



A Test Lab Techno Corp.

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MPE Report

Test Report No.	: 1606FS16
Applicant	: Comtrend Corporation
Product Type	: Wireless Gateway
Trade Name	: COMTREND
Model Number	: NexusLink 3240u, NexusLink 3240, NexusLink 3120ua, NexusLink 3120, WAP-5895ua, WR-6895
Date of Received	: Apr. 19, 2016
Test Period	: Apr. 28, 2016
Date of Issued	: Aug. 16, 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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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 Gateway				
Trade Name	COMTREND				
Model Number	NexusLink 3240u, NexusLink 3240, NexusLink 3120ua, NexusLink 3120, WAP-5895ua, WR-6895 (Refer to Model Different description table)				
FCC ID	L9VNL3240U				
Frequency Range	IEEE 802.11b / 802.11g / 802.11n 2.4GHz 20MHz : 2412 - 2462 MHz IEEE 802.11n 2.4GHz 40MHz : 2422 - 2452 MHz IEEE 802.11a U-NII Band I : 5180 - 5240 MHz IEEE 802.11a U-NII Band III : 5745 - 5825 MHz IEEE 802.11n 5GHz 20MHz U-NII Band I : 5180 - 5240 MHz IEEE 802.11ac 20MHz U-NII Band I : 5180 - 5240 MHz IEEE 802.11n 5GHz 20MHz U-NII Band III : 5745 - 5825 MHz IEEE 802.11ac 20MHz U-NII Band III : 5745 - 5825 MHz IEEE 802.11n 5GHz 40MHz U-NII Band I : 5190 - 5230 MHz IEEE 802.11ac 40MHz U-NII Band I : 5190 - 5230 MHz IEEE 802.11n 5GHz 40MHz U-NII Band III : 5755 - 5795 MHz IEEE 802.11ac 40MHz U-NII Band III : 5755 - 5795 MHz IEEE 802.11ac 80MHz U-NII Band I : 5210 - 5775 MHz IEEE 802.11ac 80MHz U-NII Band III : 5210 - 5775 MHz				
Antenna information	ANT	Trade Name	Model Number	Type	Max. Gain (dBi)
	2.4GHz ANT-0	Cortec	AN2450-64D02BBF	External antenna (Reversed-SMA Connector)	2.5
	2.4GHz ANT-1	Cortec	AN2450-64D03BBF	External antenna (Reversed-SMA Connector)	1.2
	5GHz ANT-0	Cortec	AN2450-64D02BBF	External antenna	2.5
	5GHz ANT-1	Cortec	NBO351-C195BF	Embedded antenna	4.0
	5GHz ANT-2	Cortec	NBO351-C70BF	Embedded antenna	3.0
	5GHz ANT-3	Cortec	AN2450-64D03BBF	External antenna	2.5
Temperature Range	0 ~ +40°C				
RF Evaluation	0.191 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



Model Different description table

Model	NexusLink 3240u NexusLink 3240	NexusLink 3120ua NexusLink 3120	WAP-5895ua WR-6895
DSL	V	V	X
USB	V	V	V
ETH1-4	V	V	V
ETH WAN	V	V	V
PHONE1-2(VOIP)	V	X	X
A Main board	V	V	V

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 ANT-0	1M	1	2412.0	16.21	---	---
		6	2437.0	16.79	---	---
		11	2462.0	17.70	---	---
	2M	6	2437.0	16.71	---	---
	5.5M	6	2437.0	16.74	---	---
	11M	6	2437.0	16.66	---	---
IEEE 802.11g ANT-0	6M	1	2412.0	17.85	---	---
		6	2437.0	17.47	---	---
		11	2462.0	16.58	---	---
	9M	6	2437.0	17.26	---	---
	12M	6	2437.0	17.20	---	---
	18M	6	2437.0	17.25	---	---
	24M	6	2437.0	17.15	---	---
	36M	6	2437.0	17.19	---	---
	48M	6	2437.0	17.18	---	---
	54M	6	2437.0	17.16	---	---
IEEE 802.11n 2.4GHz 20MHz	13M	1	2412.0	16.18	15.85	19.03
		6	2437.0	16.03	15.37	18.72
		11	2462.0	15.85	14.90	18.41
	26M	6	2437.0	15.87	15.31	18.61
	39M	6	2437.0	15.68	15.39	18.55
	52M	6	2437.0	15.94	15.22	18.61
	78M	6	2437.0	15.59	15.31	18.46
	104M	6	2437.0	15.95	15.27	18.63
	117M	6	2437.0	15.98	15.36	18.69
	130M	6	2437.0	15.93	15.34	18.66
IEEE 802.11n 2.4GHz 40MHz	27M	3	2422.0	14.70	14.03	17.39
		6	2437.0	14.44	13.80	17.14
		9	2452.0	15.23	14.75	18.01
	54M	6	2437.0	14.50	13.60	17.08
	81M	6	2437.0	14.19	13.55	16.89
	108M	6	2437.0	14.41	13.59	17.03
	162M	6	2437.0	14.30	13.67	17.01
	216M	6	2437.0	14.53	13.63	17.11
	243M	6	2437.0	14.25	13.54	16.92
	270M	6	2437.0	13.53	13.63	16.59

