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13 Conducted Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.407(a)

KDB662911 D01 Multiple Transmitter Output v02r01

Test Method: KDB789033 D02 General U-NII Test Procedures New Rules v02r01

Section E

Test Limit: U-NII-1 250mW(24dBm) U-NII-3 1W(30dBm)

Test Result: PASS

Conducted output power= measurement power+ $10\log(1/x)$

Remark: X is duty cycle=1, so $10\log(1/1)=0$

Conducted output power= measurement power

13.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

- 2. Set the spectrum analyzer: RBW = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
- 3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

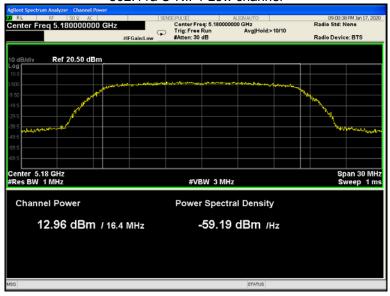
13.2 Test Result:

D 1	Operation mode	Conducted Output Power (dBm)			
Band		Low	Middle	High	
	802.11a	12.96	12.40	12.66	
	802.11n(HT20)	12.69	12.41	12.70	
	802.11n(HT40)	12.81	1	12.48	
U-NII-1	802.11ac(HT20)	12.72	12.27	12.41	
	802.11ac(HT40)	12.73	1	12.55	
	802.11ac(HT80)	12.88	1	1	
U-NII-3	802.11a	14.60	14.01	13.99	
	802.11n(HT20)	14.38	13.66	13.29	
	802.11n(HT40)	14.28	1	13.69	
	802.11ac(HT20)	14.15	13.56	13.34	
	802.11ac(HT40)	14.31	1	13.38	
	802.11ac(HT80)	14.09	/	/	

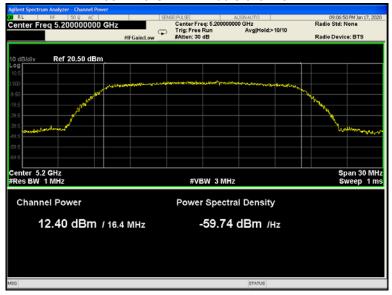
^{*} All transmit signals are completely uncorrelated with each other, Directional gain = G_{ANT} which is less than 6dBi. So the limit does not be reduced.

Test result plots shown as follows:

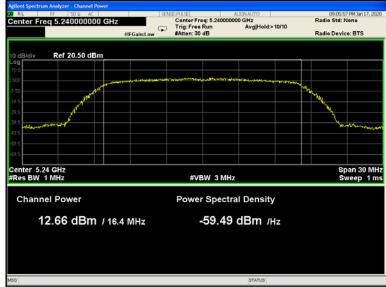
802.11a U-NII-1 Low channel



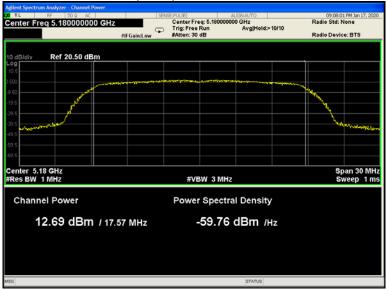
802.11a U-NII-1 Middle channel



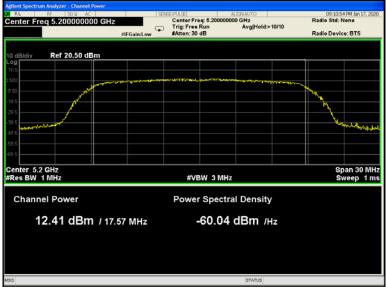




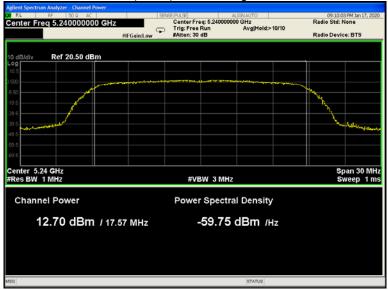
802.11n(HT20) U-NII-1 Low channel



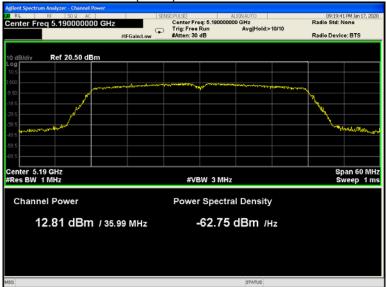




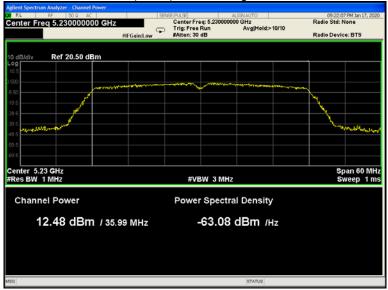
802.11n(HT20) U-NII-1 High channel



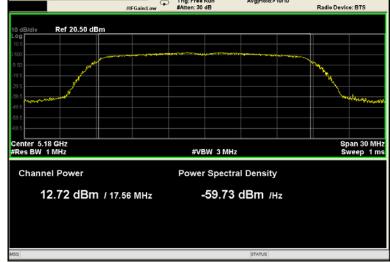




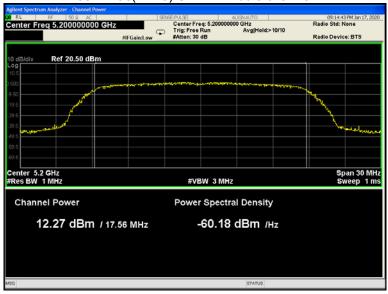
802.11n(HT40) U-NII-1 High channel

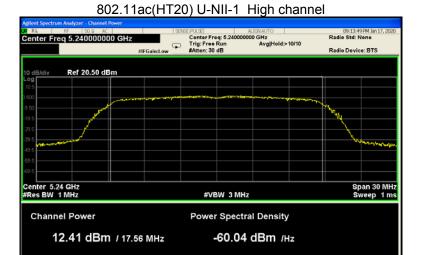




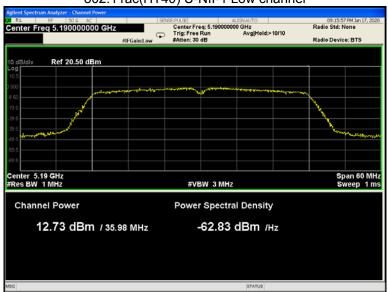


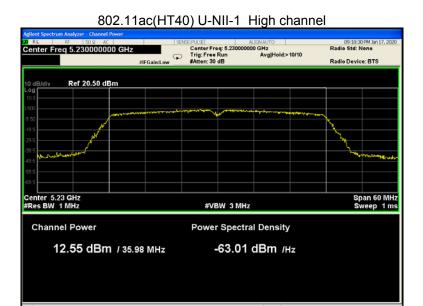
802.11ac(HT20) U-NII-1 Middle channel



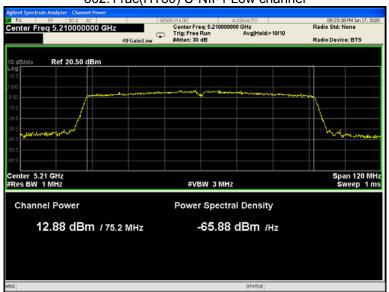




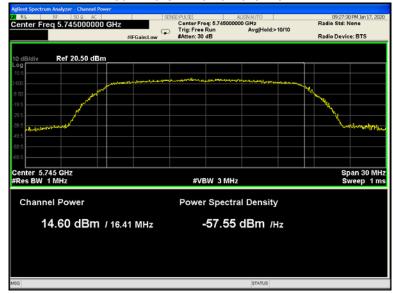




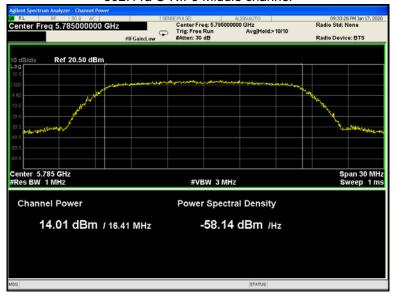
802.11ac(HT80) U-NII-1 Low channel



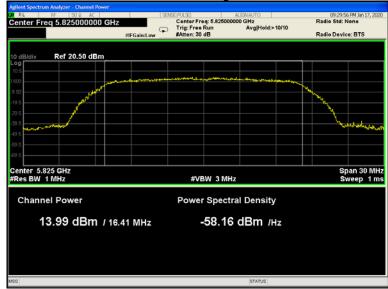
802.11a U-NII-3 Low channel



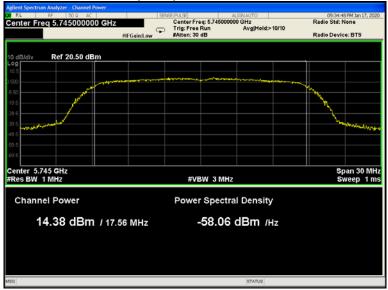
802.11a U-NII-3 Middle channel

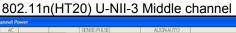


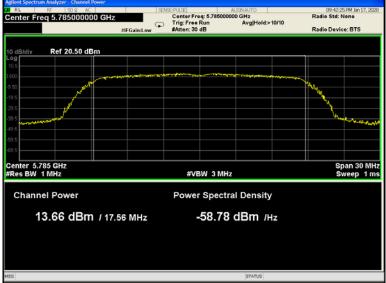




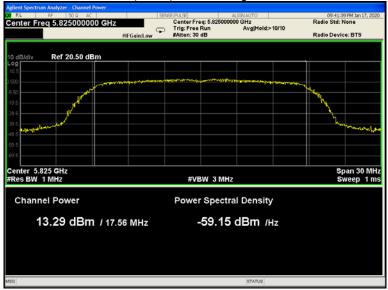
