1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name of Host:	AC2600 Wireless Router	
Brand Name of Host:	COMTREND	
Model No of Host.:	WR-5931	
Model Difference:	N/A	
Hardware Version:	N/A	
Software Version:	N/A	
Power Supply:	12V from DC Power Supply	
	Adapter:	Model No.: WB-18D12FU, Supplier: Asian Power Devices Inc.

WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Modulation Technology
11b/g	2412-2462	11	DSSS OFDM
11n (2.4GHz)	HT20 2412-2462	11	OFDM
11n (2.4GHz)	HT40 2422-2452	9	OFDM
Antenna Designation:		PCB Antenna 1. Part No.: ALA130-051023-000004 Supplier: LYNwave 2.4GHz Gain: 4.79dBi 2. Part No.: ALA130-051023-000005 Supplier: LYNwave 2.4GHz Gain: 4.47dBi 3. Part No.: ALA130-051023-000003 Supplier: LYNwave 2.4GHz Gain: 3.48dBi	
Modulation type		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM	
Transition Rate:		802.11 b: 1/2/5.5/11 Mbps 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 HT20: 6.5 – 72.5Mbps 802.11 HT40: 13.5 – 150Mbps	

2 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

2.1 Standard Applicable:

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

* = Plane-wave equipment power density

2.2 Maximum Permissible Exposure (MPE) Evaluation

802.11b_MIMO										
CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)				Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit	RESULT
			CH 0	CH 1	CH 2	CH3				
1	2412	1	14.35	12.93	13.14	12.88	19.39	86.88	1 Watt = 30.00 dBm	PASS
6	2437	1	15.59	14.23	14.56	14.02	**20.66**	116.52	1 Watt = 30.00 dBm	PASS
11	2462	1	15.31	14.17	14.68	14.21	20.64	115.82	1 Watt = 30.00 dBm	PASS
802.11b_MIMO										
CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)				Max. Output include tune up tolerance Power (dBm)	Max. Output include tune up tolerance Power (mW)	Limit	RESULT
			CH 0	CH 1	CH 2	CH3				
1	2412	1	11.93	10.53	11.12	10.57	17.10	51.24	1 Watt = 30.00 dBm	PASS
6	2437	1	13.02	12.01	12.16	11.96	18.33	68.08	1 Watt = 30.00 dBm	PASS
11	2462	1	13.19	11.88	12.46	11.87	**18.41**	69.26	1 Watt = 30.00 dBm	PASS

MPE Prediction (802.11b 2412~2462)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where: S = Power density P = Power input to 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

Max. output power including tune-up tolerancel:	18.41	(dBm)
Max. output power including tune-up tolerancel:	69.342581	(mW)
Duty cycle:	100	(%)
Maximum Pav :	69.342581	(mW)
Peak Antenna gain (Maximum):	4.79	(dBi)
Peak Antenna gain (linear):	3.013006	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)
Power density at predication frequency at 20 (cm) distance:	0.042	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.042 mW/cm2.

This is below the uncontrolled exposure limit of 1 mW/cm2 at 2462MHz.

802.11g_MIMO										
CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)				Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit	RESULT
			CH 0	CH 1	CH 2	CH3				
1	2412	6	20.33	18.87	19.54	19.06	25.51	355.47	1 Watt = 30.00 dBm	PASS
6	2437	6	22.27	21.42	21.73	21.44	**27.75**	595.58	1 Watt = 30.00 dBm	PASS
11	2462	6	20.41	19.15	19.66	19.13	25.64	366.44	1 Watt = 30.00 dBm	PASS

802.11g_MIMO										
CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)				Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT
			CH 0	CH 1	CH 2	CH3				
1	2412	6	10.31	9.12	9.48	9.44	15.63	36.57	1 Watt = 30.00 dBm	PASS
6	2437	6	12.79	11.55	12.23	11.91	**18.16**	65.53	1 Watt = 30.00 dBm	PASS
11	2462	6	10.21	9.02	9.82	9.31	15.63	36.60	1 Watt = 30.00 dBm	PASS

MPE Prediction (802.11g 2412~2462)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where: S = Power density P = Power input to 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

Max. output power including tune-up tolerancel:	18.16	(dBm)
Max. output power including tune-up tolerancel:	65.463617	(mW)
Duty cycle:	82.67	(%)
Maximum Pav :	54.118773	(mW)
Peak Antenna gain (Maximum):	4.79	(dBi)
Peak Antenna gain (linear):	3.013006	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)
Power density at predication frequency at 20 (cm) distance:	0.032	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.032 mW/cm2.

