- **The purpose of this document is to initiate a discussion of Tasks (a) and (b)**

- Task (a) Given the baffle will be wide, what are the pros and cons of a minimum reasonable width or a significantly wider one?

- Task (b) For a wide baffle and optionally waveguides are the technical disadvantages of sharp baffle edges significant?

Preliminary analysis using VituixCad Diffraction tool

- Four baffle shapes were evaluated to illustrate the effect of three variables
- Baffle width
  - Minimum width baffle just large enough to encompass a 12" woofer
  - A larger baffle that is 50% wider
- Tweeter horizontal position
  - Centered
  - Horizontally offset to generate the flattest on-axis response
- Edge radius
  - Hard edge of minimum radius
  - Edge radius which represents the point of diminishing returns

- **Limitations of this initial study**

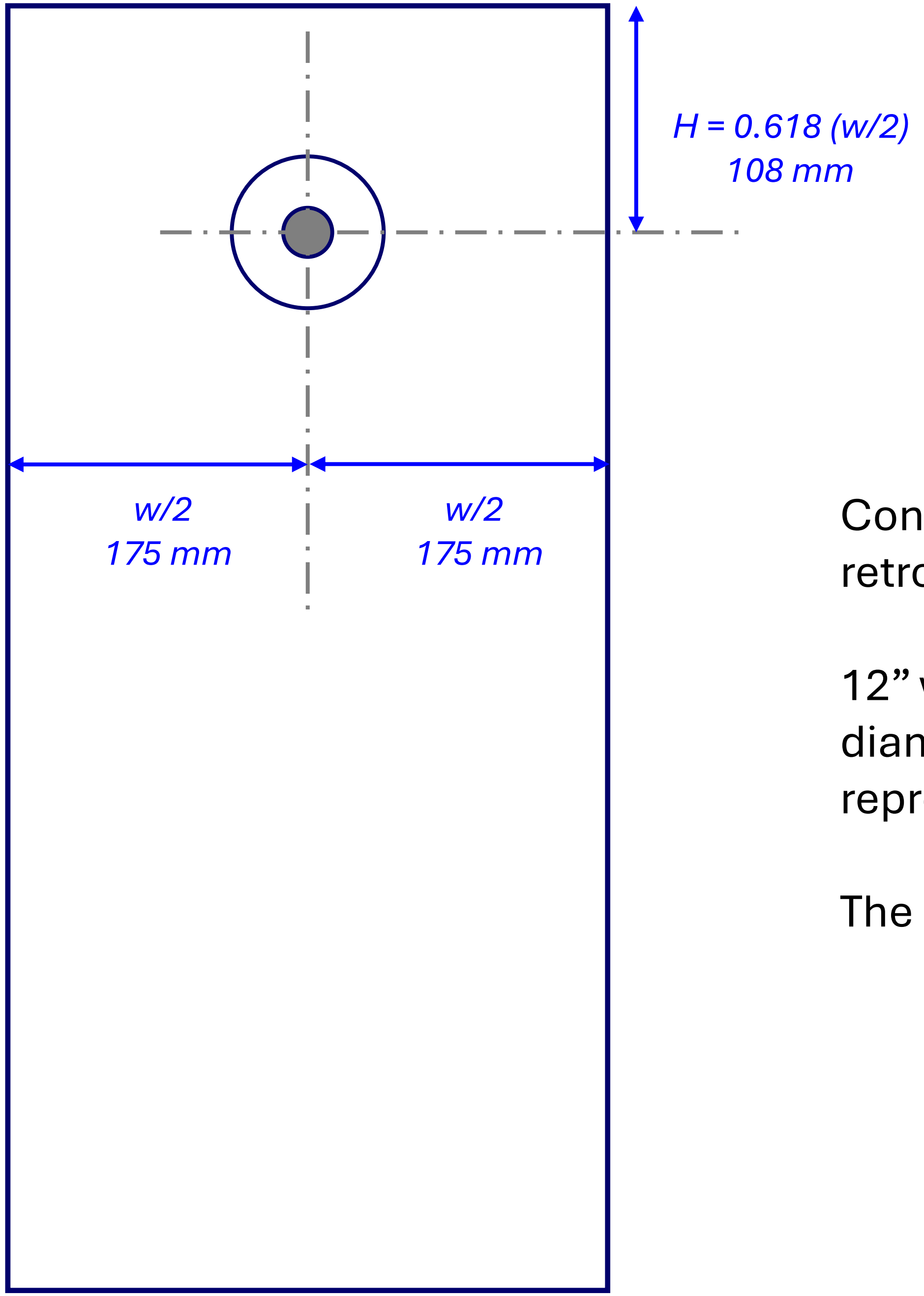
  - The baffle size/shapes chosen for study are somewhat arbitrary
  - The baffles in this study were not fully optimized, and comparisons between non-optimized baffles may cause misleading conclusions
  - Waveguide effects are not discussed.
  - Tweeter effects are addressed in this study
    - Midrange driver effects will be addressed in a future study
  - A single tweeter size was selected for study
    - Diameter of 30 mm (Sd = 7.07 cm^2)
    - Representative of most tweeters

- **Limitations of VituixCad diffraction analysis**

  - The tool models the magnitude and phase impact of the only the first diffraction edge (baffle edge)
  - The secondary diffraction on the back edge of the cabinet is not modeled
    - The cabinet is effectively simulated as if it were infinitely deep
  - Drivers are modeled as a perfect disc radiator
    - These idealized discs tend to have more directivity than actual drivers.
  - The diffraction effects of other drivers (i.e cavities) are not simulated
  - Edges are modeled as a radius, and flat bevels are assumed to be equivalent to a radius of the same size
    - There are small measurable differences between a radius and a bevel
  - The radiation pattern of waveguides must be simulated in another tool (BEM) before being imported into VituixCad.

- **Each configuration will have four graphics**

  - A schematic showing the baffle
  - A screenshot of the VituixCad diffraction tool
    - This shows diffraction response applied to a 0 dB idealized driver of 30 mm diameter
  - The horizontal polar response of the diffraction
  - The CTA-2034 plot showing Sound Power, Early Reflections, Listening Window, and Directivity Index.
    - DI is relative to the Listening Window

