

BPA-10CC-7 1.99-2.5 GHz 10W Power Amplifier

Installation and Operation Manual

Doc #6051407904 Rev -



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**WARNING! RF RADIATION EXPOSURE HAZARD**

- This warning is provided by Broadcast Microwave Services (BMS) Inc. for safety purpose.
- The following information help to reduce the risk of RF exposure hazard.

FCC Limit of RF Exposure

According to the Federal Communication Commission (FCC), the Maximum Permissible Exposure (MPE) for RF radiation has been set to 1.0 mW/cm² for the 1.99–2.5GHz linear power amplifier with maximum of 10 watts output power (OET Bulletin 65) for operation under part 74 of FCC regulations (47CFR74).

The 1.99–2.5GHz power amplifier (PA) may be a part of a non-broadcast transmitter, and without an antenna it will not create RF exposure (power density) exceeding the 1.0 mW/cm² FCC limit. However, a high-gain antenna such as a parabolic dish will greatly enhance the PA output power density beyond the MPE limit of 1.0 mW/cm².

In this situation a minimum distance from the antenna must be calculated in order to keep the MPE always below the safety limit. The calculation has been done for the PA based on the formula mentioned in OET Bulletin 56. The calculations have been done for different commonly used antenna in the BAS and Public Safety/ Law enforcement applications.

Figure 1 shows the plot of the minimum exposure distance for 5dBi, 16dBi, and 30dBi antennas, assuming the PA transmits the maximum power of 10W. The minimum exposure distances are found from the cross points of the exposure graphs (for various antennas) with the line of maximum permissible exposure (i.e. 1mW/cm²). Notice that the numbers in Figure 1 predict the worse case scenario, which is straight in front of the antenna (exposing the antenna's main lobe). Obviously the side-lobe exposures are well below these numbers as the radiation intensity drops dramatically on the side lobes. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The user and installer must provide suitable operating procedures and warnings to meet the MPE requirements when operating the PA into an antenna.

Operational Limits and User Access**CAUTION!**

- Do not 5A peak load in optional accessory equipment!
- Do not exceed -12dBm average input power!

**NOTE**

There are NO user adjustable components in the amplifier!

Contents

| | | |
|----------|--|----------|
| 1 | Product Description | 1 |
| 1.1 | RF Exposure | 1 |
| 1.2 | Linear Power Amplifier (BPA-10CC-7) Description..... | 2 |
| 1.3 | Specifications | 3 |
| 1.4 | Applications | 3 |
| 2 | Installation | 5 |
| 2.1 | Installation Notes and Wiring Diagram | 5 |
| 3 | Warranty..... | 8 |
| 3.1 | Customer Service and Contact Information..... | 8 |
| 4 | Appendix..... | 9 |
| 4.1 | Labels..... | 9 |

List of Figures

| | |
|--|---|
| Figure 1. Estimated RF exposure | 1 |
| Figure 2. Parts locations | 2 |
| Figure 3. External view | 2 |
| Figure 4. Typical application block diagram..... | 4 |
| Figure 5. Typical application with power amplifier | 4 |
| Figure 6. Pin-out for PTO connector, MS3112E14-5P..... | 5 |
| Figure 7. PA wiring diagram | 6 |
| Figure 8. PA chassis footprint..... | 6 |
| Figure 9. PA chassis dimensions..... | 7 |
| Figure 10. BMS product label | 9 |
| Figure 11. FCC label | 9 |

1 Product Description

1.1 RF Exposure

In order to keep the RF exposure within the FCC limit, it is necessary to maintain the safe distance from the antenna. The results shown in Figure 1 can be summarized in the following table:

| Antenna Gain (dBi) | Minimum permissible distance from antenna (cm) |
|--------------------|--|
| 5 | 63 |
| 16 | 177 |
| 30 | 870 |

Notice the above table indicates worst-case situation (straight in front of the antenna).

