



Radio Frequency Exposure Evaluation Report

FOR:

Honeywell International Inc.

Model Number:

NXC MR200

Product Description:

900MHz ISM radio, LTE Cat-M1 MODEM, gas & water metering metrology

FCC ID: QZC-NXC MR200

IC ID: 4577A-NXC MR200

Per:

CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06
ISED RSS-102 Issue 5

Report number: EMC_HONEY-225-22001_FCC_I SED_MPE

DATE: 2022-04-12



CETECOM Inc.

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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).

In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

| Company | Description | Model # |
|------------------------------|--------------------------------------------------------------------|----------|
| Honeywell International Inc. | 900MHz ISM radio, LTE Cat-M1 MODEM, gas & water metering metrology | NXCMR200 |

Report reviewed by: TCB Evaluator

2022-04-12 Compliance Kevin Wang
(Lab Manager)

| Date | Section | Name | Signature |
|------|---------|------|-----------|
|------|---------|------|-----------|

Responsible for the Report:

2022-04-12 Compliance Cheng Song
(EMC Engineer)

| Date | Section | Name | Signature |
|------|---------|------|-----------|
|------|---------|------|-----------|

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

| | |
|------------------------------------|------------------------|
| Company Name: | CETECOM Inc. |
| Department: | Compliance |
| Street Address: | 411 Dixon Landing Road |
| City/Zip Code | Milpitas, CA 95035 |
| Country | USA |
| Telephone: | +1 (408) 586 6200 |
| Fax: | +1 (408) 586 6299 |
| Lab Manager: | Kevin Wang |
| Responsible Project Leader: | Cathy Palacios |

2.2 Identification of the Client / Manufacturer

| | |
|------------------------|------------------------------|
| Client's Name: | Honeywell International Inc. |
| Street Address: | 208 South Rogers Lane |
| City/Zip Code | Raleigh, NC 27610 |
| Country | USA |

Identification of the Manufacturer

| | |
|-------------------------------|----------------|
| Manufacturer's Name: | Same as Client |
| Manufacturers Address: | |
| City/Zip Code | |
| Country | |

3 Equipment under Assessment

| | |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Model No: | NXCMR200 |
| HW Version : | 1.0 |
| SW Version : | 1.10 |
| Product Marketing Name (PMN): | Next Generation Cellular Module |
| Regulatory Band: | <ul style="list-style-type: none"> ❖ Cellular: <ul style="list-style-type: none"> ▪ LTE BAND 2: 1857.5 ~ 1902.5 MHz ▪ LTE BAND 4: 1717.5 ~ 1747.5 MHz ▪ LTE BAND 5: 824.7 ~ 848.3 MHz ▪ LTE BAND 12: 699.7 ~ 715.3 MHz ▪ LTE BAND 13: 777 ~ 787 MHz ❖ ISM: <ul style="list-style-type: none"> ▪ Nominal band: 902 MHz – 928 MHz; |
| Integrated Module Info: | <ul style="list-style-type: none"> ❖ ISM: <ul style="list-style-type: none"> ▪ SiLabs EFR32FG1 SoC ▪ FSK modulation ▪ 25 channels frequency hopping ❖ Cellular: <ul style="list-style-type: none"> ▪ Quectel BG95-M2 (CAT-M1) ▪ FCC ID: XMR2020BG95M2; IC ID: 10224A-2020BG95M2 |
| Antenna Type: | <ul style="list-style-type: none"> ❖ Cellular: <ul style="list-style-type: none"> ▪ multiband dipole ▪ Gain = 1dBi 699-960MHz ▪ Gain = 3.5dBi 1710-2170 MHz ❖ ISM: <ul style="list-style-type: none"> ▪ printed monopole ▪ Antenna gain: 1.38 dBi |
| Power Supply/ Rated Operating Voltage Range: | 3.2 VDC – 3.6 VDC |
| Operating Temperature Range: | -40° to 85° C |
| Sample Revision: | <input type="checkbox"/> Prototype Unit; <input type="checkbox"/> Production Unit; <input checked="" type="checkbox"/> Pre-Production |

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

| Frequency Range (MHz) | Power density (mW/cm ²) | Averaging time (minutes) |
|-----------------------|-------------------------------------|--------------------------|
| 300 – 1500 | f (MHz) /1500 | 30 |
| 1500 – 100000 | 1.0 | 30 |

IC

| | | |
|------------|-------------------------------------|---|
| 300 – 6000 | 0.02619 x f (MHz) ^{0.6834} | 6 |
|------------|-------------------------------------|---|

4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC

operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9 dBm);
 operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9 dBm);

IC

300MHz <= operating frequency < 6 GHz: excluded if EIRP < 0.0131 x f (MHz)^{0.6834} W

4.3 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

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

where: S = power density (mW/cm² or W/m²)
 P = power input to the antenna (mW or W)
 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 (cm or m)

5 Evaluations

5.1 Analysis of RF Exposure for simultaneous transmission

- Evaluations are based on worst case power density limits for Canada.
- Calculations are made for 20cm.
- Evaluations are based on ERP/EIRP measured or calculated from known gain and conducted output power.
- Cellular can transmit simultaneously with ISM.

| Radio | freq MHz | MaxPower W conducted | MaxPower convert to dBm | Ant Gain dbi | Ant Gain lin | EIRP W calculated | Max Duty Cycle | IC W/m2 | FCC W/m2 | Actual W/m2 | How much of IC limit is used up | How much of FCC limit is used up |
|--------|----------|----------------------|-------------------------|--------------|--------------|-------------------|----------------|---------|--------------|-------------|---------------------------------|----------------------------------|
| LTE 2 | 1850 | 0.158 | 22.000 | 3.5 | 2.24 | 0.355 | 100.00% | 4.476 | 10.000 | 0.706 | 15.75% | 7.05% |
| LTE 4 | 1710 | 0.158 | 22.000 | 3.5 | 2.24 | 0.355 | 100.00% | 4.242 | 10.000 | 0.706 | 16.62% | 7.05% |
| LTE 5 | 824 | 0.158 | 22.000 | 1 | 1.26 | 0.200 | 100.00% | 2.576 | 5.493 | 0.397 | 15.38% | 7.21% |
| LTE 12 | 699 | 0.158 | 22.000 | 1 | 1.26 | 0.200 | 100.00% | 2.302 | 4.660 | 0.397 | 17.21% | 8.50% |
| LTE 13 | 777 | 0.158 | 22.000 | 1 | 1.26 | 0.200 | 100.00% | 2.474 | 5.180 | 0.397 | 16.01% | 7.64% |
| | | | | | | | | | Distance(m)= | 0.200 | | |
| ISM | 902 | 0.005 | 7.250 | 1.28 | 1.34 | 0.007 | 100.00% | 2.740 | 6.013 | 0.014 | 0.51% | 0.23% |

Note: The calculation is based on the distance of 20cm

5.2 Conclusion:

The worst-case is LTE 12 simultaneous transmission with ISM, which is using 8.73 of FCC limit of 100% and 17.72 of IC limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.

6 Revision History

| Date | Report Name | Changes to report | Prepared by |
|------------|----------------------------------|-------------------|-------------|
| 2022-04-12 | EMC_HONEY-225-22001_FCC_ISED_MPE | Initial Release | Cheng Song |

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