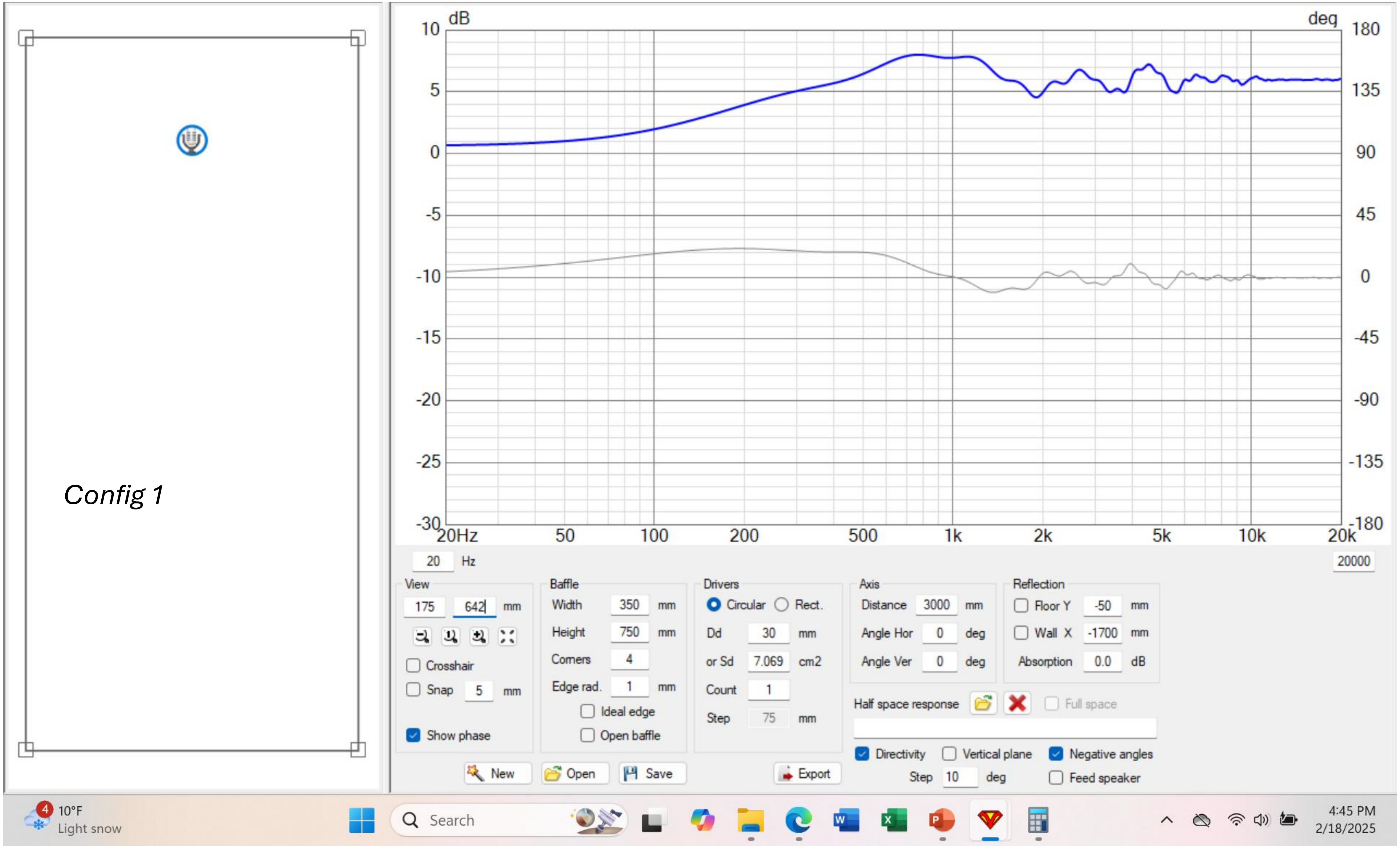


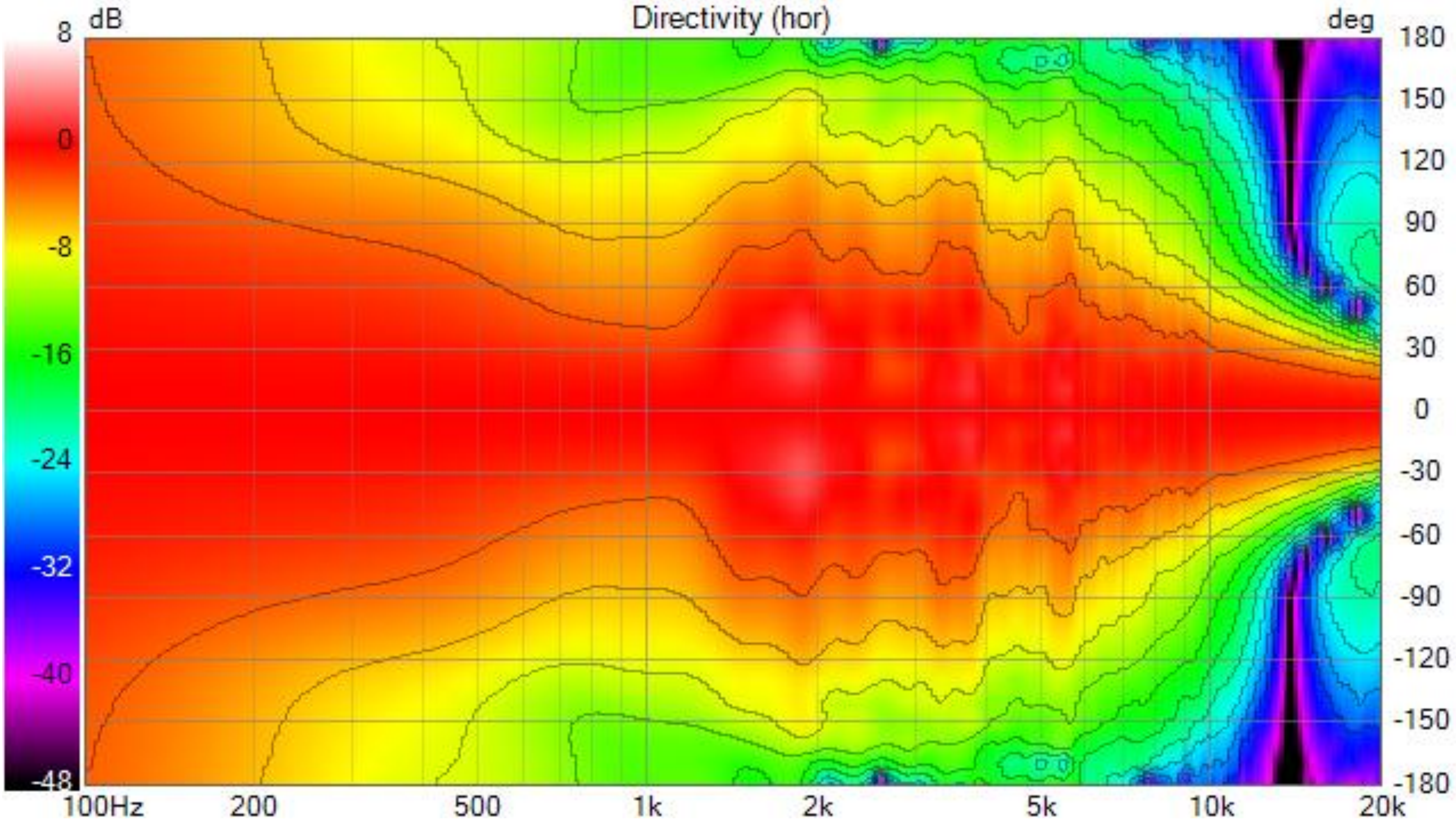
Configuration 1
750 mm x 350 mm
Edge radius = 1 mm (hard edge)
Tweeter on centerline

Configuration 1 represents a typical shape for a retro stand-mount monitor (the “monkey coffin”)

12” woofers range from 315 mm to 340 mm outer diameter. A width of 350 mm is fairly representative

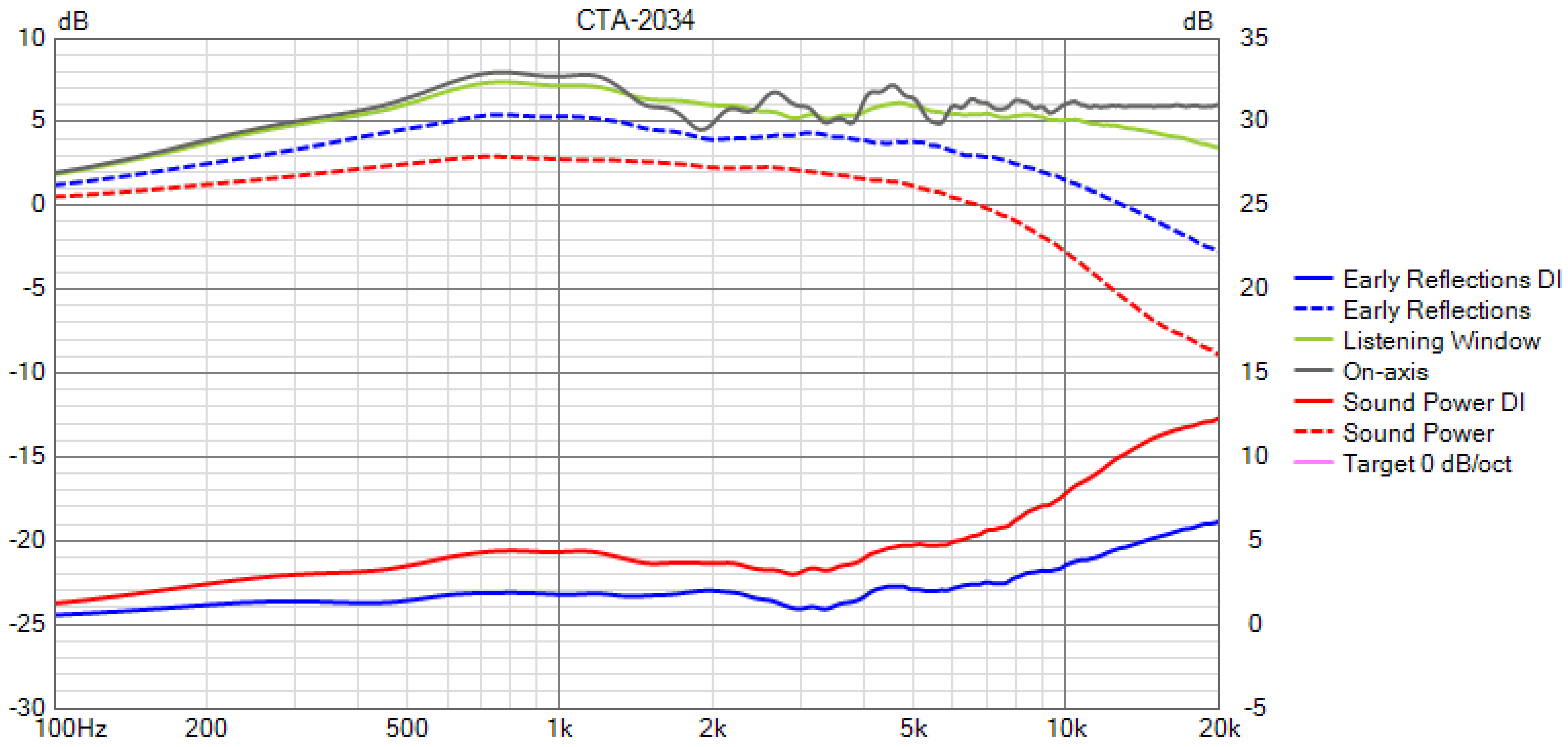
The edge radius of 1 mm is a hard edge


Config 1
dB
deg
20Hz
50
100
200
500
1k
2k
5k
10k
20k
View
Baffle
Width 350 mm
Height 750 mm
Corners 4
Edge rad. 1 mm
Ideal edge
Open baffle
Drivers
Circular
Rect.
Dd 30 mm
or Sd 7.069 cm2
Count 1
Step 75 mm
Axis
Distance 3000 mm
Angle Hor 0 deg
Angle Ver 0 deg
Reflection
Floor Y -50 mm
Wall X -1700 mm
Absorption 0.0 dB
Half space response
Full space
Directivity
Vertical plane
Negative angles
Step 10 deg
Feed speaker
Crosshair
Snap 5 mm
Show phase
New
Open
Save
Export



dB
Directivity (hor)
deg
8
0
-8
-16
-24
-32
-40
-48
180
150
120
90
60
30
0
-30
-60
-90
-120
-150
-180
100Hz
200
500
1k
2k
5k
10k
20k

