

4. Channel Edge

4.1. Test Equipment

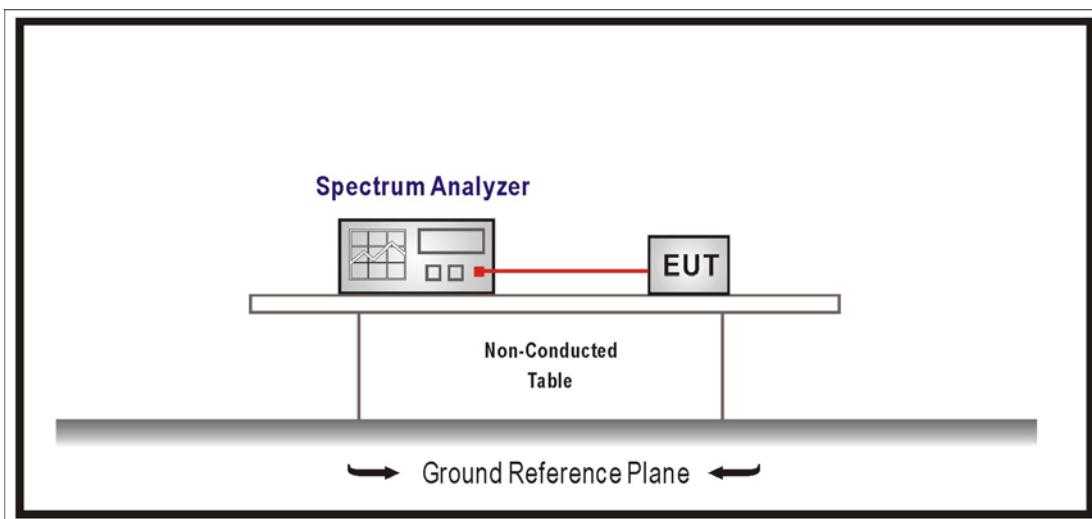
The following test equipments are used during the test:

Channel Edge/ SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2013/07/31

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

4.2. Test Setup



4.3. Limits

- (1) For digital base stations, the attenuation shall be not less than $43 + 10\log(P)$ dB.
- (2) For all fixed digital user stations, the attenuation factor shall be not less than $43 + 10 \log(P)$ dB at the channel edge.
- (3) Mobile Digital Stations: not less than $43 + \log(P)$ dB at the channel edge and $55 + \log(P)$ dB at 5.5 MHz from the channel edges

Example for Calculation:

Assume the EUT Output Power is 2 Watt = 33 dBm

$43 + 10\log(P)$ dB; $43 + 10\log(2) = 46$ dB

33 dBm (2 Watt) – 46 dB = -13 dBm

4.4. Test Procedure

The EUT was tested according to KDB Publications 662911 D01 and 662911 D02 about MIMO test rules for compliance to FCC CFR Title 47 Part 27 requirements.

The transmitter output was connected to spectrum analyzer through an attenuator and the test result was measured and recorded.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed

All measurements were done at 3 channels: low, middle and high operational frequency.

Record the max trace plot into the test report, and spectrum setting for different channel bandwidth as follows:

a. For 3.5 MHz Channel bandwidth:

The frequency span is 10MHz, RBW setting is 36kHz and VBW setting is 180kHz.

b. For 5 MHz Channel bandwidth:

The frequency span is 20MHz, RBW setting is 56kHz and VBW setting is 180kHz.

c. For 7 MHz Channel bandwidth:

The frequency span is 30MHz, RBW setting is 100kHz and VBW setting is 300kHz.

d. For 10 MHz Channel bandwidth:

The frequency span is 30MHz, RBW setting is 100kHz and VBW setting is 300kHz.

According to KDB Publications 662911, the testing for compliance with absolute emission limits, emissions measured on individual channels must either be summed across the outputs or adjusted by $10\log(N_{ANT})$ before comparison to the emission limit.

N_{ANT} : Number of transmit antennas.

The test results will be measured level by reading level add $10\log(N_{ANT})$ as follow:

Test Results= Measured Level= Reading Level + 10log(2)= Reading Level +3dB

4.5. Uncertainty

The measurement uncertainty is defined as $\pm 1.27\text{dB}$.

4.6. Test Result

Product	CBS 2.5GHz		
Test Item	Channel Edge		
Test Mode	Mode 1: Transmit (3.5MHz BW_64QAM-2/3)		
Date of Test	2013/01/16	Test Site	SR7

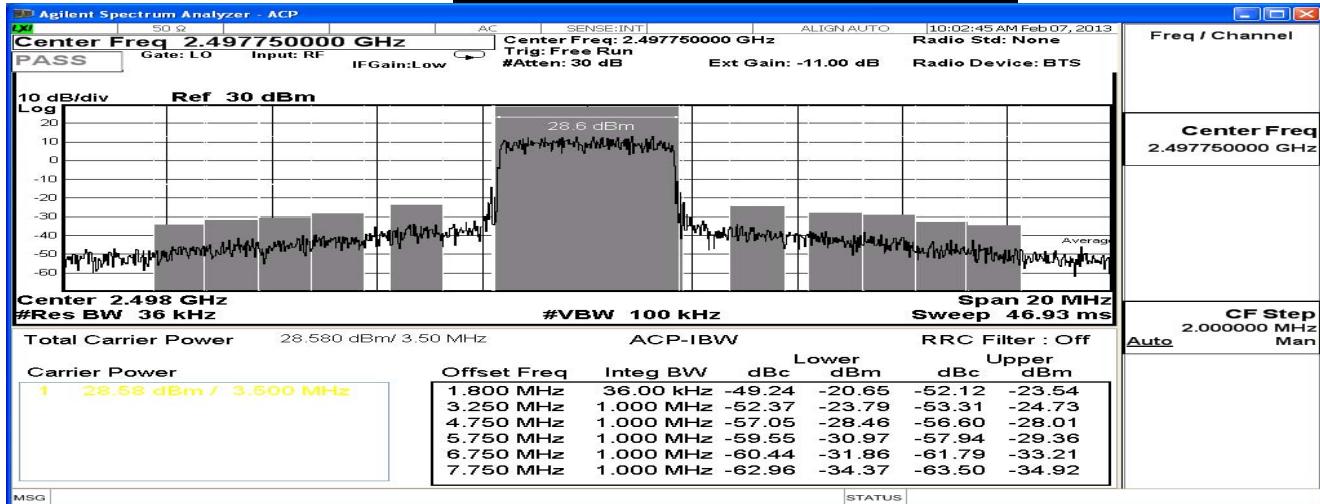
3.5MHz 64QAM2/3- ANT0

Frequency (MHz)	Reading Level -Worst (dBm)	Measured Level -Worst (dBm)	Limit (dBm)
2497.75	-20.65	-17.65	-13
2593.00	-22.09	-19.09	-13
2688.25	-18.92	-15.92	-13

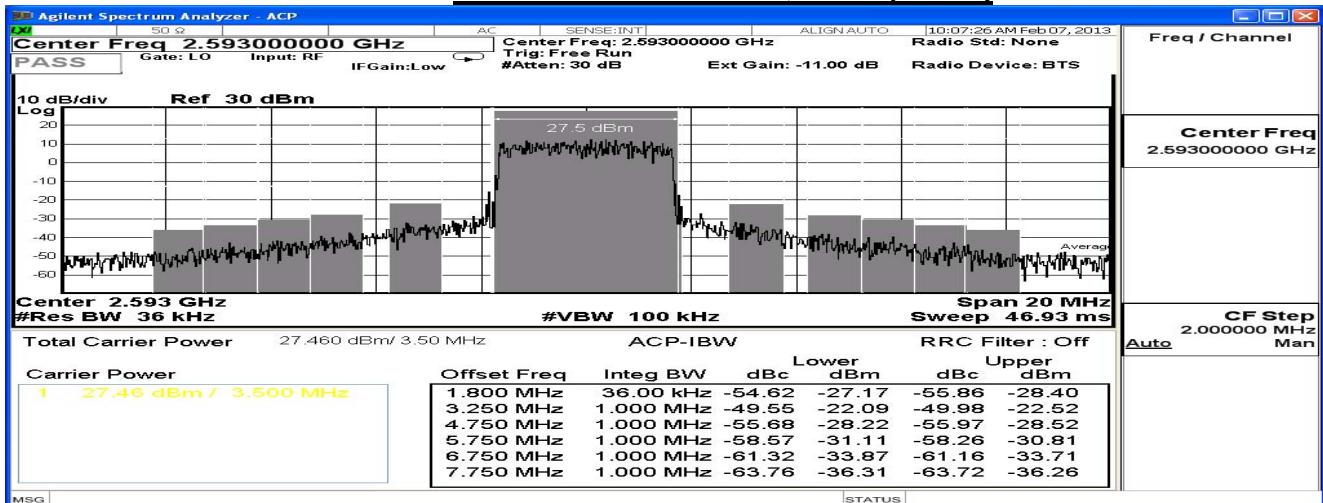
3.5MHz 64QAM2/3- ANT1

Frequency (MHz)	Reading Level -Worst (dBm)	Measured Level -Worst (dBm)	Limit (dBm)
2497.75	-21.80	-18.80	-13
2593.00	-24.87	-21.87	-13
2688.25	--22.94	25.94	-13

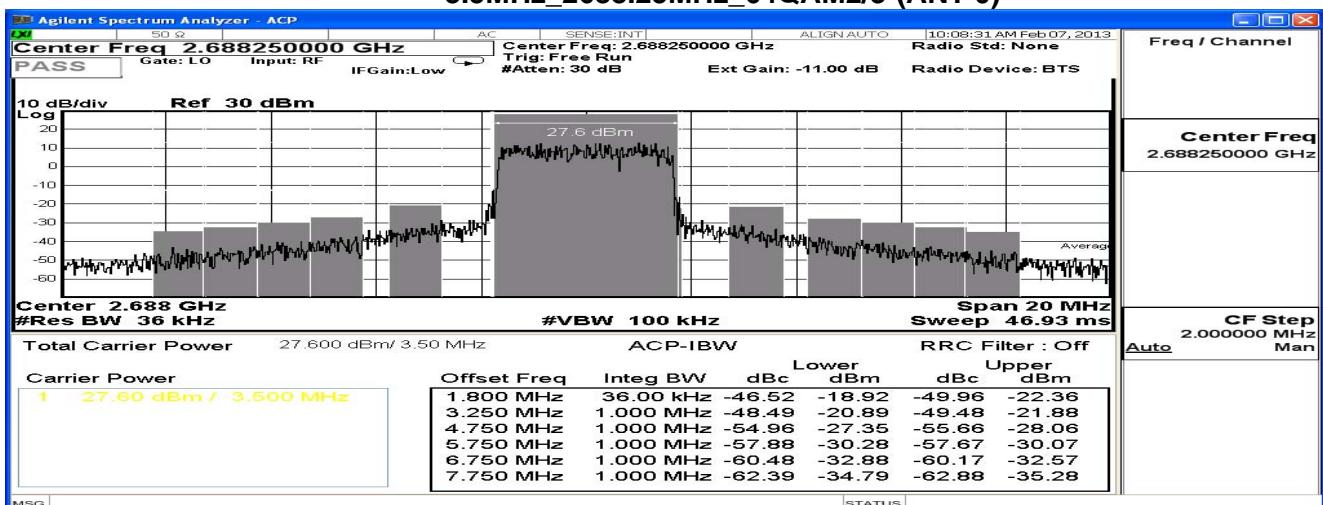
3.5MHz 2497.75 MHz 64QAM2/3-(ANT 0)



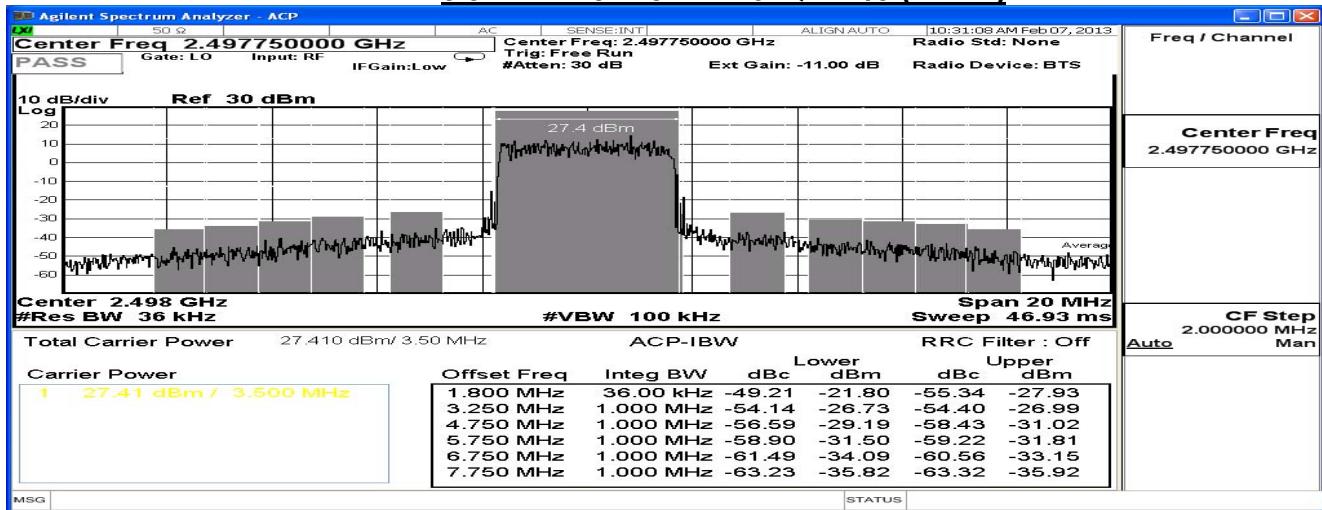
3.5MHz 2593.0MHz 64QAM2/3-(ANT 0)



