

**Stewart**  
FILMSCREEN

# HARMONY G3

## Close-Coupled Acoustic Performance Guide

Measured Performance Across Real-World Speaker Configurations



Independent Testing by SH Acoustics

## Introduction

Acoustically transparent projection screens must balance two critical performance requirements:

1. Preserve projected image fidelity
2. Maintain accurate and predictable audio transmission

The Harmony G3 screen material was engineered to minimize acoustic interference while maintaining reference-level visual performance. To validate its behavior under real-world installation conditions, independent acoustic testing was conducted by SH Acoustics.

This document summarizes measured performance across multiple speaker distances and angular orientations, including extreme close-coupled placement scenarios representative of depthconstrained installations.

## Test Objectives

The evaluation was designed to quantify:

- Frequency response deviation introduced by the screen material
- The acoustic impact of optional liner material
- Close-coupled speaker behavior at 1-inch placement
- Off-axis response behavior
- Comb filtering and boundary interaction effects

Testing conditions reflect installation scenarios commonly encountered by professional integrators, including shallow wall cavities, structural depth limitations, and immersive audio speaker arrays..

## Test Configurations Evaluated

The following configurations were measured:

- 8 inches | On-Axis | No Liner (Reference Configuration)
- 8 inches | On-Axis | With Liner
- 1 inch | On-Axis | No Liner
- 1 inch | On-Axis | With Liner
- 8 inches | 10° Off-Axis | With Liner
- 8 inches | 45° Off-Axis | With Liner
- 1 inch | 10° Off-Axis | With Liner
- 1 inch | 45° Off-Axis | With Line

These distances and angles were selected to reflect practical installation constraints including shallow wall cavities, structural limitations, and immersive speaker array positioning.

## Measured Performance Results

### Reference Configuration

#### 8 inches | On-Axis | No Liner

- Frequency response remains within  $\pm 3$  dB beyond 16 kHz
- Smooth and consistent spectral balance
- Minimal variance across the audible band

This configuration represents optimal acoustic transparency and establishes baseline performance expectations.

### Liner Impact

#### 8 inches | On-Axis | With Liner

- Frequency response remains within  $\pm 3$  dB through 13.5 kHz
- Controlled and predictable high-frequency attenuation
- No significant midband anomalies

The addition of the liner introduces mild high-frequency attenuation while maintaining overall spectral balance suitable for reference installations.

### Close-Coupled Performance (1-Inch Placement)

Extreme proximity placement represents a worst-case acoustic scenario and was intentionally evaluated to reflect real-world depth constraints.

#### 1 Inch | On-Axis | No Liner

- Baseline frequency response remains between 0 and  $-2$  dB across the majority of the audible spectrum
- A localized dip reaching approximately  $-2$  dB between 1–2 kHz
- Observable comb filtering between 3–16 kHz
- Overall response remains within  $\pm 3$  dB through and beyond 16 kHz

Without liner material, the baseline amplitude response remains notably flat in close-coupled placement. However, predictable boundary interaction between speaker output and the screen surface produces comb filtering in the upper midrange and lower treble bands.

Importantly, the magnitude of variation remains within  $\pm 3$  dB, indicating controlled acoustic behavior rather than large-scale spectral disruption.

## 1 Inch | On-Axis | With Liner

- Frequency response remains within  $\pm 3$  dB through 15 kHz
- Minor - 1 dB dip between 1 - 2 kHz
- Observable comb filtering between 3–12 kHz
- Minor low-frequency reflection interaction attributable to liner boundary proximity

Compared to the unlined configuration:

- The lined configuration introduces slight additional low-frequency boundary interaction.
- The unlined configuration exhibits a slightly flatter baseline amplitude trend.
- Observable comb filtering between 3–12 kHz
- Comb filtering remains present in both configurations due to proximity-driven boundary effects.

## Off-Axis Performance

Off-axis behavior is critical in immersive and multi-channel systems where speakers are frequently angled or positioned laterally.

### 8 inches | 10° Off-Axis | With Liner

- Minor response variation near 200 Hz (~2 dB)
- No  $\pm 3$  dB deviation until 16 kHz

### 8 inches | 45° Off-Axis | With Liner

- Smooth and predictable high-frequency rolloff
- No  $\pm 3$  dB deviation until 16 kHz

### 1 Inch | 10° Off-Axis | With Liner

- Midrange comb filtering between 3–7 kHz
- No  $\pm 3$  dB deviation until 15 kHz

### 1 Inch | 45° Off-Axis | With Liner

- Approximately 2 dB dip centered near 1 kHz
- No  $\pm 3$  dB deviation until 15 kHz
- Most linear response among evaluated 1-inch configurations

Measured data indicates that angular orientation can mitigate proximity-related artifacts in constrained installations.

