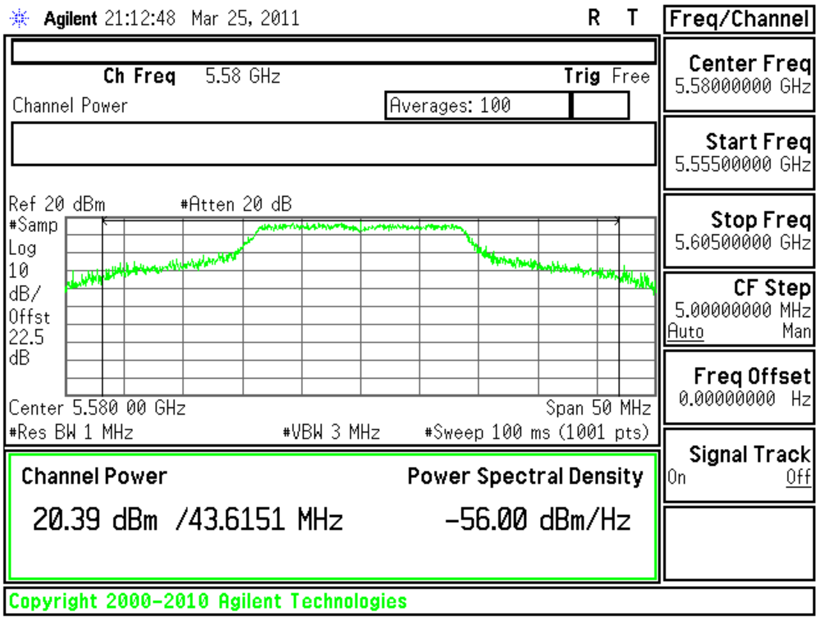
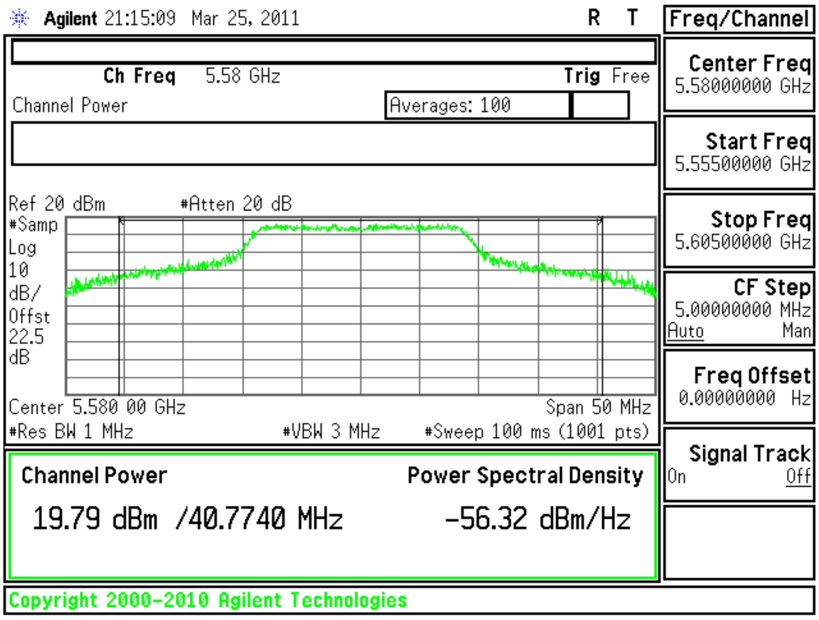
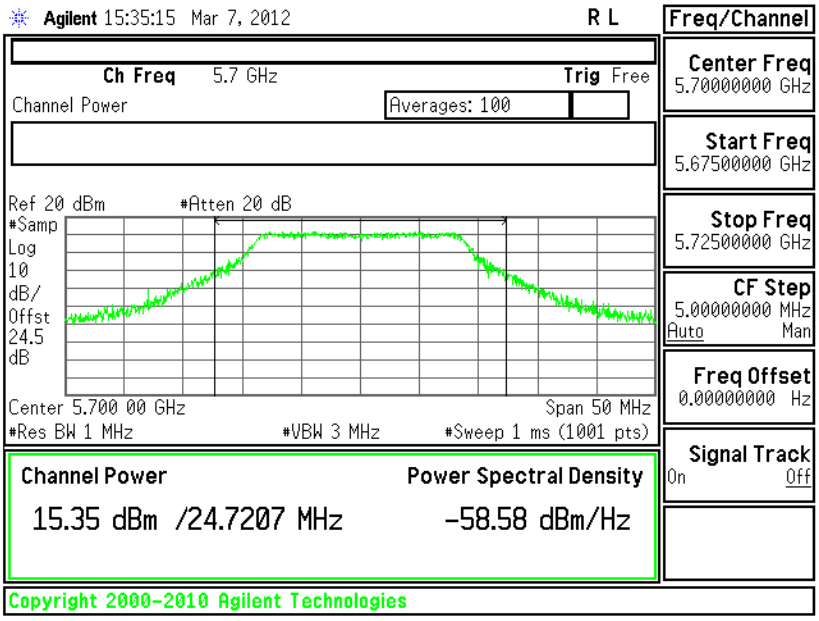
Conducted Output Power on 802.11n (BW 20MHz) Channel 116 - Chain A+B(A)



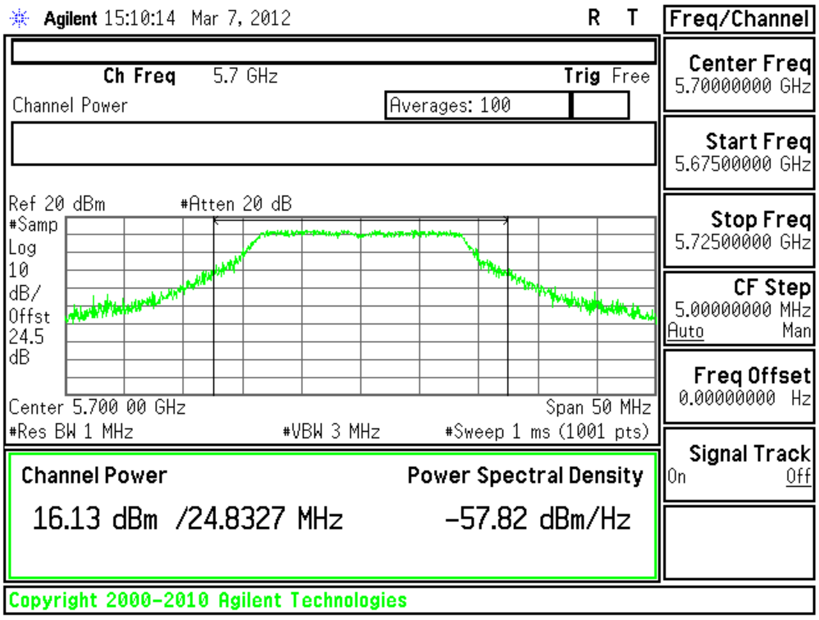
Conducted Output Power on 802.11n (BW 20MHz) Channel 116 - Chain A+B(B)



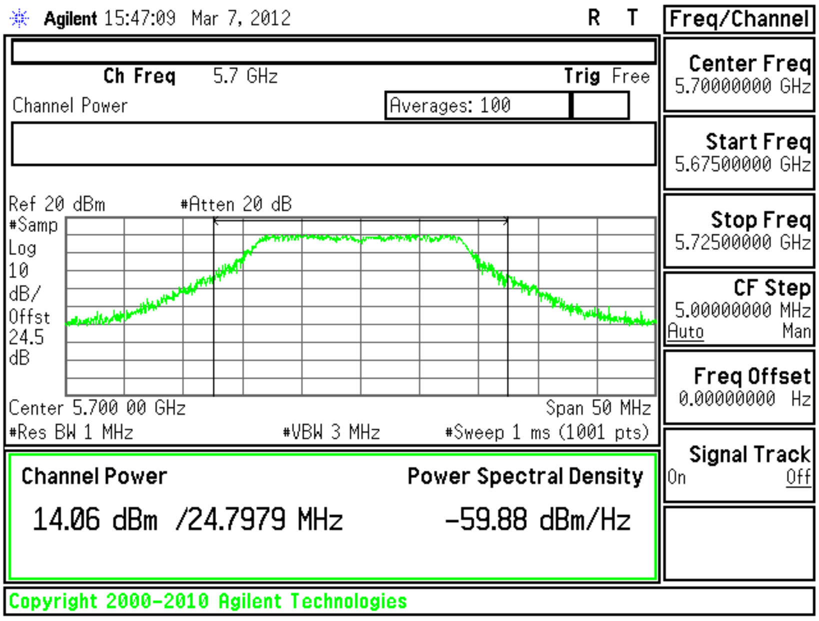
Conducted Output Power on 802.11n (BW 20MHz) Channel 140 - Chain A



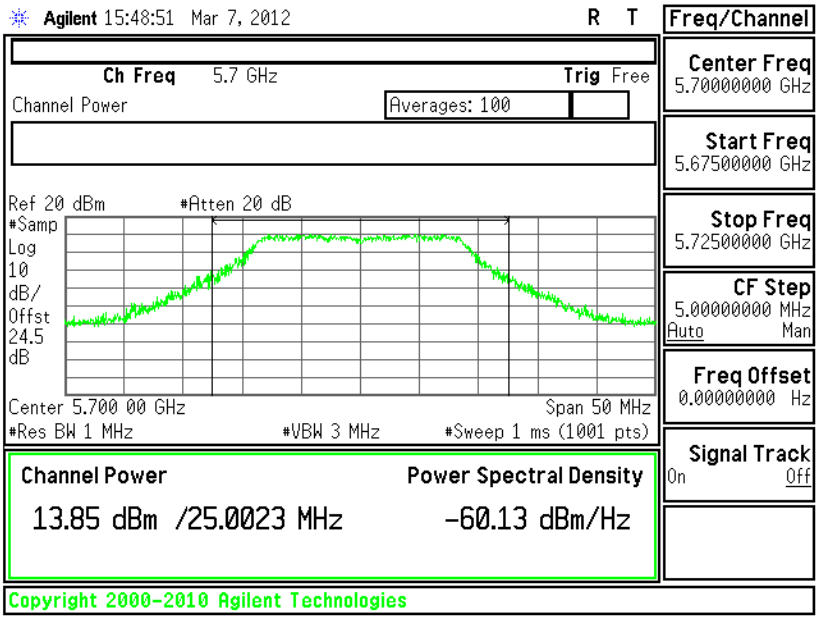
Conducted Output Power on 802.11n (BW 20MHz) Channel 140 - Chain B



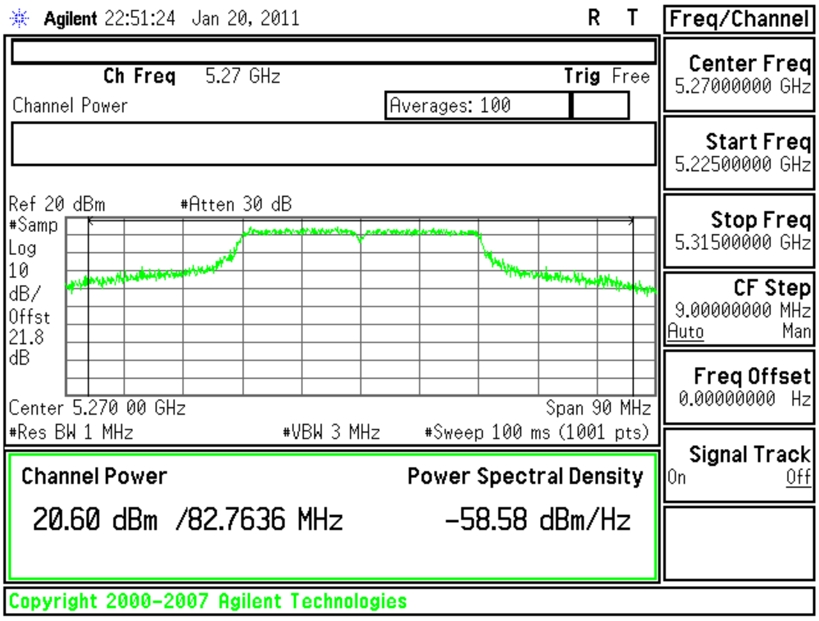
Conducted Output Power on 802.11n (BW 20MHz) Channel 140 - Chain A+B(A)



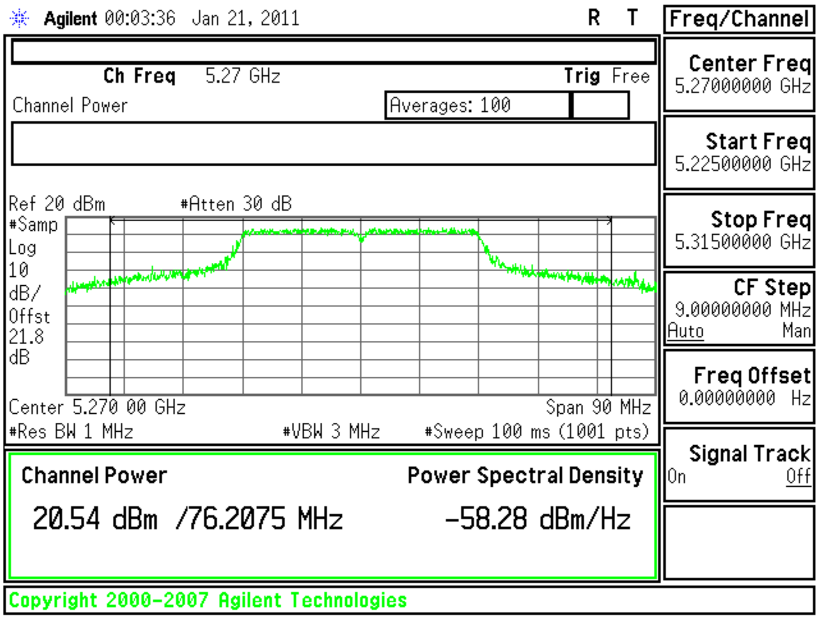
Conducted Output Power on 802.11n (BW 20MHz) Channel 140 - Chain A+B(B)



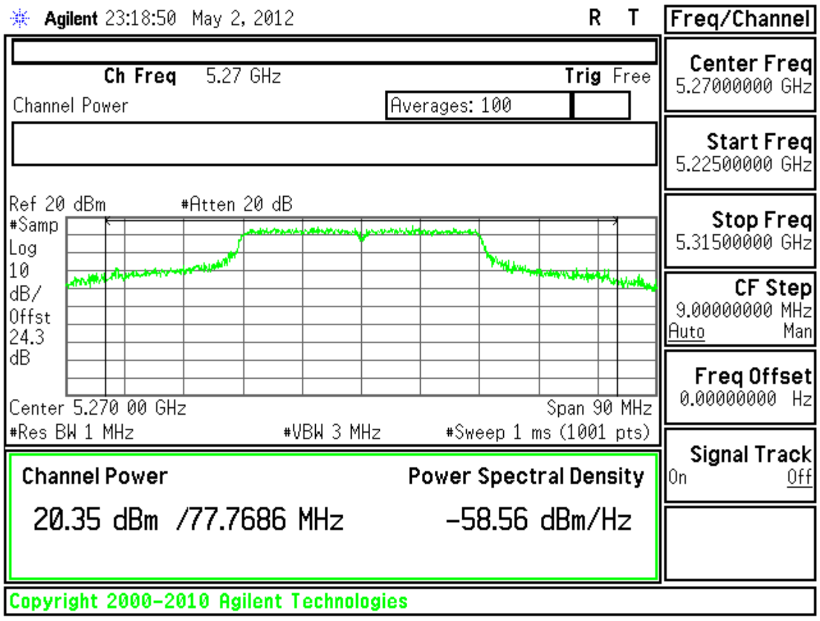
Conducted Output Power on 802.11n (BW 40MHz) Channel 54 - Chain A



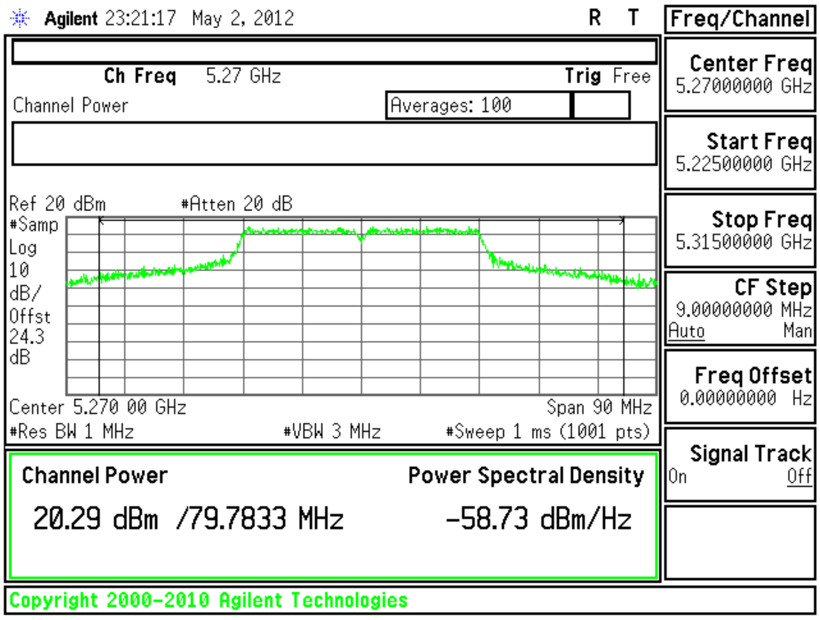
Conducted Output Power on 802.11n (BW 40MHz) Channel 54 - Chain B



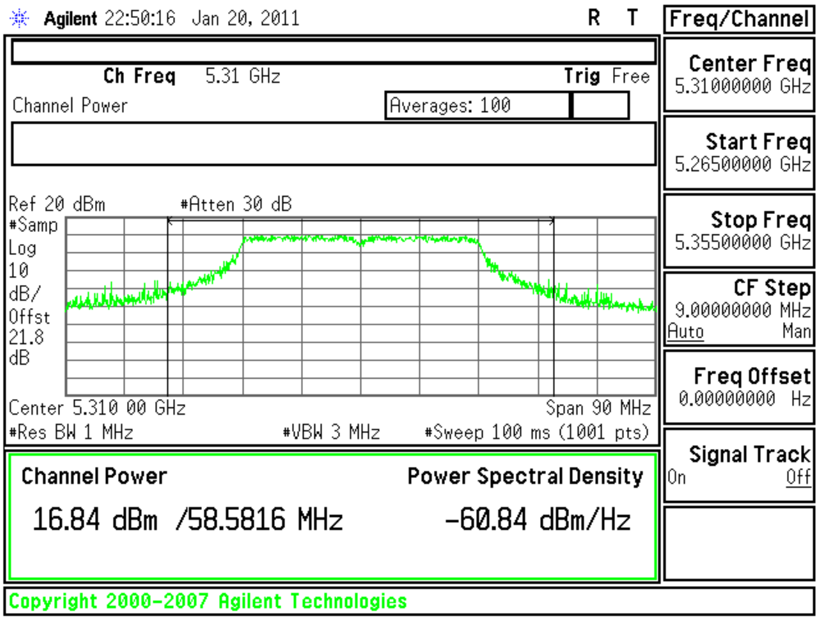
Conducted Output Power on 802.11n (BW 40MHz) Channel 54 - Chain A+B(A)



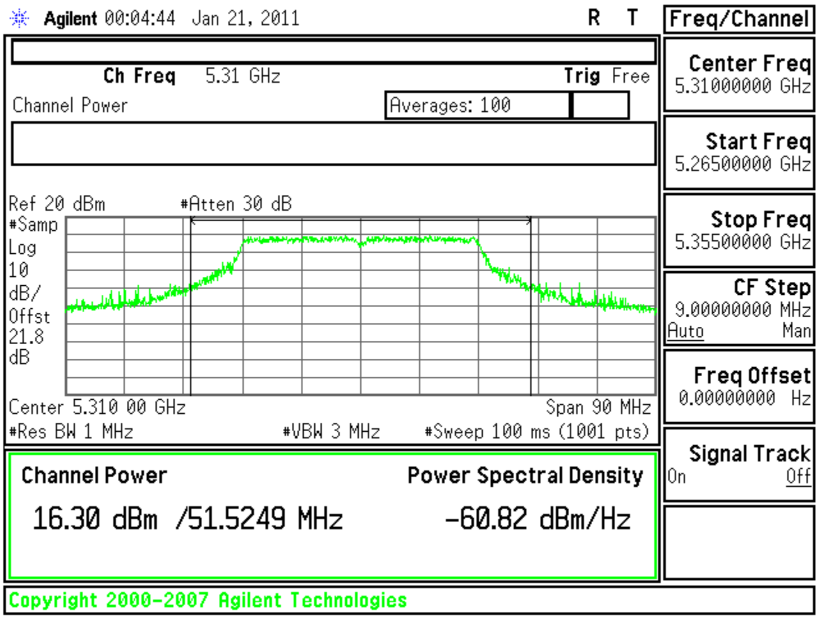
Conducted Output Power on 802.11n (BW 40MHz) Channel 54 - Chain A+B(B)



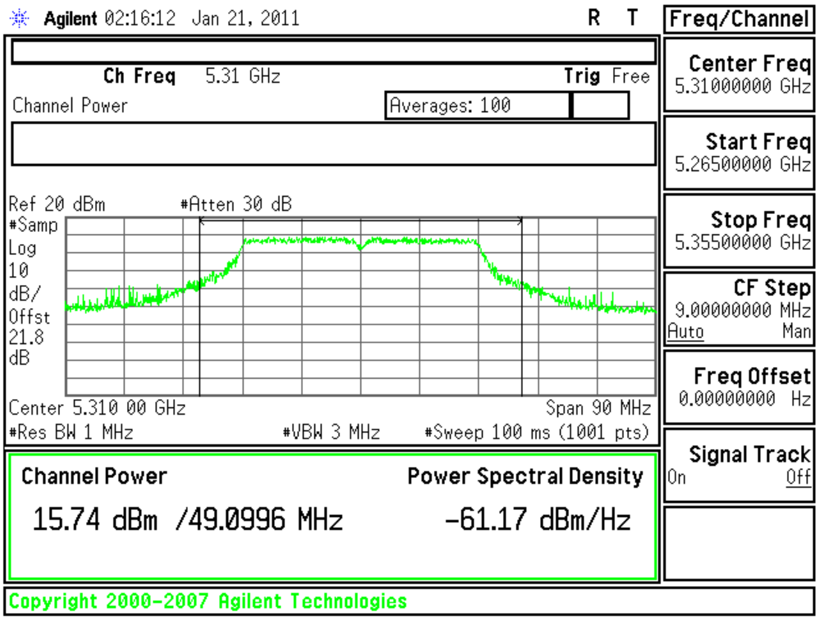
Conducted Output Power on 802.11n (BW 40MHz) Channel 62 - Chain A



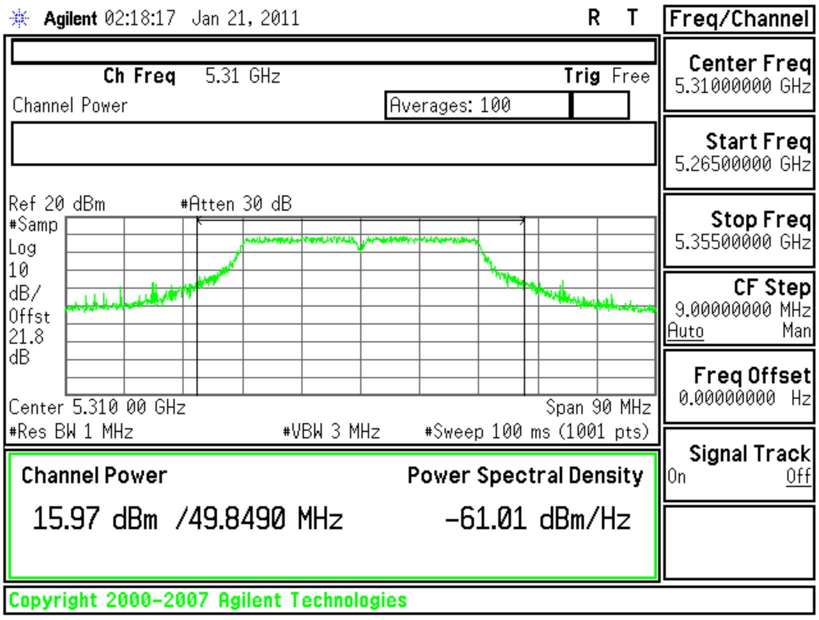
Conducted Output Power on 802.11n (BW 40MHz) Channel 62 - Chain B



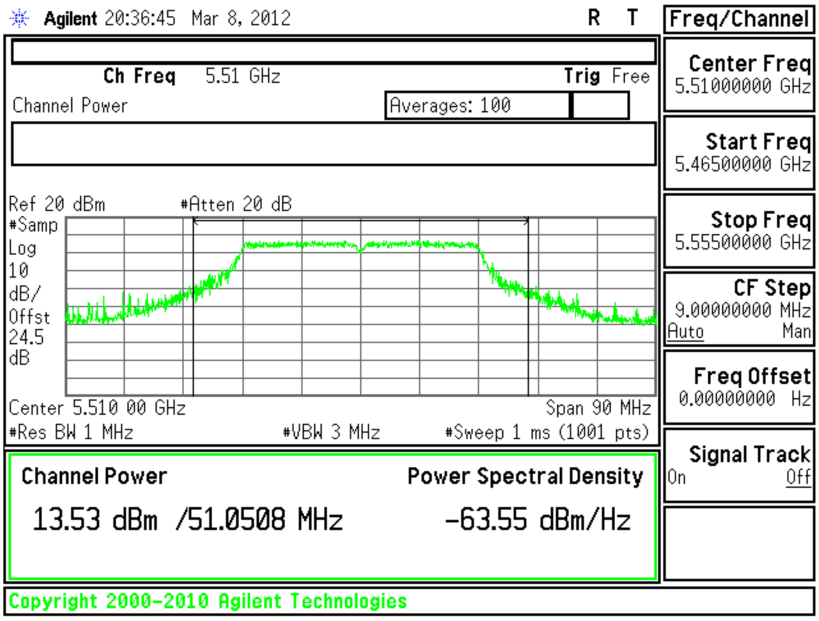
Conducted Output Power on 802.11n (BW 40MHz) Channel 62 - Chain A+B(A)



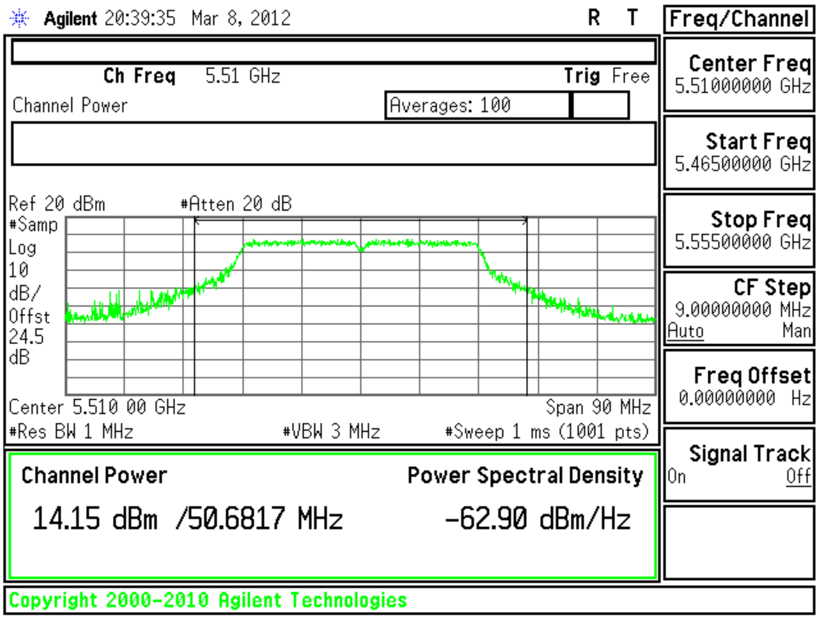
Conducted Output Power on 802.11n (BW 40MHz) Channel 62 - Chain A+B(B)



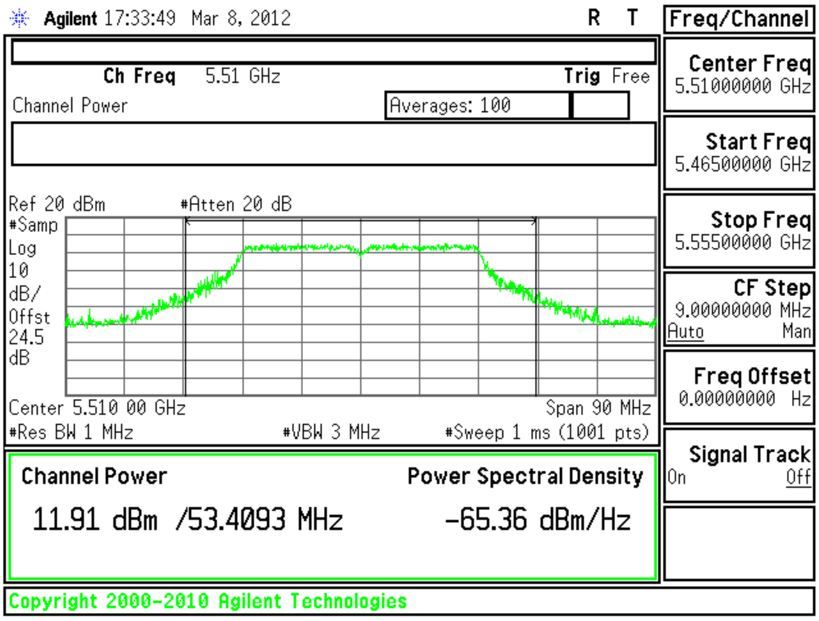
Conducted Output Power on 802.11n (BW 40MHz) Channel 102 - Chain A



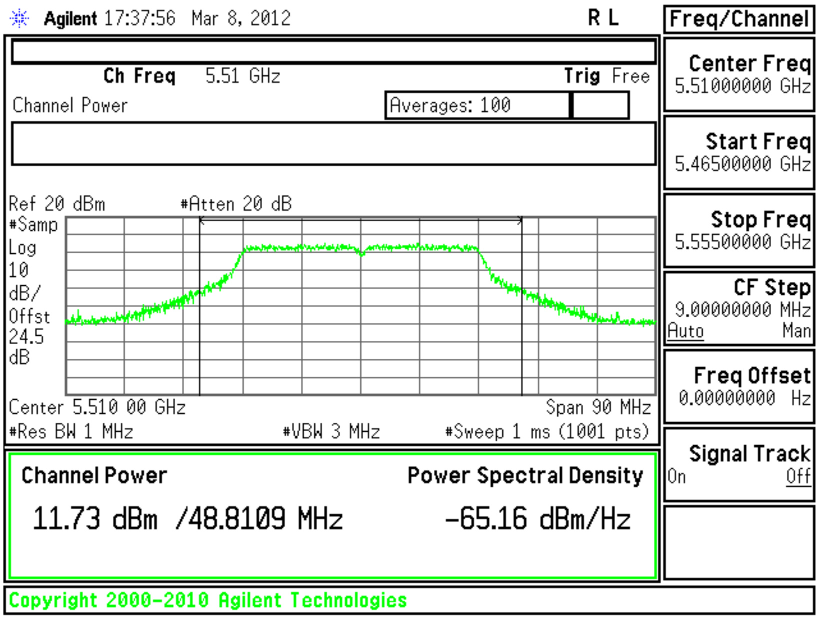
Conducted Output Power on 802.11n (BW 40MHz) Channel 102 - Chain B



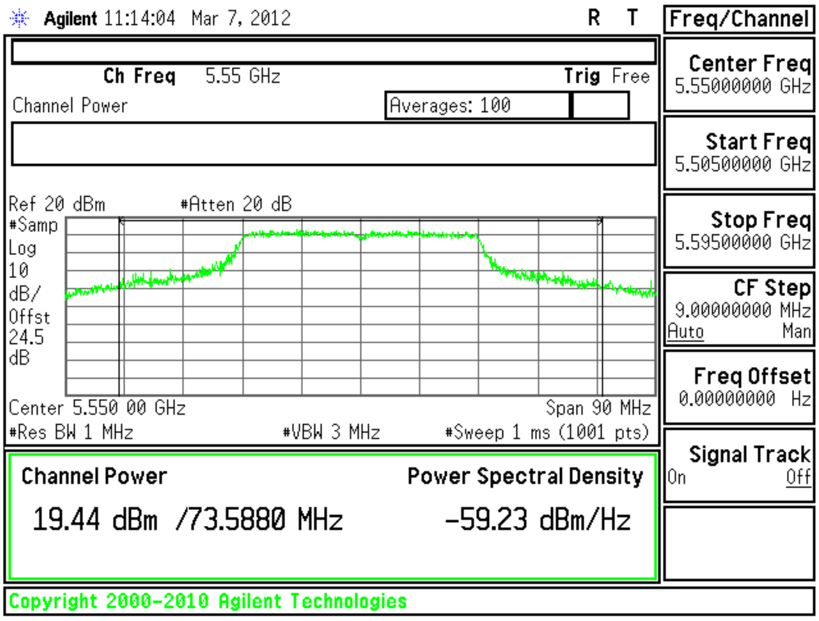
Conducted Output Power on 802.11n (BW 40MHz) Channel 102 - Chain A+B(A)



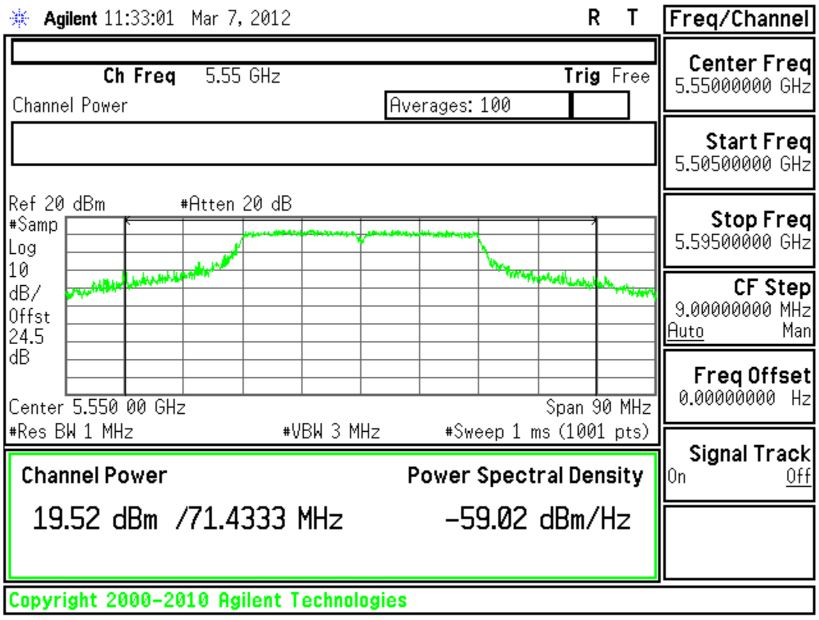
Conducted Output Power on 802.11n (BW 40MHz) Channel 102 - Chain A+B(B)