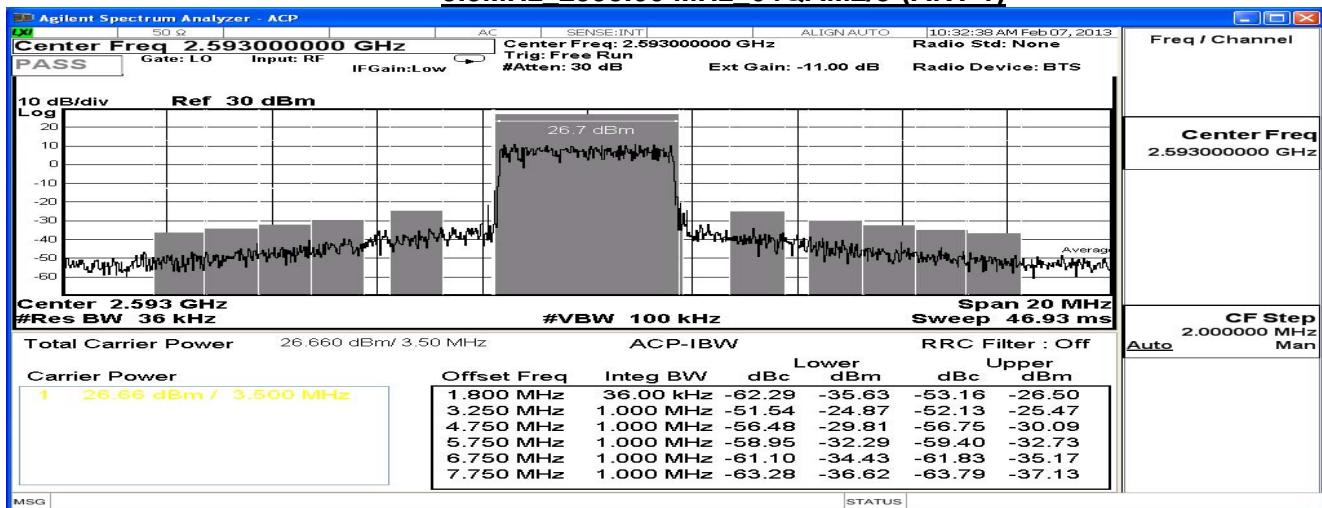
3.5MHz_2688.25MHz_64QAM2/3-(ANT 0)



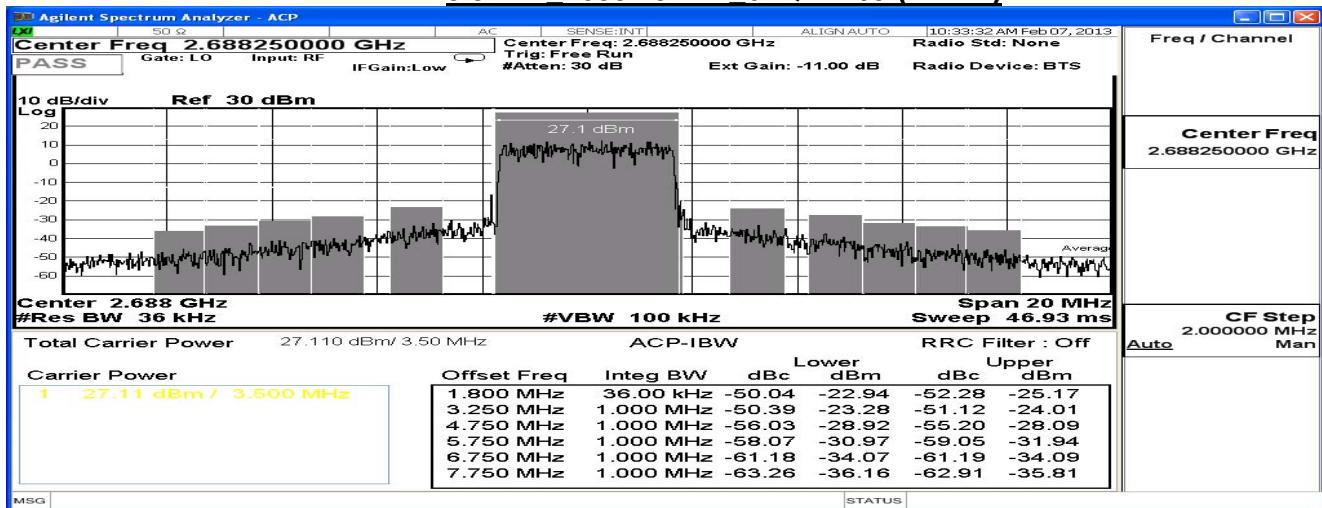
3.5MHz 2497.75 MHz 64QAM2/3-(ANT 1)



3.5MHz 2593.00 MHz 64QAM2/3-(ANT 1)



3.5MHz 2688.25MHz 64QAM2/3-(ANT 1)



Product	CBS 2.5GHz		
Test Item	Channel Edge		
Test Mode	Mode 2: Transmit (5MHz BW_ QPSK-1/2)		
Date of Test	2013/01/16	Test Site	SR7

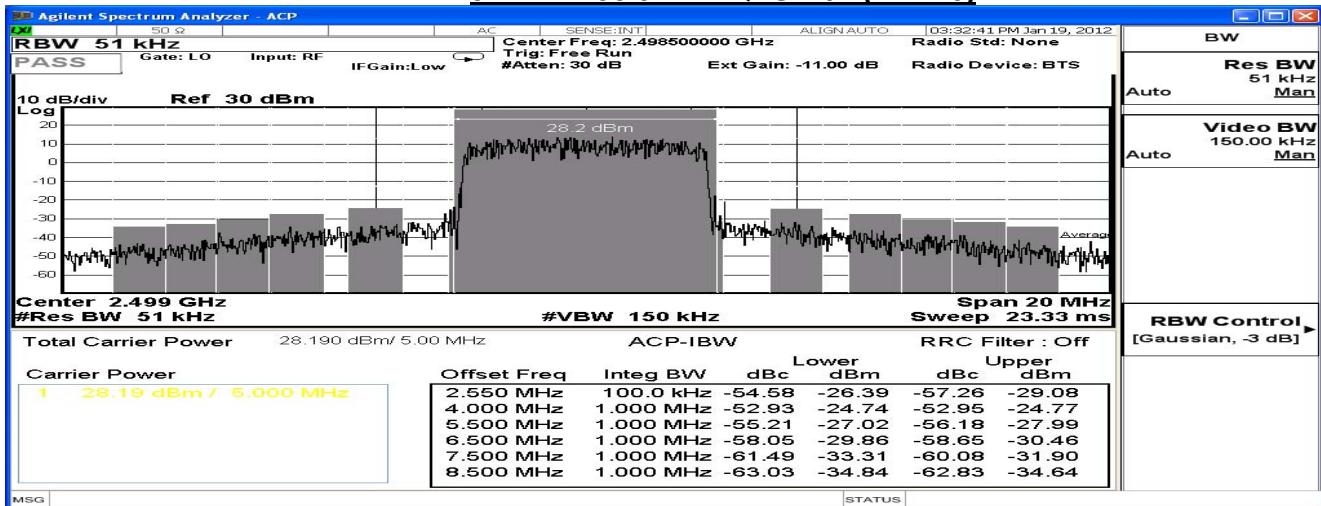
5MHz QPSK1/2- ANT0

Frequency (MHz)	Reading Level -Worst (dBm)	Measured Level -Worst (dBm)	Limit (dBm)
2498.50	-24.74	-21.74	-13
2593.00	-18.19	-15.19	-13
2687.50	-18.86	-15.86	-13

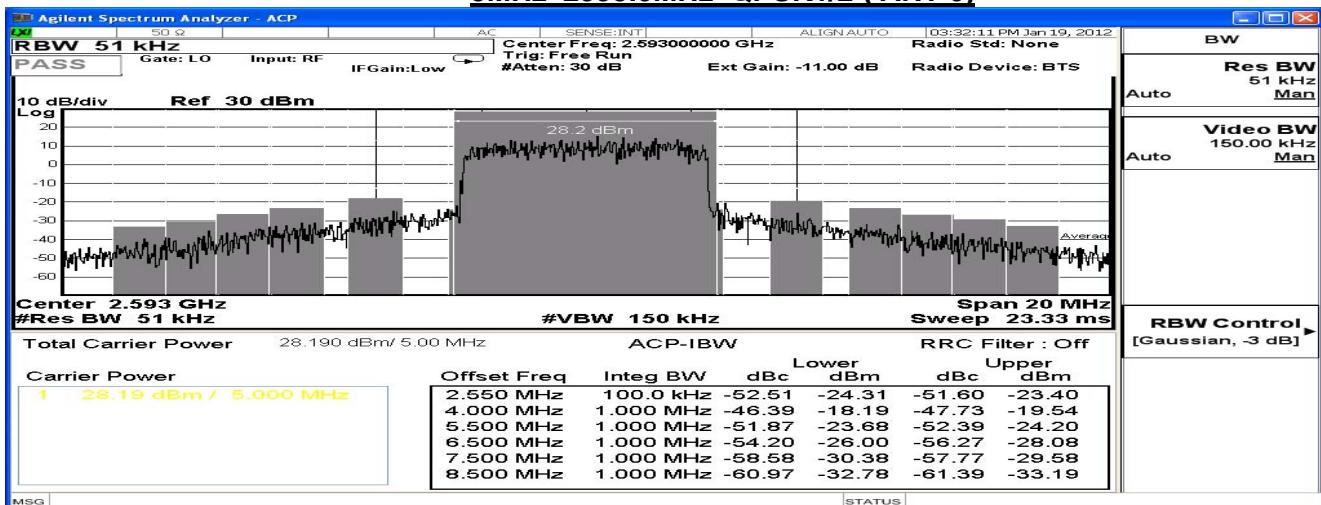
5MHz QPSK1/2- ANT1

Frequency (MHz)	Reading Level -Worst (dBm)	Measured Level -Worst (dBm)	Limit (dBm)
2498.50	-22.66	-19.66	-13
2593.00	-19.94	-16.94	-13
2687.50	-20.36	-17.36	-13

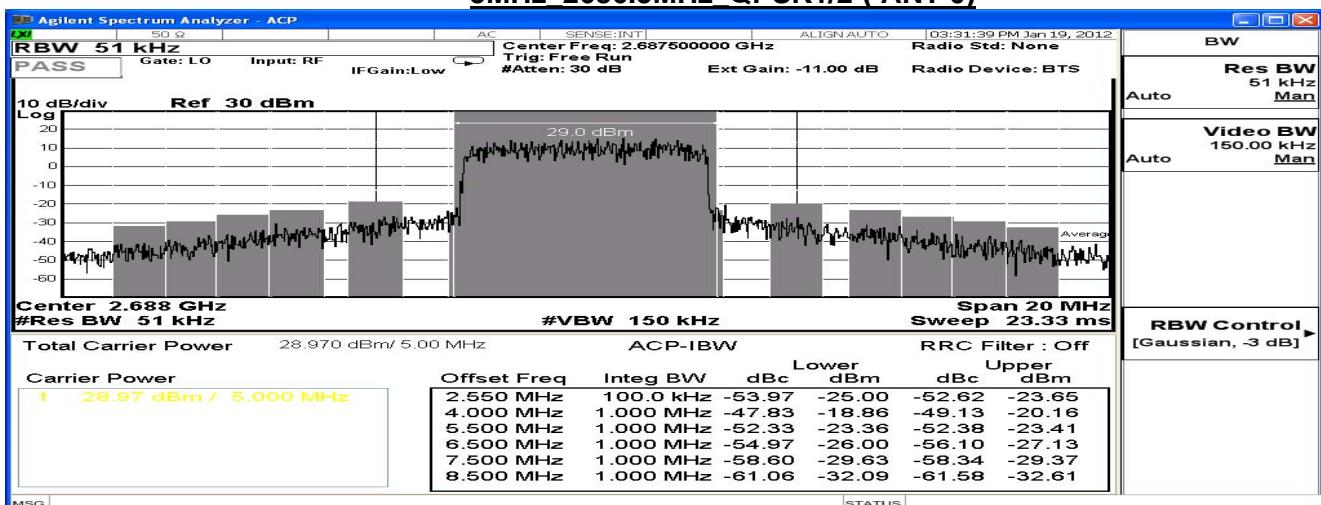
5MHz 2498.5MHz QPSK1/2-(ANT 0)



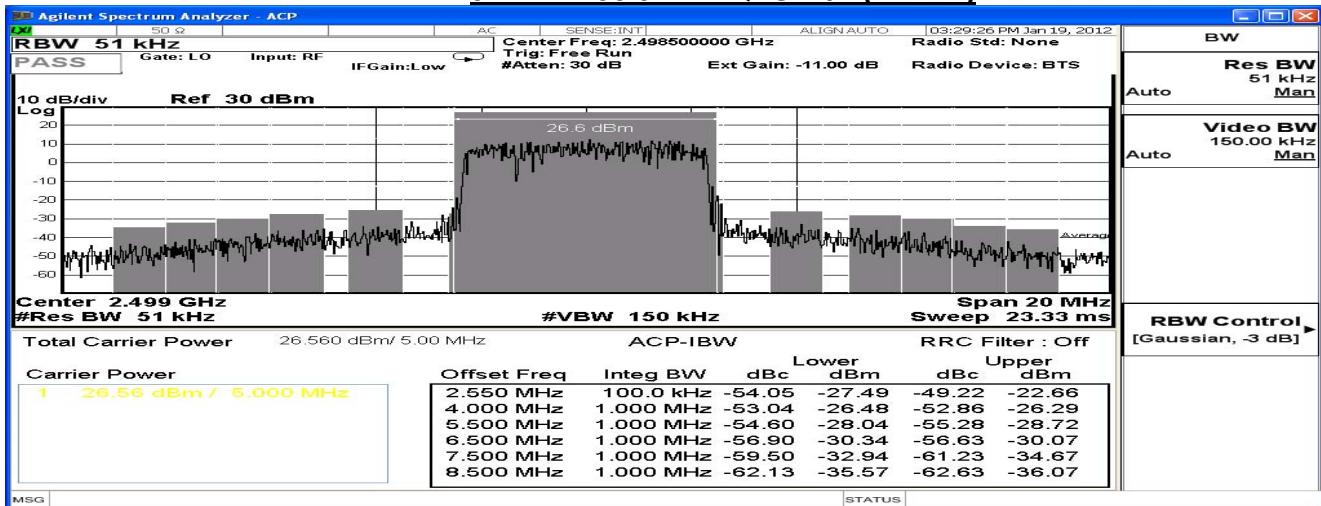
5MHz 2593.0MHz QPSK1/2-(ANT 0)