802.11n(HT20) U-NII-3 Low channel

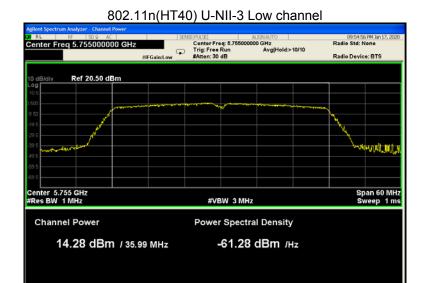




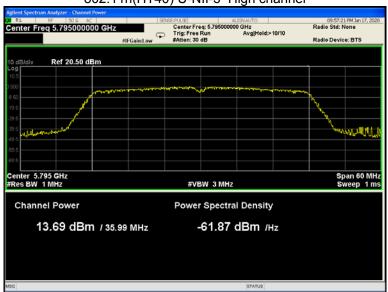


802.11n(HT20) U-NII-3 High channel

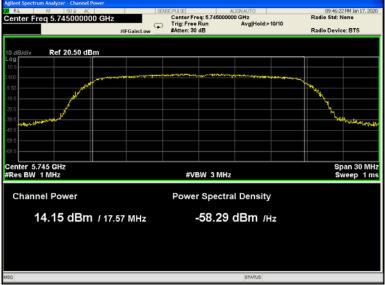




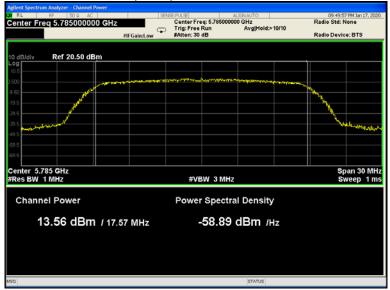
802.11n(HT40) U-NII-3 High channel

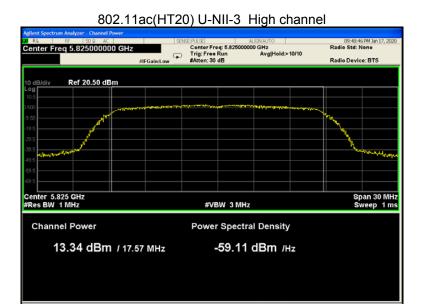




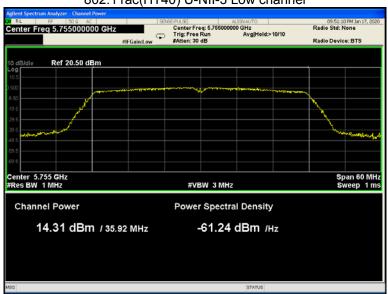


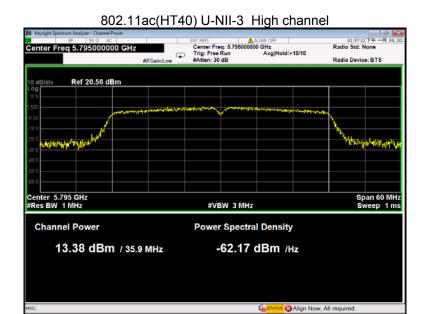
802.11ac(HT20) U-NII-3 Middle channel



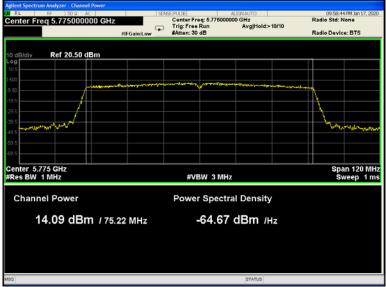


802.11ac(HT40) U-NII-3 Low channel









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14 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.407(a)

KDB662911 D01 Multiple Transmitter Output v02r01

Test Method: KDB789033 D02 General U-NII Test Procedures New Rules v02r01,

Section F

Test Limit: ≤11.00dBm/MHz for Operation in the U-NII-1(5150MHz-5250MHz)of

mobile device

≤30.00dBm/500KHz for Operation in the U-NII-3(5725MHz-

5850MHz)of device

Test Result: PASS

14.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer:

U-NII-1

RBW = 1MHz, VBW ≥3* RBW Sweep = auto; Detector Function = Peak. Trace = Max hold.