Band	Data Rate	CH	Frequency (MHz)	Average Conducted power (dBm)				
				ANT-0	ANT-1	ANT-2	ANT-3	ANT-0+1+2+3
IEEE 802.11a	6M	36	5180.0	17.96	17.39	19.57	18.74	24.51
		40	5200.0	17.72	17.82	19.80	19.03	24.70
		44	5220.0	17.65	17.44	19.36	18.87	24.43
		48	5240.0	17.61	17.32	19.40	18.69	24.36
		149	5745.0	17.20	17.64	19.23	18.92	24.35
		153	5765.0	17.38	17.39	19.00	18.78	24.22
		157	5785.0	17.08	17.59	18.91	18.52	24.11
		161	5805.0	17.25	17.72	18.70	18.72	24.16
	54M	165	5825.0	17.27	17.79	18.64	18.65	24.15
		36	5180.0	17.52	17.78	19.56	19.03	24.58
		40	5200.0	17.58	17.41	19.51	18.83	24.44
		44	5220.0	17.60	17.60	19.74	19.04	24.62
		48	5240.0	17.54	17.42	19.55	19.02	24.50
		149	5745.0	17.15	17.40	19.11	18.83	24.23
		153	5765.0	17.06	17.04	18.88	18.72	24.03
		157	5785.0	17.02	17.44	18.81	18.13	23.92
IEEE 802.11ac 20MHz	26M	161	5805.0	17.04	17.64	18.59	18.52	24.01
		165	5825.0	17.10	17.72	18.58	18.42	24.01
		36	5180.0	17.57	17.51	19.92	19.16	24.68
		40	5200.0	17.40	17.53	19.50	19.01	24.48
		44	5220.0	17.46	17.62	19.52	19.12	24.54
		48	5240.0	17.44	17.52	19.85	19.03	24.60
		149	5745.0	17.10	17.55	19.47	19.41	24.53
		153	5765.0	17.43	17.76	19.25	19.25	24.52
	312M	157	5785.0	17.35	17.34	19.24	19.20	24.40
		161	5805.0	17.32	17.41	19.01	19.06	24.30
		165	5825.0	17.50	17.82	18.98	18.95	24.38
		36	5180.0	17.59	17.41	19.80	19.25	24.66
		40	5200.0	17.48	17.71	19.42	18.88	24.47
		44	5220.0	17.32	17.50	19.47	18.85	24.40
		48	5240.0	17.39	17.76	19.36	18.70	24.39
		149	5745.0	17.43	17.61	19.42	19.08	24.49
		153	5765.0	17.02	17.39	19.27	18.76	24.23
		157	5785.0	17.27	17.63	18.95	18.94	24.28
		161	5805.0	17.20	17.40	18.83	18.91	24.18
		165	5825.0	17.27	17.76	18.78	18.45	24.13

Band	DataRate	CH	Frequency (MHz)	Average Conducted power (dBm)				
				ANT-0	ANT-1	ANT-2	ANT-3	ANT-0+1+2+3
IEEE 802.11ac 40MHz	54M	38	5190.0	15.07	15.45	17.82	17.17	22.55
		46	5230.0	18.03	17.67	19.95	19.61	24.95
		151	5755.0	17.46	17.44	19.76	19.58	24.72
		159	5795.0	17.68	17.65	19.43	19.23	24.60
	720M	38	5190.0	14.77	14.95	17.80	17.16	22.39
		46	5230.0	17.64	17.90	19.73	19.16	24.71
		151	5755.0	17.65	17.80	19.36	19.23	24.60
		159	5795.0	17.78	17.69	19.38	18.91	24.52
IEEE 802.11ac 80MHz	117.2M	42	5210.0	13.51	13.50	15.24	14.87	20.37
		155	5775.0	17.44	17.25	19.21	18.70	24.25
	1560M	42	5210.0	13.54	13.42	14.87	14.89	20.26
		155	5775.0	17.24	17.48	18.98	18.52	24.14