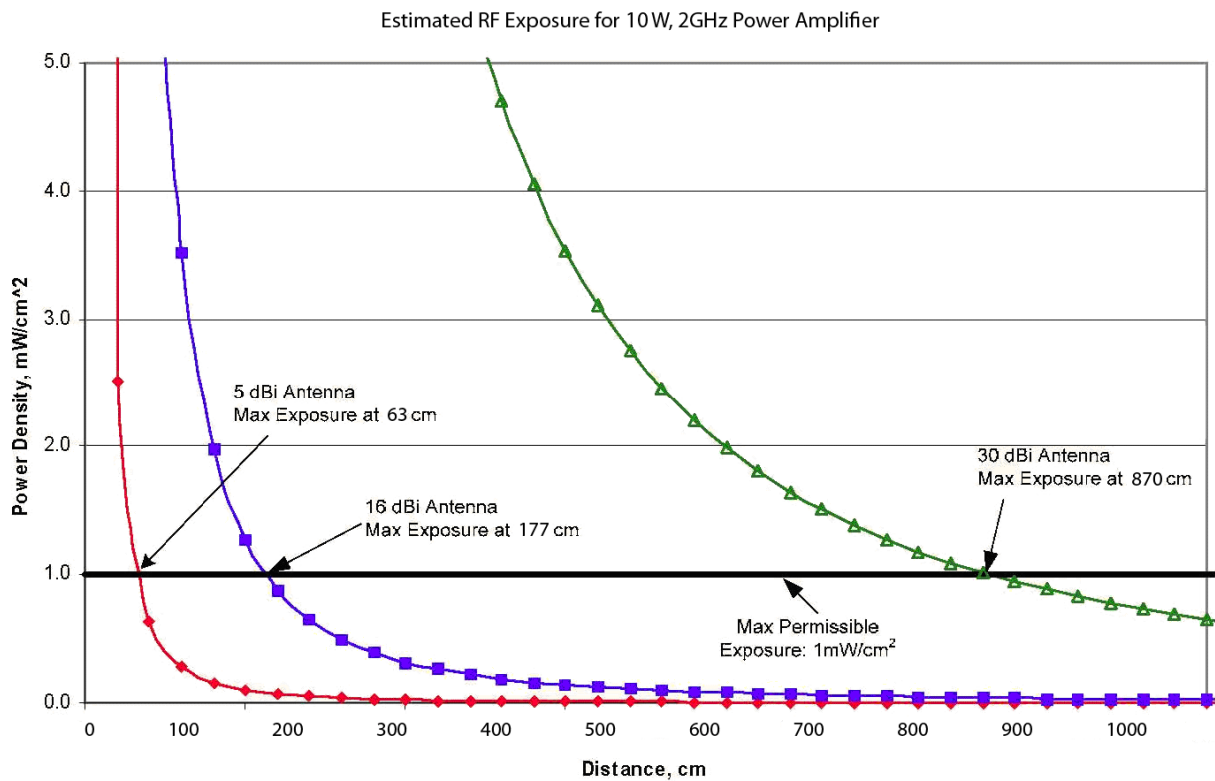


Figure 1. Estimated RF exposure

1.2 Linear Power Amplifier (BPA-10CC-7) Description

The BPA-10CC-7 is a linear power amplifier with 10W maximum RF power and operates at 1.99GHz to 2.4835GHz. This power amplifier is used for increasing transmission range by boosting a 2GHz transmitter's power to 10W maximum. The amplifier may be used as part of a transmitter under part 74 in two bands, 1.99–2.10GHz and 2.45–2.4835GHz. The PA may be used from 1.99 to 2.50GHz for non-US applications or for special grandfathered frequency allocations.