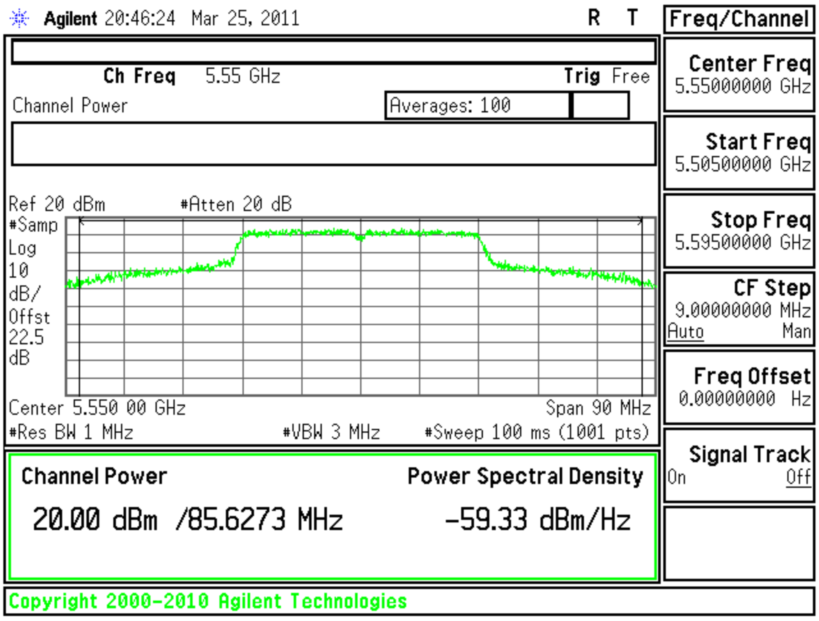
Conducted Output Power on 802.11n (BW 40MHz) Channel 110 - Chain A



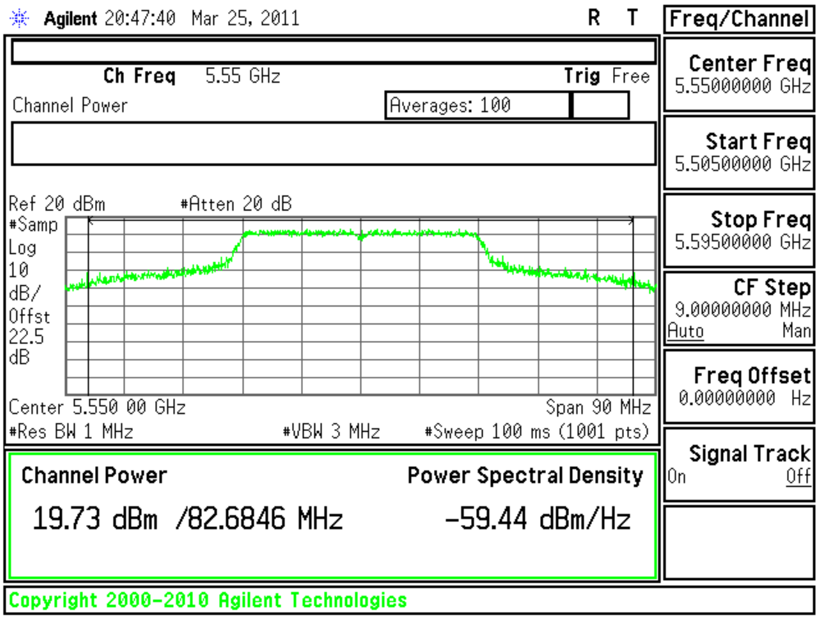
Conducted Output Power on 802.11n (BW 40MHz) Channel 110 - Chain B



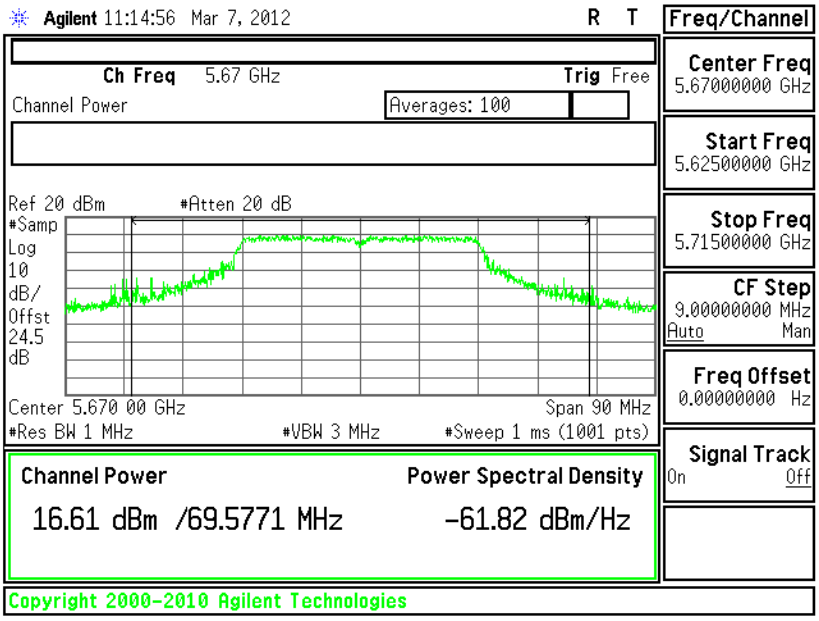
Conducted Output Power on 802.11n (BW 40MHz) Channel 110 - Chain A+B(A)



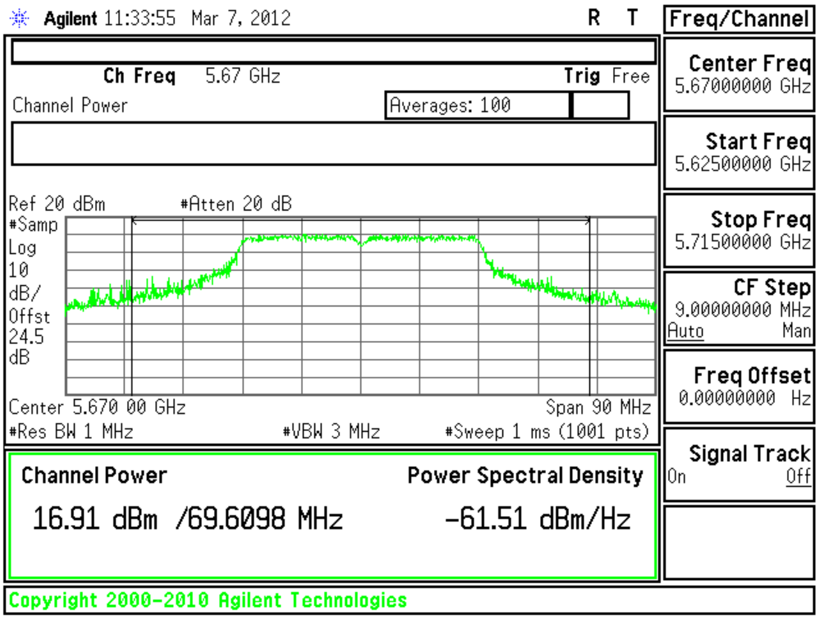
Conducted Output Power on 802.11n (BW 40MHz) Channel 110 - Chain A+B(B)



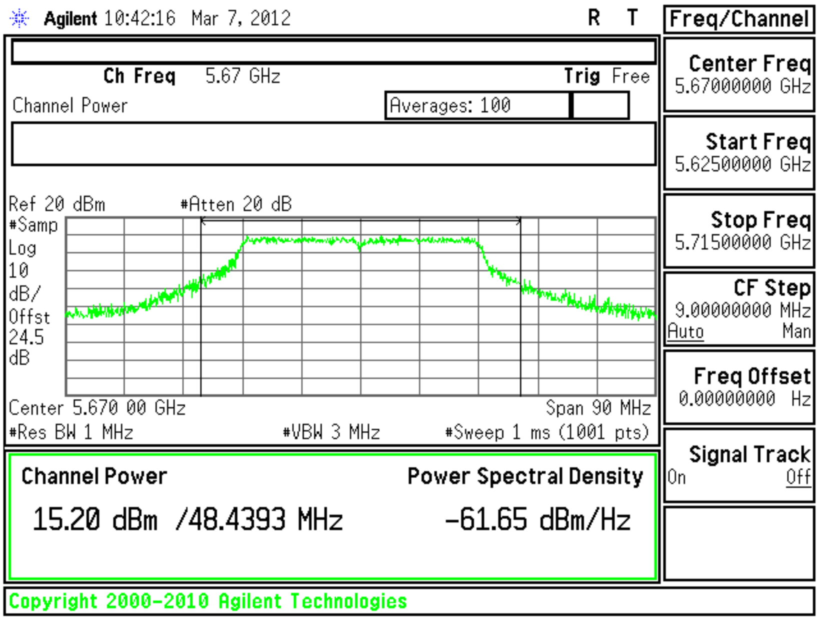
Conducted Output Power on 802.11n (BW 40MHz) Channel 134 - Chain A



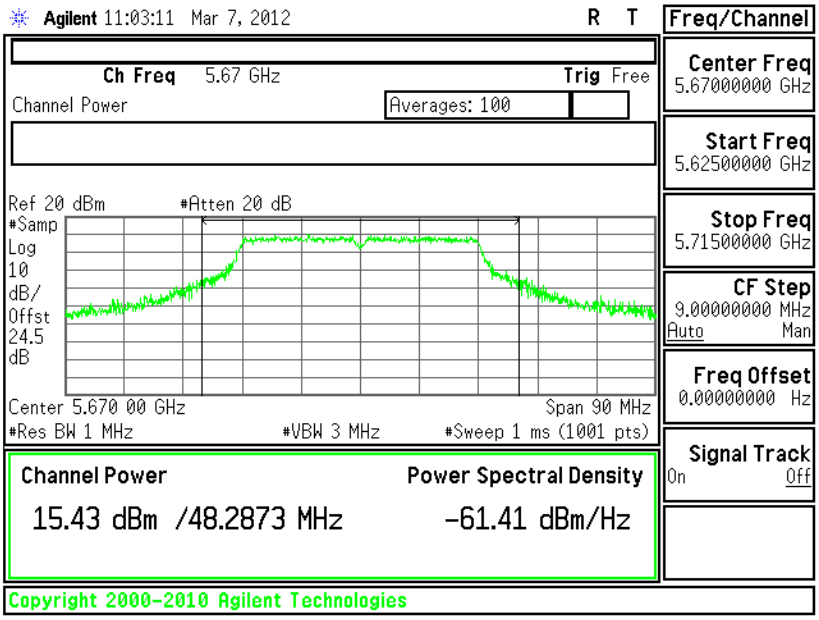
Conducted Output Power on 802.11n (BW 40MHz) Channel 134 - Chain B



Conducted Output Power on 802.11n (BW 40MHz) Channel 134 - Chain A+B(A)



Conducted Output Power on 802.11n (BW 40MHz) Channel 134 - Chain A+B(B)



3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 1MHz band. If transmitting antenna directional gain is greater than 6 dBi, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

The duty cycle of WLAN 802.11a/n Signal Mode Chain A was 95.92 % for 802.11a, Chain B was 96.83 % for 802.11a, Chain A was 96.64 % for 802.11n (BW 20MHz), Chain B was 96.83 % for 802.11n (BW 20MHz), Chain A was 91.89 % for 802.11n (BW 40MHz), and Chain B was 93.33 % for 802.11n (BW 40MHz).

The duty cycle of WLAN 802.11a/n Dual Mode for Chain A were 98.00 % for 802.11a, 97.75 % for 802.11n (BW 20MHz), and 95.15% for 802.11n (BW 40MHz).

The duty cycle of WLAN 802.11a/n Dual Mode for Chain B were 98.01 % for 802.11a, 97.69 % for 802.11n (BW 20MHz), and 94.96% for 802.11n (BW 40MHz).

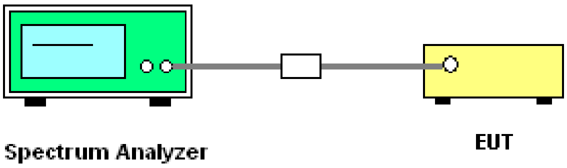
1. The testing follows Method SA-2 of FCC KDB 789033 D01 General UNII Test Procedures v01r01.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 1 MHz.
   - Set VBW ≥ 3 MHz.
   - Number of points in sweep ≥ 2 Span / RBW.
   - Sweep time = auto.
   - Detector = sample detector
   - Trace average at least 100 traces in power averaging mode.
   - Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.
   - Use the Peak search function to find out the maximum value.

2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The cable loss and attenuator loss are offset / entered into the Spectrum Analyzer, as below examples,
   (1) For SISO mode, only chain A or chain B transmits signals at a time.
   For 802.11a Channel 52 Chain A, the measured power is 8.52 dBm which is the reading of spectrum analyzer with offset cable loss, and attenuator loss, The duty factor (95.92% / 0.18dB) is also added, so the final result comes to 8.70 dBm.
   (2) For MIMO mode, each chain was tested follows FCC KDB Publication No. 662911 D01 Multiple Transmitter Output v01r01.There are two test methods.
   If measurements performed using method (2) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

   (a) Method (1):
   Measure and sum the spectra across the outputs.
   the total final Power Spectral Density is from a device with 2 transmitter outputs, the spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.
   (b) Method (2):
   Measure and add 10 log (N) dB, where N is the number of outputs. (N=2)
   For example:
   (a) Method (1) for MIMO mode, the 802.11a Channel 60 Chain A+B: The measured Power Spectral Density is 10.88 dBm which is offset with cable loss, and attenuator. The duty factor (97.64% / 0.10dB) is also added, so the final result comes to 10.98dBm.

   (b) Method (2) for 802.11a Channel 56 Chain A+B: the total final Power Spectral Density is 10.73 dBm from the formula of 7.72+10 log (2).

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

<Antenna 3 for 4.5V>

Test Mode :	Mode 1~6	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

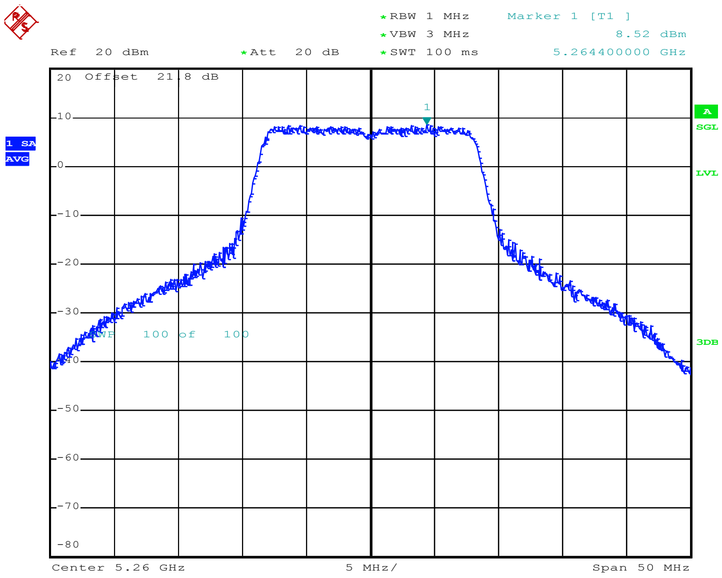
Channel	Frequency (MHz)	802.11a Measured PSD (dBm) SISO Chain A	802.11a Measured PSD (dBm) SISO Chain B	Max. Limits (dBm)	Pass/Fail
52	5260	8.70	8.66	11	Pass
60	5300	10.78	10.68	11	Pass
64	5320	8.2	8.54	11	Pass
100	5500	3.3	5.21	11	Pass
116	5580	10.96	10.88	11	Pass
140	5700	0.72	3.51	11	Pass

<DUTY CYCLE AND DUTY FACTOR>

Mode		Data rate	Duty Cycle (%)	Duty Factor (dB)
Chain A	11a	6M	95.9	0.18
	11n (BW 20MHz)	MCS0	96.6	0.15
	11n (BW 40MHz)	MCS0	91.9	0.37
Chain B	11a	6M	96.8	0.14
	11n (BW 20MHz)	MCS0	96.8	0.14
	11n (BW 40MHz)	MCS0	93.3	0.30
Chain A+B (A)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.8	0.10
	11n (BW 40MHz)	MCS8	95.0	0.22
Chain A+B (B)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.7	0.10
	11n (BW 40MHz)	MCS8	95.1	0.22

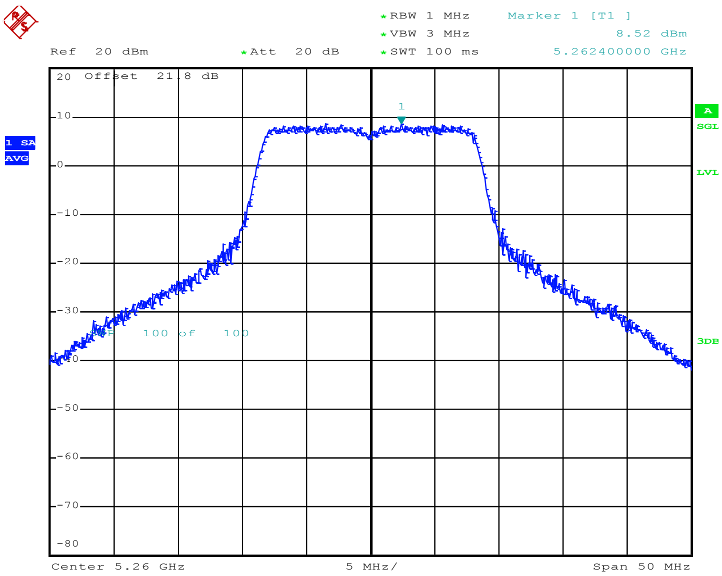
Note: The duty factor is also added to all the final result.

PSD Plot on 802.11a Channel 52 - Chain A



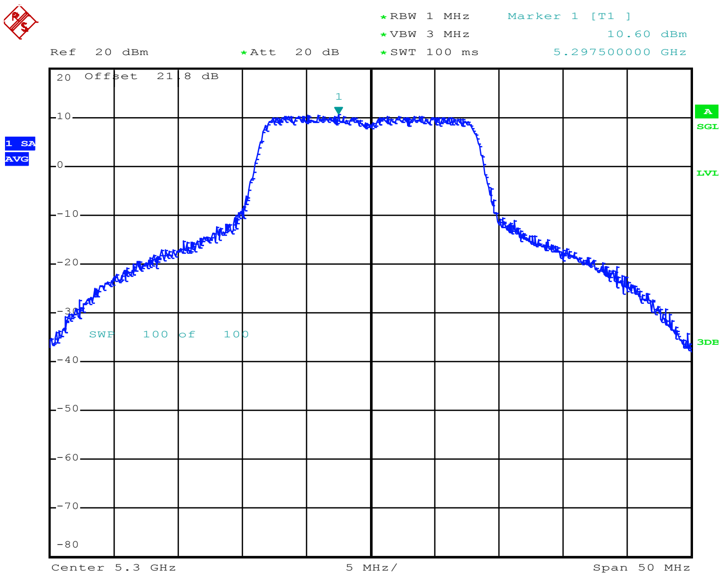
Date: 18.NOV.2010 04:22:02

PSD Plot on 802.11a Channel 52 - Chain B



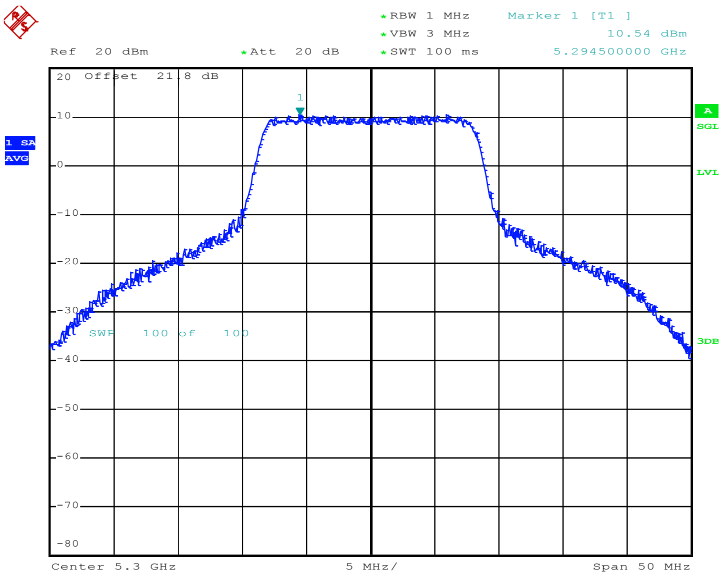
Date: 18.NOV.2010 04:56:55

PSD Plot on 802.11a Channel 60 - Chain A



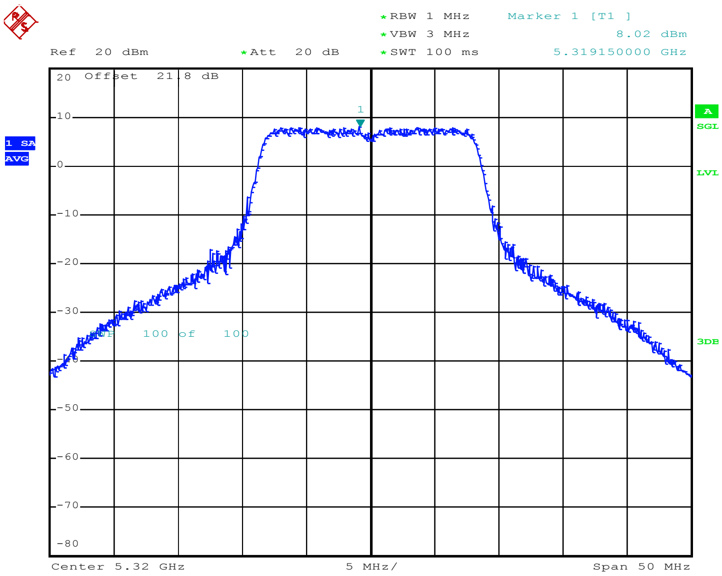
Date: 19.JUL.2011 09:03:51

PSD Plot on 802.11a Channel 60 - Chain B



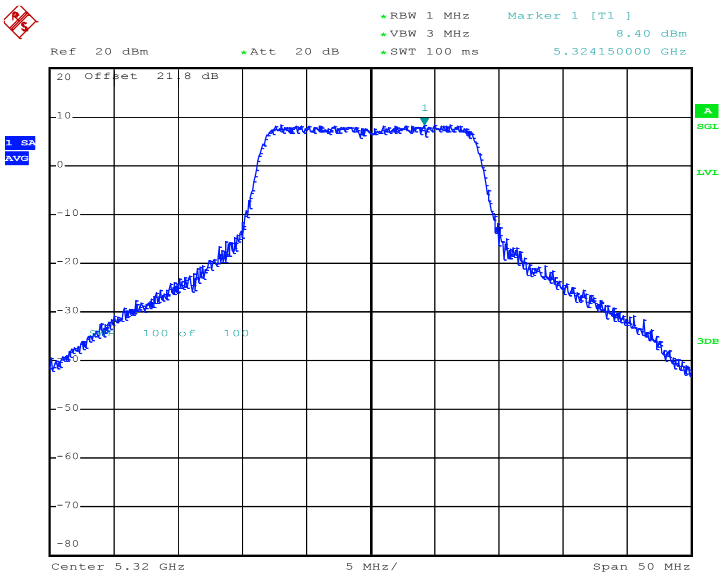
Date: 18.NOV.2010 04:58:32

PSD Plot on 802.11a Channel 64 - Chain A



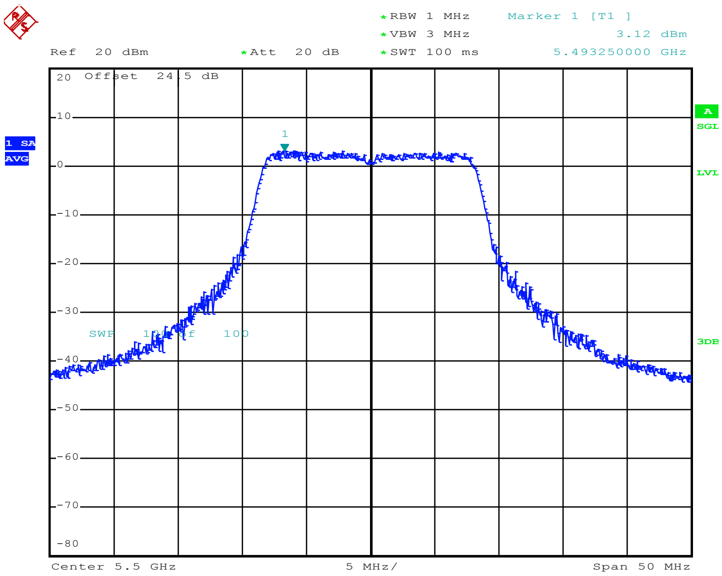
Date: 18.NOV.2010 04:32:15

PSD Plot on 802.11a Channel 64 - Chain B



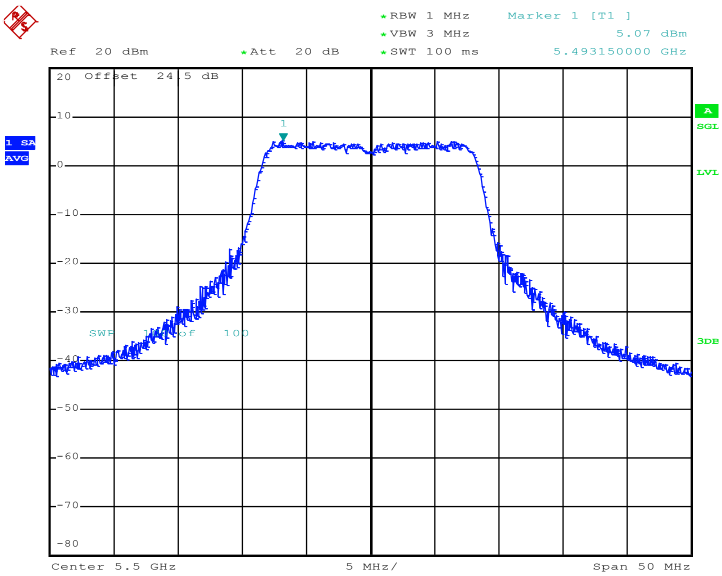
Date: 18.NOV.2010 05:01:09

PSD Plot on 802.11a Channel 100 - Chain A



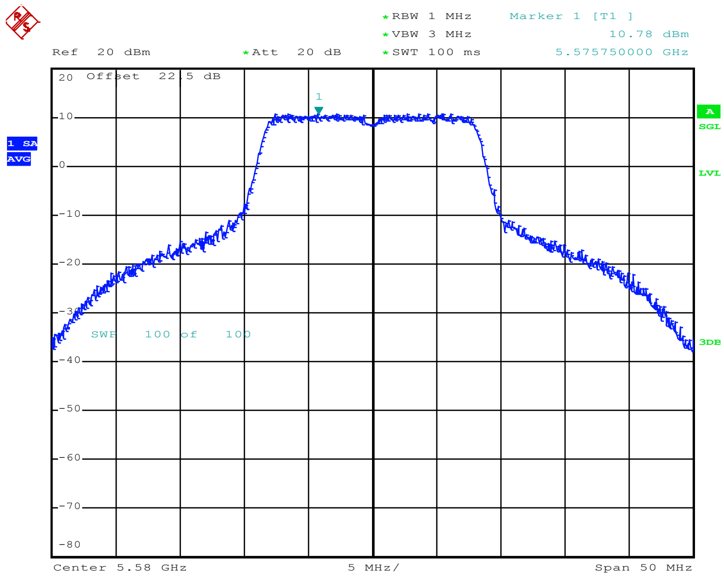
Date: 4.MAR.2012 08:45:57

PSD Plot on 802.11a Channel 100 - Chain B



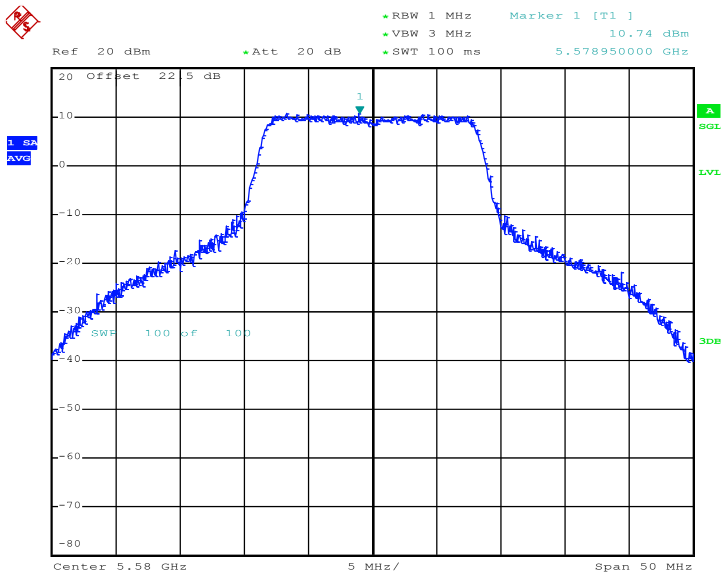
Date: 4.MAR.2012 09:18:47

PSD Plot on 802.11a Channel 116 - Chain A



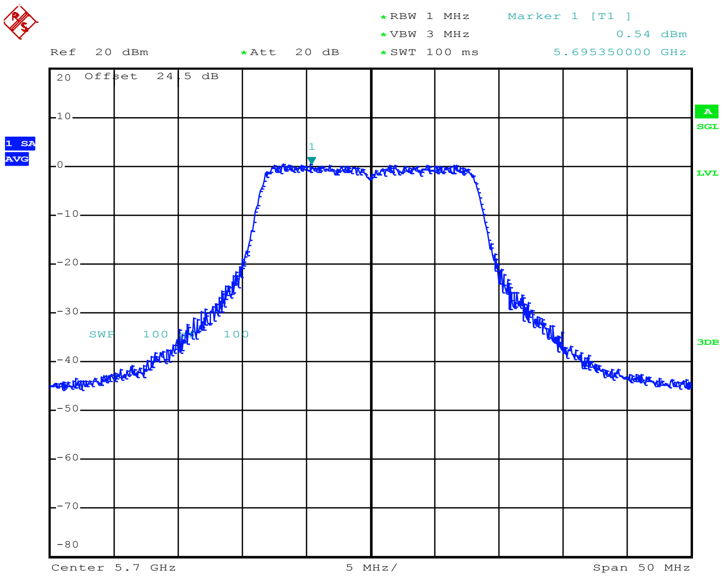
Date: 19.JUL.2011 09:21:45

PSD Plot on 802.11a Channel 116 - Chain B



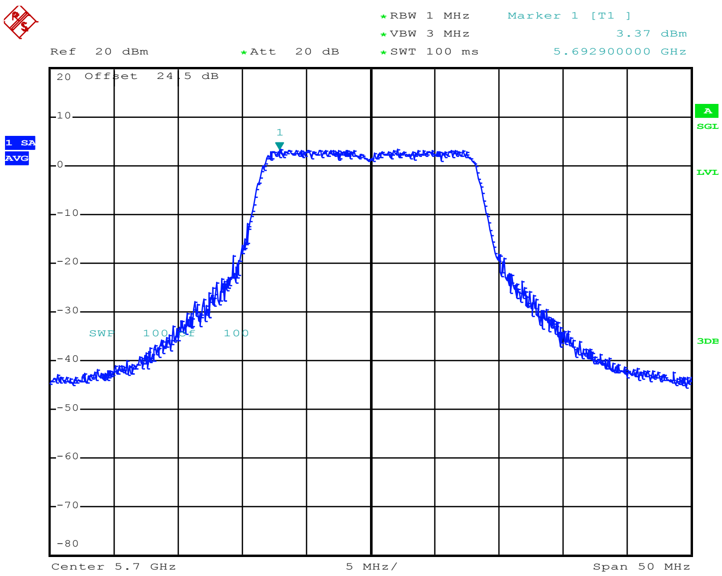
Date: 19.JUL.2011 09:26:58

PSD Plot on 802.11a Channel 140 - Chain A



Date: 4.MAR.2012 08:46:55

PSD Plot on 802.11a Channel 140 - Chain B



Date: 4.MAR.2012 09:09:11

Test Mode :	Mode 7~12	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n (BW 20MHz) Measured PSD (dBm)		Max. Limits (dBm)	Pass/Fail
		SISO			
		Chain A	Chain B		
52	5260	9.28	8.95	11	Pass
60	5300	8.3	8.74	11	Pass
64	5320	8.03	7.54	11	Pass
100	5500	2.73	4.88	11	Pass
116	5580	10.49	10.51	11	Pass
140	5700	0.22	3.68	11	Pass

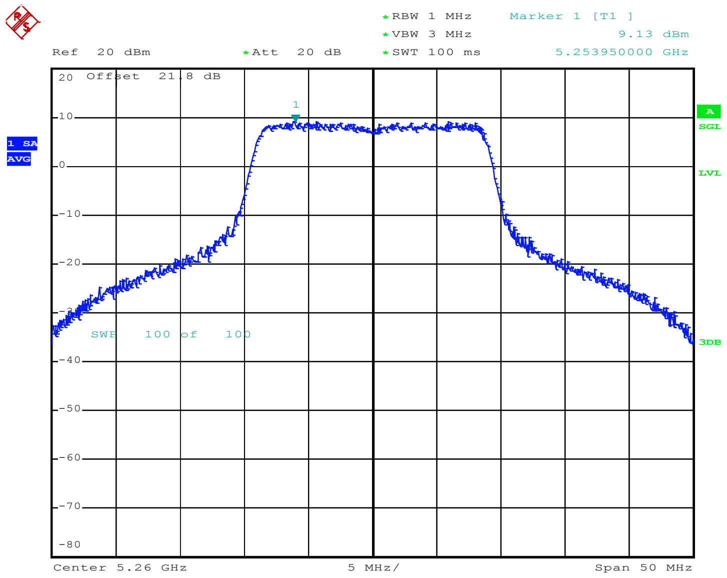
.