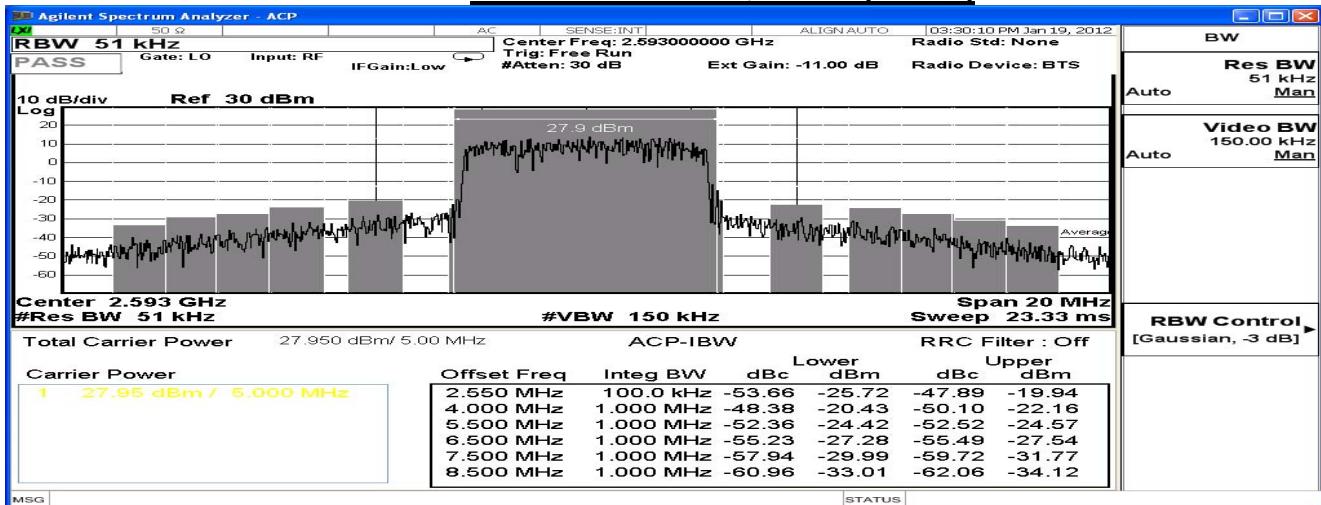
5MHz 2686.5MHz QPSK1/2-(ANT 0)



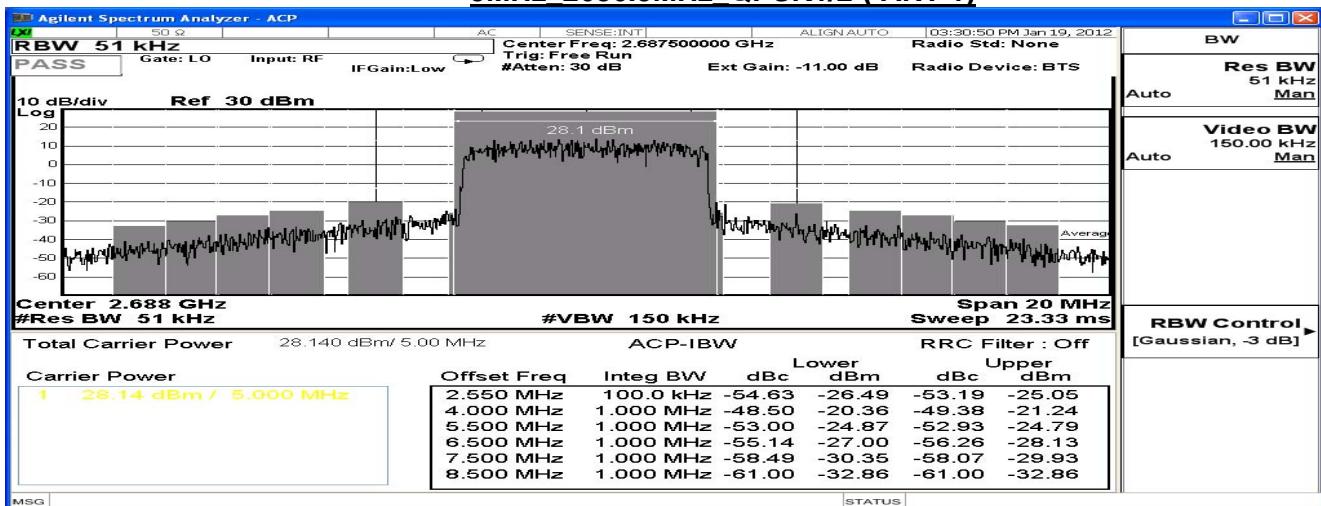
5MHz 2498.5MHz QPSK1/2-(ANT 1)



5MHz 2593.0MHz QPSK1/2-(ANT 1)



5MHz 2686.5MHz QPSK1/2-(ANT 1)



Product	CBS 2.5GHz		
Test Item	Channel Edge		
Test Mode	Mode 3: Transmit (7MHz BW_64QAM-2/3)		
Date of Test	2013/01/16	Test Site	SR7

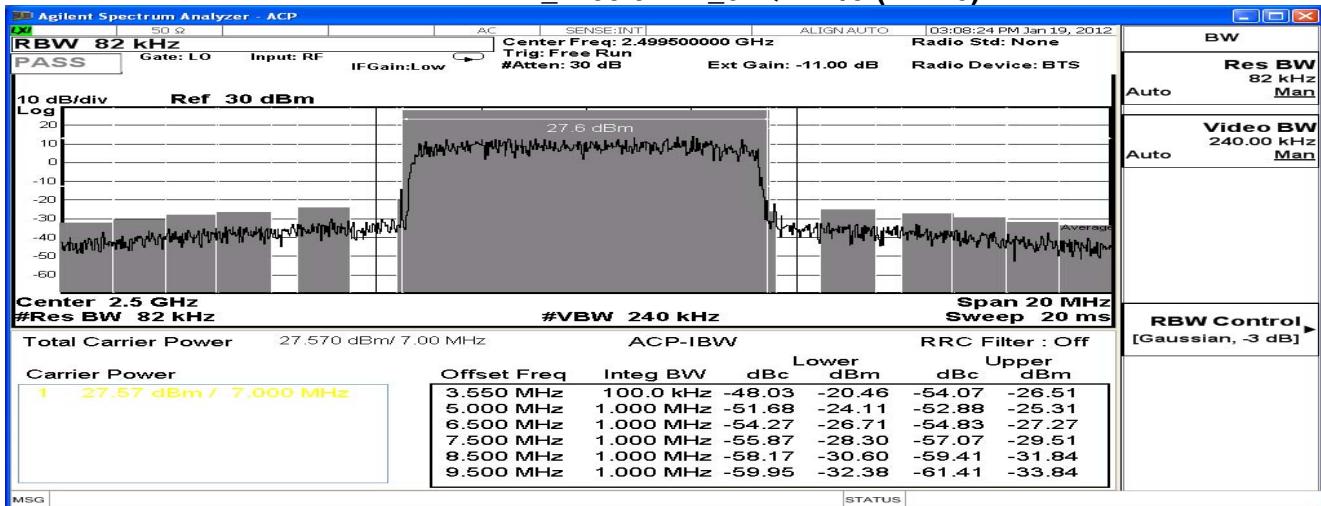
7MHz 64QAM2/3- ANT0

Frequency (MHz)	Reading Level -Worst (dBm)	Measured Level -Worst (dBm)	Limit (dBm)
2499.50	-20.46	-17.46	-13
2593.00	-19.37	-16.37	-13
2686.50	-19.04	-16.04	-13

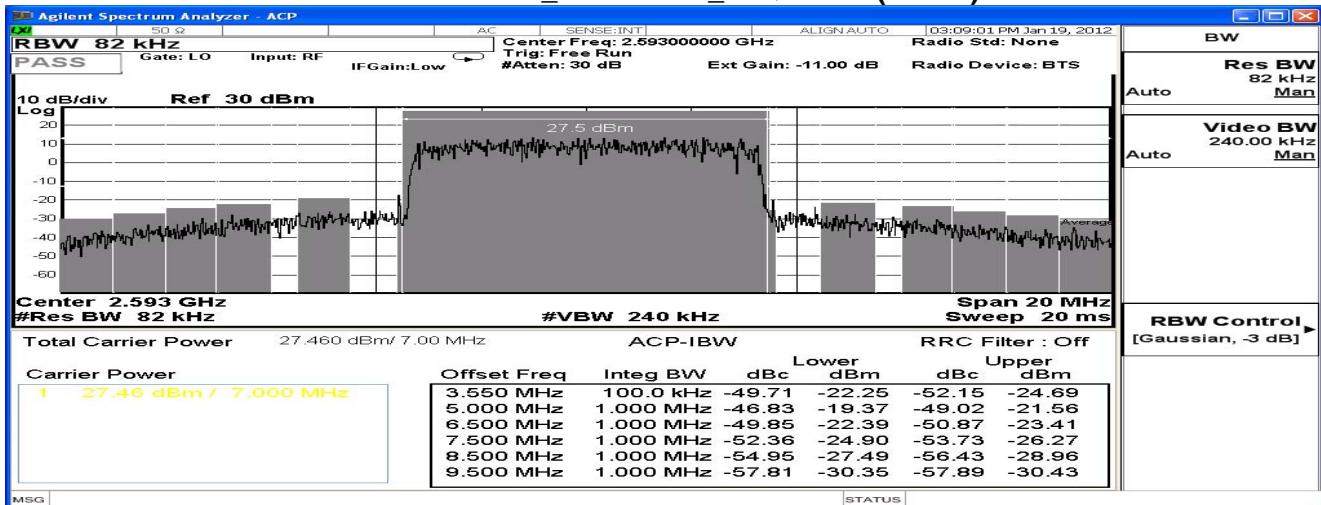
7MHz 64QAM2/3- ANT1

Frequency (MHz)	Reading Level -Worst (dBm)	Measured Level -Worst (dBm)	Limit (dBm)
2499.50	-21.09	-18.09	-13
2593.00	-19.64	-16.64	-13
2686.50	-19.69	-16.69	-13

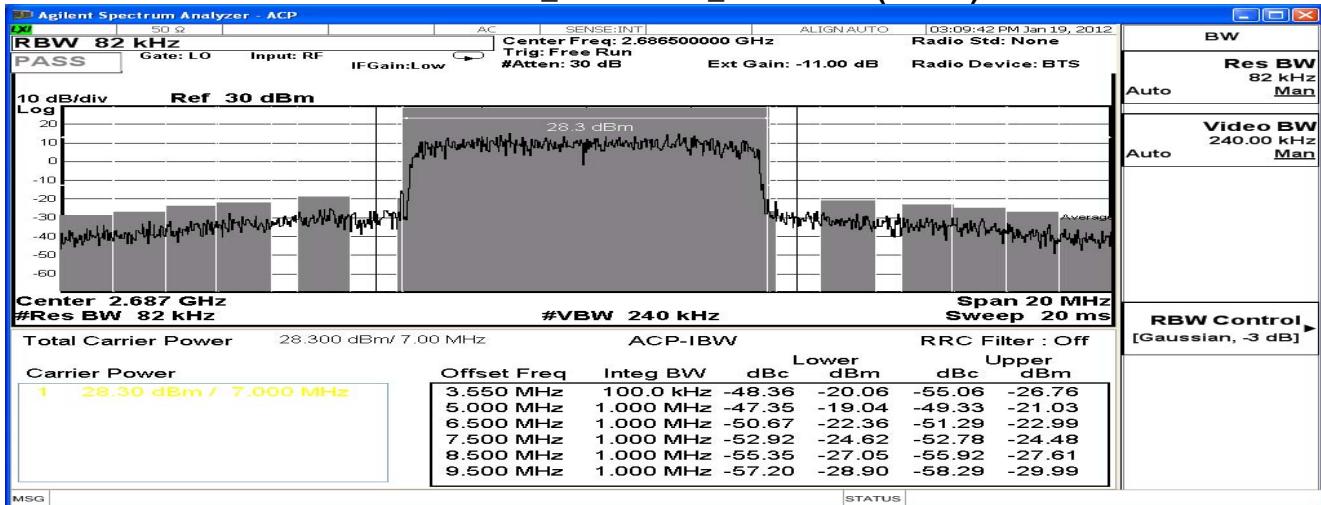
7MHz_2499.5MHz_64QAM2/3-(ANT 0)



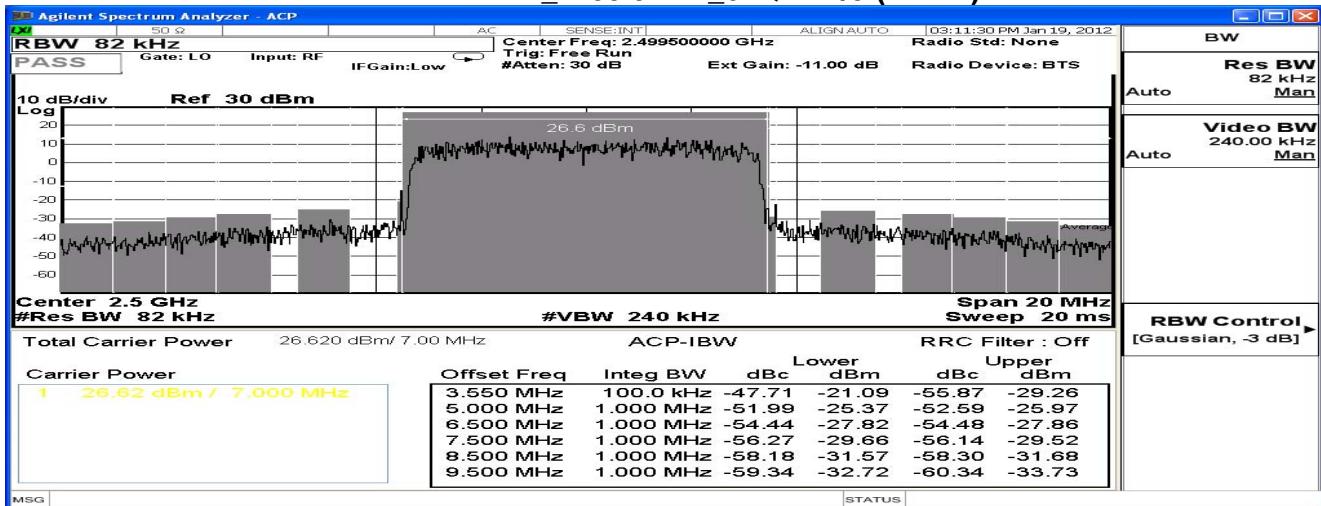
7MHz_2953.0MHz_64QAM2/3-(ANT 0)



