

Modffusor™

1D Diffusion



*The First Modulated Optimized Diffusor
From The Acoustical Industry's Leading Innovator*

In 1983, RPG Diffusor Systems, Inc. introduced the first commercial sound diffuser that offered uniform scattering over a designable bandwidth. The QRD® has now been used in thousands of projects in a wide range of venues. As with any technology, research and experimentation lead to advances. The QRD® is a reflection phase grating formed from the periodic repetition of a base shape, consisting of a series of wells of depth based on the quadratic residue sequence, separated by dividers. While periodicity is the basis of the QRD®, it is also one of its limitations, because periodicity causes lobing in specific diffraction directions. To minimize this lobing, which compromises the uniformity of the polar response, RPG developed the Modffusor™. By contrast to the QRD®, the Modffusor™ is formed from an aperiodic array of a single, asymmetric, optimized base shape. The optimization offers better performance than a low-prime, number theoretic diffuser and the aperiodic modulation minimizes lobing non-uniformity caused by periodicity. Thus, the Modffusor™ offers the next generation of high performance reflection phase gratings.

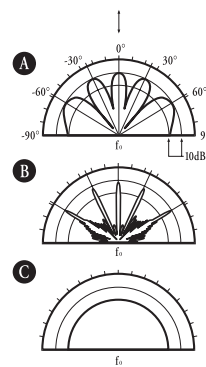


The Sound of Innovation™

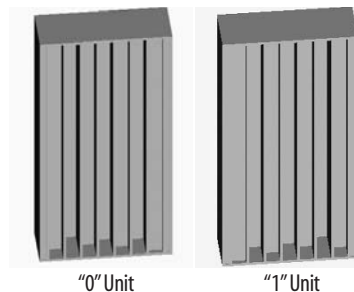
Problem and Solution

Problem

Quadratic Residue Diffusors (QRD®) owe their diffusing ability to the phenomenon of diffraction from a periodic reflection phase grating. The product of the number and width of the wells defines the diffraction directions and the energy in these directions is equal due to the fact that the quadratic residue well depth sequence has a flat power spectrum. To cover wide areas, the QRD® is repeated. This periodicity decreases uniformity by focusing the energy in the diffraction directions (B), preventing uniform diffusion (C) from being achieved.

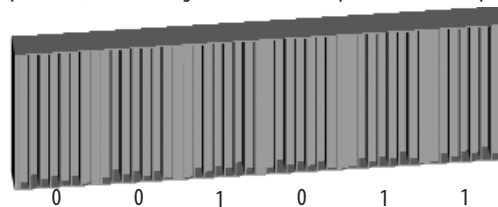


Solution

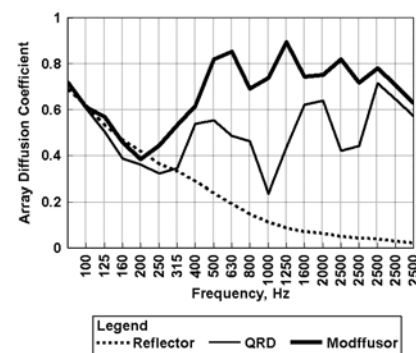


To solve this problem, RPG patented a concept called Aperiodic Modulation of a Single Asymmetric Base Shape, in which a single, optimized, asymmetric, base shape ("0" Unit) is modulated by simply flipping the base unit 180° (forming "1" Unit) according to the prescription of an optimal binary sequence with good aperiodic autocorrelation, as shown in the aperiodic array below. The base shape, consisting of 7 full wells and two zero-depth half wells on either end, is optimized using RPG's proprietary Shape Optimizer™ software. Using aperiodic modulation, the

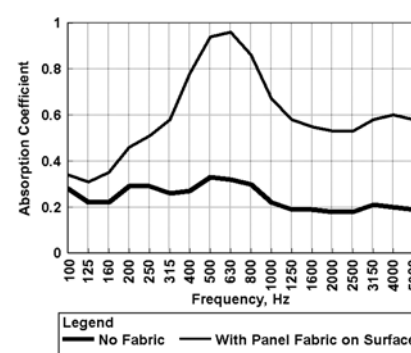
performance of the single optimal base shape can be preserved, while covering an infinite area. The patented half wells provide seamless tiling and the appearance of pseudo-periodicity and pseudo-symmetry which is aesthetically pleasing.



Performance Specifications



Diffusion coefficient comparison between a traditional QRD and the Modfusor, reveals significant performance improvement, due to the reduction of periodic lobing. A flat panel response of comparable size is also shown to indicate the Modfusor's better low frequency diffusion, as indicated by the onset of diffusion.



The Modfusor exhibits minimal absorption with a slight rise between 500 and 630 Hz, due to pressure gradient absorption between resonant and non-resonant wells. If a panel fabric is placed over the surface, then this resistive element increases the absorption significantly in this frequency region.

Installation

Installation of the array is accomplished by mounting the labeled Modfusors sequentially over supplied mounting cleats, which are attached to the wall or ceiling. The array consists of a beginning unit, a series of interior units and an end unit.

FEATURES

- Optimized shape
- Single asymmetric base shape
- Asymmetric shape capable of aperiodic modulation
- Optimal modulation sequences provided
- Seamless tiling for wide area coverage
- Pseudo-periodicity
- Extended low frequency performance
- Shallower depth than QRD
- Furniture grade wood construction and finish

BENEFITS

- Optimized shape insures uniform coverage
- Single asymmetric base shape allows modulation and removes the need for two base shapes, thus lowering manufacturing costs
- RPG's patent pending aperiodic modulation of a single asymmetric base shape minimizes periodicity effects and improves scattering uniformity
- Optimal binary modulation mounting sequences provided for each array size
- Adjacent panels seamlessly tile, due to the patented zero-depth, half-well edge design, for wide area coverage, simulating a single continuous element
- The zero-depth, edge half-wells also provide a visually appealing periodicity, while acoustically the Modfusor™ is aperiodic
- Modulation reduces the periodic lobing into diffraction directions and therefore, improves the low frequency response of the Modfusor over the QRD
- Optimization and modulation allows the depth to be reduced by 16%
- RPG's furniture grade wood construction and standard and custom finishing allow the Modfusor to be used in high end venues

APPLICATIONS

Recording and broadcast studios, Home theaters, Rehearsal rooms, Auditoriums, Performing Arts Facilities, and Worship Spaces.

SPECIFICATIONS

- Sizes and weights:
23-5/8" (H) x 23-5/8" (W) x 7-7/8" (D): 25 lbs.
47-1/4" (H) x 23-5/8" (W) x 7-7/8" (D): 50 lbs.
- Custom sizes available
- Standard finish: Uniform white birch clear coat
- Custom finishes available
- Class A fire rated