<DUTY CYCLE AND DUTY FACTOR>

Mode		Data rate	Duty Cycle (%)	Duty Factor (dB)
Chain A	11a	6M	95.9	0.18
	11n (BW 20MHz)	MCS0	96.6	0.15
	11n (BW 40MHz)	MCS0	91.9	0.37
Chain B	11a	6M	96.8	0.14
	11n (BW 20MHz)	MCS0	96.8	0.14
	11n (BW 40MHz)	MCS0	93.3	0.30
Chain A+B (A)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.8	0.10
	11n (BW 40MHz)	MCS8	95.0	0.22
Chain A+B (B)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.7	0.10
	11n (BW 40MHz)	MCS8	95.1	0.22

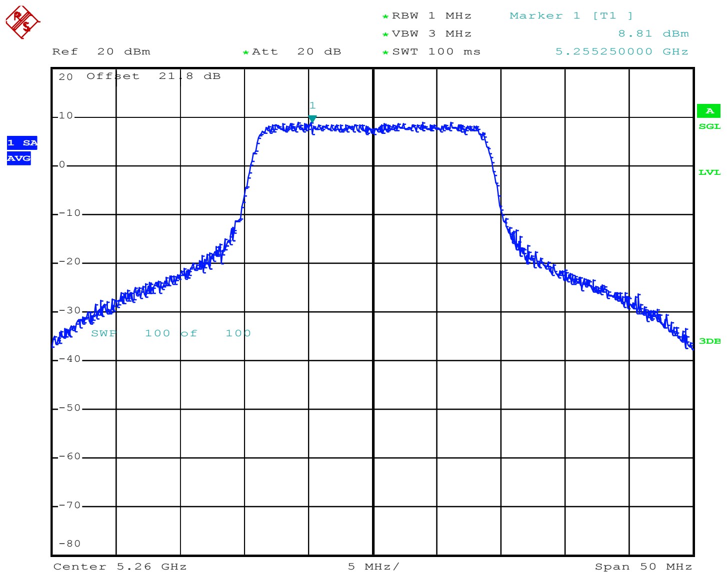
Note: The duty factor is also added to all the final result.

PSD Plot on 802.11n (BW 20MHz) Channel 52 - Chain A



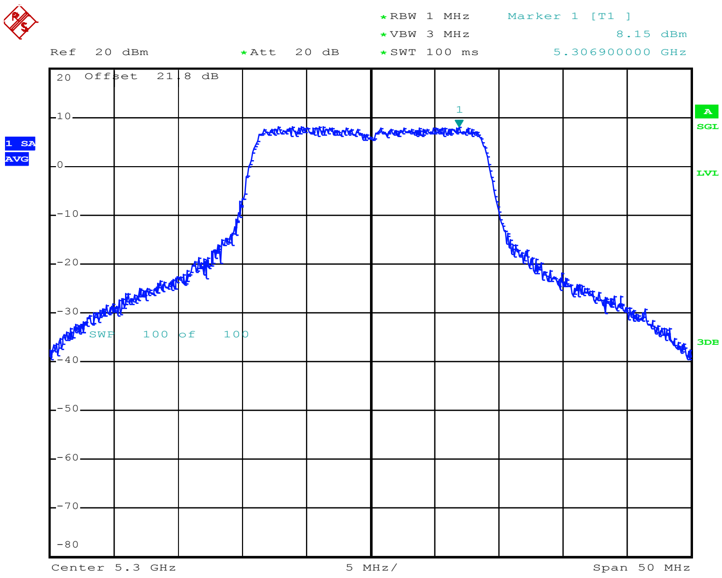
Date: 18.NOV.2010 05:49:09

PSD Plot on 802.11n (BW 20MHz) Channel 52 - Chain B



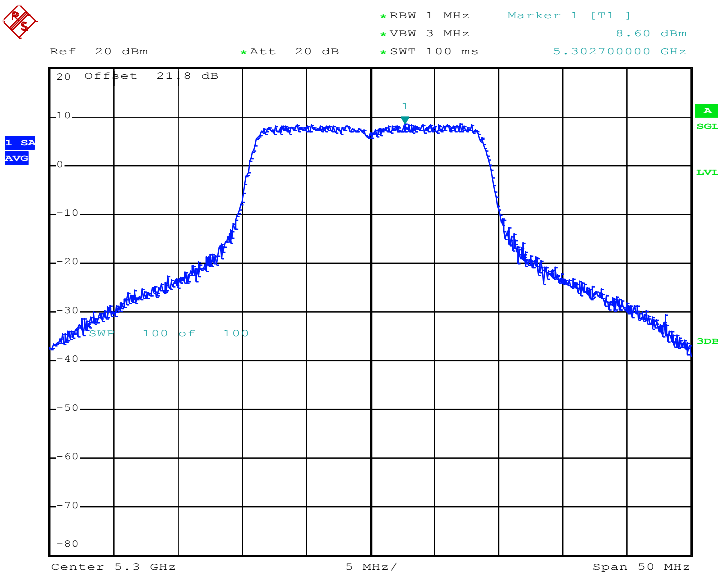
Date: 18.NOV.2010 05:21:55

PSD Plot on 802.11n (BW 20MHz) Channel 60 - Chain A



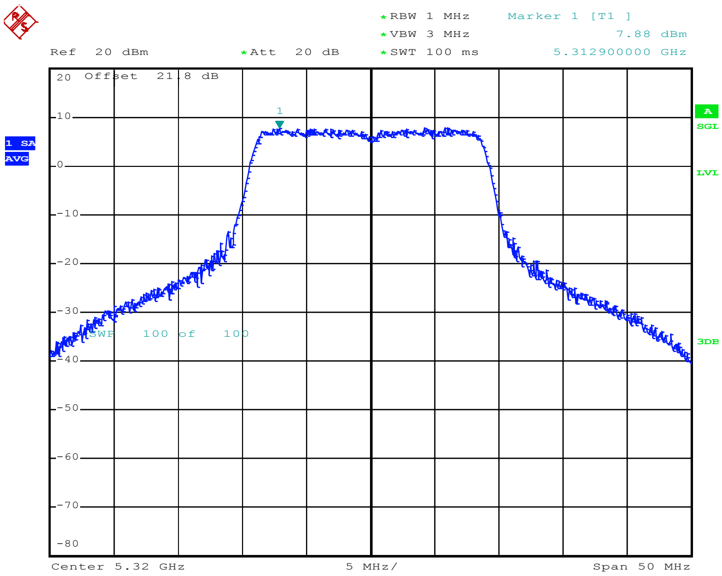
Date: 18.NOV.2010 05:50:42

PSD Plot on 802.11n (BW 20MHz) Channel 60 - Chain B



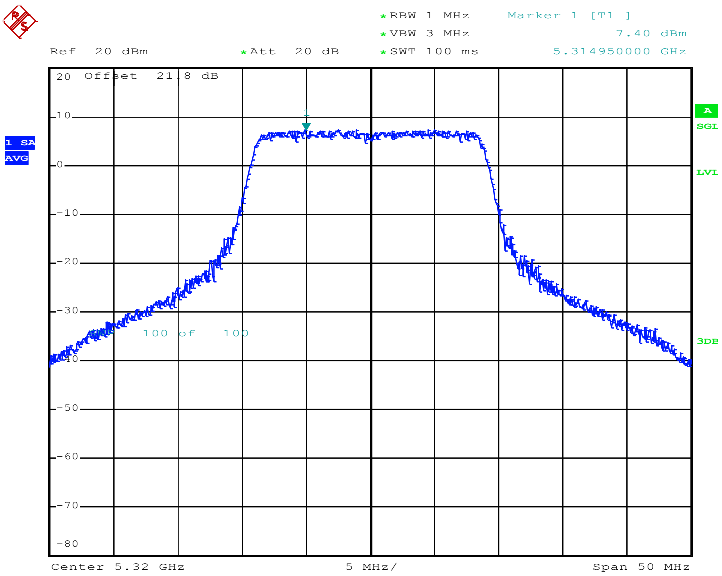
Date: 18.NOV.2010 05:24:26

PSD Plot on 802.11n (BW 20MHz) Channel 64 - Chain A



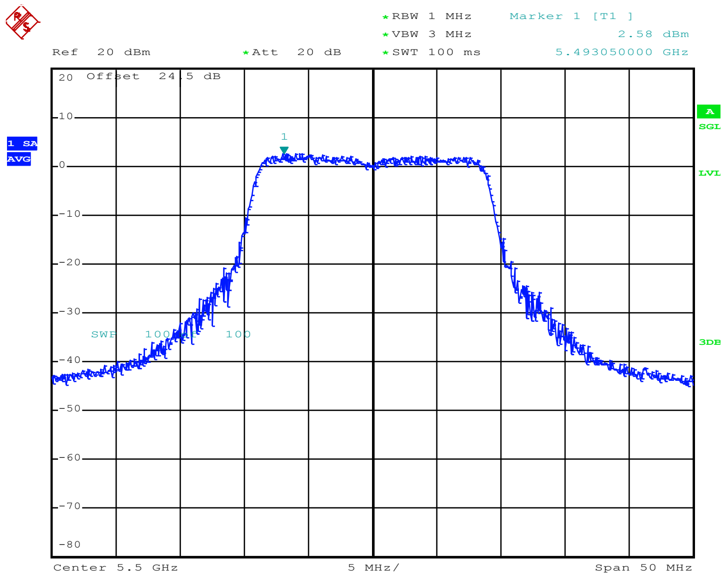
Date: 18.NOV.2010 05:53:15

PSD Plot on 802.11n (BW 20MHz) Channel 64 - Chain B



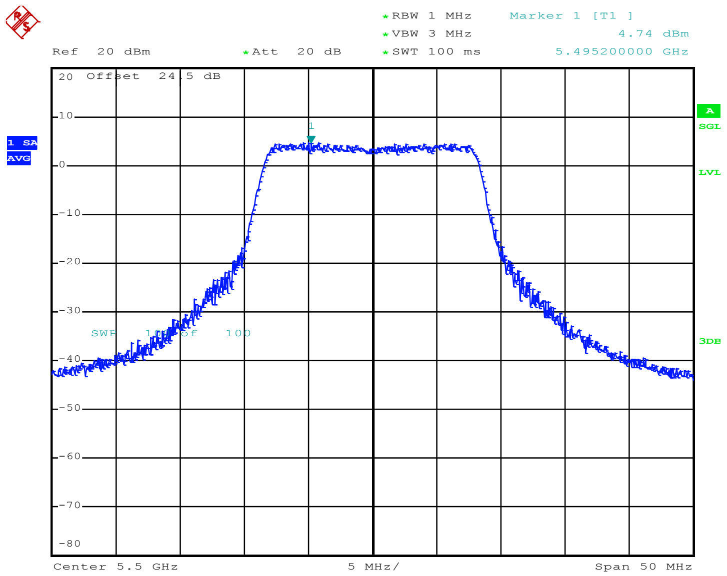
Date: 18.NOV.2010 05:25:55

PSD Plot on 802.11n (BW 20MHz) Channel 100 - Chain A



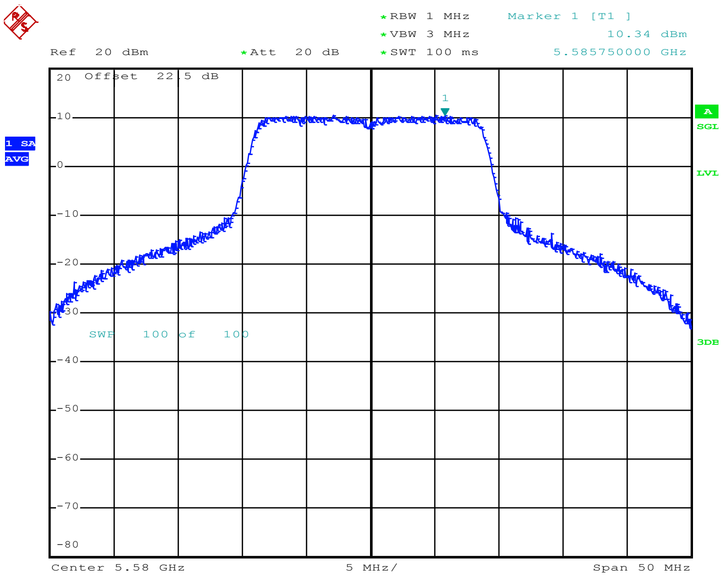
Date: 4.MAR.2012 08:51:17

PSD Plot on 802.11n (BW 20MHz) Channel 100 - Chain B



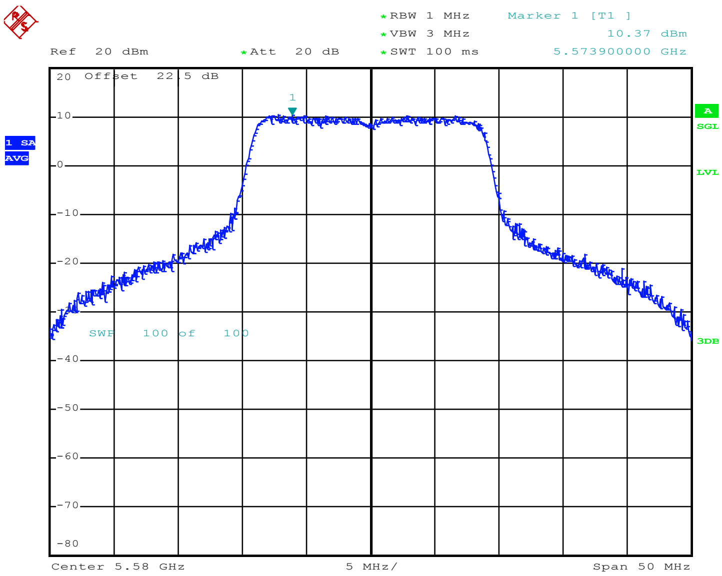
Date: 4.MAR.2012 09:19:41

PSD Plot on 802.11n (BW 20MHz) Channel 116 - Chain A



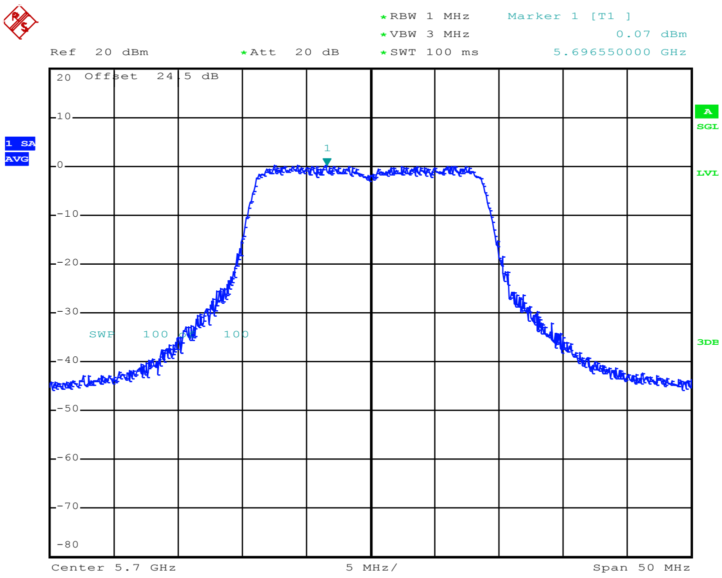
Date: 19.JUL.2011 09:24:34

PSD Plot on 802.11n (BW 20MHz) Channel 116 - Chain B



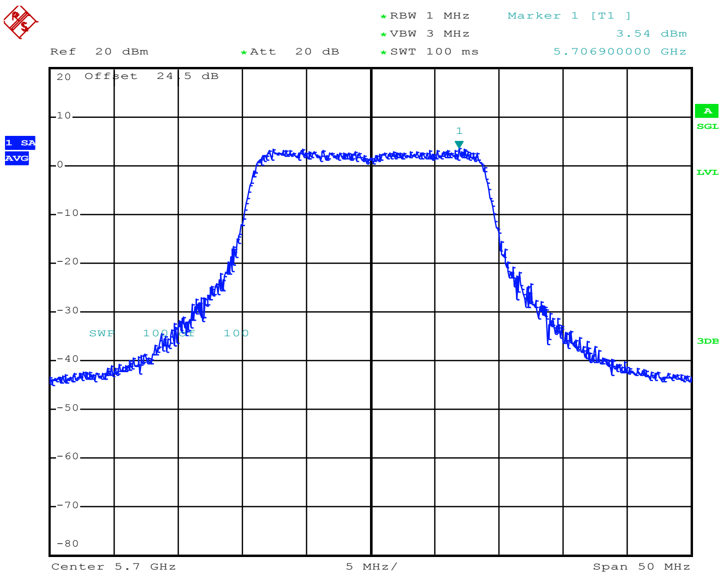
Date: 19.JUL.2011 09:26:06

PSD Plot on 802.11n (BW 20MHz) Channel 140 - Chain A



Date: 4.MAR.2012 08:50:12

PSD Plot on 802.11n (BW 20MHz) Channel 140 - Chain B



Date: 4.MAR.2012 09:08:28

Test Mode :	Mode 13~17	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

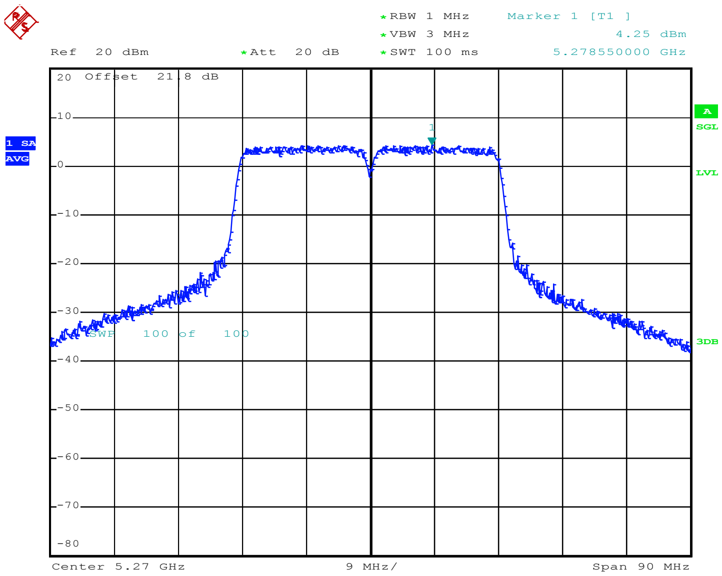
Channel	Frequency (MHz)	802.11n (BW 40MHz) Measured PSD (dBm)		Max. Limits (dBm)	Pass/Fail
		SISO			
		Chain A	Chain B		
54	5270	4.62	5.58	11	Pass
62	5310	-0.13	0.45	11	Pass
102	5510	-5.06	-2.94	11	Pass
110	5550	2.96	5.83	11	Pass
134	5670	0.1	2.46	11	Pass

<DUTY CYCLE AND DUTY FACTOR>

Mode		Data rate	Duty Cycle (%)	Duty Factor (dB)
Chain A	11a	6M	95.9	0.18
	11n (BW 20MHz)	MCS0	96.6	0.15
	11n (BW 40MHz)	MCS0	91.9	0.37
Chain B	11a	6M	96.8	0.14
	11n (BW 20MHz)	MCS0	96.8	0.14
	11n (BW 40MHz)	MCS0	93.3	0.30
Chain A+B (A)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.8	0.10
	11n (BW 40MHz)	MCS8	95.0	0.22
Chain A+B (B)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.7	0.10
	11n (BW 40MHz)	MCS8	95.1	0.22

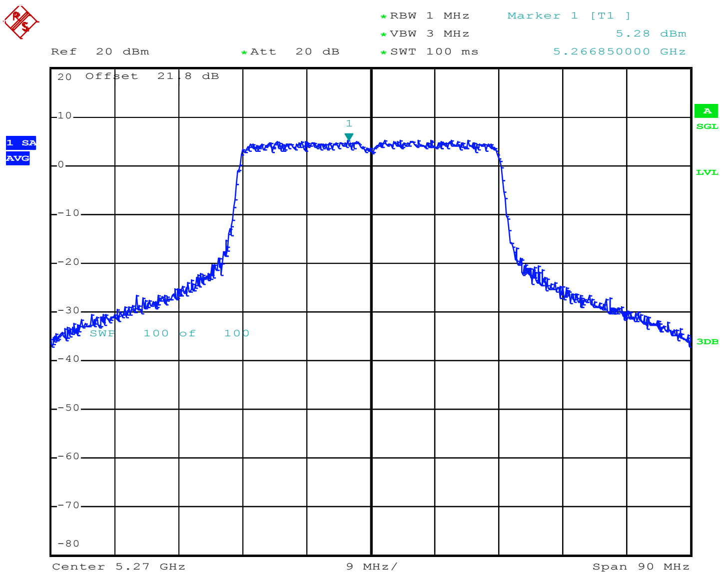
Note: The duty factor is also added to all the final result.

PSD Plot on 802.11n (BW 40MHz) Channel 54 - Chain A



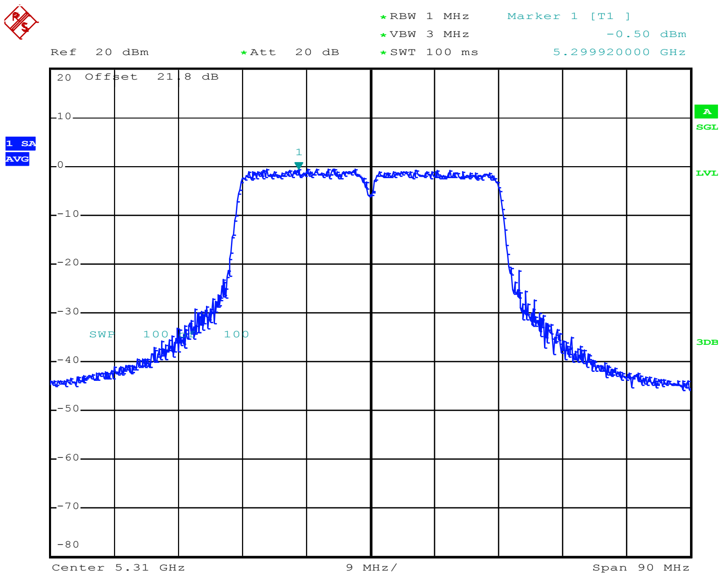
Date: 18.NOV.2010 06:12:00

PSD Plot on 802.11n (BW 40MHz) Channel 54 - Chain B



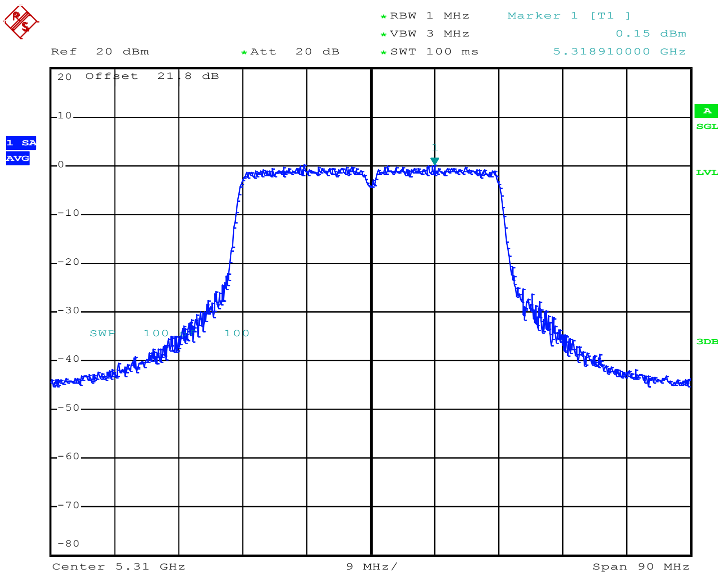
Date: 18.NOV.2010 07:49:17

PSD Plot on 802.11n (BW 40MHz) Channel 62 - Chain A



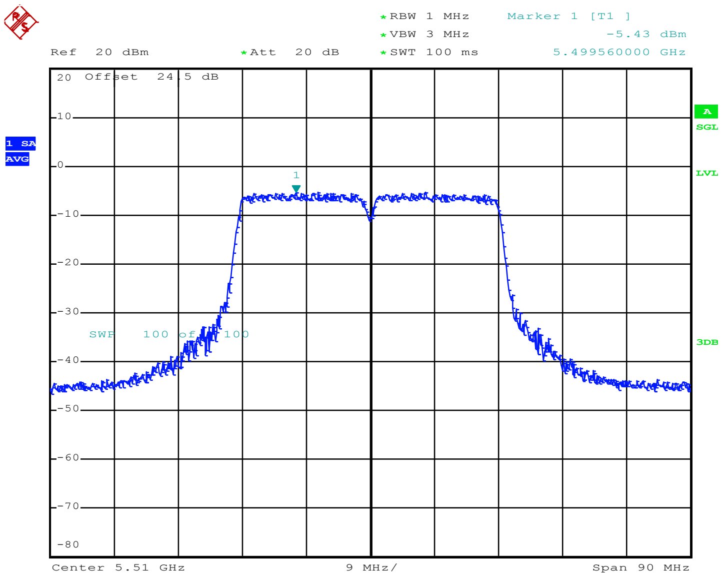
Date: 18.NOV.2010 06:14:14

PSD Plot on 802.11n (BW 40MHz) Channel 62 - Chain B



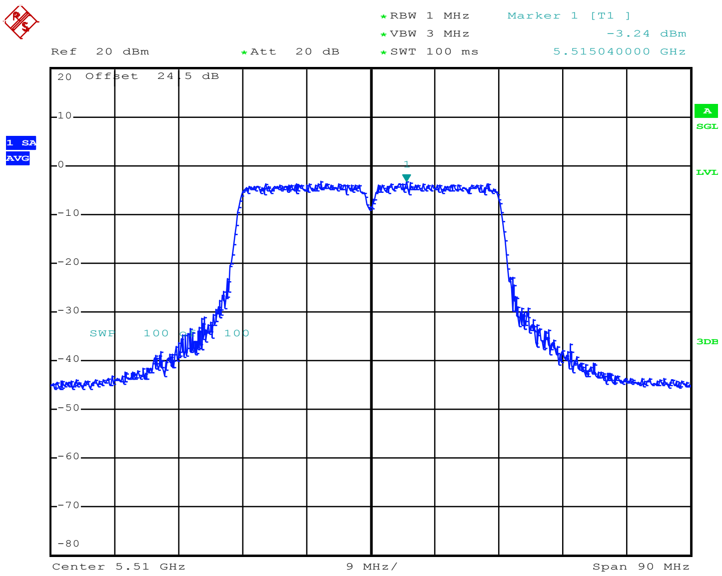
Date: 18.NOV.2010 07:51:23

PSD Plot on 802.11n (BW 40MHz) Channel 102 - Chain A



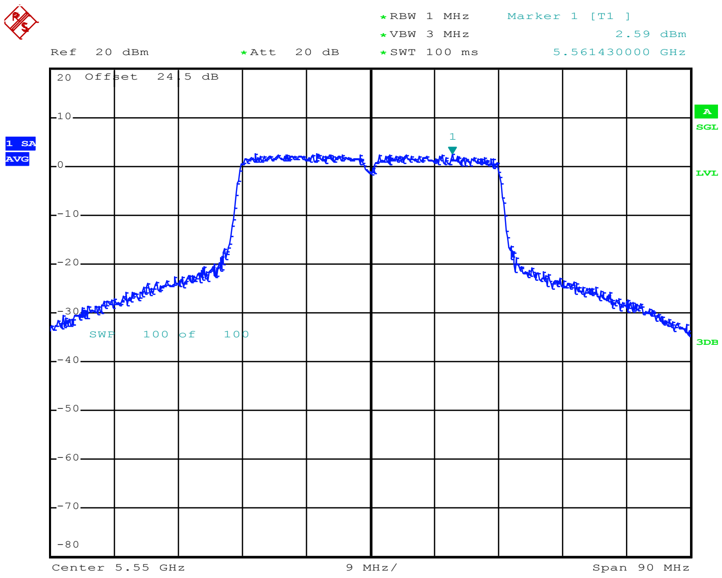
Date: 4.MAR.2012 09:00:05

PSD Plot on 802.11n (BW 40MHz) Channel 102 - Chain B



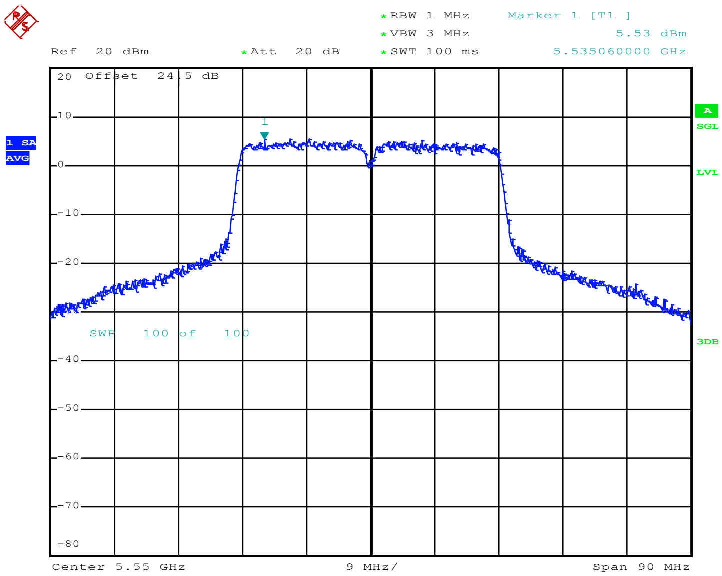
Date: 4.MAR.2012 09:01:51

PSD Plot on 802.11n (BW 40MHz) Channel 110 - Chain A



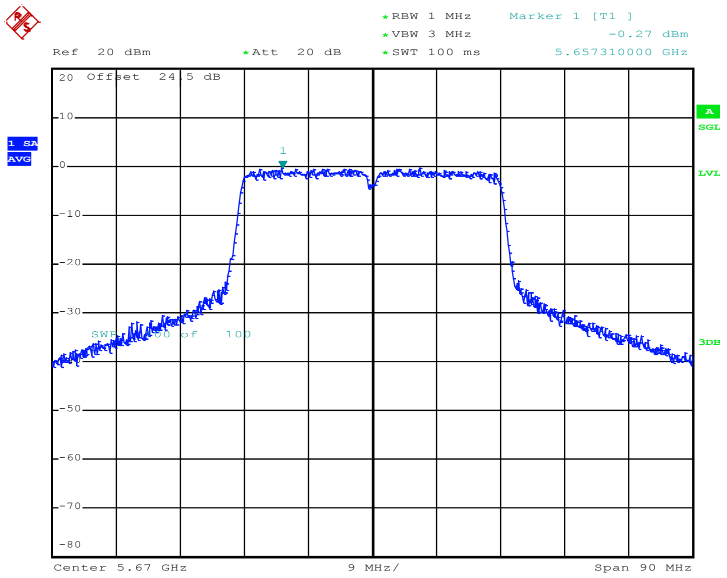
Date: 4.MAR.2012 08:59:05

PSD Plot on 802.11n (BW 40MHz) Channel 110 - Chain B



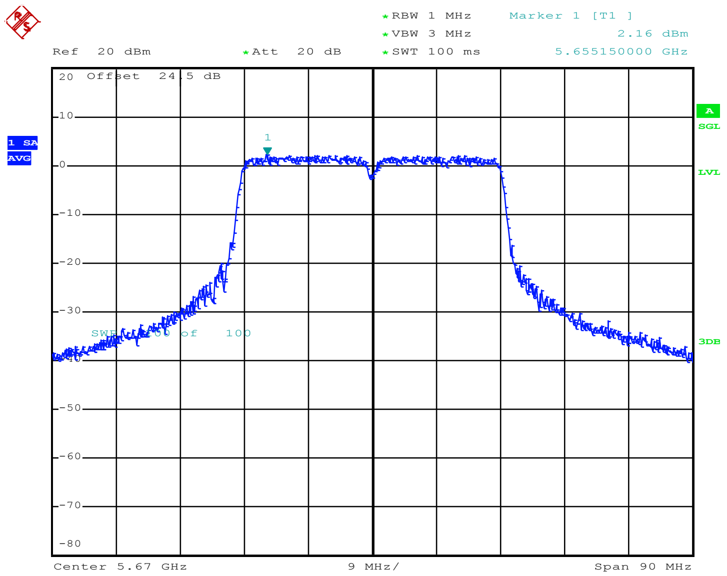
Date: 4.MAR.2012 09:04:10

PSD Plot on 802.11n (BW 40MHz) Channel 134 - Chain A



Date: 4.MAR.2012 08:57:29

PSD Plot on 802.11n (BW 40MHz) Channel 134 - Chain B



Date: 4.MAR.2012 09:04:58

<Antenna 4 for 3.3V>

Test Mode :	Mode 1~6	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11a Measured PSD (dBm)				Max. Limits (dBm)	Pass/Fail
		MIMO (2Tx)					
		Chain A+B(A)	Chain A+B(B)	Chain A+B(A) + 10 log (2)	Chain A+B(B) + 10 log (2)		
52	5260	7.81	7.38	10.82	10.39	11	Pass
64	5320	6.73	6.55	9.74	9.56	11	Pass
100	5500	1.44	5.74	4.45	8.75	11	Pass
140	5700	-0.02	3.60	2.99	6.61	11	Pass

Note: Measure and add 10 log (N) dB, where N (N=2) is the number of outputs.

Channel	Frequency (MHz)	802.11a Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
		MIMO (2Tx)		
		Chain A+B		
60	5300	10.92	11	Pass
116	5580	10.85	11	Pass

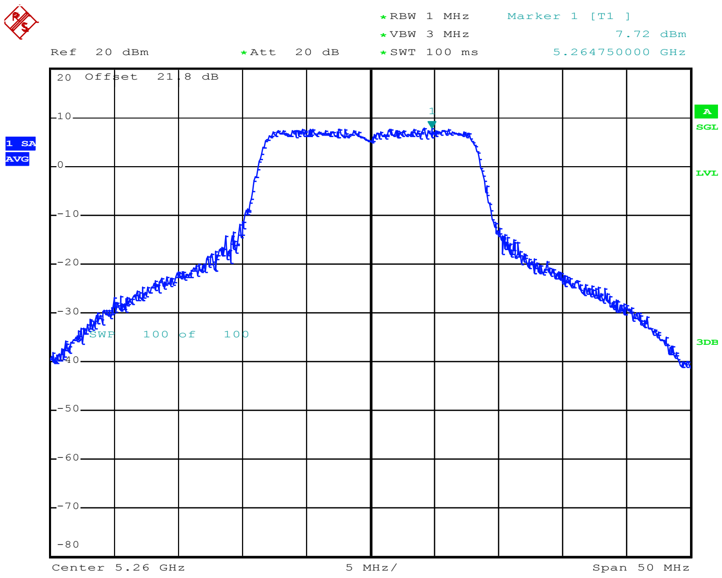
Note: Measure and sum the bin-by-bin from two outputs by computer.

