



A Test Lab Techno Corp.

Changan Lab : N o. 140-1, Changan Street, Bade District, Taoyuan City 33465, Taiwan (R.O.C)
Tel : 886-3-271-0188 / Fax : 886-3-271-0190



MPE Report

Test Report No.	: 1602FS15
Applicant	: Comtrend Corporation
Product Type	: Multi-DSL Wireless Router
Trade Name	: COMTREND
Model Number	: VR-3033u, VR-3033
Date of Received	: Jan. 08, 2016
Test Period	: Jan. 08, 2016
Date of Issued	: Mar. 09, 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.
3. The measurement report has to be written approval of A Test Lab Techno Corp. It may only be reproduced or published in full. This report shall not be reproduced except in full, without the written approval of A Test Lab Techno Corp.
4. This document may be altered or revised by A Test Lab Techno. Corp. personnel only, and shall be noted in the revision section of the document.

Approved By

: Bill Hu
(Bill Hu)

Tested By

: Sky Chou
(Sky Chou)



Contents

1.	Description of Equipment under Test (EUT).....	3
2.	Human Exposure Assessment.....	4
3.	RF Output Power	5
4.	Test Result	6

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	Multi-DSL Wireless Router			
Trade Name	COMTREND			
Model Number	VR-3033u, VR-3033			
Models Different Description	Those model numbers differ from each other in selling region and appearance colors.			
FCC ID	L9VVR-3033U			
Frequency Range	IEEE 802.11b / 802.11g / 802.11n 2.4GHz 20MHz :		2412 - 2462	MHz
	IEEE 802.11n 2.4GHz 40MHz :		2422 - 2452	MHz
Transmit Power (conducted power)	IEEE 802.11b:		0.054 W /	17.30 dBm
	IEEE 802.11g:		0.041 W /	16.15 dBm
	IEEE 802.11n 2.4GHz 20MHz :		0.076 W /	18.82 dBm
	IEEE 802.11n 2.4GHz 40MHz :		0.061 W /	17.88 dBm
Antenna Information	ANT Port	Model Name	Type	Max. Gain
	ANT-0	EDA-1313-2G4C1-B4	External Antenna	2.59 dBi
	ANT-1	EDA-1313-2G4C1-B3		2.63 dBi
Temperature Range	0 ~ +40°C			
RF Evaluation	0.169 mW/cm ²			

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

Band	Data Rate	CH	Frequency (MHz)	Average Conducted power (dBm)		
				ANT-0	ANT-1	ANT-0+1
IEEE 802.11b	1M	1	2412.0	17.26	---	---
		6	2437.0	17.30	---	---
		11	2462.0	17.16	---	---
	2M	6	2437.0	17.25	---	---
	5.5M	6	2437.0	17.21	---	---
	11M	6	2437.0	17.14	---	---
IEEE 802.11g	6M	1	2412.0	16.15	15.27	---
		6	2437.0	15.98	15.07	---
		11	2462.0	15.86	14.84	---
	9M	6	2437.0	15.95	15.03	---
	12M	6	2437.0	15.93	15.00	---
	18M	6	2437.0	15.88	14.95	---
	24M	6	2437.0	15.80	14.93	---
	36M	6	2437.0	15.75	14.87	---
	48M	6	2437.0	15.72	14.85	---
	54M	6	2437.0	15.66	14.81	---
IEEE 802.11n 2.4GHz 20MHz	13M	1	2412.0	16.39	15.15	18.82
		6	2437.0	16.25	14.81	18.60
		11	2462.0	15.93	14.63	18.34
	26M	6	2437.0	16.21	14.79	18.57
	39M	6	2437.0	16.14	14.76	18.51
	52M	6	2437.0	16.10	14.71	18.47
	78M	6	2437.0	16.07	14.67	18.44
	104M	6	2437.0	16.02	14.63	18.39
	117M	6	2437.0	15.99	14.60	18.36
	130M	6	2437.0	15.95	14.55	18.32
IEEE 802.11n 2.4GHz 40MHz	27M	3	2422.0	15.14	14.59	17.88
		6	2437.0	14.91	14.25	17.60
		9	2452.0	15.05	14.28	17.69
	54M	6	2437.0	14.89	14.20	17.57
	81M	6	2437.0	14.82	14.17	17.52
	108M	6	2437.0	14.76	14.15	17.48
	162M	6	2437.0	14.74	14.11	17.45
	216M	6	2437.0	14.68	14.08	17.40
	243M	6	2437.0	14.62	14.02	17.34
	270M	6	2437.0	14.57	13.96	17.29

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 ²
IEEE 802.11b	1M	2412.0	1	20	17.40	2.59	1.82	1	100.02	0.020
		2437.0	1	20	17.40	2.59	1.82	1	100.02	0.020
		2462.0	1	20	17.40	2.59	1.82	1	100.02	0.020
IEEE 802.11g_ANT-0	6M	2412.0	1	20	16.30	2.59	1.82	1	77.64	0.015
		2437.0	1	20	16.30	2.59	1.82	1	77.64	0.015
		2462.0	1	20	16.30	2.59	1.82	1	77.64	0.015
IEEE 802.11n 2.4GHz 20MHz_MIMO	13M	2412.0	1	20	19.00	2.63	1.83	1	145.36	0.029
		2437.0	1	20	19.00	2.63	1.83	1	145.36	0.029
		2462.0	1	20	19.00	2.63	1.83	1	145.36	0.029
IEEE 802.11n 2.4GHz 40MHz_MIMO	27M	2422.0	1	20	18.00	2.63	1.83	1	115.47	0.023
		2437.0	1	20	18.00	2.63	1.83	1	115.47	0.023
		2452.0	1	20	18.00	2.63	1.83	1	115.47	0.023

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 MPE results are evaluated by lowest data rate for wlan.
- 4 The device operating 802.11b mode is Only with transmit signals to 1TX.
- 5 The device operating 802.11g mode is Diversity with transmit signals to 1TX.
- 6 The device operating 802.11n mode is MIMO with transmit signals to 2TX.