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 ²
IEEE 802.11b ANT-0	1M	2412	1.000	20	16.40	2.50	1.78	1	77.700	0.015
		2437	1.000	20	16.90	2.50	1.78	1	87.180	0.017
		2462	1.000	20	17.80	2.50	1.78	1	107.260	0.021
IEEE 802.11g ANT-0	6M	2412	1.000	20	18.00	2.50	1.78	1	112.310	0.022
		2437	1.000	20	17.60	2.50	1.78	1	102.430	0.020
		2462	1.000	20	16.70	2.50	1.78	1	83.260	0.017
IEEE 802.11n 2.4GHz 20MHz MIMO	13M	2412	1.000	20	19.20	2.50	1.78	1	148.050	0.029
		2437	1.000	20	18.90	2.50	1.78	1	138.170	0.027
		2462	1.000	20	18.60	2.50	1.78	1	128.950	0.026
IEEE 802.11n 2.4GHz 40MHz MIMO	27M	2422	1.000	20	17.50	2.50	1.78	1	100.100	0.020
		2437	1.000	20	17.30	2.50	1.78	1	95.590	0.019
		2452	1.000	20	18.20	2.50	1.78	1	117.600	0.023

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 802.11a MIMO	6M	5180	1.000	20	24.70	4.00	2.51	1	740.750	0.147
		5200	1.000	20	24.90	4.00	2.51	1	775.660	0.154
		5220	1.000	20	24.80	4.00	2.51	1	758.010	0.151
		5240	1.000	20	24.70	4.00	2.51	1	740.750	0.147
		5745	1.000	20	24.50	4.00	2.51	1	707.410	0.141
		5765	1.000	20	24.40	4.00	2.51	1	691.310	0.138
		5785	1.000	20	24.30	4.00	2.51	1	675.580	0.134
		5805	1.000	20	24.30	4.00	2.51	1	675.580	0.134
		5825	1.000	20	24.30	4.00	2.51	1	675.580	0.134
IEEE 802.11ac 20MHz MIMO	26M	5180	1.000	20	24.80	4.00	2.51	1	758.010	0.151
		5200	1.000	20	24.60	4.00	2.51	1	723.890	0.144
		5220	1.000	20	24.70	4.00	2.51	1	740.750	0.147
		5240	1.000	20	24.80	4.00	2.51	1	758.010	0.151
		5745	1.000	20	24.70	4.00	2.51	1	740.750	0.147
		5765	1.000	20	24.70	4.00	2.51	1	740.750	0.147
		5785	1.000	20	24.60	4.00	2.51	1	723.890	0.144
		5805	1.000	20	24.50	4.00	2.51	1	707.410	0.141
		5825	1.000	20	24.50	4.00	2.51	1	707.410	0.141
IEEE 802.11ac 40MHz MIMO	54M	5190	1.000	20	22.70	4.00	2.51	1	467.380	0.093
		5230	1.000	20	25.10	4.00	2.51	1	812.220	0.162
		5755	1.000	20	24.90	4.00	2.51	1	775.660	0.154
		5795	1.000	20	24.70	4.00	2.51	1	740.750	0.147
IEEE 802.11ac 80MHz MIMO	117.2M	5210	1.000	20	20.50	4.00	2.51	1	281.630	0.056
		5775	1.000	20	24.40	4.00	2.51	1	691.310	0.138

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 Diversity with transmit signals to 1 TX.
4. The device operating IEEE 802.11a / n / ac mode is MIMO with transmit signals to 4 TX.
5. In WLAN 2.4G and WLAN 5G functions, they can be chosen to simultaneously transmitted.

Simultaneous Transmitting:

$$\text{Total MPE} = \text{WLAN 2.4GHz MPE} + \text{WLAN 5GHz MPE} = 0.029 + 0.162 = 0.191 \text{ mW/cm}^2 < 1\text{mW/cm}^2$$