

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

In order to find the worst case condition, Pre-tests are needed at the presence of different data rate. Data rate below means worst-case rate of each test item.

Worst-case data rates are shown as following table.

Test Mode	Data Rate
802.11b	1Mbps
802.11g	6Mbps
802.11n HT20	MCS0(6.5 Mbps)
802.11n HT40	MCS0(13.5 Mbps)

Directional Antenna Gain

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain1 Antenna Gain(dBi)	Chain2 Antenna Gain(dBi)	Correlated Chains Directional Gain(dBi)
0.20	-0.39	2.93

Antenna Gain and Limits

Frequency (MHz)	Correlated Chains Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm)
2412	2.93	30.0	8.0
2422	2.93	30.0	8.0
2442	2.93	30.0	8.0
2452	2.93	30.0	8.0
2462	2.93	30.0	8.0

Average power in SISO Mode

Test Mode	Ant	Average power (dBm)		
		2412MHz	2437MHz	2462MHz
802.11b	Ant1	15.92	16.01	15.96
802.11b	Ant2	16.05	16.11	16.08
802.11g	Ant1	14.71	14.74	14.78
802.11g	Ant2	14.83	14.88	14.84
802.11n HT20	Ant1	14.78	14.83	14.86
802.11n HT20	Ant2	14.87	14.92	14.97
Test Mode	Ant	Average power (dBm)		
		2422MHz	2437MHz	2452MHz
802.11n HT40	Ant1	14.63	14.67	14.71
802.11n HT40	Ant2	14.76	14.79	14.82

Output Power in SISO Mode

Test Mode	Ant	Peak power output (dBm)			
		2412MHz	2437MHz	2462MHz	Power Limit(dBm)
802.11b	Ant1	19.46	19.55	19.49	30.0
802.11b	Ant2	19.65	19.77	19.68	30.0
802.11g	Ant1	20.23	20.26	20.32	30.0
802.11g	Ant2	20.42	20.48	20.51	30.0
802.11n HT20	Ant1	20.66	20.72	20.81	30.0
802.11n HT20	Ant2	20.78	20.83	20.91	30.0
Test Mode	Ant	Peak power output (dBm)			
		2422MHz	2437MHz	2452MHz	Power Limit(dBm)
802.11n HT40	Ant1	19.98	20.08	20.11	30.0
802.11n HT40	Ant2	20.23	20.28	20.32	30.0

Average power in MIMO Mode

Test Mode	Ant	Average power (dBm)		
		2412MHz	2437MHz	2462MHz
802.11n HT20	Ant1	14.71	14.74	14.82
802.11n HT20	Ant2	14.82	14.87	14.91
802.11n HT20	Ant1+Ant2	17.78	17.82	17.88
Test Mode	Ant	Average power (dBm)		
		2422MHz	2437MHz	2452MHz
802.11n HT40	Ant1	14.58	14.62	14.65
802.11n HT40	Ant2	14.66	14.69	14.74
802.11n HT40	Ant1+Ant2	17.63	17.67	17.71

Output Power in MIMO Mode

Test Mode	Ant	Peak power output (dBm)			
		2412MHz	2437MHz	2462MHz	Power Limit(dBm)
802.11n HT20	Ant1	20.57	20.62	20.68	30.0
802.11n HT20	Ant2	20.69	20.74	20.81	30.0
802.11n HT20	Ant1+Ant2	23.64	23.69	23.76	30.0
Test Mode	Ant	Peak power output (dBm)			
		2422MHz	2437MHz	2452MHz	Power Limit(dBm)
802.11n HT40	Ant1	19.86	19.93	19.98	30.0
802.11n HT40	Ant2	20.12	20.19	20.26	30.0
802.11n HT40	Ant1+Ant2	23.00	23.07	23.13	30.0

We chose the Worst-modes are shown as following table:

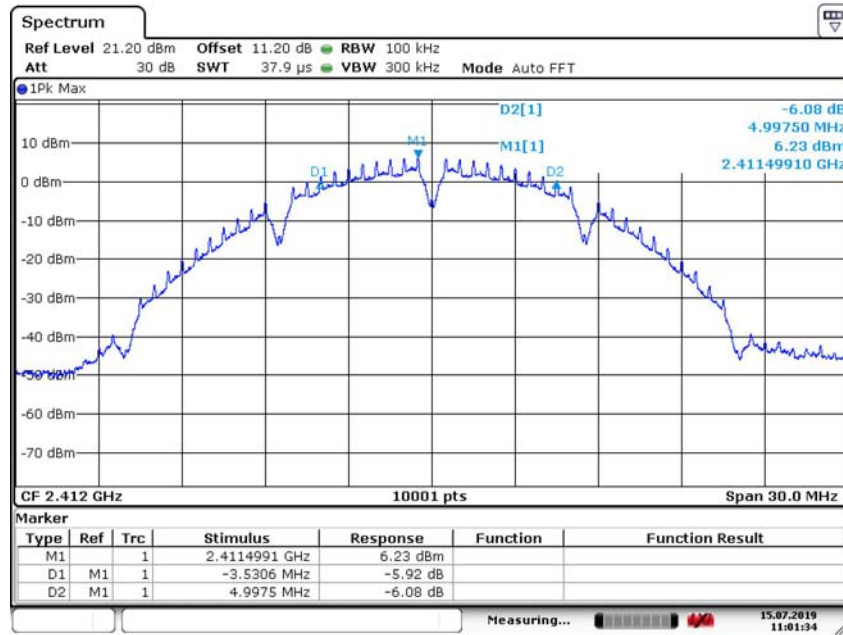
Test Mode	Ant
802.11b	SISO Ant2
802.11g	SISO Ant2
802.11n HT20	SISO Ant2
802.11n HT40	SISO Ant2
802.11n HT20	MIMO Ant1+Ant2
802.11n HT40	MIMO Ant1+Ant2

6dB Bandwidth

Offset 11.2dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.0dB

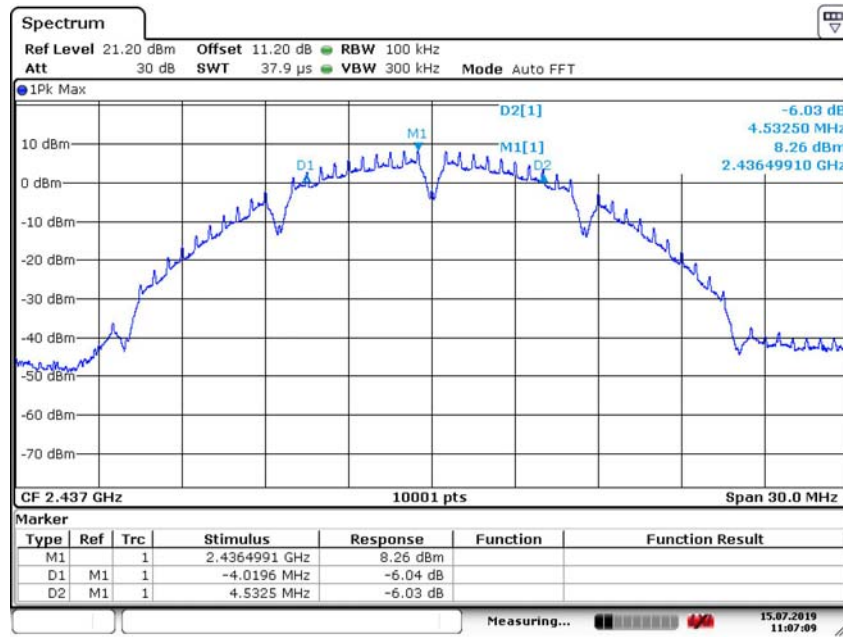
Test Mode: 802.11b (SISO Ant2)

Carrier frequency (MHz)	Channel No.	6 dB bandwidth(kHz)
2412	1	8528.1
2437	6	8552.1
2462	11	8555.1



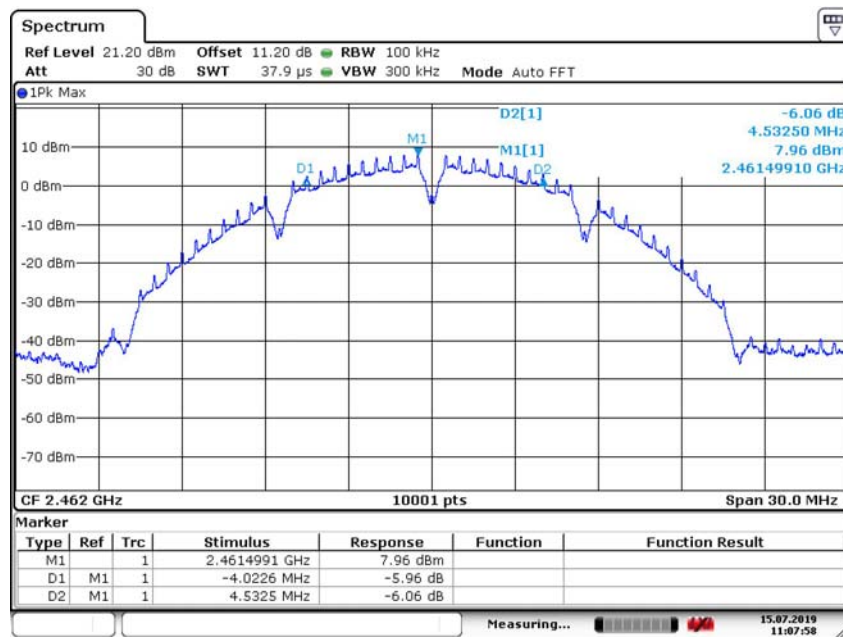
Date: 15.JUL.2019 11:01:34

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b



Date: 15.JUL.2019 11:07:08

Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11b

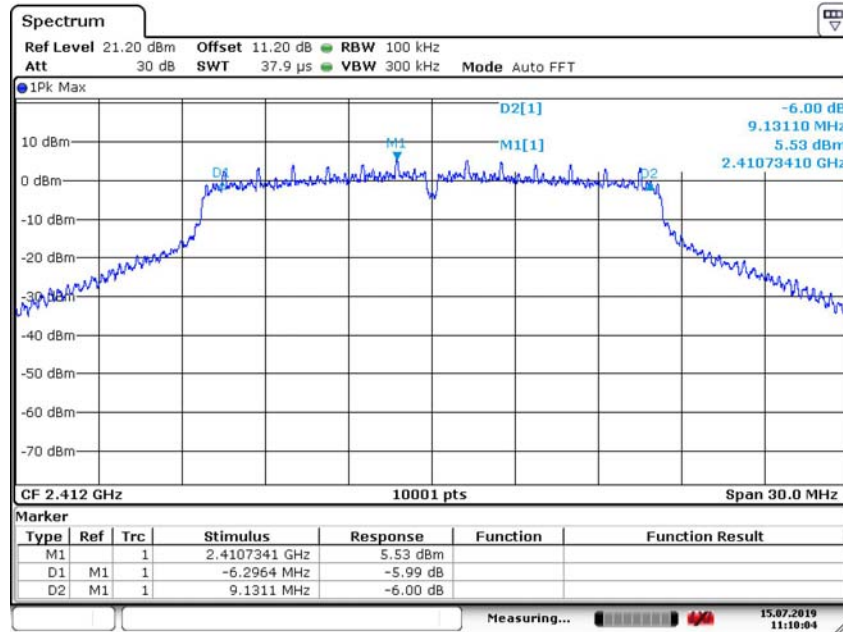


Date: 15.JUL.2019 11:07:58

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b

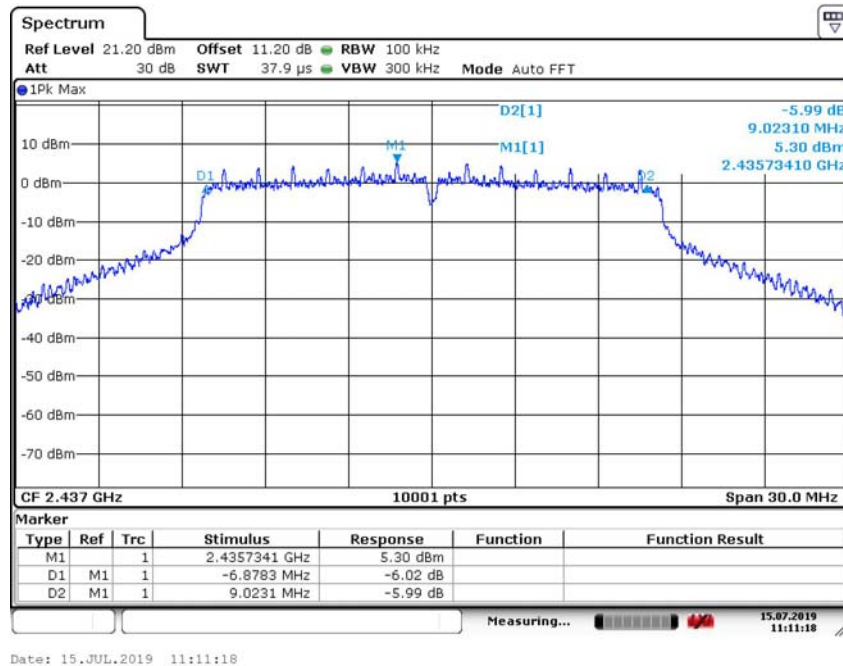
Test Mode: 802.11g (SISO Ant2)

Carrier frequency (MHz)	Channel No.	6 dB bandwidth(kHz)
2412	1	15427.5
2437	6	15901.4
2462	11	15664.4

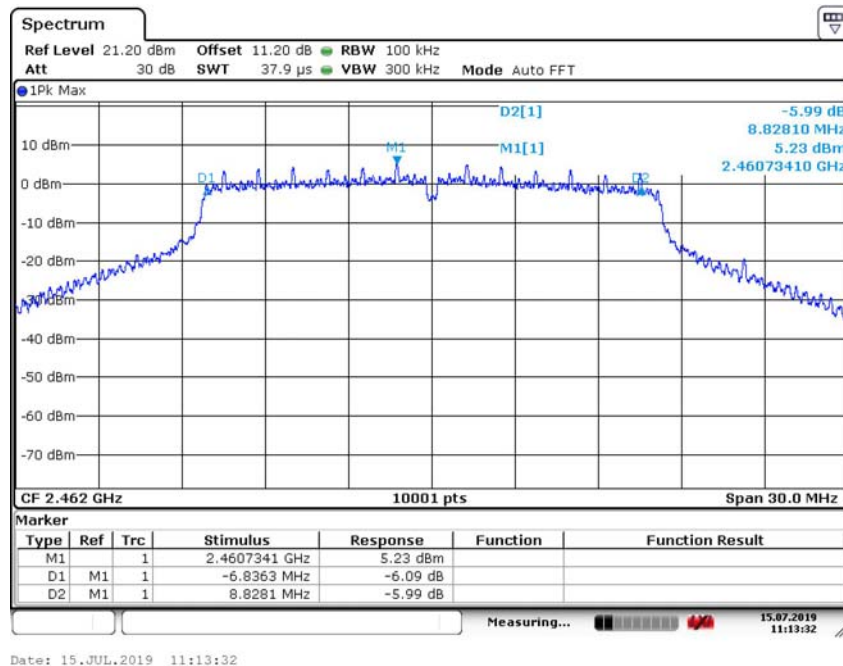


Date: 15.JUL.2019 11:10:04

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g



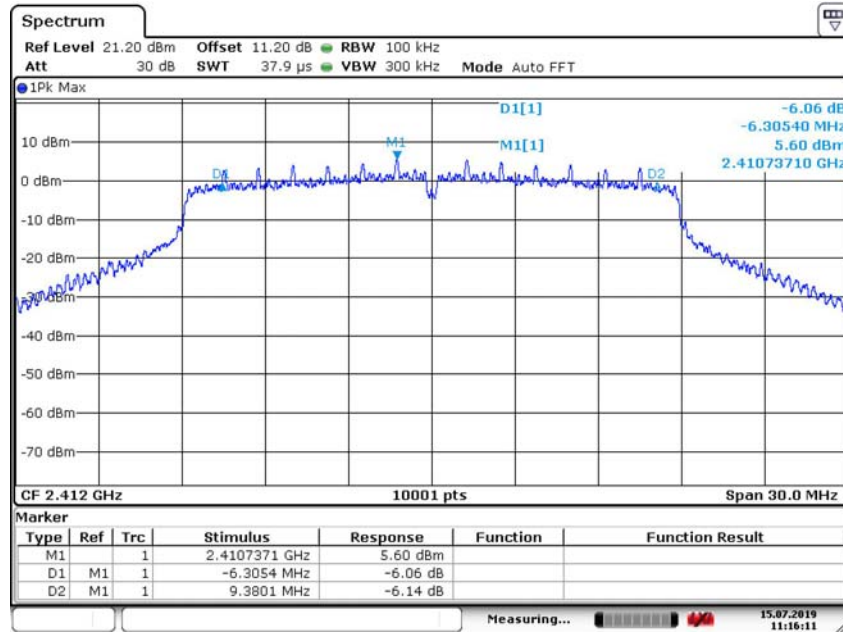
5Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11g



Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g

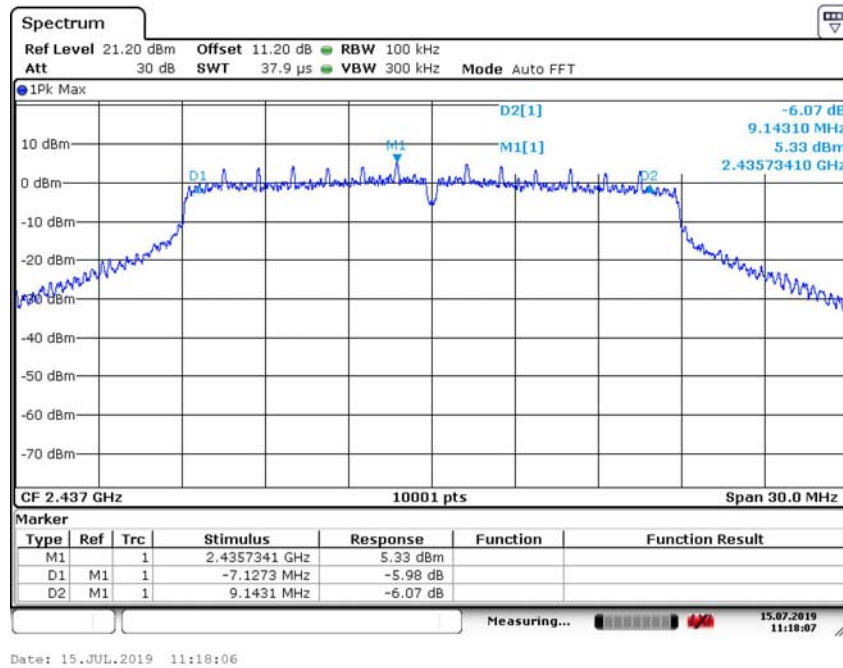
Test Mode: 802.11n (HT20) (SISO Ant2)