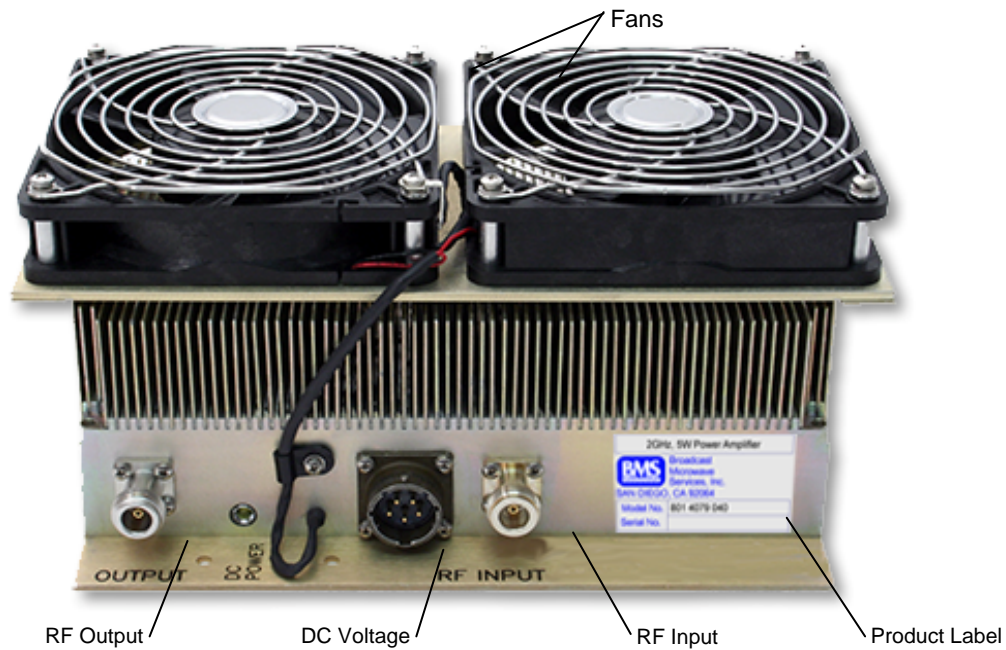


Figure 2. Parts locations



Figure 3. External view

1.3 Specifications

| Frequency | 1.99 – 2.50 GHz * |
|-----------------------|-----------------------------|
| Output Power | 10W max. |
| Input Voltage | 28 VDC |
| Input Current | 7 to 9 Amp @ 28VDC |
| Input RF Power | -12 dBm max. |
| Gain @ -12 dBm input | 52 dB |
| Gain Flatness | ± 1.0 dB over 500 MHz |
| Gain vs. Temperature | ± 1 dB over temperature |
| Operating Temperature | -20° to +50°C |
| Storage Temperature | 40° to +90°C |
| Dimensions | 9.5" x 5" x 3" |
| Weight | 8 lbs |
| RF Input Connector | Type "N" |
| RF Output Connector | Type "N" Isolator Protected |

* FCC certification for 1.99 to 2.10GHz or 2.45 to 2.4835GHz under Part 74

This product supports the following Emission Designators:

| FCC ID | Modulation | Emission Designators |
|-----------|------------|------------------------|
| CNVHCII-7 | Digital | 6M0W7D, 7M0W7D, 8M0W7D |

Operation under FCC rule part: 74, 90

1.4 Applications

Portable digital video COFDM transmitters, such as the BMS 2GHz CarryCoder II, are used behind the camera in electronic news gathering (ENG) for mobile broadcast auxiliary stations (BAS). These transmitters can only provide a medium RF power (e.g. < 1W), limiting the distance between the event site and relay station. To extend the transmission range, an external amplifier is needed to boost the transmitter power in order to compensate the path loss and ensure the acceptable Received Signal Level (RSL) at the destination. The BPA-10CC-7 will increase the RF power to the maximum 10W without adding spurious signals and distortions to the transmitter output. The power amplifier output is directly connected to the 2GHz transmitting antenna.

A typical transmitter application of the 1.99–2.5GHz PA is shown in Figure 5. A practical application is shown in Figure 6. The output of the PA is directed to the transmitting antenna located the roof of a mobile vehicle. The receiver antenna can also be located on a mast to result in better coverage over longer distance.