## Comb Filtering and Boundary Interaction

Comb filtering observed in 1-inch configurations is consistent with expected interference patterns generated by sub-quarter-wavelength boundary spacing at upper midrange and high frequencies.

These artifacts are driven by predictable boundary interaction between direct speaker output and reflected energy from the screen surface and liner material.

The measured deviations remain within  $\pm 3$  dB, demonstrating controlled acoustic behavior rather than severe spectral irregularity.

## Calibration Considerations

Observed response deviations – including localized dips and comb filtering in extreme proximity configurations – fall within the correction capability of modern DSP and room optimization platforms.

## Installation Guidance Summary

Based on measured data:

### For Maximum Acoustic Neutrality

- 8 inches
- On-axis
- No liner

### When Liner Is Required

- 8 inches
- On-axis

### When Depth Is Limited (1-Inch Placement)

- 45° off-axis orientation provides the most linear close-coupled response

## Conclusions

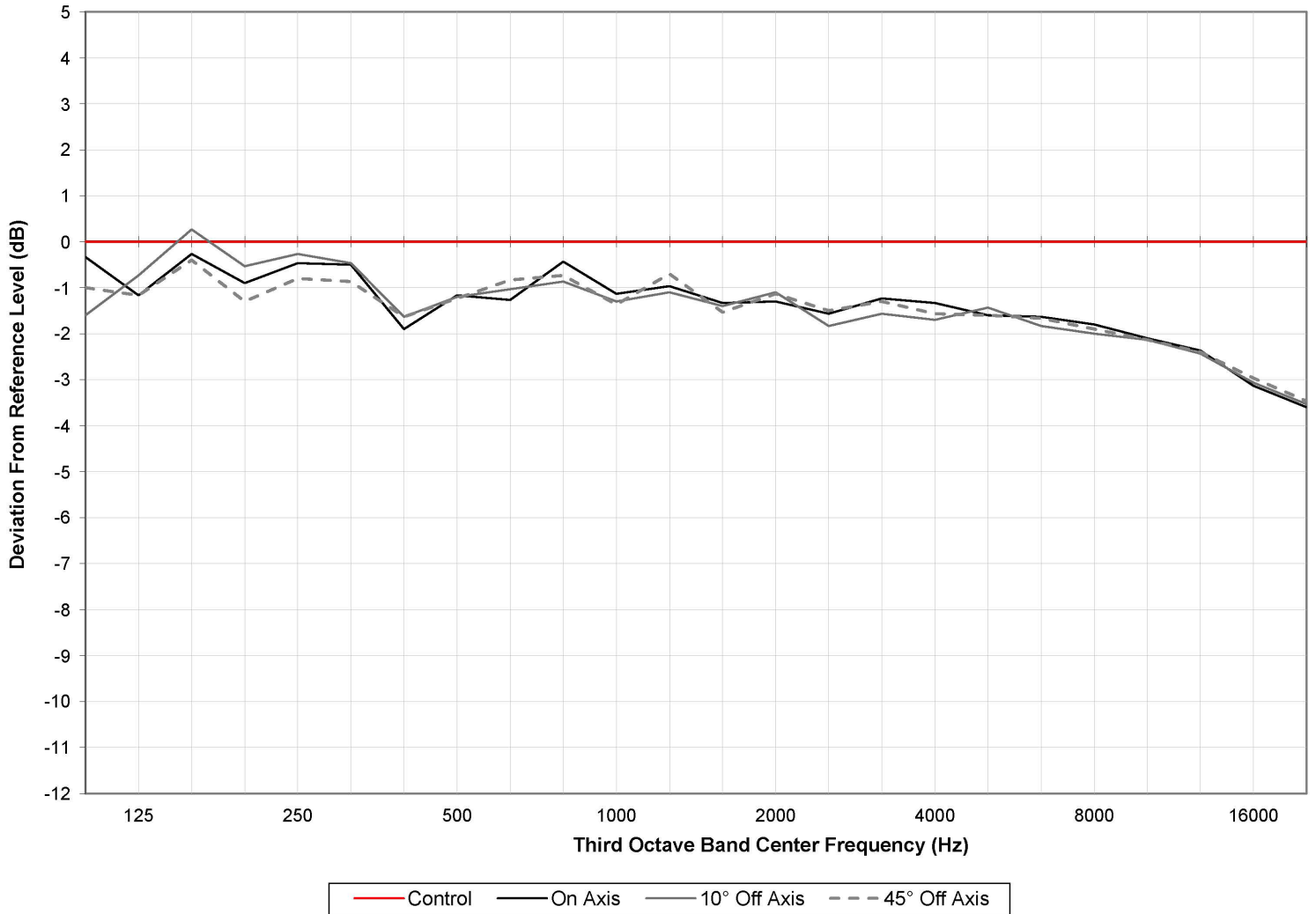
Independent third-party testing confirms that Harmony G3 maintains controlled and predictable acoustic performance across a wide range of installation scenarios.