Carrier frequency (MHz)	Channel No.	6 dB bandwidth(kHz)
2412	1	15685.5
2437	6	16270.4
2462	11	16264.3

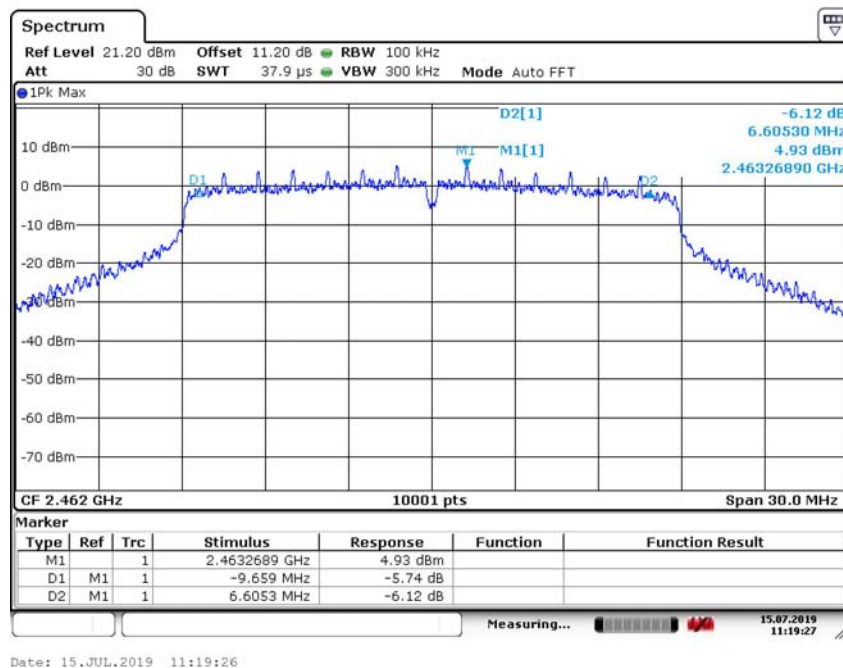


Date: 15.JUL.2019 11:16:11

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n (HT20)



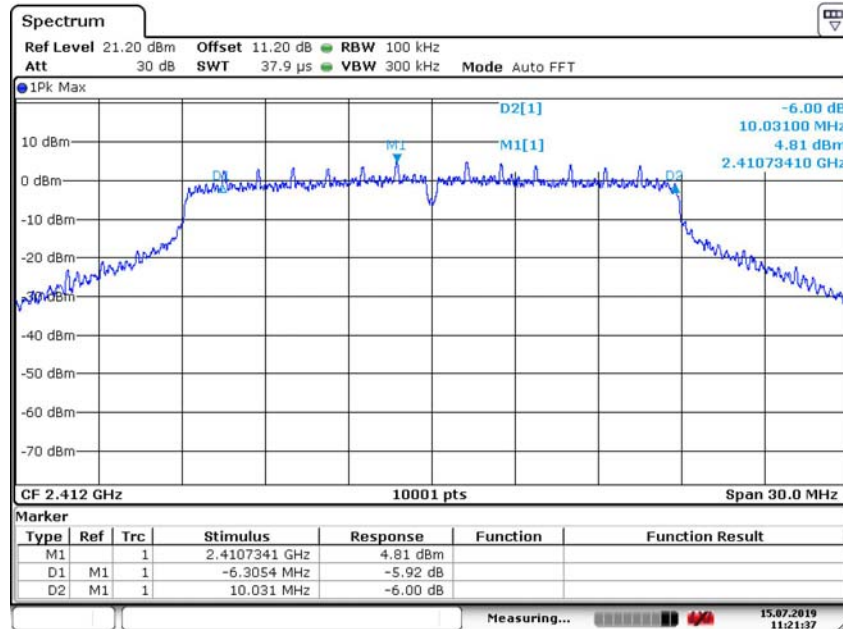
Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11n (HT20)



Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n (HT20)

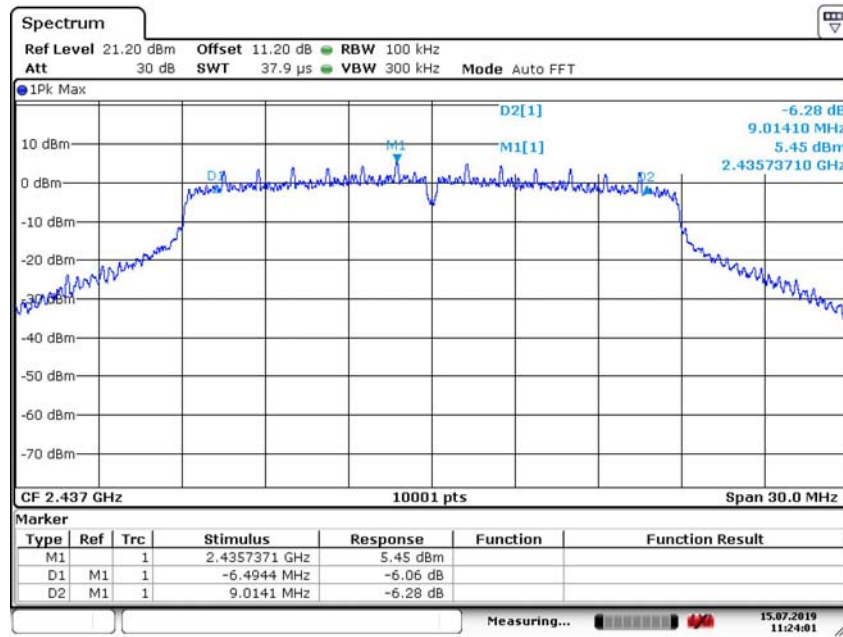
Test Mode: 802.11n (HT20) (MIMO Ant1)

Carrier frequency (MHz)	Channel No.	6 dB bandwidth(kHz)
2412	1	16336.4
2437	6	15513.5
2462	11	17005.3



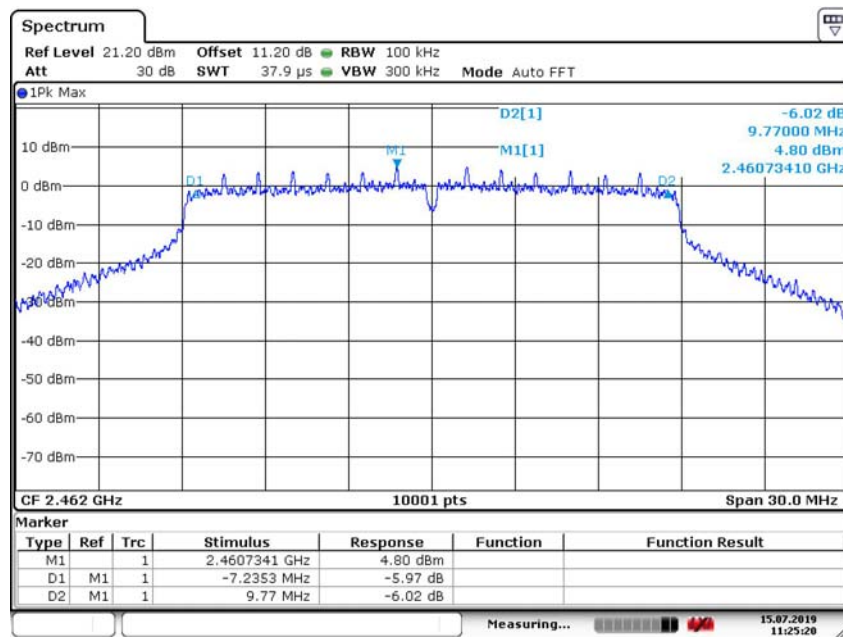
Date: 15.JUL.2019 11:21:36

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n (HT20)



Date: 15.JUL.2019 11:24:00

Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11n (HT20)

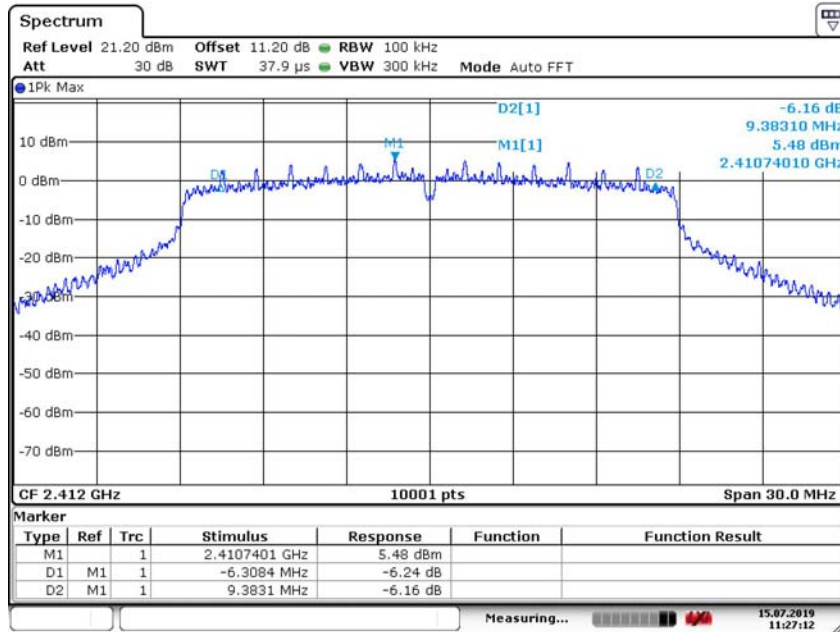


Date: 15.JUL.2019 11:25:20

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n (HT20)

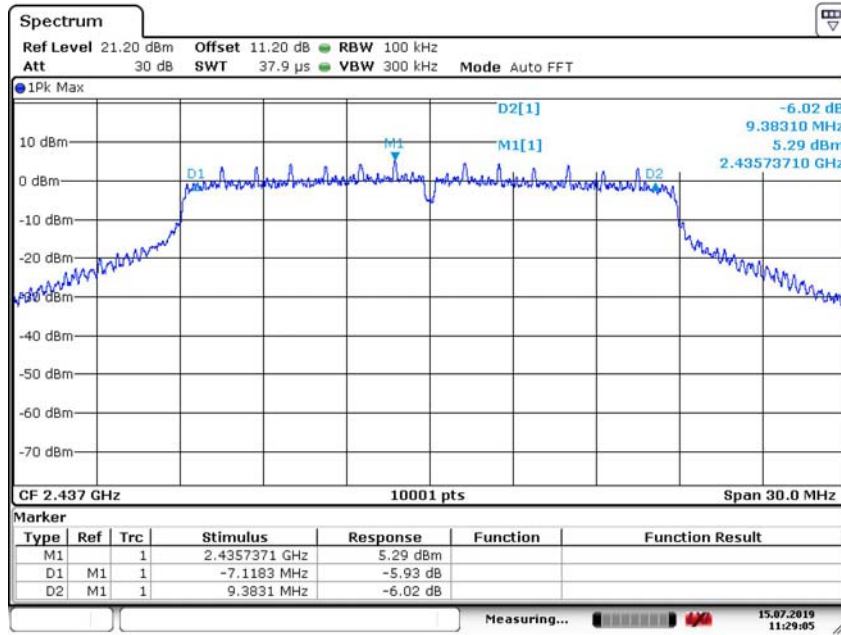
Test Mode: 802.11n (HT20) (MIMO Ant2)

Carrier frequency (MHz)	Channel No.	6 dB bandwidth(kHz)
2412	1	15691.5
2437	6	16501.4
2462	11	16633.4



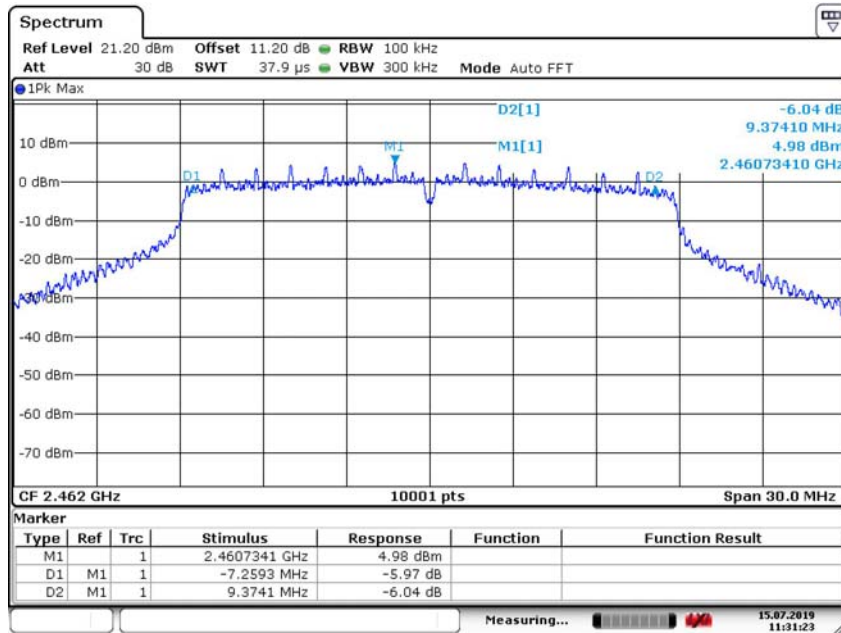
Date: 15.JUL.2019 11:27:11

Carrier frequency (MHz): 2412
 Channel No.:1
 Test Mode: 802.11n (HT20)



Date: 15.JUL.2019 11:29:04

Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11n (HT20)

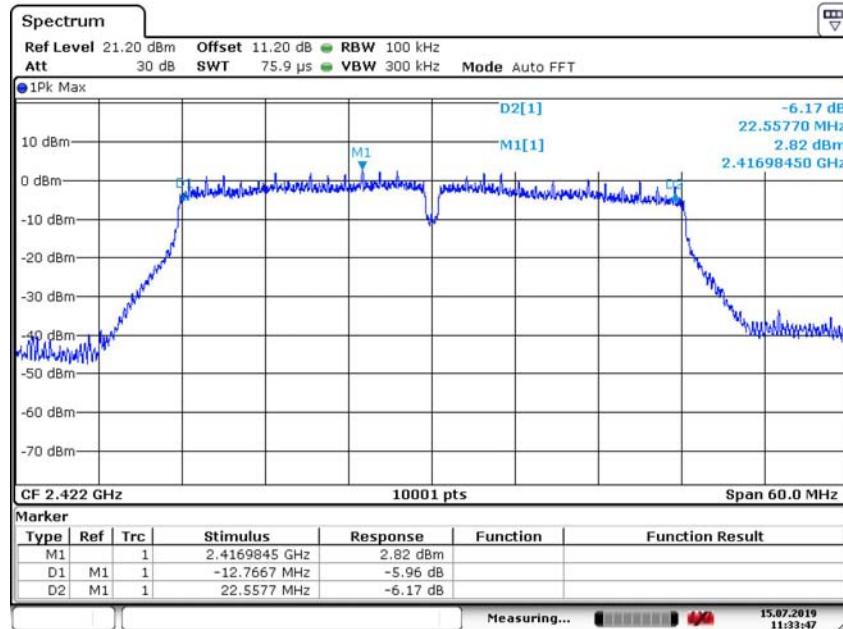


Date: 15.JUL.2019 11:31:23

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n (HT20)

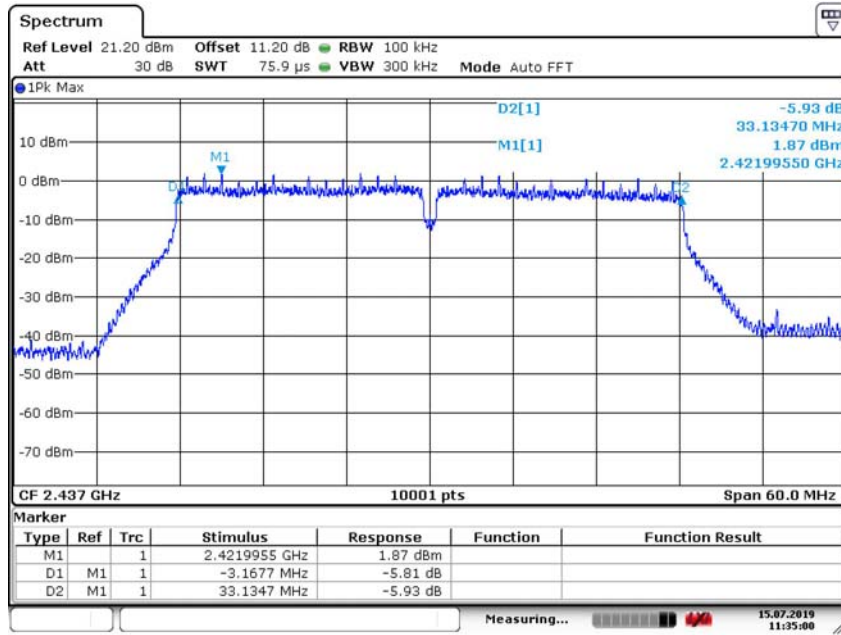
Test Mode: 802.11n (HT40) (SISO Ant2)

Carrier frequency (MHz)	Channel No.	6 dB bandwidth(kHz)
2422	3	35324.4
2437	6	36302.4
2452	9	35684.4



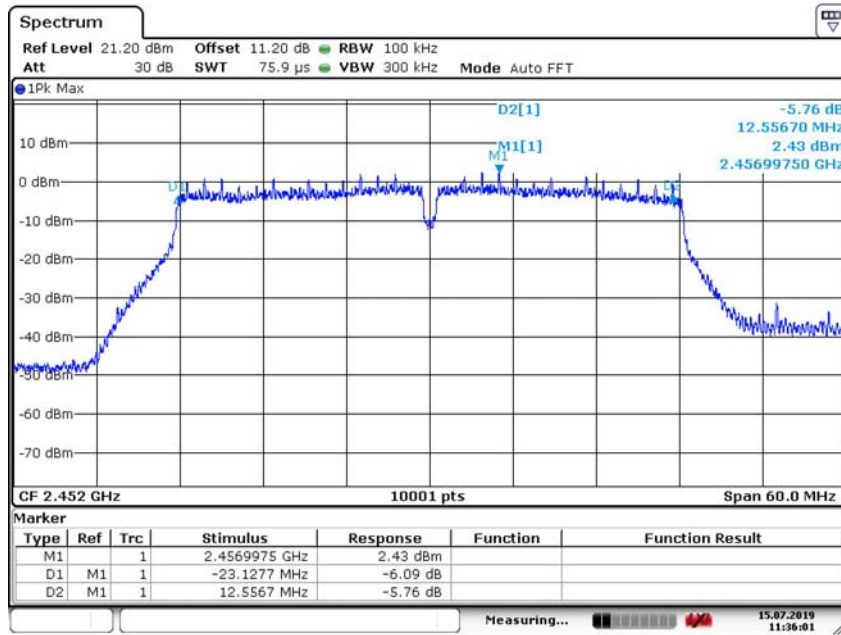
Date: 15.JUL.2019 11:33:46

Carrier frequency (MHz): 2422
 Channel No.:3
 Test Mode: 802.11n (HT40)