<DUTY CYCLE AND DUTY FACTOR>

Mode		Data rate	Duty Cycle (%)	Duty Factor (dB)
Chain A	11a	6M	95.9	0.18
	11n (BW 20MHz)	MCS0	96.6	0.15
	11n (BW 40MHz)	MCS0	91.9	0.37
Chain B	11a	6M	96.8	0.14
	11n (BW 20MHz)	MCS0	96.8	0.14
	11n (BW 40MHz)	MCS0	93.3	0.30
Chain A+B (A)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.8	0.10
	11n (BW 40MHz)	MCS8	95.0	0.22
Chain A+B (B)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.7	0.10
	11n (BW 40MHz)	MCS8	95.1	0.22

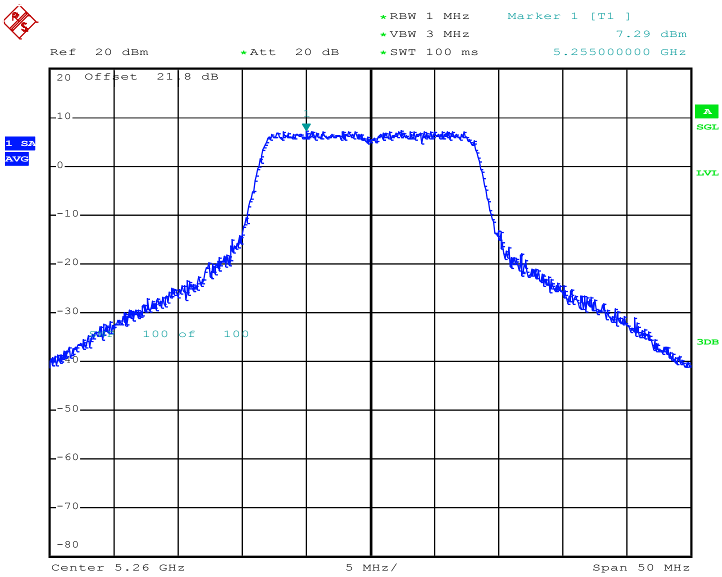
Note: The duty factor is also added to all the final result.

PSD Plot on 802.11a Channel 52 - Chain A+B(A)



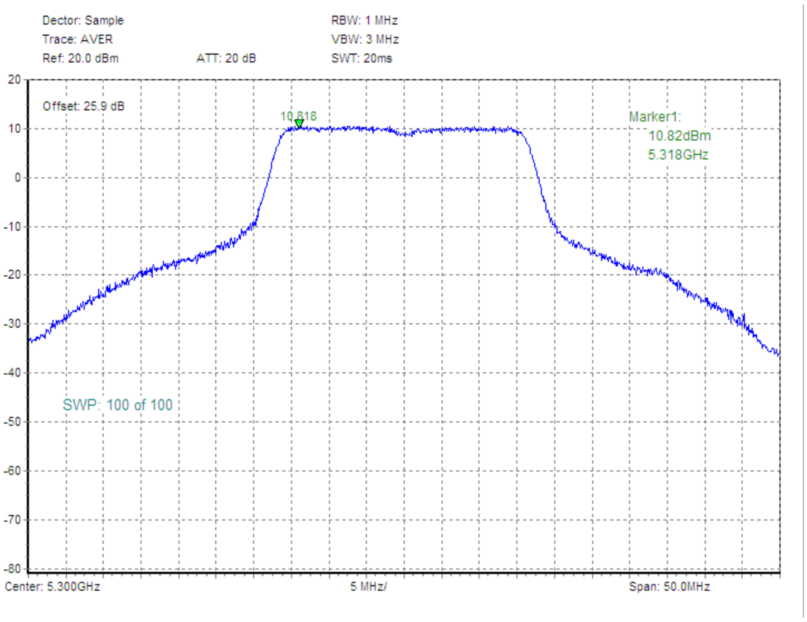
Date: 17.NOV.2010 21:09:30

PSD Plot on 802.11a Channel 52 - Chain A+B(B)



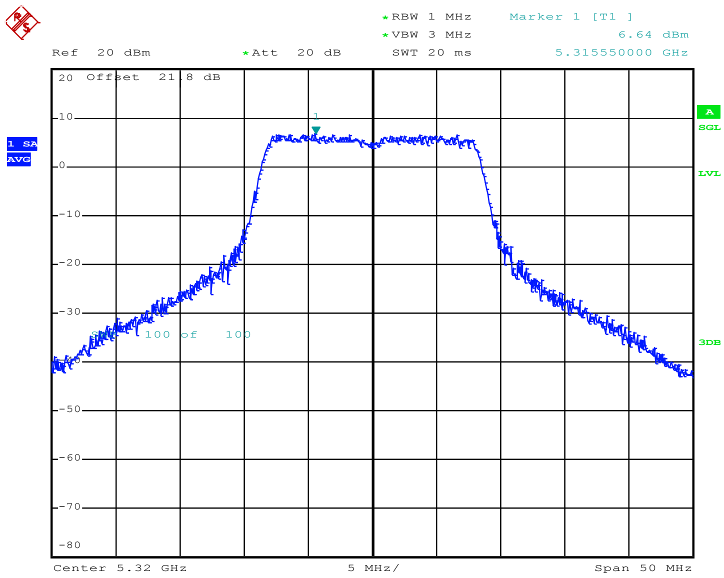
Date: 17.NOV.2010 21:08:30

PSD Plot on 802.11a Channel 60 - Chain A+B



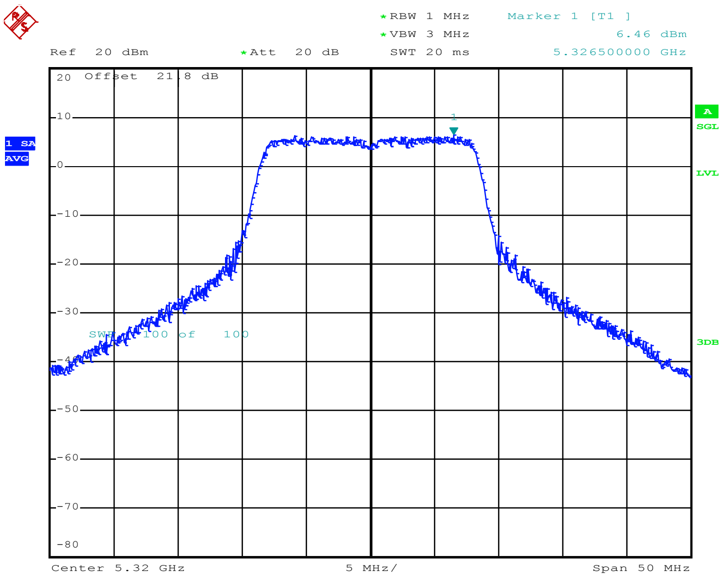
Note: Measure and sum the bin-by-bin from two outputs by computer.

PSD Plot on 802.11a Channel 64 - Chain A+B(A)



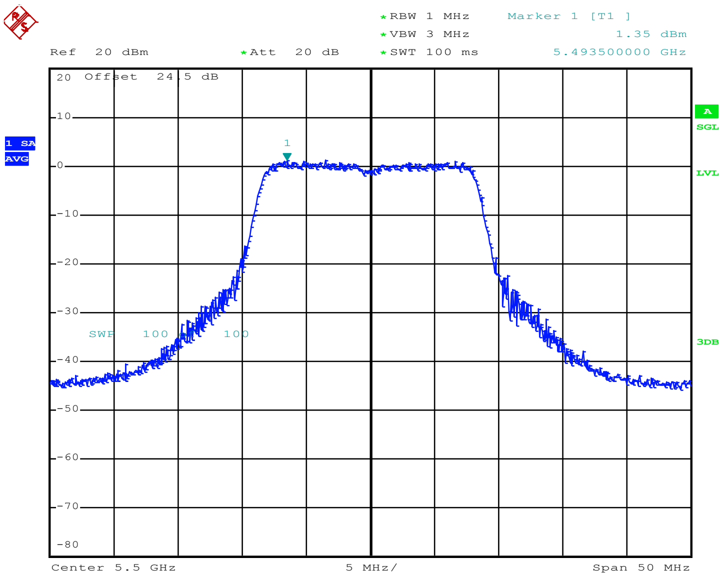
Date: 10.NOV.2010 16:30:33

PSD Plot on 802.11a Channel 64 - Chain A+B(B)



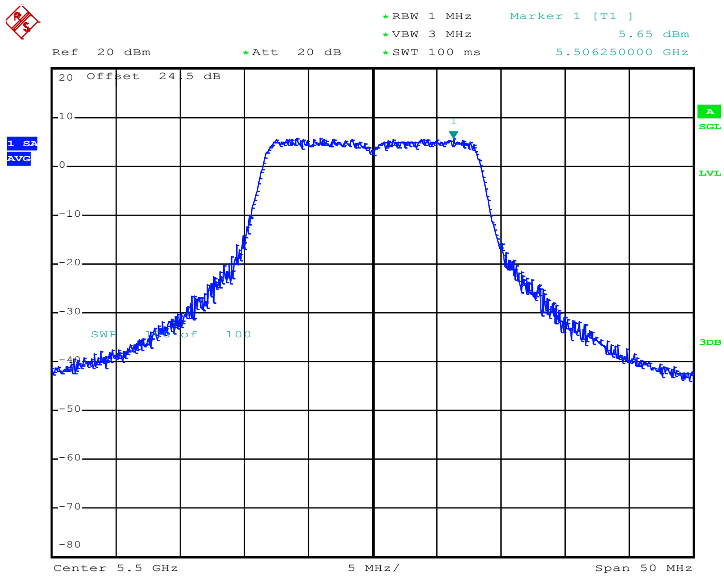
Date: 10.NOV.2010 16:28:28

PSD Plot on 802.11a Channel 100 - Chain A+B(A)



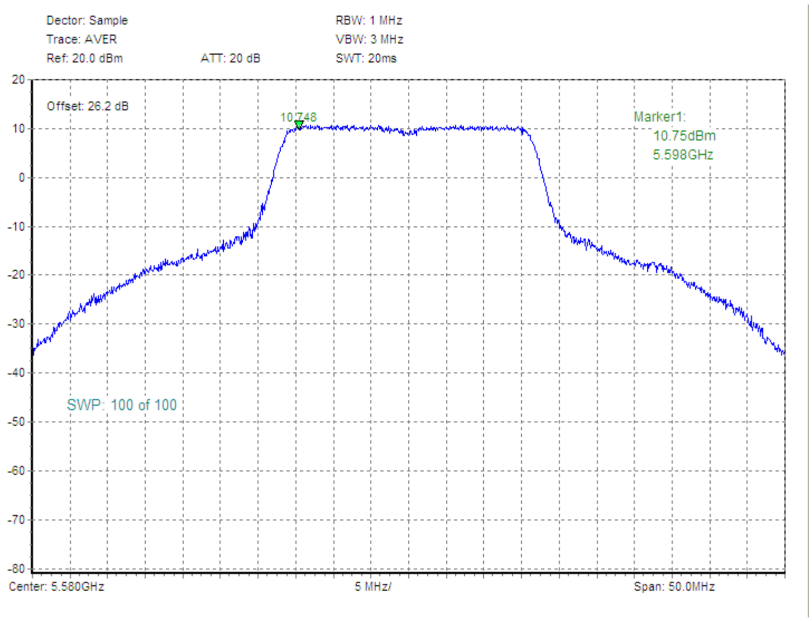
Date: 4.MAR.2012 10:00:54

PSD Plot on 802.11a Channel 100 - Chain A+B(B)



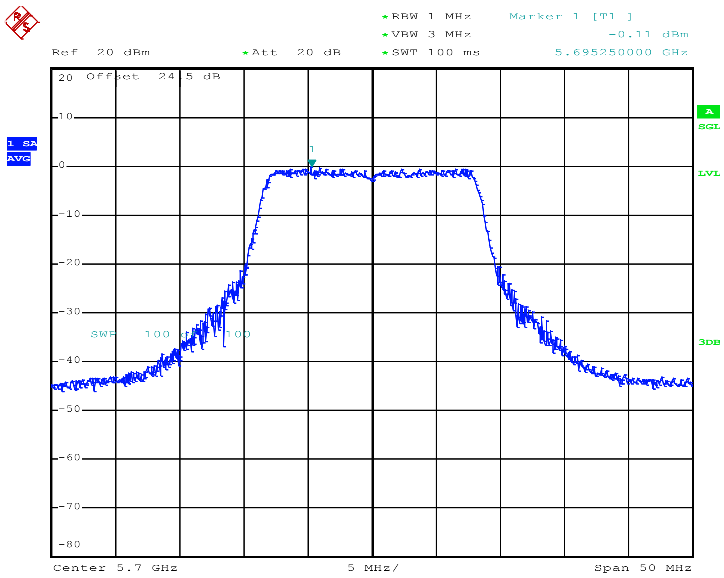
Date: 4.MAR.2012 09:48:33

PSD Plot on 802.11a Channel 116 - Chain A+B



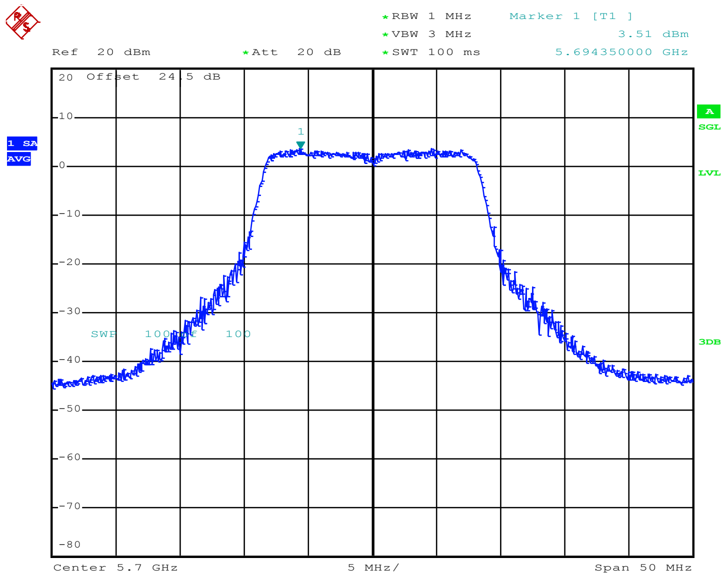
Note: Measure and sum the bin-by-bin from two outputs by computer.

PSD Plot on 802.11a Channel 140 - Chain A+B(A)



Date: 4.MAR.2012 10:00:18

PSD Plot on 802.11a Channel 140 - Chain A+B(B)



Date: 4.MAR.2012 09:47:45

Test Mode :	Mode 7~12	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n (BW 20MHz) Measured PSD (dBm)				Max. Limits (dBm)	Pass/Fail
		MIMO (2Tx)					
		Chain A+B(A)	Chain A+B(B)	Chain A+B(A) + 10 log (2)	Chain A+B(B) + 10 log (2)		
64	5320	4.18	3.69	7.19	6.70	11	Pass
100	5500	1.01	3.65	4.02	6.66	11	Pass
116	5580	7.68	7.85	10.69	10.86	11	Pass
140	5700	-0.20	2.08	2.81	5.09	11	Pass

Note: Measure and add 10 log (N) dB, where N (N=2) is the number of outputs.

Channel	Frequency (MHz)	802.11n (BW 20MHz) Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
		MIMO (2Tx)		
		Chain A+B		
52	5260	10.40	11	Pass
60	5300	10.46	11	Pass

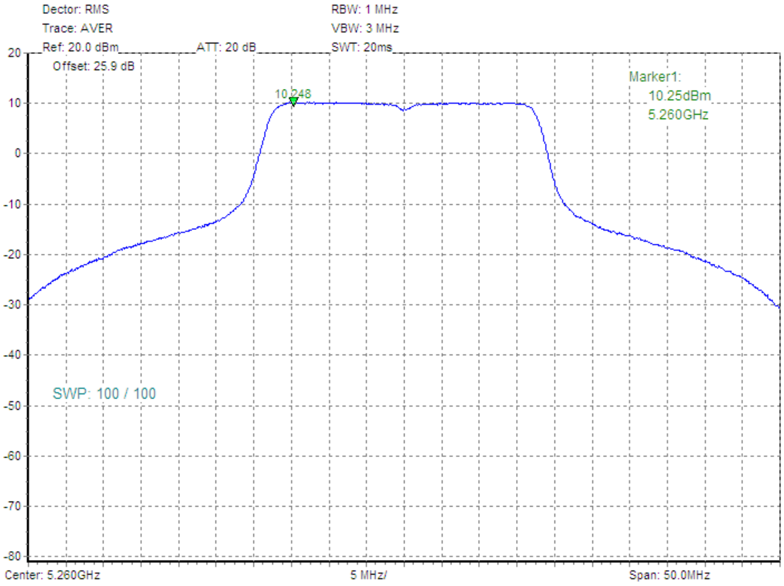
Note: Measure and sum the bin-by-bin from two outputs by computer.

<DUTY CYCLE AND DUTY FACTOR>

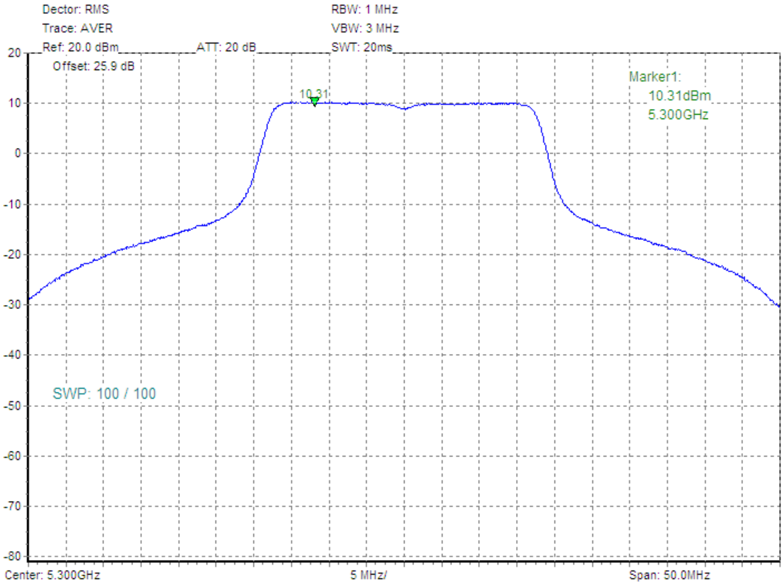
Mode		Data rate	Duty Cycle (%)	Duty Factor (dB)
Chain A	11a	6M	95.9	0.18
	11n (BW 20MHz)	MCS0	96.6	0.15
	11n (BW 40MHz)	MCS0	91.9	0.37
Chain B	11a	6M	96.8	0.14
	11n (BW 20MHz)	MCS0	96.8	0.14
	11n (BW 40MHz)	MCS0	93.3	0.30
Chain A+B (A)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.8	0.10
	11n (BW 40MHz)	MCS8	95.0	0.22
Chain A+B (B)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.7	0.10
	11n (BW 40MHz)	MCS8	95.1	0.22

Note: The duty factor is also added to all the final result.

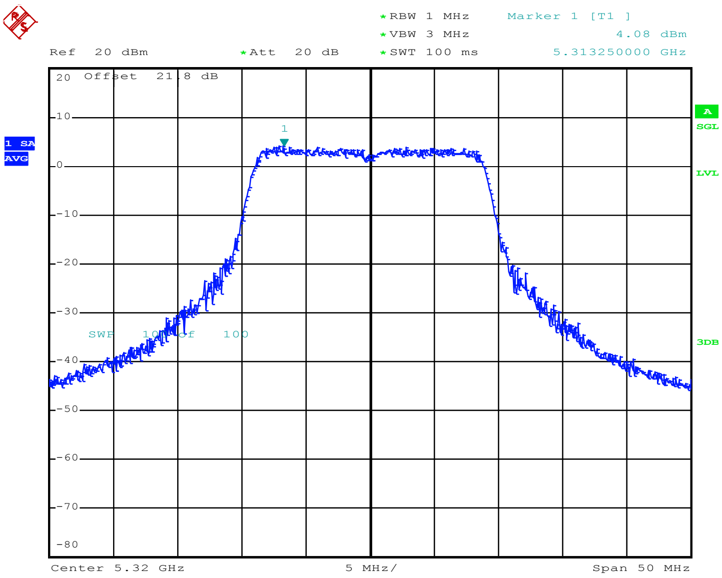
PSD Plot on 802.11n (BW 20MHz) Channel 52 - Chain A+B



PSD Plot on 802.11n (BW 20MHz) Channel 60 - Chain A+B

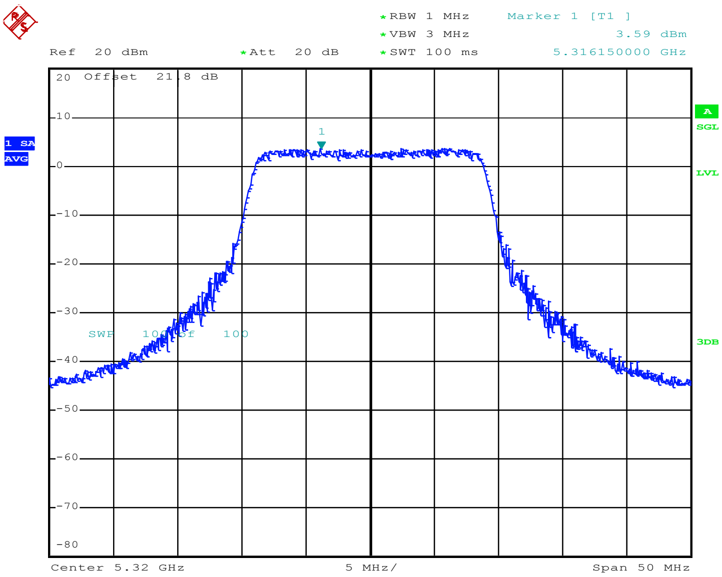


PSD Plot on 802.11n (BW 20MHz) Channel 64 - Chain A+B(A)



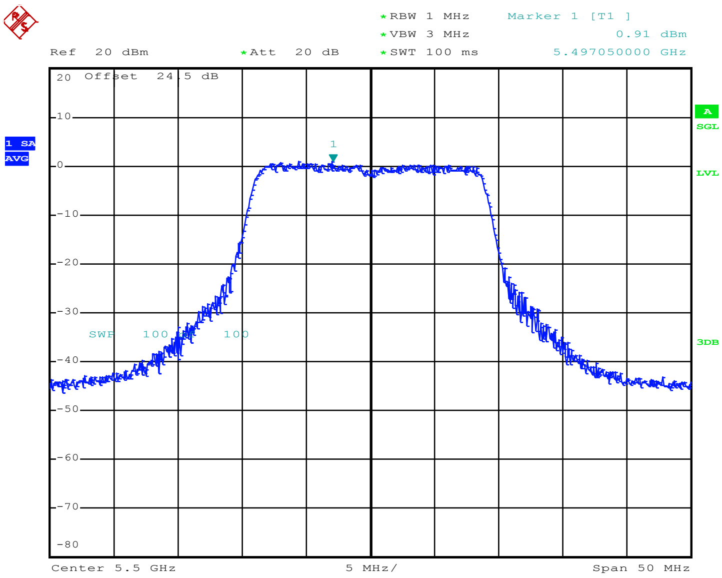
Date: 17.NOV.2010 21:59:51

PSD Plot on 802.11n (BW 20MHz) Channel 64 - Chain A+B(B)



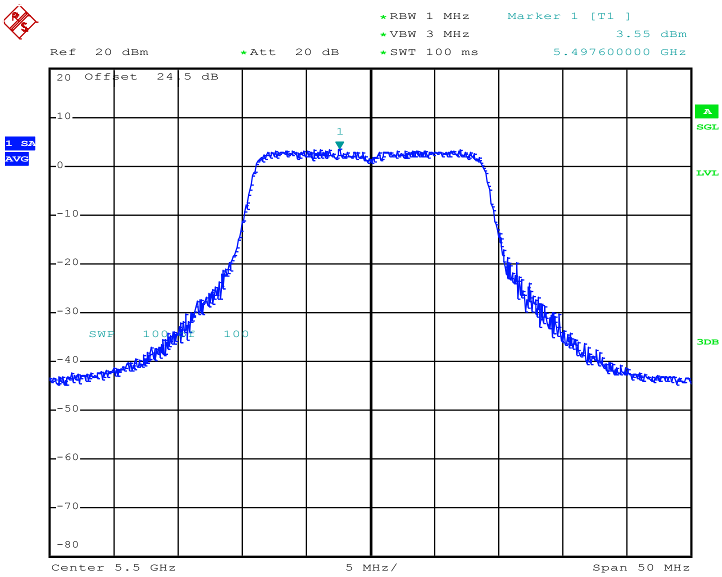
Date: 17.NOV.2010 21:55:51

PSD Plot on 802.11n (BW 20MHz) Channel 100 - Chain A+B(A)



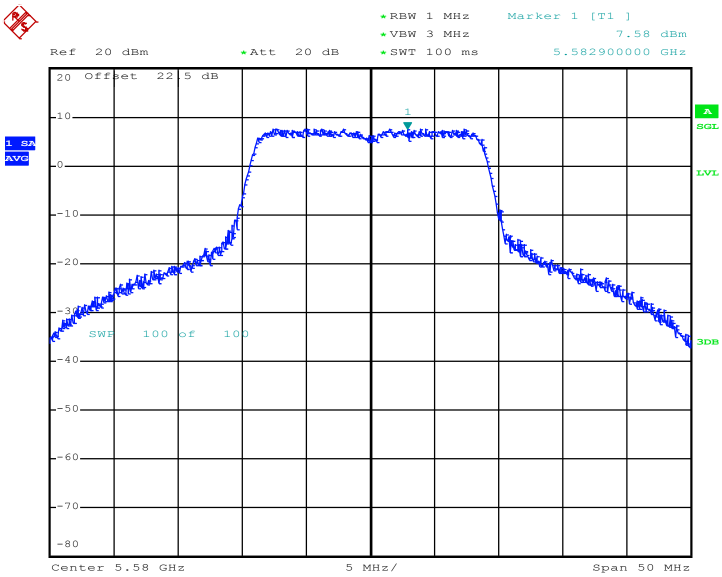
Date: 4.MAR.2012 10:01:31

PSD Plot on 802.11n (BW 20MHz) Channel 100 - Chain A+B(B)



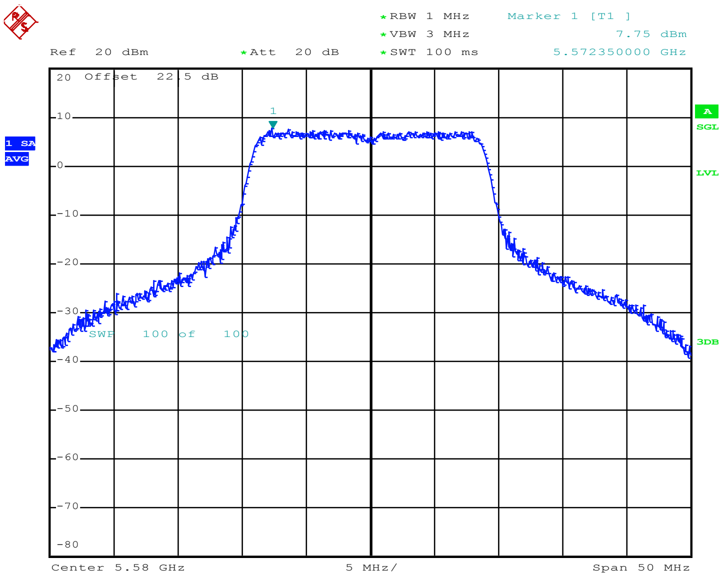
Date: 4.MAR.2012 09:49:35

PSD Plot on 802.11n (BW 20MHz) Channel 116 - Chain A+B(A)



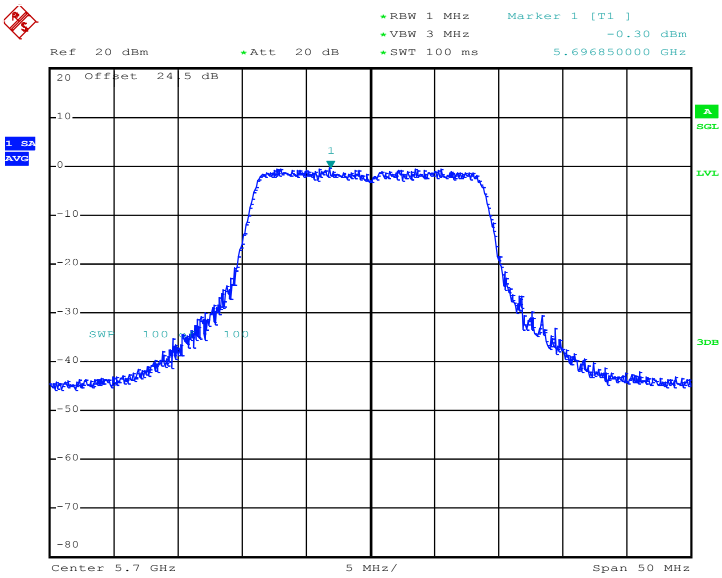
Date: 19.JUL.2011 08:10:46

PSD Plot on 802.11n (BW 20MHz) Channel 116 - Chain A+B(B)



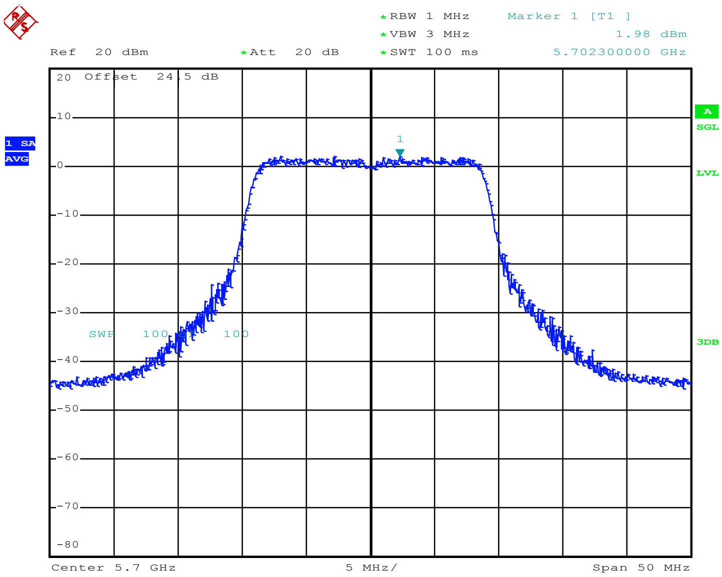
Date: 19.JUL.2011 08:14:05

PSD Plot on 802.11n (BW 20MHz) Channel 140 - Chain A+B(A)



Date: 4.MAR.2012 09:59:39

PSD Plot on 802.11n (BW 20MHz) Channel 140 - Chain A+B(B)



Date: 4.MAR.2012 09:50:07

Test Mode :	Mode 13~17	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n (BW 40MHz) Measured PSD (dBm)				Max. Limits (dBm)	Pass/Fail
		MIMO (2Tx)					
		Chain A+B(A)	Chain A+B(B)	Chain A+B(A) + 10 log (2)	Chain A+B(B) + 10 log (2)		
54	5270	6.25	5.88	9.26	8.89	11	Pass
62	5310	-1.66	-1.60	1.35	1.41	11	Pass
102	5510	-6.84	-3.87	-3.83	-0.86	11	Pass
110	5550	2.81	6.24	5.82	9.25	11	Pass
134	5670	-2.27	2.23	0.74	5.24	11	Pass

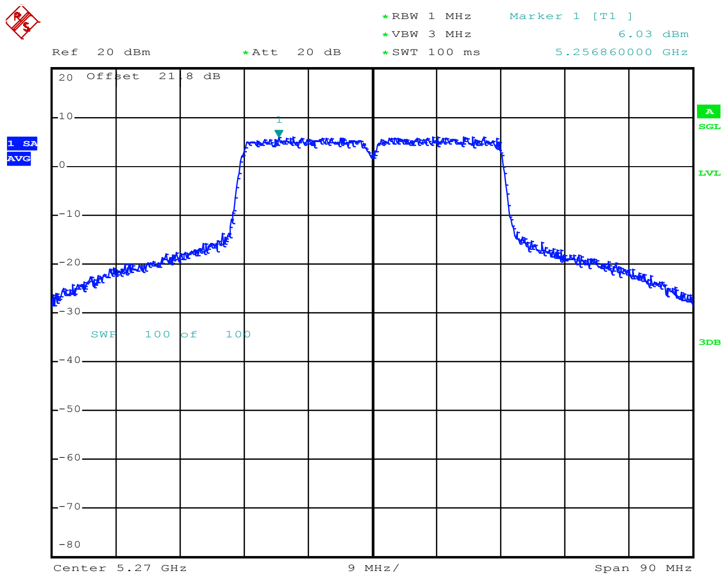
Note: Measure and add 10 log (N) dB, where N (N=2) is the number of outputs.

<DUTY CYCLE AND DUTY FACTOR>

Mode		Data rate	Duty Cycle (%)	Duty Factor (dB)
Chain A	11a	6M	95.9	0.18
	11n (BW 20MHz)	MCS0	96.6	0.15
	11n (BW 40MHz)	MCS0	91.9	0.37
Chain B	11a	6M	96.8	0.14
	11n (BW 20MHz)	MCS0	96.8	0.14
	11n (BW 40MHz)	MCS0	93.3	0.30
Chain A+B (A)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.8	0.10
	11n (BW 40MHz)	MCS8	95.0	0.22
Chain A+B (B)	11a	6M	98.0	0.09
	11n (BW 20MHz)	MCS8	97.7	0.10
	11n (BW 40MHz)	MCS8	95.1	0.22

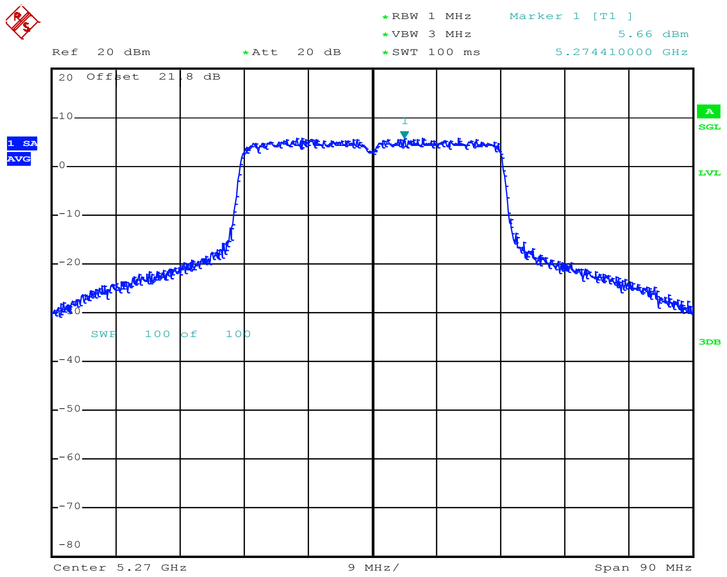
Note: The duty factor is also added to all the final result.

