

FCC RF EXPOSURE REPORT

FCC ID: KA2AP1665B1

Project No. : 1608C193
Equipment : Wireless AC1200 Dual Band Access Point
Model : DAP-1665
Applicant : D-Link Corporation
Address : NO.289, Sinhu 3rd Rd.,Neihu District,Taipei
City 114,Taiwan,R.O.C.

According: : FCC Guidelines for Human Exposure IEEE
C95.1

B T L I N C .

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, China.
TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

MPE CALCULATION METHOD:

Calculation Method of RF Safety Distance:

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

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

Table for Filed Antenna

For 2.4G:

Group 1

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	RenFeng	RF21S00240A	Dipole	SMA	5.12
2	RenFeng	RF21S00240A	Dipole	SMA	5.12

Group 2

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	WHAYU	C037-511429-A	Dipole	SMA	3.50
2	WHAYU	C037-511429-A	Dipole	SMA	3.50

Note:

The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R). All transmit signals are uncompletely correlated, then, Direction gain = 5.12.

Operating Mode	1TX	2TX
TX Mode		
802.11b	V (ANT 1)	-
802.11g	V (ANT 1)	-
802.11n(20MHz)	-	V (ANT 1+ ANT 2)
802.11n(40MHz)	-	V (ANT 1+ ANT 2)

For 5G:

Group 1

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	RenFeng	RF21S00240A	Dipole	SMA	5.10
2	RenFeng	RF21S00240A	Dipole	SMA	5.10

Group 2

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	WHAYU	C037-511429-A	Dipole	SMA	4.50
2	WHAYU	C037-511429-A	Dipole	SMA	4.50

Note:

The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R). All transmit signals are completely correlated, then, Direction gain = 5.10.

Remark:

For 2TX with beamforming

The EUT with beamforming function, then, Direction gain = $G_{ANT} + 10\log(N_{ANT}/N_{SS})$, where N_{SS} = the number of independent spatial streams of data.

Directional gain = $5.10 + 10\log(2/2) = 5.10 + 0 = 5.10$ dBi.

The beamforming ANT gain is 3dBi.

The UNII-1 EIRP Output Power limit is $30 - (5.10 + 3) + 6 = 27.90$ dBm

The UNII-3 Output Power limit is $30 - (5.10 + 3) + 6 = 27.90$ dBm

The UNII-1 PSD limit is $17 - (5.10 + 3) + 6 = 14.90$ dBm/MHz

The UNII-3 PSD limit is $30 - (5.10 + 3) + 6 = 27.90$ dBm/500kHz.

Operating Mode	2TX
TX Mode	
802.11a	V (ANT 1+ANT 2)
802.11n(20MHz)	V (ANT 1+ANT 2)
802.11n(40MHz)	V (ANT 1+ANT 2)
802.11ac (20MHz)	V (ANT 1+ANT 2)
802.11ac (40MHz)	V (ANT 1+ANT 2)
802.11ac (80MHz)	V (ANT 1+ANT 2)

TEST RESULTS

2.4G:

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature :	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX B MODE /CH01, CH06, CH11		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.12	3.2509	19.26	84.3335	0.05456955	1	Complies
5.12	3.2509	20.26	106.1696	0.06869899	1	Complies
5.12	3.2509	19.97	99.3116	0.06426143	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature :	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX G MODE /CH01, CH06, CH11		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.12	3.2509	16.71	46.8813	0.03033544	1	Complies
5.12	3.2509	20.42	110.1539	0.07127716	1	Complies
5.12	3.2509	15.62	36.4754	0.02360208	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N20 Mode_CH01/06/11_Total (ANT1+ANT2)		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.12	3.2509	17.46	55.7186	0.03605374	1	Complies
5.12	3.2509	21.10	128.8250	0.08335859	1	Complies
5.12	3.2509	18.22	66.3743	0.04294873	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N40 Mode_CH03/06/09_Total (ANT1+ANT2)		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.12	3.2509	15.71	37.2392	0.02409630	1	Complies
5.12	3.2509	18.57	71.9449	0.04655329	1	Complies
5.12	3.2509	17.79	60.1174	0.03890007	1	Complies

UNII-1 2TX with Beamforming:

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature :	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-1/TX A Mode _Total		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	20.27	106.4143	0.06854099	1	Complies
5.1	3.2359	24.58	287.0781	0.18490573	1	Complies
5.1	3.2359	26.60	457.0882	0.29440852	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature :	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-1/TX N20 Mode _Total		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	21.26	133.6596	0.08608954	1	Complies
5.1	3.2359	24.86	306.1963	0.19721973	1	Complies
5.1	3.2359	26.39	435.5119	0.28051131	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-1/TX N40 Mode		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	20.33	107.8947	0.06949449	1	Complies
5.1	3.2359	24.75	298.5383	0.19228720	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-1/TX AC20 Mode _Total		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	20.06	101.3911	0.06530559	1	Complies
5.1	3.2359	24.61	289.0680	0.18618744	1	Complies
5.1	3.2359	26.25	421.6965	0.27161289	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-1/TX AC40 Mode _Total		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	20.77	119.3988	0.07690425	1	Complies
5.1	3.2359	24.54	284.4461	0.18321050	1	Complies
5.1	3.2359	20.77	119.3988	0.07690425	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-1/TX AC80 Mode _Total		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	17.97	62.6614	0.04035993	1	Complies

UNII-3 2TX with Beamforming:

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-3/ TX A Mode_ Total		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	26.14	411.1497	0.26481975	1	Complies
5.1	3.2359	26.02	399.9447	0.25760268	1	Complies
5.1	3.2359	25.51	355.6313	0.22906059	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-3/TX N20 Mode_ Total		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	26.20	416.8694	0.26850376	1	Complies
5.1	3.2359	26.14	411.1497	0.26481975	1	Complies
5.1	3.2359	26.10	407.3803	0.26239187	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-3/ TX N40 Mode_ Total		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	26.68	465.5861	0.29988198	1	Complies
5.1	3.2359	25.80	380.1894	0.24487834	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-3/TX AC20 Mode_Total		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	26.25	421.6965	0.27161289	1	Complies
5.1	3.2359	26.08	405.5085	0.26118629	1	Complies
5.1	3.2359	26.09	406.4433	0.26178838	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-3/TX AC40 Mode_Total		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	26.68	465.5861	0.29988198	1	Complies
5.1	3.2359	25.99	397.1915	0.25582935	1	Complies

EUT :	Wireless AC1200 Dual Band Access Point	Model Name :	DAP-1665
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	UNII-3/TX AC80 Mode		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.1	3.2359	23.77	238.2319	0.15344416	1	Complies

For 2.4G+5G simultaneous transmission MPE:

$$0.0834/1+0.2999/1=0.3833<1$$

Note: the calculated distance is 20 cm.