Date: 15.JUL.2019 11:35:00

Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11n (HT40)

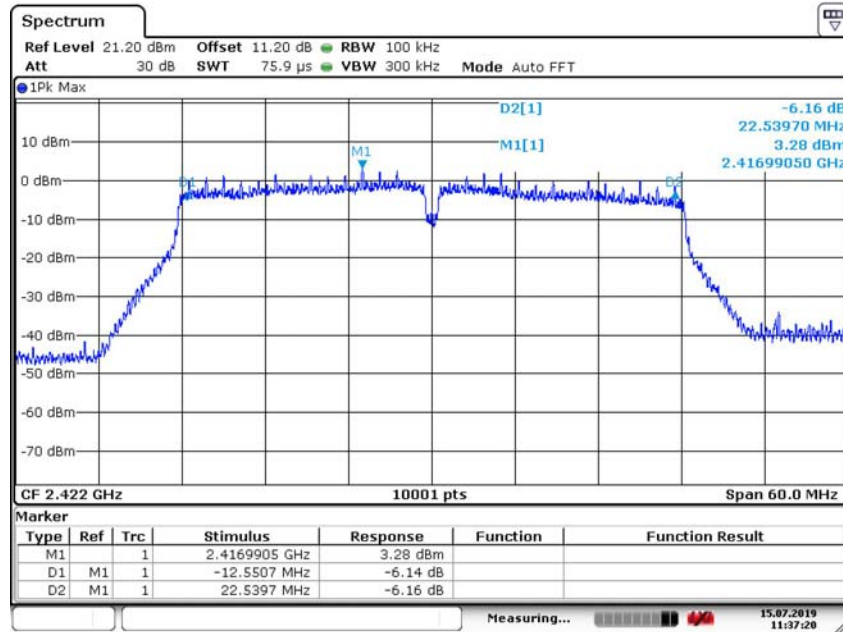


Date: 15.JUL.2019 11:36:00

Carrier frequency (MHz): 2452
Channel No.:9
Test Mode: 802.11n (HT40)

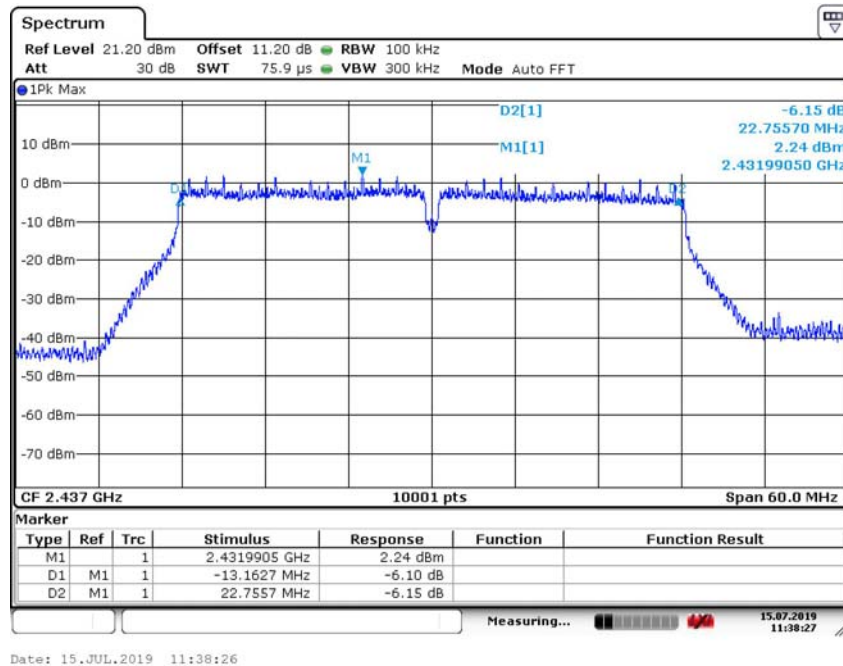
Test Mode: 802.11n (HT40) (MIMO Ant1)

Carrier frequency (MHz)	Channel No.	6 dB bandwidth(kHz)
2422	3	35090.4
2437	6	35918.4
2452	9	35726.4

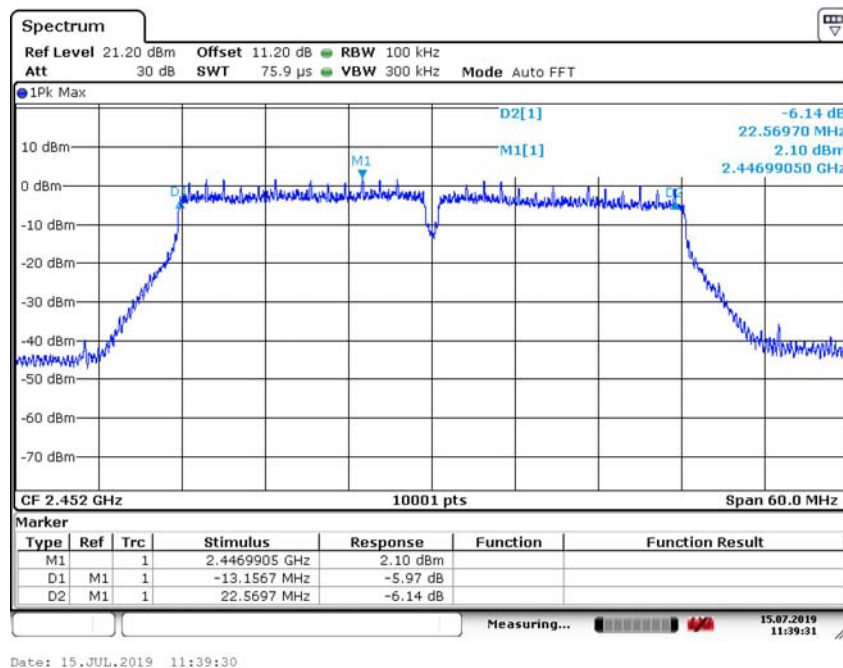


Date: 15.JUL.2019 11:37:19

Carrier frequency (MHz): 2422
 Channel No.:3
 Test Mode: 802.11n (HT40)



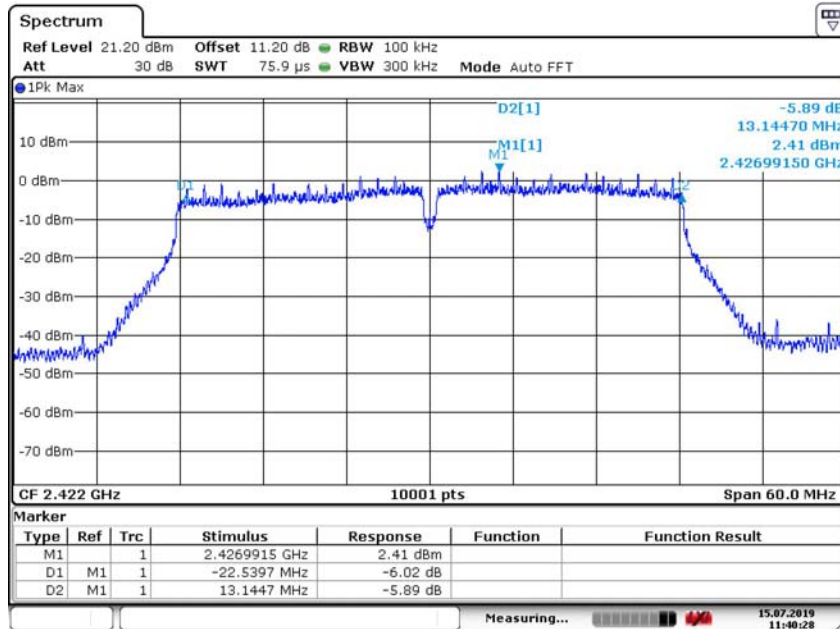
Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11n (HT40)



Carrier frequency (MHz): 2452
Channel No.:9
Test Mode: 802.11n (HT40)

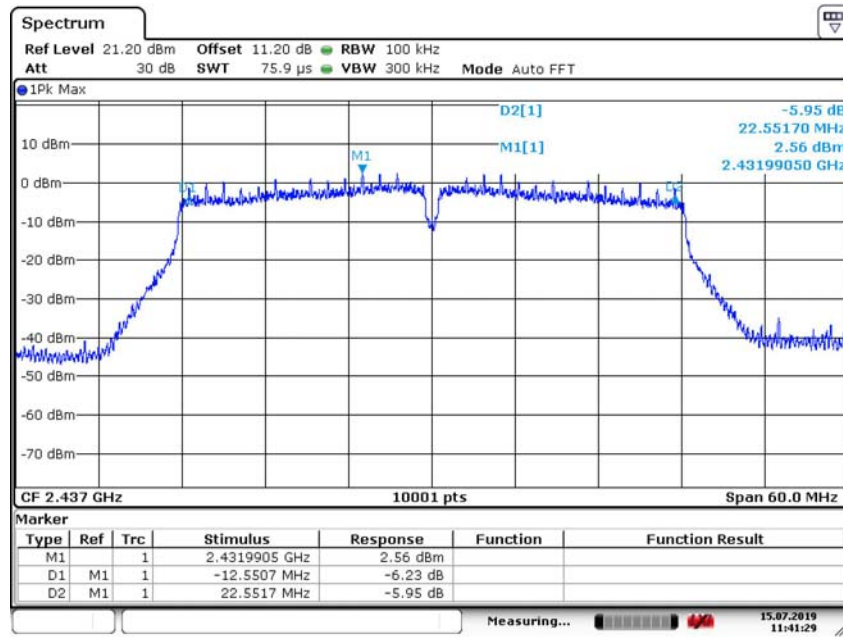
Test Mode: 802.11n (HT40) (MIMO Ant2)

Carrier frequency (MHz)	Channel No.	6 dB bandwidth(kHz)
2422	3	35684.4
2437	6	35102.4
2452	9	35426.4



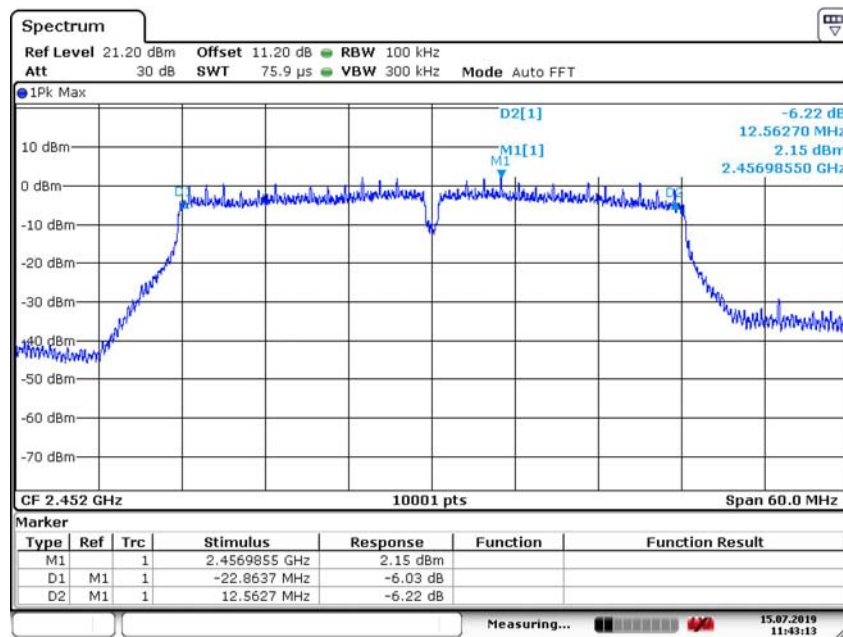
Date: 15.JUL.2019 11:40:27

Carrier frequency (MHz): 2422
Channel No.:3
Test Mode: 802.11n (HT40)



Date: 15.JUL.2019 11:41:29

Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11n (HT40)



Date: 15.JUL.2019 11:43:12

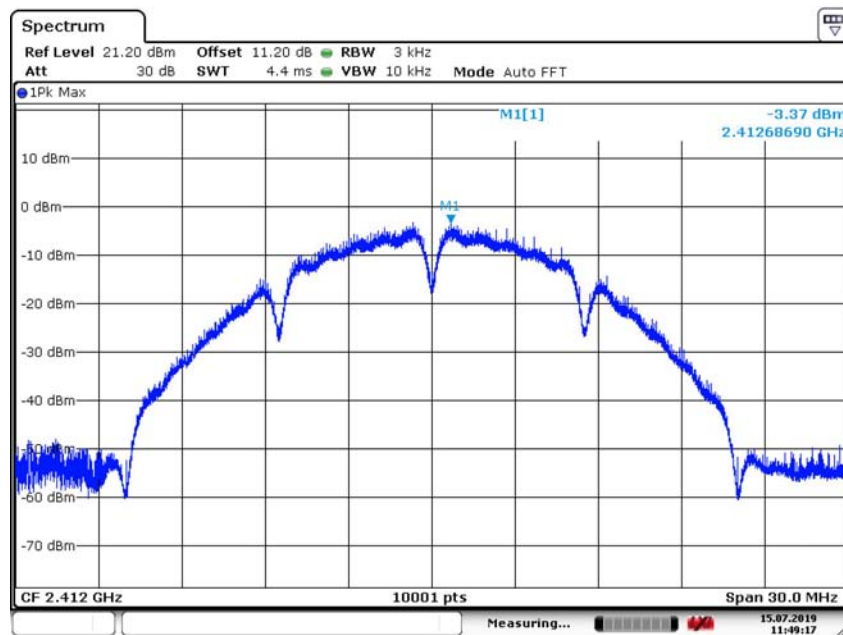
Carrier frequency (MHz): 2452
Channel No.:9
Test Mode: 802.11n (HT40)

Transmitter Power Spectral Density

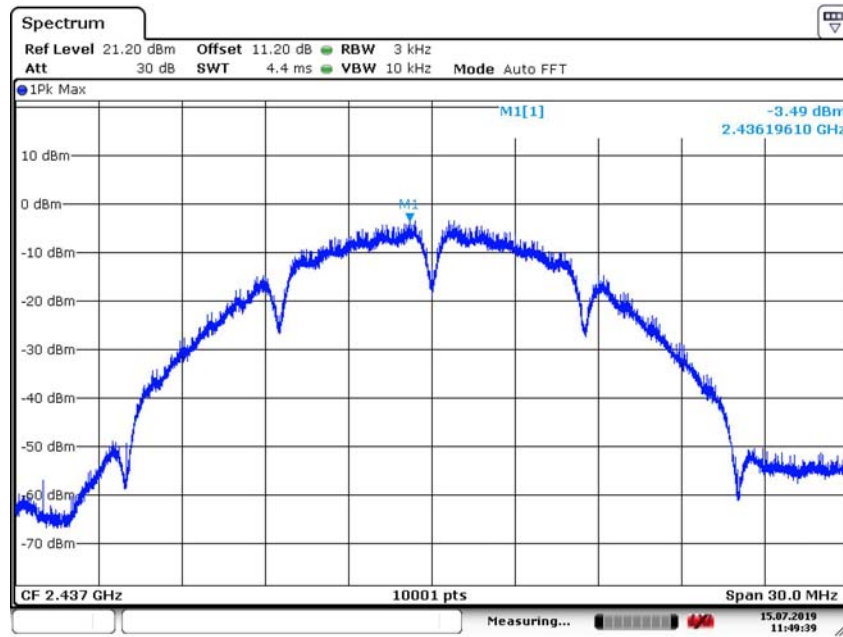
Offset 11.2dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.0dB

Test Mode: 802.11b (SISO Ant 2)

Carrier frequency (MHz)	Channel No	Power Density (dBm)
2412	1	-3.37
2437	6	-3.49
2462	11	-3.19

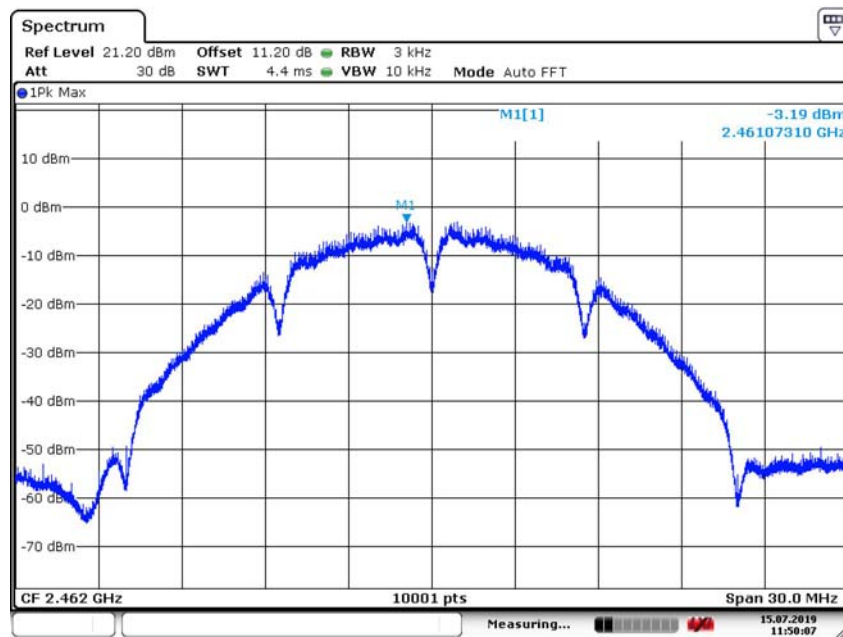


Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11b



Date: 15.JUL.2019 11:49:38

Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11b

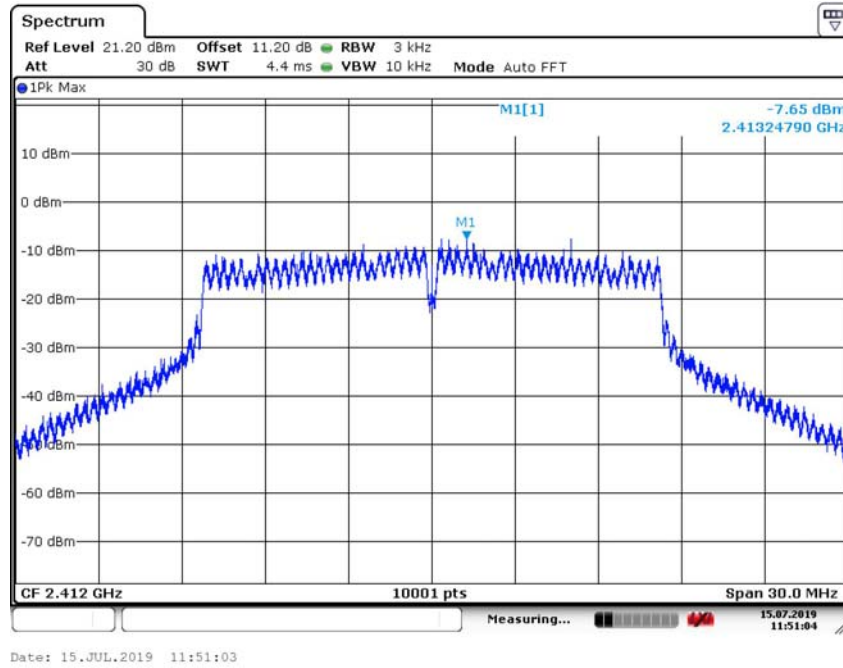


Date: 15.JUL.2019 11:50:07

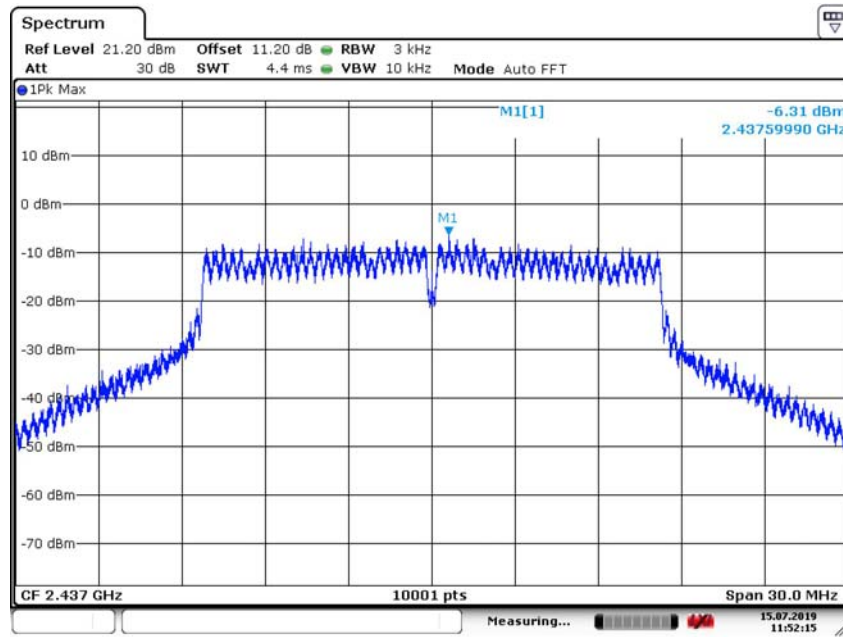
Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11b

