

FCC RF EXPOSURE REPORT

FCC ID: 2AF5PMG8702

Project No. : 1908C159
Equipment : DOCSIS 3.1 Cable Modem plus AC3200 Router
Brand Name : motorola
Test Model : MG8702XY
Series Model : N/A
Applicant : MTRLC LLC
Address : 225 Franklin St. 26th Floor, Boston, MA 02110
Manufacturer : MTRLC LLC
Address : 225 Franklin St. 26th Floor, Boston, MA 02110
Date of Receipt : Aug. 20, 2019
Date of Test : Aug. 26, 2019 ~ Oct. 24, 2019
Issued Date : Jan. 21, 2020
Report Version : R00
Test Sample : Engineering Sample No.: DG19082034
Standard(s) : FCC Guidelines for Human Exposure IEEE C95.1
FCC Title 47 Part 2.1091, OET Bulletin 65 Supplement C

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.



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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue	Jan. 21, 2020

1. 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

Antenna Specification:

For 2.4GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	3.00
2	N/A	N/A	Internal	N/A	3.00
3	N/A	N/A	Internal	N/A	3.00
4	N/A	N/A	Internal	N/A	3.00

Note:

(1) For Non Beamforming function:

This EUT supports CDD, and all antennas have the same gain, Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows:

For power spectral density measurements, $N_{ANT} = 4$, $N_{SS} = 1$.

So Directional gain = $G_{ANT} + \text{Array Gain} = 3.00 + 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.00 + 10 \log (4/1) \text{ dBi} = 9.02$. Then, the power spectral density limit is $8 - 9.02 + 6 = 4.98$.

For power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain = 3.00.

(2) For Beamforming function, Beamforming Gain: 6.00 dB.

So Directional gain = $6.00 + 3.00 = 9.00$. Then, output power limit is $30 - 9.00 + 6 = 27.00$.

For 5GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	3.00
2	N/A	N/A	Internal	N/A	3.00
3	N/A	N/A	Internal	N/A	3.00
4	N/A	N/A	Internal	N/A	3.00

Note:

(1) For Non Beamforming function:

This EUT supports CDD, and all antennas have the same gain, Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows:

For power spectral density measurements, $N_{ANT} = 2$, $N_{SS} = 1$.

So Directional gain = $G_{ANT} + \text{Array Gain} = 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.00 + 10 \log (2/1) \text{ dBi} = 9.02$.

Then, the UNII-1 power spectral density limit is $17 - 9.02 + 6 = 13.98$,

the UNII-3 power spectral density limit is $30 - 9.02 + 6 = 26.98$.

For power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain = 3.00.

(2) For Beamforming function, Beamforming Gain: 6.00 dB.

So Directional gain = $6.00 + 3.00 = 9.00$. Then, UNII-1 and UNII-3 output power limit is $30 - 9.00 + 6 = 27.00$.

2. TEST RESULTS

For 2.4GHz Non Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
3.00	1.9953	29.94	986.2795	0.25069	1	Complies

For 2.4GHz Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
9.00	7.9433	26.64	461.3176	0.46680	1	Complies

For 5GHz UNII-1 Non Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
3.00	1.9953	26.79	477.5293	0.12138	1	Complies

For 5GHz UNII-3 Non Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
3.00	1.9953	28.73	746.4488	0.18973	1	Complies

For 5GHz UNII-1 Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
9.00	7.9433	26.01	399.0249	0.40377	1	Complies

For 5GHz UNII-3 Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
9.00	7.9433	26.77	475.3352	0.48098	1	Complies

For the max simultaneous transmission MPE:

Power Density (S) (mW/cm ²)	Power Density (S) (mW/cm ²)	Total	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4GHz	5GHz			
0.46680	0.48098	0.94778	1	Complies

Note: The calculated distance is 25 cm.
Output power including tune up tolerance.

End of Test Report