U-NII-3

RBW = 510KHz, VBW ≥3* RBW Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

14.2 Test Result:

Dond	Operation mode	Power Spectral Density (dBm/MHz)			
Band		Low	Middle	High	
	802.11a	4.297	3.233	3.343	
	802.11n(HT20)	2.713	2.894	2.599	
	802.11n(HT40)	-0.034	1	0.134	
U-NII-1	802.11ac(HT20)	3.595	2.272	2.333	
	802.11ac(HT40)	0.040	1	-0.440	
	802.11ac(HT80)	-2.794	1	1	
	Limit	≤11.00dBm/MHz			

Dond	Operation mode	Power Spectral Density (dBm/MHz)			
Band		Low	Middle	High	
	802.11a	6.680	4.780	4.759	
	802.11n(HT20)	4.315	3.749	4.516	
	802.11n(HT40)	0.886	1	4.906	
U-NII-3	802.11ac(HT20)	4.092	3.992	3.424	
	802.11ac(HT40)	1.276	1	5.128	
	802.11ac(HT80)	-1.522	1	1	
	Limit	≤30.00dBm/500kHz			

^{*} All transmit signals are completely uncorrelated with each other, Directional gain = G_{ANT} which is less than 6dBi. So the limit does not be reduced.

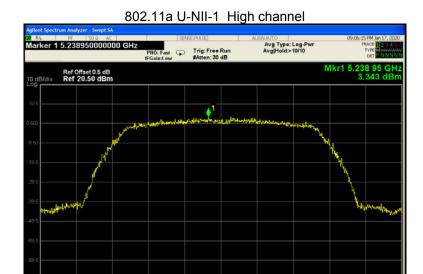
Test result plots shown as follows:

802.11a U-NII-1 Low channel

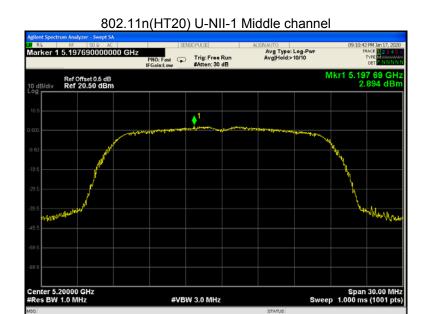


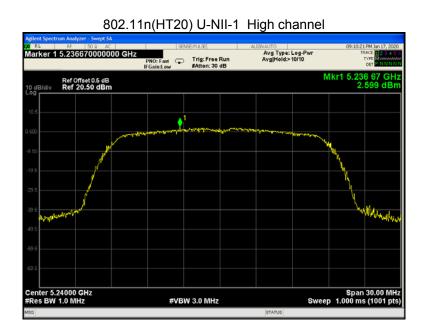
802.11a U-NII-1 Middle channel



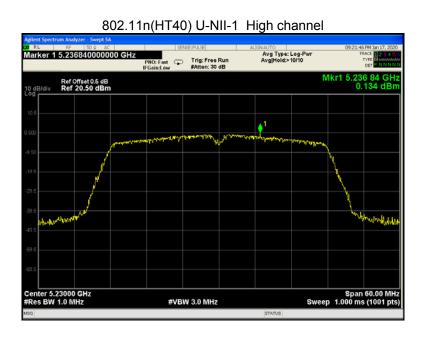










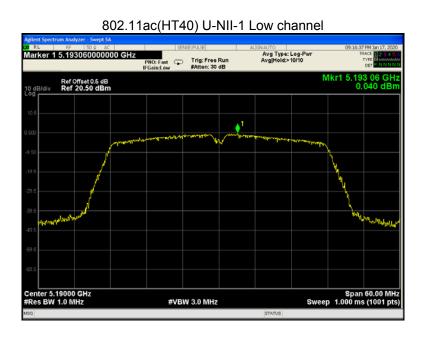
















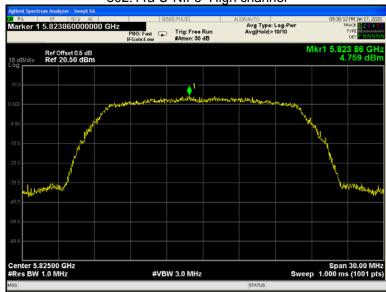
802.11a U-NII-3 Low channel



802.11a U-NII-3 Middle channel



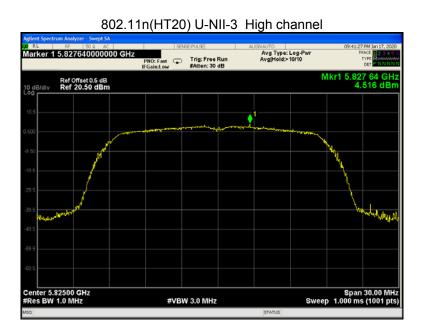
802.11a U-NII-3 High channel

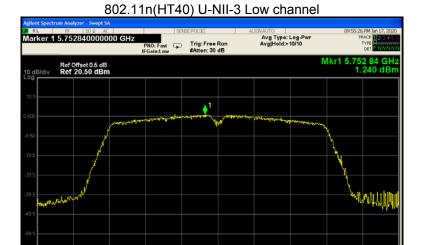




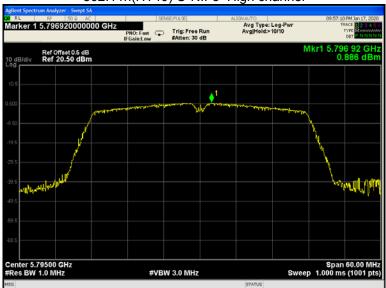


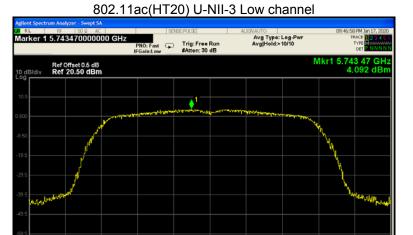








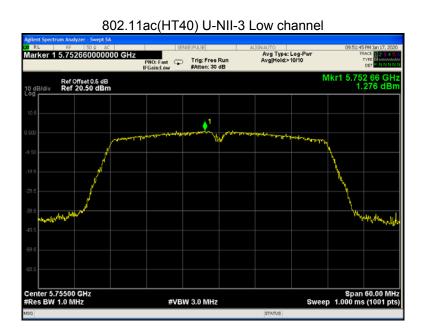




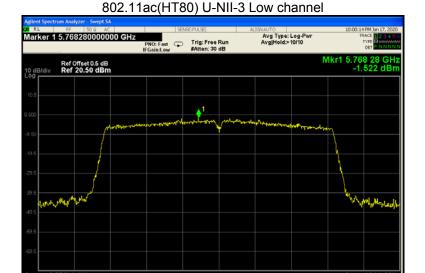
802.11ac(HT20) U-NII-3 Middle channel











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15 Frequency Stability

Test Requirement: FCC CFR47 Part 15 Section 15.407(g)

Test Method: ANSI C63.10:2013

Test Limit:

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 users manual or 20ppm.

Test Result: PASS

15.1 Test Procedure:

1. The transmitter output (antenna port) was connected to the spectrum analyzer. EUT have transmitted absence of unmodulation signal and fixed channelise. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and the limit is less than ±20ppm The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.

2. Extreme temperature rule is -15°C~ 45°C.

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15.2 Test Result:

U-NII-1 Test Frequency:5180MHz				
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
45		1711	0.3303	20
30		1726	0.3332	20
20		1719	0.3319	20
10	120	1710	0.3301	20
0		1728	0.3336	20
-10		1716	0.3313	20
-15		1725	0.3330	20
20	108	1726	0.3332	20
20	132	1714	0.3309	20

U-NII-3 Test Frequency:5785MHz				
Temperature (°C)	Power Supply (VAC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
45		1804	0.3118	20
30		1805	0.3120	20
20		1810	0.3129	20
10	120	1810	0.3129	20
0		1804	0.3118	20
-10		1800	0.3111	20
-15		1797	0.3106	20
20	108	1808	0.3125	20
20	132	1812	0.3132	20

16 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

This device uses of two antennas that uses a specified coupling to the intentional radiator. Antenna connectors complied with the requirement.

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17 RF Exposure

Remark: refer to SAR test report: WTS20S01000938W001.

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18 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-CD6-Photos.

=====End of Report=====