Test Mode: 802.11g (SISO Ant 2)

Carrier frequency (MHz)	Channel No	Power Density (dBm)
2412	1	-7.65
2442	6	-6.31
2472	11	-6.13

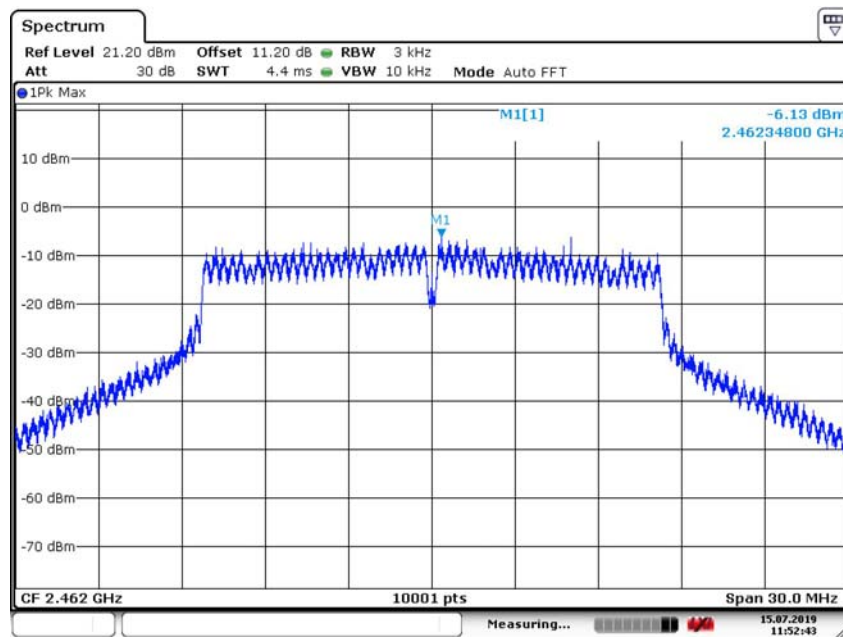


Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11g



Date: 15.JUL.2019 11:52:15

Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11g

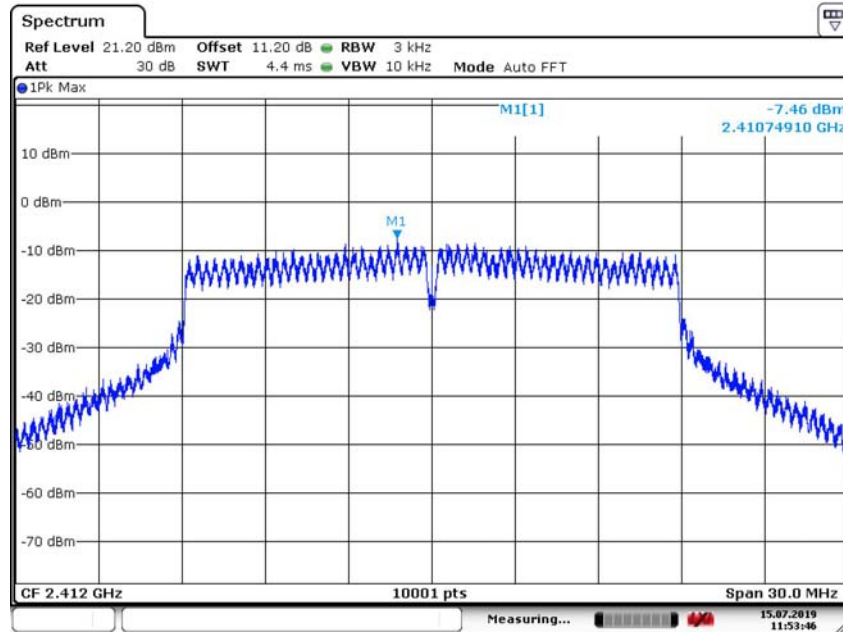


Date: 15.JUL.2019 11:52:42

Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11g

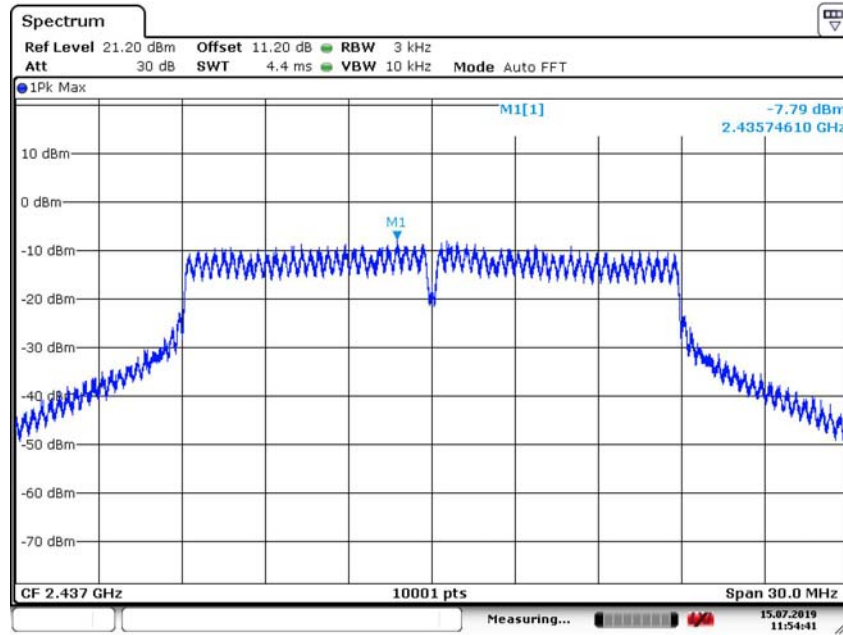
Test Mode: 802.11n (HT20) (SISO Ant 2)

Carrier frequency (MHz)	Channel No	Power Density (dBm)
2412	1	-7.46
2437	6	-7.79
2462	11	-7.39



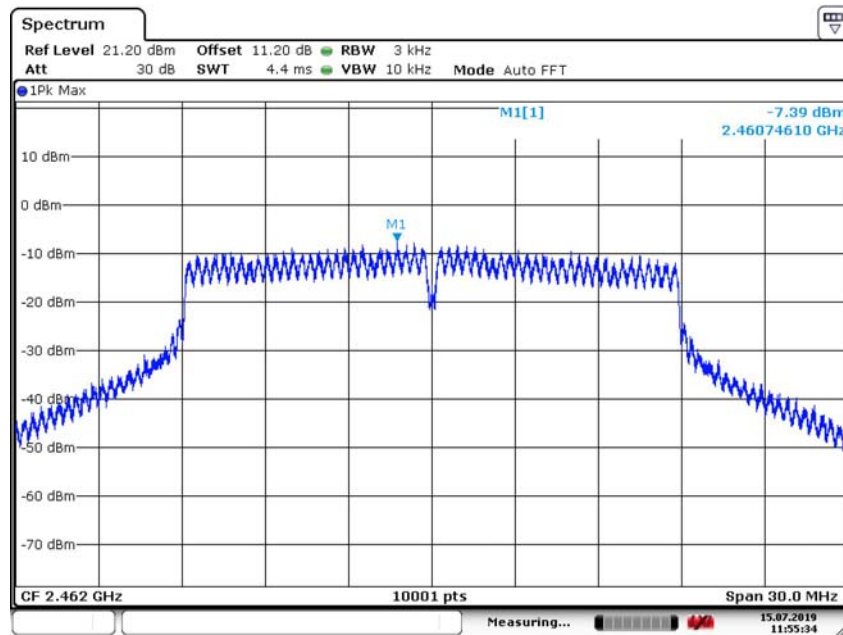
Date: 15.JUL.2019 11:53:46

Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11n (HT20)



Date: 15.JUL.2019 11:54:41

Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11n (HT20)

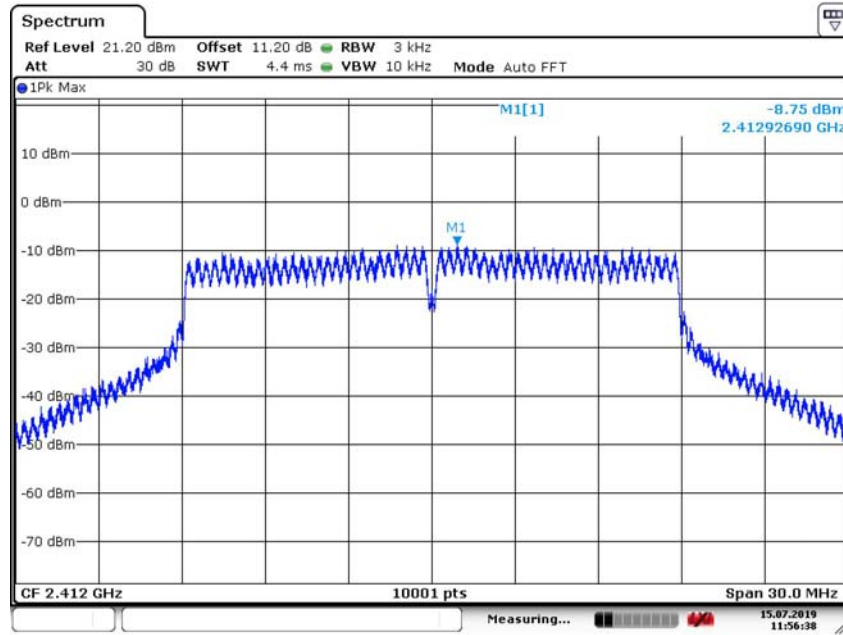


Date: 15.JUL.2019 11:55:33

Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11n (HT20)

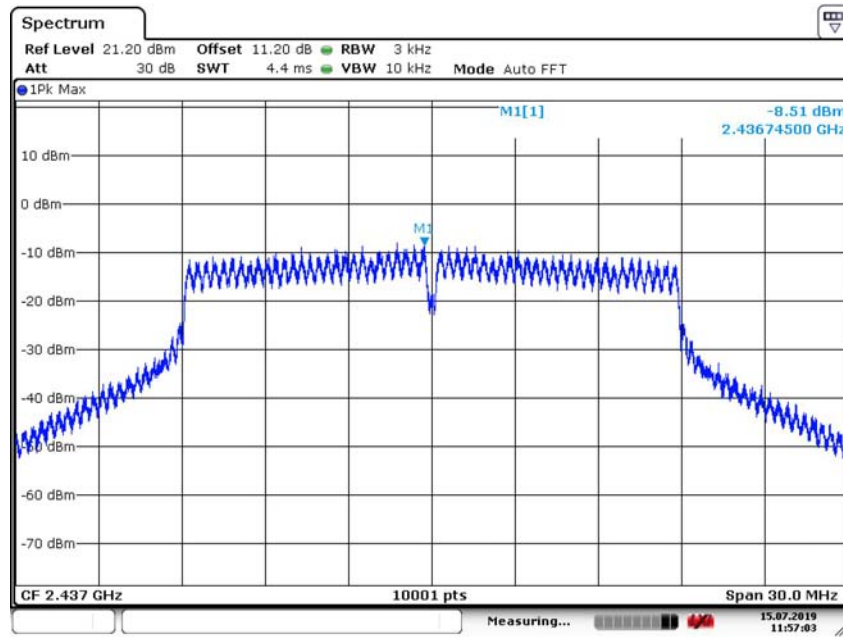
Test Mode: 802.11n (HT20) (MIMO Ant1 + Ant 2)

Carrier frequency (MHz)	Channel No	Power Density (dBm)(Ant1)	Power Density (dBm)(Ant2)	Total Corr'd (dBm)
2412	1	-8.75	-8.10	-5.40
2437	6	-8.51	-8.30	-5.39
2462	11	-9.00	-8.69	-5.83



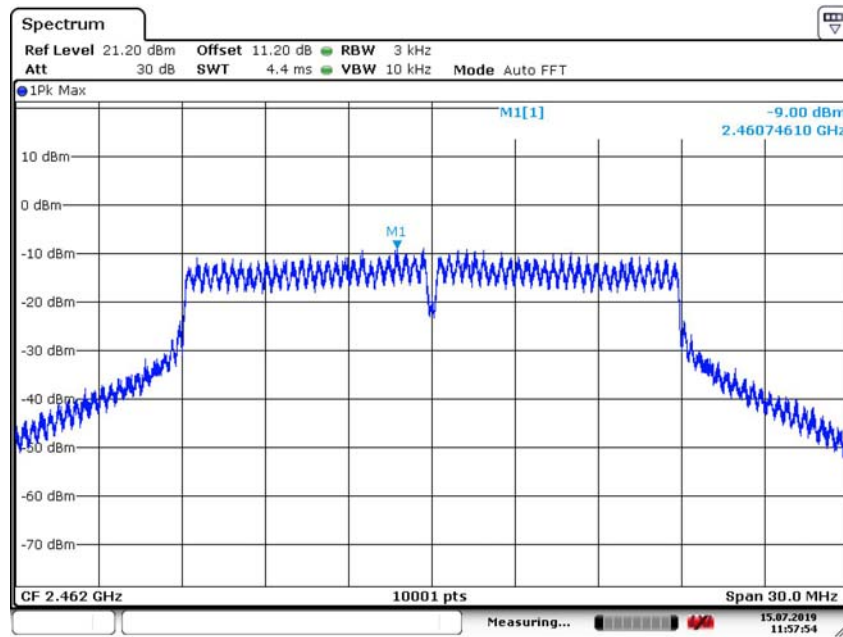
Date: 15.JUL.2019 11:56:37

Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11n (HT20 MIMO Ant1)



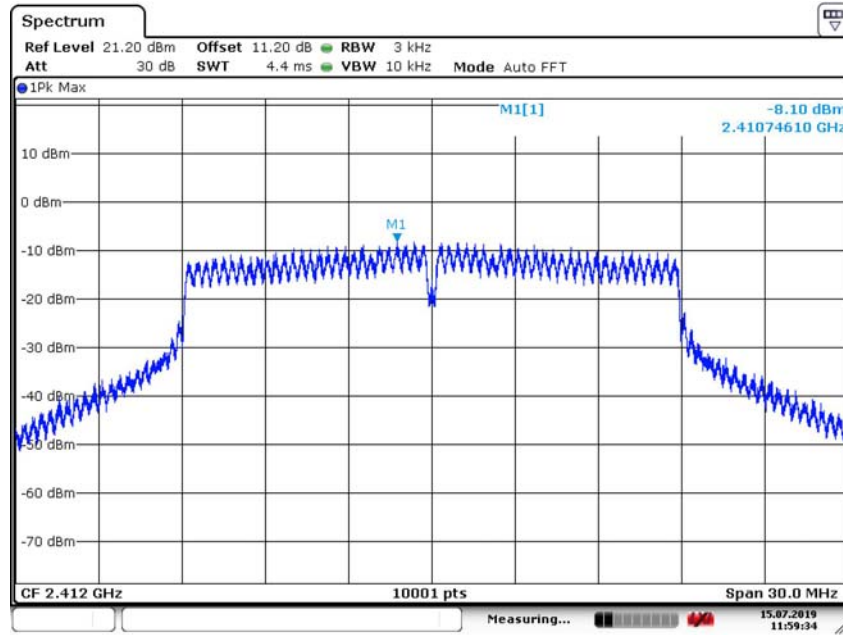
Date: 15.JUL.2019 11:57:03

Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11n (HT20 MIMO Ant1)



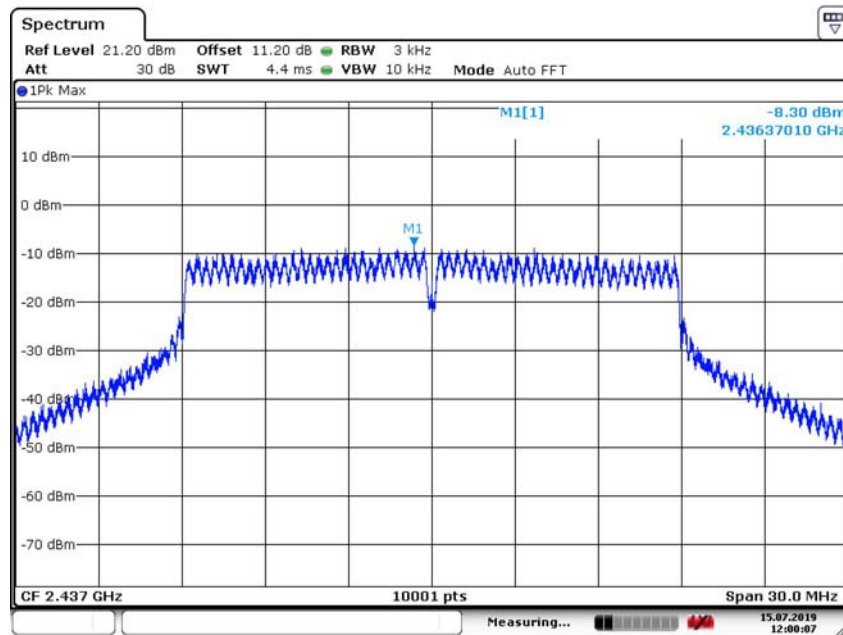
Date: 15.JUL.2019 11:57:54

Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11n (HT20 MIMO Ant1)