This is below the uncontrolled exposure limit of 1 mW/cm2 at 2437MHz.

802.11n_HT20M MIMO										
CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)				Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit	RESULT
			CH 0	CH 1	CH 2	CH3				
1	2412	MCS2	20.87	19.76	20.33	20.45	**26.39**	435.62	1 Watt = 27.81 dBm	PASS
6	2437	MCS2	20.80	19.76	20.23	20.45	26.35	431.21	1 Watt = 27.81 dBm	PASS
11	2462	MCS2	20.86	19.68	20.39	20.32	26.35	431.84	1 Watt = 27.81 dBm	PASS
802.11n_HT20M MIMO										
CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)				Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT
			CH 0	CH 1	CH 2	CH3				
1	2412	MCS2	12.48	11.65	12.29	11.84	18.10	64.54	1 Watt = 27.81 dBm	PASS
6	2437	MCS2	12.56	11.73	12.37	11.82	18.15	65.39	1 Watt = 27.81 dBm	PASS
11	2462	MCS2	12.57	11.68	12.64	11.74	**18.20**	66.09	1 Watt = 27.81 dBm	PASS

MPE Prediction (802.11n20 2412~2462)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where: S = Power density P = Power input to 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

MIMO gain= Directional gain = 10 log $[(10^{(G1/20)}+10^{(G2/20)}+\ldots+10^{(GN/20)})^2/N_{ANT}]$ = 10.43dBi

Max. output power including tune-up tolerancel:	18.20	(dBm)
Max. output power including tune-up tolerancel:	66.069345	(mW)
Duty cycle:	55.02	(%)
Maximum Pav :	36.351354	(mW)
Peak Antenna gain (Maximum):	10.43	(dBi)
Peak Antenna gain (linear):	11.040786	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction frequency	1	(mW/cm^2)
Power density at predication frequency at 20 (cm) distance	0.080	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.08 mW/cm2.

This is below the uncontrolled exposure limit of 1 mW/cm2 at 2462MHz.

802.11n_HT40M MIMO										
CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)				Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit	RESULT
			CH 0	CH 1	CH 2	CH3				
3	2422	MCS2	19.98	19.37	19.86	19.36	25.67	369.16	1 Watt = 27.81 dBm	PASS
6	2437	MCS2	20.92	20.37	21.06	20.54	**26.75**	473.37	1 Watt = 27.81 dBm	PASS
9	2452	MCS2	20.98	20.25	21.02	20.42	26.70	467.87	1 Watt = 27.81 dBm	PASS
802.11n_HT40M MIMO										
CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)				Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT
			CH 0	CH 1	CH 2	CH3				
3	2422	MCS2	11.58	10.73	11.33	11.01	17.19	52.42	1 Watt = 27.81 dBm	PASS
6	2437	MCS2	12.76	11.88	12.52	12.18	18.37	68.68	1 Watt = 27.81 dBm	PASS
9	2452	MCS2	12.61	12.09	12.76	12.24	**18.45**	70.05	1 Watt = 27.81 dBm	PASS

MPE Prediction (802.11n40 2412~2452)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where: S = Power density P = Power input to 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

MIMO gain= Directional gain = 10 log $[(10^{(G1/20)}+10^{(G2/20)}+\ldots+10^{(GN/20)})^2/N_{ANT}]$ = 10.43dBi

Max. output power including tune-up tolerancel:	18.45	(dBm)
Max. output power including tune-up tolerancel:	69.9842	(mW)
Duty cycle:	39.77	(%)
Maximum Pav :	27.832716	(mW)
Peak Antenna gain (Maximum):	10.43	(dBi)
Peak Antenna gain (linear):	11.040786	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction frequency	1	(mW/cm^2)
Power density at predication frequency at 20 (cm) distance	0.061	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.061 mW/cm2.

This is below the uncontrolled exposure limit of 1 mW/cm2 at 2437MHz.

~ End of Report ~