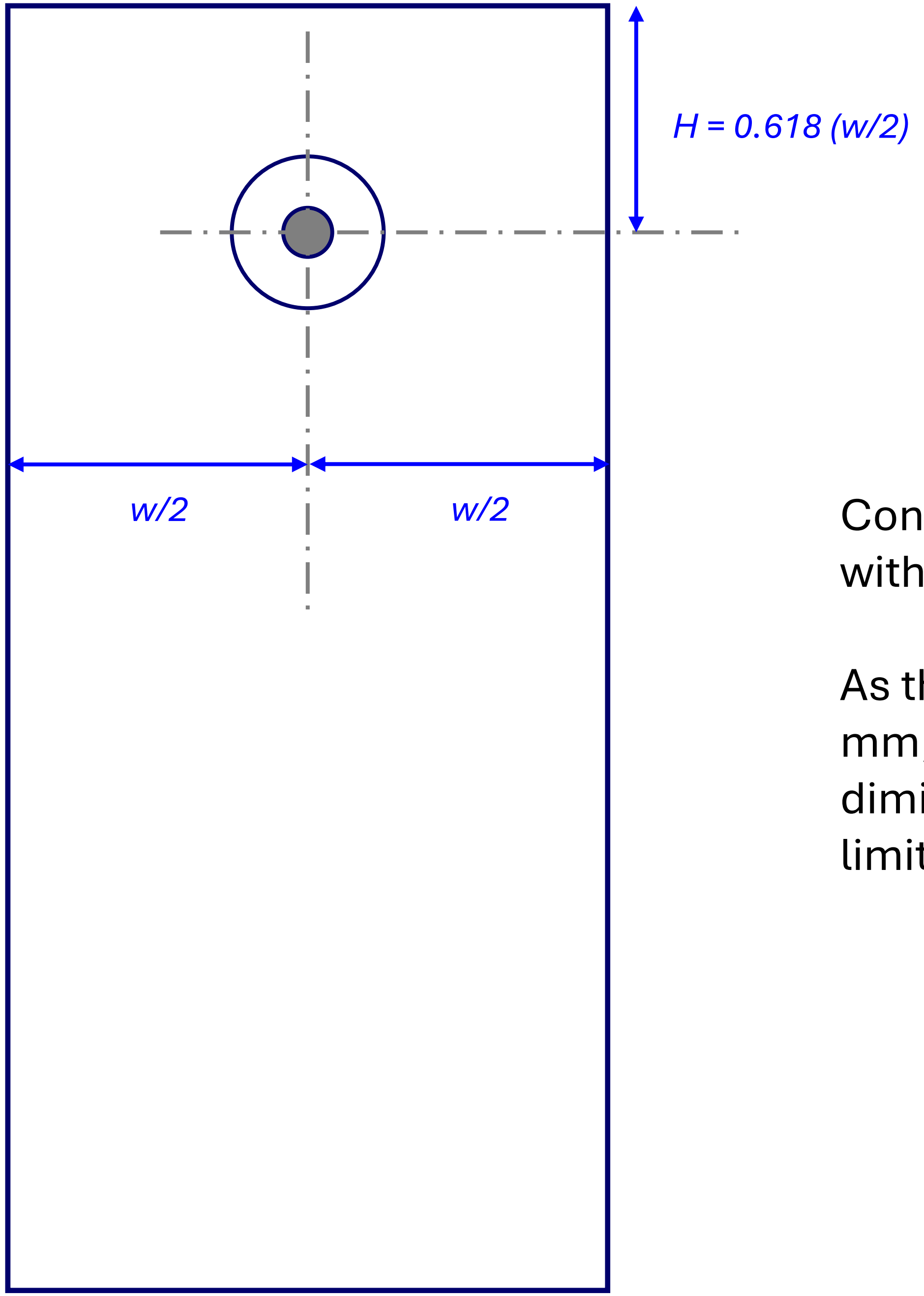
Config 1


CTA-2034
dB
dB
10
5
0
-5
-10
-15
-20
-25
-30
35
30
25
20
15
10
5
0
-5
100Hz
200
500
1k
2k
5k
10k
20k
Early Reflections DI
Early Reflections
Listening Window
On-axis
Sound Power DI
Sound Power
Target 0 dB/oct

Config 1

- **Configuration 1 Discussion**

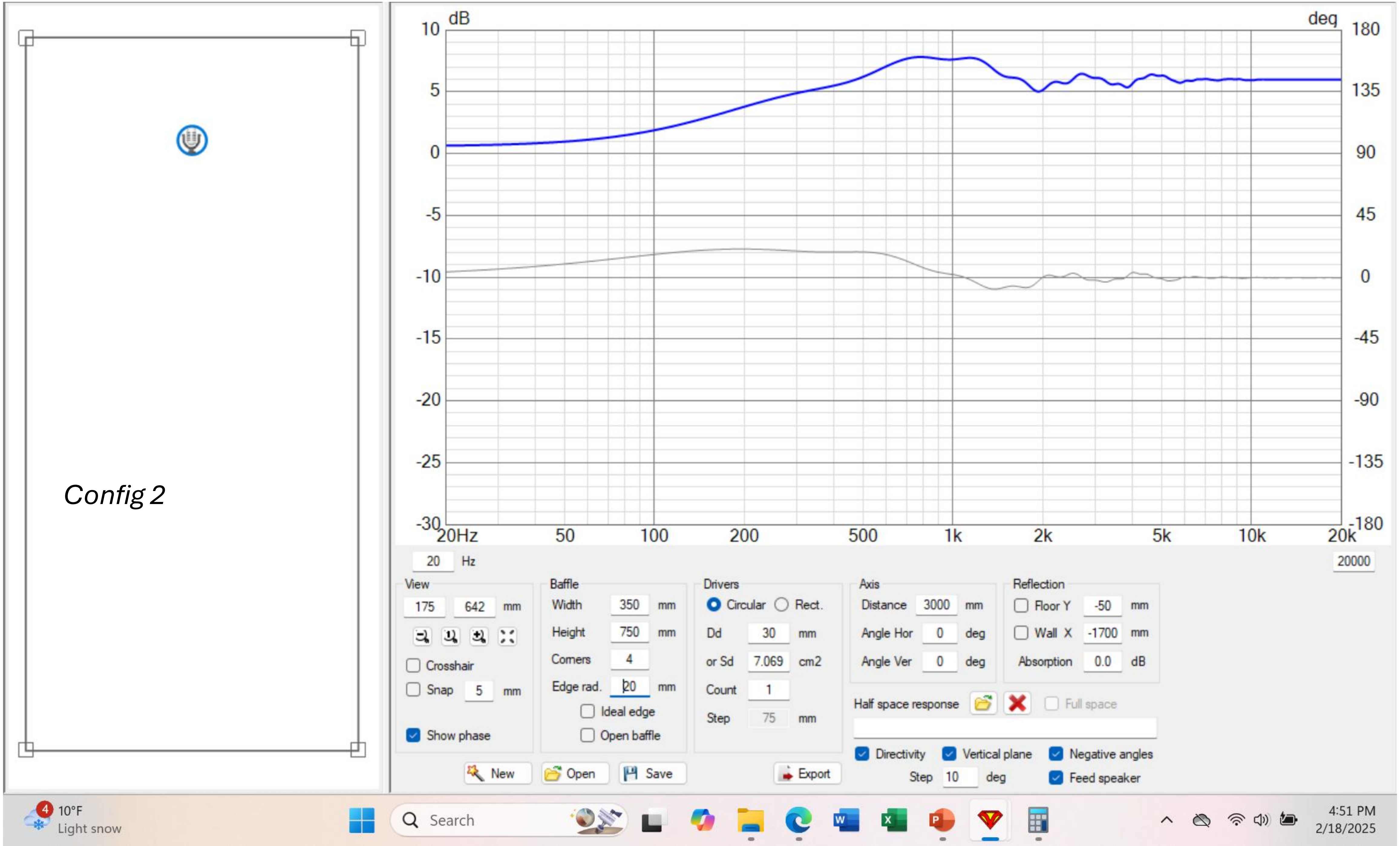
- From 600 Hz to 1200 Hz, there is a +2 dB baffle gain
  - Baffle gain can complicate crossover design, particulary in managing sound power and DI.
  - The crossover frequency will probably need to be above 2.4k to achieve a smooth DI through the crossover region.
- High frequency diffraction (above the baffle gain hump) can be seen in the on-axis response
- The hard edge creates a ragged polar response both on-axis and far off axis