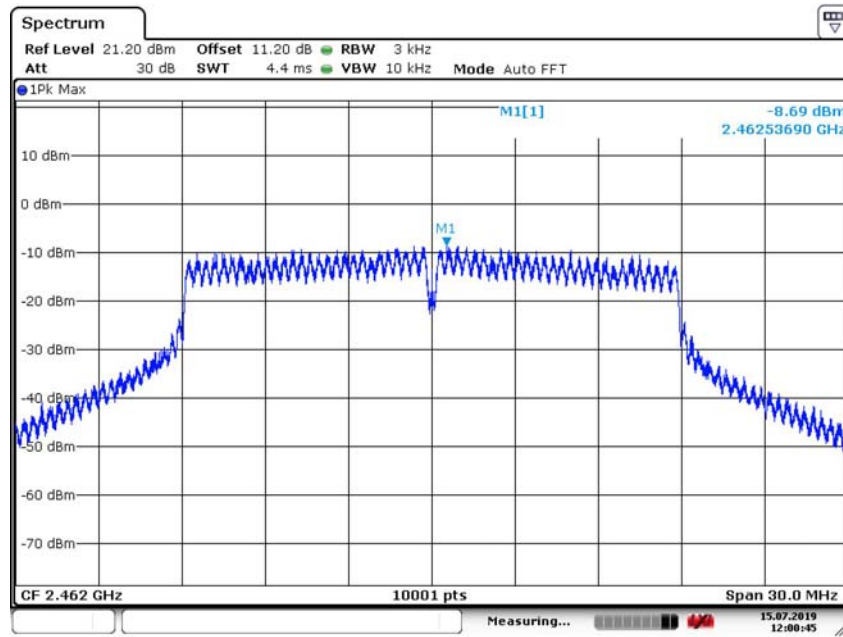
Date: 15.JUL.2019 11:59:33

Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11n (HT20 MIMO Ant2)



Date: 15.JUL.2019 12:00:06

Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11n (HT20 MIMO Ant2)

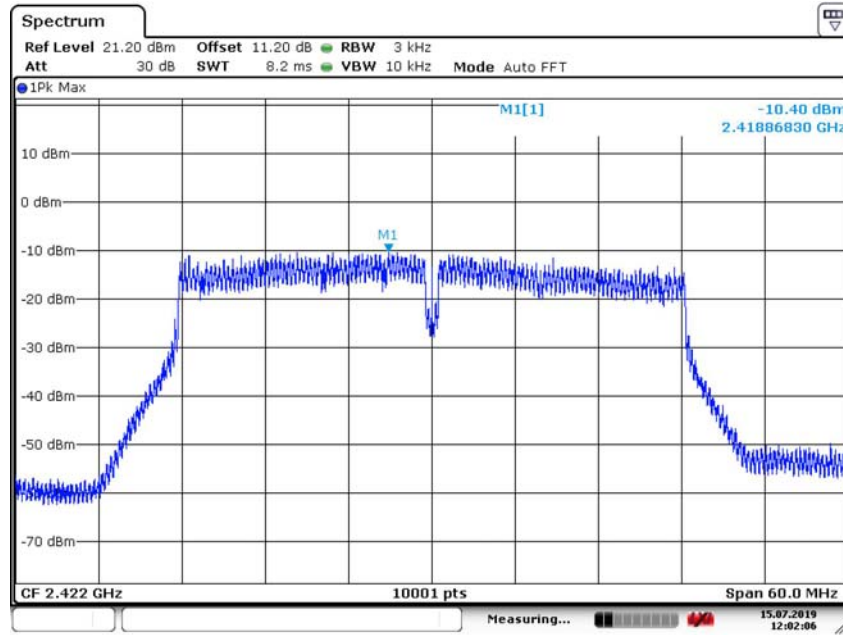


Date: 15.JUL.2019 12:00:44

Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11n (HT20 MIMO Ant2)

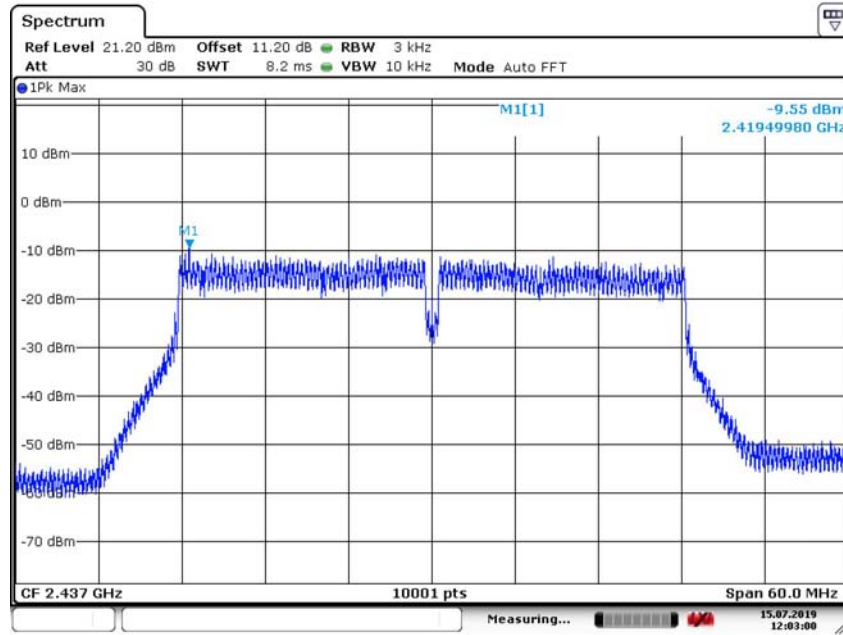
Test Mode: 802.11n (HT40) (SISO Ant 2)

Carrier frequency (MHz)	Channel No	Power Density (dBm)
2422	3	-10.40
2437	6	-9.55
2452	9	-9.94



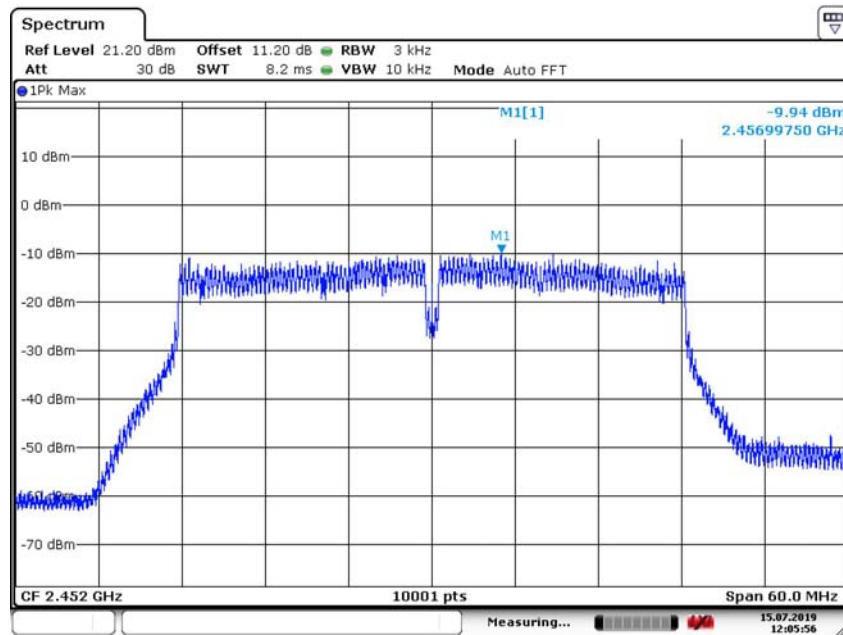
Date: 15.JUL.2019 12:02:06

Carrier frequency (MHz): 2422
Channel No.3
Test Mode: 802.11n (HT40)



Date: 15.JUL.2019 12:02:59

Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11n (HT40)

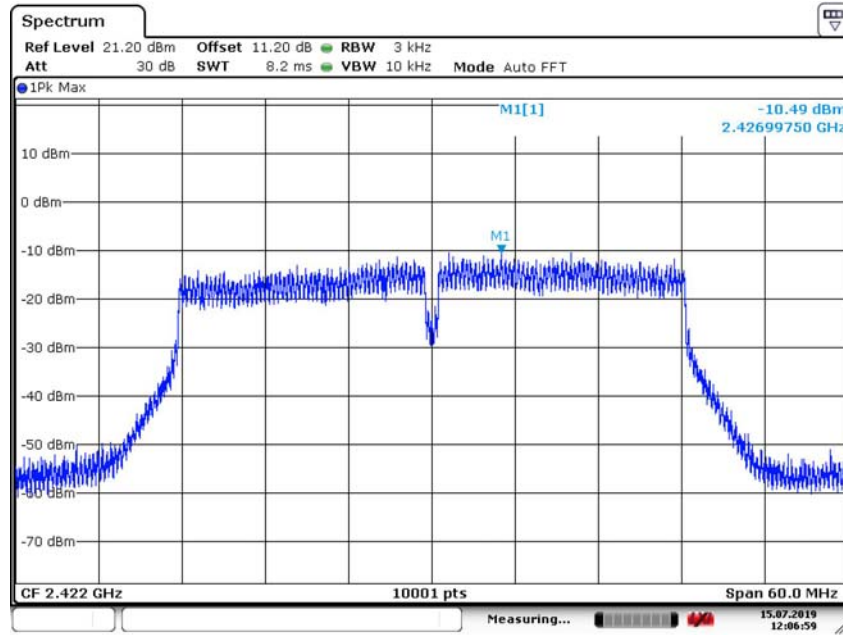


Date: 15.JUL.2019 12:05:56

Carrier frequency (MHz): 2452
Channel No.9
Test Mode: 802.11n (HT40)

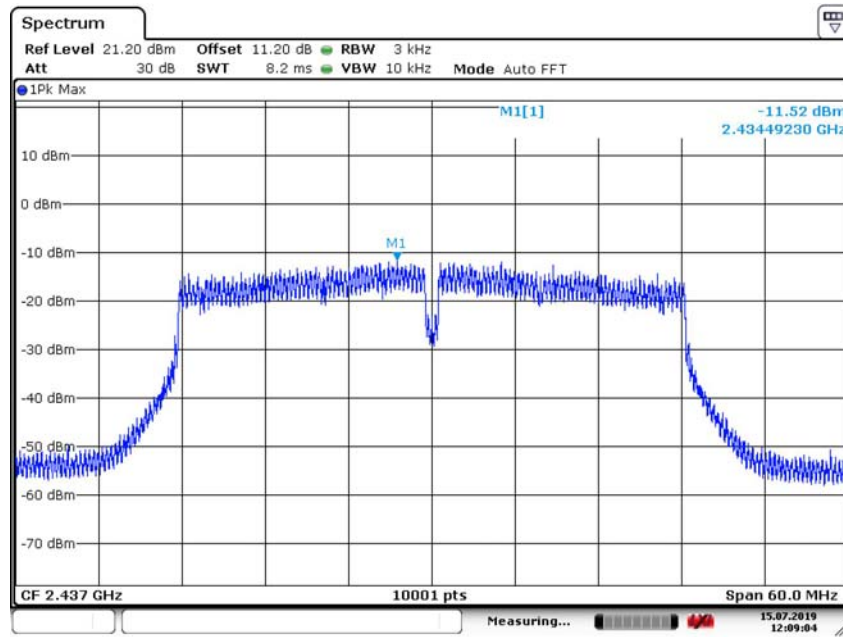
Test Mode: 802.11n (HT40) (MIMO Ant1 + Ant 2)

Carrier frequency (MHz)	Channel No	Power Density (dBm)(Ant1)	Power Density (dBm)(Ant2)	Total Corr'd (dBm)
2422	3	-10.49	-10.21	-7.34
2437	6	-11.52	-10.08	-7.73
2452	9	-12.05	-10.36	-8.11

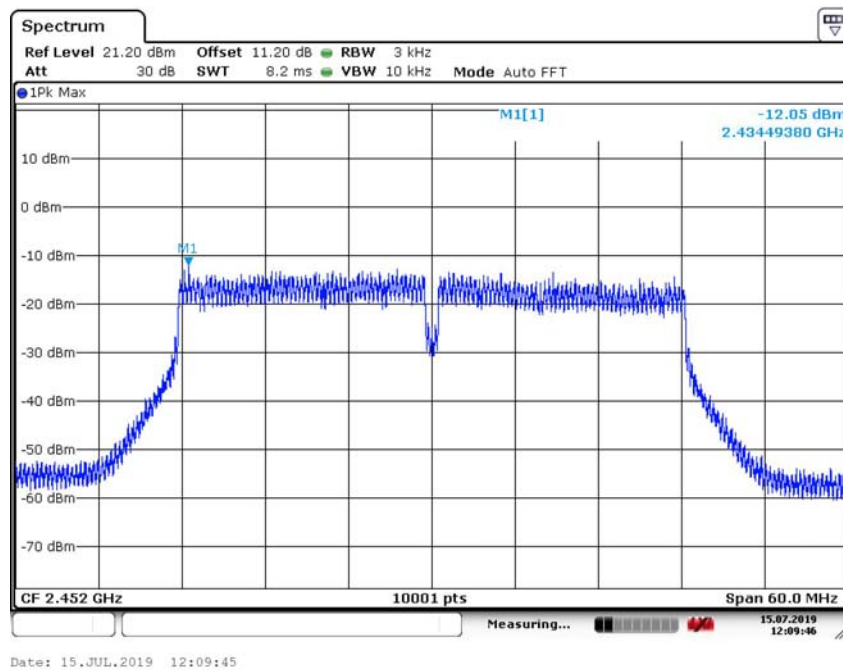


Date: 15.JUL.2019 12:06:59

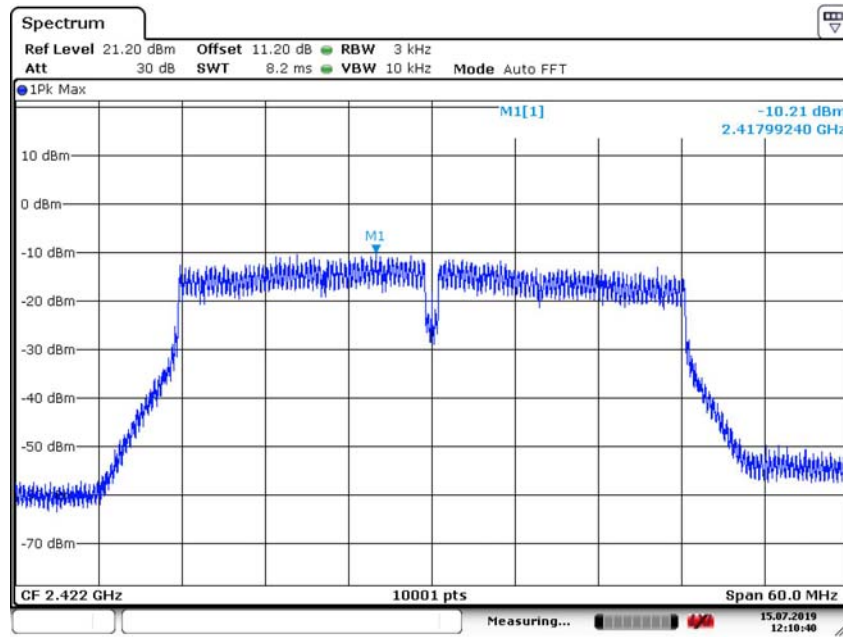
Carrier frequency (MHz): 2422
Channel No.3
Test Mode: 802.11n (HT40 MIMO Ant1)



Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11n (HT40 MIMO Ant1)

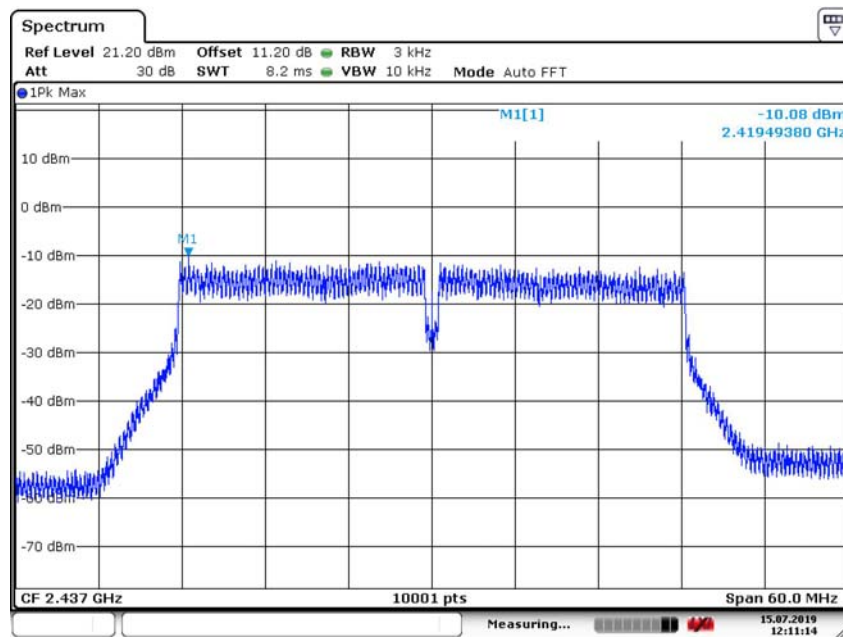


Carrier frequency (MHz): 2452
Channel No.9
Test Mode: 802.11n (HT40 MIMO Ant1)



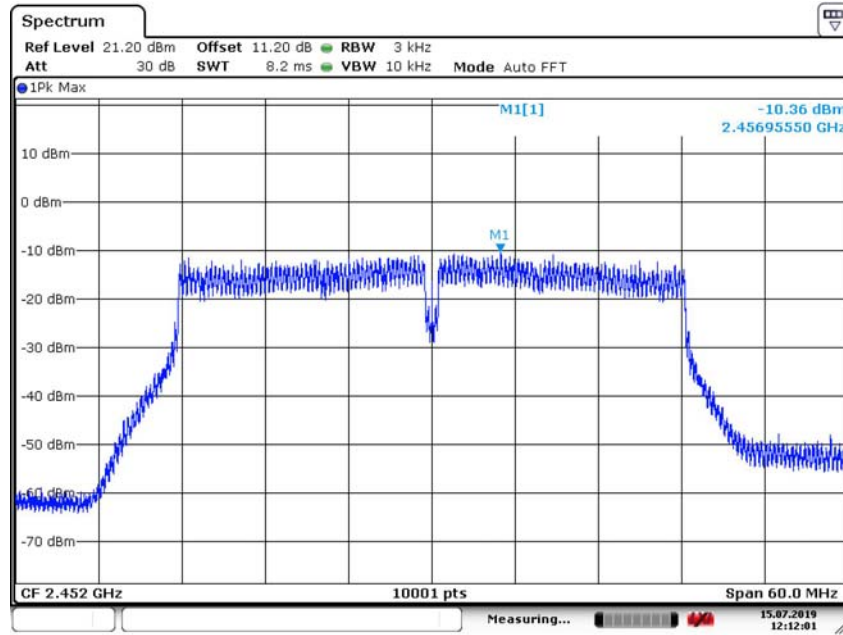
Date: 15.JUL.2019 12:10:40

Carrier frequency (MHz): 2422
Channel No.3
Test Mode: 802.11n (HT40 MIMO Ant2)