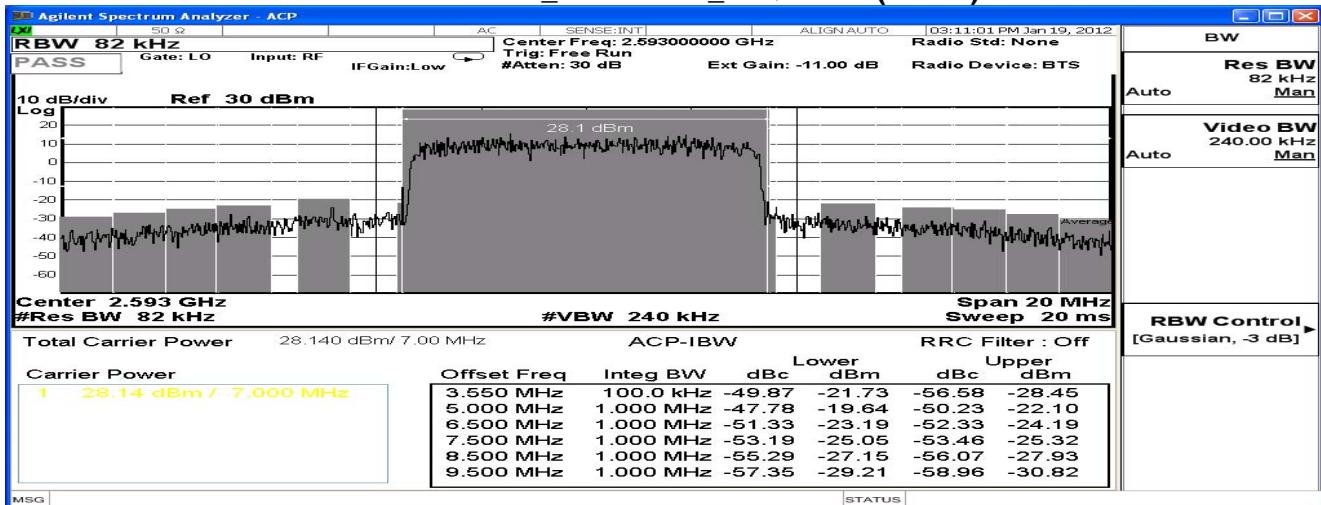
7MHz_2686.5MHz_64QAM2/3-(ANT 0)



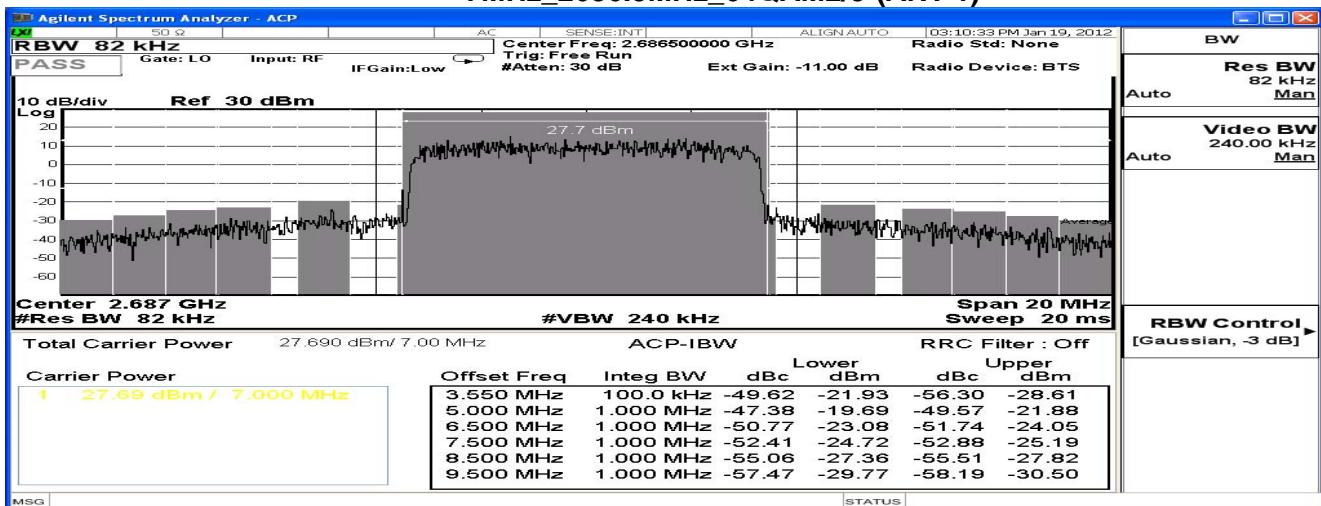
7MHz_2499.5MHz_64QAM2/3-(ANT 1)



7MHz_2953.0MHz_64QAM2/3-(ANT 1)



7MHz_2686.5MHz_64QAM2/3-(ANT 1)



Product	CBS 2.5GHz		
Test Item	Channel Edge		
Test Mode	Mode 4: Transmit (10MHz BW_64QAM-2/3)		
Date of Test	2013/01/16	Test Site	SR7

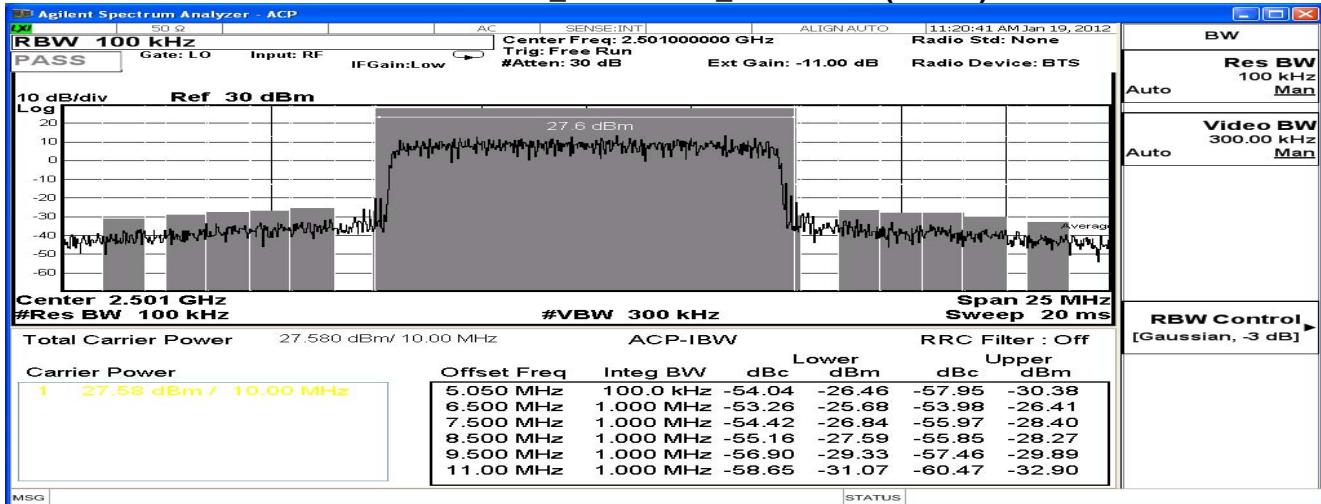
10MHz 64QAM2/3- ANT0

Frequency (MHz)	Reading Level -Worst (dBm)	Measured Level -Worst (dBm)	Limit (dBm)
2501.00	-26.41	-23.41	-13
2593.00	-19.85	-16.85	-13
2685.00	-20.79	-17.79	-13

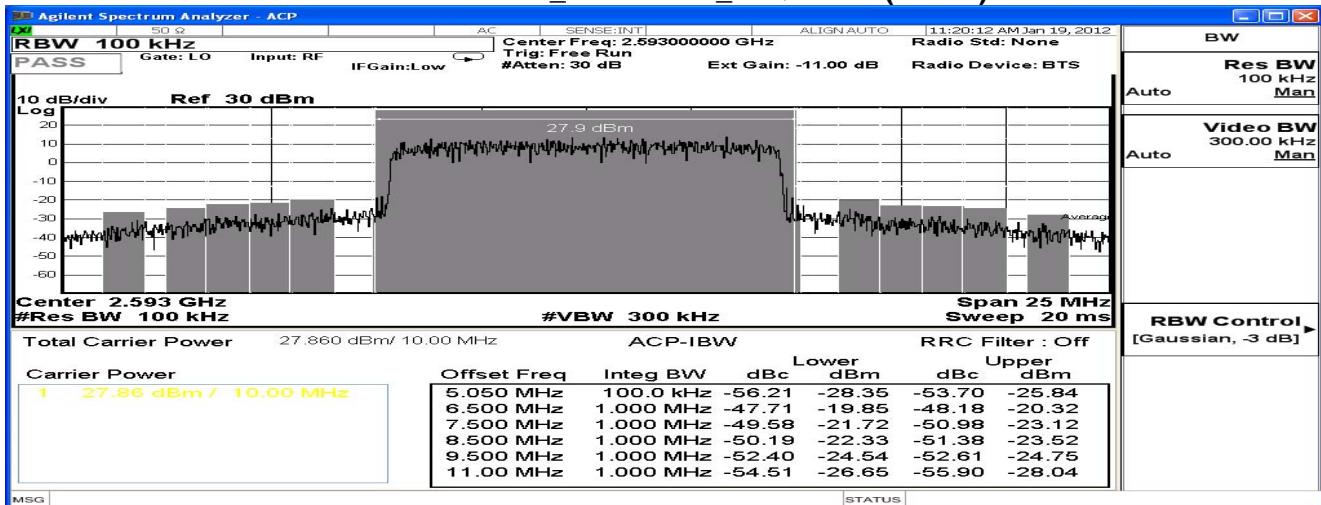
10MHz 64QAM2/3- ANT1

Frequency (MHz)	Reading Level -Worst (dBm)	Measured Level -Worst (dBm)	Limit (dBm)
2501.00	-24.76	-21.76	-13
2593.00	-21.39	-18.39	-13
2685.00	-21.84	-17.79	-13

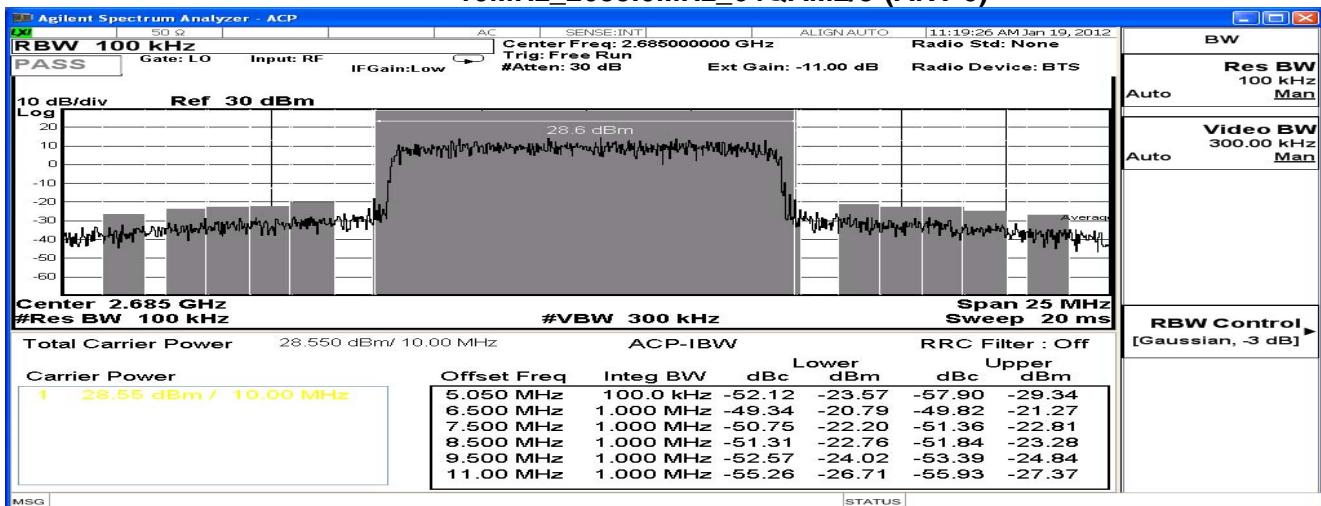
10MHz_2501.0MHz_64QAM2/3-(ANT 0)



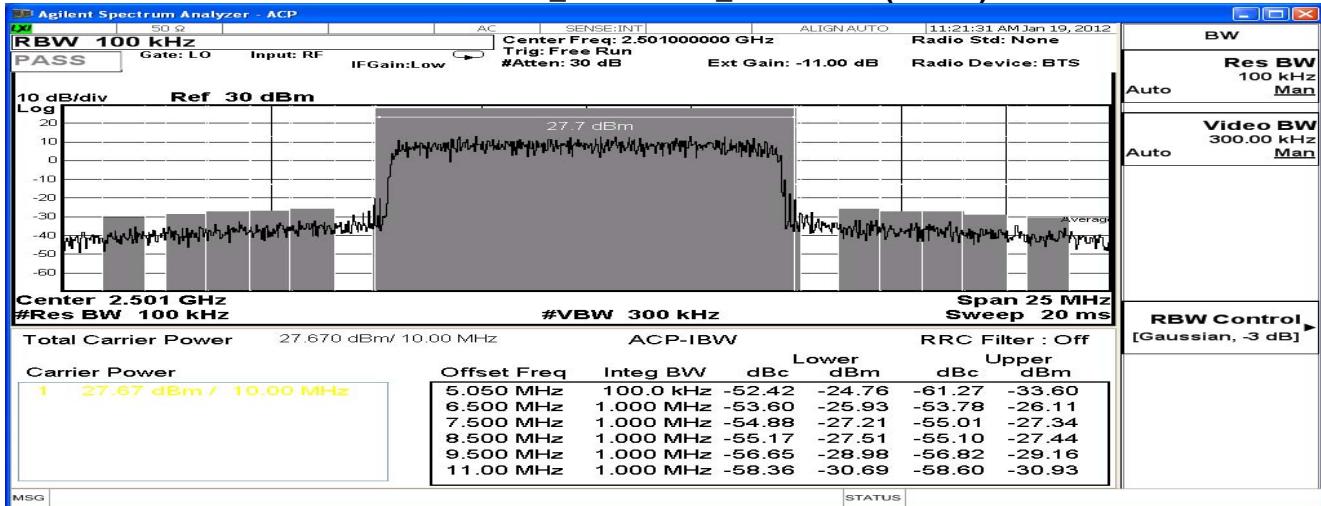
10MHz_2593.0MHz_64QAM2/3-(ANT 0)