PSD Plot on 802.11n (BW 40MHz) Channel 54 - Chain A+B(A)



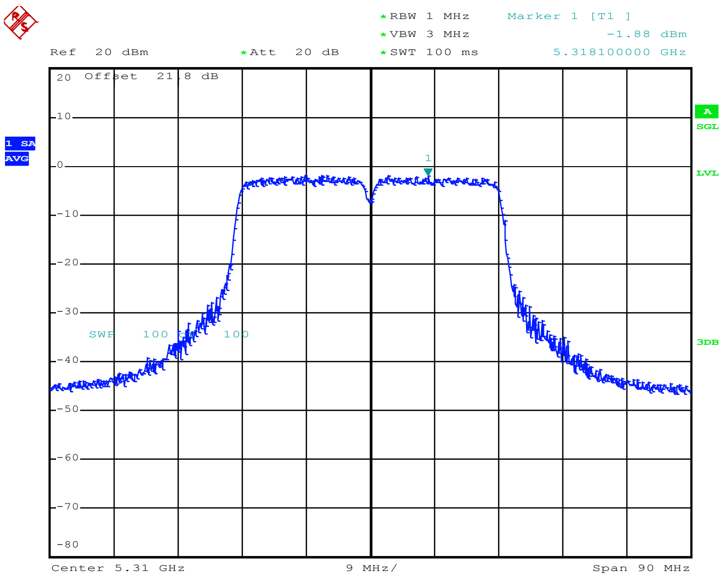
Date: 17.NOV.2010 22:52:43

PSD Plot on 802.11n (BW 40MHz) Channel 54 - Chain A+B(B)



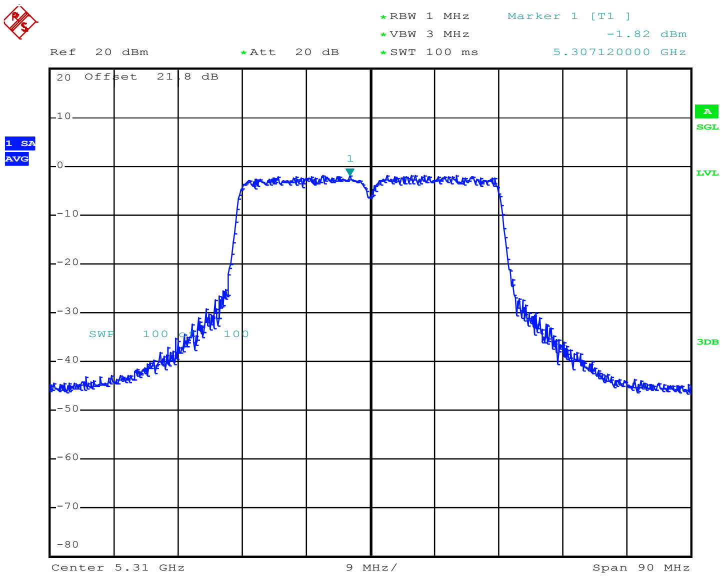
Date: 17.NOV.2010 22:45:12

PSD Plot on 802.11n (BW 40MHz) Channel 62 - Chain A+B(A)



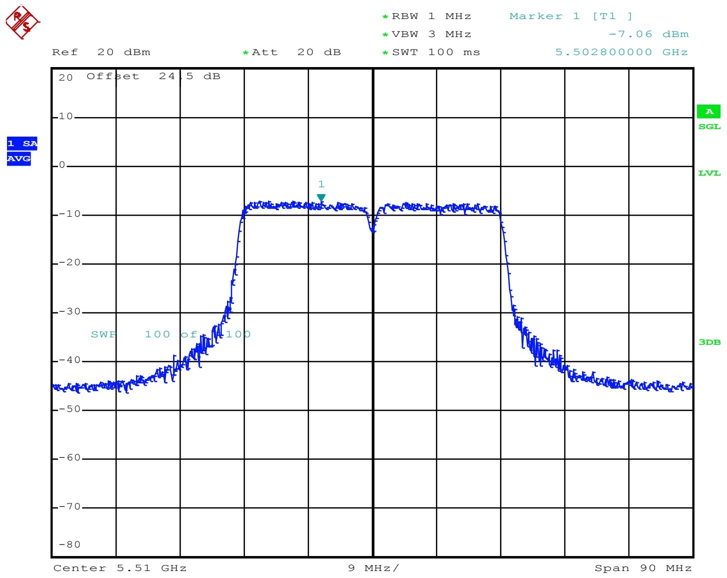
Date: 17.NOV.2010 23:04:35

PSD Plot on 802.11n (BW 40MHz) Channel 62 - Chain A+B(B)



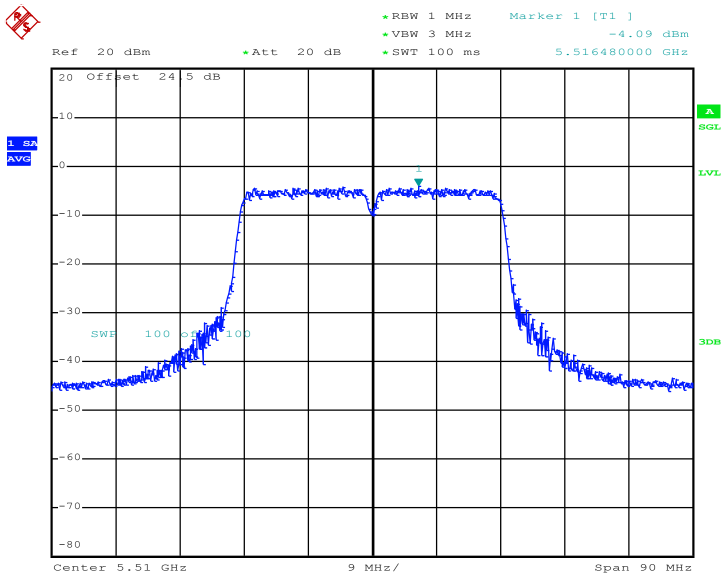
Date: 17.NOV.2010 23:06:45

PSD Plot on 802.11n (BW 40MHz) Channel 102 - Chain A+B(A)



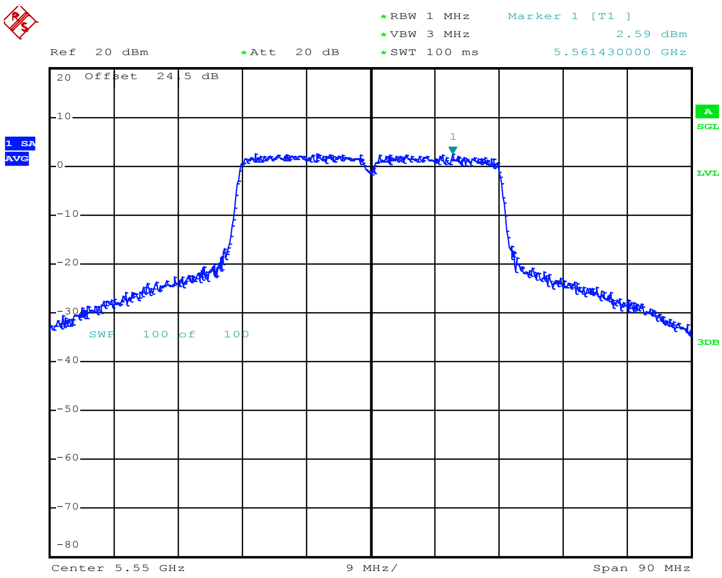
Date: 4.MAR.2012 09:57:07

PSD Plot on 802.11n (BW 40MHz) Channel 102 - Chain A+B(B)



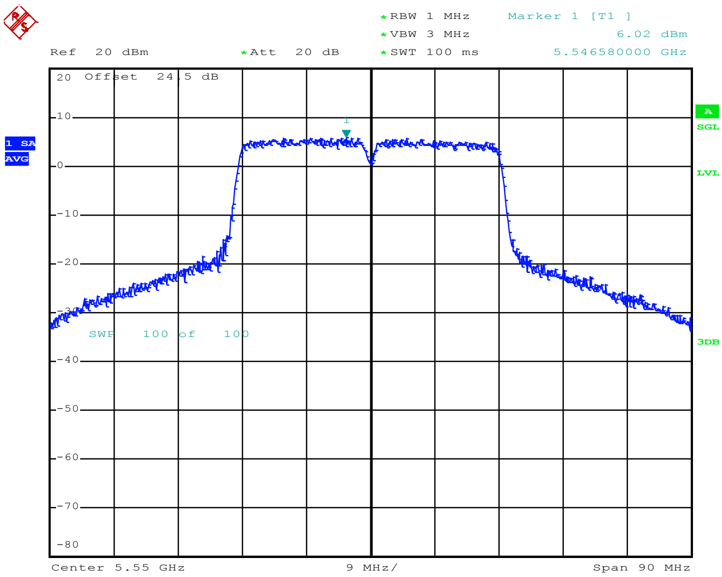
Date: 4.MAR.2012 09:52:32

PSD Plot on 802.11n (BW 40MHz) Channel 110 - Chain A+B(A)



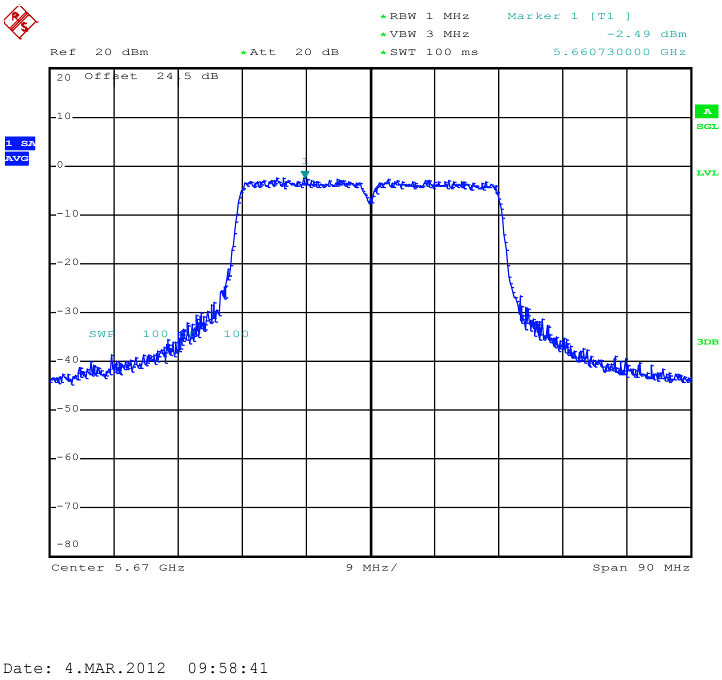
Date: 4.MAR.2012 08:59:05

PSD Plot on 802.11n (BW 40MHz) Channel 110 - Chain A+B(B)

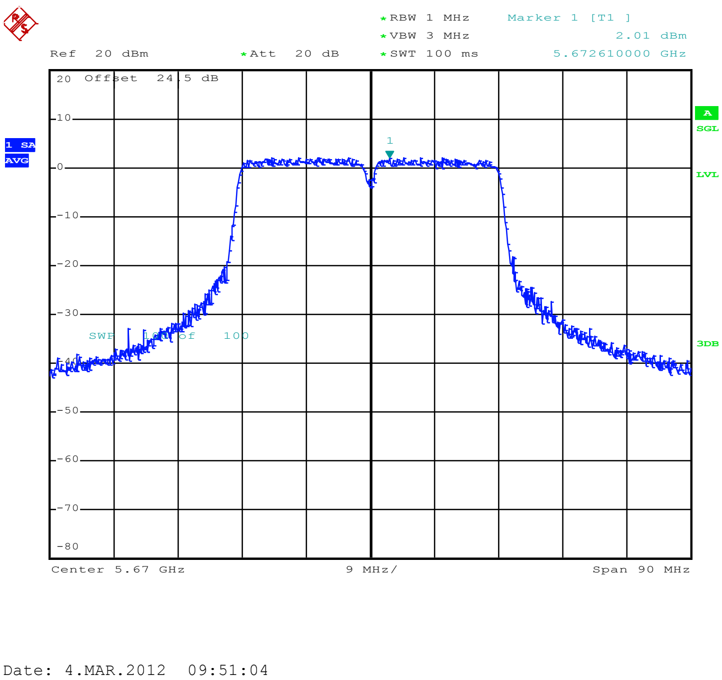


Date: 4.MAR.2012 09:51:58

PSD Plot on 802.11n (BW 40MHz) Channel 134 - Chain A+B(A)



PSD Plot on 802.11n (BW 40MHz) Channel 134 - Chain A+B(B)



3.4. AC Conducted Emission Measurement

3.4.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

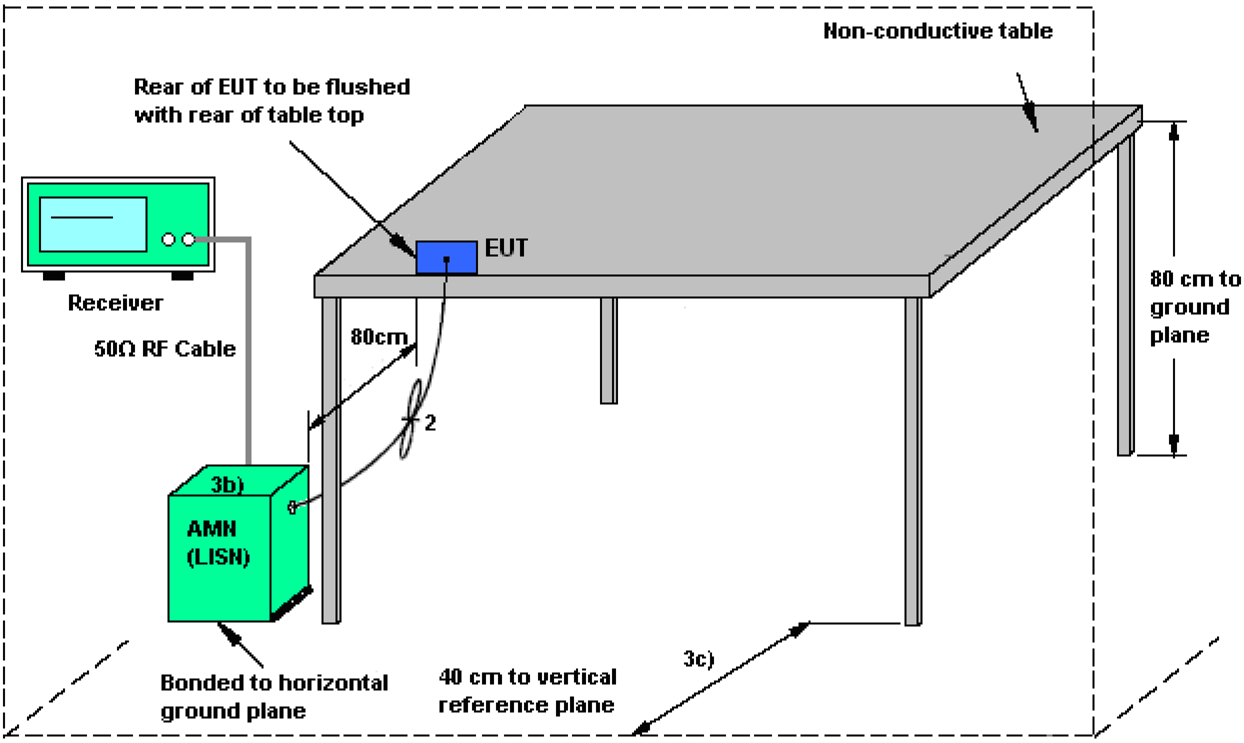
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

4. Please follow the guidelines in ANSI C63.4-2003.
5. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
6. Connect EUT to the power mains through a line impedance stabilization network (LISN).
7. All the support units are connecting to the other LISN.
8. The LISN provides 50 ohm coupling impedance for the measuring instrument.
9. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
10. Both sides of AC line were checked for maximum conducted interference.
11. The frequency range from 150 kHz to 30 MHz was searched.
12. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

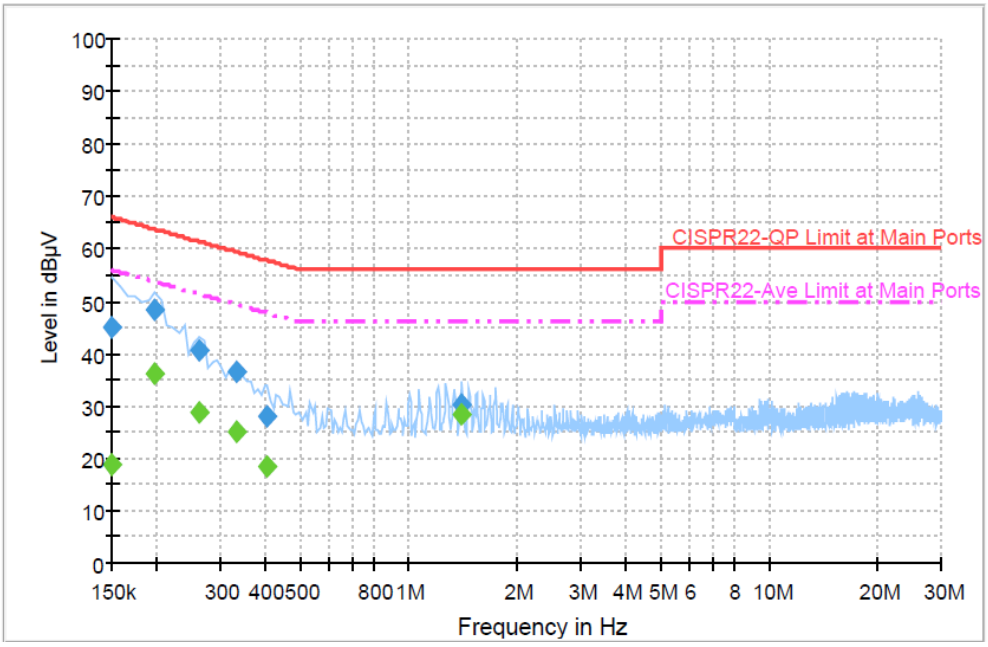
3.4.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.4.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Novic Chiang	Relative Humidity :	48~50%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (5G) Link		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



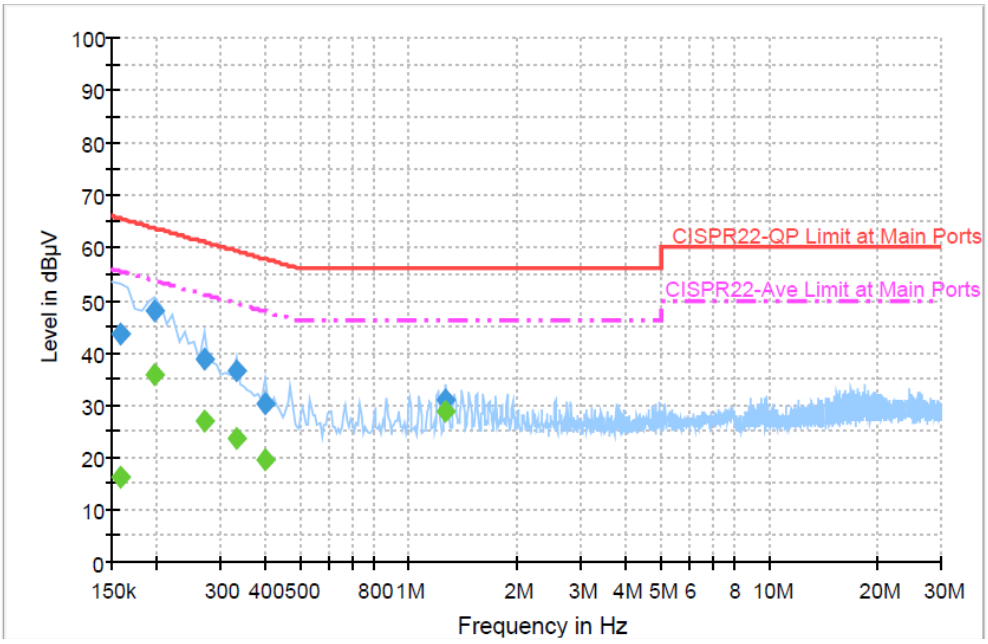
Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	44.9	Off	L1	19.4	21.1	66.0
0.198000	48.2	Off	L1	19.3	15.5	63.7
0.262000	40.6	Off	L1	19.3	20.8	61.4
0.334000	36.4	Off	L1	19.3	23.0	59.4
0.406000	28.0	Off	L1	19.4	29.7	57.7
1.406000	30.4	Off	L1	19.4	25.6	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	18.7	Off	L1	19.4	37.3	56.0
0.198000	36.2	Off	L1	19.3	17.5	53.7
0.262000	28.6	Off	L1	19.3	22.8	51.4
0.334000	25.3	Off	L1	19.3	24.1	49.4
0.406000	18.4	Off	L1	19.4	29.3	47.7
1.406000	28.4	Off	L1	19.4	17.6	46.0

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Novic Chiang	Relative Humidity :	48~50%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (5G) Link		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	43.5	Off	N	19.4	22.1	65.6
0.198000	48.0	Off	N	19.3	15.7	63.7
0.270000	38.6	Off	N	19.3	22.5	61.1
0.334000	36.7	Off	N	19.3	22.7	59.4
0.398000	30.1	Off	N	19.4	27.8	57.9
1.270000	30.9	Off	N	19.5	25.1	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	16.3	Off	N	19.4	39.3	55.6
0.198000	35.7	Off	N	19.3	18.0	53.7
0.270000	27.1	Off	N	19.3	24.0	51.1
0.334000	23.7	Off	N	19.3	25.7	49.4
0.398000	19.5	Off	N	19.4	28.4	47.9
1.270000	28.8	Off	N	19.5	17.2	46.0

3.5 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

3.5.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.

(2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ µV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBuV/m)
- 27	68.3

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The testing follows the guidelines in FCC KDB 789033 D01 General UNII Test Procedures v01r01.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
   - RBW = 120 KHz
   - VBW = 300 KHz
   - Detector = Peak
   - Trace mode = max hold

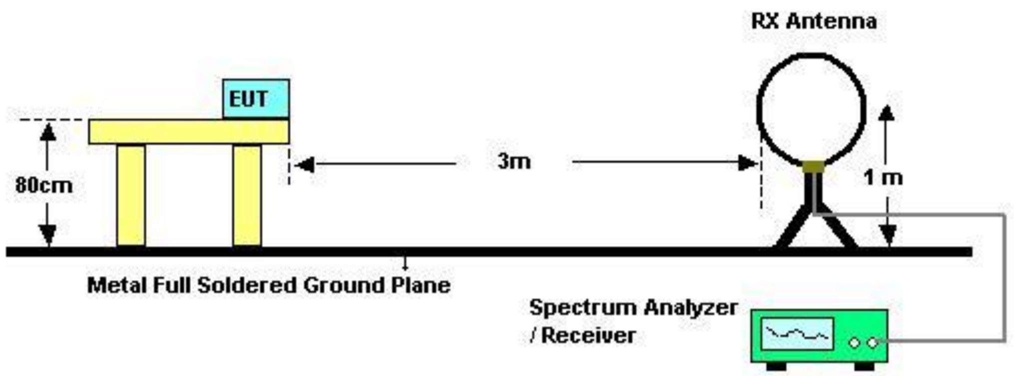
   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
   - The setting follows the G) 5) of FCC KDB 789033.
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
   - The setting follows G) 6) of FCC KDB 789033.
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. The EUT was placed on a rotatable table top 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest radiation.
5. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.

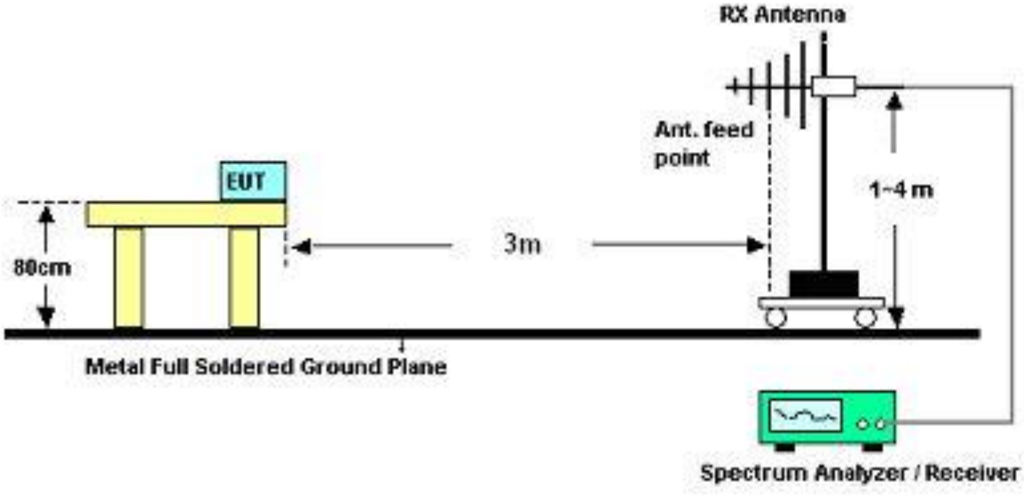
6. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
7. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.5.4 Test Setup

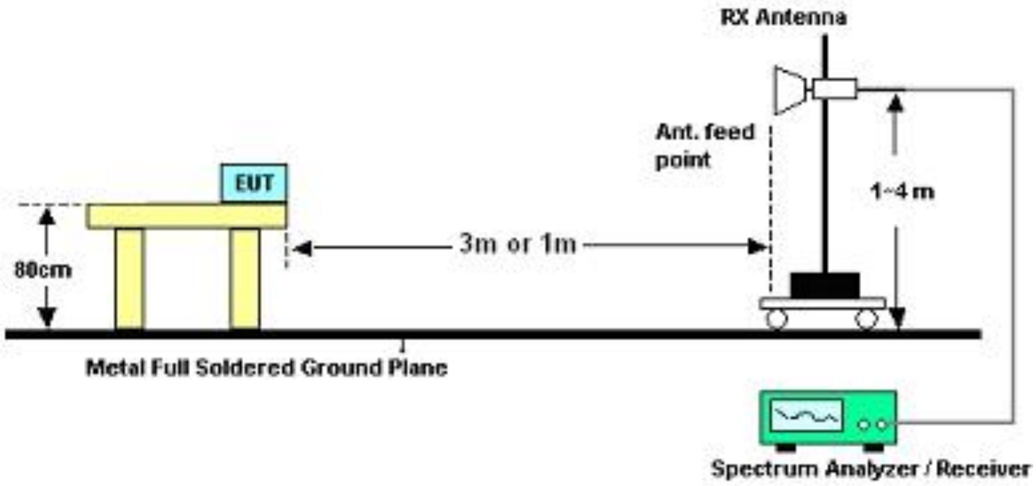
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.5.6 Test Result

3.5.7 Test Result of Radiated Band Edges

Please refer to Appendix A to E.

3.5.8 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix A to E.

3.6 Peak Excursion Ratio Measurement

3.6.1 Limit of Peak Excursion Ratio

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

1. The transmitter output is connected to the spectrum analyzer.
2. Set the spectrum analyzer span to view the entire emission bandwidth.
3. Find the maximum of the peak-max-hold spectrum.

   * Set RBW = 1 MHz.

   *Set VBW ≥ 3 MHz.

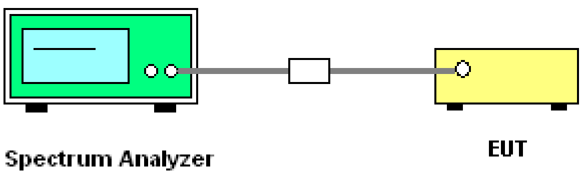
   *Detector = peak.

   *Trace mode = max-hold.

   *Allow the sweeps to continue until the trace stabilizes.

   *Use the peak search function to find the peak of the spectrum.
4. Use the procedure found under section 3.3 to measure the PPSD.
5. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

3.6.4 Test Setup

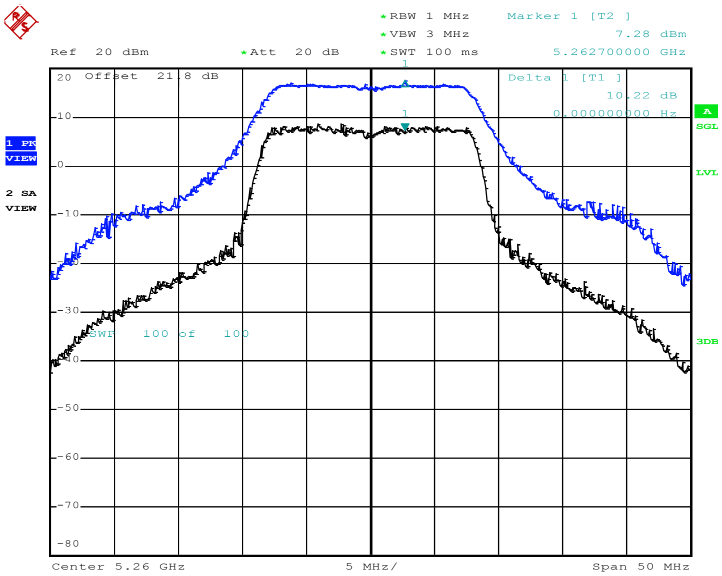


3.6.5 Test Result of Peak Excursion Ratio

<Antenna 3 for 4.5V>

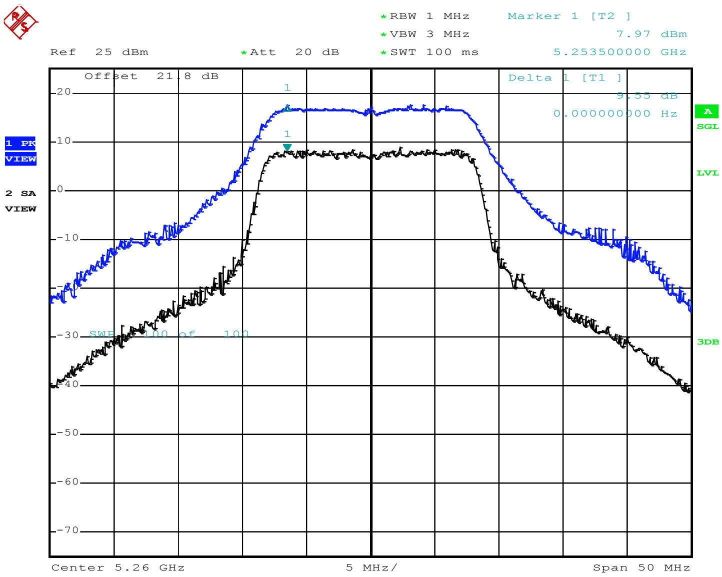
Test Mode :	Mode 1~6	**Temperature :**	23~25℃
Test Engineer :	Hank Yu	**Relative Humidity :**	50~53%