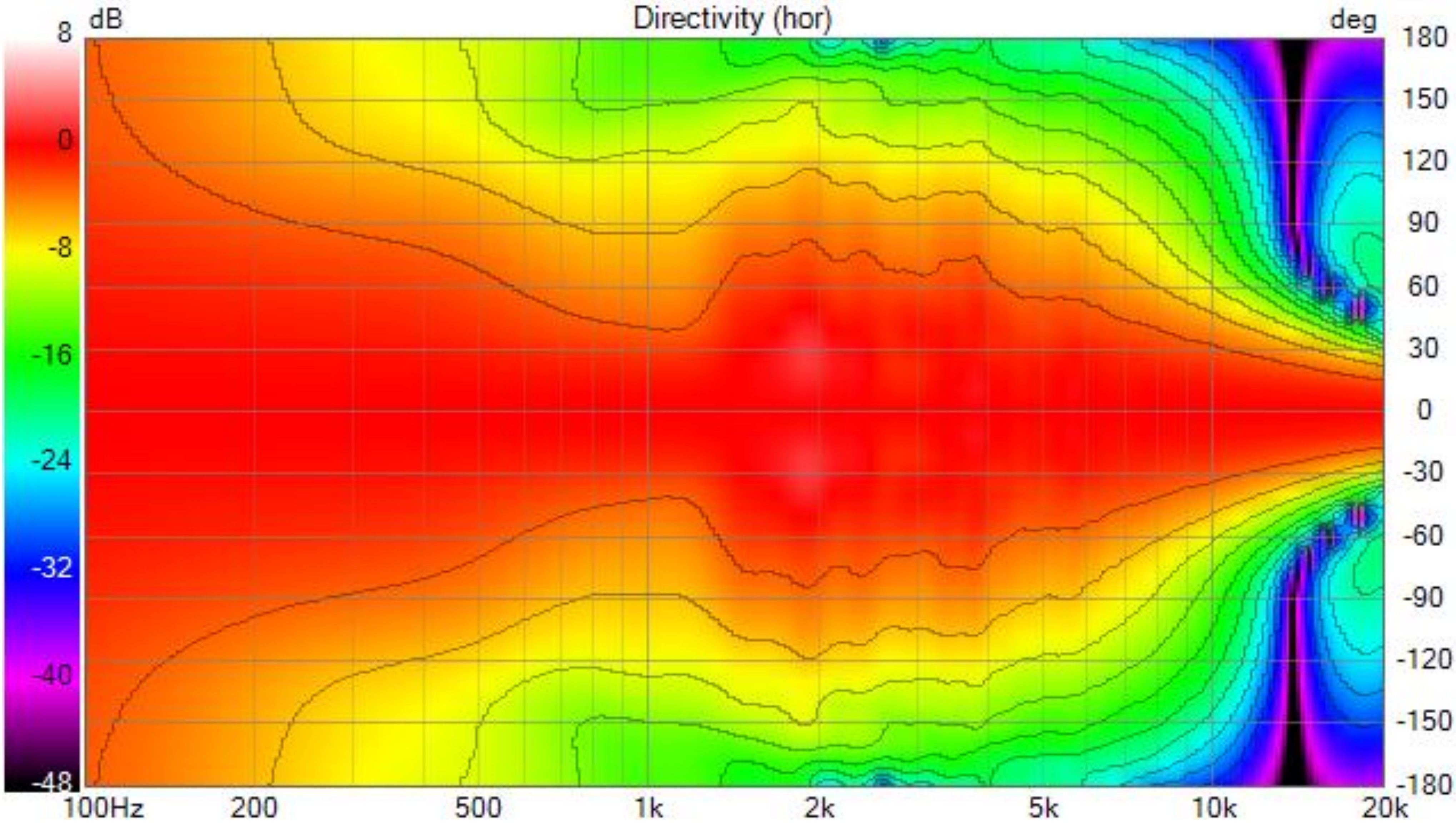


Configuration 2
750 mm x 350 mm
Edge radius = 20 mm
Tweeter on centerline

Configuration 2 is the same as Configuration 1 but with a 20 mm radius edge

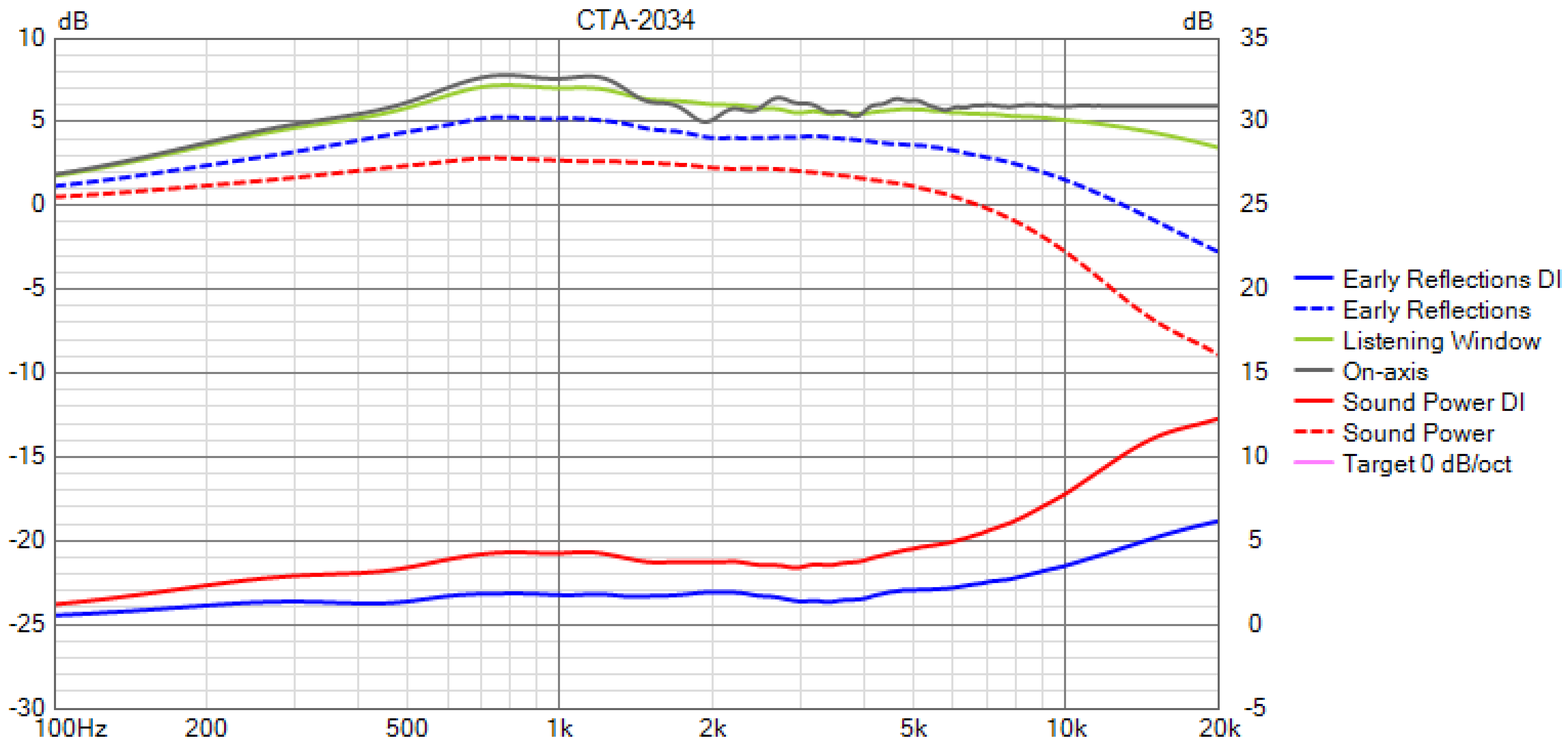
As the edge radius was varied from 1 mm to 50 mm, it was found that 20 mm was the point of diminishing returns. Progressively larger radii had a limited benefit.