Date: 15.JUL.2019 12:11:14

Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11n (HT40 MIMO Ant2)



Date: 15.JUL.2019 12:12:01

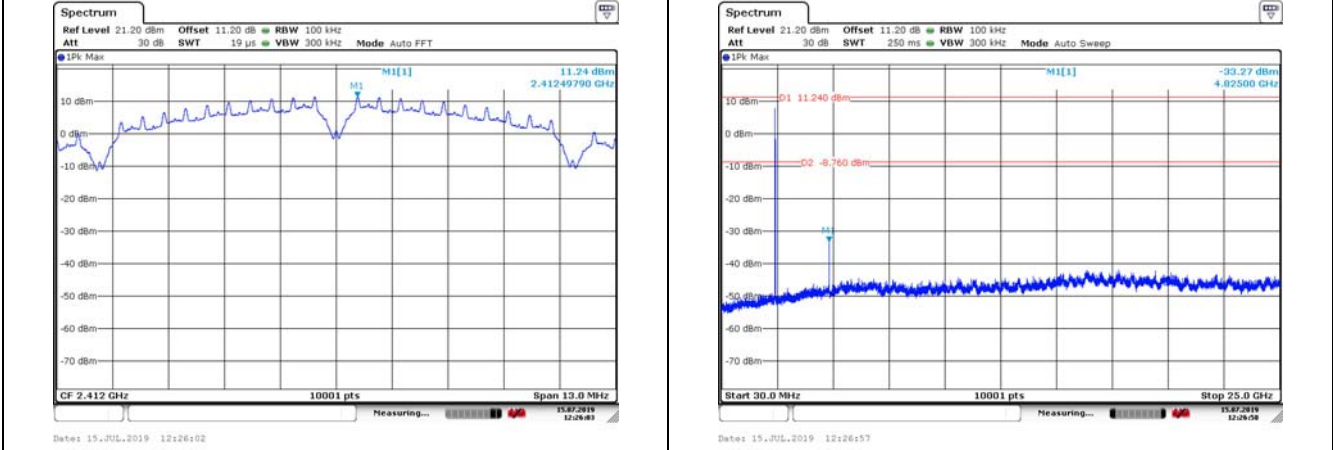
Carrier frequency (MHz): 2452
Channel No.9
Test Mode: 802.11n (HT40 MIMO Ant2)

Conducted Out of band emission measurement

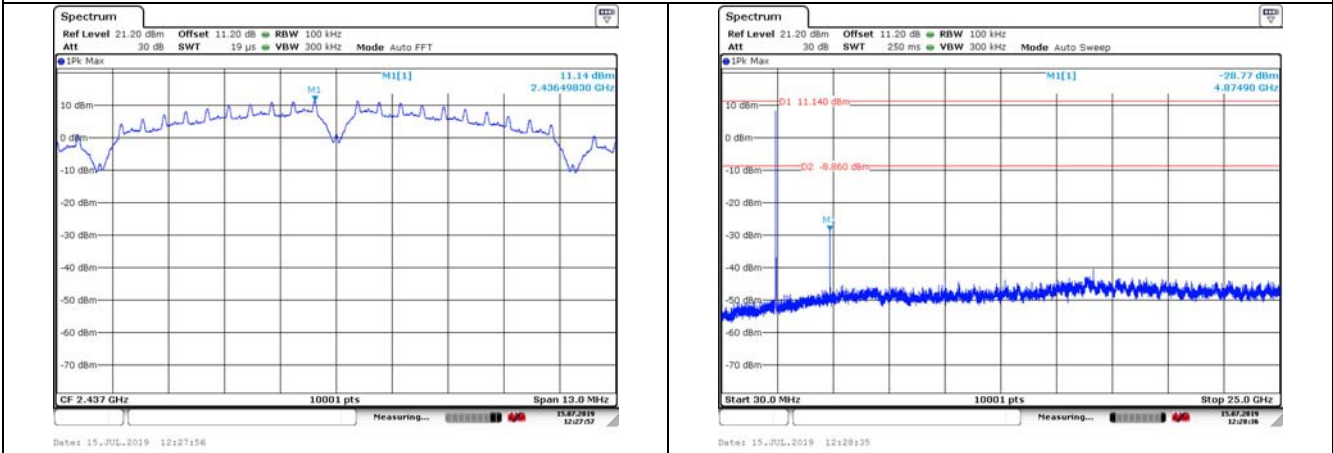
Offset 11.2dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.0dB

802.11b (SISO Ant2)

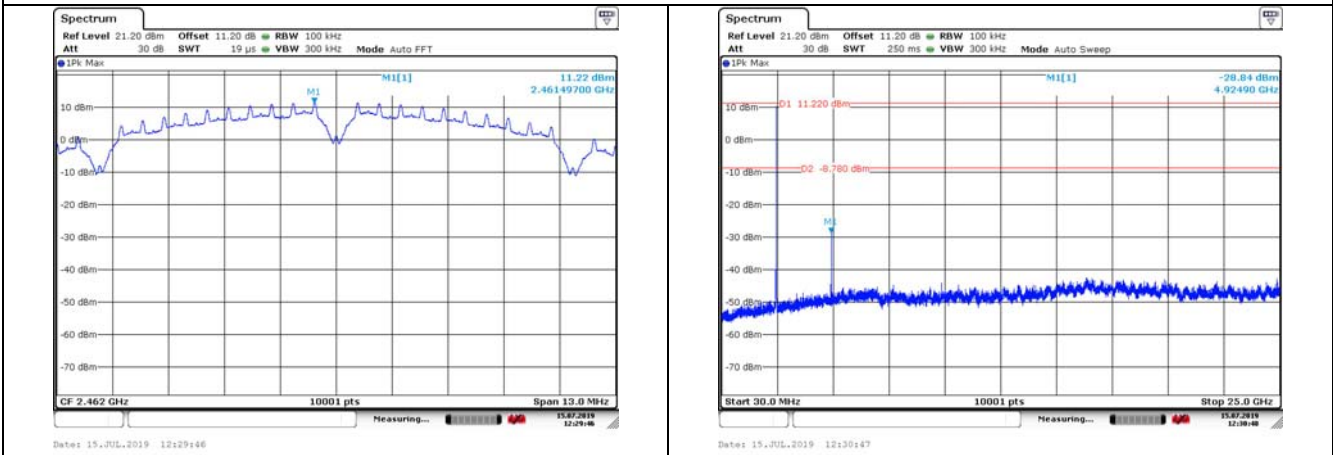
CH1



CH6

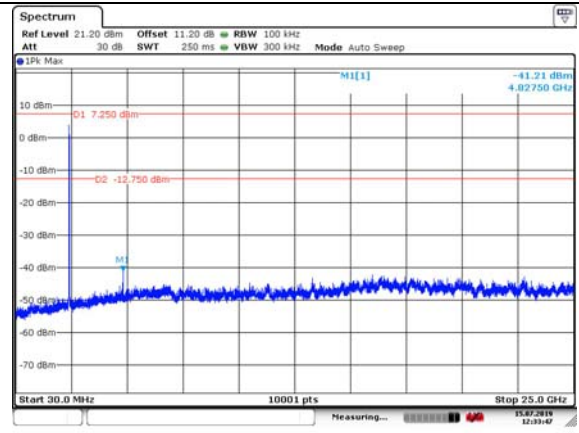
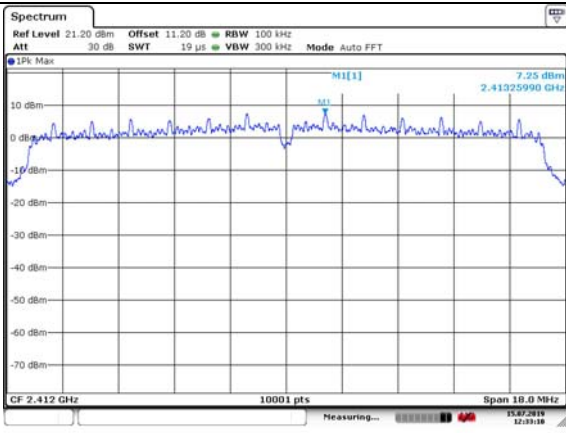


CH11

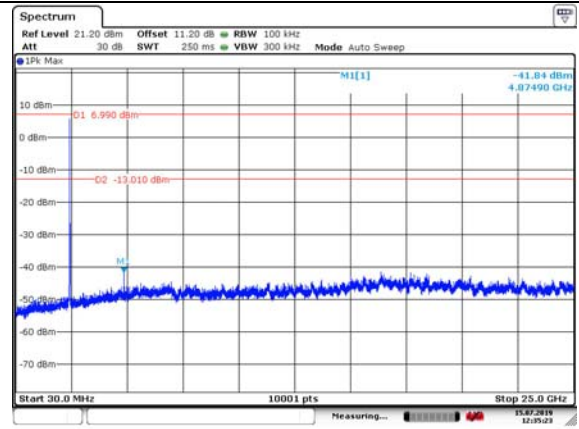
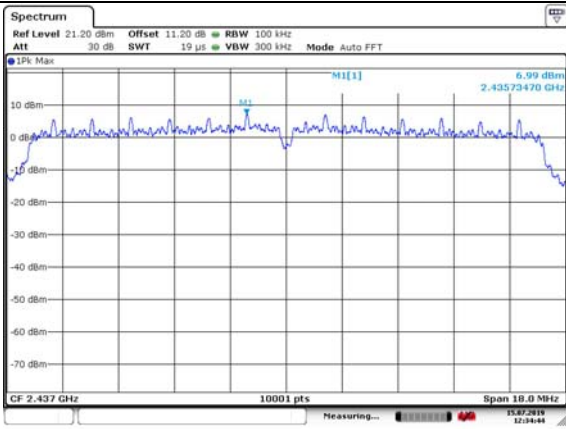


802.11g (SISO Ant2)

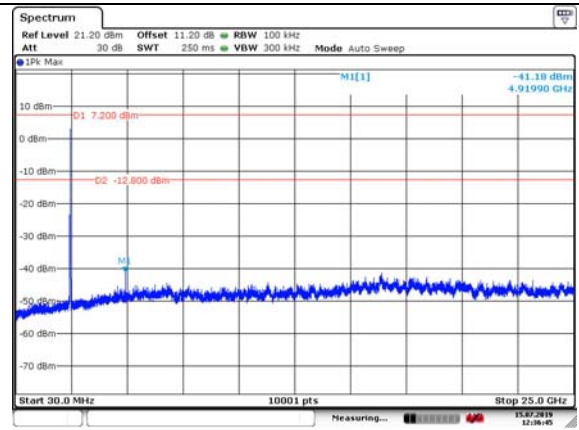
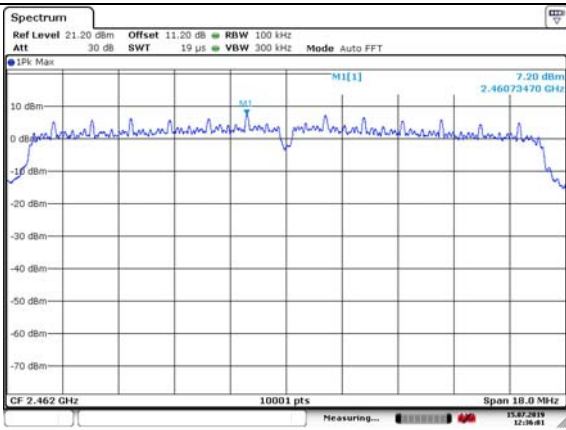
CH1



CH6

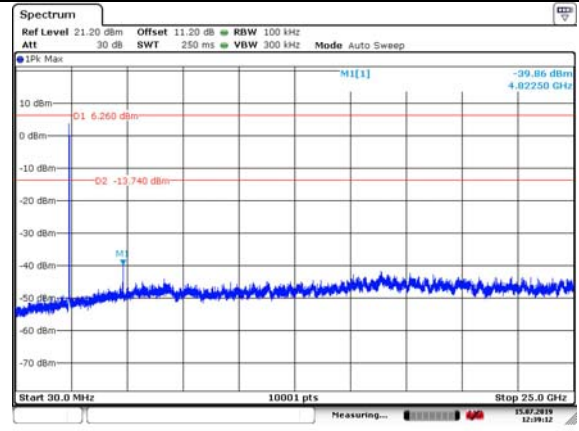
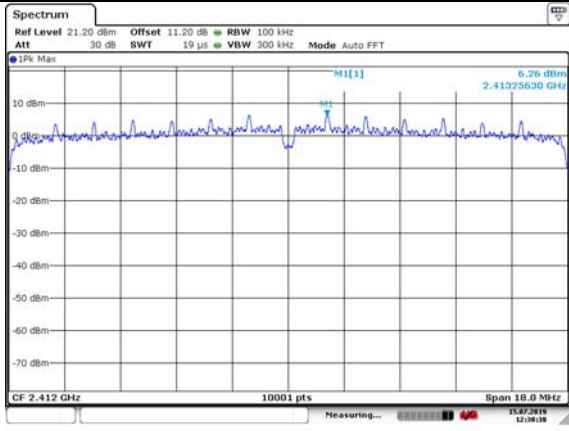


CH11

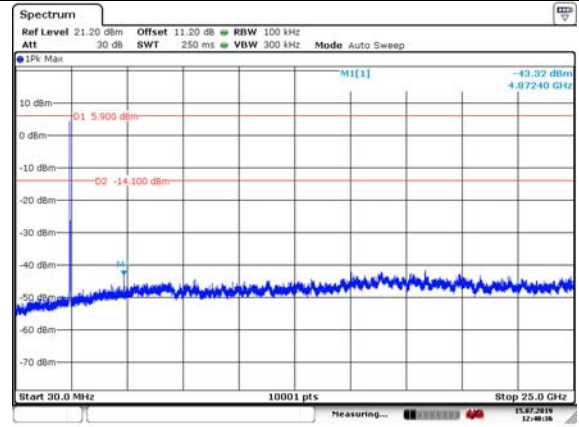
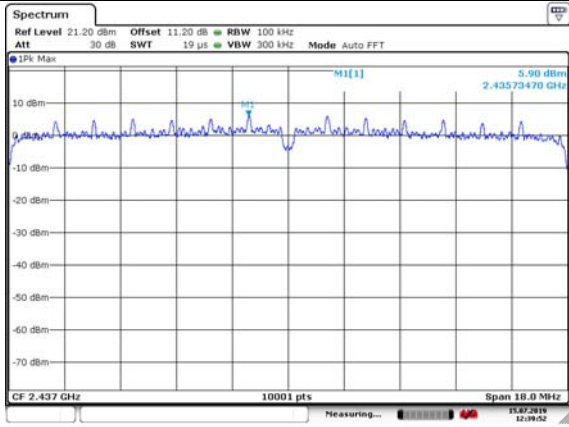


802.11n (20MHz) (SISO Ant2)

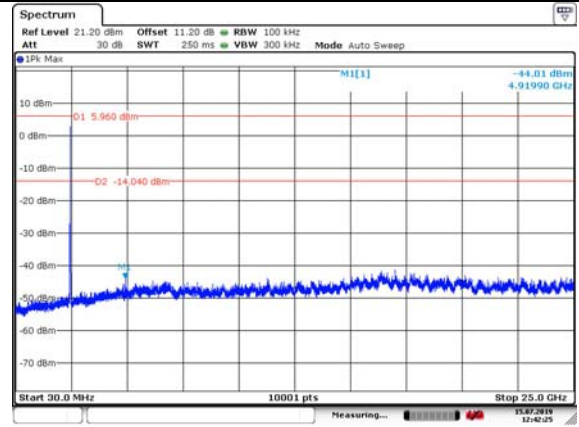
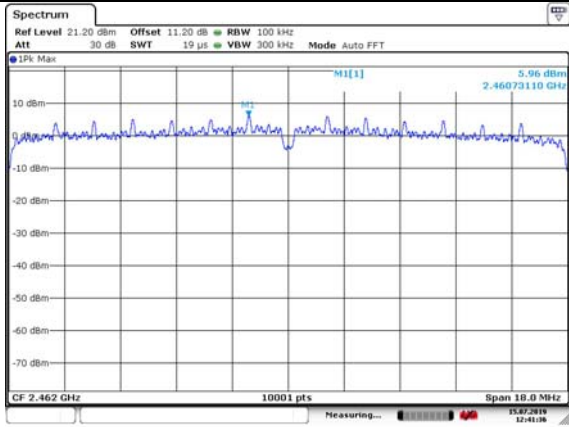
CH1



CH6

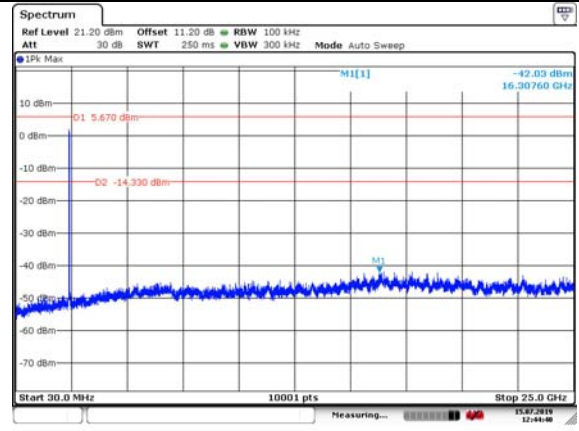
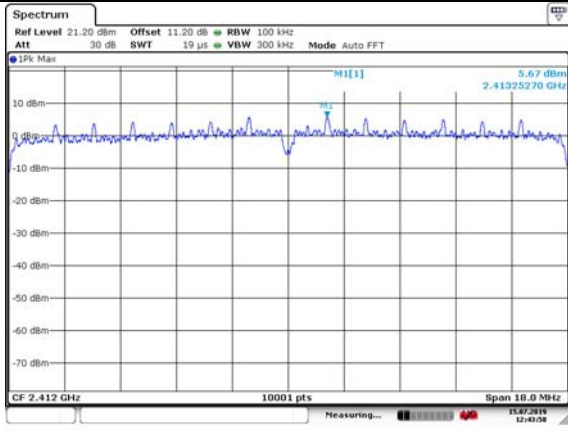


