



# A Test Lab Techno Corp.

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## MPE Report

Test Report No.	: 1606FS12-01
Applicant	: Comtrend Corporation
Product Type	: Wireless ADSL2+ Router
Trade Name	: COMTREND
Model Number	: AR-5313u, AR-5310u
Date of Received	: May 20, 2016
Test Period	: Jun. 06, 2016
Date of Issued	: Jul. 18, 2016
Test Specification	: ANSI / IEEE Std.C95.1-1992 / IEEE Std. 1528-2013 47 CFR § 2.1091 47 CFR § 1.1310
Location of Test Lab.	: Chang-an Lab.

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
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Approved By

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(Bill Hu)

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(Mark Duan)



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## 1. Description of Equipment under Test (EUT)

Applicant	Comtrend Corporation 3F-1, No. 10, Lane 609, Chung Hsin Road, Section 5, San Chung Dist, New Taipei City 24159, Taiwan				
Manufacturer	Comtrend Corporation 3F-1, No. 10, Lane 609, Chung Hsin Road, Section 5, San Chung Dist, New Taipei City 24159, Taiwan				
Product Type	Wireless ADSL2+ Router				
Trade Name	COMTREND				
Model Number	AR-5313u, AR-5310u (AR5313u with 16MB memory, AR5310u with 8MB memory)				
FCC ID	L9VAR5313U				
Frequency Range	IEEE 802.11b / 802.11g / 802.11n 2.4GHz 20MHz : 2412 - 2462 MHz IEEE 802.11n 2.4GHz 40MHz : 2422 - 2452 MHz				
Antenna information	ANT	Trade Name	Model Number	Type	Max. Gain (dBi)
	ANT-0	MAG.LAYERS	EDA-8709-2G4C1-A75	External antenna (Reversed-SMA Connector)	2.0
	ANT-1	MAG.LAYERS	EDA-8709-2G4C1-A80	External antenna (Reversed-SMA Connector)	2.0
	Directional Gain : 5.01 dBi please refer to RF report.				
Antenna Delivery	IEEE 802.11b / 802.11g :1TX + 1RX (ANT-0) IEEE 802.11n 2.4GHz 20MHz / 40MHz :2TX + 2RX				
Temperature Range	0~ +40°C				
RF Evaluation	0.038 mW/cm <sup>2</sup>				

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties



## 2. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons." This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

Exposure evaluation

$$S = \frac{PG}{4\pi R^2}$$

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna.



### 3. RF Output Power

The conducted power turn-up tolerance reference manufacturer specification.

Band	Data Rate	CH	Frequency (MHz)	Average Conducted power (dBm)		
				ANT-0	ANT-1	ANT-0+1
IEEE 802.11b	1M	1	2412.0	14.45	---	---
		6	2437.0	14.41	---	---
		11	2462.0	14.17	---	---
	2M	6	2437.0	14.39	---	---
	5.5M	6	2437.0	14.36	---	---
	11M	6	2437.0	14.38	---	---
IEEE 802.11g	6M	1	2412.0	14.88	---	---
		6	2437.0	14.93	---	---
		11	2462.0	12.19	---	---
	9M	6	2437.0	14.90	---	---
	12M	6	2437.0	14.89	---	---
	18M	6	2437.0	14.86	---	---
	24M	6	2437.0	14.91	---	---
	36M	6	2437.0	14.84	---	---
	48M	6	2437.0	14.88	---	---
54M	6	2437.0	14.39	---	---	
IEEE 802.11n 2.4GHz 20MHz	13M	1	2412.0	9.73	9.53	12.64
		6	2437.0	14.66	14.56	17.62
		11	2462.0	9.59	9.50	12.56
	26M	6	2437.0	14.64	14.54	17.60
	39M	6	2437.0	14.56	14.47	17.53
	52M	6	2437.0	14.63	14.52	17.59
	78M	6	2437.0	14.58	14.45	17.53
	104M	6	2437.0	14.61	14.51	17.57
	117M	6	2437.0	14.59	14.49	17.55
	130M	6	2437.0	14.55	14.43	17.50
IEEE 802.11n 2.4GHz 40MHz	27M	3	2422.0	7.73	7.10	10.44
		6	2437.0	8.42	7.98	11.22
		9	2452.0	9.68	8.81	12.28
	54M	6	2437.0	8.40	7.96	11.20
	81M	6	2437.0	8.32	7.87	11.11
	108M	6	2437.0	8.38	7.93	11.17
	162M	6	2437.0	8.33	7.88	11.12
	216M	6	2437.0	8.30	7.85	11.09
	243M	6	2437.0	8.36	7.91	11.15
	135M	6	2437.0	8.34	7.90	11.14



#### 4. Test Result

Band	Data Rate	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm <sup>2</sup> )
IEEE 802.11b ANT-0	1M	2412.0	1.000	20	14.60	2.00	1.58	1	45.570	0.009
		2437.0	1.000	20	14.60	2.00	1.58	1	45.570	0.009
		2462.0	1.000	20	14.30	2.00	1.58	1	42.530	0.008
IEEE 802.11g ANT-0	6M	2412.0	1.000	20	15.00	2.00	1.58	1	49.960	0.010
		2437.0	1.000	20	15.10	2.00	1.58	1	51.130	0.010
		2462.0	1.000	20	12.30	2.00	1.58	1	26.830	0.005
IEEE 802.11n 2.4GHz 20MHz MIMO	13M	2412.0	1.000	20	12.80	5.01	3.17	1	60.400	0.012
		2437.0	1.000	20	17.80	5.01	3.17	1	191.010	0.038
		2462.0	1.000	20	12.70	5.01	3.17	1	59.030	0.012
IEEE 802.11n 2.4GHz 40MHz MIMO	27M	2422.0	1.000	20	10.60	5.01	3.17	1	36.400	0.007
		2437.0	1.000	20	11.40	5.01	3.17	1	43.760	0.009
		2452.0	1.000	20	12.40	5.01	3.17	1	55.090	0.011

Note:

1. The Numeric Gain calculated by  $10^{(\text{ant. Gain(dBi)} / 10)}$ .
2. Each band max power which perform MPE of any configurations.
3. The device operating IEEE 802.11b / g mode is Only with transmit signals to 1TX.
4. The device operating IEEE 802.11n mode is MIMO with transmit signals to 2TX.