Config 2
dB
deg
10
5
0
-5
-10
-15
-20
-25
-30
180
135
90
45
0
-45
-90
-135
-180
20Hz
50
100
200
500
1k
2k
5k
10k
20k
20 Hz
20000
View
175 642 mm
Crosshair
Snap 5 mm
Show phase
Baffle
Width 350 mm
Height 750 mm
Corners 4
Edge rad. 20 mm
Ideal edge
Open baffle
Drivers
Circular Rect.
Dd 30 mm
or Sd 7.069 cm2
Count 1
Step 75 mm
Axis
Distance 3000 mm
Angle Hor 0 deg
Angle Ver 0 deg
Reflection
Floor Y -50 mm
Wall X -1700 mm
Absorption 0.0 dB
Half space response
Full space
Directivity
Vertical plane
Negative angles
Step 10 deg
Feed speaker
New
Open
Save
Export
10°F
Light snow
Search
4:51 PM
2/18/2025



dB
Directivity (hor)
deg
8
0
-8
-16
-24
-32
-40
-48
180
150
120
90
60
30
0
-30
-60
-90
-120
-150
-180
100Hz
200
500
1k
2k
5k
10k
20k

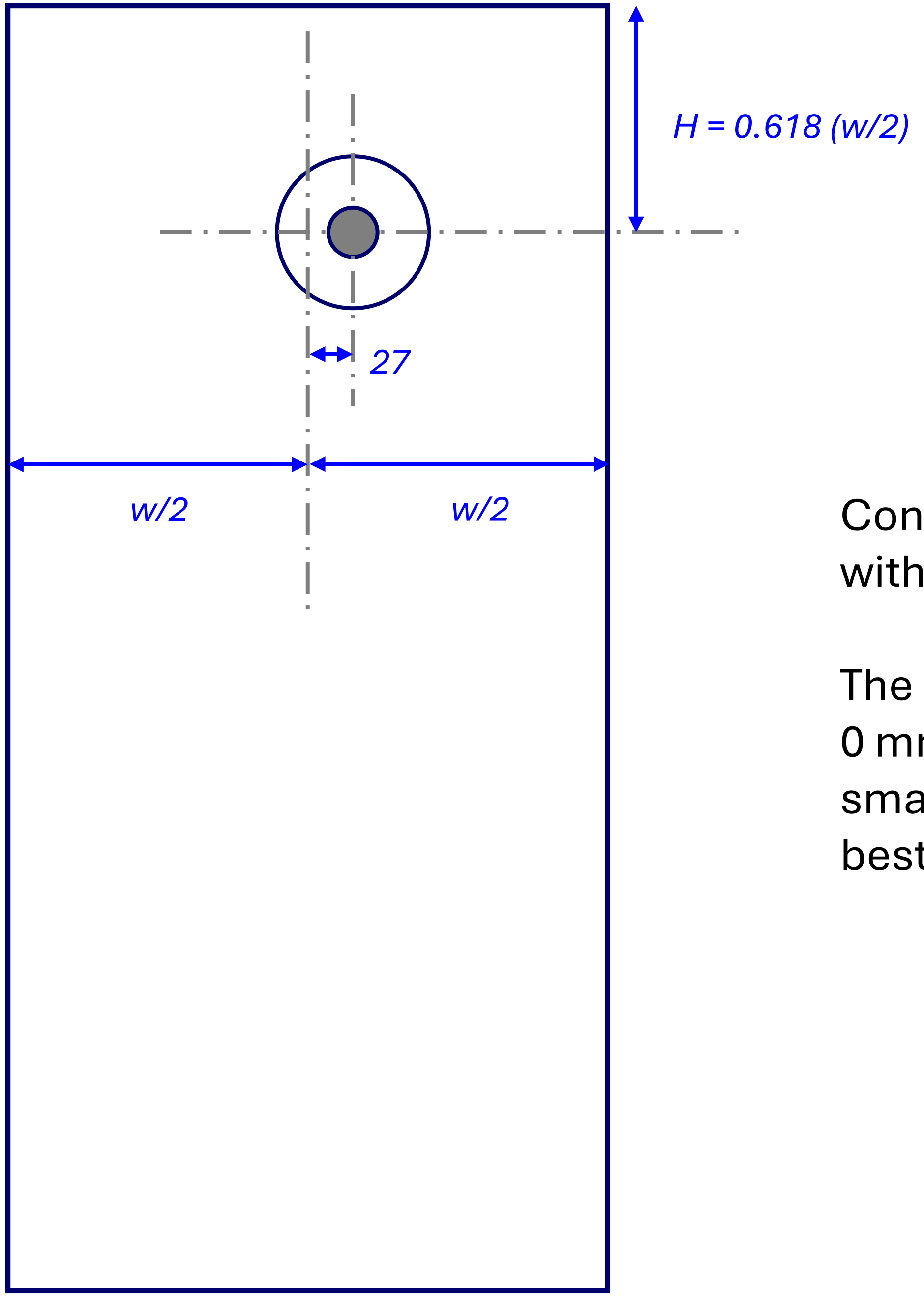
Config 2


CTA-2034
dB
dB
10
5
0
-5
-10
-15
-20
-25
-30
35
30
25
20
15
10
5
0
-5
100Hz
200
500
1k
2k
5k
10k
20k
Early Reflections DI
Early Reflections
Listening Window
On-axis
Sound Power DI
Sound Power
Target 0 dB/oct

Config 2

- **Configuration 2 Discussion**

- From 600 Hz to 1200 Hz, the +2 dB baffle gain remains
- The softened edge reduces the raggedness of the polar response
  - High frequency diffraction is reduced
  - This is particularly noticeable on-axis, but the effect can be seen far off axis as well
- The DI curve is flatter than configuration 1
  - +/- 0.5 dB from 500 – 4k



