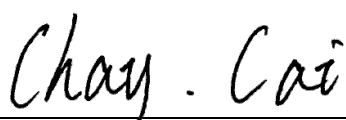


# FCC RF EXPOSURE REPORT

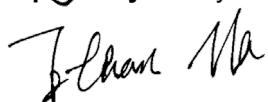
## FCC ID: 2AF5PMG8702

**Project No.** : 1908C159A  
**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  
                               May 13, 2020  
**Date of Test** : Aug. 26, 2019 ~ Oct. 24, 2019  
                               May 14, 2020 ~ Jul. 14, 2020  
**Issued Date** : Aug. 27, 2020  
**Report Version** : R00  
**Test Sample** : Engineering Sample No.: DG19082034 and DG20200512124  
**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.



Prepared by : Chay Cai



Approved by : Ethan Ma



Certificate #5123.02

Add: No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

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**REPORT ISSUED HISTORY**

| Report Version | Description                                                                                                                                                                    | Issued Date   |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| R00            | Compared with original report (BTL-FCCP-3-1908C159), added the UNII-2A & UNII-2C mode. In this report only added the data for UNII-2A & UNII-2C mode. Other are kept the same. | Aug. 27, 2020 |

## 1. TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3,Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's Test Firm Registration Number for FCC: 357015

BTL's Designation Number for FCC: CN1240

## 2. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

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

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.

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 =  $G_{ANT}$ +Array Gain, where Array Gain is as follows:

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

So Directional gain =  $G_{ANT} + \text{Array Gain} = G_{ANT} + 10 \log (N_{ANT}/ N_{SS}) \text{ dB} = 3.00 + 10 \log (4/1) \text{ dBi} = 9.02$ . 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 =  $G_{ANT} + \text{Array}$ 

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

So Directional gain =  $G_{ANT} + \text{Array Gain} = G_{ANT} + 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.00 + 10 \log (4/1) \text{ dBi} = 9.02$ .

Then, the UNII-1 power spectral density limit is  $17 - (9.02 - 6) = 13.98$ , the UNII-2A and UNII-2C power spectral density limit is  $11 - (9.02 - 6) = 7.98$ , 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

 $30 - (9.00 - 6.00) = 27.00$ , UNII-2A and UNII-2C output power limit is  $24 - (9.00 - 6.00) = 21.00$ .

### 3. 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 <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | 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 <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | 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 <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 3.00                   | 1.9953                     | 26.79                   | 477.5293               | 0.12138                                 | 1                                                | Complies    |

For 5GHz UNII-2A Non Beamforming:

| Directional Gain (dBi) | Directional Gain (numeric) | Max. Output Power (dBm) | Max. Output Power (mW) | Power Density (S) (mW/cm <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 3.00                   | 1.9953                     | 23.49                   | 223.3572               | 0.05677                                 | 1                                                | Complies    |

For 5GHz UNII-2C Non Beamforming:

| Directional Gain (dBi) | Directional Gain (numeric) | Max. Output Power (dBm) | Max. Output Power (mW) | Power Density (S) (mW/cm <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 3.00                   | 1.9953                     | 23.31                   | 214.2891               | 0.05447                                 | 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 <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | 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 <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 9.00                   | 7.9433                     | 26.01                   | 399.0249               | 0.40377                                 | 1                                                | Complies    |

## For 5GHz UNII-2A Beamforming:

| Directional Gain (dBi) | Directional Gain (numeric) | Max. Output Power (dBm) | Max. Output Power (mW) | Power Density (S) (mW/cm <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 9.00                   | 7.9433                     | 20.97                   | 125.0259               | 0.12651                                 | 1                                                | Complies    |

## For 5GHz UNII-2C Beamforming:

| Directional Gain (dBi) | Directional Gain (numeric) | Max. Output Power (dBm) | Max. Output Power (mW) | Power Density (S) (mW/cm <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 9.00                   | 7.9433                     | 20.7                    | 117.4898               | 0.11889                                 | 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 <sup>2</sup> ) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | 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 <sup>2</sup> ) | Power Density (S) (mW/cm <sup>2</sup> ) | Total   | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Test Result |
|-----------------------------------------|-----------------------------------------|---------|--------------------------------------------------|-------------|
| 2.4GHz                                  | 5GHz                                    |         |                                                  |             |
| 0.46680                                 | 0.48098                                 | 0.94778 | 1                                                | Complies    |

Note: The calculated distance is 25 cm.

**End of Test Report**