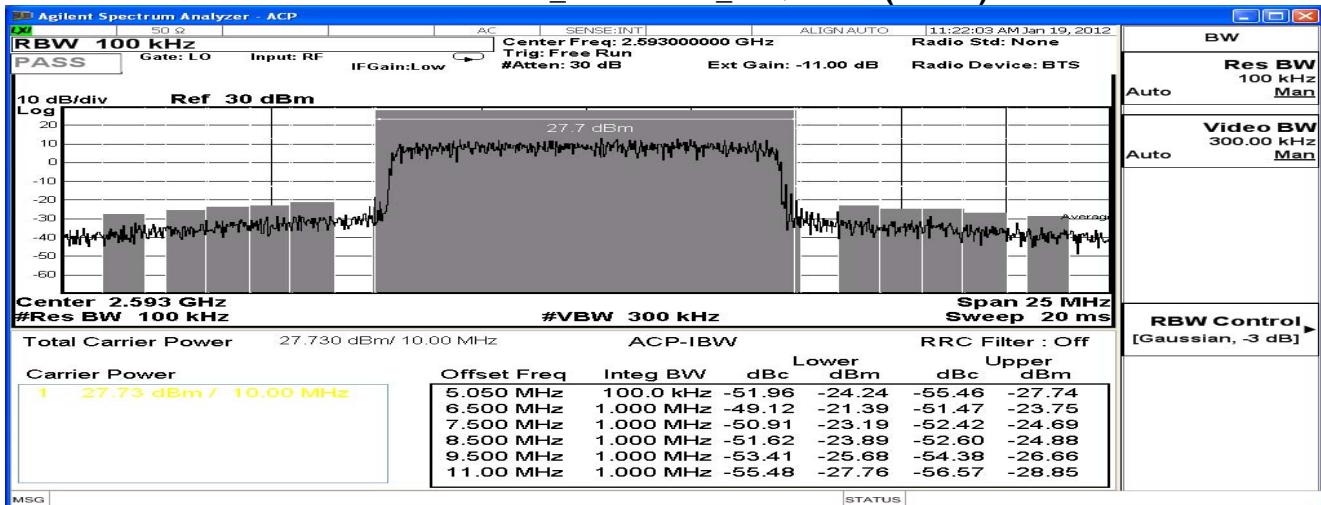
10MHz_2685.0MHz_64QAM2/3-(ANT 0)



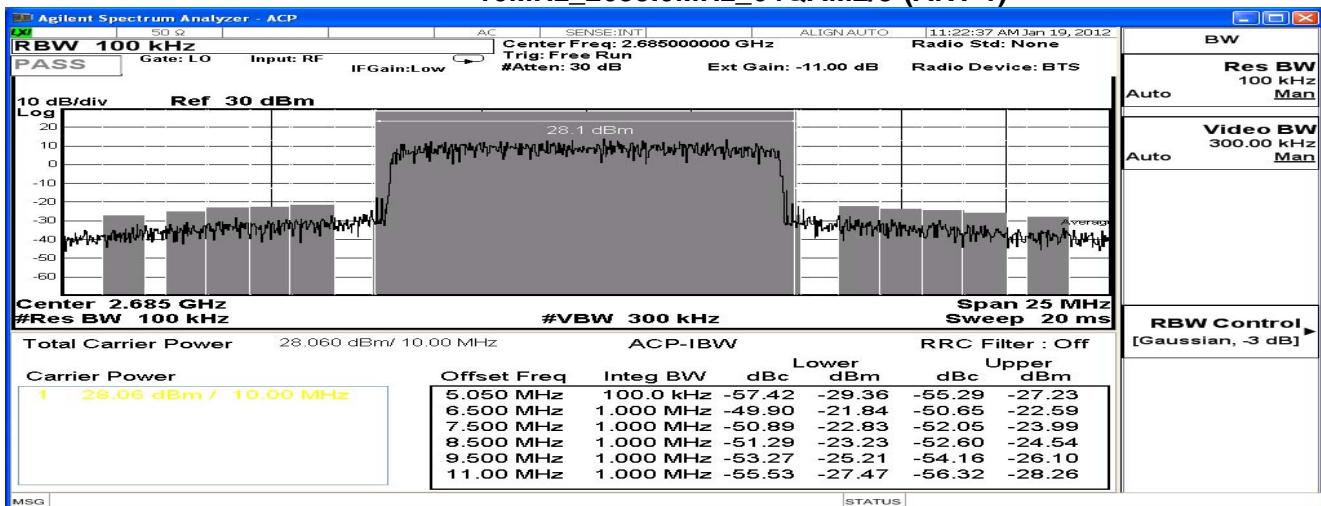
10MHz_2501.0MHz_64QAM2/3-(ANT 1)



10MHz_2593.0MHz_64QAM2/3-(ANT 1)



10MHz_2685.0MHz_64QAM2/3-(ANT 1)



5. Conducted Spurious Emission

5.1. Test Equipment

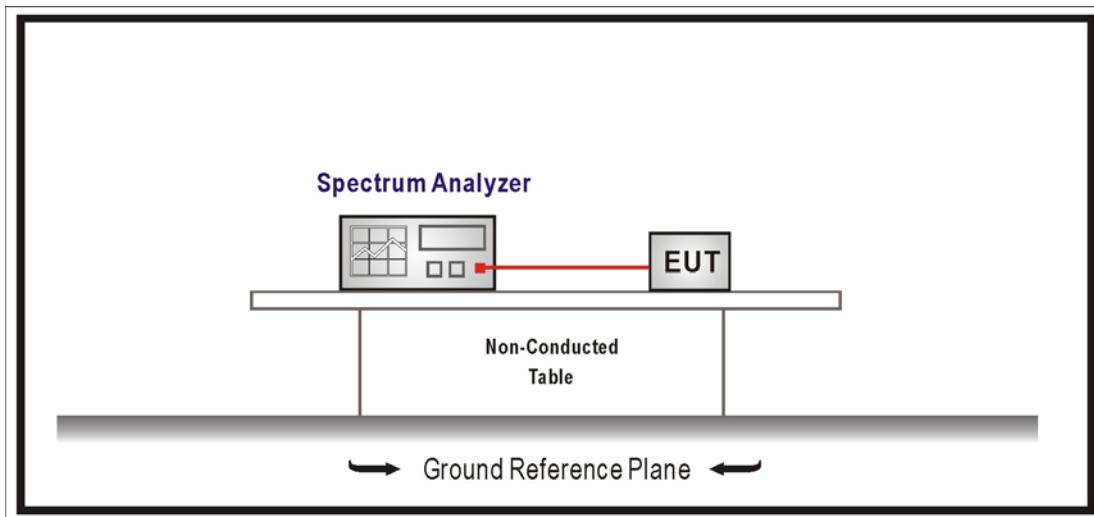
The following test equipments are used during the test:

Conducted Spurious Emission/ SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2013/07/31

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

5.2. Test Setup



5.3. Limits

- (1) For digital base stations, the attenuation shall be not less than $43 + 10\log(P)$ dB.
- (2) For all fixed digital user stations, the attenuation factor shall be not less than $43 + 10 \log(P)$ dB at the channel edge.
- (3) Mobile Digital Stations: not less than $43 + \log(P)$ dB at the channel edge and $55 + \log(P)$ dB at 5.5 MHz from the channel edges

Example for Calculation:

Assume the EUT Output Power is 2 Watt = 33 dBm

$43 + 10\log(2)$ dB; $43 + 10\log(2) = 46$ dB

$33 \text{ dBm (2 Watt)} - 46 \text{ dB} = -13 \text{ dBm}$

5.4. Test Procedure

The EUT was tested according to KDB Publications 662911 D01 and 662911 D02 about MIMO test rules for compliance to FCC CFR Title 47 Part 27 requirements.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed

All measurements were done at 3 channels: low, middle and high operational frequency.
Record the max trace plot into the test report.

According to KDB Publications 662911, the testing for compliance with absolute emission limits, emissions measured on individual channels must either be summed across the outputs or adjusted by $10\log(N_{\text{ANT}})$ before comparison to the emission limit.

N_{ANT} : Number of transmit antennas.

The test results will be measured level by reading level add $10\log(N_{\text{ANT}})$ as follow:

Test Results= Measured Level= Reading Level + $10\log(2)$ = Reading Level +3dB

5.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

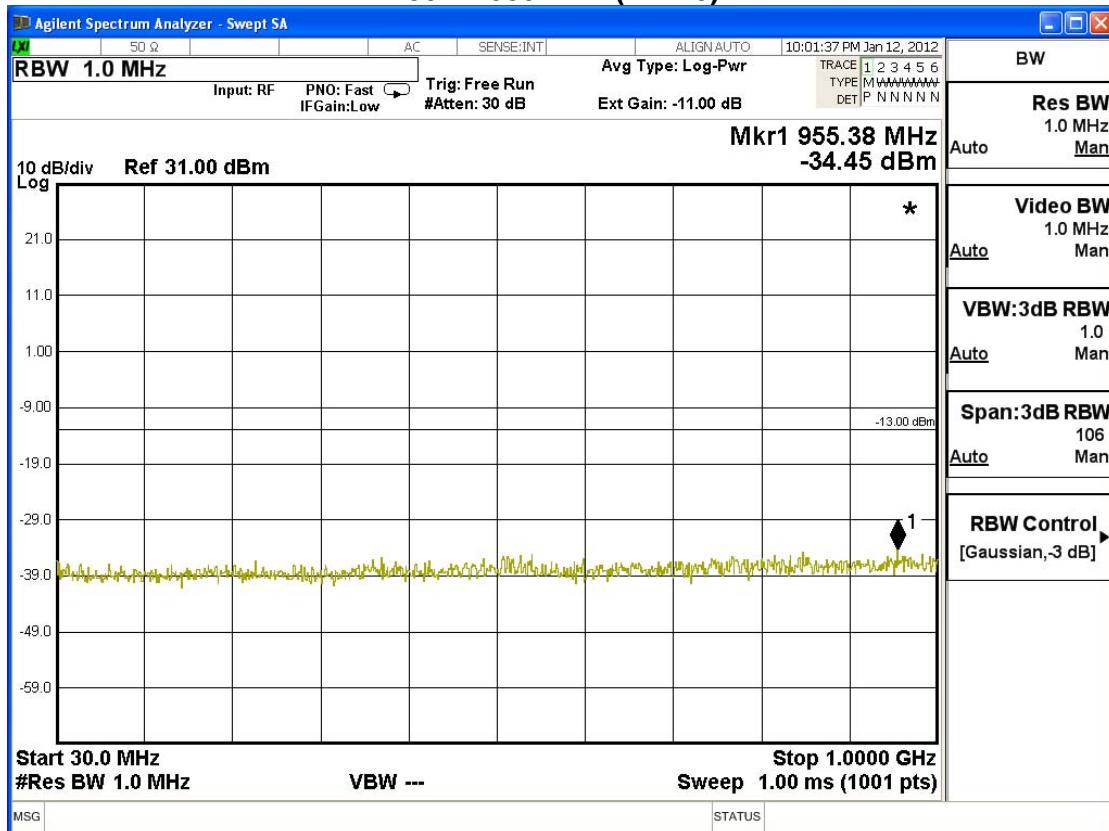
5.6. Test Result

Product	CBS 2.5GHz		
Test Item	Conducted Spurious Emission		
Test Mode	Mode 1: Transmit (3.5MHz BW_64QAM-2/3)		
Date of Test	2013/01/16	Test Site	SR7

Test Frequency: 2497.75MHz- ANT0				
Frequency Band (MHz)	Frequency (MHz)	Reading Level (dBm)	Measured Level (dBm)	Limit (dBm)
30-1000	293.81	-34.45	-31.45	≤-13
1000-6000	2575.00	-19.95	-16.95	≤-13
6000-18000	17700.00	-29.58	-26.58	≤-13
18000-26500	26287.50	-22.35	-19.35	≤-13

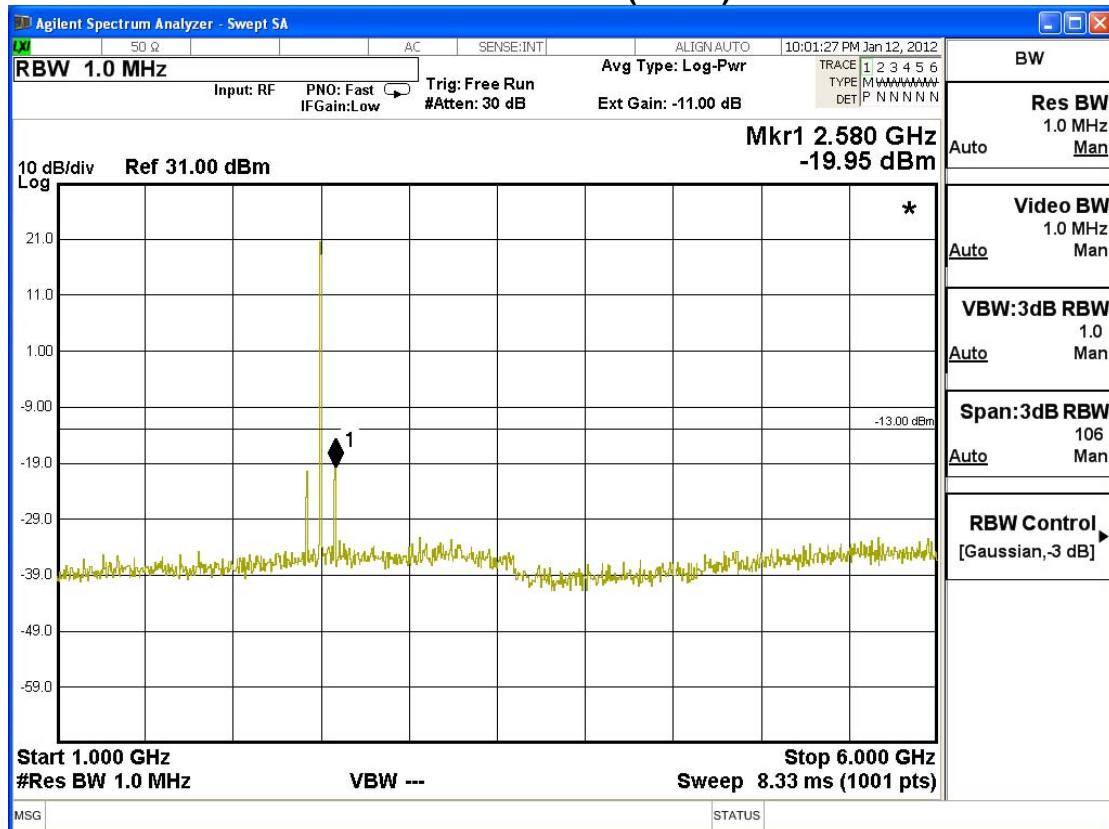
Test Frequency: 2497.75MHz- ANT1				
Frequency Band (MHz)	Frequency (MHz)	Reading Level (dBm)	Measured Level (dBm)	Limit (dBm)
30-1000	894.27	-34.77	-31.77	≤-13
1000-6000	2420.00	-17.11	-14.11	≤-13
6000-18000	17616.00	-31.81	-28.81	≤-13
18000-26500	25794.50	-22.72	-19.72	≤-13

30 – 1000 MHz-(ANT 0)