Configuration 3

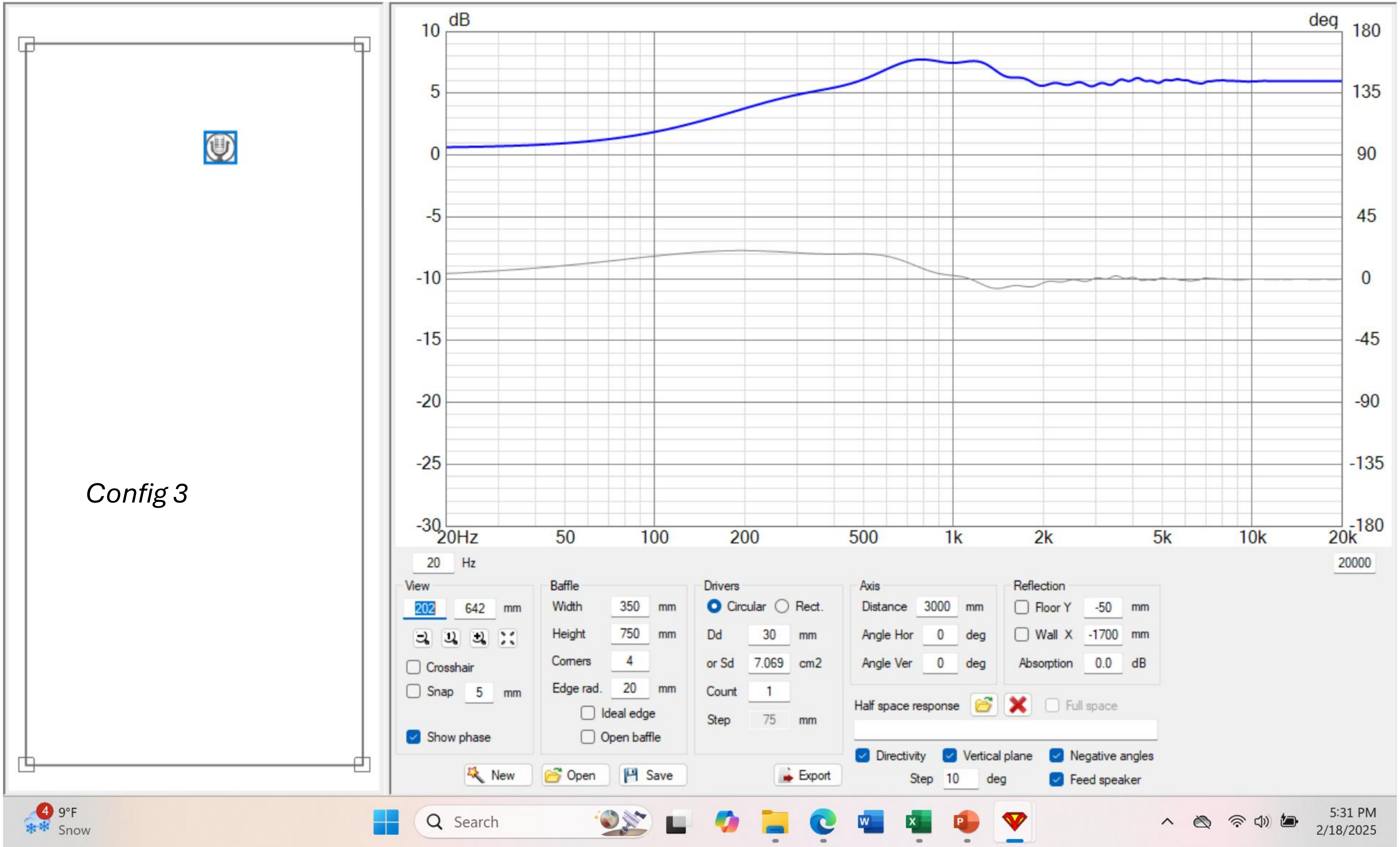
750 mm x 350 mm

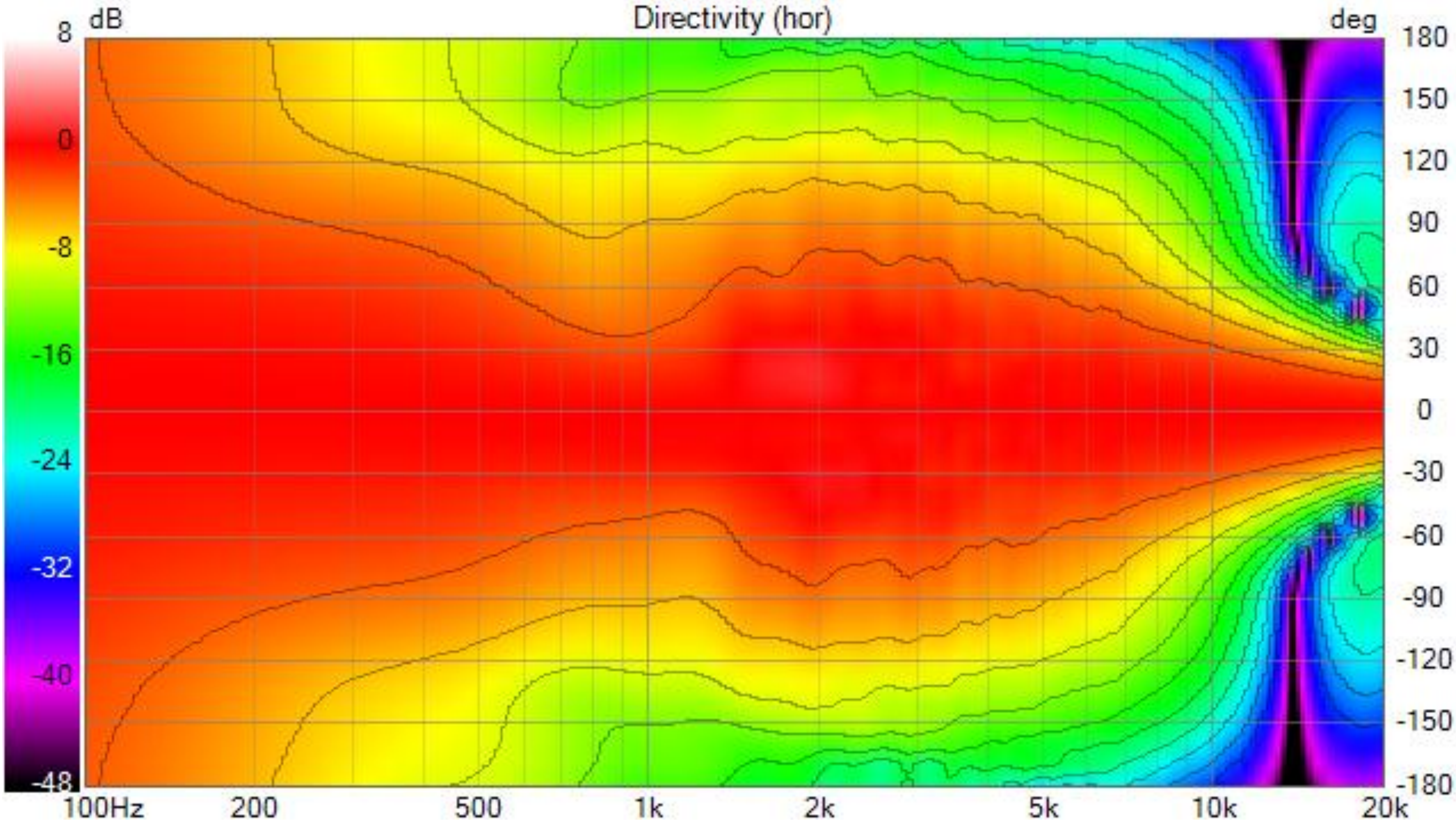
Edge radius = 20 mm

Tweeter horizontal offset 27 mm

Configuration 3 is the same as Configuration 2 but with the tweeter offset horizontally

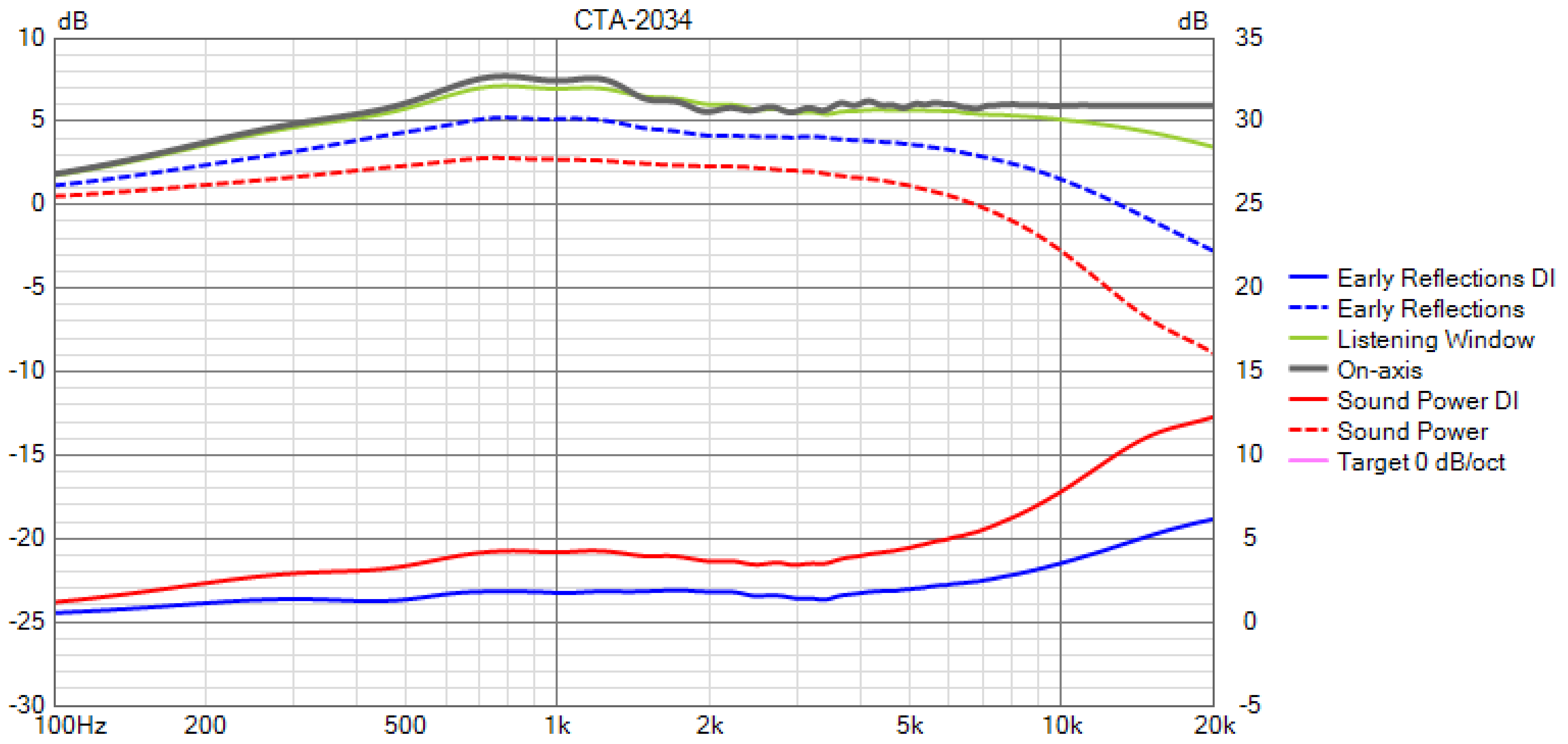
The amount of horizontal offset was adjusted from 0 mm to 120 mm. It was found that a relatively small offset of just 27 mm produced one of the best results.


Config 3
dB
deg
20Hz 50 100 200 500 1k 2k 5k 10k 20k
10 5 0 -5 -10 -15 -20 -25 -30
180 135 90 45 0 -45 -90 -135 -180
20 Hz
20000
View
202 642 mm
Crosshair
Snap 5 mm
Show phase
Baffle
Width 350 mm
Height 750 mm
Corners 4
Edge rad. 20 mm
Ideal edge
Open baffle
Drivers
Circular Rect.
Dd 30 mm
or Sd 7.069 cm2
Count 1
Step 75 mm
Axis
Distance 3000 mm
Angle Hor 0 deg
Angle Ver 0 deg
Reflection
Floor Y -50 mm
Wall X -1700 mm
Absorption 0.0 dB
Half space response
Full space
Directivity
Vertical plane
Negative angles
Step 10 deg
Feed speaker
New
Open
Save
Export
9°F
Snow
Search
5:31 PM
2/18/2025



Directivity (hor)
dB
deg
8
0
-8
-16
-24
-32
-40
-48
180
150
120
90
60
30
0
-30
-60
-90
-120
-150
-180
100Hz
200
500
1k
2k
5k
10k
20k