CH11

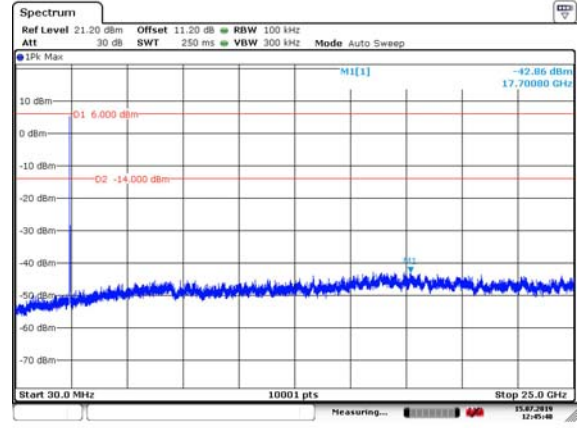
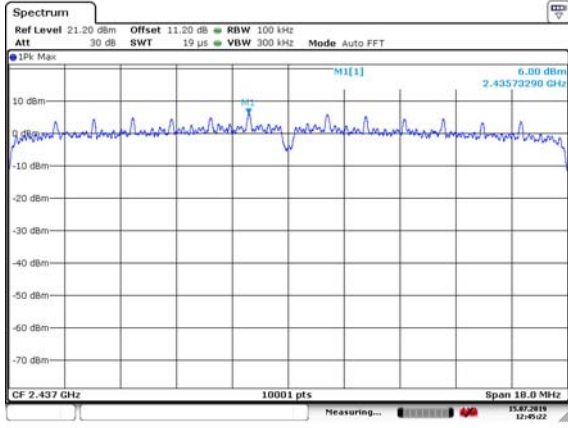


802.11n (20MHz) (MIMO Ant1)

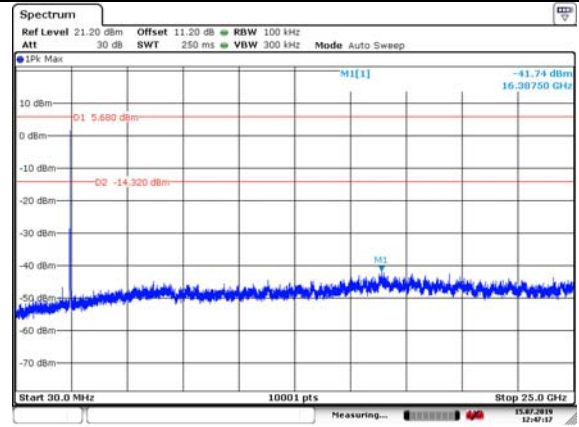
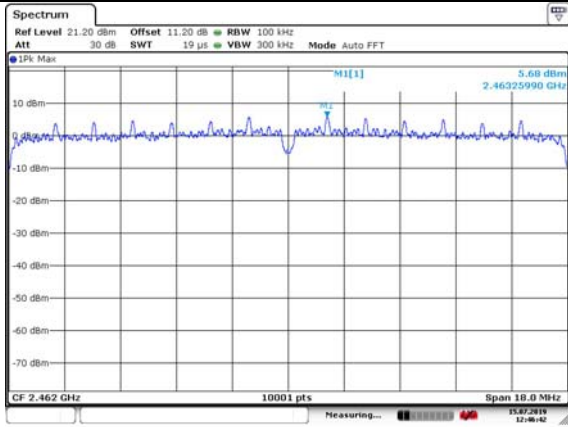
CH1



CH6

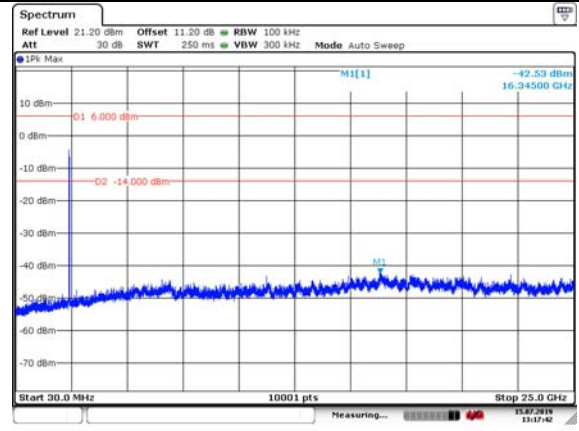
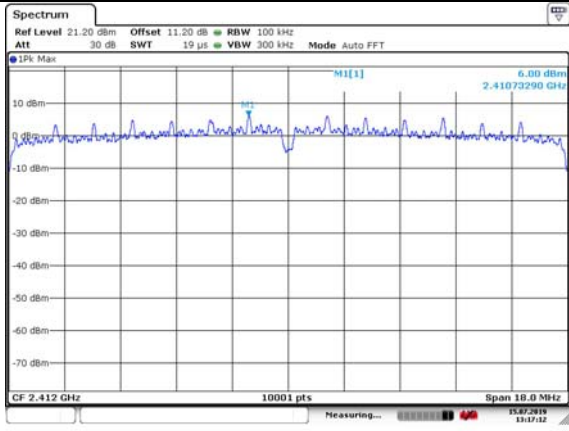


CH11

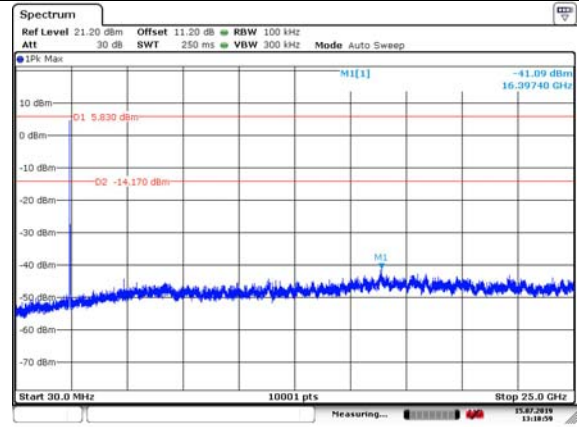
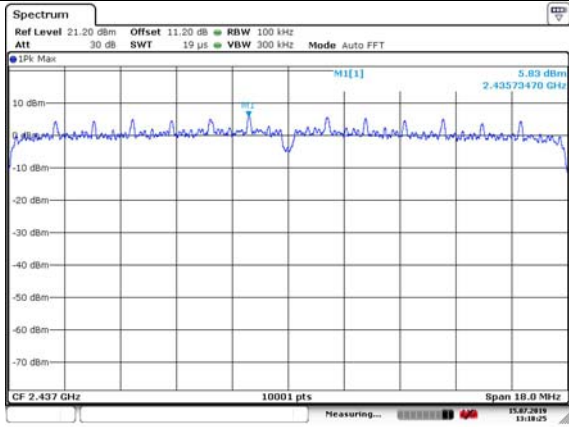


802.11n (20MHz) (MIMO Ant2)

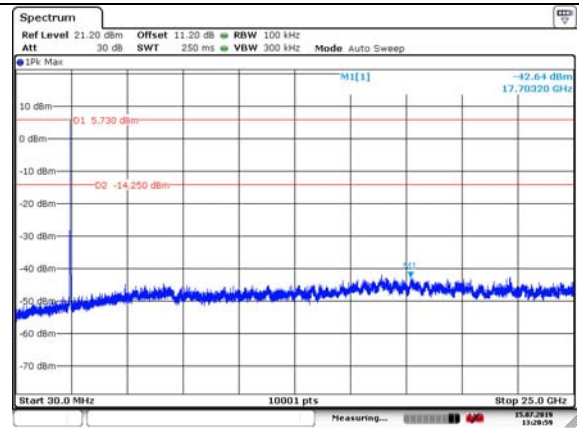
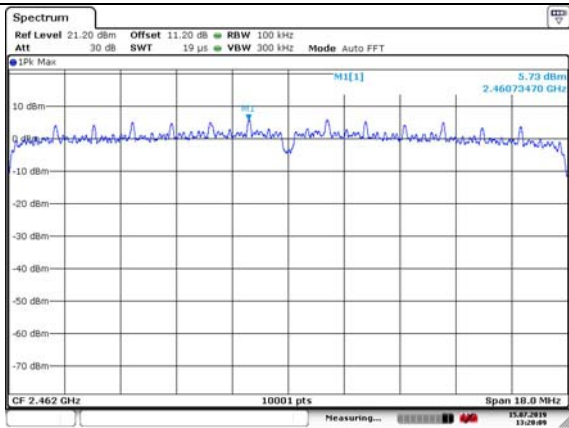
CH1



CH6

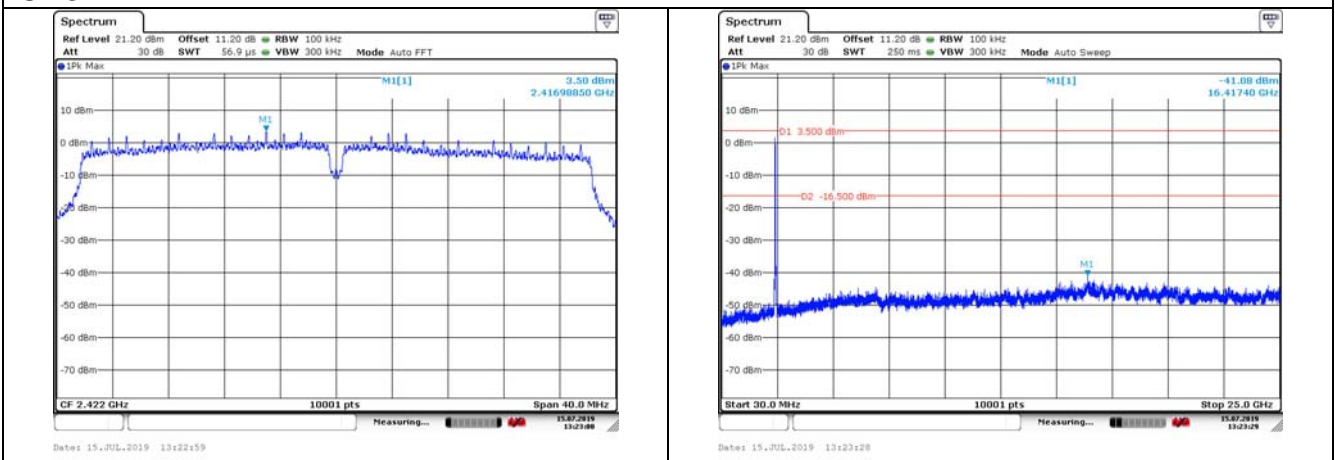


CH11

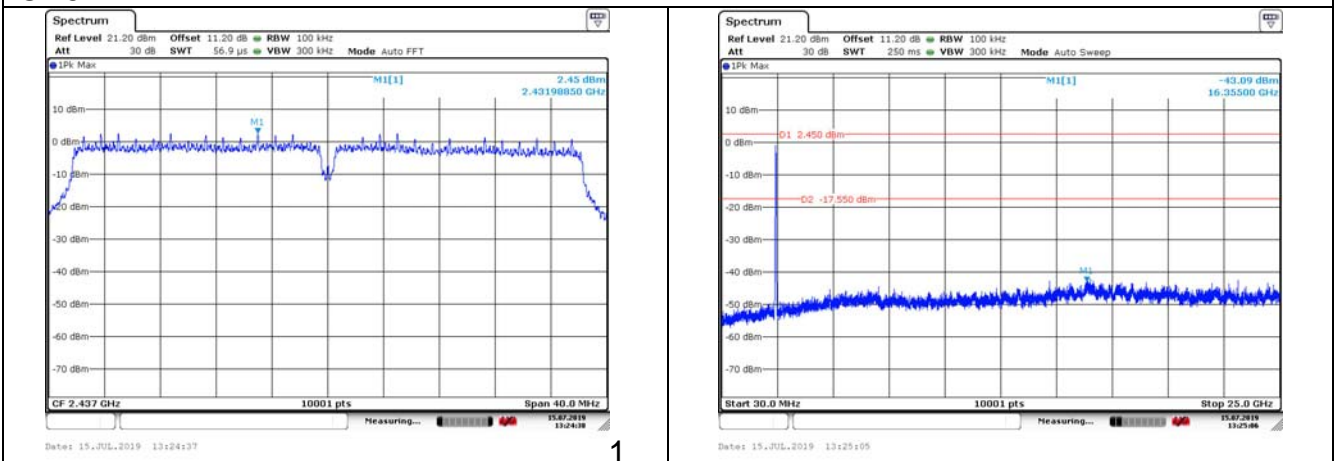


802.11n (40MHz) (SISO Ant2)

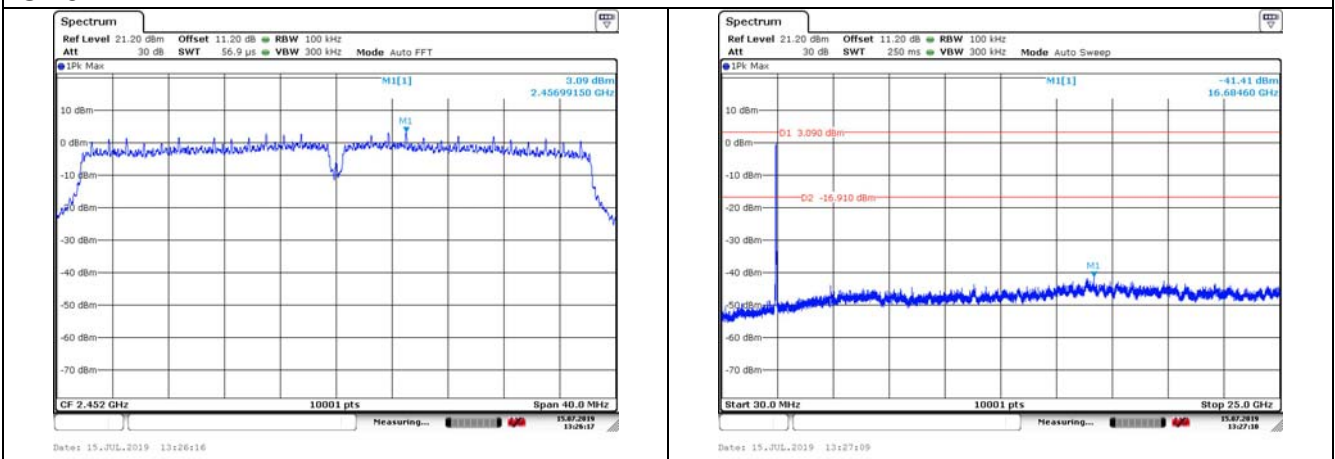
CH3



CH6

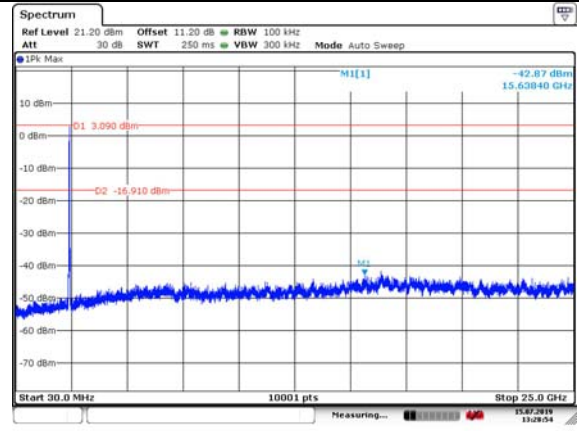
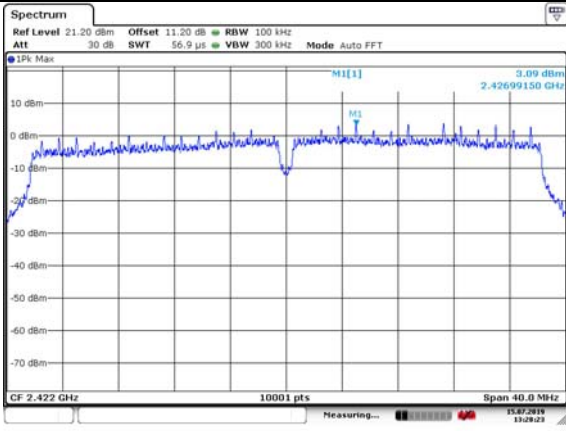


CH9



802.11n (40MHz) (MIMO Ant1)

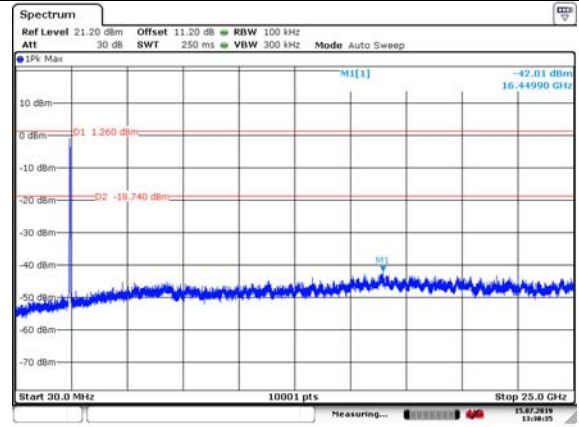
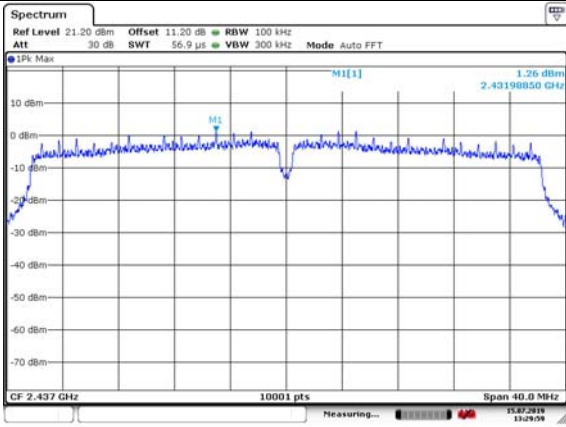
CH3



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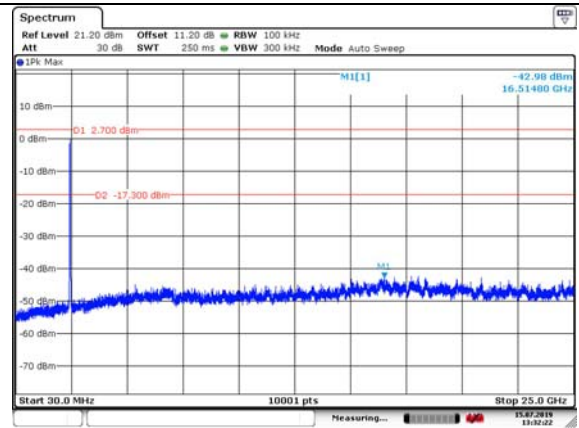
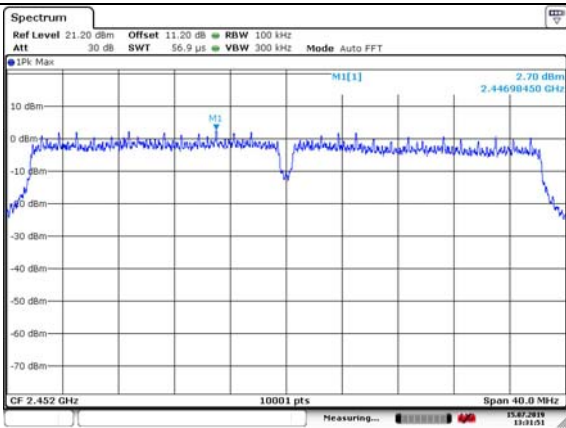
CH6