- Reference-level transparency at optimal spacing
- Controlled and predictable liner impact
- Stable,  $\pm 3$  dB performance even at 1-inch placement
- Manageable comb filtering consistent with boundary physics
- Strong off-axis consistency
- Calibration-friendly response characteristics



**1/3 Octave Band Spectral Deviation:  
Stewart Filmscreen Harmony V3 8 Inches from Speaker (w/ Liner)**

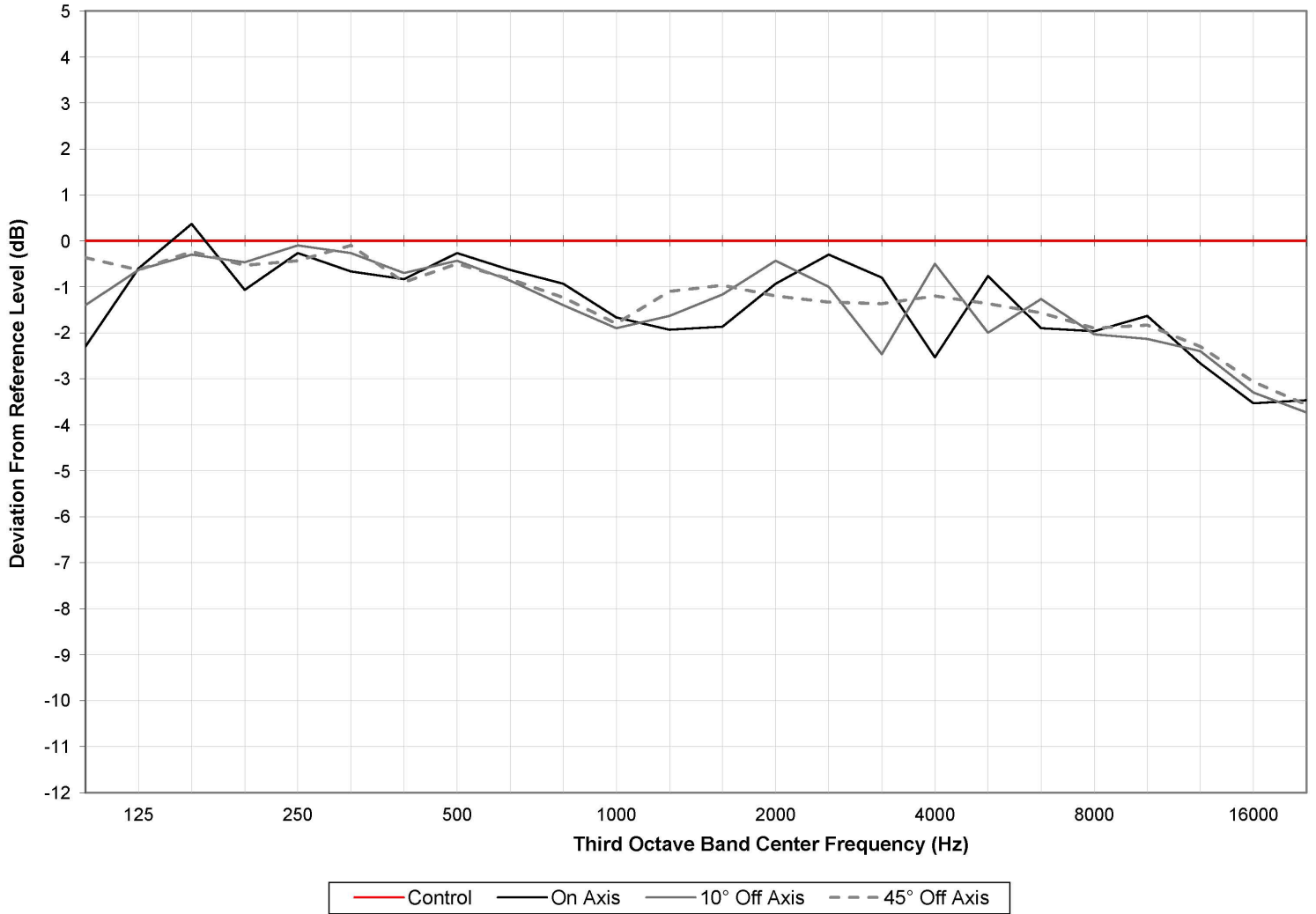
Test performed on 02/07/2024