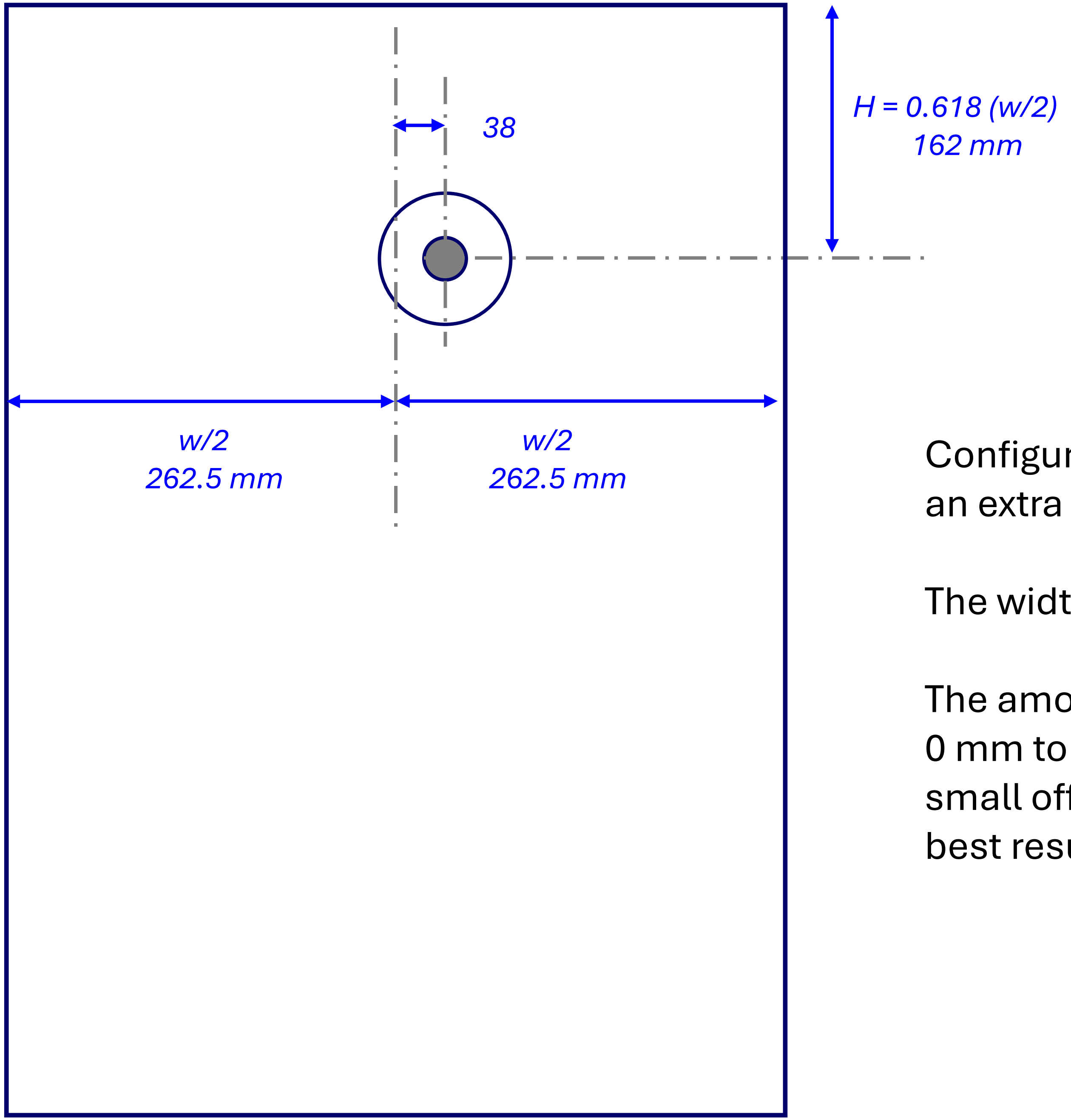
Config 3


CTA-2034
dB
dB
10
5
0
-5
-10
-15
-20
-25
-30
35
30
25
20
15
10
5
0
-5
100Hz
200
500
1k
2k
5k
10k
20k
Early Reflections DI
Early Reflections
Listening Window
On-axis
Sound Power DI
Sound Power
Target 0 dB/oct

Config 3

- **Configuration 3 Discussion**

- From 600 Hz to 1200 Hz, the +2 dB baffle gain remains
- The on-axis response is noticeably smoother and flatter
- Off axis response is slightly less ragged than Configuration 2
- Left and right polar responses are no longer symmetric
- The benefits of the softened edge remains
  - This is particularly noticeable on-axis, but the effect can be seen far off axis as well

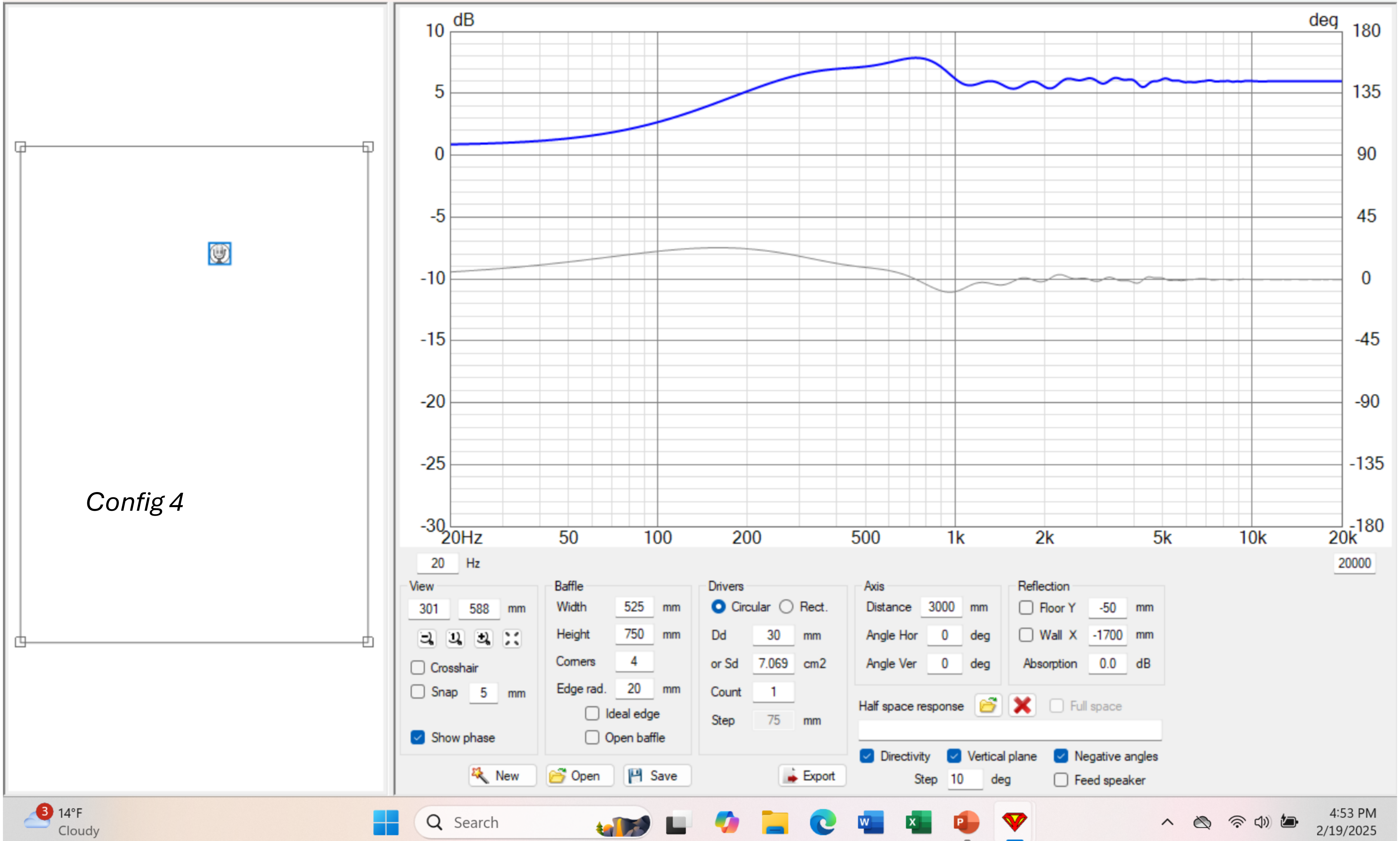


Configuration 4
750 mm x 525 mm
Edge radius = 20 mm
Tweeter horizontal offset 38 mm