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Date: 15 JUL 2019 13:29:34

CH9

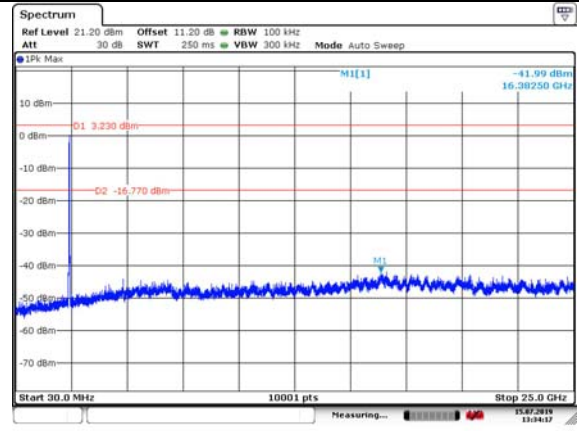
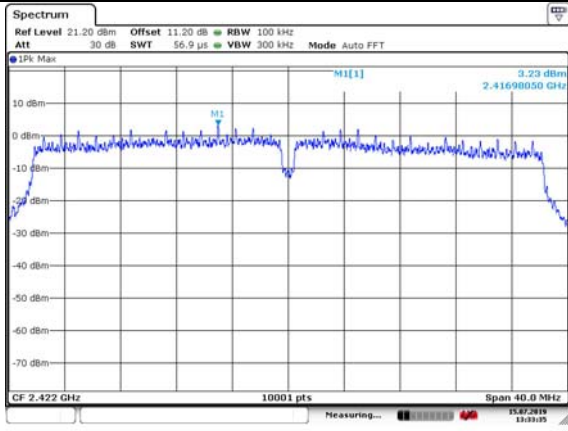


Date: 15 JUL 2019 13:31:51

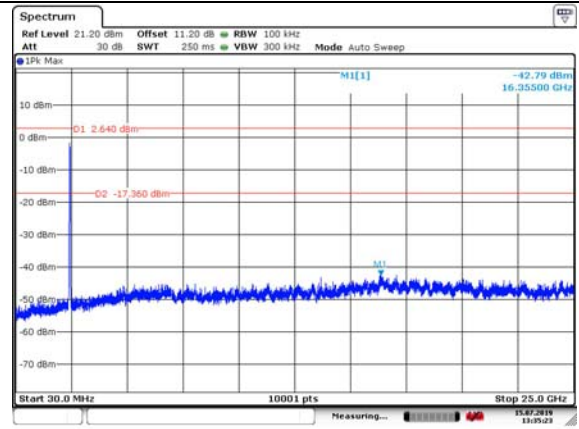
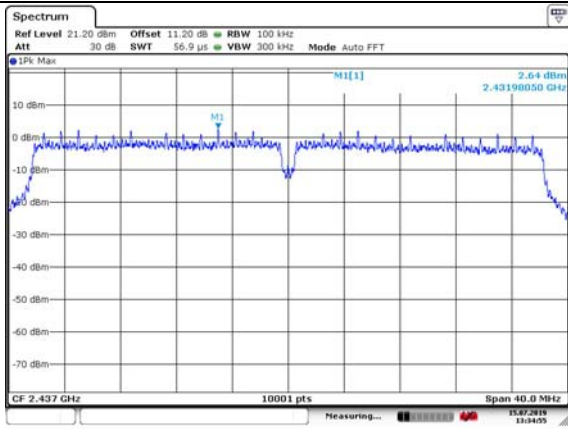
Date: 15 JUL 2019 13:32:21

802.11n (40MHz) (MIMO Ant2)

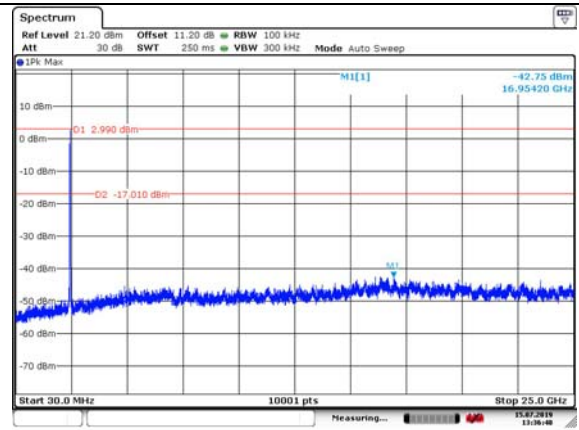
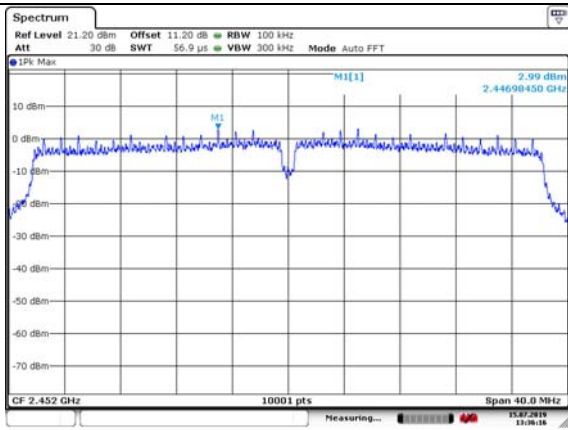
CH3



CH6



CH9

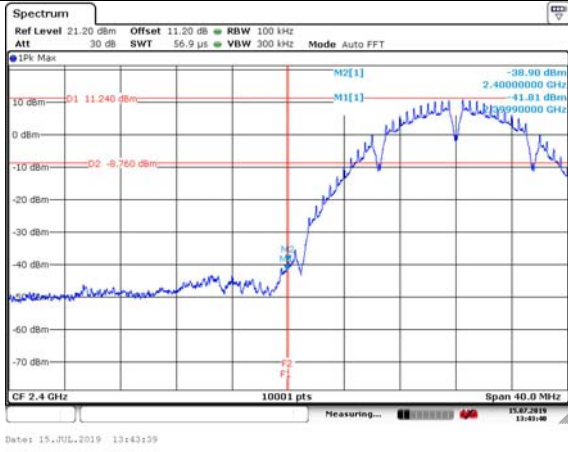


Band edge measurement (RF Conducted measurement)

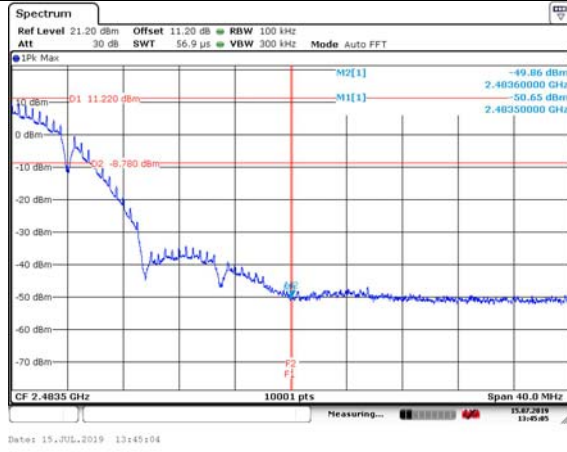
Offset 11.2dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.0dB

802.11b (SISO Ant2)

CH1

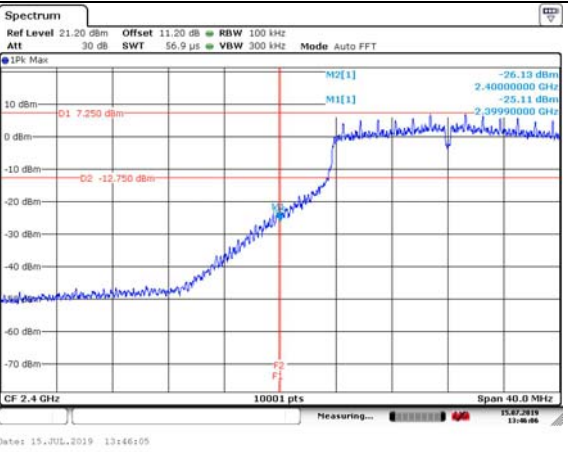


CH11

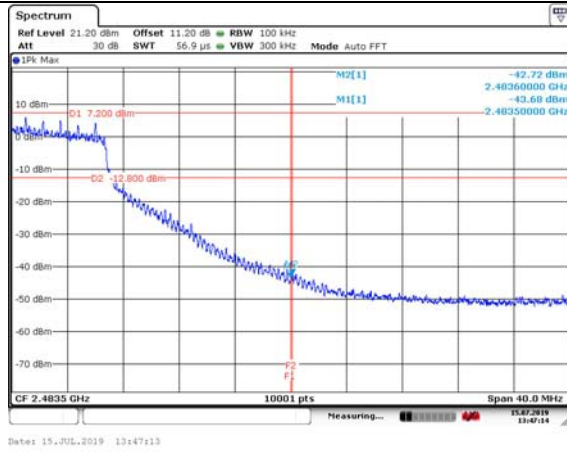


802.11g (SISO Ant2)

CH1

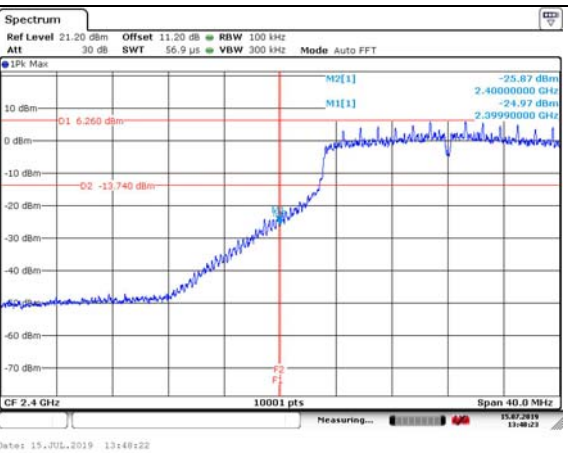


CH11

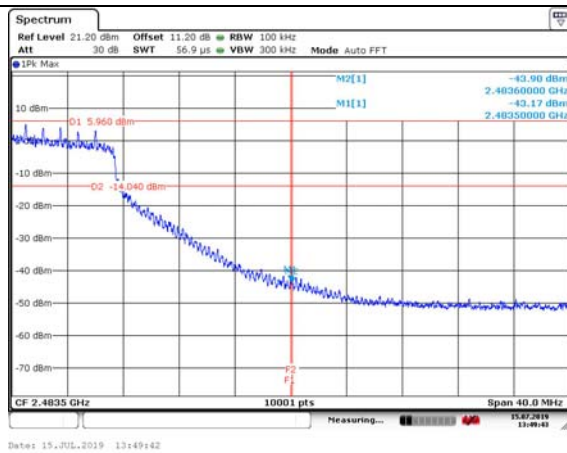


802.11n (20MHz) (SISO Ant2)

CH1

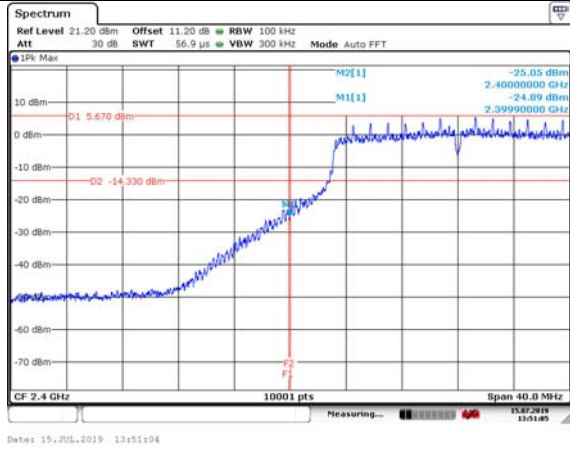


CH11

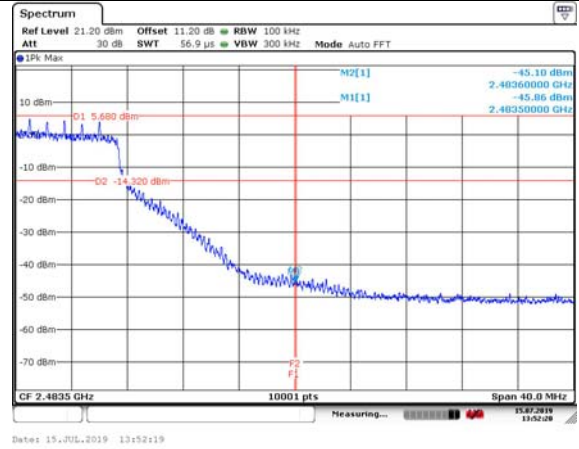


802.11n (20MHz)(MIMO Ant1)

CH1

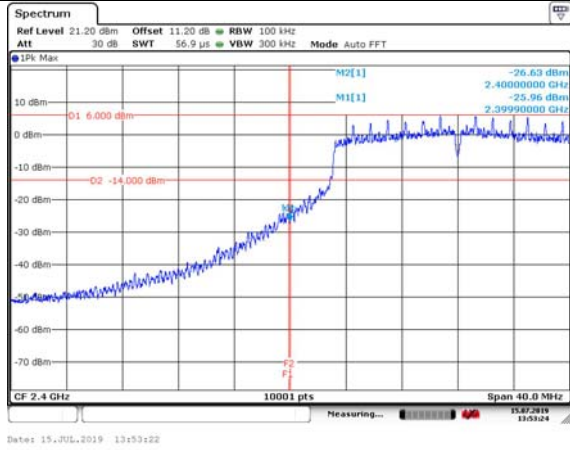


CH11

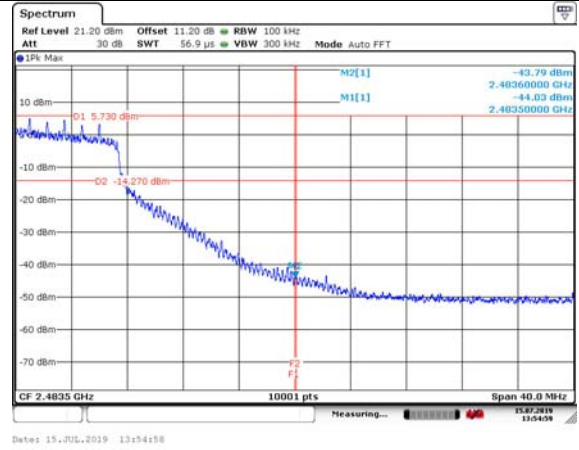


802.11n (20MHz) (MIMO Ant2)

CH1

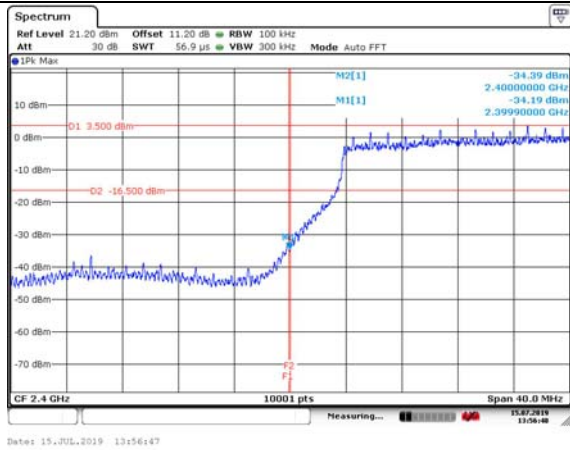


CH11

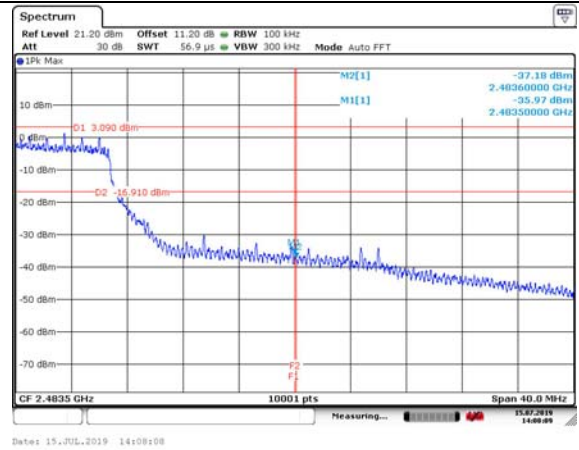


802.11n (40MHz) (SISO Ant2)

CH3

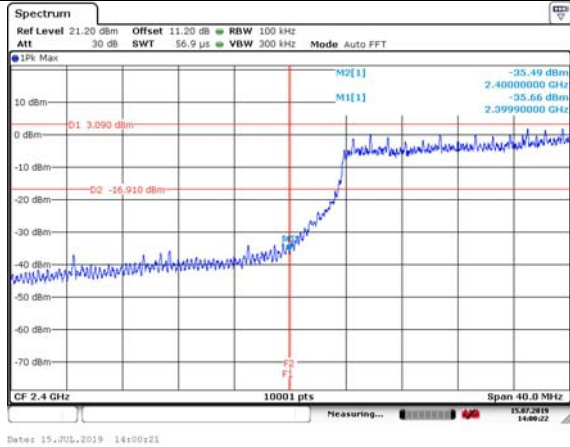


CH9

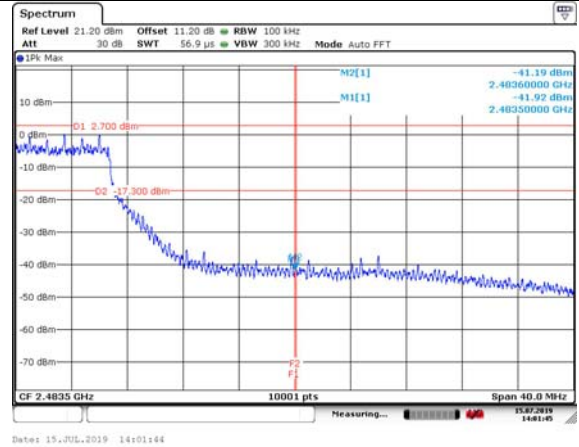


802.11n (40MHz)(MIMO Ant1)

CH3

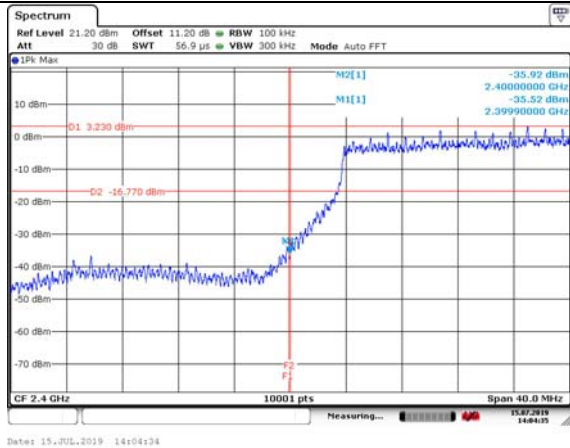


CH9



802.11n (40MHz) (MIMO Ant2)

CH3



CH9

