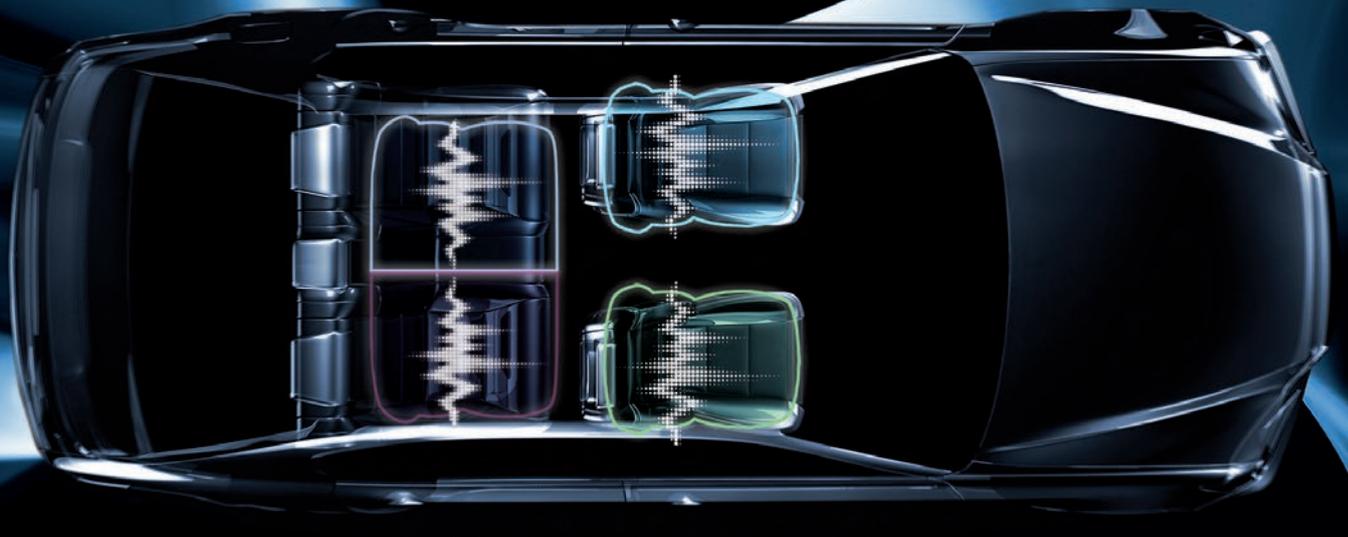




iSZ[®]

INDIVIDUAL SOUND ZONES



MY SEAT. MY SOUND.

ISZ[®]

INDIVIDUAL SOUND ZONES



THE SOUND THAT MATTERS

The sound that matters to you can be determined by the seat in which you sit

The convenience of today's portable electronics and in-car technologies like navigation, hands-free calling and Bluetooth connections have dramatically altered how we drive and what we hear in a car. Navigation prompts and phone calls interrupt our music. Audible entertainment and vehicle alerts all add to the in-car sonic clutter created today.

But what if each passenger could personalize their listening experience? What if each passenger could reduce the sounds from their neighbors and focus in on what they would like to listen to? HARMAN's Individual Sound Zones solution will help drivers and passengers alike create a more personalized listening experience without the physical isolation of headphones.

ISZ (Individual Sound Zones) is intended to create individual listening zones for each passenger, allowing passengers to remain connected and effectively communicate with one another, while enjoying a personalized listening experience. HARMAN's ISZ solution is the ultimate declaration of audio independence, the democratization of listening preferences, the next expression of personal audio.

USE CASES



DRIVER-SPECIFIC SOUNDS

– Many sounds like navigation prompts and vehicle alerts are only relevant to the driver. ISZ will allow these sounds to be directed to the driver. The driver will remain alert and informed; passengers will barely realize that they will "turn left in 100 feet" as they continue to listen to their favorite music or sports game completely uninterrupted.



INDIVIDUAL VOLUME CONTROL

– Each passenger can now control their own volume. Instead of being blasted out of your seat when dad cranks up his favorite rock song, you can adjust the volume up or down to meet your needs.



PHONE CALLS

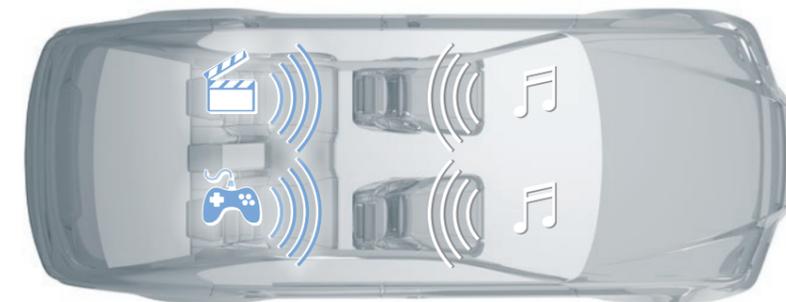
– Phone calls can be a major interruption to your listening experience. It often means missing an updated news report, your favorite part in a song or missing the game-winning home run. With ISZ, you will now be able to direct that call to one passenger, while everyone else can still enjoy the game. But be careful who you pass the call to, we can't help with loud talkers in the car (yet).