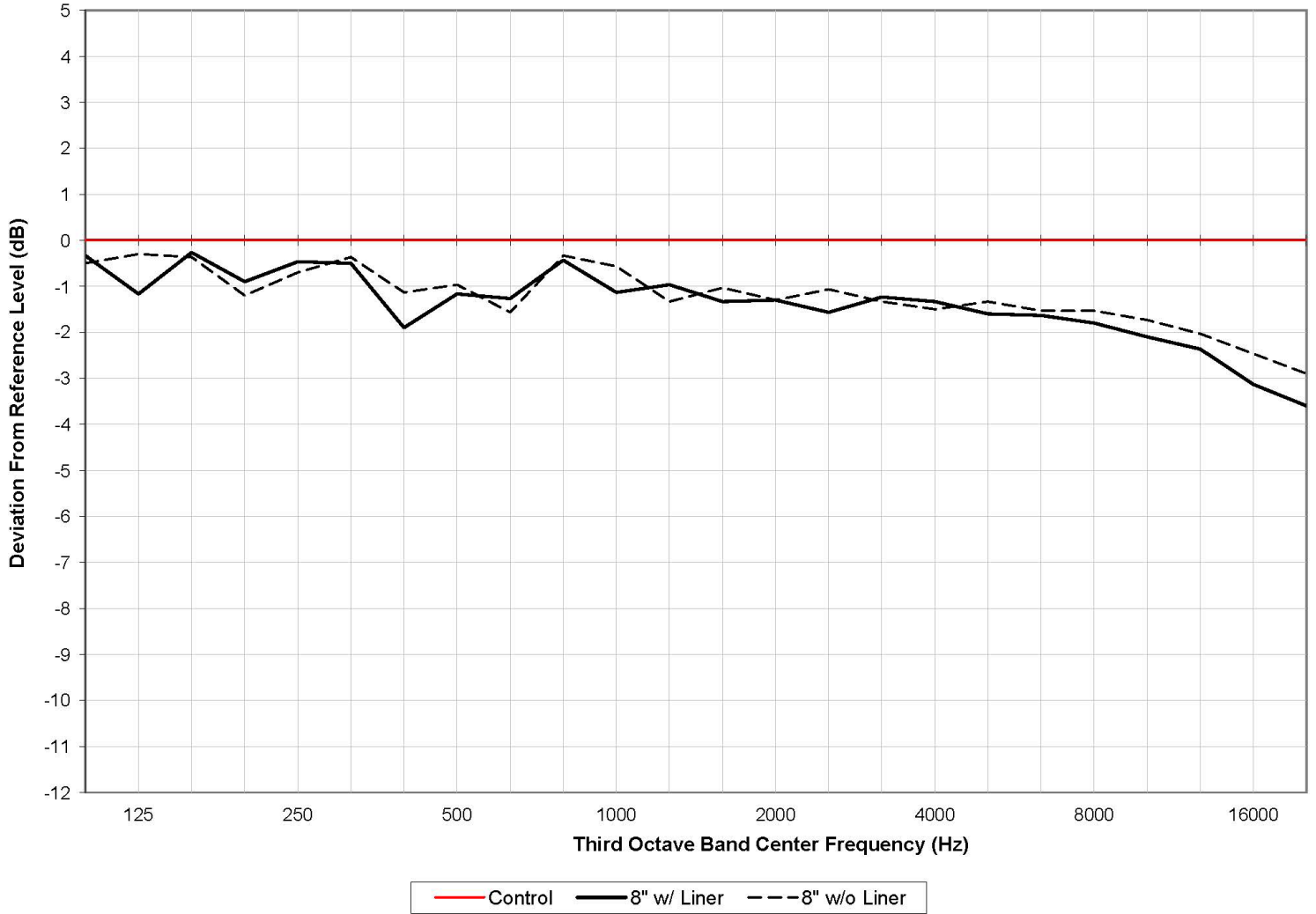


1/3 Octave Band Spectral Deviation:  
Stewart Filmscreen Harmony V3 1 Inch from Speaker (w/ Liner)

Test performed on 02/07/2024



**1/3 Octave Band Spectral Deviation:  
Stewart Filmscreen Harmony V3 8 Inches from Speaker, With and Without Liner (On Axis)**





**1/3 Octave Band Spectral Deviation:  
Stewart Filmscreen Harmony V3 1 Inch from Speaker, With and Without Liner (On Axis)**

Test performed on 02/07/2024