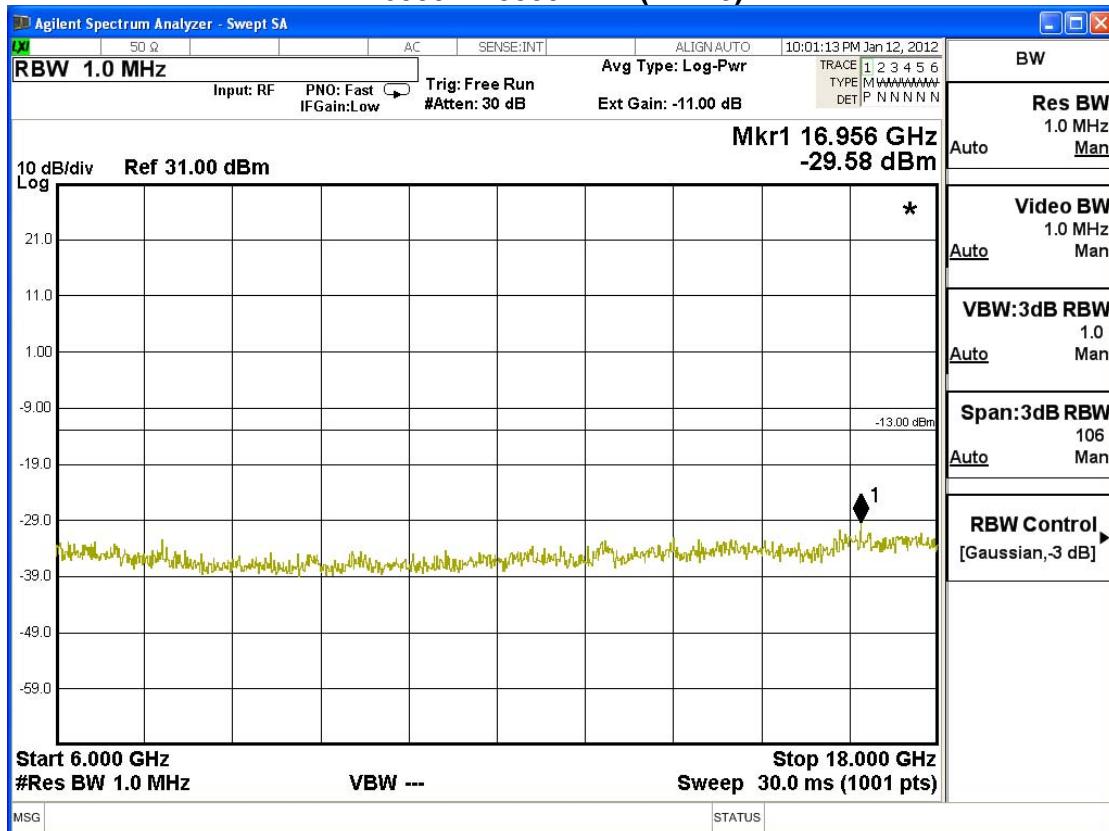
The search value is under the technical standard value, do not need to measure by measuring mode.

1000– 6000 MHz-(ANT 0)



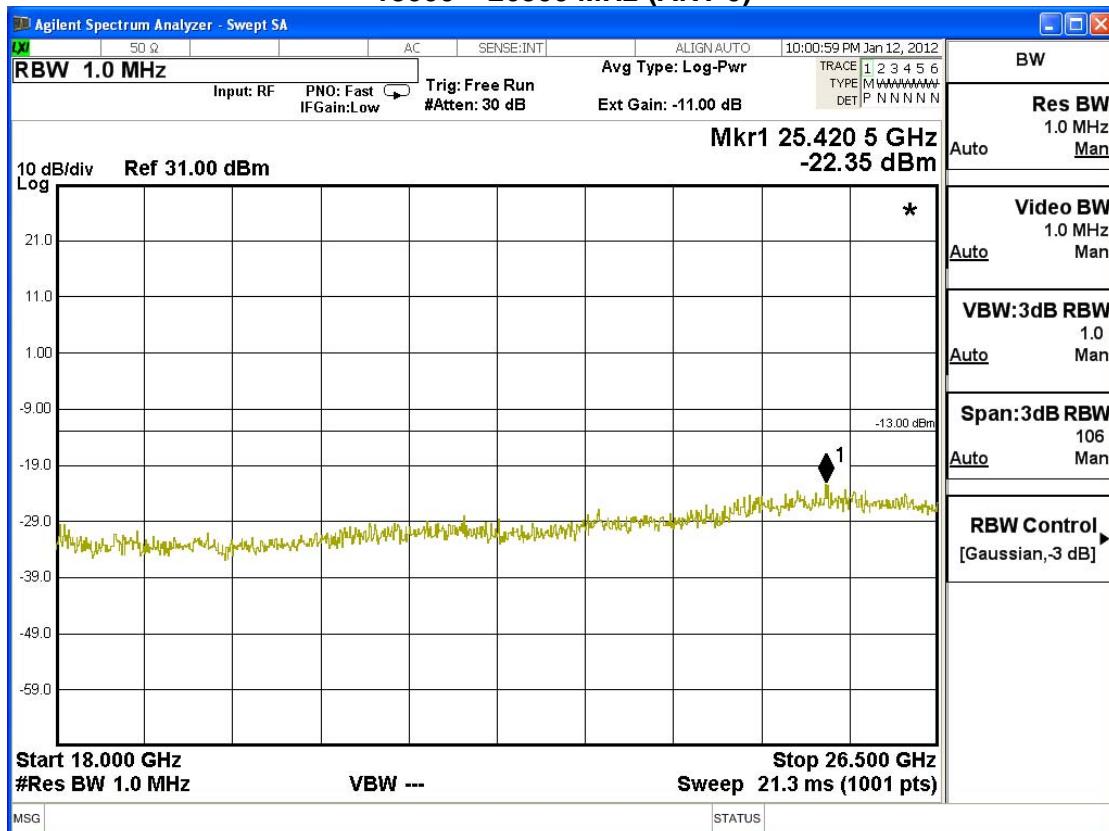
The search value is under the technical standard value, do not need to measure by measuring mode.

6000 – 18000 MHz-(ANT 0)



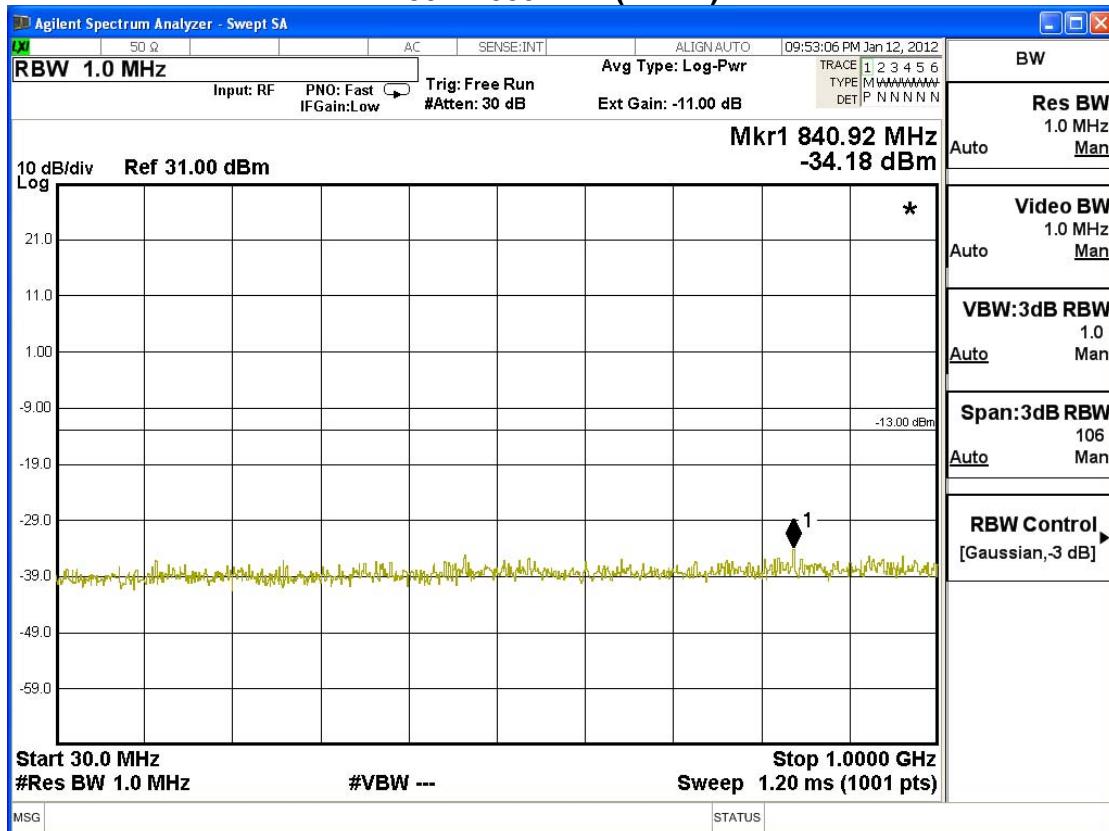
The search value is under the technical standard value, do not need to measure by measuring mode.

18000 – 26500 MHz-(ANT 0)



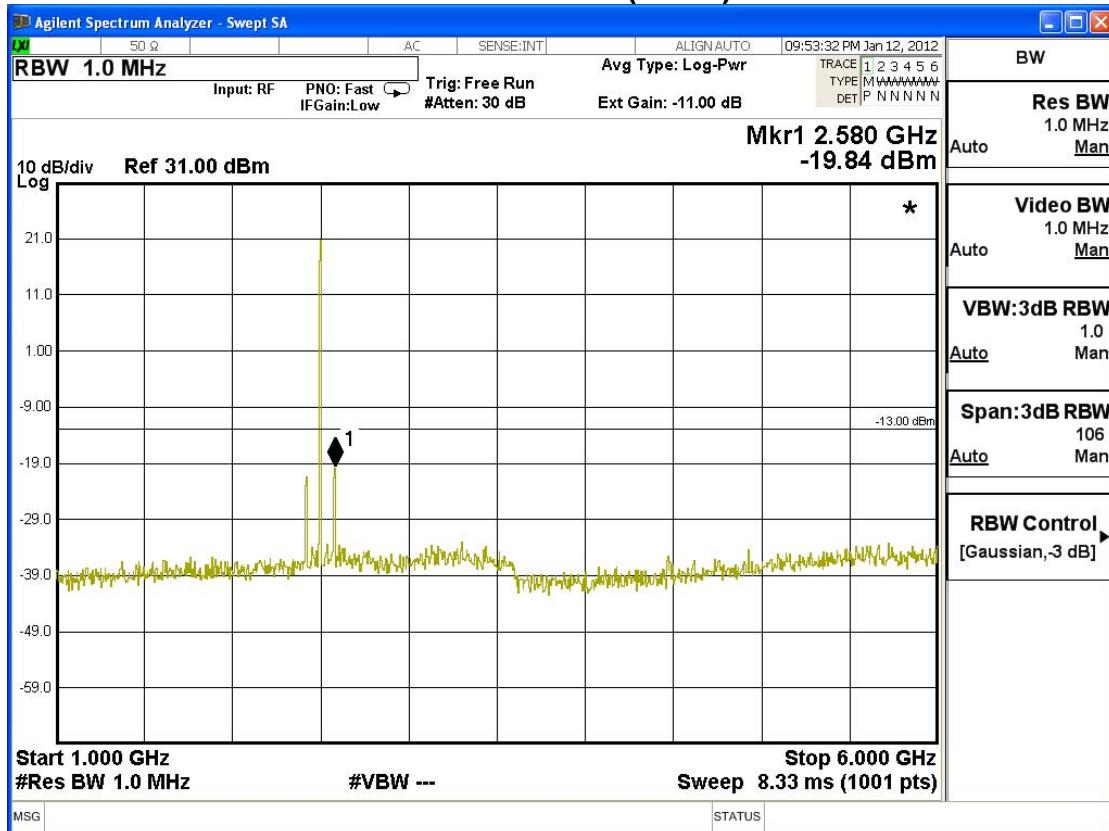
The search value is under the technical standard value, do not need to measure by measuring mode.

30 – 1000 MHz-(ANT 1)



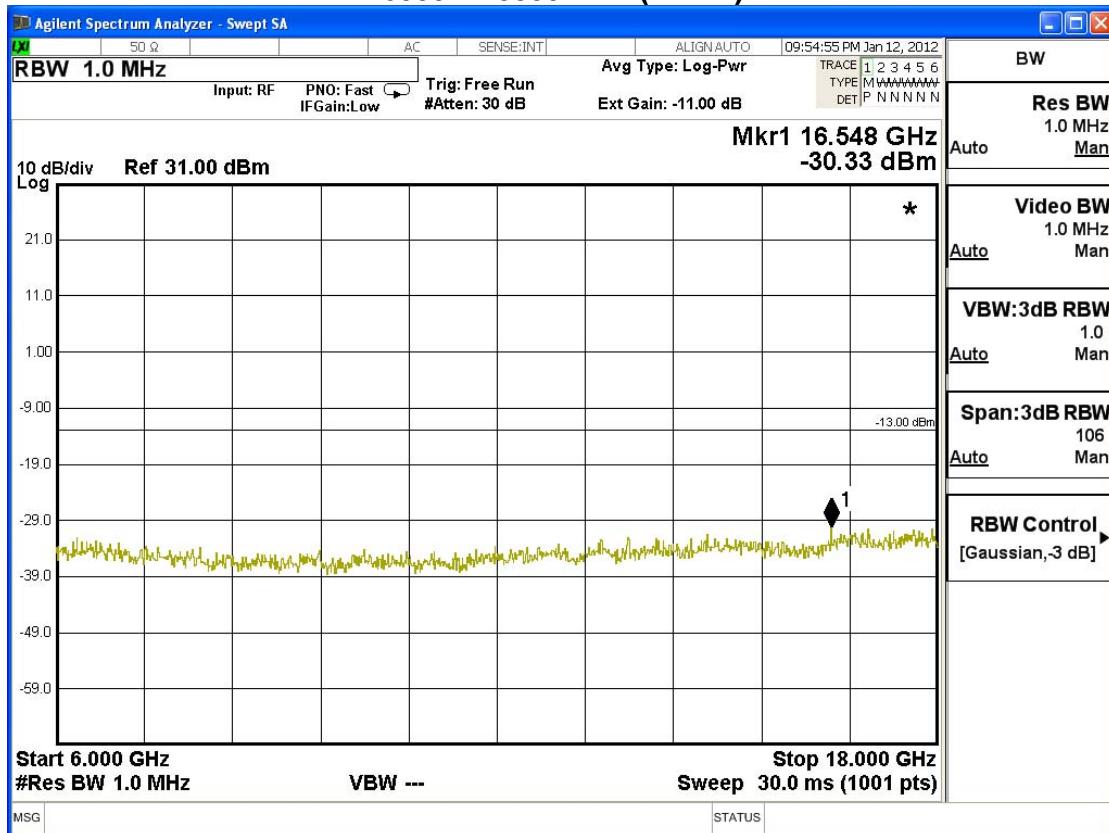
The search value is under the technical standard value, do not need to measure by measuring mode.