BACK SEAT DRIVERS

– Videos, games and audio books in the back seat all interfere with the easy-listening favorites of parents in the front seat. With ISZ, parents and kids alike can declare their independence, and select the sound source of their choosing. Music or talk radio up front – videos in the back.

The Sound That Matters to you can be determined by the seat in which you sit.

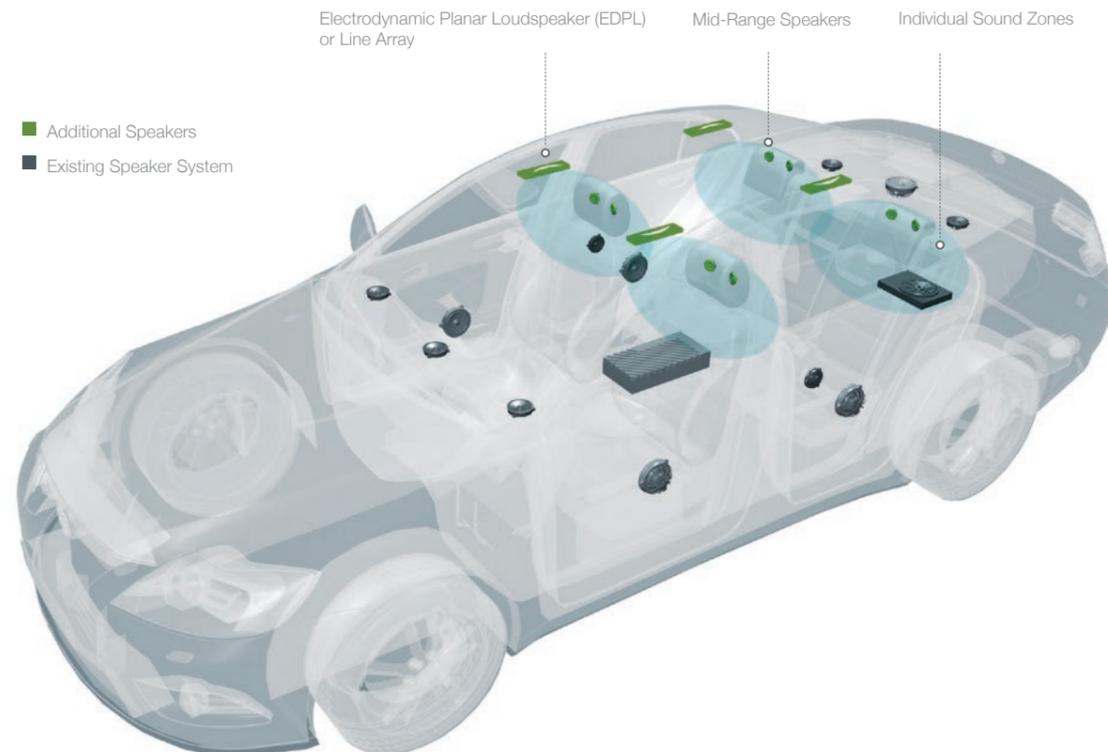


THE COMPLETE SYSTEM

Sometimes more is more

Our exhaustive simulations highlighted that standard car audio speakers are able to achieve good control of the wave field, but only at low frequencies due to the modal characteristics of the car interior. To achieve personal listening zones over a broader audio bandwidth, it is necessary to introduce additional speakers positioned in closer proximity to the occupants' heads. This has been achieved by positioning two small but powerful speakers with micro-speaker technology at each headrest. The active system

comprises the headrest speakers and standard car audio speakers to enable modification of the wave field as desired via a specially designed ISZ filter matrix. In addition, our patent-pending directional EDPL headliner speakers, which form a passive system, can cover the majority of the spectral audio range. The conclusion is that a complete system with system, headrest and directional speakers is preferable, as it provides highly satisfactory CTC (Cross Talk Cancellation) covering the entire audio frequency band.



HOW IT WORKS

HARMAN's ISZ utilizes existing audio speakers and layers in additional systems for increased performance

- > The existing speaker architecture achieves good CTC at low frequencies.
- > On top of the existing audio system, either mid-range speakers for each individual headrest or directional EDPL speakers or line arrays in the headliner further enhance the results.
- > By utilizing the existing speakers plus an additional set of mid-range speakers in each headrest as well as EDPL speakers and/or line arrays in the cabin roof, a very satisfying cancellation throughout the entire audio band can be achieved.



GLOSSARY

OEM (Original Equipment Manufacturer)

Entity also known as the car manufacturer.

Broadband Noise

Broadband noise is a noise or sound that covers a wide frequency range and has no dominant tone. Sound fluctuations of broadband noises are relatively random and minor in shape/less characteristic.

CTC (Cross Talk Cancellation)

A measure defining how much one zone is acoustically isolated from another zone. This measure is usually given in [dB] and defines the performance of an ISZ system.

EDPL (Electrodynamic Planar Loudspeaker)

A directional speaker, able to focus the sound in a certain direction. At the place where the focus of the speaker is directed, the sound is loud, while, in other directions away from the focus, the perception of the sound is somewhat attenuated.

Line Array

A combination of speakers arranged in a line, connected together via specific signal processing (beam-forming), with the purpose of forming a desired, directional response.



www.IndividualSoundZones.com



WWW.HARMAN.COM