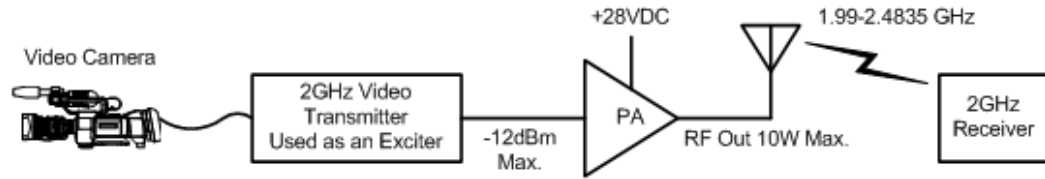


Figure 4. Typical application block diagram

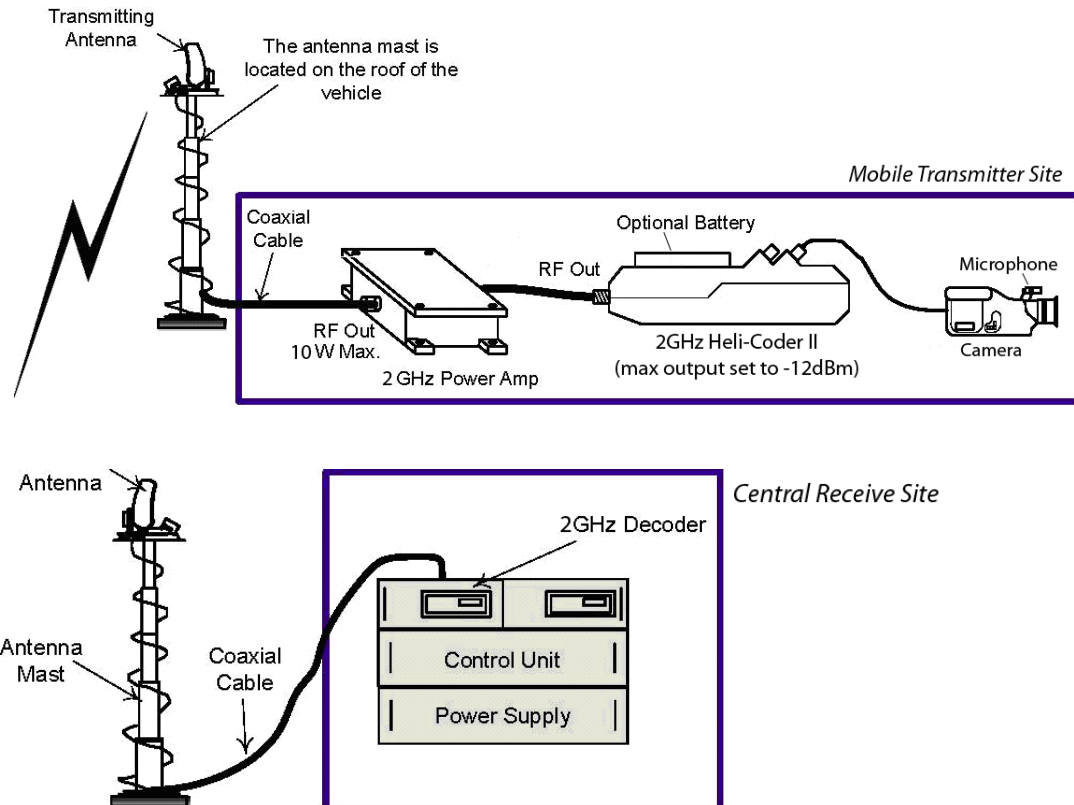


Figure 5. Typical application with power amplifier

2 Installation

2.1 Installation Notes and Wiring Diagram

The power amplifier is wired to accessory equipment according to the pin-out and wiring diagrams in Figure 6 and Figure 7. Chassis dimensions are provided in Figure 8 and Figure 9. Be aware of the following critical installation points:

1. 28V breaker should handle 15A to 20A surge, 10A average, and 0.8 joules in-rush to charge the input capacitor.
2. Accessory +12V_{out} is internally fused at 5A.



CAUTION!

- Do not 5A peak load in optional accessory equipment!\



NOTE

There are NO user adjustable components in the amplifier!

3. Output power is proportional to input power. Do not exceed the PA's rated output power for OFDM.



CAUTION!

- Do not exceed -12dBm average input power!

4. The PTO connector pin-out is as follows. See Figure 6.

Pin A = +28VDC input
 Pin B = +12V fused output
 Pin C = 28 VDC Return
 Pin D = 12 VDC Return
 Pin E = Power ON/OFF control