1000– 6000 MHz-(ANT 1)



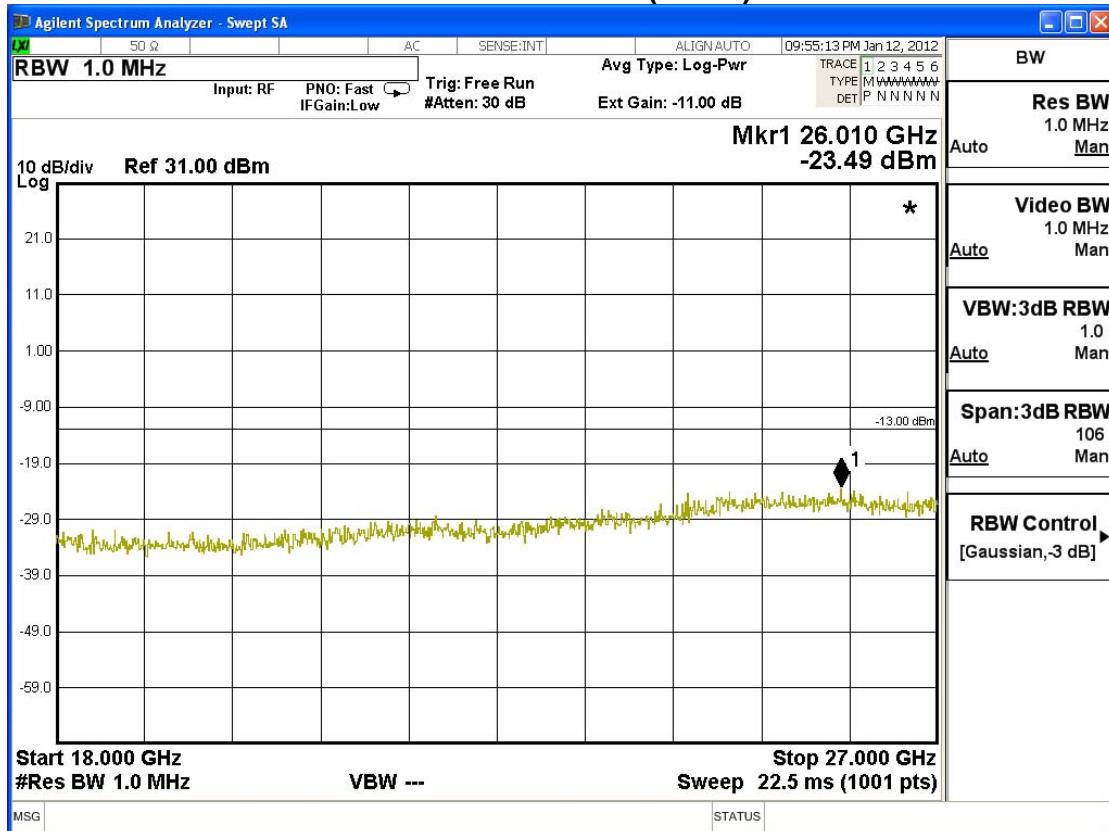
The search value is under the technical standard value, do not need to measure by measuring mode.

6000 – 18000 MHz-(ANT 1)



The search value is under the technical standard value, do not need to measure by measuring mode.

18000 – 26500 MHz-(ANT 1)



The search value is under the technical standard value, do not need to measure by measuring mode.

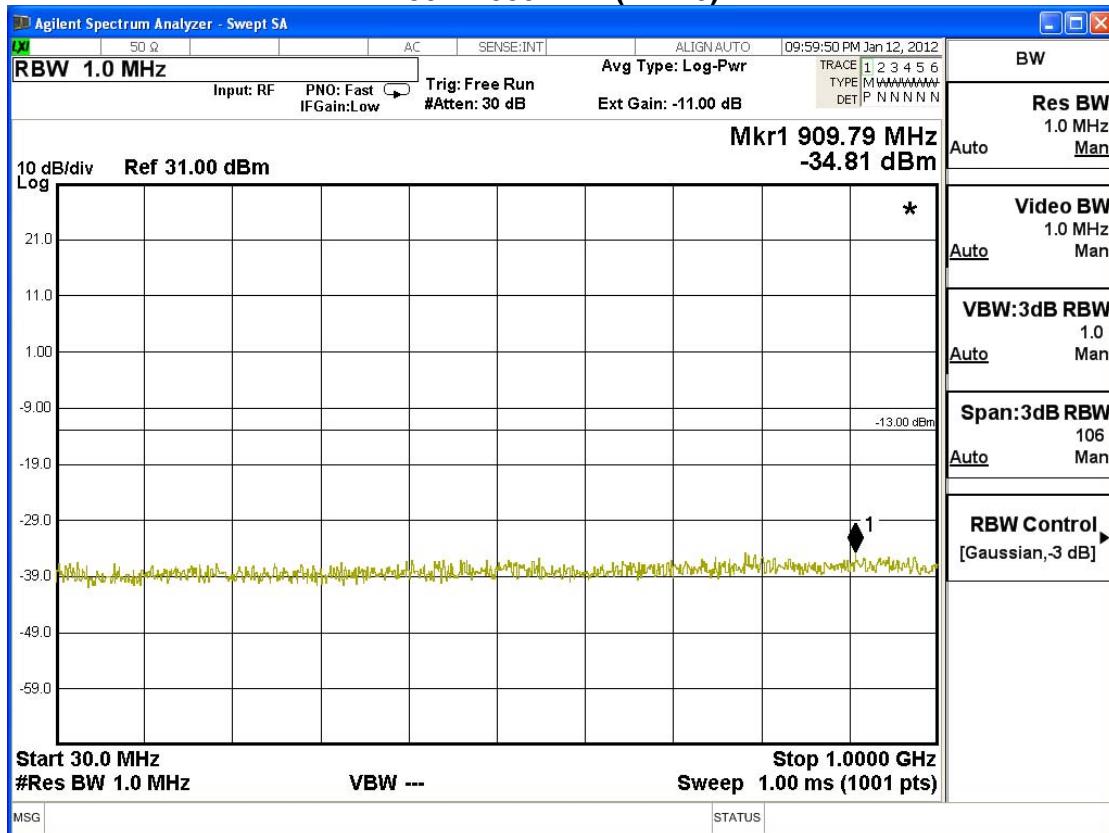
Test Frequency: 2593MHz - ANT0

Frequency Band (MHz)	Frequency (MHz)	Reading Level (dBm)	Measured Level (dBm)	Limit (dBm)
30-1000	777.87	-34.81	-31.81	≤-13
1000-6000	2675.00	-17.64	-14.64	≤-13
6000-18000	17004.00	-30.42	-27.42	≤-13
18000-26500	25539.50	-23.49	-20.49	≤-13

Test Frequency: 2593MHz – ANT1

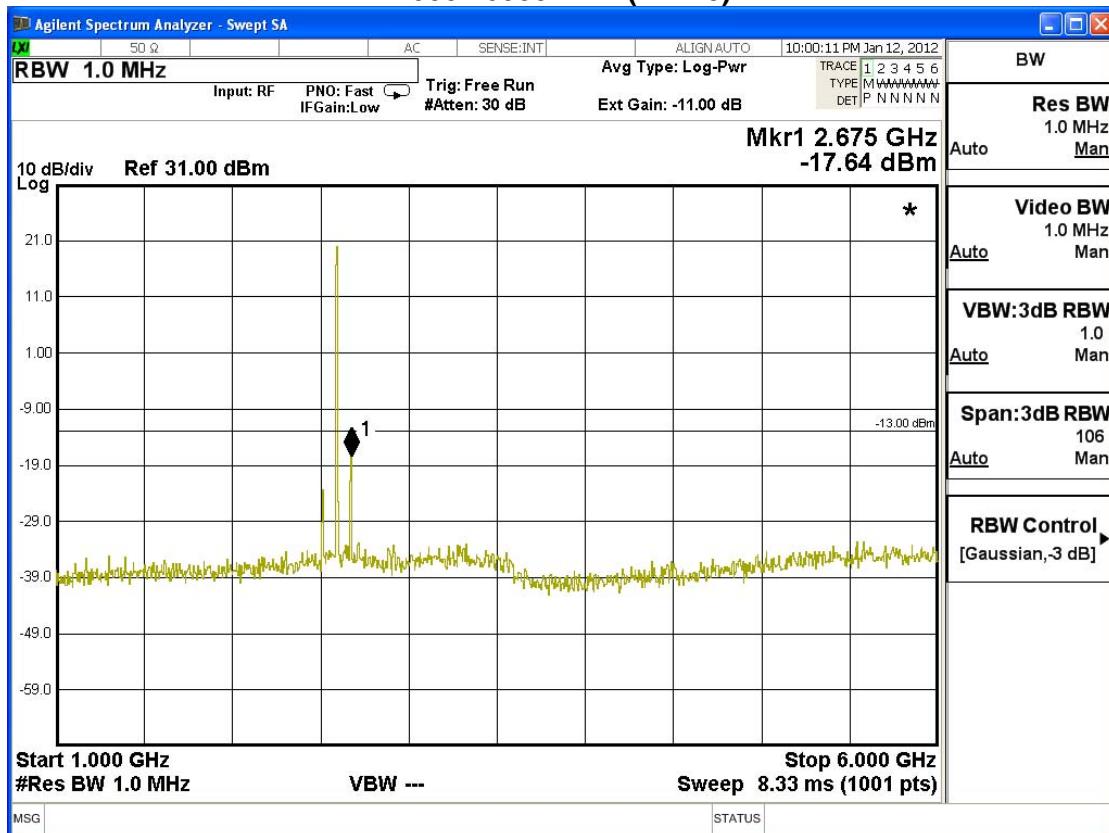
Frequency Band (MHz)	Frequency (MHz)	Reading Level (dBm)	Measured Level (dBm)	Limit (dBm)
30-1000	918.52	-34.26	-31.26	≤-13
1000-6000	2675.00	-21.35	-18.35	≤-13
6000-18000	17520.00	-30.09	-27.09	≤-13
18000-26500	26202.50	-24.07	-21.07	≤-13

30 – 1000 MHz-(ANT 0)



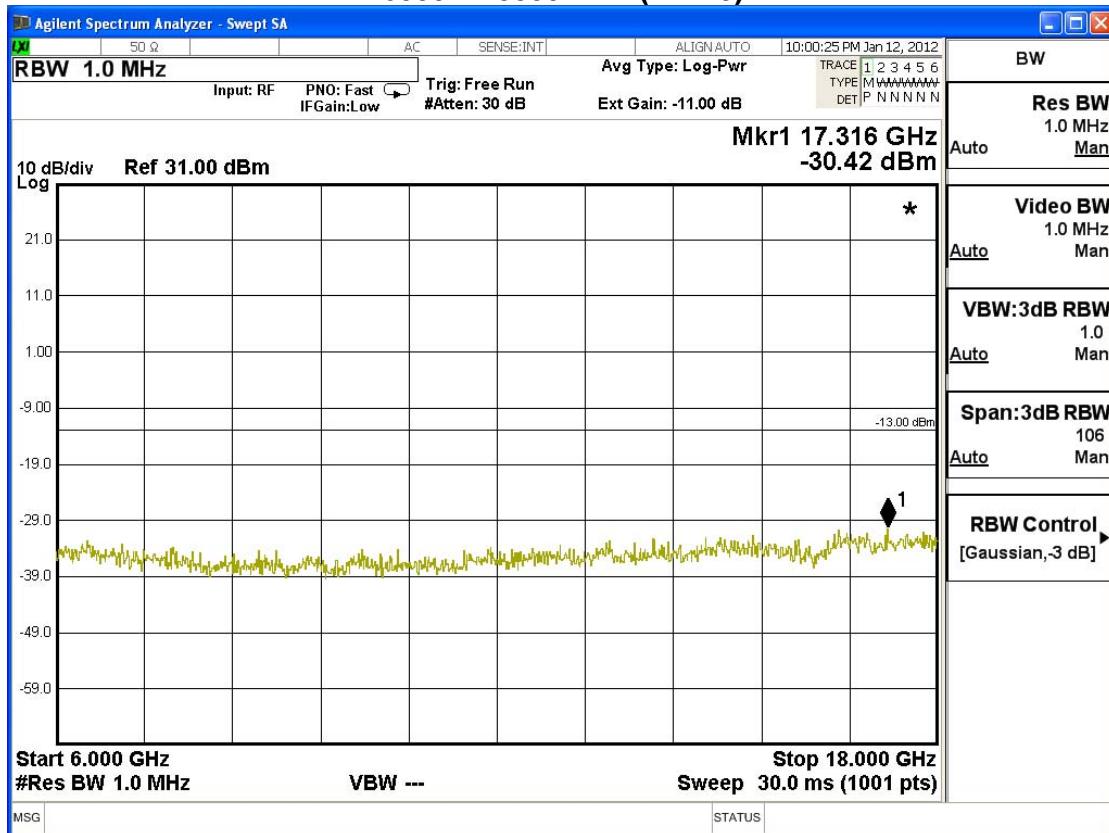
The search value is under the technical standard value, do not need to measure by measuring mode.