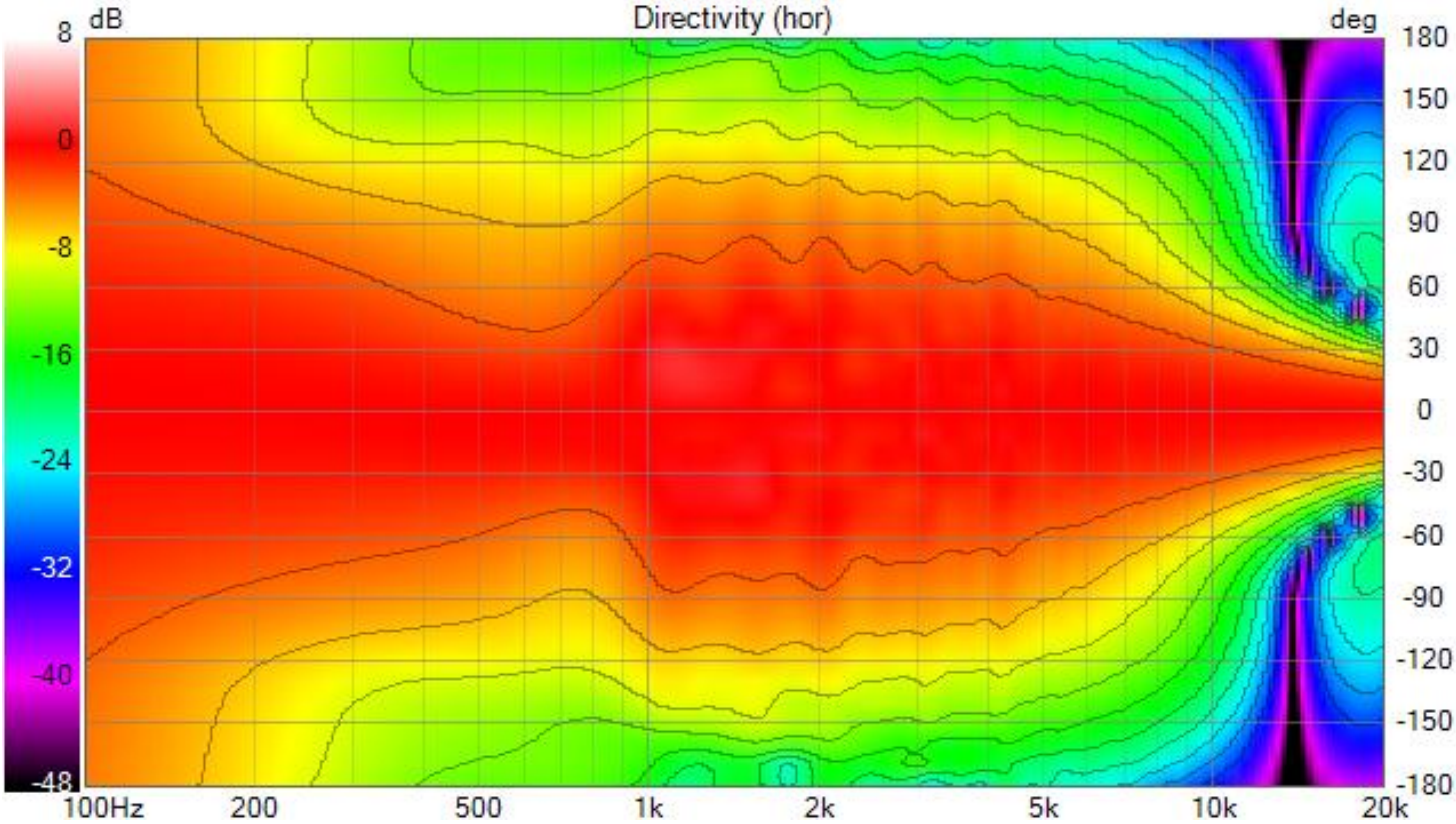
Configuration 4 explores the potential benefits of an extra wide baffle.

The width was increased 50% to 525 mm

The amount of horizontal offset was adjusted from 0 mm to 150 mm. It was found that a relatively small offset of just 38 mm produced one of the best results.

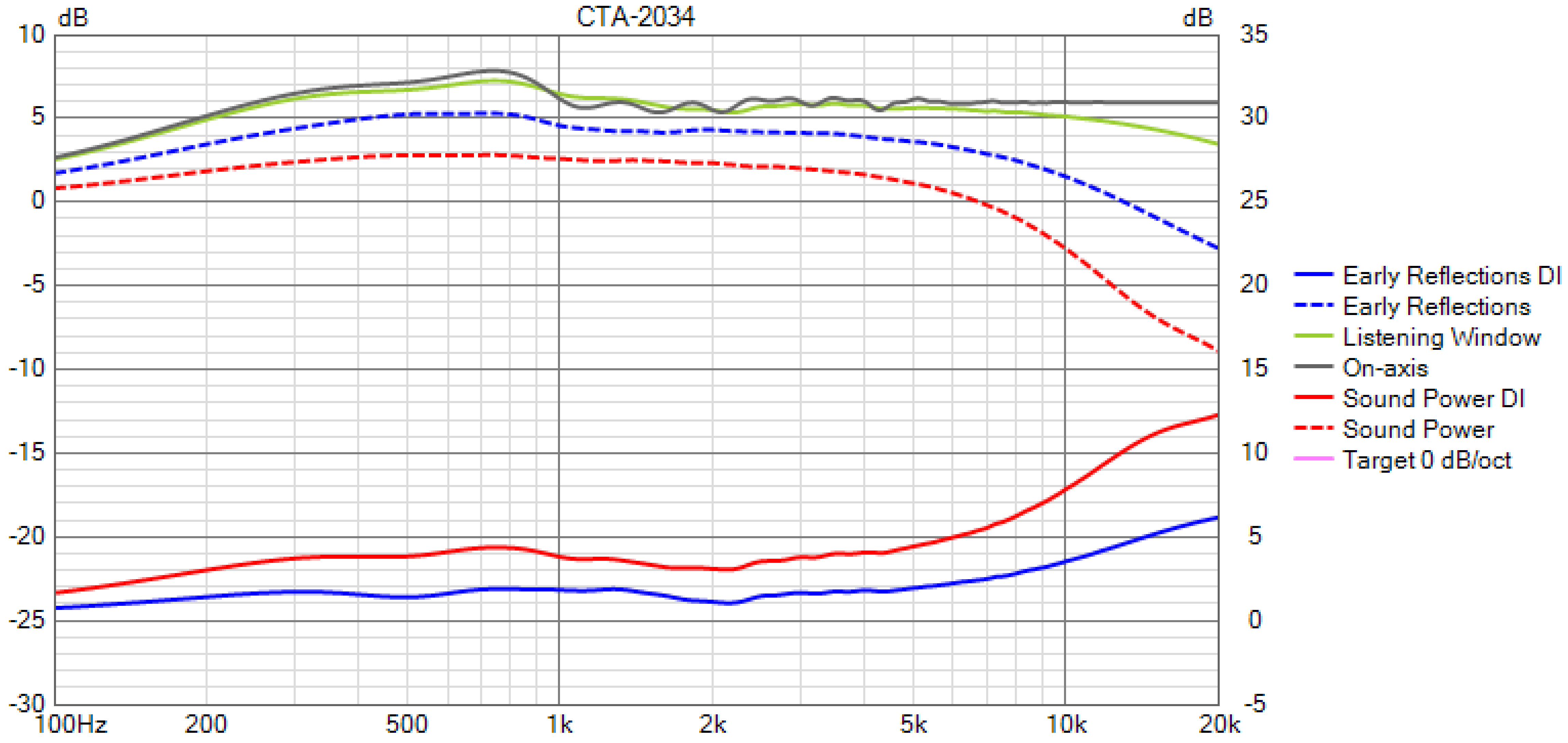


Config 4
dB
deg
10
5
0
-5
-10
-15
-20
-25
-30
180
135
90
45
0
-45
-90
-135
-180
20Hz
50
100
200
500
1k
2k
5k
10k
20k
20
Hz
20000
View
301
588
mm
Crosshair
Snap
5
mm
Show phase
Baffle
Width
525
mm
Height
750
mm
Corners
4
Edge rad.
20
mm
Ideal edge
Open baffle
Drivers
Circular
Rect.
Dd
30
mm
or Sd
7.069
cm2
Count
1
Step
75
mm
Axis
Distance
3000
mm
Angle Hor
0
deg
Angle Ver
0
deg
Reflection
Floor Y
-50
mm
Wall X
-1700
mm
Absorption
0.0
dB
Half space response
Full space
Directivity
Vertical plane
Negative angles
Step
10
deg
Feed speaker
New
Open
Save
Export
14°F
Cloudy
Search
4:53 PM
2/19/2025



Directivity (hor)
dB
deg
8
0
-8
-16
-24
-32
-40
-48
180
150
120
90
60
30
0
-30
-60
-90
-120
-150
-180
100Hz
200
500
1k
2k
5k
10k
20k

Config 4


CTA-2034
dB
dB
10
5
0
-5
-10
-15
-20
-25
-30
35
30
25
20
15
10
5
0
-5
100Hz
200
500
1k
2k
5k
10k
20k
Early Reflections DI
Early Reflections
Listening Window
On-axis
Sound Power DI
Sound Power
Target 0 dB/oct

Config 4

- **Configuration 4 Discussion**

- With the wider baffle, the +2 dB baffle gain is at 400 – 900 Hz
  - Baffle hump at a lower frequency compared to configurations 1 – 3
  - This would support a crossover frequency as low as 1.8k with good directivity control
- On and off axis response is fairly smooth
- Due to the offset, left and right horizontal polar response is not symmetric
- DI curve is not as flat as configuration 3, but the difference may be insignificant at the system level (i.e. with 3 drivers and a crossover)