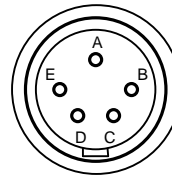


Figure 6. Pin-out for PTO connector, MS3112E14-5P

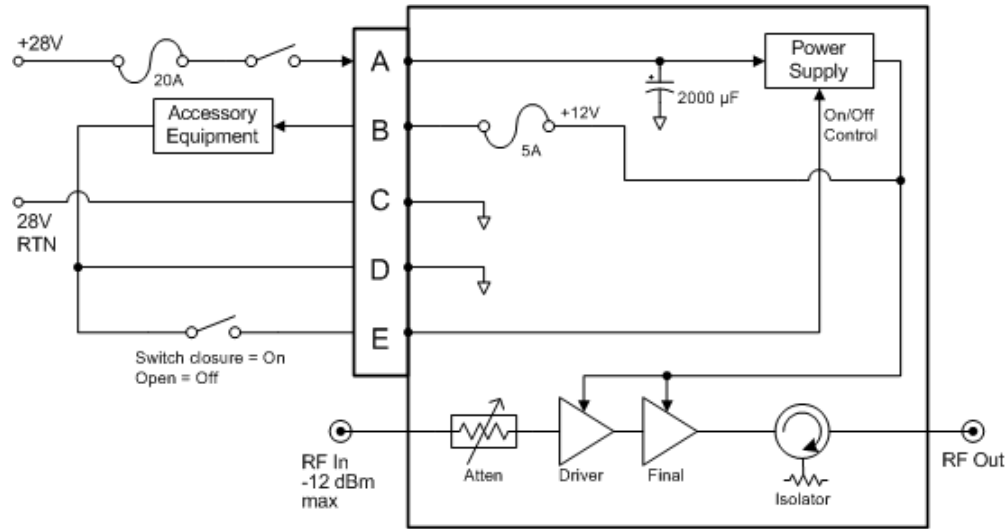


Figure 7. PA wiring diagram

5. The PA's mounting footprint and envelope are shown in Figure 8 and Figure 9.

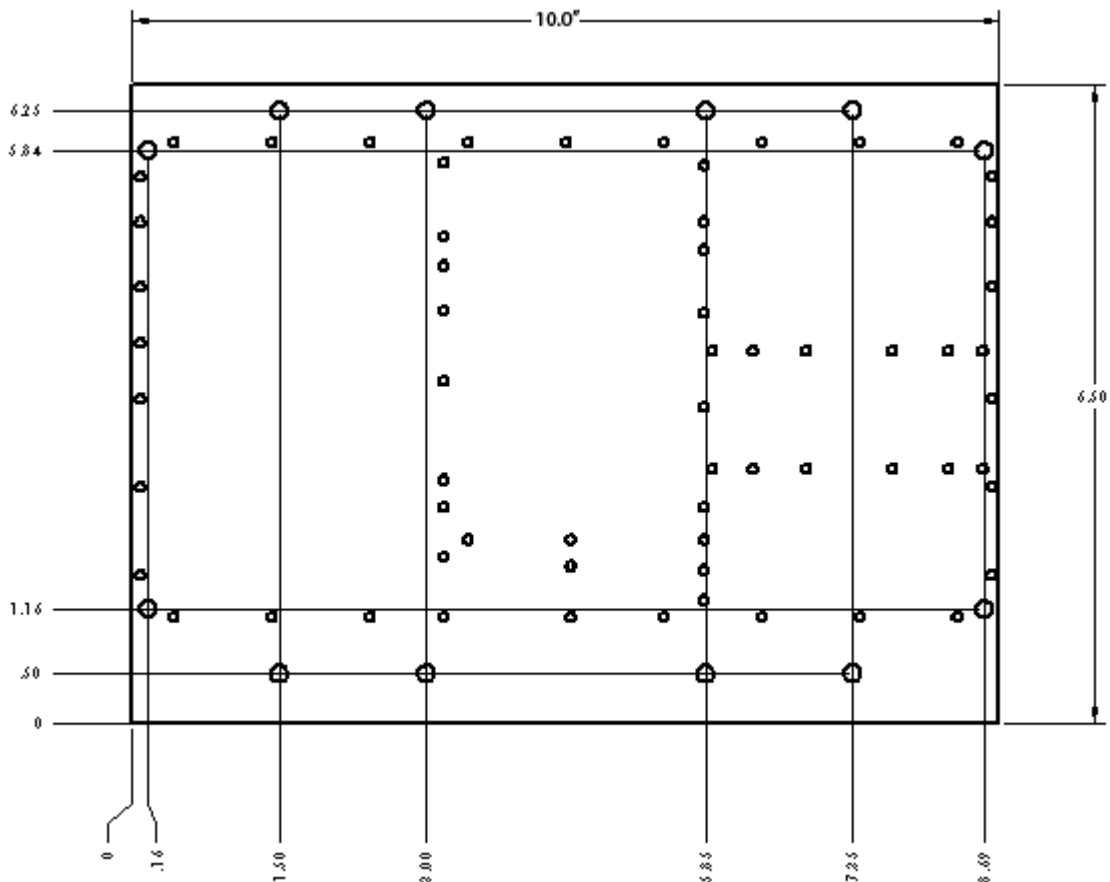


Figure 8. PA chassis footprint

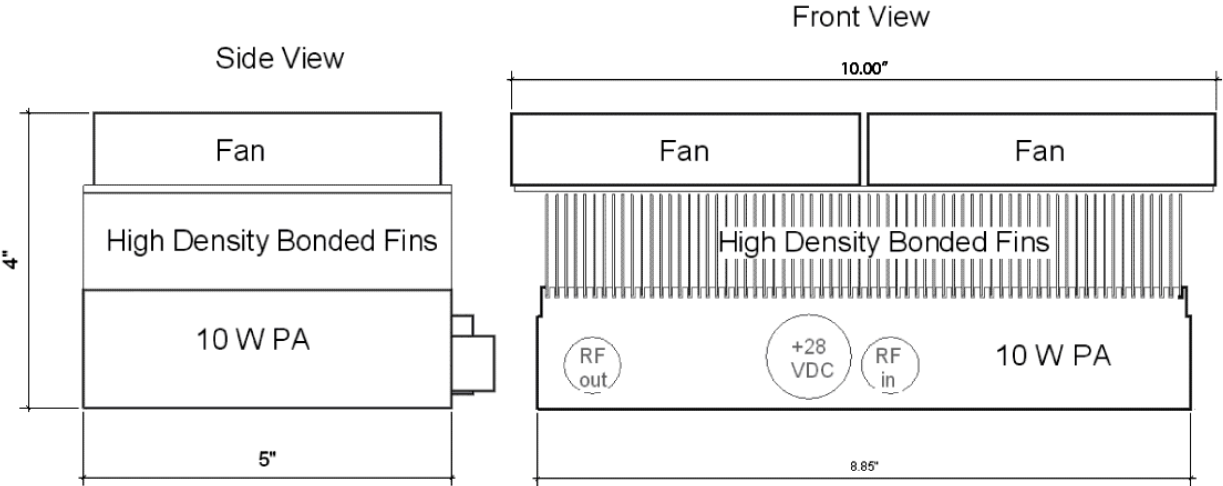


Figure 9. PA chassis dimensions

3 Warranty

BMS warrants that, at time of delivery, the product will be free from defects in materials and workmanship, provided the equipment or system is installed, operated and maintained in accordance with the Operation and Maintenance manual or such other BMS documentation as may be applicable. Any such defect reported to BMS within two years, BMS will take reasonable and prompt action to repair or replace such equipment.

Should any of the components be defective, please contact BMS immediately. Please have the following information available so we can best serve you.

- customer name
- contract number
- BMS model number
