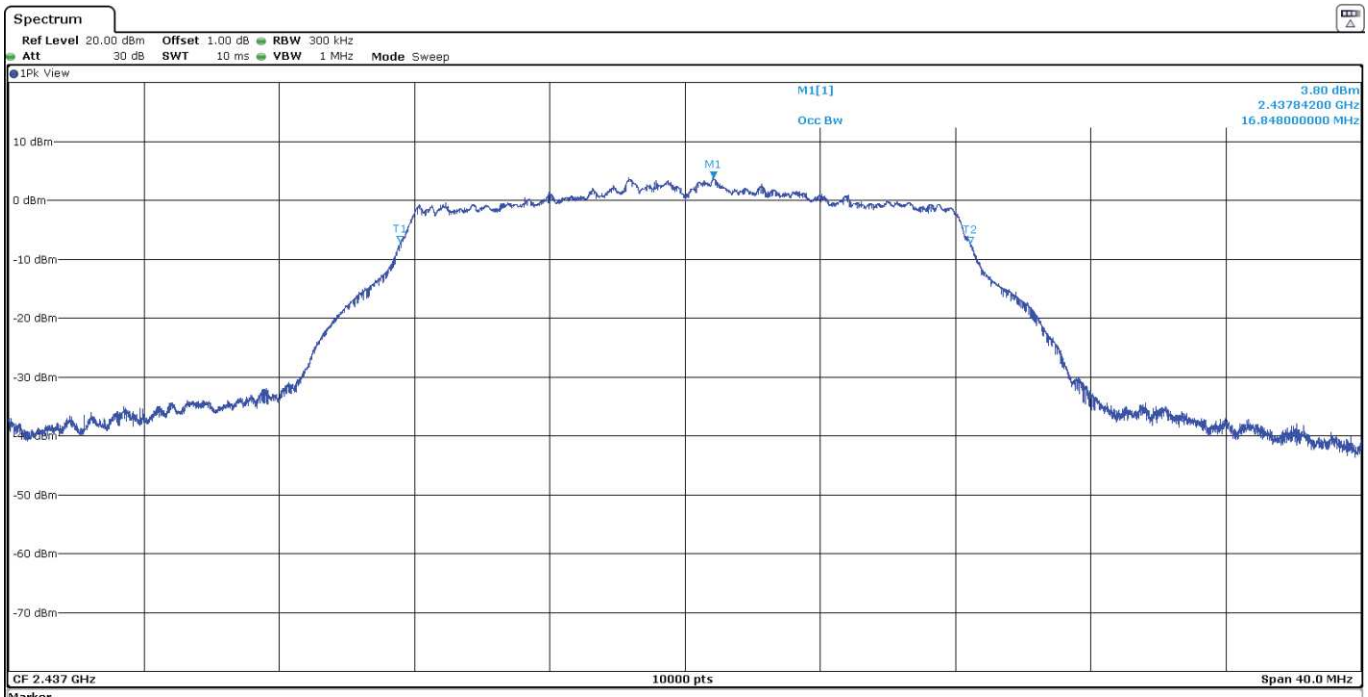
- Low Channel:



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.412858 GHz	3.68 dBm		
T1		1	2.40359 GHz	-7.43 dBm	Occ Bw	16.848 MHz
T2		1	2.420438 GHz	-7.30 dBm		