Peak Excursion Ratio Plot on 802.11a Channel 52 - Chain A



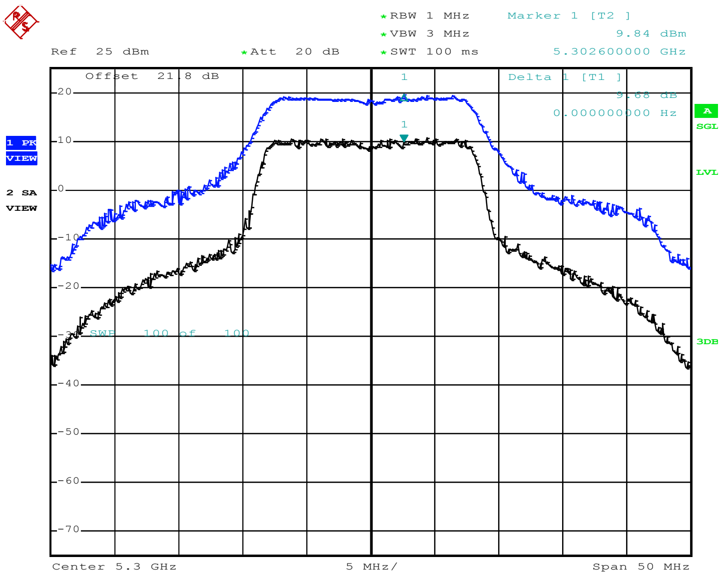
Date: 18.NOV.2010 04:22:28

Peak Excursion Ratio Plot on 802.11a Channel 52 - Chain B



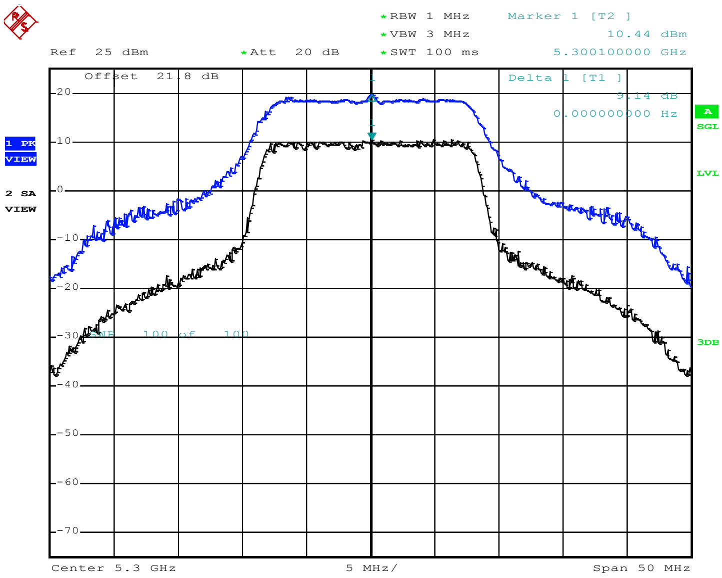
Date: 18.NOV.2010 04:57:26

Peak Excursion Ratio Plot on 802.11a Channel 60 - Chain A



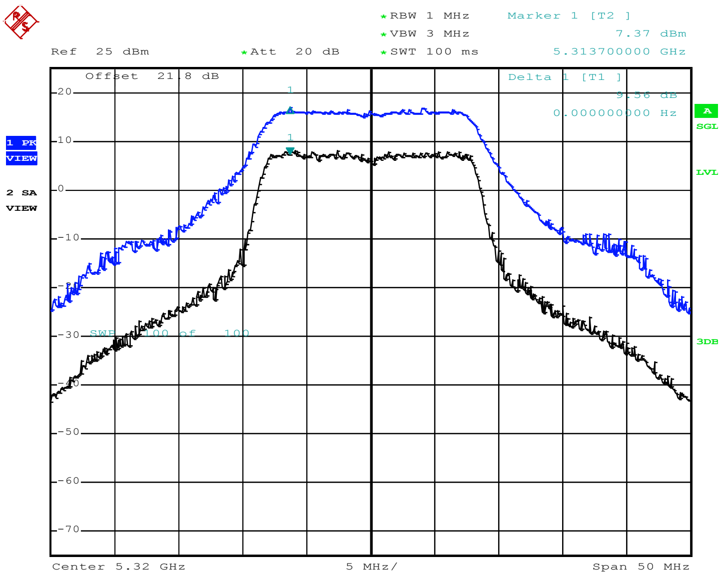
Date: 18.NOV.2010 04:29:09

Peak Excursion Ratio Plot on 802.11a Channel 60 - Chain B



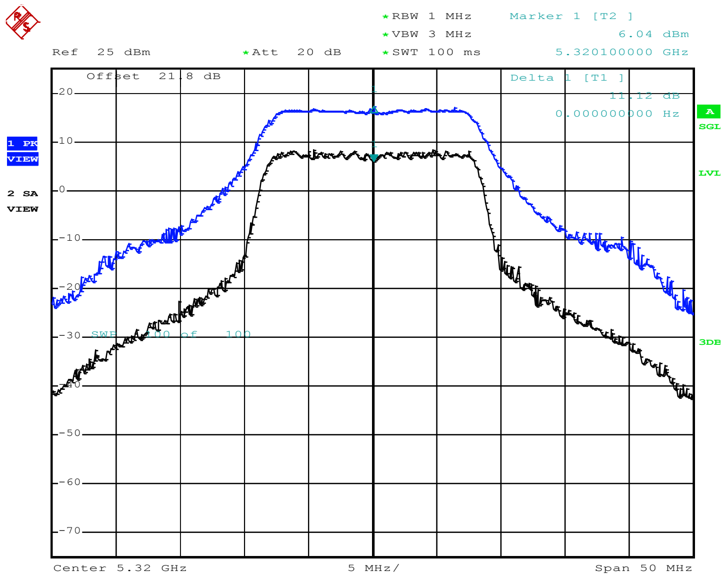
Date: 18.NOV.2010 04:58:53

Peak Excursion Ratio Plot on 802.11a Channel 64 - Chain A



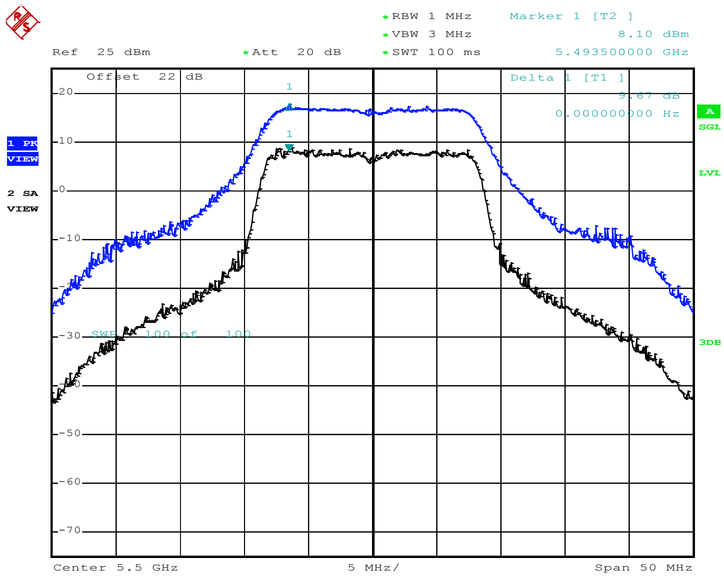
Date: 18.NOV.2010 04:32:43

Peak Excursion Ratio Plot on 802.11a Channel 64 - Chain B



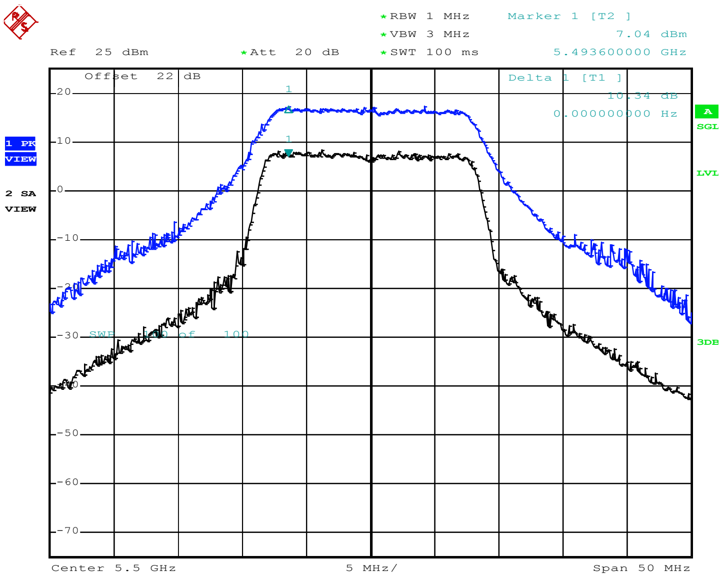
Date: 18.NOV.2010 05:01:31

Peak Excursion Ratio Plot on 802.11a Channel 100 - Chain A



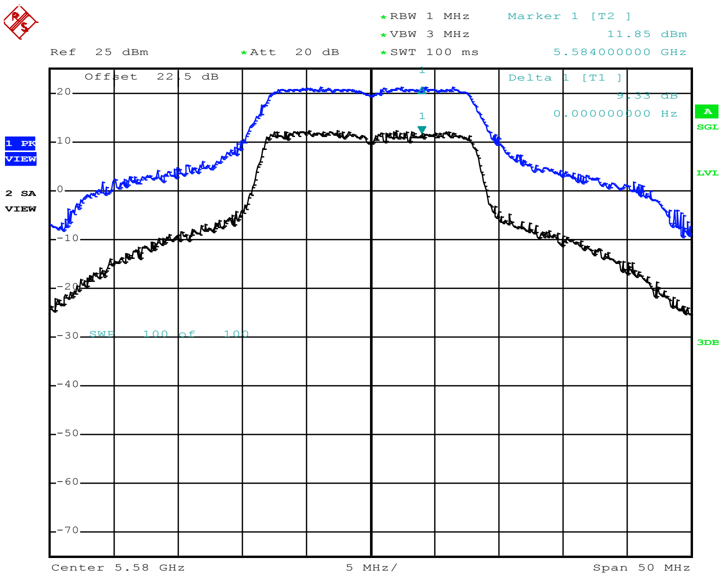
Date: 18.NOV.2010 04:36:48

Peak Excursion Ratio Plot on 802.11a Channel 100 - Chain B



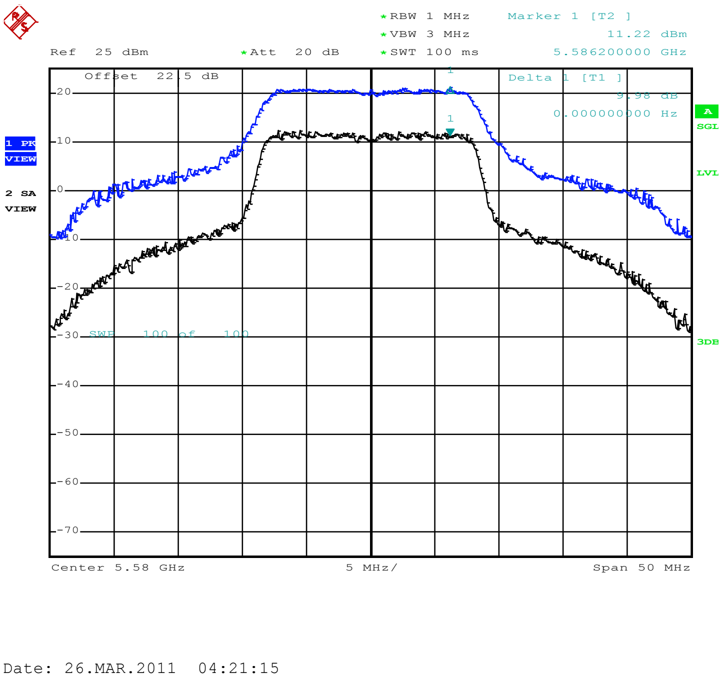
Date: 18.NOV.2010 05:03:01

Peak Excursion Ratio Plot on 802.11a Channel 116 - Chain A

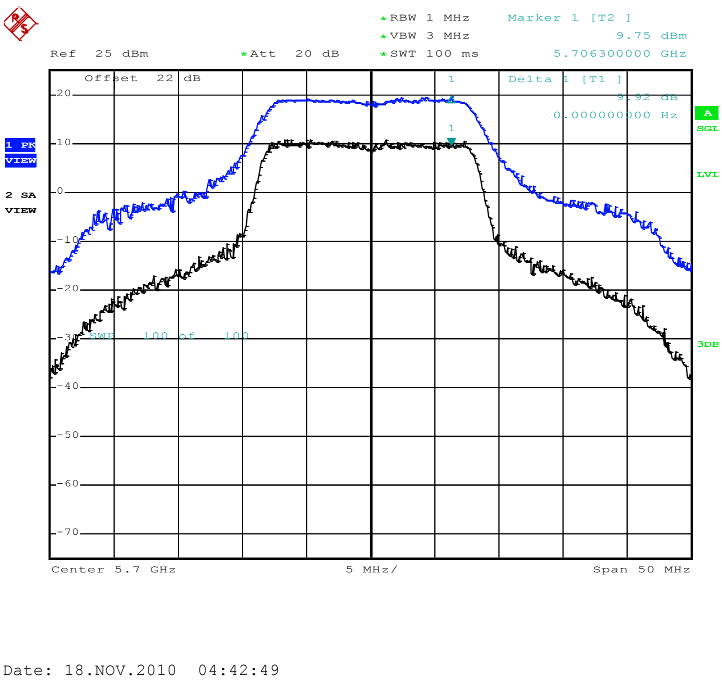


Date: 26.MAR.2011 04:36:41

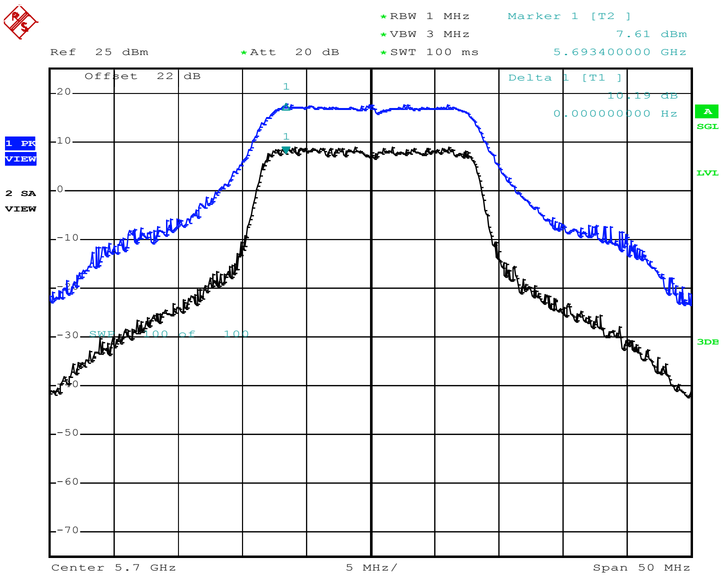
Peak Excursion Ratio Plot on 802.11a Channel 116 - Chain B



Peak Excursion Ratio Plot on 802.11a Channel 140 - Chain A



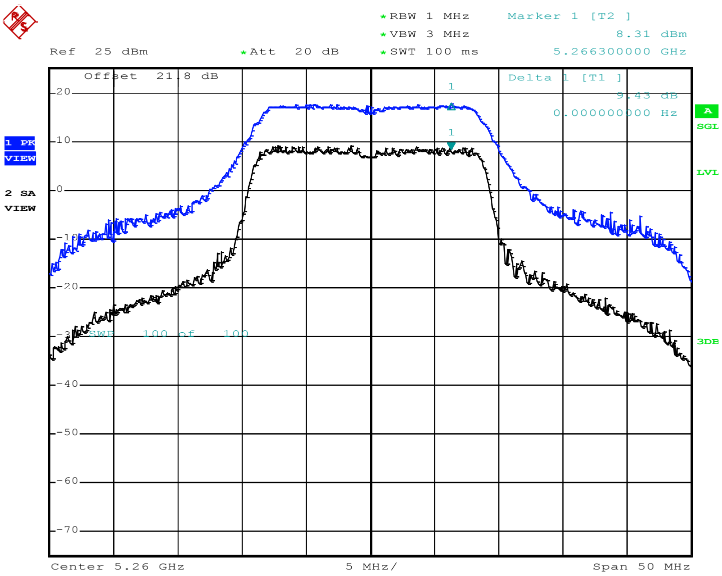
Peak Excursion Ratio Plot on 802.11a Channel 140 - Chain B



Date: 18.NOV.2010 05:06:42

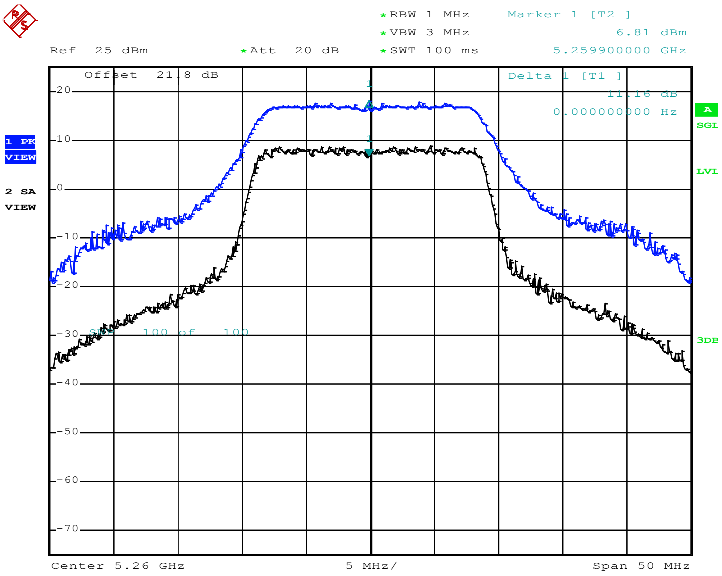
Test Mode :	Mode 7~12	**Temperature :**	23~25℃
Test Engineer :	Hank Yu	**Relative Humidity :**	50~53%

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 52 - Chain A



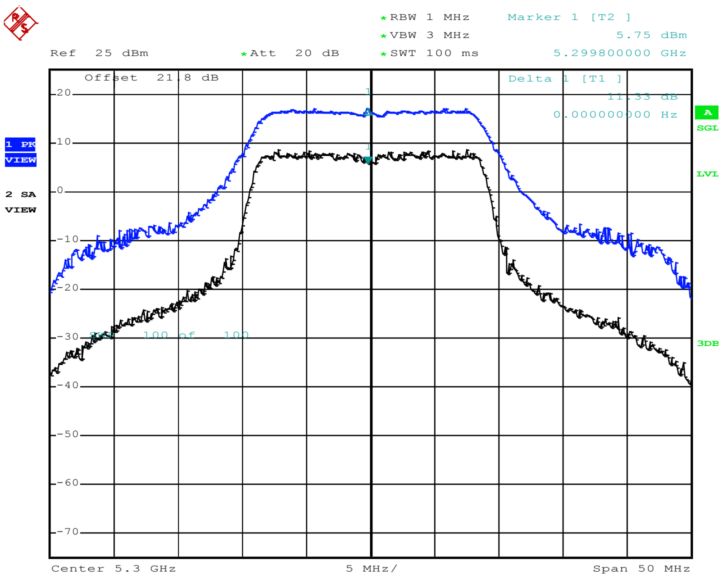
Date: 18.NOV.2010 05:49:37

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 52 - Chain B



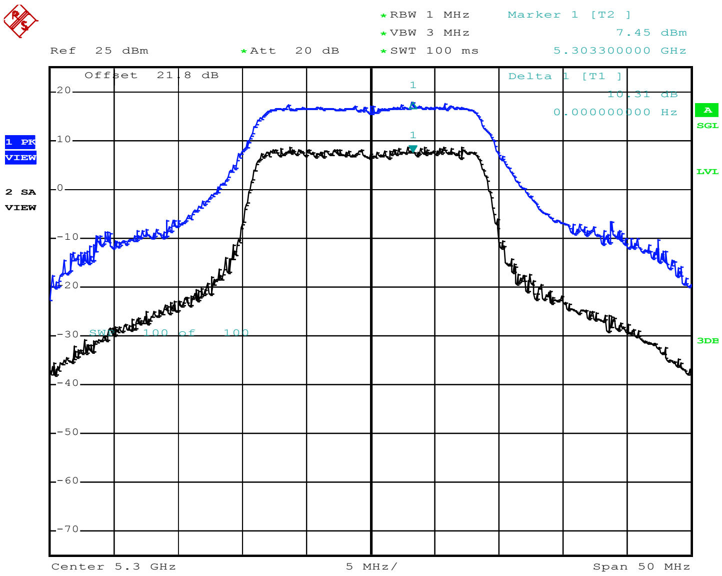
Date: 18.NOV.2010 05:22:17

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 60 - Chain A



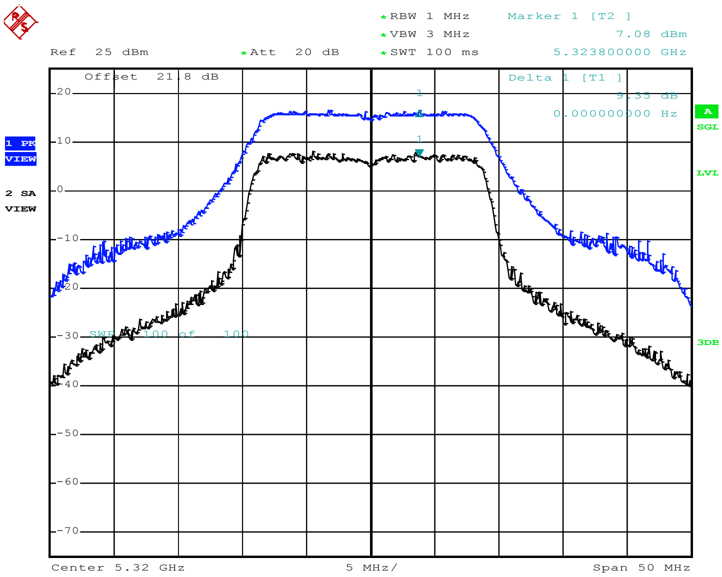
Date: 18.NOV.2010 05:51:04

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 60 - Chain B



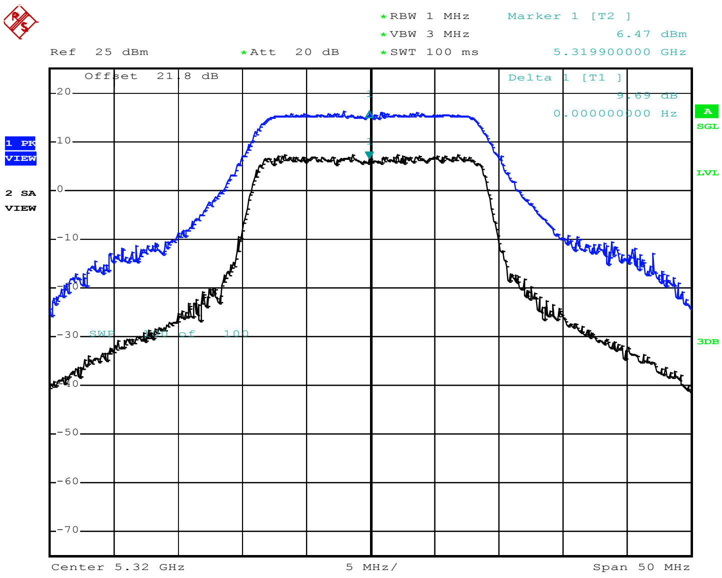
Date: 18.NOV.2010 05:24:51

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 64 - Chain A



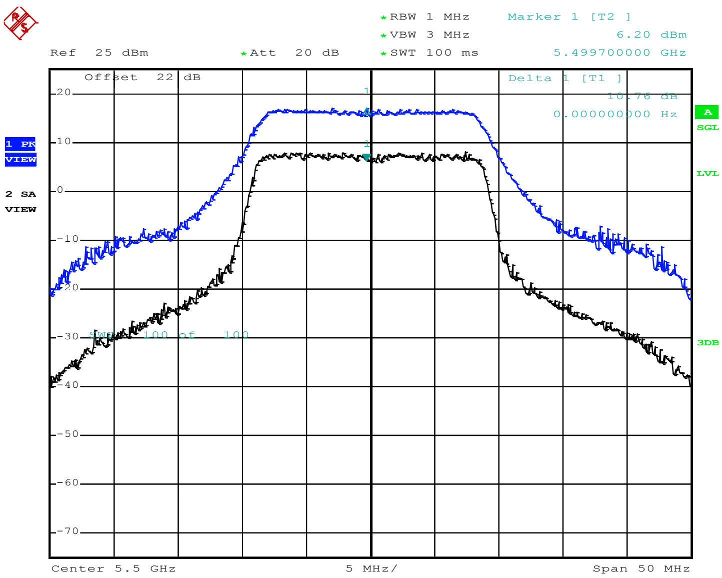
Date: 18.NOV.2010 05:53:36

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 64 - Chain B



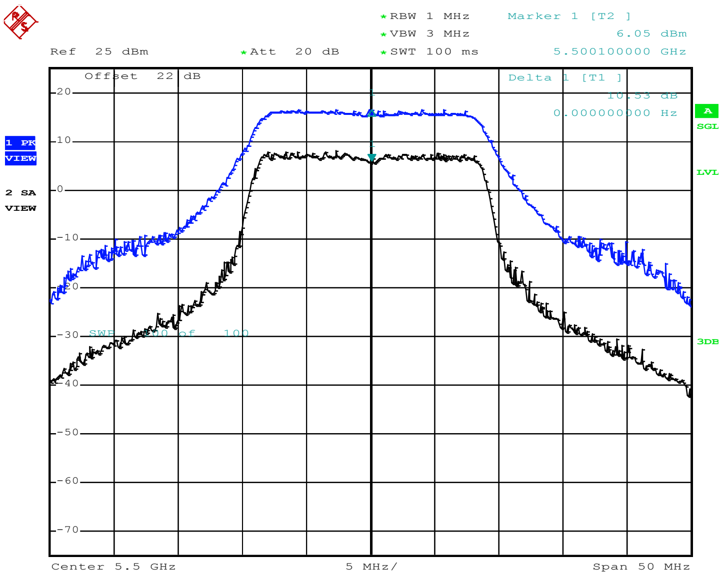
Date: 18.NOV.2010 05:26:15

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 100 - Chain A



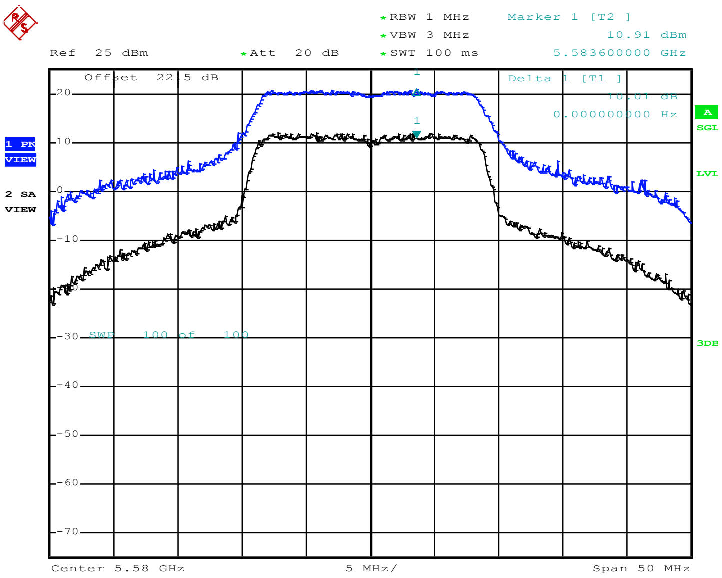
Date: 18.NOV.2010 05:55:04

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 100 - Chain B



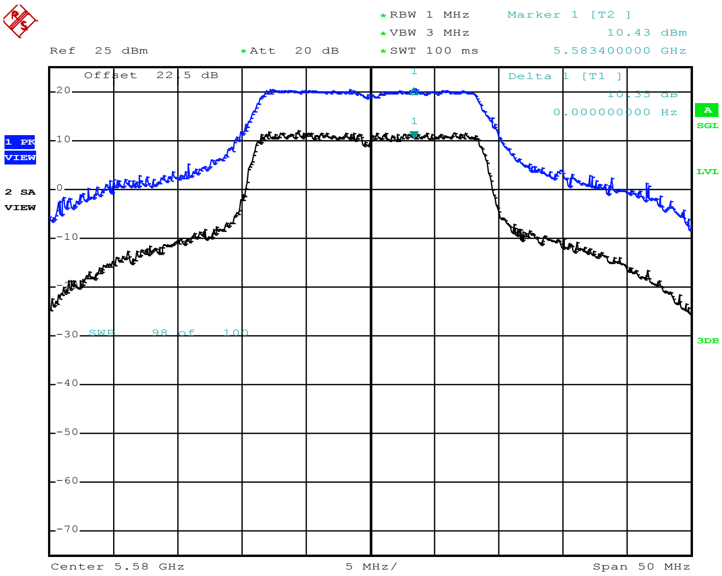
Date: 18.NOV.2010 05:29:05

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 116 - Chain A



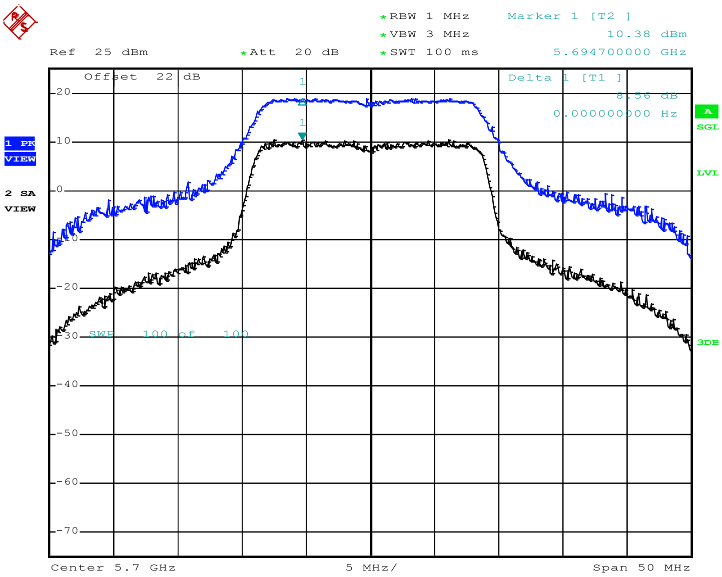
Date: 26.MAR.2011 04:39:06

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 116 - Chain B



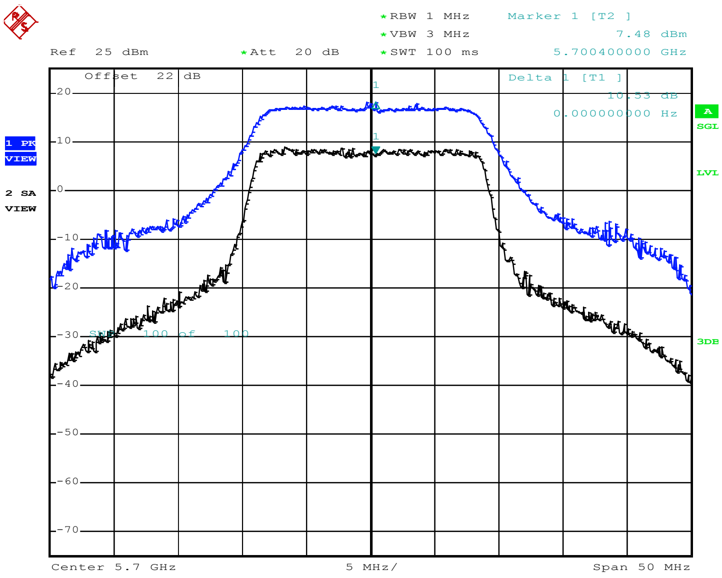
Date: 26.MAR.2011 04:24:30

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 140 - Chain A



Date: 18.NOV.2010 05:59:01

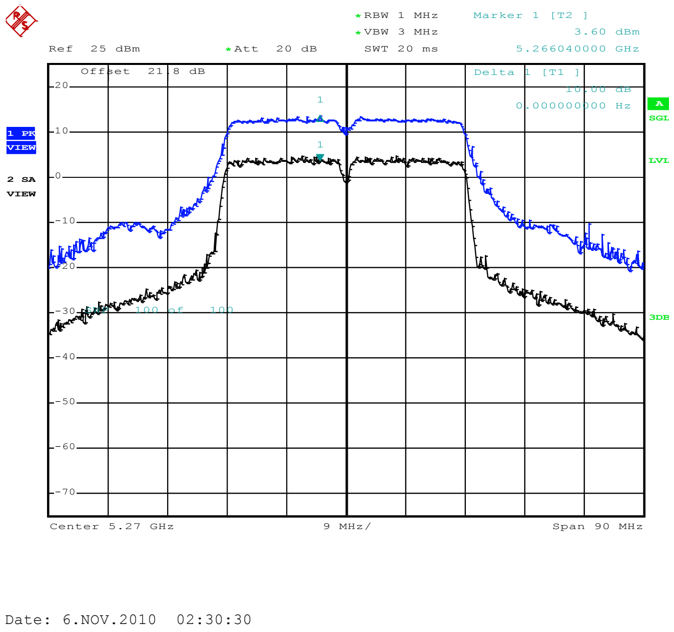
Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 140 - Chain B



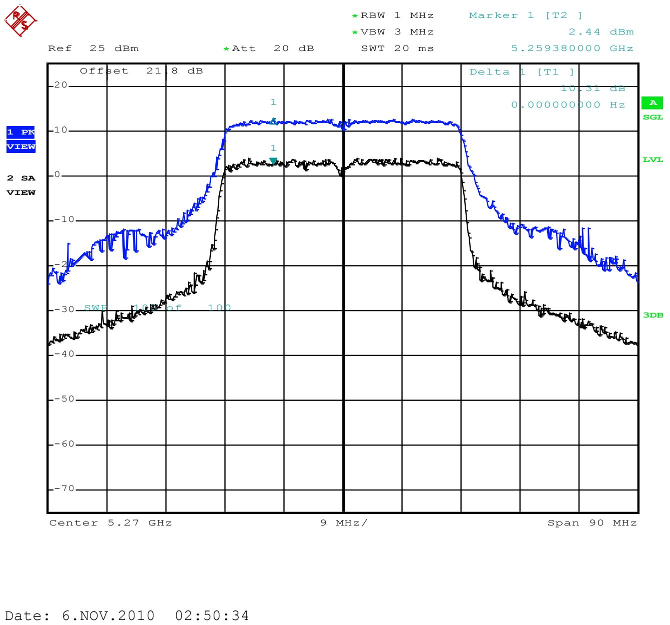
Date: 18.NOV.2010 05:32:49

Test Mode :	Mode 13~17	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

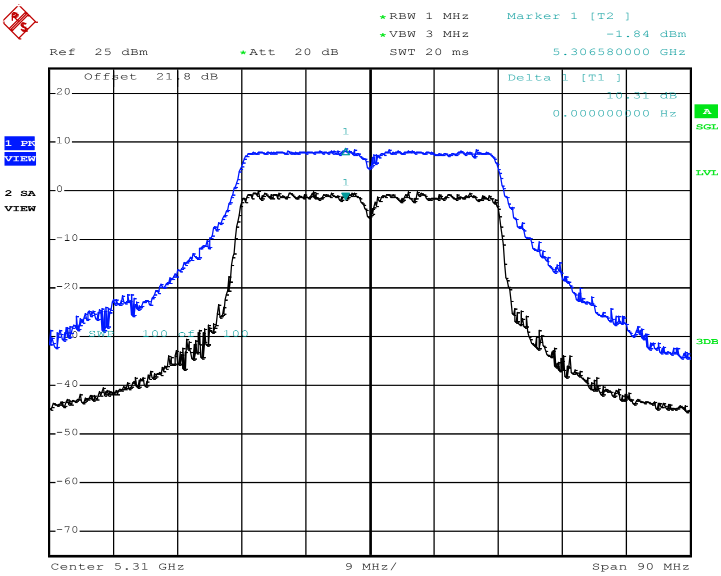
Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 54 - Chain A



Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 54 - Chain B

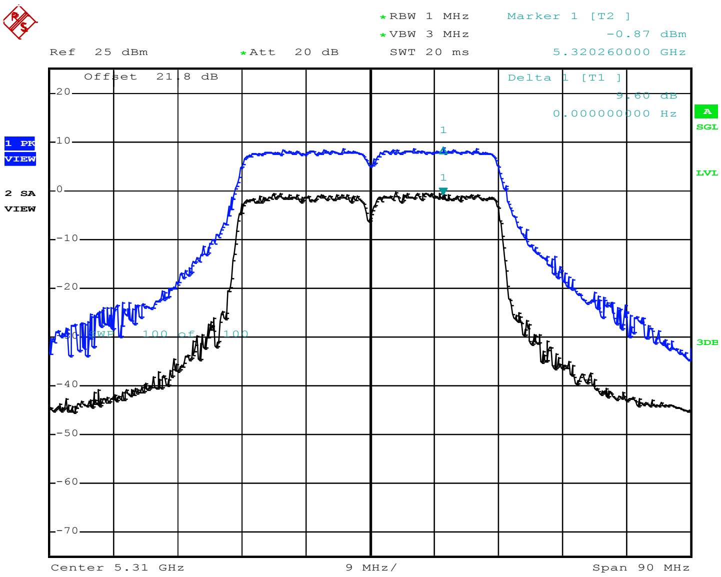


Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 62 - Chain A



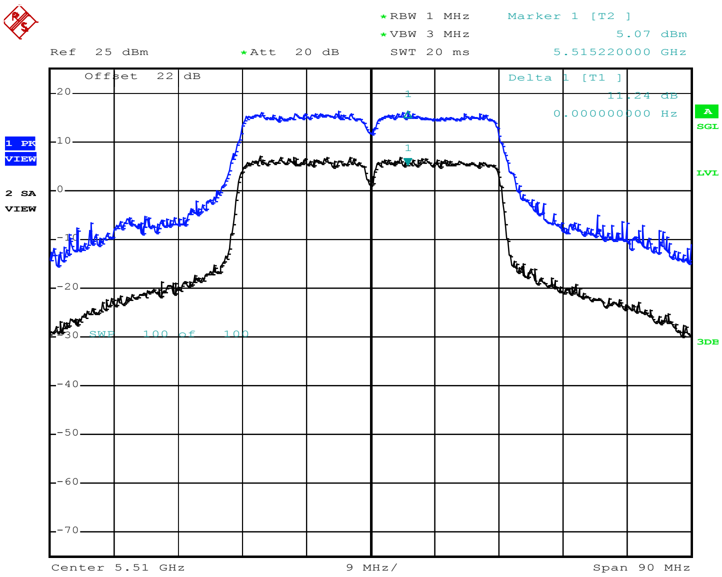
Date: 6.NOV.2010 02:31:19

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 62 - Chain B



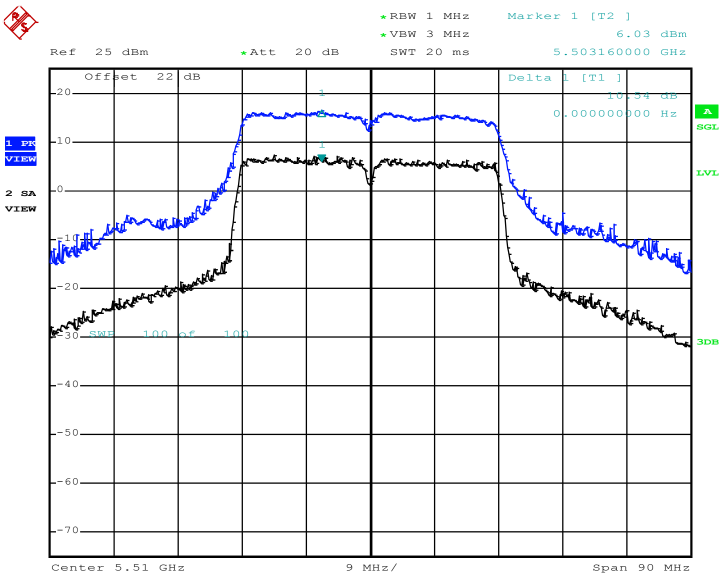
Date: 6.NOV.2010 02:49:27

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 102 - Chain A



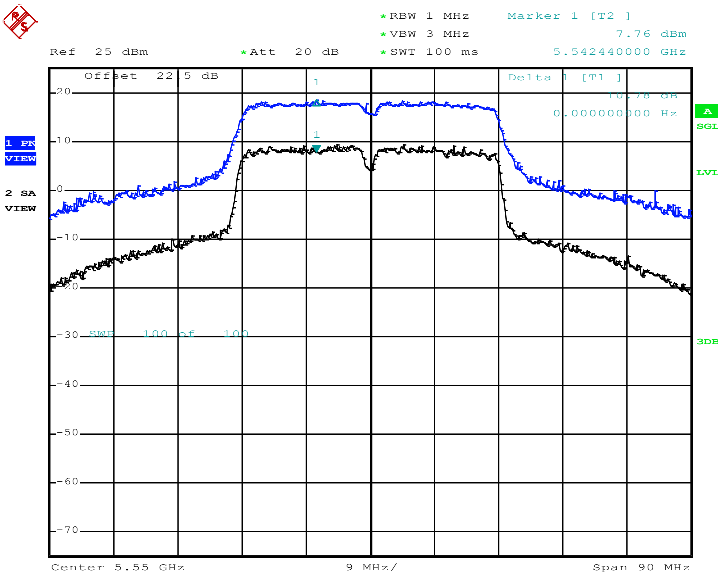
Date: 6.NOV.2010 02:32:17

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 102 - Chain B



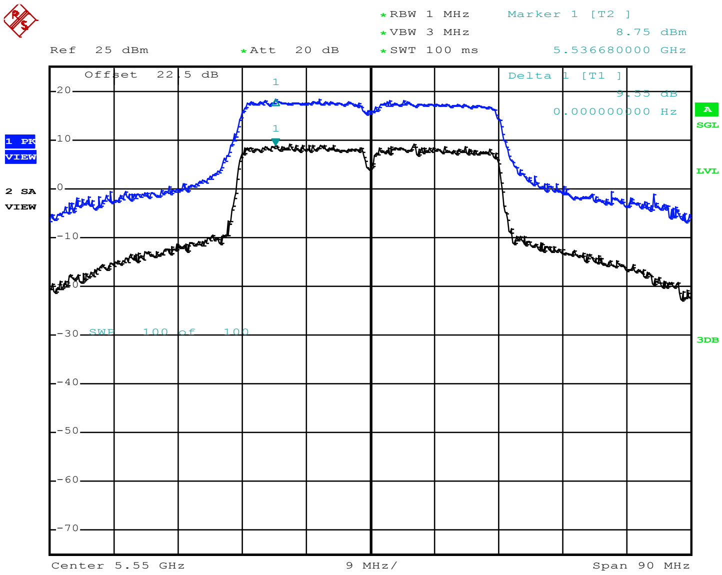
Date: 6.NOV.2010 02:48:01

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 110 - Chain A



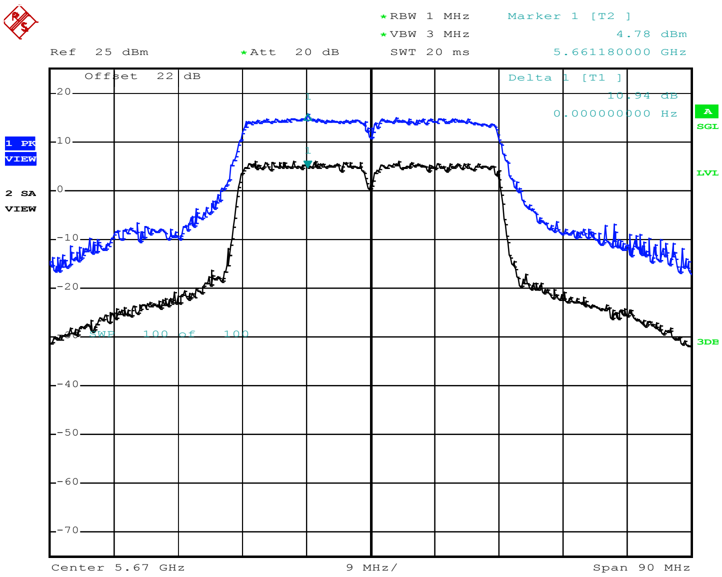
Date: 26.MAR.2011 04:33:34

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 110 - Chain B



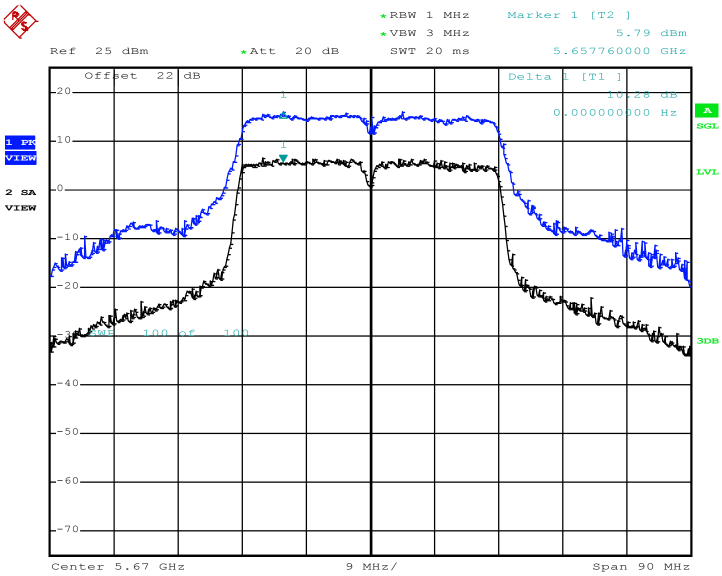
Date: 26.MAR.2011 04:26:59

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 134 - Chain A



Date: 6.NOV.2010 02:33:59

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 134 - Chain B

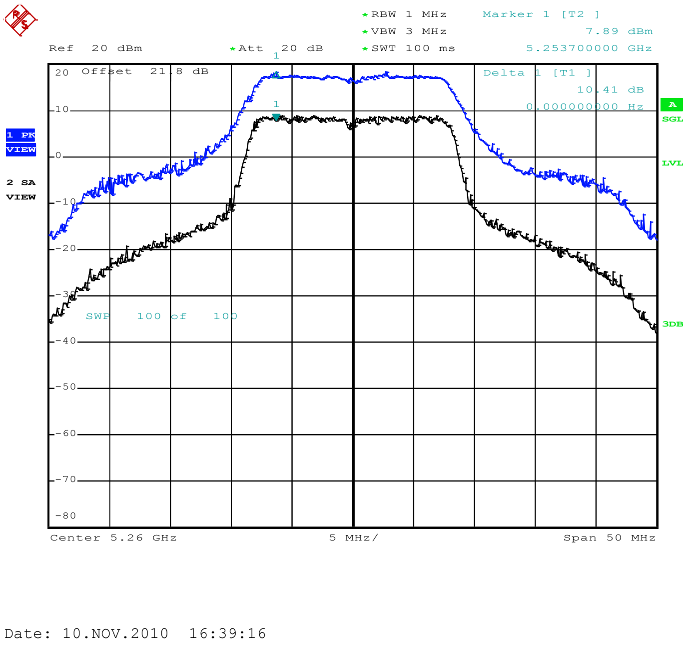


Date: 6.NOV.2010 02:45:57

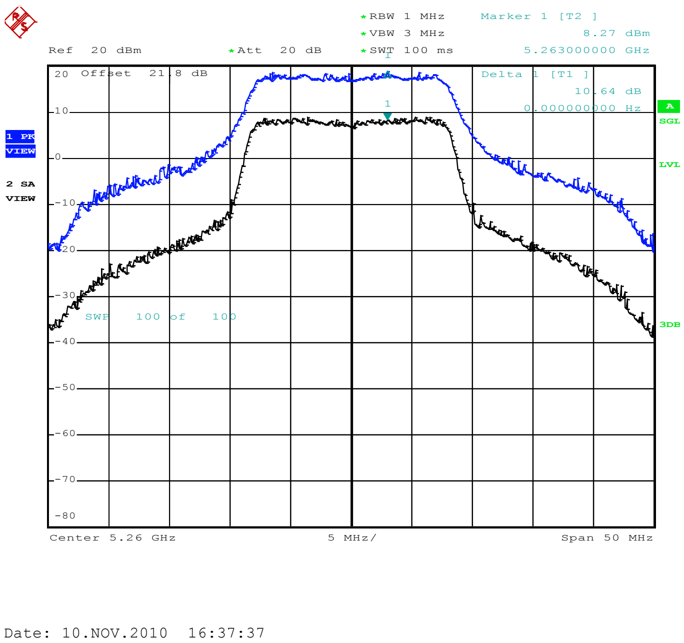
<Antenna 4 for 3.3V>

Test Mode :	Mode 1~6	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

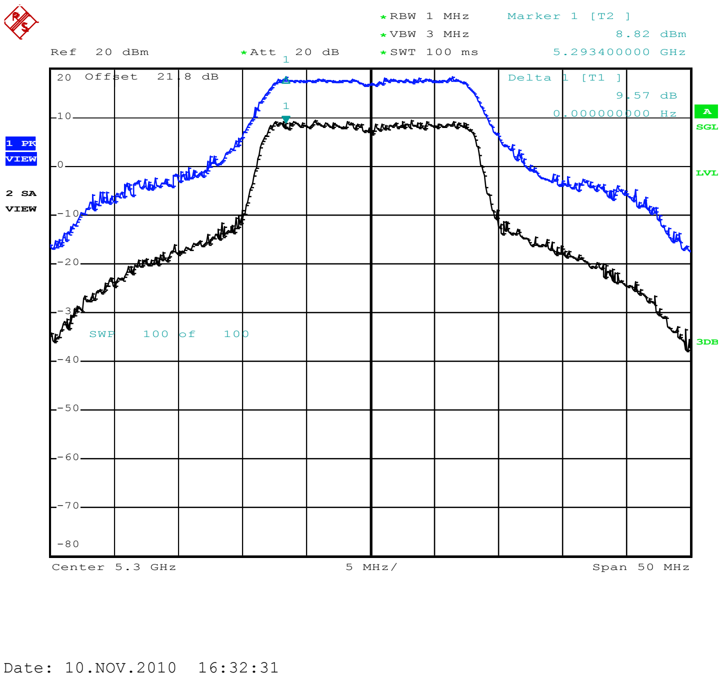
Peak Excursion Ratio Plot on 802.11a Channel 52 - Chain A+B(A)



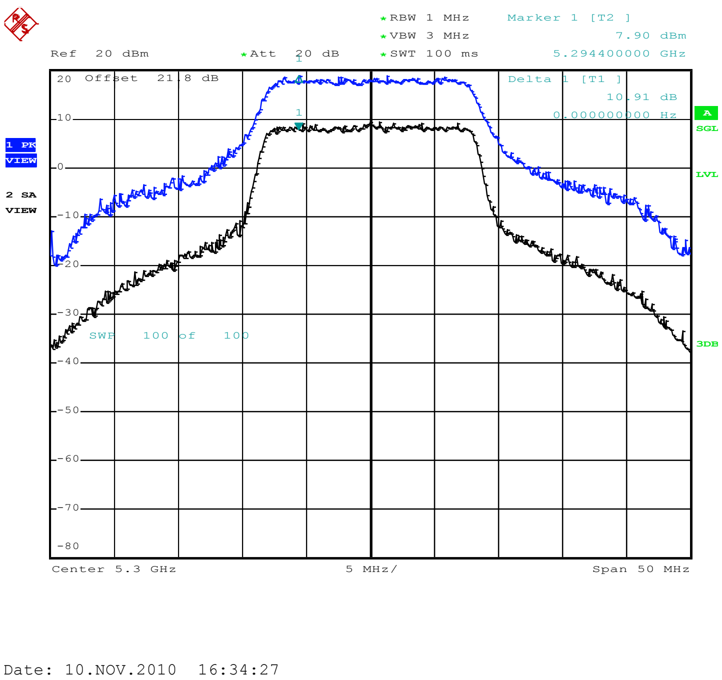
Peak Excursion Ratio Plot on 802.11a Channel 52 - Chain A+B(B)



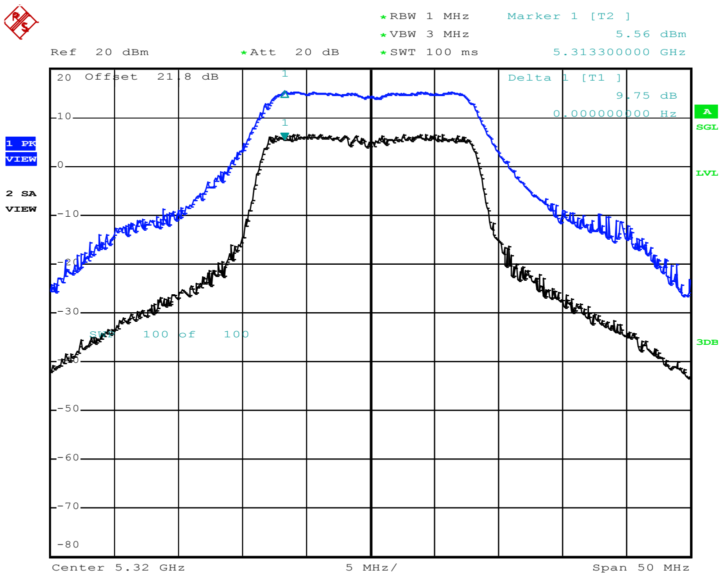
Peak Excursion Ratio Plot on 802.11a Channel 60 - Chain A+B(A)



Peak Excursion Ratio Plot on 802.11a Channel 60 - Chain A+B(B)

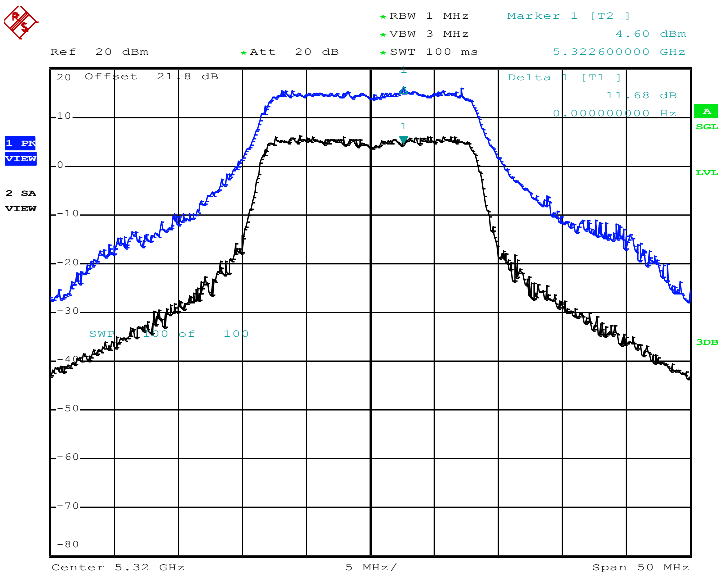


Peak Excursion Ratio Plot on 802.11a Channel 64 - Chain A+B(A)



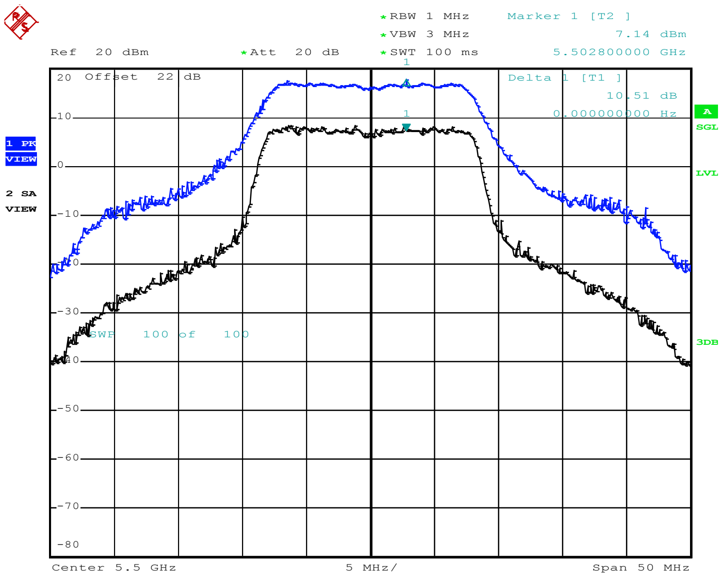
Date: 10.NOV.2010 16:30:53

Peak Excursion Ratio Plot on 802.11a Channel 64 - Chain A+B(B)



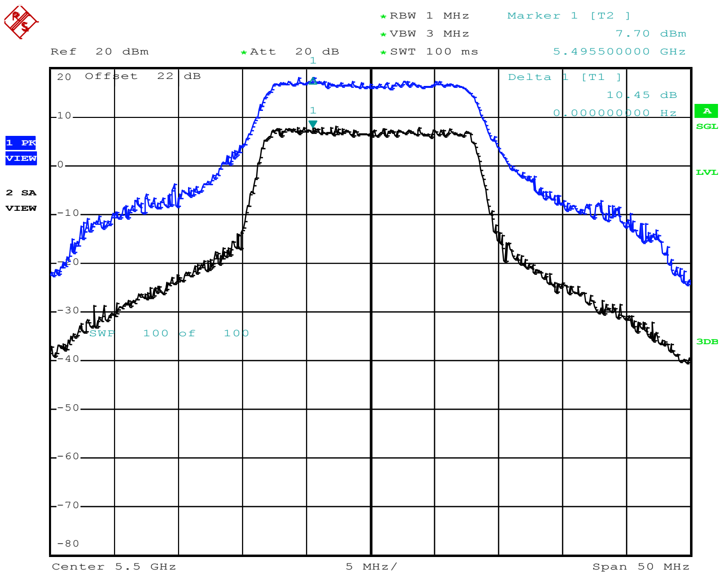
Date: 10.NOV.2010 16:28:48

Peak Excursion Ratio Plot on 802.11a Channel 100 - Chain A+B(A)



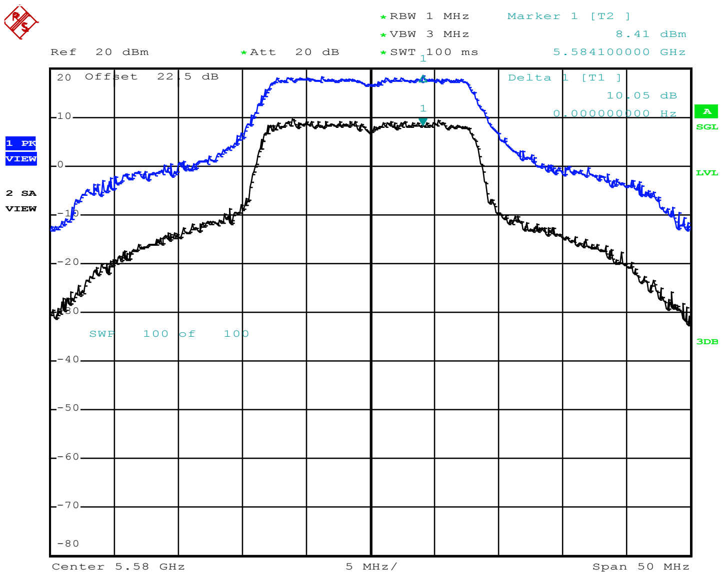
Date: 10.NOV.2010 16:20:16

Peak Excursion Ratio Plot on 802.11a Channel 100 - Chain A+B(B)



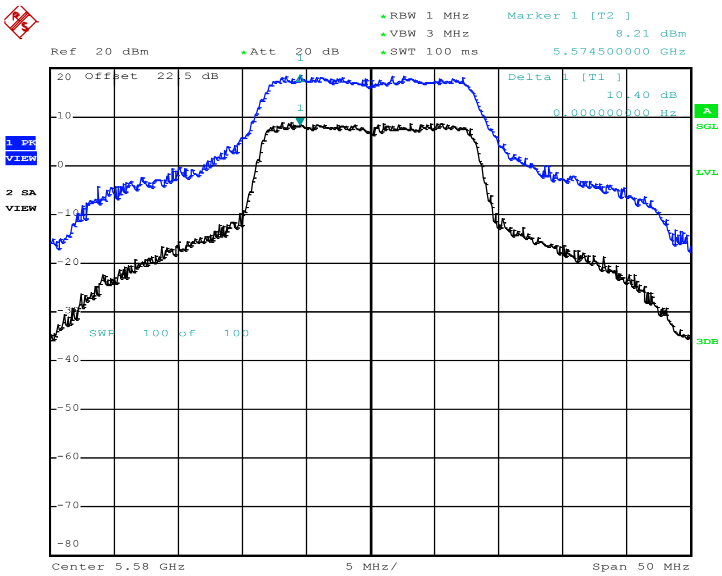
Date: 10.NOV.2010 16:22:48

Peak Excursion Ratio Plot on 802.11a Channel 116 - Chain A+B(A)



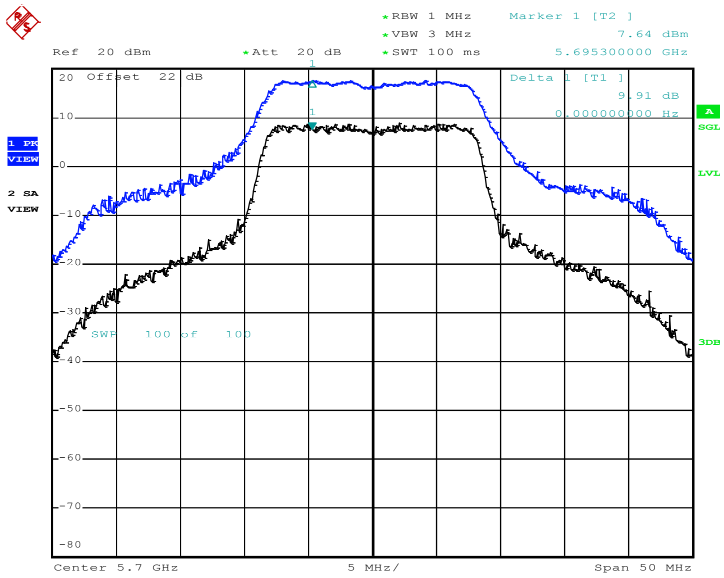
Date: 26.MAR.2011 02:26:59

Peak Excursion Ratio Plot on 802.11a Channel 116 - Chain A+B(B)



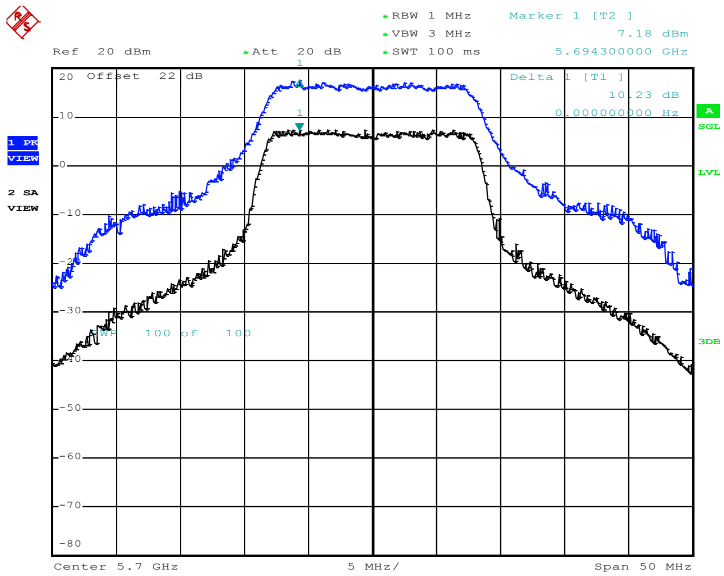
Date: 26.MAR.2011 02:40:44

Peak Excursion Ratio Plot on 802.11a Channel 140 - Chain A+B(A)



Date: 10.NOV.2010 16:16:32

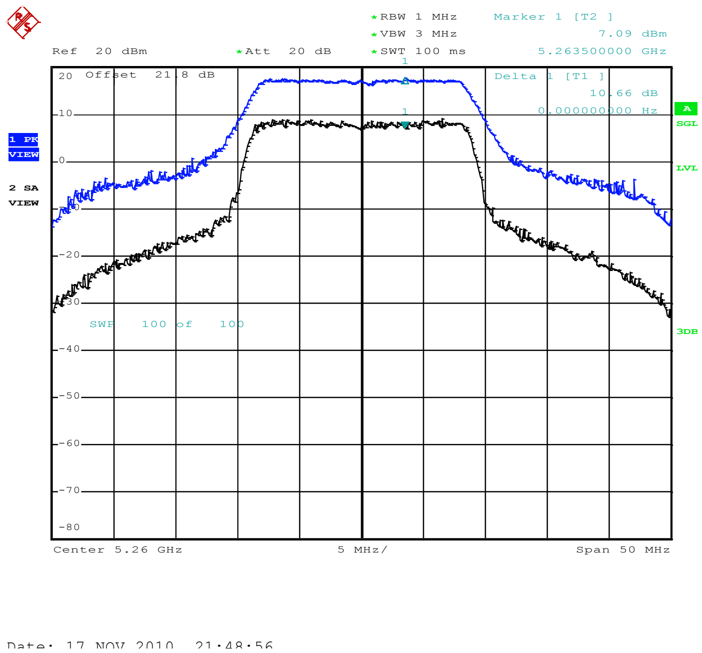
Peak Excursion Ratio Plot on 802.11a Channel 140 - Chain A+B(B)



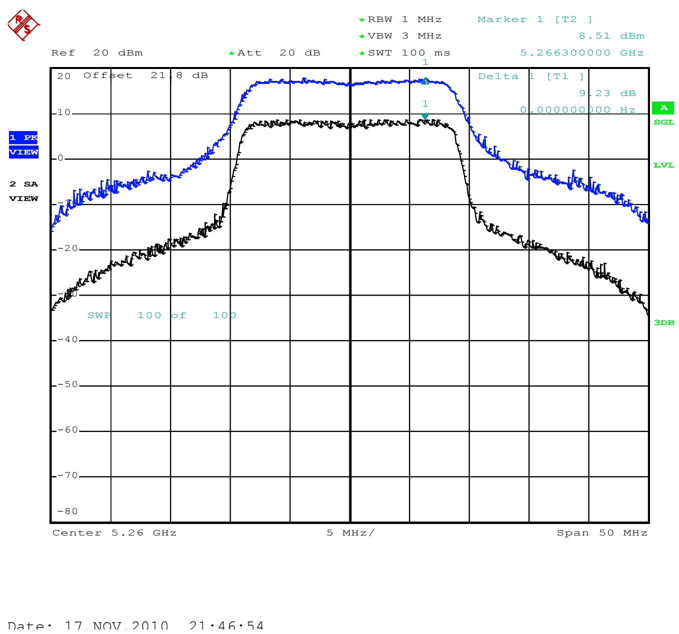
Date: 10.NOV.2010 16:25:51

Test Mode :	Mode 7~12	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

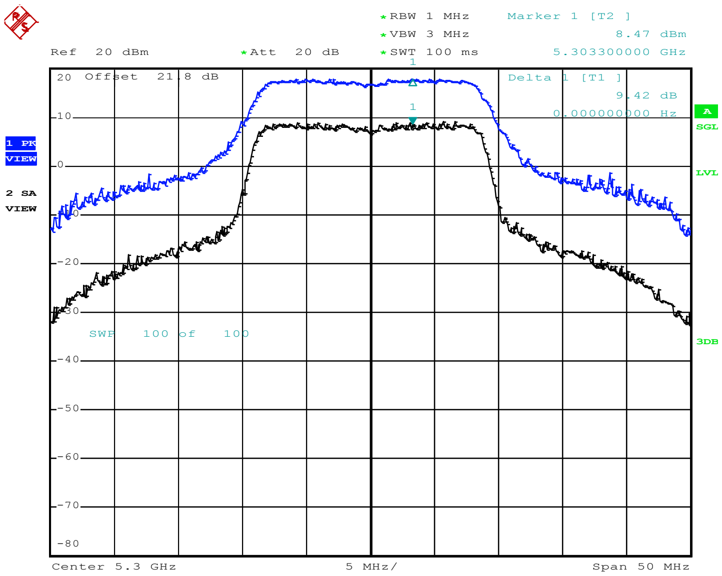
Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 52 - Chain A+B(A)



Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 52 - Chain A+B(B)

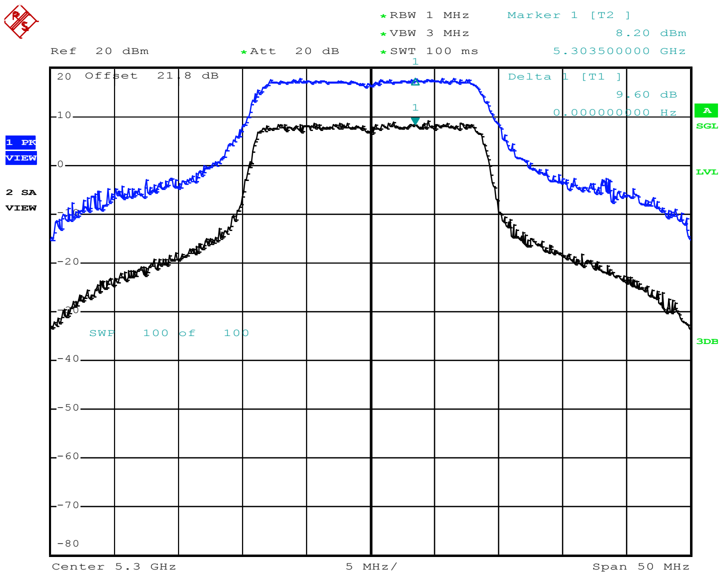


Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 60 - Chain A+B(A)



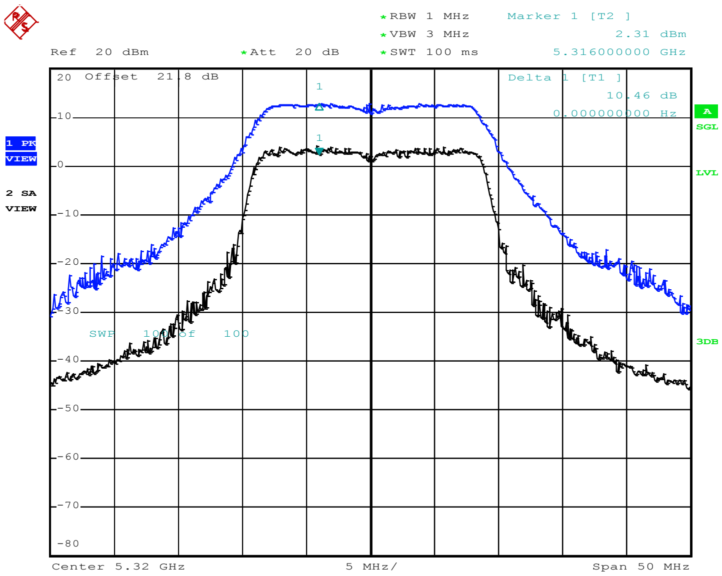
Date: 17.NOV.2010 21:51:56

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 60 - Chain A+B(B)



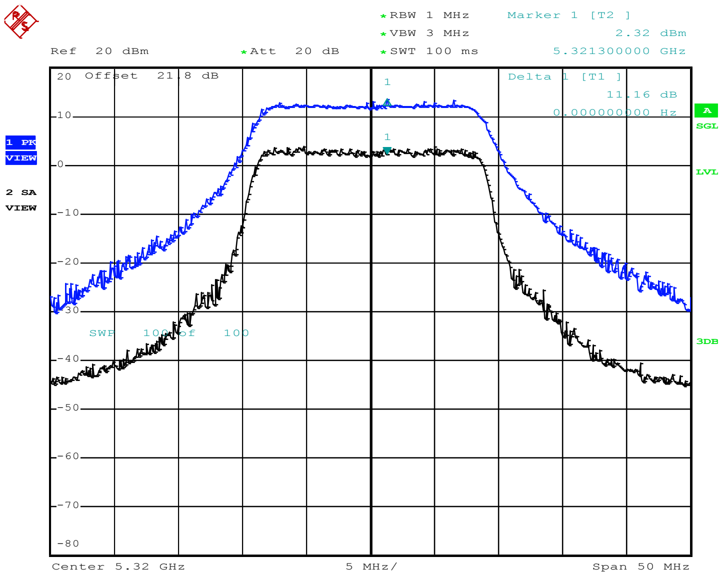
Date: 17.NOV.2010 21:53:23

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 64 - Chain A+B(A)



