MOTOROLA SOLUTIONS

SAMM 086 CERTIFICATE 2518.05

# DECLARATION OF COMPLIANCE: MPE ASSESSMENT

**Motorola Solutions, Inc.**
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**Date of Report: 11/10/2023**
**Report Revision: B**

| | |
|---|---|
| **Responsible Engineer:** | Saw Sun Hock (Senior EME Engineer) |
| **Report Author:** | Hamidi Bin Ismail (EME Senior Technician) |
| **Assessment Date(s)** | 11/8/2023 |
| **Manufacturer:** | Barrett Communication Pty Ltd |
| **Manufacturer Location:** | 47 Discovery Drive, Bibra Lake, Perth, WA 6163 Australia |
| **DUT Description:** | 4075 Linear Amplifier - 1000W<br>4075 HF High Power Transmitter Package |
| **Max. Power output:** | 1kW |
| **Tx Frequency Bands:** | 1.5-30 MHz |
| **Signaling type:** | AM |
| **Model(s) Tested:** | BC407501 |
| **Model(s) Certified:** | BC407501 |
| **Classification:** | Occupational / Controlled Environment |
| **Firmware Version:** | V2.85 |
| **FCC ID:** | OW4-407510 |
| **FCC Test Firm Registration Number:** | 823256 |

**Based on the information and the testing results provided herein, the undersigned certifies that when used as stated in the operating instructions supplied, said product complies with the national and international reference standards and guidelines listed in section 2.0 of this report (**no deviation from standard methods**). This report shall not be reproduced without written approval from an officially designated representative of the Motorola Solutions Inc. EME Laboratory.**
**I attest to the accuracy of the data and assume full responsibility for the completeness of these measurements.**
**This reporting format is consistent with the suggested guidelines of the TIA TSB-159 April 2006**
**The results and statements contained in this report pertain only to the device(s) evaluated herein.**

**Tey Pei Loo (Approved Signatory)**
**Approval Date:** 11/10/2023

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## Report Revision History

| Date | Revision | Comments |
|---|---|---|
| 11/8/2023 | A | Initial release |
| 11/10/2023 | B | Correct Model Number in Section 1.0 and 4.0 |

## 1.0 Introduction

This report contains calculated Maximum Permissible Exposure (MPE) results for product model 4075 Linear Amplifier-1000W, with Model Number BC407501.

## 2.0 Referenced Standards and Guidelines

This product is designed to comply with the following applicable national and international standards and guidelines.

- United States Federal Communications Commission, Code of Federal Regulations; Rule Part 47CFR § 1.1307, § 1.1310, § 2.1091 (d) and § 2.1093 for RF Exposure, where applicable.
- Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65 (Edition 97-01), FCC, Washington, D.C.: August 1997.
- American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE) C95. 1-1999
- American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE) C95. 1-1992. Specific to FCC rules and regulations.
- Institute of Electrical and Electronics Engineers (IEEE) C95.3-2002
- FCC KDB – 865664 D02 RF Exposure Reporting v01r02

## 3.0 Power Density Limits

**Table 1 – Occupational / Controlled Exposure Limits**

| Frequency Range (MHz) | FCC OET Bulletin 65 mW/cm^2 | ICNIRP W/m^2 | IEEE C95.1 1992/1999 mW/cm^2 | IEEE C95.1 2005 W/m^2 | RSS-102 Issue 5 2015 W/m^2 |
|---|---|---|---|---|---|
| 10 – 20 | | | | | 10.0 |
| 20 – 48 | | | | | $44.72 / f^{0.5}$ |
| 30 – 300 | 1.0 | | | | |
| 48 – 100 | | | | | 6.455 |
| 10 – 400 | | 10.0 | | | |
| 100 – 300 | | | 1.0 | 10.0 | |
| 100 – 6,000 | | | | | $0.6455 f^{0.5}$ |
| 300 – 1,500 | f/300 | | | | |
| 300 – 3,000 | | | f/300 | f/30 | |
| 400 – 2,000 | | f/40 | | | |
| 1,500 – 15,000 | | | | | |
| 1,500 – 100,000 | 5.0 | | | | |
| 2,000 – 300,000 | | 50.0 | | | |
| 3,000 – 300,000 | | | 10.0 | 100.0 | |
| 6,000 – 15,000 | | | | | 50.0 |
| 15000 – 150,000 | | | | | 50.0 |
| 150000 –300,000 | | | | | 3.33×10-4 f |

