

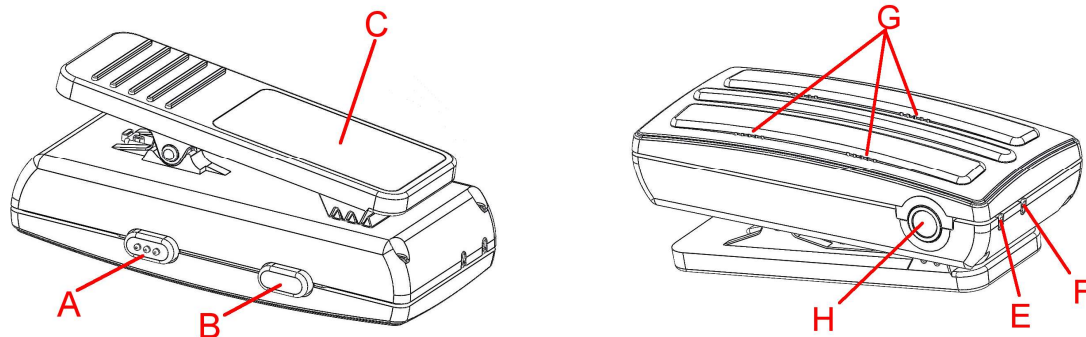
## 1. Introduction

This document describes the functional specification of the next generation Companion Microphone product, CM-4.

## 2. Product Description

A next generation Companion Microphone system consists of multiple identical units:

- One unit, referred to as the master unit (identified by blue buttons) must be on for the system to work
- A system must include at least two units.
- The first four units are talker/listener units (Identified by blue or gray buttons). The remaining units in a set must be listen-only units (identified by black buttons)
- Units must be “paired” as a system in the factory. Unique system number printed on unit label.
- Each unit has a position sensitive directional microphone and a 3.5mm mono over stereo earphone jack. Each unit can support a 3.5mm, 4-position (TRRS) headset - those equipped with microphone and earpiece.
- There are two buttons for volume control and unit on/off. Two LEDs indicate operational state.
- Up to 4 system units can be charged simultaneously through the stereo earphone jack with use of a provided system charging cable and USB charger capable of at least 1Ah.
- An integral clip provided for clothing attachment.



### Mechanical

- A (+) Power On and Volume up
- B (-) Power Off and Volume down
- C Clothing Clip (product label is placed in recess).
- E Orange LED
- F Green LED
- G Microphone inlets
- H 3.5mm jack (audio out, charging, and external microphone)

## User Interface Keys

- The units are turned on by pressing and holding the (+) key for about 3 seconds.
- The units are turned off by pressing and holding the (-) key for about 3 seconds.
- The units are tuned off (hard reset) by pressing and holding the (-) key for at least 10 seconds. This works even if the software is hung up.
- The current volume setting is increased by pressing the (+) key (about 6dB/press).
- The current volume setting is decreased by pressing the (-) key (about 6dB/press).
- Any talker unit can force mute on the other microphones (take priority) by pressing and holding the “+” key. This also defeats the function on the other units until the first to take priority has released.

## User Interface LEDs

- The green LED blinks slowly (about once per second) when the unit is on but not connected to another unit.
- The green LED is on when the unit is connected to another unit.
- The Orange LED is on while charging. The yellow LED turns off when charging is complete.
- The Orange LED blinks slowly when the remaining battery charge is low.
- The green LED is off when the unit is off.
- Upon power on, if both Orange and Green lights are on, the unit is in a test mode and/or connected via RF to a PC.

## Usage

There is no “lock up” period when turning on the units. The units turn on independently, but the Master Unit must be turned on before any other units can form an RF connection. Once a unit forms a RF connection to at least one another unit, the audio path is enabled.

Compared to previous products, this product produces a click on the headphone at power up. This is because the output is single ended (to support other features such as re-flashing, pairing, query, and charging thru the 3.5mm port and support of mono/stereo plugs). So the user should be warned to put the earphones in after powering up the unit.

If upon power-on, there is no RF connection with another unit within 5 minutes, the unit turns off automatically.

## Microphone

For talker/listener units, the unit should be attached to the shirt or blouse, close to the face, and with the long dimension of the unit pointed at the mouth. If not possible, the unit uses an inertia sensor to correctly pick the appropriate microphones to “point” toward the mouth.

### 3. Specifications

Size	52 x 26mm. 11.4-12.7 mm thick (without clip)
Weight	20g per unit
Talk time	Up to 7 hours
Charging connector:	3.5mm (TRRS) jack to USB
Charge time	2 hours
Low Battery time	Yellow light slow blinks when the battery capacity is <10%
Audio connector	3.5mm stereo jack
Audio Output	200 to 6200 Hz audio bandwidth, THD 1% Separate stereo drivers (mono signal)
Power Consumption	Off, < 40 uA 4 active set (each), 35 +/- 3 mA
Full Battery Voltage	4.2 +/- 0.05 V
Low Battery Voltage	3.4 +/- 0.05 V
RF Transmit output power	4dB +/- 3 dBm at antenna port
Phase clock difference	Total, < 50 ppm
Audio Delay	Sidetone, < 2.5 mS Unit/Unit, < 34 mS
Audio Output	>40 mW output into 16 ohms ~ 1 V rms (+/- 5%) output signal swing >= 115 dB thru ER6i
Sidetone Loss	-18 dB (default)