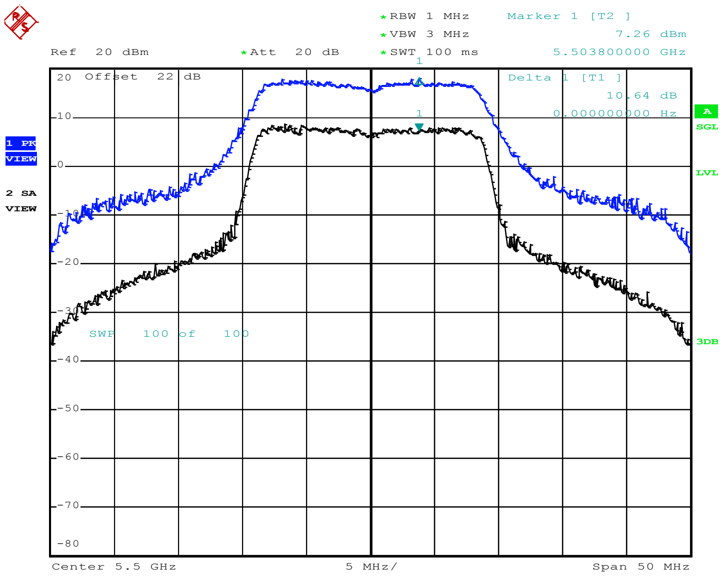
Date: 17.NOV.2010 22:00:13

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 64 - Chain A+B(B)



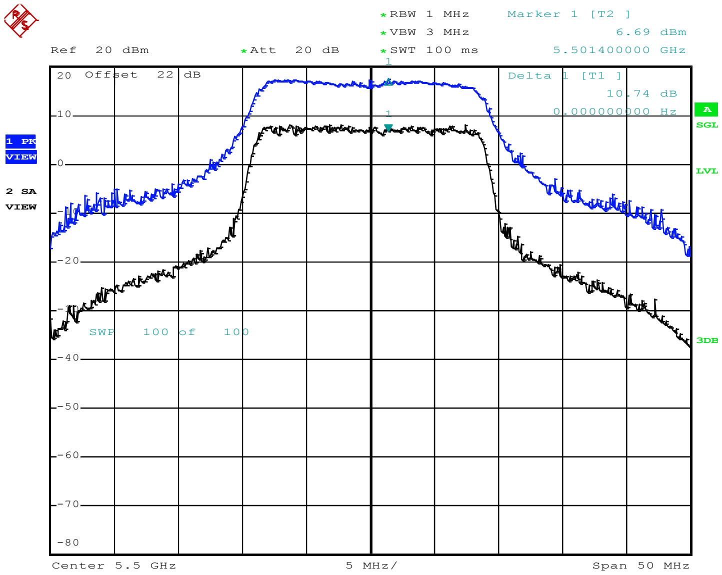
Date: 17.NOV.2010 21:56:17

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 100 - Chain A+B(A)



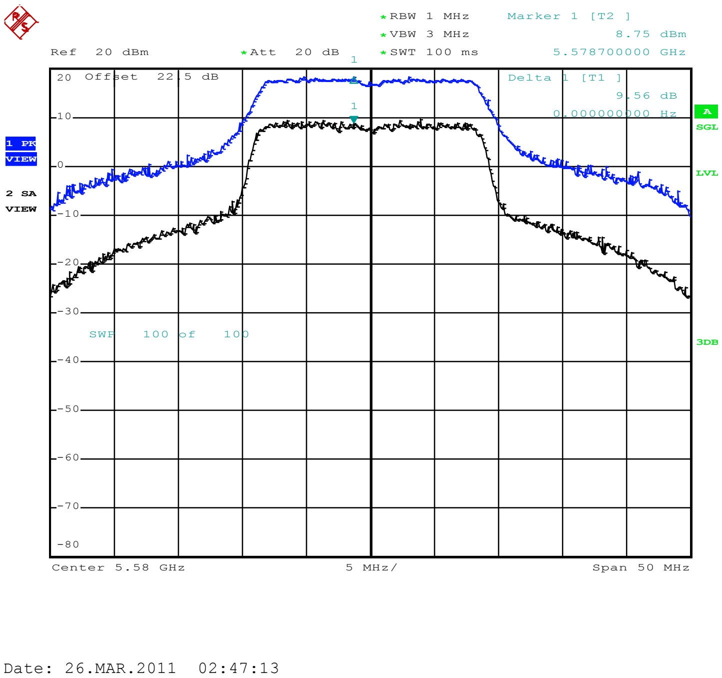
Date: 17.NOV.2010 22:04:45

Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 100 - Chain A+B(B)

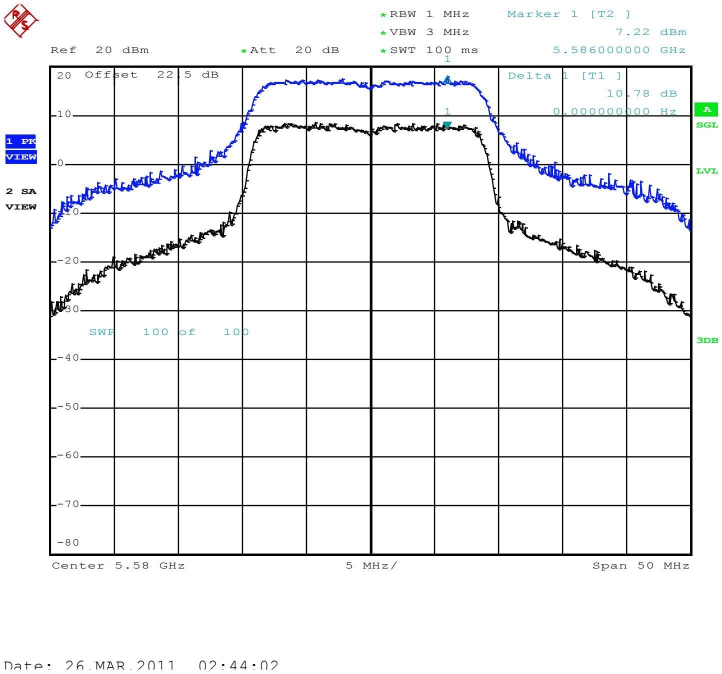


Date: 17.NOV.2010 22:06:35

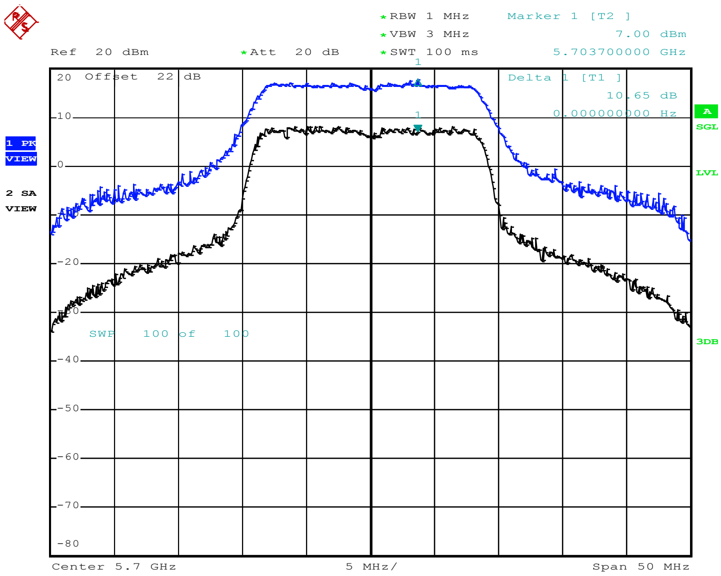
Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 116 - Chain A+B(A)



Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 116 - Chain A+B(B)

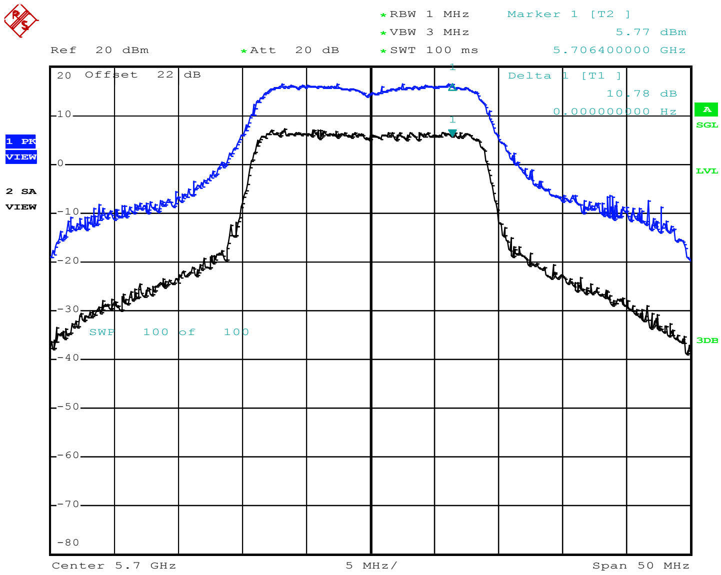


Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 140 - Chain A+B(A)



Date: 17.NOV.2010 22:13:15

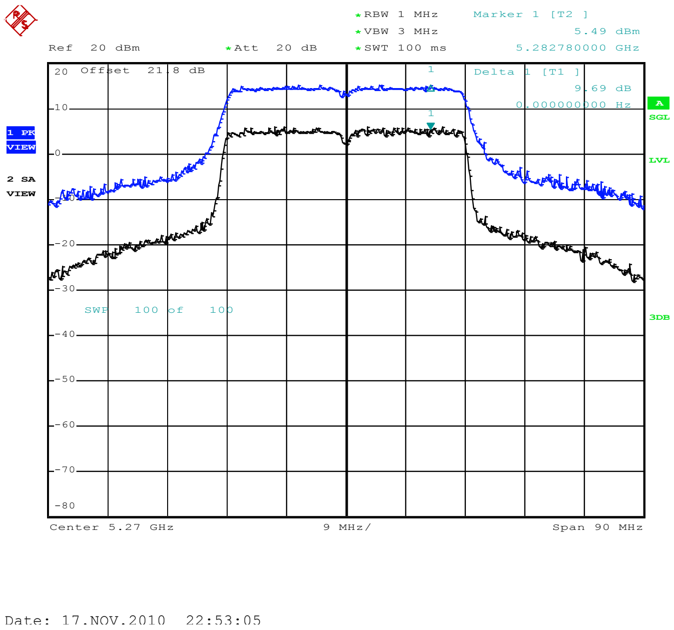
Peak Excursion Ratio Plot on 802.11n (BW 20MHz) Channel 140 - Chain A+B(B)



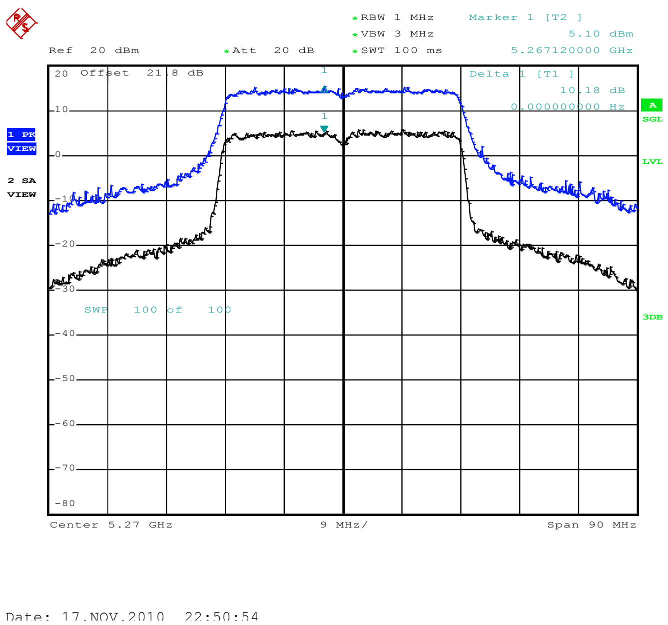
Date: 17.NOV.2010 22:15:17

Test Mode :	Mode 13~17	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

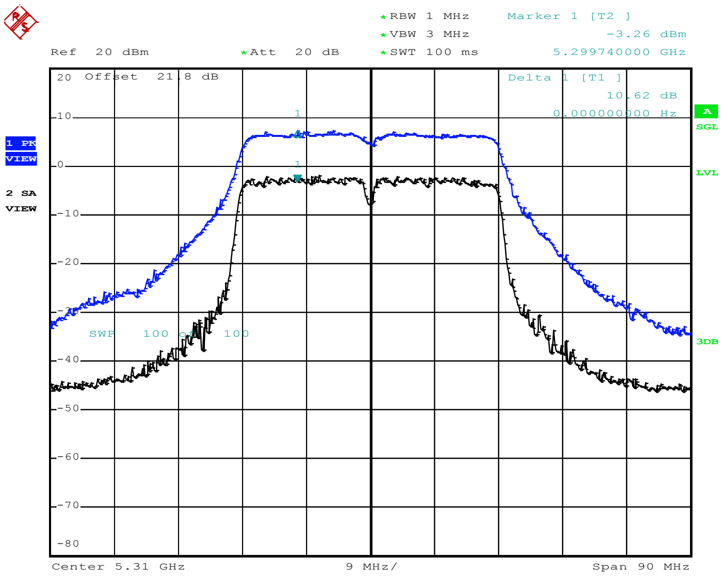
Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 54 - Chain A+B(A)



Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 54 - Chain A+B(B)

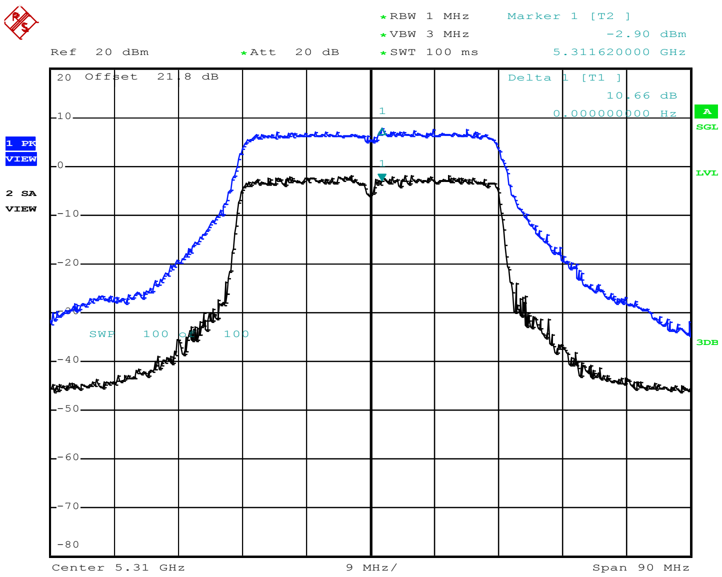


Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 62 - Chain A+B(A)



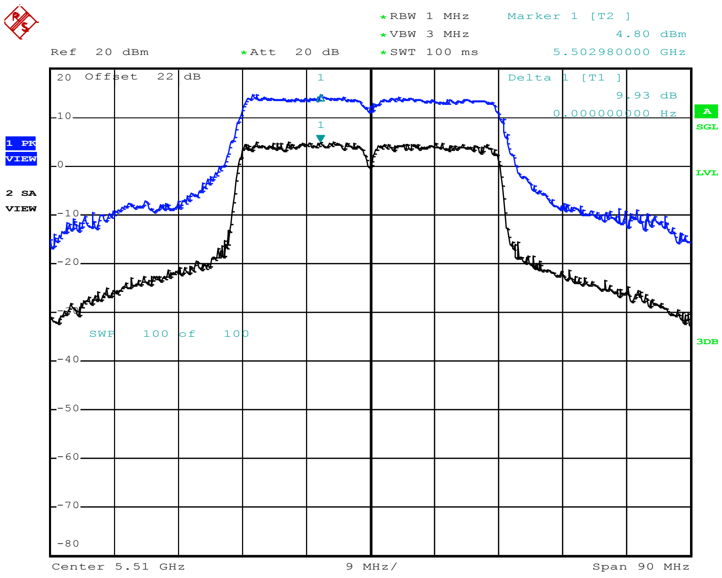
Date: 17.NOV.2010 23:04:57

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 62 - Chain A+B(B)



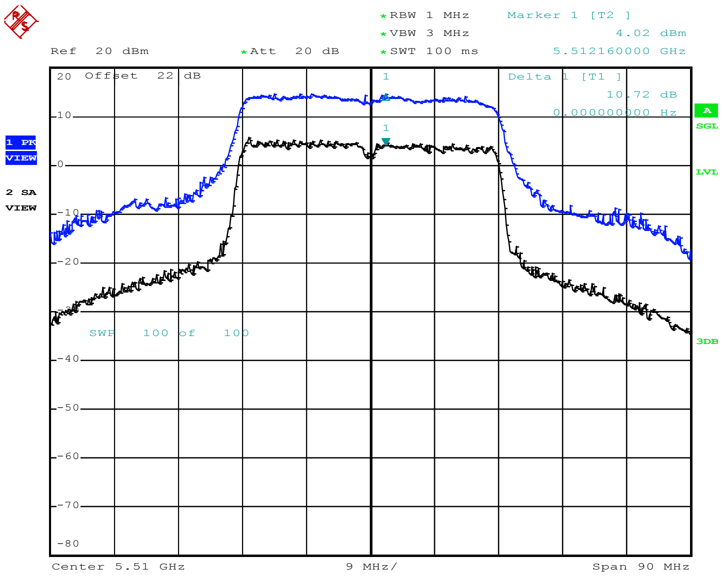
Date: 17.NOV.2010 23:07:07

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 102 - Chain A+B(A)



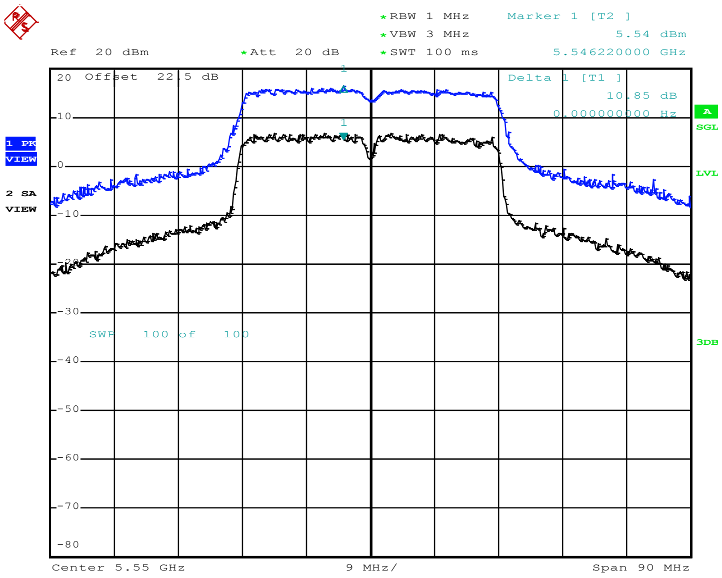
Date: 17.NOV.2010 23:15:30

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 102 - Chain A+B(B)



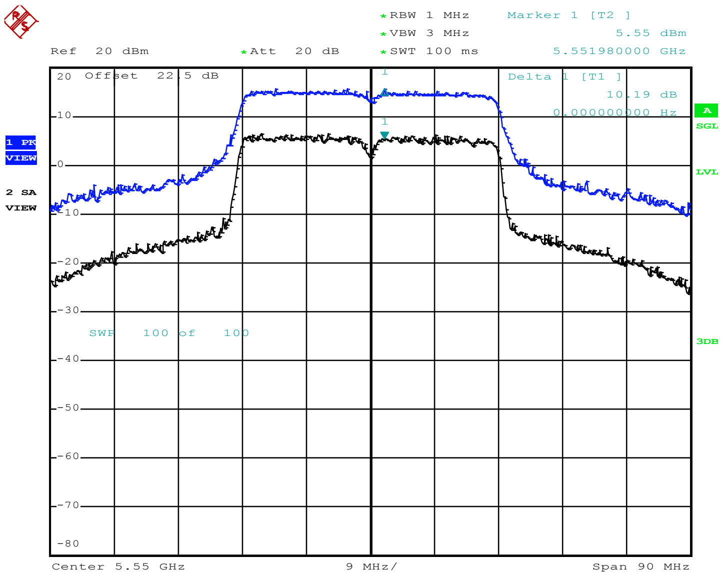
Date: 17.NOV.2010 23:12:05

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 110 - Chain A+B(A)



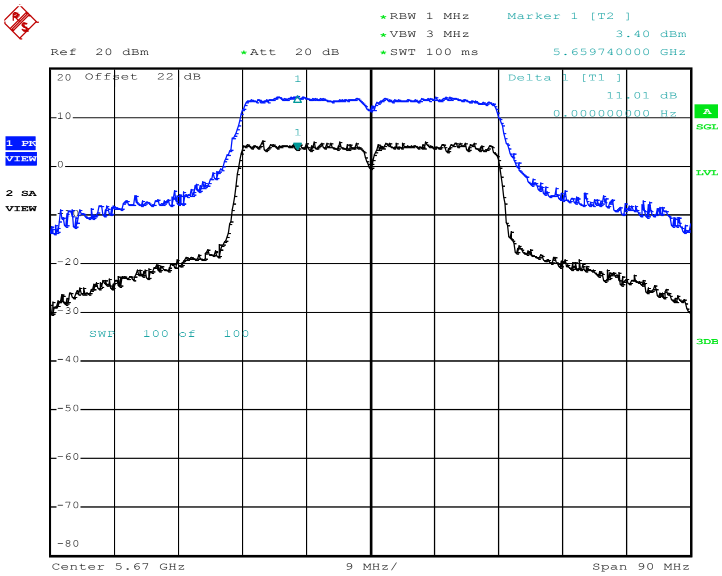
Date: 26.MAR.2011 02:51:37

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 110 - Chain A+B(B)



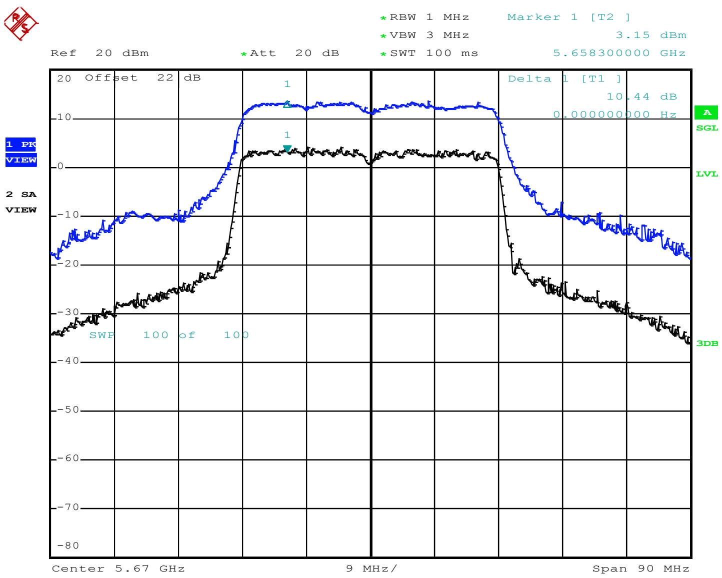
Date: 26.MAR.2011 02:55:02

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 134 - Chain A+B(A)



Date: 17.NOV.2010 23:28:52

Peak Excursion Ratio Plot on 802.11n (BW 40MHz) Channel 134 - Chain A+B(B)



Date: 17.NOV.2010 23:26:05

3.7 Automatically Discontinue Transmission

3.7.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Result of Automatically Discontinue Transmission

During no any information transmission, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

3.8 Frequency Stability Measurement

3.8.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user’s manual. The frequency tolerance of the carrier signal shall be maintained within the band of operation frequency over a temperature variation of –30 degrees to 50 degrees Celsius at normal supply voltage, and for a variation +/- 3% in the primary supply voltage decelerated by manufacturer.

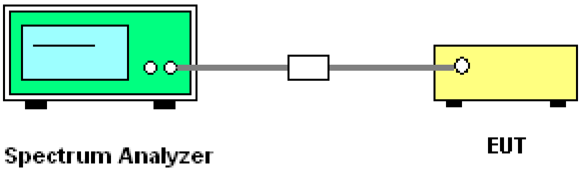
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two, and then reported as in below table.
4. The frequency stability measurement under extreme condition,
    a. For temperature variation, the EUT was placed inside the environmental test chamber, and set the chamber to the highest temperature as specified. After temperature stabilized, turn the EUT on and measured.
    b. Repeat and measure the temperature by changing 10 degree step, until the lowest temperature as specified.
    c. For voltage variation, the supply voltages were adjusted on the EUT by the +/- 3% variation of primary supply voltage decelerated by manufacturer.

3.8.4 Test Setup



3.8.5 Test Result of Normal Frequency Stability

<Antenna 3 for 4.5V>

Test Mode :	Mode 1~6	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
		SISO		SISO		SISO	
		Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
52	5260	5251.68	5251.68	5268.28	5268.28	-3.80	-3.80
60	5300	5291.68	5291.68	5308.32	5308.32	0.00	0.00
64	5320	5311.68	5311.68	5328.32	5328.28	0.00	-3.76
100	5500	5491.68	5491.68	5508.32	5508.28	0.00	-3.64
116	5580	5571.64	5571.64	5588.28	5588.28	-7.17	-7.17
140	5700	5691.68	5691.68	5708.28	5708.28	-3.51	-3.51

Test Mode :	Mode 7~12	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
		SISO		SISO		SISO	
		Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
52	5260	5251.04	5251.04	5268.92	5268.92	-3.80	-3.80
60	5300	5291.04	5291.04	5308.92	5308.92	-3.77	-3.77
64	5320	5311.04	5311.04	5328.92	5328.92	-3.76	-3.76
100	5500	5491.04	5491.04	5508.92	5508.92	-3.64	-3.64
116	5580	5571.00	5570.98	5588.88	5588.92	-10.75	-8.96
140	5700	5691.04	5691.04	5708.92	5708.92	-3.51	-3.51

Test Mode :	Mode 13~17	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
		SISO		SISO		SISO	
		Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
54	5270	5251.68	5251.68	5288.32	5288.32	0.00	0.00
62	5310	5291.68	5291.68	5328.32	5328.32	0.00	0.00
102	5510	5491.68	5491.68	5528.32	5528.32	0.00	0.00
110	5550	5531.60	5531.60	5568.32	5568.32	-7.21	-7.21
134	5670	5651.68	5651.68	5688.32	5688.32	0.00	0.00

<Antenna 4 for 3.3V>

Test Mode :	Mode 1~6	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
		MIMO (2Tx)		MIMO (2Tx)		MIMO (2Tx)	
		Chain A+B(A)	Chain A+B(B)	Chain A+B(A)	Chain A+B(B)	Chain A+B(A)	Chain A+B(B)
52	5260	5251.68	5251.68	5268.32	5268.28	0.00	-3.80
60	5300	5291.68	5291.68	5308.28	5308.32	-3.77	0.00
64	5320	5311.68	5311.68	5328.28	5328.28	-3.76	-3.76
100	5500	5491.68	5491.68	5508.28	5508.28	-3.64	-3.64
116	5580	5571.64	5571.63	5588.28	5588.28	-7.17	-8.06
140	5700	5691.68	5691.68	5708.28	5708.28	-3.51	-3.51

Test Mode :	Mode 7~12	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
		MIMO (2Tx)		MIMO (2Tx)		MIMO (2Tx)	
		Chain A+B(A)	Chain A+B(B)	Chain A+B(A)	Chain A+B(B)	Chain A+B(A)	Chain A+B(B)
52	5260	5251.06	5251.06	5268.90	5268.90	-3.80	-3.80
60	5300	5291.08	5291.08	5308.92	5308.92	0.00	0.00
64	5320	5311.06	5311.06	5328.92	5328.90	-1.88	-3.76
100	5500	5491.08	5491.08	5508.90	5508.90	-1.82	-1.82
116	5580	5571.00	5571.04	5588.92	5588.88	-7.17	-7.17
140	5700	5691.06	5691.06	5708.90	5708.90	-3.51	-3.51

Test Mode :	Mode 13~17	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
		MIMO (2Tx)		MIMO (2Tx)		MIMO (2Tx)	
		Chain A+B(A)	Chain A+B(B)	Chain A+B(A)	Chain A+B(B)	Chain A+B(A)	Chain A+B(B)
54	5270	5251.68	5251.68	5288.24	5288.32	-7.59	0.00
62	5310	5291.68	5291.68	5328.28	5328.24	-3.77	-7.53
102	5510	5491.72	5491.68	5528.28	5528.24	0.00	-7.26
110	5550	5531.68	5531.70	5568.32	5568.32	0.00	1.80
134	5670	5651.68	5651.68	5688.28	5688.24	-3.53	-7.05

3.8.6 Test Result of operation under extreme conditions Frequency Stability

Temperature (°C)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
	Channel 60	Channel 116	Channel 60	Channel 116	Channel 60	Channel 116
	5300 MHz	5580 MHz	5300 MHz	5580 MHz	5300 MHz	5580 MHz
-30	5291.65	5571.65	5308.30	5588.30	-4.72	-4.48
-20	5291.70	5571.70	5308.35	5588.30	4.72	0.00
-10	5291.70	5571.70	5308.35	5588.35	4.72	4.48
0	5291.70	5571.70	5308.35	5588.35	4.72	4.48
10	5291.70	5571.70	5308.30	5588.30	0.00	0.00
20	5291.70	5571.70	5308.30	5588.30	0.00	0.00
30	5291.65	5571.65	5308.30	5588.30	-4.72	-4.48
40	5291.65	5571.65	5308.30	5588.30	-4.72	-4.48
50	5291.65	5571.65	5308.30	5588.30	-4.72	-4.48

Voltage (V)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
	Channel 60	Channel 116	Channel 60	Channel 116	Channel 60	Channel 116
	5300 MHz	5580 MHz	5300 MHz	5580 MHz	5300 MHz	5580 MHz
4.500	5291.65	5571.65	5308.30	5588.30	-4.72	-4.48
4.365	5291.65	5571.65	5308.30	5588.30	-4.72	-4.48
4.635	5291.70	5571.65	5308.30	5588.30	0.00	-4.48

Antenna A+B(A)						
Voltage (V)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
	Channel 60	Channel 116	Channel 60	Channel 116	Channel 60	Channel 116
	5300 MHz	5580 MHz	5300 MHz	5580 MHz	5300 MHz	5580 MHz
3.300	5291.65	5308.30	5571.65	5588.30	-4.72	-4.48
3.201	5291.65	5308.30	5571.65	5588.30	-4.72	-4.48
3.399	5291.65	5308.30	5571.65	5588.30	-4.72	-4.48

Antenna A+B(B)						
Voltage (V)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
	Channel 60	Channel 116	Channel 60	Channel 116	Channel 60	Channel 116
	5300 MHz	5580 MHz	5300 MHz	5580 MHz	5300 MHz	5580 MHz
3.300	5291.65	5308.30	5571.65	5588.30	-4.72	-4.48
3.201	5291.65	5308.30	5571.65	5588.30	-4.72	-4.48
3.399	5291.65	5308.25	5571.65	5588.30	-9.43	-4.48

3.9 Antenna Requirements

3.9.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.9.2 Antenna Connected Construction

The antennas types used in this product are Dipole Antenna, Panel Antenna, Patch Antenna and PIFA Antenna with non-standard connectors and it is considered to meet antenna requirement of FCC.

3.9.3 Antenna Gain

The antenna gain is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101329	9kHz~30GHz	Apr. 26, 2010	Oct. 02, 2010 ~ Mar. 26, 2011	Apr. 25, 2011	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 13, 2011	Apr. 25, 2012 ~ Apr. 30, 2012	Jun. 12, 2012	Conducted (TH02-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	Apr. 03, 2011	Jul. 19, 2011 ~ Mar. 08, 2012	Apr. 02, 2012	Conducted (TH02-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	Apr. 17, 2012	May 02, 2012 ~ May 03, 2012	Apr. 16, 2013	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 16, 2010	Nov. 17, 2010	Aug. 15, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9kHz~30MHz	Nov. 30, 2009	Nov. 17, 2010	Nov. 29, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9kHz~30MHz	Nov. 23, 2009	Nov. 17, 2010	Nov. 22, 2010	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Nov. 17, 2010	N/A	Conduction (CO05-HY)
Spectrum Analyzer	R&S	ESU26	100390	20Hz ~ 26.5GHz	Dec. 22, 2011	Feb. 05, 2012 ~ Feb. 14, 2012	Dec. 21, 2012	Radiation (03CH05-HY)
COM-POWER	Double Ridge Horn	AH-118	701030	1GHz ~ 18GHz	N/A	Feb. 05, 2012 ~ Feb. 14, 2012	N/A	Radiation (03CH05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2725	30MHz ~ 2GHz	Oct. 22, 2011	Feb. 05, 2012 ~ Feb. 14, 2012	Oct. 21, 2012	Radiation (03CH05-HY)
Turn Table	HD	Deis HD 2000	420/611	0 ~ 360 degree	N/A	Feb. 05, 2012 ~ Feb. 14, 2012	N/A	Radiation (03CH05-HY)
Antenna Mast	HD	MA 240	240/666	1 m ~ 4 m	N/A	Feb. 05, 2012 ~ Feb. 14, 2012	N/A	Radiation (03CH05-HY)
Horn Antenna	ESCO	3117	66584	1GHz ~ 18GHz	Aug. 04, 2011	Feb. 05, 2012 ~ Feb. 14, 2012	Aug. 03, 2012	Radiation (03CH05-HY)
COM-POWER	COM-POWER	PA-103	161075	10Hz ~ 1000MHz Gain:32dB	Mar. 29, 2011	Feb. 05, 2012 ~ Feb. 14, 2012	Mar. 28, 2012	Radiation (03CH05-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz~18GHz	Jul. 18, 2011	Feb. 05, 2012 ~ Feb. 14, 2012	Jul. 17, 2012	Radiation (03CH05-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz~26.5GHz	Aug. 30, 2011	Feb. 05, 2012 ~ Feb. 14, 2012	Aug. 29, 2012	Radiation (03CH05-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Feb. 05, 2012 ~ Feb. 14, 2012	Jul. 28, 2012	Radiation (03CH05-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
Combined Standard Uncertainty Uc(y)	**1.13**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**		

Uncertainty of Radiated Emission Measurement (30MHz ~ 1000MHz)

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
Combined Standard Uncertainty Uc(y)	**1.27**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**		

Uncertainty of Radiated Emission Measurement (1GHz ~ 40GHz)

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	±0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	±1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	±0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site Imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR Γ1 = 0.197 Antenna VSWR Γ2 = 0.194 Uncertainty = 20Log(1-Γ1*Γ2)	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty Uc(y)	**2.36**				
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**				