



## General

AM3D Zirene® is featured on CSR's BlueCore3 and BlueCore5 Bluetooth platform, and offers a world leading Audio Enhancement Technology. The technology is based on AM3D's world patents. This lifts the overall sound experience of Bluetooth headsets remarkably.

Zirene® creates a powerful listening experience by adding high quality audio effects such as expanding the size of the audio image, improving the low frequency sound perception and giving the possibility to experience the audio in various acoustical environments.

Zirene® is comprised of the following features:

- Zirene® Stereo Widening
- Zirene® Virtual 5.1 Surround
- Zirene® Power Bass
- Zirene® Equalization

## Zirene® Stereo Widening

Because of the physical constraints of a Bluetooth Headset it is very difficult to achieve high quality audio playback.

Zirene® Stereo Widening is capable of processing stereo signals so their originally intended stereo perspective is created.

Normal headphone playback is often perceived as playing "in the head". By use of Zirene® Stereo Widening the user get an "out of head" experience which improves the overall listening experience. See figure 1

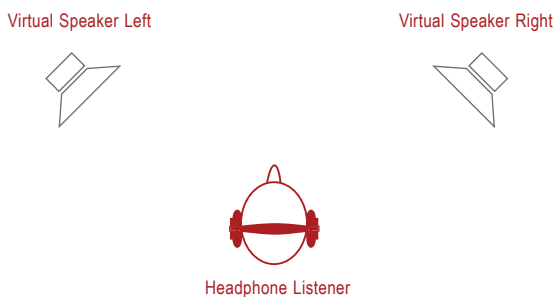


Figure 1. Zirene® Stereo Widening in headphone playback

## Zirene® Equalization

Zirene® Equalization gives the possibility to add a number of equalization settings for different kinds of music. By this it is possible to change the frequency characteristics of the playback system to suit a particular style of music. In addition Zirene® also includes transducer equalization.

## Zirene® Virtual 5.1 Surround

The introduction of video streaming in Portable Devices enforces the need for having facilities for playing Virtual Surround sound over headphones and closely spaced loudspeakers.

Zirene® Virtual 5.1 Surround gives the possibility to experience a 5.1 Surround Sound setup using headphones or narrow spaced stereo loudspeakers. To experience this, an illusion is created that the audio is actually coming from the five loudspeakers placed in a 5.1 setup. This illusion is created by use of interactive binaural processing through AM3D world-wide patented Head-Related Transfer Functions (HRTFs).

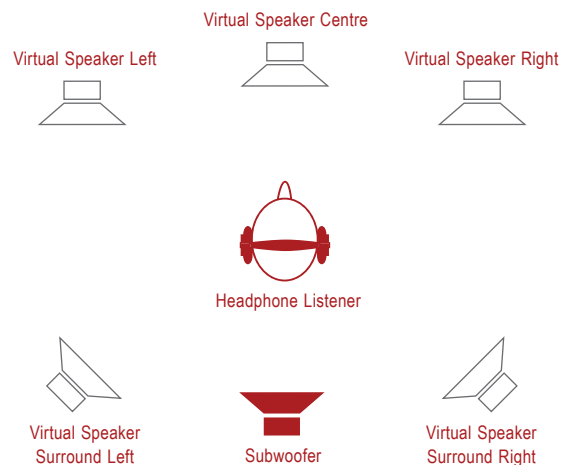


Figure 2. Zirene® Virtual 5.1 Surround in headphone playback

## Zirene® Power Bass

Portable devices are typically provided with headphones and loudspeakers with limited low frequency reproduction capabilities due to driver characteristics. This problem can be counteracted by applying knowledge about psychoacoustic phenomena in order to evoke the illusion of bass below the cut-off frequency. Zirene® Power Bass stimulates the perception of bass by means of non-linear processing.