- serial number
- detailed description of problem
- name of contact person.
- contact information such as phone number and/or email address.
- return information

Much of this information is printed on the equipment's product label.

Defective components under BMS warranty will be repaired/replaced promptly at the discretion of BMS. A PO is required BEFORE repairs can begin on items no longer under warranty.

Note: All goods returned for service require an RMA number. Any goods received without an RMA number may not be processed in a timely manner. Please contact BMS for an RMA number.

3.1 Customer Service and Contact Information

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4 Appendix

4.1 Labels

The following label diagrams are included in this appendix for reference.

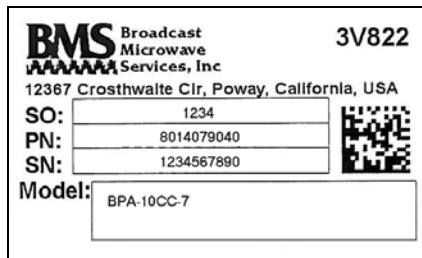
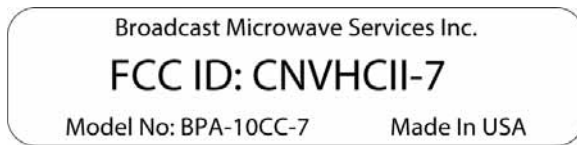


Figure 10. BMS product label



Label Specifications:

Dimensions: 2.5" L x .5" H
Label Stock: White vinyl
Lettering: Black ink

Figure 11. FCC label