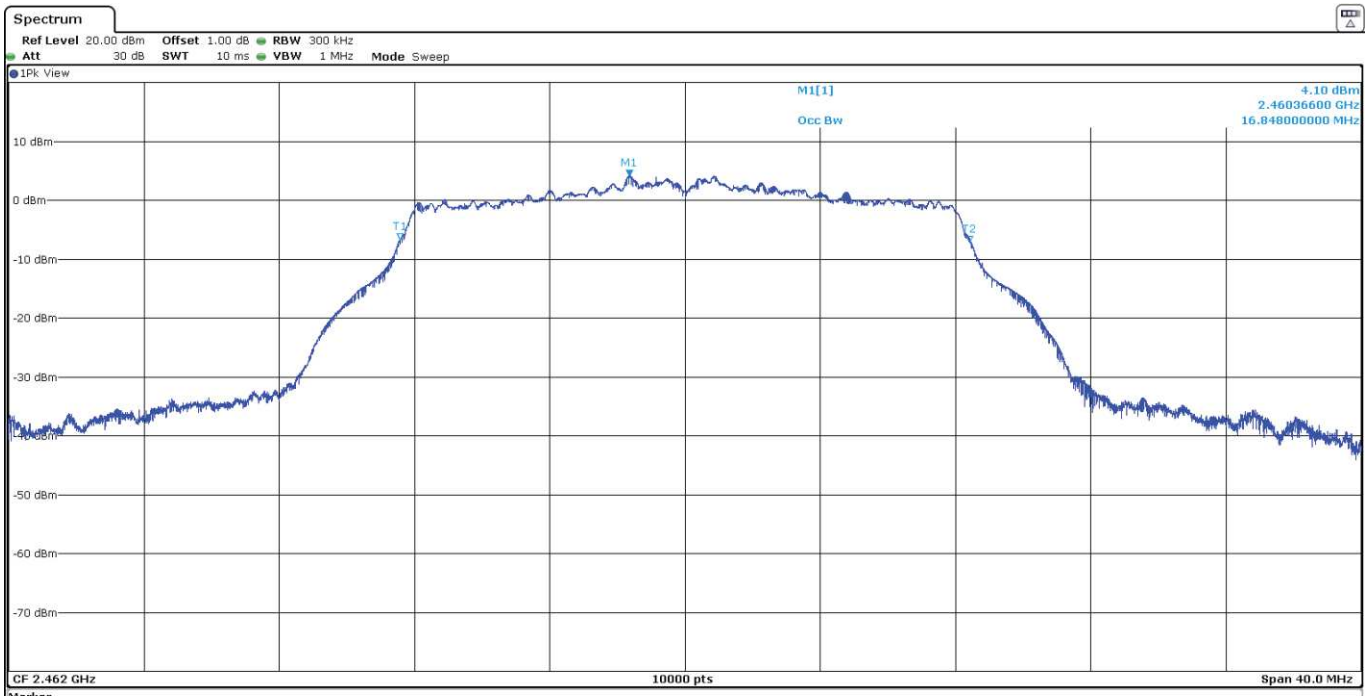
- Middle Channel:



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.437842 GHz	3.80 dBm		
T1		1	2.42859 GHz	-7.15 dBm	Occ Bw	16.848 MHz
T2		1	2.445438 GHz	-7.28 dBm		

- High Channel:

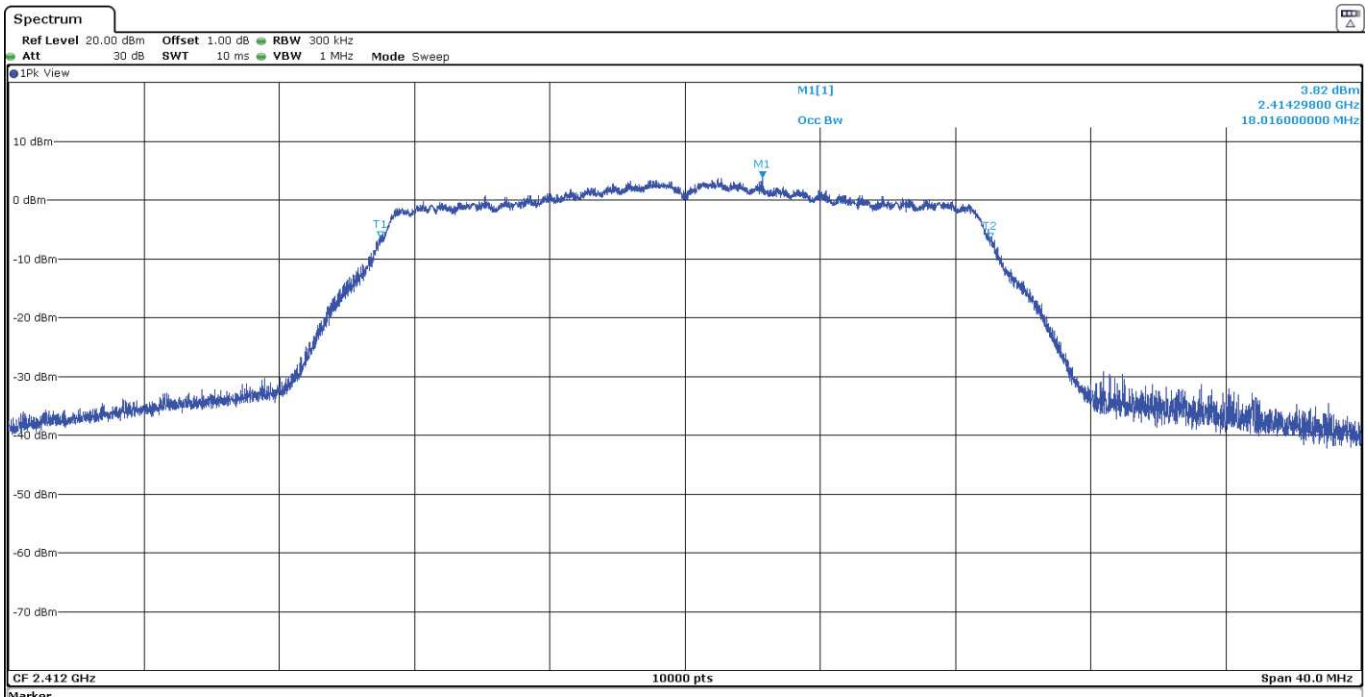


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.460366 GHz	4.10 dBm		
T1		1	2.453582 GHz	-6.76 dBm	Occ Bw	16.848 MHz
T2		1	2.47043 GHz	-7.11 dBm		

- **Mode 802.11 n20 – Occupied Bandwidth**

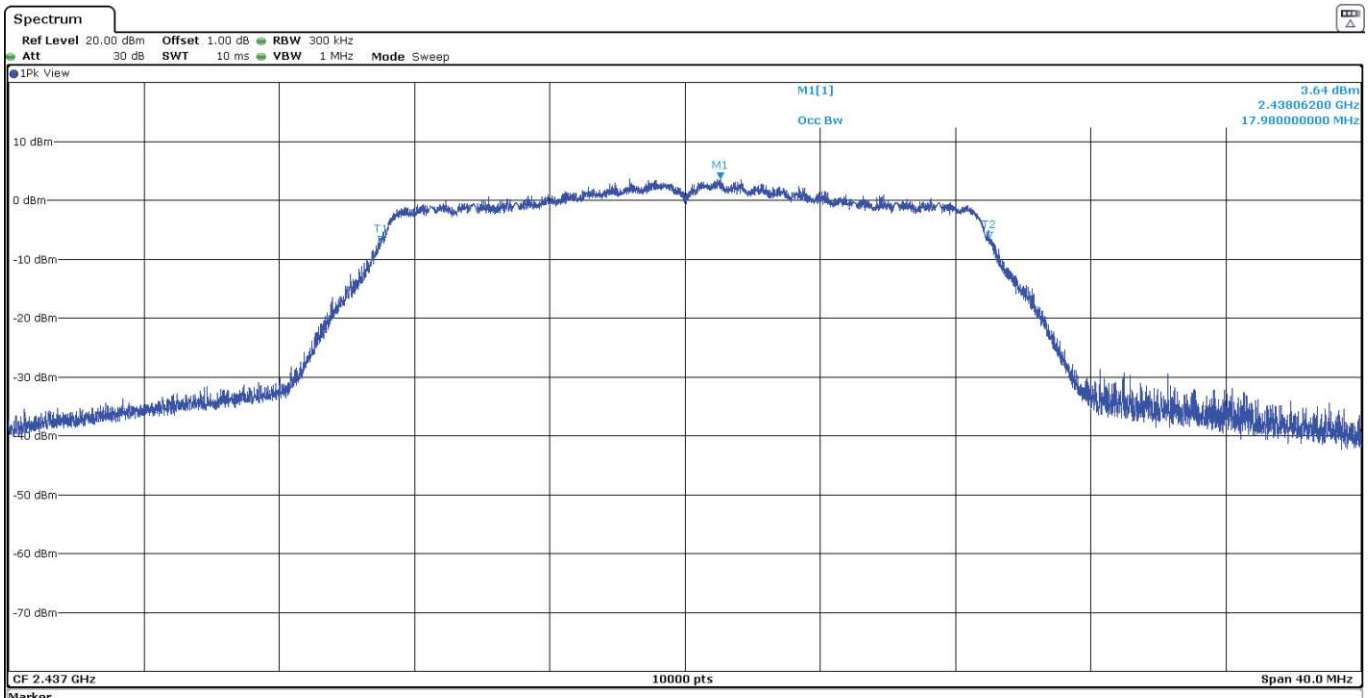
- Low Channel:



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.414298 GHz	3.82 dBm		
T1		1	2.403002 GHz	-6.49 dBm	Occ Bw	18.016 MHz
T2		1	2.421018 GHz	-6.67 dBm		

- Middle Channel:



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.438062 GHz	3.64 dBm		
T1		1	2.42803 GHz	-7.11 dBm	Occ Bw	17.98 MHz
T2		1	2.44601 GHz	-6.38 dBm		