**Table 2 – General Population / Uncontrolled Exposure Limits**

| Frequency Range (MHz) | FCC OET Bulletin 65 mW/cm^2 | ICNIRP W/m^2 | IEEE C95.1 1992/1999 mW/cm^2 | IEEE C95.1 2005 W/m^2 | RSS-102 Issue 5 2015 W/m^2 |
|---|---|---|---|---|---|
| 10 – 20 | | | | | 2.0 |
| 20 – 48 | | | | | $8.944 / f^{0.5}$ |
| 30 – 300 | 0.2 | | | | |
| 48 – 300 | | | | | 1.291 |
| 10 – 400 | | 2.0 | | | |
| 100 – 300 | | | 0.2 | | |
| 100 – 400 | | | | 2.0 | |
| 300 – 1,500 | f/1,500 | | | | |
| 300 – 6000 | | | | | $0.02619 f^{0.6834}$ |
| 400 – 2,000 | | f/200 | | f/200 | |
| 300 – 15,000 | | | f/1,500 | | |
| 1,500 – 15,000 | | | | | |
| 1,500 – 100,000 | 1.0 | | | | |
| 2,000 – 100,000 | | | | 10.0 | |
| 2,000 – 300,000 | | 10.0 | | | |
| 6,000 – 15,000 | | | | | 10.0 |
| 15,000 – 150,000 | | | | | 10.0 |
| 150,000 – 300,000 | | | | | $6.67\times10^{-5} f$ |

## 4.0 Product and System Description

Model BC407501 is a compact rack mounted communication solution developed for base station application in large HF network. This model can supplied up to 1kW. Its comes as a complete package with an exciter, power supply, power amplifier, interconnecting cables and all required rack mount hardware.

## 5.0 FCC MPE Assessment

This report calculates the minimum separation distance from a fixed antenna, connected to the subject mobile radio operated at a fixed location, ensuring that the power density limits listed is not exceeded.

MPE calculation was used to determine the RF exposure for transmitter due to maximum power. . According to FCC's OET Bulletin 65 Edition 97-01 Section 2, calculations can be made to predict RF field strength and power density levels around typical RF sources. Equation (1) below was used to show compliance for this device and generally accurate in far-field of an antenna.

$$S = \frac{P_t G}{4\Pi d^2} F$$ Equation (1)

Equation (1) account for the maximum duty cycle of the signal, and the factor, F, to provide a conservative power density prediction.

Where:
S = power density
$P_t$ = maximum output power scaled by the maximum duty cycle of the signal
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
d = distance from antenna
F = Enhancement factor [1 or 2.56 for predicting ground-level field strength]

**Table 3**

| Antenna # | Peak Envelope Power (W) | Time-Averaged Power Factor (%) | Tx Frequency (MHz) | Antenna Gain (dBi) | Cable Loss, L (dB) | Dist., d (cm) | Enhancement Factor, F [1] | Max Calc. MPE (mW/cm²) | MPE Spec Limit (mW/cm²) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | FCC | % of FCC Spec Limit |
| BC91203 | 1412.540 | 50.00% | 30.0 | 8.00 | 0.61 | **1990** | 2.56 | 0.199 | 0.20 | 99.6 |
| BC91207 | 1412.540 | 50.00% | 30.0 | 8.00 | 0.61 | **1990** | 2.56 | 0.199 | 0.20 | 99.6 |
| BC91713 | 1412.540 | 50.00% | 30.0 | 2.10 | 0.24 | **1060** | 2.56 | 0.196 | 0.20 | 98.1 |

Note: Peak Envelope Power figures used in the calculation include +1.5dB tune-up margin from nominal power 1000W.

## 6.0 Conclusion

The MPE assessment presented in this report concludes that model BC407501 when transmitting at a minimum separation distance of 19.9 m for BC91203 and BC91207, and 10.6 m for BC91713 from nearby persons is compliant to FCC General Population /Uncontrolled Environment RF exposure limits.