1000– 6000 MHz-(ANT 0)



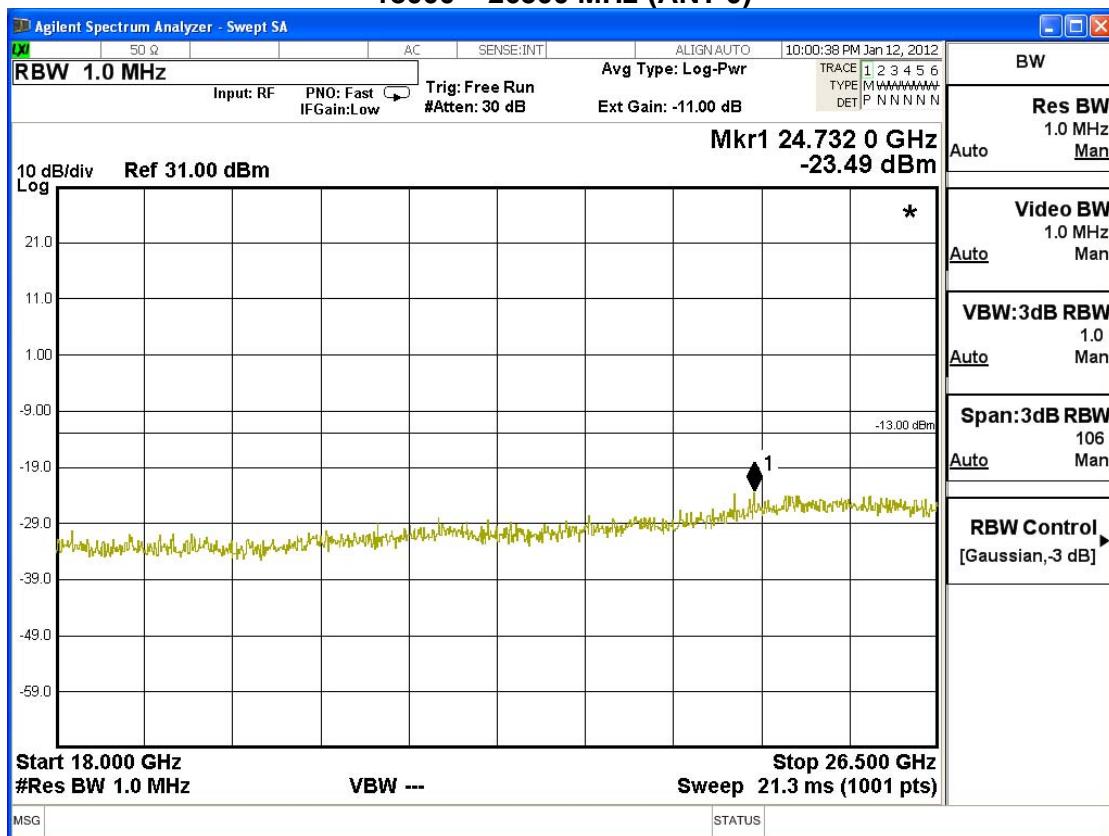
The search value is under the technical standard value, do not need to measure by measuring mode.

6000 – 18000 MHz-(ANT 0)



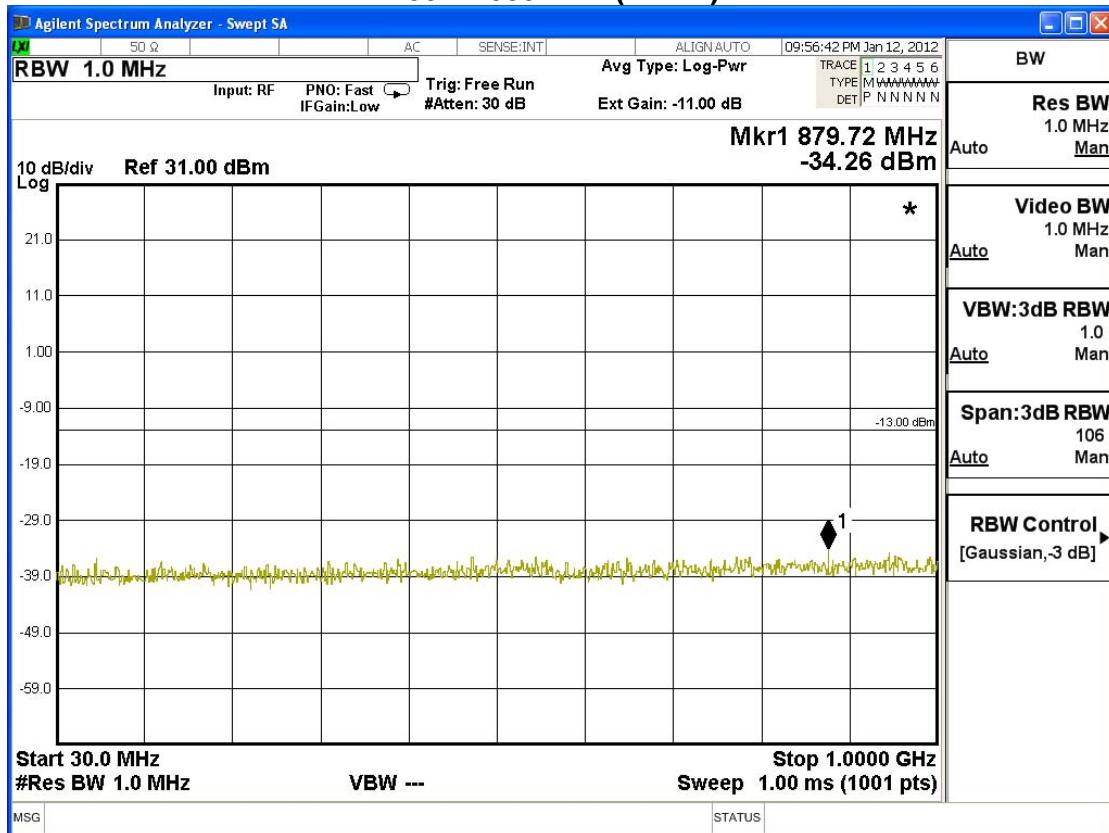
The search value is under the technical standard value, do not need to measure by measuring mode.

18000 – 26500 MHz-(ANT 0)



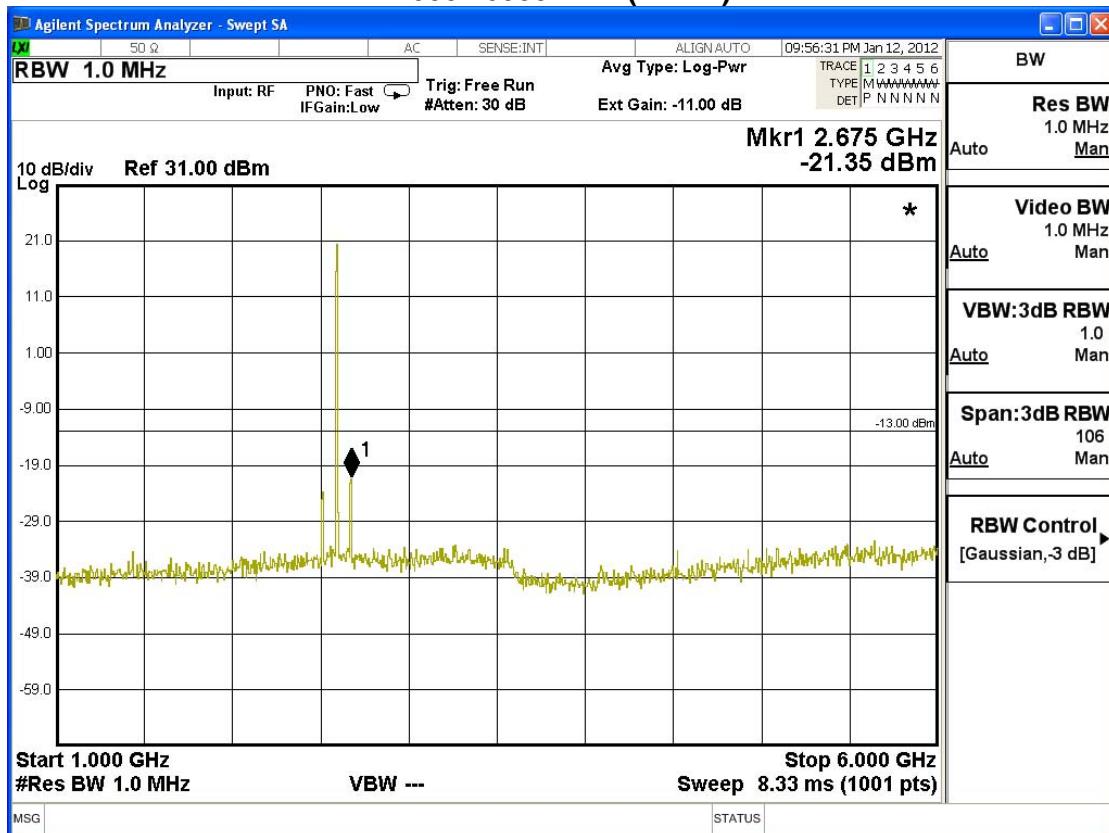
The search value is under the technical standard value, do not need to measure by measuring mode.

30 – 1000 MHz-(ANT 1)



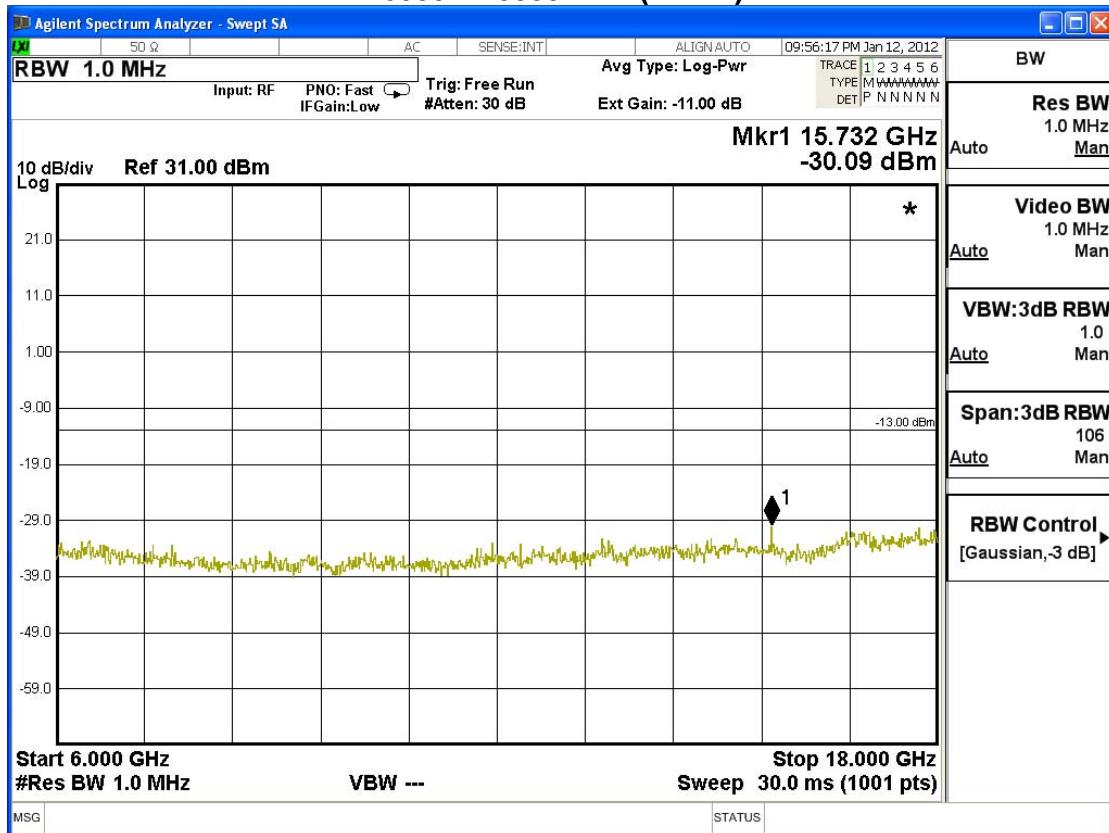
The search value is under the technical standard value, do not need to measure by measuring mode.

1000– 6000 MHz-(ANT 1)



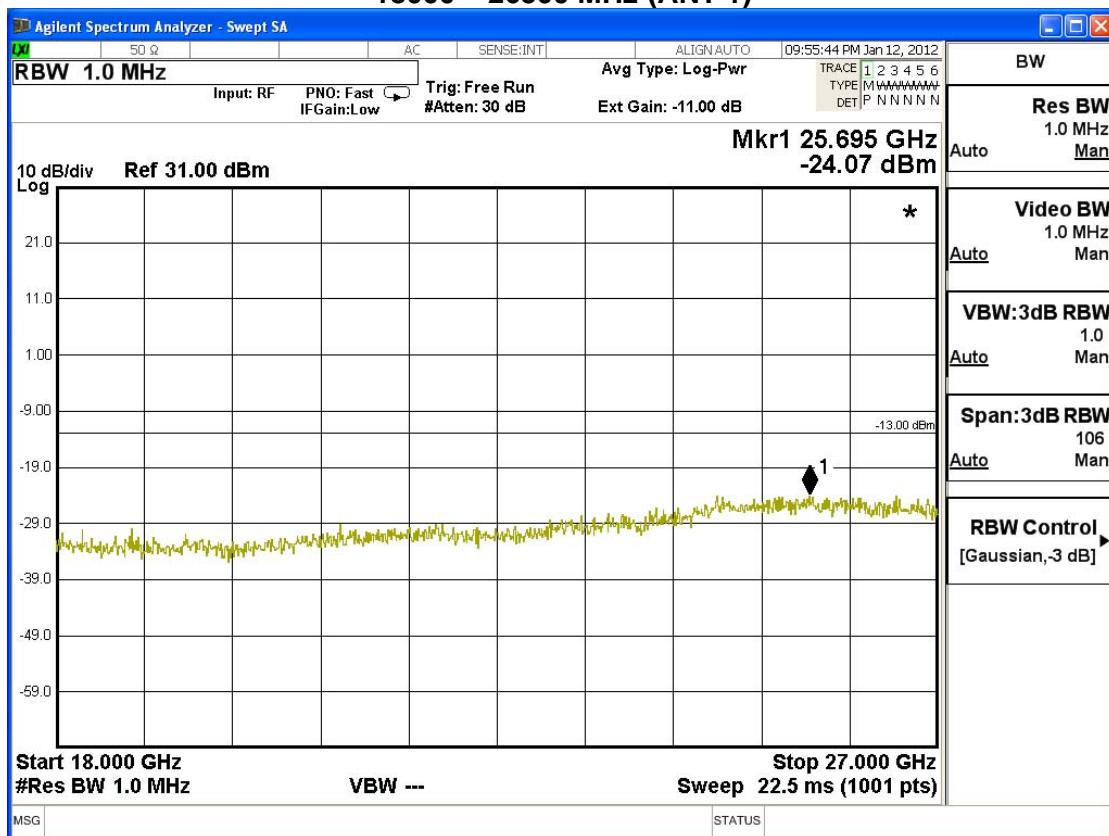
The search value is under the technical standard value, do not need to measure by measuring mode.

6000 – 18000 MHz-(ANT 1)



The search value is under the technical standard value, do not need to measure by measuring mode.

18000 – 26500 MHz-(ANT 1)



The search value is under the technical standard value, do not need to measure by measuring mode.